Industrial X-Ray

Chiller Manual XRCA-3023-WA
3000 Watt Water to Air Chiller
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1. About this manual

This document is the manual for the cooling unit XRCA-3023 WA. It is based on international safety regulations. In your country other regulations may apply.

This operating manual addresses the needs of the user of the unit. Its intention is to allow the safe operation of the unit. Thus, it should be read carefully and be kept accessible for the users of the unit at any time.

All chapters of this operating manual can be read independently and thus can be used for look-up purposes.

1.1. Explanation of symbols and signs

1.1.1. Safety symbols

The safety symbols used in this operating manual are indicated below. The main reason for their use is to point the reader to the safety instruction given in the text field beside.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Warning symbol" /></td>
<td>Warning with respect to general danger or damage to property.</td>
</tr>
<tr>
<td><img src="image" alt="Warning symbol" /></td>
<td>Warning with respect to electrical hazard.</td>
</tr>
</tbody>
</table>

Table 1: Warning signs

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Mandatory action symbol" /></td>
<td>This symbol indicates the requirement of disconnecting from mains.</td>
</tr>
<tr>
<td><img src="image" alt="Mandatory action symbol" /></td>
<td>This symbol indicates the requirement of wearing protective footwear.</td>
</tr>
<tr>
<td><img src="image" alt="Mandatory action symbol" /></td>
<td>This symbol indicates the requirement of wearing protective gloves.</td>
</tr>
<tr>
<td><img src="image" alt="Mandatory action symbol" /></td>
<td>This symbol indicates the requirement of wearing protective eyewear.</td>
</tr>
</tbody>
</table>

Table 2: Mandatory action signs

1.1.2. Warning instructions

In this operating manual concrete warning instructions are given in order to point out unavoidable residual risks when operating the unit. These risks include hazard for

- Human beings
- The unit and other equipment
- The environment

Warning instructions in this operating manual are identified using symbols. The warning instructions are introduced using signal words which express the scale of the hazard.

Always comply with the warning instructions and act cautiously in order to avoid accidents, injuries to persons and damage to property.
### About this manual

<table>
<thead>
<tr>
<th>Warning Symbol</th>
<th>Signal Word</th>
<th>Type and Source of the Hazard</th>
<th>Causing</th>
<th>Measure(s) to Avoid the Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Danger" /></td>
<td>Danger</td>
<td>Reference to immediate danger to human health. Failure to comply with this warning instruction will result in severe irreparable injury and even death.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Warning" /></td>
<td>Warning</td>
<td>Reference to recognizable hazard to human health. Failure to comply with this warning instruction may result in severe irreparable injury and even death.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><img src="image" alt="Caution" /></td>
<td>Caution</td>
<td>Reference to recognizable hazard to human health. Failure to comply with this warning instruction may result in slight to medium injury.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reference to a material hazard. Failure to comply with this warning instruction may result in material damage.</td>
</tr>
</tbody>
</table>

### Structure of the warning instructions

The following information builds the warning instructions:

- Warning symbol
- Signal word
- Type and source of the hazard
- Causing
- Measure(s) to avoid the hazard

**Example:**

<table>
<thead>
<tr>
<th>Warning Symbol</th>
<th>Signal Word</th>
<th>Type and Source of the Hazard</th>
<th>Causing</th>
<th>Measure(s) to Avoid the Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Warning" /></td>
<td>Warning</td>
<td>Risk of burning and/or scalding due to possibly hot coolant. Coolant can reach high temperatures during operation and cause burns or scalding in the case of contact. Check whether the coolant is hot before handling it. If necessary, let it cool down to the ambient temperature, that there is no more risk of burns or scalding.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Important information and tips concerning operation of the unit

- This symbol is used to highlight passages with important information and tips concerning operation of the unit.
1.1.3. Text designations

Text mark-ups

- Text that appears in **bold** refers to emphases and subheadings.

Step-by-step instructions

Step-by-step instructions have the following structure:

Objective for action

Requirement(s)

Tools and material required

Procedure

- Prompt to take action (indicated by a 1)
- Prompt to take action (indicated by a 2)
- (Preliminary) result
- Prompt to take action (indicated by a 3)
- Prompt to take action (indicated by a n)

Result

1.2. Illustrations

Illustrations in this operating manual are provided for general understanding and can be different from the actual version of the unit.

1.3. Terms of warranty

General sale and delivery terms of COMET apply. The buyer accepts these terms, at the latest when signing the contract of purchase.

The particular terms of warranty and duration of warranty of the unit in question can be taken from the contract documents as well as from the order confirmation.

Warranty claims and liability are excluded in case of one of the following situations:

- Use of the unit in an unintended way
- Inaccurate installation, putting into service, operation, repair or maintenance of the unit by people that are not fully authorized
- Use of the unit despite of defect, wrongly implemented or non-functional safety devices or protective gear
- Unauthorized or forbidden modifications by the user concerning the electrical equipment of the unit
- Unauthorized or forbidden modifications by the user concerning the mechanical structure of the unit
- Unauthorized or forbidden modifications by the user concerning the operating parameters
- Use of unauthorized tools
- Use of unauthorized operating supplies
- Exceedance of mandatory maintenance intervals
- Cases of disaster caused by foreign matter influence or act of nature beyond control
Any form of unintended use of the unit and any structural change caused by the user without prior authorization in written form by COMET will lead to the termination of warranty as well the termination of the declaration of conformance and will free COMET from product liability. This concern includes safety devices as well.

In case of authorized changes or when adding optional equipment it is the sole responsibility of the customer to assure the accurate implementation of the safety devices required.

1.4. Contact information

If you have questions with respect to this unit please use the contact information given below. Always communicate the following:

- Your name and address
- Name of contact at your address
- Product data as on identification plate: Type of unit, serial number, article number and year of manufacture

Company contact:

Mail: COMET AG
Herrengasse 10
CH-3175 Flamatt

Internet: http://www.comet-xray.com
E-Mail: info@comet.ch
Phone: +41 31 744 9000
Fax: +41 31 744 9090
2. Safety

This chapter provides an overview of all important safety aspects for optimal protection of personnel as well as safe and trouble-free operation.

Disregarding this operating manual and warning instructions specified therein may result in considerable danger.

2.1. Hints for the safe operation

Conduct inspections on a regular time base. This will ensure that the appropriate measures will actually be carried out.

The unit is operational save. It was built according to the existing state of technology.

Despite this the unit could cause hazards, if it is

- used in a way it was not intended for
- used improperly
- operated under unsuitable conditions

2.1.1. Prevent hazards

Hazards can be prevented by safety-conscious and anticipatory behavior of staff.

Everybody working with the unit should keep the following in mind:

- Make this operating manual available for everybody at the operational location of the unit in a complete and perfectly readable form!
- Use the unit exclusively for what it was intended!
- The unit must be operational and error free. Check the condition of the unit before working with it and within a regular time frame!
- Make sure that nobody can injure themselves by any part of the unit!
- Any disruption or recognizable change concerning the unit should be reported to the person responsible.
- Stick to the accident prevention regulations as well as any regional regulations!
- Use personal protection equipment!

2.1.2. Hints regarding the electrical equipment

When working on electrical installations the following principles should be observed:
• Works on the electrical installations may only be accomplished by qualified electrical staff.
• When connecting electrical equipment to mains regional regulations have to be observed. Be aware of the connection diagram information!
• The unit is powered by electricity. Electrical shock hazard exists, if the electrical installations are defective or the insulation fails during operation.
• When switched-off the unit is not disconnected from mains. This is only the case when the mains plug is pulled.
• Any changes regarding the control elements of the unit can have an influence on the save operation. All changes intended must be authorized by the manufacturer.
• After the implementation of a change the correct operation of the safeguards must be verified.
• No unauthorized changes on the unit are allowed. All intended changes must be authorized by the manufacturer.

2.1.3. Inadmissible operating conditions

Operation of the unit under improper operational conditions is not permitted, since otherwise the operation safety cannot be granted.

When using the unit in a way not compliant with the intended use, hazardous situations may occur. Operation of the unit is not permitted under the following conditions:

• The unit is used for a purpose other than the one it is intended for.
• The unit or parts of it are damaged, the electrical installation is not correct or the insulation is broken.
• Protective or safety equipment is not functional or defect, improperly installed or missing.
• The unit is not working properly.
• The unit was modified without authorization or modified in a way that is not permitted.
• Controlling devices were modified in a way that is not permitted.
• Operational parameters were changed in a way that is not permitted.
• Operation in areas exposed to explosion hazards.
• Operation with cooling media not according to specification.
• Use of unauthorized tools.
• Exceedance of the compulsory maintenance intervals.

NOTE

The manufacturer is not liable for damage occurring when using the unit in a way it was not intended. When using the unit in a way it was not intended for, the manufacturer’s warranty given by COMET will expire.
2.2. Responsibilities of the unit operator

2.2.1. Planning and monitoring the safety measures

It is a matter for the operator of the unit to plan the safety measures and to monitor their implementation.

The operator of the unit has to ensure that all persons involved with the unit have read and understood the operating instructions. He must also train the personnel.

2.2.2. Minimizing the risk of injury

To minimize the risk of injury the following measures have to be taken:

- Work on the unit may be carried out by qualified personnel only.
- The personnel involved with the unit have to be authorized and trained by the operator of the unit.
- The personnel have to be familiar with all safety devices, before starting work on the unit.
- The personnel have to be familiar with all operating elements of the unit, before starting work on the unit.
- The tidiness and cleanliness at the workplace and area immediately surrounding the unit has to be ensured.
- The personnel have to wear protective gear. The required protective gear is specified in this operating manual.
- During operation qualified skilled staff is available for first aid and rescue operations.
- The procedures, competence and responsibility have to be determined. Employees have to practice the procedures to be followed in the event of an incident.
- All warning and information signs on the unit have to be kept in legible condition. If a warning or information sign should be lost or difficult to read, it has to be replaced.

2.3. Personnel requirements

2.3.1. Qualifications

All works on the unit require an in-depth knowledge and skills of the personnel.

All persons working with or on the unit have to fulfill the following requirements:

- They have to be personally reliable and professionally suitable.
- They have been instructed on how to professionally handle the unit.
- They are familiar with the safety devices and how they functions.
- They are familiar with this operating manual and observe all warning instructions present in this operating manual.
- They are familiar with the fundamental regulations on work safety and accident prevention.

Generally, all persons have to meet the following minimum qualification requirements:

- They are specialists in their area and are able to undertake works to the unit themselves.
- They have had sufficient instruction and are able to undertake works to the unit under the instruction and supervision of a qualified specialist.
2.3.2. User groups

This operating manual distinguishes between the following user groups:

<table>
<thead>
<tr>
<th>Personal</th>
<th>Qualifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating person-</td>
<td>Adequate specific training in the following areas:</td>
</tr>
<tr>
<td>nel</td>
<td>• The operation of the unit</td>
</tr>
<tr>
<td></td>
<td>• Operating sequences</td>
</tr>
<tr>
<td></td>
<td>Specific experience in the following areas:</td>
</tr>
<tr>
<td></td>
<td>• Specific competencies and responsibilities, which are essential for the</td>
</tr>
<tr>
<td></td>
<td>work on and with the unit</td>
</tr>
<tr>
<td></td>
<td>• Adequate behavior at an emergency</td>
</tr>
<tr>
<td>Maintenance per-</td>
<td>Deep knowledge in the fields of:</td>
</tr>
<tr>
<td>sonnel</td>
<td>• Mechanical engineering</td>
</tr>
<tr>
<td></td>
<td>• Electrical engineering</td>
</tr>
<tr>
<td></td>
<td>Authorization for performance of the following tasks according to the standards</td>
</tr>
<tr>
<td></td>
<td>of safety technology:</td>
</tr>
<tr>
<td></td>
<td>• Commissioning units</td>
</tr>
<tr>
<td></td>
<td>• Grounding units</td>
</tr>
<tr>
<td></td>
<td>• Designating units</td>
</tr>
<tr>
<td></td>
<td>A sound knowledge of the structure and functionality of unit.</td>
</tr>
</tbody>
</table>

Table 3: User groups

2.3.3. Specialized knowledge

NOTE

Authorized persons

The technical information about the unit settings, maintenance and electrics is directed to the licensed specialists. Unauthorized persons are not allowed to carry out the activities stated therein.

The following activities may be carried out by personnel with specialized knowledge only:

<table>
<thead>
<tr>
<th>Activities</th>
<th>Qualifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working on hydraulic installations</td>
<td>Specialized knowledge and experience in hydraulics</td>
</tr>
<tr>
<td>Working on electrical installations and</td>
<td>Skilled electrician</td>
</tr>
<tr>
<td>equipment</td>
<td></td>
</tr>
<tr>
<td>Working on mechanical installations</td>
<td>Industrial technician or sufficient instructed personnel, which are able to</td>
</tr>
<tr>
<td></td>
<td>undertake works to the unit under the instruction and supervision of an</td>
</tr>
<tr>
<td></td>
<td>industrial technician according to the standards of safety technology</td>
</tr>
</tbody>
</table>

Table 4: Activities and specialized knowledge
2.3.4. Exclusion criteria

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating personnel</td>
</tr>
<tr>
<td>Operating personnel are only allowed to operate the unit. They are neither allowed to open the unit chassis, remove parts, connect or disconnect power or coolant fluids nor to do maintenance.</td>
</tr>
</tbody>
</table>

Persons allowed to operate and to maintain the unit must not be under the influence of intoxicating substances (e.g. alcohol, drugs or medicine).

2.4. Personal protective gear

Wearing the personal protective gear is required when handling the unit to minimize the health hazards.

The following personal protective gear must always be worn when handling the unit:

- **Protective footwear**
  - For the protection against heavy parts falling down and from slipping on slippery surface.

When performing cleaning, maintenance or repair work on the unit, the following specific personal protective gear is required:

- **Protective gloves**
  - To protect the hands from rubbing, abrasions, cuts or more profound injuries, as well as when touching possibly hot coolant.

- **Protective eyewear**
  - To protect the eyes against parts flying around or splashing of coolant.

2.5. Safety and signaling equipment included in the unit

The unit is equipped with the following safety equipment (see Figure 1):

- The maximum pump pressure is limited by a pressure relief valve that returns the coolant stream back into the coolant tank, when the pre-set pressure is exceeded.
- The coolant temperature is monitored by a thermostat. When the coolant temperature exceeds the maximum set point this is indicated by the potential-free safety circuit.
- The circulated coolant amount is monitored by a flow switch that has to be integrated in the potential-free safety circuit of the device that is to be cooled.
- The frost control temperature controller prevents freezing of the coolant fluid (anti-freeze protection).
- The refrigerant circular flow is protected by a high pressure switch (press stat).
- The level of the coolant in the system is monitored by a level guard.

The unit is equipped with the following signals:

- In case of insufficient coolant the regulator will turn off the unit and the warning light „Water level low“ will appear.
- In case the coolant level in the coolant tank is too low, the warning light „Coolant level low“ will appears. The unit will then be turned off and an error signal will be sent via the potential-free safety circuit.
Figure 1: Mounting position of the safety equipment of the unit
(1) Pressure relief valve  (3) Flow switch
(4) Level guard  (5) Temperature controller with display
(6) On/Off switch for the refrigeration circuit  (7) Warning light „Coolant level low“

2.6. Guards
Direct access to hazardous parts or areas of the unit is restricted by the unit cover. The unit cover may only be removed for the purpose of maintenance or repair works and shall be replaced prior to taking the unit back into operation (see “Removing and mounting the unit cover”).

2.7. Caution label
Danger spots on the unit are indicated corresponding to German safety regulation DGUV Vorschrift 9 “Sicherheits- und Gesundheitsschutzkennzeichnung am Arbeitsplatz”

Caution labels on the unit must be easily readable at all times. Illegible caution labels must be exchanged without delay.

Figure 2: Caution labels on the unit
(1) Warning of hazardous electrical voltage  (2) Hint about the use of the operation cap
2.8. In case of accidents

Should you or another person be injured when working with the unit:

- Stay calm.
- Render first aid.
- Call the company first- aider without exception.
- If necessary, call your local emergency number.

First Aid on accidents involving Tetrafluorethan

The unit contains the refrigerant Tetrafluorethan (R134a) in a closed circuit system. If the system is damaged, the cooling fluid can spill and cause hazard including but not limited to the following occurrences:

- Fast vaporizing fluids can lead to frostbite.
- Vapor is heavier than air and can lead to asphyxiation in enclosed, poorly-ventilated or low lying areas.

Ensure to adhere to manufacturer safety regulation when handling spilled refrigerant.

2.9. Environmental issues

And anticipatory behavior of staff avoids environmentally hazardous impacts.

The following principles apply for environmentally conscious behavior:

- Environmentally hazardous substances must not get into the soil or into the drains. They should be kept in appropriate containers.
- Environmentally hazardous substances must be brought to utilization or disposal according to regional regulations.
- When dealing with working fluids always keep aware of the safety data sheet of the corresponding manufacturer.

Refrigerant R134a (Tetrafluorethan)

The refrigerant used in the unit is classified to be slightly dangerous to groundwater and contains fluoridated greenhouse gas.

- Do not release into canalization or waters.
- Do not release into atmosphere.
- Storage only in approved containers.
- Waste disposal only by qualified contractors.

Always adhere to manufacturer safety requirements when handling operating supplies.
3. Product identification

3.1. Unit specifications
The following table provides information about the unit.

| Manufacturer: | Laird Technologies, Průmyslová 497, 462 11 Liberec, Czech Republic |
| Distributor:  | COMET                                                                     |
| Type of product: | 3000 watt water to air chiller                                      |
| Type of unit:   | XRCA-3023-WA                                                              |

3.2. Identification plate
The identification plate is attached to the housing of the unit and contains the following specifications:

- Unit name, e.g. XRCA-3023-WA
- Name and address of the manufacturer
- Name and address of the distributor
- Article number
- Manufacture date
- Serial number
- CE marking
- Electrical specifications
- Type of refrigerant
4. Unit description

4.1. Intended use
The chiller unit XRCA-3023-WA is used for chilling a coolant circuit. The coolant circulates in a secondary circuit between the unit and the device to be cooled. The coolant itself is cooled down by an air ventilated refrigerated primary circuit. The maximum cooling capacity depends on the coolant outlet temperature and the ambient air temperature (see "Technical specifications").

The unit is exclusively intended for use in industrial and commercial environments. The intended use also includes the observance and following of all hints given in this operating manual, as well as all requirements for setup, initial operation and maintenance at the required time intervals and the safety regulations. Any use beyond these limits is not regarded as intended use. Any use other than the intended use is explicitly prohibited.

4.2. Non-conformity with the intended use
Operation of the unit under improper operational conditions is not permitted, since otherwise the operation safety cannot be granted. When using the unit in a way not compliant with the intended use, hazardous situations may occur.

Operation of the unit is not permitted under the following conditions:

- The unit is used for a purpose other than the one it is intended for.
- The unit or parts of it are damaged, the electrical installation is not correct or the insulation is broken.
- Protective or safety equipment is not functional or defect, improperly installed or missing.
- The unit is not working properly.
- The unit was modified without authorization or modified in a way that is not permitted.
- Controlling devices were modified in a way that is not permitted.
- Operational parameters were changed in a way that is not permitted.
- Operation in areas exposed to explosion hazards.
- Operation with cooling media not according to specification.
- Use of unauthorized tools.
- Exceedance of the compulsory maintenance intervals.

NOTE

4.3. Predictable errors during operation
The unit may not be used to cool a different coolant than detailed in its technical specifications, see "Technical specifications". Furthermore the unit may only be operated in its defined temperature range.
4.4. Unit components

The unit mainly consists of the following subassemblies. Additional unit information can be found in the diagrams contained in the addendum.

Figure 3: Subassemblies
(1) Refrigeration circuit (2) Cooling circuit (3) Casing
(4) Temperature controller with display

4.4.1. Refrigeration circuit (primary circuit)

The refrigeration circuit transfers heat from the cooling circuit to the ambient atmosphere. The refrigerant R134a removes heat from the coolant of the secondary circuit in the evaporator, which is built as a plate heat exchanger following the principal of opposing flows. After evaporation a compressor drives the refrigerant to the liquefier. The liquefier assembly is equipped with a heat exchanger and a downstream fan. The extracted heat is transferred to the surrounding air driven by the fan through the heat exchanger.

4.4.2. Cooling circuit (secondary circuit)

In the cooling circuit the coolant is moved by the pump via the supply line to the target device and back through the return flow to the plate heat exchanger. The heat is transferred to the evaporating refrigerant and the coolant is pumped into a storage tank.

A bypass circuit prevents the pressure from exceeding the maximum allowed values. The temperature of the cooling liquid is monitored by an electric thermostat. A frost guard thermostat prevents a cooling down of the coolant in the supply line below the minimal allowed temperature limit. The throughput of the coolant is monitored by a flow switch.

4.4.3. Temperature controller with display

The temperature controller has a numeric display for visualization of set and actual temperature values as well as 3 LEDs to indicate operation modes. The temperature values can be changed via three control keys.

Figure 4: Temperature controller with display
Unit description

<table>
<thead>
<tr>
<th>1</th>
<th>LED 1</th>
<th>2</th>
<th>LED 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>LED 3</td>
<td>4</td>
<td>Control key UP</td>
</tr>
<tr>
<td>5</td>
<td>Control key DOWN</td>
<td>6</td>
<td>Control key SET</td>
</tr>
<tr>
<td>7</td>
<td>Temperature display in °C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Changes to system settings are made through the control panel. During normal operation the display will show the current temperature of the secondary cooling circuit. If changes are made, the current parameter will be presented in the display.

<table>
<thead>
<tr>
<th>LED 1</th>
<th>On: chilling active</th>
<th>Off: chilling circuit in heat-up mode</th>
</tr>
</thead>
<tbody>
<tr>
<td>LED 2</td>
<td>On: temperature limit exceeded</td>
<td>Off: temperature range normal</td>
</tr>
<tr>
<td>LED 3</td>
<td>On: unit operational, frost guard did not trigger</td>
<td>Off: frost guard triggered, unit cannot be activated</td>
</tr>
</tbody>
</table>

Key DOWN | Lowers the value of the selected parameter incrementally
Key UP | Raises the value of the selected parameter incrementally
Key SET | Selects a parameter

Table 5: Functionality of the control keys and LEDs on the temperature controller

4.5. Technical specifications

**Dimensions, weight and color**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length:</td>
<td>590 mm (see detailed dimension drawings)</td>
</tr>
<tr>
<td>Width:</td>
<td>612 mm (see detailed dimension drawings)</td>
</tr>
<tr>
<td>Height:</td>
<td>925 mm (see detailed dimension drawings)</td>
</tr>
<tr>
<td>Weight (without coolant):</td>
<td>115 kg</td>
</tr>
<tr>
<td>Weight (with coolant):</td>
<td>129 kg</td>
</tr>
<tr>
<td>Casing color:</td>
<td>Grey aluminum (RAL 9007)</td>
</tr>
</tbody>
</table>

**Refrigerant circuit**

| Refrigerant: | R 134a |
| Refrigerant capacity: | 2,2 kg |

**Coolant circuit**
Coolant: Water or water-glycol mixture (ration 1:1)

Coolant capacity: ca. 14 liters

**Performance data**

Cooling capacity: 3000 W at $\Delta T_1 = 15$ K temperature difference between the coolant outlet temperature and the ambient air temperature

Throughput: > 4,4 l/min at 400 kPa (4.0 bars)

Mains voltage: 230 V AC + 10% / - 15%, 50/60 Hz (can be switched to 208 V AC, 50/60 Hz)

Current consumption: < 9,3 A

Operating noise: ≤ 65 dB (A) measured at a distance of 1 m

Air flow at 50Hz (60Hz): 1700 m³/h (2200 m³/h)

Protection class: IP21

**Environment specifications**

Operation above sea level: Up to 4000 meters above sea level

Operating temperature: +5°C up to +40°C

Storage temperature: -25°C up to +70°C (with antifreeze)

Rel. humidity: 20% up to 90% (non-condensing)

**Settings**

Maximum pressure: ≤ 670 kPa (6.7 bars)

Coolant outlet temperature (T1): 25°C

Anti-freeze guard (T2): 5°C

Max. temperature (T3): 35°C

Flow switch open / close: < 4.0 l/min / > 4.8 l/min

5. **Transport, packing and storage**

5.1. **Safety**
Transport, packing and storage

WARNING

Damage due to improper transportation!
Injuries to persons and significant damage to property can occur in the case of improper transportation.

→ When unloading the packed unit on delivery, as well as in-house transport, proceed very carefully and obey the symbols and instructions on the packaging.
→ Remove the packing material only immediately before installing the unit.

NOTE

Risk of damage through improper transportation!
The mounting suspensions of different components inside the unit are not secured with transportation locks. In case of improper transportation these can be damaged without repair and would need to be replaced.

→ Transport the unit upright.
→ Unit is not to be tilted or subjected to mechanical impact.

5.2. Checking the delivery condition

Check the delivery immediately on receipt for possible transport damage and completeness. If any transport damage is noticed, proceed as follows:

- Refuse the delivery or accept it with reservation.
- Note extent of damage on the transport documents or on the delivery note.
- Inform the manufacturer immediately of any damage incurred during transport.
5.3. Symbols on the packaging

The following symbols are attached to the packaging:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Meaning</th>
</tr>
</thead>
</table>
| ![Top symbol](image) | **Top**  
The arrows mark the top of the package.  
The package has to be stored and transported in such a way that the arrows always point upwards. |
| ![Fragile symbol](image) | **Fragile, Handle with care**  
This symbol marks fragile, easily breakable goods.  
Goods marked with this symbol have to be handled carefully and should never be rolled over or tied tightly. |
| ![Keep dry symbol](image) | **Keep dry**  
This symbol marks goods which are sensitive to moisture/humidity.  
Goods marked with this symbol have to be protected from overly high air humidity levels. |

5.4. Packing

**NOTE**

Hazard for environment due to improper disposal!

Packing materials are valuable raw materials and can continue to be used in many cases or sensibly reconditioned and recycled.

→ Dispose of packing materials environmentally.

→ Follow the locally valid waste disposal regulations. If necessary employ a special waste disposal company to dispose of packing material.

The unit has been packed according to the anticipated transportation conditions (e.g. packed in sealed plastic or cardboard box on a transport pallet). The packing has the function to protect the unit against damage and corrosion until it is finally installed. The packing material should only be removed just before the installation takes place.

COMET advises to keep the transport pallet (if provided) for later transportation of the unit.

Dispose packing material in accordance with environment protection requirements.

5.5. Manual handling

**WARNING**

Danger due to lifting and carrying heavy loads!

Manual handling of the loads (lifting, pushing, and carrying) has to be avoided.

→ Unit weight: see "Technical specifications"

→ Use only suitable means of transport (e.g. industrial truck, lift truck or sack truck).
5.6. Handling with industrial truck

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
</table>
| Danger of injury due to tipping or falling loads!  
Bruises. Bone fracture.  
When Handling with industrial truck, observe the following basic rules:  
→ Wear the personal protective gear (e.g. protective footwear, protective gloves).  
→ Do not walk or stand under a suspended load.  
→ Use only suitable means of transport (e.g. industrial truck or lift truck).  
→ Use only industrial trucks with sufficient capacity for loading (unit weight: see "Technical specifications").  
→ Secure the unit so that it cannot tip or fall. |

For in-house transport lift the unit and transport it by means of suitable industrial truck or lift truck.

5.7. Transportation on rollers

The unit is equipped with lockable rollers. For transportation of the unit over short distances the unit can be moved on its rollers.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
</table>
| Damage to property due to tipping of the unit!  
The center of gravity of the unit is relatively high. When rollers get blocked by obstacles, there is a risk the unit tips over.  
→ Slowly and carefully move the unit over flat surfaces.  
→ Keep possible obstacles out of the work area. |

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
</table>
| Damage to property due to unintended rolling of the unit!  
→ Place the unit on a level surface.  
→ Lock the breaks of the rollers. |
5.8. Storing the unit

These storage conditions apply to the following cases:

- To new units.
- To units that are already in operation and were prepared for a temporary placing out of operation, see "Temporary placing out of operation".

Store the units under the following conditions:

- Indoors.
- Dry.
- Dust-free.
- Low vibration.
- Protected against direct sunlight.
- Protected against any aggressive medium.
- Storage temperature and relative humidity: see "Technical specifications".
- In the case of storing the units for longer than 3 months, the general condition of all parts and the packing have to be checked regularly.
- The packaging has only to be removed just before installation takes place.
- Protection caps for the coolant inlet and coolant outlet connections have only to be removed just before installation takes place.
- In order to store the units for more than 6 months, please consult COMET.

5.9. Preparing the unit for the further transport

**DANGER**

**Electrical danger!**

Work on electrical installations may be carried out by trained and authorized electricians only.

- Switch off the unit before starting your work.
- Disconnect the unit from mains by pulling the mains plug.
- Secure the unit against being switched on again.
- Verify that the unit is dead.
- Carry out earthing and short circuiting.
- Keep unauthorized persons away from the working area.

**NOTE**

**Risk of damage due to improper transportation!**

A coolant that has not been drained or a packaging with inappropriate dimensions may cause damage during transport.

- Drain the coolant before transporting the unit, see "Draining the coolant".
- Use proper packaging.
Transporting the unit (after use)

Requirements

- Cooling operation finished.
- Unit switched off.
- Unit and coolant cooled down to the ambient temperature.
- Coolant hoses disconnected from the unit, see "Disconnecting the coolant hoses".
- Coolant drained, see "Draining the coolant".
- Unit cover removed, see "Removing and mounting the unit cover".

Tools and material required

- Slot screwdriver

Procedure

- Dismount the vent plug.
- Mount the transport plug using the slot screwdriver.
- Mount the unit cover, see "Removing and mounting the unit cover".
- Pack the unit according to the transport conditions that can be expected.

COMET advises to use original packaging, if available, or an equivalent packaging.
- Mark the packaging with appropriate symbols; see "Symbols on the packaging".

The unit can now be transported.
6. Installation and commissioning

6.1. Requirements concerning the installation location

6.1.1. Installation location

- The location must be even.
- When choosing the installation location the following must be kept in mind: the flow of the cooling air must not be restricted, coolant inlet and coolant outlet connections must be easily accessible and all hoses must be installed without sharp bends.

6.1.2. Environmental conditions

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of damage through unsuitable environmental conditions!</td>
</tr>
<tr>
<td>Damage to unit and corrosion damage may result and are not covered by manufacturer’s liability.</td>
</tr>
<tr>
<td>→ The unit is only authorized for use in indoor environments.</td>
</tr>
<tr>
<td>→ The unit must not be stored or operated in aggressive, humid environments.</td>
</tr>
<tr>
<td>→ The unit must not be stored or operated outdoor.</td>
</tr>
</tbody>
</table>

Environmental conditions: see "Technical specifications"

6.1.3. Infrastructure

The following infrastructure is required for connecting the unit:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Rated value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating voltage</td>
<td>230 VAC + 10% / - 15%, 50/60 Hz</td>
</tr>
</tbody>
</table>

6.1.4. Placing the unit

Place the unit in a way that air intake and air discharge are not obstructed. Otherwise the cooling capacity may be restricted. The clearance with the wall of the unit is shown in the figure 5.

Figure 5: Required clearance with the wall of the unit
(1) Ventilation grids
6.2. Using the unit for the first time

NOTE
Risk of damage to the unit due to temperature fluctuations!
In case the unit is stored outside the operating temperature for a longer period of time, let the unit rest at the installation location so long, until it has reached ambient temperature. Only then can the unit be put into operation.

Procedure
- Connect the coolant hoses, see "Connecting the coolant hoses"
- If necessary, add the coolant, see "Adding coolant"
- Connect the unit electrically; see "Connecting the unit electrically"

The unit can now be put into operation, see "Putting the unit into operation"

6.3. Connecting the unit electrically

DANGER
Electrical danger!
Work on electrical installations may be carried out by trained and authorized electricians only.
→ Switch off the unit before starting your work.
→ Disconnect the unit from mains by pulling the mains plug.
→ Secure the unit against being switched on again.
→ Verify that the unit is dead.
→ Carry out earthing and short circuiting.
→ Keep unauthorized persons away from the working area.

NOTE
Risk of damage through improper connections!
Improper integration of the unit into the safety circuit of the device to be cooled will lead to the inoperativeness of the safety equipment included in the unit.
→ Incorporate all required connections according to the wiring diagram shown in the addendum.
→ Ensure that all connected safety equipment is properly functioning.
→ All tasks should be carried out only by expert staff.

NOTE
The electrical connection as well as the integration into the safety circuit of the device to be cooled are the customer’s responsibility and must be accomplished by expert staff.
Information required can be taken from the technical specifications and the wiring diagram available in the addendum.
Connecting the unit electrically

Requirements

✓ Coolant hoses connected, see "Connecting the coolant hoses".
✓ Coolant added, see "Adding coolant".
✓ Unit cover removed, see "Removing and mounting the unit cover".

Procedure

- Connect the unit to mains by inserting the mains plug or making a mains connection as required by the particular periphery.

The unit is now connected electrically.

6.4. Putting the unit into operation

NOTE

Danger of malfunction caused by faulty connections during initial operation!
Before switching on the unit make sure that:

→ All safety equipment of the unit is implemented and functional.
→ All connections were properly made.
→ Nobody is endangered by the start-up of the unit.

NOTE

Lack of coolant may impair cooling capacity and destroy the pump!

→ Only operate the unit with correct coolant level.
→ Check the coolant level regularly.

Starting up the unit

Requirements

✓ Coolant hoses connected, see "Connecting the coolant hoses".
✓ Coolant added, see "Adding coolant".
✓ Unit connected electrically, see "Connecting the unit electrically".
✓ Unit cover removed, see "Removing and mounting the unit cover".

Procedure

- Start the unit using the power button.
- Let the unit run for approximately 10 minutes with coolant filler plug mounted.
- Switch off the unit using the power button.
- Dismount the coolant filler plug.
- Check coolant level and top up, if necessary, see "Adding coolant".
- Mount the coolant filler plug.
- Mount the unit cover, see "Removing and mounting the unit cover".
- Restart the unit.
- Check whether the operating specifications are met, see "Technical specifications".

The unit is operational.
7. Controlling the unit

The unit is controlled by using the controls of the device that is to be cooled. All alarm and error signaling is only indicated on the control panel of the device that is to be cooled. To show the status of the unit multiple LEDs are available directly at the unit. Alert and error messages are shown at the display of the unit and, if available, at the device that is to be cooled.

7.1. Switching on the unit

Switching on the unit

Requirements

✓ The unit is ready to be switched on.

Procedure

• Switch on the unit about 1 minute prior to operation of the device to be cooled.
• Check whether the operating specifications are met, see "Technical specifications".

The unit has been switched on.

7.2. Switching off the unit

Switching off the unit

Requirements

✓ Cooling operation finished.

Procedure

• Switch of the unit using the power button.
• Close all valves that may exist in the extension of the hoses running to and from the unit.

The unit has been switched off.

7.3. Settings

NOTE

The monitoring units are set according to technical specifications and sealed. Any modifications to these settings lie in the sole responsibility of the customer and must only be carried out by expert staff.

7.3.1. Flow switch

NOTE

The adjusting of the flow switch should not be made without the help of proper measuring equipment, as the switching point must be adjusted in a controlled way. Otherwise the function of the safety circuit might not be reliable and, as a result, the device to be cooled might get damaged.

The flow switch is equipped with a closing contact. The flow switch opens when the flow falls below an adjusted quantity. The set switch-off threshold: see "Technical specifications"
Controlling the unit

7.3.1. Adjusting the switch contact

Procedure

- Loosen the seal and the set screw.
- Push the switching head into the flow direction to adjust the switch contact at a higher flow.
- Push the switching head against the flow direction to adjust the switch contact at a lower flow.
- Tighten the set screw.

The switch contact is now adjusted.

7.3.2. Pressure relief valve

The pressure relief valve is set by the manufacturer to a maximum pressure (factory setting: see "Technical specifications"). If any modification to this setting should be required, please contact the COMET service department to receive a briefing.

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The maximum pressure, which is reached by the device to be cooled, is affected by the length of the coolant hoses.</td>
</tr>
</tbody>
</table>

Setting the maximum pressure

Tools and material required

- Slot screwdriver (size 5)

Procedure

- Turn the screw clockwise by using the slot screwdriver (size 5) to increase the maximum pressure.
- Turn the screw counterclockwise by using the slot screwdriver (size 5) to decrease the maximum pressure.
- Check the maximum pressure again and repeat the setting, if necessary.

The maximum pressure is now set.

7.3.3. Temperature controller

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The temperature controller is set according to the customer specifications. The settings should not be changed. Should a change to these settings become necessary, they have to be carried out by expert staff.</td>
</tr>
</tbody>
</table>
7.3.3.1. Setting the coolant outlet temperature (T1)

**NOTE**

The hysteresis value of T1 is set as factory default to symmetrical 1°K. The value itself is stored in the internal parameter “P2” of the temperature controller.

### Setting the coolant outlet temperature (T1)

**Procedure**

1. Press the SET key and hold it during the adjustment.
   
   *The current temperature setting (factory default value: 12 °C) is displayed. Set-up mode is activated.*

2. Use the keys ▲ (UP) and ▼ (DOWN) to set the desired value.

3. Release keys ▲ (UP) and ▼ (DOWN).

4. Release SET key.
   
   *Set-up mode is now disabled. The new nominal value of the water supply is displayed for a second.*

*The coolant outlet temperature is now set.*

7.3.3.2. Setting the anti-freeze guard (T2)

**NOTE**

By default the nominal value of the anti-freeze temperature is set to 5°C by factory. It is stored in the internal parameter „P30“ of the temperature controller.

### Setting the anti-freeze guard (T2)

**Procedure**

1. Press the keys ▲ (UP) and ▼ (DOWN) simultaneously and hold for 4 seconds.
   
   *The display shows „P1“.*

2. Use the key ▲ (UP) to select parameter „P30“.

3. Press the SET key and hold it during the adjustment.
   
   *The display shows the current value for the anti-freeze (T2). Set-up mode is activated.*

4. Use the keys ▲ (UP) and ▼ (DOWN) to set the desired value.

5. Release keys ▲ (UP) and ▼ (DOWN).

6. Release SET key. Set-up mode is now disabled. The display shows „P30“.

7. Press the keys ▲ (UP) and ▼ (DOWN) simultaneously and hold for 4 seconds to return to normal operation mode.

*If no input is entered, the temperature controller will automatically return to normal operation mode after 45 seconds.*

*The anti-freeze value for T2 is now set.*
7.3.3.3. Setting the temperature guard (T3)

**NOTE**

The temperature T3 for the control of the „Temperature MAX“ warning light is stored in the internal parameter „P1“ of the temperature controller.

A hysteresis represented by a symmetrical temperature value of ± 2.5 K around parameter “P1” has been set between flash-up of the alarm at exceeding of maximum temperature and ceasing of the alarm.

Example:
- Value for “Temperature Max” is set to 32.5°C.
- Warning signal ON is triggered at 35.0 °C.
- Warning signal OFF is triggered at 30.0 °C.

**Setting the temperature guard (T3)**

**Procedure**

- Press the keys ▲ (UP) and ▼ (DOWN) simultaneously and hold for 4 seconds
  The display shows „P1“.
- Press the SET key and hold it during adjustment.
  Set-up mode is now activated and the current value of P1 is displayed.
- Set the desired value of maximum temperature (trigger value of the temperature controller) with the keys ▲ (UP) and ▼ (DOWN) (the trigger point is determined by the hysteresis).
- Release keys ▲ (UP) and ▼ (DOWN).
- Release SET key.
  Set-up mode is now disabled. The display shows „P1“.
- Press the keys ▲ (UP) and ▼ (DOWN) simultaneously and hold for 4 seconds to return to normal operation mode.
- Tasten ▲ (UUF) und ▼ (AB) gleichzeitig für 4 Sekunden drücken, um in den Betriebsmodus zurückzukehren.

If no input is entered, the temperature controller will automatically return to normal operation mode after 45 seconds.

*The new value for the temperature guard (T3) is now set.*
8. Disruptions

8.1. Safety
Adhere to the safety regulations detailed in chapter “Safety”.
In the event of fault diagnostics follow the guidelines detailed below:

- Only sufficiently qualified personnel may perform maintenance on the unit.
- Do not attempt to repair the refrigeration circuit.
- If you cannot determine the error, please contact COMET services.

8.2. Disruption in operation
The most common reason for disruption in operation of the unit is improper maintenance. Maintenance should be carried out regularly according to the maintenance intervals defined in chapter "Maintenance and cleaning", see "Maintenance and cleaning".
In case of disruption start with checking the following:

- Coolant polluted?
- Low coolant contents because of leakage, evaporation or an extended cooling circuit with long hoses?
- Heat exchanger (condenser) polluted?
- Fan polluted or blocked?
- Filter strainer in a closed hydraulic circuit polluted or blocked?

More help can be found in the following paragraph.
In case you do not succeed in identifying the problem cause by means of this manual, please contact the service department of COMET.

8.2.1. Troubleshooting
For trouble shooting you may rely on the following:

- Alarm signaling within the safety circuit of the unit to be cooled
- Wiring diagram
- Flow chart
- Trouble shooting table given below

Fault table

<table>
<thead>
<tr>
<th>Fault</th>
<th>Possible cause</th>
<th>Corrective measures</th>
<th>Clearance by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit does not start</td>
<td>Power not applied. Electrical connection not correct or no mains connection</td>
<td>Check power supply and ensure proper voltage in the line. Check connection, insert mains plug.</td>
<td>Operator</td>
</tr>
<tr>
<td></td>
<td>Coolant level too low. Red warning lamp shows a lack of coolant</td>
<td>Check coolant level and top up, if necessary, see &quot;Adding coolant&quot;.</td>
<td>Operator</td>
</tr>
<tr>
<td>Disruptions</td>
<td>Solution</td>
<td>Responsible Party</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------</td>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td><strong>Main switch not turned on</strong></td>
<td>Turn main switch on.</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td><strong>Unit running but cooling capacity is not available or too low</strong></td>
<td><strong>Coolant hoses buckled or pitched</strong> Install the hoses with a larger radius in order to avoid sharp bends.</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td><strong>Unit not placed properly</strong></td>
<td>Required clearance with the wall of the unit see &quot;Placing the unit&quot;.</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td><strong>Heat exchanger (condenser) polluted</strong></td>
<td>Clean heat exchanger (condenser), see &quot;Cleaning the heat exchanger&quot;.</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td><strong>Coolant level too low. Red warning lamp shows a lack of coolant</strong></td>
<td>Check coolant level and top up, if necessary, see &quot;Adding coolant&quot;.</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td><strong>Coolant hoses not connected</strong></td>
<td>Connect the coolant hoses, see &quot;Connecting the coolant hoses&quot;.</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td><strong>Filter strainer dirty</strong></td>
<td>Clean filter strainer, see &quot;Cleaning the filter strainer&quot;.</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td><strong>No flow in cooling circuit</strong></td>
<td>Flow is signaled potential-free by the safety equipment of the unit and can be indicated by the controls of the device to be cooled.</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td><strong>Fan does not turn</strong></td>
<td>Check, if fan is mechanically blocked.</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td><strong>Fan blades damaged</strong></td>
<td>Replace damaged fan</td>
<td>Skilled employee</td>
<td></td>
</tr>
<tr>
<td><strong>Ambient air temperature too high</strong></td>
<td>Check specifications, see “Technical specifications”.</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td><strong>Refrigeration circuit not working properly</strong></td>
<td>Press reset on the press stat. If compressor start can be heard, there is an error in the refrigeration circuit. The unit must be returned for factory maintenance.</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td><strong>Noise</strong></td>
<td><strong>Filter strainer dirty</strong> Clean filter strainer, see &quot;Cleaning the filter strainer&quot;.</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td><strong>Heat exchanger (condenser) polluted</strong></td>
<td>Clean heat exchanger (condenser), see &quot;Cleaning the heat exchanger&quot;.</td>
<td>Operator</td>
<td></td>
</tr>
<tr>
<td><strong>Cooling circuit blocked</strong></td>
<td>Ensure that cooling circuit is not blocked.</td>
<td>Operator</td>
<td></td>
</tr>
</tbody>
</table>

*Table 6: Troubleshooting*
9. Maintenance and cleaning

Diligent maintenance is the prime factor for assuring an error-free and efficient operation of the unit. All the maintenance tasks contained in this chapter have to be performed according to the maintenance intervals.

9.1. Safety

Working on the electrical equipment

<table>
<thead>
<tr>
<th><strong>DANGER</strong></th>
</tr>
</thead>
</table>
| **Electrical danger!**  
Work on electrical installations may be carried out by trained and authorized electricians only.  
→ Switch off the unit before starting your work.  
→ Disconnect the unit from mains by pulling the mains plug.  
→ Secure the unit against being switched on again.  
→ Verify that the unit is dead.  
→ Carry out earthing and short circuiting.  
→ Keep unauthorized persons away from the working area. |

When working on electrical installations the following principles should be observed:

- Works on the electrical installations may only be accomplished by qualified electrical staff.
- When connecting electrical equipment to mains regional regulations have to be observed. Be aware of the connection diagram information!
- The unit is powered by electricity. Electrical shock hazard exists, if the electrical installations are defective or the insulation fails during operation.
- When switched-off the unit is not disconnected from mains. This is only the case when the mains plug is pulled.
- Any changes regarding the control elements of the unit can have an influence on the save operation. All changes intended must be authorized by the manufacturer.
- After the implementation of a change the correct operation of the safeguards must be verified.
- No unauthorized changes on the unit are allowed. All intended changes must be authorized by the manufacturer.
Improper maintenance

**WARNING**

Danger of injury due to improperly performed maintenance.
Improper maintenance can lead to personal injury or material damage.

→ Disconnect the unit from all sources of power during maintenance work.
→ Ensure the sufficient working area at the beginning of the maintenance work.
→ Provide all components and tools required for maintenance work.
→ Keep the working area clean and tidy. Loose components and tools, which are lying on each other or lying around, are sources of accidents.
→ Check all components for soiling and damage. Do not use damaged or incorrect components.
→ Handle the components with care, in order to avoid damage.
→ Assemble components properly. Comply with specified screw tightening torques.
→ Secure components, in order to prevent them from falling or tipping over.
→ Only perform maintenance work using conventional tools. Improper or damaged tools can result in personal injury.

Handling with coolant

**WARNING**

Risk of burning and/or scalding due to possibly hot coolant.
Coolant can reach high temperatures during operation and cause burns or scalding in the case of contact.

→ Check whether the coolant is hot before handling it. If necessary, let it cool down to the ambient temperature, that there is no more risk of burns or scalding.

**CAUTION**

Danger of slipping or endangering the environment due to spilled coolant.
Spilled coolant can cause slipping and endanger the environment.

→ Do not spill coolant.
→ Immediately remove the spilled coolant with an appropriate bonding agent.
→ Dispose the bonding agent and coolant mixture in accordance with regulations.

**NOTE**

Testing and replacing coolant hoses.
Coolant hoses can become brittle through age and have to be checked at regular intervals.
→ Observe the specifications of the coolant hoses manufacturer.
Environmental issues

NOTE

Danger to the environment due to improper handling!
Environmentally conscious and anticipatory behavior of staff avoids environmentally hazardous impacts.

The following principles apply for environmentally conscious behavior:

→ Environmentally hazardous substances must not get into the soil or into the drains. They should be kept in appropriate containers.
→ Environmentally hazardous substances must be brought to utilization or disposal according to regional regulations.
→ When dealing with working fluids always keep aware of the safety data sheet of the corresponding manufacturer.

Personnel

Unless otherwise noted, all maintenance tasks described in this chapter can be performed by the operator of the unit.

Other maintenance tasks have to be performed by specially trained qualified personnel. This is specially noted in the description of the single maintenance task.

Personal protective gear

The following personal protective gear for all maintenance work has to be worn:

- Protective footwear
- Protective gloves
- Protective eyewear

9.2. Maintenance schedule

The maintenance tasks necessary to ensure proper operation of the unit are described in the maintenance schedule.

The maintenance intervals are as follows:

- regularly
- every 3 months
- every 6 months

If increased wear of single components or component groups has been determined during regular inspections, the operator of the unit has to reduce the required maintenance intervals on the basis of the actual signs of wear. Deviations from normal operation of the unit lead to the assumption that the functions are impaired. These then have to be subjected to an inspection by specialized staff.

Maintenance table

<table>
<thead>
<tr>
<th>Interval</th>
<th>Activities to be carried out</th>
<th>Criteria</th>
<th>Personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regularly</td>
<td>Clean heat exchanger, see &quot;Cleaning the heat exchanger&quot;.</td>
<td>Plate fins and ventilation grids polluted</td>
<td>Skilled employee</td>
</tr>
<tr>
<td></td>
<td>Check the coolant level and replenish it, if necessary, see &quot;Adding coolant&quot;.</td>
<td>Coolant level well above mesh</td>
<td>Operating personnel</td>
</tr>
</tbody>
</table>
### Maintenance and cleaning

<table>
<thead>
<tr>
<th></th>
<th>Inspect coolant hoses, connections and pipes for cracks and for leakages (visual inspection)</th>
<th>Coolant hoses, pipes and connections are leaking</th>
<th>Operating personnel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inspect the coolant quality (visual inspection)</td>
<td>Turbidity, airborne particles</td>
<td>Operating personnel</td>
<td></td>
</tr>
<tr>
<td>Every 3 months</td>
<td>Clean or replace the filter strainer, see &quot;Cleaning the filter strainer&quot;.</td>
<td>Filter strainer damaged or dirty</td>
<td>Skilled employee</td>
</tr>
</tbody>
</table>

*Table 7: Maintenance*

### 9.3. Preparing the unit for maintenance

All necessary safety measures have to be taken to prevent accidents when carrying out the maintenance. The following preparations have to be made:

- Terminate the cooling operation.
- Let the unit and its coolant cool down to the ambient temperature.
- Switch off the unit.
- Disconnect the unit from mains by pulling the mains plug.
- Secure the unit against being switched on again.
- Verify that the unit is disconnected.
- Carry out earthing and short circuiting.
- Keep unauthorized persons away from the working area.
- Place the unit on a level surface.

### 9.4. Disconnecting the coolant hoses

The coolant hoses are connected to the unit by means of couplings. Coolant inlet and coolant outlet are labeled with respective symbols.

*Figure 8: Labeling of coolant inlet and coolant outlet*

**Disconnecting the coolant hoses**

**Requirements**

- Unit prepared for maintenance, see "Preparing the unit for maintenance".
- Coolant cooled down to the ambient temperature.

**Tools and material required**
Maintenance and cleaning

- Absorbent cloth
- Bonding agent
- Protection caps

Procedure

- Release coupling nipples from the coupling sockets.
- Secure the coolant inlet and coolant outlet connections with protection caps against soiling.

The coolant hoses are now disconnected from the unit.

9.5. Connecting the coolant hoses

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
</table>
| Risk of damage by using improper or faulty coolant hoses! This may lead to damage to persons, damage to property or corrosion damage.
  → When choosing coolant hoses pay attention to sufficient burst strength and compatibility with coolant.
  → Only use coolant hoses without any signs of damage.
  → In case water is being used as coolant, ensure that non-transparent hoses are used to prevent algae growth in the water. Otherwise appropriate additives have to be used. |

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
</table>
| When connecting the coolant hoses pay attention to flow direction. Follow the documentation released by the manufacturer of the unit to be cooled.

Transparent coolant hoses stimulate algae growth that may increase the error-proneness of the components built into the unit. Thus, only use non-transparent coolant hoses. |

The coolant hoses are connected to the unit by means of couplings. Coolant inlet and coolant outlet are labeled with respective symbols.

![Figure 9: Labeling of coolant inlet and coolant outlet](image)

Connecting the coolant hoses

Requirements

- Unit prepared for maintenance, see "Preparing the unit for maintenance".

Procedure

- Remove the protection caps from the coolant inlet and coolant outlet connections of the unit.
• Connect an appropriate coolant hose to coolant inlet and coolant outlet respectively.
• Connect the coolant hoses to the corresponding connections of the unit to be cooled.

_The coolant hoses are now connected to the unit._

### 9.6. Draining the coolant

**Draining the coolant**

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
</table>
| **Damage of the pump!**  
When the coolant level in the coolant tank is too low and, if it is allowed to run the pump dry, the pump can be damaged or destroyed.  
→ Avoid dry running of the pump in order not to damage the pump. |

**Requirements**

✓ Unit prepared for maintenance, see "Preparing the unit for maintenance".
✓ Coolant hoses disconnected from the unit, see "Disconnecting the coolant hoses".
✓ Coolant cooled down to the ambient temperature.

**Tools and material required**

– Collection container
– Filling funnel
– Absorbent cloth
– Bonding agent

**Procedure**

• Connect the hose nipple to the coolant outlet.
• Place a suitable container below the coolant outlet to collect the coolant.
• Switch on the unit using the main switch in order to pump the coolant from the coolant tank.
• Drain the coolant into the container placed below.
• Immediately switch off the unit using the main switch.
• Disconnect the unit from mains by pulling the mains plug.

_The coolant is now drained._

### 9.7. Adding coolant

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
</table>
| **NOTE**  
When operating the unit make sure only to use the vent plug. This plug allows the pressure equilibrium in the cooling system (breathing). Save the transport plug for later transportation purposes (e.g. when sending the unit back for repair). |

**Adding coolant**

**Requirements**

✓ Unit prepared for maintenance, see "Preparing the unit for maintenance".
✓ Coolant hoses connected to the unit, see "Connecting the coolant hoses".
Maintenance and cleaning

✓ Unit cover removed, see "Removing and mounting the unit cover".

Tools and material required

- Filling funnel
- Measuring cup
- Absorbent cloth

Procedure

- Dismount the coolant filler plug.
- Add coolant up to 3 cm below the coolant filler opening.
  Coolant and quantity see "Technical specifications".
- Use a filling funnel in order not to moisten any current-carrying components with coolant.
- Mount the coolant filler plug.

The coolant is now added.

Figure 10: Mounting position of the coolant filler plug

(1) Vent plug  (2) Transport plug  (3) Coolant filler opening

9.8. Removing and mounting the unit cover

NOTE

The connection side and the back side of the unit may not be removed.

Removing the unit cover

Requirements

✓ Unit prepared for maintenance, see "Preparing the unit for maintenance".

Tools and material required

- Square spanner (size 7)

Procedure

- Release the six cam locks on the side covers (when viewed from the connection side) and on the top side of the unit by turning them 90° counterclockwise using the square spanner (size 7).
- Disconnect the grounding cable from the grounding bolt.
- Carefully lift off the covers and lay them aside.

The unit cover has been removed.
Mounting is the reverse order.

Figure 1: Mounted unit cover
(1) Cam locks

9.9. Cleaning the filter strainer

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of burning and/or scalding due to possibly hot coolant.</td>
</tr>
<tr>
<td>Coolant can reach high temperatures during operation and cause burns or scalding in the case of contact.</td>
</tr>
<tr>
<td>→ Check whether the coolant is hot before handling it. If necessary, let it cool down to the ambient temperature, that there is no more risk of burns or scalding.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of damage to the pump, if the unit is operated with a fully closed ball valve.</td>
</tr>
<tr>
<td>→ Never start the unit, when the ball valve is closed.</td>
</tr>
</tbody>
</table>

Cleaning the filter strainer

Requirements
- Unit prepared for maintenance, see "Preparing the unit for maintenance".
- Coolant cooled down to the ambient temperature.
- Unit cover removed, see "Removing and mounting the unit cover".

Tools and material required
- Spanner (size 24)
- Absorbent cloth

Procedure
- Close the ball valve.
- Place an absorbent cloth below the filter strainer to collect the coolant.
Maintenance and cleaning

- Unscrew the cap of the filter strainer using the spanner (size 24).
- Remove the filter strainer and clean it.
- Check the filter strainer for damage.

Damaged filter strainer has to be replaced immediately.
If the filter strainer cannot be cleaned, replace the filter strainer.
If the seal of the cap of the filter strainer is damaged, replace the filter strainer.
- Insert the cleaned or a new filter strainer.
- Screw the cap of the filter strainer back on using the spanner (size 24).
  The recommended torque is approx. 125inlb (14 Nm).
- Collect any coolant that emerges using an absorbent cloth.
- Open the ball valve.
- Check coolant level and top up, if necessary, see "Adding coolant".
- Start up the unit, see "Putting the unit into operation".

The filter strainer is now clean.

Figure 12: Mounting position of the filter strainer
(1) Screw cap of the filter strainer  (2) Ball valve

9.10. Cleaning the heat exchanger

Cooling capacity is heavily reduced, if the heat exchanger is contaminated. The heat exchanger has to be checked for contamination regularly and be cleaned, if required.

The cleaning of the heat exchanger has to be performed in accordance with the maintenance intervals.

DANGER

The use of water for cleaning the heat exchanger can cause short circuit and damage the fan.

The use of water for cleaning the heat exchanger can damage the fan and result in a short circuit. In this case persons are in danger to get an electric shock.

Do not clean the heat exchanger with water.
NOTE

Damage to the fins of the heat exchanger due to improper handling of the unit. Damaged fins of the heat exchanger lead to a reduced cooling capacity.

→ Take care not to damage the fins of the heat exchanger when cleaning the heat exchanger.
→ If the fins of the heat exchanger are not in a suitable condition, you must only start to use the unit when the damage has been rectified.

Cleaning the heat exchanger

Requirements

✓ Unit prepared for maintenance, see "Preparing the unit for maintenance".
✓ Unit cover removed, see "Removing and mounting the unit cover".

Tools and material required

– Vacuum cleaner
– Compressed air pistol/pressurized air spray
– Hand brush
– Brush

Procedure

• Clean the heat exchanger with a vacuum cleaner, hand brush or brush.
• Clean the heat exchanger with compressed air opposite to the direction of air entrance into the unit (i.e. from the inside out).
• Remove any contamination from the ventilation grid.
• Start up the unit, see "Putting the unit into operation".

The heat exchanger is now clean.

9.11. Cleaning the casing

NOTE

Risk of damage by use of improper cleansing material!

When using aggressive or abrasive cleaning agents corrosion damage may occur as result of a damaged paint film.

→ For cleaning the unit body only use mild cleaning agents (e.g. dish washing detergents).
→ Use clean and lint less cloth for cleaning.

Regularly remove dirt from the casing of the unit to prevent corrosion damage and clogging of the air grids. Pay attention that all plates at the unit are always clean and legible.
10. Repair

10.1. Safety
Ensure to adhere to safety regulations as detailed in chapter “Safety”.

10.2. Repair procedures

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The unit can be damaged!</td>
</tr>
<tr>
<td>→ Do not attempt to make repairs on the refrigeration circuit of the unit. For repairs on the refrigeration circuit please send the unit to COMET services (see “Contact information”).</td>
</tr>
</tbody>
</table>

In case of malfunctioning during the warranty period the unit must be sent to the COMET service department for repair (see “Contact information”) or the COMET services website under http://www.comet-xray.com/Service/Contact-Form).

When warranty has expired, no restrictions from the side of COMET exist with respect to repair work carried out by the customer, as long as warranty and warranty conditions remain untouched. In any case only expert staff is authorized for doing repair work.

When doing repair work on the unit always be aware of the terms of warranty as defined in chapter “Terms of warranty”.


11. Decommissioning and disposal

11.1. Temporary placing out of operation

DANGER

Electrical danger!
Work on electrical installations may be carried out by trained and authorized electricians only.

→ Switch off the unit before starting your work.
→ Disconnect the unit from mains by pulling the mains plug.
→ Secure the unit against being switched on again.
→ Verify that the unit is dead.
→ Carry out earthing and short circuiting.
→ Keep unauthorized persons away from the working area.

The decommissioned unit has to be stored in a dry and dust-free room.

- For recommended storage conditions see "Storing the unit"

Prior to decommissioning

Procedure

- Finish the cooling operation.
- Disconnect the unit from mains.
- Let the unit and the coolant cool down.
- Disconnect coolant hoses from the unit, see "Disconnecting the coolant hoses".
- Drain the coolant, see "Draining the coolant".
- Add antifreeze, if necessary.
- Clean the unit, see "Maintenance and cleaning".
- Secure the coolant inlet and coolant outlet connections with protection caps against soiling.

The unit has now been decommissioned.

11.2. Returning the unit to service after decommissioning

Procedure

- Thoroughly clean the unit, see "Maintenance and cleaning".
- Check that the unit is in perfect condition.
- Install the unit and put it into operation, see "Installation and commissioning"
11.3. Final decommissioning, disposal

Final decommissioning or disposal of the unit has to be performed in accordance with the regulations of the country of use.

The unit was manufactured mainly from recyclable material. Make sure the components of the unit end up at a qualified company for disposal and recycling.

Contact COMET for take back of end-of-life units (see "Contact information") or the official COMET services website at http://www.comet-xray.com/Service/Contact-Form or ask a company destined for disposal and recycling.

11.4. Disposal of operating materials

The operating materials of the unit can be hazardous to the environment and to health.

- Make sure the operating materials are disposed of or recycled according to local regulations.
- Also, the safety specifications of the coolant manufacturer must be obeyed.

11.5. Disposal of refrigerant

The refrigerant used in the unit is classified to be slightly dangerous to groundwater and contains fluorinated greenhouse gas.

- Do not release into canalization or waters.
- Do not release into atmosphere.
- Storage only in approved containers.
- Waste disposal only by qualified contractors.

Always adhere to manufacturer safety requirements when handling operating supplies.

11.6. Return of the unit to COMET

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declaration of decontamination</td>
</tr>
<tr>
<td>Before re-shipment of the unit a declaration of decontamination must be sent to COMET.</td>
</tr>
</tbody>
</table>
12. Wear parts and spare parts

<table>
<thead>
<tr>
<th>NOTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spare parts must comply with the technical specifications defined by COMET. Original COMET parts are subject to strict obligations and fulfill these requirements. COMET does not provide warranty service in case of damages caused by the use of spare parts made by manufacturers other than COMET.</td>
</tr>
</tbody>
</table>

The type of the unit and the article number can be found on the identification plate of the unit. The corresponding numbers shown in drawings below as well as the part description are listed in the spare part list (table 7).

Please direct your inquiries and orders to COMET (see "Contact information") with the following detailed information:

- Type of unit
- Article number
- Serial number
- Part description
- Quantity
- Shipping details
- Picture of the item in question
13. Addendum

13.1. Performance diagram

<table>
<thead>
<tr>
<th>Item/Position</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>∆T [°C]</td>
<td>Temperature difference Oil to water</td>
</tr>
<tr>
<td>[W]</td>
<td>Cooling performance in watts</td>
</tr>
<tr>
<td>1</td>
<td>Ambient temperature</td>
</tr>
</tbody>
</table>
13.2. Flow chart
### Flow chart diagram

<table>
<thead>
<tr>
<th>Item</th>
<th>Designation</th>
<th>Item</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Coupling (water in)</td>
<td>1 / D</td>
<td>Evaporator</td>
</tr>
<tr>
<td>B</td>
<td>Flow controller</td>
<td>2</td>
<td>Suction line accumulator</td>
</tr>
<tr>
<td>C</td>
<td>Bypass valve</td>
<td>3</td>
<td>Compressor</td>
</tr>
<tr>
<td>D / 1</td>
<td>Evaporator</td>
<td>4</td>
<td>Pressure controller LP/HP</td>
</tr>
<tr>
<td>E</td>
<td>Temperature controller</td>
<td>5</td>
<td>Check valve</td>
</tr>
<tr>
<td>F</td>
<td>Level sensor</td>
<td>6</td>
<td>Condenser</td>
</tr>
<tr>
<td>G</td>
<td>Container</td>
<td>7</td>
<td>Collector</td>
</tr>
<tr>
<td>H</td>
<td>Filter</td>
<td>8</td>
<td>Shut off-valve</td>
</tr>
<tr>
<td>I</td>
<td>Pump</td>
<td>9</td>
<td>Drier</td>
</tr>
<tr>
<td>K</td>
<td>Coupling (water out)</td>
<td>10</td>
<td>Inspection glass</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11</td>
<td>Expansion valve</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12</td>
<td>Y2 solenoid valve</td>
</tr>
<tr>
<td></td>
<td></td>
<td>13</td>
<td>Y1 solenoid valve</td>
</tr>
</tbody>
</table>
13.3. Wiring diagram
## Wiring diagram legend

<table>
<thead>
<tr>
<th>Item</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>Level sensor</td>
</tr>
<tr>
<td>B2</td>
<td>Flow controller</td>
</tr>
<tr>
<td>F1</td>
<td>Pressure switch HP/LP</td>
</tr>
<tr>
<td>F2</td>
<td>Protective relay for motor</td>
</tr>
<tr>
<td>M1</td>
<td>Pump</td>
</tr>
<tr>
<td>M2</td>
<td>Refrigerating unit</td>
</tr>
<tr>
<td>M3</td>
<td>Fan</td>
</tr>
<tr>
<td>N1</td>
<td>Temperature controller</td>
</tr>
<tr>
<td>N1T1</td>
<td>Forward temperature</td>
</tr>
<tr>
<td>N2T2</td>
<td>Temperature max.</td>
</tr>
<tr>
<td>N1T3</td>
<td>Antifreezing</td>
</tr>
<tr>
<td>Q1</td>
<td>Relay refrigerating unit</td>
</tr>
<tr>
<td>Q2</td>
<td>Disturbance level relay</td>
</tr>
<tr>
<td>Q3</td>
<td>Relay</td>
</tr>
<tr>
<td>R1</td>
<td>RC element</td>
</tr>
<tr>
<td>R2</td>
<td>RC element</td>
</tr>
<tr>
<td>S1</td>
<td>Voltage change over switch</td>
</tr>
<tr>
<td>T1</td>
<td>Trafo</td>
</tr>
<tr>
<td>Y1</td>
<td>Solenoid valve heat</td>
</tr>
<tr>
<td>Y2</td>
<td>Solenoid valve cool</td>
</tr>
<tr>
<td>Z1</td>
<td>Safety circuit</td>
</tr>
<tr>
<td>Z2</td>
<td>i-Cooler node</td>
</tr>
<tr>
<td>Z3</td>
<td>Spare clamp</td>
</tr>
<tr>
<td>Z4</td>
<td>Spare clamp</td>
</tr>
</tbody>
</table>
13.4 Dimension drawing
<table>
<thead>
<tr>
<th>Europe &amp; RoW</th>
<th>USA</th>
<th>Asia</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMET AG</td>
<td>COMET Technologies USA, Inc.</td>
<td>COMET China</td>
</tr>
<tr>
<td>Herrengasse 10</td>
<td>100 Trap Falls Road Extension</td>
<td>1201 Gui Qiao Road</td>
</tr>
<tr>
<td>CH-3175 Flamatt</td>
<td>Shelton, CT 06484</td>
<td>Building 10, 1st floor</td>
</tr>
<tr>
<td>Switzerland</td>
<td>USA</td>
<td>Pudong, Shanghai 201206</td>
</tr>
<tr>
<td>T +41 31 744 90 00</td>
<td>T +1 203 447 31 65</td>
<td>T +86 21 6879 9000</td>
</tr>
<tr>
<td>F +41 31 744 90 90</td>
<td>F +1 203 925 03 64</td>
<td>F +86 21 6879 9009</td>
</tr>
<tr>
<td><a href="mailto:service.xray@comet.ch">service.xray@comet.ch</a></td>
<td><a href="mailto:service.xray@cometusa.com">service.xray@cometusa.com</a></td>
<td><a href="mailto:service.xray@cometchina.com">service.xray@cometchina.com</a></td>
</tr>
</tbody>
</table>