Reflex Longtherm
Soldered plate-type heat exchanger

EN Operating instructions
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1 Safety

1.1 Personnel requirements

Installation and operation tasks are to be carried out by specialist personnel or specially trained personnel only.

1.2 Instructions for personnel

• Modifications of the plate-type heat exchanger are not permitted:
  – Welding at other locations than the connection piece.
  – Mechanical deformations.

• Plate-type heat exchanger with visible damage.

Ignoring this manual and the safety information in particular, may cause the destruction and defects of the plate-type heat exchanger, endanger persons and adversely affect the functioning. Any contravention voids the guarantee and liability.

1.3 Intended use

Plate-type heat exchangers ("heat exchangers") are copper-soldered and used for the system isolation of contra-directional water circuits. They are used for exchanging the thermal energy between the water circuits in heating or drinking water systems. Operation with a water/glycol mixture is approved. When the heat exchanger is operated with ionised water, the increased concentration of copper ions in the water must be taken into consideration. The oxygen content must then not exceed 50 mg/litre.
1.4 **Impermissible operating conditions**

The heat exchanger is not suitable for the following conditions:

- Use with aggressive water corroding the plate material or the copper solder.
  - Ammonia- and sulphur-containing water, acids and brines.
  - Water containing hydrogen sulphide, sulphate or sulphite.
- Use in galvanised pipe systems and in facility systems prone to water hammer.

1.5 **Residual risks**

The heat exchanger has been manufactured using state-of-the-art technology. Despite this, residual risks cannot be excluded.

### Caution — risk of burning!

- Hot surfaces in heating systems can cause burns on the skin.
  - Wear personal protective equipment: Protective gloves, protective clothing.
  - Please place appropriate warning signs in the vicinity of the device.

### Warning — large weight!

- The devices are heavy. Consequently, there is a risk of physical injury and accidents.
  - Use suitable lifting equipment for transportation and installation.

### Caution — risk of injury!

- The devices carry a water pressure of up to 31 bar at temperatures up to 195 °C. Incorrect installation, removal or maintenance work may cause burns or other injuries at the connection points, when pressurised hot water or vapour suddenly escapes.
  - Use suitable personal protective equipment (safety clothing, gloves and goggles).
  - Ensure proper installation, removal or maintenance work.
  - Wait for the device to have cooled down before starting removal or maintenance tasks.
  - Ensure that the system is de-pressurised before performing installation, removal or maintenance work at the connection points.
2 Product description

The heat exchanger comprises several, in-series arranged stainless steel plates. Copper soldering at contact points connects the stainless steel plates. Channels are impressed in the surfaces of the stainless steel plates. These channels form two contra-directional and isolated flow spaces for two water circuits.

The flow spaces differ by two channel designs:

- **rhc - channel**: Large thermally-effective length of flow channels with large flow resistance.
- **rlc - channel**: Small thermally-effective length of flow channels with small flow resistance.

The plate-type heat exchangers are organised in various assemblies, see chapter 3.2 "Assemblies" on page 7.

2.1 Identification

The nameplate provides information on manufacturer, year of manufacture, part number and technical data.
3 Technical data

3.1 General technical data

The general technical data at static operating conditions apply to the following assemblies:

<table>
<thead>
<tr>
<th>Component of water</th>
<th>Unit</th>
<th>Characteristic value</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH value</td>
<td>--</td>
<td>7 – 9.0</td>
</tr>
<tr>
<td>Electric conductivity</td>
<td>μS / cm</td>
<td>10 – 500</td>
</tr>
<tr>
<td>Sulphate</td>
<td>mg / litre</td>
<td>&lt; 100</td>
</tr>
<tr>
<td>Ammonia</td>
<td></td>
<td>&lt; 2</td>
</tr>
<tr>
<td>Nitrates</td>
<td>mg / litre</td>
<td>&lt; 100</td>
</tr>
<tr>
<td>Iron</td>
<td></td>
<td>&lt; 0.2</td>
</tr>
<tr>
<td>Manganese</td>
<td></td>
<td>&lt; 0.1</td>
</tr>
<tr>
<td>Chlorides</td>
<td>mg / litre</td>
<td>&lt; 300</td>
</tr>
<tr>
<td>50 °C</td>
<td></td>
<td>&lt; 100</td>
</tr>
<tr>
<td>75 °C</td>
<td></td>
<td>&lt; 10</td>
</tr>
<tr>
<td>90 °C</td>
<td></td>
<td>Not permitted</td>
</tr>
<tr>
<td>Free chlorine</td>
<td>mg / litre</td>
<td>&lt; 0.5</td>
</tr>
<tr>
<td>Free carbonic acid</td>
<td></td>
<td>&lt; 20</td>
</tr>
<tr>
<td>Saturation index SI</td>
<td>ΔpH</td>
<td>-0.2 – +0.2</td>
</tr>
<tr>
<td>Total hardness</td>
<td>°dH</td>
<td>6 – 15</td>
</tr>
<tr>
<td>Suspended solids</td>
<td>mg / litre</td>
<td>&lt; 30</td>
</tr>
<tr>
<td>Hydrogen sulphide</td>
<td></td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Hydrogen carbonate</td>
<td></td>
<td>&lt; 300</td>
</tr>
<tr>
<td>Hydrogen carbonate / Sulphate</td>
<td></td>
<td>&gt; 1.0</td>
</tr>
<tr>
<td>Sulphide</td>
<td></td>
<td>&lt; 1.0</td>
</tr>
<tr>
<td>Nitrite</td>
<td></td>
<td>&lt; 0.1</td>
</tr>
</tbody>
</table>

The corrosion behaviour of stainless steel 1.4401 and copper must be taken into consideration. Comply with these values for the media used.
### 3.2 Assemblies

Plate-type heat exchanger sizes

<table>
<thead>
<tr>
<th>Channel form / size</th>
<th>Width mm</th>
<th>Height mm</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>h</td>
<td></td>
</tr>
<tr>
<td>rhc 15</td>
<td>74</td>
<td>204</td>
<td>170</td>
</tr>
<tr>
<td>rhc 40</td>
<td>124</td>
<td>335</td>
<td>281</td>
</tr>
<tr>
<td>rhc 60</td>
<td>124</td>
<td>532</td>
<td>478</td>
</tr>
<tr>
<td>rhc 85 / rlc 85</td>
<td>271</td>
<td>532</td>
<td>460</td>
</tr>
<tr>
<td>rhc 150</td>
<td>271</td>
<td>532</td>
<td>421</td>
</tr>
<tr>
<td>rhc 200</td>
<td>271</td>
<td>802</td>
<td>690</td>
</tr>
<tr>
<td>rhc 85 / rlc 85</td>
<td>271</td>
<td>532</td>
<td>460</td>
</tr>
<tr>
<td>rhc 150</td>
<td>271</td>
<td>532</td>
<td>421</td>
</tr>
<tr>
<td>rhc 200</td>
<td>271</td>
<td>802</td>
<td>690</td>
</tr>
<tr>
<td>rhc 300</td>
<td>386</td>
<td>875</td>
<td>723</td>
</tr>
</tbody>
</table>
## Technical data

### Heat insulation

<table>
<thead>
<tr>
<th>RHC/RLC</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 / 40 / 60 / 85 ; RLC 85</td>
<td>Two half shells from rigid polyurethane foam with connecting clips.</td>
</tr>
<tr>
<td>150 / 200 / 300</td>
<td>Heat insulation from mineral wool with aluminium exterior coating.</td>
</tr>
</tbody>
</table>

### Brackets

<table>
<thead>
<tr>
<th>Size</th>
<th>Mount design</th>
<th>Transport lug</th>
<th>a / mm</th>
<th>b / mm</th>
<th>c / mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHC 85 / RLC 85</td>
<td>x</td>
<td>--</td>
<td>140</td>
<td>600</td>
<td>--</td>
</tr>
<tr>
<td>RHC 150</td>
<td>x</td>
<td>--</td>
<td>160</td>
<td>581</td>
<td>--</td>
</tr>
<tr>
<td>RHC 200</td>
<td>x</td>
<td>x</td>
<td>160</td>
<td>850</td>
<td>966</td>
</tr>
<tr>
<td>RHC 300</td>
<td>x</td>
<td>x</td>
<td>231</td>
<td>954</td>
<td>1088</td>
</tr>
</tbody>
</table>

### Connection

<table>
<thead>
<tr>
<th>Size</th>
<th>Screw connection with flat gasket, brass</th>
<th>Solder connection, brass</th>
<th>Welding connection, steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHC 15</td>
<td>G¾ x G½</td>
<td>G¾ x 18 mm</td>
<td>G¾ x 21.2 mm</td>
</tr>
<tr>
<td>RHC 40</td>
<td>G1 x G¾</td>
<td>G1 x 22 mm</td>
<td>G1 x 26.9 mm</td>
</tr>
<tr>
<td>RHC 60</td>
<td>G1¼ x G1</td>
<td>G1¼ x 28 mm</td>
<td>G1¼ x 33.7 mm</td>
</tr>
<tr>
<td>RHC 85 / RLC 85</td>
<td>G2 x G1½</td>
<td>--</td>
<td>G2 x 48.3 mm</td>
</tr>
<tr>
<td>RHC 150 / 200</td>
<td>G2½ x G2</td>
<td>--</td>
<td>G2½ x 60.3 mm</td>
</tr>
</tbody>
</table>

### Butt flanges

<table>
<thead>
<tr>
<th>Size</th>
<th>Connection size</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>RHC 150 / 200</td>
<td>DN 65 x 76.1 mm</td>
<td>Steel or, optionally, stainless steel</td>
</tr>
<tr>
<td>RHC 300</td>
<td>DN 100 x 114.3 mm</td>
<td></td>
</tr>
</tbody>
</table>

*Butt flanges are special models and should be ordered specifically.*
4 Installation

Caution – Property damage from dynamic loads from the system

- Dynamic loads from the facility system such as water hammer, re-evaporation, cavitation and unstable temperature regulation will damage the device.
  - Ensure stable pressure and temperature regulation for the heat exchanger.
  - Avoid re-evaporation and cavitation.

4.1 Connection

Comply with the general instructions for connections:

- Connect the water circuits according to the counter-flow principle. Connect the water circuit with the larger temperature range and the small flow rate to s1 / s2. The s1 / s2 connection end is identified by a red dot.
- Install the devices for shut-off, draining and ventilation directly upstream of the heat exchanger to ensure unimpeded servicing.
  - Install the draining devices directly upstream of the lower connecting lines s2 and s3.
  - Install the ventilation devices directly upstream of the upper connecting lines s1 and s4.
- If appropriate, install filters in the feed pipes for protecting the heat exchanger.
  - For open systems, filters with a mesh width of maximal 0.08 mm.
  - For closed systems, filters with a mesh width of maximal 0.8 mm.
Comply with the instructions for thread connection:
- Use only flat-sealing union nuts at the thread connection.
- Tighten the thread connections only to the maximum torque provided.

Bending and torsion moments for thread connections

<table>
<thead>
<tr>
<th>Size</th>
<th>Connection force</th>
<th>Bending moments</th>
<th>Torsion moments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T (kN)</td>
<td>F (kN)</td>
<td>Mb (Nm)</td>
</tr>
<tr>
<td>rhc 15</td>
<td>1.5</td>
<td>8.0</td>
<td>40</td>
</tr>
<tr>
<td>rhc 40</td>
<td>2.5</td>
<td>10</td>
<td>65</td>
</tr>
<tr>
<td>rhc 60</td>
<td>25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>rhc (rlc) 85</td>
<td>11.5</td>
<td>30</td>
<td>740</td>
</tr>
<tr>
<td>rhc 150 / 200</td>
<td>15</td>
<td>40</td>
<td>980</td>
</tr>
<tr>
<td>rhc 300</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comply with the instructions for soldered connections:
- Prepare the surface of the connection of heat exchanger and copper pipe.
  - Clean, de-grease and polish.
  - Remove oxides.
- Fill the inside of the heat exchanger with nitrogen to prevent oxidation.
- Apply flux.
- Protect the heat exchanger from overheating.
  - For example, use a wet cloth to cool the soldering area.
- Use only solder material with a silver portion of 45 – 55%.
- Do not exceed the maximum soldering temperature of 650 °C.
- Do not point the soldering flame in the direction of the heat exchanger.
- During soldering, ensure the fixed position of the copper pipe.

Comply with the instructions for welded connections:
- Use only TIG welding.
- Fill the inside of the heat exchanger with nitrogen to prevent oxidation.
- Protect the heat exchanger from overheating.
  - For example, use a wet cloth to cool the soldering area.
4.2 Connection diagram

The water circuit with the large temperature range is the source of heat and the primary side in the facility system. The secondary side is the heat consumer.

Ensure regulation stability with a “TC” temperature controller and a “TAZ+” temperature limiter. Install the controller immediately downstream of the secondary side outlet.
5 Commissioning, operation and decommissioning

Caution – Device damage from overheating!
• Incorrect opening of the water circuits may overheat the heat exchanger.
  – Open first the secondary side before opening the primary side.

Proceed as follows for commissioning:
1. Fill the facility system and the heat exchanger with water.
   – Simultaneously and slowly open the valves in the supply and return of primary and secondary side until the operating temperature is reached.
2. Vent primary and secondary side.
3. Shut off the primary side.
4. Create the circulation of the water circuit in the secondary side.
   – Use a recirculating pump, for example.
5. Create the circulation of the water circuit in the primary side.

Note!
Avoid re-evaporation and cavitation. The pressure at primary and secondary side must be at least 0.5 bar above the water saturation pressure.

Comply with these instructions when using pumps:
• Use shut-off valves.
• Use pressure relief valves to ensure the permissible operating pressure of the heat exchanger.
• Avoid air being drawn in.
  – This prevents water hammer.
• Start the pumps against the closed shut-off valves.
  – This prevents pressure surges.

Commissioning is competed and the heat exchanger is ready for operation.

Decommissioning:
For an extended standstill time, drain the heat exchanger. This is particularly important for aggressive or bacteria-forming water (bio-fouling, for example).

Proceed as follows:
1. Shut off the primary side.
2. Shut off the secondary side.
3. Shut off the outgoing pipes.

Use the pressure maintenance to prevent vacuum from forming due to the water cooling down.
6  Maintenance

Caution — Property damage from the use of cleaning agents

- Cleaning agent may corrode and damage the materials used in the heat exchanger (e.g., stainless steel, copper or nickel).
  - Comply with the safety instructions and recommendations of the cleaning agent manufacturer.
  - Use chloride-free or low-chloride water with low hardness.

Inspect and clean the unit exterior once per year.
Exterior inspection:
- For damages.
- For leaks.
- Strain-free position in the facility system.

Cleaning:
Purge and clean the heat exchanger. If the water quality causes excessive deposit (due to, e.g., contamination or hardness of the water), purge and clean the unit in shorter intervals.
Proceed as follows:
1. Use a suitable cleaning agent to purge the unit against the direction of flow.
2. Clean the heat exchanger in compliance with the work instruction provided by the manufacturers of the cleaning agents.
3. If required, clean the upstream filters (e.g., dirt trap).
4. Use fresh water to rinse the heat exchanger before re-installation.

Comply with these instructions when using cleaning agents:
- Select the appropriate cleaning agent according to the type of contamination to be removed.
- Ensure the compatibility of the heat exchanger with each cleaning agent.

7  Removal

Proceed as follows:
1. Shut off the primary side.
2. Shut off the secondary side.
3. Wait until the water in the heat exchanger has cooled down.
4. Disconnect the pipe connections of the heat exchanger to the facility system.
5. Drain the heat exchanger.
6. If required, remove the heat exchanger from the facility system vicinity.

The heat exchanger has been removed.
8  Annex

8.1  Reflex Customer Service

Central customer service
Switchboard: Telephone number: +49 (0)2382 7069 - 0
Customer Service extension: +49 (0)2382 7069 - 9505
Fax: +49 (0)2382 7069 - 523
E-mail: service@reflex.de

Technical hotline
For questions about our products
Telephone number: +49 (0)2382 7069-9546
Monday to Friday, 8:00 a.m. – 4:30 p.m.

8.2  Inspection

The Pressure Equipment Directive 97/23/EC is applicable. Comply with the applicable national regulations regarding recurring inspections.

8.3  Warranty

The respective statutory warranty regulations apply.

8.4  Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bio-fouling</td>
<td>Bacterial contamination of heat-transmitting system components due to material content in the used water.</td>
</tr>
<tr>
<td>Cavitation</td>
<td>Formation and dissolution of vapour-filled cavities (vapour bubbles) in fluids.</td>
</tr>
<tr>
<td>Re-evaporation</td>
<td>Water steam from hot and pressurised water caused at a vacuum.</td>
</tr>
</tbody>
</table>
8.5 **Conformity and standards**

<table>
<thead>
<tr>
<th><strong>Declaration of conformity</strong></th>
<th><strong>Design, manufacture, and testing of pressure equipment</strong></th>
</tr>
</thead>
</table>

**Soldered plate heat exchangers: reflex ‘longtherm’**

Universal use in heating, solar, drinking water and cooling water systems

<table>
<thead>
<tr>
<th><strong>Tank information</strong></th>
<th><strong>r ... c ... / ... according to nameplate</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating limits</strong></td>
<td><strong>according to nameplate</strong></td>
</tr>
<tr>
<td><strong>Charging material</strong></td>
<td><strong>according to installation, operating and maintenance manual</strong></td>
</tr>
<tr>
<td><strong>Standards and set of rules</strong></td>
<td><strong>Pressure Equipment Directive 2014/68/EU, ASME VIII</strong></td>
</tr>
<tr>
<td><strong>Pressure equipment</strong></td>
<td><strong>according to Directive 2014/68/EU Art. 4</strong></td>
</tr>
<tr>
<td><strong>Fluid group</strong></td>
<td><strong>1 (according to DGRL, Art. 13)</strong></td>
</tr>
<tr>
<td><strong>Conformity assessment method to module</strong></td>
<td><strong>B + D</strong></td>
</tr>
<tr>
<td><strong>Labelling according to Directive 2014/68/EU</strong></td>
<td><strong>CE 0090</strong></td>
</tr>
<tr>
<td><strong>Certificate No. of the EU design type examination:</strong></td>
<td></td>
</tr>
<tr>
<td>0662/169/03 rhc 15/</td>
<td></td>
</tr>
<tr>
<td>0662/043/02 rhc 40/</td>
<td>0662/044/02 rhc 60/</td>
</tr>
<tr>
<td>0662/045/02 rhc 85/</td>
<td>0662/046/02 rhc 150/</td>
</tr>
<tr>
<td>0662/059/02 rhc 200/</td>
<td>0662/060/02 rhc 300/</td>
</tr>
</tbody>
</table>

**Notified body for the EU design type examination (Module B) and evaluation of the QA system (Module D)**

TÜV Thüringen e. V.
Melchendorfer Straße 64, 99096 Erfurt, Germany

**Register No. of the notified body**

0090

The signatories are authorised to collate the technical documentation and undertakes to provide this documentation in a suitable format, if required by the competent authority.

**Manufacturer**

**Reflex Winkelmann GmbH**

Gersteinstraße 19
D - 59227 Ahlen - Germany
Telephone: +49 (0)2382 7069 - 0
Fax: +49 (0)2382 7069 - 588
E-mail: info@reflex.de

The manufacturer hereby confirms that the design, manufacture and testing of this pressure equipment meets the requirements of Directive 2014/68/EU / ASME VIII.

Norbert Hülsmann
Volker Mauel

Members of the Board of Directors