



CPE SYSTEMS INC



HEAT EXCHANGER

OPERATIONS MANUAL



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1. INTRODUCTION

This manual is applicable to all CPE plate heat exchangers. It is designed to help people who are trained in the use of plate heat exchangers to maintain, clean, operate, and generally care for their CPE heat exchangers. Please read this manual carefully before commencing work on your heat exchanger. If you wish to redesign or alter your heat exchanger, please contact CPE for a consultation.

2. SAFETY

Your heat exchanger is built to be reliable and safe, but it may become dangerous or damaged if not handled correctly. Only operators trained or instructed on how to work on the heat exchanger should work on the heat exchanger. For safety reasons it should be forbidden for other persons to disassemble any part of the heat exchanger.

2.1 General

Always ensure that:

- The heat exchanger is in working order.
- There is no premature wear of parts, resulting from unfavorable ambient conditions.
- The unit has not been modified or altered beyond the adding of plates (within the limits of the unit).

Conditions that may damage gaskets include:

- Exposure to very high or very low ambient temperatures.
- Exposure to aggressive or corrosive gases or aerosols.
- Exposure to UV radiation (e.g. direct sunlight).

2.2 Installation

Pressure on connections can damage your heat exchanger. Do not lift the unit by the connections or studs. Always use straps when lifting.

2.3 Operation

Pressure within the heat exchanger should not exceed the pressures marked on the front plate.

- Never pressurize the unit with compressed air.
- Safety valves should be installed according to pressure vessel regulations.

Variations in pressure within your hydraulic circuit can produce cavitation - especially at high temperatures.

- Do not set up pumps to suck water through your heat exchanger.
- Always place the pump before the heat exchanger.

2.4 Disassembly

If a full heat exchanger is opened, the flow media can escape. When operating with very cold or very hot media there is risk of freezing or burning.

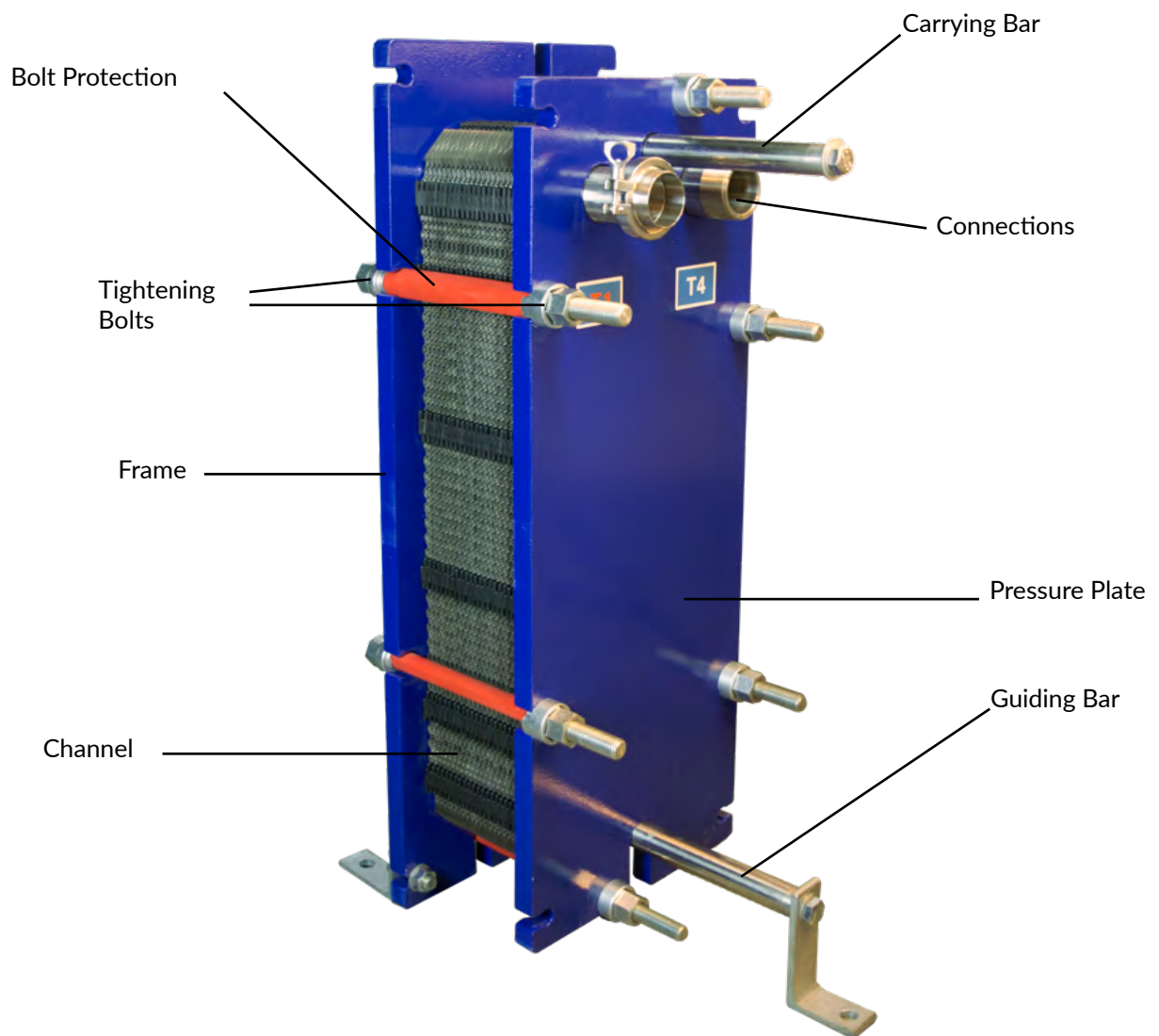
- Always release pressure and drain your heat exchanger before disassembly.
- Before maintenance, always make sure the heat exchanger is at room temperature.

Plates are very sharp. When improperly fitted, plates can fall out sideways and risk severe injury.

- When handling the plates always wear gloves.
- When closing the heat exchanger, always ensure that the heat exchanger plates do not unexpectedly loosen from the guide bar and tip over.

Plates have a very specific order. When placed in the wrong order your heat exchanger will not function correctly.

3. DIAGRAM



4. INSTALLATION

4.1 Before you start

All heat exchangers that are not fixed risk falling over. Always ensure that:

- Hoisting gear is not able to come loose.
- Hoisting gear is of sufficient dimensions.
- Do not permit the unit to swing from side to side when lifting.
- That the space you installed it into is level and strong enough to support the load.

It is preferable to anchor heat exchangers securely to the ground immediately after installation as gasketed plate heat exchangers can be knocked over with relatively little effort.

Caution:

Pressure on connections can damage your heat exchanger.



4.2 Positioning

We recommended leaving between 60cm and 150cm of space around the heat exchanger, depending on the size of the unit.

Do not install anything in the area behind the pressure plate. The pressure plate must be moved to open the unit. As such, fixed pipes should not be fitted on the rear of the unit. Instead, use a short sideways bend or other option that will still permit an opening of the unit.

If your heat exchanger is being used in an automated installation be sure to program the stopping and starting of your pumps and actuation of valves so as to limit the amplitude and frequency of the pressure variation. If connecting a homogeniser, install efficient dampers at the homogenisers inlet and outlet.

Your heat exchanger can be installed on its side or upside down if desired. Do not lay your heat exchanger on either the pressure plate or the front plate.

4.3 Connecting Pipes

- Using fast-closing valves may result in water-hammer.
- Before connecting piping assure that all foreign objects have been flushed from the system.
- Avoid stressing or straining the heat exchanger when connecting pipes.
- The direction of flow is very important; pay special attention to ensure flow is counter current.

When fitting pipes, make sure that no pressure is being transferred to the heat exchanger. All pipes that connect to the pressure plate or connection plates must allow for 1% variability of the distance from the connection to the frame plate.

5. OPERATION

5.1 Start-up

Caution: After any maintenance always make sure your plate pack width matches the specification in your spec sheet. Always assure that this is the case.

- Make sure all valves are in the correct position.
- If using a vent, open it and start the pump.
- Slowly increase flow rate.
- Close the vent once all air has been released.
- Repeat for each medium.

Make sure when running centrifugal pumps to your heat exchanger that they are started against closed valves. Then slowly and smoothly release valves.

Never run pumps temporarily empty on the suction side.

Note: Avoiding water hammer

Water hammer is a pressure wave caused by fluid being forced to stop or change suddenly. These peaks can appear during both start-up and shut-down, forcing a wave to move along the pipe at the speed of sound. This can damage your equipment. To avoid water hammer, always adjust flow rates slowly.

Caution:

Never pressure the unit with compressed air.



Caution:

Pressure within the unit should not exceed the pressures marked on the front plate.



5.2 Operation

1. Check that media temperatures and pressures are within the limits listed in the spec sheet.
2. Check to make sure that the unit is not leaking.
3. Check that the cleanliness and greasing of the carrying bar and guiding bar.
4. Check that the bolts are clean and in good working order.
5. Make sure you check with CPE Systems if at any time you intend to:
 - Change the number of plates in the plate pack.
 - Change the medium operating in the heat exchanger.

5.3 Shutdown

Reduce flow rate slowly on each medium (slow as to avoid water hammer).

6. CLEANING

After each use, plate heat exchangers must be cleaned. A plate heat exchanger has a unique design that makes it easy to clean. If too much fouling builds up in your heat exchanger, the performance will start to diminish; this is evident by an increased pressure drop. A clean in place process (CIP) will help remove any debris. Heat exchangers should be cleaned using CIP at the end of each working cycle. The heat exchanger should be manually cleaned approximately once a year, or when productivity of the machine declines without a noticeable cause. If there is no notable debris being removed with the CIP method, it may be necessary to manually clean the unit.

6.1 Clean in Place

The clean in place method, or CIP, is practical and easy to incorporate into the clean up procedure. The water and cleaning solution should be run counter to the normal direction of flow. The heat exchanger can be cleaned at the same time as the rest of the system during clean up.

1. Flush with water.
2. Run hot water through the heat exchanger, counter to the normal flow of product.
3. Debris should be flowing out with the water.
4. Pump cleaning solution through (Do not use chlorinated cleaners).
5. Flush with water.
6. Rerun hot water through the system.

Note:

All the water does not need to be removed after the cleaning process.

If debris does not exit the heat exchanger or the heat exchanger shows continued decrease in performance, it may be necessary to manually clean the heat exchanger.

6.2 Manual Cleaning

Manual cleaning of the heat exchanger should be done when the heat exchanger is approximately 3 months old, and then subsequently once a year. The first inspection and cleaning after three months is to ensure that your CIP procedures are working correctly and that the heat exchanger is functioning as it should. After this, a yearly inspection should suffice. The inspection involves a routine check of the plates to ensure that there is no debris left on the plates and that everything is still intact. You should check the plates for debris, faulty gaskets, and cracks.

After you disassemble the heat exchanger (see page 9), you can either wash the plates with water, or you can clean them with cleaning fluid.

If washing with water (no cleaning liquids) then the plates can stay in the heat exchanger.

1. Use running water and a bristle brush to gently clean the plates.
2. Rinse with hot pressured water.
3. Let plates dry.

If using cleaning fluid, the plates must be removed to be cleaned.

1. Number plates or only remove one at a time.
2. Remove plate carefully.
3. Use a bristle brush and cleaning fluid to carefully brush the plate.
4. Run hot water over the plate to rinse, continue to rinse until the runoff is clear.
5. Dry and replace the plate.

Caution:
Plates are very sharp.
Wear gloves when
handling
plates.



Note:

It is extremely important that the plates are replaced in them same order and are facing the same direction as they were prior to disassembly.

Once the plates are clean and dry, you can reassemble the heat exchanger (see page 11).

With proper care and maintenance your plate heat exchanger will run much more efficiently, will help preserve the quality of your product, and keep the product clean and unspoiled.

7. RE-GASKETING

All CPE heat exchangers come with clip on gaskets, no glue is used. Therefore, gaskets are fairly simple to replace and can clip into place without the need for adhesive.

1. Open heat exchanger (see page 9 for disassembly instructions).
2. remove the plate that needs a new gasket.
3. Gently remove the old gasket (no tools are needed, unhook the edges and pull away).
4. Clean and dry the plate.

Caution:

Always wear gloves when handling plates.



Locked



Unlocked

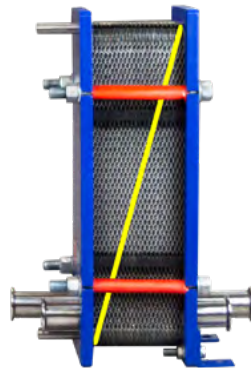
5. Attach the new gasket by slipping the gasket prongs under the edges of the plate.
6. Replace the plate (ensure that it is in the correct place and has the original orientation).
7. Close the heat exchanger (see page 11 for reassembly instructions).

8. DISASSEMBLY

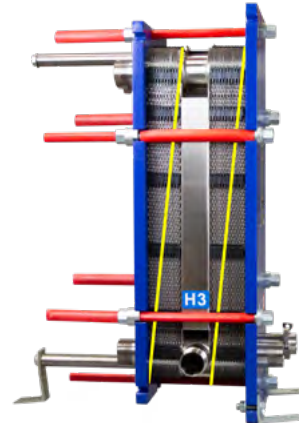
1. Ensure that the heat exchanger is shut down, isolated from the system, drained, and is at 40°C (100°F) in temperature or cooler.
2. Disconnect pipes and connections from the pressure plate.
3. Check the carrying bar and wipe down the sliding surface.
4. Make a diagonal mark across the plates of the assembly from the top right corner to the bottom left corner (using an indelible marker or an ink pen). For two section heat exchangers this must be done separately for each section.

Caution:

Always wear gloves when handling plates.

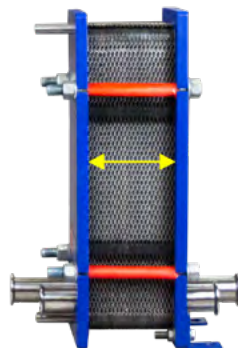


Single Stage

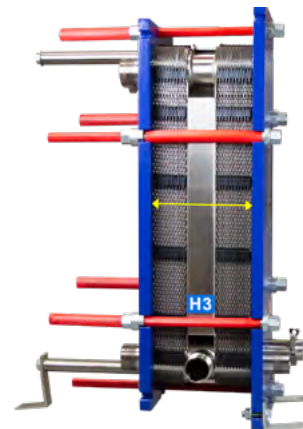


Two Stage

5. Measure and take note of the distance between the pressure plate and the frame plate (Measure A).



Single Stage



Two Stage



60H Single Stage



Two Stage



30H Single Stage

Note:

CPE 30H heat exchangers only have the four bolts. Do NOT remove any bolts from a 30H at this stage.

6. Remove outside bolts (leave 1,2,3,4).
7. Loosen bolts 1,2,3,4 slowly in diagonal pairs, alternating back and forth.
8. Slide the pressure plate along the guiding bar to open the unit.
9. To remove a plate, lift up gently and swing the bottom out.

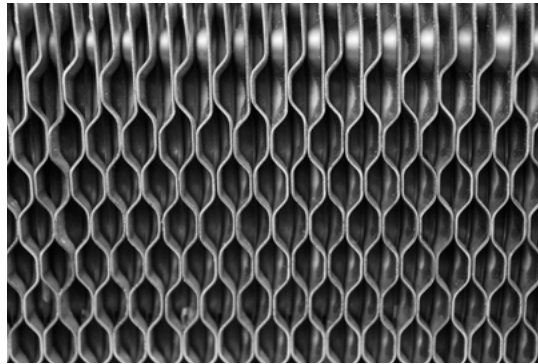
**Note:**

If you are removing plates, number them to ensure that they are returned to the correct place.

9. REASSEMBLY

Before you reassemble and close your heat exchanger, it is important to ensure that all plates have been returned to their original position and are in the correct direction.

1. Check the plates and gaskets. It is important to make sure that the gaskets are on correctly and that there is no debris in the unit.
2. Brush any debris off of the bolts, the carrying bar, and the guiding bar (we suggest the use of a wire brush) and then apply a thin layer of grease.
3. Press the plates together. With the plates together, check again that the plates form a honeycomb pattern (as shown below).



4. Begin by tightening bolts 1,2,3,4 in diagonal pairs until you reach the desired Measure A. When tightening the bolts, ensure that the frame plate and the pressure plate are always parallel and are not uneven.



60H Single Stage



Two Stage



30H Single Stage

5. Attach the remaining bolts.
6. Measure the unit and check that the Measure A is the same as the measure marked on the front of the unit. Check Measure A at the top, bottom, and middle of the unit.
7. Connect pipes.

10. TROUBLESHOOTING

Plate heat exchangers can lose productivity for several reasons. The three main issues that occur with PHEs are:

- leaking within the unit,
- leaking outside the unit,
- and pressure drop.

Many of the issues can be spotted, diagnosed, and resolved simply.

10.1 Leaking outside of the unit

Liquid leaking out of the unit is usually a result of damage to the gaskets or a result of an error in the assembly of the unit. Start by checking if the distance between the front plate and the pressure plate has changed (Measure A). If this measure is larger than normal, the unit needs to be tightened. If this measure is correct or the unit keeps leaking after it is corrected, mark which plates are leaking, then disassemble the heat exchanger (see page 9) and inspect the plates. The the marked plates should be regasketed (see page 8 for regasketing instructions).

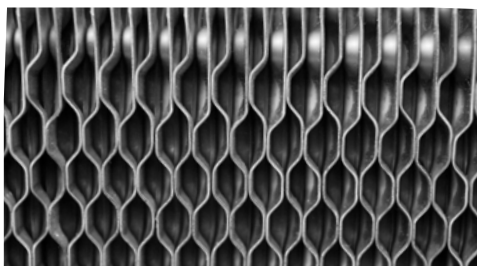
10.2 Leaking within the unit

If the liquids inside the unit begin to mix, it is because the plates are leaking within the unit. This is likely the result of a perforated plate. A pressure test is required to see if this is the case. Apply constant water pressure to one side of the unit, then fill the other side of the unit with water, but do not continue pressure on this side. Open the connections on the side filled with water, if a plate is perforated the pressurized side will leak into the side filled with water, causing it to overflow and resulting in water pouring from the connections. For a two section heat exchanger, each section must be tested separately. If a plate is perforated, disassemble the unit (see page 11) and inspect the plates with crevice detection liquids.

10.3 Poor performance

Poor performance is the most common issue with heat exchangers. There are several main causes: an error in the platage, too little water flow, an accumulation of debris within the unit, or a faulty setup.

Checking the platage: If the plates are assembled in the wrong fashion, it can create a deadzone, causing the unit to bypass a portion of the plates. Review the plates and ensure they are assembled in the honeycomb pattern shown below. If a plate is reversed, open the unit (see page 11 for disassembly instructions) and adjust the rotation of the plates to achieve the honeycomb pattern.



Too much debris: If there is a buildup of debris in the unit, it will negatively affect performance. Run a CIP cycle to clear out debris (see page 7) , if the debris does not clear, manual cleaning may be necessary (see page 7).

Insufficient water flow: If the water flowing to the unit has a flow rate beneath the design flow, it will cause the heat exchanger to lose productivity. Check the pressure and flow of the water and ensure that it meets the threshold.

Faulty setup: if the setup is wrong, the unit will function at an extremely low efficiency. Review the operating (page 6) and setup instructions (page 6) to ensure that it is being used correctly.

For more information please visit our website:

www.cpesystems.com/collections/plate-heat-exchangers

or contact us at sales@cpesystems.com