

**EURO HEAT – manufacture of plate heat exchangers**

**USER MANUAL**

- P 100 , P 200 , P 350 , P 500 , P 750 , P 1000 –



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## 1.0 GENERAL INFORMATION

### *Manufacturer information*



- manufacture of plate heat exchangers

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### 1.1 USER INFORMATION


The information in this manual applies to EURO HEAT standard products.

Please always obey the note given by this guide.

Only authorized and qualified persons are allowed to perform installation, commissioning and maintenance of heat exchanger.

Users are obliged to comply with all national (international) regulations and norms concerning equipment under pressure, storage and transport of dangerous liquids and gases (if they are used in the operation of heat exchanger)

Explanations and instructions that must be followed in order to avoid system damage and workers' injuries are marked with red triangles 

Explanations and instructions that must be followed in order to ensure proper and smooth operation of heat exchanger are marked with a yellow triangle 

If any modification to the heat exchanger installation is required, follow these instructions. In the event that there are no indications related to the specific modification in this manual or some explanation is not explained enough, contact the manufacturer, EURO HEAT.


### 1.2 APPLICATION OF HEAT EXCHANGER

EURO HEAT heat exchangers are designed to meet the specific requirements (working temperature, operating pressure, volume flow) set by the customer. Exchangers are manufactured in accordance with European standard EC-PED 97/23.

In the event of any change in operating modes that deviate from the regime specified when ordering a heat exchanger, contact the EURO HEAT and wait for a written approval that the heat exchanger may be used under altered operating conditions.

### 1.3 IDENTIFICATION OF HEAT EXCHANGER

Each EURO HEAT heat exchanger is supplied with an identification plate placed on the front of the heat exchanger. The table contains basic information about the heat exchanger. Make sure that the table can always be accessed and that data can always be read from the table.

|   |  |  |
|---|--|--|
|  |  | manufacture of plate heat exchangers<br>KRAGUJEVAC, INDUSTRIJSKA BB, 034 345 055<br>www.euroheat.co.rs — office@euroheat.co.rs |
| TYPE  |  | <input type="text"/>   |
| Serial number   |  | <input type="text"/>   |
| Year of production  |  | <input type="text"/>   |
| Head load   |  | <input type="text"/>   |
| Inlet temperature   |  | <input type="text"/>   |
| Outlet temperature  |  | <input type="text"/>   |
| Working pressure  |  | <input type="text"/>   |
| Testing pressure  |  | <input type="text"/>   |

## 1.4 BASIC ELEMENTS OF HEAT EXCHANGER



Plate heat exchangers are devices that are under high pressure in working mode and therefore must be connected, put into operation and maintained only by a qualified person.

National and international regulations (eg European Standard EC PED 97/23 / EG) concerning equipment under pressure, transport and use of hazardous liquids and gases as well as occupational safety regulations must be respected.

Do not make any modifications or reparations on the heat exchanger while the heat exchanger is pressurized and until the temperature of the exchanger does not drop below 40 °C.

If the operating temperature of the heat exchanger exceeds 90 °C, a certain type of protection (not supplied with the exchanger) must be provided in order to avoid contact with the hot surface and eventual injuries of the work personnel.

Due to the existence of high pressure, it is recommended to use a safety valve (not supplied with an heat exchanger) in front of an heat exchanger in order to protect the heat exchanger from unplanned pressure increase..

## 2.0 WORKING PRINCIPLE OF PLATE HEAT EXCHANGER

The plate heat exchanger consists of a number of profiled metal plates with openings through which two mediums (fluids) pass and between them the heat exchange takes place.

Two inner plates are welded together into a two plate package, and then they are welded with each other into a plate pack and placed inside the shell.

The inner plates are profiled to increase the heat exchange surface. The profile of the inner plates also accelerates the streaming fluids turbulence and strengthens the inner plate and thus protects them from possible deformations that can arise due to the difference in pressure between the primary and secondary side of the heat exchanger.

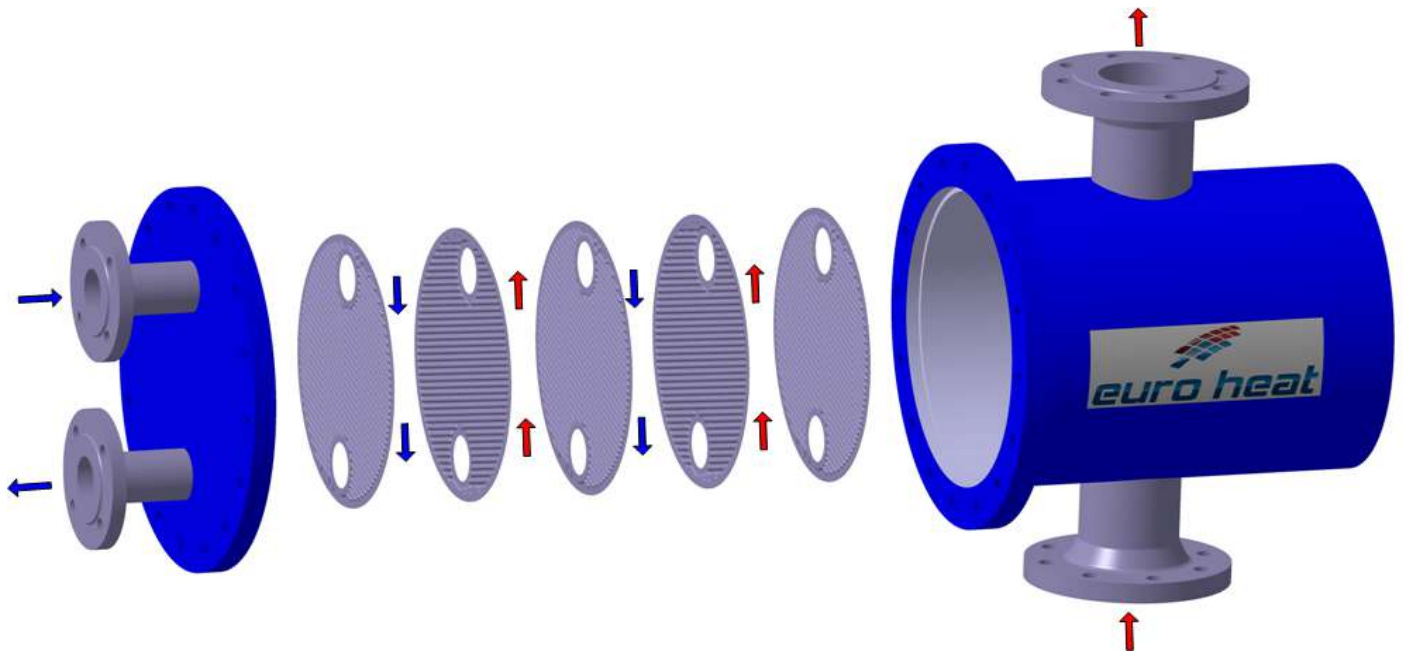
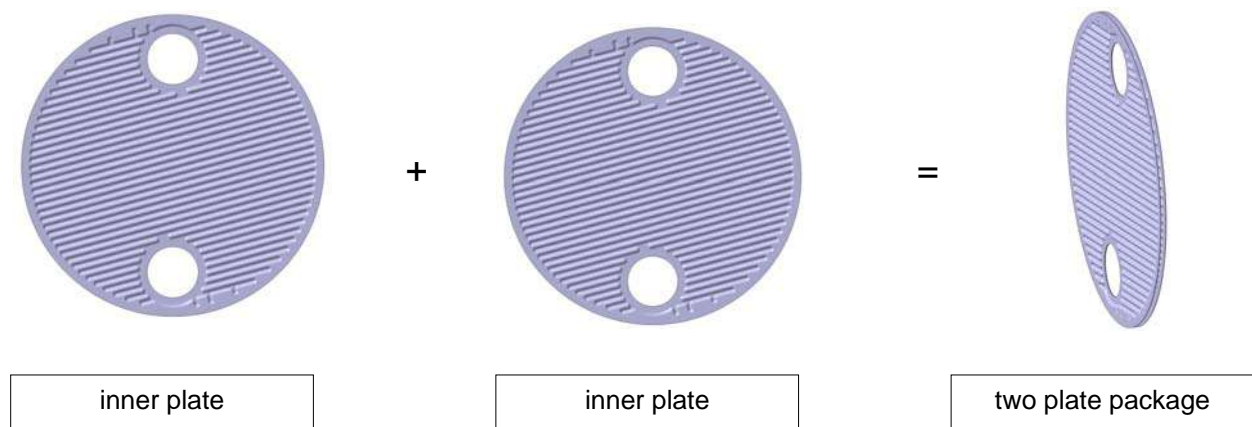


Figure 1. Working principle



### 3.0 BASIC ELEMENTS OF HEAT EXCHANGER

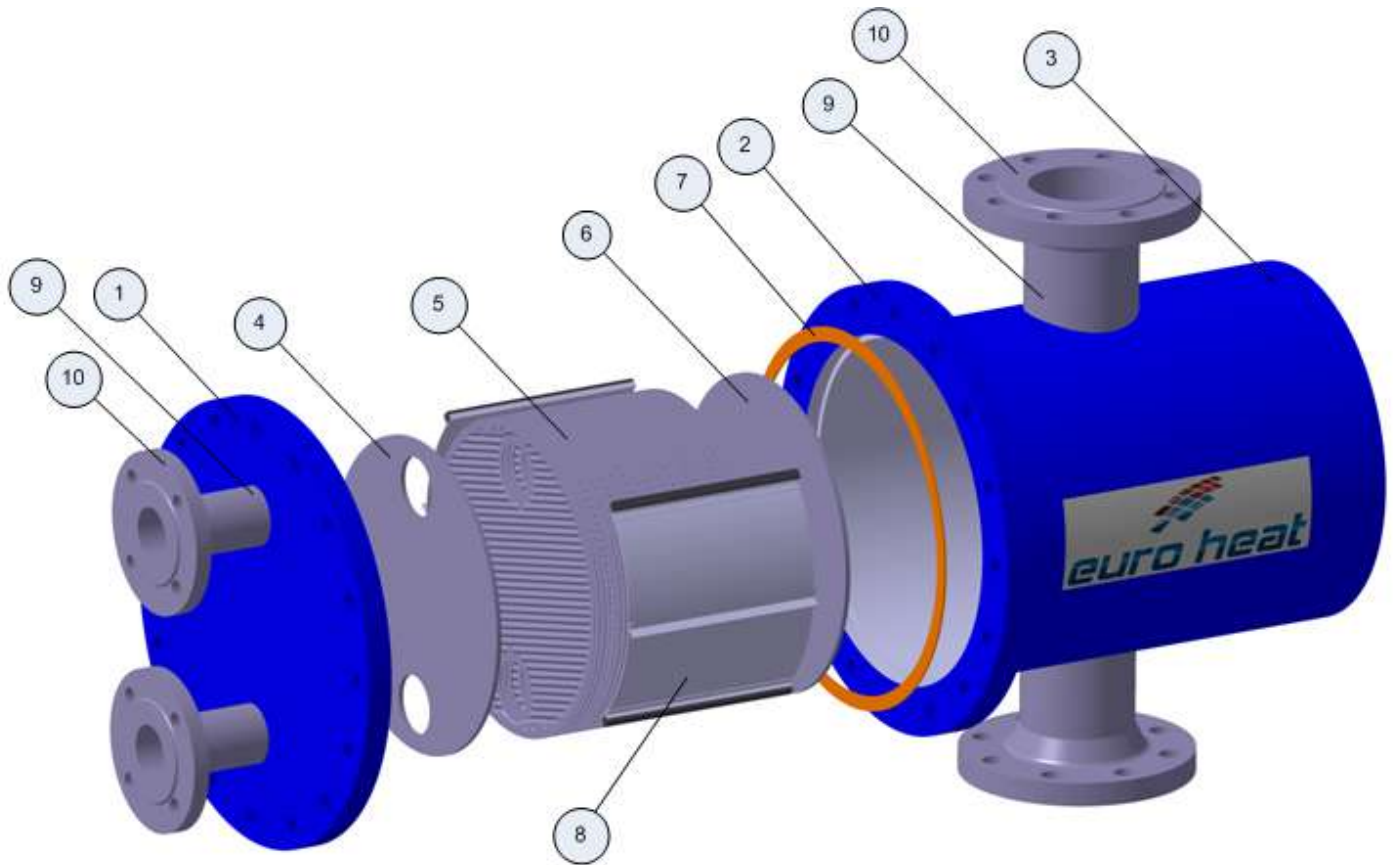


Figure 2. Basic elements of heat exchanger

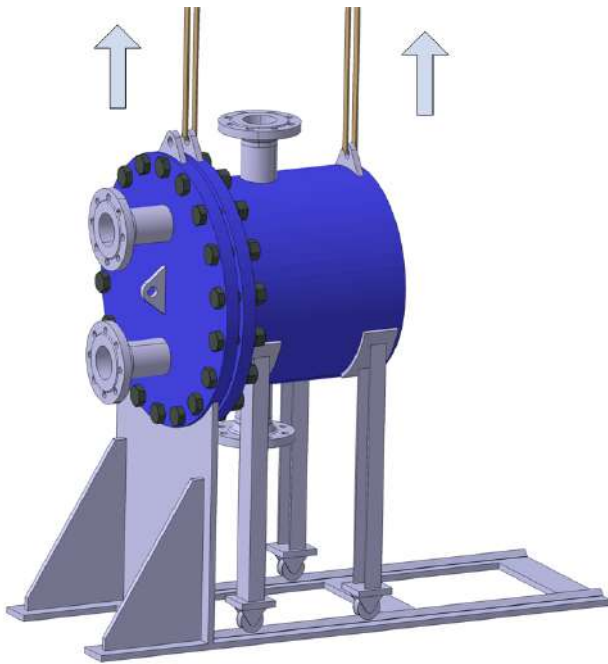
| Number of component | Name of component          |
|---------------------|----------------------------|
| 1                   | Bottom plate               |
| 2                   | Ring                       |
| 3                   | Shell                      |
| 4                   | Bottom plate of plate pack |
| 5                   | Plate pack                 |
| 6                   | End plate of plate pack    |
| 7                   | Gasket                     |
| 8                   | Flow directors             |
| 9                   | Connections                |
| 10                  | Flanges                    |

## 4.0 TRANSPORT, UNLOADING, INSTALLATION IN THE WORKING SPACE

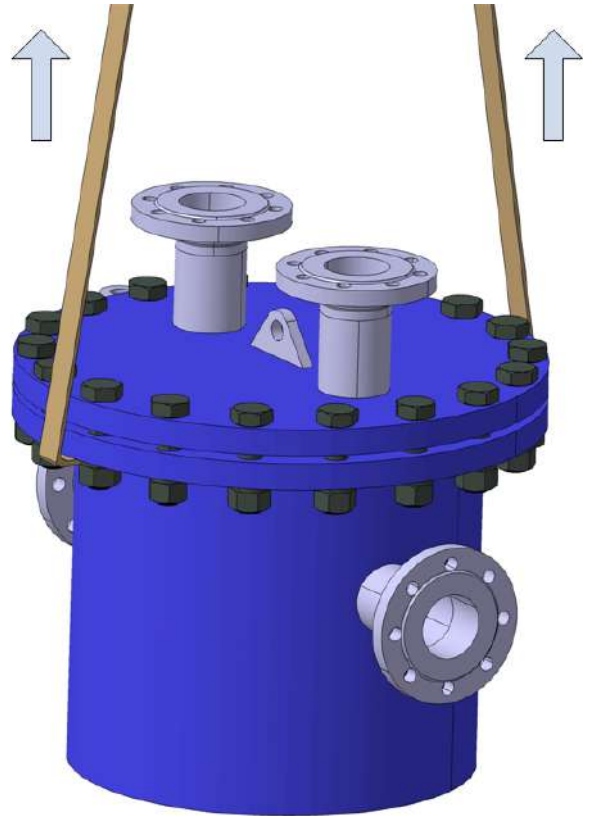
### 4.1 TRANSPORT AND UNLOADING

P-type heat exchangers are usually transported in two ways. If the heat exchanger has feet, it is necessary to attach the carrier straps to the lift lugs (Figure 1). In the second case, if the heat exchanger is without feet, attach the belts around the ring and under the nuts (Figure 2). While unloading, transferring and manipulating, pay attention to the security measures.

1 Manipulation of the exchanger with feet



2 Manipulation of the exchanger without feet



## 4.2 INSTALLATION OF HEAT EXCHANGER IN THE WORKING SPACE

### FREE SPACE

It is necessary to leave a minimum of 600 mm of free space between the heat exchanger and the walls to allow access to the heat exchanger for regular inspection and maintenance, as well as possible service interventions (Figure 4). In the case of a openable heat exchanger, a free space on the back side is also required. This space is the sum of the length of the shell and additional 300 mm (Figure 5). The length of the shell is given in the technical documentation of the heat exchanger.

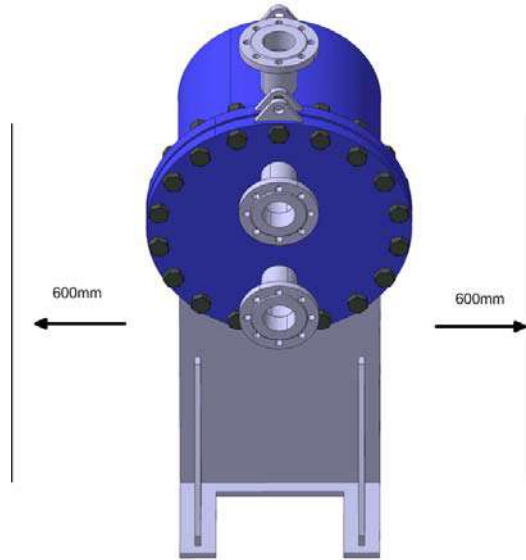


Figure 4. Required space from the sides

### SHUT-OFF VALVES

The shut-off valves must exist both on primary and secondary lines, to allow servicing of the heat exchanger.

### BASE SURFACE

The heat exchanger must be placed on a flat surface.

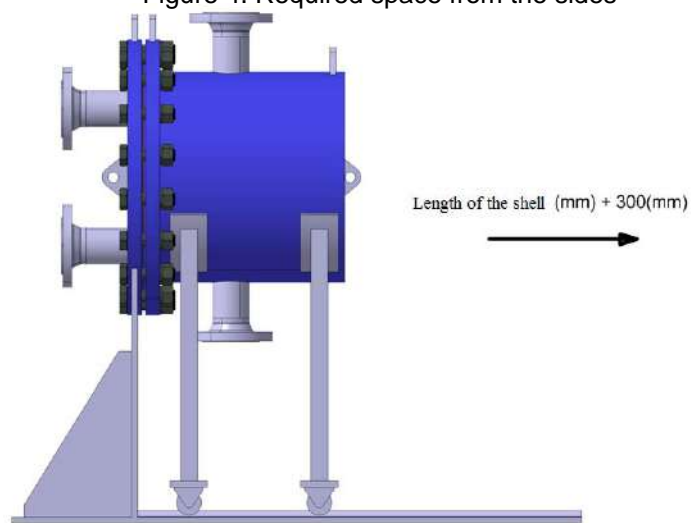


Figure 5. Required space from the back side



- ❖ Before connecting to the pipe network, check that there is no foreign body in the heat exchanger.
- ❖ When connecting to the pipe network, check that the pipes do not exert any pressure on the heat exchanger.
- ❖ It is not advisable to use quick-release valves in order to avoid the risk of hydraulic shock.



- ❖ Safety valves should be installed in accordance with the current technical regulations for pressure vessels.
- ❖ If the surface of the heat exchanger is expected to be at high temperature, it is recommended to add the insulation or some other protective layer.
- ❖ The maximum operating temperatures and pressures for each model of heat exchanger are indicated on the identification plate and must not be exceeded.



## 5.0 COMMISSIONING AND USE OF HEAT EXCHANGER

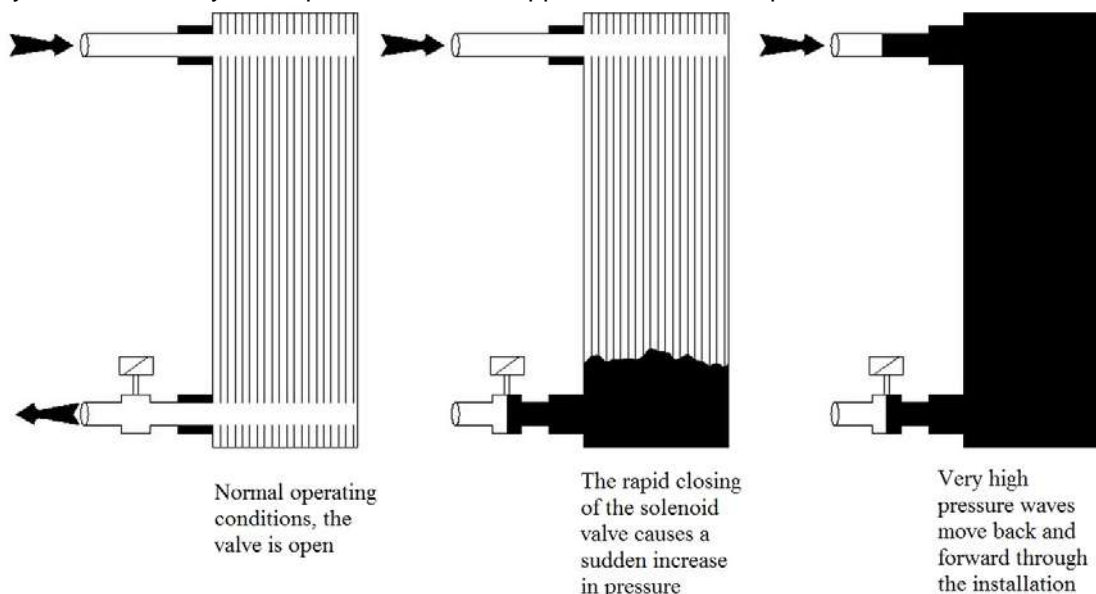
### 5.1 COMMISSIONING



If there are more than one pump in the system, check which of the pumps needs to be put into operation first.

The flow adjustment should be carried out slowly to avoid the risk of a **hydraulic shock**.

Sudden changes in the velocity of incompressible fluids flow (such as water) can cause a hydraulic shock, a phenomenon that can seriously damage pipes, valves, heat exchanger and other components of the system. The most common cause of hydraulic shock is the closing the shut-off valve too fast. An abrupt discontinuity of the fluid flow leads to a multiple pressure increase relative to the normal operating pressure. A very high pressure wave is moving through the pipes between the breakpoint and the exit point of the system. At the exit point of the system the velocity of the pressure wave is approximated to the speed of sound.



The impact wave generated in this way can cause significant damage as it leads to alternating expansion and collecting of the pipeline. With gasket heat exchanger a hydraulic shock can cause the popping out of the gaskets as well as the large deformation of the inner plates, resulting in leakage of the working fluid. Valves with controlled closing times can be used to avoid the risk of hydraulic shock

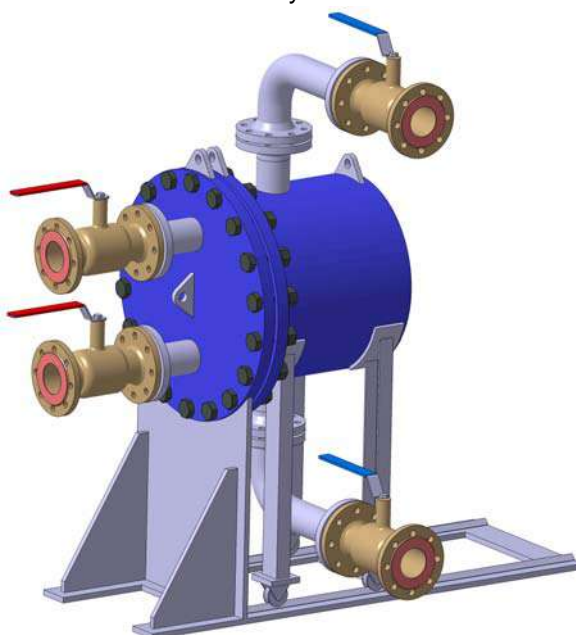


Figure 6. Valve opening and commissioning

## 5.2 OPERATING MODE OF HEAT EXCHANGER



The flow adjustment should be carried out slowly and gradually in order to protect the system from sudden changes in pressure and temperature. **Heating rate is max 5°C/ minute. Pressure increase or decrease is max 1 bar/minute.**

During operation, the heat exchanger periodically checks:

- 1 whether the temperatures and pressures are within the limits indicated on the heat exchanger identification plate
- 2 whether it was accidental leakage of the working fluid
- 3 whether the pressure drop in one of the sides is too big (most often due to dirt)

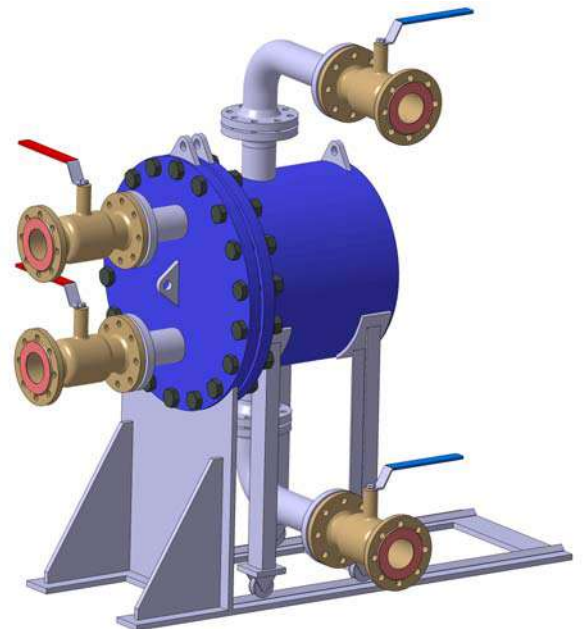
If there are any problems in the operating mode of the heat exchanger, contact the person who made the installation and commissioning of the heat exchanger or the direct manufacturer EURO HEAT.

## 5.3 TURNING OFF THE HEAT EXCHANGER



If there are more than one pump in the system, check which of the pumps needs to be switched off first.

- 1 Turn off the pump
- 2 Slowly close the shut-off valve

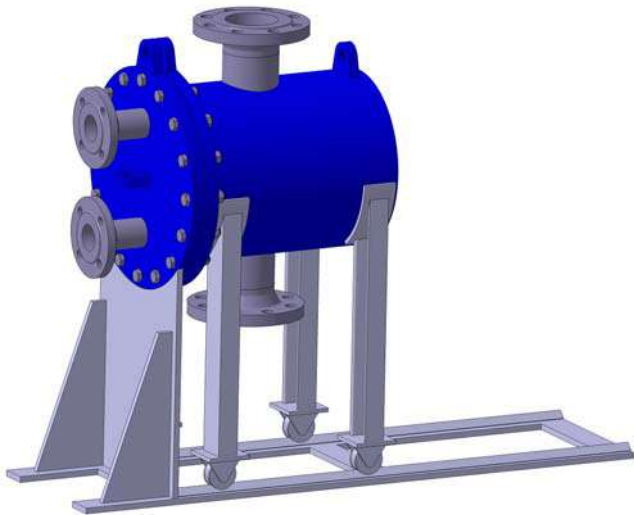


- 3 Repeat steps from 1 to 2 on the secondary side of the heat exchanger

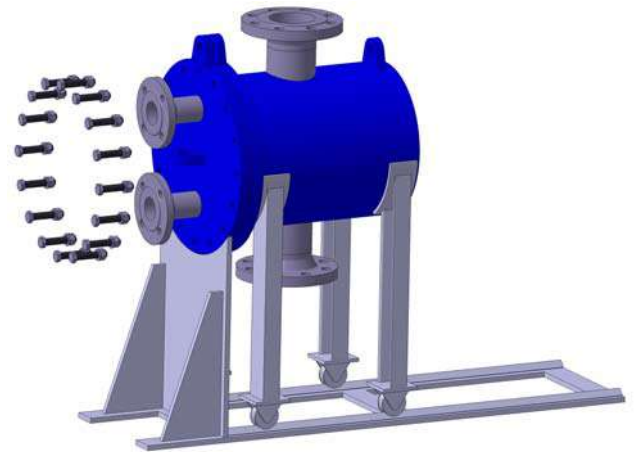
## 6.0 OPENING AND CLEANING THE HEAT EXCHANGER

After stopping the heat exchanger, due to servicing and cleaning, it is necessary to dismantle all the screws as shown in Figure 2. It is therefore necessary to start with the opening as shown in Figure 3. When the heat exchanger is opened, it is necessary to use wooden spacers and supporting strips (Figure 3), which provides horizontal position of plate pack while pulling out. After the opening, the plate pack can be washed mechanically with the help of high-pressure washers (Figure 4).

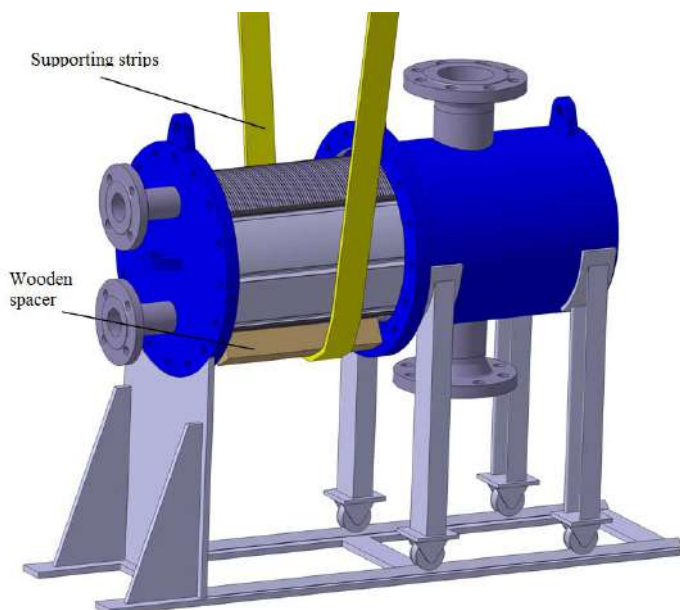
- 1 The heat exchanger is removed from the pipe network



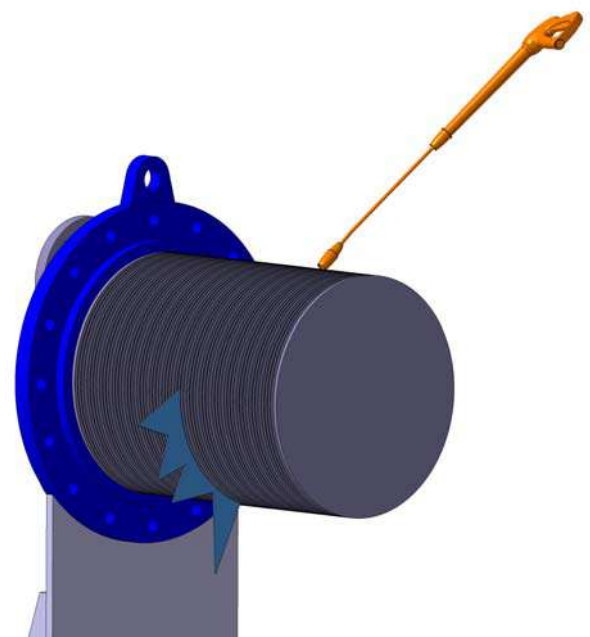
- 2 Dismantle all the screws



- 3 Opening the heat exchanger



- 4 Washing the plate pack



After washing and cleaning, put back the plate pack of the heat exchanger in the same way. Also it is necessary to replace the gasket as shown in Figure 1.

① Putting back the plate pack to the shell with a new gasket

② Closed heat exchanger and ready for use

