



Totally welded PLATE HEAT EXCHANGER

PresskoWeld®

Instruction and Safety manual

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1. General conditions

- The correct service of the pressure equipment is an absolutely prerequisite for the safety service. To this purpose, this operating instruction is necessarily to be heeded of the user.
- Always proceed sensible and carefully according to existing rules.
- Valid laws of the respective country at the installation place for the service of pressure equipment are to be followed.
- Pressure vessels to which the Pressure Equipment Directive applies are constructed according to one of the following modules: A, A1, B+D, B+F, G. The identification numbers of the responsible Notified Bodies depending on the module are shown in the following table:

Module A1	Internal manufacturing checks with monitoring of the final assessment	0090 TÜV Thüringen e.V.
Module B	EC type-examination	0036 TÜV SÜD Industrie Service GmbH
Module D	production quality assurance	0090 TÜV Thüringen e.V.
Module F	product verification	see EC declaration of conformity
Module G	EC unit verification	see EC declaration of conformity

2. Safety

- Depending on temperature (below -10°C or above 60°C on shell side) use insulation to protect personnel from burns or frost.
- The pressure device may only be used within the pressure and temperature limits which are indicated on the factory plate, the conformity statement, and, if necessary, on the risk analysis. Te conformity statement and this operating

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manual are to be preserved with the greatest of care. If no minimum temperature is indicated, -10°C is considered the minimum temperature.

- Never exceed the design pressures or temperatures.
- Ensure system is at a safe temperature, drained and pressure is released before starting work on the system.
- Removal/replacement of the plate pack on open able models will normally require the use of lifting equipment.
- Follow the start-up procedure after installation.
- If in doubt, ask Tranter GmbH or your PresskoWeld® representative.

3. Principle & construction

The pressure device is primarily designed for a resting pressure with the highest 1,000 full load alternations. Frequent pulsating or fluctuating load alternations are not permitted. The range of pressure cycles must not exceed 10% of the maximum allowed pressure. A corrosive excess of 1 mm is taken into account for all pressure-bearing, fluid-side, uncoated components made of C-steel. The corrosive excess in 0 mm for components made of stainless steel.

3.1. Principle of the PresskoWeld® plate heat exchanger

The pressure equipment is lent to predominantly recumbent pressure-burden with the most highly 1.000 full-load-changes. Frequent swelling or changing changes of load are prohibited. Te function of this heat exchanger is to transfer heat form hot/primary to cold/secondary flow through circular corrugated heat transfer plates.

The construction is such that primary and secondary channels alternate throughout the plate pack. The flow can be arranged as counter-current, co-current or cross-flow as desired.

3.2. Construction of the PresskoWeld® plate heat exchanger

A plate heat exchanger consists of circular plates welded into a pack which are then inserted into a pressure vessel.

One medium enters and leaves through plate ports aligned with end cover connections. This is known as plate side flow.

The other medium enters through connections on the shell and is directed to individual channels by means of peripheral metallic flow directors and exits similar manner at a shell connection. This is known as the shell side flow.

The construction can be either fully welded or in certain cases, with single pass plate side operation, with a removable end cover so that the plate pack can be withdrawn for inspection.



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4. Mounting instructions

Adequate space should be provided around the heat exchanger for mounting, insulation and maintenance. The distance to the nearest obstacle (e.g. wall, must be at least 500 mm). Also the space between adjacent exchangers must be more than 100 mm.

To remove the plate pack out of the shell, in case of an open type heat exchanger, additional space equal to the total length should be available.

The heat exchanger can be mounted with steel saddles, with wooden saddles or with insulation saddles to a frame.

Lifting lugs situated on the unit are only for mounting and transport.

All pipe connections to the heat exchanger must be equipped with shut-off valves. Any pipe connection to the detachable end plates (on open model) must be made either with flange or threaded connections. Also the pipes to be connected must be mounted so that strains caused by these (e.g. thermal expansion or contraction) do not harm the heat exchanger.

Where there is a risk of exceeding the design pressure, pressure relief valves must be fitted.

If multiple units are arranged in parallel there should be sufficient control on the inlet lines to adjust flow rates to each unit.

Fluids (also water from a closed cooling water circuit) must be free of coarse pollution or other contamination that can cause blocking or silting of the pressure vessel. In any other case a filter (500 µm maximum mesh width) must be installed. All mediums flowing through the heat exchanger must not contain corrosive components or corrosive additives attacking the used material in an unacceptable manner. If necessary, water must be preprocessed (e.g. in danger of calcification). Depending on the pollution, cleaning and if possible an interior inspection must be performed in adequate intervals to ensure the proper function (see 8.).

For heat exchangers that can be opened:

- All screw connections of the pressure vessel must be tightened on start of operation of the equipment until the final fit is ensured.
- Torque for screws of flange connection with lubricant (e.g. MOS2)

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- Required torque: 70 Nm¹
- Maximum torque: 90 Nm¹
- The screws must not be immediately tightened with the required torque but must be tightened first by hand, then with 45 Nm, finally with the required torque.
- After downtime or after malfunction an interior inspection should be performed for heat exchangers that can be opened.

WARNING:

Do not weld anything to the body of the heat exchanger (including shell, end plates and the sides of the connection pipes) without first consulting your PresskoWeld[®] representative, since it can harm the inner structure of the heat exchanger.

ADVICE:

On use of mediums of water pollution class 1 and flange connections with flat face, the use of reinforced, inherently stable gaskets is essential (see ATV-DVWK-A 780, Appendix 2).

5. Start-up

Before start-up check that:

- Shut-off valves are closed
- The pipe connections comply with the drawings
- There are no potential sources of water hammer, steam hammer or sudden pressure changes.

The heat exchanger is then filled with the operating medium and the pressure is slowly increased or decreased. The pressure increase or decrease occurs in the casing and plate area **simultaneously** with a **maximum pressure increase or decrease of 1 bar/min.**

The heat exchanger should be deaerated during filling.

Then the shut-off valves should be opened and the operation of the heat exchanger observed (e.g. temperature, pressure, expansion, outside leakages, etc.). If the heat exchanger operates in accordance with the specification, it can be taken into continuous use.

Note: All PSHE units have been pressure tested prior to dispatch.

¹ Example! – see drawing for exact specification

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6. Allowable pressure and temperatures

The working temperature and pressure levels for each PSHE are indicated on the data plate mounted on the unit.

It is to be guaranteed, that the differential pressure between plate side and shell side in dependence of plate side material and temperature (especially to start-up and shut-down) don't overstep given values. If no maximum differential pressure is given on the name plate of an individual unit, the following table applies (valid for 1.4404/AISI316L).

Temperatur T [°C]		20	100	150	200	250	300	350	400	450	
Differential Pressure [bar]	SPW17	0,6mm	40				x	x	x	x	x
		0,8mm	65	65	65	59,8	56,5	53,8	51,6	49,9	48,2
	SPW30	0,6mm	40				x	x	x	x	x
		0,8mm	65	65	65	59,8	56,5	53,8	51,6	49,9	48,2
	DPW30	0,6mm	40				x	x	x	x	x
		0,8mm	40								x
	SPW40	0,6mm	40				x	x	x	x	x
		0,8mm	65	65	65	59,8	56,5	53,8	51,6	49,9	48,2
	SPW55	0,6mm	40				x	x	x	x	x
		0,8mm	65	65	65	59,8	56,5	53,8	51,6	49,9	48,2
	SPW75	0,6mm	40				x	x	x	x	x
		0,8mm	65	65	65	59,5	56,0	51,7	49,5	48,1	46,3
	SPW100	0,6mm	40				x	x	x	x	x
		0,8mm	65	65	65	59,5	56,0	51,7	49,5	48,1	46,3
	DPW101	0,6mm	40				x	x	x	x	x
		0,8mm	40								x
	OPW42	0,6mm	40								x
		0,8mm	40								x

7. Service / troubleshooting

If the heating/cooling capacity is not sufficient after start-up, check the following:

- Pipe connections (correct acc. drawing)
- Pressure (both sides)
- Temperatures (both sides)
- Liquid flow (correct position of the valves, the pump operates perfectly, measure flow rates)
- Check heat balance
- Leakages in the heat exchanger by unbalanced pressure testing

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- Possibility of blockages and fouling creating reduced heat transfer or increased pressure loss
- flow-ways (right positioning of valves, pump is working properly)

If, after this checking the heating/cooling capacity and/or pressure losses have reached an unacceptable level, contact your PresskoWeld[®] representative.

8. Cleaning of the heat exchangers

The need and time interval for cleaning the heat exchanger depends on the type of media used. If risk of fouling exists the performance of the unit should be monitored by measuring the temperatures and pressure losses.

When pressure drops raise above unacceptable level or temperatures indicate poor heat transfer the heat exchanger should be cleaned.

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Note:

There is no need to open the heat exchanger. In most cases loose debris gathered on the surface of the plates can be removed by back washing. Clean water is flushed at high velocity on one side and/or both sides in a direction opposite to the normal operation. The valves in the connection pipes must be closed and the drain valves opened. The dirty water/effluent must be disposed of in accordance with local regulations.

If scales cannot be removed from the heat exchanger by washing; soda solution 2% caustic and/or 0,5% nitric acid or 5% sulphamic acid (not sulphuric acid) may be used up to 60°C. Phosphoric acid at 5% concentration can also be employed.

For open able single pass units, it is possible to withdraw the plate stack for partial access to the shell side channels. Water jet or other cleaning methods can be used.
WARNING: It's forbidden to set the removed plate packet under pressure!

WARNING:

If the shell material is carbon steel, do not use nitric acid for cleaning shell side. Also reduce strength of sulphamic acid to 2%.

WARNING:

Sulphamic acid hydrolyses with temperature and time, only use freshly made solutions.

WARNING:

After soda, acid or detergent treatment, plates must be absolutely rinsed carefully with clean water.

WARNING:

Never use hydrochloric acid with stainless steel plates, even in small concentrations.

9. Wearing / replacement parts

It is possible to replace the gasket and the plate package for open able, fitted plate heat exchangers. They are available from Tranter GmbH when the drawing number and manufacturing number are provided.

10. Testing periods

For recurring tests, in Germany the testing periods are to be maintained in accordance with §15 Operational safety ordinance, the internal test and stability test after maintenance or after a major modification. In other countries their national law must be observed.

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11. Vibrations

Plant specific oscillations are permitted in the context of ISO 10816-1/A1: 2010:06 only. According to Table B.1 of the standard allowable vibrations are set to Zone A and are specified in the following table:

effective value of vibration velocity [mm/s]	Class 1 e.g. motors < 15kW	Class 2 e.g. motors 15 - 75 kW	Class 3 e.g. motors 75 - 300 kW	Class 4 e.g. motors > 300 kW
$0,00 \leq 0,71$	X	X	X	X
$0,71 \leq 1,12$		X	X	X
$1,12 \leq 1,80$			X	X
$1,80 \leq 4,50$				X

Table 1: allowable vibration velocity depending on motor power

If these values deviate the operator of the facility has to announce to Tranter GmbH. Tranter GmbH will check if the Heat Exchanger is suitable for the changed operating conditions. If the Heat Exchanger is working under conditions that exceed these limits for vibration, this may cause damage to the unit. In order to avoid damage appropriate actions have to be started immediately. This can be the installation of vibration dampers, expansion joints, repair of defective bearings of compressors / pumps, etc..