Heating and cooling solutions from Alfa Laval

Everything you need for your HVAC application, 2012-2013

Alfa Laval Comfort mission statement

Alfa Laval's goal is to be the preferred brand for leading HVAC companies. We provide energy-saving heating & cooling solutions using compact heat exchangers as core technology.

Together with our partners, we do this in all buildings on all continents. By doing this, we help create a better standard of living.

To help you find the right product for your HVAC application we have developed this Heating and Application Handbook. It is also available as an App for tablets, in digital format on alfalaval.com/hvac and on our eBusiness portal.

Whichever format you choose to learn more about our products – we have made sure it is as easy as possible for you to find the information you are looking for.

Welcome to Alfa Laval

Chapter 1

Our mission

We optimize the performance of our customers' processes.

Time and time again.

Pure Performance

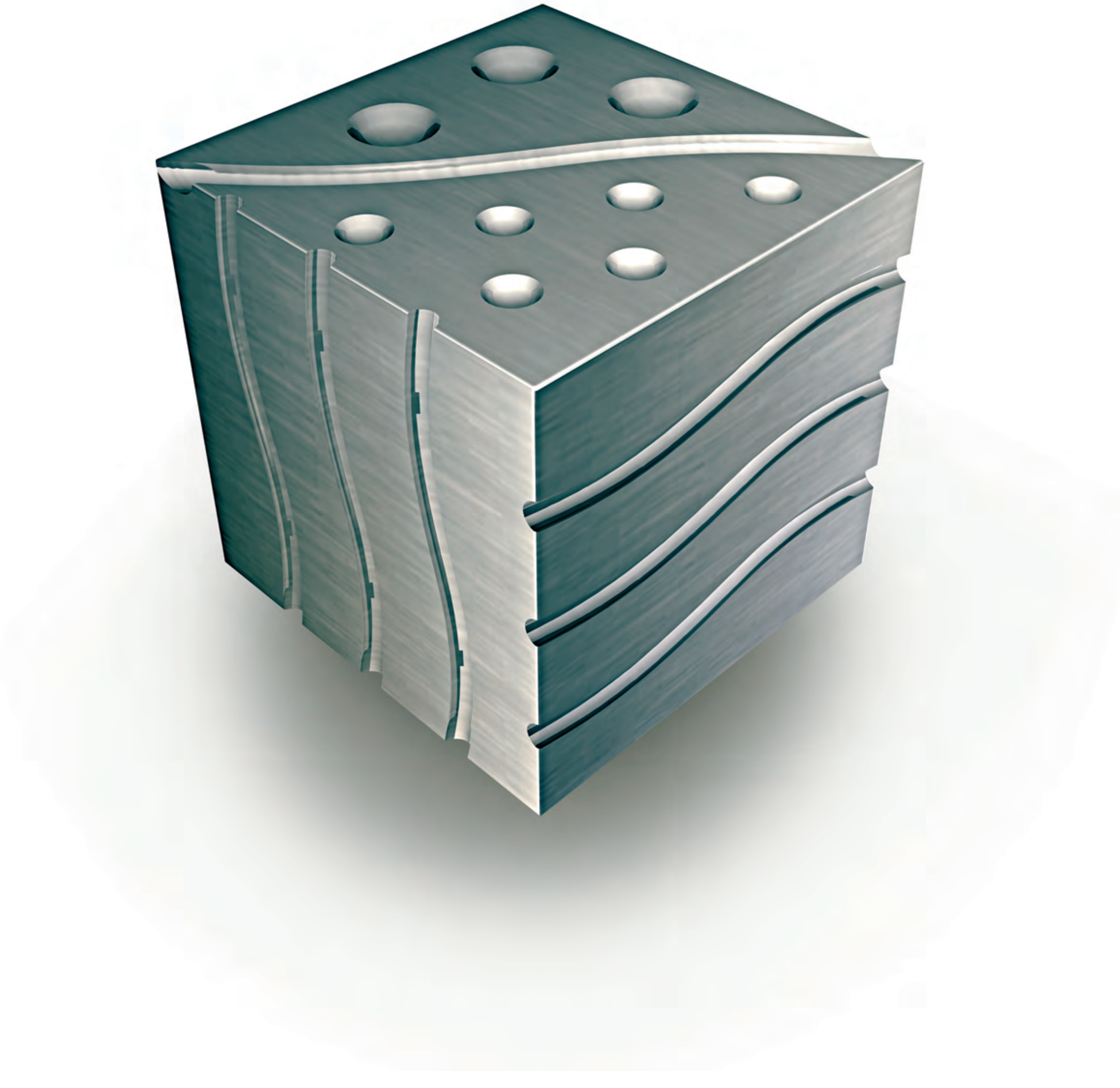
Alfa Laval focuses closely on offering its customers solutions that pay off.

This is clearly reflected in our mission:

To optimize the performance of our customers'processes. Time and time again.

This is a never-ending commitment. Every improvement we achieve creates a new platform for the next step on the improvement ladder.

Our aim is to stay in pole position at all times.



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High-tech performance

The Alfa Laval brand stands for technical expertise, reliable products, efficient service and the finest possible process-engineering skills.

Our reputation is based on our unique knowledge and experience in three key technologies:

- Separation
- Heat transfer
- Fluid handling

These are technologies that play major roles in most sectors of industry.

Our company

A global brand

Our equipment, systems and service are hard at work in more than 100 countries.
In 2011 Alfa Laval had 37 major production units and 99 service centres all over the world. The proximity to the market is vital to the company's success, for it is only by working closely with our customers that we can respond to their needs.

129 years young

The origin of the company dates back to 1883, when Gustaf de Laval founded Alfa Laval to exploit his pioneering invention of the centrifugal separator.
Gustav de Laval was a great technical genius who registered 92 patents in his lifetime. His innovative spirit has always been the guiding star for Alfa Laval and remains so to this day.

3.2 billion euros in sales

During 2011, Alfa Laval posted sales of 3.2 billion euros.
Europe is the biggest geographical market in terms of sales volume – roughly twice the size of both Asia and the American continent.

14,700 employees

Alfa Laval has nearly 14,700 highly qualified employees worldwide. Their basic mission is to assist industries of almost every kind to refine and improve their products and to optimise the performance of their processes. Thereby we help create better living conditions and a cleaner, safer environment for all mankind.

Ten customer segments

To create a clear focus on different types of customer, Alfa Laval's business is divided into ten segments.
Each segment is dedicated to working closely with specific customer groups. This gives us insight into their special needs and the power to develop the best possible solutions to fulfil them.

Technical leadership

Alfa Laval holds world-leading market positions in its fields of technical expertise.
Its success is based on an average investment of 2.5% of annual turnover in Research & Development.
The work of our almost 300 dedicated R&D specialists results in 35-40 new product releases every year.

Our key areas

Separation
Alfa Laval has led the development of separation technology since the company was formed in 1883. Today Alfa Laval is the world's largest supplier of separation technologies.

Heat transfer
Alfa Laval is the world leader in plate and spiral heat exchangers.
It also offers the market's most extensive range of refrigeration equipment.

Fluid handling
Alfa Laval produces flow equipment for industries requiring high standards of hygiene and reliable, continuous process flows.

Heat transfer

Plate heat exchangers
Alfa Laval has the most comprehensive range in the market for industrial, sanitary and heating applications.

Air heat exchangers, evaporators and condensers
Designed for refrigeration.

Shell-and-tube heat exchangers
An extensive range of heat exchangers dedicated to pharmaceutical, food and refrigeration applications.

Spiral heat exchangers
Tailored for viscous and particulate products that can cause severe fouling or corrosion.

Finned tube heat exchangers
Alfa Laval's range covers most types of refrigerants and most cooling applications.

Separation

High-speed separators
Primarily used for separating fluids and sludges containing up to 30% of solid particles.

Membrane filtration
Alfa Laval's wide range of filters covers reverse osmosis, nanofiltration, ultra-filtration and microfiltration.

Decanter centrifuges
For separating solids from liquids: a key function in countless industrial, food and treatment processes.

Fluid handling

Valves
Sanitary mixproof valves. Intelligent control equipment. For example:
Butterfly valves.
Seat valves.
Aseptic diaphragm valves.

Pumps
We cover every need for gentle, precision pumping of all kinds of fluids of all viscosities in sanitary applications.

Tank equipment
We offer the widest range of sanitary applications for the marine/offshore business – supplying everything except the tank itself.

Installation material
Our promise: You can always find the right installation material, in the right quantity, for the right application.

Focus on customer segments

Vegetable oils industry

Our equipment and systems produce tons of extra virgin olive oil every day.

Marine industry

More than half of the world's ships are equipped with Alfa Laval products and solutions.

Beverage industry

We manage the vital balance between flavour, food safety and manufacturing efficiency. Our equipment handles millions of litres of wine and beer every year.

Wastewater

Alfa Laval has unique knowledge in the increasingly critical areas of effluent treatment and recycling.

Energy

Alfa Laval is involved throughout the long process from the extraction of raw materials to the production and use of energy.

The process industries

Alfa Laval's equipment and solutions are critical for performing and optimizing many industrial processes.

Starch industry

More than half of the 60 million tons of starch produced in the world every year comes from our products and processes.

Pharmaceutical and biotech industry

We offer a wide range of products to satisfy the industry's exceptional demands for precision, safety and cleanliness.

Comfort/HVAC and refrigeration

Alfa Laval is a leader in climate control, providing an optimized balance of heating and cooling.

Food industry

Our equipment helps the food industry to turn quality raw materials into equally high-quality products.

Chapter 2

Heating and cooling solutions from Alfa Laval

The Alfa Laval Business Unit Comfort/ HVAC applies heat-transfer technology to heating and cooling systems, helping you to be more efficient in obtaining the ideal temperature in any area.

Customers in more than 60 countries have made Alfa Laval the world market leader in heat exchangers and thermal solutions. Over 60 years of dedicated research and development in the field of heat-exchanger solutions, together with field experience from some 500,000 heating installations around the world, are your assurance that we have the solutions you are looking for.

There are many different ways to achieve comfortable, economic climate control. That's why a thorough understanding of each individual situation, the available resources and the real needs is the first step towards success.

Global experience always near you

In a world of constant change, it can be comforting to know that some essentials will remain the same. One such essential is the local presence of Alfa Laval through our local sales companies and network of authorized distributors, who can meet all your needs and help you optimize your systems' performance.

Many of our customers are engaged in building a modern infrastructure based on proven, effective and sophisticated technology.

This calls for customized design to meet specifications that address local conditions and specific needs.

Others are expanding current plants or designing next generation systems. This means analyzing the application benefits that new technology has to offer, locating opportunities for even faster return on investment, ensuring lower than ever total cost of ownership, and reducing environmental impact. Globalization is an obligation – the obligation to adapt global experience to meet local needs.

Alfa Laval is fully equipped to meet any project requirements from day one with fast answers and timely suggestions for improvements. These are the success factors that lead to a rewarding, long-term customer supplier relationship.

Time is money: that's why it's easy to do business with us

Speed and simplicity are essential for us, because a company's leadership derives not just from the quality of its products, but also from its organization and the services it offers. This is why we provide our customers with all the tools they need to do business with us easily and efficiently. Contact our local representative to learn more about the latest available tools.

We know because we have been there

Alfa Laval customers always benefit from our first-hand experience in hundreds of projects in different countries and climates all over the world. You can access our experience through our global team of Alfa Laval experts and partners. Your Alfa Laval agent is just a phone call away, while contact details for all countries are continually updated on our website at www.alfalaval.com

Fast, timely delivery

Experienced planning means superior logistics. At Alfa Laval, we believe that deliveries should not merely be in time. They should be just in time in order to save money and storage space for our customers. This is one of our major strengths together with supplying and supporting the resources needed at each different stage of a project.

From a single product to the complexity of a power plant

Close collaboration with the customer and every one of his partners and advisors is essential. We contribute actively and constructively from the very first enquiry in order to assure you the best possible solution – whether you need a single product or a full-scale project.

Advanced design

Alfa Laval's extensive product development work has led to technologically advanced plates for heat exchangers that make it possible to adopt our "close approach" to energy efficiency. The optimized plate corrugation pattern not only increases heat transfer, but also reduces the risk of fouling thanks to highly turbulent flow. Plates are available in different materials and configurations to suit the customer's needs.

Alfa Laval's innovative heating and cooling systems are certified according to ISO 9001 and we have the possibility to control every component. As the interaction between all components is thoroughly tested, you can be sure to receive a reliable and cost-efficient system, ensuring lowest cost of ownership.

Leveraging local energy sources

The availability of local energy is an important cost parameter in designing a system. By using heat exchangers from Alfa Laval, you can choose one or several of a wide variety of energy sources in order to maximize economic benefits and minimize environmental impact.

Global expertise for local projects

District-heating system projects typically span a period of several year. These projects are complex processes that are often split up into several stages. Each of these starts with a pilot project, and is minutely documented as a basis for improvements and refining specifications for coming stages.

This meticulous process is even more critical when external financing and approvals need to be obtained.
At first it may seem daunting, but it is part of our global experience and everyday work.

Full documentation

We provide documentation and specifications for local authorities, consultants and contractors. We can customize throughout the project – down to the smallest details of three-dimensional drawings.

Innovative solutions

Alfa Laval pursues an active research and development policy at laboratories around the world. All Alfa Laval development projects are based on an analysis of the benefits of applying new technologies and the opportunities for even faster return on investment, reducing both the total operating cost and environmental impact.

We're closer than you think

Alfa Laval is represented in most countries by local sales companies, and a network of regional authorized distributors are responsible for serving our customers at all times. All of our authorized distributors and sales companies are able to perform dimensioning of heat exchangers based on application, heat load and available space, and to provide installation guidelines together with full pricing details.

We understand and meet your needs

There are many different ways to achieve comfortable, economic climate control. A thorough understanding of each individual situation, the available resources and the real needs is always the first step towards success.

Power and performance

Alfa Laval has a full range of products catering for every need, however large or small. We offer versatile, compact and easy-to-install products that ensure high efficiency and low maintenance costs. Alfa Laval is your assurance of reliable operation, unsurpassed operating life span, fast return on investment and low cost of ownership.

Chapter 3

Applications

In this chapter, we will illustrate a number of common applications of heat exchangers and heat-exchanger systems in HVAC installations.

The diagrams and other information provided are intended only to clarify the operating principle. Actual systems must thus be completed with the components and accessories envisaged by current regulations.

For a more tailor-made design, contact your local Alfa Laval representative, who will be happy to provide you with professional assistance in selecting the best heat exchanger or heat-exchanger system for the job (see contact details at www.alfalaval.com).

At www.alfalaval.com/HVAC you can check out our reference library and read about installations we have completed within all applications in different places all over the world.

District heating/Community heating

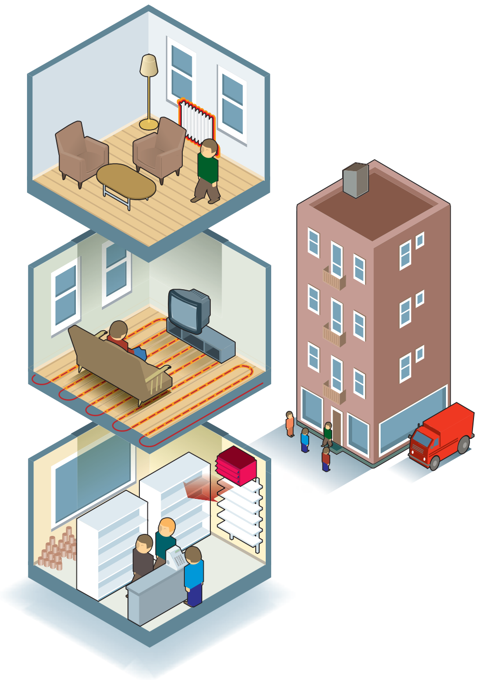
Space heating

Heating, in most cases, is a matter of providing a comfortable indoor environment, whether at home, at work or in a public facility. Heating can also involve tapwater heating, swimming pools, greenhouses etc.

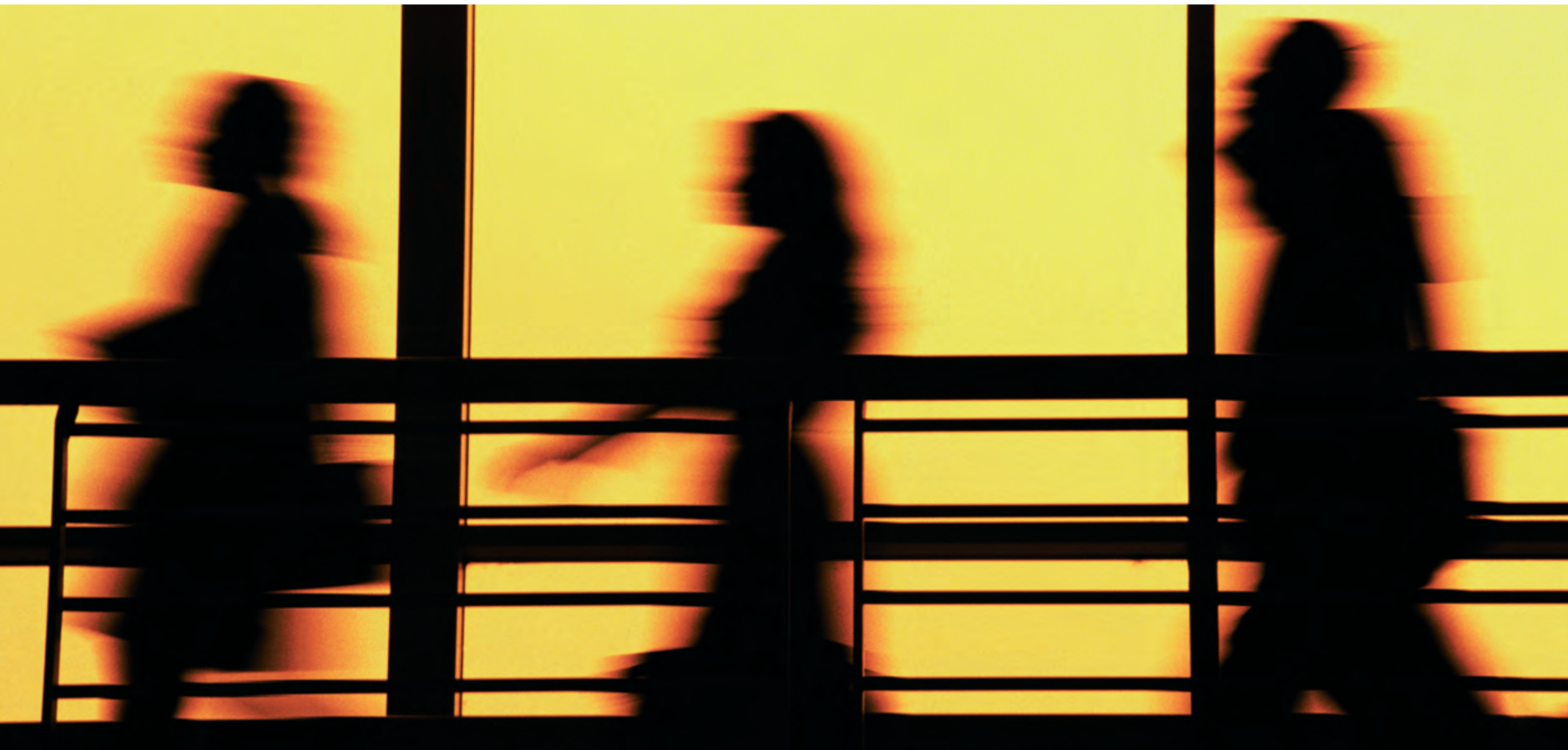
Space heating
The use of hot water for space heating is very common. The methods used to transfer energy from the water to a comfortable indoor environment vary. Using radiators is one common method.

An alternative to radiators is under-floor heating, where heat circuits are placed under the floor. The floor-heating circuit can be connected to the radiator circuit.

An air heater, blowing hot air into a room, is more commonly used in public buildings. Very often a combination is used, with for example radiators and floor heating, or radiators and air heaters via a separate mixing loop.



The objective of space heating is usually to achieve a comfortable indoor temperature. The heat can be transferred using radiators, floor heating or air heaters.



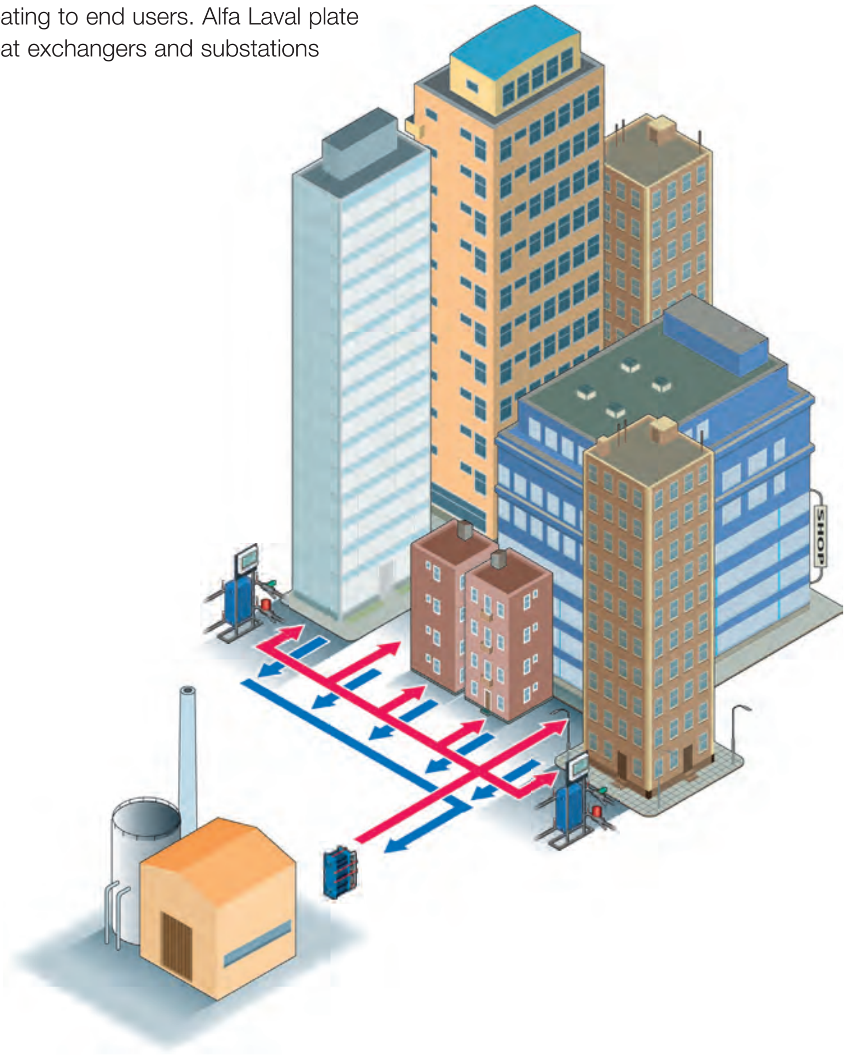
What is district and community heating?

District heating and community heating are environmentally friendly and energy-efficient methods of delivering hot tapwater and radiator heating. Heat generated in a central boiler plant is transferred to several buildings through pipes. A very wide range of energy sources, including combustion of oil, natural gas, biofuel or renewable energy, can provide the heat. A successful energy company will have 6-8 heating sources that they can combine and utilize according to their priorities – fuel cost, emissions, etc. The possibilities of using waste heat from industry, surplus heat from waste incineration, industrial processes and sewage, purpose-built heating plants or co-generation plants in district heating make it a flexible and energy-efficient choice. You can optimise costs as prices change, and maximize environmental protection.

For the consumer, district or community heating means a trouble-free way of receiving energy. The heating sources of a district or community heating system are more convenient and more efficient than small individual space-heating systems. Combustion techniques and exhaust cleaning will decrease the negative impact on the environment.

Plate heat exchangers and heat-exchanger systems, substations, play a major role in enabling efficient heat transfer between the two systems in order to deliver heated tap water and heating to end users. Alfa Laval plate heat exchangers and substations deliver the preferred solution in district- or community-heating systems throughout the world today.

Alfa Laval currently offers different types of plate heat exchangers and substations in district- and community-heating applications.

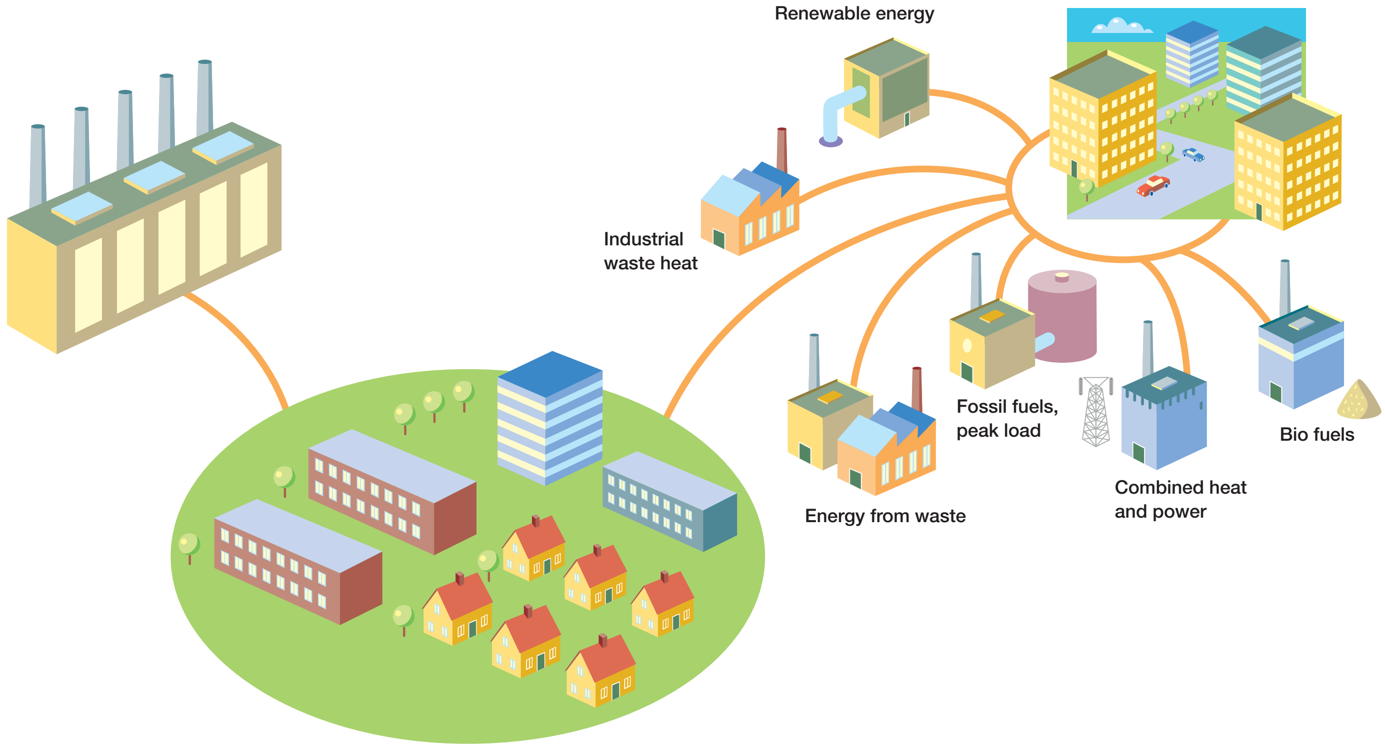


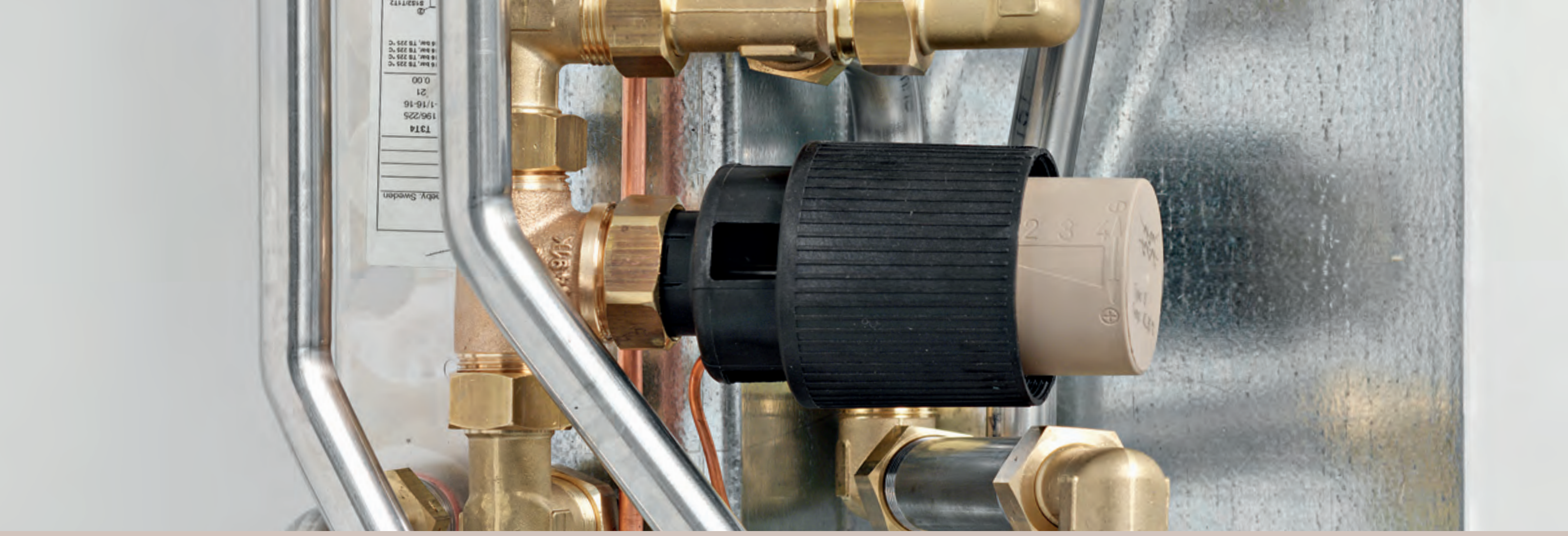
Community heating

Community heating is based on the same technology as a “standard” district-heating network but on a smaller scale. Even in networks consisting of a relatively small number of houses or apartments, the technology developed for district heating offers some obvious benefits. One central boiler will replace several of small boilers. Fuel from different local sources – e.g. industrial waste energy, garbage or solar – can be used.

In many cases, small-scale community heating networks can be integrated into more comprehensive district-heating networks, thus creating economies of scale while some of the initial investments in equipment are already taken.

Substations are the brain of the community-heating concept. The challenge is to achieve the ideal temperature while simultaneously reducing energy consumption and paying attention to environmental issues. During the last few years, compact and very efficient units have been developed specifically for small-scale applications. As metering can be set individually, residents are offered an incentive to save energy, while sensors adjust the indoor temperature in relation to temperature fluctuations outdoors.



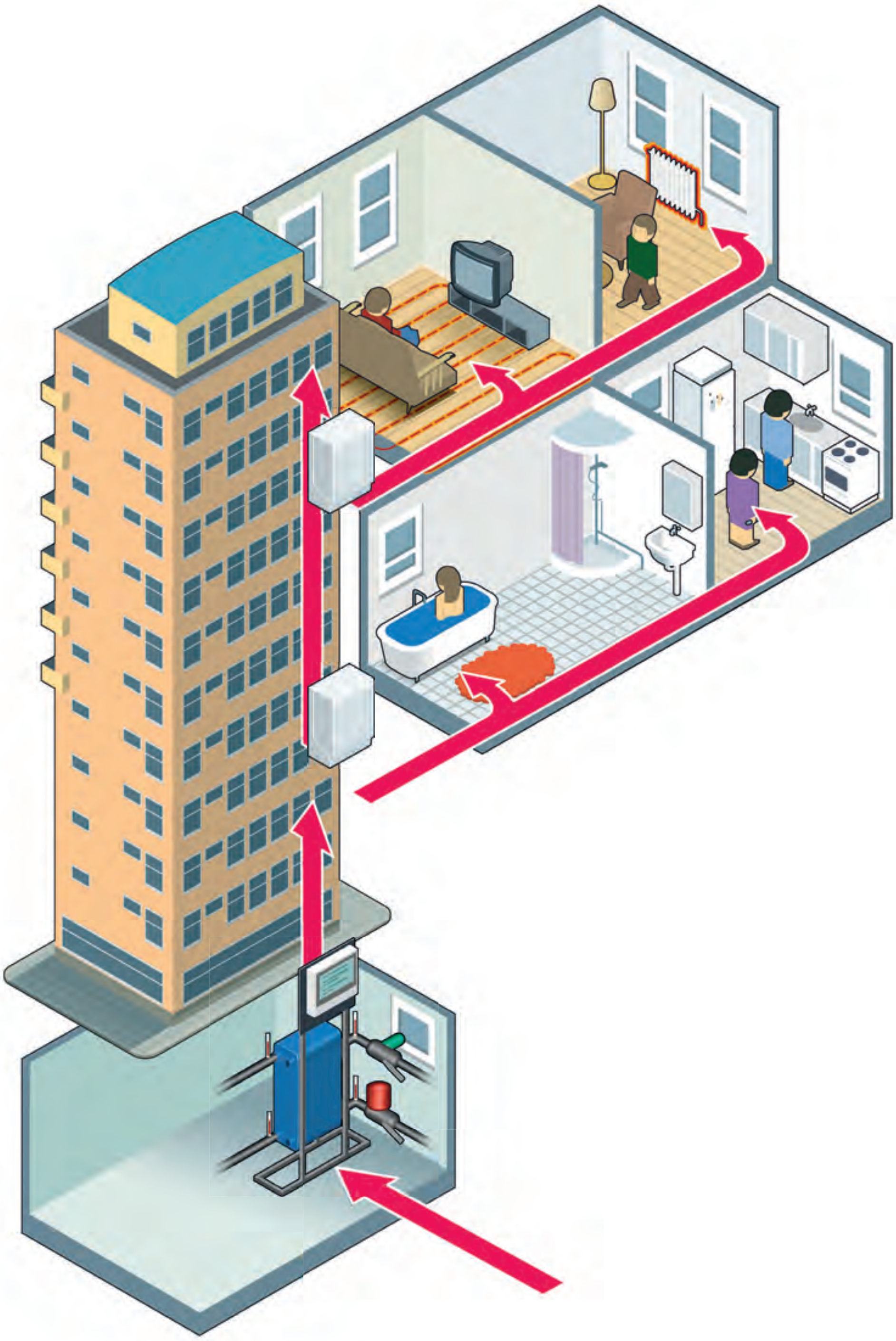


Energy savings in district/community heating

Today, the district- and community heating application is moving from "production-driven" towards "demand-driven". In a production-driven system the production plant regulates the volumes of heat delivered to residents. The residents have no technical means of regulating the heat reaching their apartments, as the system temperature can only be set at the heat source.

In a demand-driven system, each building is furnished with an individual substation equipped with a weather sensor. The sensor and control equipment adjust the supply temperature automatically, taking into account the specific heating needs of the building. Therefore, the substation will capture only the heat needed from the network. A refined regulation of the ambient temperature also means that the temperature gap between the supply and return temperatures can be expanded. As a result, pipe dimensions can be kept relatively small, thus cutting investment costs and pumping costs.

One substation in every building (even every apartment) has proven to provide the best result, enabling individual control and superior economy.



District and community heating must be viewed as a total system, and as all systems, it requires a holistic approach – optimising and working with the total system and not only focusing on parts. For district and community heating it is crucial to have products and components in the system that work together as well as separately in an optimal way.

Strategy

- Two pipe systems
- Eliminating leaking pipes and waste of water
- A substation in every building
- All buildings need its own metering
- Individual measuring of use of energy for every apartment
- Connecting small district- and community-heating networks to the main city networks
- Analysis of optional energy supply
- Individual building efficiency

Keeping waste heat from going to waste

In many companies and industries there are untapped sources of waste heat or surplus heat. Such heat can be found in many forms, whether it is steam going out into the air or hot water going out into the ocean. By utilizing the waste heat in district heating, the same fuel achieves twice the work, thereby doubling fuel efficiency.

Huge heat losses appear in power plants, oil refineries and industrial processes. Much of this heat could be retrieved and distributed by district heating systems to heat urban buildings. District-heating systems provide the necessary heat load for high-efficiency combined heat and power plants while at the same time, allowing the use of renewable energy.

Connection principles

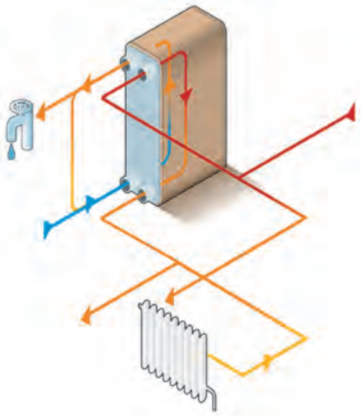
There are many different ways to connect district heating/community heating to buildings. The most common principles are:

1. Direct connection
2. Indirect parallel connection
3. Indirect two-step connection

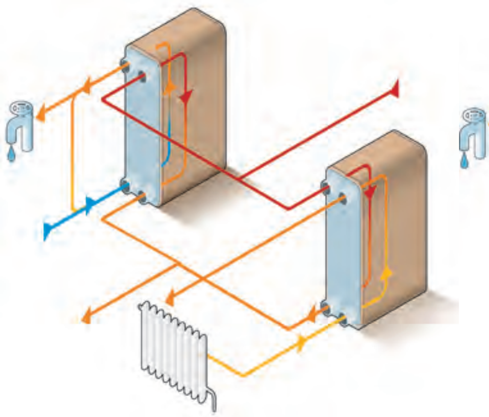
The direct-connection system includes a heat exchanger for the domestic tap water circuit but there is no heat exchanger between the heating network and the customer heating circuit. The same heating water is inside the secondary network (radiators, underfloor heating etc.).

The indirect parallel-connection system includes a heat exchanger for the domestic hot water circuit and a heat exchanger separating the district- or community-heating network from the customer heating circuit.

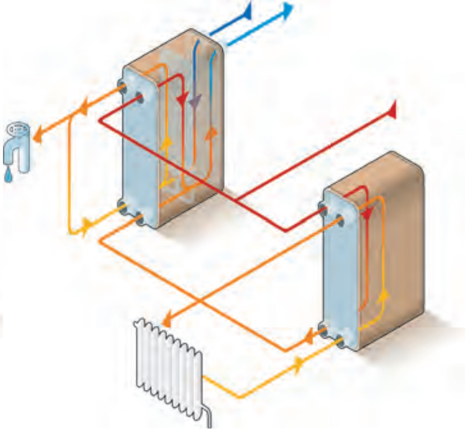
The indirect two-step connection includes a two-step heat exchanger for the domestic hot water circuit and a heat exchanger separating the district- or community-heating network from the customer heating circuit. The heating flow from space heating flows through the pre-heater of the domestic tap water exchanger and improves the total cooling of the district- or community heating system.



Direct connection



Indirect parallel system



Indirect two-step system

A direct connection system needs a differential pressure controller in order to decrease pressure on the secondary side and is recommended for low-pressure systems.

In the indirect parallel connection system, a differential pressure controller can be used in some cases.

The indirect two-step connection means maximum utilization of heat and a low return temperature during tap water consumption.

Environmental aspects

Combined Heat & Power (CHP) is a key technology for district and community heating. It will almost double fuel efficiency and at the same time reduce the need for additional heating sources. This reduces the impact on the climate and environment and increases the energy efficiency.

Wherever district or community heating is established, the surrounding environment benefits. One large plant has better combustion and cleaner emissions than many smaller plants.
District and community heating enables the utilization of waste heat from industries and garbage from both households and industries; energy that would otherwise be lost.

Large or small-scale district and community heating open up for using local fuels and switching between different heat sources, thus making renewable energy sources an attractive alternative.

Tap water heating

Hot tap water is a convenience and comfort that most people take for granted in modern society. For cleaning, washing and personal hygiene, we're used to turning a tap and getting as much hot water as we need – quickly and reliably. And we do use lots of it!

Close to 40% of all energy consumed by households in Europe goes to heating tap water. Hot tap water can be produced in a variety of ways, depending on the type of energy employed (electricity, gas, solar or other fuels) and the users needs. Essentially, tap water heating systems can be either instantaneous, without a storage tank, or semi-instantaneous, using a tank storage.

Which method is best for any particular application is determined by weighing the advantages and disadvantages of each solution. The main factors involved are:

- available capacity (kW) on site
- temperatures needed on the primary and secondary sides
- available energy on site
- available place in the boiler room
- local preferences and/or habits

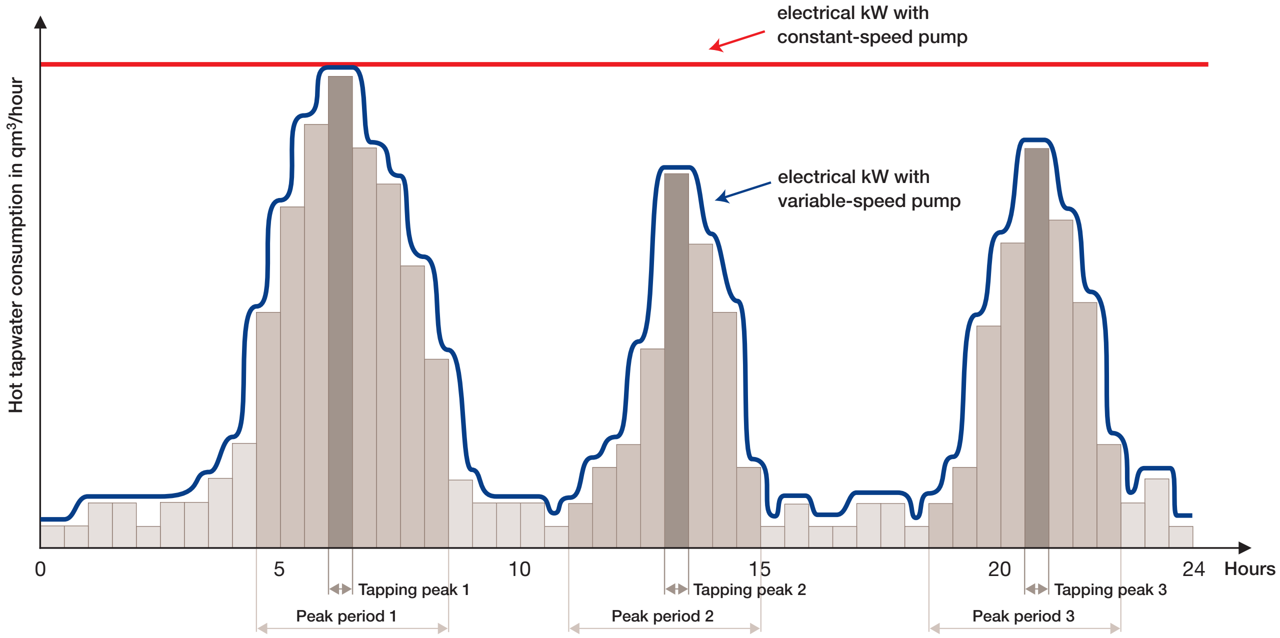
Instantaneous

Semi-instantaneous

Some of the key requirements that are considered in selecting a system are as follows:

Indicator	Benefits
Cost efficiency	Low up-front investment, operating and maintenance cost
Energy efficiency	Low energy consumption
Space efficiency	Using minimal floor and room space
Installation efficiency	Simple and quick to install, test and start up
Service efficiency	Easy to clean and maintain; long maintenance intervals with short service shut-downs
Comfort	No waiting for hot water; and appropriate temperature levels, no risk of scalding at the tap
Dependability	Hot water available at the right moment
Health	No build-up bacteria cultures
Sufficiency	Enough hot water even during peak-consumption hours

Tap water demand



Modern buildings are designed to consume less and less energy.
If building losses can thus be brought down to very low levels, the same cannot be said of domestic hot water production: it is not possible to reduce the heat needed to produce hot water significantly, as it depends on quantity and distribution characteristics.

In order to keep energy consumption low, it is thus essential to optimise the hot water production system, where tap-water systems from Alfa Laval play a fundamental role.

A tap-water system is much more than a heat exchanger; it combines the Alfa Laval know-how of heat exchangers with a perfect knowledge of quality material and professional skills in order to offer a complete ready-to-use hot-water system to the customer.

Alfa Laval offers:

- Instantaneous systems
- Semi-instantaneous systems
- Anti-legionella systems
- Multi functional electronic controlbox
- Choice of gasketed, brazed and fusion-bonded heat exchangers
- Choice of 2-port, 3-port and 4-port valves on the primary side

These systems are the best solution for anywhere where hot water is needed in large volumes in a short time:

- For any collective application:

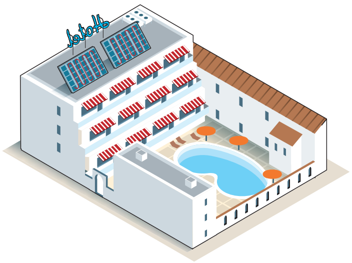
- Apartment blocks
- Hotels
- Hospitals
- Sports facilities
- Retirement homes
- Schools & universities
- Prisons

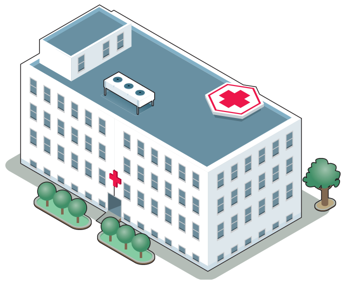
- For any heating source:

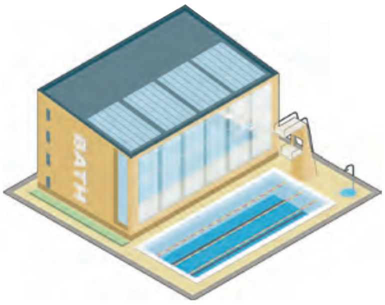
- Local boiler
- District heating
- Community heating
- Renewable energies

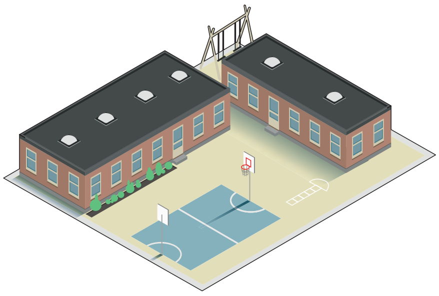
- For any functionality:

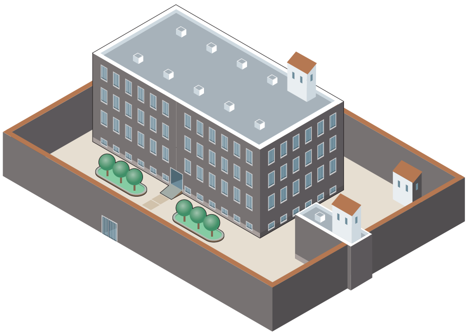
- Simple product range
- Standard product range
- Smart product range









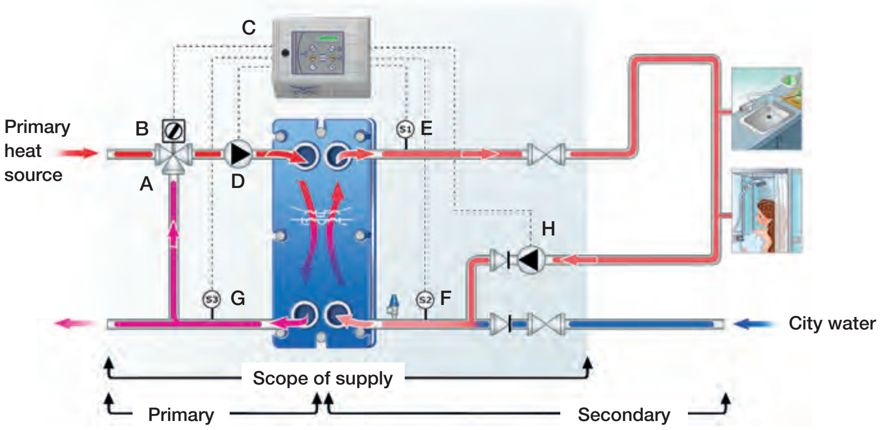


Instantaneous hot water production

An instantaneous tap water system heats the water at the moment it is needed by the user.
The working principle is very simple: connected to the hot water distribution pipe works, the heat exchanger provides controllable domestic hot water directly to the consumption taps in large volumes and at very fast pace. The primary side can be fed by different heating sources such as:

- A local boiler
- A district-heating system
- A community-heating system
- A system using renewable energy: solar, heat pumps etc.

Working principle instantaneous, 3-port valve



The system operates with a 2-, 3- or 4-port *control valve* on the primary side (A). The valve is connected to an *actuator (B)* and the *control box (C).*

The *temperature sensor S1(E)*, located at the secondary outlet, checks the temperature and adjusts the control valve accordingly, via the control box, in order to supply domestic hot water at the right temperature.

The *primary pump (D)* maintains a constant flow rate whereas the temperature entering the heat exchanger is continuously adapted to the demand detected at sensor S1(E).

This eliminates thermal shock in the plate heat exchanger and reduces the build-up of lime scale on the tap-water side.

Sensor S2 (F) indicates if circulating water has reached 70°C minimum for thermal treatment.
Sensor S3 (G) indicates a decrease of the heat-exchanger efficiency due to scaling.

The *circulation pump (H)* maintains a minimum flow rate through the entire network.

An instantaneous tap water system must be sized to cope with peak consumption which means that both the plate heat exchanger and the boiler capacity (or heating network) must be larger than for a semi-instantaneous system (see next section).

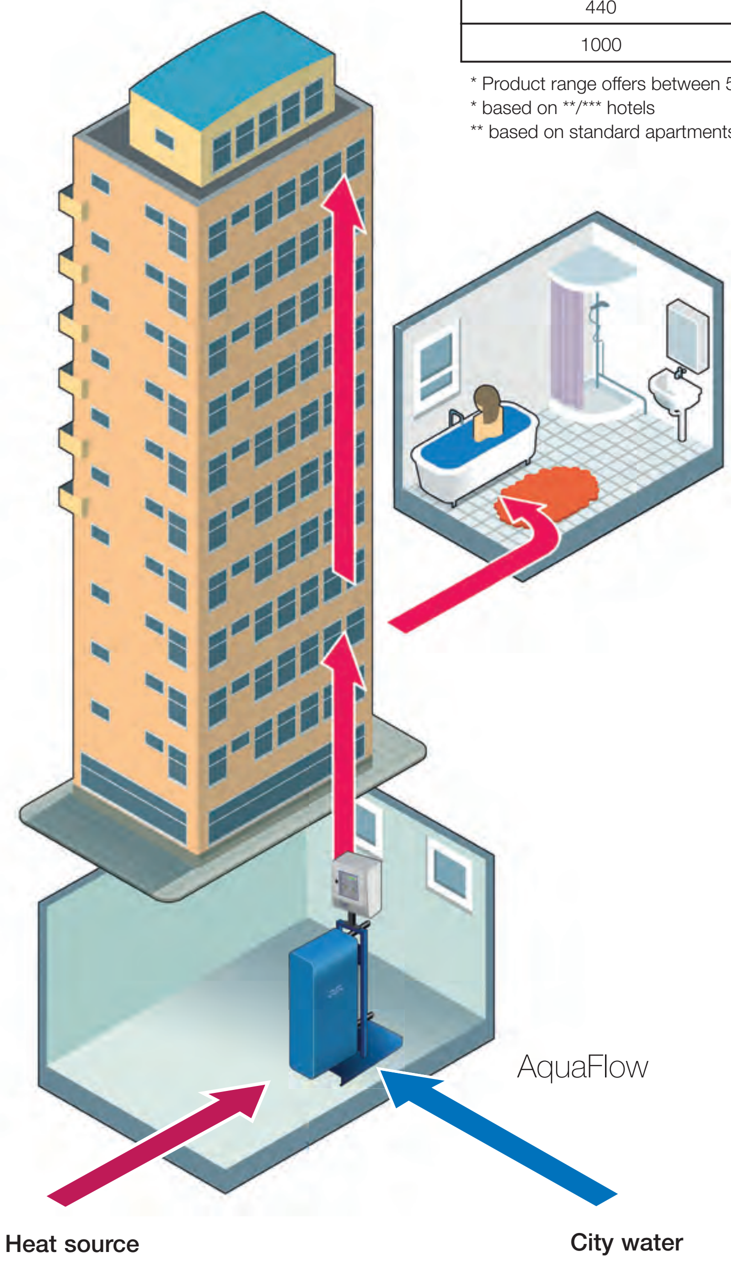
Advantages of an instantaneous tap water system:

- It is simple, reliable and easy to install (plug & play)
- It provides domestic hot water in large quantities, up to 1220kW, in a very short time
- It comfortably keeps up with peak consumption without having a tank on site; cost and space saving
- With no stagnant water, there is no less risk of legionella
- Limited lime scaling thanks to the mixing valve on the primary side and turbulent flow through the plate heat exchanger
- Extremely compact
- One instantaneous tap water system has the muscle to replace several storage tanks

Application examples for one single instantaneous tap water system:

Nominal capacity of the system (kW)*	number of hotel rooms**	number of apartments***
70	8	5
150	25	20
440	100	130
1000	320	500

* Product range offers between 50 and 1220kW
* based on **/*** hotels
** based on standard apartments of 3/4 rooms



Semi-instantaneous hot water production

In a semi-instantaneous tap-water system, the heated domestic hot water is stored in a buffer tank on the secondary side. The stored hot water is only used for peak periods when the domestic hot water demand is higher than the energy supply.
Contrary to instantaneous systems these systems can operate with a smaller boiler (or heating network).

The primary side can be fed by different heating sources:

- A local boiler
- A district-heating system
- A community-heating system
- A system using renewable energy: solar, heat pumps etc.

The system operates with a 2-, 3- or 4-port *control valve* on the primary side (A). The valve is connected to an *actuator (B)* and the *control box (C).*

The *temperature sensor S1(E),* located at the secondary outlet, checks the temperature and adjusts the control valve accordingly, via the control box, in order to supply domestic hot water at the right temperature.

The *primary pump (D)* maintains a constant flow rate whereas the temperature entering the heat exchanger is continuously adapted to the demand detected at sensor S1. This eliminates thermal shock in the plate heat exchanger and reduces the build-up of limescale on the tap-water side.

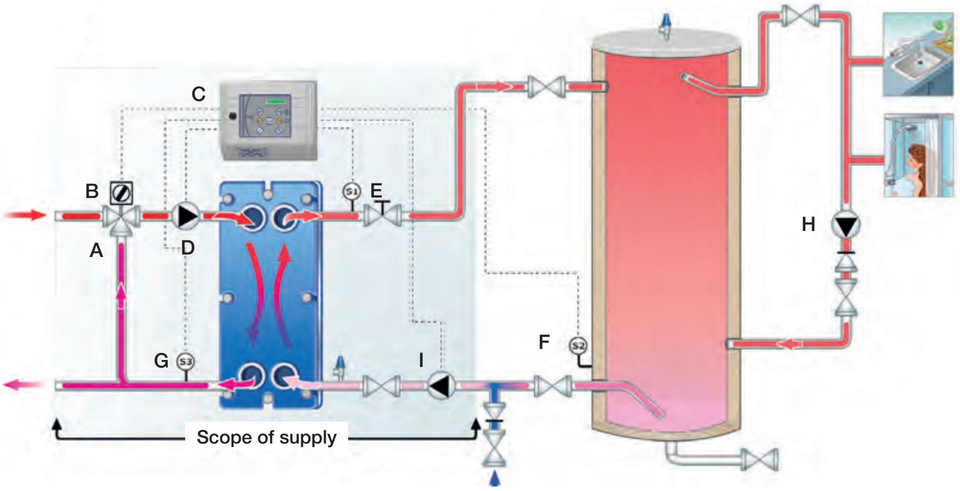
Sensor S2 (F) indicates if circulating water has reached 70°C minimum for thermal treatment.
Sensor S3 (G) indicates a decrease of the plate heat-exchanger efficiency due to scaling.

The *circulation pump (H)* maintains a minimum flow rate through the entire network.

The *charging pump (I)* on the secondary side is used to store hot water in the storage tank.
When there is no or limited tapping of domestic hot water, the storage vessel is gradually heated up to the set point temperature. When tapping occurs, hot water is being drawn from the top of the storage tank.

The only feature difference between an instantaneous and a semi-instantaneous tap water system is the charging pump (I) on the secondary side.

Working principle semi-instantaneous, 3-port valve



Advantages of a semi-instantaneous tap-water system:

- It is simple, reliable and easy to install (plug & play)
- Even where hot water demand is not constant, it comfortably keeps up with sudden peak consumption thanks to the buffer tank
- No need for a large boiler capacity on site
- No need for a very large heat exchanger
- Any combination of power output (50-1220kW) and tank size (150 to 4000L) is possible, thus providing large quantities of hot water
- To avoid legionella proliferation the semi-instantaneous systems are equipped with a thermal treatment function which raises the temperature to 70°C in order to kill the bacteria
- Limited lime scaling thanks to the mixing valve on the primary side and turbulent flow through the plate heat exchanger

Applications

Application examples for one single semi-instantaneous tap water system combined with one 300L storage tank:

Nominal capacity of the system (kW)*	number of hotel rooms**	number of apartments***
70	25	20
150	50	45
440	130	200
1000	350	620

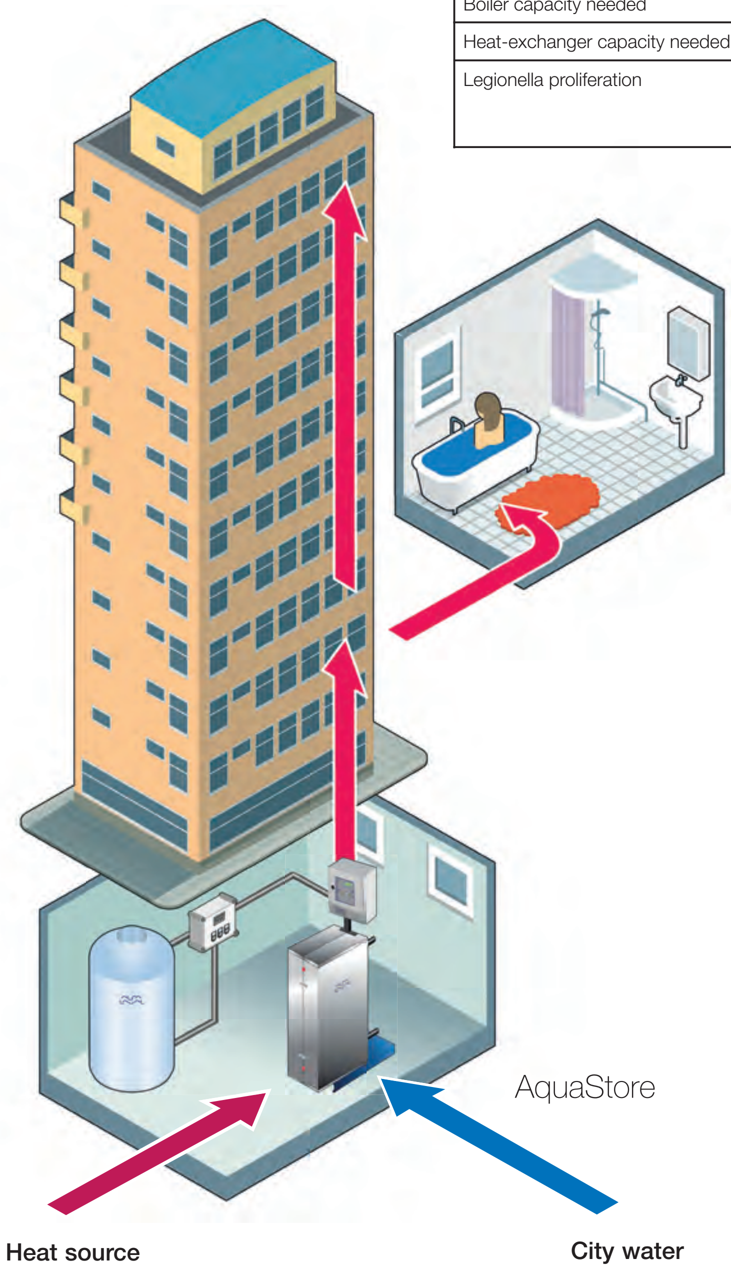
* Product range offers between 50 and 1220kW
** based on **/*** hotels
*** based on standard apartments of 3/4 rooms

Application examples for one single semi-instantaneous tap water system combined with one 2000L storage tank:

Nominal capacity of the system (kW)*	number of hotel rooms**	number of apartments***
150	100	120
440	320	430
1000	580	950

Comparison Instantaneous versus Semi-instantaneous

	Instantaneous	Semi-instantaneous
Features	No charging pump	One or two charging pumps
Tank needed	No	Yes
Boiler capacity needed	High	Mid to Low
Heat-exchanger capacity needed	High	Mid to Low
Legionella proliferation	No stagnant water, reduced risk, possibility for thermal treatment function	Stagnant water in tank but possibility for thermal treatment function

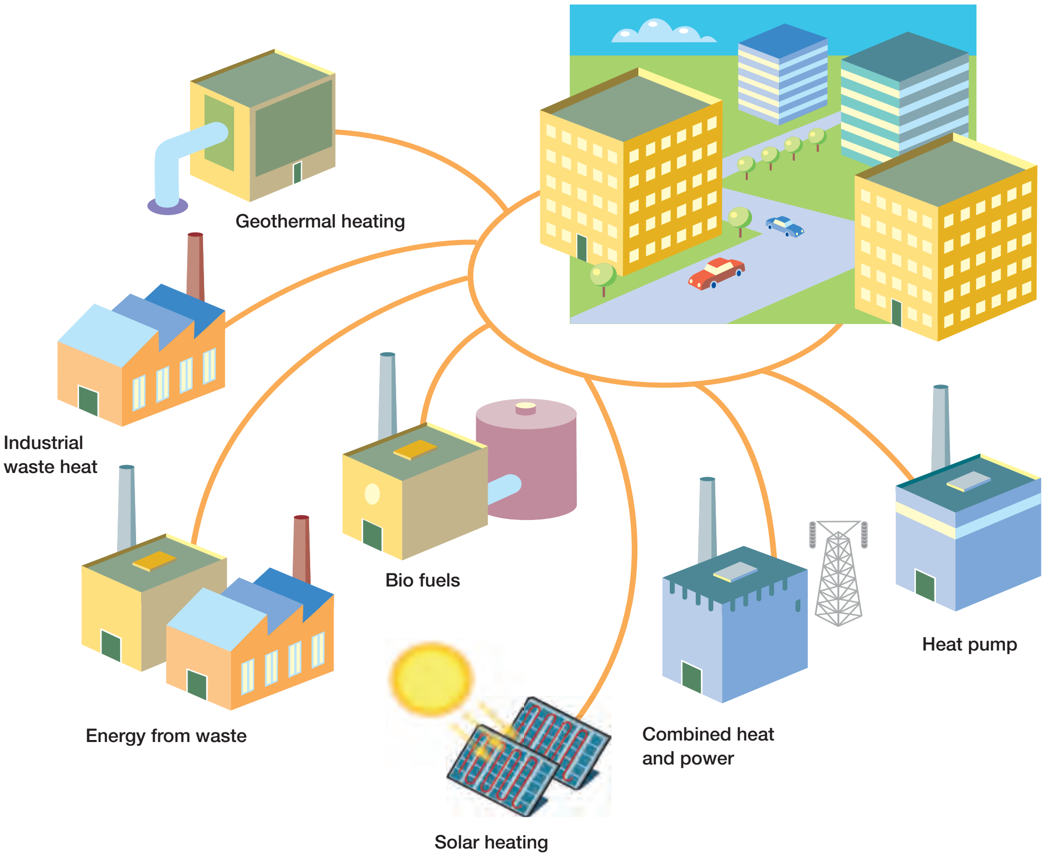


Renewable energies

The fact that reserves of fossil fuels (e.g. coal, petroleum and natural gas) are depleted much faster than they develop, and that CO_2 emissions need to be reduced, poses a giant challenge within multiple fields of technological evolution. Renewable energies represent a “technology of the future”, and Alfa Laval has developed solutions for heating systems based on alternative energies as heating sources.

A major characteristic of a modern district- and community-heating system is flexibility – also when it comes to fuels. Switching from one fuel to another can be done without adjustment or change of equipment in the houses or apartments of the subscribers. The preparedness for future changes of energy source is built into the system.

A district- or community-heating network can be integrated with local recycling energy sources, such as industrial waste, garbage and biomass. There is also a possibility to use geothermal or solar energy as an energy source.



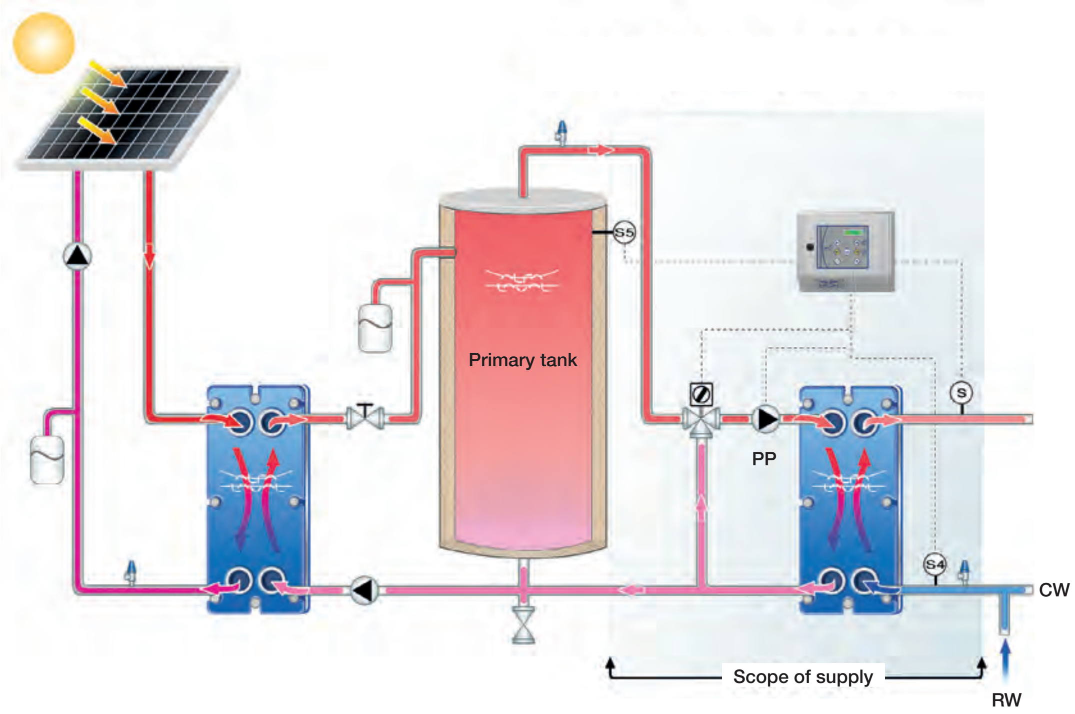
Solar heating

Transferring heat from solar collector panels is an ideal way of using the sun's energy. The sun's heat is absorbed on a flat surface, and then transferred to a fluid. The hot fluid can be used for heating domestic tap water and for radiator heating.

Solar heating is a renewable energy that works well as an alternative or supplement to other energy sources in a district-heating plant. During peak loads, or during seasons when the number of sunshine hours are not sufficient, other energy sources can be used as a complement.

It is advisable to separate the primary and secondary circuits with a plate heat exchanger and a heat exchanger system. For heating of domestic tap water, a storage tank can be used to cover the peak load demand. Alfa Laval offers suitable products for solar heating of both domestic tap water and radiators.

Working principle SolarFlow



Working principle
On the primary side, SolarFlow is connected to a primary tank that is heated by renewable energy.

A temperature sensor (S4) located at the secondary inlet checks the temperature of the water entering into SolarFlow.

The water can come from the water main (CW) or from the circulation loop (RC). This temperature is compared to the temperature checked by a sensor (S5) located on top of the primary tank.

Renewable energy vs. fossil
If water heated by renewable energy is available in the primary tank (S5>S4), then SolarFlow regulation is engaged.

A temperature sensor (S), located at the secondary side outlet, checks the temperature and adjusts the control valve (VA) accordingly in order to always maintain domestic hot water as close as possible to the set-point temperature.

If water heated by renewable energy is not available in the primary tank (S5<S4), SolarFlow goes to stand-by mode. The valve is closed, the pump (PP) is switched off and the energy consumption of SolarFlow equals zero. In that case, the tap water will have to be heated using different source of energy.

Economy mode
To generate further energy savings, SolarFlow can switch to an economy mode that will limit the electricity consumption of the pump when the network temperature is stable.

SolarFlow offers electronic control equipment that provides several user-definable functions to customize the system and ensure precise temperature control in order to reduce the build-up of limescale.

Geothermal heating

Geothermic is the science that studies the earth's heat. The earth´s heat content (enthalpy) is 10^{31} Joule and the energy the earth sends out in the atmosphere is double that what we consume. Today we only use a small fraction (0,07%) of the available geothermal energy available. A great untapped resource is at our disposal.

By using heat from geothermal water we have a cheap and environmentally friendly method for heat generation.

The ground is an inexhaustible source of heat and the seasonal variations in the soil temperature is reduced as depth increases.

At depths of 15 to 18 meters, the ground's temperature will remain absolutely constant year round at 9-12 °C. As we go deeper, the temperature will not only remain constant, but will increase by an average of 3 °C every 100 meters.

Geothermal heat is used in two major areas of application:

- Direct use of geothermal energy, involving geological anomalies or volcanic activity that provide a source of steam (which can be used to produce electricity) or hot water for heating buildings and tap water
- Low enthalpy geothermal energy, where the subsoil or ground water is used as a thermal reservoir in combination with heat pumps.

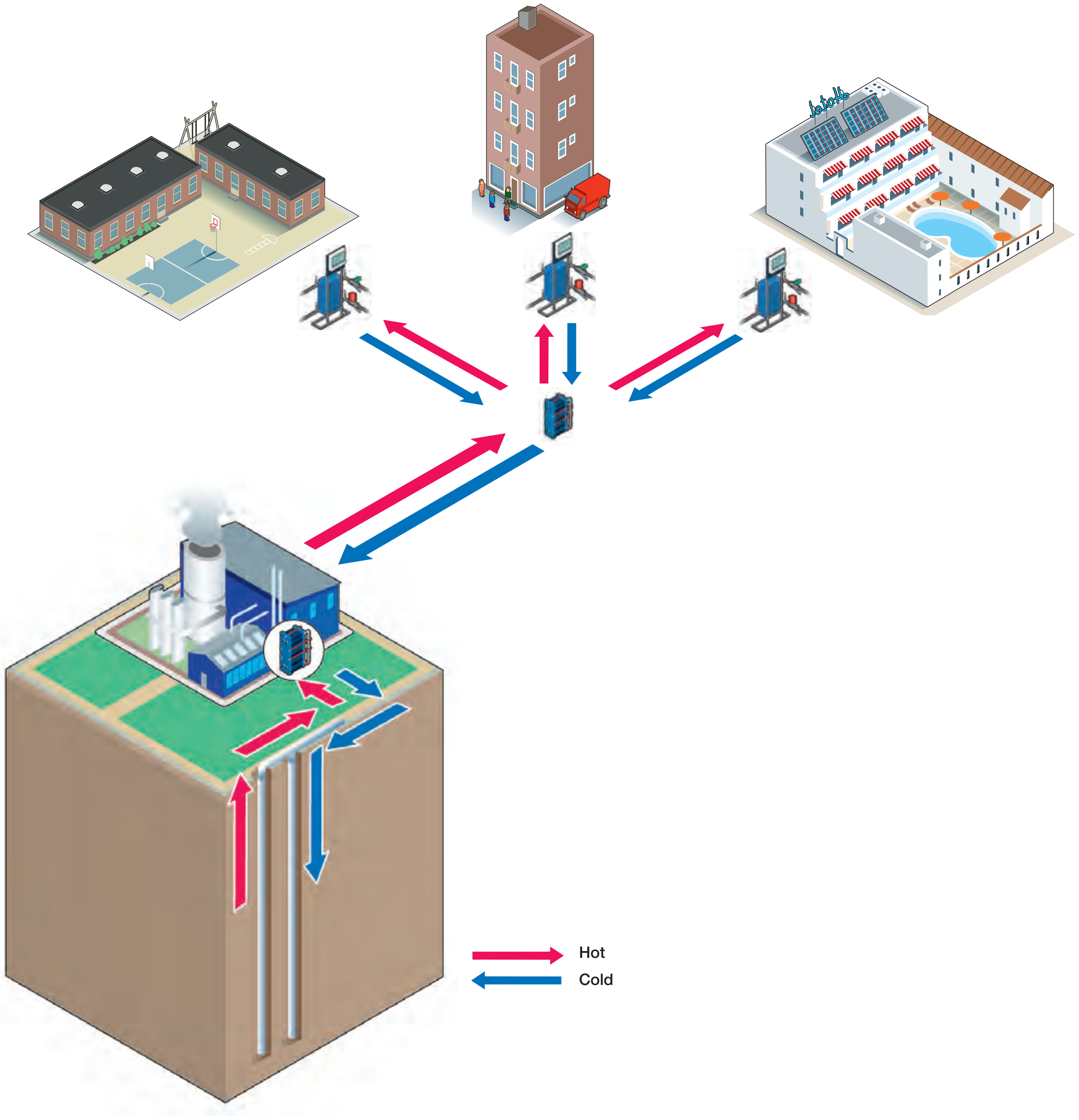
Especially in the low enthalpy geothermal energy, growth has been spurred by the availability of increasingly efficient heat pumps. With current technologies, using heat pumps is very safe and requires no additional energy from other sources (e.g. natural gas boilers) to cover consumption peaks or situations where performance is reduced.

Since the geothermal water often contains chemicals and solid particles aggressive to the plate it is important to select suitable plate materials for the main heat exchanger. Titanium or SMO are often used because of high content of calcium. Gasketed plate heat exchangers are often the preferred solution due to good serviceability, maximum heat transfer, high capacities and possibilities to increase or decrease the capacity.

The supply of geothermal heat is the same as district and community heating; it is only the heat source that differs.

Typical end users of geothermal heat are single and multi-family houses often using a heat exchanger system.

Other common applications using geothermal heat are fish farms, green houses, thermal spas and industrial applications.



Other heating applications

Steam heating

Steam has been used as a carrier of heat since the Industrial Revolution and continues to be a modern, flexible and versatile tool wherever heating is needed. It is produced by the evaporation of water; a relatively inexpensive and plentiful commodity that is environmentally friendly. Its temperature can be adjusted very accurately by the control of its pressure and it carries a large amount of energy in a small mass.

Steam is commonly used in HVAC applications as the primary heat source, heating water in the secondary circuit:

- Heat generation: Boiler plants, Combined heat and power plants
- Heat usage: Tap water heating, space heating and maintaining temperature in tanks/pools.

Some industries use a lot of steam in their processes. Surplus steam may be used for space heating and tap water heating locally, or sold for use in district- and community-heating systems.

Alfa Laval can offer different types of equipment for steam duties:

Gasketed plate heat exchangers
It is usually the temperature performance of the gaskets that sets the limits of its use. Their elastic mechanical design makes them resistant to pressure pulsation and thermal fatigue. Alfa Laval has developed a range of steam plate heat exchangers, the TS-M Series, for heating water with industrial steam

All-welded plate heat exchangers
In the all-welded heat exchanger, the gaskets have been replaced by laser-welds. This raises the performance limits considerably and makes it a very good choice for large capacities, high pressures and high temperatures.

Tubular heat exchanger
The tubular heat exchanger, Cetecoil, is well suited in steam systems due to flexibility in connections and low pressure drops on the shell side, as well as high temperature performance.

Swimming-pool heating

Using plate heat exchangers to heat swimming pools has become common practice because of its unquestioned thermodynamic advantages and low cost compared to conventional shell-and-tube heat exchangers.

At heat transfer level, the problem is maintaining temperatures steady. Accordingly, it is important that the heat exchanger be dimensioned as suggested in our selection tables.

It's important to remember that additions of chlorine should take place after the water has passed the heat exchanger to avoid a high concentration of chlorine flowing through the exchanger from coming into contact with the plates and causing cracking.

Alfa Laval offers a compact system for reheating and maintaining the temperature of water in swimming pools of any dimension – the AquaPool.

The AquaPool can be connected to any primary heat source, such as a local boiler, a solar installation, a heat pump etc.

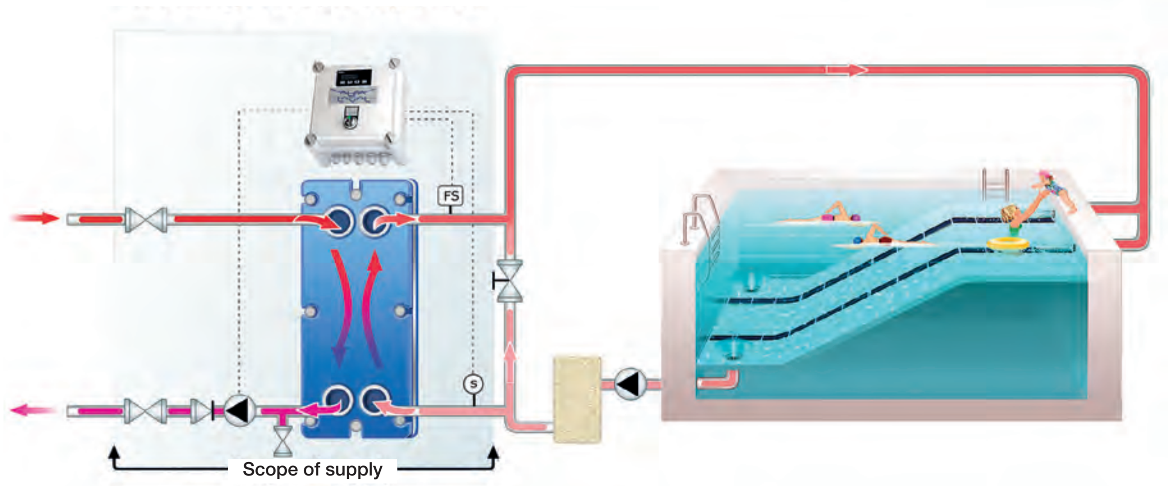
The AquaPool system consists of a gasketed plate heat exchanger, with plates in either stainless steel or titanium, an electronic control panel, a primary pump and various valves.

The AquaPool is extremely simple to use, robust, compact and highly reliable.

3 key parameters for the right AquaPool selection:

1. Volume of the swimming pool
2. Temperature rises necessary
3. Time required to heat up the pool

Working principle AquaPool



AquaPool selection tables

Model	90°C					80°C					70°C					55 °C				
	kW	Primary		Swim. pool		kW	Primary		Swim. pool		kW	Primary		Swim. pool		kW	Primary		Swim. pool	
		m^3/h	kPa	m^3/h	kPa		m^3/h	kPa	m^3/h	kPa		m^3/h	kPa	m^3/h	kPa		m^3/h	kPa	m^3/h	kPa
AquaPool-7	30	0,5	44	1,3	41	30	0,9	24	1,3	41	30	1,2	6	1,3	41	17	1,2	6	0,7	18
AquaPool-11	52	0,9	41	2,2	43	51	1,4	25	2,2	41	50	1,8	5	2,2	41	30	1,8	5	1,3	19
AquaPool-17	82	1,3	36	3,5	43	79	1,9	19	3,4	40	76	2,5	6	3,3	38	46	2,5	6	2	18
AquaPool-23	111	1,7	30	4,8	43	104	2,3	18	4,5	38	96	2,9	6	4,1	33	58	2,9	6	2,5	16
AquaPool-29	140	2,2	26	6,0	43	125	2,7	18	5,4	34	111	3,2	6	4,8	28	69	3,2	6	3	14
AquaPool-35	166	2,6	22	7,1	42	144	3,0	15	6,2	32	123	3,5	5	5,3	27	78	3,5	5	3,4	12
AquaPool-41	194	3,1	16	8,3	42	164	3,4	11	7,1	30	134	3,6	6	5,8	21	84	3,6	6	3,6	11
AquaPool-49	222	3,5	11	9,5	41	184	3,6	11	7,9	28	146	3,8	5	6,3	19	96	3,8	5	4,1	9
AquaPool-55	246	3,8	5	10,6	41	199	3,8	5	8,6	27	151	3,8	5	6,5	16					

Note: Secondary conditions: 27/47°C (if primary at 70°C, 80°C or 90°C)
20/40°C (if primary at 55°C)

Waste heat recovery

For many energy companies and municipalities there are untapped opportunities for using waste heat or surplus heat. Such heat can be found in many forms, whether it is steam going out into the air or hot water going out into the ocean.

A lot of heat is lost in power plants, oil refineries and industrial processes. Many of these losses could be retrieved and distributed by district-heating systems to heat buildings. The same fuel achieves twice the work, thereby doubling fuel efficiency.

District-heating systems provide the necessary heat load for high-efficiency combined heat and power plants, while at the same time enabling the use of renewable energy. It demonstrates fantastic opportunities for other communities from a financial as well as an environmental point of view.

A residential building in Belgium, heated by surplus energy from a waste incineration facility.

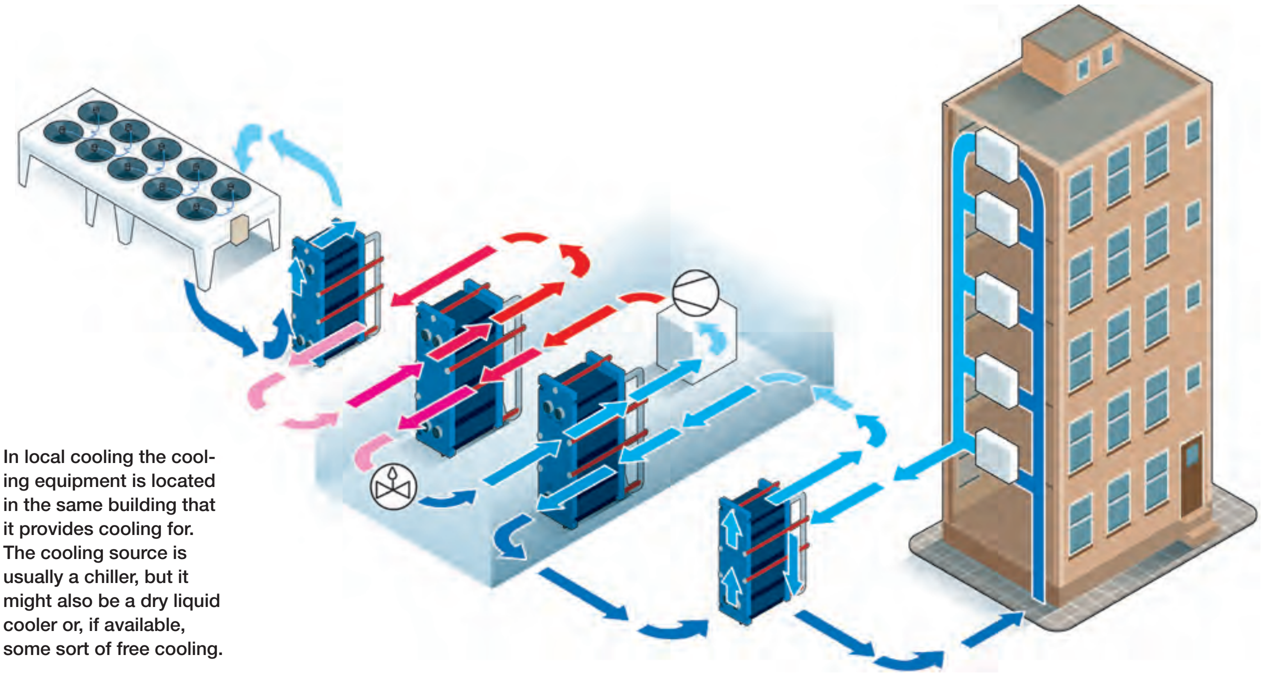
Local and district cooling

Local cooling

Local cooling is the most common cooling system globally. The local cooling system provides cooling for a single building, for example a hotel, conference center, sports center, hospital, or an office block. The chiller plant and the storage facility are located inside each building, the cooling source usually being a chiller. Depending on availability some sort of free cooling might be used, alone or in combination with the chiller. The cold from the source water is transferred to the building's internal cooling system through a plate heat exchanger.

OLA (Optimization Liquid Air), Alfa Laval's new special software, will let you calculate an optimized combination of two heat exchangers, for example a dry liquid cooler and a plate heat exchanger. This optimized package will make your system work at just the right capacity. A fine-tuned system will run smoother and minimize maintenance. It will also enable you to choose the most economical cooling source solution for each season, for example free cooling in the wintertime.

Another application is installing plate heat exchangers at different stories in tall buildings to solve the cooling system's pressure problems. These heat exchangers act as pressure interceptors, transferring the cold between the separate zones, and also protecting the air handling units and other equipment from excessive pressure.



In local cooling the cooling equipment is located in the same building that it provides cooling for. The cooling source is usually a chiller, but it might also be a dry liquid cooler or, if available, some sort of free cooling.

District cooling

The concept of district cooling is becoming more and more widespread all over the world. The idea, as for district heating, is to use one central source instead of local systems for each building. This will create both economic and environmental benefits.

The district-cooling system offers operating flexibility, since each building can use as much or as little cooling as needed, without worrying about chiller size or capacity. The installation will be very comfortable and convenient for the customer, with the possibility of using the same supplier for electricity, heating and cooling. The installation of a district cooling system is greatly facilitated if combined with an existing district-heating system, or one built at the same time, since the costs can be shared between the two systems.

One of the benefits for the customer is the saving of space at the location as there is no chiller. The investment cost will also be less than when having to invest in a chiller. There will be no need to re-place chiller, cooling towers or pumps due to wear or CFC/HCFC phase-out, as the CFC/HCFC handling problem will be taken care of. With centrally produced comfort cooling there will be no noise or vibrations. Maintenance and running costs will be lower, and a better level of equipment redundancy and round-the-clock expert management, which individual buildings cannot match, will be achieved.

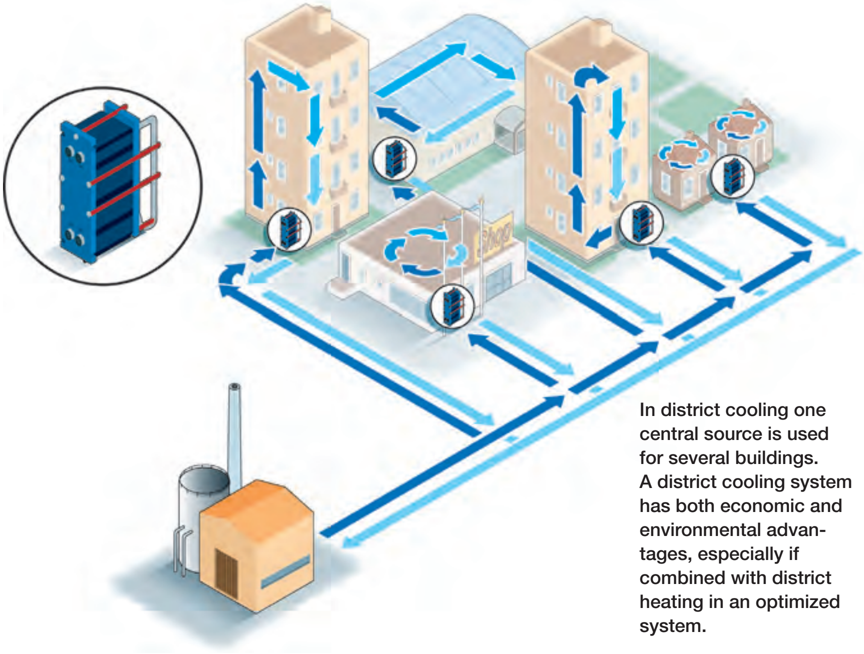
Direct and indirect cooling systems

In cooling systems the distribution can be either direct or indirect. If direct, the cooling water goes directly into the internal piping system of a building. In an indirect system, a heat exchanger separates the internal from the external system. Today this is the most common system, and the indirect system provides several benefits.

Leakage will be easier to detect, and if it does occur, will create minimum damage. There is no risk of one system contaminating another. In a district cooling system the responsibility line will be clearer, and the regulation and sales are easier to monitor with clear borders. With separate circuits the customers may experience fewer fluctuations and disturbances, should the central system expand or need maintenance.

In an indirect system the heat exchanger will also decrease the static pressure, thus working as a pressure interceptor. Noise from valves can be eliminated when the pressure in the pipes is decreased. In the indirect system solution the dimensions of the consumer's in-home system will be smaller, and thus cheaper.

Installing Alfa Laval plate heat exchangers in an indirect cooling system ensures minimal energy loss throughout the system. Alfa Laval's "close approach" enables temperature exchange approaches of no more than 0.5°C/<0.9°F.



In district cooling one central source is used for several buildings. A district cooling system has both economic and environmental advantages, especially if combined with district heating in an optimized system.

Pressure interceptor

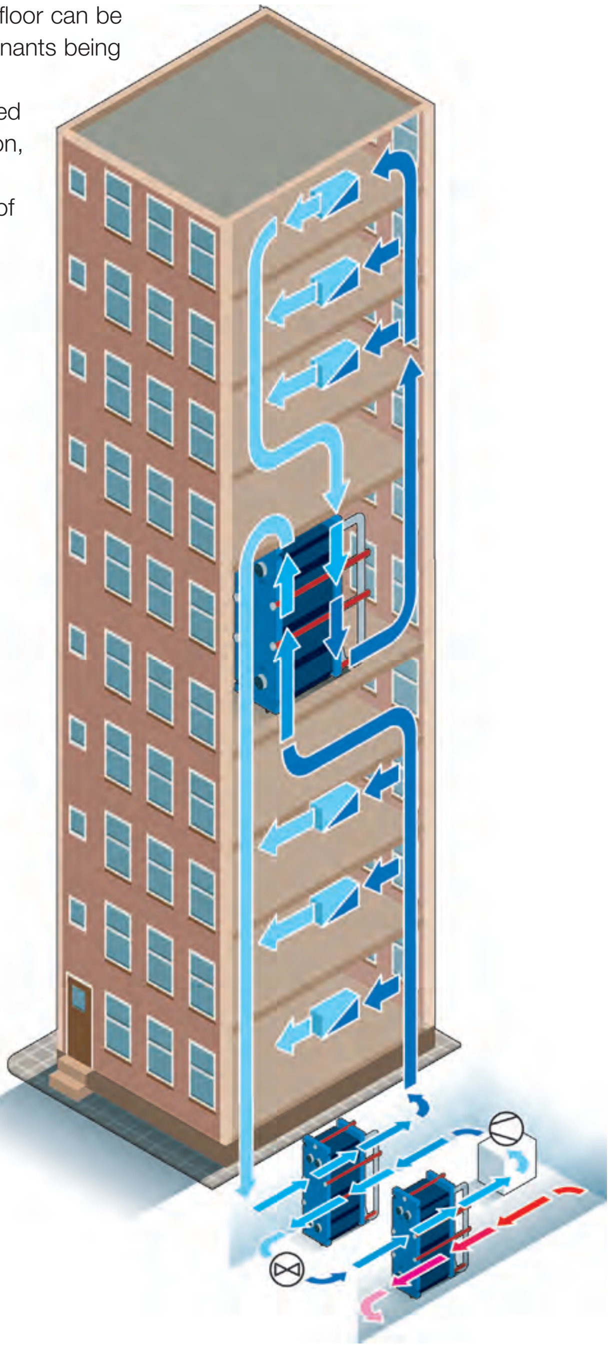
In skyscrapers, the static head creates a pressure that may exceed what the chiller condenser or room air conditioners can handle. A plate heat exchanger will then split the circuit in order to keep the pressure at an acceptable level. It is possible to put plate heat exchangers on different levels throughout the building, thus limiting the pressure and the corresponding requirements on, for example, pumps, piping and valves.

Depending on the size of a skyscraper there might be many plate heat exchangers acting as pressure interceptors. It is very important that cold is not wasted in the cooling system. Alfa Laval's "close approach" when it comes to energy efficiency means that the heat exchangers will transfer practically all cold to the top of the building with minimum loss.

Advantages of plate heat exchangers as pressure interceptors

The entire chilled water system will be designed for low pressure, for example 10 bar (150 psig). This means cost savings in the chiller as well as in the selection of air handling units and other system equipment. Instead of having many chillers in a building, plate heat exchangers can be placed on several floors as pressure interceptors. This has a positive effect on building design:

- They are very compact and only require normal room height, i.e <3 m/10 ft, and only a third of the floor space of a chiller with identical capacity. This makes them easy to install, even in buildings with limited space.
- They do not cause any vibrations or noise. This will save money for the owner as the rest of the floor can be rented out without the tenants being disturbed.
- They do not normally need any maintenance attention, apart from a planned maintenance consisting of a gasket replacement approximately every 10-12 years.



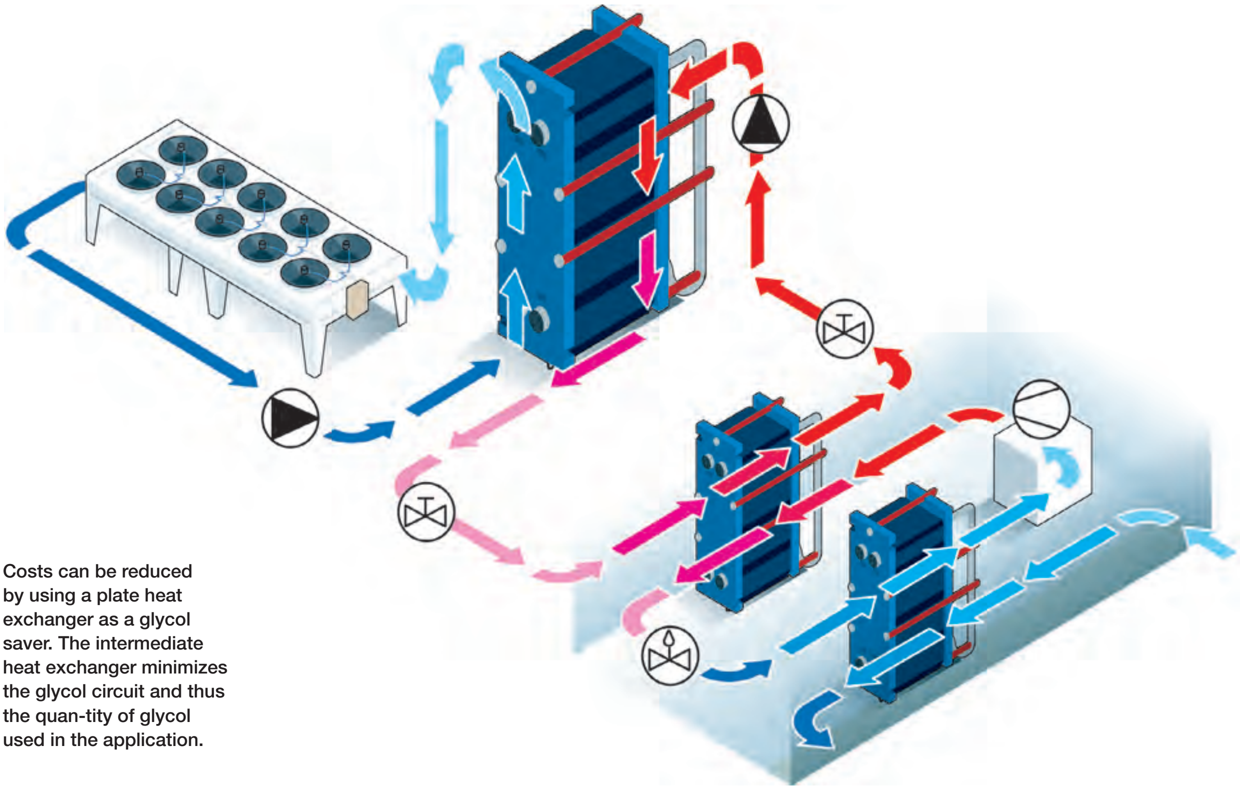
PHEs used as pressure interceptors in tall buildings protect other equipment like chillers and air condition units from excessive pressure. It is a compact, low-noise, no-worries solution.

Glycol saving

Glycol is used in systems with outside piping when there is a risk of the ambient temperature dropping below 0°C/32°F. Another cooling application for plate heat exchangers is to use them as glycol savers.

The sketch above shows an example where a dry liquid cooler is used instead of a cooling tower.
In order to avoid the risk of bacteria in the cooling tower water, this is increasingly required by law in many countries.

In cases where the dry liquid cooled condenser is situated far away from the chiller and glycol is used, the amount of glycol that has to be added to the system is high and so is the cost. An intermediate plate heat exchanger will minimize the glycol circuit, thus acting as a glycol saver and cutting expenses.



Costs can be reduced by using a plate heat exchanger as a glycol saver. The intermediate heat exchanger minimizes the glycol circuit and thus the quan-tity of glycol used in the application.

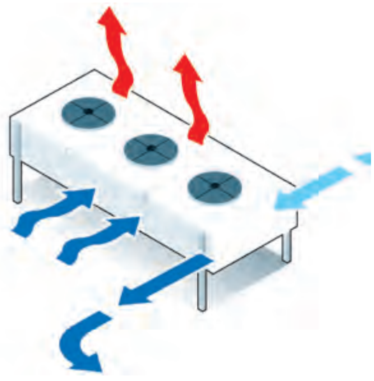
Cooling sources

Cooling tower

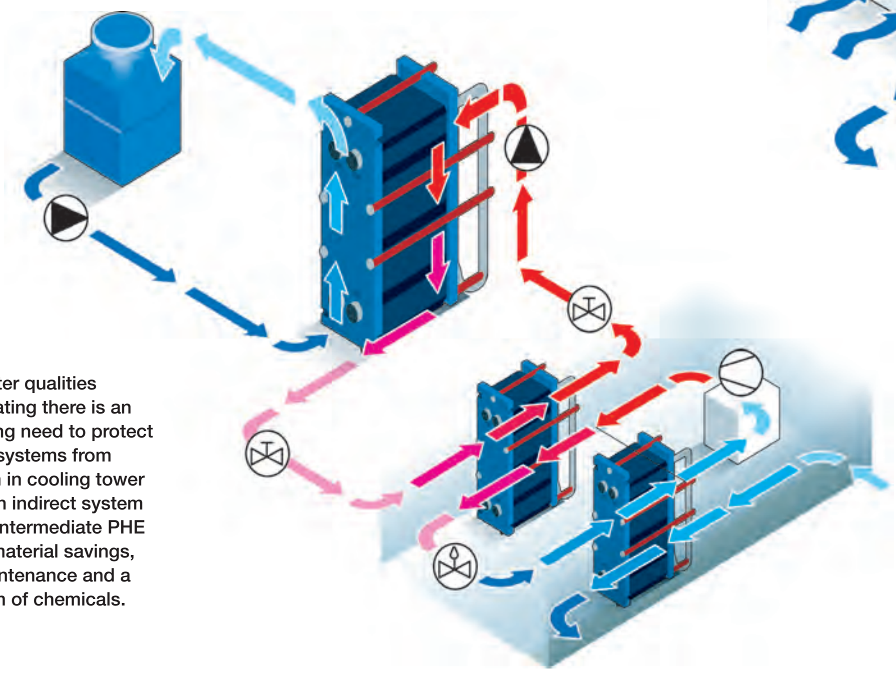
Today water qualities are deteriorating because of different kinds of pollution. This increases the risk of chiller shut-downs due to operation problems of the condenser. The condenser is subject to attacks from either chlorides that will cause corrosion or impurities or biological activities in the water that will cause fouling. As the expectations of trouble-free cooling operations have increased, it has become more and more interesting to look at alternative solutions where these problems can be avoided.

One solution is an indirect system using a heat exchanger in combination with an open cooling tower. The advantages of this are:

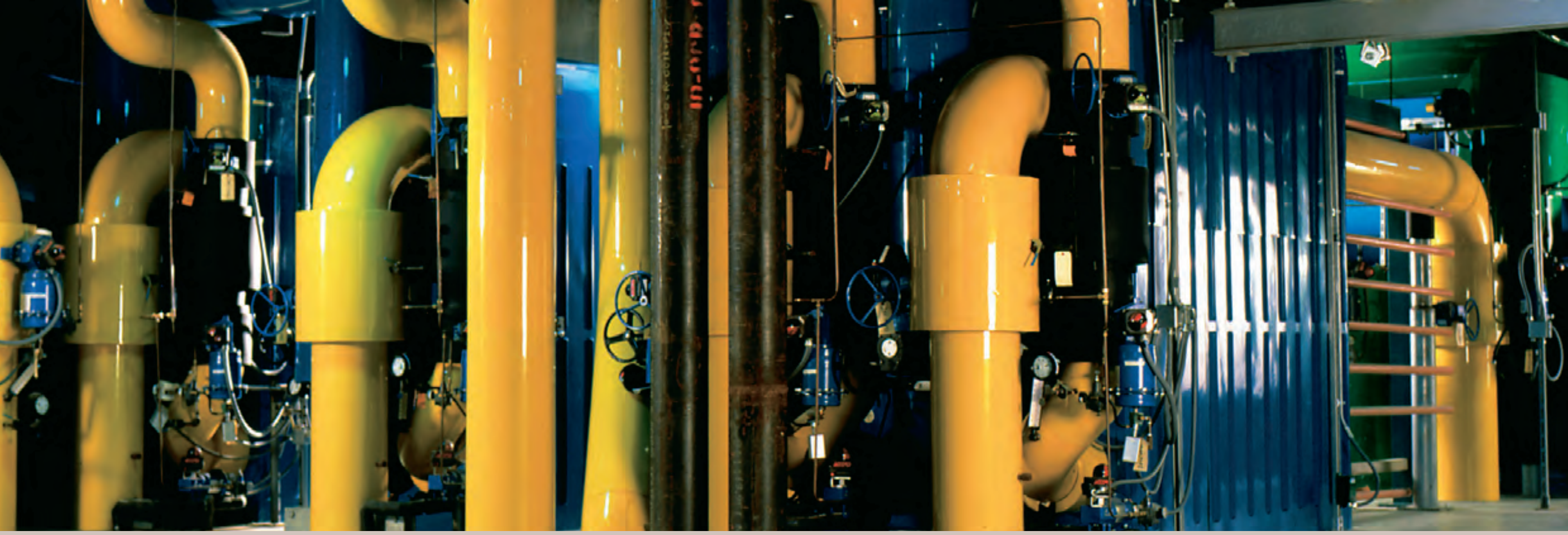
- Low system cost: Cost calculations show that the payback period of the heat exchanger is very short.
- Material savings in the condenser: Less expensive materials can be used.
- With an intermediate heat exchanger, chillers as well as cooling towers can be run at an optimal temperature.
- An intermediate heat exchanger means that the use of water treatment chemicals, for example chromates used for the cooling tower water, can be minimized.
- Less maintenance of the condenser.



For smaller or medium-sized cooling applications a dry liquid cooler is an energy-saving option that might be a source of free cooling when the temperature drops.
Alfa Laval offers a wide range of high-quality dry liquid coolers.



With water qualities deteriorating there is an increasing need to protect cooling systems from pollution in cooling tower water. An indirect system with an intermediate PHE means material savings, less maintenance and a minimum of chemicals.



Free cooling

Free cooling combines an environment-friendly alternative for producing cold with economical benefits. Cooling applications relying on free cooling have been installed with good results in many countries around the world.

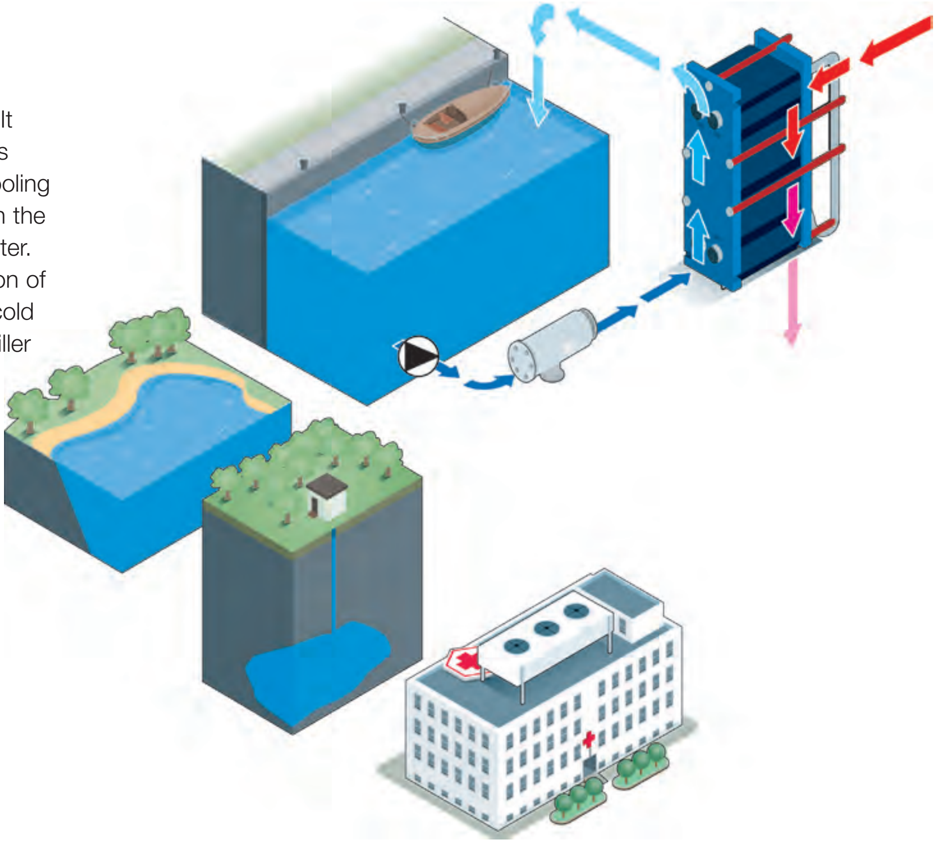
When utilizing free cooling as a cooling source in an application, the use of ecologically harmful refrigerants can be reduced. Free cooling is also a way to cut down on electricity costs – in some cases the reduction might exceed 75 percent, resulting in great savings. Reduction in electricity consumption also has positive environmental effects, as electricity production often involves air pollution.

Free cooling is used mainly for air conditioning and process cooling. It can cover the cooling requirements during the period when the free cooling source has lower temperature than the cold water, for example during winter. In spring and autumn a combination of free cooling and chiller-produced cold is used. In the summertime the chiller supplies the total cooling requirement. Suitable free cooling sources are water from for example rivers, lakes, (deep) oceans or ground water, ice and snow storage, or air.

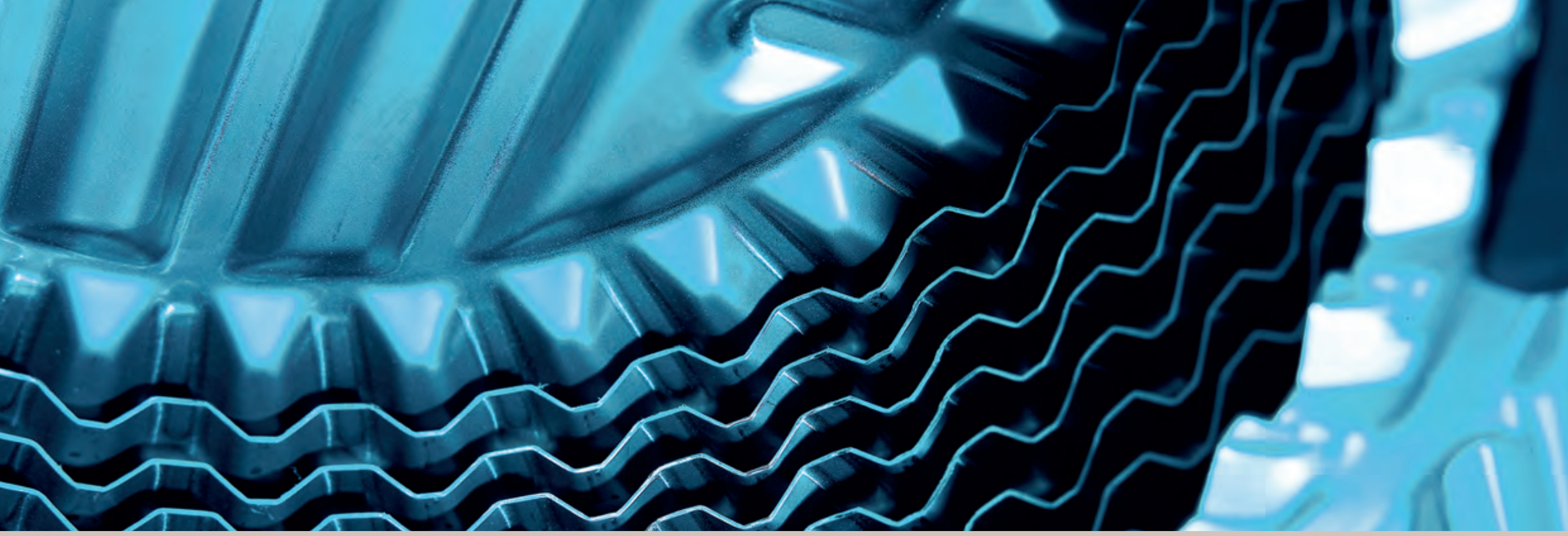
Products for free cooling

Alfa Laval's continuous research and development strategy means we are able to supply products for any cooling application, regardless of cooling media and cooling source. This makes it possible to utilize aggressive cooling media such as sea-water, brackish water, or water from rivers and wells.

By installing a plate heat exchanger, the chilled water loop can be totally isolated from sensitive equipment like air conditioners, thereby eliminating corrosion, scaling and constant maintenance. In seawater and fresh-water applications, installation of a filter for protecting the heat exchanger is recommended.
A cooling system using free cooling in combination with a plate heat exchanger will also require less space, creating an extremely compact solution.
But Alfa Laval is more than outstanding products and optimized systems.
Based on our vast experience we are always able to provide quality solutions.



Free cooling has many economical and environmental advantages. Alfa Laval's knowledge about for example corrosive media has resulted in products that can handle aggressive cooling media like seawater and brackish water.

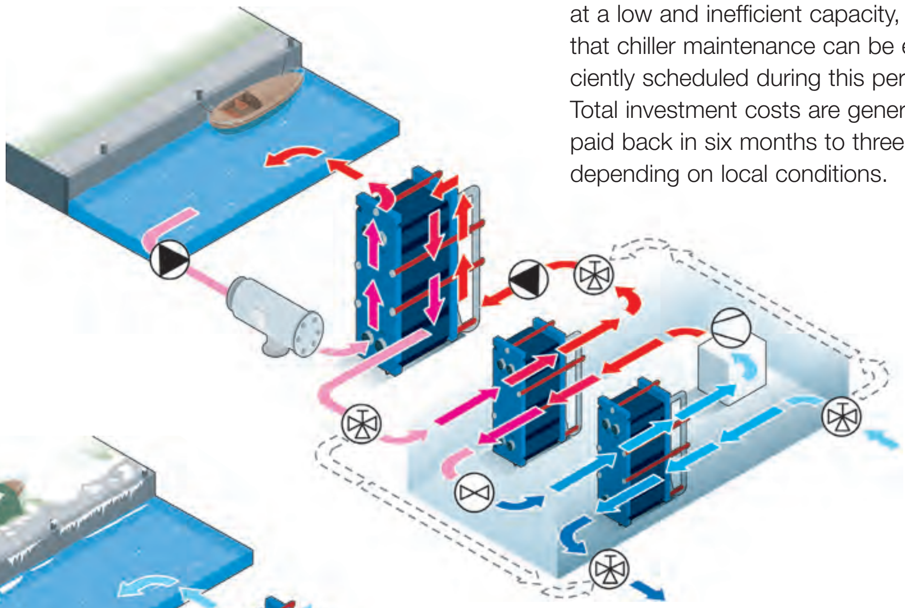


Chiller bypass

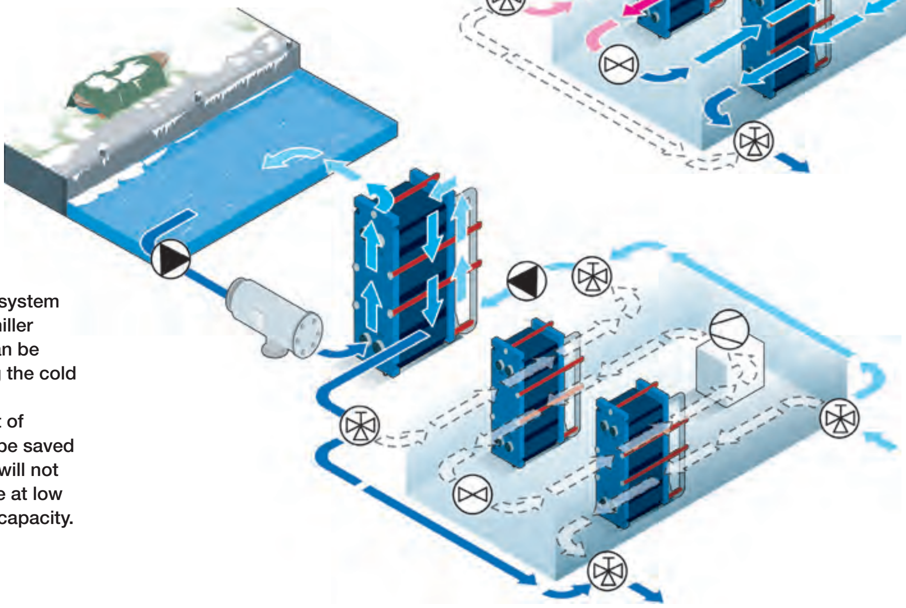
Traditionally the chiller in an air conditioning system runs continuously during the entire cooling season, even when full capacity is not required. Previously, the only alternative to constant chiller operation has been a chiller bypass system using a strainer. This strainer removes impurities, but at the same time it requires costly maintenance, chlorination and other chemical treatment.

By installing a plate heat exchanger – and sometimes a filter to protect it – in the chiller bypass system, corrosion, scaling and constant maintenance can be virtually eliminated. Another advantage is that this system can use any type of cooling, such as a cooling tower or free cooling with river or well water, even seawater or brackish water, without ruining sensitive equipment like air conditioners.

As soon as the bulb drops below the required condenser temperature (min. 1°C/1.8°F), the heat exchanger makes it possible to reduce the chiller temperature. This means that a large amount of electricity can be saved during the cold season. It also means that the chiller will not have to operate at a low and inefficient capacity, and that chiller maintenance can be efficiently scheduled during this period. Total investment costs are generally paid back in six months to three years, depending on local conditions.



Chiller bypass system (summer). The chilled water is isolated from the other cooling equipment. This minimizes costly maintenance and the system can use aggressive cooling media.



Chiller bypass system (winter). The chiller temperature can be reduced during the cold season.
A large amount of electricity can be saved and the chiller will not have to operate at low and inefficient capacity.

Ice accumulator/storage

An ice accumulator/storage is a tank where ice can be accumulated during one period, stored and then thawed and used during another. There are two main reasons for using an ice accumulator/storage:

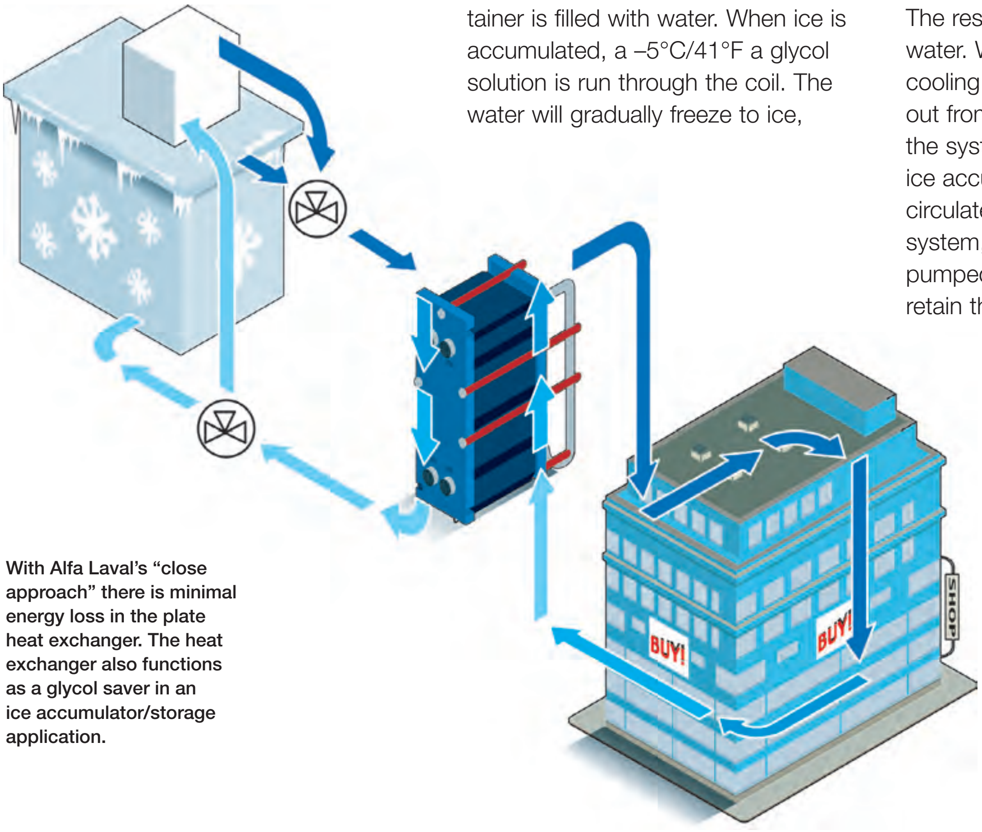
- Where the cooling requirements vary during the day a smaller chiller can be used. As a result the initial cost of cooling equipment can be reduced considerably.
- Cooling energy can be purchased during the night or off-peak hours. In many countries this means that it can be obtained at a lower price.

Since it has been shown that payback periods for ice accumulators will be as low as two years, it is an increasingly worthwhile investment. There are two main applications for ice accumulators: air conditioning and industry. Especially in industry, the cooling demand is often variable, for example in a dairy where the milk will be brought in in the morning.

Types of ice accumulators

There are two main types of ice accumulator systems:

- Systems with internal melting consist of a polyethylene tank containing coils of the same material. The container is filled with water. When ice is accumulated, a –5°C/41°F a glycol solution is run through the coil. The water will gradually freeze to ice, first around the coils and then further and further out in the tank. When the extra cooling capacity is required, the glycol solution in the coils will be led through the system and returned to the tank at a higher temperature. The ice accumulated in the tank will then melt, and the glycol solution will be recooled until all the ice is consumed.
- In systems with external melting the tank is made of steel or concrete. Here too are coils with glycol or a CFC/HCFC coolant, and ice is accumulated to a thickness of 35 mm/1.4 inches around each coil. The rest of the tank will be filled with water. When there is a need for cooling energy, ice water is pumped out from the bottom of the tank to the system. When it returns to the ice accumulator it will be forced to circulate around the ice. In this system, the ice water that is pumped into the system will always retain the same temperature.



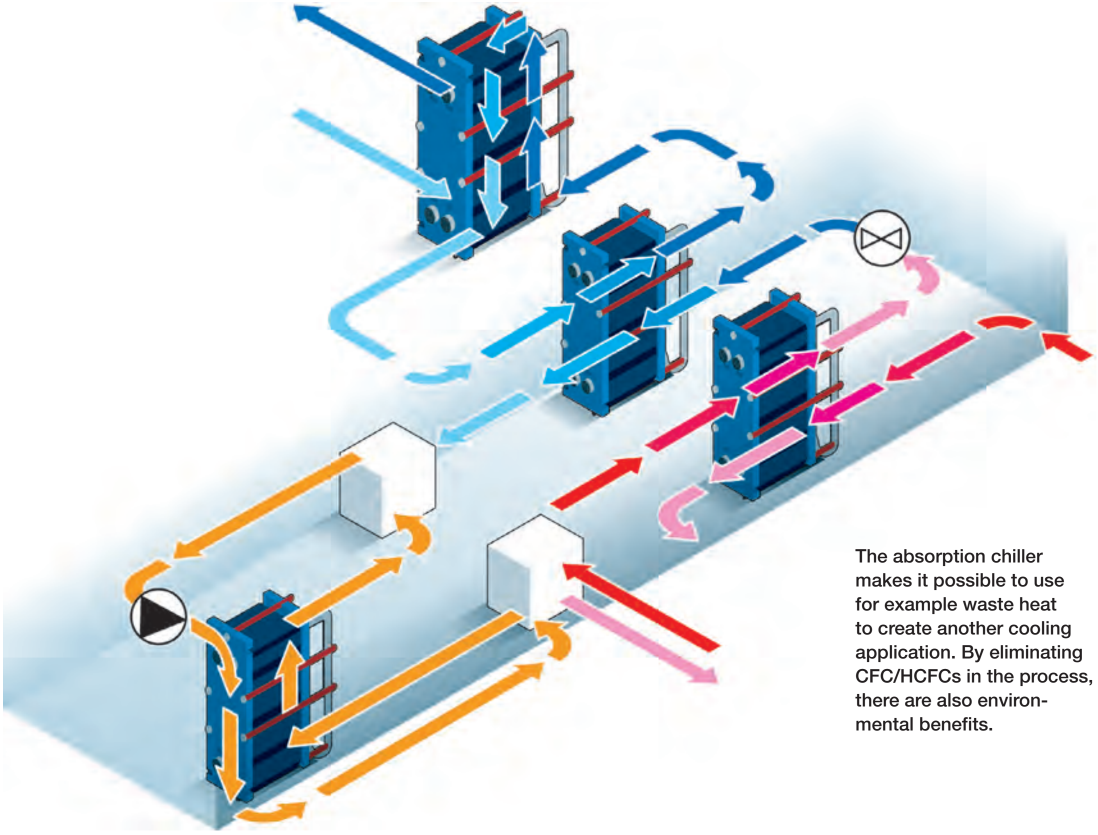
With Alfa Laval's "close approach" there is minimal energy loss in the plate heat exchanger. The heat exchanger also functions as a glycol saver in an ice accumulator/storage application.

Other cooling applications

Absorption chiller

If district heat or waste heat is available, for example from waste disposal, there is another possibility for comfort cooling with an absorption chiller. This is an example of the kind of system optimization that Alfa Laval excels in. We have the knowledge and just the right equipment for providing solutions with both economical and environmental benefits.

In this application the CFC/HCFCs influencing the ozone are replaced with for example water and lithium bromide, both environment-friendly. In the evaporator the refrigerant (water) takes up heat/energy from the connected system, thus cooling the air conditioning circuit in a heat exchanger. The refrigerant enters the absorber as low-pressure vapor, where the liquid solvent (lithium bromide) absorbs it. The pump increases the pressure and the mixture continues to the interchanger where it is preheated in for example a plate heat exchanger. Using the district heat, the refrigerant is boiled off from the solvent in the regenerator. The high-pressure vapor is sent to the condenser, where heat is emitted during the refrigerant's condensation.



The absorption chiller makes it possible to use for example waste heat to create another cooling application. By eliminating CFC/HCFCs in the process, there are also environmental benefits.

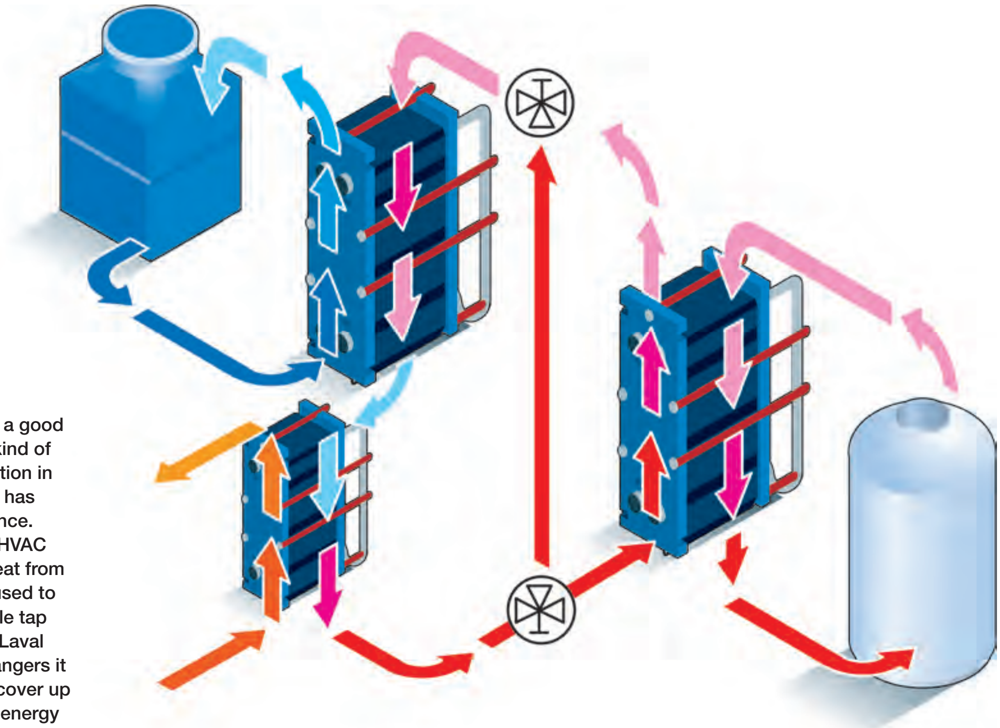
Heat recovery

In an optimized HVAC system, cooling and heating are integrated and waste heat and cold will be re-utilized in the system. Heat recovery is one often-neglected area where plate heat exchangers can be profitably used.

There are large potential savings as soon as there is a demand for hot tap water or other types of heating at the same time as the cooling system is running. Some types of buildings where this may be the case are hospitals and hotels, or different production facilities, for example in the chemical, pharmaceutical and beverage industries.

Alfa Laval has many years' experience from both cooling and heating applications and from customizing this kind of optimized system.

The heat-recovery plate heat exchanger will be installed between the condenser and the cooling tower, recouping part of the energy that would otherwise be let out in the air. While recovering heat for pre-heating tap water, for example, the cooling need decreases on the condenser side. Thus the savings will not only be the energy recovered in the heating system, but also the energy not wasted in the cooling system. Due to the extreme efficiency of the plate heat exchanger it is possible to recover up to 95 percent of the energy that would otherwise be wasted. This is often more than enough to offset the capital and operating costs of the plate heat exchanger. In this case the heat exchanger should be of the double-wall type, with double walls between the condenser circuit and the tap water, to give extra protection against contamination.



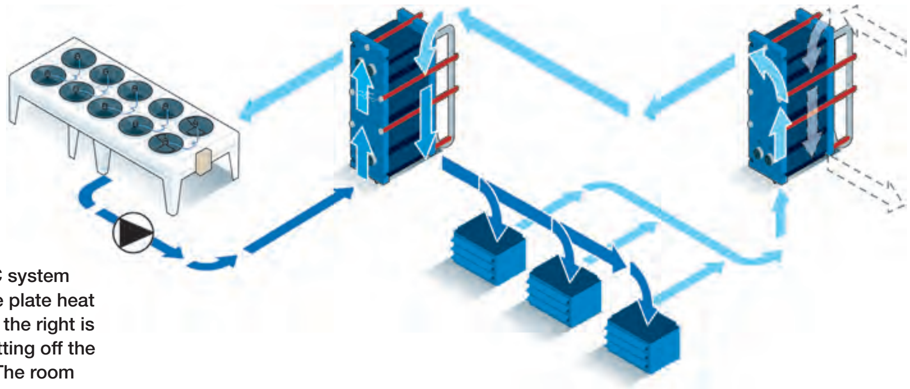
Heat recovery is a good example of the kind of system optimization in which Alfa Laval has years of experience. In an optimized HVAC system waste heat from cooling can be used to warm for example tap water. With Alfa Laval plate heat exchangers it is possible to recover up to 95 percent of energy that would otherwise be wasted.

Reversible air conditioning system

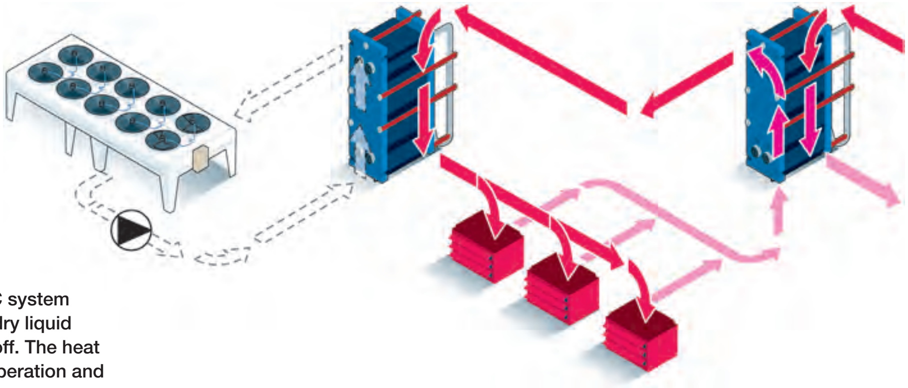
Another system where heating and cooling is integrated is the reversible air conditioning system. In this particular type of condenser cooling system there are separate small cooling units in each room of, for example, an office building. These chillers can be used as either chillers or heat pumps, depending on the season and the climate. They are all connected to a main pipe that carries water through the system. This pipe is connected both to the cooling source and to the heat source of the building.

During summer, the heat source is cut off and the water will flow directly through the plate heat exchanger on the heat-source side. The water of the main pipe will cool the condensers of the room units and transport the excess energy to the cooling source via the heat exchanger on the cooling-source side.

During winter, the cooling source is cut off and the water will flow through the plate heat exchanger on the cooling-source side with no change of temperature. Instead the heat source will now be in operation, and the water will be heated when passing the plate heat exchanger on the heat-source side. The room units will now be reversed, so that the hot water will go into the evaporators and transfer the heat to the rooms. The room units are now heat pumps.



Reversible AC system (summer). The plate heat exchanger on the right is bypassed, cutting off the heat source. The room units are used as chillers.



Reversible AC system (winter). The dry liquid cooler is cut off. The heat source is in operation and the room units are used as heat pumps.

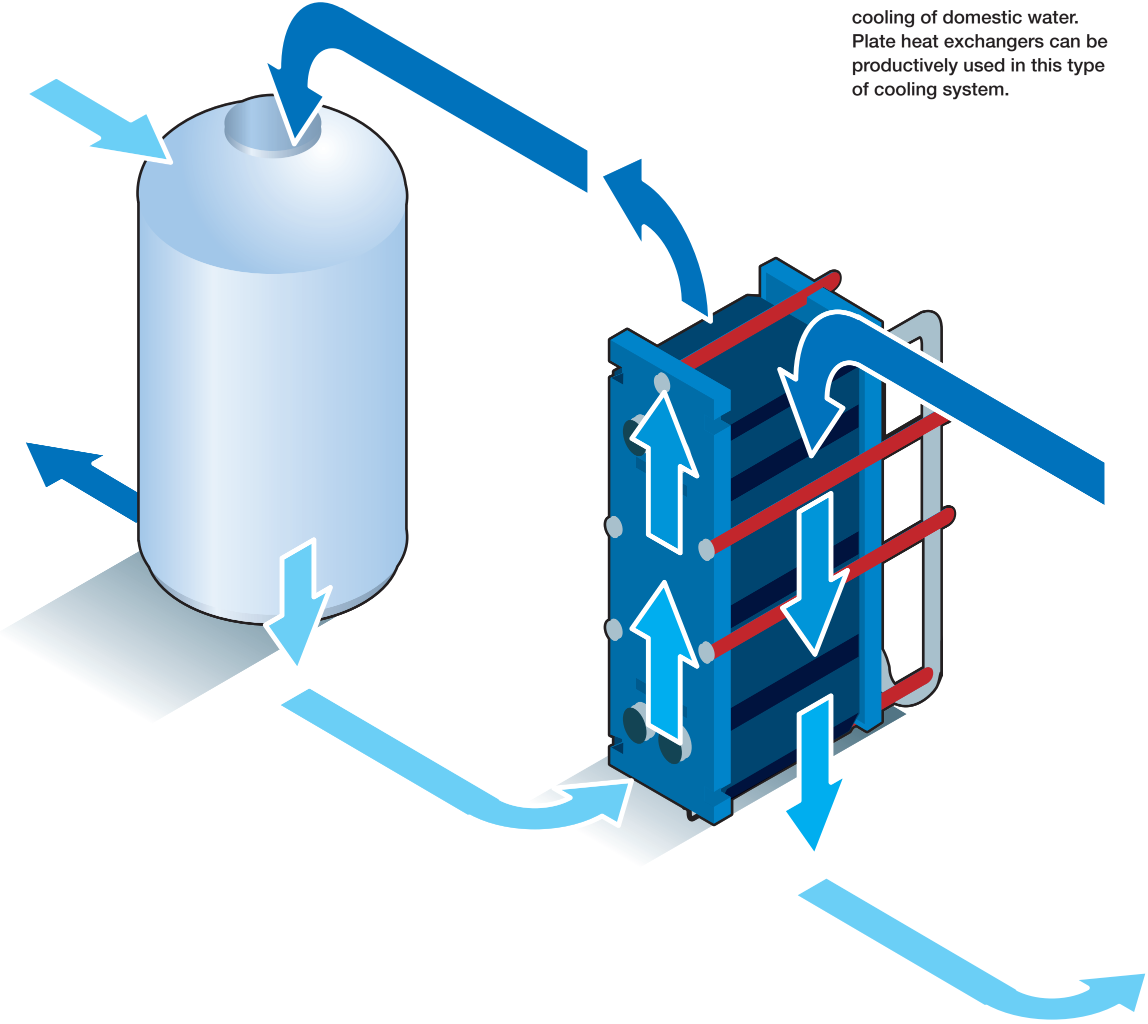
Tap water cooling

In hot geographical regions, where the atmospheric temperatures are in the range of 40–45°C/104–113°F, cooling plays a vital role in an individual’s daily life. With such an atmospheric temperature one can easily imagine the water supply temperature to be in the range of 35°C/95°F.

This gives rise to the need for domestic water cooling.

This is achieved by having domestic water flowing through one side of the heat exchanger. The other medium flowing through the heat exchanger is chilled water.

In regions with extremely hot atmospheric temperatures there is an increased need for cooling of domestic water. Plate heat exchangers can be productively used in this type of cooling system.

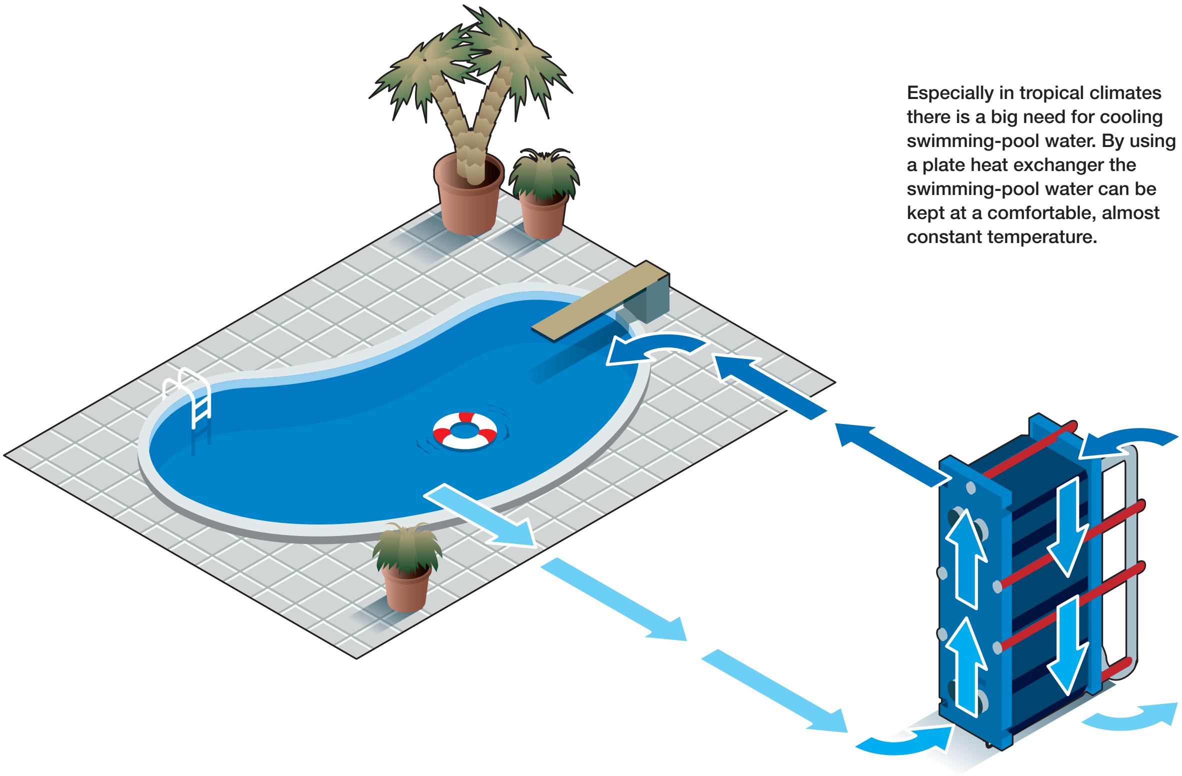


Swimming pool cooling

Plate heat exchangers can be used to maintain a nearly constant temperature in swimming pools all year round.

In hot geographical regions where the atmospheric temperatures are in the range of 40–45°C/104–113°F, there is a need to cool the incoming water temperature (~40°C/104°F) to more suitable pool temperatures (~26°C/79°F).

The swimming pool water is one of the media that flows through the heat exchanger. Chilled water is used as the other medium.



Especially in tropical climates there is a big need for cooling swimming-pool water. By using a plate heat exchanger the swimming-pool water can be kept at a comfortable, almost constant temperature.

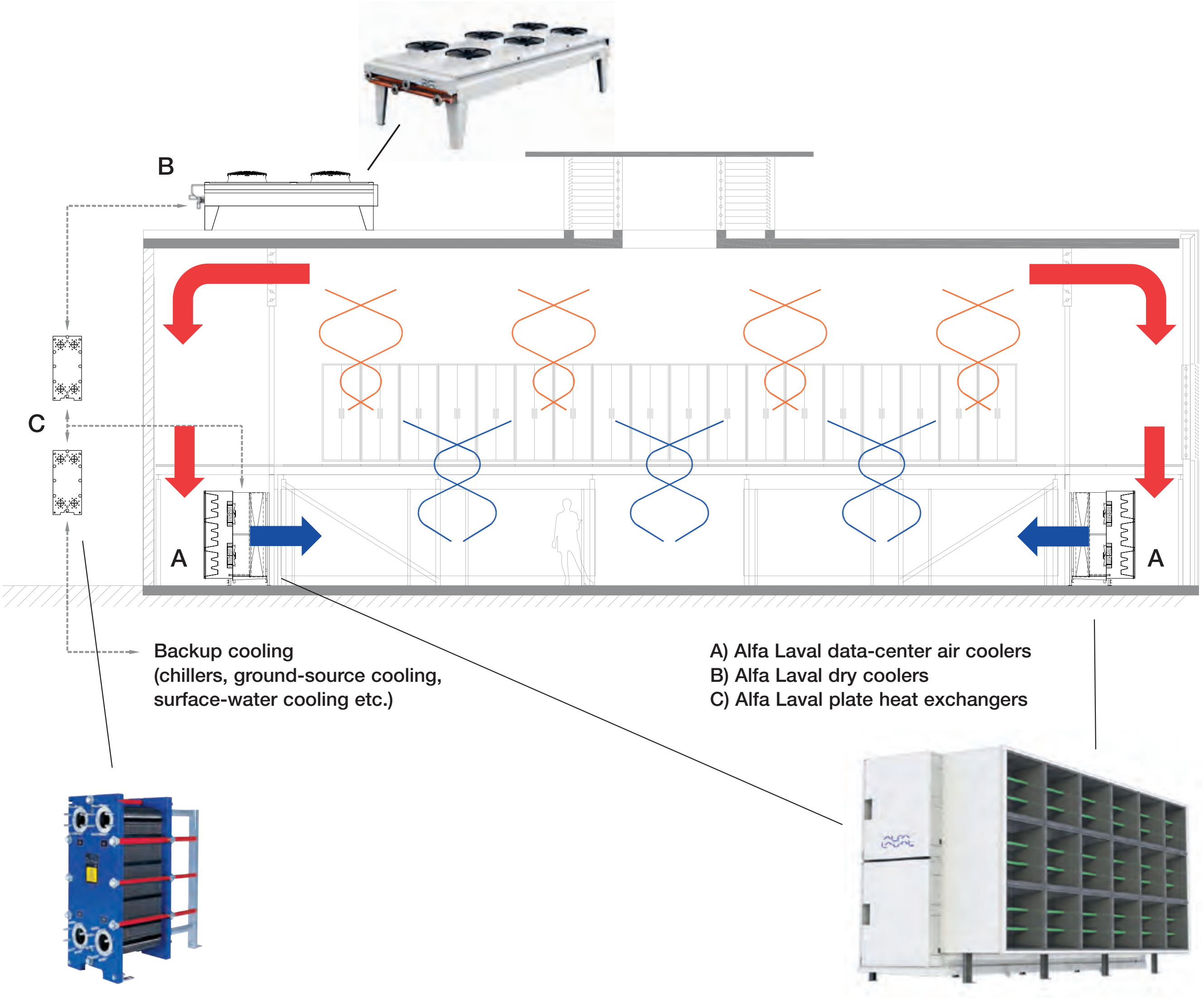
Data-center cooling

The data-center industry is a big industry in full expansion. Their needed cooling capacities grow fast, especially driven by the latest trend in cloud computing.

Typically, data-center owners and operators are looking for reliable, cost-efficient equipment with long lifetime, energy savings, elimination of hot spots in their servers and minimum maintenance.

The Low Speed Ventilation concept for data centers is a completely integrated building ventilation/recirculation system. It dissipates heat from the servers by means of low-speed controlled-air recirculation. As a result, hot spots are avoided at the lowest energy consumption possible (-30%).

Example of data-center design



Backup cooling
(chillers, ground-source cooling,
surface-water cooling etc.)

A) Alfa Laval data-center air coolers
B) Alfa Laval dry coolers
C) Alfa Laval plate heat exchangers

Additional benefits of the Low Speed Ventilation Datacenter™ concept are:

- Lower investment compared with traditional Computer Room Air Conditioning units (CRAC): CAPEX -15%
- Very low maintenance cost (OPEX)
- Maintenance happens outside the whitespace, avoiding unauthorized people entering this sensitive area
- Suitable for both cold and hot containment
- Optimal temperature and humidity conditions at any server position
- Possibility to re-use dissipated heat
- No dust accumulation

Alfa Laval products used in the Low Speed Ventilation Datacenter™ concept

- **Alfa Laval THOR LSV Air Cooler**

THOR LSV air coolers are heavy duty industrial air coolers specifically designed for cooling servers in data centers that have been built according to "Low Speed Ventilation". LSV air coolers operate with low fan speed, low air velocities and minimal pressure differences along the route of the air flow. This is achieved by the building itself being part of the system. For this reason all THOR-LSV air coolers have been designed with a nominal of 12 Pa air-sided pressure drop and a sensible heat factor of 1.0. In case direct fresh air is used in the computer room the THOR LSV air cooler contains an F7 or F9 filter, with a pressure drop of just 25 Pa.

- **Alfa Laval plate heat exchangers**

Plate heat exchangers are used for general heating and cooling duties.

- **Alfa Laval dry coolers**

Alfa Laval dry coolers are mainly used for free cooling duties.

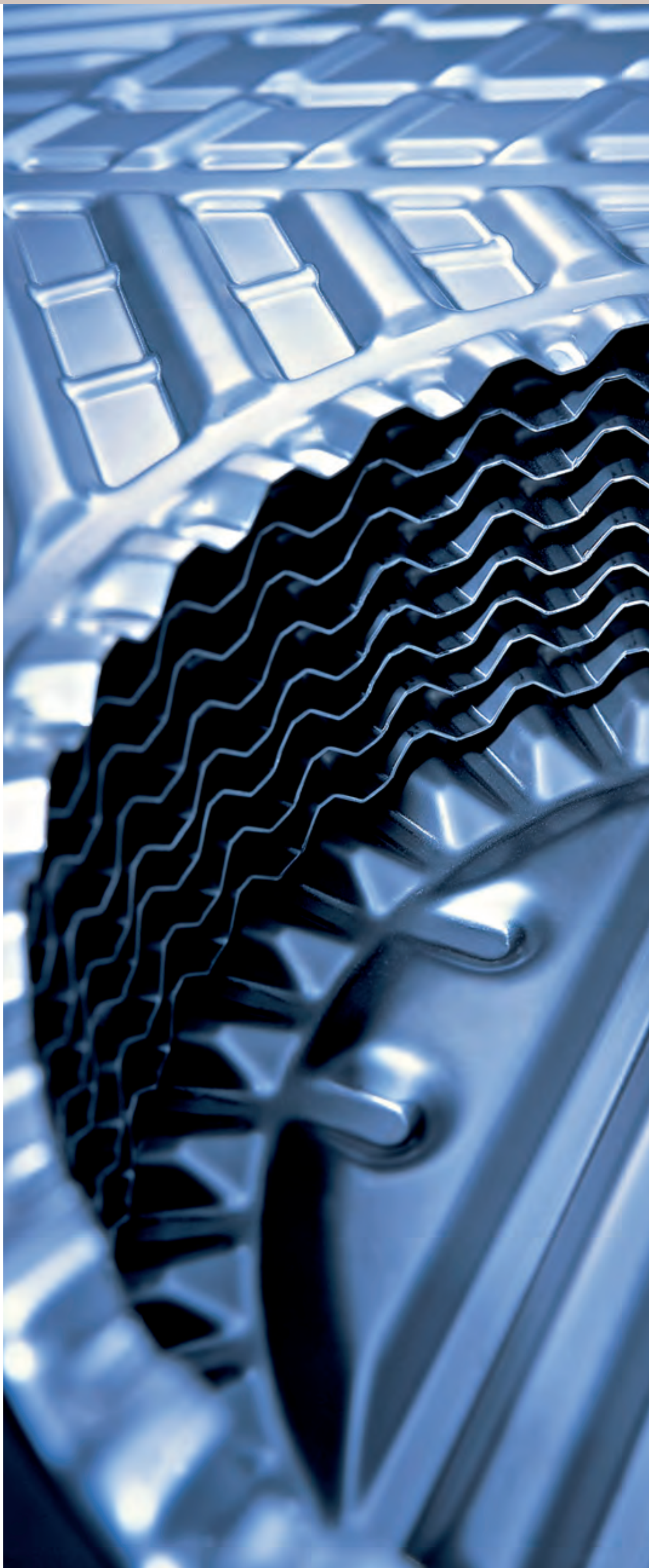
Alfa Laval THOR LSV Air Cooler

Alfa Laval plate heat exchangers

Alfa Laval dry coolers

Chapter 4

The theory behind heat transfer



The following pages will help you gain a better understanding of how heat exchangers work.

The basic principles of heat transfer will be clearly and simply illustrated.

The natural laws of physics always allow the driving energy in a system to flow until equilibrium is reached. Heat leaves the warmer body or the hottest fluid, as long as there is a temperature difference, and will be transferred to the cold medium.

A heat exchanger follows this principle in its endeavour to reach equalization. With a plate type heat exchanger, the heat penetrates the surface, which separates the hot medium from the cold one very easily. It is therefore possible to heat or cool fluids or gases which have minimal energy levels.

The difference in temperature is the heat exchanger's "driving energy".

Heat transfer theory

The theory of heat transfer from one media to another, or from one fluid to another, is determined by several basic rules.

- Heat will always be transferred from a hot medium to a cold medium.

- There must always be a temperature difference between the media.

- The heat lost by the hot medium is equal to the amount of heat gained by the cold medium, except for losses to the surroundings.

Heat exchangers

A heat exchanger is a piece of equipment that continually transfers heat from one medium to another.

There are two main types of heat exchangers.

- Direct heat exchanger, where both media are in direct contact with each other. It is taken for granted that the media are not mixed together.

An example of this type of heat exchanger is a cooling tower, where water is cooled through direct contact with air.

- Indirect heat exchanger, where the two media are separated by a wall through which heat is transferred.

Heat transfer theory

Heat can be transferred by three methods.

- **Radiation** – Energy is transferred by electromagnetic radiation. One example is the heating of the earth by the sun.

- **Conduction** – Energy is transferred between solids or stationary fluids by the movement of atoms or molecules.

- **Convection** – Energy is transferred by mixing part of a medium with another part.

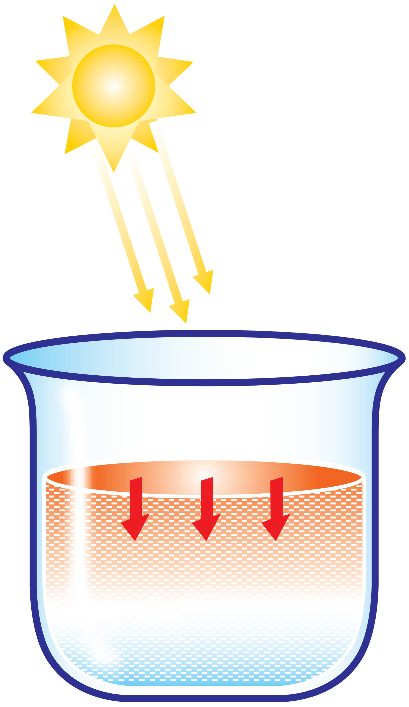
a) Natural convection, where the movement of the media depends entirely upon density difference, and temperature differences are evened out.

b) Forced convection, where the movement of the media depends entirely or partly upon the results of an outside influence. One example of this is a pump causing movement in a fluid.

Heat exchanger types

In this context only indirect heat exchangers are discussed, i.e. those where the media are not mixed, but where the heat is transferred through heat-transfer surfaces.

Temperature losses through radiation can be disregarded when considering heat exchangers in this context. Indirect heat exchangers are available in several main types (plate, shell-and-tube, spiral etc.) In most cases the



Radiation

plate type is the most efficient heat exchanger. Generally it offers the best solution to thermal problems, giving the widest pressure and temperature limits within the constraint of current equipment. The most notable advantages of a plate heat exchanger are:

- Takes up much less space than a traditional shell-and-tube heat exchanger.

- Thin material for the heat transfer surface – this gives optimum heat transfer, since the heat only has to penetrate thin material.

- High turbulence in the medium – this gives a higher convection, which results in efficient heat transfer between the media. The consequence of this higher heat transfer coefficient per unit area is not only a smaller surface area requirement but also a more efficient operation.

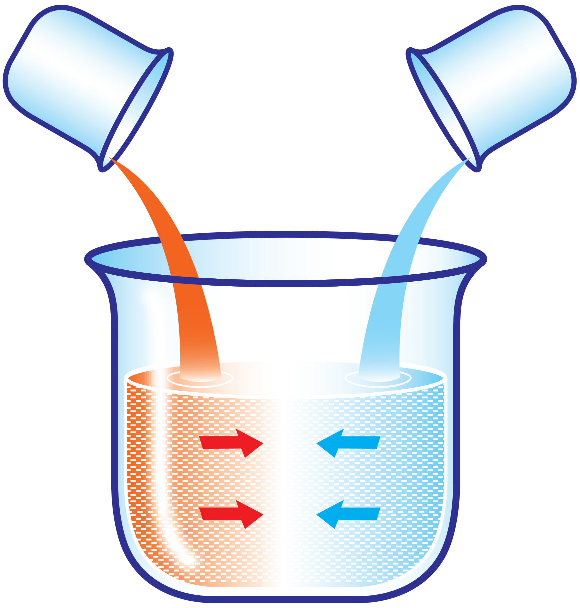
The high turbulence also gives a self-cleaning effect. Therefore, when compared to the traditional shell-and-tube heat exchanger, the fouling of the heat transfer surfaces is considerably reduced. This means that the plate heat exchanger can remain in service far longer between cleaning intervals.

- Flexibility – the plate heat exchanger consists of a framework containing several heat transfer plates. It can easily be extended to increase capacity. Furthermore, it is easy to open for the purpose of cleaning. (This only applies to gasketed heat exchangers, and not to brazed or fusion-bonded units.)

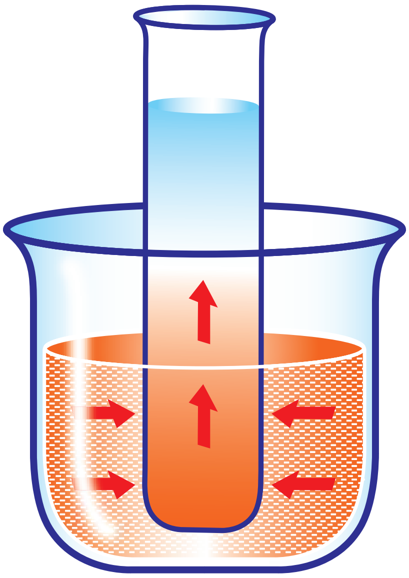
- Variable thermal length – most of the plate heat exchangers manufactured by Alfa Laval are available with two different pressing patterns. When the plate has a narrow pattern, the pressure drop is higher and the heat exchanger is more effective. This type of heat exchanger has a long thermal channel.

When the plate has a wide pattern, the pressure drop is smaller and the heat transfer coefficient is accordingly somewhat smaller. This type of heat exchanger has a short thermal channel.

When two plates of different pressing patterns are placed next to each other, the result is a compromise between long and short channels as well as between pressure drop and effectiveness.

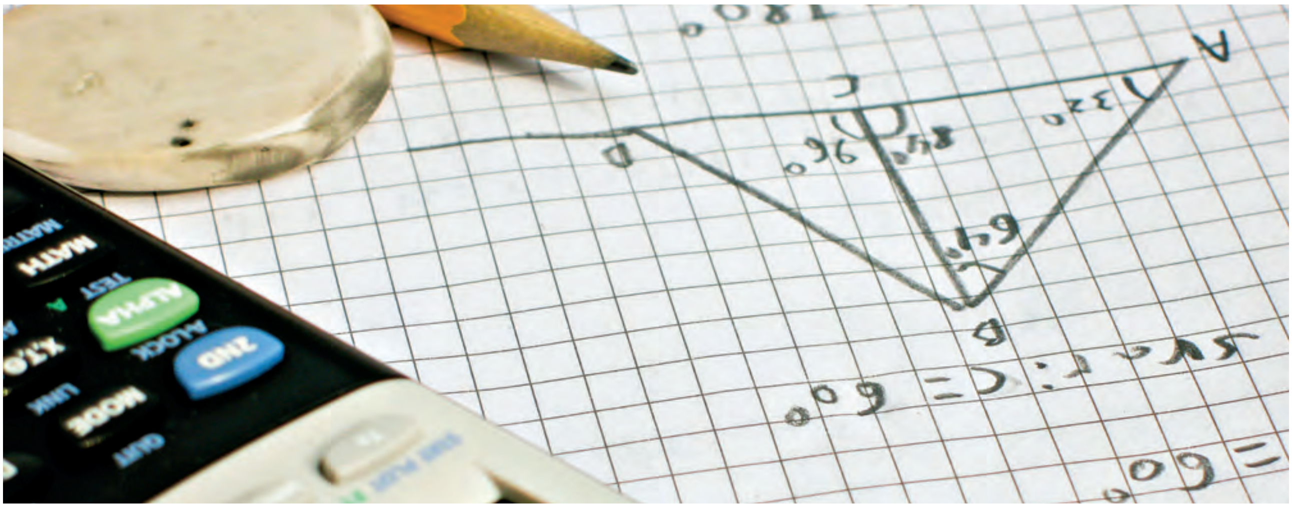


Convection



Conduction

Calculation method



To solve a thermal problem, we must know several parameters. Further data can then be determined. The six most important parameters are the following:

- The amount of heat to be transferred (heat load).
- The inlet and outlet temperatures on the primary and secondary sides.
- The maximum allowable pressure drop on the primary and secondary sides.
- The maximum operating temperature.
- The maximum operating pressure.
- The flow rate on the primary and secondary sides.

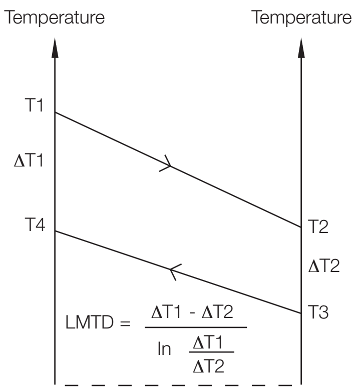
If the flow rate, specific heat and temperature difference on one side are known, the heat load can be calculated. See also page 4:6.

Temperature program

This means the inlet and outlet temperatures of both media in the heat exchanger.

T1 = Inlet temperature – hot side
T2 = Outlet temperature – hot side
T3 = Inlet temperature – cold side
T4 = Outlet temperature – cold side

The temperature program is shown in the diagram below.



Heat load

Disregarding heat losses to the atmosphere, which are negligible, the heat lost (heat load) by one side of a plate heat exchanger is equal to the heat gained by the other. The heat load (P) is expressed in kW or kcal/h.

Logarithmic mean temperature difference

Logarithmic mean temperature difference (LMTD) is the effective driving force in the heat exchanger. See diagram to the left.

Thermal length

Thermal length (Θ) is the relationship between temperature difference δt on one side and LMTD.

$$\Theta = \frac{\delta t}{\mathrm{LMTD}}$$

Thermal length describes how difficult a duty is from a thermal perspective.

Density

Density (ρ) is the mass per unit volume and is expressed in kg/m^3 or kg/dm^3.

$$P = m \times c_p \times \delta t$$

Where;

P = Heat load (kW)
m = Mass flow (kg/s)
c_p = Specific heat (KJ/kg ºC)
δt = Difference between inlet and outlet temperatures on one side (ºC)

Cooling
For some duties, cooling applications for example, the temperature program is very tight with close approaches on the different temperatures. This gives what we refer to as high theta duties and requires high theta units. High theta duties are duties that have $\Theta > 1$ and are characterized by:

- Long plate, longer time for the fluid to be cooled
- Low pressing depth that gives less fluid per plate to be cooled

Plate heat exchangers are superior compared to shell-and-tube heat exchangers when it comes to theta values. Shell-and-tube heat exchangers can go up to a maximum value of theta ~1 while plate heat exchangers reach theta values of 10 and more. For a shell-and-tube to climb over theta value of 1 or more, several units need to be installed in a series.

Flow rate
This can be expressed in two different terms, either by weight or by volume. The units of flow by weight are in kg/s or kg/h, the units of flow by volume in m^3/h or l/min. To convert units of volume into units of weight, it is necessary to multiply the volume flow by the density.

The maximum flow rate usually determines which type of heat exchanger is the appropriate one for a specific purpose. Alfa Laval plate heat exchangers can be used for flow rates from 0.05 kg/s to 1,400 kg/s. In terms of volume, this equates 0.18 m^3/h to 5,000 m^3/h in a water application. If the flow rate is in excess of this, please consult your local Alfa Laval representative.

Pressure drop
Pressure drop (Δp) is in direct relationship to the size of the plate heat exchanger. If it is possible to increase the allowable pressure drop, and incidentally accept higher pumping costs, then the heat exchanger will be smaller and less expensive. As a guide, allowable pressure drops between 20 and 100 kPa are accepted as normal for water/water duties.

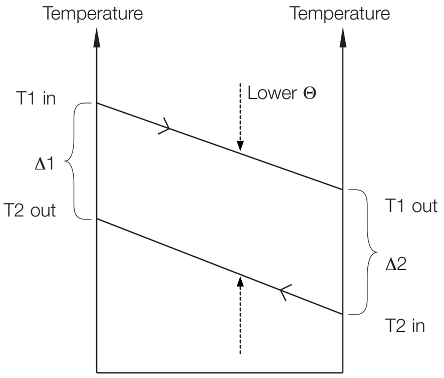
Specific heat
Specific heat (c_p) is the amount of energy required to raise 1 kg of a substance by one degree centigrade. The specific heat of water at 20°C is 4.182 kJ/kg °C or 1.0 kcal/kg °C.

Viscosity
Viscosity is a measure of the ease of flow of a liquid. The lower the viscosity, the more easily it flows.

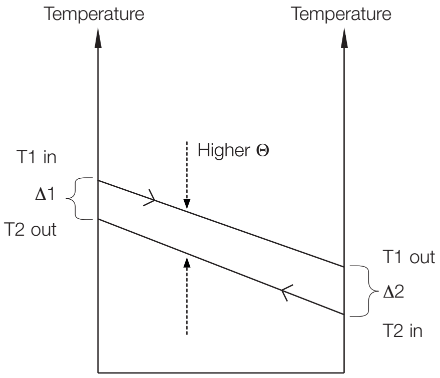
Viscosity is expressed in centiPoise (cP) or centiStoke (cSt).

Overall heat transfer coefficient
Overall heat transfer coefficient (k) is a measure of the resistance to heat flow, made up of the resistances caused by the plate material, amount of fouling, nature of the fluids and type of exchanger used.

Overall heat transfer coefficient is expressed as W/m^2 °C or kcal/h, m^2 °C.



The diagram shows that large temperature differences result in low theta.



The diagram shows that small temperature differences result in high theta.

Calculation method

The heat load of a heat exchanger can be derived from the following two formulas:

1. Heat load, Theta and LMTD calculation

$$P = m \cdot c_p \cdot \delta t \ (m = \frac{P}{c_p \cdot \delta t} \ ; \ \delta t = \frac{P}{m \cdot c_p})$$

$$P = k \cdot A \cdot LMTD$$

Where:

P = heat load (kW)
m = mass flow rate (kg/s)
c_p = specific heat (kJ/kg °C)
δt = temperature difference between inlet and outlet on one side (°C)
k = heat transfer coefficient (W/m^2 °C)
A = heat transfer area (m^2)
LMTD = log mean temperature difference

$$\Theta = \text{Theta-value} = \frac{\delta t}{LMTD} = \frac{k \cdot A}{m \cdot c_p}$$

T1 = Temperature inlet – hot side
T2 = Temperature outlet – hot side
T3 = Temperature inlet – cold side
T4 = Temperature outlet – cold side

LMTD can be calculated by using the following formula, where $\Delta T1 = T1–T4$ and $\Delta T2 = T2–T3$

$$LMTD = \frac{\Delta T1 - \Delta T2}{\ln \frac{\Delta T1}{\Delta T2}}$$

2. Heat transfer coefficient and design margin

The total overall heat transfer coefficient k is defined as:

Where: $\frac{1}{k} = \frac{1}{\alpha_1} + \frac{1}{\alpha_2} + \frac{\delta}{\lambda} + R_f = \frac{1}{k_c} + R_f$

The design margin (M) is calculated as: $M = \frac{k_c - k}{k}$

α_1 = The heat transfer coefficient between the warm medium and the heat transfer surface (W/m^2 °C)
α_2 = The heat transfer coefficient between the heat transfer surface and the cold medium (W/m^2 °C)
δ = The thickness of the heat transfer surface (m)
R_f = The fouling factor (m^2 °C/W)
λ = The thermal conductivity of the material separating the medias (W/m °C)
k_c = Clean heat transfer coefficient (R_f=0) (W/m^2 °C)
k = Design heat transfer coefficient (W/m^2 °C)
M = Design Margin (%)

Combination of these two formulas gives: $M = k_c \cdot R_f$

i.e the higher k_c value, the lower R_f-value to achieve the same design margin.

$$\mathrm{LMTD} = \frac{\Delta T1 - \Delta T2}{\ln \dfrac{\Delta T1}{\Delta T2}}$$

$$\frac{1}{k} = \frac{1}{\alpha_1} + \frac{1}{\alpha_2} + \frac{\delta}{\lambda} + R_f = \frac{1}{k_c} + R_f$$

Every parameter in the equation above can influence the choice of heat exchanger. The choice of materials does not normally influence the efficiency, only the strength and corrosion properties of the unit.

In a plate heat exchanger, we have the advantages of small temperature differences and plate thicknesses of between 0.3 and 0.6 mm. The alpha values are products of the very high turbulence, and the fouling factor is usually very small. This gives a k-value which under favourable circumstances can be in the order of 8,000 W/m² °C.

With traditional shell-and-tube heat exchangers, the k-value will be below 2,500 W/m² °C.

Important factors to minimize the heat exchanger cost:

1. Pressure drop
The larger allowed pressure drop, the smaller the heat exchanger.

2. LMTD
The larger the temperature difference between the media, the smaller the heat exchanger.

Manufacturing materials

High-quality AISI 316 stainless steel plates are used in most Alfa Laval heat exchangers for water/water applications. When the chloride content does not require AISI 316, the less expensive stainless steel material AISI 304 may sometimes be used. Several other plate materials are also available for various applications. For Alfa Laval brazed and fusion bonded plate heat exchangers AISI 316 is always used. For salt and brackish water only titanium should be used.

Pressure and temperature limitations

The maximum allowed temperature and pressure influence the cost of the heat exchanger. As a general rule, the lower the maximum temperature and maximum pressure are, the lower the cost of the heat exchanger will be.

Fouling and fouling factors

Fouling allowance can be expressed either as a design margin (M), i.e. an additional percentage of heat transfer area, or as a fouling factor (R_f) expressed in the units m² °C/W or m²h °C/kcal. R_f should be much lower for a plate heat exchanger than for a shell-and-tube exchanger. There are two main reasons for this.

Higher k-values means lower fouling factors

The design of plate heat exchangers gives much higher turbulence, and thereby thermal effeciency, than a shell-and-tube exchanger. A typical k-value (water/water) for a plate heat exchanger is 6,000-7,500 W/m² °C while a typical shell-and-tube exchanger only gives 2,000-2,500 W/m² °C. A typical R_f-value used for shell-and-tube exchangers is 1×10^{-4} m² °C/W. With k-values 2,000-2,500 W/m² °C this give a Margin of 20-25%. ($M = k_c \times R_f$). To achieve M = 20-25% in the plate heat exchanger with 6,000-7,500 W/m² °C the R_f-value should only be 0.33×10^{-4} m² °C/W.

Difference in how margin is added

In a shell-and-tube heat exchanger margin is often added by increasing the tube length, keeping the same flow through each tube. In a plate heat exchanger however, margin is added by adding parallell channels, i.e. lowering the flow per channel. This results in lower turbulence/efficiency, increasing the risk for fouling. A too high fouling factor can result in increased fouling!

For a plate heat exchanger in a water/water duty a Margin of 0-15% depending on water quality is normally enough.

Chapter 5

Product range

Alfa Laval has a full range of heat exchangers, heat exchanger systems and accessories catering to every need, however large or small.

Alfa Laval is your assurance of quality in terms of compactness, ease of installation, low maintenance costs, high energy efficiency, confidence and flexibility.

In other words, reliable operation, unsurpassed operating life span and fast return on investment.

Alfa Laval product range

Gasketed Plate Heat Exchangers

Read all about it in chapter 6

Brazed Plate Heat Exchangers

Read all about it in chapter 7

Fusion-bonded plate heat exchangers, AlfaNova

Read all about it in chapter 8

Air Heat Exchangers

Read all about it in chapter 9

Heating and Cooling systems

Read all about it in chapter 10

Tap Water Systems

Read all about it in chapter 11

Tubular Heat Exchangers

Read all about it in chapter 12

All Welded Heat Exchangers

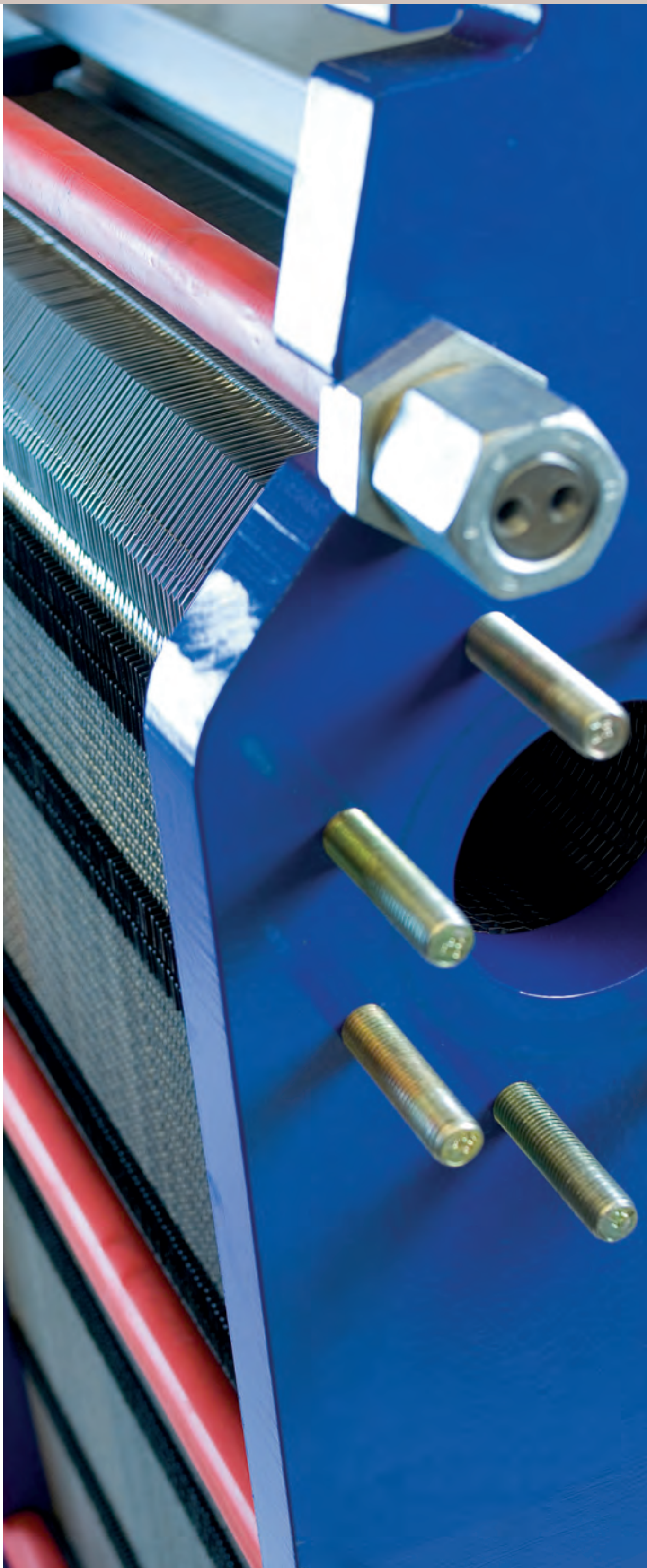
Read all about it in chapter 13

Filters

Read all about it in chapter 14

Chapter 6

Gasketed plate heat exchangers (GPHE)



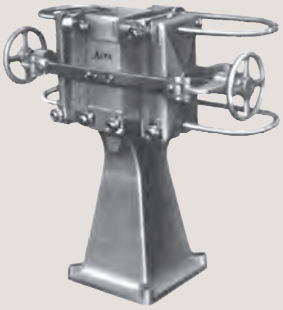
Alfa Laval plate heat exchangers are the most cost-effective solution available for your comfort heating and cooling needs.

Our gasketed plate heat exchanger range is the result of years of experience, research and development in heat transfer technology.

Our gasketed plate heat exchangers feature certified materials and advanced design to guarantee maximum performance with minimum operating costs.

At a quick glance the design may seem traditional, but when studying the plates, gaskets and frames in detail the superiority of Alfa Laval gasketed plate heat exchangers becomes obvious. As always, attention to detail is what gives Alfa Laval the winning edge.

Our products and our sales and service organization make Alfa Laval the ideal business partner, as well as the unquestioned world market leader.



Alfa Laval supplied the first plate heat exchangers to the dairy industry in 1931. Plates were 5-10 mm thick with a milled pattern, compared to 0.4 mm today. In developing our range of plate heat exchangers, we have focused on cost-efficiency.

Six reasons to buy your gasketed plate heat exchangers (GPHEs) from the market leader

1. Technology that saves you money
The result of decades of development and testing, Alfa Laval plate heat exchangers utilize well-proven materials and advanced design that optimize performance, Most important of all, they reduce your operating costs and save you money.

2. Service-friendly design
Service-friendly designs ensure that even the largest Alfa Laval GPHE can be serviced rapidly and easily by one person using standard tools. This reduces downtime, enhances safety and ensures a longer equipment lifetime.

3. A wide range of solutions
We have the ideal solution for every specific need. Alfa Laval GPHEs come in a wide range of sizes and capacities, Different plate patterns are available for various duties and performance specifications. A range of pressing depths from 1.5 to 11 mm ensures an optimal plate design for any duty. Two-pass plate packs can give double capacity in the same floor space.

4. Full compliance with PED
All Alfa Laval GPHEs comply with the European Pressure Vessel Safety Directive, PED, in terms of mechanical and materials specifications. They can also be delivered according to other relevant standards,such as ASME. Various national codes are also available.

5. A partner you can trust
Genuine application know-how and long experience make Alfa Laval the ideal business partner for heating and cooling. Rely on us to supply the most cost-effective solution for your specific needs – we won't let you down.

6. Fast deliveries and service worldwide
Alfa Laval is truly a global company. Our regional distribution centres serve Alfa Laval facilities and distributors worldwide, ensuring fast delivery to customers. We also have more than 30 Alfa Laval GPHE Service Centres throughout the world. Wherever you are, talk to us, we're only a phone call away.

A few benefits of using gasketed plate heat exchangers

Low capital investments
Thanks to the high heat transfer coefficients, the required plate surface area can be quite small. Reducing the amount of material used makes for significant savings.

Small footprint
With its compact design, the plate heat exchanger has a smaller footprint than any other comparable solution.

Low installation costs
Parallel and counter-current flow connections make installation easy, reducing costs for pipes and valves.

Easy expansion
Versatile bolted construction makes future expansion easy, simply by adding further plates to increase heat transfer capacity.

Complete restoration of heat transfer
The heat-transfer area can be readily inspected by disassembling the plates. With suitable maintenance, 100% of performance can be recovered at low cost.

Low maintenance cost
Glue-free clip-on gaskets ensure fast, easy maintenance, with significant savings in labour costs.

Minimum downtime
High-quality materials and careful gasket and heat-transfer plate design provide effective protection from fouling, thus minimizing downtime.

Low energy consumption
Close-approach temperatures make it possible to reduce the flow rates needed for heating or cooling, which makes for lower pumping costs.

Readily recyclable materials
Materials used in construction are pure and thus easily recycled with the environmental benefits this ensures.

Attention to detail

Alfa Laval gasketed heat exchangers are the product of years of experience in heat-transfer technology.

At a quick glance the design may seem traditional, but when studying the main components in detail the superiority of Alfa Laval heat exchangers becomes obvious.
In this chapter, we will illustrate the construction details that will help you choose the right plate heat exchanger.

In particular, we will discuss the following main components:

- Gaskets
- Plates
- Frame
- Insulation

Gaskets

The gaskets in Alfa Laval gasketed plate heat exchangers are an advanced hydraulic sealing system designed for high performance and long operating life.

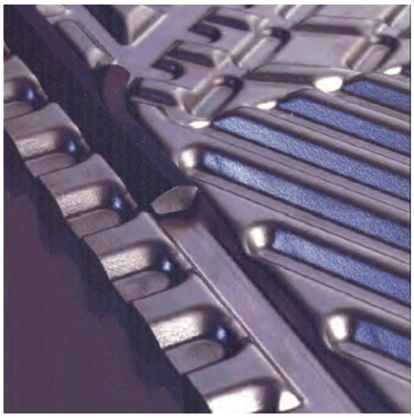
Our "roof-top" gasket profile produces a highly efficient seal, minimizing the risk of leakage.

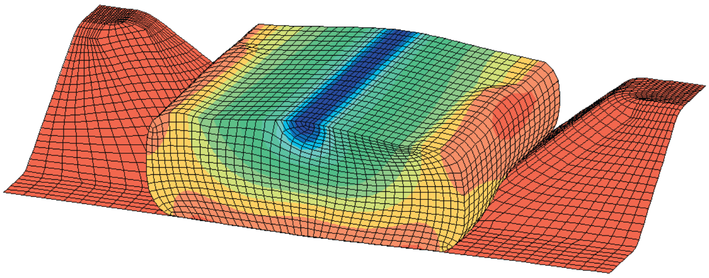
All gaskets are made from a single uniform rubber by the best suppliers, In addition, they are moulded in one piece, guaranteeing exact gasket geometry with no weak links from vulcanisation.

Gaskets are available in a wide range of elastomers, the most common being nitrile rubber and EPDM.
The choice of gasket material depends on the chemical composition of the media and the combination of temperature and operating pressure. Gasket properties change over time and as a result of temperature, oxidizing agents or chemicals in the transfer medium.

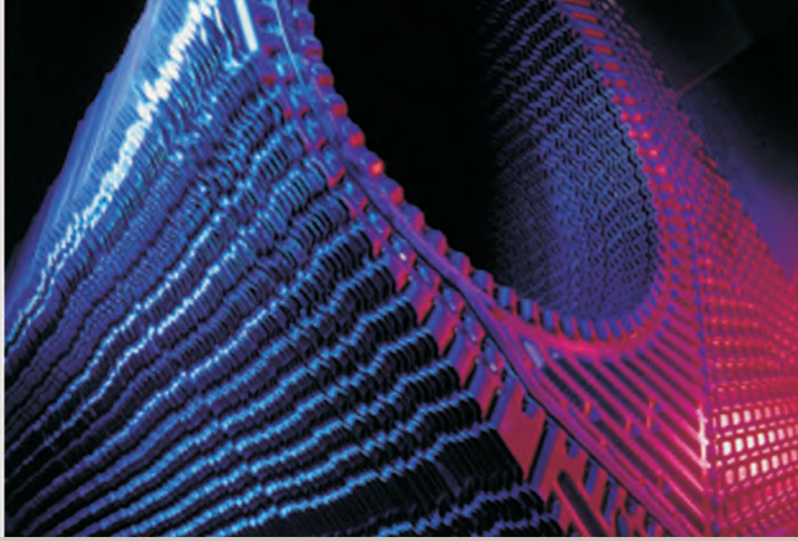
Alfa Laval was the first heat-exchanger manufacturer to develop and use the glue-free clip-on system that makes it easier to replace gaskets during maintenance, thus saving time.

Gasket groove design ensures minimum contact between the gasket and the media, helping extend the heat exchanger's operating life. The groove on the plate and the gasket match perfectly, ensuring that the gasket is fully supported.





Alfa Laval R&D focuses to optimize the sealing system to its fullest, with help of latest technology like FEM analysis. With help of 3D FEM analysis the gasket profile and gasket track in the plate is optimized to accomplish highest possible sealing safety with thinnest possible plate material.



Plates

Reliability in a single step

The transfer efficiency and degree of process control offered by a GPHE depend partly on the thickness of the plates. In today's advanced Alfa Laval units, plates as thin as 0.4 mm, normally in stainless steel. They offer highly efficient heat transfer and impressive strength.

Each plate is pressed in a single step in a hydraulic press exerting a pressure of up to 40,000 tons. Thus all plates are identical, minimizing the risk of distortion and leakage when hundreds are stacked together in a GPHE. When assembled with gaskets, the metal-to-metal contact points on the plates create a flexible, yet mechanically stable construction that can withstand enormous stress.

Traceability and identification

Alfa Laval plates and gaskets are stamped and marked with identifications, making it possible to trace the components, put the plates in correct order during maintenance and guarantee correct replacement in case of service.

The pattern of performance

The corrugated pattern on the plates gives parallel flow and strength. The "chocolate" pattern of the distribution area ensures even distribution of the fluid over the plate surface, while the herringbone pattern in the main heat-transfer area creates maximum turbulence.

Together, these features ensure high heat transfer efficiency and eliminate dead spots that can lead to scaling and corrosion. With parallel flow, only one plate type and one gasket type are required in the heat exchanger. This means fewer spare parts and simpler installation and maintenance. As the plate corrugations are fully supported diagonally across the entire surface, a higher design pressure can be achieved, or plates can be made thinner.

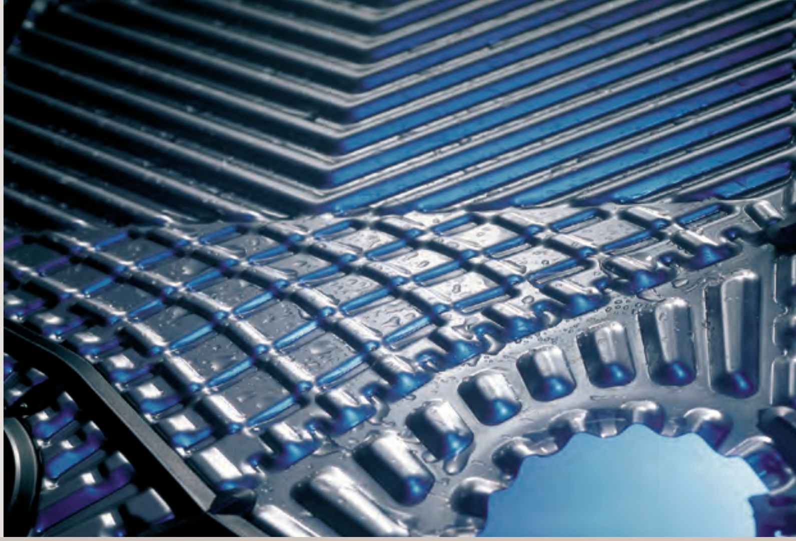
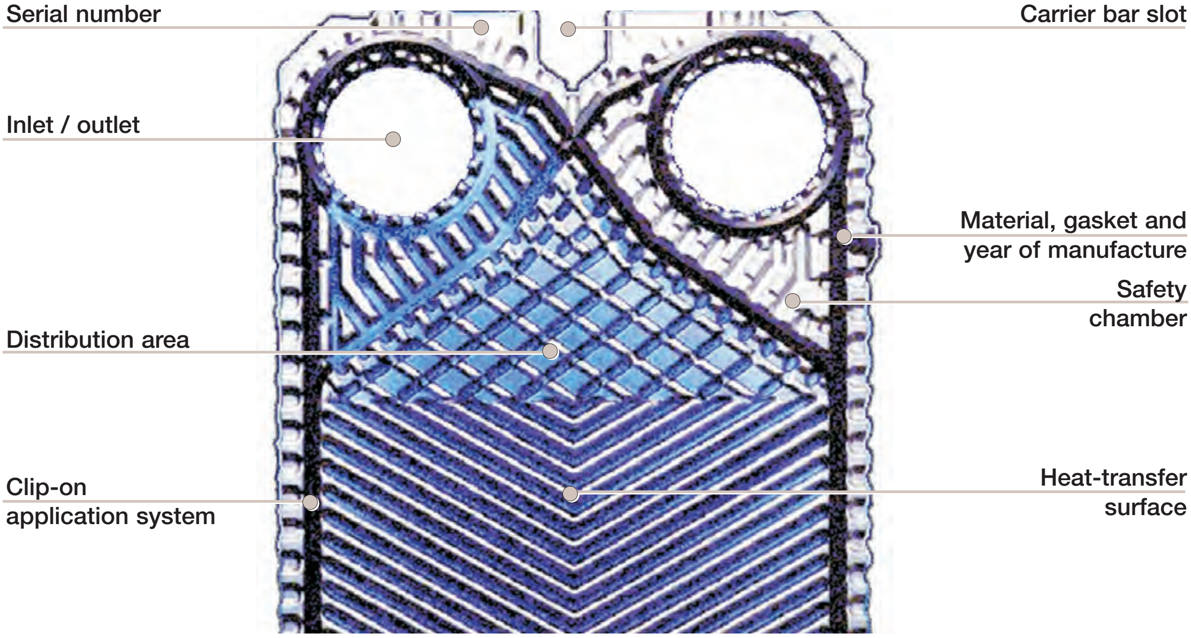


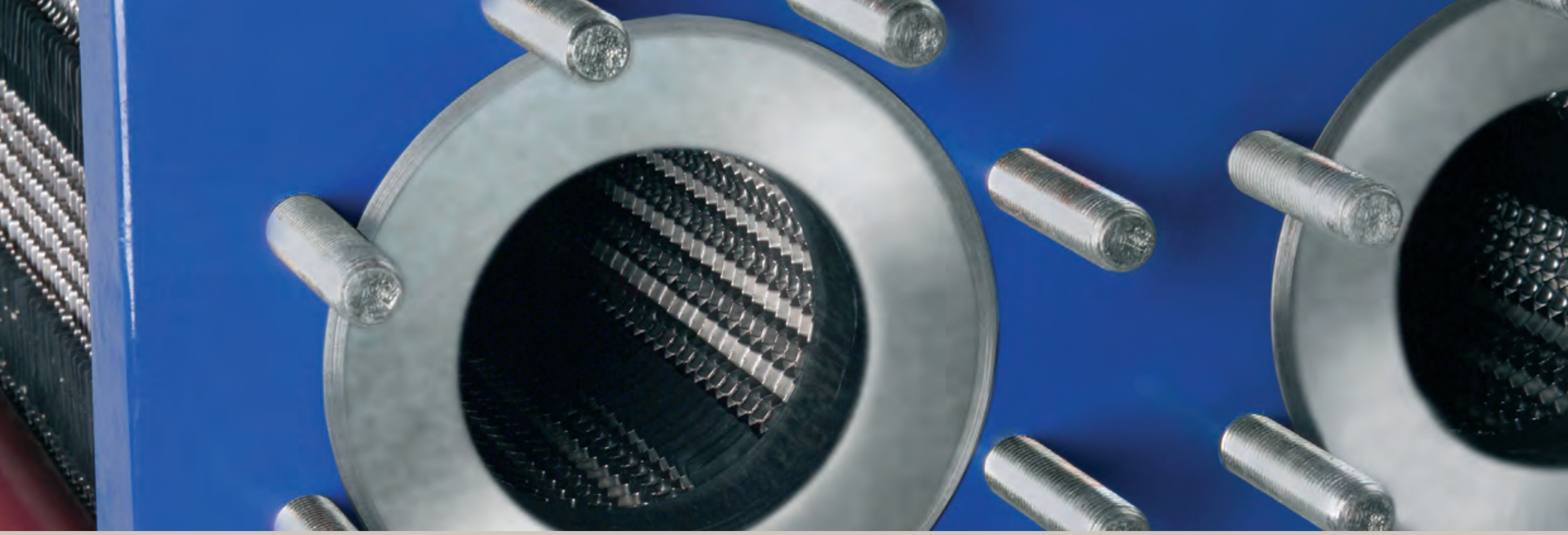
Plate areas



The heat-transfer surface
The heat exchanger plates are pressed in a so-called herringbone corrugation pattern. When two plates are superimposed with opposing herringbone patterns, this type of corrugation generates a helix-like flow with very high turbulence, thus producing the essential condition for achieving high transfer coefficients and effective heat exchanger self-cleaning. By changing the plate corrugation pattern, the heat exchanger can be used in different processes, even those with very dirty media.

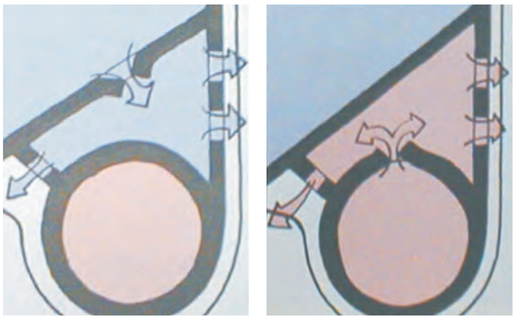
The distribution area
The plate distribution is pressed in a so-called chocolate pattern. This pattern is an Alfa Laval innovation that has revolutionized plate heat exchangers.

This type of corrugation has numerous advantages. Among the most important: it optimises flow distribution over the entire transfer surface involved in parallel flow and, above all, eliminates the dead spots in the corners that are the main cause of corrosion and fouling.



Safety chamber

Accidental mixing of the two circuits is never caused by leakage as a result of the failure of a gasket. Thanks to the double gasket and the safety chamber, if a gasket fails the fluid will flow out of the heat exchanger through the gasket vents.
The leak can thus be identified and repaired with no risk of contamination between the two media.



Standard plate materials

Plates can be obtained in all pressable materials.
The most common materials are:

- AISI 304
- Typically used for water-water transfer with up to 50 ppm of chorides at 50°C

- AISI 316
- Typically used for water-water transfer with up to 250 ppm of chorides at 50°C

- Titanium
- Typically used for seawater

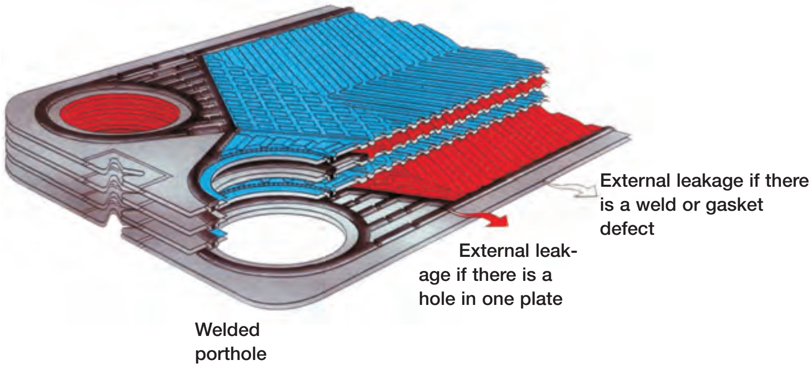
Special Plates

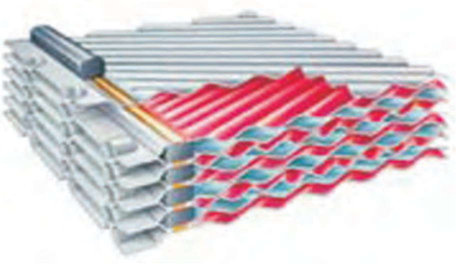
Double-wall plates

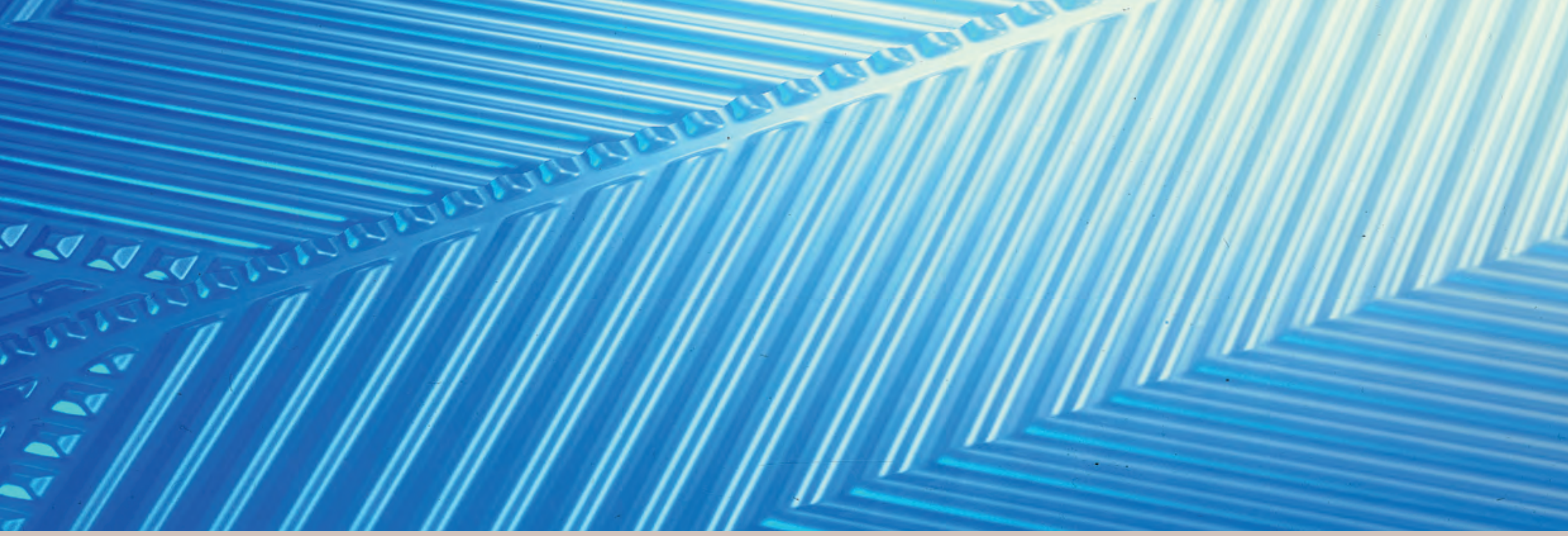
Double-wall plate heat exchangers are ideal for use with fluids that must not be allowed to mix.
Pairs of identical plates are laser-welded around the ports. The gasket is installed in the conventional manner and the welded plate pairs are assembled in a plate pack in the same way as ordinary single plates.
In the unlikely event of leakage through a plate because of a puncture or crack, the leaking fluid will never come into contact with the fluid in the other circuit, as it will be stopped by the double plate and flow outside the heat exchanger.

Semi-welded plates

Semi-welded plates are used when one of the two media is particularly aggressive for most elastomers.
The aggressive fluid flows in the welded channels along the gasket groove, while the non-aggressive fluid flows in the gasketed channels.
Semi-welded plates are available for models M6M, M10B, M20M.







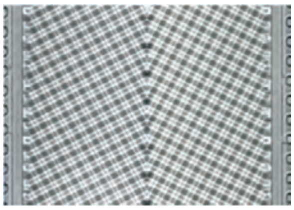
Channel types

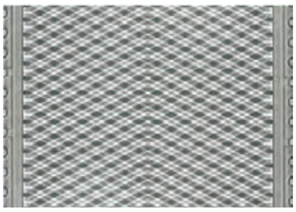
We have two plate corrugations (L and H)
These form three different channels (L, M, H)


L: Low theta


H: High theta


L + L = L channel

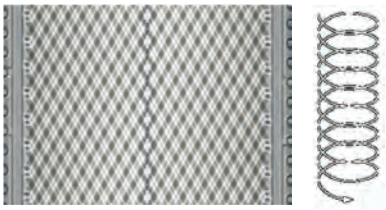

L + H = M channel


H + H = H channel

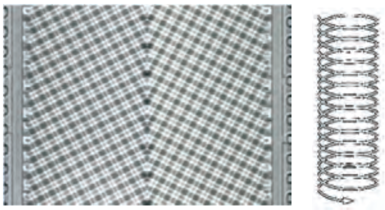
Optimal channel type is selected on the basis of the temperature program to be satisfied and the maximum permissible pressure drop

Channel characteristics

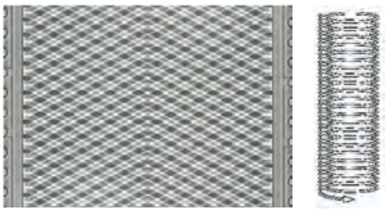
Low turbulence and pressure drop


"L" channels

Medium turbulence and pressure drop


"M" channels

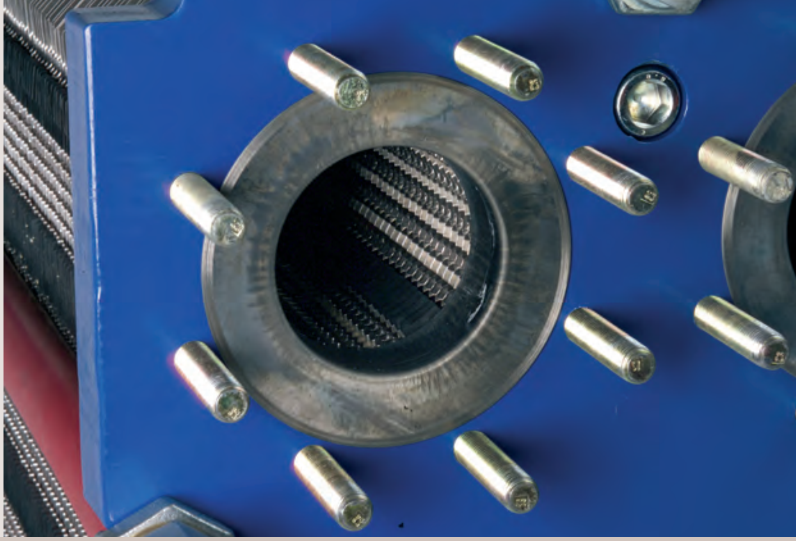
High turbulence and pressure drop


"H" channels

Advantages
- Efficient heat transfer
- High turbulence
- Variable thermal length
- Low pressure drop

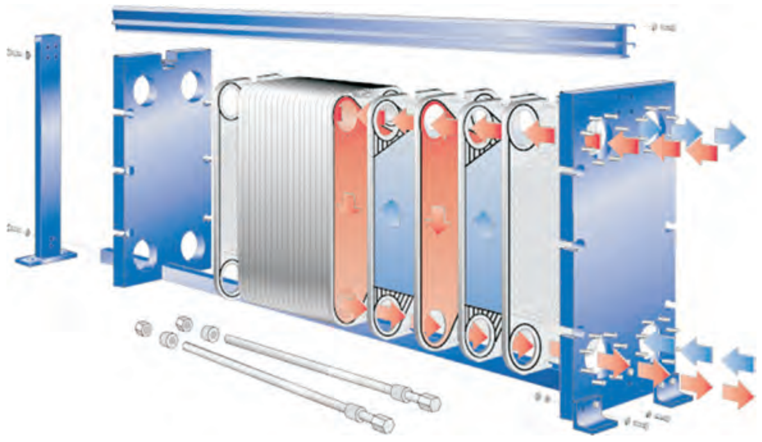
Benefits
- Increased heat recovery
- High self-cleaning coefficients
- Low heat-transfer surface area
- Low pumping costs

Frame



Designed with service in mind

Alfa Laval gasketed plate heat exchangers of all sizes can be opened quickly and easily for inspection and gasket replacement by one man using standard tools. They are reassembled just as easily. Our large units feature Alfa Laval's 5-point alignment system. Precise positioning of the plates horizontally and vertically ensures efficient sealing throughout the plate pack. A roller on the pressure plate, and bearing boxes on the four tightening bolts, make opening and closing an easy task. Simpler in design, our smaller plate heat exchangers are equally service-friendly, while keeping costs to a minimum. During reassembly, alignment of the plate pack is achieved using the round carrying and guide bar.



Corner guides lock the plates in position and ensure perfect final alignment.

Bearing boxes and a roller make tightening the plate pack easier.

On medium-large heat exchangers, the carrying bar and roller facilitate opening and closing.

Lifting lugs are provided right on the frame covers for safe and easy handling.

Tightening bolts on the sides reduce the amount of room required for opening and closing.

Connections can be in stainless steel, titanium, rubber or painted carbon steel.

”No Shift” 5-point metal-to-metal alignment system

- Keeps plates aligned easily during opening and closing
- Guarantees first time seal
- Improves protection against gasket blow-out

Stainless-steel roller assembly to facilitate opening and avoid wear & tear on carrying bar

Bolted construction (no welded parts) allowing field assembly and future expansion

Connections are available with metal linings, rubber linings or unlined

Lifting lugs or lifting holes for safe & easy handling

In single-pass units:
All connections in frame plate enables maintenance without disconnection of piping

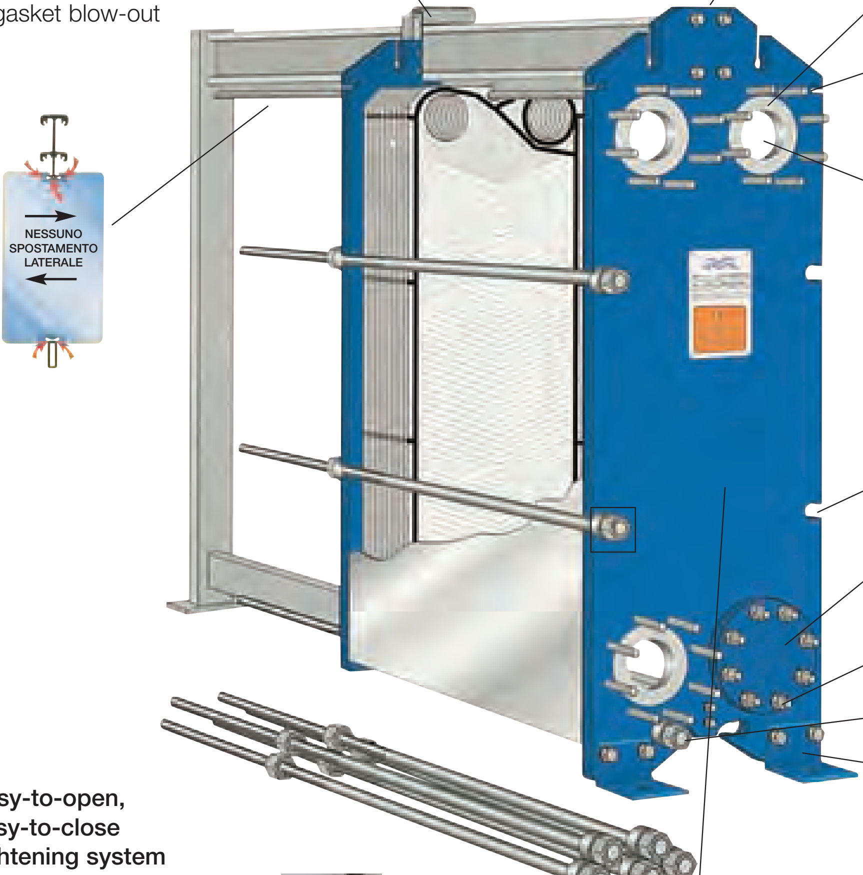
Recess to secure bolts safely

In multi-pass units:
Blind flanges & inspection covers available

Studded port allowing increased pipe loads

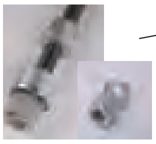
Superior bolt closing system

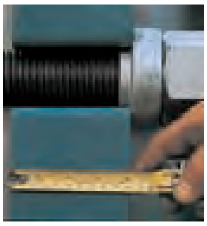
Bolted feet for increased stability and fixing to the floor



Easy-to-open, easy-to-close tightening system

- Low torque bearing box and lock washers allow easy opening and closing
- Simple, one-person operation
- No special tools required
- Rolled threads eliminate galling and seizing
- Bolted construction (no welded parts) allowing field assembly and future expansion





Heavy-duty design without reinforcements

- Applies uniform plate pressure
- Eliminates flexing or bending of plates
- Creates a superior seal
- Extends gasket life

Frame standards

- ASME, U and UM
- PED/CE marking
- Alfa Laval standard for other, local PV rules.

When performance is crucial

AlfaQ™ AHRI-certified plate heat exchangers

When performance is crucial, each component of an HVAC system must be optimized to perform exactly as specified.

The Air Conditioning, Heating and Refrigeration Institute (AHRI) Standard 400 certification is an independent, third-party verification of thermal performance. AHRI 400 is now a global standard, assuring customers worldwide that the heat exchangers they choose will perform according to specification.

Performance certification verifies that the product performs in accordance with the manufacturer's published ratings, and is particularly useful in applications such as district-cooling substations, ice-storage systems, data centres and free-cooling systems.

Alfa Laval was the first to offer a broad range of heat exchanger innovations – the AlfaQ™ range – that are certified to AHRI 400.

Certification leads the "green" wave
AHRI-certified heat exchangers can meet the Leadership in Energy and Environmental Design (LEED) standards for heating and cooling applications. LEED is an internationally recognized mark, providing building owners and operators with a framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions.
Through its certification program and standards, AHRI strives to help customers save energy, improve their productivity and contribute to a better environment.

AHRI Certification Procedures and Benefits
Performance deficiencies in an HVAC system are difficult to detect and can result in much higher energy costs. Certification of all components assures the buyer that the system will perform optimally.

To certify a product to AHRI standards, the manufacturer submits specifications and performance data to AHRI for performance evaluation and potential certification.

The certification assures buyers and users that:

- The plate heat exchanger will perform in accordance with the manufacturer's published ratings.
- Product performance can be easily compared for their specific application.

Alfa Laval has accomplished a 100% success rate in the AHRI performance certification program for more than a decade.

Cost-effective for everyone involved
Consultants

- Allows for the design of a system in which all the major components are independently performance certified, ensuring that targets on power consumption and climate control can be met.
- Provides a verifiable basis for heat exchanger selection.
- Protects the owner and consulting engineer from performance concerns during commissioning and after installation.

Contractors

- Eliminates field acceptance tests of each component, thereby reducing payment hold-back times after commissioning.
- Ensures that all certified plate heat exchangers included in proposals will deliver the stated thermal performance.
- Reduces troubleshooting time during commissioning and after start-up.

End users

- Reduces lifetime operating costs significantly by assuring a more energy-efficient system.
- Ensures full investment value by reducing costs for field tests and additional component performance margins.

AlfaQ™ plate heat exchangers, the optimal choice

Alfa Laval's broad range of heat exchangers for HVAC applications include gasketed, semi-welded, fully-welded, double-wall plate, and brazed heat exchangers. The AlfaQ™ Series are part of our gasketed plate heat exchanger portfolio.

AlfaQ™ plate heat exchangers are available to meet most heat-transfer requirements – whether large or small – and include a three-year warranty, demonstrating our commitment to optimizing the performance of our customers' processes.

AlfaQ™ Series is the optimal choice when performance is crucial.

3
Three year warranty

Model	AQ1	AQ1L	AQ2	AQ2L	AQ2S	AQ4	AQ4L	AQ6
Nom flow rate m^3/h/GPM	14/80	14/80	58/250	58/250	72/300	180/980	180/980	430/1850
Nom design temp C˚/F˚	180/300	180/300	180/300	180/300	180/300	180/300	180/300	180/300
Nom. design pressure bar/psi	16/150	16/150	25/300	25/300	25/300	25/300	25/400	30/400

Model	AQ6L	AQ8	AQ8S	AQ10	AQ14	AQ14L	AQ20
Nom flow rate m^3/h/GPM	430/1850	800/3600	700/3100	900/6000	1800/7900	2000/8000	3600/15500
Nom design temp C˚/F˚	180/300	180/300	180/300	180/300	180/300	180/300	180/300
Nom. design pressure bar/psi	30/460	30/400	30/400	30/400	25/300	30/400	25/300

Insulation

Insulation

Insulation, designed for HVAC applications, is available for most GPHE models. There are two different types of insulation – heating and cooling insulation.

The reason for having two different types is that the mineral wool will be wet from condensing water if used when the heat exchanger temperature is lower than the surrounding temperature. Polyurethane is more expensive than mineral wool, but technically the cooling insulation can be used for heating duties as well.

Drip tray

The Alfa Laval drip tray insulates the heat exchanger from the floor, and it also collects any condensate formed on the outside of the heat exchanger. The drip tray also collects any remaining water (after drainage) in the GPHE when the unit is opened for inspection or maintenance. The drip tray consists of 0.75 mm hot galvanized steel plates, 50 mm polyurethane foam, supports of waterproof wood, and a draining valve.

Heating insulation
Heating insulation consists of 65 mm of mineral wool, cladded with a 1 mm aluminium sheet on the outside and aluminium foil on the inside. It covers all sides of the GPHE including the frame and pressure plate, except downwards. The different parts are held together with snap catches.

Cooling insulation
Cooling insulation consists of 60 mm of polyurethane, cladded with a 1 mm aluminium sheet on the outside and aluminium foil on the inside. It covers all sides of the GPHE including the frame and pressure plate, except down wards, where there is a galvanized drip tray. The different parts are held together with snap catches.

Protection sheet

A protection sheet is a device covering all sides of the plate pack except downwards. It is used to prevent persons from getting injured if a sudden leak of hot, corrosive or toxic media should occur. The Alfa Laval protection sheet consists of one or more aluminium or stainless-steel (AISI 304) sheet(s) formed to fit the GPHE. On most frames the sheet is fitted between the plate pack and the tightening bolts.

Instructions for use

Start-up procedure

1. Before starting any pump, check whether instructions exist stating which pump should be started first.
2. Check that the valve between the pump and the heat exchanger is closed.
3. Check that the valve at the exit, if there is one, is fully open.
4. Open the ventilation.
5. Start the pump.
6. Open the valve slowly.
7. When all the air is out, close the ventilation.
8. Repeat the procedure for the other side.

Shut-down procedure

1. First establish whether instructions exist as to which side should be stopped first.
2. Slowly close the valve controlling the flow rate of the pump you are about to stop.
3. When the valve is closed, stop the pump.
4. Repeat the procedure for the other side.

Installation instructions

In HVAC applications, it is recommended, from a performance point of view, to install the heat exchanger so that a counter-current flow is obtained. Alfa Laval recommends installing the GPHE on a flat foundation giving the necessary support to the frame. It is important to leave free space around the GPHE, to be able to carry out maintenance work if needed. Make sure that all foreign objects have been rinsed out of the system before connecting any piping to the heat exchanger. Also, no stress or strain is to be placed on the GPHE by the piping system.

Operation

Adjustments in flow rates to maintain correct temperatures or pressure drops should be made slowly in order to prevent pressure shocks to the system. Any problems in maintaining the performance of the heat exchanger may be caused by changing temperature conditions, changing flow rates or by fouling. As long as the GPHE is operating satisfactorily, it should be left without any interference. After start-up, the GPHE does not require continuous supervision.

Maintenance instructions

The heat transfer through the plates can be seriously reduced by the formation of deposits of various kinds on the plate surfaces. Even if the highly turbulent flow gives a strong resistance to the formation of deposits the turbulence can not completely eliminate fouling. Normal maintenance does not usually require the GPHE to be opened (apart from occasional check of plates and gaskets). Thanks to CIP (Cleaning In Place) it is possible to remove calcium deposits and other forms of scaling from the plate surfaces in an easy and effective way without opening the heat exchanger. Different cleaning solutions can be used depending on the type of deposits. Alfa Laval has a worldwide service organization. Service is available in 130 countries at 15 major service centres and a network of service stations around the globe.

Technical specifications

Gasketed plate heat exchanger (GPHE) data and dimensions

	T2	M3	TL3	T5	M6	
Plate types	T2B	M3/M3D	TL3B/TL3P/TL3BD	T5M/T5B	M6, M6M, M6MD	
Frame type	FG	FG	FG	FG	FG	FD
Height, H [mm]	380	480	790	737	920	940
Width, W [mm]	140	180	190	245	320	330
Min standard length, L [mm]	165	400	420	190	500	500
Max standard length, L [mm]	275	650	1370	365	1500	1500
Vertical port distance, VC [mm]	298	357	668	553	640	640
Horizontal port distance, HC [mm]	50	60	60	100	140	140
Max temperature [°C]	180	180	180	180	180	180
Max pressure [barg]	16	16	16	16	16	25
PV codes and directives*	ALS	ALS, PED, ASME	ALS, PED, ASME	ALS, PED, ASME	ALS, PED, ASME	PED, ASME
Flange size	–	–	–	–	DN50/2”	DN50/2”
Pipe size	3/4”	1¼”	1¼”	2”	2”	
Max. flow rate [kg/s]	2	4	4	14	16	

	TL6			TS6	
Plate types	TL6B			TS6M	
Frame type	FM	FG	FD	FG	FD
Height, H [mm]	1264	1299	1308	704	704
Width, W [mm]	320	320	320	400	410
Min standard length, L [mm]	615	620	625	530	540
Max standard length, L [mm]	1665	1670	1675	1430	1440
Vertical port distance, VC [mm]	1036	1036	1036	380	380
Horizontal port distance, HC [mm]	140	140	140	203	203
Max temperature [°C]	180	180	180	180	180
Max pressure [barg]	10	16	25	16	20.6
PV codes and directives*	ALS, PED	ALS, PED, ASME	ALS, PED, ASME	ALS, PED, ASME	ASME
Flange size	DN50/DN65/2"/2,5"			DN65/2,5”	2.5”
Pipe size	2”				
Max. flow rate [kg/s]	20			20	

	M10				TL10			
Plate types	M10M, M10B, M10BD				TL10B, TL10P			
Frame type	FL	FM	FG	FD	FM	FG	FD	FS
Height, H [mm]	1084	1084	1084	1084	1885	1923	1923	1923
Width, W [mm]	470	470	470	470	480	480	480	480
Min standard length, L [mm]	800	700	700	800	850	850	850	850
Max standard length, L [mm]	1100	2300	2300	2400	2350	3250	3250	3250
Vertical port distance, VC [mm]	719	719	719	719	1338	1338	1338	1338
Horizontal port distance, HC [mm]	225	225	225	225	225	225	225	225
Max temperature [°C]	130	180	180	180	160	160	160	160
Max pressure [barg]	6	10	16	25	10	16	25	27.6
PV codes and directives*	ALS	ALS, PED	ALS, PED, ASME	ALS, PED, ASME	ALS	ALS, PED, ASME	PED	ASME
Flange size	DN100/4”				DN100/4”	DN100/4”	DN100/4”	4”
Max. flow rate [kg/s]	50				50			

	M15			TL15-B			
Plate types	M15B, M15M, M15BD			TL15B			
Frame type	FM	FG	FD	FM	FG	FD	FS
Height, H [mm]	1885	1885	1980	2672	2752	2752	2752
Width, W [mm]	610	650	650	610	637	646	646
Min standard length, L [mm]	1150	1110	1140	928	928	928	928
Max standard length, L [mm]	2050	3210	3240	4368	4368	4368	4368
Vertical port distance, VC [mm]	1294	1294	1294	2035	2035	2035	2035
Horizontal port distance, HC [mm]	298	298	321	288	288	288	288
Max temperature [°C]	180	180	180	180	18	180	180
Max pressure [barg]	10	16	25	10	16	20.7	30
PV codes and directives*	ALS, PED	ALS, PED, ASME	ALS, PED, ASME	ALS	ALS, PED, ASME	ASME	ALS, PED, AMSE
Flange size	DN150/6”			DIN150/6”			
Max. flow rate [kg/s]	120			120			

	TS20			T20		
Plate types	TS20M			T20M, T20B, T20P		
Frame types	FM	FG	FS	FM	FG	FS
Height, H [mm]	1405	1405	1435	2150	2150	2180
Width, W [mm]	740	800	800	750	780	780
Min standard length, L [mm]	900	900	950	1250	1250	1300
Max standard length, L [mm]	2700	2700	2750	3350	3950	4000
Vertical port distance, VC [mm]	698	698	698	1478	1478	1478
Horizontal port distance, HC [mm]	363	363	363	353	353	363
Max temperature [°C]	180	180	180	180	180	180
Max pressure [barg]	10	16	30	10	16	30
PV codes and directives*	ALS, PED	ALS, PED, ASME	PED, ASME	ALS	ALS, PED, ASME	PED, ASME
Flange size	DN200/8”	DN200/8”	DN200/8”	DN200/8”	DN200/8”	DN200/8”
Max. flow rate [kg/s]	190			225		

	MX25					M30		
Plate types	MX25M, MX25B					M30/M30D		
Frame types	FMS	FGS	FG	FD	FS	FM	FG	FD
Height, H [mm]	2595	2595	2895	2895	2895	2882	2882	2920
Width, W [mm]	920	920	920	940	940	1150	1170	1190
Min standard length, L [mm]	1550	1600	1600	1600	1600	1600	1600	1650
Max standard length, L [mm]	3350	3400	5200	5200	5200	5200	5200	5250
Vertical port distance, VC [mm]	1939	1939	1939	1939	1939	1842	1842	1842
Horizontal port distance, HC [mm]	439	439	439	439	439	596	596	596
Max temperature [°C]	180	180	180	180	180	180	180	180
Max pressure [barg]	10	16	16	25	27.6	10	16	25
PV codes and directives*	ALS, PED	ALS, PED, ASME	ALS, PED, ASME	PED, ASME	ASME	ALS, PED, ASME		
Flange size	DN200/DN250/8”/10”	DN200/8”	DN200/DN250/8”/10”	DN200/DN250/8”/10”	8”/10”	DN300/DN350/12”/14”		
Max. flow rate [kg/s]	250					497		

	TL35				T45		
Plate types	TL35B				T45-M		
Frame types	FM	FG	FD	FS	FM	FG	FD
Height, H [mm]	3210	3210	3218	3218	3560	3560	3560
Width, W [mm]	1506/1154**	1506/1154**	1529/1174**	1526/1174**	1782/1430**	1782/1430**	1782/1430**
Min standard length, L [mm]	2195	2210	2235	2245	2774	2774	2774
Max standard length, L [mm]	4595	4610	3435	3345	6404	6404	6404
Vertical port distance, VC [mm]	2177	2177	2177	2177	2468	2468	2468
Horizontal port distance, HC [mm]	578	578	578	578	720	720	720
Max temperature [°C]	180	180	180	180	180	180	180
Max pressure [barg]	10	16	25	30	10	16	25
PV codes and directives*	ALS, PED, ASME				ALS	ALS, PED, ASME	ASME
Flange size	DIN300/DIN350/12”/14”				DIN450/18”		
Max. flow rate [kg/s]	550				1000		

Gasketed plate heat exchangers range

T2	M3	TL3
Read all about it on page 6:21	Read all about it on page 6:23	Read all about it on page 6:25
		
T5	**M6**	**TL6**
Read all about it on page 6:27	Read all about it on page 6:29	Read all about it on page 6:31
		
TS6	**M10**	**TL10**
Read all about it on page 6:33	Read all about it on page 6:35	Read all about it on page 6:37
		

M15

Read all about it on page 6:39

TL15-B

Read all about it on page 6:41

TS20

Read all about it on page 6:43

T20

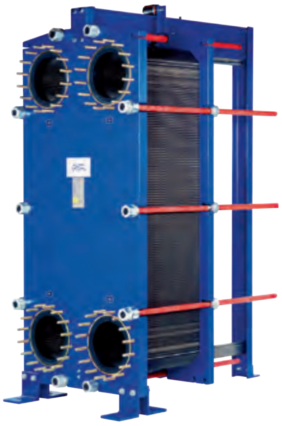
Read all about it on page 6:45

MX25

Read all about it on page 6:47

M30

Read all about it on page 6:49



TL35

Read all about it on page 6:51

T45

Read all about it on page 6:53

T2

Plate Heat Exchanger

T2B-FG

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

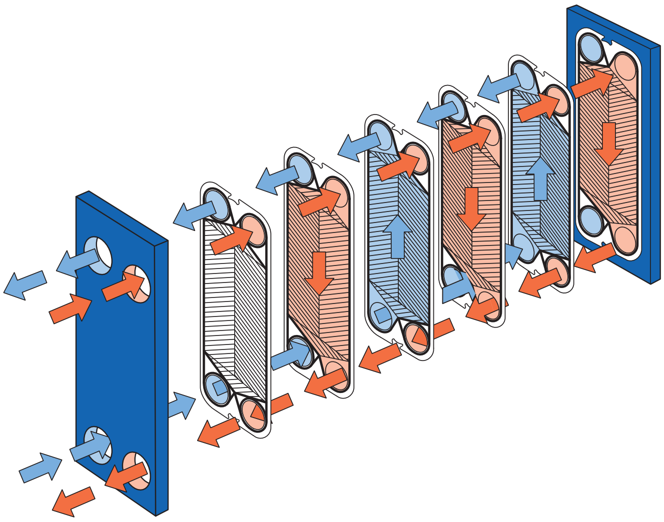
Typical capacities

Liquid flow rate
Up to 2 kg/s (30 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
T2-B

Frame types
FG

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Pipe: Stainless steel, Titanium

Plates
Stainless steel Alloy 316, Titanium

Gaskets
Nitrile, EPDM

TECHNICAL DATA

Pressure vessel code pvcALS$^{\text{TM}}$

Mechanical design pressure (g) / temperature
FG 1.6 MPa / 180°C

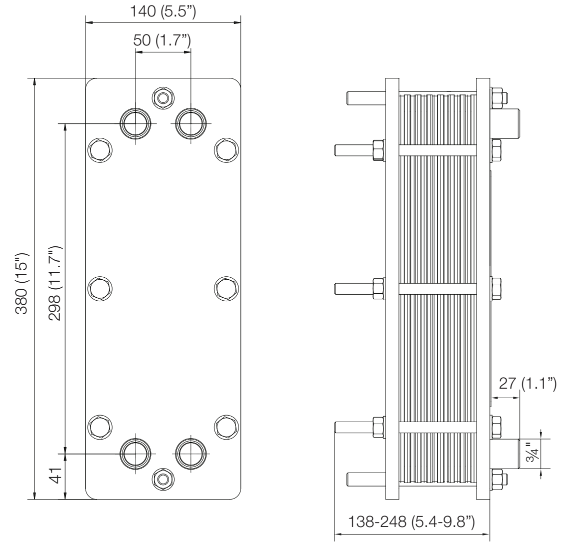
Maximum heat transfer surface
1.0 m^2 (10.76 sq. ft)

Connections
Straight pipe thread ISO-R ¾"

Particulars required for quotation

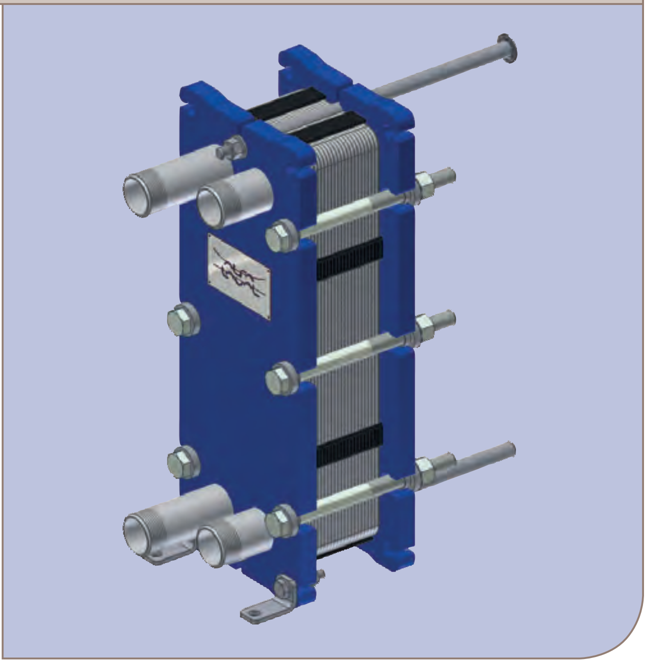
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop

Dimensions mm (inch)



M3

Plate Heat Exchanger



M3-FG

Applications

General heating and cooling duties. Heating by means of steam.

Standard design

The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities

Liquid flow rate

Up to 4 kg/s (60 gpm), depending on media, permitted pressure drop and temperature program.

Plate types

M3 and M3-X, where M3 provides parallel and M3-X diagonal flow (see figures on the next page).
M3D, double wall plates.

Frame types

FG

Water heating by steam

50 to 250 kw

Working principle

Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.

STANDARD MATERIALS

Frame plate

Mild steel, Epoxy painted

Nozzles

Carbon steel
Pipe: Stainless steel, Titanium

Plates

Stainless steel Alloy 316, Titanium

Gaskets (Clip-on)

Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FG	PED, pvcALS™	1.6 MPa / 180ºC
FG	ASME	150 psig / 350ºF

Maximum heat transfer surface

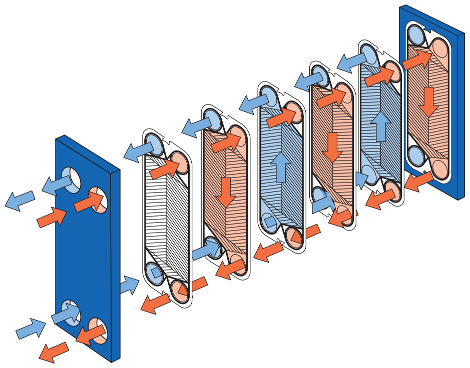
3.9 m^2 (40 sq. ft)

Connections

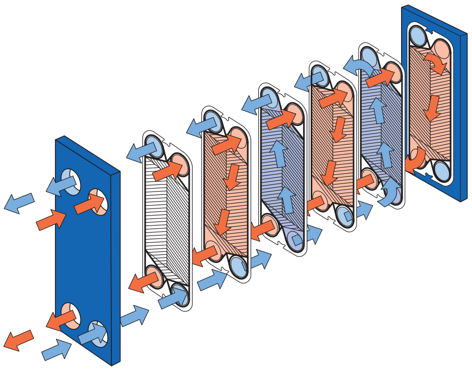
FG	PED	Size 1¼”	Pipe, thread ISO-R 1¼”
FG	pvcALS™	Size 1¼”	Pipe, thread ISO-R 1¼”
FG	pvcALS™	Size 1¼”	Internal thread ISO-G 1¼”, carbon steel
FG	ASME	Size 1¼”	Pipe, thread NPT 1¼”

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

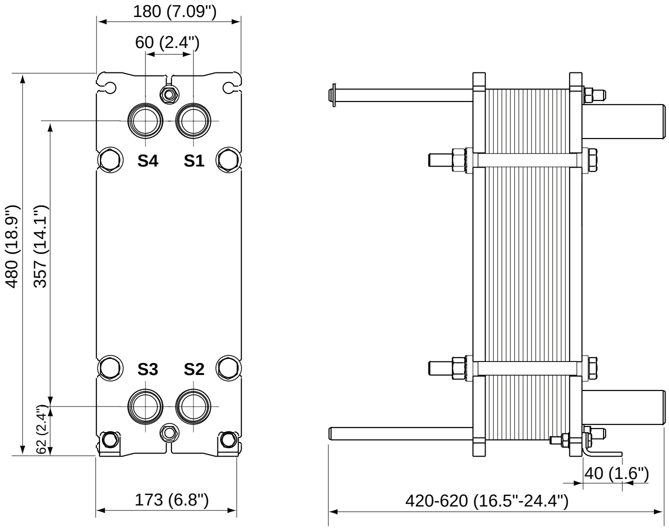


Flow principle of an M3 plate heat exchanger



Flow principle of an M3X plate heat exchanger

Dimensions



Measurements mm (inch)
The number of bolts may vary depending on pressure rating.

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TL3

Plate Heat Exchanger

TL3-FG

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar.

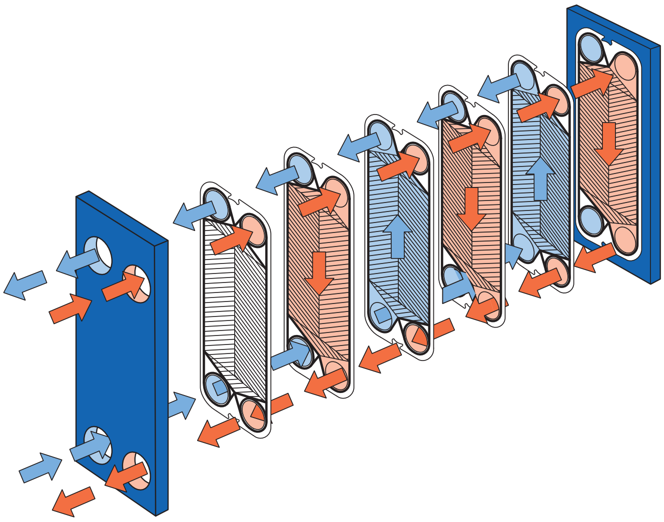
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 5 kg/s (80 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
TL3-B, TL3-P
TL3-BD, double wall plates

Frame types
FG

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Pipe: Stainless steel, Titanium

Plates
Stainless steel: Alloy 316 / Alloy 304. Titanium
Alloy 254 SMO, Alloy C276

Gaskets
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes PED, ASME, pvcALS™

Mechanical design pressure (g) / temperature

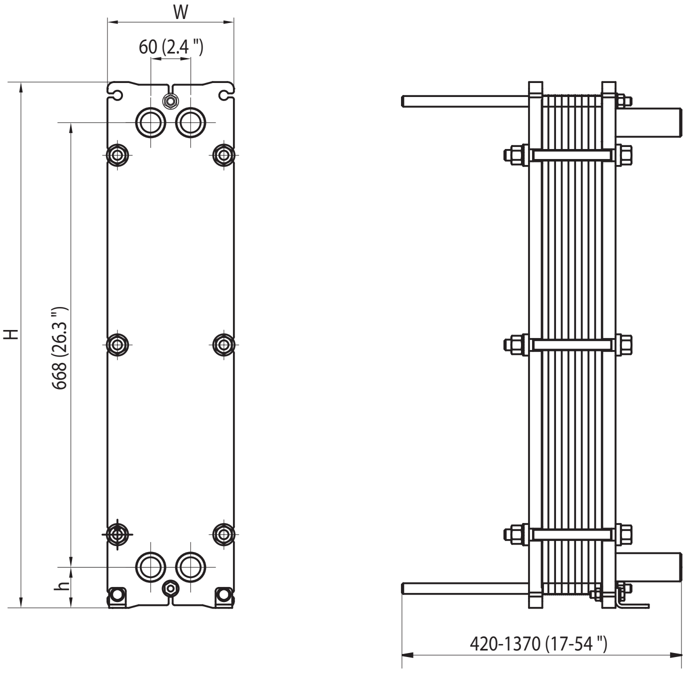
FG	pvcALS™	1.6 MPa / 180ºC
FG	PED	1.6 MPa / 180ºC
FG	ASME	150 psig / 356ºF

Maximum heat transfer surface
10.9 m² (117.3 sq.ft)

Connections

FG	PED	Size 1¼"	Pipe, thread ISO-R 1¼"
FG	pvcALS™	Size 1¼"	Pipe, thread ISO-R 1¼" and NPT 1¼"
FG	pvcALS™	Size 1¼"	Internal thread ISO-G 1¼", carbon steel
FG	ASME	Size 1¼"	Pipe, thread NPT 1¼"

Dimensions



Measurements mm (inch)

Type	H	W	h
TL3-FG	790 (31.1")	190 (7.5")	61 (2.4")

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop

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T5

Plate Heat Exchanger

T5-FG

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar.

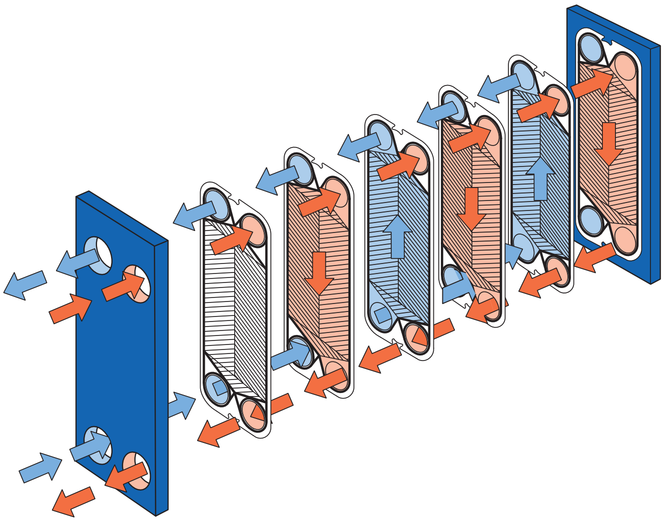
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 14 kg/s (222 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
T5-B, T5-M

Frame types
FG

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Pipe: Stainless steel, titanium

Plates
Stainless steel Alloy 316 / Alloy 304
Titanium

Gaskets
Nitrile, EPDM

TECHNICAL DATA

Pressure vessel codes PED, ASME, pvcALS™

Mechanical design pressure (g) / temperature

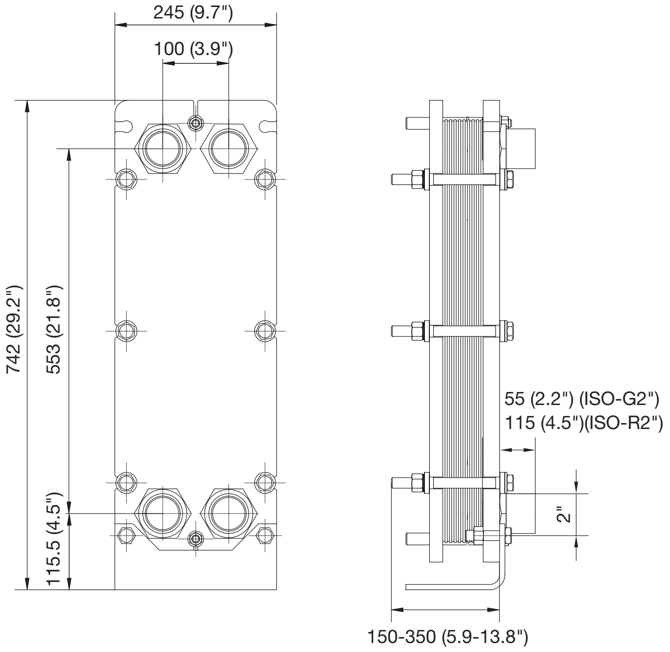
FG	pvcALS™	1.6 MPa / 180ºC
FG	PED	1.6 MPa / 160ºC
FG	ASME	150 psig / 356ºF

Maximum heat transfer surface

T5-B	7.1 m² (76.4 sq.ft)
T5-M	4.4 m² (47.4 sq.ft)

Connections	
Straight threaded	Size 50 mm ISO G2"
Tapered threaded	Size 50 mm ISO R2", NPT2"
Threaded inlet port	Size 50 mm ISO-G2"

Dimensions



Measurements mm (inch)

Type	H	W	h
T5-FG	737 (29.0")	245 (9.6")	115.5 (4.5")

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop

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M6

Plate Heat Exchanger

M6-FG

Applications
General heating and cooling duties. Heating by means of steam.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

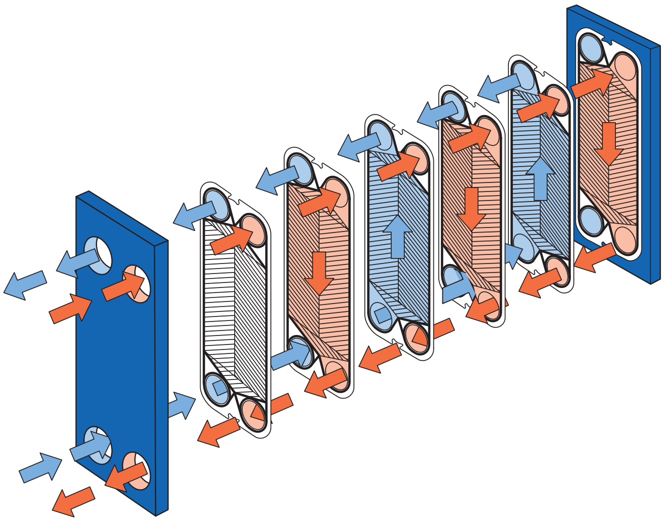
Typical capacities
Liquid flow rate
Up to 16 kg/s (250 gpm), depending on media, permitted pressue drop and temperature program.

Water heating by steam
300 to 800 kW

Plate types
M6, M6-M and M6-MD

Frame types
FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium, Alloy 254 SMO, Alloy C276
Rubber lined: Nitrile, EPDM

Plates
Stainless steel: Alloy 316, Alloy 304. Alloy 254 SMO, Alloy C276, Titanium

Gaskets
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FM	pvcALS™	1.0 MPa / 180°C
FG	PED	1.6 MPa / 180°C
FG	ASME	162 psig / 482°F
FG	pvcALS™	1.6 MPa / 180°C
FD	PED, pvcALS™	2.5 MPa / 180°C
FD	ASME	351 psig / 482°F

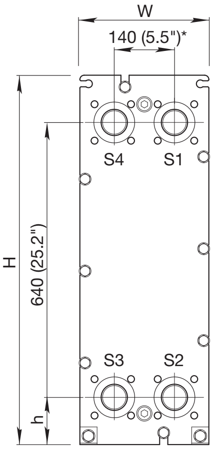
Connections
Pipe connections (not for frame type FD)

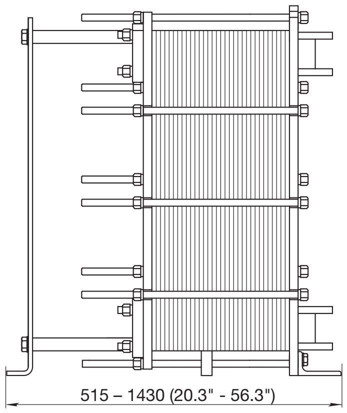
	Size:	
Straight threaded	50 mm	ISO G2"
Tapered threaded	50 mm	ISO R2", NPT2"
Straight weld	50 mm	
Threaded inlet port	50 mm	ISO G2"

Flange connections

		Size:	
FM	pvcALS™	50 mm	DIN/GB/GOST PN10, ASME Cl. 150, JIS 10K
FG	PED	50 mm	DIN PN16, ASME Cl. 150
FG	ASME	2"	ASME Cl. 150
FG	pvcALS™	50 mm	DIN/GB/GOST PN16, ASME Cl. 150, JIS 16K
FD	PED	50 mm	DIN PN25, ASME Cl. 300
FD	ASME	2"	ASME Cl. 300
FD	ALS	50 mm	DIN, GB, GOST PN25, JIS 20K

Dimensions





* Displacement of some connection types occur.

Measurements mm (inch)

Type	H	W	h
M6-FM	920 (36.2")	320 (12.6")	140 (5.5")
M6-FG	920 (36.2")	320 (12.6")	140 (5.5")
M6-FD	940 (37.0")	330 (13.0")	150 (5.9")

The number of tightening bolts may vary depending on pressure rating.

Maximum heat transfer surface
38 m² (400 sq. ft)

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

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TL6

Plate Heat Exchanger

TL6-FG

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

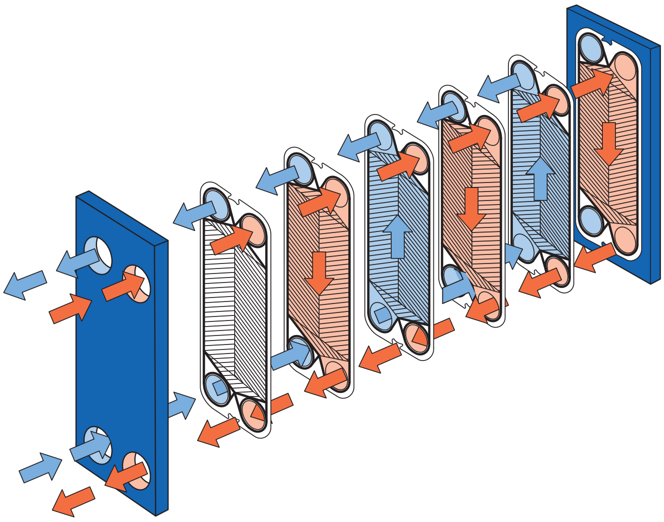
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 20 kg/s (317 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
TL6-B

Frame types
FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate

Mild steel, Epoxy painted

Nozzles

Carbon steel
Metal lined: Stainless steel, Titanium
Rubber lined: Nitrile, EPDM
Pipe: Stainless steel

Plates

Stainless steel Alloy 316 / Alloy 304, Titanium, Alloy 254 SMO, Alloy C276

Gaskets

Nitrile, EPDM, Viton®
Other grades and material available on request

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™

Mechanical design pressure (g) / temperature

FM	pvcALS™	1.0 MPa / 180ºC
FM	PED	1.0 MPa / 180ºC
FG	pvcALS™	1.6 MPa / 180ºC
FG	PED	1.6 MPa / 180ºC
FG	ASME	150 psig / 482ºF
FD	pvcALS™	2.5 MPa / 180ºC
FD	PED	2.5 MPa / 180ºC
FD	ASME	300 psig / 482ºF

Connections

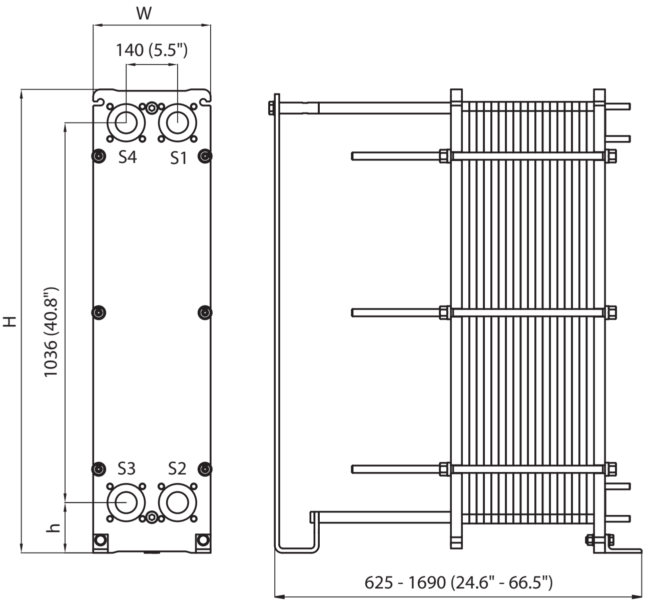
Pipe connections (not for frame type FD)

Straight threaded	Size 50 mm	ISO G2", NPT 2"
Threaded inlet port	Size 50 mm	ISO G2"

Flange connections

		Size:	
FM	pvcALS™	50/65 mm	DIN/GB/GOST PN16, ASME Cl.150, JIS 10K
FM	PED	50/65 mm	DIN PN16, ASME Cl. 150
FG	pvcALS™	50/65 mm	DIN/GB/GOST PN16, ASME Cl. 150, JIS 10K, JIS 16K
FG	PED	50/65 mm	DIN PN16, ASME Cl. 150
FG	ASME	2-2½" in	ASME Cl.150
FD	pvcALS™	50/65 mm	DIN/GB/GOST PN40, ASME Cl.300, JIS 20K
FD	PED	50/65 mm	DIN PN40, ASME Cl. 300
FD	ASME	2-2½" in	ASME Cl. 300

Dimensions



Measurements mm (inch)

Type	H	W	h
TL6-FM / PED / pvcALS™	1264 (49.8")	320 (12.6")	137 (5.4")
TL6-FG / PED / pvcALS™	1264 (49.8")	320 (12.6")	137 (5.4")
TL6-FG / ASME	1299 (51.1")	320 (12.6")	142 (5.6")
TL6-FD / PED / pvcALS™	1264 (49.8")	330 (13.0")	137 (5.4")
TL6-FD / ASME	1308 (51.5")	330 (13.0")	142 (5.6")

The number of tightening bolts may vary depending on pressure rating.

Maximum heat transfer surface

102.0 m^2 (1097 sq.ft)

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop

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TS6

Plate Heat Exchanger

TS6-MFG

Applications
General heating and cooling duties. Heating by means of steam.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, an additional auxiliary connection for steam may be mounted on the pressure plate to handle high capacities.

Typical capacities
Liquid flow rate
Up to 20 kg/s (300 gpm), depending on media, permitted

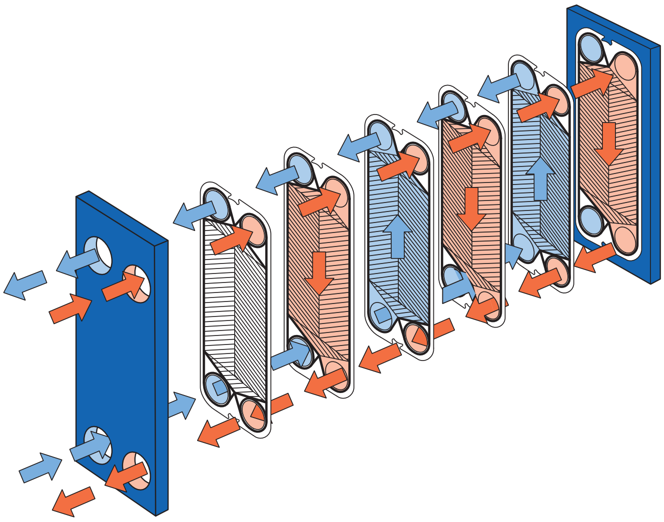
pressue drop and temperture program.

Water heating by steam
200-1800 kW

Plate types
TS6-M

Frame types
FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium

Plates
Stainless steel Alloy 316, Titanium

Gaskets
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

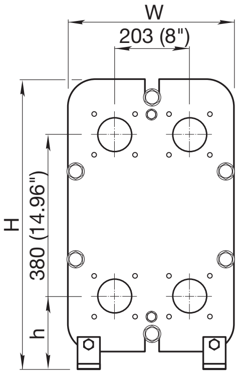
FG	PED	1.6 MPa / 180°C *)
FG	pvcALS™	1.6 MPa / 180°C
FG	ASME	207 psig / 482°F
FD	PED	2.5 MPa / 180°C
FD	ASME	300 psig / 482°F

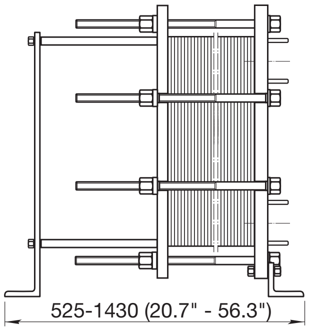
*) Frame FG also approved for 1.2 MPa / 200ºC to allow use in steam systems without safety valves.

Connections

		Size:	
FG	PED	65 mm	DIN PN16, ASME Cl. 150
FG	pvcALS™	65 mm	DIN/GB/GOST PN16, JIS 10 K, JIS 16 K
FG	ASME	3"	ASME Cl. 150
FD	PED	65 mm	DIN PN25, ASME Cl. 300
FD	ASME	2½"	ASME Cl. 300
FD	pvcALS™	65 mm	DIN/GB/GOST PN25, JIS 10 K, JIS 20 K

Dimensions





Measurements mm (inch)

Type	H	W	h
TS6-FG	704 (27.7")	400 (15.7")	188 (7.4")
TS6-FD	704 (27.7")	410 (16.1")	188 (7.4")

The number of tightening bolts may vary depending on pressure rating.

Maximum heat transfer surface
13 m^2 (140 sq. ft)

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)

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M10

Plate Heat Exchanger

Applications
General heating and cooling duties. Heating by means of steam.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities

Liquid flow rate
Up to 50 kg/s (800 gpm), depending on media, permitted pressure drop and temperature program.

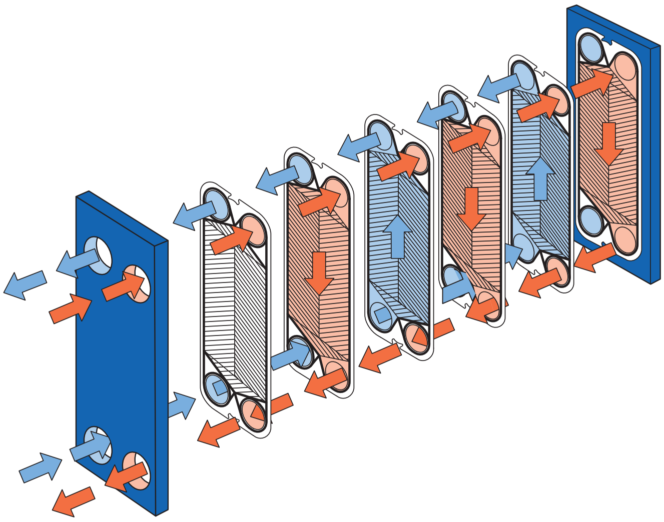
Water heating by steam
0.7 to 3.0 MW

Plate types
M10-B, M10-M and M10-BD, double wall plates.

Frame types
FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.

M10-BFG



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium
Rubber lined: Nitrile, EPDM

Plates
Stainless steel Alloy 316/Alloy 304, Titanium, Alloy 254 SMO, Alloy C276

Gaskets (Clip-on, glued)
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

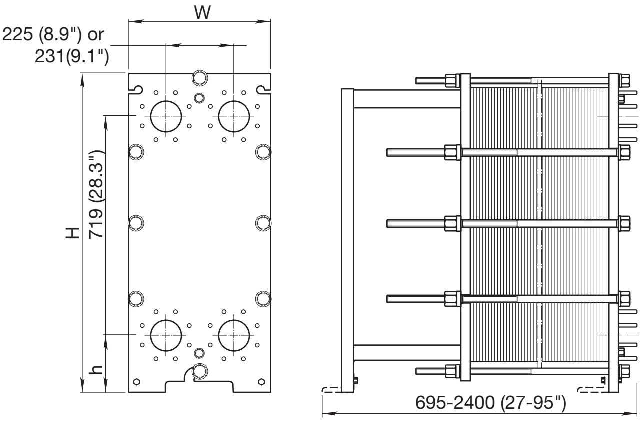
FL pvcALS™	0.6 MPa / 130ºC
FM pvcALS™	1.0 MPa / 180ºC
FM PED	1.0 MPa / 180ºC
FG pvcALS™	1.6 MPa / 180ºC
FG PED	1.6 MPa / 180ºC *
FG ASME	150 psig / 356ºF
FD PED pvsALS™	2.5 MPa / 180ºC
FD ASME	389 psig / 482ºF

*) Frame FG also approved for 1.2 MPa / 200°C to allow use in steam systems without safety valves.

Connections

		Size:	
FL	pvcALS™	100 mm	DIN/GB/GOST PN10, JIS 10K
FM	pvcALS™	100 mm	DIN/GB/GOST PN10, ASME Cl.150, JIS 10K
FM	PED	100 mm	DIN PN10, ASME Cl. 150
FG	pvcALS™	100 mm	DIN/GB/GOST PN10, ASME Cl. 150, JIS 10K, JIS 16K
FG	PED	100 mm	DIN PN16, ASME Cl. 150
FG	ASME	4”	ASME Cl.150
FD	PED	100 mm	DIN PN25, ASME Cl.150 / 300
FD	ASME	4”	ASME Cl. 300

Dimensions



Measurements mm (inch)

Type	H	W	h
M10-FM	1084 (42.7")	470 (18.5")	215 (8.5")
M10-FG	1084 (42.7")	470 (18.5")	215 (8.5")
M10-FD	981 (38.6")	470 (18.5")	131 (5.2")
M10-FD ASME	1084 (42.7")	470 (18.5")	215 (8.5")

The number of tightening bolts may vary depending on pressure rating.

Maximum heat transfer surface
M10-B 90 m^2 (970 sq. ft)
M10-M 60 m^2 (650 sq. ft)

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

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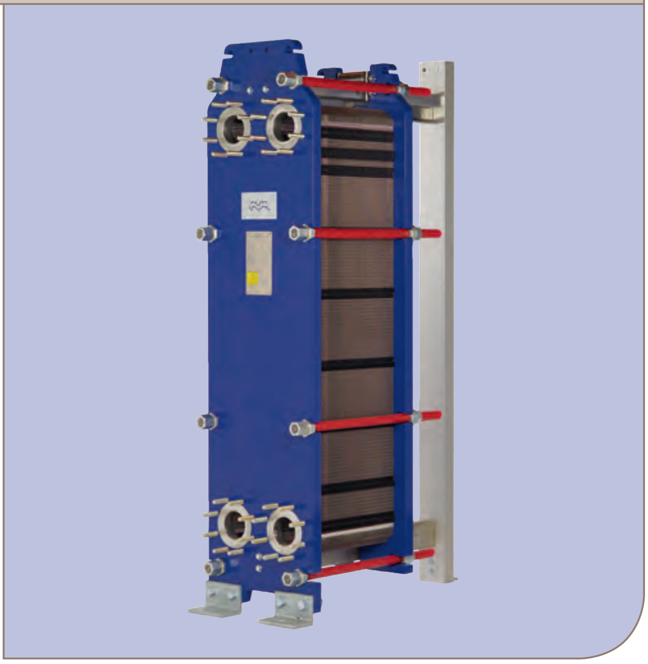
TL10

Plate Heat Exchanger



TL10-BFG

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

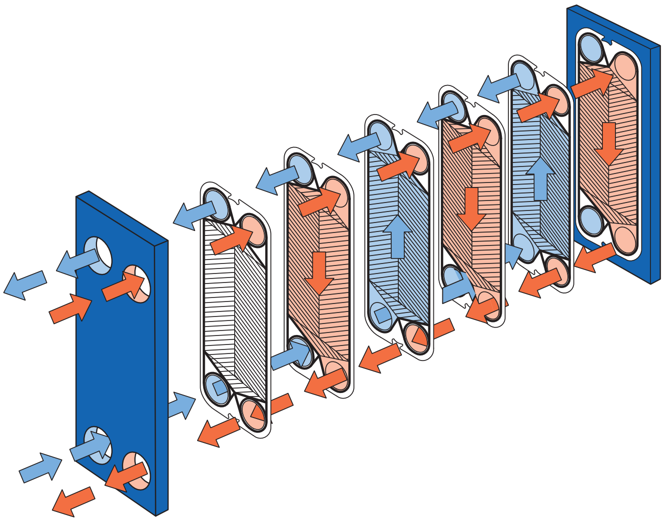
Typical capacities

Liquid flow rate
Up to 50 kg/s (800 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
TL10-B, TL10-P

Frame types
FM, FG and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium, Alloy 254, Alloy C276, Nickel
Rubber lined: Nitrile, EPDM

Plates
Stainless steel: Alloy 304, Alloy 316. Alloy 254, Alloy C276
Nickel, Titanium

Gaskets
Nitrile, EPDM, Viton®
Other grades and material available on request

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™

Mechanical design pressure (g) / temperature

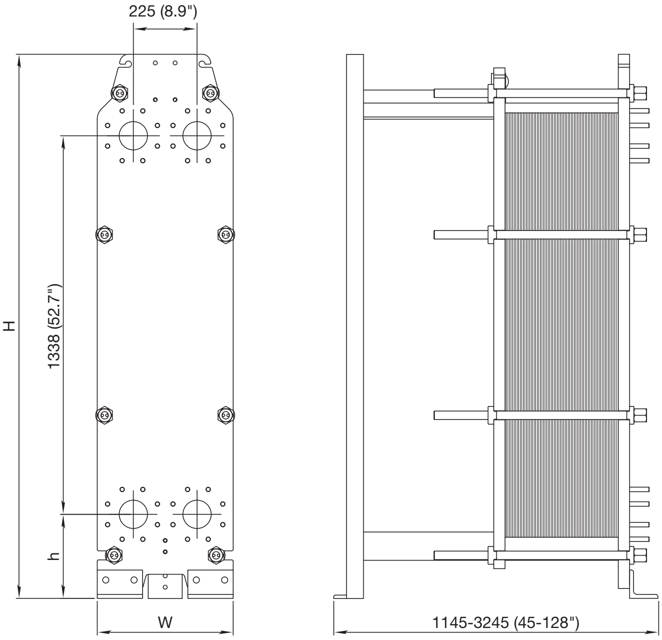
FM	pvcALS™	1.0 MPa / 180°C
FG	PED, pvcALS™	1.6 MPa / 180°C
FG	ASME	150 psig / 482°F
FD	PED	2.5 MPa / 180°C
FS	ASME	400 psig / 482°F

Connections

		Size:	
FM	pvcALS™	100 mm	DIN/GB/GOST, PN10, ASME Cl. 150, JIS 10K
FG	PED	100 mm	DIN PN16, ASME Cl. 150
FG	pvcALS™	100 mm	DIN/GB/GOST, PN16, ASME Cl. 150, JIS 16K
FG	ASME	4"	ASME Cl. 150
FD	PED	100 mm	DIN PN25, ASME Cl. 300, Special square flange
FD	pvcALS™	100 mm	DIN/GB/GOST, PN16, ASME Cl. 150, JIS 16K
FS	ASME	4"	Special square flange

Maximum heat transfer surface
250 m^2 (2700 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
TL10-FM	1885 (74.2")	480 (18.9")	255 (10")
TL10-FG	1981 (78")	480 (18.9")	297 (11.7")
TL10-FD	1981 (78")	480 (18.9")	297 (11.7")
TL10-FS	1981 (78")	510 (20.1")	297 (11.7")

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop

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M15

Plate Heat Exchanger

M15-BFM

Applications

General heating and cooling duties.

Standard design

The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities

Liquid flow rate

Up to 80 kg/s (1300 gpm), depending on media, permitted pressure drop and temperature program.

Plate Types

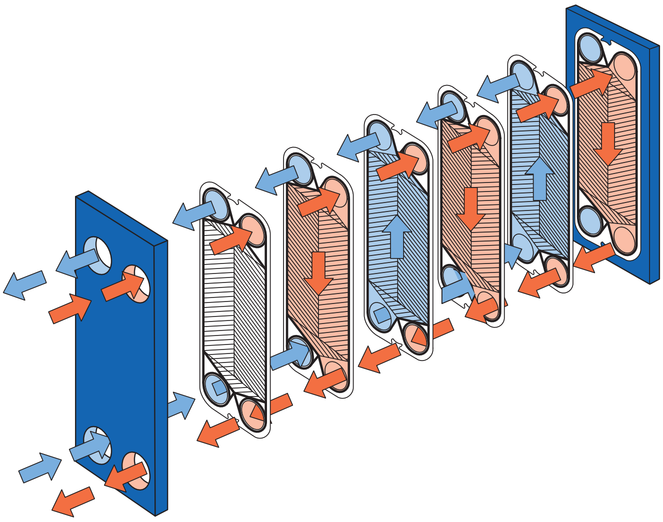
M15-B, M15-M and M15-BD, double wall plates

Frame types

FL, FM, FG and FD

Working principle

Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium
Rubber lined: Nitrile, EPDM

Plates
Stainless steel: Alloy 304, Alloy 316, Alloy C276, Alloy 254 SMO, Titanium

Gaskets (Clip-on/tape-on, glued)
Nitrile, EPDM, Viton®
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™

Mechanical design pressure (g) / temperature

FL	pvcALS™	0.6 MPa / 130°C
FM	PED, pvcALS™	1.0 MPa / 180°C
FG	PED, pvcALS™	1.6 MPa / 180°C
FG	ASME	170 psig / 482°F
FD	PED, pvcALS™	3.0 MPa / 180°C
FD	ASME	300 psig / 356°F

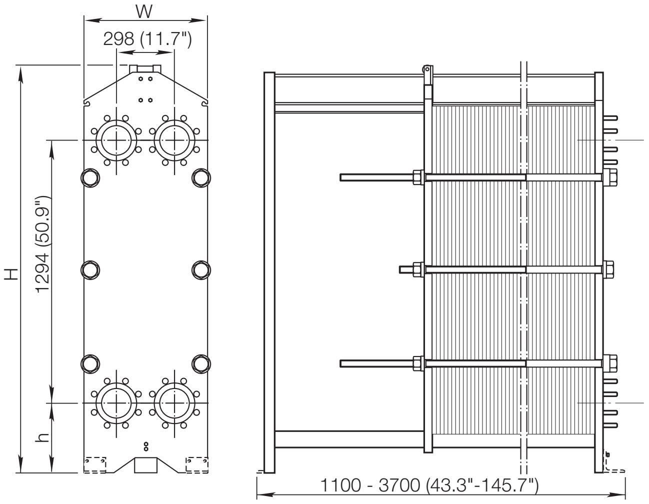
Connections

		Size:	
FL	pvcALS™	150 mm	DIN/GB/GOST PN10, JIS 10K
FM	PED	150 mm	DIN PN10, ASME Cl. 150
FM	pvcALS™	150 mm	DIN/GB/GOST PN10, ASME Cl. 150, JIS 10K
FG	PED	150 mm	DIN PN16, ASME Cl. 150
FG	pvcALS™	150 mm	DIN/GB/GOST PN16, ASME Cl. 150, JIS 10K, JIS 16K
FG	ASME	6"	ASME Cl. 150
FD	PED	150 mm	DIN PN25, ASME Cl. 300
FD	ASME	6"	ASME Cl. 300

Maximum heat transfer surface

390 m² (4200 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
M15-FL	1815 (71.5")	610 (24")	275 (10.8")
M15-FM	max. 1941 (76.4")	610 (24")	275 (10.8")
M15-FG	max. 1941 (76.4")	650 (25.6")	275 (10.8")
M15-FD	max. 2036 (80.2")	650 (25.6")	370 (14.6")

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

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TL15-B

Plate Heat Exchanger

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

TL15-FG

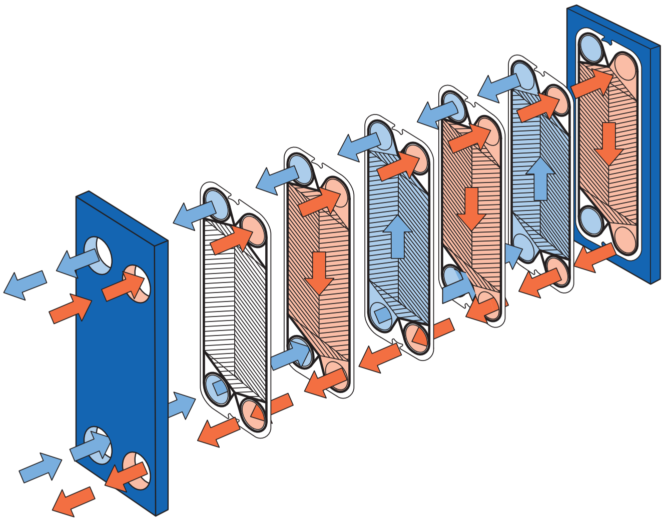
Typical capacities

Liquid flow rate
Up to 120 kg/s (1900 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
TL15-B

Frame types
FM, FG, FD and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium
Rubber lined: Nitrile, EPDM

Plates
Stainless steel: Alloy 304, Alloy 316. Titanium

Gaskets
Nitrile, EPDM

TECHNICAL DATA

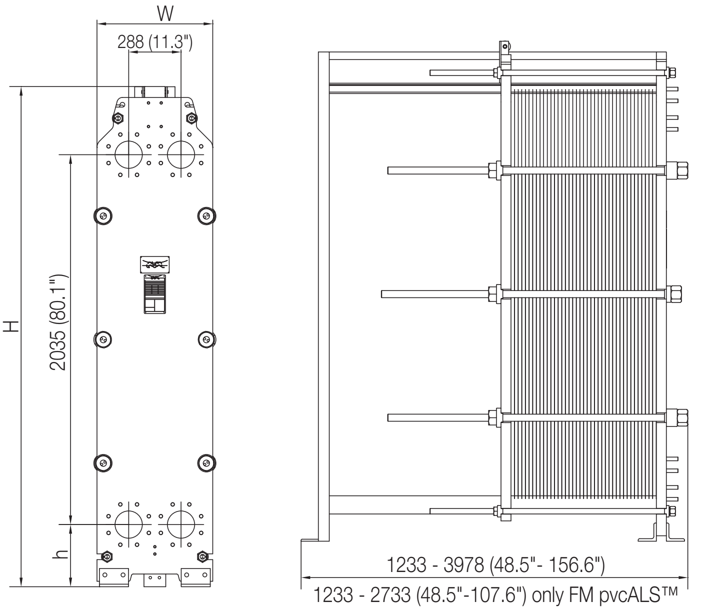
Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature*

FM	pvcALS™	1.0 MPa / 180ºC
FG	pvcALS™	2.0 MPa / 50°C
FG	PED	2.0 MPa / 50°C
FG	ASME	150 psig / 482°F
FD	ASME	300 psig / 482ºF
FS	pvcALS™	3.5 MPa / 50°C
FS	PED	3.5 MPa / 50°C
FS	ASME	460 psig / 482ºF

* All PED and ALS units, except FM, are optimised for a design temperature of 50ºC (122ºF).
All PED and ALS units are also available for of multi range temperatures 50, 100, 150, 180 and 200ºC with corresponding lower design pressure.

Connections

		Size:	
FM	pvcALS™	150 mm	DIN/GB/GOST PN10, ASME Cl. 150, JIS 10K
FG	pvcALS™	150 mm	DIN/GB/GOST PN16, PN25, ASME Cl. 150, JIS 10K, JIS 16K
FG	PED	150 mm	DIN PN16, PN25, ASME Cl. 150
FG	ASME	6”	ASME Cl. 150
FD	ASME	6”	ASME Cl. 300
FS	pvcALS™	50 mm	DIN/GB/GOST PN25, PN40, ASME Cl. 300, JIS 20K
FS	PED	150 mm	DIN PN25, PN40, ASME Cl. 300
FS	ASME	6”	ASME Cl. 300



Measurements mm (inch)

Type	H	W	h
TL15-FM/pvcALS™	2752 (108.3")	610 (24.0")	342 (13.5")
TL15-FG/PED/pvcALS™	2752 (108.3")	637 (25.1")	342 (13.5")
TL15-FG/ASME	2752 (108.3")	646 (25.4")	342 (13.5")
TL15-FD/ASME	2752 (108.3")	646 (25.4")	342 (13.5")
TL15-FS/PED/pvcALS™	2752 (108.3")	646 (25.4")	342 (13.5")
TL15-FS/ASME	2752 (108.3")	646 (25.4")	342 (13.5")

The number of tightening bolts may vary depending on pressure rating and Pressure Vessel Code (PVC) requirements.

Maximum heat transfer surface
990 (1.1 x 900) m² (10660 sq.ft)

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

TS20

Plate Heat Exchanger

Applications
General heating and cooling duties. Heating by means of steam.

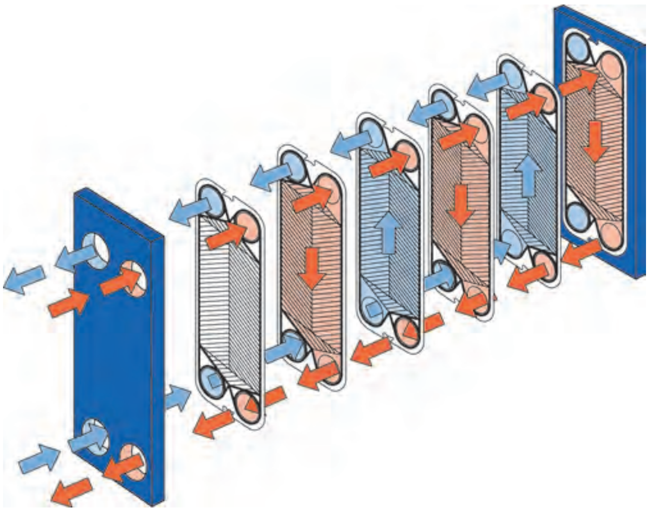
Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

TS20-MFG



Typical capacities

Liquid flow rate
Up to 190 kg/s (3040 gpm), depending on media, permitted pressue drop and temperature program.

Water heating by steam
2.5-15 MW at a steam condensation temperature of 150°C
2.5-9 MW at a steam condensation temperature of 120°C

Plate types
TS20-M plates

Frame types
FM, FG and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.

STANDARD MATERIALS

Frame plate

Mild steel, Epoxy painted

Nozzles

Carbon steel
Metal lined: Stainless steel, Titanium, Alloy C-276
Rubber lined: Nitrile, EPDM

Plates

Stainless steel Alloy 316 (Alloy 254, Alloy C-276 or Titanium
Other grades and material available on request.

Gaskets

Nitrile, EPDM, Viton or HeatSealF™
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes, PED, ASME, pvcALS™

Mechanical design pressure (g) / temperature

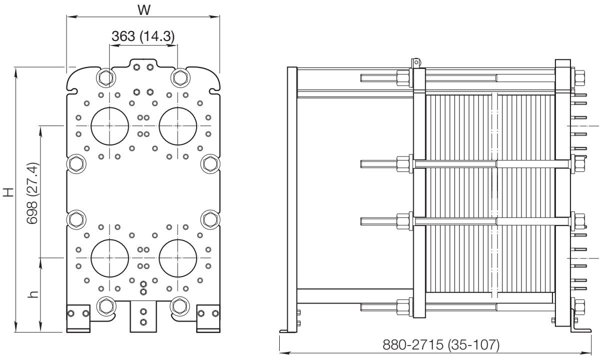
FM	PED	10 MPa / 210°C
FM	pvcALS™	1.0 MPa / 180°C
FG	PED	1.6 MPa / 180°C *)
FG	ASME	150 psig / 350°F
FG	pvcALS™	1.6 MPa / 180°C
FS	PED	3.0 MPa / 160°C
FS	ASME	460 psig / 350°F

*) Frame FG also approved for 1.2 MPa / 200ºC to allow use in steam systems without safety valves.

Connections

		Size:	
FM	PED	200 mm	DIN 2501 PN10, ASME Cl. 150
FM	pvcALS™	200 mm	DIN/GB/GOST PN10, ASME Cl. 150, JIS 10K
FG	PED	200 mm	DIN 2501 PN16, ASME Cl. 150
FG	ASME	8"	ASME Cl. 150
FG	pvcALS™	200 mm	DIN/GB/GOST PN16, ASME Cl. 150, JIS 10K/JIS 16K
FS	PED	200 mm	DIN 2501 PN25/PN40, ASME Cl. 300
FS	ASME	8"	ASME Cl. 150/300

Dimensions



Measurements mm (inch)

Type	H	W	h
TS20-MFM	1405 ($55^{5}/_{16}$)	740 (29⅛)	360 (14⅛)
TS20-MFG	1405 ($55^{5}/_{16}$)	800 (31½)	360 (14⅛)
TS20-MFS	1435 (56½)	800 (31½)	390 (14⅛)

The number of tightening bolts may vary depending on pressure rating.

Maximum heat transfer surface

85 m^2 (910 sq. ft)

Particulars required for quotation

- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

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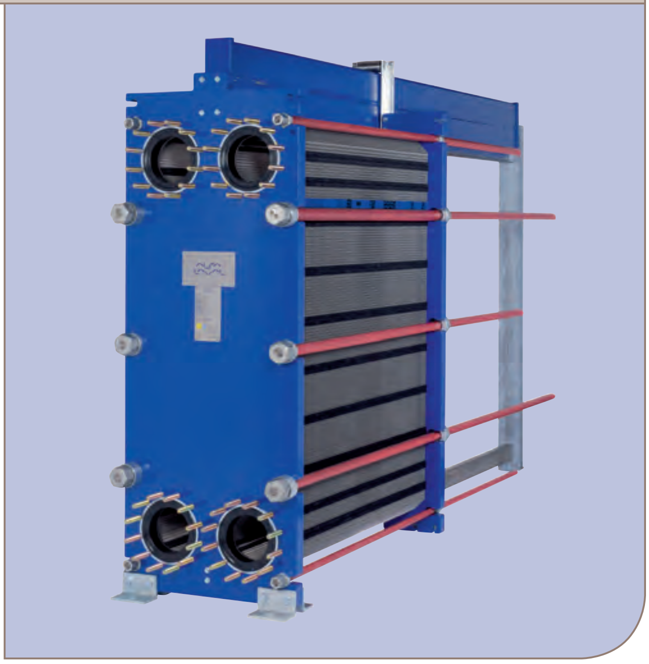
T20

Plate Heat Exchanger



Applications
General heating and cooling duties

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket, which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

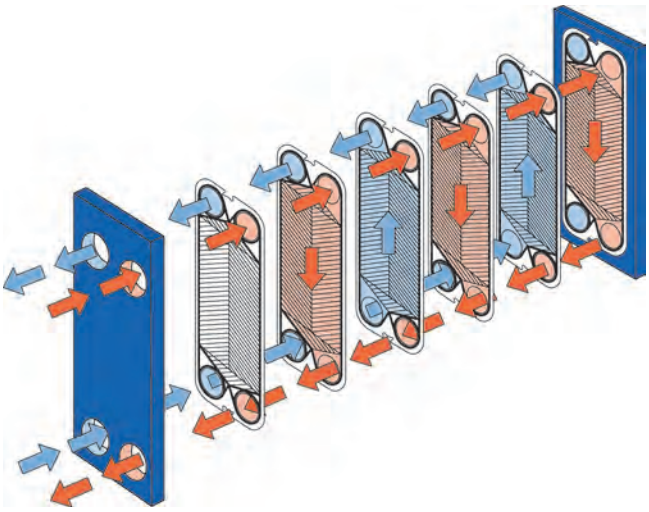
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 225 kg/s (3600 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
T20-P, T20-B and T20-M plates

Frame types
FM, FG and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Rubber lined
Carbon steel
Metal lined: Stainless steel, Titanium, Alloy C-276

Plates
Stainless steel Alloy 304, Stainless steel Alloy 316, Alloy 254 SMO, Alloy C-276 or Titanium Other grades and material available on request.

Gaskets
Nitrile, EPDM or Viton
Other grades and material available on request.

TECHNICAL DATA

Mechanical design pressure (g) / temperature

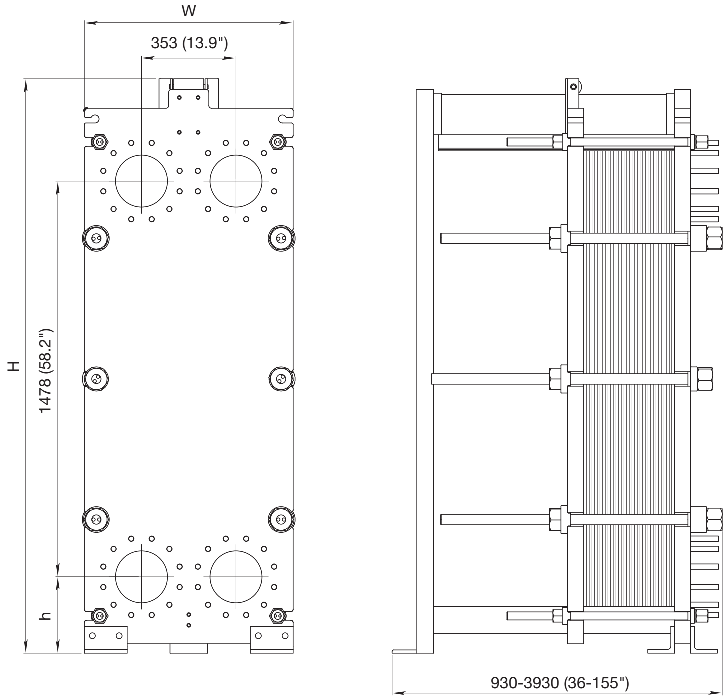
FM	pvcALS™	1.0 MPa / 180°C
FG	pvcALS™	1.6 MPa / 180°C
FG	PED	1.6 MPa / 180°C
FG	ASME	150 psig / 480°F
FD	ASME	300 psig / 480°F
FS	PED	3.0 MPa / 160°C
FS	ASME	400 psig / 480°F

CONNECTIONS

		Size:	
FM	pvcALS™	200 mm	DIN PN10/JIS 10K
		8"	ASME Cl. 150
FG	pvcALS™	200 mm	DIN PN16/JIS 10K/16K
		8"	ASME Cl. 150
FG	PED	200 mm	DIN PN10/16/25, ASME Cl 150
FG	ASME	8"	ASME Cl. 150
FD	ASME	8”	ASME Cl 150/300
FD	pvcALS™	200 mm	DIN PN25/40
		8”	ASME Cl. 300/400
FS	PED	200 mm	DIN PN25/40, ASME Cl. 300/400, JIS 20K
FS	ASME	8"	ASME Cl. 300/400

Maximum heat transfer surface
630 m^2 (7000 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
T20-FM	2145 (84 ½")	780 (30 $^{11}/_{16}$")	285 (11 $^{7}/_{32}$)
T20-FG	2145 (84 ½")	780 (30 $^{11}/_{16}$")	285 (11 $^{7}/_{32}$)
T20-FS	2183 (84 ½")	780 (30 $^{11}/_{16}$")	323 (12 $^{11}/_{16}$)

The number of tightening bolts may vary depending on pressure rating.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

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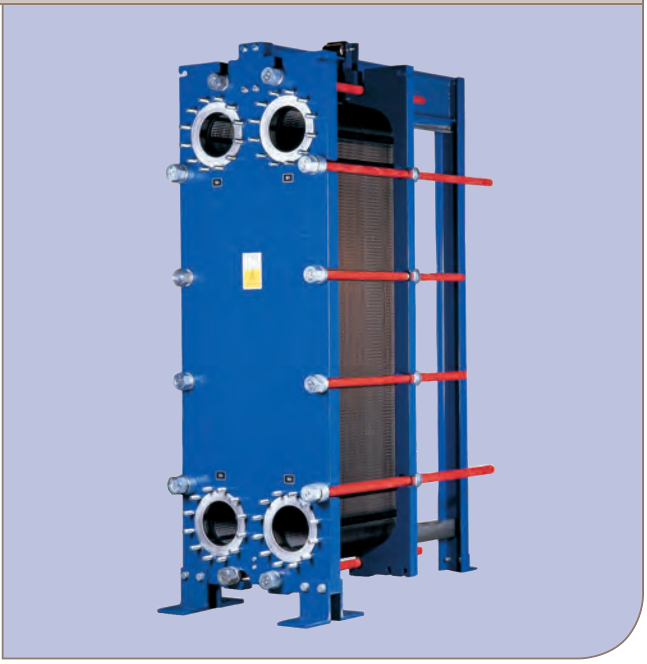
MX25

Plate Heat Exchanger



MX25-BFG

Applications
Plate heat exchanger for general heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket, which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

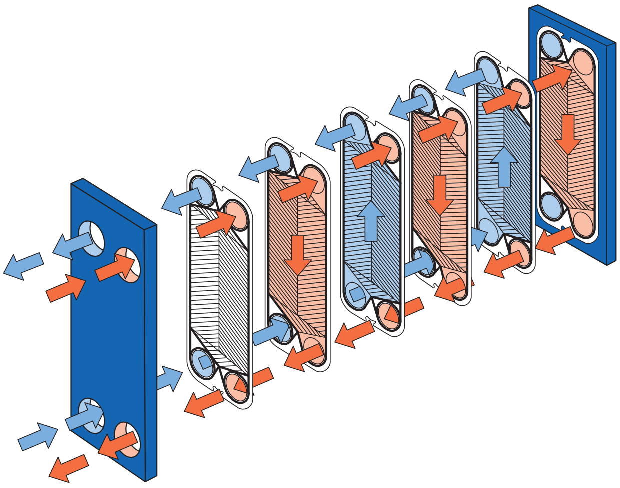
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate.
Up to 350 kg/s (5600 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
MX25B and MX25M plates

Frame types
FMS, FGS, FG, FD and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium, Alloy C276, Rubber lined: Nitrile, EPDM

Plates
Stainless steel Alloy 316, Alloy C276, Alloy 254 SMO or Titanium Other grades and material available on request.

Gaskets
Nitrile, EPDM or Viton
Other grades and material available on request.

TECHNICAL DATA

Pressure vessel codes PED, ASME, pvcALS™

Mechanical design pressure (g) / temperature

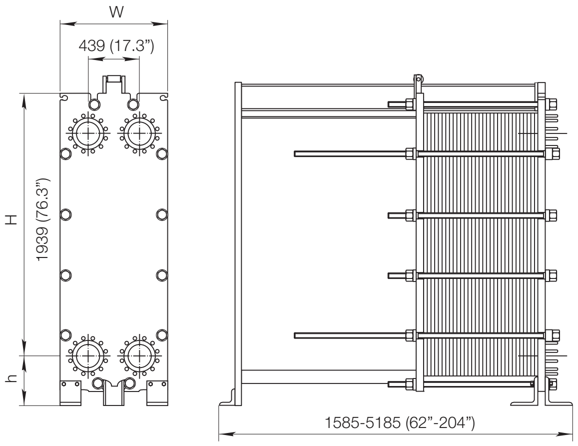
FMS PED, pvcALS™	1.0 MPa / 180°C
FGS PED, pvcALS™	1.6 MPa / 180°C
FGS ASME	150 psig / 350°F
FG PED, pvcALS™	1.6 MPa / 200°C
FG ASME	150 psig / 350°F
FD PED, pvcALS™	2.5 MPa / 210°C
FD ASME	300 psig / 350°F
FS ASME	400 psig / 350°F

Connections

	Size:	
FMS PED	200/250 mm	DIN 2501 PN10, ASME Cl. 150
FMS pvcALS™	200/250 mm	DIN 2501 PN10, ASME Cl. 150, JIS 10K
FGS PED	200 mm	DIN 2501 PN16, ASME Cl. 150
FGS pvcALS™	200/250 mm	DIN 2501 PN16, ASME Cl. 150, JIS 10K/16K
FGS ASME	8”	ASME Cl. 150
FG PED	200/250 mm	DIN 2501 PN16, ASME Cl. 150
FG pvcALS™	200/250 mm	DIN 2501 PN16, ASME Cl. 150, JIS 10K/16K
FG ASME	8”/10”	ASME Cl.150
FD PED	200/250 mm	DIN 2501 PN25, ASME Cl. 300
FD pvcALS™	200/250 mm	DIN 2501 PN25, ASME Cl. 300, JIS 20K
FD ASME	8”/10”	ASME Cl. 300
FS ASME	8”/10”	ASME Cl. 400

Maximum heat transfer surface
940 m^2 (10000 sq. ft)

Dimensions



Measurements mm (inch)

Type	H	W	h
MX25-FMS	2595 (102”)	920 (36.2”)	325 (12.8”)
MX25-FGS	2595 (102”)	920 (36.2”)	325 (12.8”)
MX25-FG	max 3103 (122.2”)	920 (36.2”)	435 (17.1”)
MX25-FD	max 3103 (122.2”)	940 (37”)	435 (17.1”)
MX25-FS	max 3103 (122.2”)	940 (37”)	435 (17.1”)

The number of tightening bolts may vary depending on the pressure rating

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

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M30

Plate Heat Exchanger

M30-FG

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket, which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

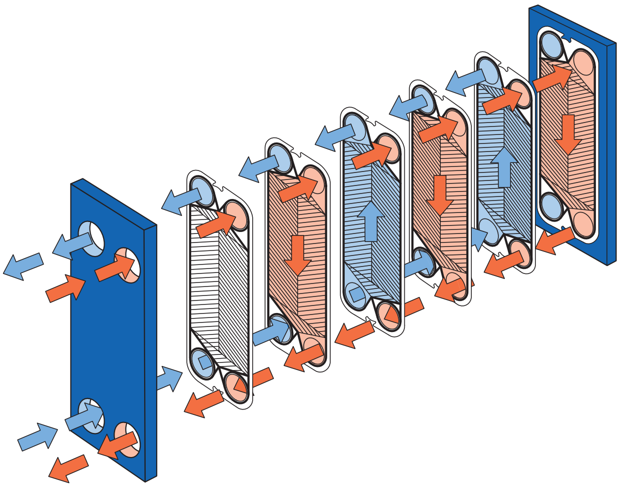
Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

Typical capacities
Liquid flow rate
Up to 650 kg/s (10400 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
M30 and M30D plates

Frame types
FM, FG and FD

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium, Alloy C276

Plates
Stainless steel Alloy 304, Alloy 316, Alloy C276, Alloy 254 SMO or Titanium
Other grades and material available on request.

Gaskets
Nitrile, EPDM or Viton
Other grades and material available on request.

TECHNICAL DATA

Mechanical design pressure (g) / temperature

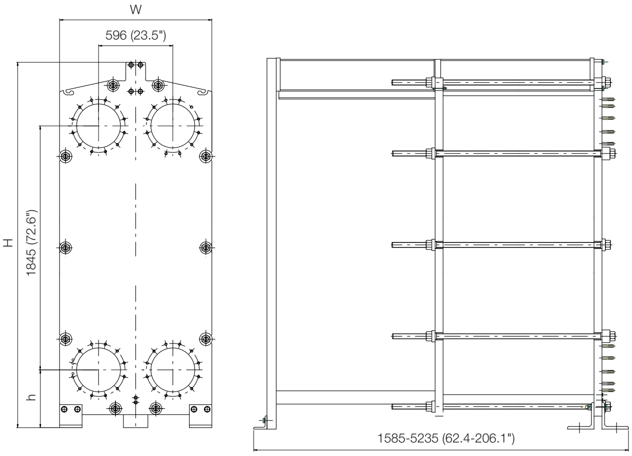
FM PED, pvcALS™	1.0 MPa / 190°C
FG PED, pvcALS™	1.6 MPa / 180°C
FG ASME	150 psig / 320°F
FD PED, pvcALS™	2.5 MPa / 190°C
FD ASME	300 psig / 320°F

Connections

	Size:	
FM pvcALS™	300/350 mm	DIN PN10, ASME Cl. 150, JIS 10K
FM PED	300/350 mm	DIN PN10, ASME Cl. 150
FG pvcALS™	300/350 mm	DIN PN16, ASME Cl. 150, JIS 16K
FG PED	300/350 mm	DIN PN16, ASME Cl. 150
FG ASME	12”/14”	ASME Cl. 150
FD pvcALS™	300/350 mm	DIN PN25, ASME Cl. 150/300, JIS 20K
FD PED	300/350 mm	DIN PN25, ASME Cl. 150/300
FD ASME	12”/14”	ASME Cl. 300

Maximum heat transfer surface
1400 m^2 (14980 sq. ft)

Dimensions



Measurements mm (inch)

Type	H*	W	h
M30-FM	2882 (113.5”)	1150 (45.3”)	470 (18.5”)
M30-FG	2882 (113.5”)	1170 (46.1”)	470 (18.5”)
M30-FD	2920 (115”)	1190 (46.9”)	506 (19.9”)

* +200 mm (7.9”) for carrying bars > 3600 mm (141.7”) The number of tightening bolts may vary depending on the pressure rating.

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

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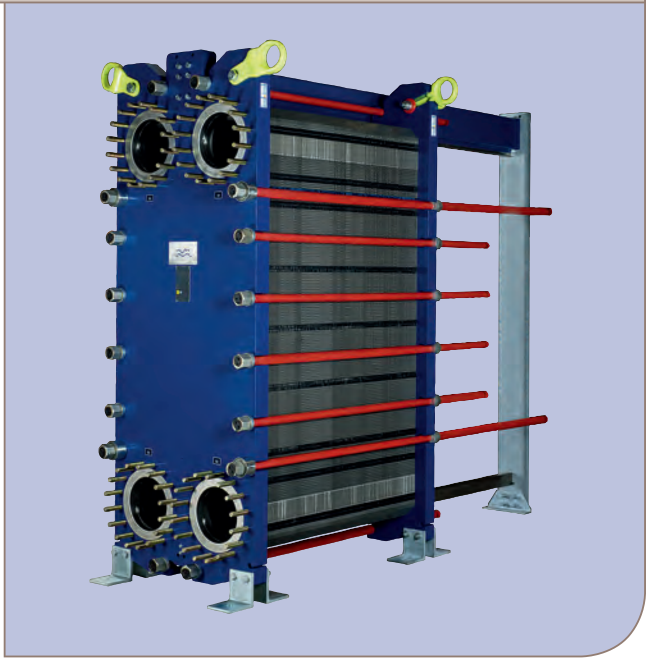
TL35

Plate Heat Exchanger



TL35-FD

Applications
General heating and cooling duties.

Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fix frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with a gasket, which seals the interplate channel and directs the fluids into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate is stationary, while the pressure plate is movable along the upper carrying bar, which also holds the plate pack. The pressure plate and the plate pack are located by the lower guiding bar. The carrying bar is supported by the frame at one end and a support column at the other which are bolted to the foundation.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plates.

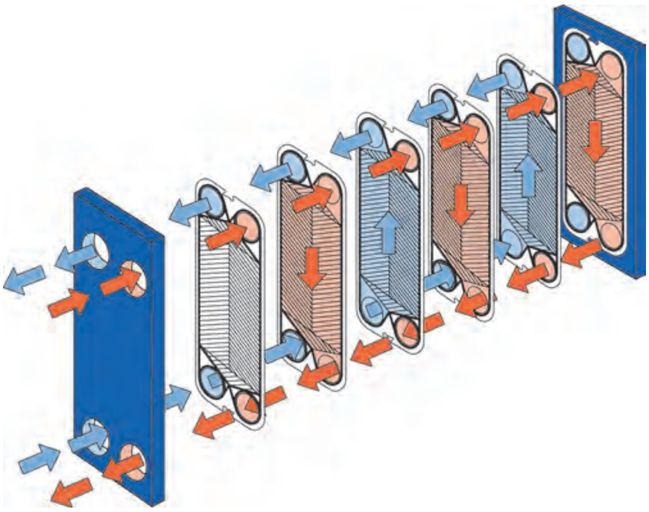
Typical capacities

Liquid flow rate
Up to 650 kg/s (10400 gpm), depending on media, permitted pressure drop and temperature program.

Plate types
Plate types

Frame types
FM, FG, FD and FS

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two media flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIALS

Frame plate
Mild steel, Epoxy painted

Nozzles
Carbon steel
Metal lined: Stainless steel, Titanium, C276

Plates
Stainless steel Alloy 316 / Alloy 304 / Alloy 254 / Alloy C276 / Titanium
Other grades and material available on request.

Gaskets
Nitrile, EPDM or Viton
Other grades and material available on request.

TECHNICAL DATA

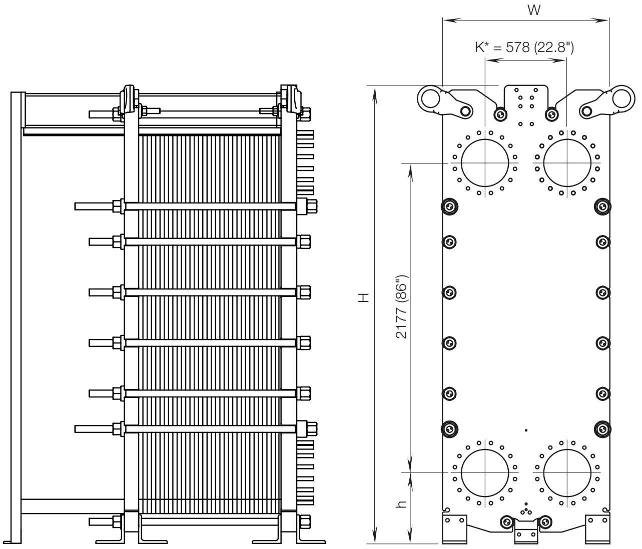
Pressure vessel codes, PED, ASME, pvcALS™
Mechanical design pressure (g) / temperature

FM	PED / pvcALS™	1.0 MPa / 180°C
FM	ASME	100 psig / 350°F
FG	PED / pvcALS™	1.6 MPa / 180°C
FG	ASME	150psig / 350°F
FD	PED	2.5 MPa / 180°C
FD	ALS	2.5 MPa / 160°C
FD	ASME	300 psig / 350°F
FS	PED	3.0 MPa / 180°C
FS	ASME	400 psig / 350°F

Connections

		Size:
FM	pvcALS™	300 or 350 mm DIN PN10 ASME Cl.150, JIS 10K
FM	PED	300 or 350 mm DIN PN10, ASME Cl. 150
FM	ASME	12 or 14” ASME Cl. 150
FG	pvcALS™	300 or 350 mm DIN PN16, ASME Cl. 150, JIS 16K
FG	PED	300 or 350 mm DIN PN16, ASME Cl. 150
FG	ASME	12 or 14” ASME Cl. 150
FD	PED	300 or 350 mm DIN PN25, ASME Cl. 150/300
FD	ALS	300 or 350 mm DIN PN25, ASME Cl. 150/300, JIS 20K
FD	ASME	12 or 14” ASME Cl. 150/300
FS	PED	300 or 350 mm DIN PN25/40, ASME Cl. 300/400
FS	ASME	12 or 14” ASME Cl. 300/400

Dimensions



Measurements mm (inch)

Type	H	W	h	C_{min}	C_{max}
TL35-FM	3210 (126.4”)	1154 (45.4”)	488 (19.2”)	2190 (86”)	6360 (250”)
TL35-FG	3210 (126.4”)	1154 (45.4”)	488 (19.2”)	2205 (89”)	6375 (251”)
TL35-FD	3218 (126.7”)	1174 (46.2”)	496 (19.5”)	2230 (88”)	6400 (252”)
TL35-FS	3218 (126.7”)	1174 (46.2”)	496 (19.5”)	2245 (88”)	6420 (253”)

The number of tightening bolts may vary depending on pressure rating. Max no. of plates TL35B = 1000.

K* = 578 mm (22.8 inches) except following cases	
584 (23.0") FS PED	Size 350 DN PN40
589 (23.2") FD PED/pvcALS™ ASME	Size 14" ASME Cl.300
589 (23.2") FS PED/ASME	Size 14" ASME Cl 300 or 400

Maximum heat transfer surface
2100 m^2 (23000 sq.ft)

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

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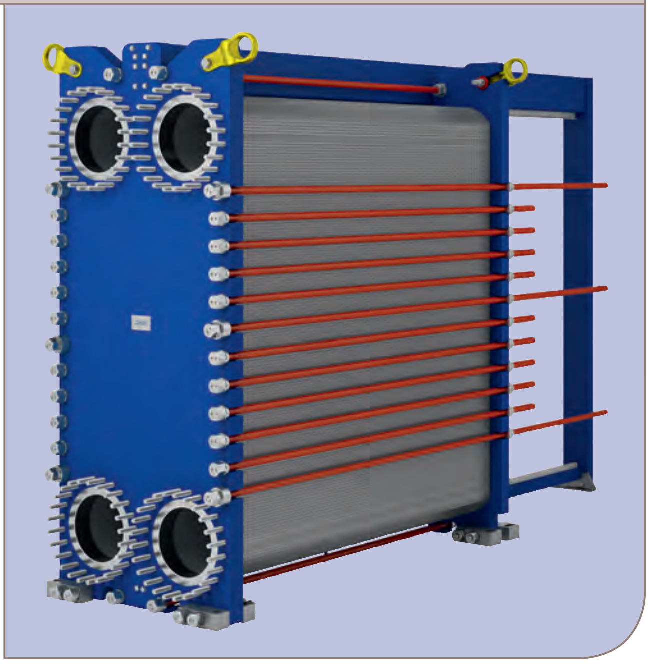
T45

Plate Heat Exchanger



T45-M

Applications
General heating and cooling duties.

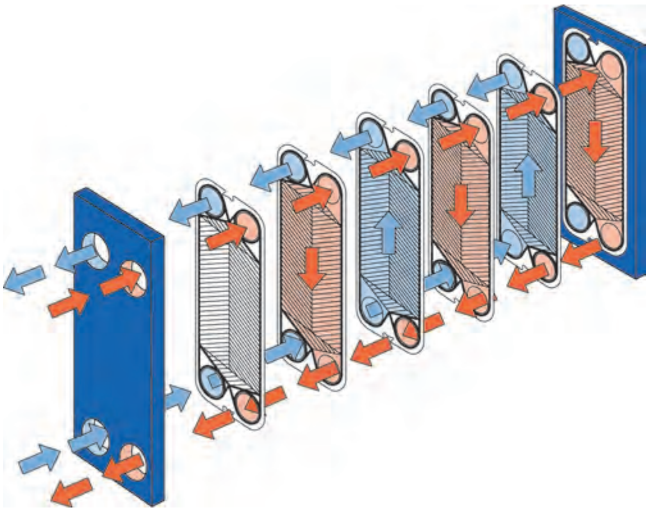
Standard design
The plate heat exchanger consists of a pack of corrugated metal plates with port holes for the passage of the two fluids between which heat transfer will take place.

The plate pack is assembled between a fixed frame plate and a movable pressure plate and compressed by tightening bolts. The plates are fitted with gaskets, which seal the interplate channels and direct the fluid into alternate channels. The number of plates is determined by the flow rate, physical properties of the fluids, pressure drop and temperature program. The plate corrugations promote fluid turbulence and support the plates against differential pressure.

The frame plate and the pressure plate are suspended from an upper carrying bar and located by a lower guiding bar, both of which are fixed to a support column.

Connections are located in the frame plate or, if either or both fluids make more than a single pass within the unit, in the frame and pressure plate.

Working principle
Channels are formed between the plates and the corner ports are arranged so that the two fluids flow through alternate channels. The heat is transferred through the plate between the channels, and complete counter-current flow is created for highest possible efficiency. The corrugation of the plates provides the passage between the plates, supports each plate against the adjacent one and enhances the turbulence, resulting in efficient heat transfer.



Flow principle of a plate heat exchanger

STANDARD MATERIAL

Frame/pressure plate
Mild steel, coated with water-based epoxy paint

Nozzles/Connections
Carbon steel
Metal lined: Stainless steel Alloy 316, Alloy 254, Titanium

Plates
Stainless steel Alloy 316, Alloy 254, Titanium
Other materials may be available on request.

Gaskets
Nitrile, EPDM or Viton
Other materials may be available on request.

TECHNICAL DATA

Design pressure (g)

FM	pvcALS™	1.0 MPa
FG	PED	1.6 MPa
FG	pvcALS™	1.6 MPa
FG	ASME	150 psig
FD	ASME	250 psig

Higher pressures may be available on request.

Design temperature
Determined by gasket material.

Maximum liquid flow rate
Up to 1000 kg/s (16000 gpm)

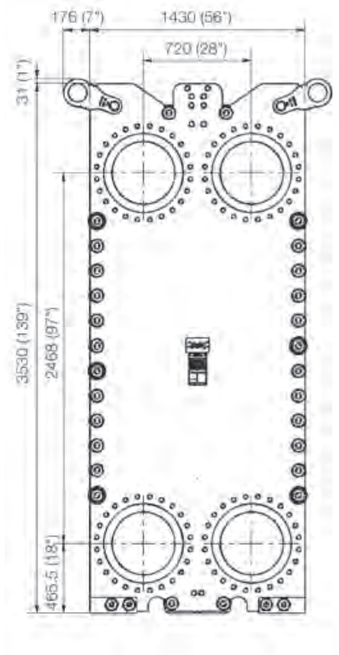
Maximum standard heat transfer surface
2360 m² (25400 sq. ft)
Larger non-standard design available on request.

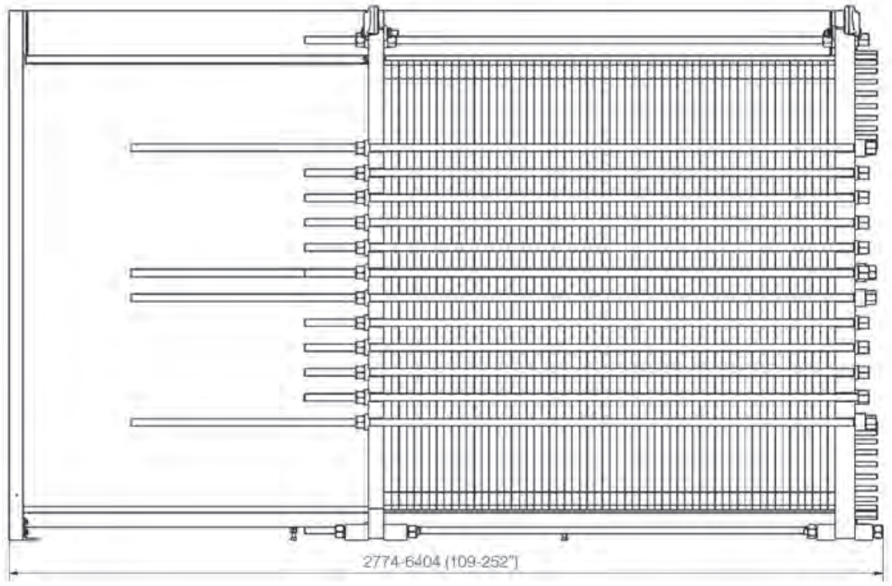
Plate types
T45-M

Connections

FM	pvcALS™	DN 450 mm, DIN PN 10, ASME Cl. 150, JIS 10K
FG	PED	DN 450 mm, DIN PN 16, ASME Cl. 150
FG	pvcALS™	DN 450 mm, DIN PN 16, GB DN16 ASME Cl. 150, JIS 16K
FG	ASME	18", ASME Cl. 150
FD	ASME	18", ASME Cl. 300

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of fluids in question
- Desired working pressure and temperature
- Allowable pressure drops





The number of tightening bolts may vary depending on pressure rating.

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Plate Heat Exchanger

Heating Insulation

Standard design

The Alfa Laval heating insulation is designed to insulate the heat exchanger at operating temperatures up to 180°C. It is delivered in sections (panels) in a separate box along with the heat exchanger. The system of panels ensures simple assembly and disassembly. Most insulation types are equipped with connecting spring locks in galvanized steel.

Benefits

The insulation saves energy and provides protection against the heat of the plate pack. It also assures a dry and comfortable working climate in the operating room. The graph below shows the effect (W) lost to the environment for un-insulated plate heat exchangers as function of the difference (Δt) between the temperature inside the plate heat exchanger and the ambient temperature.

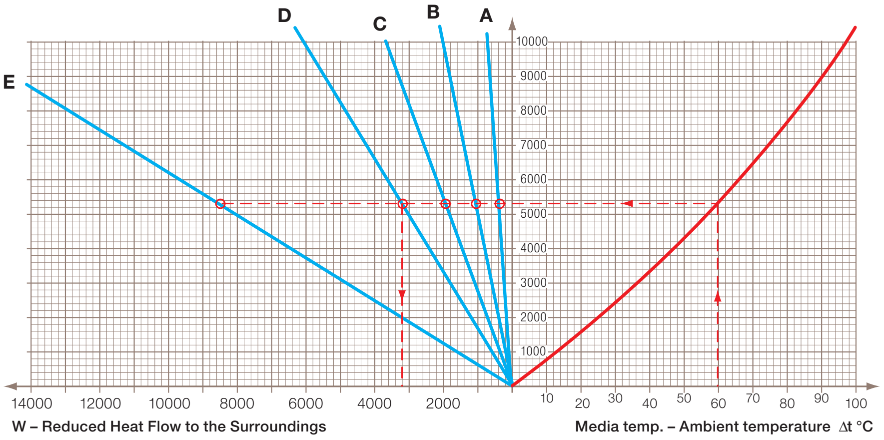
Availability

Heating insulations are available for most of the Alfa Laval plate heat exchangers. The table on the next page shows measurements for standard types.

A = M3 60 plts
B = M6 100 plts
C = M10 200 plts
D = M15 150 plts
E = MX25 300 plts

W = Heat released from different sizes of Alfa Laval plate heat exchangers.

Δt = The difference between the average temperature inside the plate heat exchanger and the environment.



Example: M15-BFG 150 plates
1*M15-B Alloy 316 0.50 mm
Load = 12927 LMTD = 19.9 k = 7045
Water T = 110.0->70.0 1*75 L S1->S2
Water T = 90.2<-50.0 1*75 L S4<-S3
Average temperature inside the PHE (110 + 70 + 50 + 90) / 4 = 80°C.

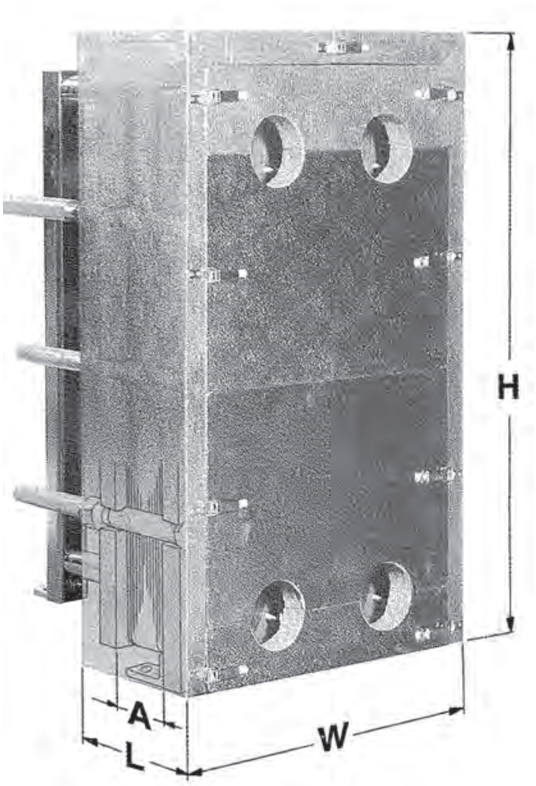
Ambient temperature 20°C.
delta t = 80-20 = 60°C
The heat released will then be 3200 W or 3.2 kW.
This is less than 0.3 promille of the total heat exchanged in the PHE.

Dimensions

Measurements in mm (inch)*.

PHE type	$L_{min-max}$	W_{max}	H_{max}
T2	240-350 (9.45-13.78)	220 (8.66)	380 (14.96)
M3	380-640 (14.96-25.20)	260 (10.24)	520 (20.47)
TL3	440-890 (17.32-35.04)	270 (10.63)	830 (32.68)
T5	300-480 (11.81-18.90)	380 (14.96)	800 (31.50)
TS6	360-825 (14.17-32.48)	545 (21.46)	760 (29.92)
M6	300-850 (11.81-33.46)	450 (17.72)	1005 (39.57)
TL6	300-850 (11.81-33.46)	450 (17.72)	1315 (51.78)
M10	450-1160 (17.72-45.67)	600 (23.62)	1095 (43.11)
TL10	450-1960 (17.72-77.16)	640 (25.20)	2100 (82.67)
M15	450-1960 (17.72-77.16)	820 (32.28)	2250 (88.58)
TL15	500-2900 (19.68-114.17)	820 (32.28)	2880 (113.39)
TS20	500-1850 (19.68-72.83)	930 (36.61)	1600 (62.99)
T20	530-2560 (20.87-100.79)	920 (36.22)	2400 (94.49)
MX25	550-2580 (21.65-101.57)	1070 (45.13)	3200 (125.98)
TL35	950-4120 (37.40-162.20)	1320 (51.97)	3300 (129.92)

*) For exact dimensions frame type including A-measurement must be specified.



Technical specification

Item	All PHE types excl. type T2, M3, TL3, T5	PHE type T2, M3, TL3, T5
Plating	Alustucco 1 mm (0.039 in)	Alustucco 1 mm (0.039 in)
Insulation material	Mineral wool 65 mm (2.56 in)	Mineral wool 40 mm (1.57 in)
Inside layer	Aluminum folie 0.05 mm (0.002 in)	Aluminum folie 0.05 mm (0.002 in)
Panel fixation	Snap locks galvanized	Screws

Particulars required for quotation

- Frame type
- A-measurement
- Tightening bolt length
- Type of connections
- Connection positions

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Bolt Protection Sleeves

Genuine Spare Parts

Extending the working life of a heat exchanger means taking care of every single part, and making sure that they serve their function efficiently.

Plastic sleeves that slide over the tightening bolts keep the threads free from dirt and other deposits, and make it easier to open and close the heat exchanger for maintenance and cleaning, all of which ensures less downtime.

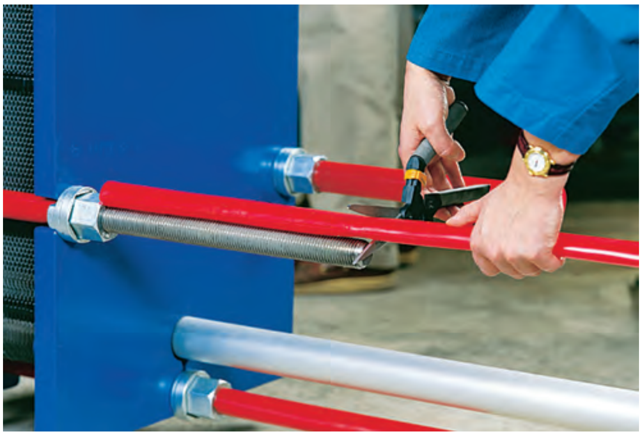
The bright red colour makes the sleeves easily visible, aids checks and helps prevent accidents. When ordering, please specify the bolt dimensions and total length.

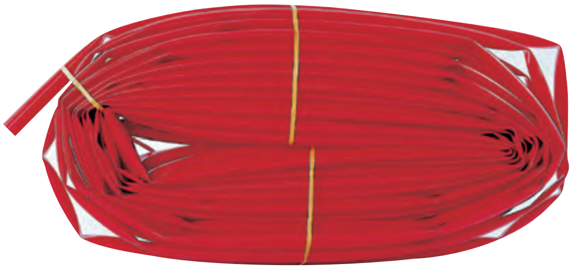
Bolt sleeves are available by specified length in meters.

Benefits
Using Alfa Laval genuine spare parts means you can be sure that the plastic bolt protection sleeves fit perfectly, and work exactly as intended.

Ordering information

Part number	Size	Measurements
1995-101-097	M20	18 x 20 mm
1995-101-096	M24	24 x 22 mm
1995-101-086	M24	26 x 28 mm
1995-101-082	M30	32 x 34 mm
1995-101-079	M39	41 x 43 mm
1995-101-081	M48	51 x 53 mm





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Pneumatic Tightening Device – PHETD80

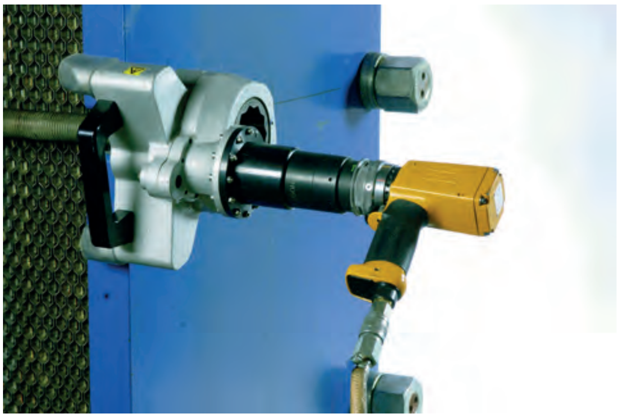
Maintenance Tools

The Alfa Laval PHETD80 is an automatic two-speed pneumatic tightening device designed to make it easy to open and close plate heat exchangers. Available in both single and twin models, this device spins the nut down at high speed, while the final tightening is automatically geared down to low speed.

The PHETD80 is easy to handle and work with, and ensures excellent operator safety. It works from both the nut side and the head side of the bolt. The handle of the drive unit can be rotated freely, in order to ensure that the user can use it while in the operating position that is most comfortable. Another operator safety feature is the low level of vibration.

The air connectors are of the ErgoQIC type, which limits energy loss and makes it easy to disconnect the hose, with no air blow out.

The PHETD80 is delivered complete with an air handling unit that includes a water separator, mist lubricator and air flow regulator, with a 5-metre length of air hose connecting the air handling unit and tightening device. All the components are packed in a sturdy wooden case for transporting and storing the device safely.



Features

- Purpose-built for plate heat exchangers
- Modular design with variable socket keys
- Continuous twin motor operation with automatic changeover
- Sturdy design
- Easy to operate, and low level of vibration
- Optional extras: socket keys in different sizes (NW36, 46, 50, 55, 60, 65 and 75)

Benefits

- Can be used on bolt head or nut at either end of plate heat exchanger
- One single tool for all bolt sizes
- No hammering effect avoids damaging equipment and bolts
- Reliable operation
- Reduced downtime

Technical specifications

Socket key size	NW80 (with inserts for smaller sizes)
Maximum torque	3,270 Nm (2390 ftlb)
Maximum air pressure	6.3 barg (91.4 psig)
Minimum air pressure	3.0 barg (43.5 psig)
Air consumption at free speed	19 l/s (40 cfm)
Oil volume mist lubricator	0.2 l (12 in^3)
Weight	17 kg (37 lbs)
L x W	54 x 25 cm (21 x 10 in)
Measured sound pressure level	79 dB(A)
Measured vibration value	<2.5 m/s^2
Air hose length	5 m (16 ft)

Ordering information

Art. no.	Component
32840-421-01	Tightening device PHETD80, complete*
32840-433-01	Tightening device PHETD80, double, complete

Socket keys

32840-004-01	Socket key reducer 80/75
32840-004-02	Socket key reducer 80/60
32840-004-03	Socket key reducer 80/46
32840-004-04	Socket key reducer 80/36
32840-004-05	Socket key reducer 80/65
32840-004-06	Socket key reducer 80/55

* Complete unit includes: Atlas Copco pneumatic wrench unit, fitted with special Alfa Laval gearbox air handling unit with regulator, filter and mist lubricator, 5-metre air hose with ErgoQIC connectors, socket key NW80, 1 litre lubricating oil, packing and storage box, fitted with carrying handles.

The handle of the drive unit can be rotated freely to ensure the most comfortable operating position.

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Electric Tightening Device – PHE-ETD80

Maintenance Tools

The Plate Heat Exchanger Electric Tightening Device unit, type PHE-ETD80 is an all-current appliance designed for easy opening and closing of plate heat exchangers. The high safety factor of IP 54 and the multi voltage and frequency motor ensures a safe and versatile tool that can operate on most mains net work or generators.

Its ease of handle includes the choice of free or fixed joint between the motor drive unit and the gear unit. By this feature the most comfortable handle position can be selected depending on which side of the plate heat exchanger the opening or tightening takes place.

Rotation direction is selected by the double function trigger; there is no need to change the hand grip. This together with a power supply switch ensures a high operator safety. The tightening device is equipped with an automatic safety monitoring function to protect the motor against damages in case of a possible overload.

Features
- Purpose-built for plate heat exchangers
- Modular design with variable socket keys
- Free joint or fixed connection between drive and gear box
- Double function trigger for clock wise or counter clock wise rotation
- Automatic temperature controlled overload protection
- Continual rotational speed
- Optional extras: Socket inserts in various sizes

Benefits
- Can be used on bolt head or nut at either end of plate heat exchanger
- One tool for all sizes of tightening bolts
- Easy and comfortable operation
- No hammering effect avoids damaging equipment and bolts
- Comfortable operation
- Reduced downtime

Technical specification

Socket key size	NW80 mm (inserts for smaller sizes)
Maximum torque	3300 Nm (2430 lbft)
Current	10 Amps
Electrical connection	100-250 V; 45-66 Hz
Protection	IP 54
Idle speed	6 rpm
Weight	21 kg (46 lb)
LxW	62x32 cm (25x13 in)
Sound pressure level	max. 86 dB(A)

Ordering data

Art no	Component
32840435-01	Electric Tightening Device PHE-ETD80
32840004-01	Socket key reducer NW 80/75
32840004-02	Socket key reducer NW 80/60
32840004-03	Socket key reducer NW 80/46
32840004-04	Socket key reducer NW 46/36
32840004-05	Socket key reducer NW 80/65
32840004-06	Socket key reducer NW 80/55

PPS00016EN 0603

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Pneumatic Nutrunner & Thread Cleaner - PHENR80

Maintenance Tools

Pneumatic tool for improved service efficiency of plate heat exchangers

The Alfa Laval Nutrunner & Thread Cleaner is a compressed air powered service tool designed to transport nuts on long threads and to efficiently clean bolt threads from rust and dirt.

When opening and tightening a PHE that has been in service for some time it is a common problem that the threads on the tightening bolts have been attacked by corrosion or that dirt deposits have been formed. Bolts have to be cleaned from this before the nuts can be loosened, a very time-consuming manual work. With large plate packs fitted, the loosened nuts must be moved long distances, a tiring and time-consuming work.

The Thread Cleaner has knives that effectively clean the bolt threads in a fraction of the time it takes to do the job manually. Keeping threads clean and free from surface rust minimizes wear and tear on the bolts during the tightening operation, thus prolonging bolt lifetimes. The thread cleaner can handle bolt sizes from M30 to M52.

For increased safety and ease of handle, the Nutrunner is equipped with a safety ring to which a balancing block may be connected.

Features

- Transport nuts on long threads
- Efficiently cleans bolt threads
- Excellent ergonomics
- Fit bolt sizes M30-M52

Benefits

- Increased service efficiency
- Lower service cost
- Lower tool costs
- Longer life time of tightening bolts

The PHENR80 is the ideal complement to the Pneumatic Tightening Device PHETD80.

Technical specification

Socket key size	NW 80 for M39, M48 and M52 bolt size
Socket key insert sizes	NW 65 for M42 bolt size
	NW 46 for M30 bolt size
Air consumption at free speed	10 l/s free air
Max air pressure	7 bar
Connection compressed air	¼" female
Nut runner speed	Max 210 rpm
Thread cleaning capacity cutting edge A	M38-M52
Thread cleaning capacity cutting edge B	M30-M38
Mechanical connection drive unit	½” square
Weight complete with drive unit	3.7 kg
Material housing	Alumina and stainless steel
Material cutting edges	Steel
Air motor	Steel

Ordering information

Art. No.	Component
32840468-01	Kit Nut Runner, Thread Cleaner & Drive Unit
32840468-02	Kit Nut Runner & Drive Unit
32840468-08	Spare kit washers and o-rings for thread cleaner
32840468-09	Spare kit cutting edges for thread cleaner
32840468-12	Socket key 80/46
32840468-14	Socket key 80/65

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Chapter 7

Brazed plate heat exchangers (BHE)

Alfa Laval's first plate heat exchanger was introduced to the dairy industry in 1931. As a development from the traditional gasketed plate heat exchanger, Alfa Laval introduced the world's first brazed plate heat exchanger in 1977. Since then, continuous developments have been made to optimize its performance and reliability.

Brazed plate heat exchangers offer multiple benefits. The brazing technology eliminates the need for seals and thick frame plates and the design offers excellent resistance to pressure and thermal fatigue in a wide range of heating and cooling applications.

Brazed plate heat exchangers from Alfa Laval are frequently a natural first alternative all over the world.

Alfa Laval invented the world's first BHE in 1977 and since then, continuous developments have been made to optimise its performance and reliability.

Five reasons to buy your BHEs from the market leader

1. Designed to withstand exhausting conditions
As the world-leading BHE manufacturer, Alfa Laval has long experience in designing BHEs that will withstand exhausting pressure and temperature fatigue conditions. Years of R&D, unique patented solutions and innovative product design, coupled with an extensive testing program, ensure that the durability and lifetime of an Alfa Laval BHE will be hard to match.

2. A wide range of solutions
Alfa Laval BHEs come in a wide range of sizes and capacities. Different plate patterns and connections are available for various duties and performance specifications, and the BHE can be designed as a one-pass, two-pass or multipass unit. We have the ideal solution for every specific need. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

3. Full compliance with PED
All Alfa Laval BHEs comply with the European Pressure Vessel Safety Directive, PED, in terms of mechanical and materials specifications. They can also be delivered according to other relevant standards. Various national codes are also available.

4. Fast deliveries and service worldwide
Alfa Laval is truly a global company. Our regional distribution centres serve Alfa Laval facilities and distributors worldwide, ensuring fast delivery to customers. Wherever you are, talk to us, we're only a phone call away.

5. A partner you can trust
Genuine application know-how and long experience make Alfa Laval the ideal business partner for heating and cooling. Rely on us to supply the most cost-effective solution for your specific needs – we won't let you down.

Choosing Alfa Laval makes sound financial sense!

A few benefits of using brazed plate heat exchangers

Low capital investments
Thanks to the high heat-transfer coefficients, the required plate surface area can be quite small. Reducing the amount of material used makes for significant savings.

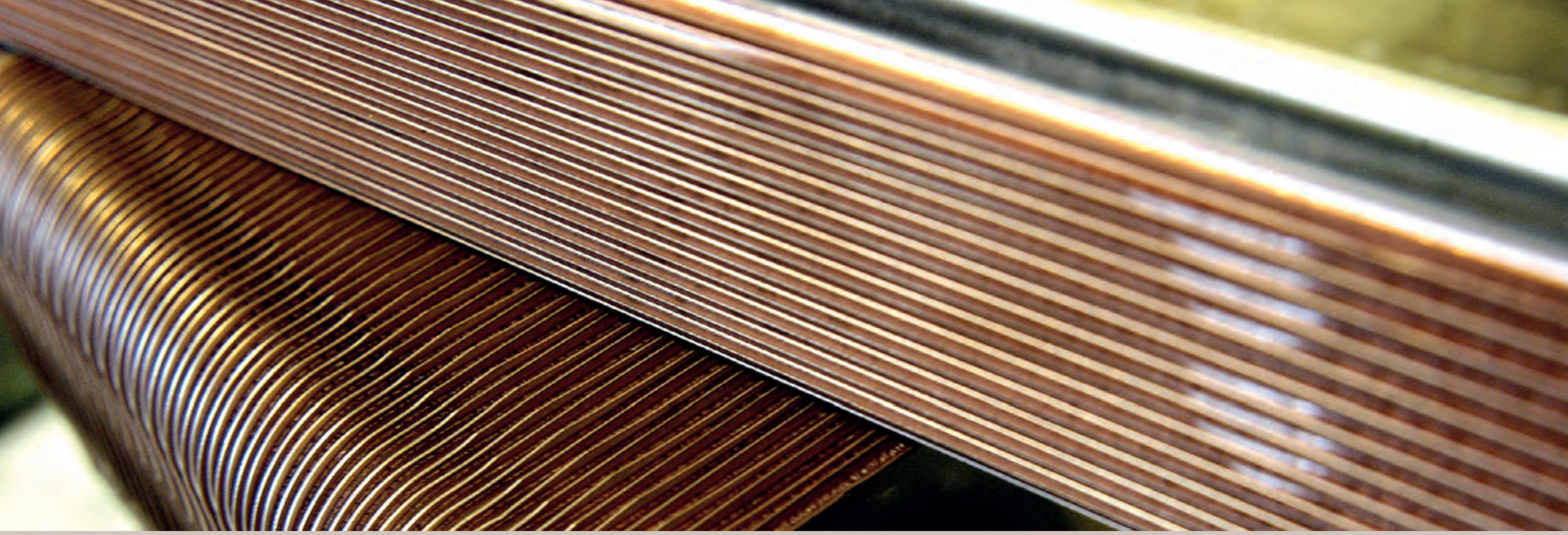
Small footprint
With its compact design, the brazed plate heat exchanger has a smaller footprint than any other comparable solution.

Low installation costs
Parallel and counter-current flow connections make installation easy, reducing costs for pipes and valves.

Minimum downtime
Thanks to a perfect plate corrugation design, high turbulence inside the heat exchanger optimizes the self-cleaning effect and thus reduces scaling. As there are no gaskets, the risk of leakage is virtually non-existent.

Maximum reliability
The brazed plate heat exchangers are individually leak- and pressure-tested to ensure first-class quality and Alfa Laval has approvals form all major certification bodies.

Save energy!
Save time!
Save money!



- Fouling is minimized by the turbulent flow, resulting in a self-cleaning effect
- All BHEs are leak- and pressure-tested before delivery
- 75 years of heat-transfer technology experience included in each BHE

Design
The brazed plate heat exchanger consists of thin corrugated stainless steel plates (AISI 316) which are vacuum-brazed together using copper as the brazing material.

Brazing the stainless-steel plates together eliminates the need for sealing gaskets and thick frame plates.
The brazing material seals as well as holds the plates together at the contact points. Alfa Laval's brazed plate heat exchangers are always brazed at all contact points, which ensures optimal heat-transfer efficiency and pressure resistance.

The plates are designed to achieve maximum possible lifetime.
Since virtually all the material is used for heat transfer, the BHE is very compact in size, has low weight and a small hold-up volume.

Compact, reliable
and cost efficient

Focus on fatigue
The expected lifetime of the heat exchanger is influenced by many factors, especially temperature and pressure variations in load conditions. In the case of high loads (pressure peaks, fast temperature changes), this can lead to fatigue failures, with a leaking BHE as the consequence.

Alfa Laval has extensive test facilities for pressure and temperature fatigue. The fatigue characteristics of each model are measured and analysed over and over again. With the help of the statistical data from our Fatigue Analysis Program we can estimate the lifetime of a BHE in a certain application.

The plate material in the heat exchanger is designed to match the demands on pressability as well as “brazeability” and fatigue durability. Metallurgical and design factors influencing fatigue are areas of constant focus for Alfa Laval’s R&D engineers when developing BHEs.

Years of continuing studies of the fatigue phenomena has put Alfa Laval in the forefront when it comes to developing and producing long lasting BHEs.

Production
Alfa Laval leads the development towards top quality. We do it by advanced production technology in high volumes. We do it with new technology, through constant research and development. We do it in delivery and service. As a leading global manufacturer we do it by offering a complete product range of heat exchangers. Our knowledge gives you the best solutions, products with higher technical performance and a focus on energy savings.

Quality must prevail through the whole chain from development to after sales. The brazed plate heat exchangers are individually leak- and pressure-tested to ensure first-class quality, and Alfa Laval has approvals from all major certification bodies.

- Small footprint and low weight, 10-20% of a traditional shell & tube
- High temperature and pressure durability
- Excellent fatigue resistance

Design options

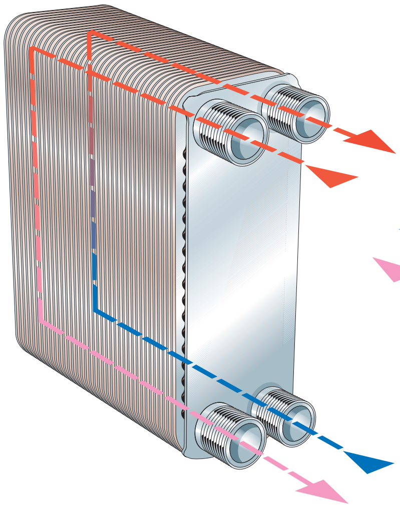
The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. The BHE can be designed as a one-pass, two-pass or multi-pass unit.

A wide range of connections are available, and there is also the option of choosing the placement of the connection.

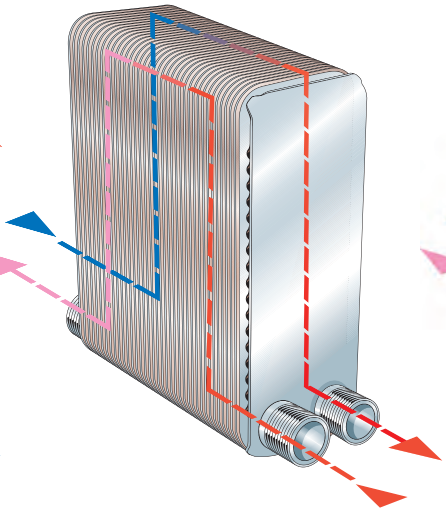
Alfa Laval offers a wide range of standard heat exchanger models and sizes, tailor-made for HVAC applications and district heating, that are available from stock. Customer-specific designs can be offered when requested.

Flow principle

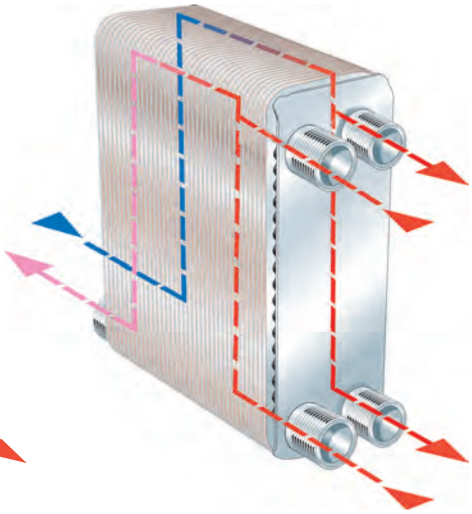
The basic flow principle in a brazed heat exchanger for HVAC applications is parallel and counter-current to achieve the most efficient heat-transfer process. In a standard single-pass design all connections are located on one side of the heat exchanger, making installation very easy.



One-pass



Two-pass



Pre/post heater

Accessories

Cleaning-In-Place (CIP)

All types of heat exchangers need to be cleaned regularly to remove deposits such as scale, sludge and microorganisms. Alfa Laval CIP is a convenient solution that carefully removes the deposit on all heat transfer surfaces in the heat exchanger. Alfa Laval CIP 200L and CIP 400L are manufactured in stainless steel using high-quality components (pumps, valves etc.) according to ISO 9001 and with the CE-mark. The smaller units, Alfa Laval CIP 20 and CIP 40, are made of industrial-grade plastic. Alfa Laval CIP is mobile due to its compact design. The units have reversible flow, and Alfa Laval CIP 200L and CIP 400L also have a built-in heater. All cleaning detergents used by Alfa Laval are environmentally friendly and do not damage the equipment.

Couplings for welding or soldering

The couplings fit on the threaded connections of the units. Future service is then facilitated by dismantling the heat exchanger from the pipes via the couplings. This connection is approved in most countries when weld or flange connection is required. A flat washer is used as sealing between the coupling and the connections.

Insulation

The heat exchanger insulation is easily assembled and dismantled. The Alfa Laval insulation provides protection from the heat pack and the climate in the operating room will be dry and not too hot. Alfa Laval insulations are available for both heating and cooling applications as well as for various temperature requirements.

Feet and mounting brackets

Larger units can be delivered with feet or mounting brackets. These make the installation work easier and minimize stresses in the connected pipes. The unit can also be bolted to the floor. CB30 and CB60 can be wall-mounted using the standard feet frame. CB200, CB300 and CB400 are always supplied with feet and a lifting hook to ensure safe and functional installation.

Insulation

Feet and mounting brackets

Instructions for use

Start-up procedure

1. Before starting any pump, check whether instructions exist stating which pump should be started first.
2. Check that the valve between the pump and the heat exchanger is closed.
3. Check that the valve at the exit, if there is one, is fully open.
4. Open the ventilation.
5. Start the pump.
6. Open the valve slowly.
7. When all the air is out, close the ventilation.
8. Repeat the procedure for the other side.

Shut-down procedure

1. First establish whether instructions exist as to which side should be stopped first.
2. Slowly close the valve controlling the flow rate of the pump you are about to stop.
3. When the valve is closed, stop the pump.
4. Repeat the procedure for the other side.

Installation instructions

In HVAC applications it is, from a performance point of view, recommended to install the heat exchanger so that a counter-current flow is obtained. It does not matter if the heat exchanger is mounted vertically or horizontally, as long as no change of phase takes place (evaporation/condensation). If drainage of the heat exchanger is needed for some reason, please take this into consideration when positioning the heat exchanger. The heat exchanger can be mounted with brackets or standing on feet supplied by Alfa Laval. It is important to minimize vibrations or pulsations from the pipes to the heat exchanger. The usage of flexible hoses is one way of reducing stresses caused by vibrations, and stresses from the piping system.

Operation

Adjustments in flow rates to maintain correct temperatures or pressure drops should be made slowly in order to prevent pressure shocks to the system. Therefore fast-closing valves should not be used unless the pipes in the system are very short. Problems with keeping the performance of the heat exchanger may be caused by changing temperature conditions, changing flow rates or by fouling.

Service efficiency

The heat transfer through the plates can be seriously reduced by the formation of deposits of various kinds on the plate surfaces. Even if the highly turbulent flow gives a strong resistance to the formation of deposits the turbulence can not completely eliminate fouling. Thanks to CIP (Cleaning In Place) it is possible to remove calcium deposits and other forms of scaling from the plate surfaces in an easy and effective way. Different cleaning solutions can be used depending on the type of deposits. Alfa Laval has a worldwide service organisation. Service is available in 130 countries at 15 major service centres and a network of service stations around the globe.

Technical specifications

Brazed plate heat exchanger (BHE) data and dimensions

	CBH16	CBH18	CB20	CB30	CB60
Channel type	H, A	H, A	H	H, M, L	H, M, L
Max./min. design temperature (ºC)	225/-160	150/-50	225/-196	225/-196	175/-196
Max. design pressure at 150° C (S3-S4/S1-S2) (bar) *	32/32	32/32	16/16	36/36	36/36
Volume/channel (S3-S4/S1-S2) (litres)	0.027 (H) 4)	0.038 (H) 5)	0.028	0.054	0.103 (H) 6)
Max. flowrate (S3-S4/S1-S2) (m^3/h) **	3.6	3.6	8.9	14.5	14.5
Height, a (mm)	211	316	324	313	527
Width, b (mm)	74	74	94	113	113
Vertical connection distance, c (mm)	172	278	270	250	466
Horizontal connection distance, d (mm)	40	40	46	50	50
Plate pack length, A (mm)	(n x 2.16) + 8	(n x 2.16) + 8	(n x 1.5) + 8	(n x 2.31) + 13	(n x 2.35) + 13
Weight empty (kg) ***	(n x 0.04) + 0.27	(n x 0.07) + 0.4	(n x 0.08) + 0.6	(n x 0.1) + 1.2	(n x 0.18) + 2.1
Standard connection, external thread (in)	3/4"	3/4"	1"	1 1/4" / 1"	1 1/4" / 1"
Plate material	AISI 316	AISI 316	AISI 316	AISI 316	AISI 316
Connection material	AISI 316	AISI 316	AISI 316	AISI 316	AISI 316
Brazing material	Copper	Copper	Copper	Copper	Copper
Max. number of plates	60	60	110	150	150

	CB110 8)	CB112	CB200 (CBH200)	CB300	CB400
Channel type	H, L, M	H, L, M, AM, AH	H, L, M	H, L, M	H, L
Max./min. design temperature (ºC)	225/-196	225/-196	225/-196	225/-196	225/-196
Max. design pressure at 150° C (S3-S4/S1-S2) (bar) *	32/32	32/32	26/26	27/16	32/27
Volume/channel (S3-S4/S1-S2) (litres)	0.21	0.18 7)	0.51	0.58/0.69	0.74
Max. flowrate (S3-S4/S1-S2) (m^3/h) **	51	34/63	128	200	200
Height, a (mm)	491	618	740	990	990
Width, b (mm)	250	191	323	365	390
Vertical connection distance, c (mm)	378	519	622	816/861	825
Horizontal connection distance, d (mm)	138	92	205	213.5	225
Plate pack length, A (mm)	(n x 2.2) + 12	(n x 2.05) + 15	(n x 2.7) + 11 / (n x 2.7) + 14)	(n x 2.62) + 11	(n x 2.56) + 14
Weight empty (kg) ***	(n x 0.38) + 13	(n x 0.35) + 4.8	(n x 0.6) + 12 / (n x 0.6) + 14)	(n x 1.26) + 21	(n x 1.35) + 24
Standard connection, external thread (in)	ISOG2"/2 1/2"	3" weld/2"	3"	4"/2 1/2"	4"
Plate material	AISI 316	AISI 316	AISI 316	AISI 316	AISI 316
Connection material	AISI 316	AISI 316	AISI 316	AISI 316	AISI 316
Brazing material	Copper	Copper	Copper	Copper	Copper
Max. number of plates	300	300	230	250	270

*) According to PED

**) Water at 5 m/s (connection velocity)

***) excluding connections

n = number of plates

1) M and L channels 29/28 bar

2) E channel 0.18/0.18; A channel 0.18/0.25

3) A channels (n x 2.5) + 10, E channels (n x 2.2) + 10

4) A channel (0.030/0.024)

5) A channel (0.042/0.035)

6) L and M channels 0.13

7) AH and AM channels 0.20/0.16

8) Released during 2012

Brazed plate heat exchangers range

CB16/CBH16

Read all about it on page 7:11

CB18/CBH18

Read all about it on page 7:13

CB20

Read all about it on page 7:15

CB30/CBH30

Read all about it on page 7:17

CB60/CBH60

Read all about it on page 7:19

CB110/CBH110

Read all about it on page 7:21

CB112/CBH112

Read all about it on page 7:23

CB200/CBH200

Read all about it on page 7:25

CB300/CBH300

Read all about it on page 7:27

CB400

Read all about it on page 7:29

CB16 / CBH16

Brazed Plate Heat Exchanger

General information

Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

Typical applications

- HVAC heating/cooling
- Refrigerant applications
- Industrial cooling/heating
- Oil cooling

Working principles

The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

Standard design

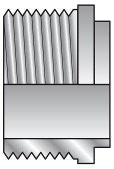
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

Particulars required for quotation

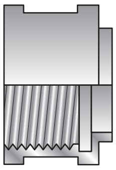
To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:

- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

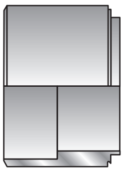
Examples of connections*



External threaded



Internal threaeded

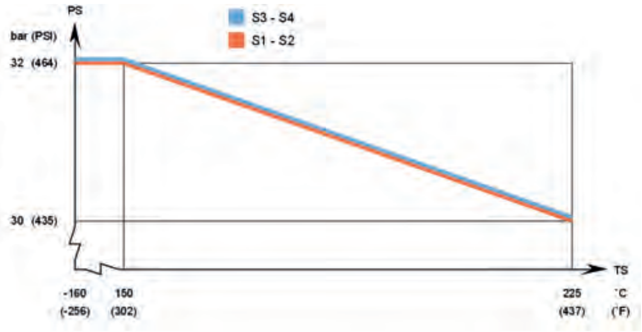


Soldering

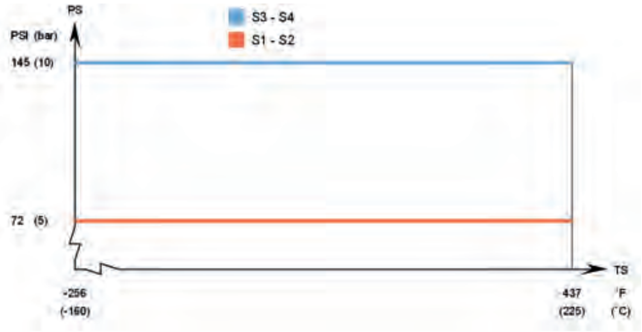
* More connections are available on request.

CB16 - PED approval pressure/temperature graph*

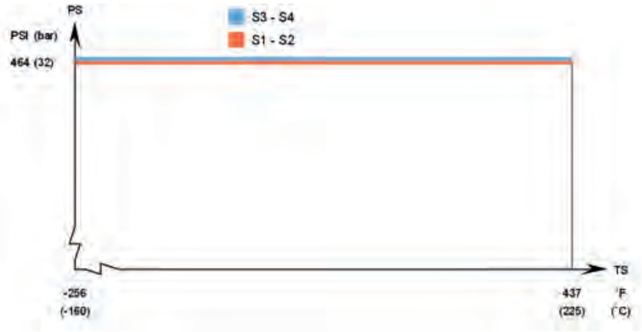
CBH16 - PED approval pressure/temperature graph*



CB16 - UL approval pressure/temperature graph*



CBH16 - UL approval pressure/temperature graph*



Standard dimensions and weight*

CB16
A measure mm = 7 + (2.16 * n) (+/-2 %)
A measure inch = 0.28 + (0.09 * n) (+/-2 %)
Weight** kg = 0.14 + (0.04 * n)
Weight** lb = 0.3 + (0.09 * n)

CBH16
A measure mm = 8 + (2.16 * n) (+/-2 %)
A measure inch = 0.31 + (0.09 * n) (+/-2 %)
Weight** kg = 0.27 + (0.04 * n)
Weight** lb = 0.59 + (0.09 * n)

(n = number of plates)
* Excluding connections

Standard data

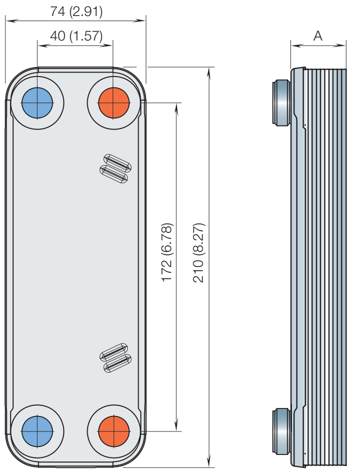
Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel H, litres (ga)	0.027 (0.0070)
Volume per channel A, litres (ga)	0.030 (0.0078) 0.024 (0.0063)
Max. flowrate* m^3/h (gpm)	3.62 (15.93)
Min. nbr of plates	4
Max. nbr of plates	60

* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

Standard dimensions
mm (inch)



For exact values please contact your local Alfa Laval representative

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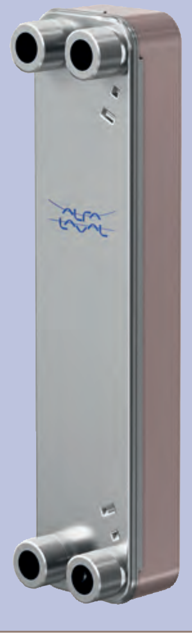
CB18 / CBH18

Brazed Plate Heat Exchanger



General information

Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

Typical applications

- HVAC heating/cooling
- Refrigerant applications
- Industrial cooling/heating
- Oil cooling

Working principles

The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

Standard design

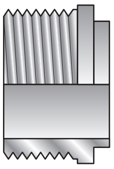
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

Particulars required for quotation

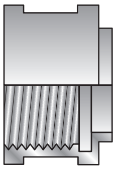
To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:

- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

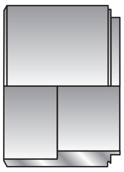
Examples of connections*



External threaded



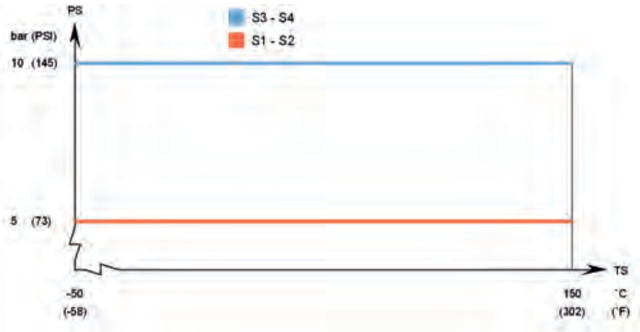
Internal threaeded



Soldering

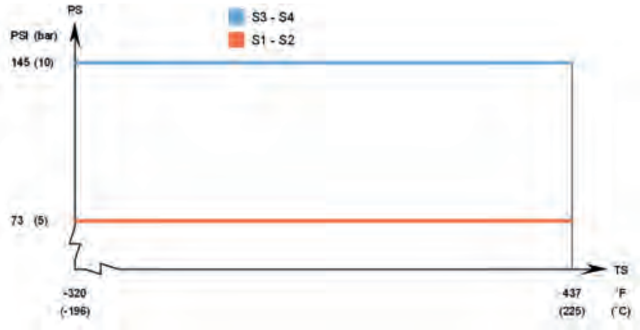
* More connections are available on request.

CB18 - PED approval pressure/temperature graph* H, A



CBH18 - PED approval pressure/temperature graph* H

CB18 - UL approval pressure/temperature graph*



CBH18 - UL approval pressure/temperature graph*

Standard dimensions and weight*

CB18
A measure mm = 7 + (2.16 * n) (+/-2 %)
A measure inch = 0.28 + (0.09 * n) (+/-2 %)
Weight** kg = 0.22 + (0.07 * n)
Weight** lb = 0.48 + (0.15 * n)

CBH18
A measure mm = 8 + (2.16 * n) (+/-2 %)
A measure inch = 0.31 + (0.09 * n) (+/-2 %)
Weight** kg = 0.4 + (0.07 * n)
Weight** lb = 0.88 + (0.15 * n)

(n = number of plates)
* Excluding connections

Standard data

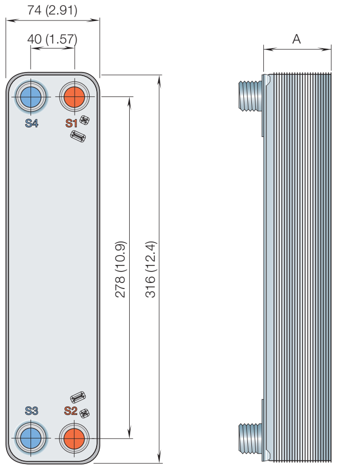
Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel H, litres (ga)	0.038 (0.010)
Volume per channel A, litres (ga)	0.042 (0.011) 0.035 (0.009)
Max. particle size mm (inch)	1.1 (0.04)
Max. flowrate* m^3/h (gpm)	3.62 (15.93)
Min. nbr of plates	4
Max. nbr of plates	60

* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

Standard dimensions
mm (inch)



For exact values please contact your local Alfa Laval representative

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CB20

Brazed Plate Heat Exchanger

General information

Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

Typical applications

- HVAC heating/cooling
- Refrigerant applications
- Industrial cooling/heating
- Oil cooling

Working principles

The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

Standard design

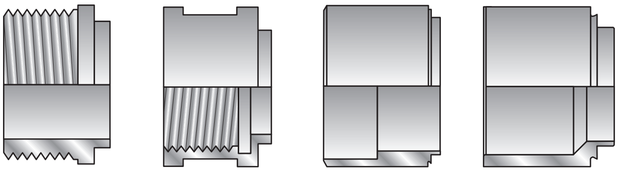
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

Particulars required for quotation

To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:

- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections



* More connections are available on request.

CB20 - PED approval pressure/temperature graph*

Standard dimensions and weight*

A measure mm = 8 + (1.5 * n) (+/-3 mm)
A measure inch = 0.31 + (0.06 * n) (+/-0.12 inch)
Weight** kg = 0.6 + (0.08 * n)
Weight** lb = 1.32 + (0.18 * n)

(n = number of plates)
* Excluding connections

Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.028 (0.007)
Max. particle size mm (inch)	0.6 (0.02)
Max. flowrate* m^3/h (gpm)	8.9 (39.16)
Min. nbr of plates	10
Max. nbr of plates	110

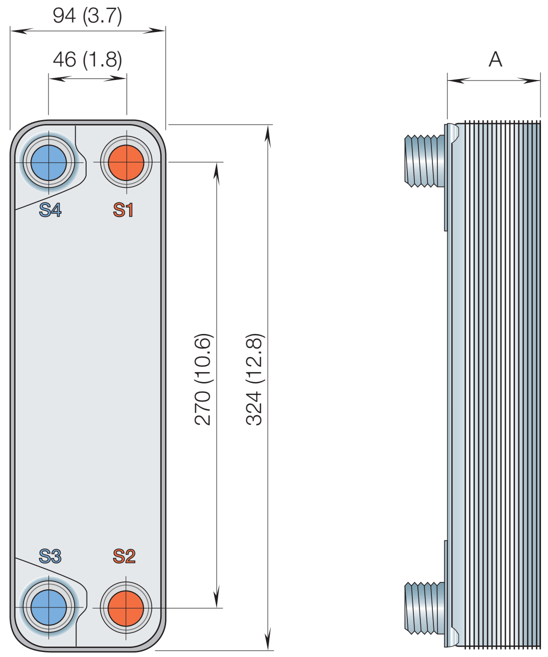
* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

Standard dimensions

mm (inch)



For exact values please contact your local Alfa Laval representative

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CB30 / CBH30

Brazed Plate Heat Exchanger

General information

Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

Typical applications

- HVAC heating/cooling
- Refrigerant applications
- Industrial cooling/heating
- Oil cooling

Working principles

The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

Standard design

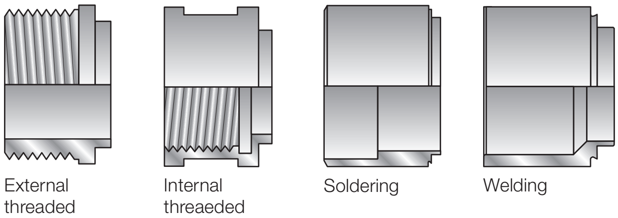
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

Particulars required for quotation

To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:

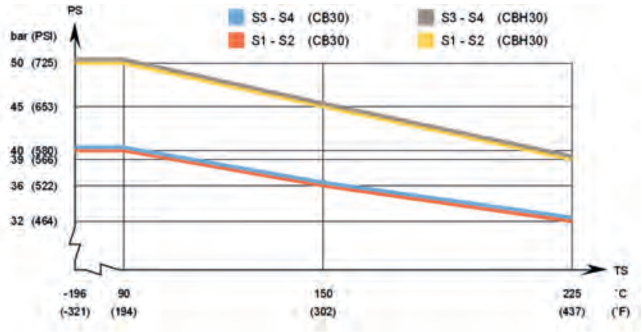
- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections

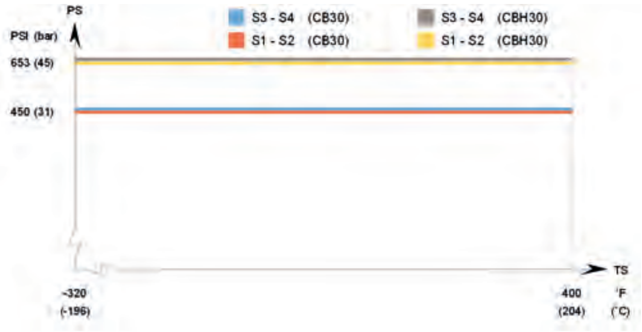


* More connections are available on request.

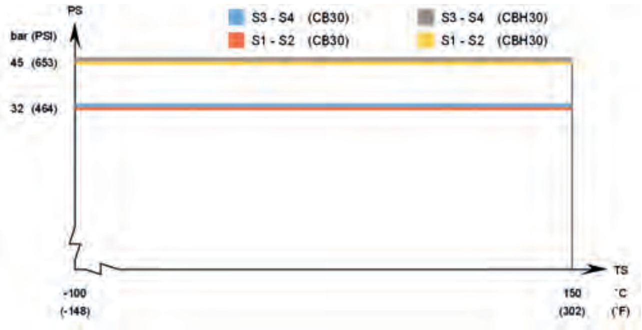
CB30 / CBH30 - PED approval pressure/temperature graph*



CB30 / CBH30 - UL approval pressure/temperature graph*



CB30 / CBH30 - KHK and KRA approval pressure/temperature graph*



Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.054 (0.014)
Max. particle size mm (inch)	1 (0.04)
Max. flowrate* m^3/h (gpm)	14.5 (63.7)
Min. nbr of plates	4
Max. nbr of plates	150

* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

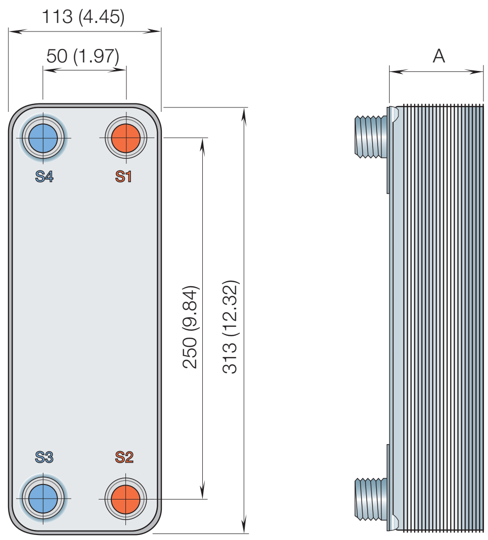
Standard dimensions and weight*

CB30
A measure mm = 13 + (2.31 * n) (+/-2 mm or +/-1.5 %)
A measure inch = 0.51 + (0.09 * n) (+/-0.08 inch or +/-1.5 %)
Weight** kg = 1.2 + (0.11 * n)
Weight** lb = 2.65 + (0.24 * n)

CBH30
A measure mm = 15 + (2.31 * n) (+/-1.5 %)
A measure inch = 0.59 + (0.09 * n) (+/-1.5 %)
Weight** kg = 1.35 + (0.11 * n)
Weight** lb = 2.98 + (0.24 * n)

(n = number of plates)
* Excluding connections

Standard dimensions
mm (inch)



For exact values please contact your local Alfa Laval representative

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Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

CB60 / CBH60

Brazed Plate Heat Exchanger

General information

Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

Typical applications

- HVAC heating/cooling
- Refrigerant applications
- Industrial cooling/heating
- Oil cooling

Working principles

The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

Standard design

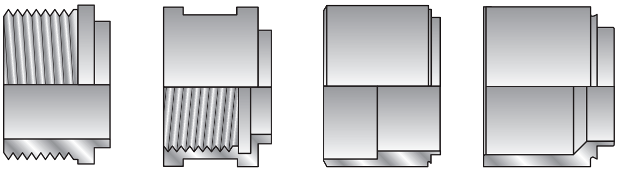
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

Particulars required for quotation

To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:

- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

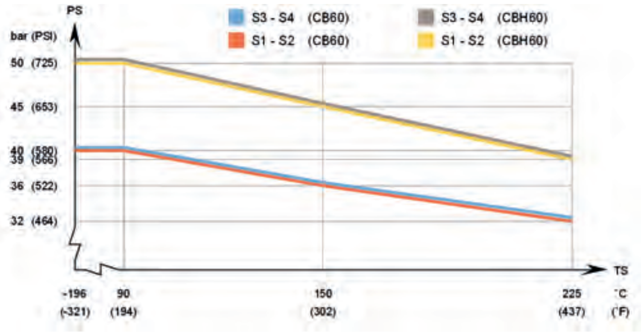
Examples of connections



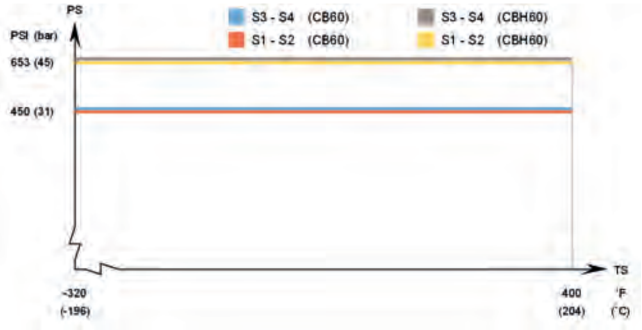
External threaded Internal threaeded Soldering Welding

* More connections are available on request.

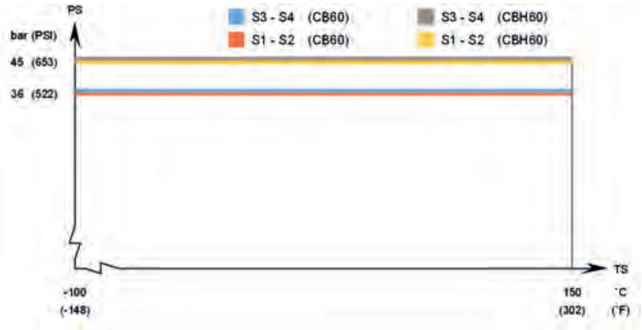
CB60 and CBH60 - PED approval pressure/temperature graph*



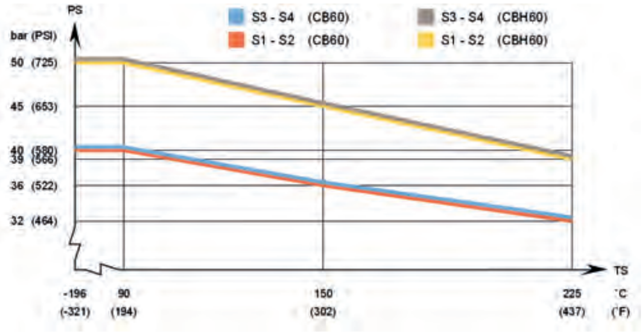
CB60 and CBH60 - UL approval pressure/temperature graph*



CB60 / CBH60 - KHK and KRA approval pressure/temperature graph*



CB60 / CBH60 - CRN approval pressure/temperature graph*



Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.10 (0.027)
Max. particle size mm (inch)	1 (0.04)
Max. flowrate* m^3/h (gpm)	14.5 (63.7)
Min. nbr of plates	4
Max. nbr of plates	150

* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

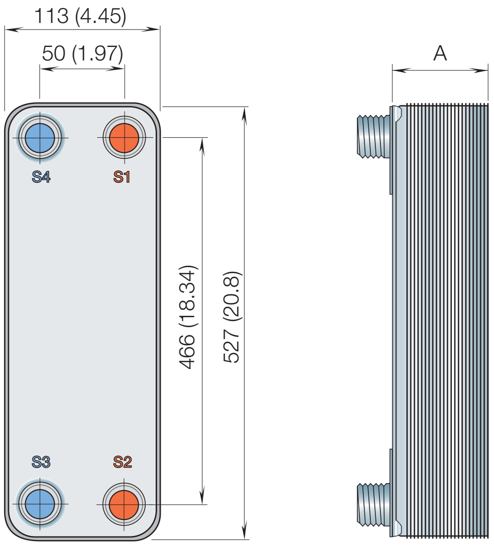
Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

Standard dimensions and weight*

A measure mm = 13 + (2.35 * n) (+/-1.5 %)
A measure inch = 0.51 + (0.09 * n) (+/-1.5 %)
Weight** kg = 2.1 + (0.18 * n)
Weight** lb = 4.63 + (0.4 * n)

(n = number of plates)
* Excluding connections

Standard dimensions
mm (inch)



For exact values please contact your local Alfa Laval representative

Alfa Laval reserves the right to change specifications without prior notification.

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CB110 / CBH110

Brazed plate heat exchanger

General information

Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

Typical applications

- HVAC heating/cooling
- Industrial heating/cooling
- Condensing
- Tap water
- Oil cooling
- Air dryer
- Solar heating

Working principles

The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

Standard design

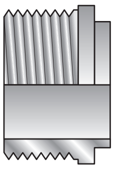
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

Particulars required for quotation

To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:

- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections*



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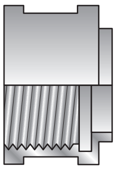

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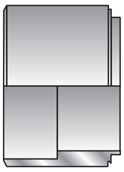
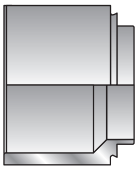
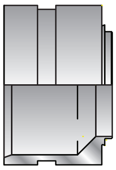


Soldering



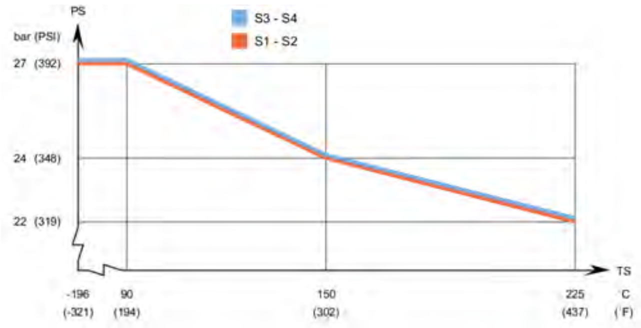
Welding



Vitaulic

* More connections are available on request.

CB110 - PED approval pressure/temperature graph*



CBH110 - PED approval pressure/temperature graph*
TO BE DEFINED

Standard dimensions and weight*

CB110

A measure mm = 15 + (2.55 * n) (±2 mm or ±1.5 %)15 + (2.55 * n) (±2 mm or ±1.5 %)

A measure inch = 0.59 + (0.1 * n) (±0.08 inch or ±1.5 %)

Weight** kg = 4.82 + (0.32 * n)

Weight** lb = 10.63 + (0.71 * n)

CBH110

A measure mm = 15 + (2.55 * n) (±2 mm or ±1.5 %)

A measure inch = 0.59 + (0.1 * n) (±0.08 inch or ±1.5 %)

Weight** kg = 5.68 + (0.32 * n)

Weight** lb = 12.52 + (0.71 * n)

(n = number of plates)

* Excluding connections

Standard data

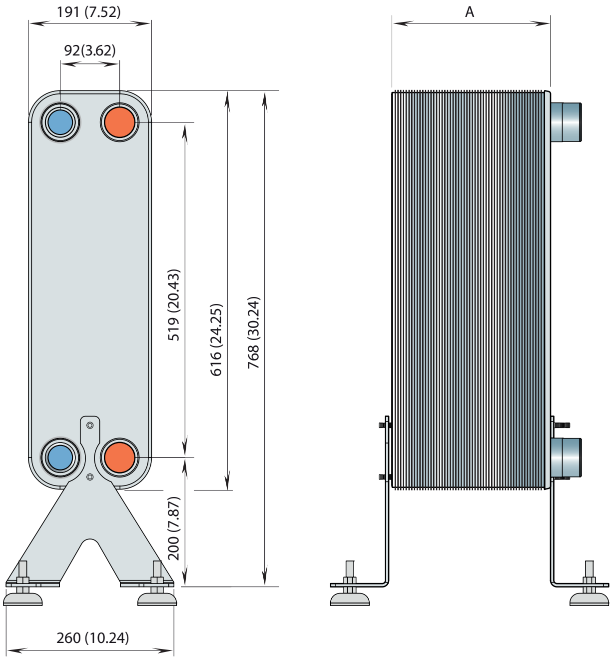
Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel H, L, M, litres (ga)	0.21 (0.05)
Max. particle size mm (inch)	1.2 (0.05)
Max. flowrate* m^3/h (gpm)	51 (224)
Min. nbr of plates	10
Max. nbr of plates	300

* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

Standard dimensions
mm (inch)



For exact values please contact your local Alfa Laval representative

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

CB112 / CBH112

Brazed Plate Heat Exchanger

General information
Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

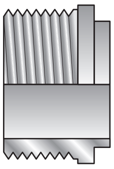
Typical applications
- HVAC heating/cooling
- Industrial heating/cooling
- Condensing
- Tap water
- Oil cooling
- Air dryer
- Solar heating

Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:
- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections*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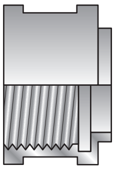
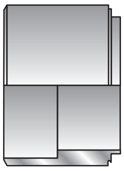
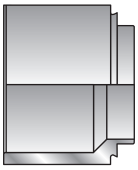
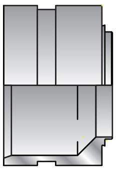

Internal threaded

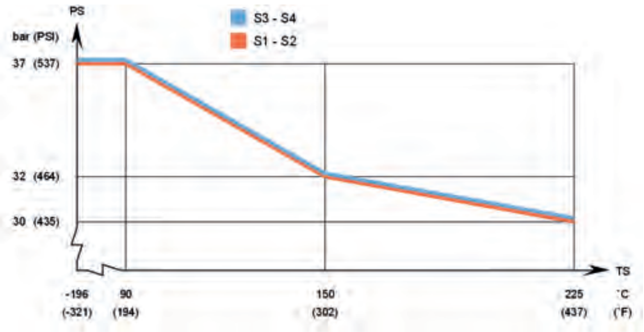

Soldering


Welding

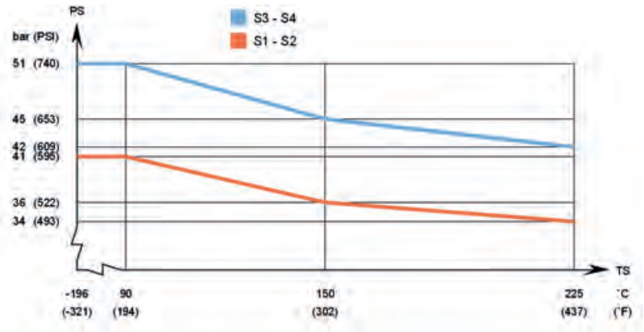

Vitaulic

* More connections are available on request.

CB112 - PED approval pressure/temperature graph*



CBH112 - PED approval pressure/temperature graph*



Standard dimensions and weight*

CB112

A measure mm = 15 + (2.05 * n) (+/-2 mm or +/-1.5 %)

A measure inch = 0.59 + (0.08 * n) (+/-0.08 inch or +/-1.5 %)

Weight** kg = 4.82 + (0.35 * n)

Weight** lb = 10.63 + (0.77 * n)

CBH112

A measure mm = 19 + (2.05 * n) (+/-2 mm or +/-1.5 %)

A measure inch = 0.75 + (0.08 * n) (+/-0.08 inch or +/-1.5 %)

Weight** kg = 5.68 + (0.35 * n)

Weight** lb = 12.52 + (0.77 * n)

(n = number of plates)

* Excluding connections

Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel H, L, M, litres (ga)	0.18 (0.046)
Volume per channel AH, AM, litres (ga)	0.20 (0.052) 0.16 (0.041)
Max. particle size mm (inch)	1 (0.04)
Max. flowrate* m^3/h (gpm)	51 (223.9)
Min. nbr of plates	10
Max. nbr of plates	300

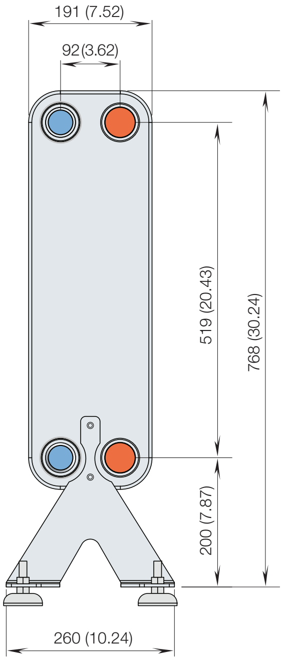
* Water at 5 m/s (16.4 ft/s) (connection velocity)

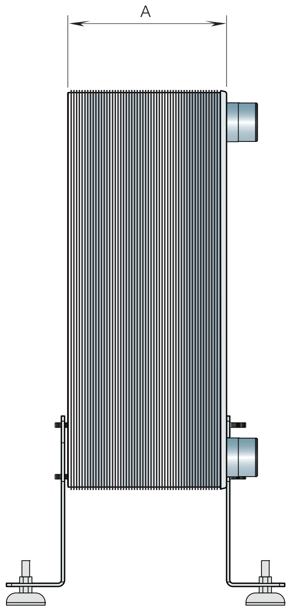
Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

Standard dimensions

mm (inch)





For exact values please contact your local Alfa Laval representative

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

CB200 / CBH200

Brazed Plate Heat Exchanger

General information

Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

Typical applications

Liquid/liquid applications:
- HVAC heating/cooling
- Process heating/cooling
- Hydraulic oil cooling
- Oil cooling

Working principles

The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

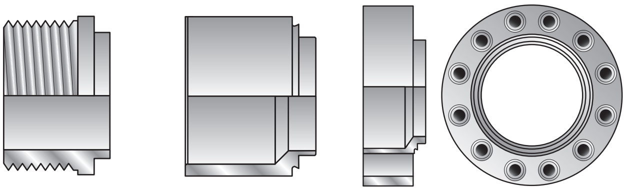
Standard design

The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

Particulars required for quotation

To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:
- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections

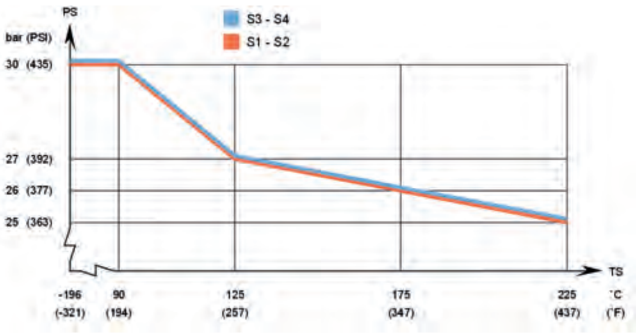


External threaded

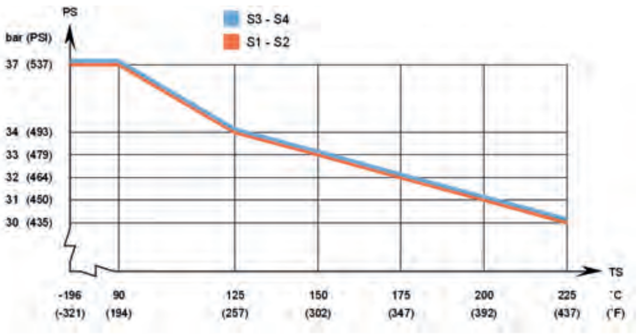
Welding

Compact flanges

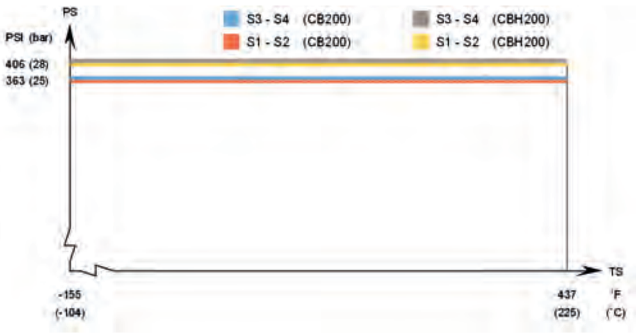
CB200 - PED approval pressure/temperature graph*



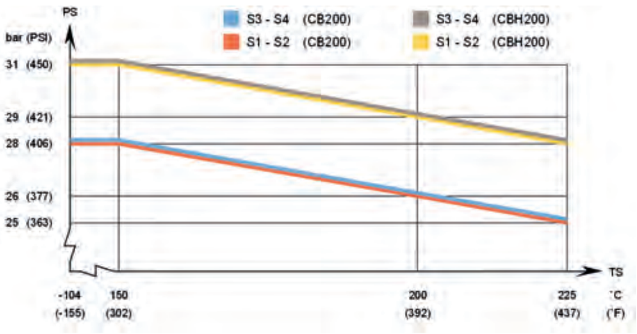
CBH200 - PED approval pressure/temperature graph*



CB200 / CBH200 - ASME approval pressure/temperature graph*



CB200 / CBH200 - CRN approval pressure/temperature graph*



Standard dimensions and weight*

CB200

A measure mm = 11 + (2.7 * n) (+/-10 mm)
A measure inch = 0.43 + (0.11 * n) (+/-0.39 inch)
Weight** kg = 12 + (0.6 * n)
Weight** lb = 26.46 + (1.32 * n)

CBH200

A measure mm = 14 + (2.7 * n) (+/-10 mm)
A measure inch = 0.55 + (0.11 * n) (+/-0.39 inch)
Weight** kg = 14 + (0.6 * n)
Weight** lb = 30.86 + (1.32 * n)

(n = number of plates)
* Excluding connections

Standard data

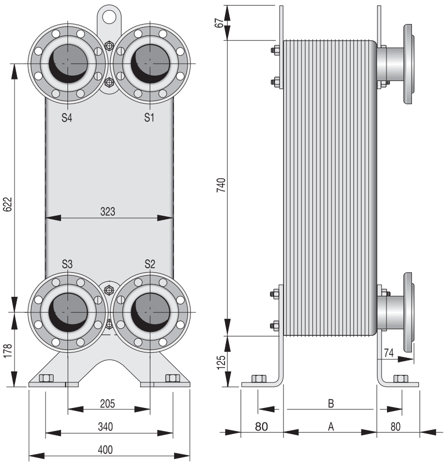
Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.51 (0.13)
Max. particle size mm (inch)	1.8 (0.07)
Max. flowrate* m^3/h (gpm)	128 (561)
Min. nbr of plates	10
Max. nbr of plates	230

* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing material	Copper

Standard dimensions
mm (inch)



For exact values please contact your local Alfa Laval representative

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

CB300 / CBH300

Brazed Plate Heat Exchanger

General information

Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

Applications

Liquid/liquid applications:
- HVAC heating/cooling
- Process heating/cooling
- Hydraulic oil cooling
- Oil cooling

Working principles

The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

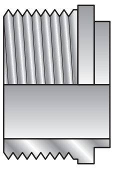
Standard design

The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

Particulars required for quotation

To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:
- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections



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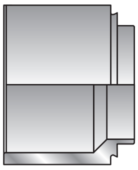
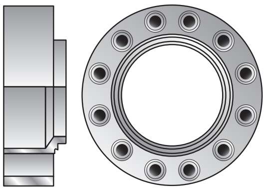
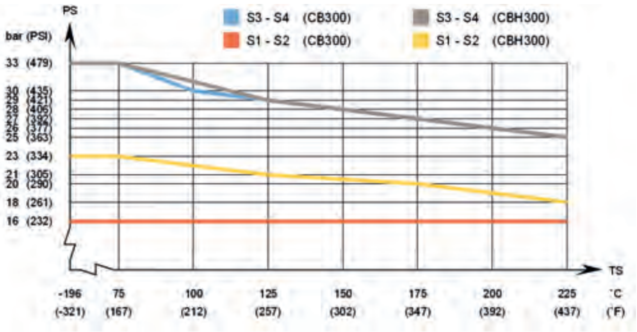


Welding

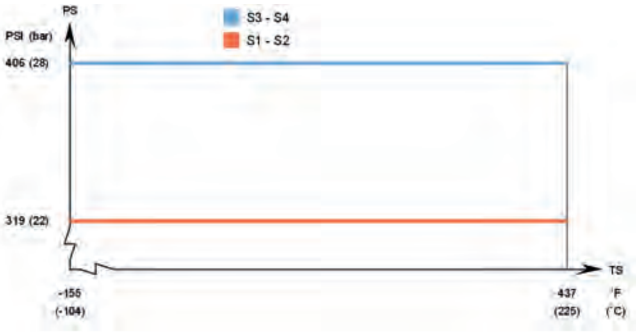


Compact flanges

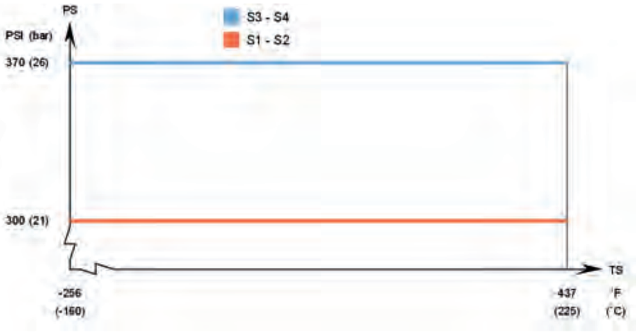
CB300 / CBH300 - PED approval pressure/temperature graph*



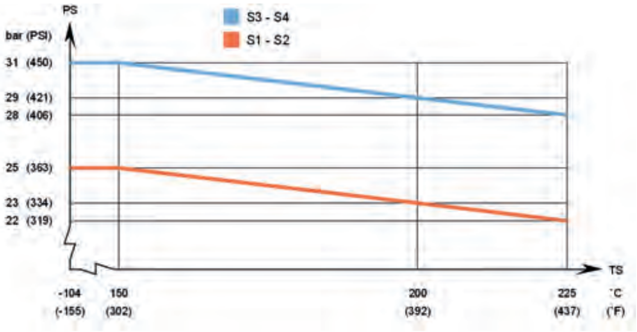
CB300 - ASME approval pressure/temperature graph*



CB300 - UL approval pressure/temperature graph*



CB300 - CRN approval pressure/temperature graph*



Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel S1/S2, litres (ga)	0.69 (0.18)
Volume per channel S3/S4, litres (ga)	0.58 (0.15)
Max. particle size mm (inch)	1.8 (0.07)
Max. flowrate S1/S2 m^3/h (gpm)*	200 (881)
Min. nbr of plates	10
Max. nbr of plates	250

* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

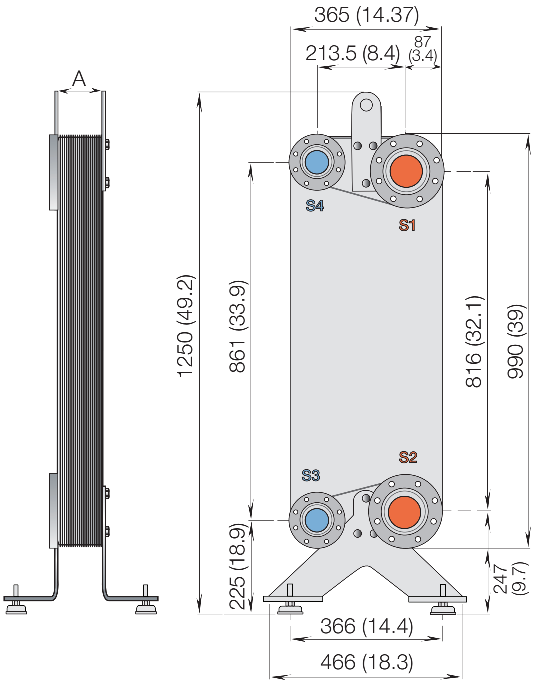
Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing material	Copper

Standard dimensions and weight*

A measure mm = 11 + (2.62 * n) (+/-10 mm)
A measure inch = 0.43 + (0.1 * n) (+/-0.39 inch)
Weight** kg = 21 + (1.26 * n)
Weight** lb = 46.3 + (2.78 * n)

(n = number of plates)
* Excluding connections

Standard dimensions
mm (inch)



For exact values please contact your local Alfa Laval representative

Alfa Laval reserves the right to change specifications without prior notification.

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

CB400

Brazed Plate Heat Exchanger

General information
Alfa Laval introduced its first brazed plate heat exchanger (BHE) in 1977 and has since continuously developed and optimized its performance and reliability.

Brazing the stainless steel plates together eliminates the need for gaskets and thick frame plates. The brazing material seals and holds the plates together at the contact points ensuring optimal heat transfer efficiency and pressure resistance. The plate design guarantees the longest possible life.

The design options of the brazed heat exchanger are extensive. Different plate patterns are available for various duties and performance specifications. You can choose a standard configuration BHE, or a unit designed according to your own specific needs. The choice is entirely yours.

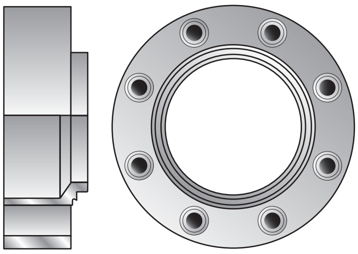
Typical applications
- HVAC heating/cooling
- Process heating/cooling
- Hydraulic oil cooling
- Oil cooling

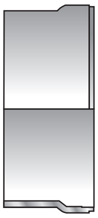
Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, usually in countercurrent flow for the most efficient heat transfer process.

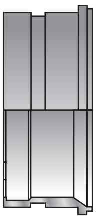
Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. To improve the heat transfer design, the channel plates are corrugated.

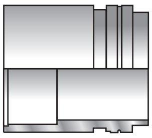
Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, specify the following particulars in your enquiry:
- Required flow rates or heat load
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

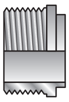
Examples of connections


Compact flanges

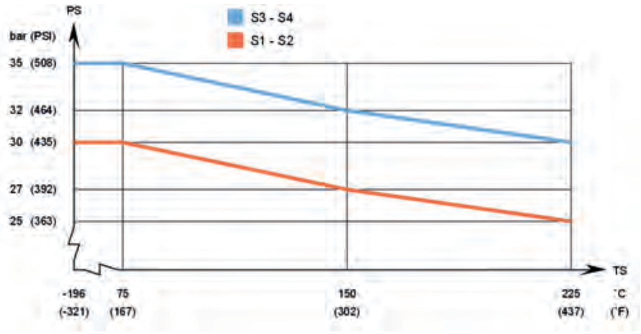

Welding


Clamp

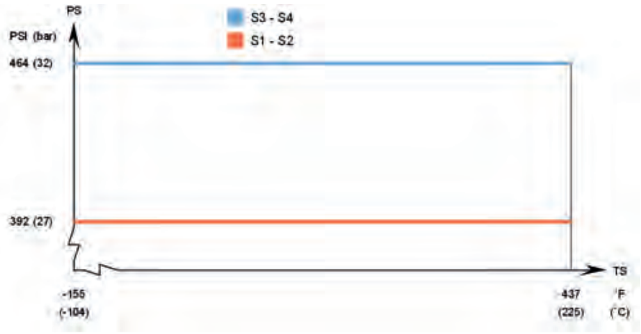

Soldering


External threaded

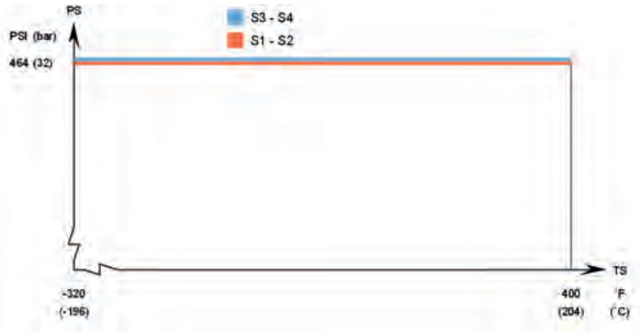
CB400 - PED approval pressure/temperature graph*



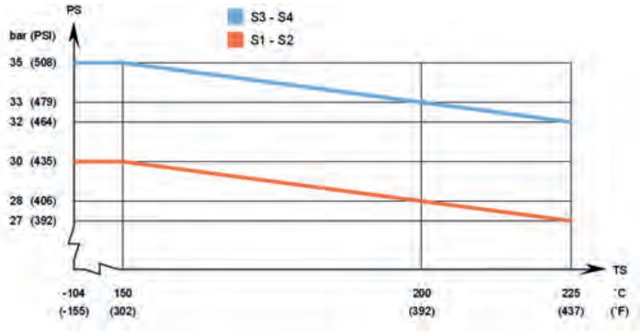
CB400 - ASME approval pressure/temperature graph*



CB400 - UL approval pressure/temperature graph*



CB400 - CRN approval pressure/temperature graph*



Standard dimensions and weight*

A measure mm = 14 + (2.56 * n) (+/-10 mm)
A measure inch = 0.55 + (0.1 * n) (+/-0.39 inch)
Weight** kg = 24 + (1.35 * n)
Weight** lb = 52.91 + (2.98 * n)

(n = number of plates)
* Excluding connections

Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.74 (0.19)
Max. particle size mm (inch)	1.8 (0.07)
Max. flowrate* m^3/h (gpm)	200 (881)
Min. nbr of plates	10
Max. nbr of plates	270

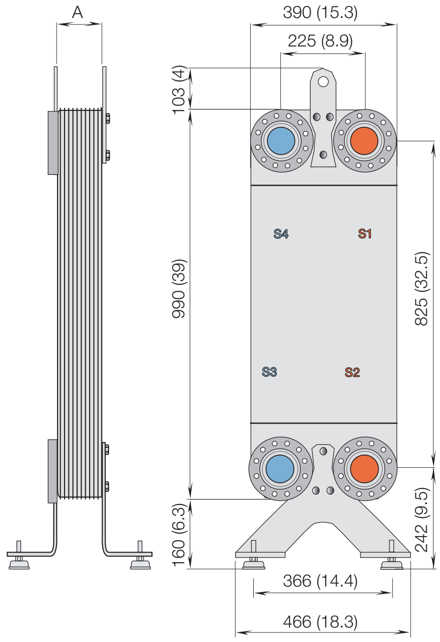
* Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
Brazing filler	Copper

Standard dimensions

mm (inch)



For exact values please contact your local Alfa Laval representative

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Couplings and Counter Flanges

Brazed and Fusion-bonded Heat Exchangers

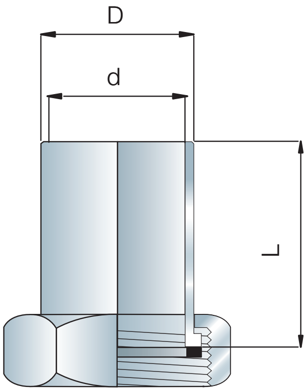
Alfa Laval offers a wide range of accessories to our products. This leaflet shows the couplings and counter compact flanges available directly from our stock.

The couplings are available in different standard dimensions and in different materials for welding or soldering installation.

The counter compact flanges fit our compact flanges and are available in different material for different applications.

Coupling DN20 / ¾"

Type	Nut Material	Pipe Material	Size	L (mm)	D (mm)	d (mm)	Item nbr.
Welding	Carbon steel	Carbon steel	DN15	23	21.3	-	162623509
Soldering	Carbon steel	Brass	Cu18	16	18	15	3456105403



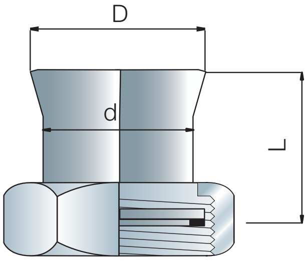
DN 20, 40, 54

Coupling DN25 / 1"

Type	Nut Material	Pipe Material	Size	L (mm)	D (mm)	d (mm)	Item nbr.
Welding	Carbon steel	Carbon steel	DN20	33	26.9	-	162623507
Welding	Carbon steel	Carbon steel	DN25	31	33.7	26.9	162623512
Soldering	Carbon steel	Brass	Cu22	20	25	22.1	3456105402
Soldering	Carbon steel	Brass	Cu28/Cu35	66	32	28	3456156701

Coupling DN32 / 1¼"

Type	Nut Material	Pipe Material	Size	L (mm)	D (mm)	d (mm)	Item nbr.
Welding	Carbon steel	Carbon steel	DN25	50	33.7	-	162623504
Welding	Carbon steel	Carbon steel	DN32	43	42.4	33.7	162623511
Soldering	Carbon steel	Brass	Cu28	50	31.9	28	162623506



DN 25, 32, 50, 65

Coupling DN40 / 2"

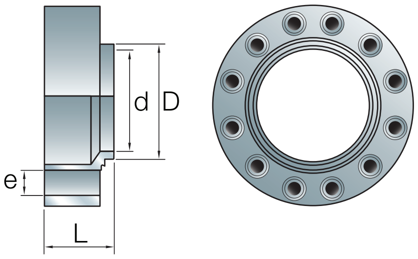
Type	Nut Material	Pipe Material	Size	L (mm)	D (mm)	d (mm)	Item nbr.
Welding	Carbon steel	Carbon steel	DN40	50	48.3	-	162623510
Welding	Carbon steel	Carbon steel	DN50	50	60.3	52	162623501
Soldering	Carbon steel	Brass	Cu42	44	48	42.1	3456105401
Soldering	Carbon steel	Brass	Cu54	50	50.9	44.5	162623503

Coupling DN50 / 2½"

Type	Nut Material	Pipe Material	Size	L (mm)	D (mm)	d (mm)	Item nbr.
Welding	Carbon steel	Carbon steel	DN50	65	60.3	-	3456040603
Welding	Carbon steel	Carbon steel	DN65	65	76.1	60.3	3456040601

Counter compact flange

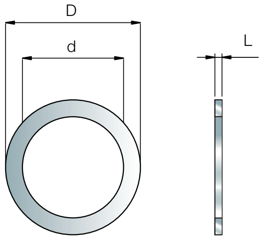
Size	Nut Material	Flange	L (mm)	D (mm)	d (mm)	e	Item nbr.
DN65	Stainless steel	Stainless steel	33.5	76.1	70.3	13.5	3456325101
DN65	Carbon steel	Stainless steel	33.5	76.1	70.3	13.5	3456325102
DN80	Stainless steel	Stainless steel	33.5	88.9	82.5	13.5	3456325103
DN80	Carbon steel	Stainless steel	33.5	88.9	82.5	13.5	3456325104
DN100	Stainless steel	Stainless steel	33.5	114.3	107.1	13.5	3456325105
DN100	Carbon steel	Stainless steel	33.5	114.3	107.1	13.5	3456325106



Extra gasket fitting

In the above couplings the gasket is included.

Size	Thickness	L (mm)	D (mm)	d (mm)	Item nbr.
DN15	1.5	1.5	24	46	162635005
DN20	1.5	1.5	30	23	162635002
DN25	1.5	1.5	39	30	162635001
DN40	1.5	1.5	56.5	46	162635003
DN50	1.5	1.5	72	63	162635004
DN65	1.5	1.5	90	70	3456287002
DN80	1.5	1.5	106	83	3456287003
DN100	1.5	1.5	132	107	3456287004



Extra gasket fitting

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Feet

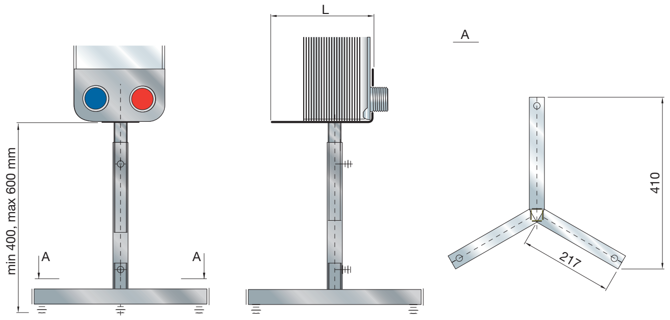
Brazed and Fusion-bonded Heat Exchangers

Alfa Laval offers a wide range of accessories to our products. This leaflet shows the feet and floor support kits available from stock.

Floor suppport kit, height adjustable

Material: Black painted steel

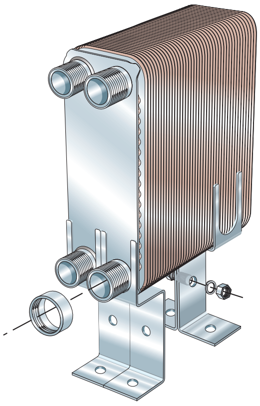
CB30, CB60, AlfaNova 27 (Fits connections 1¼" and smaller)		
Nbr. of plates	**L**	**Item nbr.**
10-60	45	3456089801
61-100	130	3456089802
101-150	200	3456089803
CB76, CB110, CB112, AlfaNova 76 (Fits connections 2½" and smaller)		
Nbr. of plates	**L**	**Item nbr.**
10-60	190	3456090801
61-90	260	3456090804
91-120	350	3456090802
121-150	350	3456090803



Floor suppport kit

Material: Galvanized steel

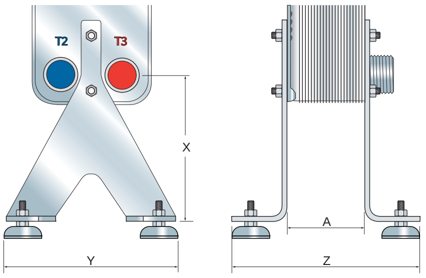
CB30, CB60, AlfaNova 27 (Fits connections 1" and smaller)		
Nbr. of plates	**L**	**Item nbr.**
Max. 30 plates	55	162965401
Max. 150 plates	110	162965402
CB76, CB110, CB112, AlfaNova 76		
Nbr. of plates	**L**	**Item nbr.**
Max. 30 plates	190	162965501
Max. 150 plates	190	162965502



Rigid feet

Require studbolts welded on the heat exchanger.
Material: Galvanized steel

Model	X	Y	Z	Item nbr.
CB76, AlfaNova 76				
CB110, CB112, AC112	199	269	A + 180	3456544501
CB200	178	400	A + 160	Incl. in the heat exchanger
CB300	217 (S2) / 194.5 (S3)	466	A + 260	Incl. in the heat exchanger
CB400, AlfaNova 400	242	466	A + 260	Incl. in the heat exchanger



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Heating Insulation

Brazed and Fusion-bonded Plate Heat Exchangers

The Alfa Laval heating insulations for brazed and fusion bonded plate heat exchangers are easily assembled and dismantled. The heating insulation provides protection from the heat pack and keeps the climate in the operating room dry and not too hot.

For the smaller sizes, up to CB100, the insulations can only be ordered as extras. For the larger sizes, the insulations are customized and assembled at the factory and are therefore ordered as a part of the heat exchanger.

There are different types of heating insulations to fit each demand:

Type A Heating

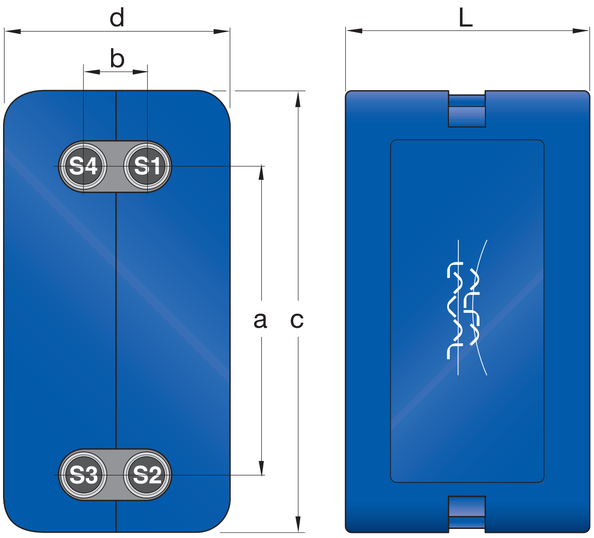
- Blue plastic cover with CFC-free polyurethane foam
- Thickness 30 mm
- Thermal conductivity: 0.031 w/mK
- Max. temperature: 140°C
- Fire class rating: Class F, DIN 4102 B3

Type B Heating

- Black EPP - polypropylen (no cover)
- Thickness 20 mm
- Thermal conductivity: 0.039 w/mK
- Max. temperature: 110 °C

Type W Heating

- Insulation: 65 mm mineral wool covered with 0.05 mm alu foil on the inside
- Cladding sheet: 1 mm Alustucco
- Lock: Galvanized steel
- Thermal conductivity: 0.024 w/mK
- Max. temperature: 200°C
- Fire class rating: A1 acc. To RD 19/12/1997
- Class 1 according to BS 476 Part 7
- Class 1 according to FM approval Standard 4450
- Euroclass D according to EN 13501-1



Type A Heating

Model	c	d	a	b	L
AC18/CB18/CB20	384	157	270	46	*)
CB30/AlfaNova 27	360	182	250	50	*)
CB60/AlfaNova 52	588	182	466	50	*)
CB110/CB112/AlfaNova 76	670	240	520	92	*)
CB100	555	315	378	138	*)
CB200	832	370	522	205	*)
CB300	1094	470	**)	213.5	*)
CB400/AlfaNova 400	1055	520	825	225	*)
AlfaNova 400					

*) Sizes to fit all standard sizes
**) Side S1, S2 = 816 mm. Side S3, S4 = 861 mm.

Type B Heating

Model	c	d	a	b	L
CB14/CB16/AlfaNova 14	248	120	172	42	*)
CB18/CB20	366	137	272	46	*)
CB30/AlfaNova 27	354	156	250	50	*)
CB60/AlfaNova 52	570	156	466	50	*)

*) Sizes to fit all standard item sizes

Type W Heating

Model	c	d	a	b	L
CB400/AlfaNova 400	1055	570	825	255	*)

*) Sizes to fit all standard item sizes

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Cooling Insulation Type P

Brazed and Fusion Bonded plate heat exchanger

Alfa Laval offers a wide range of accessories to our products. This leaflet describes the Type P cooling insulation. Type P is a flexible cooling insulation in soft material which is easy to install and adjust to your specific heat exchanger.

Description
Prefabricated insulation jacket with 19 mm thickness closed cell expanded elastomer and with 0.5 mm external PVC protection layer.

The diffusion tight insulation is intended for Alfa Laval brazed and fusion bonded plate heat exchangers and is suitable for cooling and low temperatures.

Max temperature: 100°C
Min temperature: -45°C

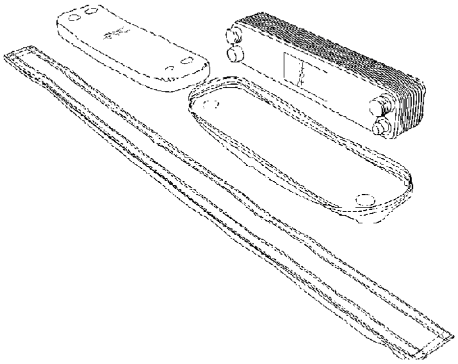
The insulation kit is composed by three parts: one lateral and two back and front pieces together with an installation manual.

Advantages

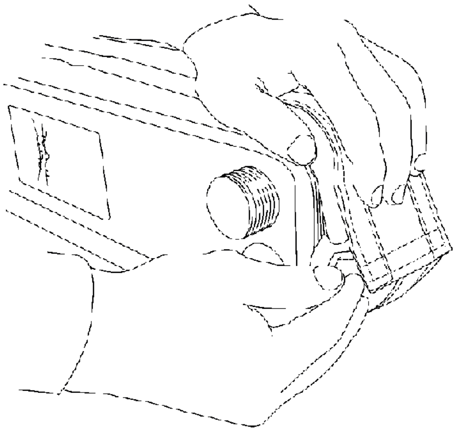
- Easy to install
- Can be mounted also after the connections have been mounted, thanks to the pre-cut S3 and S4 holes
- Available from stock
- Suitable for 6 connections thanks to the pre-cut T1 and T2 holes

Properties	Reference values	Reference regulation
Density		
	• 60 kg/m^3	DIN 53420
Working temperatures		
Max. temperature	+100°C	
Min. temperature	-45°C	
Thermal conductivity λ		
-40°C	0.028 W/(m•K)	DIN 56613
-20°C	0.030 W/(m•K)	DIN 56613
0°C	0.033 W/(m•K)	DIN 56613
+20°C	0.036 W/(m•K)	DIN 56613
+50°C	0.040 W/(m•K)	DIN 56613
Permeability		
Resistance to the steam diffusion μ	> 7000	DIN 52616
Fire resistance		
Italy	Class 1	UNI 9174 - UNI 8457
France	Class M1	AFNOR NF P92 501
Sweden	Klass II	NTF 036
Norway	Klass II	NTF 036
Finland	Klass II	NTF 036
Finland	Klass 1	NTF002
Switzerland	BKZ	-
Ozone resistance		
	Excellent	UNI 4905
Dimensional stability		
	0.3 - 0.5% shrinkage	

Complete insulation Type P set
An installation manual is also included in the set.



Easy to install
It is not needed to use special tools.



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Alfa Laval CIP 20 and Alfa Laval CIP 40

Cleaning in Place Unit for Heat Exchangers

A problem frequently encountered in almost all applications is the build-up of deposits on heat transfer surfaces. Alfa Laval supplies a wide range of cleaning agents suitable for removing most of these troublesome deposits and restoring performance to optimal levels. The time-consuming work of opening plate heat exchangers can thus often be avoided by using an Alfa Laval Cleaning in Place (CIP) unit.

Alfa Laval CIP units are available in a wide range of standard sizes, with optional extras that include reversible flow and explosion-proof capabilities. Alfa Laval CIP units can be used for all types of heat exchangers, including spiral heat exchangers, shell-and-tube heat exchangers and gasketed, welded and brazed plate heat exchangers.

Concept
Alfa Laval CIP units are simplicity itself:

- Connect the Alfa Laval CIP unit to the heat exchanger
- Mix the cleaning agent with water in the tank
- Circulate the cleaning solution a couple of hours
- Drain and rinse
- Disconnect the CIP unit
- The heat exchanger is back to full performance capacity

Alfa CIP 40

Alfa CIP 20

Alfa Laval CIP units are a cost-effective way to achieve better performance, and the cleaning agents used are, of course, environmentally friendly.

In addition to boosting the performance of all kinds of heat exchangers, Alfa Laval cleaning agents extend the operating time between cleaning cycles as well as prolonging the overall lifetime of the heat exchangers, without damaging the plates or gaskets.

Features & benefits

- Connected directly to inlet and outlet. This avoids any need to open the heat exchanger, which in turn minimizes downtime and prolongs the working life of the gasket.
- High-quality equipment that is CE marked.
- Valves for reversible flow direction. This makes it possible to remove the solid particles rapidly, and is easy to operate without needing to rearrange the connection hoses.

Technical specifications

	Alfa Laval CIP 20	Alfa Laval CIP 40/50 Hz	Alfa Laval CIP 40/60 Hz
Pump	Centrifugal	Centrifugal	Centrifugal
Max. flow rate	2.1 m³/h (8.7 gpm)	2.4 m³/h (10.6 gpm)	2.1 m³/h (8.7 gpm)
At pumping head	8 m	15 m	15 m
Motor power	170 W	400 W	400 W
Voltage	230 V/1 phase/50 Hz	230 V/1 phase/50 Hz	110 V/1 phase/60 Hz
Max. operating temp	60°C (140°F)	60°C (140°F)	60°C (140°F)
Volume	20 litres (5.3 US gallons)	40 litres (10.6 US gallons)	40 litres (10.6 US gallons)
Weight	8 kg	15 kg	15 kg
Length	500 mm	730 mm	730 mm
Width	250 mm	320 mm	320 mm
Height	350 mm	530 mm	530 mm
Number of hoses	2	2	2
Hose length	2.6 m	2.6 m	2.6 m
Hose material	PVC reinforced	PVC reinforced	PVC reinforced
Connection	ISO 228 ¾”	ISO 228 ¾”	ISO 228 ¾”
Pump wetted parts	PP (Polypropylene)	PP (Polypropylene)	PP (Polypropylene)
Pump gaskets	NBR	NBR	NBR
Hose connection gaskets	EPDM	EPDM	EPDM
Material for wetted parts	PE (Polyethylene)	PE (Polyethylene)	PE (Polyethylene)
Protection class	IP54	IP54	IP54
Eexd (explosion-proof)	No	No	No
Art. no.	32840005-01	32840000-01	32840436-01

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Alfa Laval CIP 200L and CIP 400L

Stainless Steel Cleaning in Place Units for Heat Exchangers

A problem frequently encountered in almost all applications is the build-up of deposits on heat transfer surfaces. Alfa Laval supplies a wide range of cleaning agents suitable for removing most of these troublesome deposits and restoring performance to optimal levels. The time-consuming work of opening plate heat exchangers can thus often be avoided by using an Alfa Laval Cleaning in Place (CIP) unit. These are available in a wide range of standard sizes that include reversible flow capability. Alfa Laval CIP units can be used for all types of heat exchangers, including spiral heat exchangers, shell-and-tube heat exchangers and gasketed welded and brazed plate heat exchangers.

Concept

Alfa Laval CIP units are simplicity itself:

- Connect the Alfa Laval CIP unit to the heat exchanger
- Mix the cleaning agent with water in the tank and heat it up
- Circulate the cleaning solution a few of hours
- Drain and rinse
- Disconnect the CIP unit
- The heat exchanger is back to full performance capacity

Alfa Laval CIP units are a cost-effective way to achieve better performance, and the cleaning agents used are, of course, environmentally friendly.

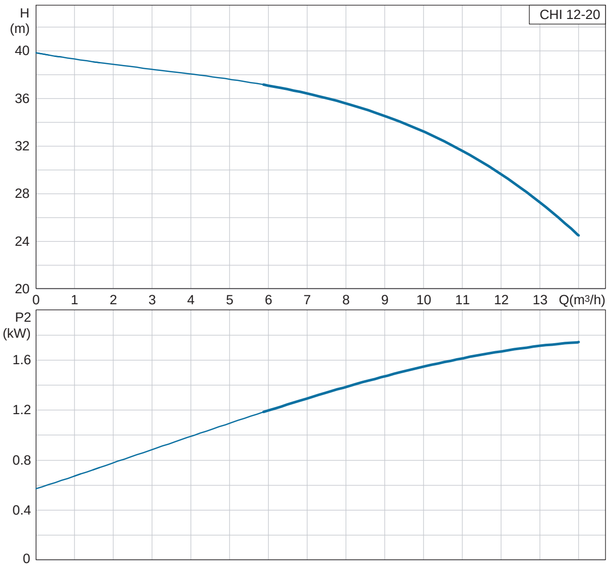
In addition to boosting the performance of all kinds of heat exchangers, Alfa Laval cleaning agents extend the operating time between cleaning cycles as well as prolonging the overall lifetime of the heat exchangers, without damaging the plates or gaskets.

Features and benefits

- Connected directly to inlet and outlet. This avoids any need to open the heat exchanger, which in turn minimizes downtime and prolongs the working life of the gasket.
- Wetted parts in the operating unit, as well as the pump and valves, are made of AISI 304 or AISI 316 stainless steel to ensure maximum working life.
- Rapid cleaning at optimal temperatures, due to built-in electric heater.
- Valve arrangement for reversible flow direction. This makes it possible to remove the solid particles rapidly, and is easy to operate without the need to rearrange the connection hoses.

Technical specifications

	Alfa Laval CIP 200L	Alfa Laval CIP 400L
Circulation pump	Centrifugal stainless steel	Centrifugal stainless steel
Pump capacity max. at 3.2 bar head	10 m^3/h	10 m^3/h
Voltage	380–440V/3-phase/50 Hz	380–420V/3-phase/50 Hz
	440–480V/3-phase/60 Hz	440–480V/3-phase/60 Hz
Pump motor size (50/60Hz)	2.3/4.2 kW	2.3/4.2 kW
Total heating power	6 alt. 12 kW	12 kW
Max. operating temp	85°C	85°C
	(185°F)	(185°F)
Volume	200 litres	400 litres
	(53 US gallons)	(106 US gallons)
Modules	1 pump + 1 tank	1 pump + 2 tanks
Weight empty module, pump + tank(s)	55+90 kg = 145 kg	55+90+90 kg = 235 kg
Size pump module (H x W x L)	1345 x 475 x 775 mm	1345 x 475 x 775 mm
Size per each tank module (H x W x L)	1345 x 475 x 1035 mm	1345 x 475 x 1035 mm
Number of hoses	4	6
Hose length	4 m	4 m
Hose material inside/outside	UPE/EPDM	UPE/EPDM
Connection standard	DIN 11851/DN 40	DIN 11851/DN 40
Material for wetted parts	Stainless steel AISI 304/316	Stainless steel AISI 304/316
Pump gaskets	EPDM	EPDM
Pump seal	C/SiC	C/SiC
Hose connection gaskets	EPDM	EPDM
Eexd (explosion-proof)	On request	On request



Pump graph (50 Hz).

Optionals

Item no	
96994900-03	Welding piece for CIP connection to PHE pipe <DN40
96994900-04	Welding piece for CIP connection to PHE pipe >=DN40
96995110-14	Spanner DN40
96995110-16	Adapter DN40/BSP 11/2"
96995110-17	Isolation valve at PHE pipe connection DN40 butterfly valve AISI 304
96995110-18	Manometer 0–10 bar
96995110-19	Thermometer 0–200°C
96995110-20	96995110-20 Hose DN40, 6 m

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Alfa Laval CIP 800L

Stainless Steel Cleaning in Place Unit for Heat Exchangers

A problem frequently encountered in almost all applications is the build-up of deposits on heat transfer surfaces. Alfa Laval supplies a wide range of cleaning agents suitable for removing most of these troublesome deposits and restoring performance to optimal levels. The time-consuming work of opening plate heat exchangers can thus often be avoided by using an Alfa Laval Cleaning in Place (CIP) unit. These are available in a wide range of standard sizes that include reversible flow capability. Alfa Laval CIP units can be used for all types of heat exchangers, including spiral heat exchangers, shell-and-tube heat exchangers and gasketed, welded and brazed plate heat exchangers.

Concept

Alfa Laval CIP units are simplicity itself:

- Connect the Alfa Laval CIP unit to the heat exchanger
- Mix the cleaning agent with water in the tank and heat it up
- Circulate the cleaning solution a couple of hours
- Drain and rinse
- Disconnect the CIP unit
- The heat exchanger is back to full performance capacity

Alfa Laval CIP units are a cost-effective way to achieve better performance, and the cleaning agents used are, of course, environmentally friendly.

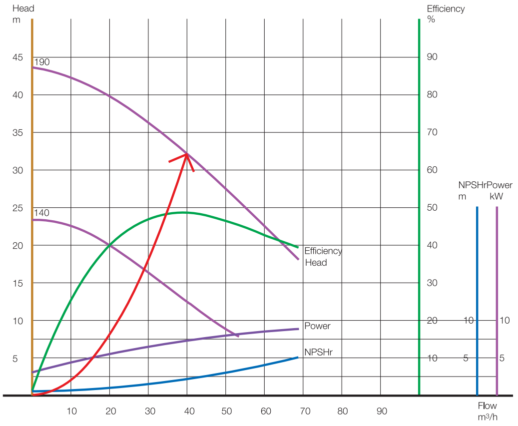
In addition to boosting the performance of all kinds of heat exchangers, Alfa Laval cleaning agents extend the operating time between cleaning cycles as well as prolonging the overall lifetime of the heat exchangers, without damaging the plates or gaskets.

Features and benefits

- Connected directly to inlet and outlet. This avoids any need to open the heat exchanger, which in turn minimizes downtime and prolongs the working life of the gasket.
- Wetted parts in the operating unit, as well as the pump and valves, are made of AISI 316 stainless steel to ensure maximum working life.
- Rapid cleaning at optimal temperatures, due to built-in electric heaters.
- Valve arrangement for reversible flow direction. This makes it possible to remove the solid particles rapidly, and is easy to operate without needing to rearrange the connection hoses.

Technical specifications

	Alfa Laval CIP 800
Circulation pump	Centrifugal sanitary
Pump capacity max. at 3.2 bar head	40 m^3/h
Voltage	380–420V/3-phase/50 Hz 440–480V/3-phase/60 Hz
Pump motor size (50/60Hz)	7.5/8.6 kW
Total heating power	12 kW alt. 24 kW
Heating time in tank, approx.	12 kW/4 h alt. 24 kW/2 h
Max. operating temperature	85°C (185°F)
Volume	800 litres (212 US gallons)
Weight empty module	300 kg
Size module (H x W x L)	1735 x 2160 x 1260 mm
Number of hoses	2
Hose length	4 m
Hose material inside/outside	UPE/EPDM
Connection standard	DIN 11851/DN 65
Material for wetted parts	Stainless steel AISI 304/316
Pump gaskets	EPDM
Pump seal	C/SiC
Hose connection gaskets	EPDM
Eexd (explosion-proof)	On request



Curve tolerances Q+/-5%, H+/-5% (SolidC Q+/-8%, H+/-6%)

Pump graph (50 Hz).

Optionals

Item no	
96994900-05	Welding piece for CIP connection to PHE pipe >=DN65
96995310-14	Spanner DN 65 DIN union
96995310-16	Adapter DN 65/BSP 21/2"
96995310-17	Isolation valve at PHE pipe connection DN65 butterfly valve AISI 304
96995310-18	Manometer 0-10 bar
96995310-19	Thermometer 0-200°C
96995310-20	Hose DN65, 6 m

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Alfa Laval CIP 1800L and CIP 2800L

Stainless Steel Cleaning in Place Units for Heat Exchangers

A problem frequently encountered in almost all applications is the build-up of deposits on heat transfer surfaces. Alfa Laval supplies a wide range of cleaning agents suitable for removing most of these troublesome deposits and restoring performance to optimal levels. The time-consuming work of opening plate heat exchangers can thus often be avoided by using an Alfa Laval Cleaning in Place (CIP) unit. These are available in a wide range of standard sizes that include reversible flow capability. Alfa Laval CIP units can be used for all types of heat exchangers, including spiral heat exchangers, shell-and-tube heat exchangers and gasketed, welded and brazed plate heat exchangers.

Concept

Alfa Laval CIP units are simplicity itself:

- Connect the Alfa Laval CIP unit to the heat exchanger
- Mix the cleaning agent with water in the tank and heat it up
- Circulate the cleaning solution a couple of hours
- Drain and rinse
- Disconnect the CIP unit
- The heat exchanger is back to full performance capacity

Alfa Laval CIP units are a cost-effective way to achieve better performance, and the cleaning agents used are, of course, environmentally friendly.

In addition to boosting the performance of all kinds of heat exchangers, Alfa Laval cleaning agents extend the operating time between cleaning cycles as well as prolonging the overall lifetime of the heat exchangers, without damaging the plates or gaskets.

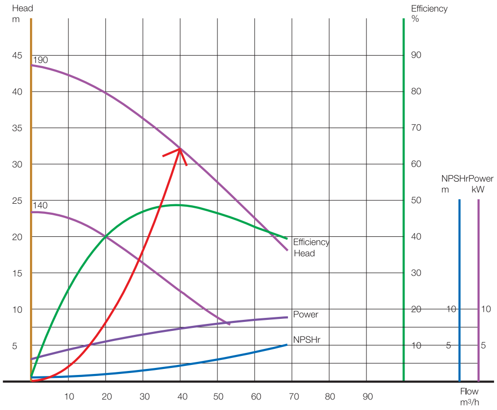
Features and benefits

- Connected directly to inlet and outlet. This avoids any need to open the heat exchanger, which in turn minimizes downtime and prolongs the working life of the gasket.
- Wetted parts in the operating unit, as well as the pump and valves, are made of AISI 304 or AISI 316 stainless steel to ensure maximum working life.
- Rapid cleaning at optimal temperatures, due to built-in electric heaters.
- Valve arrangement for reversible flow direction. This makes it possible to remove the solid particles rapidly, and is easy to operate without the need to rearrange the connection hoses.

Technical specifications

	Alfa Laval CIP 1800L	Alfa Laval CIP 2800L
Circulation pump	Centrifugal sanitary	Centrifugal sanitary
Voltage	380–420 V/3-phase/50 Hz 440–480 V/3-phase/60 Hz	380–420 V/3-phase/50 Hz 440–480 V/3-phase/60 Hz
Pump motor size (50/60 Hz)	7.5/8.6 kW	7.5/8.6 kW
Total heating power	24 kW alt. 48 kW	48 kW
Heating time in tank, approx.	24 kW/4 h alt. 48 kW/2 h	48 kW/3.5 h
Max. operating temp	85°C (185°F)	85°C (185°F)
Volume	1800 litres (477 US gallons)	2800 liters (742 US gallons)
Modules	1 pump/tank + 1 tank	1 pump/tank + 2 tanks
Weight empty module, pump + tank(s)	300+150 kg = 450 kg	300+150+150 kg = 600 kg
Size module incl. tank (H x W x L)	1735 x 2160 x 1260 mm	1735 x 2160 x 1260 mm
Size per each additional tank module (H x W x L)	1483 x 960 x 960 mm	1483 x 960 x 960 mm
Number of hoses	4	6
Hose length	4 m	4 m
Hose material inside/outside	UPE/EPDM	UPE/EPDM
Connection standard	DIN 11851/DN 65	DIN 11851/DN 65
Material for wetted parts	Stainless steel AISI 304/316	Stainless steel AISI 304/316
Pump gaskets	EPDM	EPDM
Pump seal	C/SiC	C/SiC
Hose connection gaskets	EPDM	EPDM
Eexd (explosion-proof)	On request	On request

* See pump curve for flow rate and pumping head



Curve tolerances Q+/-5%, H+/-5% (SolidC Q+/-8%, H+/-6%)

Pump graph (50 Hz).

Optionals

Item no	
96994900-05	Welding piece for CIP connection to PHE pipe >=DN65
96995310-14	Spanner DN 65 DIN union
96995310-16	Adapter DN 65/BSP 21/2"
96995310-17	Isolation valve at PHE pipe connection DN65 butterfly valve AISI 304
96995310-18	Manometer 0–10 bar
96995310-19	Thermometer 0–200°C
96995310-20	96995310-20 Hose DN65, 6 m

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Chapter 8

Fusion-bonded plate heat exchangers, AlfaNova

From the extreme heat in our furnaces comes AlfaNova, the world's first 100% stainless-steel plate heat exchanger.

The AlfaNova can handle high temperatures and has good resistance to pressure fatigue compared to a conventional brazed plate heat exchanger.

The secret is AlfaFusion, a unique bonding technology patented by Alfa Laval. Resulting in the world's first fusion-bonded plate heat exchanger, AlfaFusion has stunned specialists in the brazing field.

AlfaNova is a new class of plate heat exchangers, available only from Alfa Laval.

AlfaNova takes heat-transfer technology to the extreme

100% stainless steel

AlfaNova consists of a number of corrugated stainless steel plates, a frame plate, a pressure plate and connections – all in stainless steel of type 316. All components are bonded together by AlfaFusion, a new technology patented by Alfa Laval.

The result is the fusion-bonded plate heat exchanger, a whole new class offering extremely high mechanical strength.

It is also hygienic, corrosion-resistant and fully recyclable.

Unbeatable reliability
Years of research and testing have confirmed AlfaNova's high mechanical strength and unbeatable reliability.

The AlfaFusion technology creates a plate heat exchanger with possibilities to go much higher in temperature than conventional brazed units.

Its 100% stainless-steel design allows AlfaNova to withstand temperatures of up to 550°C (1,020°F).

Corrosion-resistant
The AlfaNova's pure stainless-steel design also ensures high resistance to corrosion.

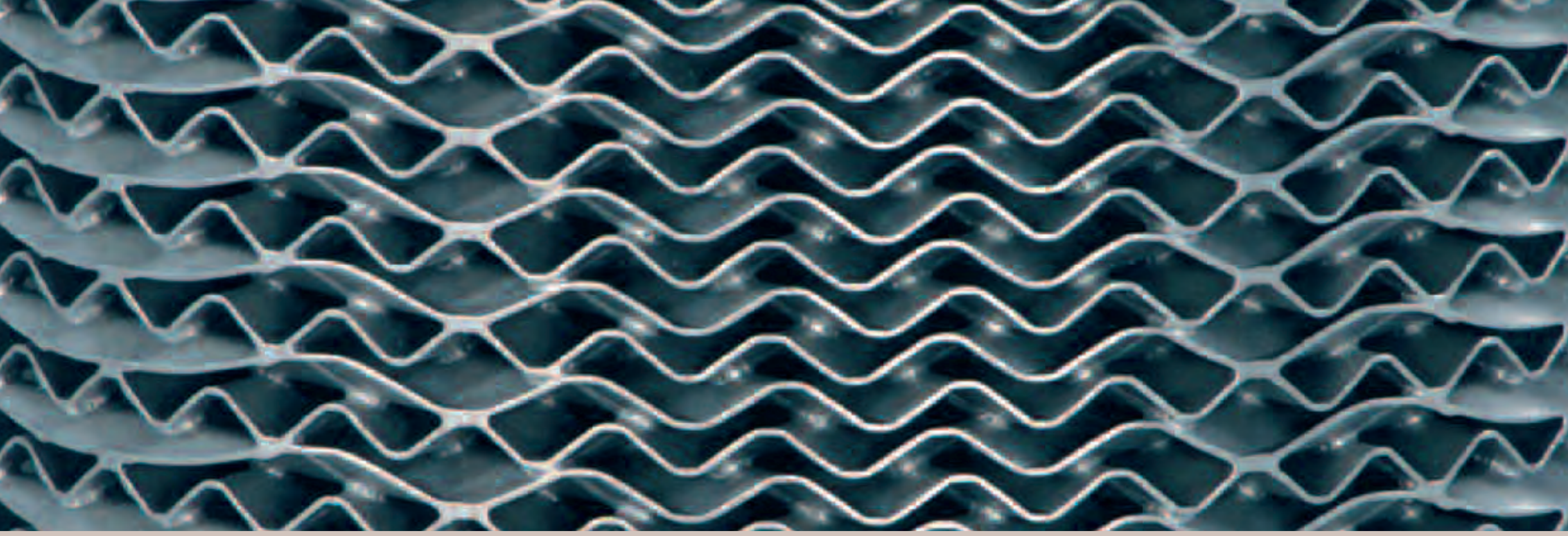
Thus, it represents a major breakthrough for refrigeration system builders using natural refrigerants such as ammonia.

It is also the perfect choice for district heating installations in areas with corrosive water or applications utilizing corrosive liquids.

Maximum purity
Purity is the subject of increasingly stringent legislation in many countries.

Applications affected are clean-water chillers in refrigeration systems, tap water heating systems, and a long list of other hygienic areas.

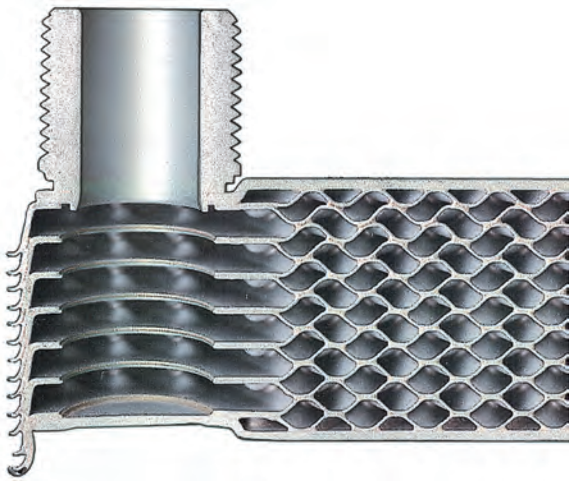
For these applications, the 100% stainless-steel AlfaNova, with its clean, hygienic heat-transfer channels and high mechanical strength, will be the heat exchanger of the future, challenging other types of heat exchangers.



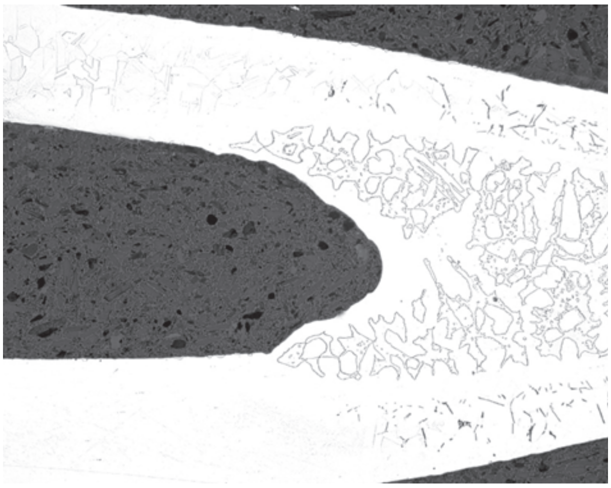
Three different technologies...

AlfaFusion

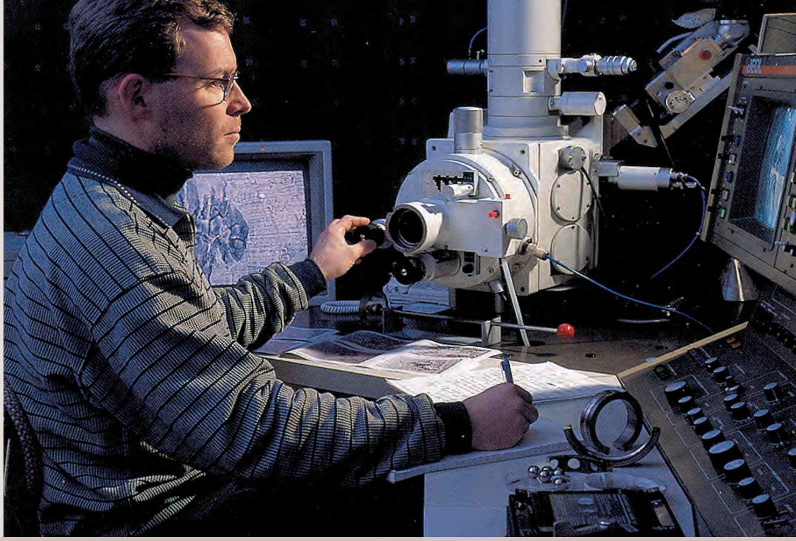
Patented by Alfa Laval, AlfaFusion™ is a peak-performance, one-material process that results in an all-stainless steel, fusion-bonded plate heat exchanger.



The result is closer to welding than brazing. It is based on Alfa Laval´s new, revolutionary technology, AlfaFusion, the art of joining stainless-steel components together. The two stainless-steel components melt in the contact points between the corrugated plates, and a fusion zone is created. This zone is also stainless steel and has properties similar to the plates in terms of corrosion resistance and durability. Success lies in precise temperature control to achieve the correct melting depth and to avoid melting through the plates.

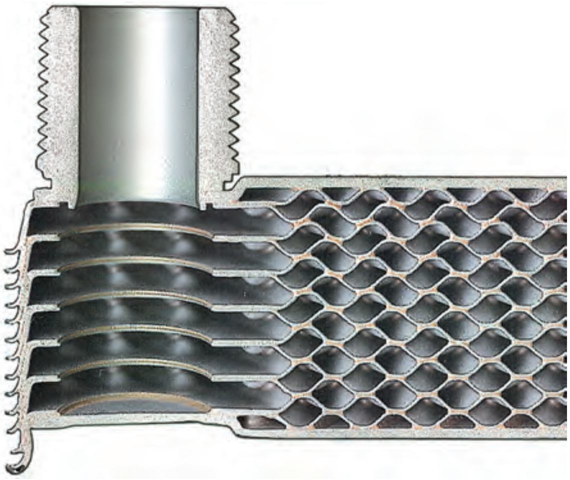


Due to the properties of the fusion zone, AlfaFusion gives a homogenous plate heat exchanger with a high level of corrosion resistance and higher resistance to mechanical and thermal fatigue than other technologies.



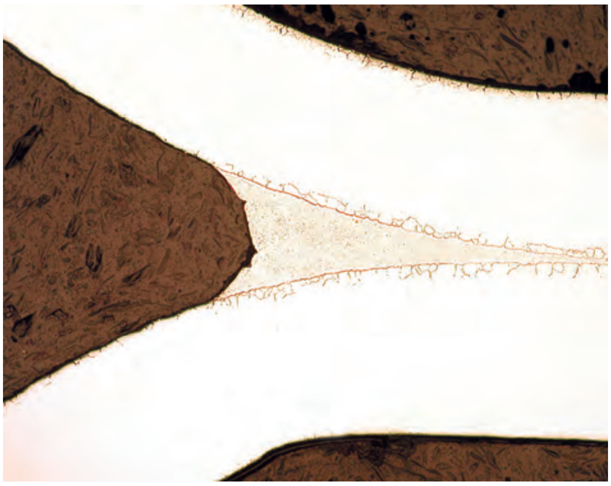
Traditional copper brazing

A two-material process, copper brazing is an efficient, cost-effective method of manufacturing plate heat exchangers.



It involves using copper filler to join stainless steel plates together by brazing them in a furnace.
At the contact points between the corrugated plates, a thin layer of copper is melted at high temperature.
Since copper has good capillary action, i.e., good capability to wet the plate and fill crevices, the filler gathers where the plates have contact, thus sealing and strengthening the plate pack.
Although copper brazing causes adhesion between the copper and the stainless steel, there is no surface reaction between the materials.

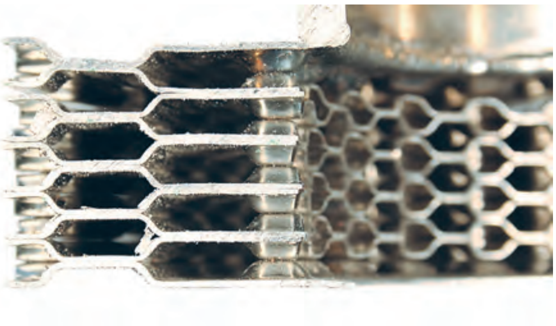
The combination of stainless steel and copper offers good ductility.

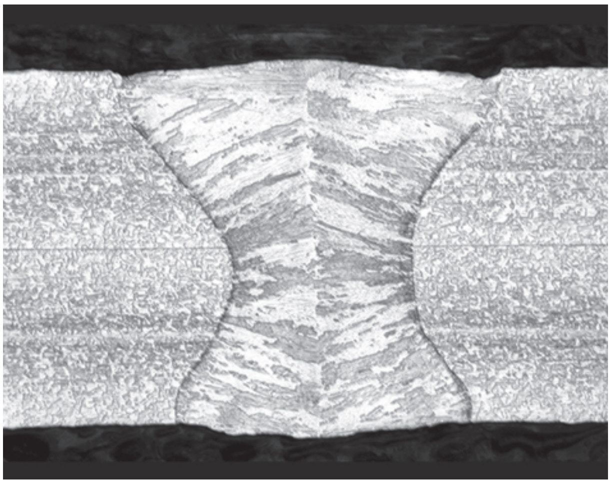


Under pressure, substantial material deformation can occur before splitting occurs.
The build-up of stress in the material causes it to change direction, thus relieving the mechanical load.
While copper brazing results in a high-quality plate heat exchanger, the brazing process must be carefully controlled, as copper may otherwise penetrate the stainless steel.
This results in liquid metal embrittlement, a known metallurgical phenomenon which reduces the strength of the heat exchanger.

Laser welding

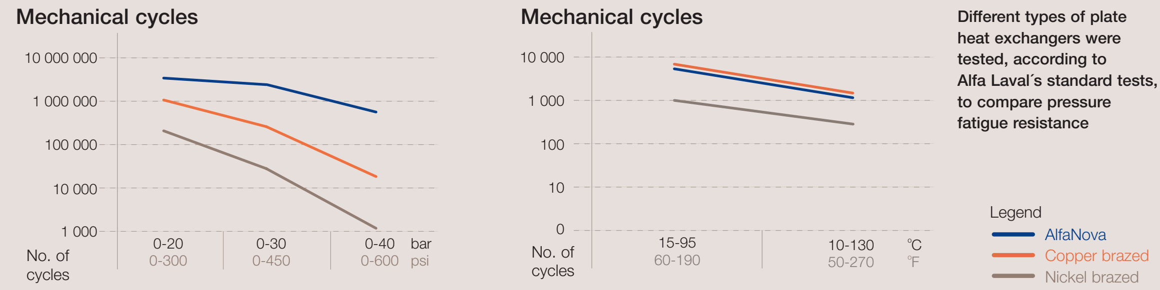
Laser welding is an effective method of joining stainless steel plates together in the manufacture of plate heat exchangers.



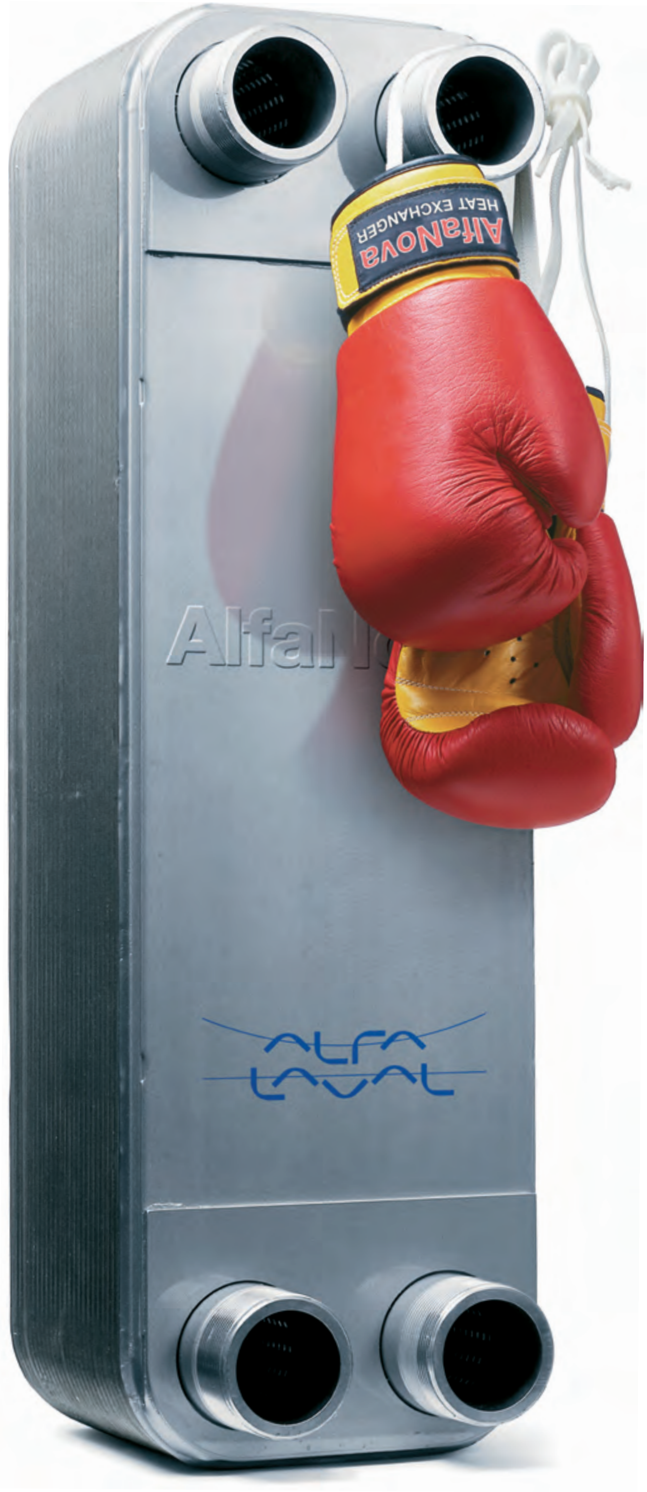


During the process, the corrugated stainless-steel plates are placed against each other and a laser is used to melt the material at the points of contact. As the stainless steel hardens there is diffusion of the metal on the plate surfaces. Since the stainless steel has gained a different micro-structure orientation during hardening, the resulting joints may be different in appearance. However, they possess the same properties as the rest of the plate material in terms of ductility and corrosion resistance.

A fully welded heat exchanger has good mechanical properties and can comfortably withstand high temperature, high pressure and aggressive media. A disadvantage is that it is sometimes necessary to adapt the design of the product to the limitations of the welding technique. It is also an expensive method. The process must take place in an inert atmosphere, otherwise it will react with the oxygen in the air, resulting in less successful welds. The equipment required for the process is also expensive.



Different types of plate heat exchangers were tested, according to Alfa Laval´s standard tests, to compare pressure fatigue resistance



Applications

Tap water heating
The copper-free AlfaNova is the perfect solution for builders of tap-water heating systems striving to comply with increasingly stringent hygiene legislation.

District heating
The fusion-brazed, all-steel AlfaNova will easily withstand the high temperatures and pressures that are common in district-heating networks.

100% stainless steel
Due to its high level of corrosion resistance, AlfaNova is a major breakthrough for builders of modules for district-heating substations in areas with corrosive water.

Technical specifications

Fusion-bonded plate heat exchangers, data and dimensions

	AlfaNova 14	AlfaNova 27	AlfaNova 52	AlfaNova 76	AlfaNova 400
Channel type	H	H, L	H, L	H, A, E, L	H, L
Max./min. design temperature (°C)	160/-175	160/-175	160/-175	160/-175	160/-175
Max. design pressure S3-S4/S1-S2 (bar) *)	21/21	27/22	27/22	27/22	17/17
Volume/channel (litres)	0.02	0.05	0.095	0.25[1]/0.25	0.74
Max. flowrate (m^3/h) **)	4.6	14	14	37	200
Height, a (mm)	207	310	526	618	990
Width, b (mm)	77	111	111	191	390
Vertical connection distance, c (mm)	172	250	466	519	825
Horizontal connection distance, d (mm)	42	50	50	92	225
Plate pack length, A (mm)	n x 2.48 + 8	(n x 2.42) + 11	(n x 2.48) + 11	(n x 2.85) + 11[***]	(n x 2.65) + 14
Weight empty (kg)	(n x 0,07) + 0.4	(n x 0.13) + 1	(n x 0.22) + 1.9	(n x 0.49) + 8	(n x 1.4) + 22
Standard connection, external thread (in)	3/4"	1 1/4"/1"	1 1/4"/1"	2"	4"
Plate material	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Connection material	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Bounding material	Stainless steel	Stainless steel	Stainless steel	Stainless steel	Stainless steel
Max. number of plates	50	100	150	150	270
Radiator heating, capacity (kW)[2]	90	400	500	1200	3300
Tap water heating, capacity (kW)[2]	60	180	380	700	2700

*) According to PED **) Water at 5 m/s (connection velocity) ***) H-channel n=number of plates

1) E channel 0.18/0.18; A channel 0.18/0.25

2) Varies from country to country depending on temperature duty. Given values are for typical district heating installations.

3) Valid for H-plate

AlfaNova plate heat exchangers range

AlfaNova 14

Read all about it on page 8:9

AlfaNova 27

Read all about it on page 8:11

AlfaNova 52

Read all about it on page 8:13

AlfaNova 76

Read all about it on page 8:15

AlfaNova 400

Read all about it on page 8:17

AlfaNova 14

Fusion-bonded plate heat exchanger

General information
AlfaNova is a plate heat exchanger made of 100% stainless steel. It is based on Alfa Laval's revolutionary technology, AlfaFusion, the art of joining stainless steel components together.

AlfaNova heat exchangers are well suited in applications which put high demand on cleanliness, applications where ammonia is used or applications where copper or nickel contamination is not accepted. Its high resistance to corrosion makes it both hygienic and environmental friendly.

It is extremely compact compared to its capacity to withstand great strains in demanding heat transfer applications.

Applications
Within refrigeration:
- Oil cooling
- Condensing
- Economizing
- Desuperheating
- Absorption systems

Other main applications:
- Domestic hot water
- Process cooling
- Hydraulic oil cooling
- Laser cooling
- Hygienic/sanitary application
- Water/water cooling & heating

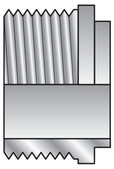
Working principles
The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, always in countercurrent flow. The media are kept in the unit by a bonded seal around the edge of the plates. The contact points of the plates are also bonded to withstand the pressure of the media handled.

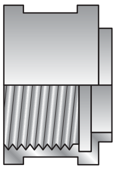
Standard design
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. The channel plates are corrugated to improve heat transfer design.

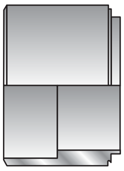
Particulars required for quotation
To enable Alfa Laval's representative to make a specific quotation, enquiries should be accompanied by the following particulars:

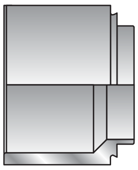
- Flow rates or heat load required
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections

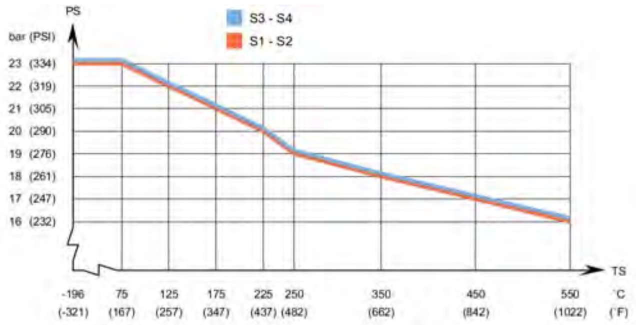

External
threaded


Internal
threaeded


Soldering

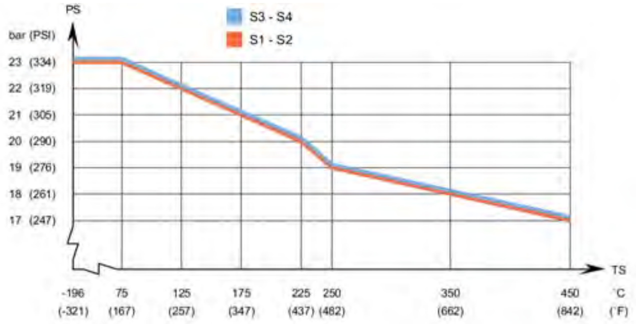

Welding

AlfaNova 14 - PED approval pressure/temperature graph



AlfaNova 14 - UL approved pressure/temperature graph

AlfaNova 14 - CRN approved pressure/temperature graph



Standard dimensions

A measure mm = 8 + (2.48 * n) (+/-3 mm)
A measure inch = 0.31 + (0.1 * n) (+/-0.12 inch)
Weight kg = 0.4 + (0.07 * n)
Weight lb = 0.88 + (0.15 * n)

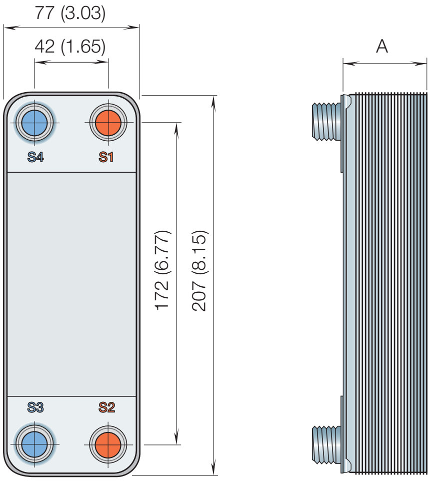
(n = number of plates)

Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.02 (0.0052)
Max. particle size mm (inch)	1.2 (0.05)
Max. flowrate* m^3/h (gpm)	4.6 (20.2)
Min. nbr of plates	4
Max. nbr of plates	50

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
AlfaFusion filler	Stainless steel



For exact values please contact your local Alfa Laval representatives.

How to contact Alfa Laval
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AlfaNova 27

Fusion-bonded plate heat exchangers

General information

AlfaNova is a plate heat exchanger made of 100% stainless steel. It is based on Alfa Laval's revolutionary technology, AlfaFusion, the art of joining stainless steel components together.

AlfaNova heat exchangers are well suited in applications which put high demand on cleanliness, applications where ammonia is used or applications where copper or nickel contamination is no accepted. Its high resistance to corrosion makes it both hygienic and environmental friendly.

It is extremely compact compared to its capacity to withstand great strains in demanding heat transfer applications.

Applications

Within refrigeration:
- Oil cooling
- Condensing
- Evaporating
- Economizing
- Desuperheating
- Absorption systems

Other main applications:
- Domestic hot water heating
- Process cooling
- Hydraulic oil cooling
- Laser cooling
- Hygienic/sanitary application
- Water/water cooling & heating

Working principles

The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, always in countercurrent flow. The media are kept in the unit by a bonded seal around the edge of the plates. The contact points of the plates are also bonded to withstand the pressure of the media handled.

Standard design

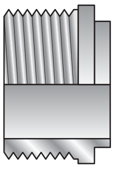
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. The channel plates are corrugated to improve heat transfer design.

Particulars required for quotation

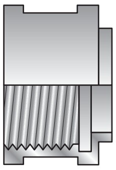
To enable Alfa Laval's representative to make a specific quotation, enquiries should be accompanied by the following particulars:

- Flow rates or heat load required
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

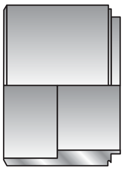
Examples of connections



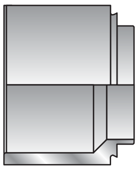
External threaded



Internal threaeded

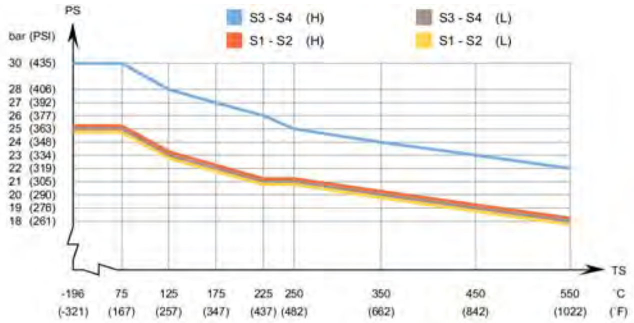


Soldering

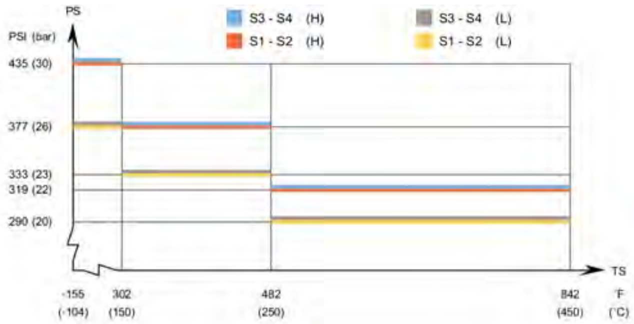


Welding

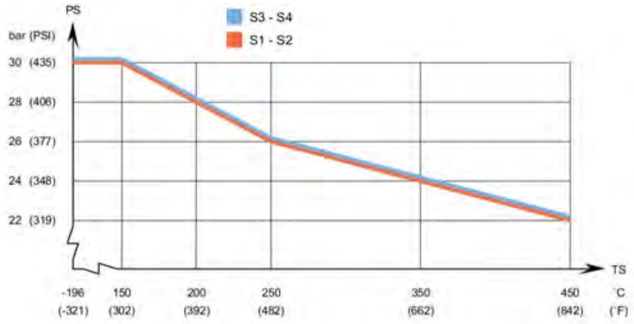
AlfaNova 27 – PED approval pressure/temperature graph [1)]



AlfaNova 27 – ASME approval pressure/temperature graph [2)]



AlfaNova 27 – CRN approval pressure/temperature graph [2)]



Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.05 (0.013)
Max. particle size mm (inch)	1.2 (0.05)
Max. flowrate* m^3/h (gpm)	14 (61.6)
Min. nbr of plates	6
Max. nbr of plates	100

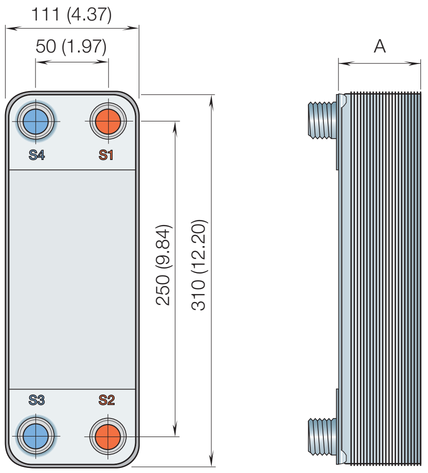
*) Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard dimensions *

A measure mm = 11 + (2.42 * n) ±4.5 mm
A measure inch = 0.43 + (0.1 * n) ±0.18 inch
Weight kg = 1 + (0.13 * n)
Weight lb = 2.2 + (0.29 * n)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
AlfaFusion filler	Stainless steel



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Alfa Laval reserves the right to change specifications without prior notification.

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AlfaNova 52

Fusion-bonded plate heat exchanger

General information

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Standard design

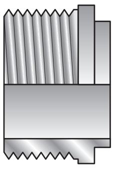
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. The channel plates are corrugated to improve heat transfer design.

Particulars required for quotation

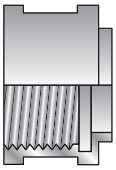
To enable Alfa Laval's representative to make a specific quotation, enquiries should be accompanied by the following particulars:

- Flow rates or heat load required
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

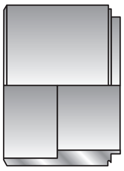
Examples of connections



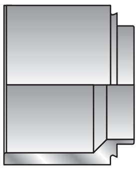
External threaded



Internal threaeded

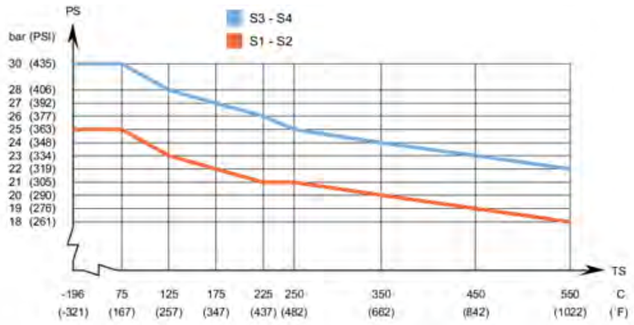


Soldering



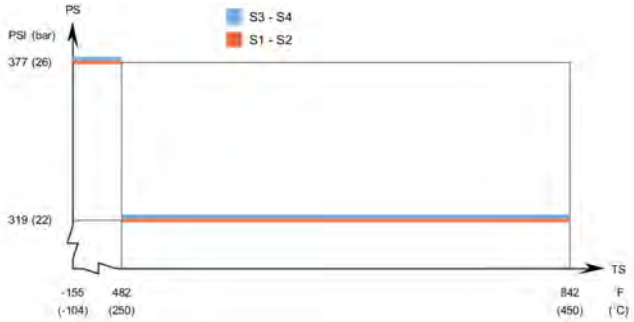
Welding

AlfaNova 52 – PED approval pressure/temperature graph [1)]



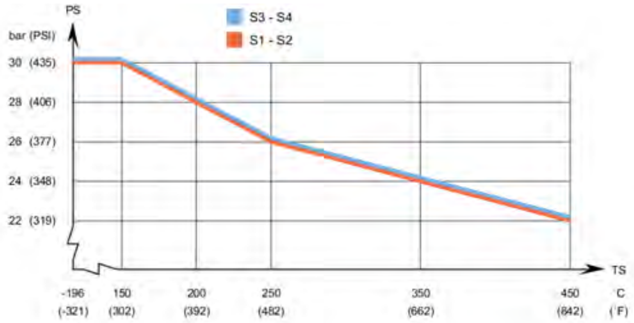
[1)] Min. temperature -10°C (14°F) with connection tube made of carbon steel.

AlfaNova 52 – ASME approval pressure/temperature graph [2)]



[2)] Min. temperature -49°F (45°C) with connection tube made of carbon steel.

AlfaNova 52 – CRN approval pressure/temperature graph [2)]



Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.095 (0.025)
Max. particle size mm (inch)	1.2 (0.05)
Max. flowrate* m^3/h (gpm)	14 (61.6)
Min. nbr of plates	6
Max. nbr of plates	150

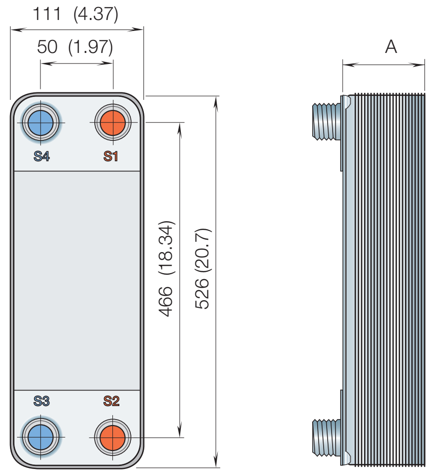
*) Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard dimensions *

A measure mm = 11 + (2.48 * n) ±4.5 mm
A measure inch = 0.43 + (0.1 * n) ±0.18 inch
Weight kg = 1.9 + (0.22 * n)
Weight lb = 4.19 + (0.49 * n)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
AlfaFusion filler	Stainless steel



For exact values please contact your local Alfa Laval representative.

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

AlfaNova 76

Fusion-bonded plate heat exchanger

General information

AlfaNova is a plate heat exchanger made of 100% stainless steel. It is based on Alfa Laval's revolutionary technology, AlfaFusion, the art of joining stainless steel components together.

AlfaNova heat exchangers are well suited in applications which put high demand on cleanliness, applications where ammonia is used or applications where copper or nickel contamination is not accepted. Its high resistance to corrosion makes it both hygienic and environmental friendly.

It is extremely compact compared to its capacity to withstand great strains in demanding heat transfer applications.

Applications

Within refrigeration:

- Oil cooling
- Condensing
- Evaporating
- Economizing
- Desuperheating
- Absorption systems

Other main applications:

- Domestic hot water heating
- Process cooling
- Hydraulic oil coolin
- Laser cooling
- Hygienic/sanitary
- Water/water cooling & heating

Working principles

The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, always in countercurrent flow. The media are kept in the unit by a bonded seal around the edge of the plates. The contact points of the plates are also bonded to withstand the pressure of the media handled.

Standard design

The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. The channel plates are corrugated to improve heat transfer design.

Standard materials

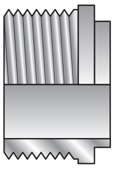
Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
AlfaFusion filler	Stainless steel

Particulars required for quotation

To enable Alfa Laval's representative to make a specific quotation, enquiries should be accompanied by the following particulars

- Flow rates or heat load required
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections



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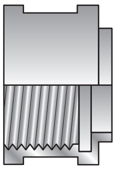
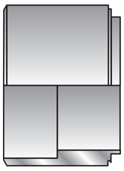
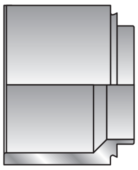


Internal threaeded

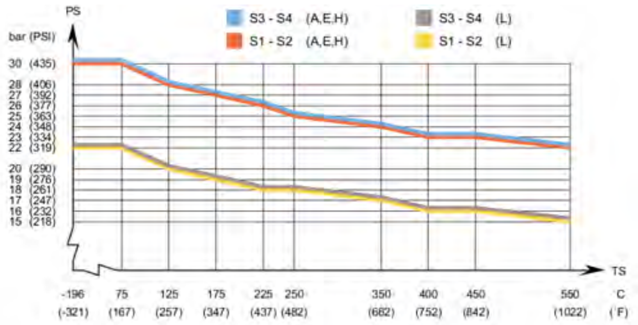


Soldering

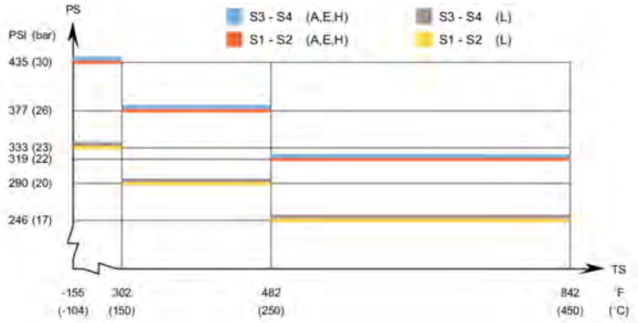


Welding

AlfaNova 76 – PED approval pressure/temperature graph 1)

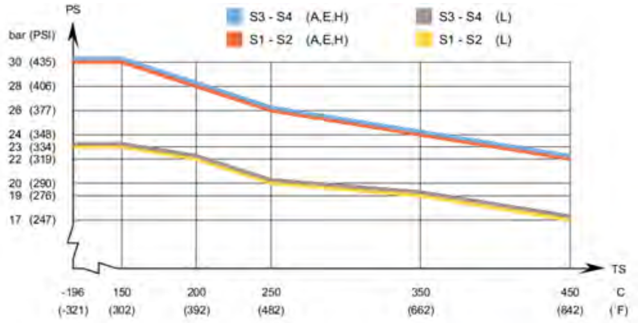


AlfaNova 76 – ASME approval pressure/temperature graph 2)



2) Min. temperature -49°F (14-45°C) with connection tube made of carbon steel.

AlfaNova 76 – CRN approval pressure/temperature graph



AlfaNova 76 – KHK approval pressure/temperature graph

Standard data

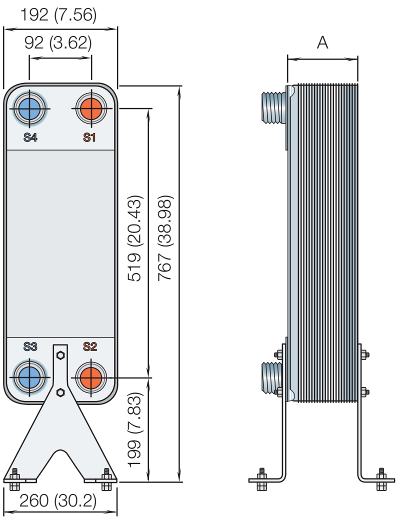
Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel A, litres (ga)	0.25 (0.065) 0.18 (0.046)
Volume per channel H, L, litres (ga)	0.25 (0.065)
Volume per channel E, litres (ga)	0.18 (0.046)
Max. particle size mm (inch)	1.2 (0.047)
Max. flowrate* m^3/h (gpm)	37 (163)
Min. nbr of plates	10
Max. nbr of plates	150

*) Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard dimensions

L channel	A measure mm	= 13 + (2.85 * n) ±5 mm
	A measure inch	= 0.51 + (0.11 * n) ±0.2 inch
H channel	A measure mm	= 11 + (2.85 * n) ±5 mm
	A measure inch	= 0.43 + (0.11 * n) ±0.2 inch
A channel	A measure mm	= 11 + (2.56 * n) ±5 mm
	A measure inch	= 0.43 + (0.1 * n) ±0.2 inch
E channel	A measure mm	= 11 + (2.29 * n) ±5 mm
	A measure inch	= 0.43 + (0.09 * n) ±0.2 inch
H, A, E channels	Weight** kg	= 8 + (0.49 * n)
	Weight** lb	= 17.64 + (1.08 * n)
L channel	Weight** kg	= 8 + (0.42 * n)
	Weight** lb	= 17.64 + (0.93 * n)

(n = number of plates)
** Excluding connections



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AlfaNova 400

Fusion-bonded plate heat exchanger

General information

AlfaNova is a plate heat exchanger made of 100% stainless steel. It is based on Alfa Laval's revolutionary technology, AlfaFusion, the art of joining stainless steel components together.

AlfaNova heat exchangers are well suited in applications which put high demand on cleanliness, applications where ammonia is used or applications where copper or nickel contamination is not accepted. Its high resistance to corrosion makes it both hygienic and environmental friendly.

It is extremely compact compared to its capacity to withstand great strains in demanding heat transfer applications.

Applications

- Evaporating
- Economizing
- Absorption systems
- Process cooling/heating
- Oil cooling

Working principles

The heating surface consists of thin corrugated metal plates stacked on top of each other. Channels are formed between the plates and corner ports are arranged so that the two media flow through alternate channels, always in countercurrent flow. The media are kept in the unit by a bonded seal around the edge of the plates. The contact points of the plates are also bonded to withstand the pressure of the media handled.

Standard design

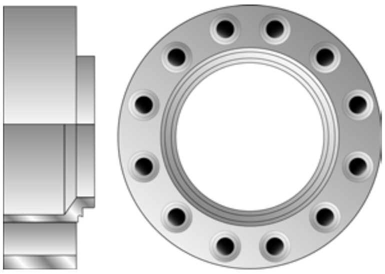
The plate pack is covered by cover plates. Connections are located in the front or rear cover plate. The channel plates are corrugated to improve heat transfer design.

Particulars required for quotation

To enable Alfa Laval's representative to make a specific quotation, enquiries should be accompanied by the following particulars:

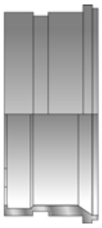
- Flow rates or heat load required
- Temperature program
- Physical properties of liquids in question
- Desired working pressure
- Maximum permitted pressure drop

Examples of connections

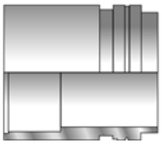


Compact flanges

Welding



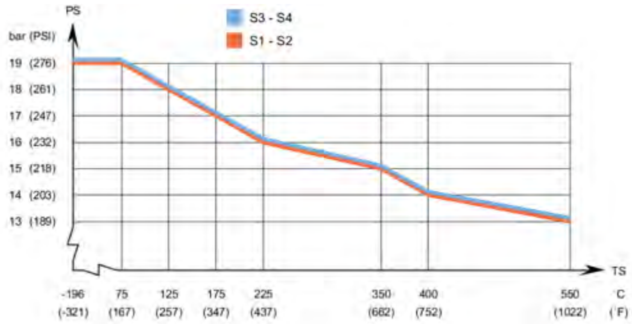
Clamp



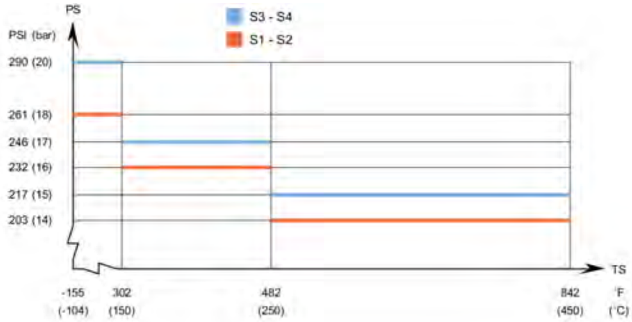
Soldering

Outside threaded

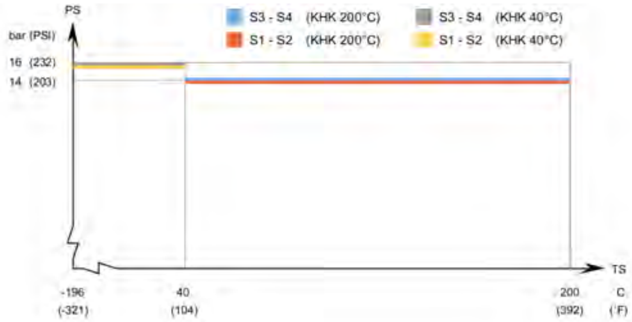
AlfaNova 400 – PED approval pressure/temperature graph [1)]



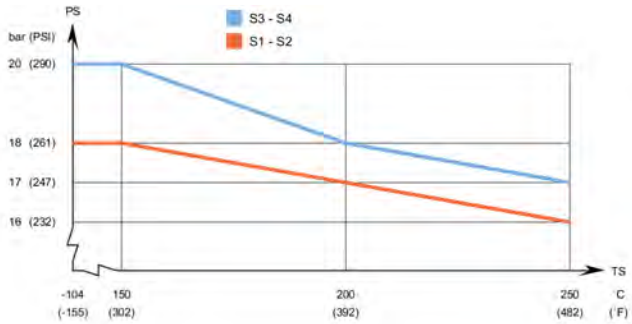
AlfaNova 400 – ASME approval pressure/temperature graph [2)]



AlfaNova 400 – KHK approval pressure/temperature graph



AlfaNova 400 – CRN approval pressure/temperature graph



Standard data

Min. working temperature	see graph
Max. working temperature	see graph
Min. working pressure	vacuum
Max. working pressure	see graph
Volume per channel, litres (ga)	0.74 (0.19)
Max. particle size mm (inch)	1.8 (0.07)
Max. flowrate* m^3/h (gpm)	200 (880)
Min. nbr of plates	10
Max. nbr of plates	270

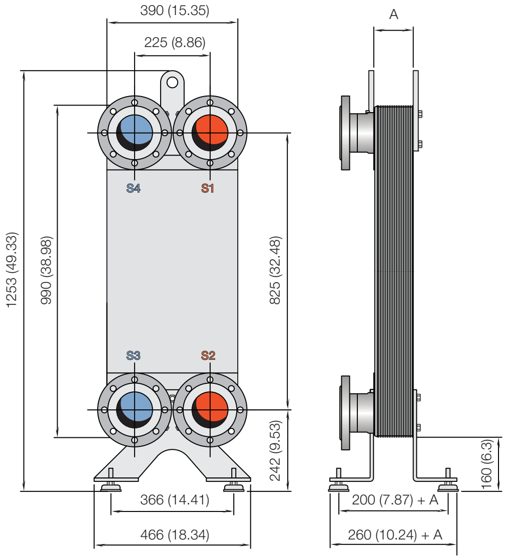
*) Water at 5 m/s (16.4 ft/s) (connection velocity)

Standard materials

Cover plates	Stainless steel
Connections	Stainless steel
Plates	Stainless steel
AlfaFusion filler	Stainless steel

Standard dimensions *

A measure mm = 14 + (2.65 * n) ±10 mm
A measure inch = 0.55 + (0.1 * n) ±0.39 inch
Weight kg = 22 + (1.4 * n)
Weight lb = 48.5 + (3.09 * n)



For exact values please contact your local Alfa Laval representative.

Alfa Laval reserves the right to change specifications without prior notification.

How to contact Alfa Laval
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Chapter 9

Air heat exchangers

It's all in the air. And it's all thanks to air heat exchangers – indoor and outdoor units capable of capturing, conditioning and distributing the right air in the right place with the right efficiency.

In other words, air heat exchangers from Alfa Laval.

As a leading supplier to the air-conditioning industry, Alfa Laval offers a complete line of dry coolers, condensers and air heaters for indoor cooling and heating. In combination with our brazed and gasketed plate heat exchangers, they live up to every requirement.

Air-cooled condensers and dry coolers.

Alfa Laval's air-cooled condensers and dry coolers are made with cross-fin copper tubes and advanced corrugated aluminium fins, which results in a combination of compact dimensions and high capacity. They are available with both copper and stainless-steel tubing (for ammonia refrigerant applications).

Alfa Laval dry coolers are typically used for cooling water, brine, oil and cooling agents. They are common in air conditioning systems and systems with secondary refrigeration circuits – as well as in free-cooling systems in process industries and total-energy installations.

Dry coolers present an excellent alternative to conventional cooling towers. Because there is no water consumption, the risk for legionella bacterial growth is virtually zero. The energy consumption is also generally lower.

AlfaBlue air-cooled condenser.

All Alfa Laval dry coolers are easily integrated with Alfa Laval's liquid-cooled plate heat exchangers. Especially in free-cooling systems, brazed or gasketed models are recommended.

Air-cooled condensers and dry coolers from Alfa Laval are available in three basic configurations – single-fan row, dual-fan row and V-shaped. They all combine an eye-pleasing appearance with a robust, highly corrosion-resistant design. They are intended for heavy-duty operation in temperatures between -30°C and +50°C. To minimize the pressure drop, they are fitted with smooth copper tubes. Noise levels and energy consumption are remarkably low, thanks to variable-speed EC fan motors.

Special heavy-duty air-cooled condensers and dry coolers for use in adverse conditions.

AlfaSolar condenser.

AlfaBlue dry cooler.

The V-shaped design of Alfa V dry coolers results in large capacity and compact dimensions.

Main benefits:

- High cooling efficiency thanks to optimized heat-transfer surfaces.
- Wide range of options and accessories for increased versatility.
- Variable-speed EC fan technology, reducing noise levels and energy consumption.
- Reliable performance, certified by Eurovent
- Robust and corrosion-resistant design, suitable for heavy industrial duties.
- Low maintenance costs and long operational life.
- Energy Efficiency Class certified.
- Compact dimensions, securing high capacity per sqm of footprint.

Stainless-steel flange connections are standard on Alfa V and dual fan-row AlfaBlue dry coolers.

Variable-speed EC fan motors combine efficiency with low power consumption. They are available in many sizes with many options.

The optional safety switch.

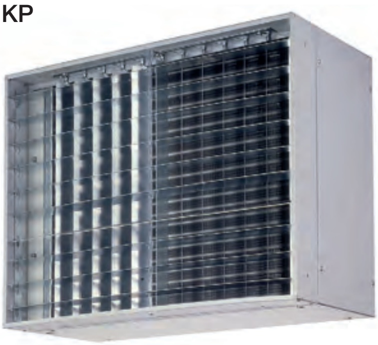
Air heaters

Alfa Laval can offer different solutions for heating and draft prevention. Our air heaters are available in four different designs, each optimized for best performance in the application.

HMP

The HMP air heater is suitable for heating of entrances in larger premises, for heating of stores and parking houses as well as for industrial halls requiring long air throw.

HKP



The HKP air heater is especially suitable for heating of production plants and comes in numerous of sizes, capacities and material alternatives.

HEV

The HEV air heater is a door curtain which reduces draft and saves heating energy.

Your complete air-cooling partner.

Why complicate your business when you can get all you need from one supplier?

You probably know that Alfa Laval offers some of the best products in the world when it comes to heat transfer – including air cooling. Our experience goes back almost a century, our know-how is based on thousands of installations globally. And as a world market leader, we continue to push technology forward.

But Alfa Laval is first and foremost about solutions. Our worldwide organization is there for you all the way. From planning and design, through installation and operation, to our Nonstop-Performance service concept. Our single-minded goal is to achieve maximum uptime and low life-cycle cost in every project we are involved in.

So, if you are in an industry where you need efficient, reliable cooling, optimized to your applications, Alfa Laval can make it easy for you. Time and again, anywhere in the world.

Globally local

Alfa Laval's business activities focus on facilitating our customers' operations.

We provide you with technologies and solutions that will help you optimize your operations and processes and keep them running smoothly year after year.

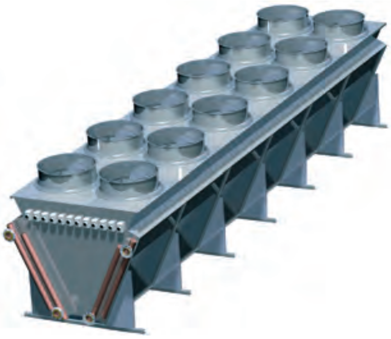
With our global network of sales companies, we are always close to you, regardless of where in the world you do business. That's how we can offer you fast and reliable deliveries and ensure non-stop performance.

Spare-part service

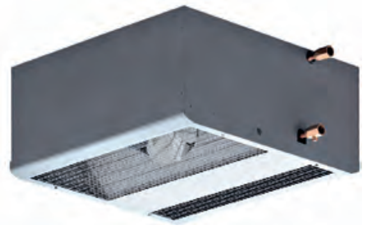
Alfa Laval's resources for spare-part service are second to none – ensuring a timely turn-around virtually anywhere in the world. Thanks to a truly worldwide orginization, customer support and trouble-shooting are available on local, regional and global levels.

Alfa Laval has 103 sales offices in 55 countries. Shown here are national and regional headquarters.

Air heat exchangers range

AlfaBlue Junior DG	**AlfaBlue** **BDM/BDMY/BDD/BDD6/BDDY**	**Alfa-V Single Row VDM**
Read all about it on page 9:9	Read all about it on page 9:11	Read all about it on page 9:13
		
Dry cooler	Dry cooler	Dry cooler
Alfa-V VDD/VDD6/VDDY	**AlfaSolar SD**	**AlfaBlue BCM/BCD & BNM/BND**
Read all about it on page 9:15	Read all about it on page 9:17	Read all about it on page 9:19
		
Dry cooler	Dry cooler	Air-cooled condenser
Alfa-V Single Row VCM	**Alfa-V ACV/ANV**	**SOLAR Max**
Read all about it on page 9.21	Read all about it on page 9:23	Read all about it on page 25
		
Air-cooled condenser	Air-cooled condenser	Air-cooled condenser

Air heat exchanger range

AlfaSolar SC	HEV	HEL
Read all about it on page 9.27	Read all about it on page 9:29	Read all about it on page 9:33
		
Air-cooled condenser	Air heater	Air heater
HKP	**HMP**	**THOR-LSV**
Read all about it on page 9:35	Read all about it on page 9:37	Read all about it on page 9:39
		
Air heater	Air heater	Air cooler

AlfaBlue Junior DG

Dry coolers – commercial range

General information & application

In addition to the well-proven AlfaBlue dry cooler line, the new generation of AlfaBlue Junior commercial dry coolers is a competitive product line of robust construction and high rigidity, that has every feature you need.

AlfaBlue Junior offers excellent performance especially at low air flow rates, allowing easy installation on site and an outstanding integration with other components. Highly efficient fan motors combine excellent sound characteristics and low energy consumption.

AlfaBlue Junior dry coolers are often used for cooling down condenser water in air-conditioning and refrigeration installations. In the processing industry, dry coolers are suitable for closed circuit cooling of various process liquids.

Coil

An innovative coil design based on 10 mm copper tubes and corrugated aluminium turbo fins provides excellent heat transfer at a limited internal volume. Standard fin spacing is 2.1 mm.

Casing

The coil frame is made from $AlMg_3$ for protection against vibration and thermal expansion. Casing material is galvanized steel sheet, pre-painted with an epoxy finish (RAL9002). Separated fan sections.

Fan motors

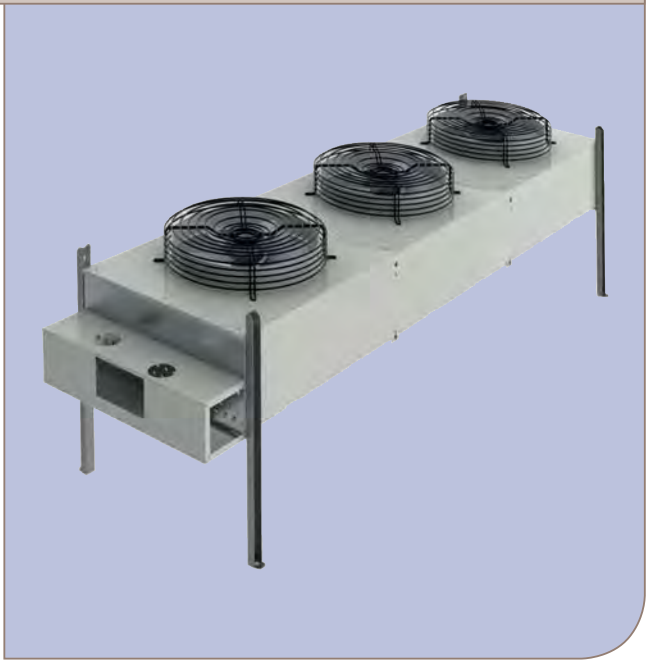
High efficiency AC or EC fans with innovative polymeric fan blades and low power consumption. Available in two fan diameters (500 & 630 mm), different power supplies (230/50-60/1, 400/50-60/3) and four noise levels.

Protection class IP 54 according to DIN 40050.

AC motors are fitted with integrated thermo contacts to provide reliable protection against thermal overload (terminals in the box). Motors may be wired to one or more common terminal boxes.

Options

- Safety switches (SW)
- Terminal box for electric power connection (CB)
- Fan speed control 230/1 and 400/3 (BFT)
- Flanges (aluminium)
- End covers (CV)
- Coil corrosion protection
  - Fins epoxy coated (EP)
  - Fins seawater resistant aluminium alloy 57S/5052 (SWR)
  - Blygold treatment (BY)
  - F-coat treatment (FC)
- Fin spacing 2.5 mm
- Vibration dampers (VD)



AlfaBlue Junior DG

Customisation (on request)

- Reverse setup (fitted with blow through fans, for high air-in temperature applications)

Certifications

All dry cooler models are “Eurovent Certify All” certified. The Alfa Laval quality system is in accordance with ISO 9001. All products are manufactured according to CE and PED rules.

Design pressure

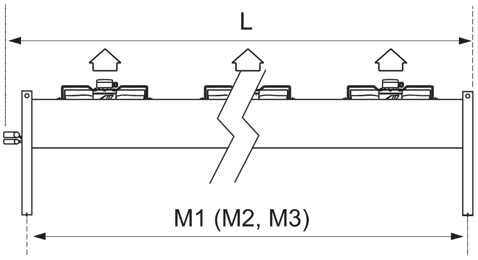
Design pressure 6 bar. Each heat exchanger is leak tested with dry air.

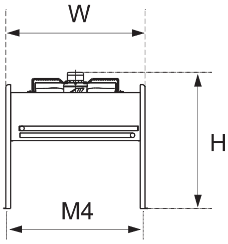
Selection

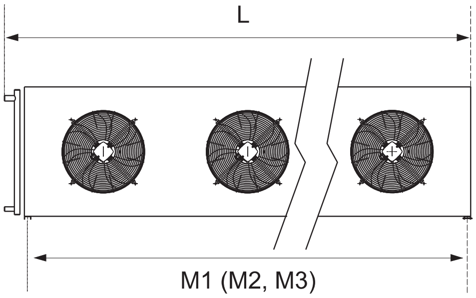
Selection and pricing is to be performed with our Alfa Laval air heat exchanger selection software. Please contact our sales organization for details and full technical documentation.

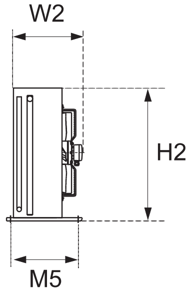
		Dimensions										Weight		
		L	H	W	H2	W2	M1	M2	M3	M4	M5	Coil A	Coil A	Coil A
type	fans	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg	kg	kg
DG*501	1	1115	846	868	828	428	860	-	-	868	420	39	42	47
DG*502	2	2015	846	868	828	428	1760	-	-	868	420	76	85	93
DG*503	3	2915	846	868	828	428	2660	-	-	868	420	111	123	137
DG*504	4	3815	846	868	828	428	1800	1840	-	868	420	-	179	192
DG*631	1	1261	1180	1070	1034	680	960	-	-	1070	700	87	93	99
DG*632	2	2261	1180	1070	1034	680	1960	-	-	1070	700	164	176	188
DG*633	3	3261	1180	1070	1034	680	2960	-	-	1070	700	242	259	277
DG*634	4	4261	1180	1070	1034	680	3960	1960	-	1070	700	318	343	366
DG*635	5	5261	1180	1070	1034	680	4960	1960	2000	1070	700	374	403	434
DG*636	6	6261	1180	1070	1034	680	5960	1960	2000	1070	700	448	484	519

NOTE: weights for DG*6 are given for sound execution S (Standard). Weights for executions L, Q & R are 92% of the given values.









Code description

DG	S(E)	50	2	B	D	H/V	BO	*	–	AL	2.1	CU	*
1	2	3	4	5	6	7	8	9		10	11	12	13

1. AlfaBlue Junior dry cooler
2. Sound level/fan code (S-standard, L=low, Q=quiet, R=residential, E=EC fan motor)
3. Fan diameter (50=500 mm, 63=630 mm)
4. Number of fans (1 to 6)
5. Tube rows code (A, B, C)
6. Phases (S=monophase, D=three phases)
7. Suitable for both horizontal & vertical installation
8. Transport packing (BO=box, P=pallet, CR=crate)
9. Options
10. Fin material/coating (AL=aluminium, IF=industrial fins, SWR=AlMg2.5, EP=epoxy coated alu, FC=F-coat, BY=Blygold)
11. Fins spacing (2.1 mm, 2.5 mm)
12. Tube mateial (CU=copper)
13. Extra options

Benefits

- Excellent sound characteristics, suitable for residential applications
- Reliable performance, Eurovent certified
- Easy installation & maintenance.
- Energy efficient - low total cost of ownership.
- Damage-proof packing in sturdy cardboard box on pallet. Bigger units in a crate and wrapped with plastic foil.
- Two-year product guarantee.

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

AlfaBlue BDM / BDMY / BDD / BDD6 / BDDY

Dry coolers

General information & application

The AlfaBlue series is a wide range of heavy-duty dry coolers. Dry coolers are often used for cooling down condenser water in air conditioning and refrigeration installations. In the processing industry, dry coolers are suitable for closed circuit cooling of various process liquids. With a wide range of sound pressure level alternatives, these units are particularly suited to demanding, noise sensitive environments. AlfaBlue dry coolers are available for both horizontal and vertical air direction, either in single (M) or dual (D) coil execution.

Capacities *	16 up to 1028 kW

* water, EN1048.

Coil

An innovative coil design provides excellent heat transfer. In standard execution dry coolers are fitted with smooth copper tubing (1/2", 3/8" or 5/8") or stainless steel tubing (5/8"). Fins in aluminium or sea water resistant AlMg2.5, available in two fin designs:

Turbo fins	maximized capacity
Industrial power fins (IF)	long lasting performance

Available in different fin thicknesses and fin spacings. Coil configuration optimized according to liquid flow. Separate connections in the D series provide the opportunity for independent operation of both coils.

Casing

Frame construction provides high rigidity for protection against vibration and thermal expansion. Casing and framework of corrosion resistant pre-galvanized sheet steel (high corrosion resistance), epoxy coated white RAL 9002 on both sides. Separated fan sections.

Fan motors

Available in four fan diameters (630, 800, 910 & 1000 mm) and five noise levels, power supply 400/50/3. Motors with external rotor, protection class IP 54 according to DIN 40050. Integrated thermo contacts provide reliable protection against thermal overload. EC fan motors available.

Options

- Spray water device (D series only)
- Vibration dampers (VD)
- Special fan motors 400V/60Hz
- Coil corrosion protection
  - Fins epoxy coated (EP)
  - Fins seawater resistant aluminium alloy 57S/5052 (SWR)
  - Copper fins
  - Blygold treatment (BY)
  - F-coat treatment (FC)

AlfaBlue BDD

- Electrical options
  - Safety switch (SW)
  - Motors wired to a common terminal box (CB)
  - Switchboard basic IP55 (B)
  - EMC approved components
  - Fan step control (BP/BSP), Fan speed control (BFP/BSFP) or Frequency control (BI/BIC)

Customisation (on request)

- Multi-circuiting
- Special fan motors
  - 480/3/60 (IP54)
  - Protection class IP55
  - High-temperature or explosion proof motors

Certifications

All dry cooler models are "Eurovent Certify All" certified. The Alfa Laval quality system is in accordance with ISO 9001. All products are manufactured according to CE and PED rules.

Design pressure

Design pressure 6 bar. Each heat exchanger is leak tested with dry air.

Selection

Selection and pricing is to be performed with our Alfa Laval air heat exchanger selection software. Please contact our sales organization for details and full technical documentation.

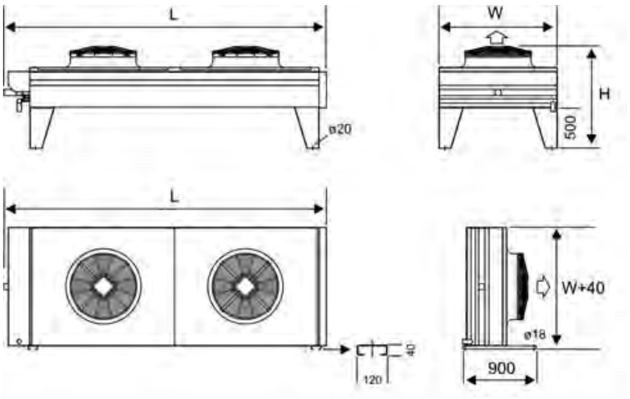
	Dimensions mm (indicative)			
type	L1*	L2*	W	H
BDM 631	1545	1625	1214	1221
BDM 632	2635	2715	1214	1221
BDM 633	3725	3805	1214	1221
BDM 634	4815	4895	1214	1221
BDML 631	1855	1935	1214	1221
BDML 632	3255	3335	1214	1221
BDML 633	4655	4735	1214	1221
BDM 801	2205	2285	1454	1252
BDM 802	3955	4035	1454	1252
BDM 803	5705	5785	1454	1252
BDM 804	7455	7535	1454	1252
BDM 805	9205	9285	1454	1252
BDM 901	2555	2635	1454	1289
BDM 902	4655	4735	1454	1289
BDM 903	6755	6835	1454	1289
BDM 904	8855	8935	1454	1289
BDM 1001	2555	2635	1454	1295
BDM 1002	4655	4735	1454	1295
BDM 1003	6755	6835	1454	1295
BDM 1004	8855	8935	1454	1295
BDD 802	3955	4035	2249	1252
BDD 803	5705	5785	2249	1252
BDD 804	7455	7535	2249	1252
BDD 805	9205	9285	2249	1252
BDD 806	10955	11035	2249	1252
BDD 902	4655	4735	2249	1289
BDD 903	6755	6835	2249	1289
BDD 904	8855	8935	2249	1289
BDD 905	10955	11035	2249	1289
BDD 1002	4655	4735	2249	1278
BDD 1003	6755	6835	2249	1278
BDD 1004	8855	8935	2249	1278
BDD 1005	10955	11035	2249	1278

Code description

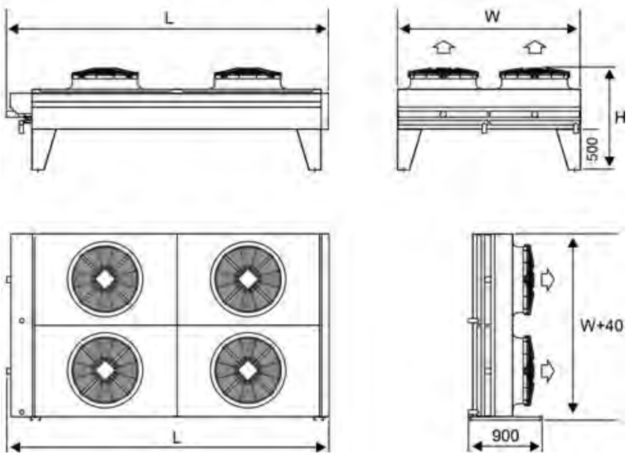
BD	M	S(E)	80	5	B	D	CR	*	–	AL	2.1	CU	*
1	2	3	4	5	6	7	8	9		10	11	12	13

1. AlfaBlue dry cooler (BDM/BDD = standard Cu tubes, BDD6 = 5/8” Cu tubes, BDMY/BDDY = SS304 tubes
2. Number of separated coils (M=1, D=2)
3. Sound level/fan code (T=high performance, S-standard, L=low, Q=quiet, R=residential, E=EC fan motor)
4. Fan diameter (63=630, 80=800, 90=910, 100=1000 mm)
5. Number of fans per coil (BDM = 1 to 5, BDD = 2 to 6
6. No. of tube rows (A=2, B=3, C=4)
7. Fan motor connection (D=delta, Y=star)
8. Tube rows code (A, B, C)
9. Packing (CR=crate, / mounting feet (Feet)
10. Electrical options
11. Fin material/coating (AL=aluminium, IF=industrial fins, SWR=AlMg2.5, EP=epoxy coated alu, FC=F-coat, BY=Blygold)
12. Fins spacing (2.1, 2.3, 2.5, 3.0 and 3.2 mm)
13. Tube mateial (CU=copper)

Dimensions BDM



Dimensions BDD



Benefits

- Heavy duty design with high corrosion resistance
- Reduced refrigerant charge
- Available with easily cleanable industrial power fins
- Excellent sound characteristics
- Reliable performance, Eurovent certified
- Easy installation & maintenance.
- Energy efficient - low total cost of ownership.
- Two-year product guarantee.

How to contact Alfa Laval
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all countries are always available on our
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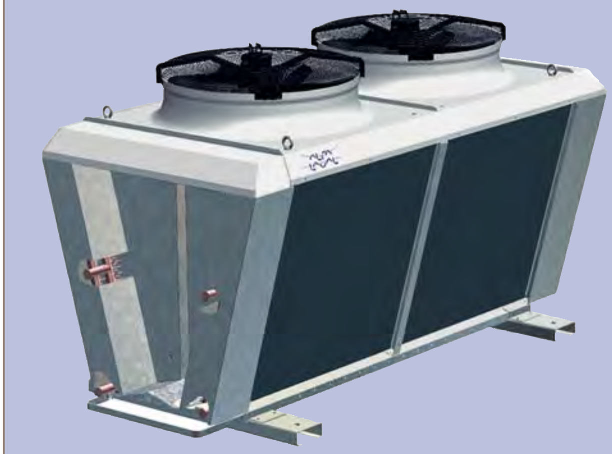
Alfa-V Single Row VDM

Dry coolers – commercial V-range



General information & application

Alfa Laval supports a sustainable environment. Therefore our new Alfa-V Single Row dry cooler range has been designed according to the following principles: material wastes have been reduced to an absolute minimum, the V-angle with its exceptional guiding optimizes airflow and low coil resistance reduces energy consumption of the fan motors.

Alfa-V Single Row has been specifically designed for commercial refrigeration and air conditioning. Its main purpose is to reject small to medium heat loads in a modest footprint. In the processing industry, dry coolers are suitable for closed circuit cooling of various process liquids.

Capacities*	20 up to 450 kW

* water, EN1048.

Coil

An innovative coil design based on 3/8" copper tubes and corrugated aluminium turbo fins provides excellent heat transfer at a minimized refrigerant charge. Standard fin spacing is 2.1 mm.

Separate connections provide the opportunity for independent operation of both dry cooler coils. Flanges stainless steel (UNI EN 1092-1).

Casing

Casing material is galvanized steel sheet, pre-painted with an epoxy finish (RAL9002). Separated fan sections.

Fan motors

Fan motors 400/50/3 available in two fan diameters (800 & 910 mm). The motors are with external rotor, protection class IP54 according to DIN 40050. Integrated thermal protection by thermo contacts provides reliable protection against thermal overload. These fan motors are available in five sound level classes: T=high performance, S=standard, L=low, Q=quiet, and R=residential. Motors are wired to one or more common terminal boxes.

Options

- Multi-circuiting
- Non-standard fin spacing
- Coil corrosion protection
    - Coil coating
    - Fins seawater resistant aluminium alloy 57S/5052

- Spray water device
- Vibration dampers
- Special fan motors
    - 480/3/60 (IP54)
    - EC fan motors
    - Protection class IP55
    - High-temperature motors
    - Explosion proof motors

- Electrical options
    - Isolating switch
    - Motors wired to a common terminal box
    - EMC approval

Certifications

All dry cooler models are "Eurovent Certify All" certified. The Alfa Laval quality system is in accordance with ISO 9001. All products are manufactured according to CE and PED rules.

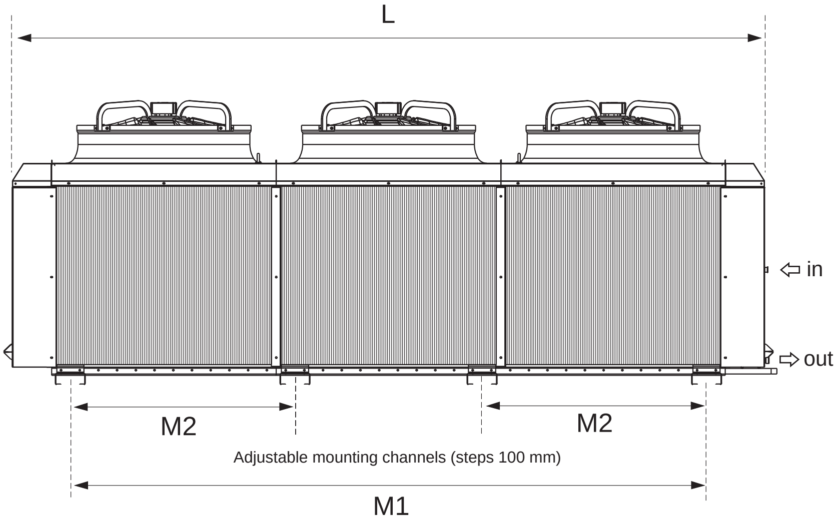
Design pressure

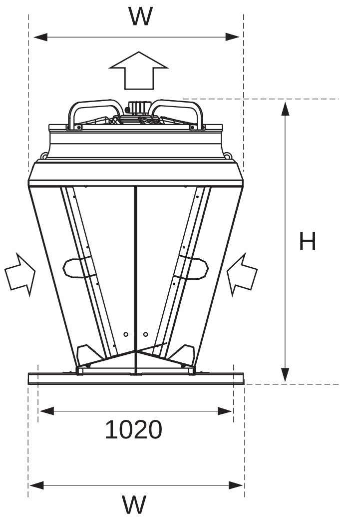
Design pressure 6 bar. Each heat exchanger is leak tested with dry air.

Selection

For VDM dry cooler selection and support please contact your local Alfa Laval representative.

		Transport dimensions				Mounting channels		
Model	Fans no.	Length L mm	Height H mm	Width W mm	Weight kg	no.	M1 mm	M2 mm
VCM 801	1	1635	1451	1150	230	2	800	-
VCM 802	2	2635	1451	1150	393	2	1800	-
VCM 803	3	3635	1451	1150	557	4	2800	800
VCM 804	4	4635	1451	1150	721	4	3800	1000
VCM 805	5	5635	1451	1150	885	4	4800	1800
VCM 806	6	6635	1451	1150	1049	4	5800	1800
VCM 901	1	1836	1520	1150	260	2	1000	-
VCM 902	2	3036	1520	1150	480	2	2200	-
VCM 903	3	4236	1520	1150	700	4	3400	1200
VCM 904	4	5436	1520	1150	920	4	4600	1300
VCM 905	5	6636	1520	1150	1140	4	5800	2200





Code description

VDM	S(E)	80	2	B	D	*	–	AL	2.1	CU	*
1	2	3	4	5	6	7		8	9	10	11

1. Alfa-V Single Row dry cooler
2. Sound level/fan code (T=high performance, S-standard, L=low, Q=quiet, R=residential, E=EC fan motor)
3. Fan diameter (80=800 mm, 90=910 mm)
4. Number of fans (1 to 6)
5. Number of tube rows (A=2, B=3, C=4)
6. Fan motor connection (D=delta, Y=star)
7. Electrical options
8. Fin material/coating (AL=aluminium, EP=epoxy coated aluminium, FC=F-coat, BY=Blygold)
9. Fins spacing (2.1 mm, 2.5 mm)
10. Tube mateial (CU=copper)
11. Options

Benefits

- Excellent sound characteristics, suitable for residential applications.
- Reliable performance, Eurovent certified
- Easy installation & maintenance.
- Energy efficient - low total cost of ownership.
- Adjustable mounting feet
- Modern design
- Heavy duty materials for a long product life
- Two-year product guarantee.

Alfa Laval reserves the right to change specifications without prior notification.

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

Alfa-V VDD / VDD6 / VDDY

Industrial dry coolers V-type

General information & application

The Alfa-V series is a wide range of heavy duty V-type dry coolers for air conditioning, refrigeration and various industrial applications. Alfa-V dry coolers provide high capacities at a compact footprint.

Alfa-V dry coolers may be used in refrigeration and air conditioning applications such as water/glycol cooling or free cooling. For industrial applications dry coolers are suitable for closed circuit cooling of various process liquids in f.i. food, power, process and general industries.

Capacities*	54 up to 1600 kW

* water, EN1048.

Coil

An innovative coil design provides excellent heat transfer. In standard execution dry coolers are fitted with smooth copper tubing (1/2”, 3/8”or 5/8”) or stainless steel tubing (5/8”). Fins in aluminium or sea water resistant AlMg2.5, available in two fin designs:

Turbo fins	maximized capacity
Industrial power fins	long lasting performance

Available in different fin thicknesses and fin spacings. Separate connections provide the opportunity for independent operation of both dry cooler coils. Flanges stainless steel (UNI EN 1092-1).

Casing

Frame construction provides high rigidity for protection against vibration and thermal expansion. Casing and framework of corrosion resistant pre-galvanized sheet steel (high corrosion resistance), epoxy coated white RAL 9002 on both sides. Separated fan sections. Supports in galvanized steel.

Fan motors

Available in three fan diameters (800, 910 & 1000 mm) and five noise levels, power supply 400/50/3. Motors with external rotor, protection class IP 54 according to DIN 40050. Integrated thermo contacts provide reliable protection against thermal overload. EC fan motors available.

Certifications

Alfa-V dry coolers are “Eurovent Certify All” certified. The Alfa Laval quality system is in accordance with ISO 9001. All products are manufactured according to CE and PED rules.

Design pressure

Design pressure 6 bar. Each heat exchanger is leak tested with dry air.

Selection

Selection and pricing is to be performed with our Alfa Laval air heat exchanger selection software. Selection output includes all relevant technical data and dimensional drawings. Please contact our sales organization for details and full technical documentation.

VDD 808

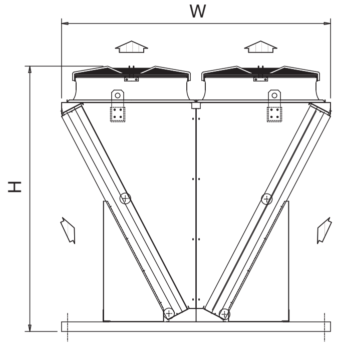
Nbr. of fan pairs	Dimensions mm (indicative)			
	L1*	L2*	H	W
2	2940	3270	2210	2230
3	4250	4580	2210	2230
4	5560	5890	2210	2230
5	6870	7200	2210	2230
6	8190	8510	2210	2230
7	9490	9820	2210	2230
8	10800	11130	2210	2230

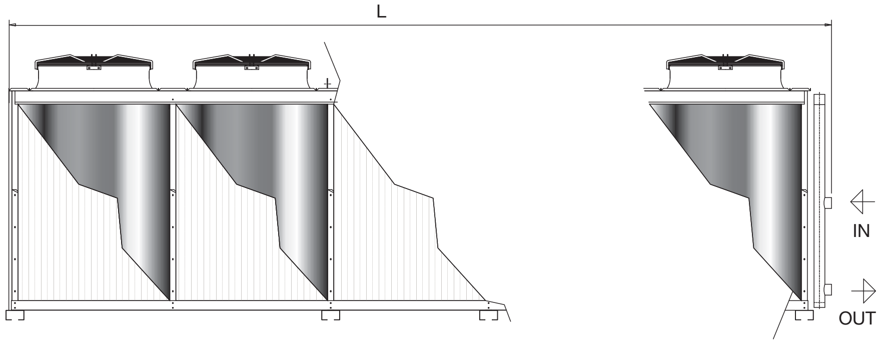
* L1 = VDD/VDD6, L2 = VDDY

Options
- Multi-circuiting
- Non-standard fin spacing
- Coil corrosion protection
  - Coil coating
  - Fins seawater resistant aluminium alloy 57S/5052

- Spray water device
- Vibration dampers
- Special fan motors
  - 480/3/60 (IP54)
  - EC fan motors
  - Protection class IP55
  - High-temperature motors
  - Explosion proof motors

- Electrical options
  - Isolating switch
  - Motors wired to a common terminal box
  - Switchboard (IP55)
  - EMC approval
  - Fan step control
  - Fan speed control
  - Frequency control





Code description

VDD	S(E)	90	4	B	D	SK	*	–	AL	2.1	CU	*
1	2	3	4	5	6	7	8		9	10	11	12

1. Alfa-V dry cooler (VDD = standard Cu tube), VDD6 = 5/8" Cu, VDDY = 5/8" SS304)
2. Sound level/fan code (T=high performance, S-standard, L=low, Q=quiet, R=residential, E=EC fan motor)
3. Fan diameter (80=800, 90=910, 100=1000 mm)
4. Number of fans pairs (2 to 8)
5. No. of tube rows (B=3, C=4)
6. Fan motor connection (D=delta, Y=star)
7. Packing (SK=container skid)
8. Electrical options
9. Fin material/coating (AL=aluminium, IF=industrial fins, SWR=AlMg2.5, EP=epoxy coated aluminium, FC=F-coat, BY=Blygold)
10. Fins spacing (2.1, 2.3, 2.5, 3.0 and 3.2 mm)
11. Tube mateial (CU=copper, SS=stainless steel)
12. Options

Benefits
- Heavy duty design with high corrosion resistance
- Reduced liquid charge
- Favourable capacity/footprint ratio.
- Available with easily cleanable industrial power fins
- Excellent sound characteristics, suitable for residential applications
- Reliable performance, Eurovent certified
- Easy installation & maintenance.
- Energy efficient - low total cost of ownership.
- Two-year product guarantee.

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

AlfaSolar SD

Dry coolers

AlfaSolar SDD

General information & application

Dry coolers are often used for cooling down condenser water in air conditioning and refrigeration installations. In the processing industry, dry coolers are suitable for closed circuit cooling of various process liquids. With a wide range of sound pressure level alternatives, these units are particularly suited to demanding, noise sensitive environments. Alfa Solar dry coolers are available for both horizontal and vertical air direction.

Capacities*	37 up to 1651 kW

* water, EN1048.

Coil

Coil manufactured from copper tubes ø 12.7 mm and corrugated Alu-fins, standard fin spacing is 2.3 mm. Flanges PN10/16 according to DIN 2642.

Casing

Casing and framework of corrosion resistant, galvanized sheet steel (GS).

Fan motors

Axial fans in a range of different fan speed executions. Available in two fan diameters: 914 mm (1 to 14 fans) or 1240 mm (1 to 7 fans). Enclosed design fan motors, protection class IP-54, class F insulation. Motors are wired to the fans' safety switches (IP65). All fans have corrosion resistant fan blades and fan guards.

Certifications

All dry cooler models are "Eurovent Certify All" certified. The Alfa Laval Vantaa quality system is in accordance with ISO 9001. All products are manufactured according to CE and PED rules.

Design pressure

Design pressure 6 barg. Each heat exchanger is leak tested dry air at 9 barg.

Transport

Standard vertical transport position, fixed on a wooden pallet.

Options

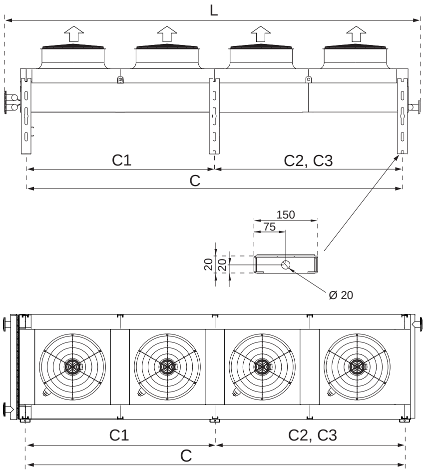
- Copper (CU) or epoxy coated (EP) fins
- Fin spacings 2.5 and 3.2 mm
- Water spraying system (KW)
- Vibration dampers (VD)
- Step control + options
- Fan speed control with frequency converter (SVC) + options
- EC fan motors, control panels & options
- Casing epoxy painted grey RAL 7040 in four thicknesses (GPU=MU, GP1=M1, GP2=M2, GP3=M3)
- EMC cables, glands & safety switches for each fan (EMC)
- Motors with thermal overload Klixon switches (THC)
- Motor heater (MH)
- Packing: pallet (P) or container (CN)

Selection

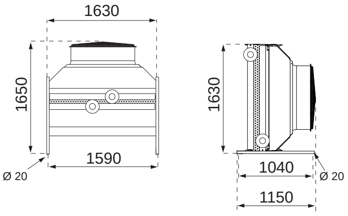
Selection and pricing is to be performed with our Alfa Laval air heat exchanger selection software. Please contact our sales organization for details and full technical documentation.

Dimensions & weights

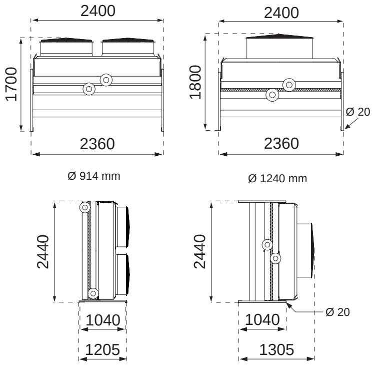
unit	dimensions (mm)					fixing	weight	nt.vol.	surface
size	L	C	C1	C2	C3	points	kg	l	m²
SDM-1A-3	2000	1400	1400			4	240	32	157
SDM-1A-4	2000	1400	1400			4	260	40	210
SDM-1B-4	2400	1800	1800			4	320	49	269
SDM-2A-3	3400	2800	2800			4	480	61	314
SDM-2A-4	3400	2800	2800			4	520	78	419
SDM-2B-4	4200	3600	3600			4	640	96	539
SDM-3A-3	4800	4200	4200			4	720	85	471
SDM-3A-4	4800	4200	4200			4	780	109	629
SDM-3B-4	6000	5400	5400			4	960	136	808
SDM-4A-3	6200	5600	2800	2800		6	960	113	629
SDM-4A-4	6200	5600	2800	2800		6	1040	145	838
SDM-4B-4	7800	7200	3600	3600		6	1280	180	1078
SDM-5A-3	7600	7000	2800	4200		6	1200	136	786
SDM-5A-4	7600	7000	2800	4200		6	1300	176	1048
SDM-5B-4	9600	9000	3600	5400		6	1600	229	1347
SDD-2B-3	4200	3600	3600			4	920	112	606
SDD-2B-4	4200	3600	3600			4	990	151	808
SDD-2C-4	4800	4200	4200			4	1110	171	943
SDD-3B-3	6000	5400	5400			4	1370	164	909
SDD-3B-4	6000	5400	5400			4	1490	224	1212
SDD-3C-4	6900	6300	6300			4	1670	254	1414
SDD-4B-3	7800	7200	3600	3600		6	1830	222	1212
SDD-4B-4	7800	7200	3600	3600		6	1980	283	1617
SDD-4C-4	9000	8400	4200	4200		6	2200	323	1886
SDD-5B-3	9600	9000	3600	5400		6	2280	267	1515
SDD-5B-4	9600	9000	3600	5400		6	2470	363	2021
SDD-5C-4	11100	10500	4200	6300		6	2770	412	2357
SDD-6B-3	11400	10800	3600	3600	3600	8	2730	331	1819
SDD-6B-4	11400	10800	3600	3600	3600	8	2970	422	2425
SDD-6B-5	13200	10800	3600	3600	3600	8	3200	514	3031
SDD-6B-6	11400	10800	3600	3600	3600	8	3430	605	3637
SDD-6C-4	11400	12600	4200	4200	4200	8	3320	482	2829
SDD-6C-5	13200	12600	4200	4200	4200	8	3590	568	3536
SDD-6C-6	3200	12600	12600	4200	4200	8	3860	675	4243
SDD-7B-3	13200	12600	3600	5400	3600	8	3190	376	2122
SDD-7B-4	13200	12600	3600	5400	3600	8	3460	482	2829
SDD-7B-5	13200	12600	3600	5400	3600	8	3730	568	3536
SDD-7B-6	13200	12600	3600	5400	3600	8	4000	674	4243



Models SDM



Models SDD



Code description

SD	D	6	B	09	L	N5Y	4	H	GS	P	*	–	AL	2.1	CU	88	1xDN80
1	2	3	4	5	6	7	8	9	10	11	12		13	14	15	16	17

1. AlfaSolar dry cooler
2. Unit width (M=narrow, D=wide)
3. No. of modules
4. Module length (A=1400 mmm B=1800 mm, C=2100 mm)
5. Fan diameter (09=910 mm, 12=1240 mm)
6. Fan speed (T=950, S=720, L=560, Q=470, R=350)
7. Power supply (N5Y=3/400/50-Y, N5D=3/400/50-D, N6=3/440/60, N7=3/230/50, N8=3/690/50
8. Tube rows in air direction (3,4,5,6)
9. Air flow (H=vertical, V=horizontal)
10. Casing material (GS, GP_U/1/2/3)
11. Packaging (P=pallet, CN=container)
12. Options
13. Fin material/coating (AL=aluminium, EP=epoxy coated, CU=copper)
14. Fins spacing (mm)
15. Tube mateial (CU=copper)
16. No. of circuits
17. Connections (1 inlet + outlet DN80 flange)

Benefits

- Heavy duty coil & casing materials, resulting in a long operational product life.
- Floating coil construction to compensate for thermal stress.
- Plain profile fins make the coil less prone to fouling and easier to clean.
- Excellent sound characteristics
- Reliable performance, Eurovent certified.
- Easy-install & maintenance
- Energy efficient - low total cost of ownership.
- Two year full product guarantee.

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

AlfaBlue BCM/BCD & BNM/BND

Air-cooled condensers

General information & application

The AlfaBlue series is a wide range of heavy-duty air cooled condensers for air conditioning and refrigeration applications. AlfaBlue condensers are available for both horizontal and vertical air direction, either in single (M) or dual (D) coil execution.

Refrigerants	all halocarbon (BC) or ammonia (BN)
Capacities H(C)FC*	15 up to 862 kW
Capacities ammonia*	20 up to 1200 kW

* Nominal capacities (T_{air} = 25°C, T_{cond} = 40°C, $T_{subcool}$ < 3K, $T_{superheating}$ = 25K).

Coil

An innovative coil design provides excellent heat transfer at minimal refrigerant charge. Depending on the application, condensers are fitted with cross-fin copper or smooth stainless steel tubing. Available with two Alu-fin types:

Turbo fins	maximized capacity
Industrial power fins (IF)	long lasting performance

Available in different fin thicknesses and fin spacings. Separate connections in the D series provide the opportunity for independent operation of both condenser coils.

Casing

Frame construction provides high rigidity for protection against vibration and thermal expansion. Casing and framework of corrosion resistant pre-galvanized sheet steel (corrosion resistance class C4), epoxy coated white RAL 9002 on both sides. Separated fan sections.

Fan motors

High efficiency AC or EC fan motors, available in four fan diameters (630, 800, 910 & 1000 mm) and five noise levels, power supply 400/50/3. Motors with external rotor, protection class IP 54 according to DIN 40050. Integrated thermo contacts provide reliable protection against thermal overload.

Options

- Sub-cooling circuit (SC)
- Coil corrosion protection
  - Fins epoxy coated (EP)
  - Fins seawater resistant aluminium alloy 57S/5052 (SWR)
  - Blygold treatment (BY)
  - F-coat treatment (FC)

- Spray water device (KW, D series only)
- Vibration dampers (VD)

AlfaBlue condensers

- Electrical options
  - Safety switch (SW)
  - Motors wired to a common terminal box (CB)
  - Switchboard basic IP55 (B)
  - EMC approved components
  - Fan step control (BP/BSP)
  - Fan speed control (BFP/BSFP
  - Frequency control (BI/BIC)

Customisation (on request)

- Multi-circuiting
  - 480/3/60 (IP54)
  - Protection class IP55
  - High-temperature or explosion proof motors

Certifications

BCM/BCD Models are “Eurovent Certify All” certified. The Alfa Laval quality system is in accordance with ISO 9001. All products are manufactured according to CE and PED rules.

Design pressure

Design pressure 33 bar (BCM/BCD) or 27 bar (BNM/BND). Each heat exchanger is leak tested with dry air and finally supplied with a nitrogen pre-charge.

Selection

Selection and pricing is to be performed with our Alfa Laval air heat exchanger selection software. Please contact our sales organization for details and full technical documentation.

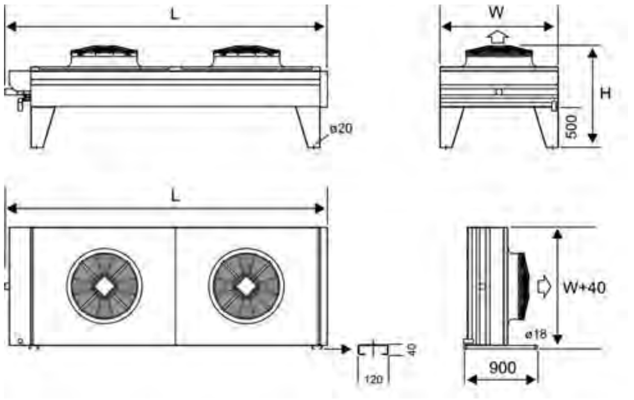
	Dimensions mm		
type	L	W	H
B*M 631	1545	1214	1221
B*M 632	2635	1214	1221
B*M 633	3725	1214	1221
B*M 634	4815	1214	1221
B*ML 631	1855	1214	1221
B*ML 632	3255	1214	1221
B*ML 633	4655	1214	1221
B*M 801	2205	1454	1252
B*M 802	3955	1454	1252
B*M 803	5705	1454	1252
B*M 804	7455	1454	1252
B*M 805	9205	1454	1252
B*M 901	2555	1454	1289
B*M 902	4655	1454	1289
B*M 903	6755	1454	1289
B*M 904	8855	1454	1289
B*M 1001	2555	1454	1295
B*M 1002	4655	1454	1295
B*M 1003	6755	1454	1295
B*M 1004	8855	1454	1295
B*D 802	3955	2249	1252
B*D 803	5705	2249	1252
B*D 804	7455	2249	1252
B*D 805	9205	2249	1252
B*D 806	10955	2249	1252
B*D 902	4655	2249	1289
B*D 903	6755	2249	1289
B*D 904	8855	2249	1289
B*D 905	10955	2249	1289
B*D 1002	4655	2249	1278
B*D 1003	6755	2249	1278
B*D 1004	8855	2249	1278
B*D 1005	10955	2249	1278

Code description

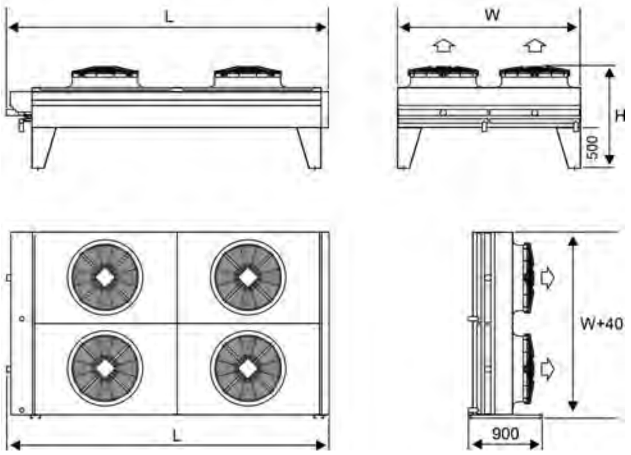
B	C	M	S(E)	63	2	L	A	D	CR	*	–	AL	2.1	CU	*
1	2	3	4	5	6	7	8	9	10	11		12	13	14	15

1. AlfaBlue condenser
2. Refrigerant (C=H(C)FC, N=ammonia
3. Number of fan rows (M=1, D=2)
4. Sound level/fan code (T=turbo, S-standard, L=low, Q=quiet, R=residential, E=EC fan motor)
5. Fan diameter (63=630, 80=800, 90=910, 100=1000 mm)
6. Number of fans per row (B*M = 1 to 5, B*D = 2 to 6)
7. Module length (optional: L=long)
8. Tube rows code (A, B, C)
9. Fan motor connection (D=delta, Y=star)
10. Packing (CR=crate, / mounting feet (Feet)
11. Electrical options
12. Fin material/coating (AL=aluminium, IF=industrial fins, SWR=AlMg2.5, EP=epoxy coated alu, FC=F-coat, BY=Blygold)
13. Fins spacing (2.1, 2.3, 2.5, 3.0 and 3.2 mm)
14. Tube mateial (CU=copper, SS=stainless steel)
15. Options

Dimensions B*M



Dimensions B*D



Benefits

- Heavy duty design with high corrosion resistance
- Reduced refrigerant charge
- Available with easily cleanable industrial power fins
- Excellent sound characteristics, suitable for residential applications
- Reliable performance, Eurovent certified
- Easy installation & maintenance.
- Energy efficient - low total cost of ownership.
- Two-year product guarantee.

How to contact Alfa Laval
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website on www.alfalaval.com

Alfa-V Single Row VCM

Air-cooled condenser – commercial V-range

General information & application

Alfa Laval supports a sustainable environment. Therefore our new Alfa-V Single Row air-cooled condenser range has been designed according to the following principles: material wastes have been reduced to an absolute minimum, the V-angle with its exceptional guiding optimizes airflow and low coil resistance reduces energy consumption of the fan motors.

Alfa-V Single Row has been specifically designed for commercial refrigeration and air conditioning. Its main purpose is to reject small to medium heat loads in a modest footprint. But Alfa-V Single Row also offers many other features to comply with the highest demands in state-of-the-art refrigeration installations in for instance city-size supermarkets.

Refrigerants	all H(C)FC
Capacities (SC2)	35 up to 550 kW

Coil

An innovative coil design based on 5/16” copper tubes and corrugated aluminium turbo fins provides excellent heat transfer at a minimized refrigerant charge. Standard fin spacing is 2.1 mm.

Casing

Casing material is galvanized steel sheet, pre-painted with an epoxy finish (RAL9002). Separated fan sections.

Fan motors

Fan motors 400/50/3 available in two fan diameters (800 & 910 mm). The motors are with external rotor, protection class IP54 according to DIN 40050. Integrated thermal protection by thermo contacts provides reliable protection against thermal overload. These fan motors are available in five sound level classes: T=high performance, S=standard, L=low, Q=quiet, and R=residential. Motors are wired to one or more common terminal boxes.

Options

- Multi-circuiting
- Sub-cooling circuit
- Non-standard fin spacing
- Coil corrosion protection
  - Coil coating
  - Fins seawater resistant aluminium alloy 57S/5052

- Spray water device
- Vibration dampers

Alfa-V Single Row

- Special fan motors
  - 480/3/60 (IP54)
  - EC fan motors
  - Protection class IP55
  - High-temperature motors
  - Explosion proof motors

- Electrical options
  - Isolating switch
  - Motors wired to a common terminal box
  - EMC approval

Certifications

All condenser models are “Eurovent Certify All” certified. The Alfa Laval quality system is in accordance with ISO 9001. All products are manufactured according to CE and PED rules.

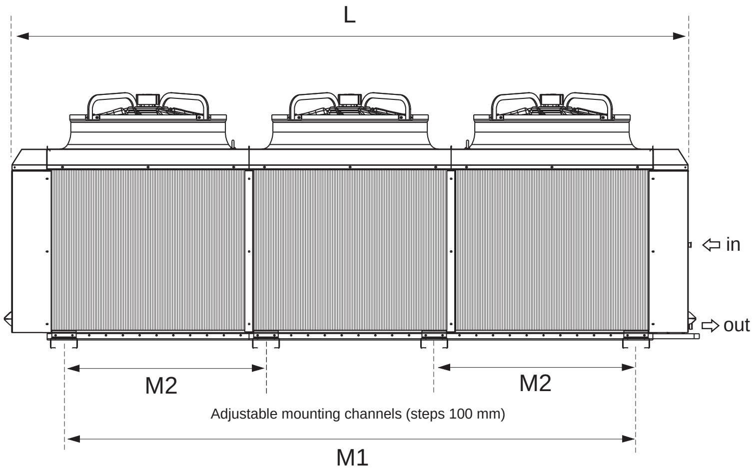
Design pressure

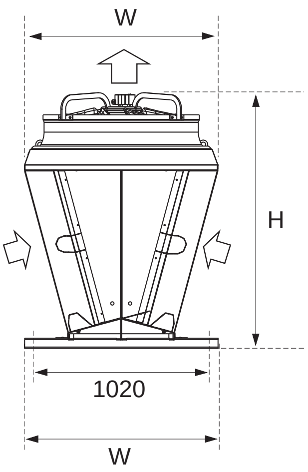
Design pressure 33 bar. Each heat exchanger is leak tested with dry air and finally supplied with a nitrogen pre-charge

Selection

Selection and pricing is to be performed with our Alfa Laval air heat exchanger selection software. Selection output includes all relevant technical data and dimensional drawings. Please contact our sales organization for details and full technical documentation.

Model	Fans no.	Transport dimensions			Weight kg	Mounting channels		
		Length L mm	Height H mm	Width W mm		no.	M1 mm	M2 mm
VCM 801	1	1635	1451	1150	230	2	800	-
VCM 802	2	2635	1451	1150	393	2	1800	-
VCM 803	3	3635	1451	1150	557	4	2800	800
VCM 804	4	4635	1451	1150	721	4	3800	1000
VCM 805	5	5635	1451	1150	885	4	4800	1800
VCM 806	6	6635	1451	1150	1049	4	5800	1800
VCM 901	1	1836	1520	1150	260	2	1000	-
VCM 902	2	3036	1520	1150	480	2	2200	-
VCM 903	3	4236	1520	1150	700	4	3400	1200
VCM 904	4	5436	1520	1150	920	4	4600	1300
VCM 905	5	6636	1520	1150	1140	4	5800	2200





Code description

VCM	S(E)	80	3	B	D	*	–	AL	2.1	CU	*
1	2	3	4	5	6	7		8	9	10	11

1. Alfa-V Single Row Condenser
2. Sound level/fan code (T=turbo, S-standard, L=low, Q=quiet, R=residential, E=EC fan motor)
3. Fan diameter (80=800, 90=910)
4. Number of fans (1 to 6)
5. Tube rows code (A, B, C)
6. Fan motor connection (D=delta, Y=star)
7. Electrical options
8. Fin material/coating (AL=aluminium, EP=epoxy coated aluminium, FC=F-coat, BY=Blygold)
9. Fins spacing (2.1, 2.3, 2.5 mm)
10. Tube mateial (CU=copper)
11. Options

Benefits

- Reduced refrigerant charge
- Excellent sound characteristics, suitable for residential applications.
- Reliable performance, Eurovent certified
- Easy installation & maintenance.
- Energy efficient - low total cost of ownership.
- Adjustable mounting feet
- Modern design
- Heavy duty materials for a long product life
- Two-year product guarantee.

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website on www.alfalaval.com

Alfa-V ACV/ANV

Industrial condensers V-type

Alfa-V air cooled condensers

General information & application

The Alfa-V series is a wide range of heavy duty V-type condensers for air conditioning and refrigeration applications. Alfa-V air-cooled condensers provide high capacities at a modest footprint.

Refrigerants	all halocarbon (ACV) or ammonia (ANV)
Capacities H(C)FC*	115 up to 1640 kW
Capacities NH3*	97 up to 1682 kW

* Nominal capacities (T_{air} = 25°C, T_{cond} = 40°C, $T_{subcool}$ < 3K, $T_{superheating}$ = 25K).

Coil

An innovative coil design provides excellent heat transfer at minimal refrigerant charge. Depending on the application, condensers are fitted with cross-fin copper or smooth stainless steel tubing. Standard fin spacing 2.1 mm, available with two Alu-fin types:

Turbo fins	maximized capacity
Industrial power fins	long lasting performance

Available in different fin thicknesses and fin spacings. Separate connections provide the opportunity for independent operation of both condenser coils.

Casing

Frame construction provides high rigidity for protection against vibration and thermal expansion. Casing and framework of corrosion resistant pre-galvanized sheet steel (corrosion resistance class C4), epoxy coated white RAL 9002 on both sides. Separated fan sections. Supports in galvanized steel.

Fan motors

Available in three fan diameters (800, 910 & 1000 mm) and five noise levels, power supply 400/50/3. Motors with external rotor, protection class IP 54 according to DIN 40050. Integrated thermo contacts provide reliable protection against thermal overload. EC fan motors available.

Certifications

ACV models are "Eurovent Certify All" certified. The Alfa Laval quality system is in accordance with ISO 9001. All products are manufactured according to CE and PED rules.

Design pressure

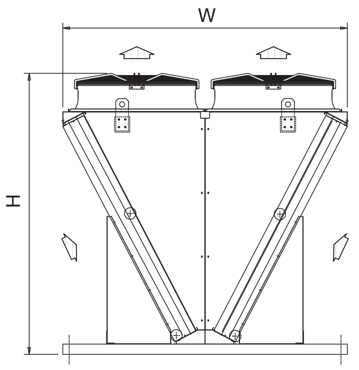
Design pressure 33 bar (ACV) or 27 bar (ANV). Each heat exchanger is leak tested with dry air and finally supplied with a nitrogen pre-charge.

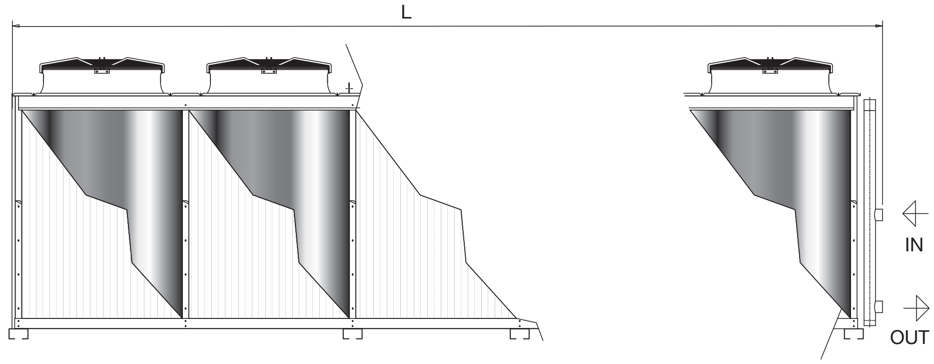
Selection

Please use our AlfaSelect Air selection software for condenser selection and RCPL pricing.

Stainless steel tubing for ammonia application (ANV)

Nbr. of fan pairs	Dimensions mm		
	L	H	W
2	2940	2210	2230
3	4250	2210	2230
4	5560	2210	2230
5	6870	2210	2230
6	8190	2210	2230
7	9490	2210	2230
8	10800	2210	2230





Options
- Multi-circuiting
- Sub-cooling circuit
- Non-standard fin spacing
- Coil corrosion protection
  - Coil coating
  - Fins seawater resistant aluminium alloy 57S/5052

- Spray water device
- Vibration dampers
- Special fan motors
  - 480/3/60 (IP54)
  - EC fan motors
  - Protection class IP55
  - High-temperature motors
  - Explosion proof motors

- Electrical options
  - Isolating switch
  - Motors wired to a common terminal box
  - Switchboard (IP55)
  - EMC approval
  - Fan step control
  - Fan speed control
  - Frequency control

Code description

ACV	S(E)	80	3	B	D	SK	*	–	AL	2.1	CU	*
1	2	3	4	5	6	7	8		9	10	11	12

1. Alfa-V condenser, (ACV=halocarbon, ANV=ammonia)
2. Sound level/fan code (T=turbo, S-standard, L=low, Q=quiet, R=residential, E=EC fan motor)
3. Fan diameter (80=800, 90=910, 100=1000 mm)
4. Number of fan pairs (2 to 8)
5. Tube rows code (B, C)
6. Fan motor connection (D=delta, Y=star)
7. Packing (SK=container skid)
8. Electrical options
9. Fin material/coating (AL=aluminium, IF=industrial fins, SWR=AlMg2.5, EP=epoxy coated aluminium, FC=F-coat, BY=Blygold)
10. Fins spacing (2.1, 2.3, 2.5, 3.0 and 3.2 mm)
11. Tube mateial (CU=copper, SS=stainless steel)
12. Options

Benefits

- Heavy duty design with high corrosion resistance
- Reduced refrigerant charge
- Favourable capacity/footprint ratio.
- Available with easily cleanable industrial power fins
- Excellent sound characteristics, suitable for residential applications
- Reliable performance, Eurovent certified (ACV)
- Easy installation & maintenance.
- Energy efficient - low total cost of ownership.
- Two-year product guarantee.

ERC00275EN 1210

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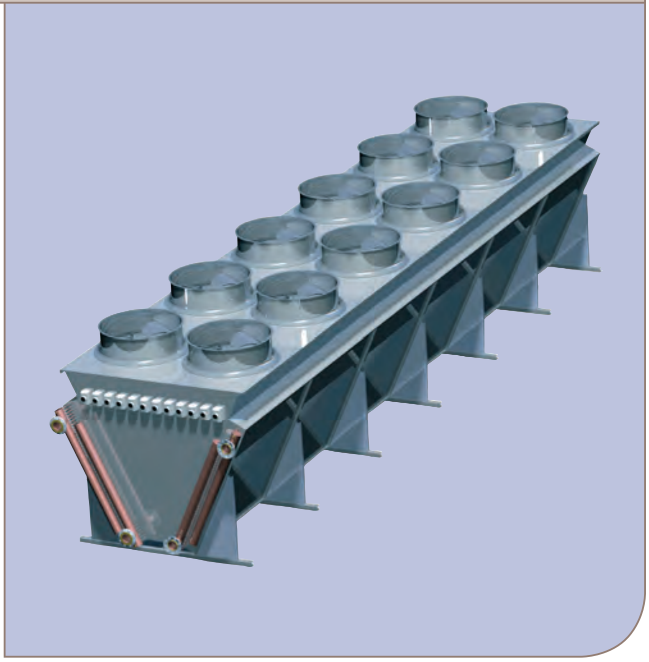
SOLAR Max

Air-cooled condensers



SOLAR Max

General information & application

Fincoil SOLAR Max condensers have been designed for commercial and industrial cooling and refrigeration plants. The Solar Max range is especially suitable when high capacities relative to available space, low energy consumption and/or low sound pressures are required.

Refrigerants	all H(C)FC
Capacities*	170 up to 1812 kW

* R-404A, 15 K TD, EN327.

Coil

Coil manufactured from copper tubes ø 12.7 mm and corrugated Alu-fins, tube pitch 35 x 30.31 mm. Standard fin spacing is 2.3 mm.

Casing

Casing and framework of corrosion resistant, hot dip galvanised sheet steel.

Fan motors

2 to 12 axial fans available in a range of different fan speed executions, diameters 914 or 1240 mm. Enclosed design fan motors, protection class IP-54, class F insulation.

Motors are wired to the fans' safety switches (IP65) at the end of the unit. All fans have corrosion resistant fan blades and fan guards.

Certifications

All condenser models are "Eurovent Certify All" certified. The Alfa Laval Vantaa quality system is in accordance with ISO 9001. All products are manufactured according to CE and PED rules.

Design pressure

Design pressure 26 bar. Each heat exchanger is leak tested with dry air and finally supplied with a nitrogen pre-charge.

Options

- Sub cooling circuit (Sub)
- Multi-circuiting (J)
- Water spraying system (D)
- Vibration dampers (S)
- Epoxy coated aluminium fins (Ep)
- Fin spacing 3 mm
- Step control (SC)
- Fan speed control with frequency converter (SVC)
- Casing epoxy painted, grey RAL 7040

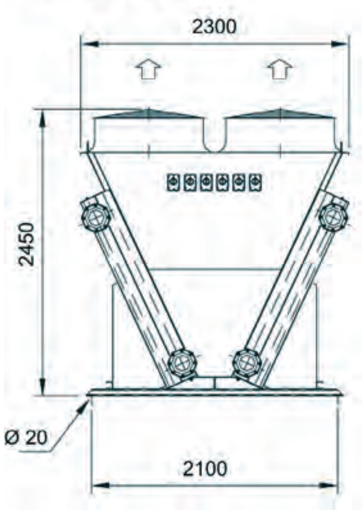
Selection

Selection and pricing is to be performed with our air heat exchanger selection software. Selection output includes all relevant technical data and dimensional drawings. Please contact our sales organization for details and full technical documentation.

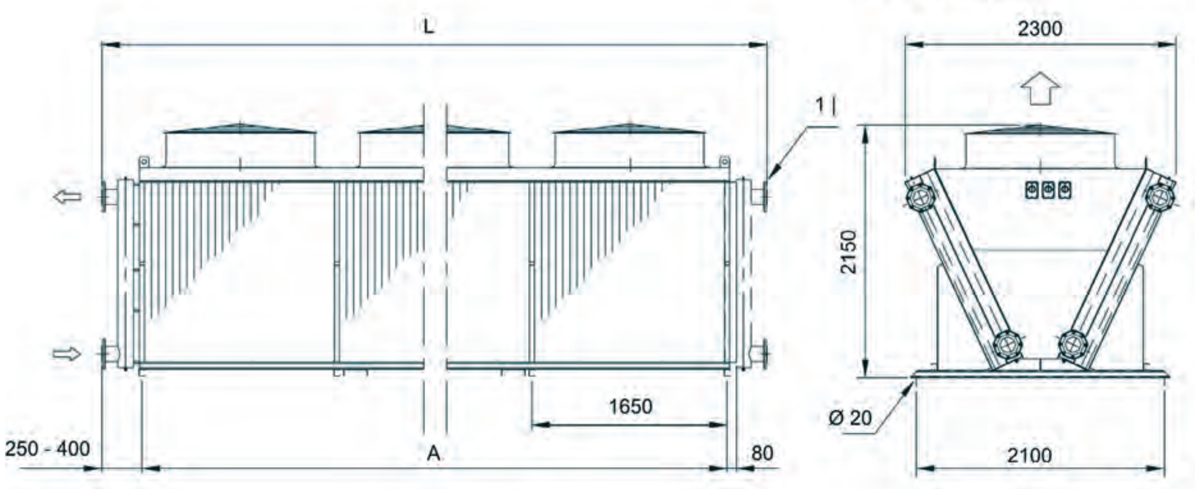
Dimensions & weights

Coil size	A (mm)	max. length L (mm)	no. of fixing points	net weight kg	int. volume l	surface area m^2
1	3300	4100	6	1220	160	840
2	3300	4100	6	1320	210	1120
3	3300	4100	6	1550	300	1680
4	4950	5750	8	1810	230	1260
5	4950	5750	8	1960	290	1680
6	4950	5750	8	2310	420	2520
7	6600	7400	10	2280	290	1680
8	6600	7400	10	2450	380	2240
9	6600	7400	10	2940	550	336
10	8250	9050	12	2800	350	2100
11	8250	9050	12	3080	460	2800
12	8250	9050	12	3630	670	4200
13	9900	10700	14	3310	420	2520
14	9900	10700	14	3600	540	3360
15	9900	10700	14	4200	800	5040

Fan ø 914 mm



Fan ø 1240 mm



Code description

SXE - 6 - 3 - 1240 - 560 - 3/400/50 - D...

- Options
- Fan speed connection (D=delta, Y=star)
- Fan speed (350, 470, 560, 720 or 950 rpm)
- Fan diameter (940 or 1240 mm)
- Number of fans
- Coil size
- Special model
- SOLAR Max condenser CuAl

Benefits

- Heavy duty coil & casing materials, resulting in a long operational product life.
- Plain profile fins make the coil less prone to fouling and easier to clean.
- Excellent sound characteristics
- Reliable performance, Eurovent certified.
- Reliable performance, Eurovent certified
- Easy-install & maintenance.
- Energy efficient - low total cost of ownership.
- One full year product guarantee..

How to contact Alfa Laval
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AlfaSolar SC

Air-cooled condensers

General information & application
AlfaSolar condensers have been designed for commercial, industrial and AC applications. With a wide range of sound pressure level alternatives, these units are particularly suited to demanding, noise sensitive environments.

Refrigerants	all H(C)FC
Capacities*	39 up to 1796 kW

* R-404A, 15 K TD, EN327

Coil
Coil manufactured from copper tubes ø 12.7 mm and corrugated Alu-fins, tube pitch 35 x 30.31 mm. Standard fin spacing is 2.3 mm.

Casing
Casing and framework of corrosion resistant, hot dip galvanised sheet steel.

Fan motors
1 to 14 axial fans available in a range of different fan speed executions, diameters 914 or 1240 mm. Enclosed design fan motors, protection class IP-54, class F insulation. Motors are wired to the fans' safety switches (IP65). All fans have corrosion resistant fan blades and fan guards.

Certifications
All condenser models are "Eurovent Certify All" certified. The Alfa Laval Vantaa quality system is in accordance with ISO 9001. All products are manufactured according to CE and PED rules.

Design pressure
Design pressure 32 bar. Each heat exchanger is leak tested with dry air and finally supplied with a nitrogen pre-charge.

Transport
Standard vertical transport position, fixed on a wooden pallet.

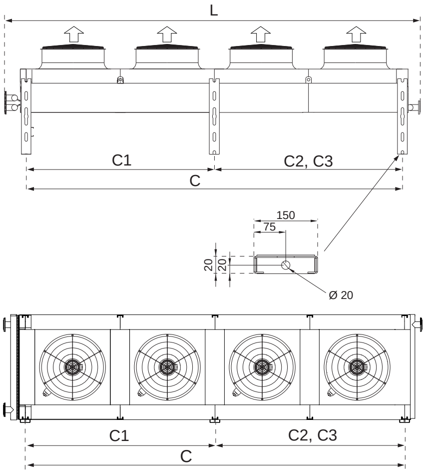
AlfaSolar SCM

Options
- Sub cooling section (SC)
- Multi-circuiting (J#)
- Copper (CU) or epoxy coated (EP) fins
- Fin spacing 2.5 mm and 3.2 mm
- Water spraying system (KW)
- Vibration dampers (VD)
- Step control + options
- Fan control with frequency converter (SVC) + options
- Casing epoxy painted grey RAL 7040 in four thicknesses (GPU=MU, GP1=M1, GP2=M2, GP3=M3)
- EMC cables, glands & safety switches for each fan (EMC)
- Motors with thermal overload Klixon switches (THC)
- Motor heater (MH)
- Fans wired to connection box (TB)
- Forced draught (FD)
- Packing: pallet (P) or container (CN)

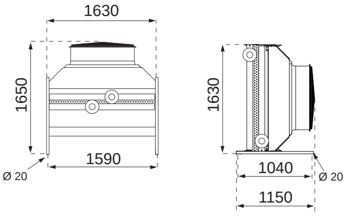
Selection
Selection and pricing is to be performed with our Alfa Laval air heat exchanger selection software. Please contact our sales organization for details and full technical documentation.

Dimensions & weights

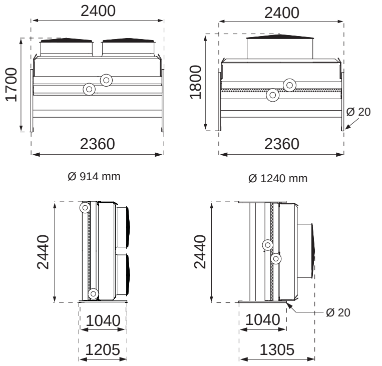
unit	dimensions (mm)					fixing	weight	nt.vol.	surface
size	L	C	C1	C2	C3	points	kg	l	m²
SCM-1A-3	2000	1400	1400			4	240	32	157
SCM-1A-4	2000	1400	1400			4	260	40	210
SCM-1B-4	2400	1800	1800			4	320	49	269
SCM-2A-3	3400	2800	2800			4	480	61	314
SCM-2A-4	3400	2800	2800			4	520	78	419
SCM-2B-4	4200	3600	3600			4	640	96	539
SCM-3A-3	4800	4200	4200			4	720	85	471
SCM-3A-4	4800	4200	4200			4	780	109	629
SCM-3B-4	6000	5400	5400			4	960	136	808
SCM-4A-3	6200	5600	2800	2800		6	960	113	629
SCM-4A-4	6200	5600	2800	2800		6	1040	145	838
SCM-4B-4	7800	7200	3600	3600		6	1280	180	1078
SCM-5A-3	7600	7000	2800	4200		6	1200	136	786
SCM-5A-4	7600	7000	2800	4200		6	1300	176	1048
SCM-5B-4	9600	9000	3600	5400		6	1600	229	1347
SCD-2B-3	4200	3600	3600			4	920	112	606
SCD-2B-4	4200	3600	3600			4	990	151	808
SCD-2C-4	4800	4200	4200			4	1110	171	943
SCD-3B-3	6000	5400	5400			4	1370	164	909
SCD-3B-4	6000	5400	5400			4	1490	224	1212
SCD-3C-4	6900	6300	6300			4	1670	254	1414
SCD-4B-3	7800	7200	3600	3600		6	1830	222	1212
SCD-4B-4	7800	7200	3600	3600		6	1980	283	1617
SCD-4C-4	9000	8400	4200	4200		6	2200	323	1886
SCD-5B-3	9600	9000	3600	5400		6	2280	267	1515
SCD-5B-4	9600	9000	3600	5400		6	2470	363	2021
SCD-5C-4	11100	10500	4200	6300		6	2770	412	2357
SCD-6B-3	11400	10800	3600	3600	3600	8	2730	331	1819
SCD-6B-4	11400	10800	3600	3600	3600	8	2970	422	2425
SCD-6B-5	13200	10800	3600	3600	3600	8	3200	514	3031
SCD-6B-6	11400	10800	3600	3600	3600	8	3430	605	3637
SCD-6C-4	11400	12600	4200	4200	4200	8	3320	482	2829
SCD-6C-5	13200	12600	4200	4200	4200	8	3590	568	3536
SCD-6C-6	3200	12600	12600	4200	4200	8	3860	675	4243
SCD-7B-3	13200	12600	3600	5400	3600	8	3190	376	2122
SCD-7B-4	13200	12600	3600	5400	3600	8	3460	482	2829
SCD-7B-5	13200	12600	3600	5400	3600	8	3730	568	3536
SCD-7B-6	13200	12600	3600	5400	3600	8	4000	674	4243



Models SCM



Models SCD



Code description

SC	D	6	B	09	L	N5Y	4	H	GS	P	*	–	AL	2.1	CU	*
1	2	3	4	5	6	7	8	9	10	11	12		13	14	15	16

1. AlfaSolar condenser
2. Unit width (M=narrow, D=wide)
3. No. of modules
4. Module length (A=1400 mm, B=1800 mm, C= 2100 mm)
5. Fan diameter (09=910 mm, 12=1240 mm)
6. Fan speed (T=950, S=720, L=560, Q=470, R=350)
7. Power supply (N5Y=3/400/50-Y, N5D=3/400/50-D, N6=3/440/60, N7=3/230/50, N8=3/690/50
8. Tube rows in air direction (3,4,5,6)
9. Air flow (H=vertical, V=horizontal)
10. Casing material (GS, GP_U/1/2/3)
11. Packaging (P=pallet, CN=container)
12. Options
13. Fin material (AL=aluminium, EP=epoxy coated, CU=copper)
14. Fin spacing (mm)
15. Tube material (CU=copper)
16. Connection sizes

Benefits

- Heavy duty coil & casing materials, resulting in a long operational product life.
- Floating coil construction to compensate for thermal stress.
- Plain profile fins make the coil less prone to fouling and easier to clean.
- Excellent sound characteristics
- Reliable performance, Eurovent certified.
- Easy-install & maintenance
- Energy efficient - low total cost of ownership.
- Two year full product guarantee.

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HEV

Door curtains

General information & application

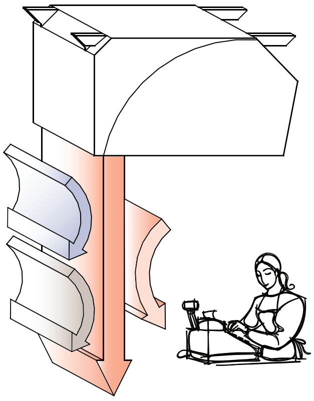
HEV door curtains are equipped with a water coil and generate a downward flow of warm air for a comfortable working conditions in draughtfree surroundings with even temperatures, even close to door openings.

HEV door curtains are designed for application in shops, factory halls and warehouses at entry doors, door openings of loading areas and for doorways between spaces with different temperatures to reduce draught at floor level, energy consumption and eliminate humidity transfer. Thanks to a long air throw, HEV door curtains are also applicable for local heating of high room spaces.

Door curtains improve the level of comfort, increase the useful area by reducing draught near to door openings and save heating costs. The best door curtain effect is reached when ventilation is balanced and the door opening is protected from wind.

Characteristics

- Warm, effective door curtain
- Low sound level
- Three fan speed alternatives
- Adjustable air flow direction
- Possible to install either visible or, if required, above the ceiling
- Minimized need of service
- Easy to install and operate



Construction

The frame construction is made of plastic coated, hot dip galvanized steel plate, standard colour white RR20 (RAL 5820). The heat transfer section is manufactured of copper tubes and aluminium fins. Water is used as heat transfer medium. The maximum working pressure of the finned coil is 10 bar. The scattered fin spacing of the effective finned coil prevents dust or dirt from gathering on it, and therefore a filter is not needed. The heat transfer section is equipped with drainage.

HEV

Fans

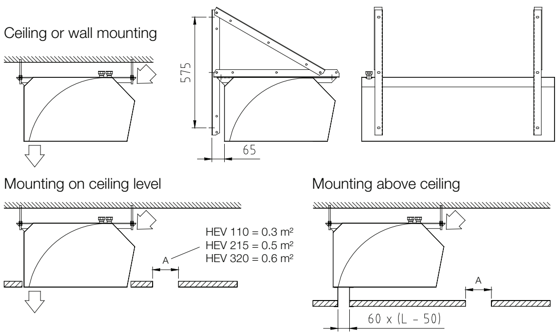
The fans are centrifugal fans with low sound level.
The 1-phase motors have inbuilt overload protection (automatic reset) and they are pre-wired to the joint junction box. Protection class is IP23.
The air flow can be regulated by connecting the motor with the selected fan speed or by using the fan speed regulator. The maximum fan speed (3) is pre-set at the factory. The fan speed can also be regulated by external control (see page 3). Fan speed control is available as an optional extra (incl. 0-position and 3 alternative positions (separate delivery, dimensions W64xH80xD75 mm).

Selection example

Door opening width is 3 m and maximum required heating capacity 42 kW. The dimensioning temperature of water is 70/40°C, incoming air temperature is 20°C.
Model HEV-215 is selected, width 1.5 m, so two units are needed. According to capacity table the capacity of HEV-215 at fan speed 3 is 21 kW, water flow is 0.17 l/s and flow resistance is 4.5 kPa. HEV HEV Door Curtains Draught, humidity Dust, exhaust gases Indoor air

Installation and maintenance

HEV door curtains can be installed at the desired height by using ceiling brackets. Wall brackets (SK) are available as an optional extra. Electrical connections and service activities are done through a service hatch. If the door curtain is installed above the ceiling, sufficient compensation air must be ensured through adequately sized ceiling openings.



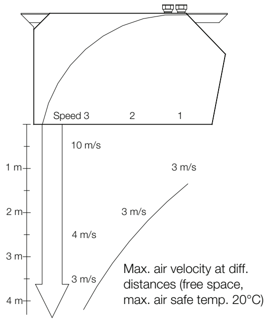
HEV	Air on tempera-ture [°C]	Fan speed	Air flow [m³/s]	80/40			70/40			60/40			55/35		
				Capacity [kW]	Water [l/s]	dP [kPa]	Capacity [kW]	Water [l/s]	dP [kPa]	Capacity [kW]	Water [l/s]	dP [kPa]	Capacity [kW]	Water [l/s]	dP [kPa]
110	10	1	0,22	9,7	0,06	0,4	11,2	0,09	0,6	10,6	0,13	1,1	9,0	0,11	0,8
		2	0,36	14,0	0,09	0,8	12,8	0,10	1,2	11,9	0,14	2,3	10,2	0,13	1,8
		3	0,54	18,4	0,11	1,4	16,9	0,13	2,1	16,2	0,19	4,2	13,4	0,16	2,9
	15	1	0,22	8,4	0,05	0,3	9,4	0,08	0,4	9,0	0,11	0,8	7,3	0,09	0,5
		2	0,36	12,2	0,07	0,6	11,1	0,10	0,9	10,2	0,12	1,7	8,4	0,10	1,2
		3	0,54	16,0	0,01	1,1	14,6	0,12	1,6	13,4	0,16	2,9	11,1	0,13	2,1
	20	1	0,22	6,1	0,04	0,1	7,4	0,06	0,2	7,3	0,09	0,5	5,0	0,06	0,2
		2	0,36	10,3	0,06	0,4	9,3	0,08	0,6	8,5	0,10	1,2	6,6	0,08	0,7
		3	0,54	13,6	0,08	0,8	12,2	0,10	1,1	11,1	0,14	2,9	8,7	0,10	1,3
215	10	1	0,32	15,7	0,01	1,5	18,8	0,15	2,3	17,8	0,22	4,9	14,8	0,18	3,1
		2	0,53	22,7	0,14	3,0	21,0	0,17	4,5	19,3	0,23	8,2	16,6	0,20	6,3
		3	0,78	31,2	0,19	5,4	28,6	0,23	8,0	25,9	0,31	14,3	22,5	0,27	11,1
	15	1	0,32	14,0	0,09	1,2	16,3	0,13	1,4	15,2	0,19	3,5	12,4	0,15	1,9
		2	0,53	20,1	0,12	2,4	22,5	0,18	3,4	16,7	0,20	6,3	13,8	0,17	4,4
		3	0,78	27,3	0,17	4,2	24,9	0,20	6,2	22,5	0,27	11,0	18,9	0,23	6,0
	20	1	0,32	12,2	0,07	0,9	13,9	0,11	1,1	12,4	0,15	2,1	10,0	0,12	1,3
		2	0,53	17,5	0,11	1,8	15,5	0,13	2,5	13,9	0,17	4,4	11,1	0,14	3,0
		3	0,78	22,9	0,14	3,0	21,0	0,17	4,5	19,0	0,23	8,0	14,7	0,18	5,0
320	10	1	0,45	21,5	0,13	1,2	24,1	0,20	0,9	22,5	0,27	1,7	19,2	0,23	1,3
		2	0,71	30,5	0,19	2,4	27,7	0,23	3,4	30,9	0,37	3,6	25,4	0,31	2,2
		3	1,05	41,6	0,25	4,2	38,3	0,31	6,3	34,9	0,42	10,3	30,2	0,37	8,8
	15	1	0,45	19,1	0,12	0,9	20,7	0,17	0,7	19,2	0,23	1,3	15,6	0,19	0,9
		2	0,71	27,0	0,17	1,9	24,3	0,20	2,6	25,6	0,31	2,4	21,0	0,26	1,6
		3	1,05	35,9	0,22	3,2	33,2	0,27	4,8	30,2	0,37	3,6	25,1	0,30	6,2
	20	1	0,45	16,6	0,10	0,7	16,9	0,14	0,4	15,8	0,19	0,9	12,1	0,15	0,5
		2	0,71	23,4	0,14	1,4	20,8	0,17	2,0	21,3	0,26	1,6	16,0	0,19	0,9
		3	1,05	30,7	0,19	2,4	27,4	0,22	3,3	25,3	0,31	6,2	19,7	0,24	3,9

Dimensions, electric current values

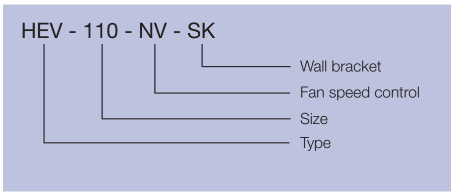
HEV	L [mm]	E [mm]	Net weight [kg]	Int. Vol. [L]	1/230 V 50Hz		Speed	Lpa *)	Lwa **)
					Max. curr. [A]	Capacity [W]			
110	1000	830	35	3	2	147	1	42	51
							2	54	63
							3	62	71
215	1500	1330	55	4	3	294	1	45	54
							2	58	67
							3	64	73
320	2000	1830	70	5	4	294	1	46	55
							2	60	69
							3	65	74

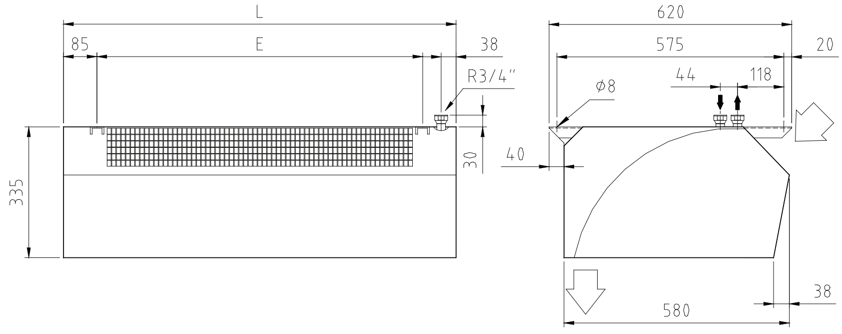
*) Lpa is the A-weighted sound pressure level dB(A),measured on a hard surface (hall of 50 sqm., Sabine), 2 meters under the equipment

**) Lwa is the A-weighted sound power level, measured according to ISO3741



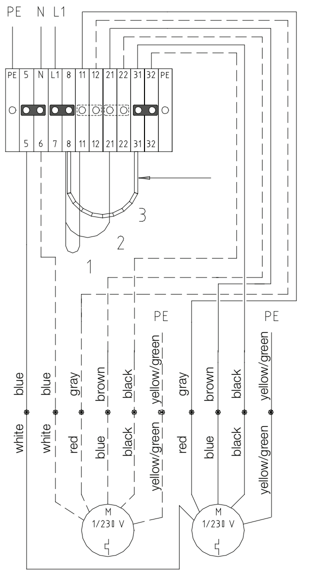
Code description





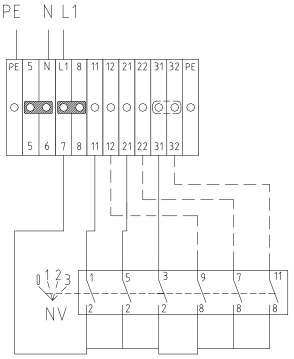
Factory setting

Air flow can be regulated by a 3-phase fan speed regulator, or by setting the selected fan speed as standard.



	∪	▣
1	8-11	11-12
2	8-21	21-22
3	8-31	31-32

Fan speed regulator NV

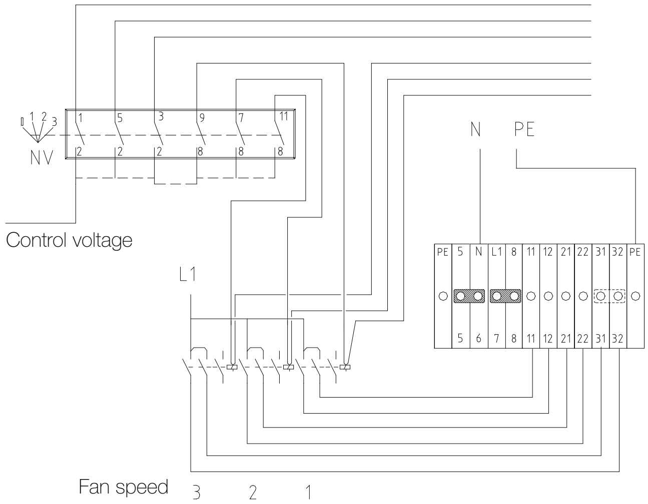


Connect fan speed regulator according to instructions.

0 1 2 3	2	2	2	8	8	8
	1	5	3	9	7	11
0						
1	X			X		
2		X			X	
3			X			X

Parallel coupling of HEV units

The fan speed can be selected by fan speed regulator NV, by time control circuits of the electrical central unit or by DDC system. The contactors are connected as shown. By NV fan speed control 20 units can be controlled. Each unit needs 3 contactors.



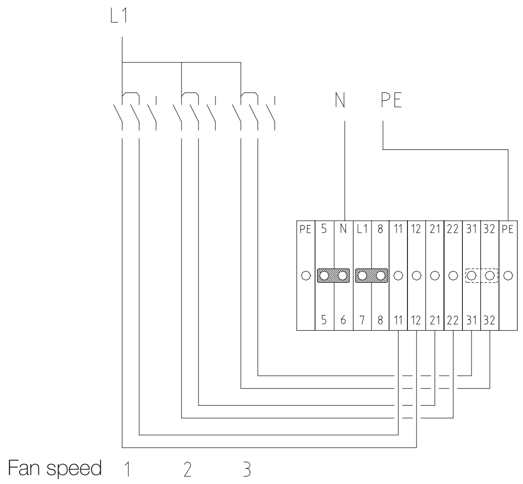
▣	Remove connection bar
∪	Remove wire connect

Examples of fan speed control

The contactors are not included in the delivery.
HEV-110 does not need any contactors.

Fan speed selection by central unit

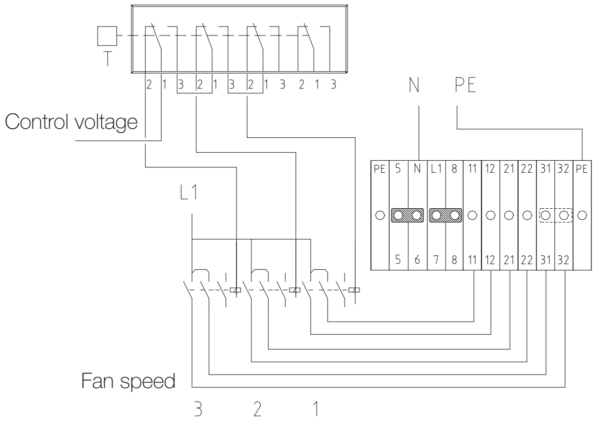
The fan speed can be selected either by time control circuits of the electric central unit or by DDC system. Connect the contactors as shown in the figure! Please note that only one contactor at a time can be switched.



▣	Remove connection bar
∪	Remove wire connect

Fan speed selection by a 3-phase thermostat

Thermostat contacts are shown at low temperature position. At higher temperature first the left contact changes its position, next the contact in the middle and last the right contact. When the temperature is getting lower, the contacts change their position in reverse order.



▣	Remove connection bar
∪	Remove wire connect

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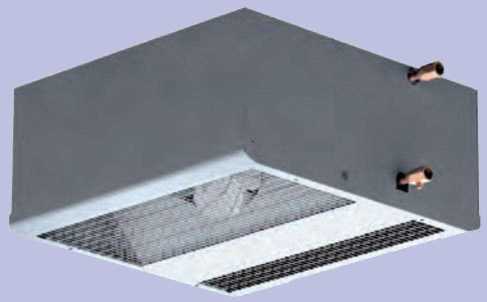
HEL

Air heaters



HEL

General information & application

HEL-1 and HEL-2 air heaters are suitable for external doors, wind cabinets, shopping malls, cafes, exhibition halls, smallscale industries, warehouses and any other location that requires effective local heating.

Fan motors

Fans ø 250 mm. Stepless adjustable axial fan motors fitted with self-lubricating bearings and protected against overload. Heating capacity, air flow and at the same time noise level can be controlled by adjusting the fan speed. The fan speed controller, which includes the 0-position, is placed either on the wall or on the device itself.

Construction

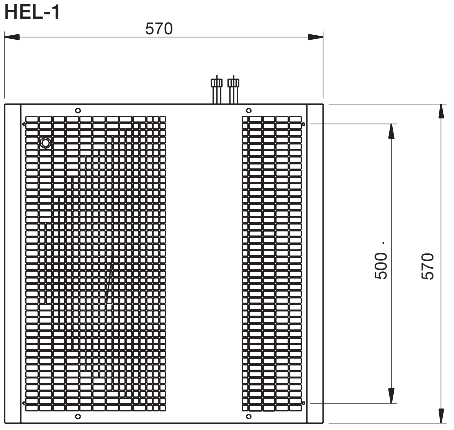
Heating coil manufactured of copper tubes and aluminum fins. Casing material plastic coated, galvanized steel sheet. Standard colour is white.

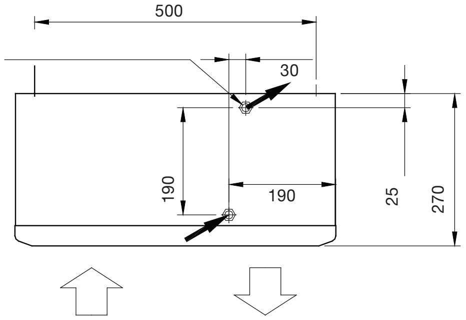
Mounting

The device can be positioned above a suspended ceiling, flush with the underside of the roof. The outside dimensions of HEL match those of standard roofing tiles. Mounting can be done directly to the roof without air gap. Installation and maintenance is easy. The fan plate can be removed by loosening just a few screws, so all actions required for installation and maintenance can be easily performed.

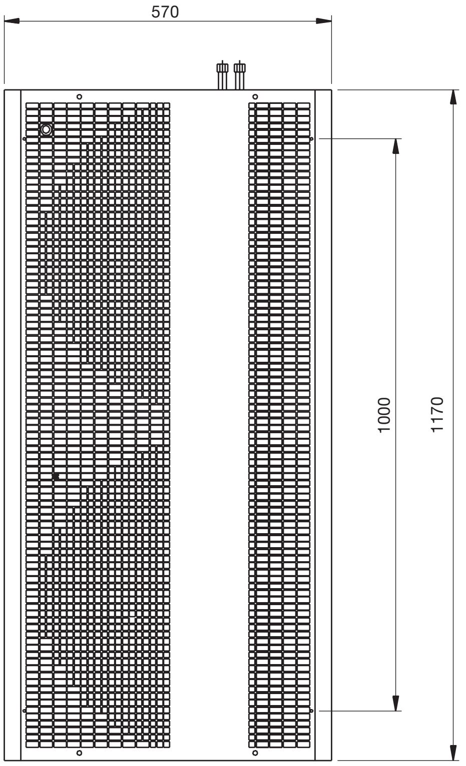
Heating power, water flow and pressure drop at maximum fan speed	HEL-1			HEL-2		
	kW	l/s	kPa	kW	l/s	kPa
Air temperature +20 °C						
Water 90/70 °C	9.2	0.11	8.7	21.2	0.26	9.9
Water 80/60 °C	7.6	0.09	6.2	17.4	0.21	7.1
Water 80/40 °C	5.0	0.03	0.8	11.4	0.07	1.0
Water 70/40 °C	4.6	0.04	1.2	10.5	0.09	1.4
Water 60/40 °C	4.2	0.05	2.3	9.5	0.12	2.5
Fans (16/70W, 1/230V/50Hz, 0.42A, 1300 rpm)						
No. of fans		1			2	
Airflow		0.22 m^3/s			0.47 m^3/s	
Air velocity		4 m/s			4 m/s	
at 2 m distance		2 m/s			2 m/s	
Sound pressure level at a distance of 1 m		60 dB(A)			60 dB(A)	
Internal water volume		about 1 l			about 2 l	
Weight (empty)		about 15 kg			about 30 kg	

HEL-1

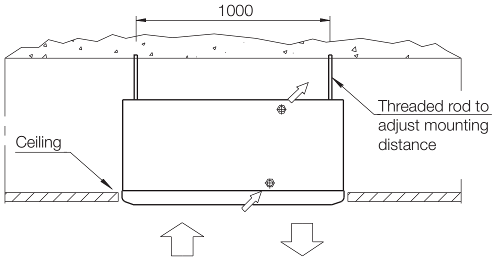


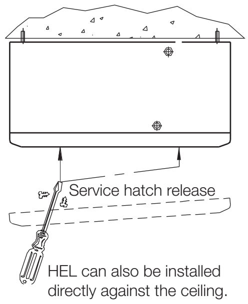


HEL-2

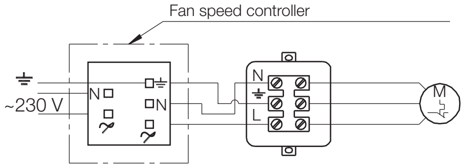


Ceiling installation

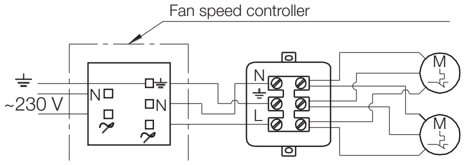


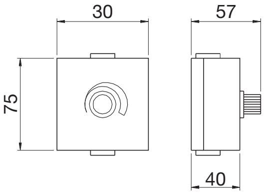


HEL-1



HEL-1





Code description

HEL - 1 - PS

PS	Fan speed controller (optional)
1	Number of fans
HEL	Air heater range

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HKP

Air heaters

General information & application

HKP-air heaters are suitable for heating of workshops, factory spaces, industrial warehouses, parking garages, sports halls and corresponding spaces. Heat transfer medium is water. The smallest size (HKP-35- 4D-P) with 1-phase motor and foothold, is specifically designed for air heating of laundry drying rooms.

Coil

Heat transfer section is made of an efficient finned coil with copper tubes and aluminium fins. Water flow direction is marked on tube connections. Air heater is provided with venting- and draining screws. Max. operating temperature is 150 °C and pressure 10 bar.

On request the standard Cu/Al coil block can be replaced by hot dip galvanized finned coil made of steel tubes and steel fins or with acid-proof steel tubes and aluminium fins for demanding industrial use. Also available for steam.

Casing

Casing is made of grey coloured, PVC-coated, hot dip galvanized steel. Special constructed, adjustable air deflectors are made of hot dip galvanized steel. Also mounting bracket (AK) is made of hot dip galvanized steel plate.

Tube connections for HKP are made from the side of the device and electric connections directly to motor from outside.

Fan motors

Three fan sizes, -35, -45 and -56 with four (4) different fan speeds 700, 900, 1150 and 1400 rpm to achieve suitable heating capacity, air flow and sound levels.

Air heaters are equipped with axial fan unit, protection class IP44. Lower speed in the 3- phase, two-speed motors is obtained by changing the delta connection into star connection.

HKP-35-4D-P-air heater is provided with automatic internal thermal protection. HKP-35-4D/4Y-model is without thermal protection. All other models have prewired thermal protections.

HKP

Motors 400/50/3 with star (Y)- or delta (D) connection are delivered with delta (D) connection, and the rotation speed is 900 or 1400 rpm. The lower fan speed can be achieved by using star (Y) connection.

Low sound level is achieved by using fan unit (incl. fan motor, fan blade and fan guard). Air heaters are equipped with adjustable air deflectors for horizontal or vertical air flow.

Options

- Optional mounting bracket (AK) for each size for both wall and ceiling mounting. In laundry drying rooms mounting bracket can be also used as a foothold for air heater.

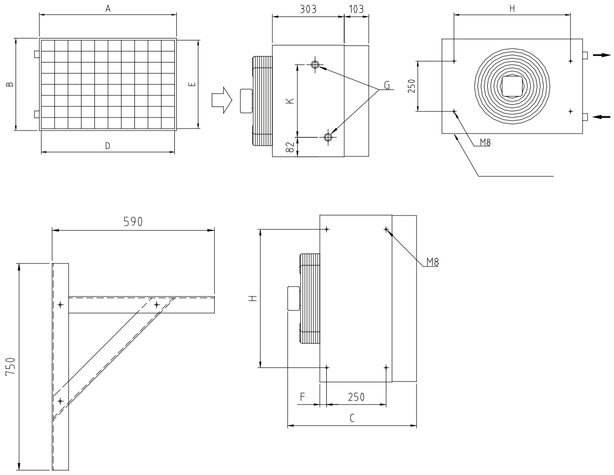
A service and installation instruction manual is delivered with each air heater.

Q = heating capacity, kW
qv = water flow, l/s
dPV = pressure drop, water, kPa

Vi = air volume flow, m_2/s
tt i = air on temperature °C
t_{2i} = air off temperature °C

Technical data

Size		Vi	t_{ti}	Water °C																							
				90/70				80/60				80/40				70/40				60/40				50/40			
				t_{2i}	Q	V_v	dPv	t_{2i}	Q	V_v	dPv	t_{2i}	Q	V_v	dPv	t_{2i}	Q	V_v	dPv	t_{2i}	Q	V_v	dPv	t_{2i}	Q	V_v	dPv
HKP	rpm	m³/s	°C	°C	kW	l/s	kPa	°C	kW	l/s	kPa	°C	kW	l/s	kPa	°C	kW	l/s	kPa	°C	kW	l/s	kPa	°C	kW	l/s	kPa
35	700	0.38	0	48	22.2	0.27	7.4	42	19.2	0.23	5.8	32	14.7	0.09	1.1	30	13.8	0.11	1.7	28	13.0	0.16	3.1	27	12.3	0.30	9.8
	900	0.44		46	24.6	0.30	8.8	40	21.2	0.26	7.0	30	16.1	0.10	1.3	28	15.2	0.12	2.0	27	14.3	0.17	3.7	26	13.6	0.33	11.7
	1150	0.57		42	28.9	0.35	11.7	36	24.9	0.30	9.2	27	18.7	0.11	1.7	27	18.7	0.11	1.7	25	16.8	0.20	4.9	23	16	0.38	15.5
	1400	0.7		39	32.8	0.40	14.5	34	28.2	0.34	11.5	25	21.0	0.13	2.1	24	19.8	0.16	3.2	23	18.9	0.23	6.1	22	18.1	0.43	19.2
	700	0.38	10	52	19.3	0.24	5.8	46	16.3	0.20	4.4	35	11.5	0.07	0.7	34	10.9	0.09	1.1	32	10.1	0.12	2.0	31	9.4	0.23	6.1
	900	0.44		50	21.4	0.26	6.9	44	18	0.22	5.2	34	12.8	0.08	0.9	32	12	0.10	1.3	31	11.0	0.13	2.4	29	10.4	0.25	7.3
	1150	0.57		47	25.1	0.31	9.1	41	21.1	0.26	6.9	32	14.8	0.09	1.1	30	13.8	0.11	1.7	29	12.9	0.16	3.1	28	12.1	0.29	9.6
	1400	0.7		44	28.4	0.35	11.3	38	23.8	0.29	8.5	30	16.5	0.10	1.4	29	15.6	0.13	2.1	27	14.6	0.18	3.8	26	13.7	0.33	11.9
	700	0.38	15	54	17.9	0.22	5.0	47	14.8	0.18	3.7	37	9.9	0.06	0.6	36	9.4	0.08	0.9	34	8.6	0.10	1.5	32	7.9	0.19	4.5
	900	0.44		52	19.8	0.24	6.0	46	16.4	0.20	4.4	35	10.9	0.07	0.7	34	10.3	0.08	1.0	33	9.5	0.11	1.8	31	8.7	0.21	5.4
	1150	0.57		49	23.2	0.28	7.9	43	19.2	0.23	5.8	33	12.6	0.08	0.9	32	11.9	0.10	1.3	31	11.0	0.13	2.3	30	10.2	0.25	7.1
	1400	0.7		46	26.2	0.32	9.8	41	21.7	0.26	7.2	32	14.1	0.09	1.0	31	13.3	0.11	1.6	30	12.3	0.15	2.9	29	11.6	0.28	8.8
45	700	0.78	0	47	43.7	0.54	14.9	41	37.8	0.46	11.9	32	29.4	0.18	2.3	29	27.5	0.22	3.5	28	25.9	0.31	6.5	26	24.2	0.58	19.9
	900	1		43	51.4	0.63	19.8	37	44.4	0.54	15.8	28	33.9	0.21	3.0	27	32.1	0.26	4.6	25	30.3	0.36	8.6	24	28.4	0.68	26.4
	1150	1.22		40	58.2	0.71	24.7	34	50.3	0.61	19.6	26	38.0	0.23	3.7	25	36.2	0.29	5.7	23	34.2	0.41	10.6	22	32.2	0.78	32.9
	1400	1.44		37	64.4	0.79	29.4	32	55.6	0.68	23.3	24	42.1	0.25	4.4	23	39.9	0.32	6.7	22	37.7	0.45	12.6	21	35.6	0.86	39.3
	700	0.78	10	51	38.0	0.47	11.7	44	32.1	0.39	9.0	35	23.4	0.14	1.6	33	21.9	0.18	2.4	32	20.0	0.24	4.2	30	18.5	0.45	12.5
	900	1		47	44.7	0.55	15.5	41	37.7	0.46	11.8	33	27.1	0.16	2.0	31	25.2	0.20	3.0	30	23.5	0.28	5.5	28	21.7	0.52	16.5
	1150	1.22		45	50.6	0.62	19.3	39	42.6	0.52	14.7	31	30.3	0.18	2.5	29	28.2	0.23	3.7	28	26.5	0.32	6.8	28	26.5	0.32	6.8
	1400	1.44		42	55.9	0.69	23.0	37	47.1	0.57	17.5	29	33.2	0.20	2.9	28	31.2	0.25	4.4	27	29.2	0.35	8.1	26	27.2	0.65	24.5
	700	0.78	15	53	35.2	0.43	10.2	46	29.3	0.36	7.6	37	20.5	0.12	1.2	35	18.9	0.15	1.8	33	17.2	0.21	3.2	32	15.7	0.38	9.3
	900	1		49	41.3	0.51	13.5	44	34.3	0.42	10.0	35	23.7	0.14	1.6	33	21.9	0.18	2.4	32	20.1	0.24	4.2	30	18.4	0.44	12.3
	1150	1.22		47	46.8	0.57	16.8	41	38.8	0.47	12.5	33	26.4	0.16	1.9	32	24.4	0.20	2.9	30	22.6	0.27	5.2	29	20.8	0.50	15.3
	1400	1.44		45	51.7	0.63	20.0	40	42.8	0.52	14.8	32	29.1	0.18	2.3	30	26.7	0.22	3.3	29	24.9	0.30	6.1	28	23	0.55	18.2
56	700	1.28	0	44	67.3	0.82	7.9	38	57.9	0.71	6.3	28	43.5	0.26	1.2	27	41.2	0.33	1.8	26	39.9	0.47	3.4	24	37.1	0.89	10.5
	900	1.6		40	77.4	0.95	10.2	35	66.6	0.81	8.0	26	49.4	0.30	1.5	24	46.8	0.38	2.2	23	44.7	0.54	4.3	22	42.7	1.03	13.4
	1150	1.92		38	86.5	1.06	12.3	32	74.4	0.91	9.7	24	54.8	0.33	1.7	23	51.8	0.42	2.7	22	49.8	0.60	5.1	21	47.7	1.15	16.4
	1400	2.23		35	94.8	1.16	14.5	30	81.5	0.99	11.4	22	59.3	0.36	2.0	21	56.8	0.46	3.1	20	54.4	0.66	6.0	20	52.3	1.26	19.2
	700	1.28	10	48	58.4	0.72	6.2	42	49	0.60	4.7	33	34.6	0.21	0.8	31	32.3	0.26	1.2	30	30.0	0.36	2.1	28	28.2	0.68	6.5
	900	1.6		45	67.2	0.82	7.9	39	56.3	0.69	6.0	30	39.1	0.24	1.0	29	36.6	0.30	1.5	28	34.2	0.41	2.7	27	32.4	0.78	8.3
	1150	1.92		43	75.0	0.92	9.6	37	62.8	0.77	7.2	29	43.2	0.26	1.1	28	40.7	0.33	1.7	27	38.2	0.46	3.2	26	36.2	0.87	10.1
	1400	2.23		41	82.1	1.01	11.3	36	68.8	0.84	8.5	28	46.8	0.28	1.3	26	43.6	0.35	2.0	26	41.7	0.50	3.8	25	39.7	0.95	11.8
	700	1.28	15	50	53.9	0.66	5.4	44	44.6	0.54	4.0	34	29.3	0.18	0.6	33	27.8	0.22	0.9	32	25.6	0.31	1.6	31	23.8	0.57	4.8
	900	1.6		47	62.0	0.76	6.9	42	51.2	0.62	5.0	32	33.2	0.20	0.7	32	31.5	0.25	1.1	30	29.0	0.35	2.0	30	27.3	0.66	6.2
	1150	1.92		45	69.2	0.85	8.3	40	57.1	0.69	6.1	31	36.7	0.22	0.9	30	34.8	0.28	1.3	29	32.3	0.39	2.4	28	30.4	0.73	7.4
	1400	2.23		43	75.8	0.93	9.8	38	62.4	0.76	7.2	30	40.5	0.25	1.0	29	37.7	0.30	1.5	28	35.0	0.42	2.8	27	33.3	0.80	8.7



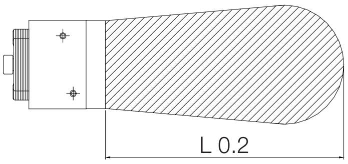
Dimensions & weights

HMP	A	B	C	D	E	F	H	K	L	M	G	Weight kg	Int.vol. l
35	700	470	520	680	450	28	580	225	250	304	R¾	36	1.5
45	850	642	545	830	620	28	730	190	250	477	R1	54	2.5
56	1000	760	540	980	740	28	880	190	250	593	R1¾	70S	4.0

Size HKP		rpm	Sound pressure level dB(A)*	Sound power level Lwi/octave band							Air throw Lo.2**	Motors 400/50/3	
				125	250	500	1000	2000	4000	8000	m	Power kW	Full load current A
35	6Y	700	55	56	59	55	53	52	46	37	3.0	0.04	0.08
	6D	900	59	62	63	60	57	57	54	46	4.0	0.07	0.17
	4Y	1150	66	65	69	67	63	63	62	53	5.0	0.11	0.18
	4D	1400	69	67	72	69	67	66	66	58	6.0	0.15	0.38
45	6Y	700	62	67	66	62	60	59	58	50	4.5	0.11	0.31
	6D	900	66	70	72	66	63	62	61	54	6.0	0.19	0.61
	4Y	1150	71	73	73	72	68	67	67	61	7.5	0.38	0.72
	4D	1400	74	76	77	75	72	70	71	66	9.0	0.54	1.15
56	6Y	700	65	72	69	65	63	61	59	52	7.5	0.16	0.4
	6D	900	67	73	75	67	66	62	56	49	10.0	0.33	0.72
	4Y	1150	73	76	78	73	72	69	69	63	12.5	0.52	1.00
	4D	1400	77	79	81	77	75	73	74	67	15.0	0.65	1.75
35-4D-P (1400 rpm, 230/50/1)												0.14	0.62

*) A-weighted sound pressure level is given in 10 m² Sabine room and observation point is 1 m distance from the middle of fan guard at 45 °C angle.

**) Air throw defines the horizontal distance from the device, where air velocity is 0.2 m/s. Air-on temperature +15 °C and air-off temperature +35 °C, provided that the air flow is not obstructed.



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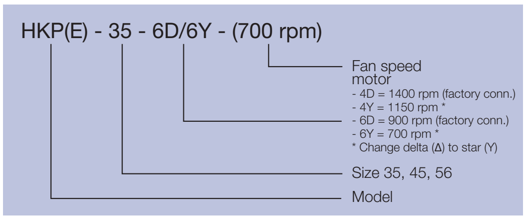


HKP(E) - 35 - 6D/6Y - (700 rpm)

Fan speed motor
- 4D = 1400 rpm (factory conn.)
- 4Y = 1150 rpm *
- 6D = 900 rpm (factory conn.)
- 6Y = 700 rpm *

* Change delta (Δ) to star (Y)

Size 35, 45, 56

Model

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

HMP

Air heaters

General information & application

HMP air heaters are suitable for heating of industrial halls, warehouses, garages, cash and carry shops and also for store entrances. Heat transfer medium is water. By providing the air heaters with air cone, they are suitable for jet-shaped air distribution in high ceiling rooms. Maximum operating temperature is 150 °C and pressure 10 bar.

Coil

Heat transfer section is made of an efficient finned coil with copper tubes and aluminium fins. Water flow direction is marked on tube connections. Air heater is provided with venting screws.

Casing

HMP air heater has a low profile, the casing is made of easily cleanable PVC-coated hot dip galvanized steel, colour white. Tube connections for HMP are made from the side and electric connections directly to motor from outside. Mounting on ceiling, on the wall or above of the drop ceiling. HMP is provided with mounting rails for helping the assembling e.g. directly on the ceiling or on the wall.

Fan motors

Air heaters HMP are equipped with axial fan units in two sizes (40 and 50) with different fan speeds to achieve suitable heating capacity, air flow and sound levels (HMP-40: 700, 900 & 1400 rpm, HMP-50: 700, 900, 1150 & 1400 rpm). The fan motors are two-speed motors, fitted with pre-wired thermal protections (except model HMP-40-4). Protection class IP44 for HMP 40 range, IP54 for HMP 50 range.

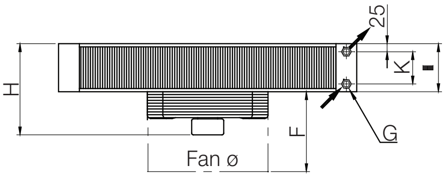
HMP

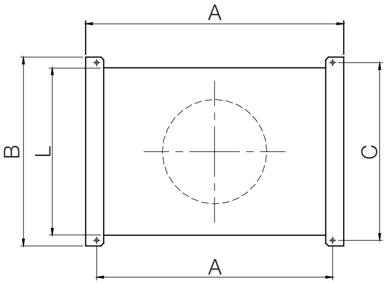
Options

Long air throw is achieved by providing the air heater with an air cone K-40/50. The material of the air cone is the same as the casing material. Service and installation instruction manual is delivered with air heater.

Dimensions

HMP	A	B	C	D	E	F	H	K	L	M	G	Weight kg	Int.vol. l
40	930	680	640	850	150	250	285	101	603	25	R¾	25.0	1.5
50	1150	780	740	1050	210	300	350	159	703	25	R1	38.0	2.5





Technical data

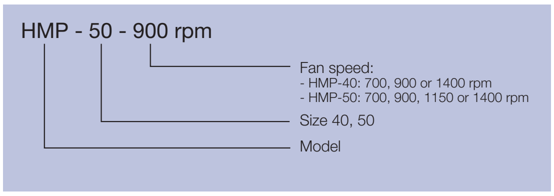
Size		Vi	t_{ti}	Water °C																							
				90/70				80/60				80/40				70/40				60/40				50/40			
HMP	rpm	m^3/s	°C	t_{2i} °C	Q kW	V_v l/s	dPv kPa	t_{2i} °C	Q kW	V_v l/s	dPv kPa	t_{2i} °C	Q kW	V_v l/s	dPv kPa	t_{2i} °C	Q kW	V_v l/s	dPv kPa	t_{2i} °C	Q kW	V_v l/s	dPv kPa	t_{2i} °C	Q kW	V_v l/s	dPv kPa
40	700	0.34	+10	53	17.6	0.22	5.8	46	15.0	0.18	4.5	36	10.8	0.06	0.8	34	10.0	0.08	1.2	33	9.4	0.12	2.1	31	8.6	0.20	6.2
	900	0.46		49	21.4	0.26	8.1	43	18.0	0.22	6.2	33	12.8	0.08	1.1	32	12.0	0.10	1.6	30	11.2	0.14	2.8	29	10.4	0.24	8.6
	1400	0.70		43	27.4	0.34	12.6	38	23.0	0.28	9.5	30	16.2	0.10	1.6	28	15.0	0.12	2.3	27	14.2	0.18	4.4	26	13.4	0.32	13.3
	700	0.34	+15	55	16.4	0.20	5.1	48	13.6	0.16	3.8	38	9.4	0.06	0.6	36	8.8	0.08	0.9	34	8.0	0.10	1.6	33	7.2	0.18	4.6
	900	0.46		51	19.8	0.24	7.1	45	16.4	0.20	5.2	35	11.2	0.06	0.8	34	10.4	0.08	1.2	32	9.6	0.12	2.2	31	8.8	0.22	6.4
	1400	0.70		46	25.4	0.32	10.9	40	21.0	0.26	8.1	32	14.0	0.08	1.2	31	13.0	0.10	1.8	30	12.2	0.14	3.3	29	11.2	0.26	9.9
	700	0.34	+20	56	15	0.18	4.4	50	12.2	0.14	3.2	39	8.0	0.04	0.4	38	7.2	0.06	0.7	36	6.6	0.08	1.2	34	6.0	0.14	3.3
	900	0.46		53	18.2	0.22	6.1	47	14.8	0.18	4.4	37	9.4	0.06	0.6	36	8.8	0.08	0.9	34	8.0	0.10	1.6	33	7.2	0.18	4.5
	1400	0.70		48	23.2	0.28	9.4	43	18.8	0.22	6.7	34	12.0	0.08	0.9	33	10.5	0.08	1.3	32	10.0	0.12	2.3	31	9.2	0.22	6.9
50	700	0.80	+10	49	37.8	0.46	12.3	43	32.0	0.38	9.4	34	23.2	0.14	1.7	32	21.6	0.18	2.4	31	20.0	0.24	4.4	29	18.4	0.44	13.1
	900	1.22		44	48.6	0.60	19.1	38	41	0.50	14.6	30	29.2	0.18	2.5	29	27.4	0.22	3.7	28	25.6	0.30	6.8	26	23.8	0.58	20.4
	1150	1.42		41	53.4	0.66	22.4	37	45	0.54	17.1	29	31.8	0.20	2.8	28	30.0	0.24	4.3	27	28.0	0.34	7.9	25	26.0	0.62	23.9
	1400	1.82		38	61.6	0.76	28.9	34	52.0	0.64	22	27	36.6	0.22	3.6	26	34.2	0.28	5.5	25	32.2	0.38	10.2	24	30.0	0.72	30.8
	700	0.80	+15	51	35.0	0.42	10.7	45	29.2	0.36	8	36	20.4	0.12	1.3	34	18.8	0.16	1.9	33	17.0	0.20	3.4	31	15.6	0.38	9.8
	900	1.22		46	45.0	0.56	16.7	41	37.4	0.46	12.4	33	25.6	0.16	1.9	31	23.6	0.18	2.8	30	21.8	0.26	5.2	29	20.0	0.48	15.2
	1150	1.42		44	49.2	0.60	19.5	39	40.8	0.50	14.5	31	27.6	0.16	2.2	30	25.8	0.20	3.3	29	23.8	0.28	6.0	28	22.0	0.52	17.8
	1400	1.82		41	57.0	0.70	25.2	37	47.2	0.58	18.6	29	31.4	0.18	2.8	29	29.4	0.24	4.2	28	27.4	0.32	7.7	27	25.4	0.60	22.9
	700	0.80	+20	53	32.2	0.40	9.3	47	26.2	0.32	6.7	38	17.4	0.10	1.0	36	15.8	0.12	1.4	35	14.2	0.18	2.4	33	12.8	0.30	0.30
	900	1.22		48	41.4	0.50	14.4	43	33.6	0.40	10.3	35	21.6	0.14	1.5	34	19.8	0.16	2.1	33	18.2	0.22	3.7	31	16.4	0.40	0.40
	1150	1.42		47	45.2	0.56	16.8	42	36.8	0.44	12.1	34	23.4	0.14	1.7	33	21.4	0.18	2.4	32	19.8	0.24	4.3	31	17.8	0.44	0.44
	1400	1.82		44	52.2	0.64	21.7	40	42.6	0.52	15.5	32	26.4	0.16	2.1	31	24.6	0.20	3.1	30	22.6	0.28	5.5	30	20.6	0.50	0.50

Vi = air volume flow, m^2/s
$t_{t\,i}$ = air on temperature °C
t_{2i} = air off temperature °C

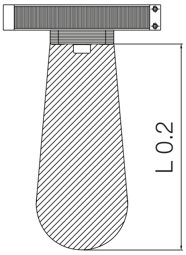
Q = heating capacity, kW
qv = water flow, l/s
dPV = pressure drop, water, kPa

Size HMP		rpm	Sound pressure level dB(A)*	Sound power level Lwi/octave band							Air throw m, Lo.2				Motors 3/400/50	
				125	250	500	1000	2000	4000	8000	without air cone	with air cone	Power input kW	Full load current A	Power input kW	Full load current A
40	6Y	700	56	59	62	58	55	48	42	35	1.5	2.5	0.04	0.10	0.07	0.15
	6Δ	900	62	63	67	64	61	56	50	39	2.0	3.5	0.07	0.22	0.09	0.20
	4Y	1400	73	78	77	74	72	67	65	58	4.0	6.0	0.16	0.45	0.15	0.38
50	6Y	700	62	69	70	64	61	53	42	26	3.0	5.0	0.14	0.45	0.15	0.32
	6Δ	900	70	71	75	72	70	65	59	52	4.0	6.5	0.24	0.80	0.24	0.52
	4Y	1150	73	73	77	75	73	68	64	42	5.0	8.5	0.46	1.00	0.39	0.68
	4Δ	1400	81	80	85	81	81	77	73	65	6.0	10.0	0.64	1.40	0.59	1.27

1) A-weighted sound pressure level is given in 10 m^2 Sabine room and observation point is 1 m distance from the middle of fan guard at 45 °C angle.



Air throw defines the straight downwards distance from the device, where air velocity is 0,2 m/s. Air on temperature +150°C and air off temperature +35°C, provided that the air flow is not obstructed.



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THOR-LSV

Datacenter air cooler

General information & application

THOR-LSV air coolers are heavy duty industrial air coolers specifically designed for cooling down server heat production in data centers that have been built according to “Low Speed Ventilation”.
LSV air coolers operate with low fan speed, low air velocities and minimal pressure differences along the route of the air flow, achieved by the building itself being part of the system. For this reason all THOR-LSV air coolers have been designed with a 12 Pa air-sided pressure drop and a sensible heat factor of 1.0.

Refrigerant	Water
Nom. capacities	52 - 195 kW
Air volume	12670 - 47500 m^3/h.

Standard configuration

- Finned coil
  - 2 coil block modules
  - Cu tubing Ø 5/8”
  - Tube pitch 50x50 mm square
  - Corrugated aluminium fins
  - Fin spacing 5 mm

- 4 to 10 energy efficient EC fans, Ø 450 or 500 mm; blowing through the coil. Fans with elevated external pres sure(60 Pa, excl. air filter resistance). Fan current 230/50/1.
- Corrosion-resistant casing: aluminium/sendzimir, white epoxy coated (RAL 9003)
- Hinged driptray, drain(s) 32 mm PVC connection, freely adjustable into either horizontal or vertical position.
- Refrigerant connections on right hand side (fan side view)
- Fitted with schräder valve on the suction connection for testing purposes.
- Stickers indicate fan direction and refrigerant in/out.
- Delivery in mounting position on wooden beams Installation can take place with use of a forklift.

THOR-LSV

Options

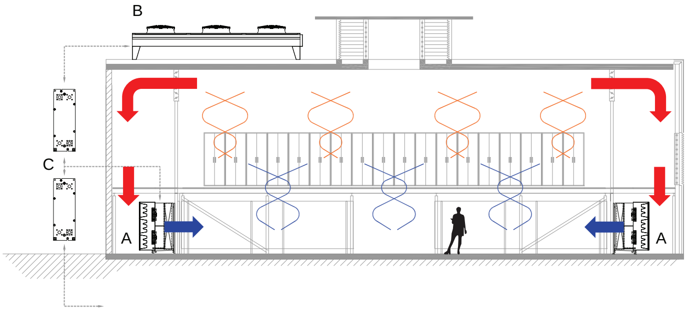
- Filter frame for mounting of compact air filters 92x592x290 mm).
- Modbus communication for precise fan control.

Design pressure

Design pressure 6 bar. Each heat exchanger is leak tested with dry air and finally supplied with a nitrogen pre-charge.

Air cooler selection

Please contact our sales organization for air cooler selection and full technical details.



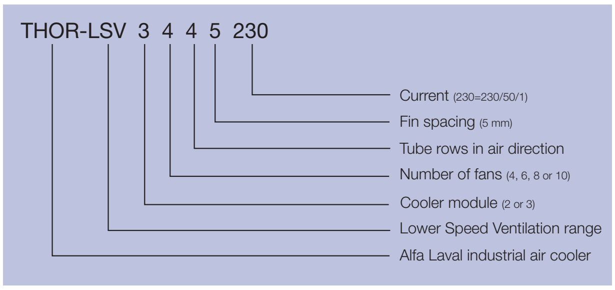
THOR LSV type	Nom. cap.* kW	Air volume m^3/h	Liquid flow m^3/h	Press. drop kPa	Int. vol. dm^3	Weight kg	Coil surface m^2	Dimensions (mm)			Connections in/out	Fans				
								Length	Height	Width		Nr.	Power (per fan) nom. W	abs. W	fan speed nom./working rpm	Sound power dB(A)**
344-5	78	19000	11.2	20	80	540	351	2916	2072	1302	NW65	4	370	360	1180/1080	66
364-5	117	28500	16.7	26	115	760	526	4116	2072	1302	NW65	6	370	360	1180/1080	66
384-5	156	38000	22.3	20	160	1000	702	5316	2072	1302	NW80	8	370	360	1180/1080	66
3104-5	195	47500	27.9	35	195	1200	877	6516	2072	1302	NW80	10	370	360	1180/1080	66
244-5	52	12670	7.4	20	53	360	234	2916	1472	1302	NW50	4	350	240	1310/1110	65
264-5	78	19000	11.2	10	80	540	351	4116	1472	1302	NW50	6	350	240	1310/1110	65
284-5	104	25330	14.9	20	106	690	468	5316	1472	1302	NW50	8	350	240	1310/1110	65
2104-5	130	31670	18.6	35	130	840	585	6516	1472	1302	NW50	10	350	240	1310/1110	65

* Nominal capacities for $T_{\text{air in}}$ = 36.5°C, $T_{\text{air out}}$ = 24°C, $T_{\text{water in}}$ = 15°C, $T_{\text{water out}}$ = 21°C (100% water).

** Sound power per fan.

Water temp. in/out °C	Capacity %	Water volume %	Pressure drop %
11.0/17.0	120	120	144
12.0/18.0	115	115	133
13.0/19.0	110	110	122
14.0/20.0	105	105	111
15.0/21.0	100	100	100
16.0/22.0	95	95	92
17.0/23.0	90	90	84
18.0/24.0	85	85	76
19.0/25.0	80	80	68

Code description



THOR-LSV 3 4 4 5 230

Current (230=230/50/1)
Fin spacing (5 mm)
Tube rows in air direction
Number of fans (4, 6, 8 or 10)
Cooler module (2 or 3)
Lower Speed Ventilation range
Alfa Laval industrial air cooler

Benefits

- Application-based air cooler design to ensure optimized operation in LSV cooling systems.
- Heavy duty coil and casing materials, resulting in a long operational product life.
- Reliable performance.
- Operational fine tuning thanks to EC fan motors.
- Coil air-sided pressure drop only 12 Pa.
- Energy efficient.
- Low total cost of ownership.
- Two-year product guarantee.

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Chapter 10

Heating and cooling systems

A holistic approach is the base of our system solution concept. The reason is clear and logical: in order to guarantee reliability, resource efficiency and performance in a system, all components must be designed to co-operate and they must have been thoroughly tested to ensure best possible performance in the application. Our system solutions are adapted to the specific needs of every application. They are customized in the true sense.

Alfa Laval has a unique, global experience when it comes to developing systems for heat transfer. We are also leading the ongoing development towards more cost-efficient heat exchangers. Therefore, we can offer customers unique, complete solutions.

All systems are certified according to ISO 9001. All components have been thoroughly tested with the most advanced test equipment available. Our customers can be sure to receive a reliable and cost-efficient system.

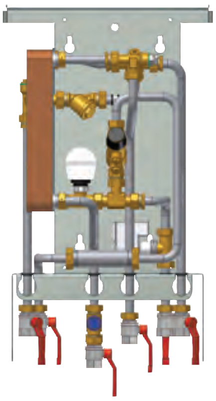
Heating and cooling systems range

Micro

Read all about it on page 10:5

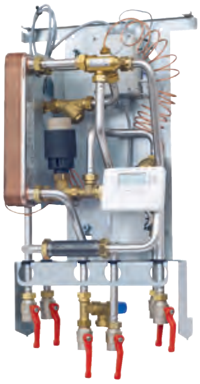
Mini City Direct HTC

Read all about it on page 10:7



Mini City Direct

Read all about it on page 10:11

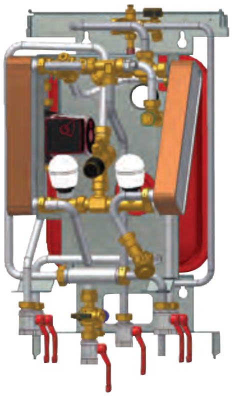


Mini City Direct STC

Read all about it on page 10:15

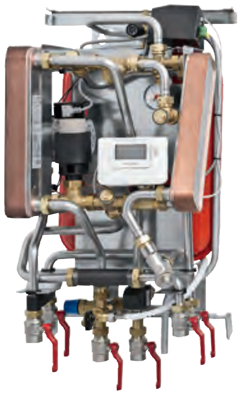
Mini City Indirect HTC

Read all about it on page 10:19



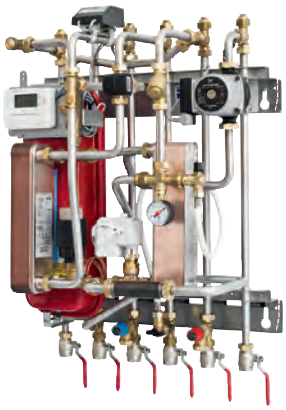
Mini City Indirect

Read all about it on page 10:23



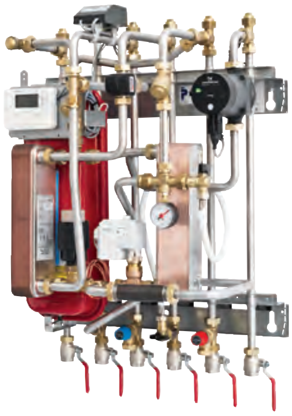
Mini

Read all about it on page 10:27



Mini ECO

Read all about it on page 10:31

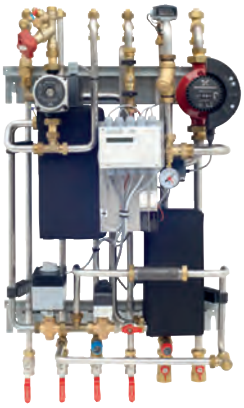


Mini XL

Read all about it on page 10:35

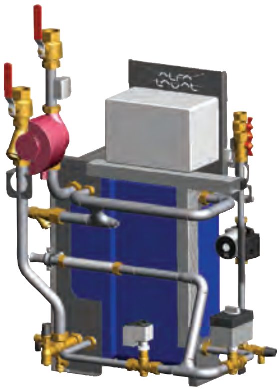
Mini Plus

Read all about it on page 10:39



Midi Basic

Read all about it on page 10:43



Midi Compact

Read all about it on page 10:47

Maxi

Read all about it on page 10:51

Maxi C1

Read all about it on page 10:55

Maxi Cooling

Read all about it on page 10:59

Micro

Heating and domestic hot water substation for apartments and single family houses

Micro is ready for installation to meet the complete central heating and hot water requirements. It is suitable for apartments and single-family houses that are direct connected to a heating network. Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Micro, resulting in its practical functionality and ease of use. All components are easily accessible for inspection and future servicing when required.

Good comfort

Micro offers fully automatic temperature control for hot water. The hot water is heated by direct exchange with high capacity. This means that the hot water is always as fresh as the incoming cold water. The room temperature is regulated with the help of thermostatic radiator valves. Integral differential pressure regulation means that good comfort is maintained throughout the year in spite of variations in the pressure of the heating network.

Simple installation

Small dimensions, low weight, well-designed pipe routing and self-acting control equipment ensure simple installation.

Long-term reliability

Micro represents the very latest technology and meets very strict long-term performance specifications. The plates and all the pipes in the unit are made from acid-resistant stainless steel. All components are mutually tuned and are subjected to detailed functional testing according to Alfa Laval's ISO 9001:2008 quality assurance system.

Heating network – a good source of heat

A heating network is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way.

Function

Micro is used for the direct connection of apartments and single family houses to the heating network. In these systems, the incoming heating water from the culvert network is at a lower pressure and temperature than in the case of a primary connection to a district heating network. This means that the heating water from the culvert network is used for the radiator system in the building for heating the property. Regulation of the room temperature is via thermostatic valves on the radiators in each room.

The transfer of heat from the heating network media to the domestic hot water system of the apartment takes place in the heat exchanger. The transfer of heat takes place via thin plates of acid-resistant stainless steel, which keep the heating water entirely separate from the apartment's own systems.

Micro has self-acting temperature control for the domestic hot water. The hot water temperature is controlled by an self-acting temperature regulator. This senses and regulates the temperature of the outgoing hot water directly in the heat exchanger. The design, which was developed and patented by Alfa Laval, provides a constant hot water temperature regardless of the size and frequency of the quantities drawn off.

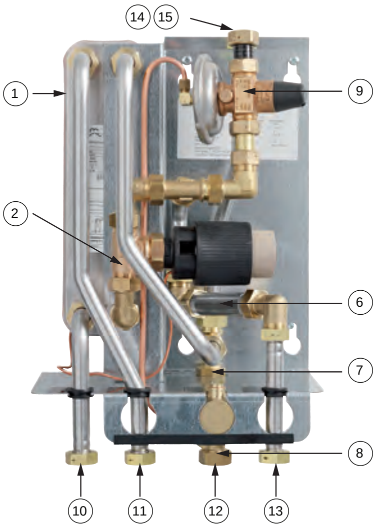
An easily operated, economical and long-lived heating source

Micro uses the heating water from the heating network to heat both the domestic hot water (in a never-ending flow) and the water in the central heating system.

Micro is mounted on the wall and takes up very little space. Wherever it is positioned, the substation is quiet and discreet, requires no care or maintenance and has a very long service life. In the event of service or replacement of components becoming necessary in the future, all parts are readily accessible and capable of individual replacement.

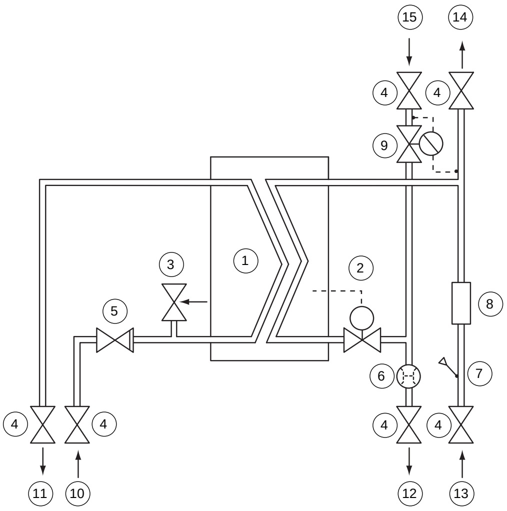
Components

1. Heat exchanger and temperature controller for hot water
2. Control valve for hot water
3. Safety valve, cold water (accessory)
4. Shut-off valve (accessory)
5. Check valve
6. Adapter for energy meter
7. Temperature sensor connection, heating network media supply
8. Filter for heating network media
9. Differential pressure regulator
10. Cold water
11. Hot water
12. Heating network media supply
13. Heating network media supply
14. Heating circuit supply
15. Heating circuit return



Connections	Screws
Heating network media supply	G ¾
Heating network media supply	G ¾
Heating circuit supply	G ¾
Heating circuit return	G ¾
Cold water	G ¾
Hot water	G ¾

Diagrammatic flowchart for Micro



Other

Electrical data
Noise level
Main dimensions: cover; width 305 x depth 200 x height 460 mm
Weight: 13 kg, cover 2 kg
For transport: weight 17 kg, volume 0.04 m³

Operating data

	Heating	Hot water
Design pressure, MPa	0.6	1.0
Design temperature, °C	100	100
Safety valve opening pressure, MPa		0.9
Volume heat exchanger, l	0.45	0.48

Performance at primary operating pressure, 80 kPa

	Output (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Design temperature program, °C Hot water circuit 65-25/10-50	50	0.28	21.4	0.3
Heating circuit	12	0.14		0.14
60-80	12	0.14		0.14
40-60				

Accessories

Cover

Safety valve

Shut-off valve (set of four units)

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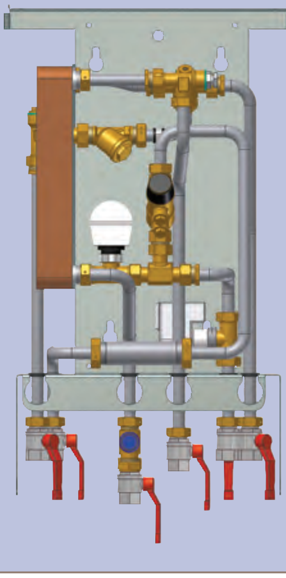
Mini City Direct HTC

Heating and domestic hot water substation for apartments and single family houses

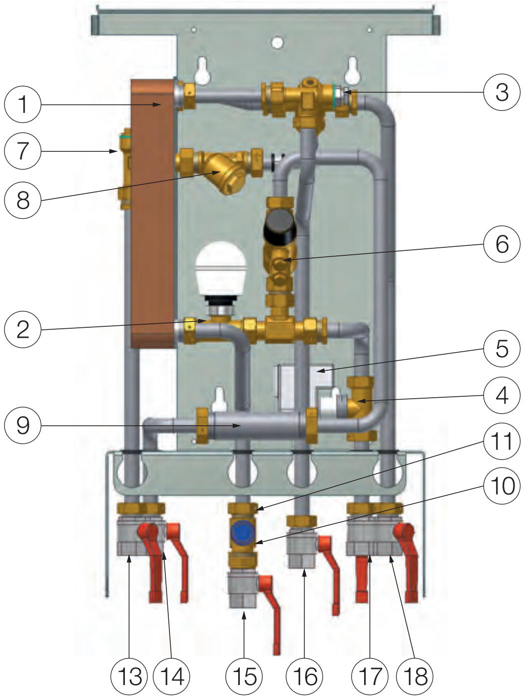


The Mini City heating substation is ready for installation to meet the complete central heating and hot water requirements. It is suitable for apartments and single-family houses that are direct connected to a heating network. Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Mini City, resulting in its practical functionality and ease of use. All components are easily accessible for inspection and future servicing when required.

Comfort
The Mini City HTC is the step-in model of the Mini City family. It has an automatic individual temperature setting for hot water. Mini City is fully prepared for individual temperature control for central heating by its valve and actuator. Domestic hot water is heated separately in a high capacity heat exchanger, this ensuring that the hot water is always as fresh as the incoming cold water main supply.

Simple installation
Compact dimensions, light weight, well arranged plumbing and ready for correction to individual temperature control for heating.

Long-term security
The Mini City represents the most modern technology, and provides the answer to stringent demands for long-term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. Mini City HTC follows PED 97/23/EC.



Components

1. Heat exchanger for hot water
2. Control valve for hot water
3. Hot water thermostat
4. Control valve for heating circuit
5. Actuator for heating circuit
6. Differential pressure controller
7. Temperature sensor connection, heating network medium supply
8. Filter for heating network medium
9. Adapter for energy meter
10. Check valve for cold water
11. Safety valve for domestic hot water
12. Shut-off valves (6 pcs)
13. Heating network media, supply
14. Heating network media, return
15. Cold water (cw)
16. Hot water (hw)
17. Heating circuit, return
18. Heating circuit, supply

Brass parts are hardened against dezincification. All connectors, DN20, internal threaded.

Heating network – a good source of heat
A heating network is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way.

Operation
Mini City is used for the direct connection of apartments and single family houses to the heating network. With this kind of connection, the heating water from the mains network is used for heating the radiator system of the apartment or single family house.

For connection to underfloor heating system, the unit should be completed with a special control equipment, suited for this purpose, or use Alfa Laval Mini City Direct STC.

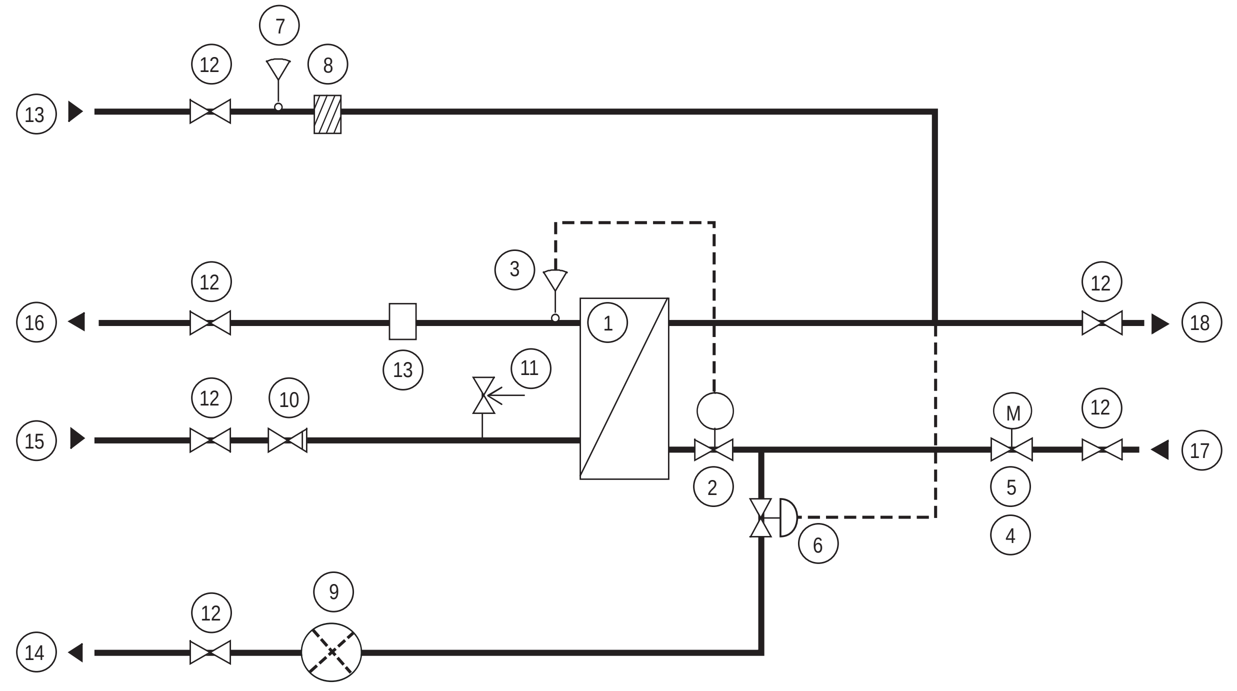
A heat exchanger is used to transfer heat from the heating network medium to the hot water system. Heat is transferred through a package of thin, acid-resistant, stainless steel plates, which keeps the heating network medium separate from the domestic hot water system.

Mini City is fully prepared for individual temperature control for central heating by its valve and actuator. With an external room controller installed, the heating circuit is adjusted in relation to the room temperature via a thermostatic control.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow.

The energy supplier registers the use of energy. Measurement is done by recording the flow of heating network medium through the system, and by measuring the temperature difference between the medium’s supply and return flow.

Diagrammatic flow chart for Mini City Direct HTC



For underfloor heating systems
Underfloor heating systems must be separately controlled. The instructions of the underfloor heating supplier must also be checked.

An easily manageable, economical and durable source of heat

The Mini City uses the heating network medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system.

The Mini City is a wall-mounted unit and is very compact. Wherever the unit is located, it is quiet and discreet, requires no attendance or maintenance and has a very long operational life. In the event of requiring servicing or component exchange at some future date, all parts are easily accessible and individually replaceable.

Operating data

	Heating network	Heating circuit	Hot water circuit
Design pressure, MPa	1.0	1.0	1.0
Design temperature, °C	100	100	100
Relief valve opening pressure, MPa	-	-	0.9
Volume, l	0.35	-	0.34

Other information

Electrical data: 230 V, single phase, 2 W
Dimensions (cover): 422 mm width x 330 mm depth, 728 mm height
Dimensions (substation): 413 mm width x 211 mm depth x 713 mm height
Weight: 15 kg, casing 5 kg
Transport particulars: Total weight 28 kg, 0.2 m³

Performance at available primary differential pressure 50-400 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-30/10-55	57	0.27	30	0.30
80-25/10-55	37	0.16	25	0.20
65-25/10-50	25	0.15	25	0.15
75-25/10-50	42	0.20	25	0.25
70-25/10-50	34	0.18	25	0.20
Heating circuit				
80-60	12	0.14	60	0.14
85-60	12	0.11	60	0.11
85-45	12	0.07	45	0.07
75-60	5	0.08	60	0.08

Connections	Screws
Heating network media supply	G ¾
Heating network media return	G ¾
Heating circuit supply	G ¾
Heating circuit return	G ¾
Cold water	G ¾
Hot water	G ¾

CE ISO 9001:2008

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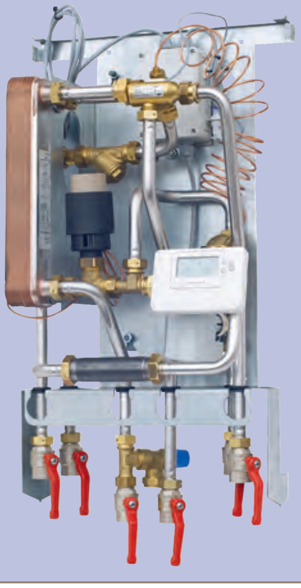
Mini City Direct

Heating and domestic hot water substation for apartments and single family houses

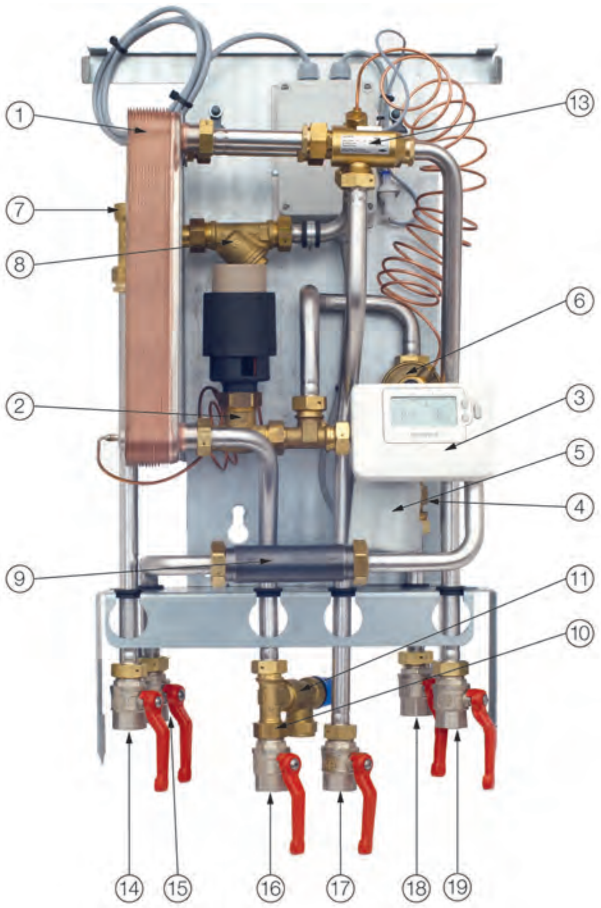


The Mini City heating substation is ready for installation to meet the complete central heating and hot water requirements. It is suitable for apartments and single-family houses that are direct connected to a heating network. Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Mini City, resulting in its practical functionality and ease of use. All components are easily accessible for inspection and future servicing when required.

High comfort
The Mini City has fully automatic individual temperature setting for central heating and hot water. Heat is automatically regulated, depending on the temperature desired inside the dwelling. Domestic hot water is heated separately in a high-capacity heat exchanger; thus ensuring that the hot water is always as fresh as the incoming cold water mains supply.

Simple installation
Compact dimensions, light weight, well arranged plumbing and factory-complete internal wiring all make installation very simple. A pre-programmed control unit and a power cable already fitted with a plug make things even simpler to allow immediate start-up.

Long-term security
The Mini City represents the most modern technology, and provides the answer to stringent demands for long-term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. The Mini City is CE marked.



Components

1. Heat exchanger and temp. controller for hot water
2. Control valve for hot water
3. Room thermostat/controller
4. Control valve for heating circuit
5. Actuator for heating circuit
6. Differential pressure controller
7. Temperature sensor connection, heating network medium supply
8. Filter for heating network medium
9. Adapter for energy meter
10. Check valve for cold water
11. Safety valve for domestic hot water
12. Shut-off valves (option)
13. Flow switch (option)
14. Heating network media, supply
15. Heating network media, return
16. Cold water (cw)
17. Hot water (hw)
18. Heating circuit, return
19. Heating circuit, supply

Brass parts are hardened against dezincification. All connectors, DN20, internal threaded.

Heating network – a good source of heat

A heating network is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way.

Operation

Mini City is used for the direct connection of apartments and single family houses to the heating network. With this kind of connection, the heating water from the mains network is used for heating the radiator system of the apartment or single family house.

For connection to floor heating system, the unit should be completed with a special control equipment, suited for this purpose.

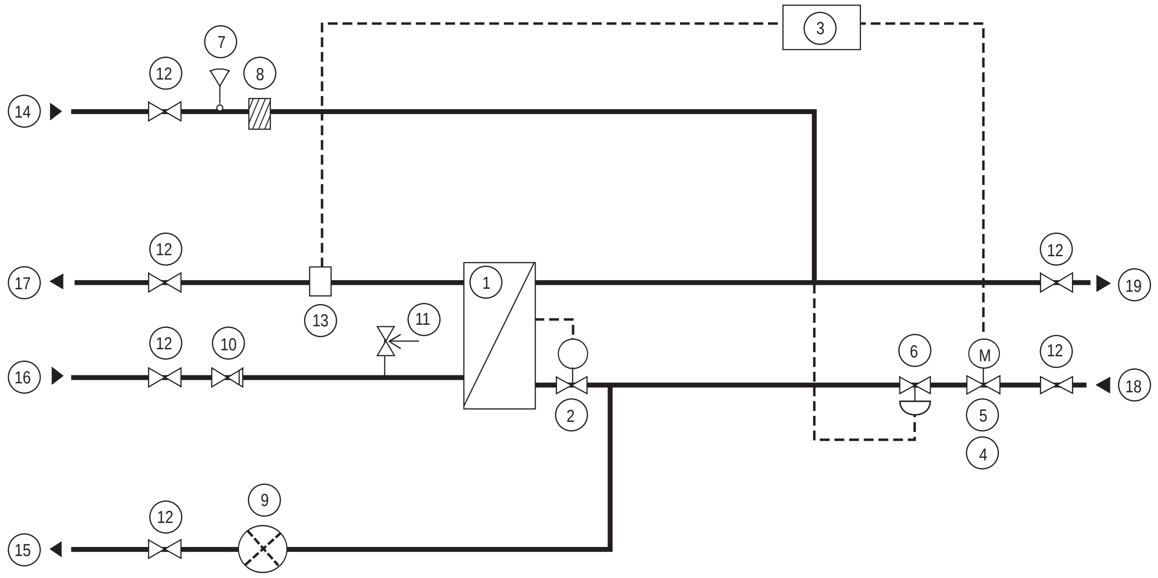
A heat exchanger is used to transfer heat from the heating network medium to the hot water system. Heat is transferred through a package of thin, acid-resistant, stainless steel plates, which keeps the heating network medium separate from the domestic hot water system.

Mini City has an automatic temperature control for central heating and hot water. The heating circuit is adjusted in relation to the room temperature via a thermostatic control.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

The energy supplier registers the use of energy. Measurement is done by recording the flow of heating network medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Mini City Direct



For underfloor heating systems
Underfloor heating systems must be separately controlled. The instructions of the underfloor heating supplier must also be checked.

An easily manageable, economical and durable source of heat

The Mini City uses the heating network media for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system.

The Mini City is a wall-mounted unit and is very compact. Wherever the unit is located, it is quiet and discreet, requires no attendance or maintenance and has a very long operational life. In the event of requiring servicing or component exchange at some future date, all parts are easily accessible and individually replaceable.

Operating data

	Heating network	Heating circuit	Hot water circuit
Design pressure, MPa	1.0	1.0	1.0
Design temperature, °C	100	100	100
Relief valve opening pressure, MPa	-	-	0.9
Volume, l	0.5	-	0.5

Other information
Electrical data: 230 V, single phase, 30 W
Dimensions: 422 mm width x 330 mm depth, 728 mm height
Dimensions: Substation 413 mm width x 211 mm depth x 713 mm height
Weight: 15 kg, casing 5 kg
Transport particulars: Total weight 28 kg, 0.2 m³

Performance at available primary differential pressure 50-400 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-25/10-60	42	0.17	22	0.2
80-25/10-55	56	0.23	22	0.3
65-25/10-50	50	0.29	24	0.3
75-25/10-50	50	0.22	20	0.3
85-25/10-50	50	0.18	17	0.3
Heating circuit				
80-60	12	0.14	60	0.14
85-60	12	0.11	60	0.11
85-45	12	0.07	45	0.07
75-60	5	0.08	60	0.08

Connections	Screws
Heating network media supply	G ¾
Heating network media return	G ¾
Heating circuit supply	G ¾
Heating circuit return	G ¾
Cold water	G ¾
Hot water	G ¾

ISO 9001:2008

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Mini City Direct STC

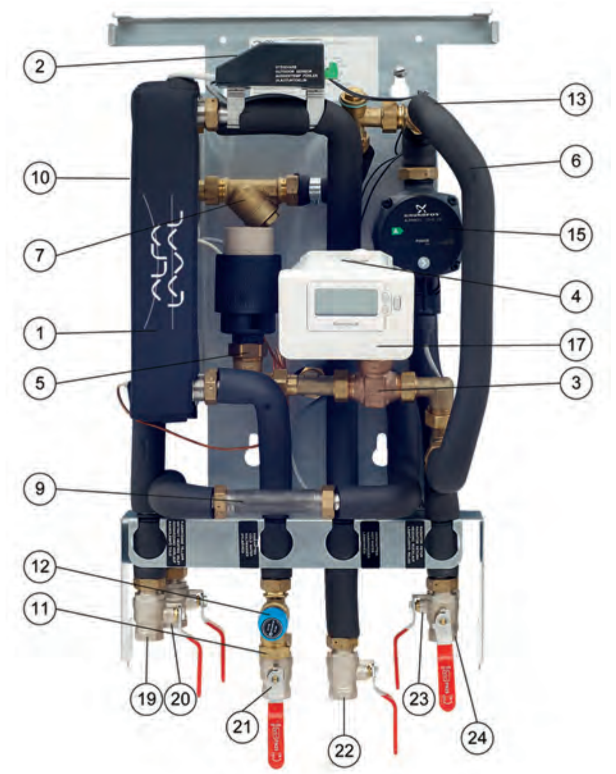
Heating and domestic hot water substation for apartments and single family houses

The Mini City heating substation is installation- ready for complete central heating and hot water requirements. It is suitable for apartments and single family houses that are connected to a heating network. Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Mini City, resulting in its practical function and ease of use. All components are easily accessible for inspection and future service when required.

High comfort
The Mini City has a fully automatic individual temperature setting for central heating and hot water. Heat is automatically regulated, depending on outdoor temperature and/or the temperature desired inside the dwelling. Domestic hot water is heated separately in a high-capacity heat exchanger; thus ensuring that the hot water is always as fresh as the incoming cold water mains supply.

Simple installation
Compact dimensions, light weight, well arranged plumbing and factory-complete internal wiring – all make installation very simple. A pre-programmed control unit and a power cable already fitted with a plug make things even simpler to allow immediate start-up.

Long-term security
The Mini City represents the most modern technology, and provides the answer to stringent demands for longterm performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. The Mini City is CE marked.



Components

1. Heat exchanger and temperature controller for hot water
2. Connection box for electric power and sensors, heating circuit
3. Control valve, heating circuit
4. Actuator, heating circuit
5. Control valve for hot water
6. Supply temperature sensor, heating circuit
7. Filter for heating media
8. Differential pressure controller (option)
9. Adapter for energy meter
10. Temperature sensor connection, heating media supply
11. Check valve for cold water
12. Safety valve for domestic hot water
13. Check valve for heating circuit
14. Underfloor heating thermostat (option)
15. Circulation pump, heating circuit
16. Outdoor temperature sensor (option)
17. Room thermostat/control panel
18. Shut-off valves (6 pcs)
19. Heating network media, supply
20. Heating network media, return
21. Cold water (cw)
22. Hot water (hw)
23. Heating circuit, supply
24. Heating circuit, return

Brass parts are hardened against dezincification. All connectors, DN20, internal threaded. Shut-off valves are included and come with the delivery.

Heating network – a good source of heat

A heating network is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way.

Operation

Mini City is used for the direct connection of apartments and single family houses to the heating network. With this kind of connection, the heating water from the heating network is used for heating the radiator system of the apartment or single family house.

A heat exchanger is used to transfer heat from the heating network medium to the hot water system. Heat is transferred through a package of thin, acid-resistant, stainless steel plates, which keeps the heating network medium separate from the domestic hot water system.

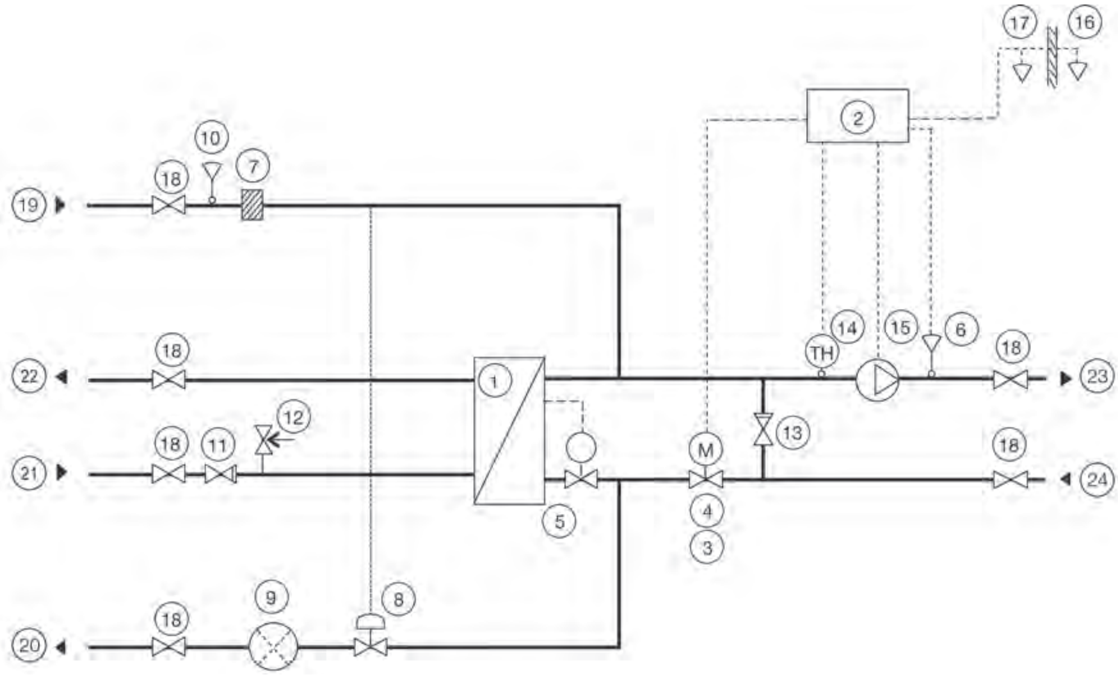
Mini City has automatic temperature control for central heating. The heating circuit is adjusted in relation to the outdoor temperature and the required indoor temperature via a thermostatic control, outdoor sensor and/or indoor sensor.

When no heating flow is required, the heating circulation pump stops automatically, but is run occasionally to prevent seizing up due to standing still for a long time. H737 has an easy to use interface and built in energy saving functions.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

The energy supplier registers use of energy. Measurement is done by recording the flow of heating network medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Mini City Direct STC



For underfloor heating systems
The instructions of the underfloor heating supplier must also be checked.

An easily manageable, economical and durable source of heat

The Mini City uses the heating network medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system. The Mini City is a wall-mounted unit and is very compact. Substations may generate sounds during operation caused by pumps, regulator systems, flow etc. The unit is discreet and to minimize transmission of operational sounds, we recommend installing it on well insulated walls or on walls of concrete. Mini City requires no attendance or maintenance and has a very long operational life. In the event of requiring service or component exchange at some future date, all parts are easily accessible and individually replaceable.

Operating data

	Heating medium	Heating circuit	Hot water circuit
Design pressure, MPa	1.0	1.0	1.0
Design temperature, °C	100	100	100
Opening pressure, safety valve, MPa	-	-	0.9
Volume, l	0.34	-	0.36

Performance at available differential pressure 50-400 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-25/10-55	79	0.34	25	0.42
70-25/10-58	36	0.19	25	0.18
65-25/10-50	55	0.33	22	0.33
Heating circuit				
80-60/60-80	12	0.14	60	0.14
80-60/60-70	12	0.14	45	0.29
80-45/45-60	12	0.08	45	0.19
80-30/30-35	9	0.04	30	0.43

Other information

Electrical data: 230 V, 1-phase, 100 W
Dimensions (cover): 422 mm width x 330 mm depth, 728 mm height
Weight: 20 kg, cover 2 kg
Transport particulars: Total weight 29 kg, 0.2 m³

Connections

Heating network media supply	G ¾
Heating network media return	G ¾
Heating circuit supply	G ¾
Heating circuit return	G ¾
Cold water	G ¾
Hot water	G ¾

CE ISO 9001:2008

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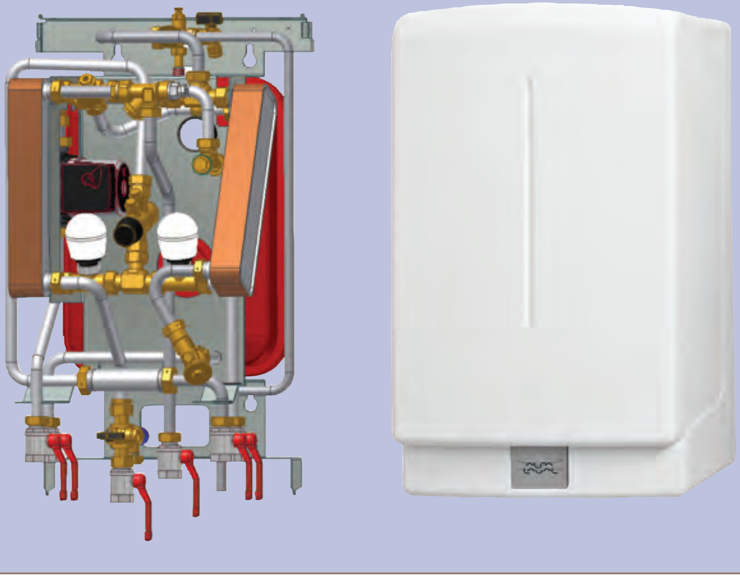
Mini City Indirect HTC

Heating and domestic hot water substation for apartments and single family houses



The Mini City heating substation is ready for installation to meet the complete central heating and hot water requirements. It is suitable for apartments and single-family houses that are connected to a heating network. Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Mini City, resulting in its practical function and ease of use. All components are easily accessible for inspection and future servicing when required.

Comfort

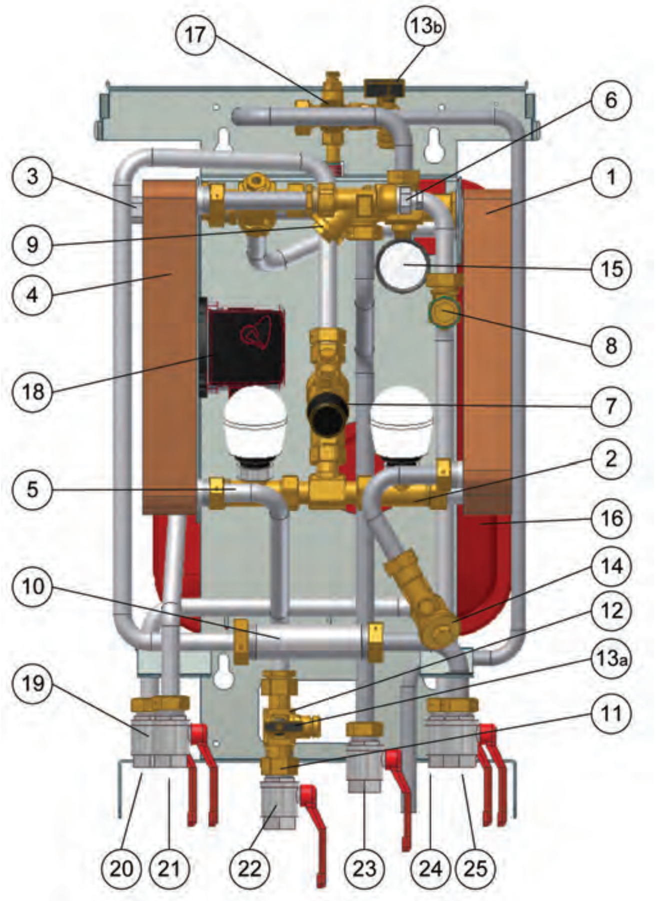
The Mini City HTC is the step-in model of the Mini City family. It has an automatic individual temperature setting for hot water. Mini City is fully prepared for individual temperature control for central heating by its valve and actuator. Domestic hot water is heated separately in a high capacity heat exchanger, this ensuring that the hot water is always as fresh as the incoming cold water main supply.

Simple installation

Compact dimensions, light weight, well arranged plumbing and ready for correction to individual temperature control for heating.

Long-term security

The Mini City represents the most modern technology, and provides the answer to stringent demands for long-term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. Mini City HTC follows PED 97/23/EC.



Components

1. Heat exchanger for heating
2. Control valve for heating circuit
3. Heating water thermostat
4. Heat exchanger for hot water
5. Contorl valve for hot water
6. Hot water thermostat
7. Differential pressure controller
8. Temperature sensor connection, heating media supply
9. Filter for heating netword media
10. Energy meter or adapter for energy meter
11. Check valve for cold water
12. Safety valve for domestic hot water
13. Valve to top up the heating circuit and hose with possibility to disconnect
14. Filter for heating circuit
15. Pressure gauge for heating circuit
16. Expansion vessel, heating circuit
17. Safety valve for heating circuit
18. Pump for heating circuit
19. Shut-off valve (6 pcs)
20. Heating circuit, return
21. Heating circuit, supply
22. Cold water (cw)
23. Hot water (hw)
24. Heating network media, supply
25. Heating network media, return

Brass parts are hardened against dezincification. All connectors, DN20, internal threaded.

Heating network – a good source of heat

A heating network is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way.

Operation

Mini City is used for the indirect connection of apartments and in single family houses to the heating network.

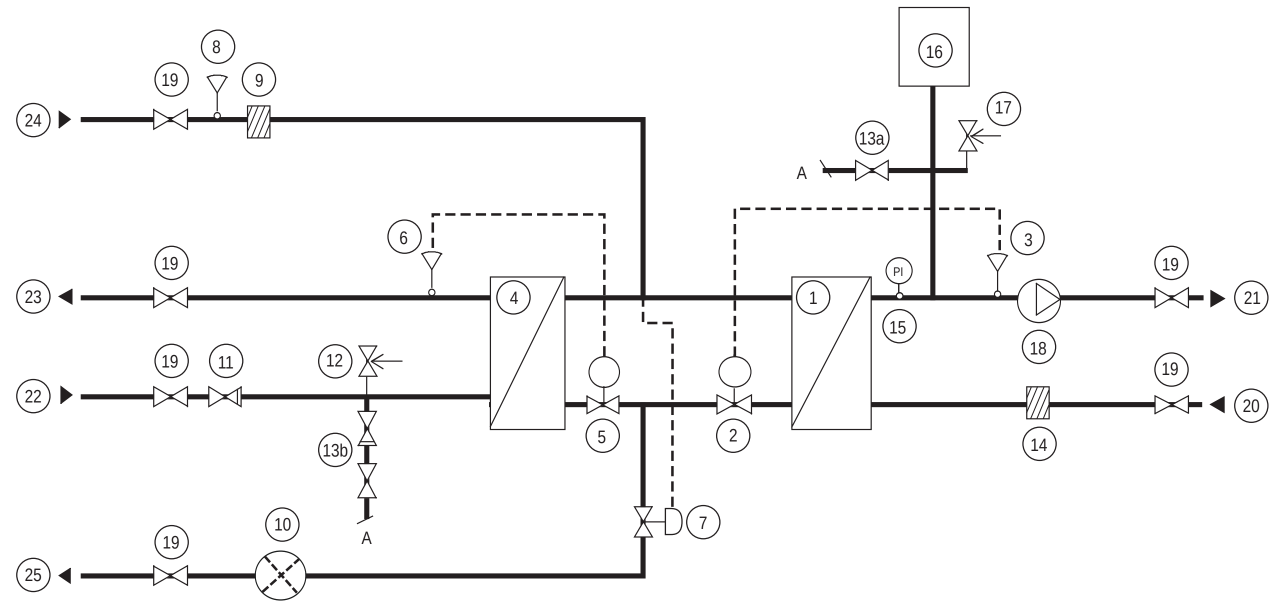
Heat exchangers are used to transfer heat from the heating netwok medium to the water in the dwelling's central heating and hot water system. Heat is transferred through a package of thin acid-resistant, stainless steel plates, which keep the heating network medium completely separate from the dwelling's own system.

Mini City is fully prepared for individual temperature control for central heating by its valve and actuator. The supply temperature can be set to a demanded supply temperature and can be used for underfloor heating systems as well as for traditionally radiator systems. With an external room controller installed, the heating circuit is adjusted in relation to the room temperature via a thermostatic control.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow.

The energy supplier registers the use of energy. Measurement is done by recording the flow of heating network medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Mini City Indirect HTC



For underfloor heating systems
Underfloor heating systems normally require a high-capacity circulation pump, preferably electronically controlled. An underfloor water flow greater than 0,25 l/s may require a special underfloor heating accessory. If combined with radiator circuits, the underfloor heating circuit must be separately controlled. The instructions of the underfloor heating supplier must also be checked.

An easily manageable, economical and durable source of heat

The Mini City uses the heating net work medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system.

The Mini City is a wall-mounted unit and is very compact. Wherever the unit is located, it is quiet and discreet, requires no attendance or maintenance and has a very long operational life. In the event of requiring servicing or component exchange at some future date, all parts are easily accessible and individually replaceable.

Operating data

	Heating network	Heating circuit	Hot water circuit
Design pressure, MPa	1.0	0.6	1.0
Design temperature, °C	100	100	100
Relief valve opening pressure, MPa	-	0.25	0.9
Volume, l	0.32/0.35	0.35	0.39

Other information
Electrical data: 230 V, single phase, 30 W
Dimensions: 422 mm width x 330 mm depth, 721 mm height
Dimensions: Substation 413 mm width x 316 mm depth x 707 mm height
Weight: 26 kg, casing 2 kg
Transport particulars: Total weight 32 kg, 0.2 m³

Performance at available primary differential pressure 50-400 kPa*

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-30/10-55	57	0.27	30	0.30
80-25/10-55	37	0.16	25	0.20
65-25/10-50	25	0.15	25	0.15
75-25/10-50	42	0.20	25	0.25
70-25/10-50	34	0.18	25	0.20
Heating circuit				
80-63/60-70	12	0.17	63	0.29
85-47/45-60	12	0.08	47	0.19
80-61/60-70	5	0.07	61	0.12
85-46/45-60	5	0.03	46	0.08

Connections	Screws
Heating network media supply	G ¾
Heating network media return	G ¾
Heating circuit supply	G ¾
Heating circuit return	G ¾
Cold water	G ¾
Hot water	G ¾

ISO 9001:2008

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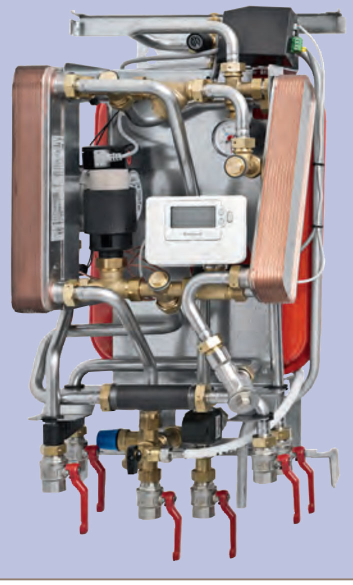
Mini City Indirect

Heating and domestic hot water substation for apartments and single family houses

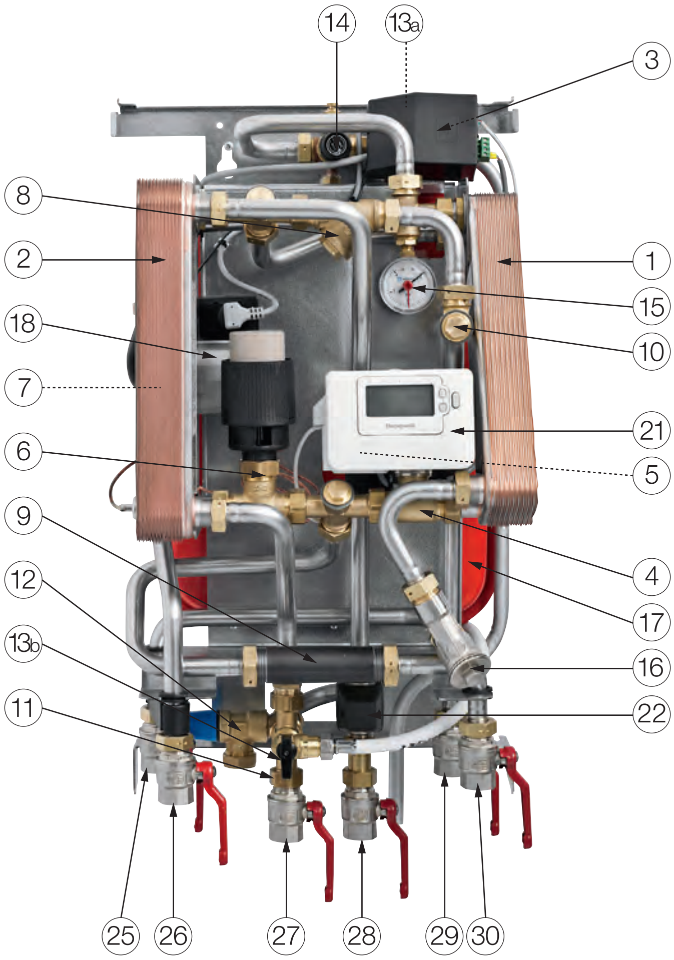


The Mini City heating substation is ready for installation to meet the complete central heating and hot water requirements. It is suitable for apartments and single-family houses that are connected to a community or district heating network. Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Mini City, resulting in its practical function and ease of use. All components are easily accessible for inspection and future servicing when required.

High comfort
The Mini City has a fully automatic individual temperature setting for central heating and hot water. Heat is automatically regulated, depending on the temperature desired inside the dwelling. Domestic hot water is heated separately in a high-capacity heat exchanger; thus ensuring that the hot water is always as fresh as the incoming cold water mains supply.

Simple installation
Compact dimensions, light weight, well arranged plumbing and factory-complete internal wiring all make installation very simple. Moreover, the plumbing can be connected from the top or bottom depending on the layout on-site. A pre-programmed control unit and a power cable already fitted with a plug make things even simpler to allow immediate start-up.

Long-term security
The Mini City represents the most modern technology, and provides the answer to stringent requirements for long-term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. The Mini City is CE and P marked.



Brass parts are hardened against dezincification. All connectors, DN20, internal threaded.

Components

1. Heat exchanger for heating
2. Heat exchanger and temperature controller for hot water
3. Connection box for electrical power and sensors, heating circuit
4. Control valve for heating circuit
5. Actuator for heating circuit
6. Control valve for hot water
7. Temperature sensor, heat supply
8. Filter for heating network medium
9. Energy meter or adapter for energy meter
10. Temperature sensor connection, heating network medium supply
11. Check valve for cold water
12. Safety valve for domestic hot water
13. Valve to top up the heating circuit and hose with possibility to disconnect
14. Safety valve for heating circuit
15. Pressure gauge for heating circuit
16. Filter for heating circuit
17. Expansion vessel, heating circuit, 8 litres
18. Circulation pump for heating circuit
19. Shut-off valves
20. Outdoor temperature sensor (option)
21. Room thermostat/Control panel
22. Safety temperature limiter, domestic hot water (option)
23. Flow switch (option)
24. Differential pressure regulator (option)
25. Heating circuit, return
26. Heating circuit, supply
27. Cold water (cw)
28. Hot water (hw)
29. Heating network media, supply
30. Heating network media, return

Heating network – a good source of heat

A community or district heating network is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way.

Operation

The incoming hot medium from the heating network is at very high pressure and temperature. Only the heat is used; the heating network medium does not mix with the water in the dwelling's heating and hot water system.

Heat exchangers are used to transfer heat from the heating network medium to the water in the dwelling's central heating and hot water system. Heat is transferred through a package of thin acid-resistant, stainless steel plates, which keep the heating network medium completely separate from the dwelling's own system.

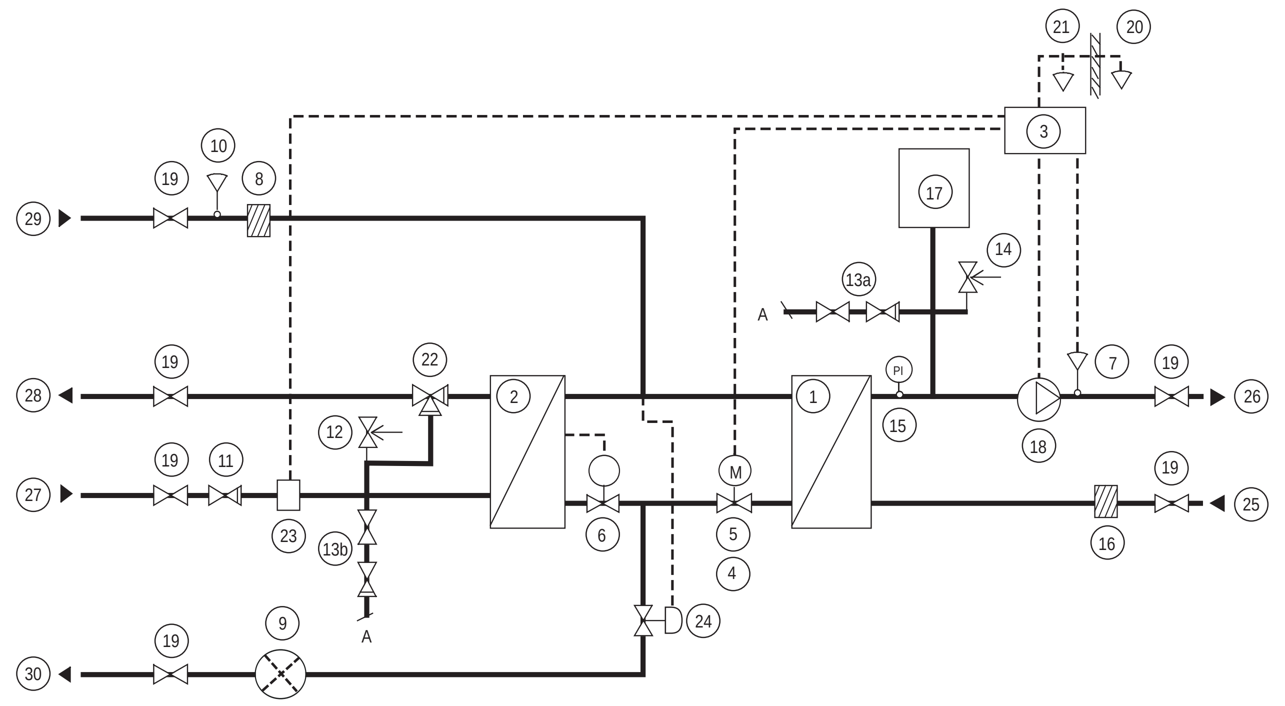
Mini City has automatic temperature control for central heating and hot water. The heating circuit is adjusted in relation to the room temperature via a thermostatic control. When no heating flow is required, the heating circuit circulation pump stops automatically, but is run occasionally to prevent seizing up due to standing still for a long time.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

Mini City can be offered with a differential pressure controller that keeps the differential pressure over the load constant. This secures accurate and stable modulating control, less risk of noise from control valves and easy balancing and commissioning.

The energy supplier registers use of energy. Measurement is done by recording the flow of heating network medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Mini City Indirect



For underfloor heating systems
Underfloor heating systems normally require a high-capacity circulation pump, preferably electronically controlled. An underfloor water flow greater than 0,25 l/s may require a special underfloor heating accessory. If combined with radiator circuits, the underfloor heating circuit must be separately controlled. The instructions of the underfloor heating supplier must also be checked.

An easily manageable, economical and durable source of heat

The Mini City uses the heating net work medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system.

The Mini City is a wall-mounted unit and is very compact. Wherever the unit is located, it is quiet and discreet, requires no attendance or maintenance and has a very long operational life. In the event of requiring servicing or component exchange at some future date, all parts are easily accessible and individually replaceable.

Operating data

	Heating network	Heating circuit	Hot water circuit
Design pressure, MPa	1.0	0.6	1.0
Design temperature, °C	120	100	100
Relief valve opening pressure, MPa	-	0.25	0.9
Volume, l	0.2/0.5	0.2	0.5

Other information

Electrical data: 230 V, single phase, 30 W
Dimensions: 422 mm width x 330 mm depth, 721 mm height
Dimensions: Substation 413 mm width x 316 mm depth x 707 mm height
Weight: 26 kg, casing 2 kg
Transport particulars: Total weight 32 kg, 0.2 m³

Performance at available primary differential pressure 50-600 kPa*

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-25/10-60	42	0.17	22	0.2
80-25/10-55	56	0.23	22	0.3
65-25/10-50	50	0.29	24	0.3
Heating circuit				
80-63/60-70	12	0.17	63	0.29
85-47/45-60	12	0.08	47	0.19
80-63/60-70	5	0.07	63	0.12
85-47/45-60	5	0.03	47	0.08

Connections	Screws
Heating network media supply	G ¾
Heating network media return	G ¾
Heating circuit supply	G ¾
Heating circuit return	G ¾
Cold water	G ¾
Hot water	G ¾

ISO 9001:2008

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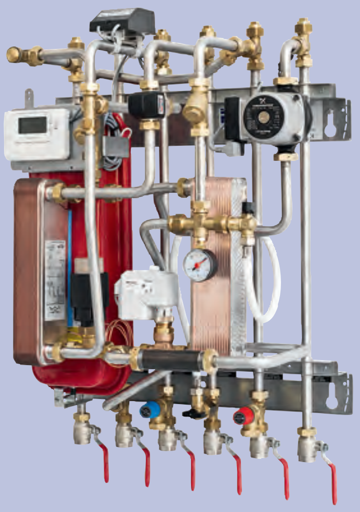
Mini

District heating substation for single-family houses

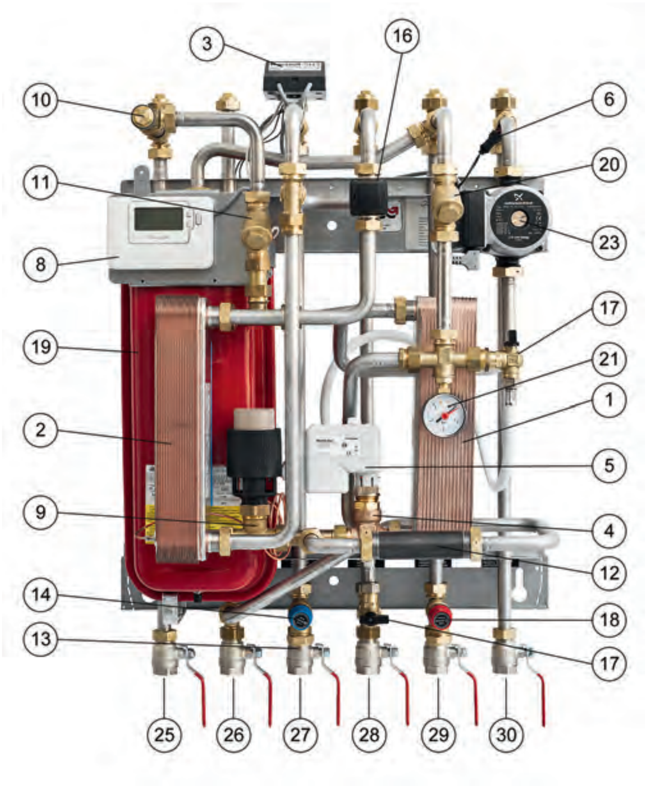


The Mini district heating substation is ready for installation to meet the complete central heating and hot water requirements. It is suitable for apartments and single-family houses that are connected to a heating network. Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Mini, resulting in its practical function and ease of use. All components are easily accessible for inspection and future servicing when required.

High comfort
The Mini has fully automatic individual temperature setting for central heating and hot water. Heat is automatically regulated, depending on outdoor temperature and/or the temperature desired inside the dwelling. Domestic hot water is heated completely separately in a high-capacity heat exchanger; thus ensuring that the hot water is always as fresh as the incoming cold water mains supply.

Simple installation
Compact dimensions, lightweight, well planned pipe runs and factory installed interior electrical routing all makes installation very simple. In addition, the pipes can be connected up or down depending on the layout of the building. The preprogrammed control device and plug connection make life even simpler in that the system can be activated immediately.

Long-term security
The Mini represents the most modern technology, and provides the answer to stringent demands for long term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. The Mini is CE and P marked.



Components

1. Heat exchanger for heating
2. Heat exchanger and temperature controller for hot water
3. Connection box for electric power and sensors, heating circuit
4. Control valve, heating circuit
5. Actuator, heating circuit
6. Supply temperature sensor, heating circuit
7. Outdoor temperature sensor
8. Room thermostat/control panel
9. Control valve, hot water
10. Temperature sensor connection, district heating supply
11. Filter for district heating supply
12. Adapter for energy meter
13. Non-return valve for cold water
14. Safety valve, domestic hot water
15. Flow switch for tap water priority (option)
16. Safety temperature limiter, domestic hot water (option)
17. Valve to top up the heating circuit
18. Safety valve, heating circuit
19. Expansion vessel, heating circuit, 12 litres
20. Filter for heating circuit
21. Pressure gauge, heating circuit
22. Underfloor heating thermostat (option)
23. Circulation pump, heating circuit
24. Shut-off valves (6 pcs)
25. District heating media, supply
26. District heating media, return
27. Cold water (cw)
28. Hot water (hw)
29. Heating circuit, return
30. Heating circuit, supply

Brass components are dezincification resistant quality. All connections, DN20, internal threading. The pipes can be connected up and/or down. Shut-off valves are included, separately packed.

District heating – a good source of heat

District heating is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way. The expansion of district heating to its current level has reduced emission of greenhouse gases from heating by about 20%. The economics of district heating are very competitive compared with other forms of heating.

Operation

The incoming hot medium from the district heating underground network is at very high pressure and temperature. Therefore, only the heat from this is used; the district heating medium does not mix with the water in the dwelling's heating and hot water system.

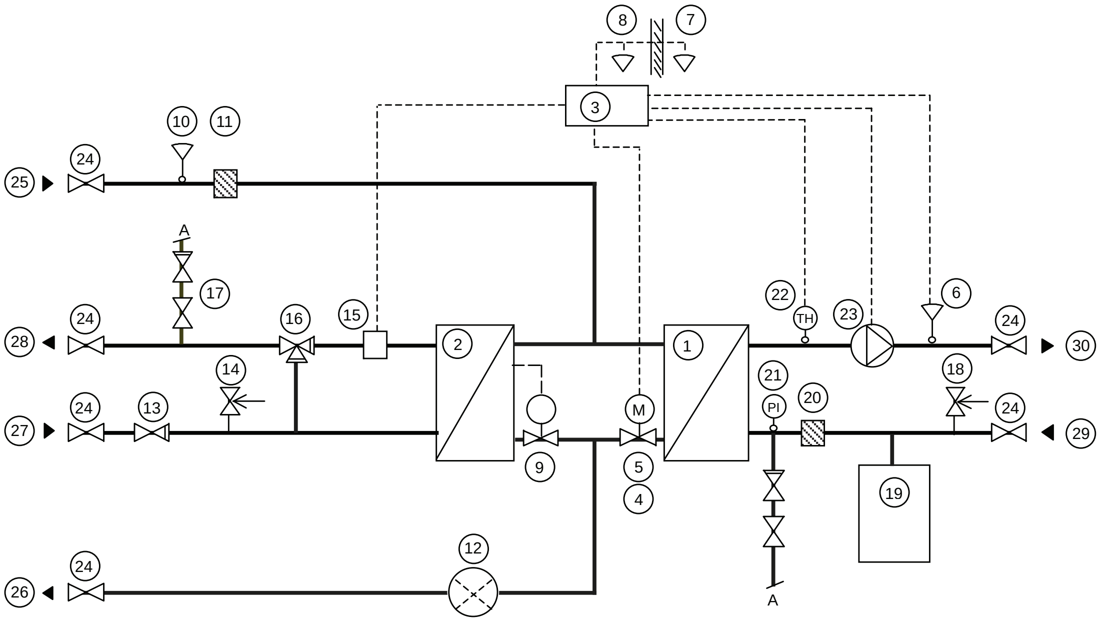
Heat exchangers are used to transfer heat from the district heating medium to the water in the dwelling's central heating and hot water system. Heat is transferred through a package of thin acid-resistant, stainless steel plates, which keep the district heating medium completely separate from the dwelling's own system.

Mini has automatic temperature control for central heating and hot water. The heating circuit is adjusted in relation to the outdoor temperature and the required indoor temperature via a thermostatic control, outdoor sensor and/or indoor sensor. When no heating flow is required, the heating circulation pump stops automatically, but is run occasionally to prevent seizing up due to standing still for a long time. H737 has an easy to use interface and built in energy saving functions.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

The district heating utility company registers use of energy. Measurement is done by recording the flow of district heating medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flowchart for Mini



For underfloor heating systems
Underfloor heating systems normally require a high-capacity circulation pump, preferably electronically controlled. An under floor water flow greater than 0,40 l/s use underfloor heating version. If combined with radiator circuits, the underfloor heating circuit must be separately controlled. The instructions of the underfloor heating supplier must also be checked.

An easily manageable, economical and durable source of heat

The Mini uses the hot district heating medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system. The Mini is a wall-hung unit and is very compact. Substations may generate sounds during operation caused by pumps, regulators systems, flow etc. The unit is discreet and to minimize transmission of operational sounds, we recommend to install it on well insulated walls or on walls of concrete. Mini requires no attendance or maintenance and has a very long operational life. In the event of requiring service or component exchange at some future date, all parts are easily accessible and individually replaceable.

Operating data

	District heating network	Heating circuit	Hot water circuit
Design pressure, MPa	1.6	0.6	1.0
Design temperature, °C	120	100	100
Opening pressure, safety valve, MPa	-	0.25	0.9
Volume, l	0.55/0.45	0.59	0.48

Performance at available primary differential pressure 100-600 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-22/10-55	75	0.31	22	0.40
70-25/10-58	49	0.26	25	0.24
65-22/10-50	54	0.30	22	0.32
Heating circuit				
115-65/60-80	40	0.18	63	0.48
100-63/60-80	21	0.14	63	0.25
100-43/40-60	37	0.16	43	0.44
100-33/30-37	16	0.05	31	0.55

Underfloor heating

115-33/30-37	23	0.06	31	0.79
100-33/30-37	23	0.08	31	0.79

Other information

Electrical data: 230 V, single phase, 100 W
Dimensions cover: 577 mm width x 458 mm depth, 770 mm height
Weight: 31 kg, cover 5 kg
Transport particulars: Total weight 40 kg, 0.23 m³

Connections	Screws
District heating media supply	G ¾”
District heating media return	G ¾”
Heating circuit supply	G ¾”
Heating circuit return	G ¾”
Cold water	G ¾”
Hot water	G ¾”

CE ISO 9001:2008

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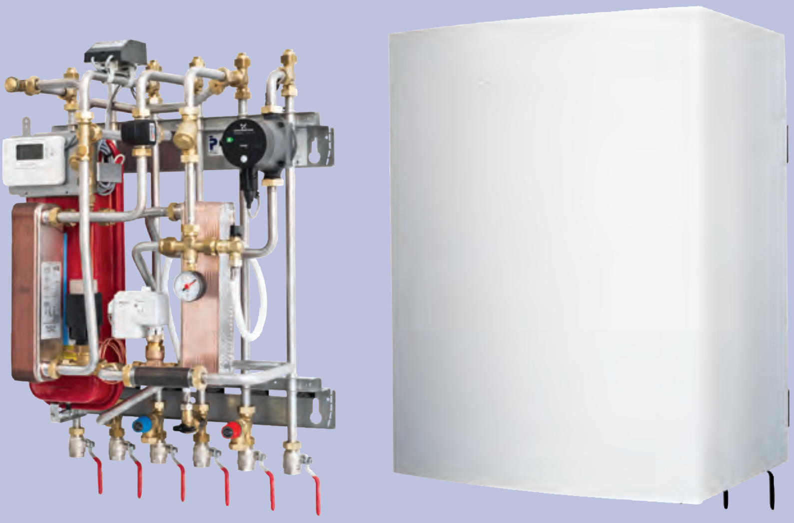
Mini ECO

District heating substation for single-family houses



The Mini ECO district heating substation is ready for installation to meet the complete central heating and hot water requirements. It is suitable for apartments and single-family houses that are connected to a heating network. Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Mini ECO, resulting in its practical function and ease of use. All components are easily accessible for inspection and future servicing when required.

High comfort

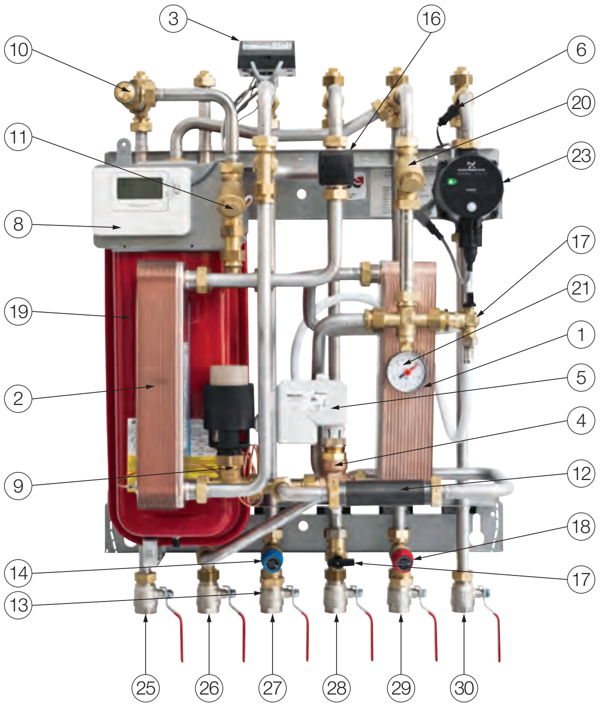
The Mini ECO has fully automatic individual temperature setting for central heating and hot water. Heat is automatically regulated, depending on outdoor temperature and/or the temperature desired inside the dwelling. Domestic hot water is heated completely separately in a high-capacity heat exchanger; thus ensuring that the hot water is always as fresh as the incoming cold water mains supply.

Simple installation

Compact dimensions, light weight, well planned pipe runs and factory installed interior electrical routing all makes installation very simple. In addition, the pipes can be connected up or down depending on the layout of the building. The pre-programmed control device and plug connection make life even simpler in that the system can be activated immediately.

Long-term security

The Mini ECO represents the most modern technology, and provides the answer to stringent demands for long term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. The Mini ECO is CE and P marked.



Components

1. Heat exchanger for heating
2. Heat exchanger and temperature controller for hot water
3. Connection box for electric power and sensors, heating circuit
4. Control valve, heating circuit
5. Actuator, heating circuit
6. Supply temperature sensor, heating circuit
7. Outdoor temperature sensor
8. Room thermostat/control panel
9. Control valve, hot water
10. Temperature sensor connection, district heating supply
11. Filter for district heating supply
12. Adapter for energy meter
13. Non return valve for cold water
14. Safety valve, domestic hot water
15. Flow switch for tap water priority (option)
16. Safety temperature limiter, domestic hot water (option)
17. Valve to top up the heating circuit
18. Safety valve, heating circuit
19. Expansion vessel, heating circuit, 12 litres
20. Filter for heating circuit
21. Pressure gauge, heating circuit
22. Underfloor heating thermostat (option)
23. Circulation pump, heating circuit
24. Shut off valves (6 pcs)
25. District heating media, supply
26. District heating media, return
27. Cold water (cw)
28. Hot water (hw)
29. Heating circuit, return
30. Heating circuit, supply

Brass component are of disinfection resistant quality. All connections, DN20, internal threaded. Plumbing connections up or down. Shut-off valves are included, separately packed.

District heating – a good source of heat

District heating is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way. The expansion of district heating to its current level has reduced emission of greenhouse gases from heating by about 20%. The economics of district heating are very competitive compared with other forms of heating.

Operation

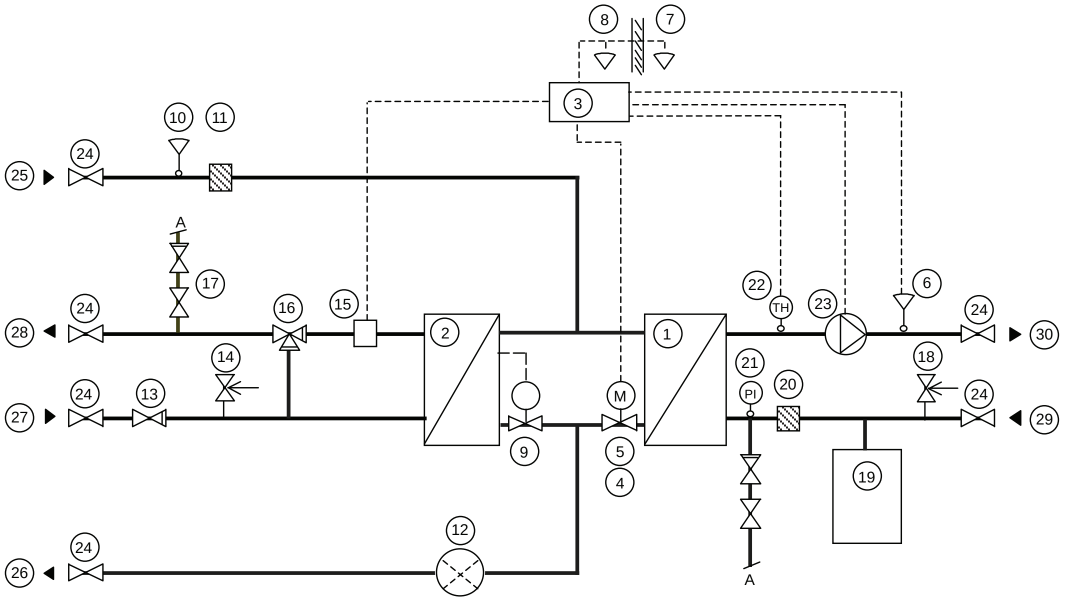
The incoming hot medium from the district heating underground network is at very high pressure and temperature. Therefore, only the heat from this is used; the district heating medium does not mix with the water in the dwelling's heating and hot water system. Heat exchangers are used to transfer heat from the district heating medium to the water in the dwelling's central heating and hot water system. Heat is transferred through a package of thin acid-resistant, stainless steel plates, which keep the district heating medium completely separate from the dwelling's own system.

Mini ECO has automatic temperature control for central heating and hot water. The heating circuit is adjusted in relation to the outdoor temperature and the required indoor temperature via a thermostatic control, outdoor sensor and/or indoor sensor. When no heating flow is required, the heating circulation pump stops automatically, but is run occasionally to prevent seizing up due to standing still for a long time. H737 has an easy to use interface and built in energy saving functions.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

The district heating utility company registers use of energy. Measurement is done by recording the flow of district heating medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Mini ECO



For underfloor heating systems
Underfloor heating systems normally require a high-capacity circulation pump, preferably electronically controlled. An under floor water flow greater than 0.40 l/s use underfloor heating version. If combined with radiator circuits, the underfloor heating circuit must be separately controlled. The instructions of the under floorheating supplier must also be checked.

An easily manageable, economical and durable source of heat

The Mini ECO uses the hot district heating medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system. The Mini ECO is a wall-hung unit and is very compact. Substations may generate sounds during operation caused by pumps, regulators systems, flow etc. The unit is discreet and to minimize transmission of operational sounds, we recommend to install it on well insulated walls or on walls of concrete. Mini ECO requires no attendance or maintenance and has a very long operational life. In the event of requiring service or component exchange at some future date, all parts are easily accessible and individually replaceable.

Operating data

	District heating network	Heating circuit	Hot water circuit
Design pressure, MPa	1.6	0.6	1.0
Design temperature, °C	120	100	100
Relief valve opening pressure, MPa	-	0.25	0.9
Volume, l	0.55/0.45	0.59	0.48

Performance at available primary differential pressure 100-600 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-22/10-55	75	0.31	22	0.40
70-25/10-58	49	0.26	25	0.24
65-22/10-50	54	0.30	22	0.32
Heating circuit				
115-65/60-80	40	0.18	63	0.48
100-63/60-80	21	0.14	63	0.25
100-43/40-60	37	0.16	43	0.44
100-33/30-37	16	0.05	31	0.55

Underfloor heating version

115-33/30-37	23	0.06	31	0.79
100-33/30-37	23	0.08	31	0.79

Other information

Electrical data: 230 V, single phase, 100 W
Dimensions: 577 mm width x 458 mm depth, 770 mm height
Weight: 31 kg, casing 5 kg
Transport particulars: Total weight 40 kg, volume 0.23 m³

Connections	Screws
District heating media supply	G ¾
District heating media return	G ¾
Heating circuit supply	G ¾
Heating circuit return	G ¾
Cold water	G ¾
Hot water	G ¾

CE ISO 9001:2008

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Mini XL

District heating substation for single and multi-family houses (1-8 dwellings)

The Mini XL district heating substation is ready for installation to meet the complete central heating and hot water requirements. It is suitable for single-family houses and multi-family buildings (1-8 dwellings) that are connected to a heating network.

Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Mini XL, resulting in its practical function and ease of use. All components are easily accessible for inspection and future servicing when required.

High comfort

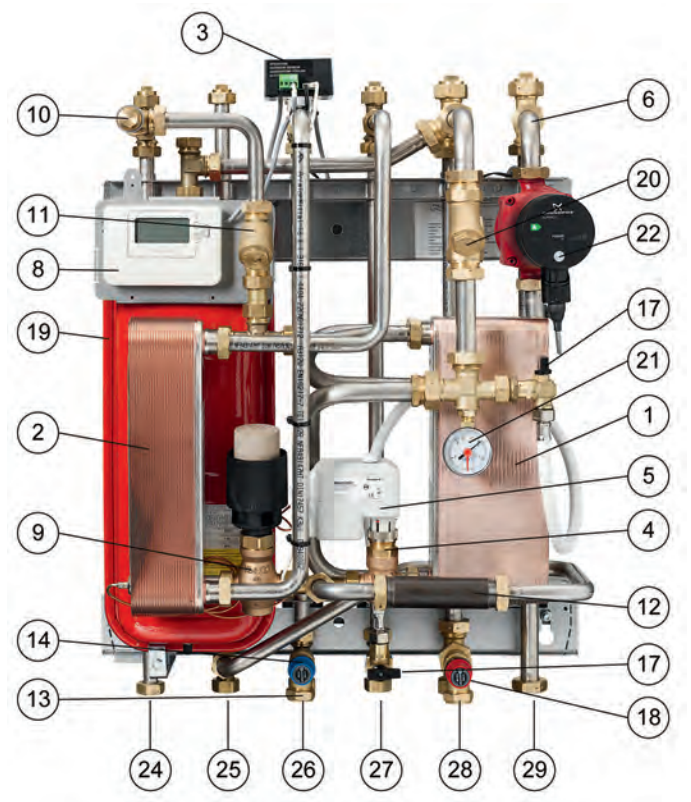
The Mini XL has a fully automatic individual temperature setting for central heating and hot water. Heat is automatically regulated, depending on outdoor temperature and/or the desired temperature inside the building. Domestic hot water is heated completely separately in a high-capacity heat exchanger; thus ensuring that the hot water is always as fresh as the incoming cold water mains supply.

Simple installation

Compact dimensions, lightweight, well-planned pipe runs and factory-installed interior electrical routing all make installation very simple. In addition, the pipes can be connected up or down depending on the layout of the building. The preprogrammed control device and plug connection make life even simpler in that the system can be activated immediately.

Long-term security

The Mini XL represents the most modern technology, and provides the answer to stringent demands for long-term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. The Mini XL is CE marked to certify that the substation conforms to international safety regulations.



Components

1. Heat exchanger for heating
2. Heat exchanger and temperature controller for hot water
3. Connection box for electric power and sensors, heating circuit
4. Control valve for heating circuit
5. Actuator, heating circuit
6. Supply temperature sensor, heating circuit
7. Outdoor temperature sensor
8. Room thermostat/control panel
9. Control valve for hot water
10. Temperature sensor connection, district heating supply
11. Filter for district heating supply
12. Adapter for energy meter
13. Non-return valve for cold water
14. Safety valve, domestic hot water
16. Safety temperature limiter, domestic hot water (option)
17. Valve to top up the heating circuit
18. Safety valve, heating circuit
19. Expansion vessel, heating circuit, 12 litres
20. Filter for heating circuit
21. Pressure gauge, heating circuit
22. Circulation pump, heating circuit
23. Shut-off valves (6 pcs)
24. District heating media, supply
25. District heating media, return
26. Cold water (cw)
27. Hot water (hw)
28. Heating circuit, return
29. Heating circuit, supply

Brass components are dezincification resistant quality. Connections for district heating and tap water DN20, internal threading. Connections for heating DN25, internal threading. The pipes can be connected up and/or down. Shut-off valves are included and come with the delivery.

District heating – an excellent heating method

District heating is an efficient technology that meets the need for central heating and hot water in a simple, convenient and secure way. The expansion of district heating to its current level has reduced the emission of greenhouse gases from heating by about 20%. The economics of district heating are very competitive compared with other forms of heating.

Operation

The incoming hot medium from the district heating underground network is at very high pressure and temperature. Therefore, only the heat from this is used; the district heating medium does not mix with the water in the dwelling's heating and hot water system.

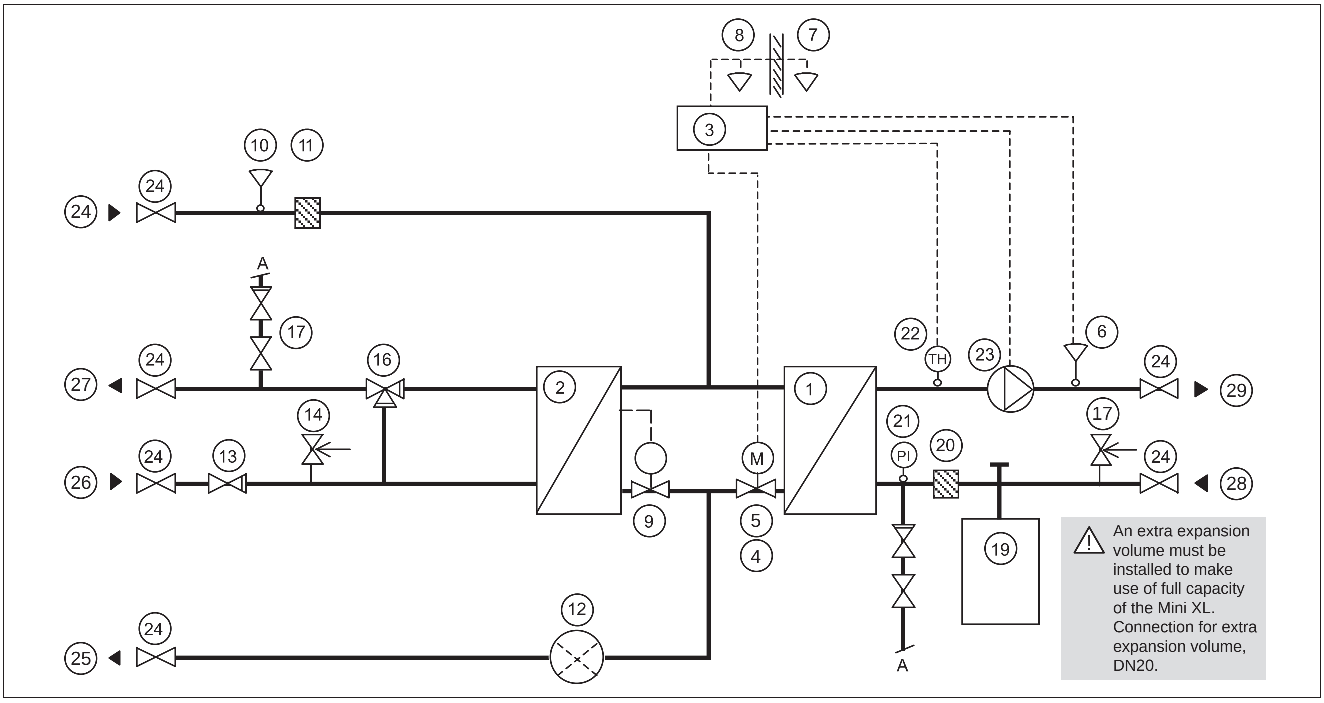
Heat exchangers are used to transfer heat from the district heating medium to the water in the dwelling's central heating and hot water system. Heat is transferred through a package of thin acid-resistant, stainless steel plates, which keep the district heating medium completely separate from the dwelling's own system.

Mini XL has automatic temperature control for central heating and hot water. The heating circuit is adjusted in relation to the outdoor temperature and the required indoor temperature via a thermostatic control, outdoor sensor and/or indoor sensor. When no heating flow is required, the heating circulation pump stops automatically, but is run occasionally to prevent seizing up due to standing still for a long time. H737 has an easy-touse interface and built-in energy-saving functions.

A self-sensing temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow. This patented, in-house Alfa Laval design gives a constant hot water temperature irrespective of volume and pressure flow.

The district heating utility company registers use of energy. Measurement is done by recording the flow of the district heating medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Mini XL



An extra expansion volume must be installed to make use of full capacity of the Mini XL. Connection for extra expansion volume, DN20.

An easily manageable, economical and durable source of heat

The Mini XL uses the hot district heating medium for heating the domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system. The Mini XL is a wall-hung unit and is very compact. Substations may generate sounds during operation caused by pumps, regulator systems, flow, etc. The unit is discreet and to minimise the transmission of operational sounds, we recommend installing it on well-insulated walls or on walls of concrete. The Mini XL requires no attendance or maintenance and has a very long operational life. In the event of requiring service or component exchange at a later date, all parts are easily accessible and individually replaceable.

Operating data

	District heating medium	Heating circuit	Hot water circuit
Design pressure, MPa	1.6	0.6	1.0
Design temperature, °C	120	100	100
Opening pressure, safety valve, MPa	-	0.25	0.9
Volume, l	1.0/0.62	1.05	0.64

Performance at available primary differential pressure 100-600 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Sec-ondary flow (l/s)
Hot water circuit				
80-22/10-55	113	0.47	22	0.60
70-25/10-58	70	0.37	25	0.35
65-22/10-50	75	0.45	22	0.42
Heating circuit				
115-65/60-80	67	0.30	63	0.80
100-63/60-80	41	0.26	63	0.49
100-43/40-60	67	0.28	43	0.80

Other information

Electrical data: 230 V, single phase, 100 W

Dimensions (cover): 577 mm width x 458 mm depth, 700 mm height

Weight: 33 kg, casing 5 kg

Transport particulars: Total weight 42 kg, 0.23 m³

Connections	Screws
District heating media supply	G ¾”
District heating media return	G ¾”
Heating circuit supply	G1”
Heating circuit return	G1”
Cold water	G ¾”
Hot water	G ¾”

CE ISO 9001:2008

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Mini Plus

District heating substation for single-family houses and multi-family buildings

The Mini Plus district heating substation is ready for installation to meet the complete central heating and hot water requirements. It can be used for single-family houses or multi-family buildings (1-12 dwellings).

Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Mini Plus, resulting in its practical function and ease of use. All components are easily accessible for inspection and future servicing when required.

High comfort

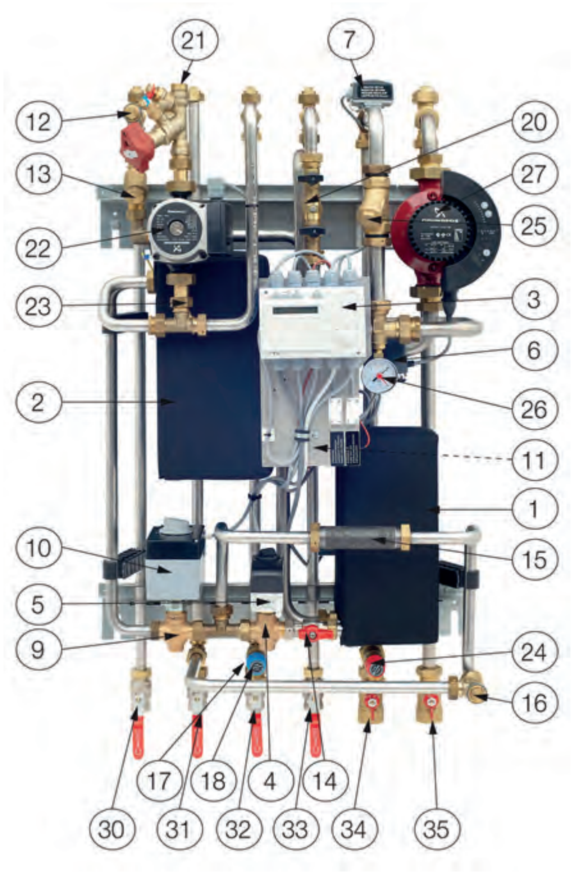
The Mini Plus has a fully automatic individual temperature setting for central heating and hot water. Heat is automatically regulated, depending on outdoor temperature and the desired temperature inside the building. Domestic hot water is heated completely separately in a high-capacity heat exchanger, thus ensuring that the hot water is always as fresh as the incoming cold water from the mains supply.

Simple installation

Compact dimensions, lightweight, well-planned pipe runs and factory-installed interior electrical routing all make installation very simple. In addition, the pipes can be connected up or down depending on the layout of the building. The pre-programmed control device and plug connection make life even simpler in that the system can be activated immediately.

Long-term security

The Mini Plus represents the most modern technology, and provides the answer to stringent demands for long-term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008. The Mini Plus is CE-marked to certify that the substation confirms to international safety regulations.



Components

1. Heat exchanger for heating
2. Heat exchanger for domestic hot water
3. Operator control panel with connection box
4. Control valve, heating circuit
5. Actuator, heating circuit
6. Supply temperature sensor, heating circuit
7. Return temperature sensor, heating circuit
8. Outdoor temperature sensor
9. Control valve for domestic hot water
10. Actuator, domestic hot water
11. Supply temperature sensor, domestic hot water
12. Temperature sensor connection, district heating supply
13. Filter for district heating supply
14. Summer shut-off valve, heating
15. Adapter for energy meter
16. Temperature sensor connection, district heating return
17. Check valve for cold water
18. Safety valve for domestic hot water
19. Flow switch (option)
20. Topping-up heating
21. Balancing valve DHWC
22. Circulation pump for DHWC
23. Check valve for DHWC
24. Safety valve for heating circuit
25. Filter for heating circuit
26. Pressure gauge for heating circuit
27. Circulation pump for heating circuit
28. Underfloor heating thermostat (option)
29. Shut-off valve
30. District heating media, supply
31. District heating media, return
32. Cold water
33. Hot water
34. Heating circuit, return
35. Heating circuit, supply

Brass components are of dezincification-resistant quality. Connections for district heating and tap water DN20, internal threading. Connections for heating DN25, internal threading. The pipes can be connected up and/or down. Shut-off valves are included and come with the delivery.

District heating – an excellent heating method

District heating is an efficient technology that satisfies the need for central heating and hot water in a simple, convenient and secure way. The expansion of district heating to its current level has reduced emission of greenhouse gases from heating by about 20%. The financial aspects of district heating are very competitive compared with other forms of heating.

Operation

The incoming hot medium from the district heating underground network is at very high pressure and temperature. Therefore, only the heat from this is used; the district heating medium does not mix with the water in the heating and hot water system in the building. Heat exchangers are used to transfer heat from the district heating medium to the water in the dwelling's central heating and hot water system.

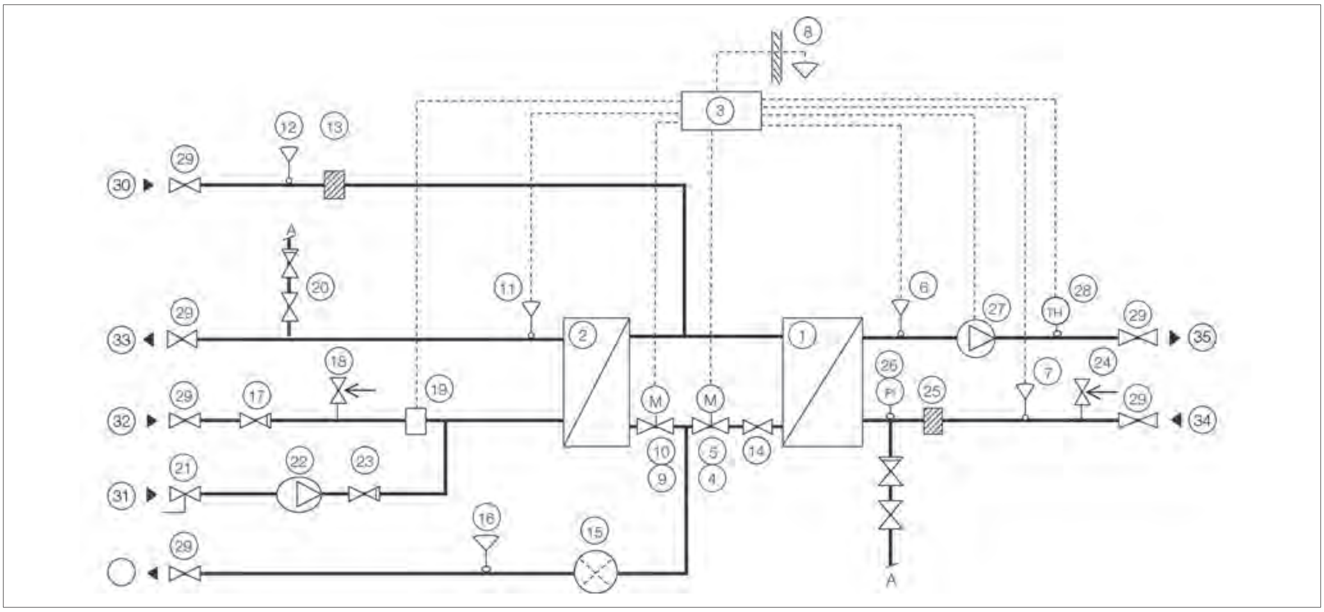
Heat is transferred through a package of thin acid-resistant, stainless steel plates, which keep the district heating medium completely separate from the building's own system.

Mini Plus has automatic temperature control for central heating and hot water. The heating circuit is adjusted in relation to the outdoor temperature and the required indoor temperature via a thermostatic control and outdoor temperature sensor. When no heating flow is required, the heating circulation pump stops automatically, but is run occasionally to prevent seizing up due to long standstill.

An automatic temperature regulator controls the hot water temperature. This measures the temperature of the hot water in the heat exchanger and automatically adjusts the outgoing flow.

The district heating utility company registers use of energy. Measurement is done by recording the flow of the district heating medium through the system, and by measuring the temperature difference between the medium's supply and return flow.

Diagrammatic flow chart for Mini Plus



An easily manageable, economical and durable source of heat

The Mini Plus uses the hot district heating medium for heating domestic hot water (providing an uninterrupted supply) as well as the water in the central heating system. The Mini Plus is a wall-hung unit and is very compact. Substations may generate noise during operation caused by pumps, regulators systems, flow etc.

The unit is discreet, and to minimize transmission of operational noise we recommend installing it on well insulated walls or on walls of concrete. Mini Plus requires no attendance or maintenance and has a very long operational life. In the event service is required or components need to be exchanged at some future date, all parts are easily accessible and individually replaceable.

Operating data

	District heating medium	Heating circuit	Hot water circuit
Design pressure, MPa	1.6	1.0	1.0
Design temperature, °C	120	100	100
Opening pressure, safety valve, MPa	-	0.25	0.9
Volume, l	1.01/1.47	1.05	1.62

Performance at available primary differential pressure 100-600 kPa

Designed temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temp. (°C)	Secondary flow (l/s)
Hot water circuit				
80-22/10-55	113	0.42	16	0.60
70-25/10-58	100	0.48	20	0.50
65-22/10-55	113	0.63	22	0.60
65-22/10-55	82	0.43	20	0.43
Heating circuit				
115-65/60-80	66*	0.30	62	0.79
100-63/60-80	57*	0.37	63	0.68
100-53/50-70	65*	0.33	52	0.78
100-33/30-37	23*	0.08	31	0.79

* With Magna circulation pump

Other information

Electrical data: 230 V, 1-phase, 120 W

Dimensions (cover): 600 mm width x 470 mm depth, 1000 mm height

Weight: 33 kg, casing 5 kg

Transport particulars: Total weight 45 kg, 0.4 m³

Connections	Screws
District heating media supply	G ¾”
District heating media return	G ¾”
Heating circuit supply	G1”
Heating circuit return	G1”
Cold water	G ¾”
Hot water	G ¾”

CE ISO 9001:2008

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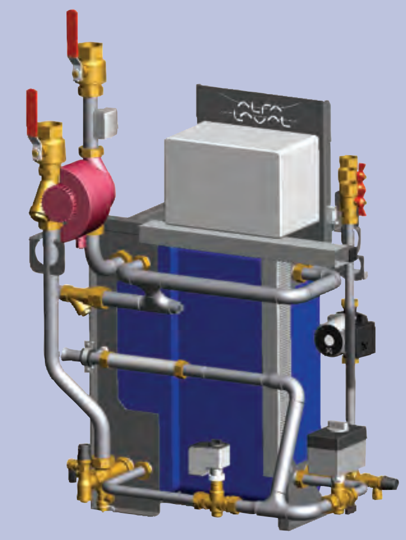
Midi Basic

District heating substation for multi-family houses (10-30 dwellings)



Midi Basic is a complete, ready-to-install district heating substation for heating and hot water. Midi Basic is available in three sizes. The sizes offered are 70, 100 and 135 kW heating, with matching hot water output.

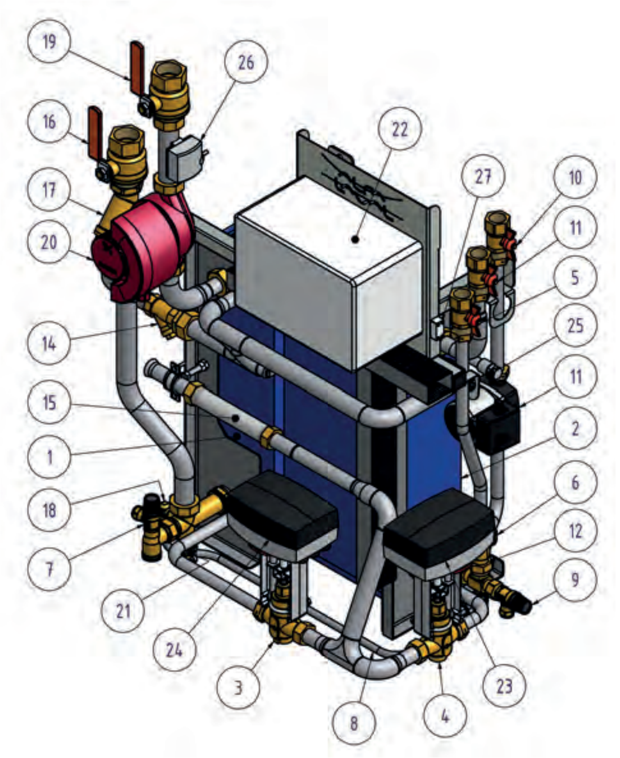
Alfa Laval has many years of experience in district heating technology, which is put to expert use in the Midi Basic, resulting in well-planned pipe-work and with all components easily accessible for inspection and future servicing.

Comfort
Midi Basic has fully automatic temperature control for heating and hot water. The outside temperature is used to control heating. The hot water temperature is set and maintained at the desired temperature.

Simple installation
Compact dimensions, light weight, well-planned pipe runs and factory-installed interior electrical routing all make installation very simple. The pre-programmed control device and plug connection make life even simpler in that the system can be activated immediately.

Long-term security
The Midi Basic represents the most modern technology, and provides the answer to stringent demands for long-term performance. The heat exchanger plates and all piping are manufactured in acid-resistant stainless steel. All components are closely matched and carefully tested for function in accordance with Alfa Laval's quality assurance system ISO 9001:2008.

Midi Basic is CE-marked to certify that the substation conforms to international safety regulations. To maintain the validity of the CE marking, only identical replacement parts may be used.

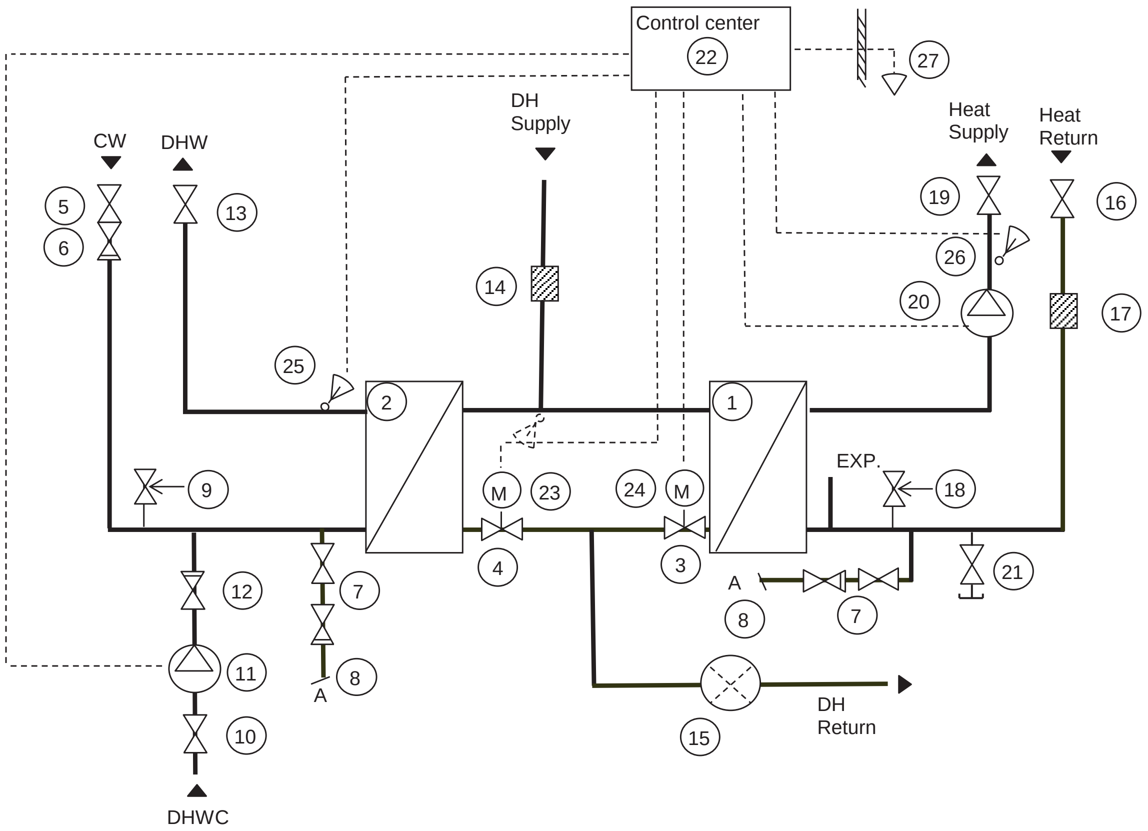


Components

1. Heat exchanger, heating
2. Heat exchanger, DHW
3. Control valve, heating
4. Control valve, DHW
5. Shut-off valve, CW
6. Non-return valve, CW
7. Topping up
8. Hose
9. Safety valve, CW
10. Shut-off valve, DHWC
11. Pump, DHWC
12. Non-return valve, DHWC
13. Shut-off valve, DHW
14. Strainer, primary in
15. Dummy, heat meter
16. Shut-off valve, heating return
17. Strainer, heating return
18. Safety valve, heating
19. Shut-off valve, heat supply
20. Pump, heating
21. Draining valve, heating return
22. Control center *
23. Actuator, DHW *
24. Actuator, heating *
25. Temperature sensor, DHW supply *
26. Temperature sensor, heating supply *
27. Temperature sensor, outdoor *

* Option

Connections for district heating are welded connections in DN32, for tap water side internal threaded connections in G 1" and for heating side internal threaded connections in G 1½".



Operating data

	Primary side	Heating	DHW
Design pressure, PS	16 bar	6 bar	10 bar
Design temperature TS, °C	120	90	90
Relief pressure safety valve SE	-	3 bar	9 bar
Volume, heat exchanger, L	1.4-3.0 / 2.5-3.0	1.55-3.0	2.6-3.1

Performance at available primary differential pressure 100-600 kPa

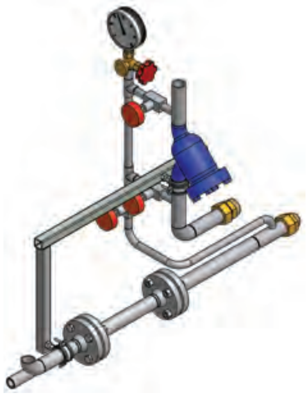
Type	Temperature programme (°C)	Capacity (kW)	Primary flow (l/s)	Actual return temperature (°C)	Secondary flow (l/s)
Heating circuit					
Midi Basic 70	100-63/60-80 100-43/40-60	70 73	0.45 0.31	62.4 41.3	0.84 0.87
Midi Basic 100	100-63/60-80 100-43/40-60	119 116	0.77 0.49	62.2 40.6	1.42 1.39
Midi Basic 135	100-63/60-80 100-43/40-60	139 136	0.90 0.57	62.1 40.4	1.66 1.63
Hot water circuit					
Midi Basic 70	65-22/10-55 70-22/10-55	83 83	0.46 0.41	20.7 17.6	0.44 0.44
Midi Basic 100	65-22/10-55 70-22/10-55	102 102	0.57 0.51	20.4 17.6	0.54 0.54
Midi Basic 135	65-22/10-55 70-22/10-55	121 121	0.67 0.44	22 18.7	0.64 0.64

Connections	Weld
District heating supply	DN32
District heating return	DN32

Connections	Thread
Heating supply	G 1½”
Heating return	G 1½”
Cold water	G 1”
Hot water	G 1”
Hot water circulation	G 1”
Expansion vessel	G ¾”

Other information
Electrical data: 230 V 50 Hz, single phase, 290-315 W
Sound level: <70 dB(A), 1.6 meters above the floor and 1 meter from the sound source
Dimensions: 800 x 570 x 1100 mm (W x D x H)
Weight: 75-90 kg

Options



3-point HB measurement

Underfloor heating thermostat

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Midi Compact

District heating substation for multi-family houses (10-50 dwellings)

Midi Compact is a complete, ready-to-install district heating substation for heating and hot water. Midi Compact is available in four sizes and is designed for buildings that have a primary connection to a district heating network. The sizes offered are 75, 100, 150 and 200 kW heating, with matching hot water output.

Alfa Laval has years of experience in district heating technology and has developed Midi Compact with well-planned pipe-work and with all components easily accessible for inspection and future servicing.

Comfort

Midi Compact has fully-automatic temperature control for heating and hot water. The outside temperature is used to control heating. The hot water temperature is set and maintained at the desired temperature. The unit has been designed with a two-step connection in order to optimize cooling of the primary return.

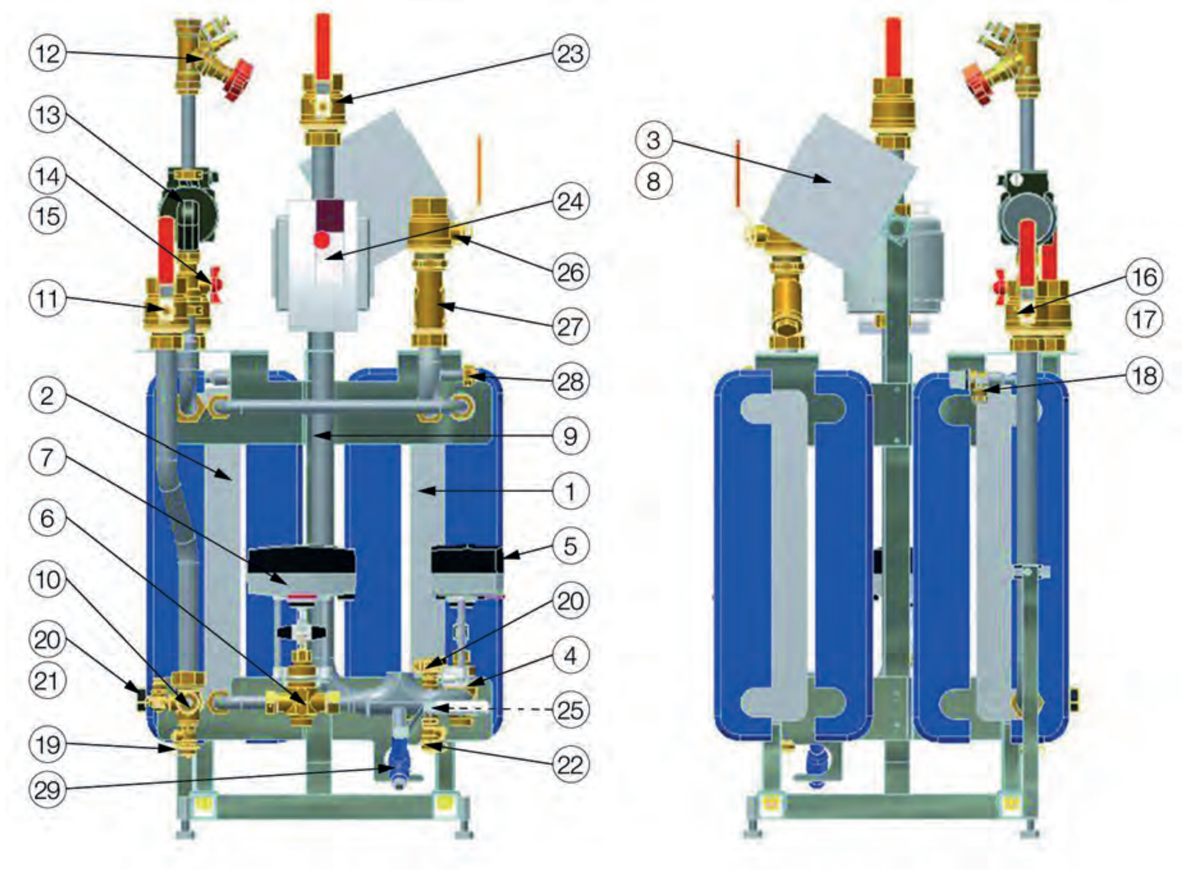
Installation

Installation is easy due to well planned pipe-work and pre-wiring. In addition, there is a pre-programmed controller and plug and- socked connection, which makes it easy to start the substation without delay. With its small size and light weight, the Midi Compact is easy to install and maintain in both new and renovated buildings.

Long-term security

All of the plates and pipes in the heat exchanger are made of acid-resistant stainless steel for long life. All components are adjusted together and undergo thorough functional testing in accordance with Alfa Laval's ISO 9001:2008 quality assurance system. All components are easily accessible and can be individually replaced in order to facilitate future servicing.

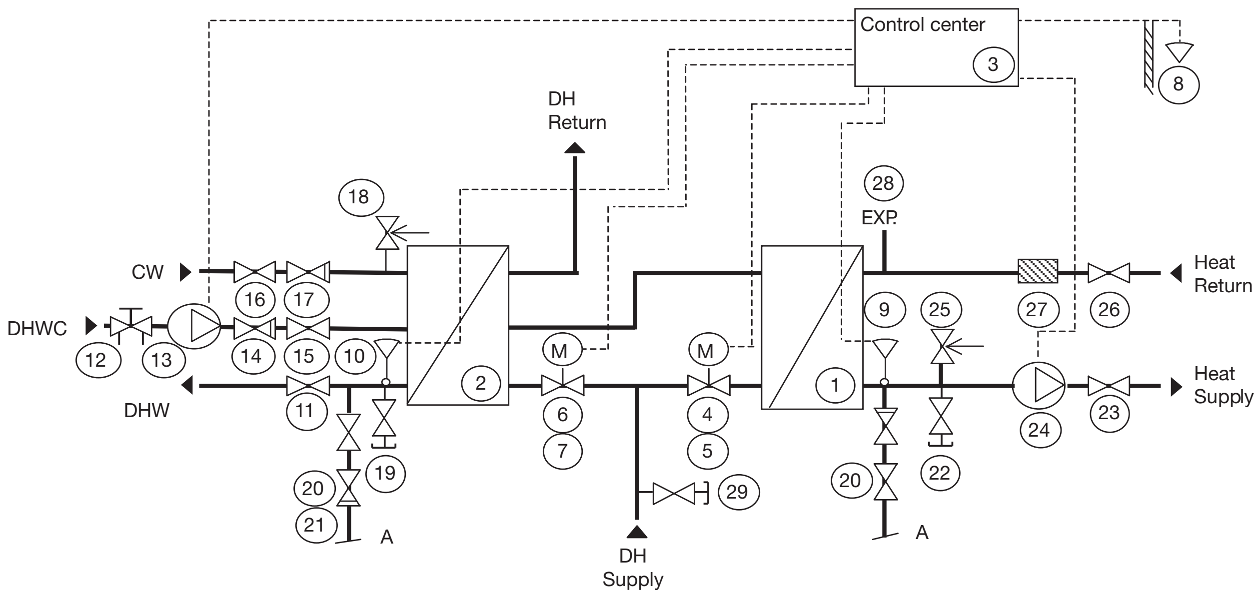
Midi Compact is CE-marked to certify that the substation conforms to international safety regulations. To maintain the validity of the CE marking, only identical replacement parts may be used.



Components

1. Heat exchanger, heating
2. Heat exchanger, DHW
3. Control center *
4. Control valve, heating
5. Actuator, heating *
6. Control valve, DHW
7. Actuator, DHW *
8. Temperature sensor, outdoor *
9. Temperature sensor, heating supply *
10. Temperature sensor, DHW supply *
11. Shut-off valve, DHW
12. Balancing valve, DHWC
13. Pump, DHWC
14. Non return valve, DHWC
15. Shut-off valve, DHWC
16. Shut-off valve, CW
17. Non return valve, CW
18. Safety valve, CW
19. Draining valve, DH supply
20. Topping up
21. Hose
22. Draining valve, heat supply
23. Shut-off valve, heat supply
24. Pump heating
25. Safety valve, heating
26. Shut-off valve, heating return
27. Strainer, heat return
28. Connection expansion vessel
29. Draining valve, DH supply

* Option



Operating data	**Primary side**	**Heating**	**DHW**
Design pressure, PS	16 bar	6 bar	10 bar
Design temperature TS, °C	120	100	100
Relief pressure safety valve SE	-	3 bar	9 bar
Volume, heat exchanger, L	1.81-4.66 / 1.81-3.2	1.9-4.75	1.81-3.2

Performance at available primary differential pressure 100-600 kPa

Type	**Temperature programme (°C)**	**Capacity (kW)**	**Primary flow (°C)**	**Actual return temperature (°C)**	**Secondary flow (l/s)**
Heating circuit					
Midi Compact 75	100-63/60-80	75	0.51	63	0.91
	100-43/40-60	106	0.47	43	1.29
Midi Compact 100	100-63/60-80	114	0.77	63	1.39
	100-43/40-60	151	0.66	43	1.83
Midi Compact 150	100-63/60-80	155	1.04	63	1.89
	100-43/40-60	188	0.82	43	2.27
Midi Compact 200	100-63/60-80	195	1.31	63	2.38
	100-43/40-60	216	0.94	43	2.61
Hot water circuit					
Midi Compact 75	65-22/10-55	110	0.61	22	0.58
	70-22/10-55	131	0.66	20.3	0.7
Midi Compact 100	65-22/10-55	109	0.61	22	0.58
	70-22/10-55	131	0.63	20.3	0.7
Midi Compact 150	65-22/10-55	147	0.82	22	0.78
	70-22/10-55	169	0.81	20	0.9
Midi Compact 200	65-22/10-55	184	1.03	22	0.98
	70-22/10-55	207	0.99	19.8	1.1

Connections	**Weld**
District heating supply	DN32
District heating return	DN32

Connections	**Thread**
Heating supply	G 1½”
Heating return	G 1½”
Cold water	G 1½”
Hot water	G 1½”
Hot water circulation	G 1”
Expansion vessel	G ¾”

Other information
Electrical data: 230 V 50Hz, single phase, 227-458 W
Sound level: <70 dB(A), 1.6 meters above the floor and 1 meter from the sound source
Dimensions: 800 mm width x 600 mm depth, 1300 mm height
Weight: 80-110 kg

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for
all countries are always available on our
website on www.alfalaval.com

Maxi

Large district heating substation

Maxi is a district heating unit of high quality from Alfa Laval. It has defined base solutions that are made for the needs of space heating and tap water heating in larger buildings, or when special needs should be fulfilled.

Applications
Maxi heating units fits many requirements, from multifamily houses to factories, and for both new installations and replacing old. Maxi is designed from type of building and needs, temperatures and capacities in the heated building.

Many of the modularized functions in Maxi can be chosen and added to fit the needs even better. Possible is 1 to 3 heat exchangers for heating and 1 for heating tap water. From 20 to 2000 kW heating capacity is available in the modularized range. Almost any function, flow chart and capacity is available as an engineered solution.

Characteristics
Maxi is a heating unit based on brazed heat exchangers from Alfa Laval. Due to the modularized concept a MAXI has a relatively short delivery time. The units are compact, and ready to connect to any buildings pipe systems, as well as for the district heating pipe network.

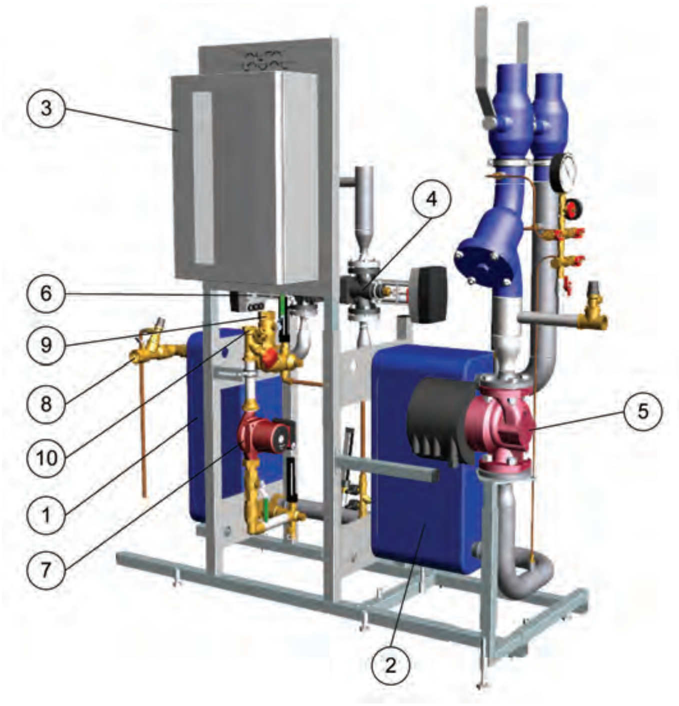
Design
A software is used to calculate and configure a MAXI. Basic functions wanted, design data, components calculation and choice, pipe sizes, pump calculation etc is main input to the design work. This tool is also available in a customer version, Alfa Select.

Components
All components and sizes are designed from input data like temperatures, capacities, pressure demands and other needs. Alfa Laval uses only well-known brands and high quality components in Maxi systems. Many pipe parts has been designed by Alfa Laval, to ensure quality and function.

Maxi can preferably be equipped with electronically controlled pumps to ensure optimal energy use. Maxi has a control cabinet with controller and pump switching functions. Depending on need of the customer or the building different brands and complexity of control equipment can be used. In a Maxi, Alfa Laval´s own IQHeat is a good choice of controller, with very good possibilities of communication and optimization from a distance, to manage best energy use possible.

Heat exchangers
In Maxi, Alfa Laval brazed heat exchangers are most often used, both for tap water and space heating. Also plate heat exchangers (PHE) can be used, if customer demands, or capacity requires so. In some areas PHE are used for the possibility to disassemble and clean the heat surfaces.

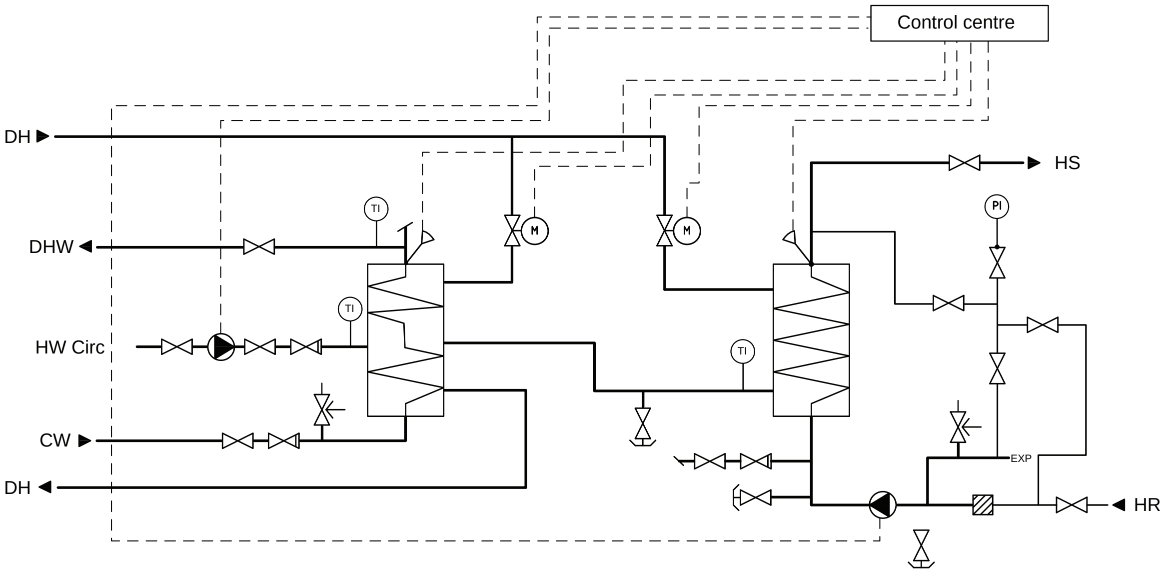
Our brazed heat exchangers are made in stainless steel and pure copper. We always use threaded or flanged connections on the heat exchangers in our systems, for easy demounting and service. Heat exchangers are insulated with 30 mm environmental friendly polyurethane foam with an ABS plastic surface.



Components

1. Heat exchanger (domestic hot water)
2. Heat exchanger (heating)
3. Controller cabinet
4. Control valve (heating)
5. Pump secondary (heating)
6. Control valve (domestic hot water)
7. Pump, domestic hot water circulation
8. Cold water inlet
9. Hot water outlet
10. Hot water circulation

Example of a flow chart for a Maxi with one circuit for hot water heating and one for space heating, 2-step connected.



Design data

	District heating	Domestic hot water	Heating
Design pressure PS	16-25 bar	10 bar	6 bar
Design temperature TS, °C	120	100	100

Maxi capacity and measure table

Dimensions of Maxi C1 with typical capacities

Capacity (kW)					
Hot water	Heating	Length mm	Width mm	Height mm	Weight kg
200	100	1500	660	1550	100
350	200	1650	660	1550	150
400	300	1650	660	1600	170
500	500	1750	700	1650	230

Typical design data, others on demand. Example measure table from a Maxi with tap water and space heating, pumps included. Other configuration or layout will influence measures and weight. Electrical panel height is about 1750 mm.

Tests and certifications

Our quality assurance system at Alfa Laval is in accordance with ISO9001. The systems are CE approved and manufactured in accordance with the Pressure Equipment Directive and its harmonized standards. All circuits are pressure tested with water at min 1,43 x PS. Electrical function and safety tests are performed on wired components

Advantages

- Open layout with a design that give good overview over its different components and circuits. This makes service and maintenance easier.
- Prefabricated optimized system with all components tested provides for less trouble during installation and startup, and better performance over many years of service.
- Compact design makes it easy to take unit in to installation room.

All documentation is placed in a binder behind electrical panel

AlfaSelect – calculation program

Available in a customer version for design of Maxi substations. User interface and printouts are available in many languages. Program is updated through internet. Contact Alfa Laval to get a free version of the program.

Adjustable feet simplifies installation

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

Maxi C1

District heating substation

The Maxi C1 is a high-quality and standardised district heating substation by Alfa Laval. It features readymade basic although configurable solutions for all heating and domestic hot water requirements.

Applications
The Maxi C1 District Heating Substation is appropriate for a wide range of uses from single small multi-family houses to blocks of multi-family houses as well as both new and renovated buildings. Maxi C1 is always built to dimensions appropriate to the site.

General features
Maxi C1 is a district heating substation based on limited component selection by Alfa Laval. Due to its standard component solutions, the delivery time is short. The dimensions of property doors have been taken into account in the construction of the unit, making it easy to move the Maxi C1 indoors and connect it to the building's heating system.

Dimension
In constructing the substation, the Alfa System Select calculation software is utilised. The selection of components is defined by, for instance, capacity, temperatures and the maximum pressure drops.

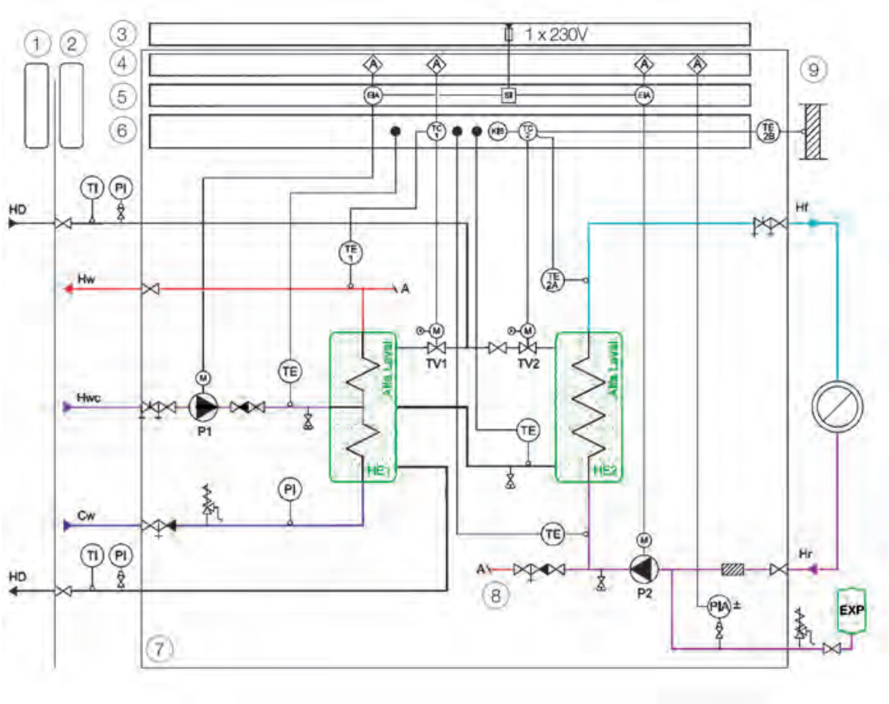
Components
All components and pipes are measured and selected according to the dimensions and requests from the designers and authorities. Alfa Laval uses only well-known components tested by themselves in its products. Most pipes and brass parts are developed by AL. Maxi C1 can be equipped with either a constant-curve or intelligent speed controlled E-pump for the heating side. Maxi C1 includes a Combibox solution which contains the control centre and pump switches in the same well protected (IP54) cabin. GSM modem accessory for remote control and the ability to read by SMS message can be added (dependant upon the control centre). Temperature measurements can be obtained from the control centre or by using normal thermometers.

Brazed heat exchangers
In Maxi C1 District Heating Substations, brazed plate heat exchangers are BHE, incorporated as standard. The BHE is made of acid-proof steel and is brazed with pure copper. Considering its size, the BHE is quite powerful, since practically all the material used within functions as a heat exchange surface. Due to the threaded and flanged coupling employed, the heat exchangers are always easy to detach. The heat exchangers are insulated with 30 mm environmentally- friendly, Freon-free polyurethane which can be easily opened, and are coated with hard ABS plastic.

Components

1. Heat exchanger (domestic hot water)
2. Heat exchanger (heating)
3. Combi-box including control centre and pump switches
4. Control valve, heating
5. Pump, heating
6. Control valve, domestic hot water
7. Pump, domestic hot water circulation
8. District heating, return
9. Cold water
10. Domestic hot water
11. Domestic hot water circulation
12. District heating supply
13. Heating, return
14. Heating, supply

Typical flow chart for Maxi C1. Components may vary due to individual calculaitons



1. Heat supplier
2. Customer
3. Electric main supply
4. Alarm centre
5. Pumps control centre
6. Control centre/temp. metering centre
7. Alfa Laval's Maxi C1 delivery limit
8. Filling
9. Control centre incl. alarm operation (with EH-203)

Operating data

	District heating	Domestic hot water	Heating
Design pressure	16 bar	10 bar	6 bar
Design temperature, °C	120	100	100

Approvals and reliability

Alfa Laval's quality system observes the ISO 9001 standard. All products are manufactured in accordance with CE and PED requirements. Maxi C1 fulfils all local and national authority requirements.

Dimensions of Maxi C1 with typical capacities

Type		Substation dimensions (mm) / Weight (kg)			
Domestic water	Heating	Length	Width	Height	Weight
200	100	1500	660	1550	100
350	200	1650	660	1550	150
400	300	1650	660	1600	170
500	500	1750	700	1650	230

Benefits

- With clear frame solutions it is possible to assemble the unit close to the wall. Service and maintenance work is also easy to carry out with all components situated at the front of substation.
- Modularised component and piping solutions aid installation, and options are easy to add.
- Strong and stable frame ensures unbreakable transportation and extended lifetime for the unit.
- Clear positions for primary and secondary sides.
- Due to the narrow construction the unit is easy to transfer to the technical room.

All documents, e.g. instructions, are placed in a box located behind the electrical panel.

Adjustable feel aid installation.

AlfaSelect – calculation tool for dimension work

For the design of the Maxi C1 unit Alfa Laval offers advanced calculation software. Some of the features can be found at AlfaSelect:

- Easy and fast to use
- Several languages are available for displays and printouts
- Internet updating
- Multiple printouts; technical specification, flow chart, measurement details etc.

To get this free software please contact Alfa Laval sales.

How to contact Alfa Laval
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Maxi Cooling

District cooling substation for larger buildings

Maxi Cooling substations are high-quality, district cooling substations designed by Alfa Laval. They feature ready-made basic, configurable solutions for all cooling requirements.

District cooling

There are many advantages of using district cooling. For instance, district cooling is an environmentally friendly way of producing and distributing cooling. Free sources of cooling like seawater or groundwater could be used for example.

As for property owners, district cooling is a simple and reliable method of creating a pleasant indoor climate. Another positive effect could be the reduction of noise in the building as there would be no need for noisy coolers connected.

Applications

A district cooling substation is suitable for a wide range of uses when connecting different types of buildings such as offices, public buildings, commercial buildings, etc. to the district cooling network. The dimensions of the unit can be adjusted to the site.

General features

Each unit is delivered as a ready-made module in a solid frame with flange connections for simple assembly with the heat exchanger. With concern for the customer, depending on its size and weight Alfa Laval can deliver the substation in sections. The PHE will then be delivered separately and the frame with the pipes will be delivered as one unit to be connected to the PHE. If Alfa Laval's IQHeat control unit is chosen, all electrical equipment will be internally connected to the control box and tested. Maxi Cooling substations have a compact design and leave a small footprint in relation to their capacity. They are easily installed and put into operation. The unit can be supplied with or without a meter section, secondary equipment and pump.

Dimensions

Thanks to its flexible design, the Maxi Cooling unit can be easily optimised for different temperature programmes, such as 6-16/17-7 or 6-16/18-8. Maxi Cooling units are dimensioned based on flow, temperature and pressure drop according to the table below.

Calculation data

The temperature programmes 6-16/7-17 ºC and 6-16/8-18 ºC are typical for district cooling.

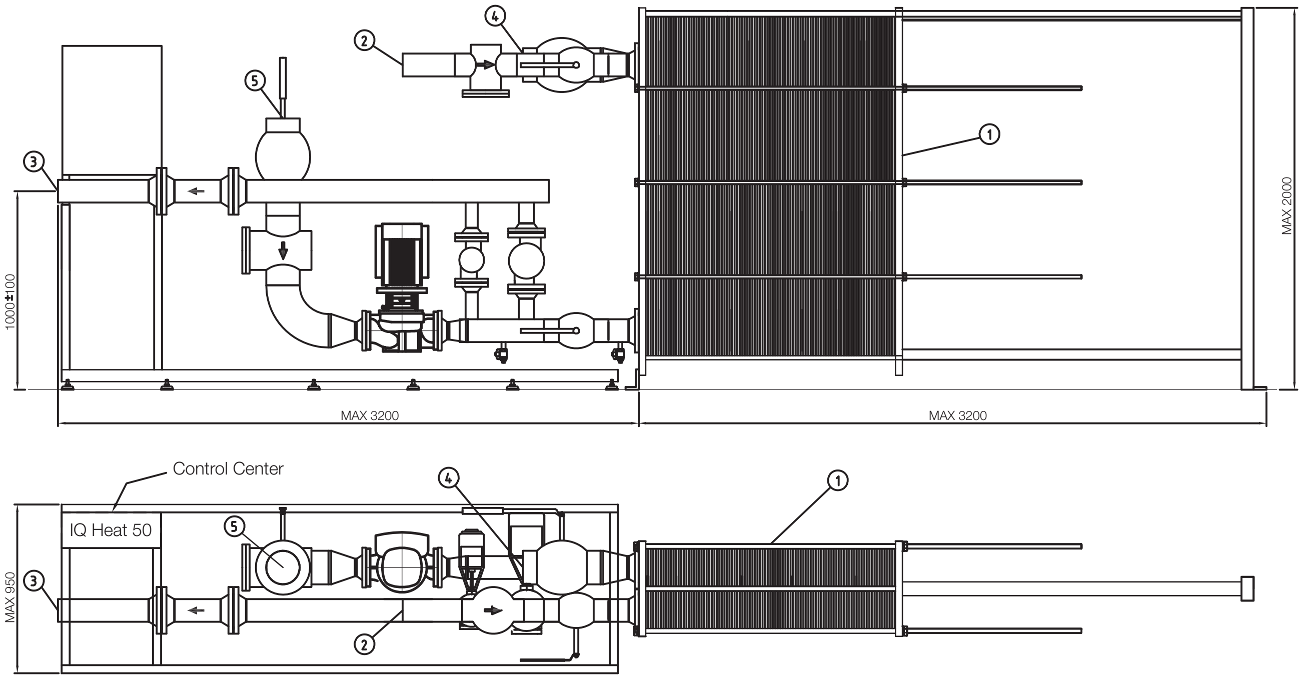
Type	Capacity kW	Temperature programme °C	Heat exchanger	Pipe connection P/S DN
Maxi Cooling	100	6-16 / 17-7	TL6B	50 / 65
Maxi Cooling	200	6-16 / 17-7	TL6B	65 / 65
Maxi Cooling	400	6-16 / 17-7	TL10B	80 / 100
Maxi Cooling	600	6-16 / 17-7	TL10B	100 / 125
Maxi Cooling	700	6-16 / 17-7	TL10B	100 / 125
Maxi Cooling	100	6-16 / 18-8	TL6B	50 / 65
Maxi Cooling	200	6-16 / 18-8	TL6B	65 / 65
Maxi Cooling	400	6-16 / 18-8	TL6B	80 / 100
Maxi Cooling	600	6-16 / 18-8	TL10B	100 / 125
Maxi Cooling	800	6-16 / 18-8	TL10B	100 / 125
Maxi Cooling	1000	6-16 / 18-8	TL10B	125 / 125
Maxi Cooling	1200	6-16 / 18-8	TL10B	125 / 150

The table above should be seen as a guideline: other combinations may apply depending on the conditions. Alfa Laval is able to provide customized solutions for any level of capacities.

Benefits

- Energy efficient and environmental friendly
- All Maxi Cooling substations include high-quality components
- The unit is designed for easy servicing and maintenance work
- Modularised component and piping solutions aid installation and options are easy to add
- Clear positions for primary and secondary sides
- Easy to transfer to the technical room and install due to the narrow design of the unit and the frame
- The heat exchangers are optimised for cooling applications
- Customised substations can be provided
- ISO 9001 and ISO 14001 certified
- Manufactured according to PED 97/23/EC

Maxi Cooling substation with maximum measurements based on TL10B



1. Heat exchanger cooling TL10
2. DC supply
3. DC return
4. Cooling supply
5. Cooling return

Components

All components and pipes are selected according to requests. Alfa Laval always uses well-known components for its products. All the pipes included can be supplied in either stainless steel or carbon steel, with the option of also being anti-corrosion treated.

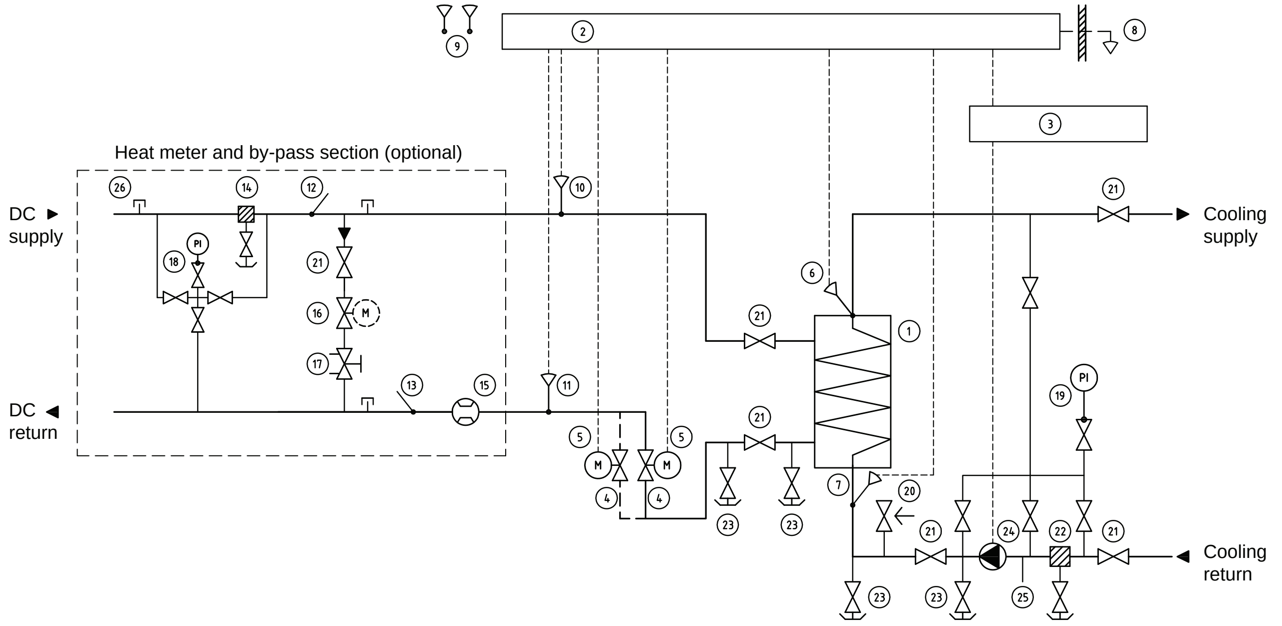
Alfa Laval's own IQHeat control unit is the standard control module. Alternatively, the Maxi Cooling substation can be delivered with valves and 0-10V actuators for DDCs chosen by the customer.

The Maxi Cooling substation can be delivered without a meter section, by-pass section and without secondary side equipment.

All units can be delivered with an optional drip tray for the condensate. All the components included can be easily reached for servicing and inspection. All Maxi Cooling substations can be equipped with capacity controlled pumps.

Design

The main component in the unit is Alfa Laval's TL6B or TL10B heat exchanger, with especially good thermal properties and a heat transfer ability suited to district cooling applications. Other heat exchangers may also be used in smaller and bigger capacities.



1. Heat exchanger cooling
2. Control center IQHeat
3. Pump control box
4. Control valve cooling *
5. Actuator cooling 0-10 V
6. Temp. sensor cooling supply
7. Temp. sensor cooling return
8. Temp. sensor outdoor
9. Temp. sensor reference 1,2 (optional)
10. Temp. sensor primary supply control centre
11. Temp. sensor primary return control centre
12. Temp. sensor primary supply energy meter
13. Temp. sensor primary return energy meter
14. Strainer district cooling with drain
15. Dummy for energy/flow meter
16. Magnetic valve/self acting valve
17. Flow adjuster valve
18. Manometer district cooling
19. Manometer cooling circuit
20. Safety valve
21. Shut-off valve
22. Strainer cooling return with drain
23. Drain valve (ball valve)
24. Circulation pump cooling circuit
25. Expansion connection
26. Air vent

* Depending on capacity the flow will be split over 1-3 valves

The flow chart shows an example of a typical cooling substation. The complete substation varies in size depending on its cooling capacity and what modules are chosen. Measures with TL10.

Max. width: 950 mm
Max. height: 2000 mm
Max. length: Depending on capacity and chosen equipment

Operating data

	District cooling	Secondary side
Design pressure (bar)	PN10/16	10
Design temperature	0-60°C	0-60°C

IQHeat control unit

With Alfa Laval's own IQHeat control unit it is possible to add several applications for performance control. IQHeat is a ready-made intelligent control unit with potential for web-applications and support for communication with building management system protocols; OPC, BACnet/IP, TCP/IP, M-bus, and LON. There are several additional services that can be added to the control unit such as optimisations and alarm-handling.

Approvals and reliability

Alfa Laval's quality system is ISO 9001 and ISO 14001 certified. All products are manufactured in accordance with CE and PED requirements. Maxi Cooling substations fulfil all local and national requirements.

How to contact Alfa Laval
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website on www.alfalaval.com

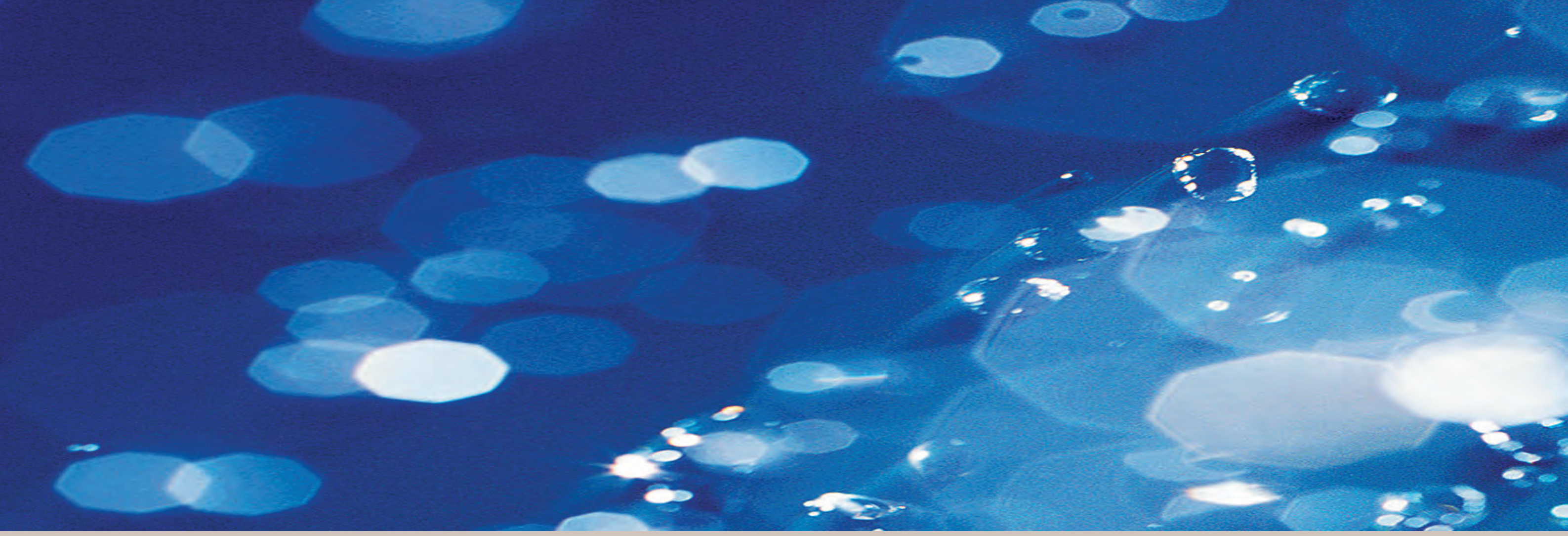
Chapter 11

Tap-water systems

Alfa Laval offers a wide range of tap-water systems for any collective use of domestic hot water.
With more than 30 years of experience, we can offer our customers not only the cost-effective but also the safest and healthiest solutions.
Our tap-water systems minimize the energy bill, eliminate any risk of legionella and are designed to keep sufficient hot water running during peak consumption.

A tap-water system is much more than a heat exchanger; it combines the Alfa Laval know-how of heat exchangers with a perfect knowledge of quality materials and professional skills, in order to offer a complete, ready-to-use hot-water system to the customer.

All Tap Water Systems are pre-assembled, pre-mounted, pre-wired, pre-tested and pre-set to customer needs by Alfa Laval. We offer hot water the fast way, which means valuable time and quality are gained by the customer.



Ten good reasons to buy Alfa Laval's tap-water systems

1. Hot water the fast way

Alfa Laval´s tap-water systems are pre-assembled, pre-mounted, pre-wired, pre-tested and pre-set for our customer. He just needs to plug the system and connect it to his pipe work. It will take him just a few hours rather than several days. We offer hot water the fast way, which means valuable time and quality to gain for the customer.

2. Energy savings

No need to have high-volume storage tanks on site with immersion heaters or heating coils. Their heat transfer is poor by design, and the tank loses heat, just by being big.
This is not the case for Alfa Laval's tap-water systems. They are very compact and the heat transfer is extremely effective in their heat exchangers.

3. Reliable

In many places the availability of sufficient hot water at any time of day is critical. Tap-water systems are real value for money: it combines the Alfa Laval know-how of heat exchangers with a perfect knowledge of quality materials and professional skills to offer a complete ready-to-use hot-water system.

Hot water the slow way

Hot water the fast way

4. Health Security

Enclosed, warm storage vessels, pipe work with lots of blind spots and under-utilized water systems containing stagnant water provide an ideal environment for legionella bacteria to flourish.
Alfa Laval has designed a specific tap-water system – called AquaProtect – to eliminate any risk of legionella in customer premises.
Also our conventional tap-water units are equipped with a thermal treatment function in order to reduce the risk of legionella proliferation.

5. Reduced scaling

The turbulent flow through the heat exchanger reduces scaling considerably. The primary-side mixing valve also contributes to a minimum of scaling as it eliminates thermal shock in the heat exchanger.
Moreover, the controller's scaling function warns when scaling is threatening, so that cleaning can be planned in time – well before problems occur.

6. Extremely compact and powerful

A tap-water unit corresponds to only 10% of the volume of a 1,500-litre storage tank. Nevertheless, it supplies domestic hot water to more than 600 families living in an apartment block! Amazing, isn't? Small but powerful.

7. Suitable for all domestic hot-water pipe works

The tap-water systems are offered with gasketed, brazed or AlfaNova plate heat exchangers. If the customer has copper piping or fear galvanic effects on site, the best solution is the gasketed plate heat exchanger or the AlfaNova which are both 100% copper free.

8. Minimum of maintenance

Cleaning of the heat exchanger is needed from time to time. Alfa Laval offers time-saving solutions:

- Gasketed plate heat exchangers: the clip-on gaskets are very easily removed and put back in place
- Brazed plate heat exchanger and AlfaNova: thanks to two extra connections on the heat exchanger the Alfa Laval Cleaning In Place (CIP) solution removes all kind of deposit, like scale, sludge and microorganisms.

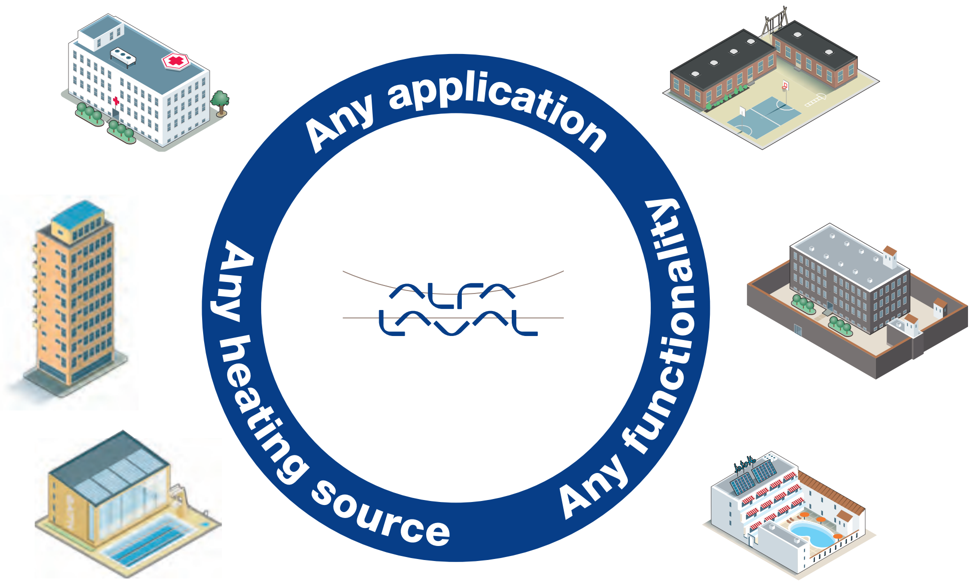
9. Long operating life with After-Sales service

Spare parts are still available for tap-water units delivered more than 20 years ago, proving the robustness of these systems but also the customer-commitment of our After-Sales service.

10. A wide range of solutions

Alfa Laval offers a wide range of efficient solutions for heating tap water. They cover a variety of requirements in terms of temperatures, pressures, components, primary heating sources and functionalities.

Tap water systems for



Tap-water systems, product range

Alfa Laval suggests to modernize your hot-water system with a choice of 3 different levels of product functionality:

Product functionality	**Instantaneous**	**Semi-instantaneous**	**Anti-legionella**	**Renewable**	**Tanks**
"Smart"	 AquaEfficiency		 AquaProtect	 SolarFlow	 Stainless Steel
"Standard"	 AquaFlow	 AquaStore			 Enamel
"Simple"	 AquaEasy	 AquaCompact  AquaEasy			 Carbon Steel

"Smart" range
These products supply hot water with a lot of clever functions for saving energy, like the AquaEfficiency. Other products in the "Smart" product range include the Solarflow using renewable energy and AquaProtect, the anti-legionella solution.

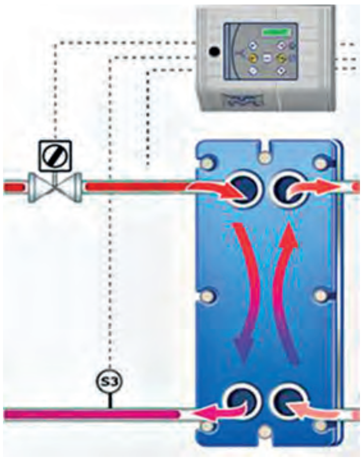
"Standard" range
These products are Alfa Laval's popular mainstream assortment. They have a multi-functional control box for thermal treatment, temperature and scaling alarms, eco and booster pump functionality and much more. Their very long lifetime demonstrates the robustness of these systems.

"Simple" range
These products supply hot water "no more, no less": no more functionality than really needed, but the same Alfa Laval quality. They are simple and strong, which results in a lower price. The customer pays for what he gets: just having hot water.

Why a 2-Port, 3-Port or 4-Port valve?

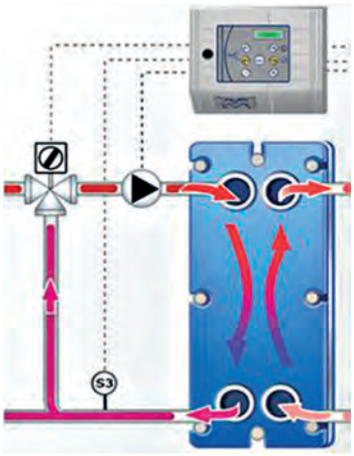
Alfa Laval's tap-water systems operate with a 2-port, 3-port or 4-port control valve on the primary side.

2-Port valve version



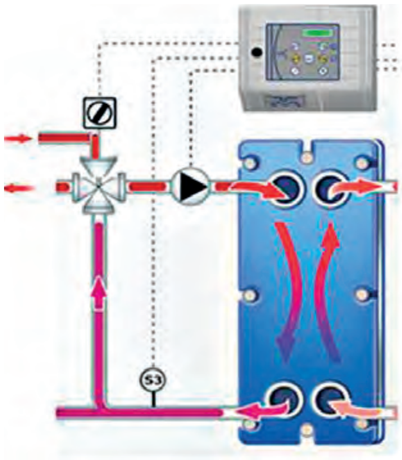
- Suitable for district heating or community heating
- Variable flow rate as there is no primary pump
- Constant primary temperature inlet
- Risk of thermal shock
- Increased risk of lime scaling compared to 3- and 4-port valve version
- Up to 20 bar and 130°C

3-Port valve version



- Suitable for a local boiler or primary tank on site
- Constant flow rate thanks to a primary pump
- Regulates the primary temperature in the heat exchanger
- No risk of thermal shock
- Limited lime scaling
- Energy-efficient as only the energy needed is used
- Up to 10 bar and 110°C

4-Port valve version

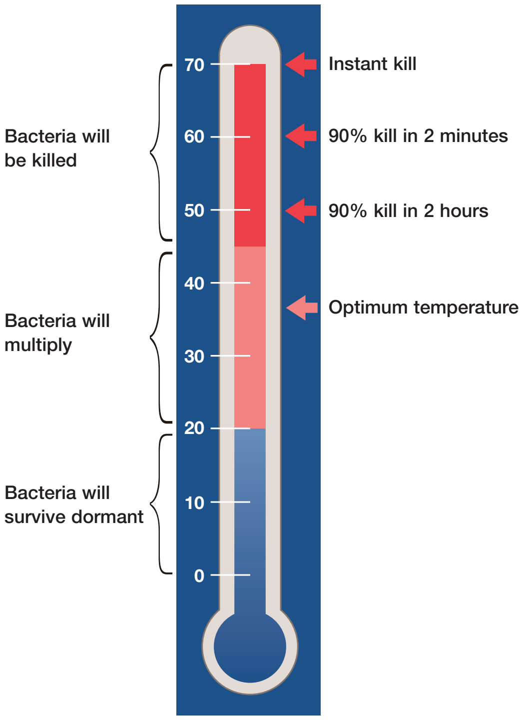


- Suitable for a local boiler or primary tank on site
- Constant flow rate thanks to a primary pump
- Regulates the primary temperature in the heat exchanger
- Necessary if the tap-water system is located far away from the heat source, in order to avoid "cold water train" in the primary pipe line
- No need for a mixing bottle
- Up to 6 bar and 110°C

Anti-legionella tap-water systems

Legionella bacteria

Legionella bacteria are common and can be found naturally in water sources such as rivers and lakes, usually in low numbers. From the natural source, the organism passes into water systems used in buildings. They pose a risk to humans if people are exposed to them through air conditioning or air-cooling systems, or through contaminated tap water used for baths, showers, spas etc.



How do they grow?

- In warm temperatures between 20°C and 45/50°C
- In stagnant water in pipes and vessels with little or no water flow
- In sediments, biofilms and micro-organisms in pipe networks
- In scale deposited in pipes, showers and taps

Where do they grow?

As stagnant water within the temperature range 20-50°C offers excellent conditions for growth, the risks are obvious in any tap-water system that is extensive and complex, or in any system where the tap-water consumption is periodically low. These types of systems are typically found in hospitals, apartment blocks, hotels, nursing homes, gyms, schools and other public buildings.

AquaProtect

Alfa Laval's tap-water system "AquaProtect" is developed specifically to prevent bacteria growth in hot-water systems. The AquaProtect range uses recovered heat to provide low-cost, energy-efficient and effective thermal disinfection. AquaProtect uses continuous thermal disinfection of incoming and circulating water to eliminate legionella bacteria in hot water.

The AquaProtect system has two plate heat exchangers. The first unit heats incoming water to 70°C to disinfect it, using hot water from a boiler.

The second unit cools the disinfected water to the requested network temperature (60°C or lower), while pre-heating the incoming and circulating water before it enters the first heat exchanger. Between being heated and cooled again, the water passes through a storage tank, awaiting peak demand periods. This creates sufficient holding time to ensure total eradication of the bacteria.

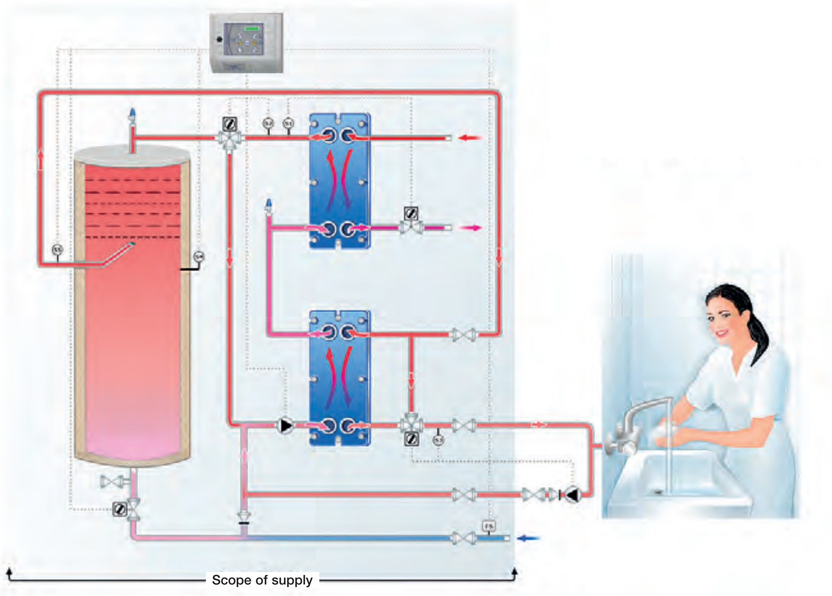
The thermal disinfection consumes no extra energy as the energy is recovered in the second heat exchanger.

Saving energy and space
The AquaProtect solution offers many other advantages. It requires very little maintenance, and its compact size saves a lot of space in the boiler room. AquaProtect also comes with energy-saving insulation. So much energy is recovered in the heat exchangers that the thermal disinfection process consumes no extra energy. AquaProtect can be connected to alternative energy sources such as solar, heat pump, etc.

AquaProtect T1

AquaProtect T2

Working principle AquaProtect T2



AquaProtect from Alfa Laval provides:

100% security

- Safe eradication of all legionella from entire hot water systems (incoming and circulating water)
- Temperature safety function
- Over-tapping protection
- Network disinfection on demand or at pre-determined intervals

Energy savings

- Energy is recovered in the heat exchanger so that thermal disinfection consumes no extra energy
- Can also be connected to alternative energy sources such as solar, heat pump etc

Comfort

- Compact system design
- Requires low maintenance
- Standardized systems for all water hardnesses
- Easy-to-use monitor and control system

Experience and expertise

- Maximum quality for maximum security

Key questions to select the right tap-water system

1) **Available capacity on site in kW (local boiler or district heating)?**

2) **Temperatures on:**
   - Primary side inlet?
   - Secondary side inlet & outlet?

If the capacity is not known:

1) Temperatures on:
   - Primary side inlet?
   - Secondary side inlet & outlet?

2) Secondary flow rate on site?
   or
   What is the application (hotel, hospital, leisure centre…) and how many rooms, beds, showers etc.?

The choice can be fine-tuned:

- Instantaneous			
- Semi-instantaneous	Tank on site: … litres		
	Tank needed:	Stainless Steel	
		Enamel 10 bar	
		Enamel 7 bar	
- Heat exchanger:	Gasketed		
	Brazed		
	AlfaNova		
- Valve on Primary side	2-port		
	3-port		
	4-port		
- Pumps	Primary	single-headed	
		double-headed	
	Secondary	single-headed	cast iron
			stainless steel/bronze
		double-headed	cast iron
			stainless steel/bronze

Different selection tools are available – digital and on paper – to choose the right tap-water system.

Tap-water system range

AquaEasy

Read all about it on page 11:13

AquaFlow

Read all about it on page 11:17

AquaStore

Read all about it on page 11:21

AquaCompact

Read all about it on page 11:25

AquaEfficiency

Read all about it on page 11:27

AquaProtect

Read all about it on page 11:31

SolarFlow

Read all about it on page 11:35

AquaMicro

Read all about it on page 11:39

AquaPool

Read all about it on page 11:41

Pressosmart

Read all about it on page 11:43

KAB

Read all about it on page 11:47

AquaTank 316Ti

Read all about it on page 11:49

AquaTank HC 316Ti

Read all about it on page 11:51

AquaTank EM (10 bar)

Read all about it on page 11:53

AquaTank HC EM (10 bar)

Read all about it on page 11:55

AquaTank EM (7 bar)

Read all about it on page 11:57

SolarTank

Read all about it on page 11:59

AquaEasy

Instant hot water system

Application

AquaEasy is an instantaneous hot water system designed to provide domestic hot water of up to 350 kW for apartment buildings, hotels, schools, sport centers and similar premises.

Once installed and comissioned, AquaEasy makes the operation and maintenance of the water supply system very simple.

Design

With a choice of 2-port or 3-port valve control, AquaEasy can be connected to any system. Its specially developed rapid response thermostat ensures quick and precise regulation of the domestic hot water output.

The reliable and robust compact copper brazed heat exchanger generates high turbulence for higher heat transfer and reduced fouling.

Thanks to its very compact footprint, AquaEasy can be wall or floor mounted for maximum flexibility in crowded boiler rooms. The thin profile also means it can be sited in cupboards.

To reduce heat losses and deliver greater energy savings, AquaEasy is fully insulated. The insulation also covers the water supply feed to ensure a neat finish.

Working principle

AquaEasy connects to a heating source on the primary side. This heating source can be a local boiler, district or centralized heating network or a renewable energy source where the water cylinder is heated by solar panels, heat pump or condensate circulation, for instance.

The secondary side inlet connects to the main supply (CW) and the outlet to the local Domestic Hot Water system (DHW). AquaEasy can be fitted with a circulation pump (PR) for continuous circulation of Domestic Hot Water in the building to reduce the risk of Legionella growth. A circulation pump reduces water loss before water is tapped at the right temperature.

Energy is transferred from the primary side to the secondary side via the heat exchanger (HE).

The domestic hot water temperature is regulated by a rapid response thermostatic valve (VA).

AquaEasy with 3-port valve control operates in accordance with the Variable Temperature and Constant Flow Rate principle. The temperature of the medium entering the heat exchanger on the primary side is adapted to the demand detected by the sensor (S). This eliminates thermal shock in the heat exchanger and reduces the build-up of lime scale in the secondary side channels.

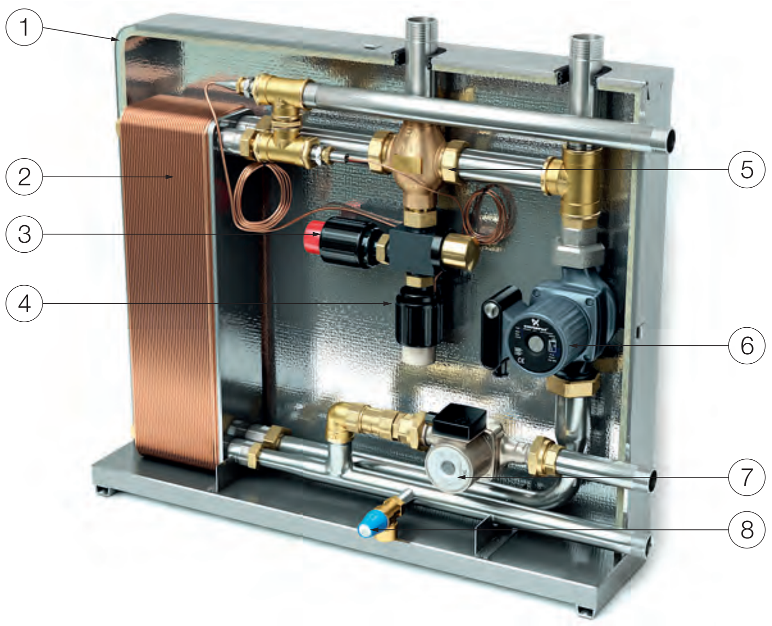
The primary pump (PP) maintains a constant flow rate through the heat exchanger.

For AquaEasy with 2-port valve control, the heating medium enters the heat exchanger at the highest available temperature with a variable flow rate.

The 2-port valve ensures the correct flow rate and delivers the right amount of heat to the heat exchanger to guarantee a constant water temperature on the secondary side outlet at all times.

AquaEasy can be fitted with an additional safety thermostat that stops the flow of the heating medium to the heat exchanger if the temperature becomes too high or the regulating thermostat develops a fault.

Equipment



1. Insulation	System fully insulated - Rockwool and aluminium cladding
2. Heat exchangers	Copper Brazed - Thermal efficiency for optimum comfort and reliability - Increased turbulence to increase heat transfer and reduce fouling - Temperature stability - Compact design (large heat transfer surface within a small footprint)
3. Safety thermostat	Optional
4. Control thermostat	Rapid response thermostat
5. Control valve	2-port or 3-port
6. Primary pump	Single-headed flooded rotor - Cast iron (for 3-port system only)
7. Circulation pump	Optional Single headed flooded rotor - Stainless steel
8. Valves	Pressure relief valve (secondary side)

Quick selection charts

AquaEasy 2-port		Temperature program					
		80/20°C -10/55°C			75/25°C - 10/60°C		
Model	Part number	Nominal heating capacity (kW)	DHW flow rates (l/min)	NL	Nominal heating capacity (kW)	DHW flow rates (l/min)	NL
2-Port Standard	AQE6020K2P	125	40	14	70	20	5
2-Port with circulation pump	AQE6020K2PR						
2-Port Standard	AQE6030K2P	155	50	22	110	32	12
2-Port with circulation pump	AQE6030K2PR						
2-Port Standard	AQE6030L2P	190	61	31	130	37	16
2-Port with circulation pump	AQE6030L2PR						
2-Port Standard	AQE6040K2P	250	80	48	150	43	21
2-Port with circulation pump	AQE6040K2PR						
2-Port Standard	AQE6050K2P	300	96	64	190	55	31
2-Port with circulation pump	AQE6050K2PR						
2-Port Standard	AQE6060K2P	325	104	73	230	66	43
2-Port with circulation pump	AQE6060K2PR						
2-Port Standard	AQE6060L2P	350	112	82	250	72	48
2-Port with circulation pump	AQE6060L2PR						

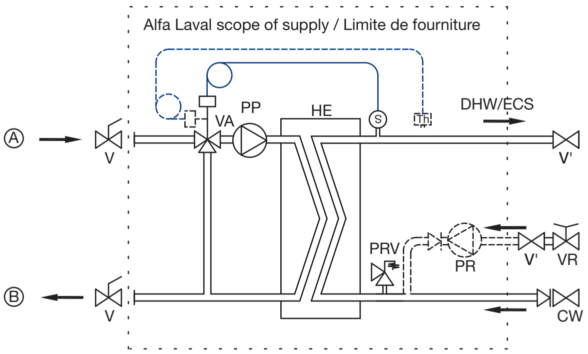
AquaEasy 3-port		Temperature program					
		80/20°C -10/55°C			75/25°C - 10/60°C		
Model	Part number	Nominal heating capacity (kW)	DHW flow rates (l/min)	NL	Nominal heating capacity (kW)	DHW flow rates (l/min)	NL
3-Port Standard	AQE6020K3P	120	38	13	80	23	6
3-Port with circulation pump	AQE6020K3PR						
3-Port Standard	AQE6030K3P	150	48	21	140	40	18
3-Port with circulation pump	AQE6030K3PR						
3-Port Standard	AQE6030L3P	200	64	34	170	49	25
3-Port with circulation pump	AQE6030L3PR						
3-Port Standard	AQE6040K3P	260	83	51	200	58	34
3-Port with circulation pump	AQE6040K3PR						
3-Port Standard	AQE6050K3P	310	99	68	245	71	47
3-Port with circulation pump	AQE6050K3PR						
3-Port Standard	AQE6060K3P	345	111	80	275	79	56
3-Port with circulation pump	AQE6060K3PR						

NL value indicates equivalent number of standard apartments (DIN).
AquaEasy is also available with safety thermostat, please contact us for further details.

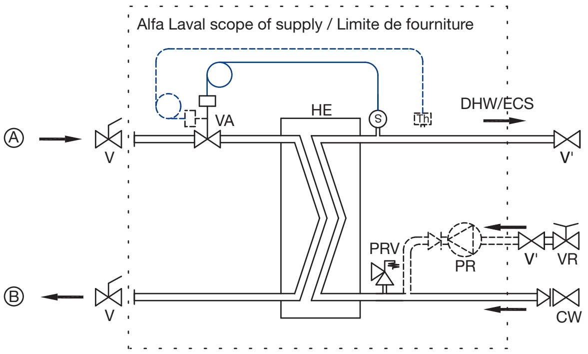
Operating limits	Primary	Secondary
Max. operating pressure (Bar)	10	10
Max. operating temperature (°C)	100	100

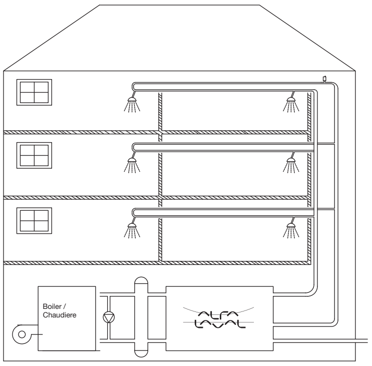
Hydaulic chart

AquaEasy 3-Port



AquaEasy 2-Port





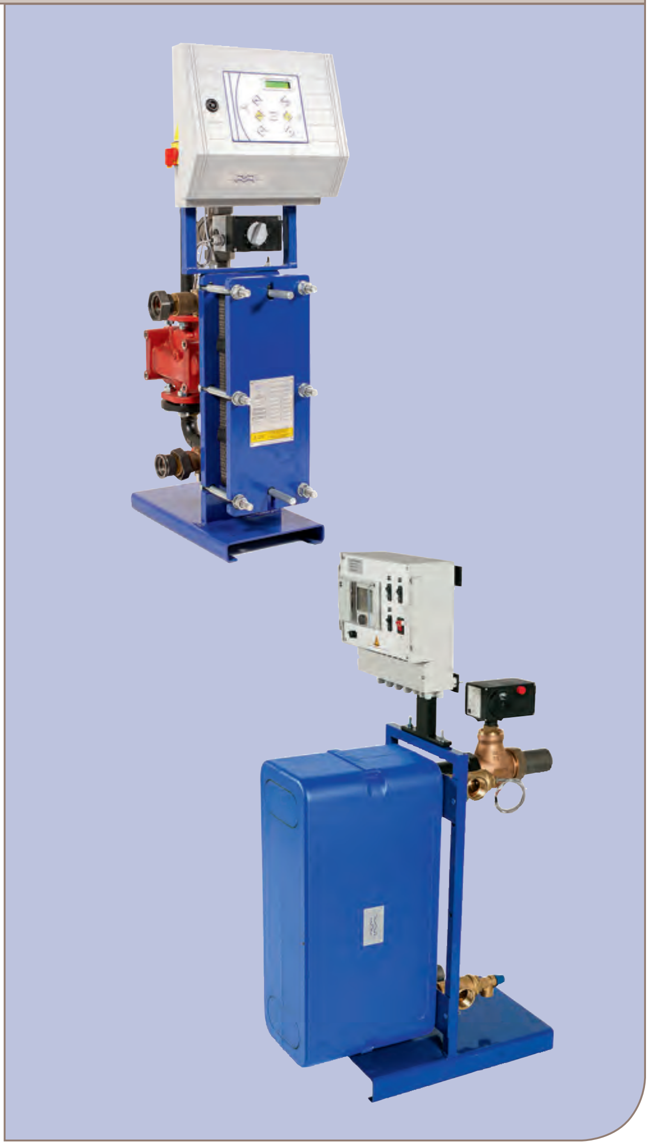
A	Primary inlet
B	Primary outlet
CW	Cold water inlet
HE	Heat exchanger
PP	Primary pump
PR	Circulation pump (optional)
S	Regulation thermostat
Th	Safety thermostat (optional)
VA	Primary control valve
VR	Setting valve
V	Gate valve
PRV	Pressure relief valve

AquaEasy is built in compliance with PED 97/23 Art 3.3 and CE 73/23 electrical regulation.

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for
all countries are always available on our
website on www.alfalaval.com

AquaFlow

Instantaneous tap water systems



Applications

AquaFlow is an instantaneous tap water system designed to provide domestic hot water in large quantities – up to 1200 kW - for applications such as apartment buildings, hospitals, hotels, retirement homes, nursing homes, schools, sports centres, prisons etc.

Different models of AquaFlow are available to fit with any installation arrangement. For instance, AquaFlow operated with a 3-port or 4-port valve can be connected to local boilers on site or primary tanks. AquaFlow operated with a 2-port valve would match requirements of district networks when the tap water system is directly connected to the city pipework.

When it comes to the selection of the heat exchanger, AquaFlow offers a large choice of possibilities: Plates & Gaskets, Copper Brazed or AlfaNova®: exclusive to Alfa Laval (100% Stainless Steel, Fusion Bonded).

Dependable performance

Since 1923, Alfa Laval has been in the water heating business, and has become a leading manufacturer and supplier. AquaFlow incorporates a wealth of background experience for secure and reliable hot water production. The components have been carefully selected and tested to perform well in combination with one another.

Principle

On the primary side, AquaFlow has to be fed by a heating source that can be provided by any source of energy: local boiler, district network, primary tank, solar system, …

On the secondary side, AquaFlow is connected to the water main (CW) and provides domestic hot water to the distribution pipework when tapping occurs. A circulation pump (PR) is usually used to limit the time needed to deliver domestic hot water to the tap at the right temperature. The circulation pump maintains a minimum flow rate through the heat exchanger and through the distribution pipework.

Energy is exchanged through the heat exchanger from the primary to the secondary side.

A temperature sensor (S) located at the secondary side outlet checks the temperature and adjusts the control valve (VA) accordingly in order to always maintain hot water at the right temperature. The piping arrangement of the control valve provides tight control of the energy entering the primary side.

AquaFlow with the 3-port or 4-port valve follows the variable temperature and constant flow rate principle. In which case, the temperature of the media entering the heat exchanger on the primary side is adapted to the demand detected on the domestic side. This eliminates thermal shock in the heat exchanger and reduces the build-up of limescale in the secondary side. The primary pump (PP) maintains a constant flow rate through the heat exchanger.

In the case of AquaFlow with a 2-port valve, the heating source enters the heat exchanger at the maximum available temperature and variable flow rate. The 2-port valve connected to the control equipment will ensure that the right flow rate and thus the right amount of energy is fed into the heat exchanger to always ensure constant water temperature on the secondary side.

AquaFlow offers electronic control equipment that provides several user-definable functions to customize the system and ensure precise temperature control.

If the water is very hard in the area where the tap water system is used, temperature control should always be fitted in order to avoid limescale deposits and the temperature set point on the secondary side should also be limited on the basis of local experience or best practice.

AquaFlow is available with control box (AquaBox/AquaTronic) that can detect and warn the user that scaling is occurring into the heat exchanger. Through this early warning message, the development of limescale can be reduced as the user will be able to plan for the cleaning of the heat exchanger.

The Plates & Gaskets heat exchanger can easily be cleaned by opening the plate pack. The Copper Brazed or AlfaNova heat exchangers do not need to be opened because they provide additional connections to perform Cleaning In Place treatment on site.

Equipments

	AquaFlow 2-Port	AquaFlow 3-Port	AquaFlow 4-Port
Heat Exchanger	**AlfaNova** AlfaNova is the world's first and only heat exchanger made of 100% stainless steel • High heat transfer • Corrosion resistance • Maximum cleanliness • 100% copper free, suitable for all DHW pipeworks • Insulation **Copper Brazed** • Thermal efficiency for optimum comfort and reliability • Increased turbulence to increase heat transfer and reduce fouling • Temperature stability • Compact design (large heat transfer surface within a small footprint) • Insulation **Plates & Gaskets** • Cost effective tap water production • Compact design • AIS I316 plates & EPDM Clip-On Gaskets • Insulation		
Control Valve	**2-Port Electronic** • 24V 0-10V with safety • 230V 3 Points with safety **2-Port Self-Actuating with safety**	**3-Port Electronic** • 24V 0-10V • 230V 3 Points • with or without safety	**4-Port Electronic** • 24V 0-10V • 230V 3 Points
Controller	**AquaBox** (Alfa Laval Micro2000) 7 languages: FR/EN/DE/NL/IT/SP/DK Temperature sensors: DHW, circulation, scaling control 8-Relay Card, Temperature Downloads **AquaTronic** (Samson 5433) Temperature sensors: DHW, circulation, storage vessel (2), primary inlet, primary outlet	**AquaBox** (Alfa Laval Micro2000) 7 languages: FR/EN/DE/NL/IT/SP/DK Temperature sensors: DHW, circulation, scaling control 8-Relay Card, Temperature Downloads **AquaTronic** (Samson 5433) Temperature sensors: DHW, circulation, storage vessel (2), primary inlet, primary outlet	**AquaBox** (Alfa Laval Micro2000) 7 languages: FR/EN/DE/NL/IT/SP/DK Temperature sensors: DHW, circulation, scaling control 8-Relay Card, Temperature Downloads **AquaTronic** (Samson 5433) Temperature sensors: DHW, circulation, storage vessel (2), primary inlet, primary outlet
Primary Pump	-	Single or Double Head Flooded Rotor	Single or Double Head Flooded Rotor
Charging Pump	Single or Double Head Flooded Rotor	Single or Double Head Flooded Rotor	Single or Double Head Flooded Rotor
Valves	Drain valve (primary), Pressure relief valve (Secondary)		

Example of maximum capacities at different temperature programs

		AquaFlow 2-port			AquaFlow 3-port			AquaFlow 4-port		
		Capacity kW	**Primary flow rate m³/h**	**Secondary flow rate L/min**	**Capacity kW**	**Primary flow rate m³/h**	**Secondary flow rate L/min**	**Capacity kW**	**Primary flow rate m³/h**	**Secondary flow rate L/min**
Plates & Gaskets	90°C - 10/55°C	1100	17.5	352	1220	20.4	390	1370	24	437
	80/60°C - 5/70°C	340	15	75	400	17.7	77	500	22.2	110
	82°C - 10/60°C	750	15	216	945	20.5	272	1140	25.5	327
	65/45°C - 10/60°C	370	17	107	350	15.4	100	320	14.1	92
Copper Brazed or AlfaNova	90°C - 10/55°C	1000	13	320	950	12.1	304	On request		
	80/60°C - 5/70°C	205	9	45	270	12	58			
	82/25°C - 10/60°C	800	12.4	231	800	12.1	230			
	75/25°C - 10/60°C	500	8.8	144						

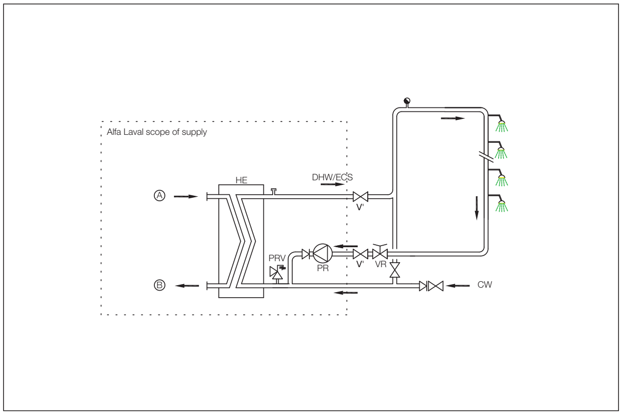
Pressure dop vary from one temperature to another.
Other capacities available, please contact Alfa Laval.

Operating pressures and temperatures

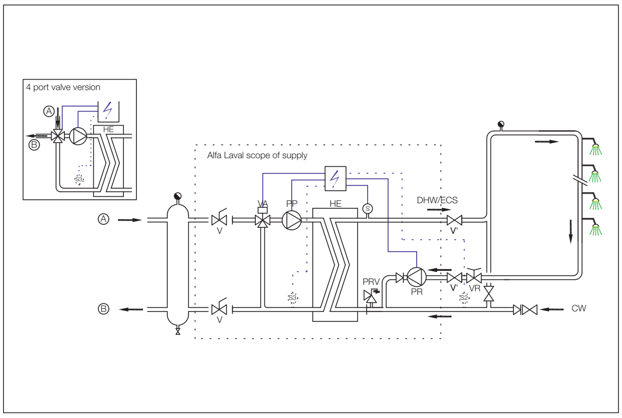
		AquaFlow 2-port		AquaFlow 3-port		AquaFlow 4-port	
		Primary	**Secondary**	**Primary**	**Secondary**	**Primary**	**Secondary**
Plates & Gaskets	Max. operating pressure	10 bar	10 bar	10 bar	10 bar	6 bar	10 bar
	Max. operating temperature	110°C	90°C	110°C	90°C	110°C	90°C
Copper Brazed	Max. operating pressure	25 bar*	10 bar	10 bar	10 bar	On request	
	Max. operating temperature	130°C	90°C	110°C	90°C		
AlfaNova	Max. operating pressure	25 bar*	10 bar	10 bar	10 bar		
	Max. operating temperature	130°C	90°C	110°C	90°C		

* Large systems limited to PN16 and 130°C.
Different maximum operating pressure or temperature also available, please contact Alfa Laval.

Hydraulic chart

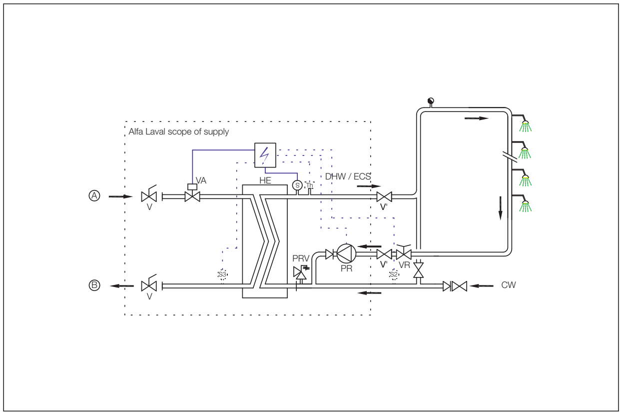


AquaFlow basic version

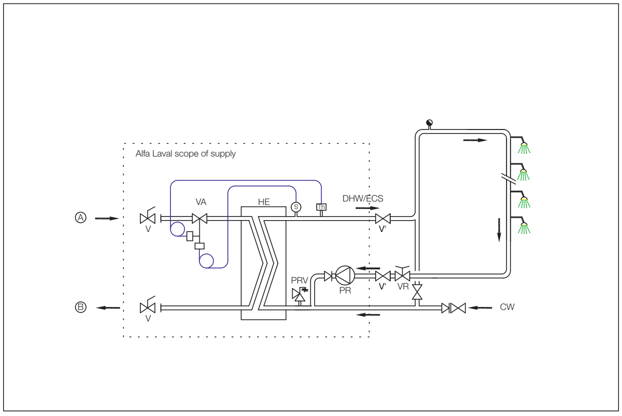


AquaFlow primary kit 3P

A Primary inlet
B Primary outlet
cw Cold water inlet
G Gate valve
VR Setting valve
PRV Pressure relief valve
PR Recycling pump (option)
VA Primary control valve
PP Primary pump
Th Safety thermostat
DC Drain cock



AquaFlow primary kit 2PE



AquaFlow primary kit 2PSA

AquaFlow is built in compliance with PED CE 97/23 Art 3.3 or PED 1 and CE 73/23 electrical regulation.
AquaFlow is assembled, wired and tested prior to shipment.

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

AquaStore

Semi-instantaneous tap water system

Applications

AquaStore is a semi-instantaneous tap water system designed to provide domestic hot water in large quantities – up to 1200 kW – for applications such as apartment buildings, hospitals, hotels, retirement homes, nursing homes, schools, sports centres, prisons etc.

Different models of AquaStore are available to fit with any installation arrangement. For instance, AquaStore operated with a 3-port or 4-port valve can be connected to local boilers on site or primary tanks. AquaStore operated with a 2-port valve would match requirements of district networks when the tap water system is directly connected to the city pipework.

When it comes to the selection of the heat exchanger, AquaStore offers a large choice of possibilities: Plates & Gaskets, Copper Brazed or AlfaNova®: exclusive to Alfa Laval (100% Stainless Steel, Fusion Bonded).

Dependable performance

Since 1923, Alfa Laval has been in the water heating business, and has become a leading manufacturer and supplier. AquaFlow incorporates a wealth of background experience for secure and reliable hot water production. The components have been carefully selected and tested to perform well in combination with one another.

Principle

On the primary side, AquaStore has to be fed by a heating source that can be provided by any source of energy: local boiler, district network, primary tank, solar system, …

On the secondary side, AquaStore is connected to a storage vessel on site and to the water main (CW). The charging pump (PC) located on the domestic hot water side of the heat exchanger is used to store the storage vessel with hot water. When there is no or limited tapping of domestic hot water, the storage vessel is gradually heated up to the setpoint temperature. When tapping occurs, hot water is being drawn from the top of the storage vessel.

When the domestic hot water demand corresponds to the energy supply, the heat exchanger compensates without affecting the quantity of stored hot water. The stored hot water is only used for peak period when the domestic hot water demand is higher than the energy supply. In that case, the available flow rate of domestic hot water corresponds to the flow rate provided by the heat exchanger combined with the volume of stored hot water in the storage vessel. In the event that the storage vessel is emptied out before the endof the peak period, AquaStore will always provide domestic hot water at a nominal flow rate corresponding to the energy input.

A circulation pump (PR) is usually used to limit the time needed to deliver domestic hot water to the tap at the right temperature. The circulation pump maintains a minimum flow rate through the heat exchanger and through the distribution pipework.

Energy is exchanged through the heat exchanger from the primary to the secondary side.

A temperature sensor (S) located at the secondary side outlet checks the temperature and adjusts the control valve (VA) accordingly in order to always maintain hot water at the right temperature. The piping arrangement of the control valve provides tight control of the energy entering the primary side.

AquaStore with the 3-port or 4-port valve follows the Variable Temperature and Constant Flow Rate principle. In which case, the temperature of the media entering the heat exchanger on the primary side is adapted to the demand detected on the domestic side. This eliminates thermal shock in the heat exchanger and reduces the build-up of limescale in the secondary side. The primary pump (PP) maintains a constant flow rate through the heat exchanger.

In the case of AquaStore with a 2-port valve, the heating source enters the heat exchanger at the maximum available temperature and variable flow rate. The 2-port valve connected to the control equipment will ensure that the right flow rate and thus the right amount of energy is fed into the heat exchanger to always ensure constant temperature on the secondary side.

AquaStore offers electronic control equipment that provides several user-definable functions to customize the system and ensure precise temperature control.

If the water is very hard in the area where the tap water system is used, temperature control should always be fitted in order to avoid limescale deposits and the temperature set point on the secondary side should also be limited on the basis of local experience or best practice.

AquaStore is available with a control box (AquaBox/AquaTronic) that can detect and warn the user that scaling is occurring into the heat exchanger. Through this early warning message, the development of limescale can be reduced as the user will be able to plan for the cleaning of the heat exchanger.

The Plates & Gaskets heat exchanger can easily be cleaned by opening the plate pack. The Copper Brazed or AlfaNova heat exchangers do not need to be opened because they provide additional connections to perform Cleaning In Place treatment on site.

Equipments

	AquaStore 2-Port	AquaStore 3-Port	AquaStore 4-Port
Heat Exchanger	**AlfaNova** AlfaNova is the world's first and only heat exchanger made of 100% stainless steel • High heat transfer • Corrosion resistance • Maximum cleanliness • 100% copper free, suitable for all DHW pipeworks • Insulation **Copper Brazed** • Thermal efficiency for optimum comfort and reliability • Increased turbulence to increase heat transfer and reduce fouling • Temperature stability • Compact design (large heat transfer surface within a small footprint) • Insulation **Plates & Gaskets** • Cost effective tap water production • Compact design • AIS I316 plates & EPDM Clip-On Gaskets • Insulation		
Control Valve	**2-Port Electronic** • 24V 0-10V with safety • 230V 3 Pts with safety 2-Port Self-Actuating with safety	**3-Port Electronic** • 24V 0-10V • 230V 3 Points • with or without safety	**4-Port Electronic** • 24V 0-10V • 230V 3 Points
Controller	**AquaBox** (Alfa Laval Micro2000) 7 languages: FR/EN/DE/NL/IT/SP/DK Temperature sensors: DHW, circulation/ tank, scaling control 8-Relay Card, Temperature Downloads **AquaTronic** (Samson 5433) Temperature sensors: DHW, circulation, storage vessel (2), primary inlet, primary outlet	**AquaBox** (Alfa Laval Micro2000) 7 languages: FR/EN/DE/NL/IT/SP/DK Temperature sensors: DHW, circulation/ tank, scaling control 8-Relay Card, Temperature Downloads **AquaTronic** (Samson 5433) Temperature sensors: DHW, circulation, storage vessel (2), primary inlet, primary outlet	**AquaBox** (Alfa Laval Micro2000) 7 languages: FR/EN/DE/NL/IT/SP/DK Temperature sensors: DHW, circulation/ tank, scaling control 8-Relay Card, Temperature Downloads **AquaTronic** (Samson 5433) Temperature sensors: DHW, circulation, storage vessel (2), primary inlet, primary outlet
Primary Pump	-	Single or Double Head Flooded Rotor	Single or Double Head Flooded Rotor
Charging Pump	Single or Double Head Flooded or Dry Rotor Bronze or Cast Iron	Single or Double Head Flooded or Dry Rotor Bronze or Cast Iron	Single or Double Head Flooded or Dry Rotor Bronze or Cast Iron
Valves		Balancing Valve Drain valve (primary), Pressure relief valve (Secondary)	

Example of maximum capacities at different temperature programs

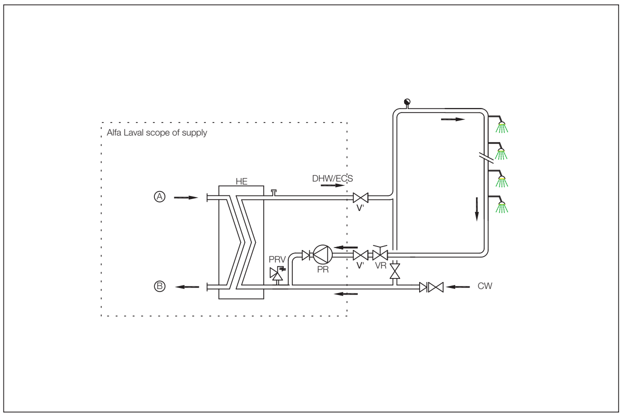
		AquaStore 2-port			AquaStore 3-port			AquaStore 4-port		
		Capacity kW	**Primary flow rate m^3/h**	**Secondary flow rate L/min**	**Capacity kW**	**Primary flow rate m^3/h**	**Secondary flow rate L/min**	**Capacity kW**	**Primary flow rate m^3/h**	**Secondary flow rate L/min**
Plates & Gaskets	90°C - 10/55°C	1100	17.5	352	1220	20.4	390	1370	24	437
	80/60°C - 5/70°C	340	15	75	400	17.7	77	500	22.2	110
	82°C - 10/60°C	750	15	216	945	20.5	272	1140	25.5	327
	65/45°C - 10/60°C	370	17	107	350	15.4	100	320	14.1	92
Copper Brazed or AlfaNova	90°C - 10/55°C	1000	13	320	950	12.1	304	On request		
	80/60°C - 5/70°C	205	9	45	270	12	58			
	82/25°C - 10/60°C	800	12.4	231	800	12.1	230			
	75/25°C - 10/60°C	500	8.8	144						

Pressure dop vary from one temperature to another.
Other capacities available, please contact Alfa Laval.

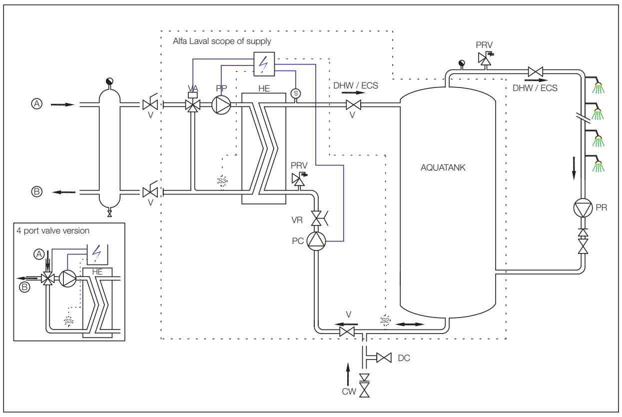
Operating pressures and temperatures

		AquaStore 2-port		AquaStore 3-port		AquaStore 4-port	
		Primary	**Secondary**	**Primary**	**Secondary**	**Primary**	**Secondary**
Plates & Gaskets	Max. operating pressure	10 bar	10 bar	10 bar	10 bar	6 bar	10 bar
	Max. operating temperature	110°C	90°C	110°C	90°C	110°C	90°C
Copper Brazed	Max. operating pressure	25 bar*	10 bar	10 bar	10 bar	On request	
	Max. operating temperature	130°C	90°C	110°C	90°C		
AlfaNova	Max. operating pressure	25 bar*	10 bar	10 bar	10 bar		
	Max. operating temperature	130°C	90°C	110°C	90°C		

* Large systems limited to PN16 and 130°C.
Different maximum operating pressure or temperature also available, please consult.

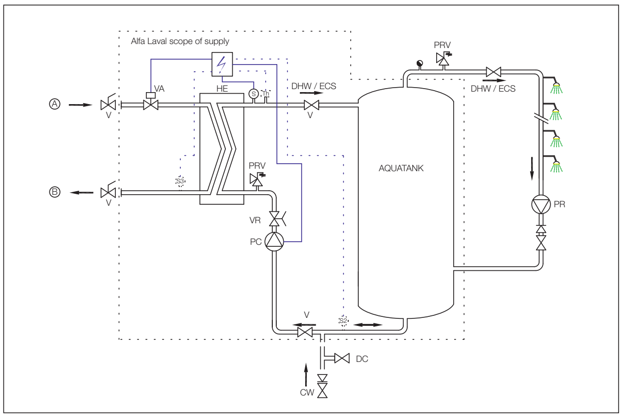


AquaStore basic version

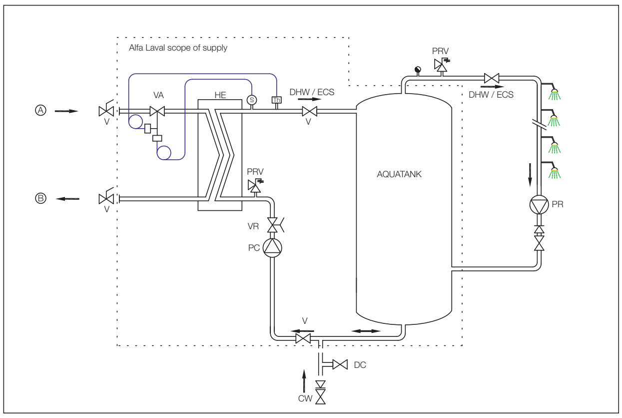


AquaStore primary kit 3p

A	Primary inlet
B	Primary outlet
cw	Cold water inlet
V	Gate valve
VR	Setting valve
PRV	Pressure relief valve
PC	Charging pump
PR	Recycling pump
VA	Primary control valve
PP	Primary pump
Th	Safety thermostat
DC	Drain cock



AquaStore primary kit 2pe



AquaStore primary kit 2psa

AquaStore is built in compliance with PED CE 97/23 Art. 3.3 or PED 1 and CE 73/23 electrical regulation. AquaStore is assembled, wired and tested prior to shipment.

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

AquaCompact

Compact heat exchanger system

Applications
AquaCompact is a compact pre-assembled system. It is designed to provide domestic hot water in applications in which the demand is not constant such as apartment blocks, hotels, hospitals, schools, sport halls etc.

AquaCompact optimizes the necessary power rating and the hot water storage volume without reducing domestic hot water capacity. AquaCompact therefore offers best possible overall economy by minimizing installation and operating costs.

Dependable performance
Since 1923, Alfa Laval has been in the water heating business, and has become a leading manufacturer and supplier. AquaCompact incorporates a wealth of background experience for secure and reliable water heating. The components have been carefully selected and tested to perform well in combination with one another.

Different ready-made charging kits including the heat exchanger, charging pump, valves and piping are available up to 240 kW to easily meet different project designs and installation requirements.

AquaCompact can be selected with:
- a Copper Brazed heat exchanger
- a Plate and Gasket heat exchanger
- or with an AlfaNova 100% Stainless Steel heat exchanger

The kits can then be combined to storage vessels from 300L up to 1500L in stainless steel or enamel.

In its standard version AquaCompact is only delivered with the charging kit but several ready-made primary kits are offered as option. These optional kits allow choosing between 2-Port and 3-Port valve and comes self actuated or with an actuator operated by a fully equipped electronic control that offers many advanced functions.

Principle
AquaCompact combines the high efficiency of a heat exchanger with the storage capacity of a tank. The charging pump and charging circuit are continuously in operation and the system is therefore continuously prepared to meet high rates of domestic hot water demand. The hot water produced in the heat exchanger is led to the top of the storage vessel from where the hot water is drawn.

If the hot water demand is less than the energy supply the extra amount of hot water produced by the heat exchanger will be stored in the storage vessel. When the hot water demand corresponds to the energy supply, the heat exchanger compensates without affecting the quantity of stored hot water.

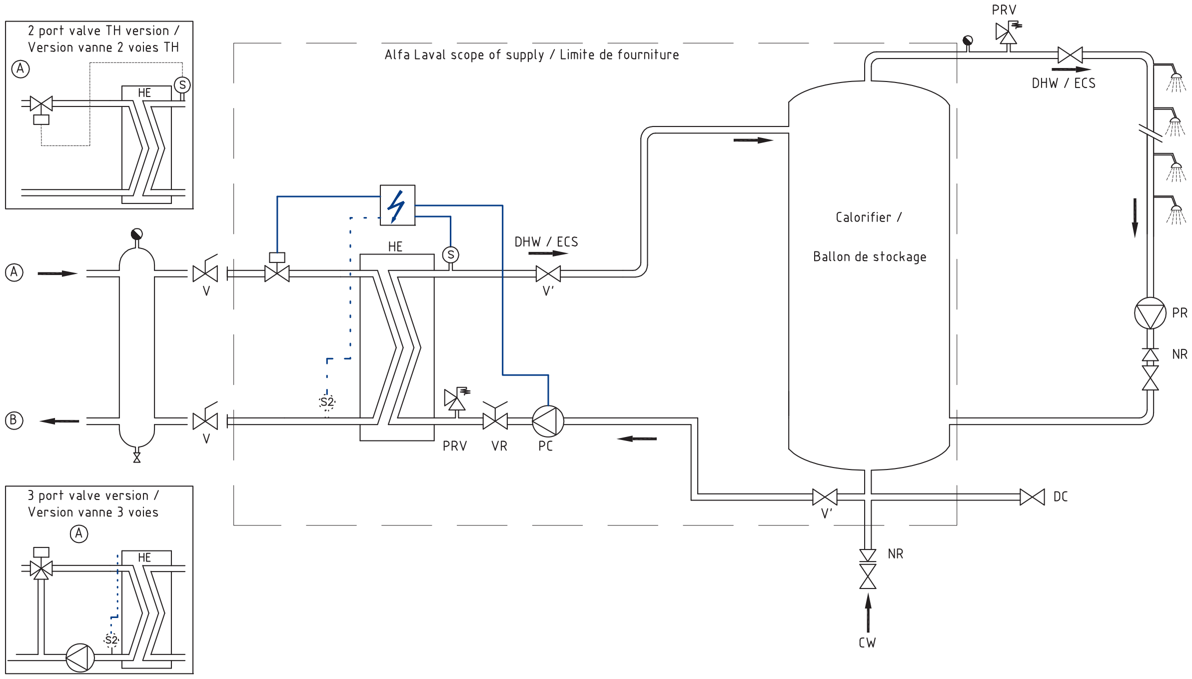
The stored hot water is only used for high hot water demands that are higher in terms of energy than the power supply. The storage vessel of the system serves as a buffer for medium or high domestic hot water demand. AquaCompact will always provide hot water at a rate corresponding to the energy input even if the storage vessel has been completely emptied of hot water.

A balancing valve is used to ensure the charging circuit will operate at the design request flow. This valve also includes a flow meter for simple adjustment.

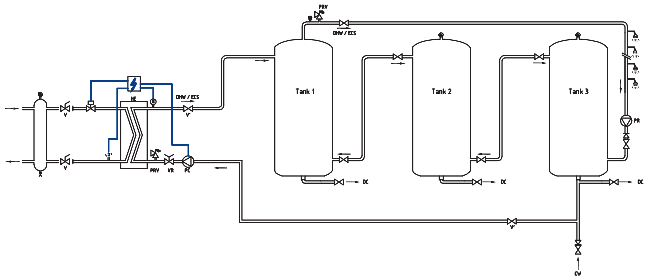
If the water hardness is high, temperature control should always be installed in order to avoid limescale deposits. The primary kit will control that only the necessary amount of hot water enters the heat exchanger and will limit thermal shocks and limescaling. In this case also the temperature set point on secondary side should be limited on the basis of local experience or best practice.

To help prevent lack of capacity due to lime-scaling the electronic primary kits provide you with an early warning message that will inform when the heat exchanger needs to be cleaned. For this purpose the Copper Brazed and AlfaNova heat exchangers are equipped with two extra connections to easily connect a Cleaning-In-Place system. Several isolating valves allow the easy maintenance of the different components used in AquaCompact without having to flush all the water stored into the tank.

AquaCompact, a compact system thought for the daily life.



A	Primary inlet	PC	Charging pump	S	Sensor
B	Primary outlet	PR	Installation recycling pump	V	Manual gate valve
CW	Cold water inlet	HE	Heat exchanger (AlfaNova / Brazed / PHE)	VR	Flow setting valve
DC	Drain cock / flooded	PRV	Pressure relief valve	S2	Scaling function / CIP optional sensor
NR	Return valve				



Principle to connect several storage vessels in serie.

	Primary side	Secondary side
Maximum operating pressure	16 bar	10 bar
Maximum operating temperature	110°C	80°C

Maximum operating temperature may differ due to local regulation.

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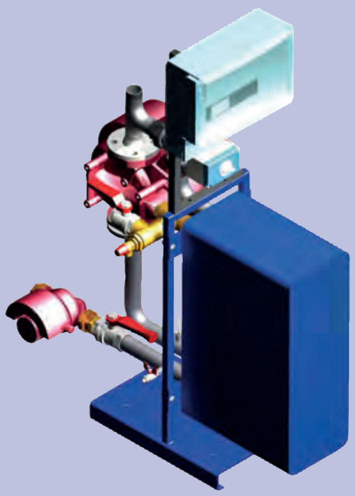
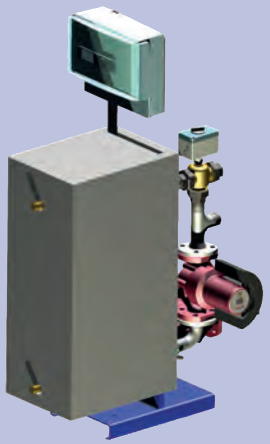
AquaEfficiency

The most efficient tap water system





Applications

AquaEfficiency is a tap water system designed to meet the upcoming European legislation demanding low energy consuming pumps in tap water systems; the variable speed pumps. A further development has made the AquaEfficiency especially ideal for connecting to condensing boilers. Customer's benefits are:

- Savings of up to 2500 EUR a year in reduced electrical consumption, reduced thermal energy losses and increased boiler efficiency.
- Reduced CO_2 emissions by up to 18.000 Kg/year

AquaEfficiency supplies domestic hot water in large quantities for applications such as apartment buildings, hospitals, hotels, retirement homes, nursing homes, schools, sports centers, prisons etc.

Two different models of AquaEfficiency are available, to fit with any installation arrangement: Instantaneous and semi-instantaneous configuration operating both with a 3-port valve for connection to local boilers, primary tanks or solar systems.

When it comes to the selection of heat exchanger, AquaEfficiency offers three choices: Plates & Gaskets, Copper Brazed or AlfaNova®: exclusive to Alfa Laval (100% stainless steel, Fusion-bonded).

Dependable performance

Since 1923, Alfa Laval has been in the water heating business, and has become a leading manufacturer and supplier. AquaEfficiency incorporates a wealth of background experience for secure and reliable hot water production. The components have been carefully selected and tested to perform well in combination with one another.

Working principle

In the tap water system, energy is exchanged through a heat exchanger from the primary to the secondary side.

On the primary side, both AquaEfficiency instantaneous and semi-instantaneous models have to be fed by a heating source that can be provided by a local boiler, a primary tank or a solar system for example. The temperature of the media entering the heat exchanger on the primary side is adapted to the demand detected on the domestic side. This eliminates themal shock in the heat exchanger and reduces the build-up of lime-scale in the secondary side.

On the secondary side, AquaEfficiency instantaneous is connected to the main water circuit and provides domestic hot water to the distribution pipe-work when tapping occurs.

A circulation pump - which is usually used to limit the time needed to deliver domestic hot water to the tap at the right temperature- maintains a constant flow rate through the heat exchanger and through the distribution pipe-work.

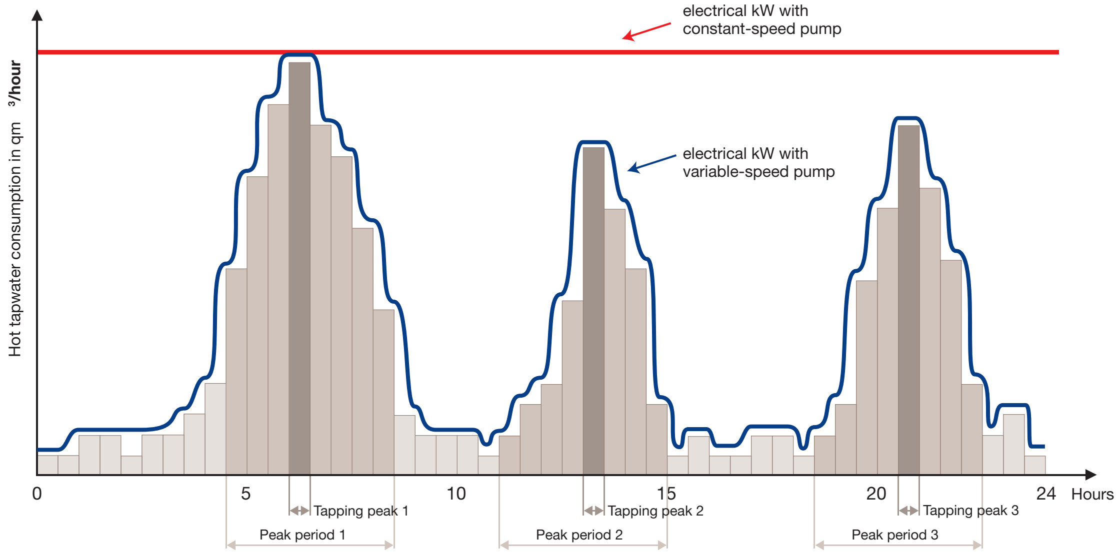
For AquaEfficiency semi-instantaneous a charging pump follows the variable flow rate through the heat exchanger according to the demand profile for the given installation, thus reducing the electrical energy consumption of the pumps.

AquaEfficiency offers electronic control equipment that provides several user-definable functions to customize the system and ensures precise temperature control.

Equipments

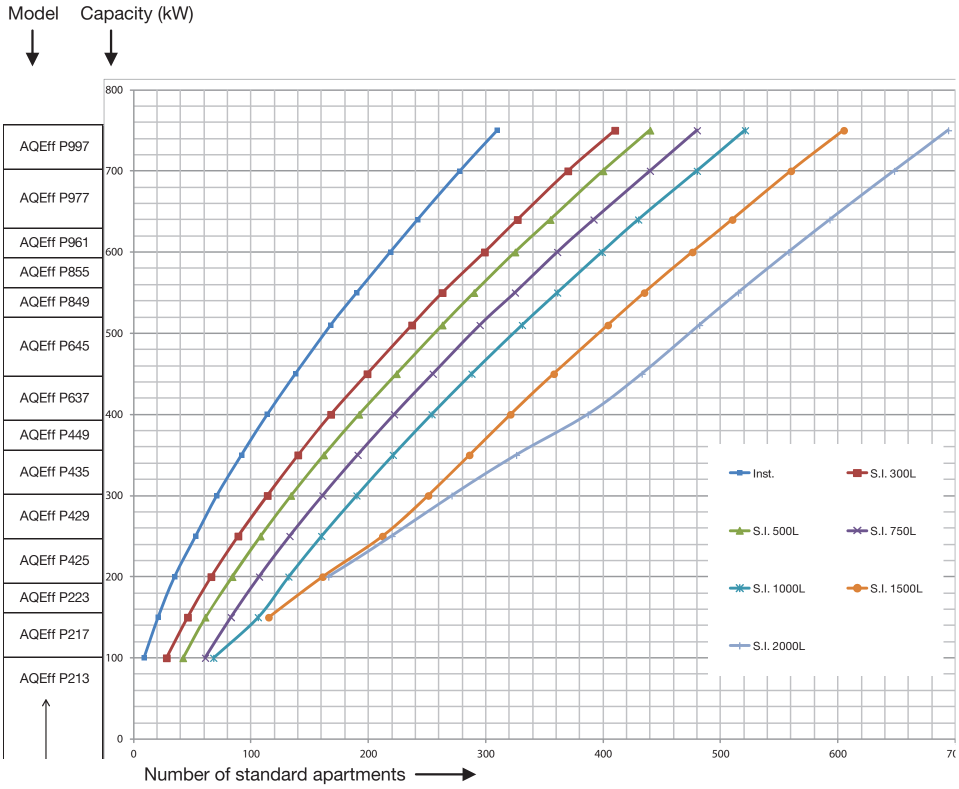
AquaEfficiency 3-Port	
Heat Exchanger	**Plates & Gaskets** • AISI 316 plates & EPDM Clip-on gaskets • Possibility to increase capacity • Compact design • Insulation **Copper Brazed** • Cost effective solution • Thermal efficiency for optimum comfort and reliability • Increased turbulence to increase heat transfer and reduce fouling • Temperature stability • Compact design (large heat transfer surface within a small footprint) • Insulation **Fusion-bonded** AlfaNova is the world's first and only heat exchanger made of 100% stainless steel • High heat transfer • Corrosion resistance • Maximum cleanliness • 100% copper free, suitable for all DHW pipeworks • Insulation
Control Valve	**3-Port Electronic** 24V 0-10V
Controller	**AquaBox Micro3000** Multi functional control box with possibility to connect to a l ocal Building Management System
Primary Pump	Variable Single or Double Head
Charging Pump	Variable Single or Double Head Flooded Rotor
Valves	Drain valve (primary), pressure relief valve (secondary)
Sensors	**Three temperature sensors** • Secondary outlet • Secondary inlet • Primary outlet

Example of tap water demand apartment block

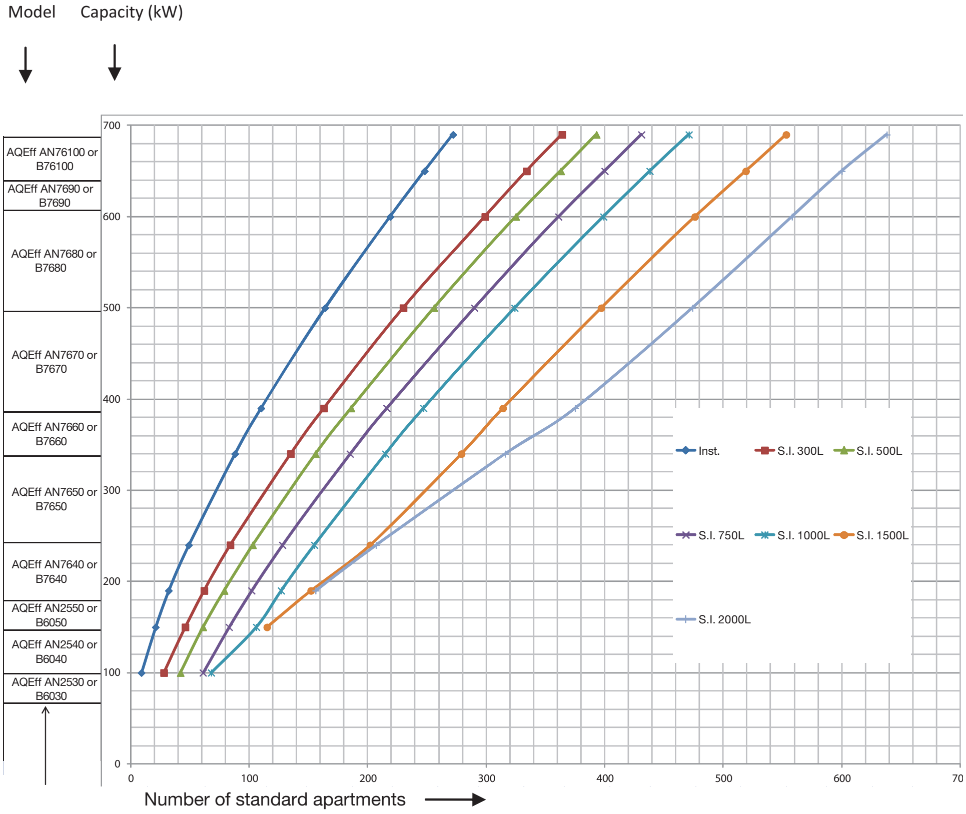


Temperature program	
Primary	70 - 30°C
Secondary	10 - 60°C

Example of selection curves - Plates & Gasket (instantaneous and semi-instantaneous)



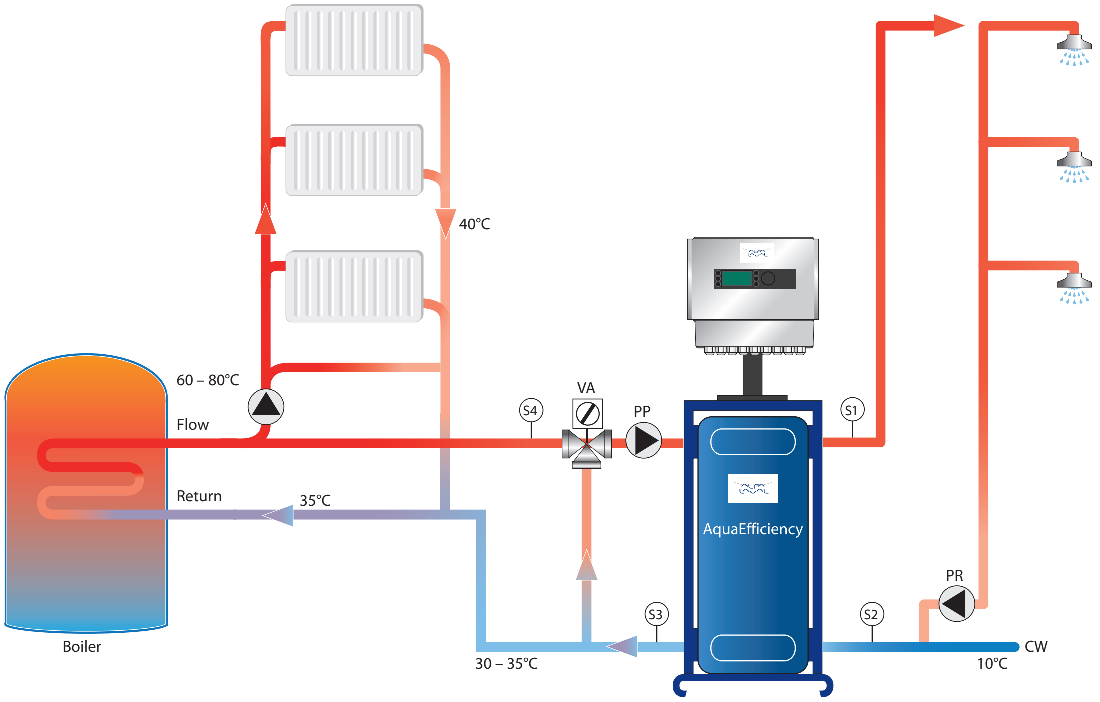
Example of selection curves - AlfaNova and Copper Brazed (instantaneous and semi-instantaneous)



Operating pressures and temperatures

AquaEfficiency 3-port		Primary	Secondary
Plates & Gaskets	Max. operating pressure	10 bar	10 bar
	Max. operating temperature	110°C	90°C
Copper Brazed	Max. operating pressure	10 bar	10 bar
	Max. operating temperature	110°C	90°C
AlfaNova	Max. operating pressure	10 bar	10 bar
	Max. operating temperature	110°C	90°C

AquaEfficiency flowchart



VA	Actuator	S1	DHW temperature sensor
PP	Primary Pump	S2	Thermal treatment sensor
PR	Circulation Pump	S3	Scaling control sensor
CW	Cold water	S4	Optional sensor

How to contact Alfa Laval
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AquaProtect

Anti-legionella tap water systems

The system to the left is AquaProtect T1 and the system to the right is AquaProtect T2 connected to a reaction tank.

Applications

AquaProtect is a tap water system which uses continuous thermal disinfection of incoming and circulating water to provide legionella-free domestic hot water for buildings such as hospitals, hotels, nursing homes, prisons and similar institutions.

Legionella bacteria occur in low numbers in natural environments such as rivers, lakes and reservoirs and can survive temperatures as low as 6°C and as high as 50°C. From these natural habitats, the bacteria can migrate into man-made water systems. Enclosed, warm storage vessels, blind spots in pipe-work and water systems containing stagnant water provide an ideal environment in which the bugs can flourish, particularly if sludge, sediment and scale are present for them to feed on. Studies have shown that many hot water systems contain legionella and other bacteria at various concentration rates.

Inhaled in tiny water droplets, legionella bacteria can cause legionnaire's disease which is potentially fatal to humans, especially those made more vulnerable because of age or illness.

AquaProtect uses recovered heat to disinfect hot water and no additional energy input is required.

Features and benefits

- Disinfection at 70°C of all incoming water.
- Continuous disinfection of the circulation loop.
- Adaptable holding time to comply with local rules.
- Domestic hot water supply at appropriate temperature (60°C) to avoid scalding at the tap.
- Up to 13 m^3/h of disinfected water.
- Continuous circulation through the system.
- Possibility to run thermal treatment of the network.
- Temperature safety function to ensure that only disinfected water enters the reaction tank (AquaProtect T2 only).
- Heat exchangers for all applications and conditions
- Electronic control.

Working principle

AquaProtect uses two heat exchangers. One is connected to the heat source (boiler, district heating network, etc) and is used to disinfect water at 70°C.

The other heat exchanger is used on one side to cool water from 70°C down to a suitable temperature for a hot tap water network (60°C). The heat recovered in the process is used to pre-heat incoming and circulating water before it enters the disinfection heat exchanger where it is heated to 70°C.

Once heated to 70°C, the disinfected water needs to be held at this temperature for a given time to ensure eradication of bacteria.

A range of tank sizes enables the appropriate tank to be selected to ensure that the hold time (1 minute, 6 minutes, etc) complies with local or national regulations. This can be achieved by using either a standard storage vessel or a reaction tank with a special internal configuration that controls the direction of flow.

In semi-instantaneous systems, disinfected water flows to a storage vessel where it is stored until the peak demand period occurs (a combined reaction tank can offer both functionalities. See hydraulic chart on the back page. AquaProtect T1 Instantaneous does not use a storage vessel but still need a holding tank).

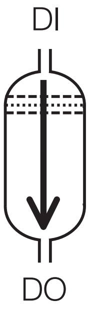
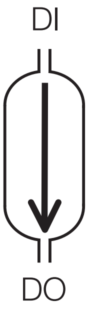
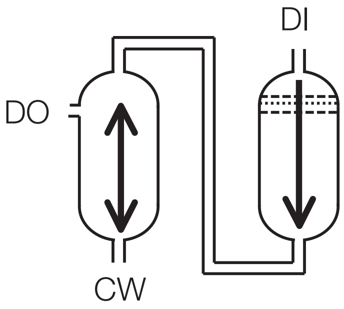
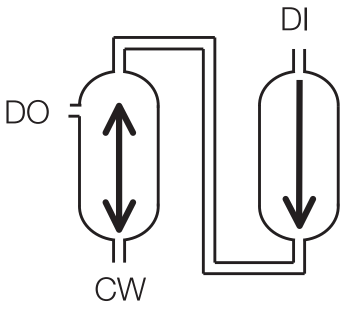
From this storage vessel, disinfected water flows to the cooling heat exchanger. A mixing valve ensures that domestic hot water is provided at the right temperature (60°C) by mixing disinfected water at 70°C with cooled water coming from the storage vessel. To eliminate any risk of infection, only disinfected water is used.

During peak periods, disinfected water is drawn off from the top of the storage vessel to the network by water entering the network.

When there is no or limited demand the water in the storage vessel is continuously replenished. Circulation through the system ensures that the water is drawn from the bottom of the storage vessel to be pre-heated and then disinfected before being stored.

AquaProtect T2 is supplied with a temperature safety function which ensures that only disinfected water enters the reaction tank. Water that hasn't attained the disinfection temperature is diverted to the beginning of the process to ensure that it finally reaches 70°C. This function can be very useful in cases of low capacity on the primary side, or in the event of scaling.

Possible tank combinations

AquaProtect T1 Instantaneous		**AquaProtect T1 Semi-instantaneous & AquaProtect T2**		**AquaProtect T2 Combined**
				
One reaction tank (holding tank)	One storage vessel used as holding tank	One storage vessel and one reaction tank (holding tank)	One storage vessel and one storage vessel used as holding tank	Combined reaction tank (holding tank and storage vessel)

DI	Disinfected Water In
DO	Disinfected Water Out
CW	Cold Water In or To Pre-Heating HE

Equipment

Disinfection temperature	70°C
Holding temperature	70°C
Distribution temperature	60°C
Circulation return continuous disinfection	Yes
Periodic net disinfection	Yes
By-pass renewable energy connection	Optional

	AquaProtect T1		AquaProtect T2		T2 Combined
Temperature safety function	-		Yes		
Available controller	Alfa Laval Micro 2000 Special		Samson 5479 with/without Communication Interface RS485		
Heat exchanger	Plates & Gaskets		Plates & Gaskets	Copper Brazed	Copper Brazed
Process	Instantaneous	Semi-instantaneous	Semi-instantaneous		
Holding tank	Needed		Needed		Combined reaction tank needed
Storage vessel	-	Needed	Needed		
Excessive tapping protection	-		Optional		
Over-heating protection	-	Yes	-		-

For additional features or AlfaNova Heat Exchanger, please consult.
AquaProtect T2 Combined can easily be connected to the Combined Reaction Tank which has a 6 min holding time.

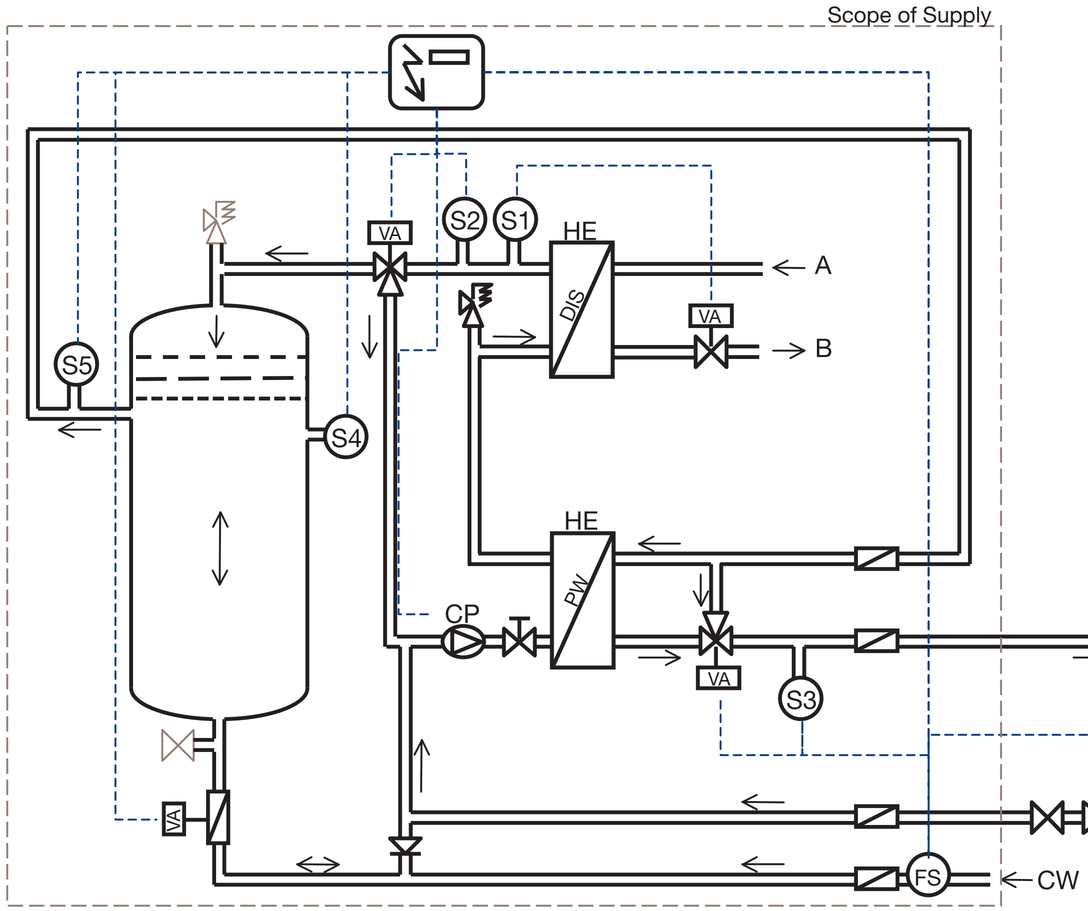
Examples of holding time according to holding tank size:

For an AquaProtect providing 5 m³/h flow rate of disinfected water

Holding tank	300 L	500 L	750 L
Holding time	3 min	6 min	9 min
Operating limits	**Primary**		
Maximum operating pressure	25 Bar		
Maximum operating temperature	130°C		

Maximum pressure and temperature differ according to model and type of heat exchanger.

Hydraulic chart



A	From District Heating Network / Boiler		**PW**	Pre-Heating HE		**VA**	Primary Control Valve
B	To District Heating Network / Boiler		**DIS**	Disinfecting HE		**FS**	Flow Switch
CW	Cold Water Inlet		**CP**	Charging Pump		**S**	Temperature Sensor
HE	Heat Exchanger		**PR**	Circulation Pump			

Note: The illustration above shows a semi-instantaneous system using a combined reaction tank. The use of 2 separate tanks may have to be considered for larger application. Tank(s) are not part of the AquaProtect Scope of Supply and should be ordered separately.

AquaProtect is also available with 2 or 3-port electronic control on the primary side of the disinfection heat exchanger.

Test requirements

AquaProtect is built in compliance with PED CE 97/23 Art 3.3 or PED 1 and CE 73/23 electrical regulation. AquaProtect is assembled, wired and tested prior to shipment.

How to contact Alfa Laval
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SolarFlow

Tap water pre-heater system

Applications

SolarFlow is a tap water pre-heater designed for domestic hot water production, with the use of renewable energy from thermal solar panels, geothermal fields, or heat pumps.

SolarFlow was developed to generate energy savings and provide cost-effective domestic hot water for large applications such as apartment buildings, hospitals, hotels, retirement homes, nursing homes, schools, and sport centres.

As SolarFlow is a pre-heater, it has to be combined with a standard tap water system, or alternatively, a domestic hot water production system, to ensure that, if needed, the domestic hot water will be heated to the right temperature by adding only the fossil fuel generated source of energy that is strictly necessary.

Features and benefits

- Energy savings
- Prioritizes renewable energy. The primary tank is never heated by a boiler or electrical heater.
- All the energy accumulated in the primary tank is used, whatever the temperature.
- Piston effect through the primary tank (stratification) guarantees that maximum energy is delivered when it is needed.
- Minimizes legionella growth by using primary tank instead of secondary storage vessel and reduces installation check costs.

Test requirements

SolarFlow is built in compliance with PED CE 97/23 Art 3.3 or PED 1 and CE 73/23 electrical regulation.

SolarFlow is assembled, wired and tested prior to shipment.

Working principle
On the primary side, SolarFlow is connected to a primary tank that is fed by thermal renewable energy.

This is provided by different sources such as solar panels, geothermal fields, heat pumps or even condensate returns.

A temperature sensor (S4) located on the secondary inlet checks the temperature of the water entering into SolarFlow.

The water can come from the water main (CW) or from the circulation loop (RC). This temperature is compared to the temperature checked by a sensor (S5) located on top of the primary tank.

Renewable energy vs. fossil
If renewable energy is available in the primary tank (S5>S4), then SolarFlow regulation is engaged.

A temperature sensor (S), located at the secondary side outlet, checks the temperature and adjusts the control valve (VA) accordingly in order to always maintain domestic hot water as close as possible to the set-point temperature.

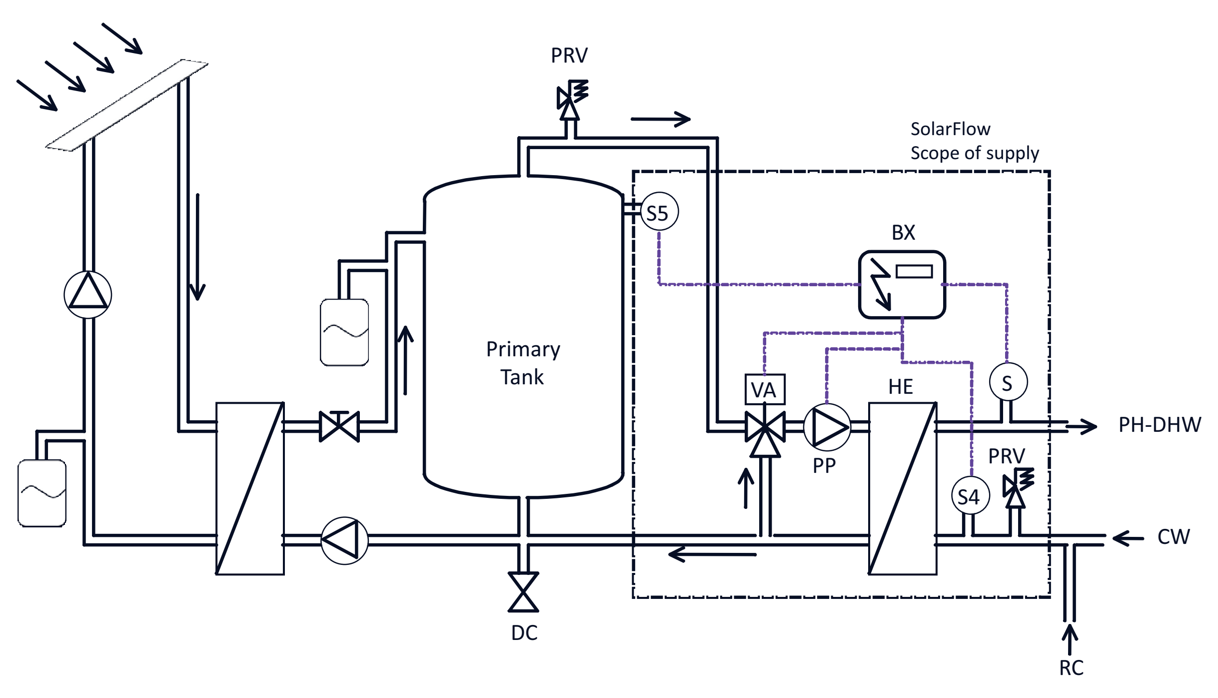
If renewable energy is not available in the primary tank (S5<S4), SolarFlow is on stand-by mode. The valve is closed, the pump (PP) is switched off and the energy consumption of SolarFlow equals zero.

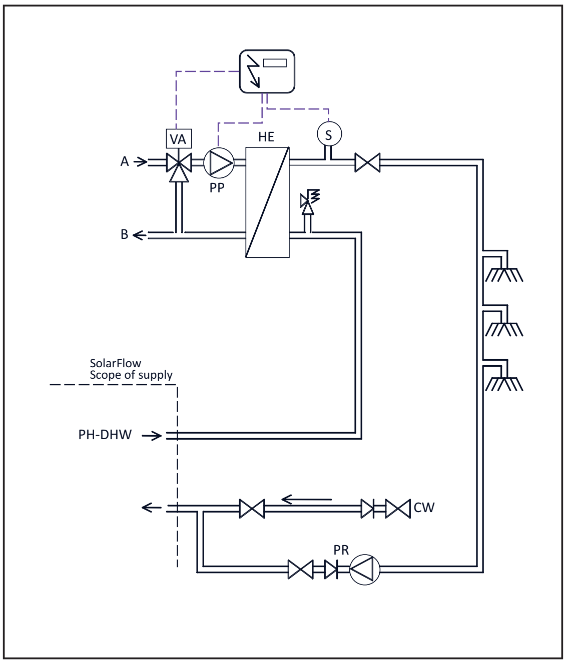
In that case, the domestic hot water will have to be heated up by another source of energy (fuel boiler, gas boiler, electrical heater).

Economy mode
To generate further energy savings, SolarFlow can switch to an economy mode that will limit the electricity consumption of the pump when the network temperature is stable.

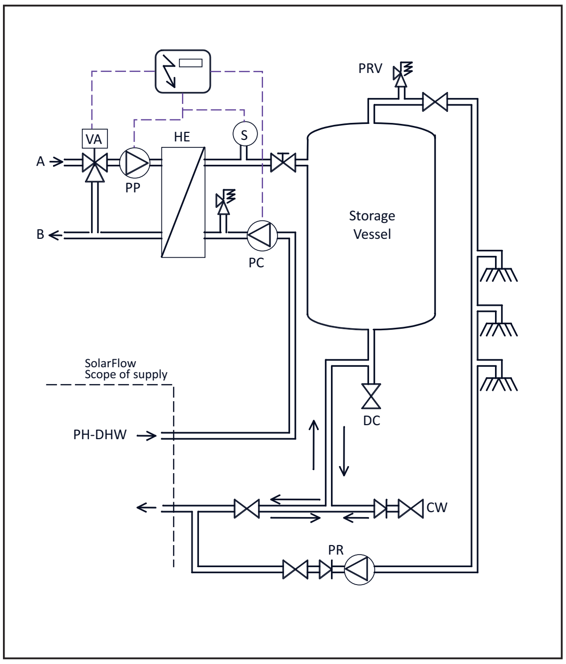
SolarFlow offers electronic control equipment that provides several user-definable functions to customize the system and ensure precise temperature control in order to reduce the build-up of limescaling.

Hydraulic chart

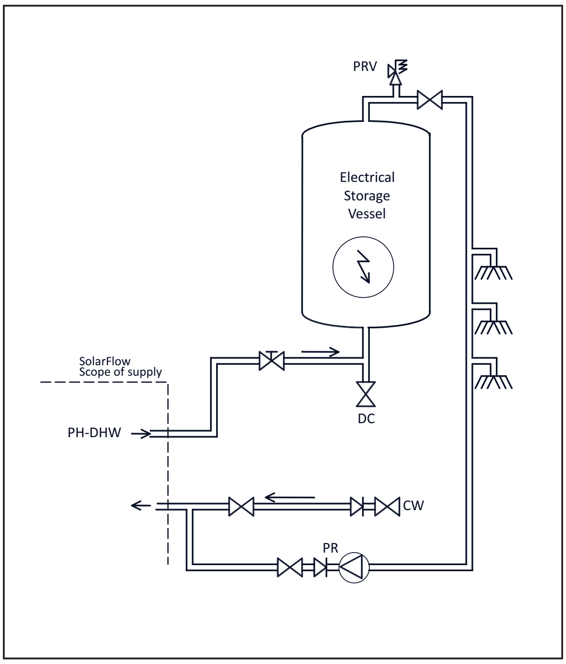




Example with instantaneous tap water system.



Example of semi-instantaneous tap water system.



Example with accumulation tank.

A	From boiler
B	To boiler
CW	Cold water inlet
PH-DHW	Pre-heated domestic hot water
PP	Primary pump
PR	Circulation pump
PRV	Pressure relief valve
S, S4, S5	Temperature sensor
HE	Heat exchanger
VA	Primary control valve
BX	Control box
PC	Charging pump
RC	Circulation return
DC	Drain cock

Equipments

	SolarFlow
Heat exchanger	**Fusion-bonded** AlfaNova is the world's first and only heat exchanger made of 100% stainless steel - High heat transfer - Corrorsion resistance - Maximum cleanliness - 100% copper free, suitable for all DHW pipeworks - Insulation **Copper Brazed** - Thermal efficiency for optimum comfort and reliability - Increased turbulence to increase heat transfer and reduce fouling - Temperature stability - Compact design (large heat transfer surface within a small footprint) - Insulation **Plates & Gaskets** - Cost effective tap water production - Compact design - AISI 316 plates & EPDM Clip-on gaskets - Insulation (rockwool and aluminum cladding)
Control valve	**3-port Electronic** 24V 0-10V 230V 3 Points
Controller	**AquaBox** (Alfa Laval Micro2000) 7 languages: FR/EN/DE/NL/IT/SP/DK Temperature sensors: DHW, secondary inlet, primary tank, circulation (option), scaling control (option) 8-Relay Card, temperature downloads
Primary pump	Single or Double Head Flooded Rotor
Valves	Drain valve (primary), Pressure relief valve (secondary)

Operating limits	Primary
Maximum operating pressure	10 bar
Maximum operating temperature	110°C

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AquaMicro

Domestic hot water unit for apartments

AquaMicro is a complete, installation-ready district heating substation for domestic hot water. It is suitable for apartments with a primary or secondary connection to a district heating network. Alfa Laval has long experience in district heating technology and has developed AquaMicro with a well-considered function and simple operation. All components are readily accessible for maintenance and future servicing needs.

Good comfort

AquaMicro offers fully automatic temperature control for hot water. The hot water is heated by direct exchange with high capacity. This means that the hot water is always as fresh as the incoming cold water.

Simple installation

Small dimensions, low weight, well-designed pipe routing and self-acting control equipment ensure simple installation.

Long-term reliability

AquaMicro represents the very latest technology and meets very strict long-term performance specifications. The plates and all the pipes in the unit are made from acid-resistant, stainless steel. All components are mutually tuned and are subjected to detailed functional testing according to Alfa Laval's ISO 9001:2000 quality assurance system.

District heating - a good form of heating

District heating is an efficient technology which meets the need for heating and hot water in a simple, convenient and reliable manner. The growth of district heating is making a positive contribution to reduced emissions of greenhouse gases. In economic terms, district heating is very competitive compared with other forms of heating.

Function

The incoming district heating water arrives from the culvert network at high pressure and high temperature. Only the heat from this water is used, therefore, and the district heating water itself does not pass into the domestic hot water system of the apartment. The transfer of heat from the district heating water to the domestic hot water system of the apartment takes place in the heat exchanger. The transfer of heat takes place via thin AquaMicro plates of acid-resistant stainless steel, which keep the district heating water entirely separate from the apartment's own systems.

AquaMicro has self-acting temperature control for the domestic hot water. The hot water temperature is controlled by an self-acting temperature regulator. This senses and regulates the temperature of the outgoing hot water directly in the heat exchanger. The design, which was developed and patented by Alfa Laval, provides a constant hot water temperature regardless of the size and frequency of the quantities drawn off.

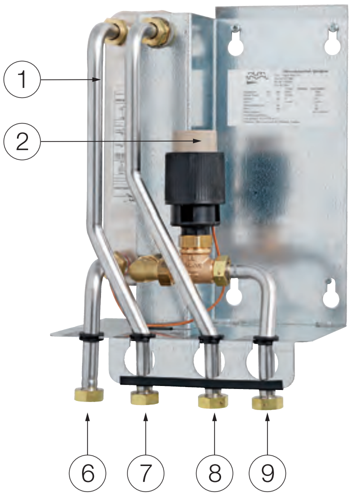
An easily operated, economical and long-lived heating source

AquaMicro uses hot district heating water to heat domestic hot water (in a never-ending flow).

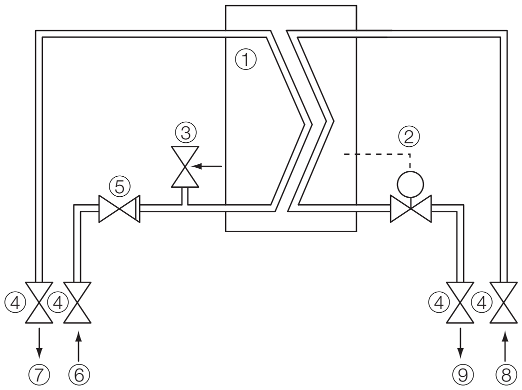
AquaMicro is mounted on the wall and takes up very little space. Wherever it is positioned, the substation is quiet and discreet, requires no care or maintenance and has a very long service life. In the event of service or replacement of components becoming necessary in the future, all parts are readily accessible and capable of individual replacement.

Components

1. Heat exchanger, hot water
2. Temperature regulator, domestic hot water
3. Safety valve, cold water (accessory)
4. Shut-off valve (accessory)
5. Check valve
6. Cold water
7. Hot water
8. District heating supply
9. District heating return



Brass components are of desincification resistant quality. Connection dimension for all connections: DN20, internally threaded.



Basic circuit diagram

Operating data

	District heating	Hot water
Design pressure, MPa	1.6	1.0
Design temperature, °C	120	100
Safety valve opening pressure, MPa		0.9
Volume heat exchanger, l	0.45	0.48

Other
Electrical data
Noise level
Main dimensions (cover): width 305 x depth 200 x height 460 mm
Weight: 8 kg, cover 2 kg
For transport: weight 12 kg, volume 0.04 m³

Performance at primary operating pressure, 50 kPa

	Output kW	Primary flow l/s	Actual return temp. °C	Secondary flow l/s
Design temp. program, °C Hot water circuit 65-25/10-50	50	0.28	21.4	0.3

Accessories

Cover

Safety valve

Shut-off valve (set of four units)

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AquaPool

Swimming pool heating system

Application
Swimming pool water heating. Simple, strong, compact and highly reliable, the AquaPool is designed to efficiently reheat and maintain temperature of water in swimming pools of all dimensions and capacities from primary heat source such as boiler, solar installation, heat pump etc.

Standard design
Complete packaged module including:

Stainless steel or titanium plate heat exchanger, for operation with sea water or slightly corrosive water (balneo-therapy, thermal spring water), EPDM clip-on gaskets.

Primary circuit:
- Single headed pump, electrically wired 230 V /1PH/50 Hz, with built-in winding overload protector
- Isolation valves on primary inlet and outlet
- Non return valve on primary pump outlet
- Black steel pipe work, epoxy painting coated

Secondary circuit:
- PVC pocket for electronic controller temperature sensor
- 2 PVC three-piece connectors for swimming pool circuit piping

Electrical panel: IP 55 plastic control box including:
- Electronic controller with front mounted display
- On/off switch
- Power on light
- Terminal block

AquaPool is fully assembled, electrically wired, pressure tested and calibrated at the factory prior to dispatch.

Installation and operating principle
Installation is simple and easy since only a required connection of:
- Primary circuit to heating pipe work, through a circuit separation bottle
- Secondary circuit to swimming pool filtration circuit
- Electrical supply 230V/1Ph/50 Hz + E to control box

Operating principle:
- The electronic thermostat sensor controls the swimming pool inlet water temperature
- The primary pump is switched on and off according to the controller demand
- On/off control

All components are easily accessible and removable, resulting in very low operating costs.

Technical data

Electrical supply:
Power supply 230V/1Ph/50 Hz + E

The AquaPool electrical supply must be protected by a circuit breaker or fuses (90 W – 0,4 A) and electrical cable properly sized must be used in compliance with electrical standards.

Operating limits

Primary circuit:
- Max. working temperature 110°C
- Max. service pressure 10 bar

Swimming pool circuit:
- Max. working temperature 60°C
- Max. service pressure 6 bar

Compliance

- PED: 97/23 CE (article 3.3)
- Electrical: 73/23 CE

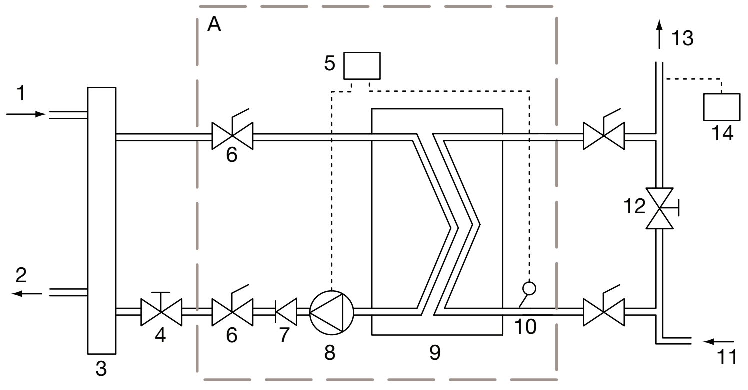
Performances

The chart below gives the heating capacity and hydraulic features of the AquaPool, depending on the primary inlet temperature.

Model	90°C					80°C					70°C					55°C				
		Primary		Pool			Primary		Pool			Primary		Pool			Primary		Pool	
	Heat capa-city kW	P flow rate m^3/h	Ext. head kPa	S flow rate m^3/h	Pres-sure drop kPa	Heat capa-city kW	P flow rate m^3/h	Ext. head kPa	S flow rate m^3/h	Pres-sure drop kPa	Heat capa-city kW	P flow rate m^3/h	Ext. head kPa	S flow rate m^3/h	Pres-sure drop kPa	Heat capa-city kW	P flow rate m^3/h	Ext. head kPa	S flow rate m^3/h	Pres-sure drop kPa
AquaPool 7	30	0.5	44	1.3	41	30	0.9	24	1.3	41	30	1.2	6	1.3	41	17	1.2	6	0.7	18
AquaPool 11	52	0.9	41	2.2	43	51	1.4	25	2.2	41	50	1.8	5	2.2	41	30	1.8	6	1.3	19
AquaPool 17	82	1.3	36	3.5	43	79	1.9	19	3.4	40	76	2.5	6	3.3	38	46	2.5	5	2.0	18
AquaPool 23	111	1.7	30	4.8	43	104	2.3	18	4.5	38	96	2.9	6	4.1	33	58	2.9	5	2.5	16
AquaPool 29	140	2.2	26	6.0	43	125	2.7	18	5.4	34	111	3.2	6	4.8	28	69	3.2	6	3.0	14
AquaPool 35	166	2.6	22	7.1	42	144	3.0	15	6.2	32	123	3.5	5	5.3	27	78	3.5	5	3.4	12
AquaPool 41	194	3.1	16	8.3	42	164	3.4	11	7.1	30	134	3.6	6	5.8	21	84	3.6	6	3.6	11
AquaPool 49	222	3.5	11	9.5	41	184	3.6	11	7.9	28	146	3.8	5	6.3	19	96	3.8	5	4.1	9
AquaPool 55	246	3.8	5	10.6	41	199	3.8	5	8.6	27	151	3.8	5	6.5	16	-	-	-	-	-

Secondary conditions: 27 / 47°C (20-40°C if primary at 55°C). Available pressure drop at primary pump external head secondary pressure at nominal flow.

A. AquaPool scope of supply
1. From primary heat source
2. To primary heat source
3. Circuit separation bottle
4. Manual flow adjust valve
5. Single stage electronic thermostat
6. Manual isolation valves
7. Non-return valve
8. Primary pump
9. Heat exchanger
10. PTC 1000 temperature sensor
11. From swimming pool
12. Manual flow adjustment valve
13. To swimming pool
14. Water treatment



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Pressosmart

Pressurisation set for heating systems, air conditioning and industrial applications

Application
Pressosmart is a pressurization set designed to maintain stable pressure in a closed water loop, such as those used in heating systems, air conditioning and a variety of industrial applications.

With its electronic controller, Pressosmart offers more accurate control than standard stand-alone membrane expansion technology and a considerably smaller equipment footprint.

Pressosmart can be connected to closed expansion vessels that prevent water from coming into contact with oxygen in the air. This reduces corrosion and pipeline maintenance, which extends the lifetime of the entire installation. Pressosmart can also be connected to open expansion vessels.

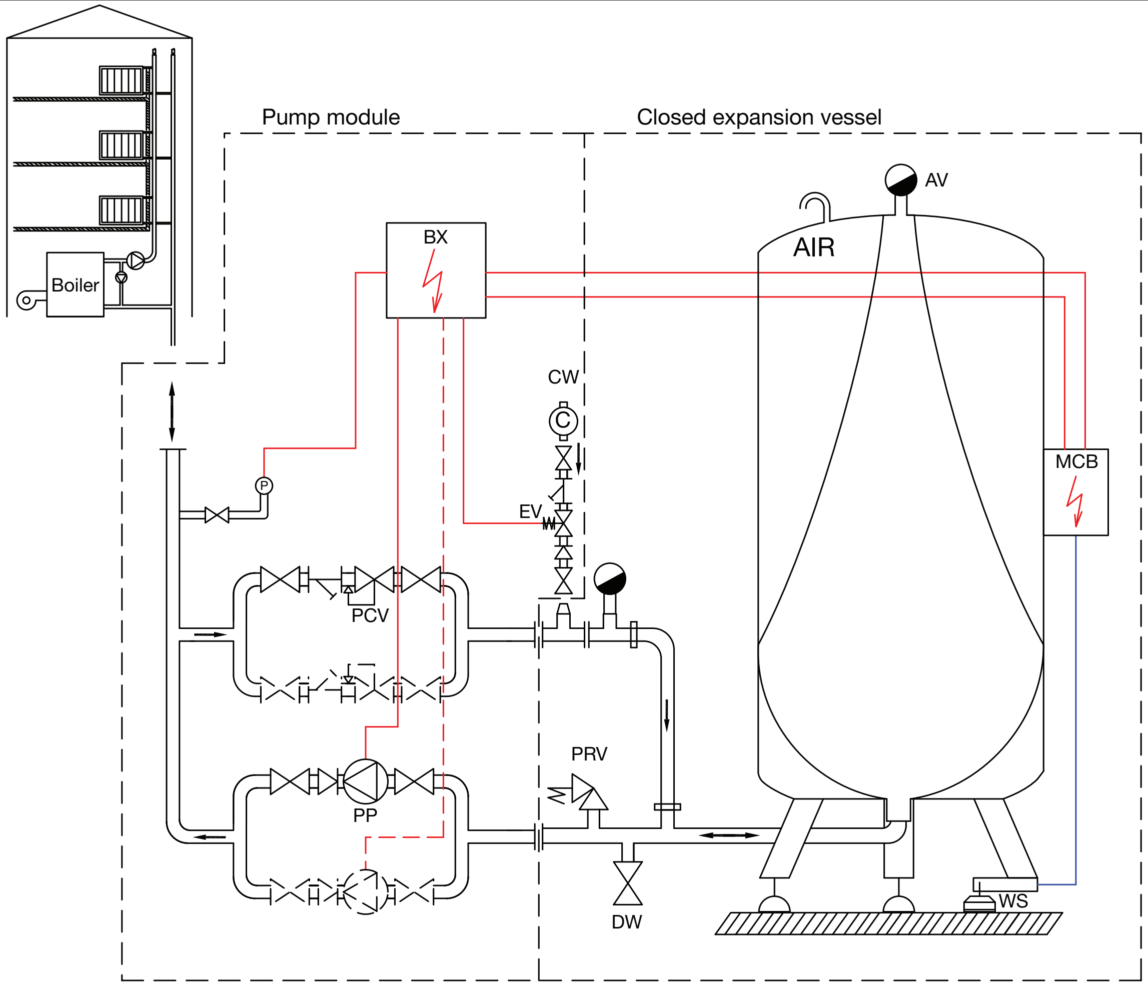
Working principle
When the temperature increases in a closed water loop, the water volume expands. When the temperature decreases, the opposite occurs.

The increased volume generated by thermal expansion in the closed loop will be discharged through the pressure control valve and stored in the expansion vessel. When the pressure sensor detects a pressure drop due to a temperature decrease, water will be pumped back into the loop. Stable and even pressure is thus continuously maintained in the closed loop.

Pressosmart automatically fills the installation when there is not enough water and also protects against overflow.

Renovation
Existing Pressosmart installations that use open expansion vessels can be easily upgraded to the closed expansion technology by simply replacing the existing vessel with a closed expansion vessel. The pump module does not need to be replaced.

Hydraulic chart



PP	Pressurization pump	CW	Cold water feed
PCV	Pressure control valve	EV	Electro-valve
P	Pressure sensor	MCB	Measure control box
BX	Control box	WS	Weight sensor
C	Filled up solenoid valve	AV	Air vent
PRV	Pressure relief valve	DW	Drain work connection

Options

- **Impulsion meter** to control the normal operation of the system by filling with water, and to alert and shut down the system in case of leakage. Included for closed expansion vessel.
- **Water-hammer damper**, for use when the length of pipeline between the Pressosmart and the installation may cause a water hammer.
- **Core-water strainer**, 89 µm, to protect the solenoid valve used to fill the expansion vessel.
- **Fill-up bypass** to enable a quick filling of the system via a manual valve.
- **Flood detector** to detect and warn of boiler room flooding.

Quick selection guide

The chart below should be used for closed-loop installations running low-pressure hot water at 90/70°C (mean temperature 80°C).

Example of use:
See chart below
- Installation capacity: 2500 kW
- Building static height: 40 m

Selection:
Possible choice: MP4N616, MP5N616, MP5N626, MP71017.
Connected to a 1000 L closed expansion vessel.
Alternative: 1000 L open expansion vessel.

Equipment

Installation Volume (m^3)	0	6	12	15	18	24	30	45	60	75	90	105	120	150	175
Installation Capacity P (kW)	0	500	1000	1250	1500	2000	2500	3750	5000	6250	7500	8750	10000	12500	14500

Closed exp. vessel	500 L	1000 L	2 x 1000L	Please consult

Open exp. vessel	200 L	400 L	600 L	800 L	1000 L	1800 L	2500 L	3000 L	3500 L	4000 L	5000 L	2 x 3000 L

75 m	MP71516	MP71516	MP71516	MP71516	MP71516	MP71516	MP71516						
	MP71526	MP71526	MP71526	MP71526	MP71526	MP71526	MP71526	MP71526	MP71526				
	MP71517	MP71517	MP71517	MP71517	MP71517	MP71517	MP71517	MP71517	MP71517				
	MP71527	MP71527	MP71527	MP71527	MP71527	MP71527	MP71527	MP71527	MP71527	MP71527			
65 m	MP5N816	MP5N816	MP5N816	MP5N816	MP5N816	MP5N816							
	MP5N826	MP5N826	MP5N826	MP5N826	MP5N826	MP5N826	MP5N826	MP5N826					
		MP71316	MP71316	MP71316	MP71316	MP71316	MP71316						
		MP71326	MP71326	MP71326	MP71326	MP71326	MP71326	MP71526	MP71526	MP71526	MP71526		
		MP71317	MP71317	MP71317	MP71317	MP71317	MP71317	MP71517	MP71517				
		MP71327	MP71327	MP71327	MP71327	MP71327	MP71327	MP71527	MP71527	MP71527	MP71527		
55 m	MP4N716	MP4N716	MP4N716	MP4N716	MP4N716								
	MP5N716	MP5N716	MP5N716	MP5N716	MP5N716								
	MP5N726	MP5N726	MP5N726	MP5N726	MP5N726	MP5N726	MP5N726	MP5N726					
		MP71016	MP71016	MP71016	MP71016	MP71016	MP71316						
		MP71026	MP71026	MP71026	MP71026	MP71026	MP71326	MP71326	MP71326	MP71526	MP71526		
		MP71017	MP71017	MP71017	MP71017	MP71017	MP71317	MP71317					
		MP71027	MP71027	MP71027	MP71027	MP71027	MP71327	MP71327	MP71327	MP71527	MP71527	MP71527	
45 m	MP195N S2												
	MP195N L2												
Building static height 40 m	MP4N616	MP4N616	MP4N616	MP4N616	**MP4N616**	MP4N616							
	MP5N616	MP5N616	MP5N616	MP5N616	**MP5N616**	MP5N616							
	MP5N626	MP5N626	MP5N626	MP5N626	**MP5N626**	MP5N626	MP5N726	MP5N726	MP5N726				
		MP71016	MP71016	MP71016	**MP71016**	MP71016	MP71016						
						MP71026	MP71026	MP71026	MP71326	MP71326	MP71326		
						MP71017	MP71017	MP71017	MP71317				
						MP71027	MP71027	MP71027	MP71327	MP71327	MP71327	MP71327	MP71327
35 m	MP195N S1												
	MP195N L1												
	MP4N516	MP4N516	MP4N516	MP4N516	MP4N516	MP4N516							
	MP5N516	MP5N516	MP5N516	MP5N516	MP5N516	MP5N516							
	MP5N526	MP5N526	MP5N526	MP5N526	MP5N526	MP5N526	MP5N526	MP5N526	MP5N526				
		MP71016	MP71016	MP71016	MP71016	MP71016	MP71016						
						MP71026	MP71026	MP71026	MP71026	MP71026	MP71326		
						MP71017	MP71017	MP71017	MP71017				
						MP71027	MP71027	MP71027	MP71027	MP71027	MP71327	MP71327	MP71327
25 m	MP195N S1												
	MP195N L1												
	MP4N416	MP4N416	MP4N416	MP4N416	MP4N416	MP4N416							
	MP5N416	MP5N416	MP5N416	MP5N416	MP5N416	MP5N416							
	MP5N426	MP5N426	MP5N426	MP5N426	MP5N426	MP5N426	MP5N426	MP5N426	MP5N426				
		MP71016	MP71016	MP71016	MP71016	MP71016	MP71016						
						MP71026	MP71026	MP71026	MP71026	MP71026	MP71026		
						MP71017	MP71017	MP71017	MP71017				
						MP71027	MP71027	MP71027	MP71027	MP71027	MP71027	MP71027	MP71027
15 m	MP195N S1												
	MP195N L1												
	MP4N316	MP4N316	MP4N316	MP4N316	MP4N316	MP4N316							
	MP5N316	MP5N316	MP5N316	MP5N316	MP5N316	MP5N316							
	MP5N326	MP5N326	MP5N326	MP5N326	MP5N326	MP5N326	MP5N326	MP5N326	MP5N326				
						MP71026	MP71026	MP71026	MP71026	MP71026	MP71026		
0 M													

For MP4/MP5/MP7 the last 2 digits indicate the number and type of pressure-control valve. Appropriate system configuration can be done in our electronic selection tool AlfaSelect.

Equipment

	Pump No.	PCV No. (1)	Static Height (m)	1 PCV		2 PCV		Connection to the pipeline
				Max. capacity (kW) (2)	Article number	Max. capacity (kW) (2)	Article number	
MP195	1	1	5-40	500	MP195NL			1”
			41-50	500	MP195NL4150			
MP4	1	1	5-15	4000	MP4N316			1”
			5-25	4000	MP4N416			
			5-35	3500	MP4N516			
			5-30	4000	MP4N616			
			31-50	1500	MP4N6163150			
			51-60	800	MP4N6165160			
			5-30	4000	MP4N716			
			31-50	3750	MP4N7163150			
			51-60	1000	MP4N7165160			
MP5	2	1 or 2	5-20	4000	MP5N316	7500	MP5N326	1½”
			5-30	4000	MP5N416	7500	MP5N426	
			5-30	4000	MP5N516	7500	MP5N526	
			31-40	4000	MP5N5163140	2000	MP5N5263140	
			5-30	4000	MP5N616	7500	MP5N626	
			31-50	3000	MP5N6163150	3000	MP5N6263150	
			5-30	4000	MP7N716	7500	MP7N726	
			31-50	4000	MP5N7163150	7500	MP5N7263150	
			51-60	2500	MP5N7165160	2000	MP5N7265160	
			5-30	4000	MP5N816	7500	MP5N826	
			31-50	4000	MP5N8163150	7500	MP5N8263150	
			51-70	2500	MP5N8165170	2000	MP5N8265170	
MP7	2	1 or 2	10-45	5000	MP71016	10000	MP71026	2”
			46-55	3750	MP710164555	5500	MP710264555	
			10-45	5000	MP71316	9500	MP71326	
			46-65	4650	MP713164565	8750	MP713264565	
			10-45	5000	MP71516	9500	MP71526	
			46-75	5000	MP715164575	8750	MP715264575	

(1) PCV (Pressure Control Valve) opens when pressure exceeds the set point.
(2) Max capacity given for Samson 44-6 PCV type. The use of Samson 44-7 type will increase these values (MP7).
(3) FLA (Full Load Amperage) when operating at full load conditions under 230 V 1Phase 50 Hz.
(4) Except for MP195 where an open expansion vessel is included.

All Pressosmart pump modules are equipped with Micro2000 controller, except MP195 type S which uses electro-mechanical pressure switches.

Electrical supply 230 V 1Phase 50 Hz. Pressosmart MP7 also exists for 400 V 3Phase 50 Hz power. Please consult our electronic selection tool.

Max. operating pressure	7.5
Max. operating temperature	95°C

Maximum operating pressure varies according to the model.

Closed expansion vessel

The closed expansion vessels of steel and an internal rubber bag are available in two configurations: one with the control equipment and one without control equipment to extend expansion capacities (always combine same volumes).

Two volumes are available: 500 L (775 mm x 1642 mm, 90 kg) and 1000 L (800 mm x 2465 mm, 150 kg). PPH open expansion vessels are also available from 200 L to 5000 L.

Pressosmart products are built in compliance with PED 97/23 Art. 3.3 and CE73/23 electrical regulation.

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KAB

Sludge filter

Applications

KAB has been developed for the purpose of removing particles caused by corrosion of heating/cooling applications. This system is designed specifically for use in new and existing installations and networks.

Principle

Iron oxide can easily be identified in an installation. It settles out in the form of black sludge and is made of dissolved iron precipitated as hydroxide. This hydroxide releases hydrogen and turns into magnetised oxide Fe_3O_4 also called magnetite. The size (0.5 µ) and density of this product do not allow for an efficient settlement or centrifugal separation. KAB uses magnetic bars to remove these magnetised particles.

Working principle

The water held in the pipework is bypassed through a set of multi-field magnetic bars. The low speed flow and the laminar flow enable KAB to retain 99.9% of magnetised particles of less than 0.5 micron. The particles then agglomerate and form a deposit on the magnetic bars. This deposit then enables the trapping of the non-magnetised particles thanks to their position around the magnetic bars. This results in the settling of particles in the installations and circulation of treated water. KAB will bypass 20% of the water flow of the installation and may operate 24 hours a day.

Advantages

- Compact and easy to install.
- Easily cleaned by simply wiping the magnetic bars.
- High efficiency enabling the treatment of particles of less than 0.5µ.
- No risk of leakage or heating/cooling shutdown during treatment.
- With the optional isolating valve, minimal water loss while cleaning.
- It can be used as an injection cylinder when chemical treatment is required (ex: pH rectifier, oxygen reducer).

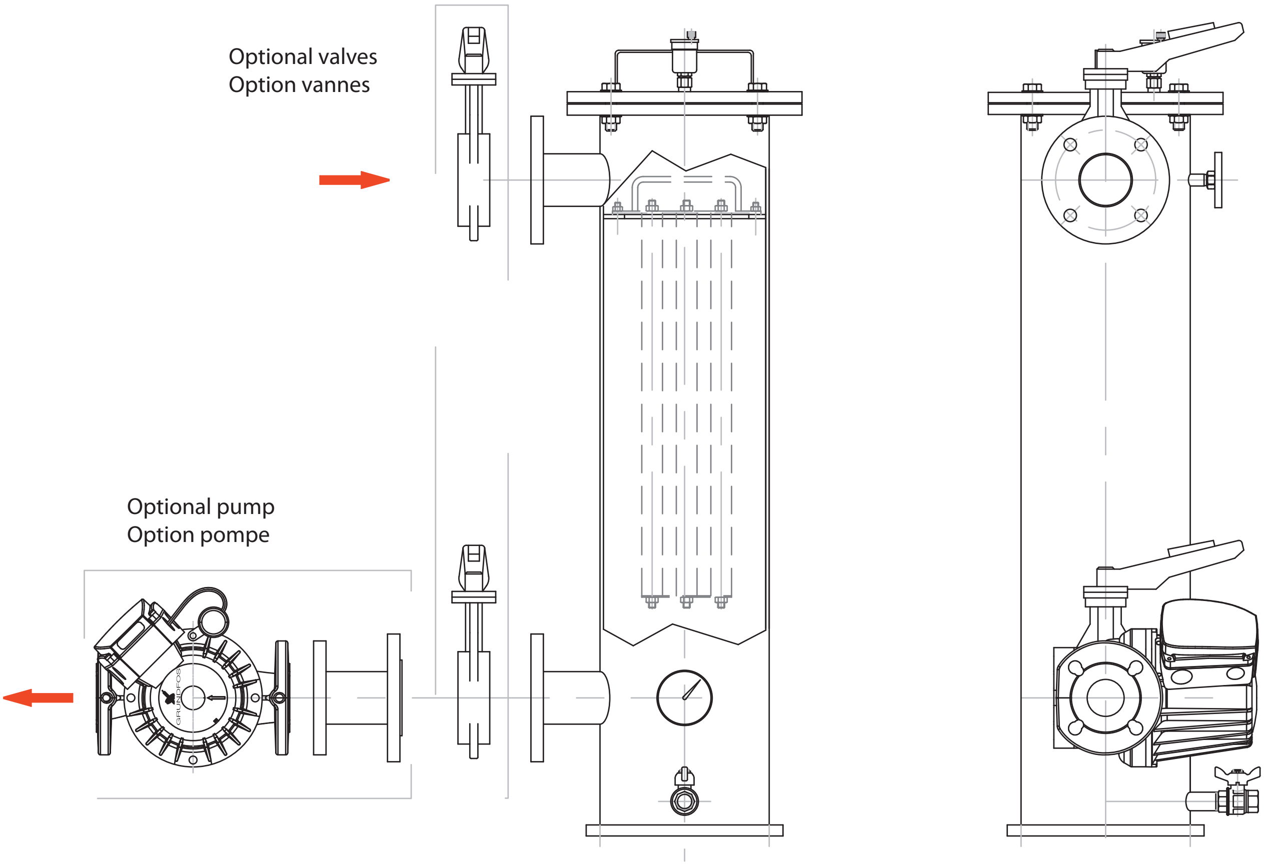
Options

50µm removable mesh strainer.
Feed pump to prevent disruption of an existing installation. Isolating valve.

Description

KAB is made of a carbon steel cylindrical body with a tangential water inlet at the top. The water outlet is located at the bottom. The multi-field magnetic bars are assembled radially in a gasket that can easily be removed for maintenance.

The shape and assembly of KAB creates a cyclonic effect where all the particles are driven to the magnetic bars and to the bottom of the body thanks to the rotational effect and gravity. The magnetic bars will catch the magnetite whereas the nonmagnetised particles will be trapped by settling.



Operating limits **Water**

Operating limits	**Water**
Max. operating pressure	10 bar
Max. operating temperature	110°C

Description	Heat load kW	Pipework content m³	Flow rate (m³/h)		Capacity kg	Hydraulic connection	Net weight kg	Article number
			Installation	KAB				
KAB03	350	5	15	3	0	1”	50	KAB0300
KAB07	820	10	35	7	1	DN65	90	KAB0700
KAB15	1750	25	75	15	2	DN65	105	KAB1500
KAB25	3000	40	125	25	4	DN65	120	KAB2500

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AquaTank 316Ti

Hot water storage tank, 300-1000 litres

AquaTank 316Ti is our range of stainless steel hot water storage tanks for customers who prefer a high-alloy austenitic stainless steel. This leaflet describes cylinders available as standard in capacities between 300 and 1000 litres. Furthermore we offer also vessels up to 4000 litre capacity with standardized dimensions.

Pressure vessel code
AquaTank 316Ti meets the requirements of the PED 97/23/EEC code. Other pressure vessel codes can be offered on request.

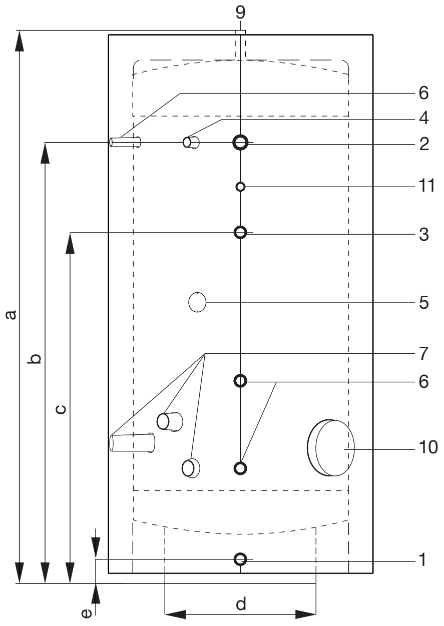
Charge heat exchangers reduce power demand
AquaTank 316Ti is designed for use in combination with charge heat exchangers. The AquaTank is then employed to store drinking quality water in facilities in which the water flow is not constant – where sudden high demands occur more or less regularly, such as in apartment houses, sports centres, schools, hotels and hospitals. With a charge heat exchanger, the power demand can be substantially reduced compared to a separate coil heater, since the AquaTank acts as a buffer to meet the power peaks occurring at high water flow rates. Following such high water demand, heating takes place very quickly, because the water that has been heated by the charge heat exchanger is stored at the top of the tank. The recovery period is short, unlike that of a traditional coil heater in which the entire heater volume must first be reheated, before the user obtains the domestic hot water comfort provided by an AquaTank with charge heat exchanger.

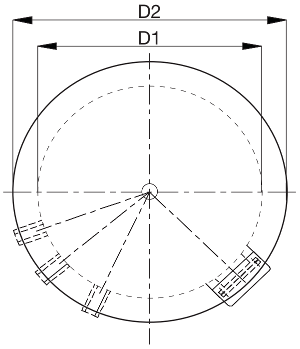
Flexible energy source
All types and sizes of the AquaTank 316Ti are equipped with threaded connections for electric immersion heaters. The immersion heater can be fitted directly to the connection, which simplifies the installation work.

High effectiveness for maximum hot water
The effectiveness of this type of storage tank from which hot water is drawn depends on its ability to keep the hot water separated from the cold water admitted into the tank. The AquaTank is particularly good in this respect because of its internal tube arrangement. The incoming cold water is distributed gently across the bottom of the tank, which prevents it from mixing with the hot water. The hot water then is drawn from the very top in the centre of the cylinder. Moreover, since vertical hot water storage tanks are more effective than horizontal ones, the AquaTank is of upright design.

Effective and environment-friendly insulation
The insulation is made of environment-friendly polyurethane foam that is produced without the use of Freons. The surface of the insulation is covered with an impact-resistant ABS plastic. The insulation is very easy to remove and refit, which makes the unit easy to transport into and out of the premises.

The special design of the insulation avoids the so called “chimney-effect” between insulation and cylinder surface and guarantees for the lowest heat losses. The insulation conforms to the strict energy saving demands made by the German EnEV law.





Connections (see table for sizes)

1. Cold water inlet
2. Hot water outlet
3. Hot water circulation
4. Charge heat exchanger
5. Support sleeve, 2”
6. Instrument connection, ¾”
7. Immersion heater, 2” (see table for number and rating of heaters)
8. Drain (to be put into connecting pipework)
9. Air vent, 1”
10. Inspection opening, 120 mm dia.
11. Instrument connection, ½”

Note: All connections have female threads, except the inspection openings. The capacity 300 litre has only three instrument connections.

Operating data

Max. operating pressure (gauge)	10 bar
Max. operating temperature	95°C

Tank capacity litres	Dimensions (mm)							Connection sizes (inch)				Heat loss kWh in 24h	Dry weight kg	Immersion heater rating kW
	a	b	c	d	D1	D2	e	1	2	3	4			
300	1505	1217	908	400	550	700	97	2	2	1	2	2.2	67	1 x 5.25
500	1815	1507	1158	450	650	800	97	2	2	1	2	3.1	89	1 x 9
500/2	1815	1507	1158	450	650	800	97	2	2	1	2	3.1	89	2 x 9
750	2105	1730	1360	600	750	900	97	2	2	1	2	3.8	144	2 x 12
750/3	2105	1730	1360	600	750	900	97	2	2	1	2	3.8	144	3 x 12
1000	2180	1763	1402	650	850	1040	97	2	2	1	2	4.2	197	3 x 12

Dimensions are target values. Binding figures are shown on the drawings.
The dimensions for the larger vessels up to 4000 litres are available on request.

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AquaTank HC 316Ti

Storage water heater, 125-1000 litres

AquaTank HC 316Ti is our range of indirectly heated, unvented (closed) storage water heaters made of stainless steel. This leaflet describes standard cylinders available in capacities between 125 and 1000 litres.

Pressure vessel code

AquaTank HC 316Ti meets the requirements of the PED 97/23/EEC code. Other pressure vessel codes can be offered on request.

Heating coil reduces the power demand

AquaTank HC 316Ti is equipped with a stainless steel heating coil to charge the vessel. The AquaTank HC is then employed to store drinking water in facilities in which the water flow is not constant – where sudden high demands occur more or less regularly, such as in apartment houses, sports centres, schools, hotels and hospitals.

With a built in heating coil, the power demand can be substantially reduced compared to a direct water heater, since the AquaTank HC acts as a buffer to meet the power peaks occurring at high water flow rates. Following such high water demand, heating takes place very quickly, because the water that has been heated by the coil is stored at the top of the tank. The recovery period is short. The unique shape of the heating coil reaches down to the bottom and heats all of the water inside the vessel.

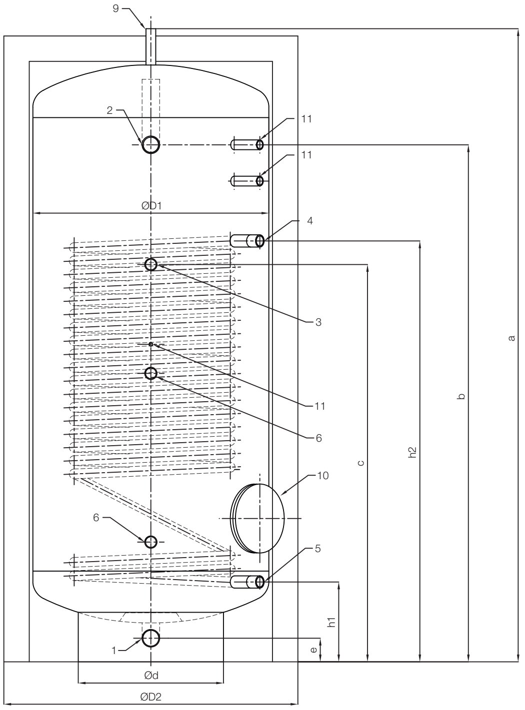
High effectiveness for maximum hot water

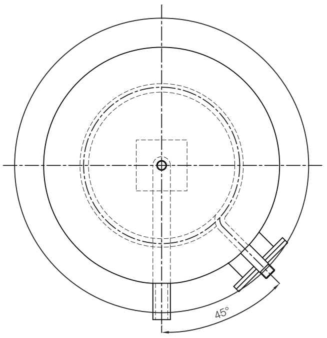
The effectiveness of this type of storage tank from which hot water is drawn depends on its ability to keep the hot water separated from the cold water admitted into the tank. The AquaTank HC is particularly good in this respect because of its internal tube arrangement. The incoming cold water is gently distributed across the bottom of the tank, which prevents it from mixing with the hot water. The hot water is then drawn from the very top in the centre of the cylinder. Moreover, since vertical hot water storage tanks are more effective than horizontal ones, the AquaTank HC is of upright design.

Effective and environment-friendly insulation

The insulation is made of environment-friendly CFC-free polyurethane foam, The surface of the insulation is covered with an impact-resistant ABS plastic. The insulation is very easy to remove and refit, making the unit easy to transport into and out of the premises. The special design of the insulation avoids the so called “chimney-effect” between insulation and cylinder surface guaranteeing for the lowest heat losses.

This insulation conforms to the strict energy saving demands stipulated by the German EnEV law.





Connections (see table for sizes)

1. Cold water inlet
2. Hot water outlet *
3. Hot water circulation *
4. Primary flow, male thread
5. Primary return, male thread
6. Instrument connection, ¾" **
8. Drain (to be put into connecting pipe work)
9. Air vent, 1/2" **
10. Inspection opening, 120 mm dia.***
11. Instrument connection, ½"

Note: All connections have female threads, except the primary connections.

Operating data

Vessel	Max. operating pressure (gauge)	10 bar
	Max. operating temperature	95°C
Coil	Max. operating pressure (gauge)	25 bar
	Max. operating temperature	200°C

Tank capacity litres	Dimensions (mm)									Connection sizes (inch)					Heat losses kWh in 24h	Dry weight kg
	a	b	c	h1	h2	d	D1	D2	e	1	2	3	4	5		
125	940	940	940	190	560	400	500	660	65	1	1	¾	1	1	1.8	40
160	1190	1190	1190	190	740	400	500	660	65	1	1	¾	1	1	1.9	50
200	1440	1440	1440	190	740	400	500	660	65	1	1	¾	1	1	2.2	58
350	1725	1425	1095	220	1280	400	550	710	65	1¼	1¼	¾	1	1	2.5	85
500	1745	1425	1095	220	1325	400	650	810	65	1¼	1¼	¾	1	1	3.1	95
750	1830	1470	1090	275	1155	600	800	1000	80	2	2	1	1	1	3.8	145
1000	2080	1705	1440	265	1080	700	850	1050	80	2	2	1	1	1	4.2	195

Dimensions are target values. Binding figures are shown on the drawings.
* For capacities between 125 and 200 litres, the connections are at the top of the vessel
** Only for capacities between 350 and 1000 litres
*** 2" female for capacities between 125 and 200 litres

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website on www.alfalaval.com

AquaTank EM (10 bar)

Hot water storage tank, 200-1000 litres

AquaTank EM is our range of enamelled (glass lined) hot water storage tanks for customers who prefer the hygienic coating of enamel which also allows operation with chlorinated water. This leaflet describes cylinders available as standard in capacities between 200 and 1000 litres. Furthermore we offer also vessels up to 3000 litre capacity rated for 7 bar operation pressure with standardized dimensions.

Pressure vessel code

AquaTank EM meets the requirements of the PED 97/23/EEC code. Other pressure vessel codes can be offered on request.

Charge heat exchangers reduce power demand

AquaTank EM is designed for use in combination with charge heat exchangers. The AquaTank is then employed to store drinking quality water in facilities in which the water flow is not constant – where sudden high demands occur more or less regularly, such as in apartment houses, sports centres, schools, hotels and hospitals. With a charge heat exchanger, the power demand can be substantially reduced compared to a separate coil heater, since the AquaTank acts as a buffer to meet the power peaks occurring at high water flow rates. Following such high water demand, heating takes place very quickly, because the water that has been heated by the charge heat exchanger is stored at the top of the tank. The recovery period is short, unlike that of a traditional coil heater in which the entire heater volume must first be reheated before the user obtains the domestic hot water comfort provided by an AquaTank with charge heat exchanger.

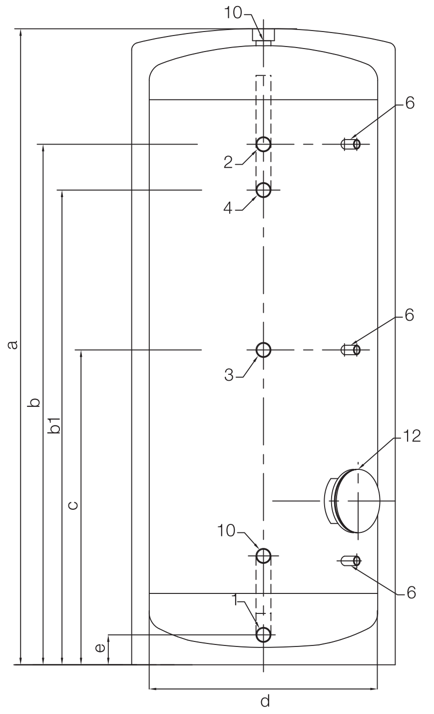
High effectiveness for maximum hot water

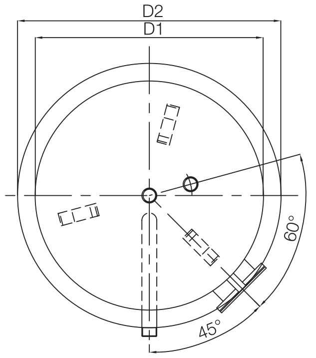
The effectiveness of this type of storage tank from which hot water is drawn depends on its ability to keep the hot water separated from the cold water admitted into the tank. The AquaTank is particularly good in this respect because of its internal tube arrangement. The incoming cold water is distributed gently across the bottom of the tank, which prevents it from mixing with the hot water. The hot water then is drawn from the very top in the centre of the cylinder. Moreover, since vertical hot water storage tanks are more effective than horizontal ones, the AquaTank is of upright design.

Effective and environment-friendly insulation

The insulation is made of environment-friendly foam that is produced without the use of Freons. The special design of the insulation avoids the so called “chimney-effect” between insulation and cylinder surface and guarantees for the lowest heat losses.

The insulation conforms to the strict energy saving demands made by the German EnEV law.





Connections (see table for sizes)

1. Cold water inlet, male thread
2. Hot water outlet, male thread
3. Hot water circulation
4. Charge heat exchanger, male thread
6. Instrument connection, ½”
9. Drain (to be put into connecting pipework)
10. Spare connection, see design drawing
12. Inspection opening, 180 mm dia.

Note: Connections no. 3 and 6 have female threads.

Operating data

Max. operating pressure (gauge)	10 bar
Max. operating temperature	95°C

Tank capacity litres	Dimensions (mm)								Connection sizes (inch)				Heat loss kWh in 24h	Dry weight kg
	a	b	b1	c	d	D1	D2	e	1	2	3	4		
200	1300	1044	914	652	-	-	600	85	1¼	1¼	1	1¼	1.9	96
300	1758	1501	1371	880	-	-	600	85	1¼	1¼	1	1¼	2.3	115
500	1806	1478	1348	894	-	-	750	85	1¼	1¼	1	1¼	3.2	184
800	1982	1580	1450	900	600	790	1000	120	2	2	1	2	4.5	200
1000	2328	1904	1774	1246	600	790	1000	120	2	2	1	2	5.5	270

Dimensions are target values. Binding figures are shown on the drawings.

Insulation material

Capacity 200 to 500 L	>> PUR foam direct moulded between vessel and outer metal cladding (powder-coated)
Capacity 800 & 1000 L	>> Soft-foam covered with a PVC-jacket

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AquaTank HC EM (10 bar)

Storage water heater, 200-1000 litres

AquaTank HC EM is our range of indirectly heated, unvented (closed) storage water heaters. These enamelled (glass lined) hot water storage heaters are for customers who prefer the hygienic coating of enamel which also allows operation with chlorinated water. This leaflet describes standard cylinders available in capacities between 200 and 1000 litres.

Pressure vessel code

AquaTank HC EM meets the requirements of the PED 97/23/EEC code. Other pressure vessel codes can be offered on request.

Heating coil reduces the power demand

AquaTank HC EM is equipped with an enamelled heating coil to charge the vessel. The AquaTank HC is then employed to store drinking water in facilities in which the water flow is not constant – where sudden high demands occur more or less regularly, such as in apartment houses, sports centres, schools, hotels and hospitals.

With a built in heating coil, the power demand can be substantially reduced compared to a direct water heater, since the AquaTank HC acts as a buffer to meet the power peaks occurring at high water flow rates. Following such high water demand, heating takes place very quickly, because the water that has been heated by the coil is stored at the top of the tank. The recovery period is short. The unique shape of the heating coil reaches down to the bottom and heats all of the water inside the vessel.

High effectiveness for maximum hot water

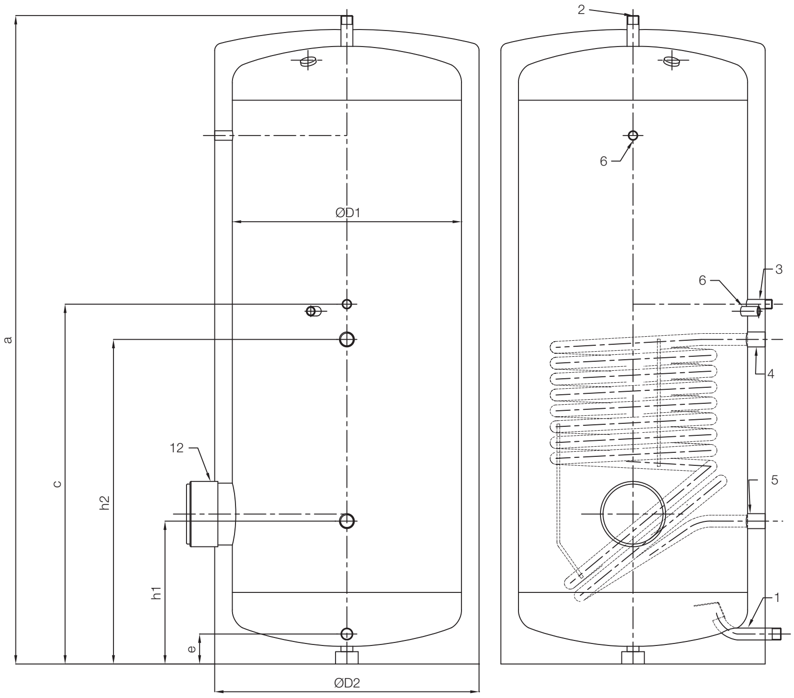
The effectiveness of this type of storage tank from which hot water is drawn depends on its ability to keep the hot water separated from the cold water admitted into the tank.

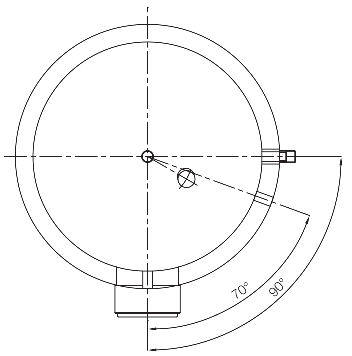
The AquaTank HC is particularly good in this respect because of its internal tube arrangement. The incoming cold water is gently distributed across the bottom of the tank, which prevents it from mixing with the hot water. The hot water is then drawn from the very top in the centre of the cylinder. Moreover, since vertical hot water storage tanks are more effective than horizontal ones, the AquaTank HC is of upright design.

Effective and environment-friendly insulation

The insulation is made of environment-friendly CFC-free foam. The special design of the insulation avoids the so called "chimney-effect" between insulation and cylinder surface guaranteeing for the lowest heat losses.

The insulation conforms to the strict energy saving demands stipulated by the German EnEV law.





Connections (see table for sizes)

1. Cold water inlet
2. Hot water outlet *
3. Hot water circulation
4. Primary flow
5. Primary return
6. Instrument connection, ½” **
9. Drain (to be put into connecting pipework)
12. Inspection opening, 120/180 mm dia.***

Note: Connections 1, 2, 3 have male threads number 4, 5, 6 have female threads.

Operating data

Vessel	Max. operating pressure (gauge)	10 bar
	Max. operating temperature	95°C
Heating coil	Max. operating pressure (gauge)	10 bar
	Max. operating temperature	110°C

Tank capacity litres	Dimensions (mm)							Connection sizes (inch)					Heat loss kWh in 24h	Dry weight kg
	a	c	h1	h2	D1	D2	e	1	2	3	4	5		
200	1340	748	263	638	-	600	85	1	1	¾	1	1	1.8	121
300	1797	1028	263	728	-	600	85	1	1	¾	1	1	2.2	149
500	1838	1020	405	920	-	750	85	1	1	1	1	1	2.7	205
800	1982	860	380	1025	790	990	120	1½	1½	1¼	1¼	1¼	4.5	272
1000	2328	1025	380	1190	790	990	120	1½	1½	1¼	1¼	1¼	5.5	299

Dimensions are target values. Binding figures are shown on the drawings.
* for capacities 800 & 1000 litres the hot water outlet is in the cylindrical part of the vessel, see details in the design drawings
** ½” only for capacities 200 to 500 litres, capacities 800 & 1000 litres are equipped with a fastening bar for surface sensors
*** 180/240 mm for capacities 800 & 1000 litres

Insulation material

Capacity 200 to 500 L	>> PUR foam injected between vessel and outer metal cladding (powder-coated)
Capacity 800 & 1000 L	>> Soft-foam covered with a PVC-jacket

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AquaTank EM (7 bar)

Hot water storage tank, 300-3000 litres

AquaTank EM is our range of enamelled (glass lined) hot water storage tanks for customers who prefer the hygienic coating of enamel which also allows operation with chlorinated water. This leaflet describes cylinders available as standard in capacities between 300 and 3000 litres. Furthermore we offer also vessels up to 1000 litre capacity rated for 10 bar operation pressure with standardized dimensions.

Pressure vessel code

AquaTank EM meets the requirements of the PED 97/23/EEC code. Other pressure vessel codes can be offered on request.

Charge heat exchangers reduce power demand

AquaTank EM is designed for use in combination with charge heat exchangers. The AquaTank is then employed to store drinking quality water in facilities in which the water flow is not constant – where sudden high demands occur more or less regularly, such as in apartment houses, sports centres, schools, hotels and hospitals.

With a charge heat exchanger, the power demand can be substantially reduced compared to a separate coil heater, since the AquaTank acts as a buffer to meet the power peaks occurring at high water flow rates. Following such high water demand, heating takes place very quickly, because the water that has been heated by the charge heat exchanger is stored at the top of the tank. The recovery period is short, unlike that of a traditional coil heater in which the entire heater volume must first be reheated before the user obtains the domestic hot water comfort provided by an AquaTank with charge heat exchanger.

Flexible energy source

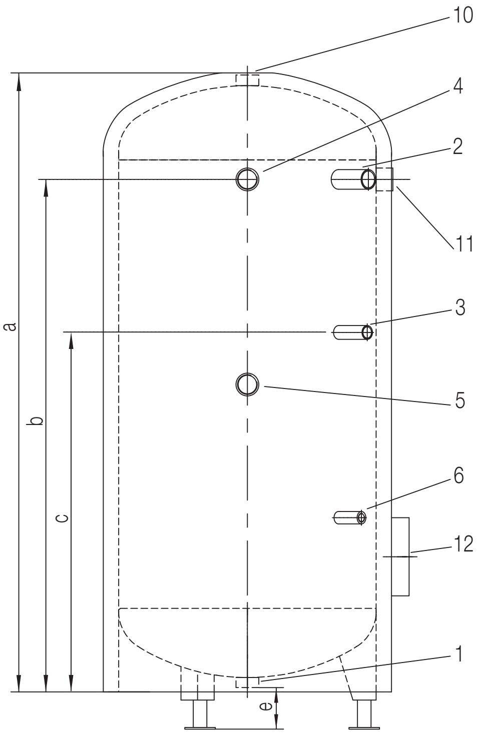
All types and sizes of the AquaTank EM can be equipped with electric immersion heaters. The immersion heater are fitted directly to the inspection opening/man hole, which simplifies the installation work.

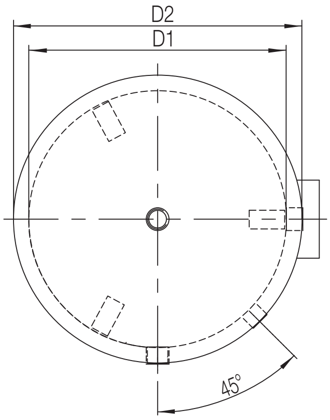
High effectiveness for maximum hot water

The effectiveness of this type of storage tank from which hot water is drawn depends on its ability to keep the hot water separated from the cold water admitted into the tank. The AquaTank is particularly good in this respect because of its internal tube arrangement. The incoming cold water is distributed gently across the bottom of the tank, which prevents it from mixing with the hot water. The hot water then is drawn from the very top in the centre of the cylinder. Moreover, since vertical hot water storage tanks are more effective than horizontal ones, the AquaTank is of upright design.

Effective and environment-friendly insulation

The insulation is made of 50 mm mineral wool and covered with a PVC-jacket. As option we offer also 100 mm mineral wool and an aluminium-plate cladding. The insulation is very easy to remove and refit, which makes the unit easy to transport into and out of the premises.





Connections (see table for sizes)

1. Cold water inlet
2. Spare connection 2”
3. Hot water circulation
4. Charge heat exchanger
5. Support sleeve 2”
6. Instrument connection ¾”
9. Drain (to be put into connecting pipework)
10. Hot water outlet 2”
11. P&T connection 2”
12. Inspection opening, 110 mm dia.

Note: All connections have female threads, except the inspection opening.

Operating data

Max. operating pressure (gauge)	7 bar
Max. operating temperature	95°C

Tank capacity litres	Dimensions (mm)						Connection sizes (inch)				Heat losses kWh in 24h *	Heat losses kWh in 24h **	Dry weight kg
	a	b	c	D1	D2	e	1	2	3	4			
300	1718	1395	1074	549	660	216	2	2	1	2	5.3	3.2	107
500	2046	1748	959	630	740	210	2	2	1	2	6	3.7	137
750	1951	1599	1150	790	900	197	2	2	1	2	6.9	4.6	233
1000	2304	1954	1324	790	900	197	2	2	1	2	7	5.4	263
1500	2127	1700	1250	1100	1210	221	2	2	1	2	9.2	7.2	344

Dimensions are target values. Binding figures are shown on the separate drawings. The dimension drawings for larger vessels up to 3000 litre as well as the optional extras like manhole and immersion heater are available on request.

* heat losses 50 mm glass wool
** heat losses 50 mm rock wool

Insulation material

Standard delivery 50 mm glass wool with PVC-jacket.

Options:

- 100 mm glass wool with PVC-jacket
- 50 mm rock wool with aluminium-plate cladding
- 100 mm rock wool with aluminium-plate cladding

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SolarTank

Heating water storage tank, 300-3000 litres

SolarTank is our range of vessels that store primary energy from different heat sources including boilers, solar heaters, heat recovery systems and others. This leaflet describes the standard cylinders that are available in capacities between 300 and 3000 litres and rated for 10 bar operation pressure.

Pressure vessel code
SolarTank meets the requirements of the PED 97/23/EEC code.

Freshwater heating on demand
SolarTank is designed for use in combination with instantaneous tap water heaters. The SolarTank can store energy from any heat source to generate hot tap water on demand in facilities where water flow is not constant – where sudden high demands occur on a fairly regular basis such as in blocks of flats, sports centres, schools, hotels and hospitals.

When discharging the SolarTank in combination with an instantaneous tap water heater, the primary power demand can be substantially reduced since the SolarTank acts as a buffer on the primary side to meet the power peaks that occur at high tap water flow rates. Following such high tap water consumption, heating takes place very quickly and only on demand. This ensures a hygienic hot tap water supply that reduces the risk of lime scaling in the tap water system and scalding at the tap.

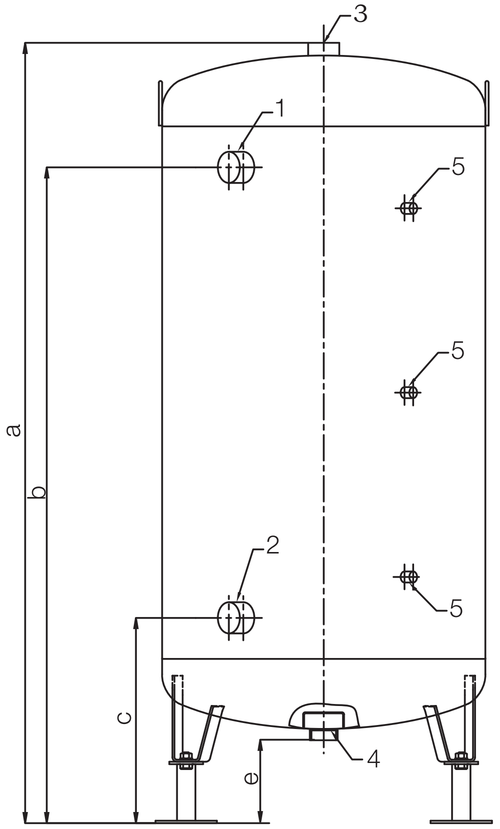
Flexible energy sources
The SolarTank can be connected to any type of primary heat source as long as it is connected in a closed heating loop. To heat tap water to the right comfort level when showering and bathing, we recommend a minimum charging temperature of 45 to 50°C for the primary heating water.

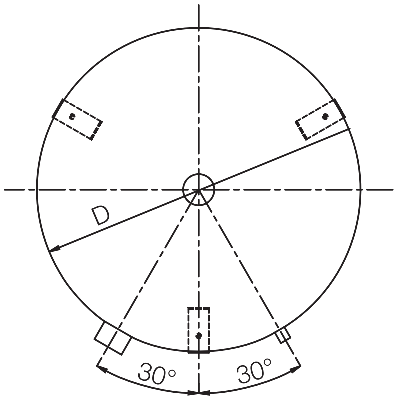
High effectiveness for maximum hot water
The effectiveness of this type of energy storage tank from which hot tap water is generated depends on its ability to keep the hot heating water separated from the cold return water that is admitted into the tank. The SolarTank is particularly positive in this respect due to its internal tube arrangement.

The returned cold heating water is distributed gently across the bottom of the tank, which prevents it from mixing with the hot water that is fed on top of the vessel.

The hot heating water is then drawn from the very top at the centre of the cylinder and is supplied to the instantaneous tap water heater. Moreover, since vertical storage tanks are more effective than horizontal ones, the SolarTank has an upright design.

Effective and environmentally friendly insulation
The insulation is made of 100 mm rockwool cladded with an alaminium metal plate (Euroclass A) or 100 mm glasswool with a PVC jacket (Euroclass B). The insulation is very easy to remove and refit, which makes the unit easy to transport in and out of the premises.





Connections (see table for sizes)

1. Primary heating water inlet
2. Primary heating water outlet
3. Feed to tap water heater
4. Return from tap water heater
5. Instrument connection, ½”

Note: All connections have female threads.

Operating data

Max. operating pressure (gauge)	10 bar
Max. operating temperature	100°C

Tank capacity litres	Dimensions (mm)					Connection sizes (inch)				Heat loss kWh in 24h *	Dry weight kg
	a	b	c	D	e	1	2	3	4		
300	1668	1395	495	549	215	2	2	2	2	5.3	107
500	1996	1748	495	630	210	2	2	2	2	6	137
750	1905	1601	501	790	200	2	2	2	2	6.9	233
1000	2258	1954	501	790	195	2	2	2	2	7	263
1500	2083	1700	600	1100	215	2	2	2	2	9.2	344
2000	2271	1888	600	1100	215	2	2	2	2	10.9	371
2500	2144	1680	680	1400	215	2	2	2	2	12.3	501
3000	2272	1810	680	1400	215	2	2	2	2	14	540

Dimensions are target values. Binding figures are shown on the separate drawings.

ECF00181EN 1204

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Chapter 12

Tubular heat exchangers

Tubular Heat Exchangers from Alfa Laval are compact and thermally very efficient. We have two types designed for use in HVAC applications:

Cetecoil is made of tubes in stainless steel and a shell in either carbon or stainless steel. Cetecoil is suitable for many different media such as steam, domestic hot water, heating water and hot oil. Cetecoil is well-suited in steam systems, due to flexibility in connections and low pressure drops on the shell side, as well as high temperature performance.

Cetetube is made of finned tubes in copper and a shell in carbon steel. Cetetube is well-suited in heating systems and domestic hot-water applications. It has high temperature performance thanks to a gasket-free design. Cetetube fit well in heating duties with asymmetric flows and rapid temperature changes.

Tubular heat exchangers range

Cetecoil™	Cetetube
Read all about it on page 12:3	Read all about it on page 12:7
	

Cetecoil®

Shell and Tube Heat Exchanger Stainless Steel / Carbon Steel

Cetecoil® is the collective name for a range of heat exchangers with tubes made of acid proof stainless steel and suitable for many different media, such as steam, domestic hot water, heating water and hot oil. When operating with steam, the Cetecoil is a very efficient condensate cooler. The Cetecoil heat exchanger is also very well-suited for use in systems in which continuous operation at high water velocities is required.

High pressures and temperatures
Cetecoil heat exchangers have no gaskets and can operate at high pressures and high temperatures, even when handling media that are subject to sudden and big temperature variations, such as in steam and refrigeration systems. In their standard design, Cetecoil heat exchangers are rated for pressures up to 25 bar and temperatures up to 300°C.

Flexible range
Cetecoil heat exchangers are manufactured in three different basic versions as regards materials and pressures, and these are designated R, S and E. All versions have stainless steel tubes.

Every basic version is manufactured in a number of sizes and different thermal lengths. This wide range makes it simple to order a suitable Cetecoil heat exchanger for virtually any operating conditions. For higher capacities, several heat exchangers can be connected in parallel or in series.

Unique design with patented tubes
The stainless steel tubes are cross-rilled. This improves the thermal properties of the tube, both on the inside and on the outside, which contributes towards a very high heat transfer rate. The performance of the heat exchanger is determined by the number of tubes and the tube length. The tubes are wound into a spiral around a central core. Each end is then secured into the tube plate. The tubes form together with the collecting chambers the 'coil' which is welded to the surrounding shell. In this design, the strength of an all-welded design is combined with high elasticity for absorbing thermal expansion. The upright position also means that Cetecoil needs a minimum of space.

All dimensions in mm. Design subject to changes without prior notice.

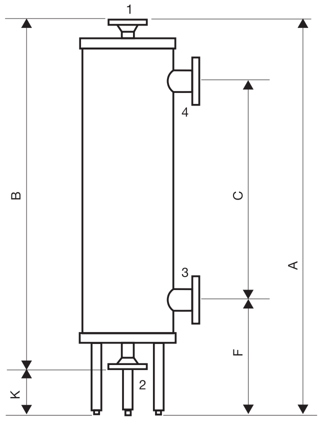
Cetecoil S/R/E Type	A mm	B mm	C mm	D mm	F mm	K mm	I mm	Connections		Volume		Dry Weight kg
								1.2 PN 40*	3.4 PN 16	Coil Litres	Shell Litres	
480 - L	980	680	440	280	425	300	200	50	50	2	8	30
850 - L	1070	771	531	280	425	300	200	50	50	3	9	35
1450 - L	1145	870	585	280	415	275	200	50	65	7	11	45
2150 - L	1170	920	580	340	420	250	235	50	80	10	30	65
3300 - L	1255	985	420	430	560	270	270	65	100	14	35	100
4100 - L	1255	985	420	430	560	270	270	65	$125^{1)}$	16	33	110
480 - M	1160	860	620	280	425	300	200	50	50	3	11	35
850 - M	1360	1060	826	280	425	300	200	50	50	4	14	45
1450 - M	1505	1230	935	280	415	275	200	50	65	8	17	75
2150 - M	1500	1250	900	340	420	250	235	50	80	14	45	110
3300 - M	1455	1185	620	430	560	270	270	65	100	21	42	150
4100 - M	1455	1185	620	430	560	270	270	65	$125^{1)}$	24	38	170
480 - H	1360	1060	826	280	425	300	200	50	50	4	15	45
850 - H	1670	1370	1130	280	425	300	200	50	50	6	20	50
1450 - H	1900	1625	1335	280	415	275	200	50	65	12	24	90
2150 - H	1800	1550	1200	340	420	250	235	50	80	19	65	160
3300 - H	1695	1425	860	430	560	270	270	65	100	28	55	220
4100 - H	1695	1425	860	430	560	270	270	65	$125^{1)}$	34	49	230

* PN16 for type E.

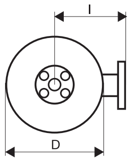
$^{1)}$ For type E the connection is DN 100.

The tube coil inside the shell

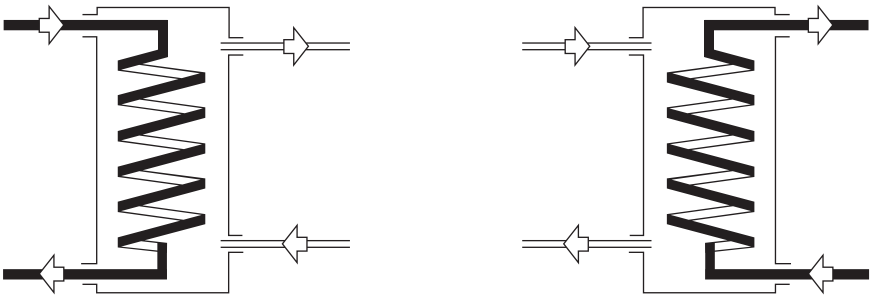
Cetecoil 480-4100



The tube coil inside the shell



Connection examples (flow diagrams)



(The heat exchanger must always be connected with the media in counterflow and,if the materials allow, at the larger flow rate on the shell side.)

Operating pressure/operating temperature

Cetecoil Type	Max. operating pressure bar (gauge) at operating temperature					
	200°C		250°C		300°C	
	Coil	Shell	Coil	Shell	Coil	Shell
R	16	16	15	14	14	12
S	25	16	23	14	19	12
E	16	16	15	15	14	14

Materials

Cetecoil type	Coil		Shell
	Tubes	Collecting chambers	
R	Stainless steel	Stainless steel	Carbon steel
S	Stainless steel	Carbon steel	Carbon steel
E	Stainless steel	Stainless steel	Stainless steel

Insulation

The insulation consists of 50 mm thick mineral wool clad with tough Aluminium structural plate.

Quality standard/approval

Designed and rated according to PED and AD2000. Approved by German TÜV. Stainless steel type AISI 316

Examples of suitable media in the coil and shell

Cetecoil type	Coil (connections 1 and 2)	Shell (connections 3 and 4)
R	Steam, domestic hot water, oils	Steam, hot oil, heating water
S	Steam, heating water	Hot oil, heating water
E	Steam, domestic hot water, oils	Same as on coil side

Cetecoil article numbers

Type	Cetecoil R	Cetecoil S	Cetecoil E
480 - L	724 115	724 122	724 129
480 - M	724 116	724 123	724 130
480 - H	724 117	724 124	724 131
850 - L	724 118	724 125	724 132
850 - M	724 119	724 126	724 133
850 - H	724 120	724 127	724 134
1450 - L	725 052	725 234	725 226
1450 - M	725 053	725 235	725 227
1450 - H	725 054	725 236	725 228
2150 - L	725 099	725 183	725 188
2150 - M	725 100	725 184	725 189
2150 - H	725 101	725 185	725 190
3300 - L	725 399	725 818	725 484
3300 - M	725 400	725 819	725 485
3300 - H	725 401	725 820	725 486
4100 - L	725 402	725 821	725 487
4100 - M	725 403	725 822	725 488
4100 - H	725 404	725 823	725 489

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Cetetube

Shell and Tube Heat Exchanger

The Cetetube range of liquid/liquid heat exchangers comprises a number of sizes, with ratings of up to around 5 MW. The Cetetube is manufactured in three different basic thermal lengths. So it is easy to find a heat exchanger that will offer optimum properties for most operating conditions.

Thermally optimized

A Cetetube coil consists of finned copper tubes. The finned tube is designed to provide flow areas to suit modern operating conditions in heat exchange technology. Due to the fins, the outside heat transfer area of the tube is many times larger and they also serve as distinct spacers between the tube rows to ensure stability of the coil. Due to the stability and thus the repeatability in production, every Cetetube heat exchanger maintains the specified output.

The heat exchanger is designed to ensure turbulent flow both inside and outside the tubes. The turbulent flow is favourable from the heat exchange viewpoint and makes the heat exchangers self-cleaning, with little risk of fouling of the heat transfer surfaces.

For a variety of operating conditions

The Cetetube is designed for the same pressures and temperatures on both sides. The same heat exchanger type can be used for different operating conditions, and all of them can be used in heating, ventilation and hot water systems. In order to put the heat transfer capacity of the heat exchanger to maximum use, the higher flow rate is routed through the shell. However, for domestic hot water, the tap water flow must always be connected to the coil side.

Shell
The shell is made of pressure vessel steel and conforms to the relevant pressure vessel standards.

Coil
The coil is made of spiral-round, seamless copper tube with area-extending fins.

Maximum operating pressure
The maximum operating pressure is 1.6 MPa (gauge) on shell side and 2.5 MPa (gauge) on tube side.

Maximum operating temperature
The corresponding maximum operating temperature is 150 °C on shell side and 160 °C on tube side

Insulation
The insulation consists of 50 mm mineral wool clad with tough Aluminium structural plate. The insulation is easy to remove and refit.

Connections
The tube coil and the shell are equipped with flange connections PN40 on tube side and PN16 on shell side.

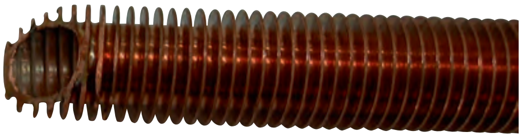
Installation
The Cetetube heat exchangers are provided with tubular legs with adjustable feet.

Connection
See the flow diagram for the relevant heat exchanger type. As a general rule, the liquid at the lower flow rate should be routed through the coil. N.B. However, domestic hot water must always flow through the coil.

Quality standard/ approval
All sizes are designed and rated according to PED, approved by German TÜV.

The Cetetube is manufactured in 7 sizes, with size designations ranging between 460 and 3500. Every size is manufactured in three different thermal lengths, to suit most operating conditions. In addition, also non-standard units are available on request. For further information, see the data sheet for each size and thermal length.

The tube coil inside the shell.



The finned copper tube.

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Chapter 13

All-welded heat exchangers

When the duty gets tougher and you still need a compact solution, you should consider an all-welded heat exchanger from Alfa Laval. They come in different shapes and forms to satisfy even the most demanding pressure and temperature requirements.

The *AlfaDisc* provides the exceptional thermal efficiency and compactness of a plate-and-frame unit under conditions that would normally require a bulky, traditional shell-and-tube unit.

The *AlfaRex* has all the benefits of a plate heat exchanger including a compact and flexible design, excellent heat-transfer abilities and very limited need of maintenance.

The *Compabloc* is a breakthrough plate heat exchanger design that combines a whole range of technological advantages in one compact unit. The all-welded plate pack does away with all gaskets between plates, and makes it possible to operate with a wide range of media and at high temperatures and pressures.

All welded heat exchangers range

AlfaDisc	AlfaRex - TM20	Compabloc
Read all about it on page 13.3	Read all about it on page 13:5	Read all about it on page 13:7
		

AlfaDisc

All-welded Plate Heat Exchanger

AlfaDisc 50

Applications

AlfaDisc is suitable for most of the applications, such as general cooling and heating duties, condensation, evaporation, reboiling and stream heating.

Standard design

AlfaDisc is built on the Plate & Shell concept. It is able to withstand higher design pressure, is more compact, is better developed for fatigue applications, has the possibility for asymmetric flow and is cleanable on one side. These features in combination with an attractive price give us a range of competitive advantages over other welded concepts.

The AlfaDisc all-welded plate heat exchanger provides the thermal efficiency and compactness of a plate and frame unit under conditions that would normally call for a shell and tube unit.

Designed for use with liquids, gases and two-phase mixtures at pressure up to 100 bars (PED & ASME) and at temperatures up to 538°C, the Plate & Shell unit works well with aggressive media, such as organic solvents, steam heaters and interchangers that are beyond the capability of a gasketed unit. The unit is also available with removable core design.

Typical capacities

Liquid flow rate

Up to 157 kg/s (2355 gpm) depending on media, permitted pressure drop and temperature program.

Sizes

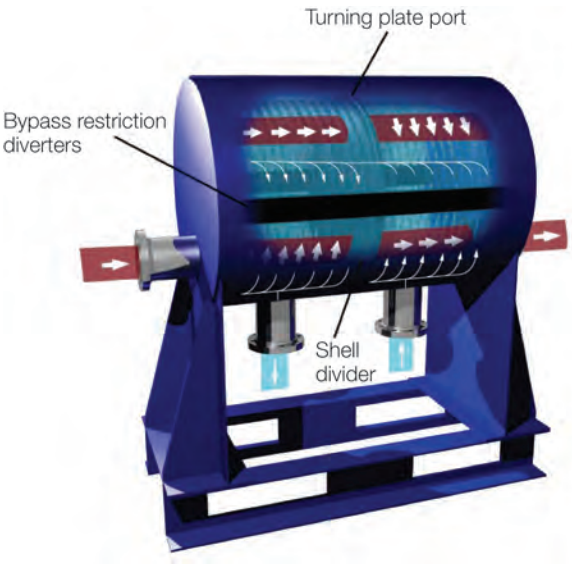
AlfaDisc 25	AlfaDisc 100
AlfaDisc 50	AlfaDisc 150
AlfaDisc 80	AlfaDisc 200

Working principle

The unit features a plate side and a shell side, which offer high pressure ratings. It has alternating channels for hot and cold media, and can offer true counter-current or co-current flow. Number of passes could be up to 3 passes maximum on each side.

Nozzle sizes up to DN 700 can be accommodated on the shell side of the exchanger, offering higher steam and liquid flow rates. Nozzles on the plate side can be up to DN 200.

The AlfaDisc unit can be fabricated from dissimilar metals when only one side will be exposed to corrosive conditions.



Flow principle of a multi-pass AlfaDisc.

STANDARD MATERIALS

Shell material
Mild steel, Epoxy painted or stainless steel

Cover material
Mild steel, Epoxy painted or stainless steel

Nozzles
Stainless steel, Titanium and 254 SMO Could be combined with carbon steel flanges

Plate material
316L, Titanium and 254 SMO

TECHNICAL DATA

Design pressure

CE/PED	Vacuum to 100 bars
ASME	Vacuum to 100 bars

Design temperature

Carbon steel Shell	-45 - 538°C
Stainless steel Shell	-160 - 538°C

Maximum heat transfer surface

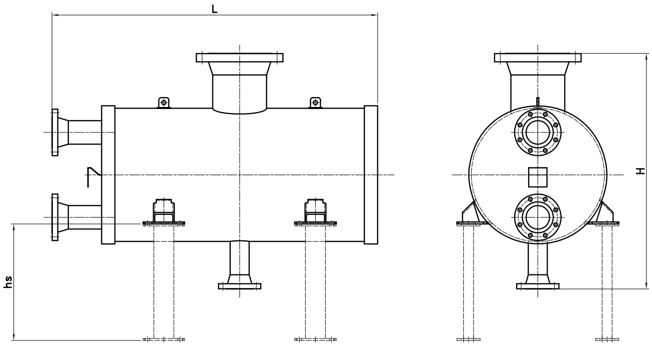
AlfaDisc 25	4.5 m^2	(48.5 ft^2)
AlfaDisc 50	35 m^2	(377 ft^2)
AlfaDisc 80	62 m^2	(667 ft^2)
AlfaDisc 100	125 m^2	(1345.5 ft^2)
AlfaDisc 150	220 m^2	(2368 ft^2)
AlfaDisc 200	380 m^2	(4090 ft^2)

STANDARD CONNECTIONS

	Sizes mm (inch)	
Model range	Plate side	Shell side
AlfaDisc25	25 (1)	20 - 100 (1 - 4)
AlfaDisc50	50 (2)	20 - 150 (1 - 6)
AlfaDisc80	80 (3)	25 - 250 (1 - 10)
AlfaDisc100	100 (4)	25 - 350 (1 - 14)
AlfaDisc150	150 (6)	25 - 500 (1 - 20)
AlfaDisc200	200 (8)	25 - 700 (1 - 28)

Pressure ratings

CE/PED	PN16, 25&40, PN63 and PN100
ASME	ASME cl. 150, 300 & 600 and Class 900



Dimensions (mm)

Model	H2 min/max		L min/max		hs1 min/max	
AD25	370	850	275	1945	260	740
AD50	630	1050	290	2010	450	790
AD80	790	1270	310	2070	540	1040
AD100	930	1450	340	2125	640	1220
AD150	1130	1700	380	2205	760	1530
AD200	1450	2400	430	2325	1000	1980

Dimensions (in)

Model	H2 min/max		L min/max		hs1 min/max	
AD25	15	33	11	77	10	29
AD50	25	41	11	79	18	31
AD80	31	50	12	81	21	41
AD100	37	57	13	84	25	48
AD150	44	67	15	87	30	60
AD200	57	94	17	92	39	78

[1] Dimensions vary with support type

[2] Dimensions vary with connection sizes and supports

Particulars required for quotation
- Flow rates or heat load
- Temperature program
- Physical properties of liquids in question (if not water)
- Desired working pressure
- Maximum permitted pressure drop
- Available steam pressure

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AlfaRex - TM20

All-welded Plate Heat Exchanger

AlfaRex TM20 - All welded plate heat exchanger

Totally gasket free, the TM20 is well suited for applications involving high temperature and/or high pressure with relatively clean media. The media can also be very corrosive (acids, NaOH, etc.).

The TM20 is particularly recommended for the following applications:

- Solvent recovery processes
- Gas dehydration plants
- Batch reactors
- Refrigeration duties

AlfaRex design

The TM20 consists of a laser welded pack of corrugated metal plates with portholes for the passage of the two fluids between which heat transfer takes place. The design has been achieved by laser welding the plates together one by one in alternate grooves to form a plate pack. The plate pack is installed in a frame consisting of a frame plate and a pressure plate compressed by tightening bolts. Extended connectors are located in the frame plate with bellow linings welded to the plate pack. The plate corrugations create high turbulence which results in very high thermal efficiency. This in turn leads to compactness and cost efficiency. The corrugations also support the plates against differential pressure and allow utilization of more expensive corrosion resistant materials.

Laser welding and fatigue resistance

The welding is performed using laser welding techniques. This means low heat input and a small heat affected zone. The highest quality is assured through a completely automated machine and welding control combined with a helium leakage test.

The construction only utilizes welding in the plane of the plate i.e. in two directions thereby avoiding welds in a third direction. This design ensures retained flexibility of the plate pack allowing for thermal and hydraulic expansions and contractions which will reduce the risk for fatigue cracks.

Working principle

The media in the heat transfer are led into the plate pack through portholes at the corners and are distributed into the passages between the plates by the arrangement of sealing welds.

The two media flow in alternate channels in full countercurrent flow, thereby making the exchanger equally suited for liquids as well as gas and two phase duties. Cleaning is done with CIP (Cleaning in Place).

STANDARD MATERIALS

Frame Plates

Mild steel. High temperature painted

Extended Nozzles

Metal bellow linings in channel plate material

Channel Plates

Stainless steel AISI 316, AISI 316L, Titanium gr. 1, Nickel 200/201

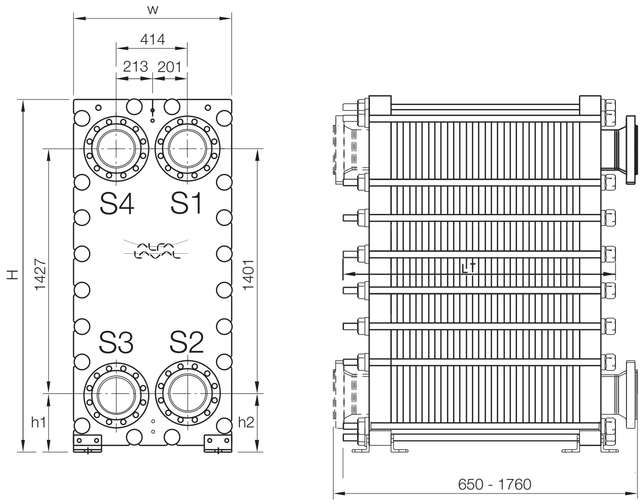
TECHNICAL DATA (Maximum design performance*)	
FB	up to 10 barg
FC	up to 16 barg
FF	up to 25 barg
FK	up to 40 barg
FN	up to 40 barg

Design temperature range	-50° to + 350°C
Maximum flow rate	700 m^3/h
Maximum heat transfer surface	250 m^2

* Depending on design temperature and pressure vessel code

CONNECTIONS	
FB – DN200/8”	DIN PN10 or ANSI 150
FC – DN200/8”	DIN PN10, PN16 or ANSI 150, ANSI 300
FF – DN200/8”	DIN PN16, PN25 or ANSI 150, ANSI 300
FK – DN200/8”	DIN PN25, PN40 or ANSI 300, ANSI 400
FN – DN200/8”	DIN PN40 or ANSI 300, ANSI 400

Dimensions



Type	H	W	h1	h2
TM20-BFB, -BFC	1990	865	301	314
TM20-BFF, -BFK, -BFN	2040	915	327	340

Measures are in millimeters

Particulars required for quotation

To enable Alfa Laval’s representative to make a specific quotation, please make sure your enquiry includes the following particulars:

- Flow rates required
- Temperature program
- Physical properties of media in question
- Desired working pressure
- Maximum permitted pressure drop
- Design pressure and temperature
- Pressure vessel code
- Data on cyclic variations in temperature and pressure

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COMPABLOC Compact Heat Exchanger Range

High-performance Fully Welded Heat Exchanger for Process Industries

Application

The Alfa Laval Compabloc is a fully welded compact heat exchanger designed for the complete range of process and utility duties. The Compabloc range provides the most efficient, cost-effective, compact and cleanable heat exchanger solution available today. After 20 years on the market, the Compabloc has shown itself to be the market leader in terms of life-cycle costs and energy savings.

Design

Alfa Laval designed the Compabloc range of welded heat exchangers with a focus on performance, compactness, and serviceability.

The heart of the Compabloc is a stack of corrugated heat transfer plates in 316L stainless steel, or other high-grade material. The plates are laser welded (models CP30 and above) and form a compact core. This core is then enclosed and supported by four corner girders, top and bottom heads and four side panels (see Sectional view of Compabloc). These components are bolted together and can be quickly taken apart for inspection, service and cleaning.

The design can be configured in single or multi-pass arrangements in either co-current or counter-current operation, for liquid-to-liquid or two-phase duties.

Operating Principles

The two media in the Compabloc heat exchanger flow in alternately welded channels between the corrugated plates. These corrugated plates promote high turbulence which provides high heat transfer efficiency and help minimize fouling. The media flows in a cross-flow arrangement within each pass (see figure below) while the overall flow arrangement is counter-current for a multi-pass unit (if required the unit can also be designed with overall co-current operation). Each pass is separated from the adjacent passes by a pressed baffle which forces the fluid to turn between the plate pack and the panel.

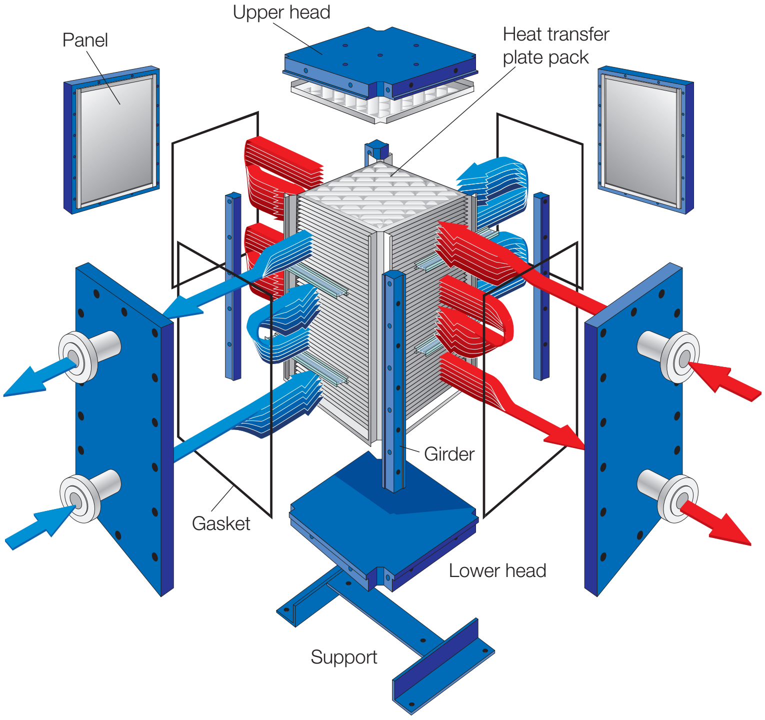
Compabloc's flexible pass arrangements make it suitable for liquid-to-liquid duties with dissimilar flow rates, or two phase condensation or reboiler applications.

Options

The Compabloc is available in virtually any material that can be pressed and welded, including:

- 316L SST
- 254 SMO
- Titanium
- Alloy C-276
- 904L SST (UB6)
- Alloy B-2
- Alloy C-22
- Incoloy 825
- Inconel 600
- Tantalum

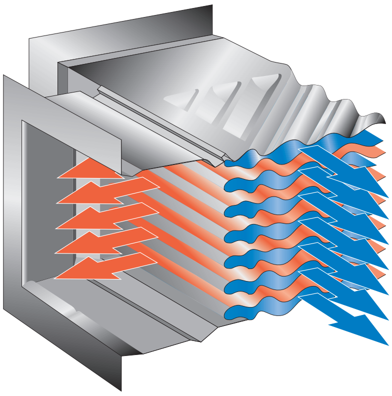
The panels and nozzles can be un-lined or lined using the same materials as the plate pack. The nozzle size is variable and can be selected independently for each side.



Sectional view of Compabloc

Process Optimization

Because of the Compabloc's unique design concept the possibilities for process optimization and flexibility are limitless. The Compabloc can be designed with both single-pass or multi-pass configurations. For condensation, reboiling and liquid-to-liquid duties without temperature cross, the singlepass configuration is suitable with its total cross-flow. The large cross flow area and short flow path fit low-pressure conden-sing duties and allow very low pressure drops. A multi-pass configuration is suitable for duties with temperature cross and close temperature approaches.



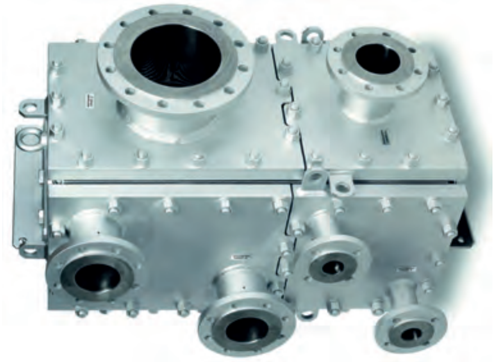
The two media flow in cross-flow in alternately welded channels.

The design concept allows a different number of passes on the two circuits thereby enabling large differences in flow rates between the hot side and the cold side. The baffling can easily be re-arranged to suit a new duty should the flow rates or temperatures change. Close temperature approaches down to 3ºC (5.4ºF) can be achieved.

The Compabloc can be mounted vertically, for normal liquidto-liquid duties, condensation with sub-cooling and gas cooling duties, or horizontally, for most condensation duties, reboiling or liquid-to-liquid duties where height is restricted.

There are currently seven plate family models with heat transfer areas ranging from 0.7 to 840 m2 per unit and each model is modularized with different numbers of plates to allow the best fits for any duty.

Special applications



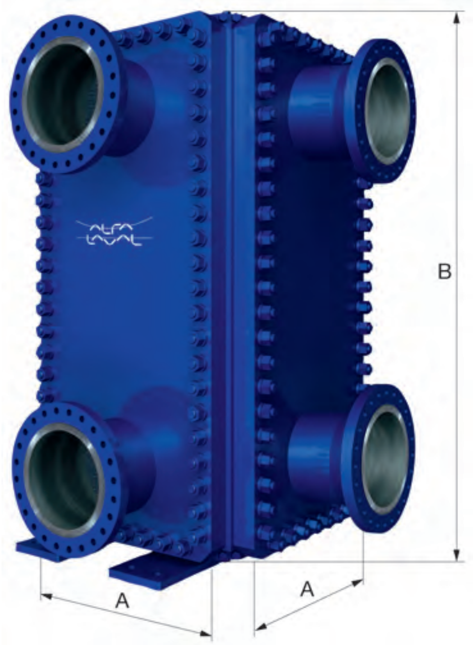
Special applications

For special applications, the Compabloc 2 cooling medium range is available which offers a two-section condenser with two different cooling medias.

Pressure vessel codes

The Compabloc is available as standard in accordance with international pressure vessel codes such as ASME (with or without U stamp) or ADM (code for PED and CE marking).

Dimensions



Technical Data

Model	Standard Pressure Range (bar) *	Standard Temp. Range (ºC)	*Code	Max. Dimensions (mm) *** A x A x B	Max. Weight (kg) ****
CP 15	FV - 32	-40 - 300	PED	280 x 280 x 540	250
CP 20	FV - 32	-40 - 300	PED	430 x 430 x 730	550
CP 30	FV - 32	-40 - 300	PED	500 x 500 x 1070	1160
CP 40	FV - 32	-40 - 300	PED	600 x 600 x 1400	2330
CP 50	FV - 32	-40 - 300	PED	840 x 840 x 2050	5940
CP 75	FV - 32	-40 - 300	PED	1240 x 1240 x 3600	17780
CP 120	FV - 42	-50 - 400	PED	2190 x 2190 x 3500	50000

* other pressures and temperatures may be available on request.
** ASME is also available
*** does not include nozzle length.
**** weight is determined by maximum number of plates and highest pressure rating.
Note: both vertical and horizontal configurations are available.

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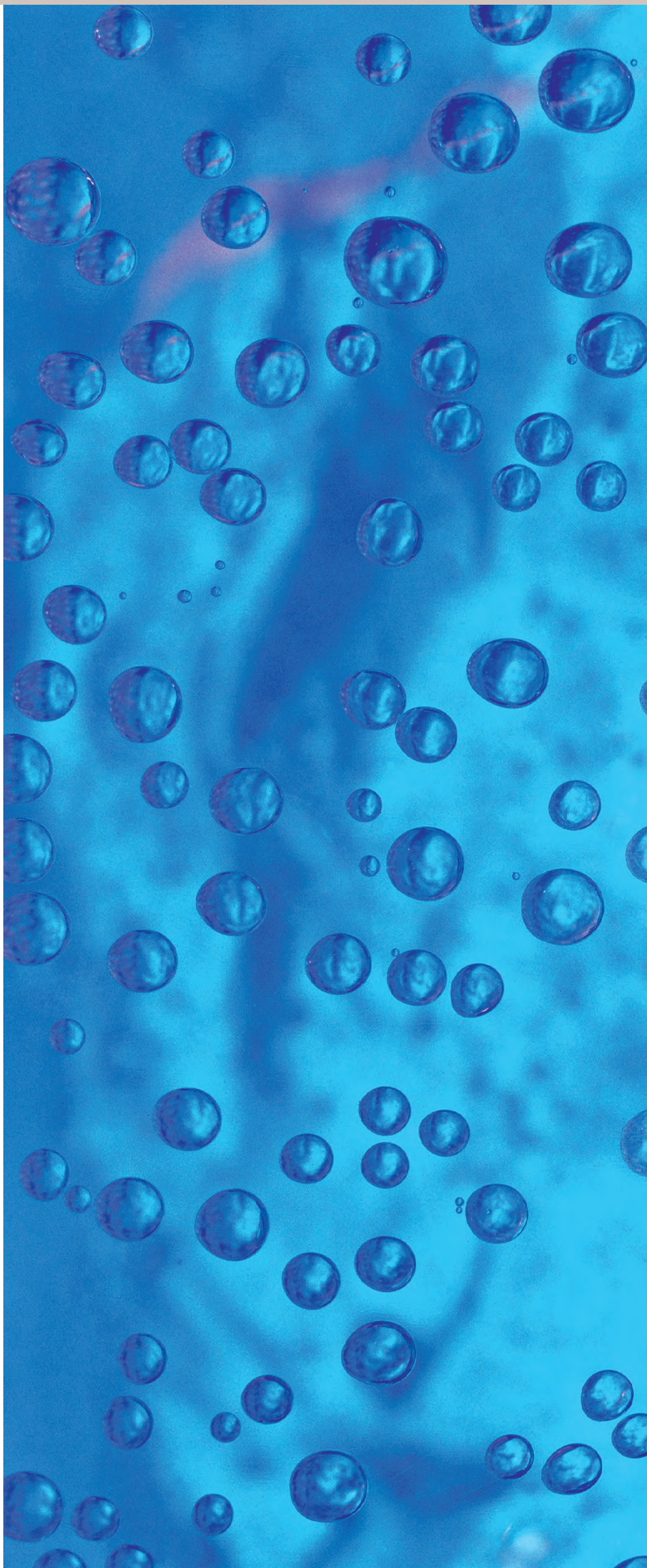
Chapter 14

Filters

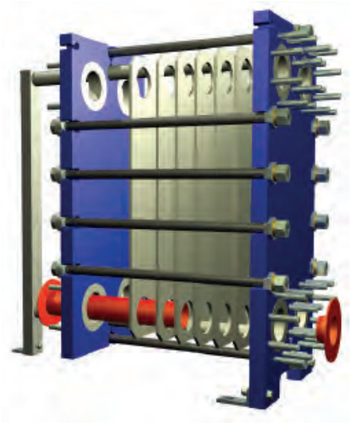


With diminishing supplies of water of sufficiently high quality to allow the plate heat exchangers in systems to operate efficiently, the need for cost-effective solutions to eliminate clogging by debris, marine life, fouling and impurities has become increasingly apparent.

The *ALF* filter is an automatic self-cleaning filter sized on the basis of the type of fouling encountered and the type of plate heat exchanger installed downstream.

The *Alfa Laval Port* filter is used to protect heat exchangers from intermittent fouling or to prevent foreign objects from entering the heat exchanger during a system startup.

Filter range

ALF	Alfa Port Filter
Read all about it on page 14:3	Read all about it on page 14:7
	

ALF – Alfa Laval Filter

Filtration for cooling systems using low-quality water

The use of inexpensive secondary cooling water from locations such as the sea, lakes or rivers has become a successful cooling solution that is now widely accepted in industry. Secondary cooling is in widespread use on ships, in power plants and in district heating and cooling systems.

However, such installations require large quantities of clean cooling water. With the supply of high-quality cooling water diminishing, the need for cost-effective solutions to eliminate clogging, fouling and corrosion has become increasingly more apparent. In a cooling system incorporating a heat exchanger and an Alfa Laval Filter, even polluted or corrosive water can be used to cool the most sensitive process equipment.

The Alfa Laval Filter (ALF) operates as an integral part of a cooling system, to remove debris that can foul and clog plate heat exchangers, tubular condensers, cooling tower spray nozzles or any similar equipment. In spite of effective screening at the water intake, mussels, seaweed and other forms of marine life can settle on the heat transfer surfaces.

Conditions are ideal for the growth of these forms of life and, as a result, they multiply rapidly. This then causes less effective heat transfer and even the complete breakdown of heat exchangers or other equipment.

If these kinds of blockages are severe, measures such as pesticides or chlorination are often no longer sufficient. In some cases, these simply cannot be used because they are prohibited by environmental legislation.

This is where Alfa Laval Filter technology comes in. It protects a wide range of sensitive equipment from clogging and fouling, and also prevents blockages in the cooling water system. An Alfa Laval Filter removes debris and marine life, and is automatically backflushed at regular intervals to keep it clean.

Standard control panel with PLC for one filter. Alternative configurations are available for controlling multiple filters.Options for remote control or high protection classes, such as ATEX, are also available.

Operation and design

The Alfa Laval Filter is a pressure filter with an automatic flushing arrangement. The design features a pressure vessel casing made of stainless steel (ALF-S), fibreglass reinforced polyester (ALF-P) or rubber-lined carbon steel (ALF-R). The internal cylindrical filter basket, along with other wetted parts, is usually made of stainless steel, super stainless steel (SMO) or titanium.

The filter system is available with connections ranging from 100 mm/4" to 800 mm/32" and is designed for placing directly in the pipe system. Because the automatic regeneration process is run by the inlet pressure, and the nozzles can be mounted in almost any way required, the Alfa Laval Filter can be mounted in almost any position.

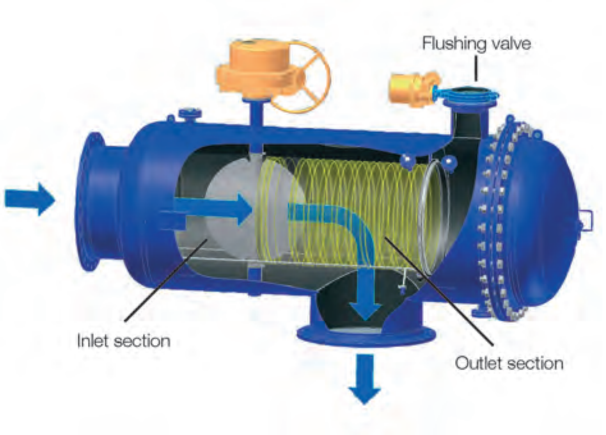
The inlet is placed at one end and the main outlet at a 90° angle, making it suitable for installation on any 90° pipe bend close to the equipment to be protected. The inspection/service opening is placed on the opposite side of the inlet, thus providing easy service access with no need to remove the pipe connection.

Automatic flushing is carried out at regular intervals without interrupting the filtering process. The flushing arrangement is completely automatic and contains a flushing valve and a flow diverter valve. These are regulated using actuators controlled by a PLC in the control panel, which can be installed close to the filter.

The filter itself is divided into two sections by the flow diverter valve, the inlet section and the outlet section. A flushing valve for discharging the debris is located at the end of the outlet section.

Normal operation

During normal operation, liquid passes through the inlet into the filter basket, in which the flow diverter valve is open and the flushing valve closed. The liquid passes through the filter basket prior to being discharged at the main outlet.



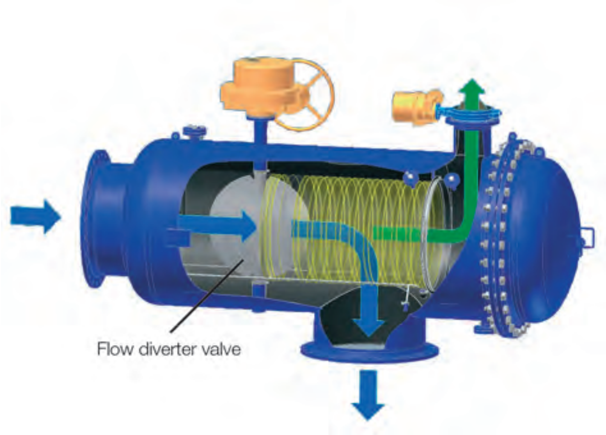
NORMAL OPERATION

Regeneration

ALF units can be cleaned either automatically, using a timer, at predetermined intervals, or manually by pushing a button on the control panel. An optional differential pressure control system is available as a back-up and for monitoring the filter status.

1. Primary flushing

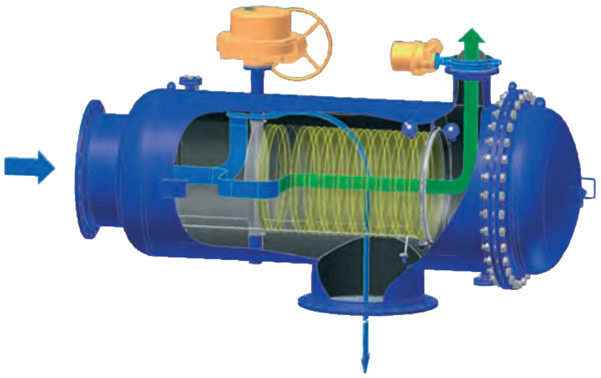
The flushing valve opens, thereby reducing the pressure drop and increasing velocity and total flow through the filter. Any debris sticking to the filter basket is dislodged and flushed out through the flushing valve. The liquid velocity is sufficient to remove any debris embedded in the inlet section of the basket.



REGENERATION – primary flushing

2. Secondary flushing (backflushing)

The flow diverter valve closes, while the flushing valve remains open. The flow is diverted and forced to pass through the filter basket in the inlet section. The majority of the liquid is discharged through the main outlet, but the pressure in the filter draws part of the flow from the exterior to the interior of the outlet section. This provides a backflushing effect in this section of the filter. Any dislodged remnants are discharged through the flushing valve.



REGENERATION – secondary flushing (backflushing)

Installation

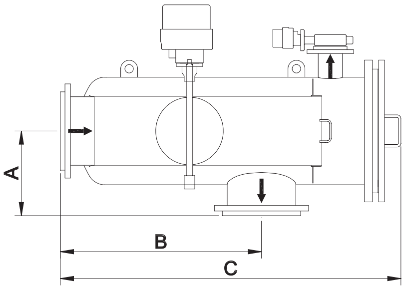
ALF units can be installed upstream of heat exchangers with shut-off valves placed upstream of the filter and downstream of the heat exchanger. This enables flexible servicing if many units are installed in parallel– for instance in a duty/standby installation or when installed on a bypass pipe, allowing the filter to be taken out of service separately.

Depending on pipe dimensions, flow rate and the premmissable pressure drop, one ALF filter can be installed to protect several heat exchangers. The filter(s) should preferably be mounted close to the heat exchanger(s) in order to minimize the risk of biological growth in the pipe system connecting the components.

Due to the flexible nozzle orientation, ALF filters can be installed in almost any position, horizontally as well as vertically. Alfa Laval recommends connecting the flushing outlet to the heat exchanger outlet when possible, and returning the debris to the natural water source. It is important that the filter is installed downstream of the feed pump(s), operating as a pressure filter.

Dimensions

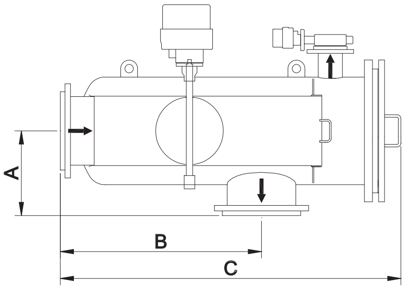
ALF-R with filter casing made of rubber lined carbon steel.



ALF-R

	A	B	C
ALF 20R	325	720	1230
ALF 30R	425	950	1610
ALF 40R	496	1150	1165
ALF 50R	600	1400	2380
ALF 60R	700	1650	2605
ALF 80R	905	2080	3720

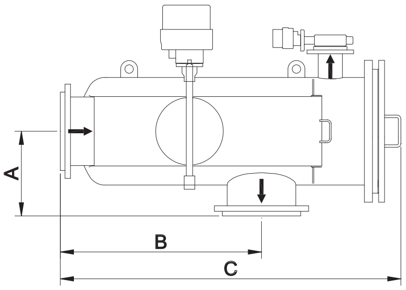
ALF-S with filter casing made of stainless steel.



ALF-S

	A	B	C
ALF 10S	175	450	740
ALF 15S	250	595	975
ALF 20S	300	720	1180
ALF 30S	400	950	1610

ALF-P with filter casing made of fibreglass reinforced polyester.



ALF-P

	A	B	C
ALF 10P	250	530	890
ALF 15P	300	685	1150
ALF 20P	350	840	1400
ALF 30P	520	1130	1820
ALF 40P	570	1150	2110

Pressure drop for Alfa Laval filters

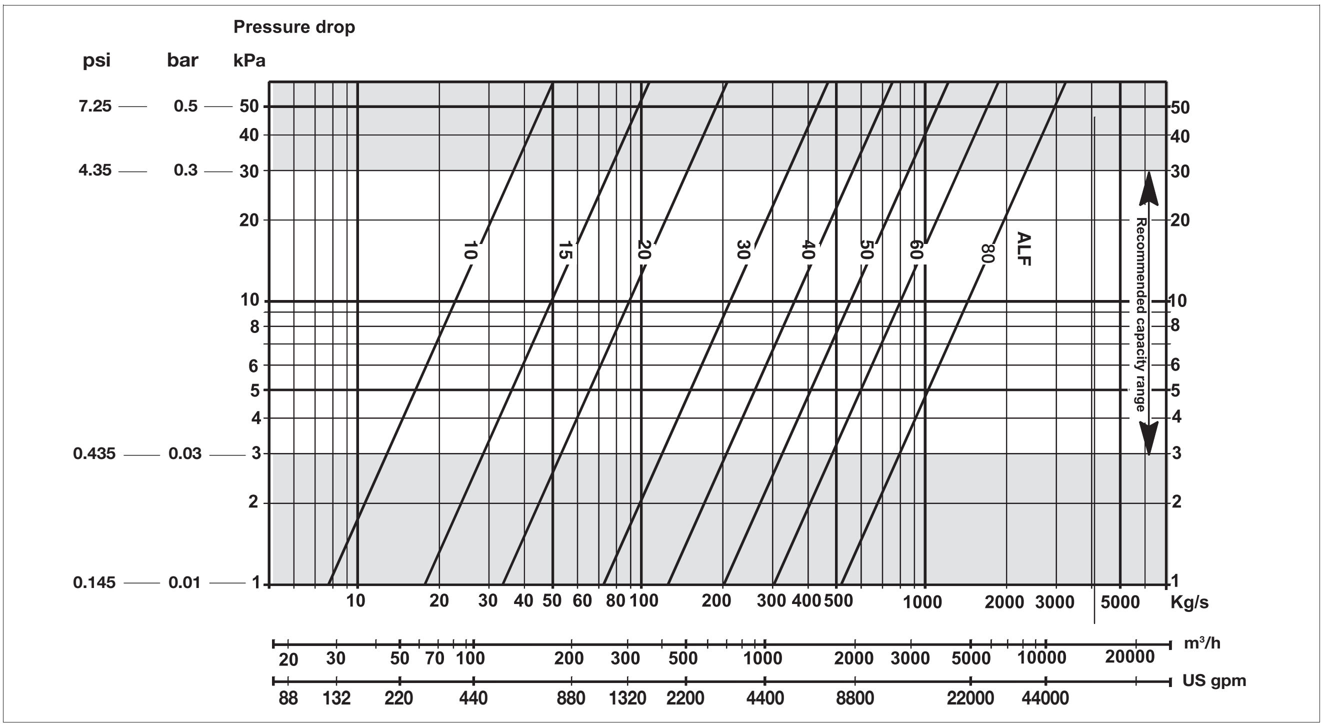


Fig. 3 Recommended pressure drop and capacity range

Technical data

Connections	EN 1092.1/PN10	DN100-DN800
	ANSI B16.5/B16.47, B series, # 150	4"-32"
	JIS B2238/K10	DN100-DN800
Operation	Pneumatic, electric or hydraulic	Actuator controlled valves
Mesh size	Perforated plate design (Ø hole)	1.0-1.5-2.0-2.5 mm
	Wedge wire design (slot size)	0.3-0.5-1.0 mm
Materials	Filter body (ALF-R)	Rubber-lined carbon steel (EN P265 GH/ASTM A516 Gr60)
	Filter body (ALF-S)	Stainless steel EN 1.4404 ASTM 316
	Filter body (ALF-P)	Fibreglass reinforced polyester (GRP/FRP)
	Internal parts (wetted)	Stainless steel EN 1.4404 ASTM 316
	Internal parts (wetted)	Super stainless steel, EN 1.4547 / ASTM S31254 (SMO)
	Internal parts (wetted)	Titanium, EN 3.7025 / ASTM B265 Grade 3
Design code	EN13445 / ASME VIII, div.1/div.2	ALF-R / ALF-S
Design code	EN13121 / ASME X	ALF-P
Design pressure	10 bar (g) / 150 psi	Alternatives on request
Design temperature	65°C / 149°F	Alternatives on request
Control panel	PLC-based	Power supply: 1~ 100-250 V, 50-60 Hz

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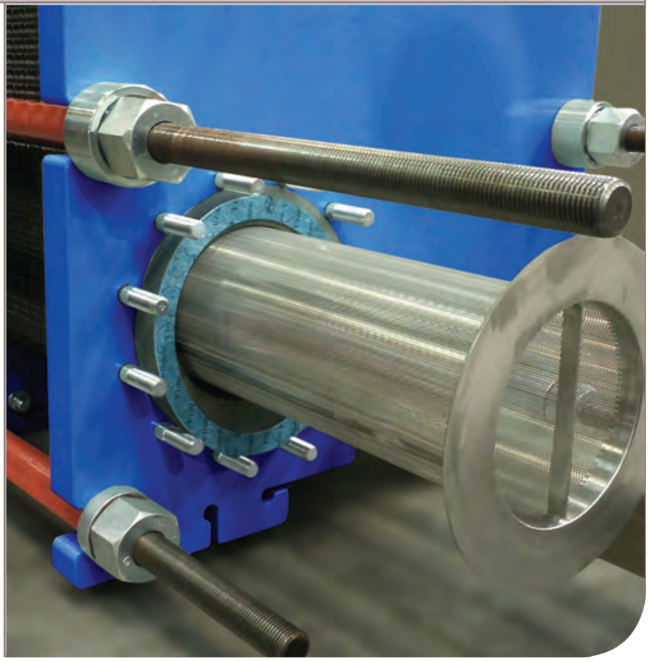
Plate Heat Exchanger

Port Filter



Application

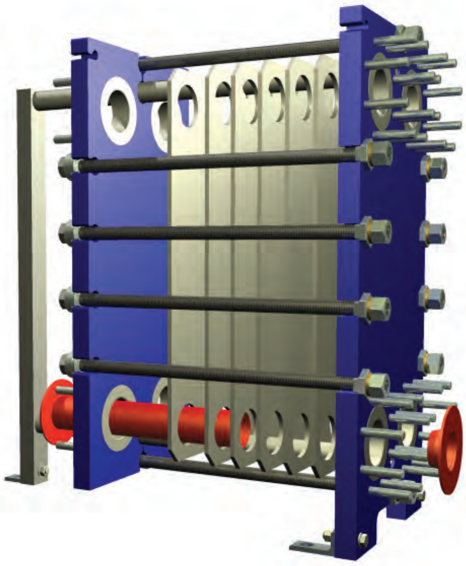
The Alfa Laval port filter is used to ensure thermal efficiency of the heat exchanger by preventing foreign objects from entering and causing clogging of the unit. The filter is designed to operate in conditions involving sea water, process water, cooling tower water or any kind of water containing particles with potential risk of disrupting the performance of the system.

Design

The filter consists of a cylindrical meshed body extending the total length of the plate pack. A cone shaped guiding ring is inserted at the inlet of the port and keeps the filter fixed during operation as well as preventing debris from entering between filter body and plate pack. A welded ring in both ends provide a flat surface for gasket sealing against piping and inspection cover.

Installation and maintenance

The filter is inserted and accessed from an extra port placed at the opposite side where the media piping is connected. An inspection cover is mounted to seal the port and makes it easy to access the filter when maintenance is needed. Removal of the port filter for inspection or maintenance is possible without dismantling the inlet pipework.



Benefits

- Prevents clogging
- Extended operation time
- Easy installation
- Easy to service
- Minimized down-town

Technical data

Available for most standard heat exchanger types with connection size Ø100 mm (4 in) and larger.

Material:	Alloy 316L, Alloy 254 (standard for sea water applications) and titanium. Other materials available on request.
Mesh size:	Ø1.5-2.2 mm (0.06-0.09 in) with a corresponding pitch providing an open surface of 37%.
Body thickness:	1 mm (0.04 in)
Ring thickness:	3-5 mm (0.12-0.20 in)

How to contact Alfa Laval
Up-to-date AlfaLaval contact details for all countries are always available on our website on www.alfalaval.com

Alfa Laval in brief
Alfa Laval is a leading global provider of specialized products and engineered solutions.

Our equipment, systems and services are dedicated to helping customers to optimise the performance of their processes. Time and time again.

We help our customers to heat, cool, separate and transport products such as oil, water, chemicals, beverages, foodstuffs, starch and pharmaceuticals.

Our worldwide organization works closely with customers in almost 100 countries to help them stay ahead.

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