

# Operating Manual

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## Cooling unit EVO 45

Type: WKL 390

Article no.: 0390.013

3x460V, 60Hz

CE



The Perfect  
Match  
Is Our Business



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*the smart way of cooling!*

## Safety notice

First carefully read through this operating manual.

Pay particular attention to the safety instructions contained in chapter [2 Safety](#), before performing work on the cooling unit.

The work described in this operating manual must only be carried out by persons who fulfil the personnel qualifications listed at the start of the corresponding chapter.

Follow the safety notes, keep to the handling instructions and follow the described handling processes.

## Foreword

This operating manual enables users to correctly operate the cooling unit described in all life phases and without danger.

## Change history

Description of the change	Where (Chapter/Page)	Date
Complete revision and redesign	All	07 / 2015

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Translation of the original German version.

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# 1 General information

## 1.1 Purpose of this operating manual

Using this operating manual, users can operate the cooling unit safely and carry out the work described safely and correctly.

## 1.2 Target groups

The target groups of this operating manual are all persons who work on or with this cooling unit in the course of the various life phases. The requirements placed on the target groups are described in the respective personnel qualifications of the active chapter.

Packing/Transport: Shipping and transport experts

Assembly: Fitters

Commissioning: Service technicians

Operating: Operating specialists

Maintenance: Plant mechanics

Repair: Plant mechanics

Plant electricians

Refrigeration technicians (with certificate for refrigerant)

Troubleshooting: Plant mechanics

Plant electricians

Refrigeration technicians (with certificate for refrigerant)

Disassembly: Fitters

Disposal: Refrigeration technicians (with certificate for refrigerant)

Specialists with knowledge of legislation and materials

## 1.3 Explanation of symbols and abbreviations

### 1.3.1 Product-specific designations

#### Refrigerant circuit

Closed refrigerant circuit in which the refrigerant circulates.

#### Water circuits

Open refrigerant circuit with integrated, high capacity tank.

### 1.3.2 Abbreviations used

The international SI unit system is basically used for the physical units, including:

A Ampere

bar Pressure

K Kelvin

kg Kilogram

kW Kilowatt

Rxxxx Refrigerant (e.g. R407C)

V Volt

V<sub>AC</sub> AC voltage

V<sub>DC</sub> DC voltage

## 2 Safety

This chapter contains safety-relevant codes of conduct and procedures that are necessary for safe operation and which must be adhered to.

### 2.1 Appropriate use

The cooling unit is used exclusively to cool and heat the medium specified in the technical data within the specified temperature limits. The quality of the medium must comply with the specifications of the laser equipment manufacturer.

Any other use is deemed to be incorrect use.

### 2.2 Incorrect use

Non-adherence to the following points is deemed to be incorrect use:

- this operating manual and the technical data contained therein
- the operating conditions
- the work processes
- the maintenance work

The following also count as incorrect use:

- Operation in explosive or inflammable atmospheres
- Storage and transport of the equipment where there is a danger of frost, without completely draining the tank and the pumps.

The manufacturer's warranty becomes automatically void for any damage due to incorrect use. Any claims for compensation for damage caused by incorrect use shall not be accepted by the manufacturer.




### 2.3 Hazards due to incorrect use

No hazards due to incorrect use are known.

### 2.4 Meaning of hazard warnings

The following hazards are residual hazards that cannot be eliminated in concept or design with suitable safety devices.

These residual hazards have been divided into the following groups according to severity and frequency:

	<p><b>Danger</b> These safety instructions warn of dangers which can result in fatal physical injury if not observed.</p>
	<p><b>Warning</b> These safety instructions warn of dangers which can result in serious physical injury if not observed.</p>
	<p><b>Caution</b> These safety instructions warn of dangers which can result in minor physical injury or material damage if not observed.</p>

**Note**

These notes warn of risks where proper functioning or specified performance parameters cannot be achieved if not heeded.

## 2.5 Authorisation of personnel

The work described in this operating manual must only be carried out by specifically authorised personnel.

Only persons who fulfil the requirements under the "Personnel Qualification" entry of the individual main chapter are authorised.

## 2.6 Personal protection

**Warning**

The refrigerant in the refrigerant circuit is pressurised.

Protective goggles and safety gloves must be worn when working on the refrigerant circuit.

Escaping refrigerant can lead to serious injury of the eyes and skin as well as respiratory distress (displacement of oxygen in the air).

- Prior to commissioning of the cooling unit, always check that all safety devices are fitted correctly and that all protective covers are closed.
- Before any service work, the cooling unit must be switched off and secured against being switched back on without authorisation. All sources of energy such as:
  - Electricity must be disconnected.
  - Refrigerant: Before working on the refrigerant circuit, the refrigerant must be properly removed and the circuit depressurised.
  - Water: The water must be drained before working on the water circuit.

## 2.7 Hazard areas

No hazard areas are specified in and around the cooling unit.

**Note**

A loss of power or switching off the main switch when there is a danger of frost and with the unit filled with water can lead to damage of the unit.

## 2.8 Personal protective equipment

The following personal protective equipment must be worn when working on the refrigerant circuit of the cooling unit:

- Protective goggles
- Safety gloves



## 2.9 Handling of pressure vessels

**Note**

All work on the refrigerant circuit must be carried out by trained refrigeration specialists. Comply with the local laws and regulations.

The refrigerant circuit and its components are pressurised. The associated pressure vessel ordinances must be adhered to in this area.

## 2.10 Medium quality

The operating medium to be used is defined in Chap. [13.1 Technical data](#).

Only fill in a mixture of 33 % propylenglycol / 67 % clean water.

## 2.11 Safety notices on the product

Safety notices on the product must always be kept in a legible condition. Fallen or missing safety notices must be replaced or reinstalled immediately in accordance with the following description.



Fig. 2.1 Warning of electrical voltage

## 2.12 Protective devices

Before each commissioning, make sure that all protective devices are fitted correctly and their protective function is in full working order.

### 2.12.1 Main switch

When the main switch is switched off the cooling unit is de-energized. The main switch is built into the control cabinet door.

### 2.12.2 Refrigerant circuit

The refrigerant circuit is equipped with the following safety devices:

#### Low-pressure transmitter (ND)

The low-pressure transmitter monitors the suction side against impermissibly low operating pressure in the refrigerant circuit. If there is a malfunction, the controller switches the compressor off and signals this on the display. Cooling is switched back on after the alarm on the display has been acknowledged. When the device is switched on again, the alarm is delayed.

(See also Chap. [7.1.3 Troubleshooting at operator level](#) and [9.4 Troubleshooting at repair level](#)).

#### High-pressure transmitter (HD)

The high-pressure transmitter monitors the pressure side against impermissibly high operating pressure in the refrigerant circuit. If there is a malfunction, the controller switches the compressor off and signals this on the display. Cooling is switched back on when the refrigerant circuit has cooled sufficiently and the alarm on the display has been acknowledged.

(See also Chap. [7.1.3 Troubleshooting at operator level](#) and [9.4 Troubleshooting at repair level](#)).

#### High-pressure safety pressure switch (HDS)

The high-pressure safety pressure switch protects the pressure side against impermissibly high operating pressure in the refrigerant circuit. If there is a malfunction, the high-pressure safety pressure switch turns off the compressor and signals the malfunction on the display. Cooling is switched back on when the refrigerant circuit has cooled sufficiently and the alarm on the display has been acknowledged.

(See also Chap. [7.1.3 Troubleshooting at operator level](#) and [9.4 Troubleshooting at repair level](#)).

### 2.12.3 Medium circuit

The medium circuit is equipped with the following safety devices:

#### **Flow meter**

The flow meter monitors the evaporator for impermissibly low flow-through, i.e. for freezing due to low flow speed.

The flow meter also protects the pump against running dry. If there is a malfunction, the controller switches off the pump (as well as the cooling) and shows the malfunction on the display. Cooling is switched back on after the alarm on the display has been acknowledged.

(See also Chap. [7.1.3 Troubleshooting at operator level](#) and [9.4 Troubleshooting at repair level](#)).

#### **Evaporator outlet sensor**

The evaporator outlet sensor monitors the evaporator for impermissibly low outlet temperature of the water. If there is a malfunction, the controller switches the compressor off. This is shown on the display. Cooling is switched back on after the alarm on the display has been acknowledged.

(See also Chap. [7.1.3 Troubleshooting at operator level](#) and [9.4 Troubleshooting at repair level](#)).

**Float switch with low and high switch point**

The low switch point monitors the water fill level in the tank. Thus temperature constancy in the water outlet, and the dry run protection of the pump are achieved. If there is a malfunction, the controller switches off the pump and also the cooling and signals the malfunction on the display. The cooling is switched back on after water is topped up and the alarm on the display has been acknowledged.

(See also Chap. [7.1.3 Troubleshooting at operator level](#) and [9.4 Troubleshooting at repair level](#)).

**Float switch high**

The high switch point outputs a warning on the PLC display. Top up water to "Max." marking.

**2.12.4 Monitoring devices****Motor protection switches – compressor, pump, fans**

If there is increased motor power and if there is a short circuit, the motor protection switch switches off and interrupts the power supply. The fault is shown on the display. The cooling is switched back on after the fault has been cleared and the alarm on the display has been acknowledged.

(See also Chap. [7.1.3 Troubleshooting at operator level](#) and [9.4 Troubleshooting at repair level](#)).

**Microprocessor-controlled programmable logic controller (PLC)**

The PLC regulates the temperature and monitors the excess temperature or insufficient temperature. If the water temperature is too high or too low, the controller switches the laser enable off and shows the malfunction on the display. The laser is enabled after the water is back in the operating range and the alarm on the display has been acknowledged.

(See also Chap. [13-57 PLC manual](#), [7.1.3 Troubleshooting at operator level](#) and [9.4 Troubleshooting at repair level](#)).

**Monitoring the air filters**

The high-pressure transmitter monitors the system pressure on the high-pressure side. If the condensation pressure is outside of the normal work range but within the limit value, the display shows a warning.

(See also Chap. [13-57 PLC manual](#), [7.1.3 Troubleshooting at operator level](#) and [9.4 Troubleshooting at repair level](#)).

**2.12.5 Temperature regulator devices****Microprocessor-controlled programmable logic controller (PLC)**

Temperature control and regulation of the water circuit are handled by the PLC. The PLC regulates the water temperature depending on the set setpoint. The tank temperature is shown on the display.

(See also Chap. [13-57 PLC manual](#), [7.1.3 Troubleshooting at operator level](#) and [9.4 Troubleshooting at repair level](#)).

**2.13 Use of original spare and wear parts**

Only original spare parts may be used. Proper functioning of the cooling unit can no longer be guaranteed by the manufacturer if third party spare parts are used. In such cases, all warranty claims are automatically void.

**2.14 Safety concept**

This cooling unit is part of a wider system and must consequently be integrated in the safety concept of the wider system.

### **2.15 Duty to instruct of the operating company**

The operating company of this cooling unit is responsible for ensuring that replacement personnel attend the customer training course and are informed of all hazards.

### **2.16 Duty to inform of the operating company**

The operating company of this cooling unit is obligated to inform the manufacturer when selling the cooling unit and to disclose the new operating company.

The operating manual is part of the cooling unit and must accompany it.

### **2.17 Noise emission**

The emission sound pressure level is specified in the Technical data.

See Chap. [13.1 Technical data](#)

## 3 Description

### 3.1 Identification

#### 3.1.1 Nameplate

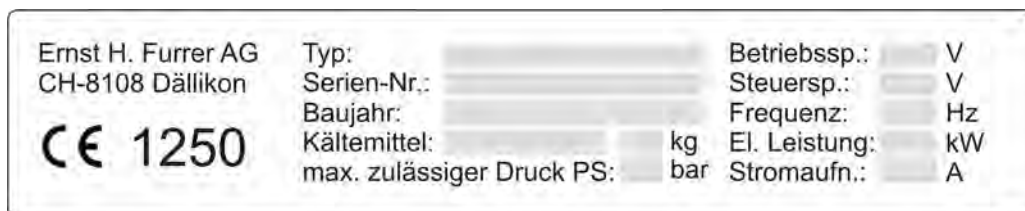


Fig. 3.1 Installation of the nameplate

#### Position of the nameplate

The nameplate is located top left on the front of the cooling unit. A copy of this is also attached in the control cabinet.

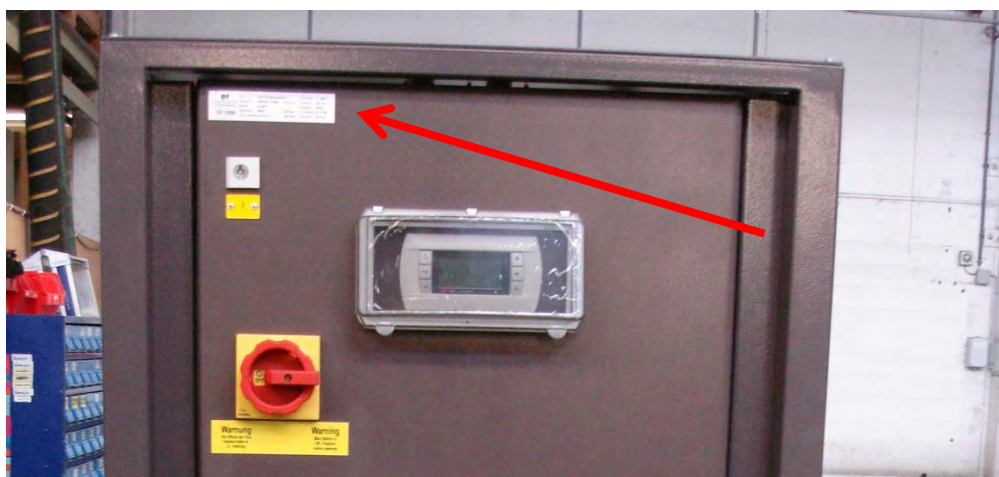


Fig. 3.2 Position of the nameplate

#### 3.1.2 Model variants

- Mains voltage / frequency

See type plate and Chap. [13.1 Technical data](#)

## 3.2 Setup and function

### 3.2.1 Overview

The cooling unit is a ready-to-connect device and essentially consists of the housing, the components of the refrigerant circuit, cooling air and medium circuit, the control cabinet, and all control, regulating and monitoring devices that are necessary for automatic operation.

The operating medium to be used is defined in Chap. [13.1 Technical data](#).

### 3.2.2 Controller

The programmable logic controller (PLC) is responsible for safety, monitoring, control and regulation of the entire cooling unit (see also Chap. [7 Operation](#)).

### 3.2.3 Refrigerant circuit

The refrigerant circuit is a closed system in which the refrigerant circulates. In the plate evaporator the process heat is transferred from the medium circuit to the refrigerant circuit at low evaporation temperature, with the refrigerant transported through the compressor to the condenser where it is dissipated to the ambient air at a high condensing temperature or to a water circuit.

*Components of the refrigerant circuit: See Chap. [13 Technical documents](#)*

### 3.2.4 Medium circuit


#### **Medium circuit with tank**


Through the installed tank, the medium circuit is designed as a system that is open to the atmosphere. The generously dimensioned tank increases the constancy of the medium outlet temperature. The pump conveys the medium out of the tank to the consumer, where it is heated, and via the evaporator, which it is cooled, back to the tank.

*Components of the medium circuit: See Chap. [13 Technical documents](#)*

## 4 Packing and transport

### 4.1 Safety

	<p><b>Danger</b></p> <p>Suspended loads can fall.</p> <p>Never step or remain under suspended loads.</p> <p>Non-observance of this instruction can lead to fatal injury.</p>
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	<p><b>Danger</b></p> <p>Unsuitable or under-dimensioned lifting gear can break and the load can fall.</p> <p>Only use suitable lifting gear with the required lifting capacity (see weight specifications in Chap. <a href="#">13.1 Technical data</a>). Only suspend the cooling unit on the suspension straps provided.</p> <p>Non-observance of this instruction can lead to fatal injury.</p>
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	<p><b>Caution</b></p> <p>Material damage due to frost.</p> <p>Transport or storage in a frost-exposed environment leads to material damage if the water circuits have not been fully drained beforehand.</p>
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#### 4.1.1 Personnel qualification

This cooling unit must only be packed and transported by personnel who fulfil the following requirements:

- Have read and understood Chap. [2 Safety](#)
- Experience in or introduction into the areas of packing and transport

### 4.2 Preparations for transport

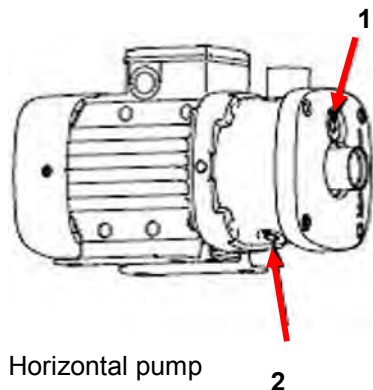
#### 4.2.1 Emptying (frost protection)

##### **Storage and transport in environments subject to freezing**

The tank, pump and water circuit must be fully emptied prior to storage.

Unscrew the filter cup. **Make sure that the O-ring doesn't get lost.**

### Emptying the pump



to drain off the fluid: remove screw

Horizontal pump

Fig. 4.1 Emptying the pump

- |   |                      |
|---|----------------------|
| 1 | Removal of rest air  |
| 2 | Opening for draining |

Procedure:

1. Remove screw (see Fig. 4.1).
2. Empty completely the pump for avoiding any damages.

After complete draining reinsert the filling plug and drain screw into the pump

Install and fit the water filter back into the filter cup.

### 4.3 Packing

The unit is screwed provided with suitable packing for overland transport.

### 4.4 Transport

#### Transport-specific data

See Chap. 13.1 [Technical data](#) for weight and dimensions. The cooling unit must be secured to prevent shifting and tipping in all cases. The cooling unit must be upright and contain no medium when transported.

#### Transport damages

Upon receipt, the cooling unit must be immediately checked for damage incurred in transit. Transport damage must be noted on the delivery note and the shipping agent notified immediately. A damaged cooling unit must not be put into operation.

Once delivered, the cooling unit must be transported using a forklift truck or a crane. During transport, ambient temperatures of +5 to + 63 °C are permissible. Lower temperatures only after completely emptying the water circuit (see Chap. 4.2.1 [Emptying \(frost protection\)](#)).

#### Transportation by forklift truck

Maintain a slow lifting speed.

Pay attention to the unit's centre of gravity, so that it does not tip over.



### Transportation by crane

Where provided, the suspension eyelets (4-point attachment) must be used for transportation by crane.



Fig. 4.2 Suspension eyelets

#### Lifting equipment

Cables (cable suspension gear) per DIN 3088 or chains (chain suspension gear) per DIN 5687/5688. Both forms of lifting equipment fulfil the necessary requirements for attachment with even cable or chain lengths.

#### Cable inclination angle

The cable inclination angle to the vertical must not exceed 45°.

#### Lifting speed

Maintain a slow lifting speed (precision hoist, jolt-free lifting).

#### Setting down the cooling unit


In order to avoid an uncontrolled deformation of the housing frame, the cooling unit should be set down on a level surface.


### Transportation by lorry

The load and the cooling unit must be secured to prevent shifting, tipping, and lifting in all cases. Transportation on roads with surface damage or unmade roads requires special measures and an appropriate driving manner to avoid damage to the cooling unit.

## 5 Installation and assembly

### 5.1 Safety

	<p><b>Danger</b></p> <p>Suspended loads can fall.</p> <p>Never step or remain under suspended loads.</p> <p>Non-observance of this instruction can lead to fatal injury.</p>
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	<p><b>Note</b></p> <p>Free intake and blow-out of the cooling air and an adequate air exchange for heat dissipation from the assembly site of the cooling unit must be ensured.</p>
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#### 5.1.1 Personnel qualification

This cooling unit must only be installed and fitted by personnel who fulfil the following requirements:

- Have read and understood Chap. [2 Safety](#)
- Have completed basic mechanical and electrical training

### 5.2 Energy connections

The energy connections must be provided by the operating company. Refer to Chap. [13.1 Technical data](#) for the required energy connections and connecting points.

The operating company is responsible for ensuring that the electrical connections are safeguarded and implemented in accordance with the country-specific regulations.

The cooling unit must be connected in accordance with the electrical diagram supplied.

### 5.3 Installation

The cooling unit must be installed in a frost-free room on an even, horizontal surface and with the requisite load-bearing capacity. There is no requirement for securing the foundations, the use of underliners or vibration absorbers. Pipes must be flexibly connected with the cooling unit by means of compensators or hoses.

Operation in frost conditions and installation outdoors require additional measures:

- Optional heating kit and permanent power supply
- Weather-resistant housing, rain protection
- Suitable antifreeze mixture

Observe the minimum distances during installation in order for the cooling unit to function in a fault-free manner.

See Chap. [13.4 Drawings](#)

## 5.4 Assembly

Place the cooling unit at the intended position and secure against shifting.

*For unit-specific connections, see Chap. 13.1 [Technical data](#)*

### 5.4.1 Electrical connection



#### Note

**Make sure that the electrical feed is shut off throughout the assembly period.**

Connect the power feed cable (terminal X1)

Connect the communication cable (terminal X3).

### 5.4.2 Connecting the remote control

The cooling unit is prepared for connection of a remote control with potential-free group alarm, ON-OFF and enable (see electrical diagram).

### 5.4.3 Connections of the medium circuit

Connect the water hoses in accordance with the labelling on the cooling unit (inlet/outlet) and secure with hose clips.

The line nominal widths for the external medium circuit must be determined based on the available pump pressure and the expected loss in pressure in the consumer circuit. The medium lines can be implemented with a fixed or flexible design.

Ensure material compatibility throughout the entire medium circuit. The following materials can be installed in the water circuit in the cooling unit:

- Copper
- Stainless steel
- Brass
- Plastic
- Nitrile elastomer

Depending on the materials used in the external water circuit, (outside of the unit, customer-provided installation), material incompatibilities can cause corrosion damage.

Pay particular attention in this regard if using galvanised and aluminium materials.

If in doubt, consult qualified specialist companies.




#### Note

**When connecting the medium circuit, avoid contamination in the external line system (rinse the lines prior to connecting).**

## 6 Commissioning

### 6.1 Safety


	<p><b>Danger</b></p> <p>Caution - dangerous voltage!</p> <p>Before commencing commissioning, switch off the main switch and secure against being switched back on without authorisation.</p> <p>Non-observance of this safety instruction can result in electrocution with fatal physical injury.</p>
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#### 6.1.1 Personnel qualification

This cooling unit must only be installed and placed in operation by personnel who fulfil the following requirements:

- Have read and understood Chap. 2 [Safety](#)
- Have completed basic mechanical and electrical training

### 6.2 Venting the pump

	<p><b>Note</b></p> <p>Before filling the medium tank, remove the filter cup so that the pump is vented. (See Chap. <a href="#">6.4.1.2 Commissioning the medium circuit</a>)</p>
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### 6.3 Checks prior to commissioning

- All transport aids and assembly fixtures are removed
- Filter cup removed (see Chap. [6.2 Venting the pumps](#))
- Electrical connections connected correctly (see Chap. [5.4.1 Electrical connection](#))
- All motor protection switches at "0" position
- Connections of the medium circuit are connected correctly (see Chap. [5.4.3 Connections of medium circuit](#))

#### 6.3.1 Oil sump heater (optional)

At temperatures below 10 °C, switch on the oil sump heater for 2 hours prior to commissioning. To do so, set the motor protection switch of the controller power and the heaters to the "I" position and turn on the main switch. The other motor protection switches remain switched off. (See Chap. [13.6 Electrical circuit diagram](#))

## 6.4 Procedure for commissioning

### 6.4.1 Medium circuit

#### 6.4.1.1 Medium requirements

The operating medium to be used is defined in Chap. [13.1 Technical data](#).

Only pour in a mixture of 33 % propylenglycol / 67 % clean water.

#### 6.4.1.2 Commissioning the medium circuit

##### Actions required:

- Main switch "ON"
- All motor protection switches in "0" position except the motor protection switch for the controller power in "I" position (see electrical diagram)
- Undo the filter cup of the water filter with the filter wrench and remove. **Make sure that the O-ring doesn't get lost.**
- The filter cup must be removed so the pump can vent
- Remove the tank lid
- Fill the tank with the operating medium to the "Max" mark
- Install the filter cartridge in the corresponding filter cup
- Make sure that the O-ring sits uniformly in the groove of the filter cup

##### Venting the pumps:

- Pump equipped with a bypass is vented automatically.

Commissioning the pumps is only possible if the low level switch is covered with water.

- Motor protection switches of the pumps in the "I" position (see electrical diagram)
- Acknowledge alarm
- Switch on the pump via the remote control
- Check the specified direction of rotation of the pump



#### Note

**If the direction of rotation of the cooling unit is wrong, de-energise the cooling unit and swap the 2 phases of the main connection cable.**

- While there is air in the pipelines, a flow alarm appears. The alarm can be acknowledged after waiting one minute. This process must be repeated until there is no flow alarm message on the display.
- Visually inspect the entire water circuit for leaks
- Check the water level again (via the high level switch) and top up water to the "Max." mark if necessary
- Fit the tank lid
- Check the setpoint adjustment of the temperature regulator in accordance with the project specification and correct the setpoint adjustment as needed

#### 6.4.2 Refrigerant circuit

- After executing the tasks on the water circuit, all motor protection switches must be placed in the "1" position (see electrical circuit diagram)
- Acknowledge alarm
- The cooling unit is ready for operation and the temperature controller takes over regulation of the water temperature

**Note: Winter kit option**

If there is danger of freezing, the main power (main switch and main power supply) should never be switched off!

**6.4.3 Operating state "Total Off"**

The cooling unit is completely switched off

Main current:                   **OFF**   (main switch)  
External enable:               **OFF**

In this operating state the cooling unit reacts neither to excess temperature nor insufficient temperature.

**Note: Winter kit option**

**Frost protection is not guaranteed** in this operating state. Ambient temperature of at least +5 °C. The tank and all water circuits may need to be completely emptied (see Chap. [4.2.1 Emptying \(frost protection\)](#))!

## 7 Operation

The refrigeration system is set up for automatic operation. No interventions by the operating company or user are intended.  
 External switch on/off commands are issued via potential-free contacts (see electrical diagram).  
 The setpoint can be set on the display.

### 7.1.1 Personnel qualification

This cooling unit must only be operated by personnel who fulfil the following requirements:

- Have read and understood Chap. 2 Safety
- Have undergone introduction as an operator of the system

### 7.1.2 Description of the PLC

The cooling unit is ready for operation and can be placed in service directly or via the remote control. The PLC regulates the temperature of the cooling medium, and controls and monitors and the cooling unit. The cooling unit is fully automatic.

For information on operating the PLC, see Chap. 13.7 PLC manual

### 7.1.3 Troubleshooting at operator level

N.B. The messages shown on the display may differ from those in this table or may not appear as stated, depending on the unit and application.

**Warning:** The cooling unit continues running. **Alarm:** The cooling unit shuts down.

The fault for the latest event is displayed. The arrow keys can be used to display other pending fault messages. To ensure rapid and effective resolution, please tell Support about all of the pending messages.

From the main menu, press the Alarm key once: The latest pending message is displayed

The messages can be acknowledge by pressing the Alarm key twice. Faults which are still pending will be shown again, either immediately or after a delay.

Return to the main menu with the ESC key.

Warning	Possible causes	Remedy
<b>Warning 13.1.</b> MEDIUM CIRCUIT OVERTEMPERATURE	<ul style="list-style-type: none"> <li>- Insufficient cooling capacity</li> <li>- Other causes</li> </ul>	<ul style="list-style-type: none"> <li>- Control signal cooling should show 100%</li> <li>- There should be no bubbles in the sight glass of the refrigerant circuit</li> <li>- Check if any other alarm messages are pending</li> <li>- Request Customer Service</li> </ul>
<b>Warning 70</b> WATER LEVEL INSUFFICIENT	<ul style="list-style-type: none"> <li>- Insufficient water level</li> <li>- Leakage</li> </ul>	<ul style="list-style-type: none"> <li>- Top up water</li> <li>- Check the pipes for leaks</li> <li>- Request Customer Service</li> </ul>
<b>Warning 130</b> WATER FILTER FOULED	<ul style="list-style-type: none"> <li>- Water filter fouled</li> <li>- Hoseline kinked</li> </ul>	<ul style="list-style-type: none"> <li>- Clean/replace water filter</li> <li>- Straighten kink in hoses</li> </ul>
<b>Warning 133</b> AIR FILTER FOULED	<ul style="list-style-type: none"> <li>- Air filter fouled</li> <li>- Condenser fouled</li> <li>- Air supply or removal obstructed</li> <li>- Air inlet temperature &gt; 45°C</li> <li>- Intake air and waste air "short circuited"</li> </ul>	<ul style="list-style-type: none"> <li>- Clean/replace air filter</li> <li>- Clean condenser</li> <li>- Remove obstructions</li> <li>- Thoroughly ventilate the area with additional fans</li> <li>- Change the set-up location</li> </ul>

Alarm	Possible causes	Remedy
<b>Alarm 01</b> LOW PRESSURE	<ul style="list-style-type: none"> <li>– Refrigerant loss Leakage</li> <li>– Expansion valve (thermal part / nozzle insert) defective</li> </ul>	<ul style="list-style-type: none"> <li>– Request Customer Service</li> </ul>
<b>Alarm 02</b> HIGH PRESSURE	<ul style="list-style-type: none"> <li>– <b>Air-cooled units:</b></li> <li>– Air filter mats fouled</li> <li>– Condenser fouled</li> <li>– Air supply or removal obstructed</li> <li>– Air inlet temperature &gt; 45°C</li> <li>– Intake air and waste air “short circuited”</li> <li>– <b>Water-cooled units:</b> Water supply or recooling system defective</li> </ul>	<ul style="list-style-type: none"> <li>– <b>Air-cooled units:</b></li> <li>– Clean/replace filter mats</li> <li>– Clean condenser</li> <li>– Remove obstructions</li> <li>– Thoroughly ventilate the area with additional fans</li> <li>– Change the set-up location</li> <li>– Request Customer Service</li> <li>– <b>Water-cooled units:</b> Check water supply or recooling system</li> <li>– Request Customer Service</li> </ul>
<b>Alarm 03</b> HIGH PRESSURE SAFETY	<ul style="list-style-type: none"> <li>– <b>Air-cooled units:</b></li> <li>– Air filter mats fouled</li> <li>– Condenser fouled</li> <li>– Air supply or removal obstructed</li> <li>– Air inlet temperature &gt; 45°C</li> <li>– Intake air and waste air “short circuited”</li> <li>– <b>Water-cooled units:</b> Water supply or recooling system defective</li> </ul>	<ul style="list-style-type: none"> <li>– <b>Air-cooled units:</b></li> <li>– Clean/replace filter mats</li> <li>– Clean condenser</li> <li>– Remove obstructions</li> <li>– Thoroughly ventilate the area with additional fans</li> <li>– Change the set-up location</li> <li>– If necessary, request Customer Service</li> <li>– <b>Water-cooled units:</b> Check water supply or recooling system</li> <li>– Request Customer Service</li> </ul>
<b>Alarm 20</b> FLOW IN MEDIUM CIRCUIT INSUFFICIENT	<ul style="list-style-type: none"> <li>– No water flow or insufficient water flow</li> <li>– Flow meter or pump defective</li> </ul>	<ul style="list-style-type: none"> <li>– Clean/replace water filter</li> <li>– Check hoses for kinks</li> <li>– Request Customer Service</li> </ul>
<b>Alarm 50</b> PROTECTION AGAINST FREEZING	<ul style="list-style-type: none"> <li>– Insufficient water flow (if compressor is in operation)</li> <li>– Ambient temperature too low</li> </ul>	<ul style="list-style-type: none"> <li>– Pumps should be operating at temperatures below 8°C</li> <li>– Heating should be operating at below 4 °C</li> <li>– Request Customer Service</li> </ul>
<b>Alarm 71</b> WATER LEVEL INSUFFICIENT	<ul style="list-style-type: none"> <li>– Water level is too low</li> <li>– Leakage</li> </ul>	<ul style="list-style-type: none"> <li>– Top up water</li> <li>– Check the pipes for leaks</li> <li>– Request Customer Service</li> </ul>

If the malfunction cannot be remedied with the aid of this malfunction table or the alarm no. is not contained in this list, please contact the internally responsible maintenance specialist or contact our Customer Service:

[support@efcooling.com](mailto:support@efcooling.com).


Please provide us with the type and serial number of the unit as well as all alarm numbers that occurred (scroll to the alarm message with the arrow key).


A complete list of the fault messages can be found in Chap. [13.7 PLC manual](#) Troubleshooting requires qualified personnel. Please contact our Support should there be any questions.



## 8 Inspection and maintenance

### 8.1 Safety

	<p><b>Danger</b> Unintentional start-up of the cooling unit can result in considerable danger.</p> <p>Before commencing any inspection and maintenance work, the cooling unit must be switched off at the main switch and secured against being switched back on without authorisation.</p> <p>Non-observance of this instruction can lead to serious physical injury with fatal consequences.</p>
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	<p><b>Note</b> Proper execution of the maintenance work is prerequisite for safe and fault-free operation.</p>
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#### 8.1.1 Personnel qualification

This cooling unit must only be inspected and maintained by personnel who fulfil the following requirements:

- Have read and understood Chap. [2 Safety](#)
- Have completed basic mechanical training

### 8.2 Visual inspection

#### 8.2.1 Tank and medium circuit

Check tank level → if necessary, top up media

Check medium for fouling → if fouled, drain and clean the medium circuit and tank, and fill with new medium.


Check whether medium hoses are kinked → if so, straighten them

#### 8.2.2 Alarms on the display


Press the Alarm key on the display and check that no warnings or alarms are pending  
→ For warnings or alarms: see Chap. [7.1.3 Troubleshooting at operator level](#)

#### 8.2.3 Air-cooled cooling units

Inflowing fresh air and outflowing exhaust air must not be restricted. Clean the air filter and condenser if necessary.

	<p><b>Caution</b> The condenser has razor-thin aluminium fins that can cause injury. Gloves must be worn for cleaning work on the condenser. Non-observance of this instruction can lead to minor physical injury.</p>
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Carefully clean the condenser with compressed air.

	<p><b>Note</b> The aluminium fins are razor-thin and must not be bent as otherwise proper functioning is no longer ensured.</p>
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**8.2.4 Water-cooled cooling units**


- Check fresh water supply to the cooling unit.
- Check recooling system


**8.3 Maintenance schedule**

Work required	weekly	monthly	annually
<b>Air-cooled cooling units:</b> Check air filter mats for fouling, clean or replace as required <b>Water-cooled cooling units:</b> Check water supply	X		
Check <b>medium filter</b> for fouling, clean or replace as required	X		
Check <b>tank level</b> , top up medium as required	X		
Inspect <b>medium lines</b> for leaks and kinks		X	
Inspect <b>refrigerant circuit</b> for refrigerant leaks (watch out for traces of refrigerant oil)		X	
Tighten <b>screw clamps</b> in the control cabinet and in the connection boxes of electrical components		X	
Check <b>medium quality</b> , replace medium as required			X
Refill <b>medium circuit</b> / replace media			X

## 9 Repair

### 9.1 Safety

	<p><b>Danger</b> Unintentional start-up of the cooling unit can result in considerable danger.</p> <p>Before commencing any repair work, the cooling unit must be switched off at the main switch and secured against being switched back on without authorisation.</p> <p>Non-observance of this instruction can lead to serious physical injury with fatal consequences.</p>
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	<p><b>Note</b> Proper execution of the repair work is prerequisite for safe and fault-free operation.</p>
---	---

#### 9.1.1 Personnel qualification

This cooling unit must only be repaired by personnel who fulfil the following requirements:

- Have read and understood Chap. 2 [Safety](#)
- Have completed basic mechanical and electrical training
- Authorised to handle refrigerant  
(e.g. in Switzerland: Certificate from responsible testing body)

## 9.2 Replacing air and water filters

### 9.2.1 Replacing air filters

Remove the fouled filter mat from the frame and insert a new filter mat into the frame. Make sure that the filter mat is positioned flat on the grid and does not make waves.

### 9.2.2 Replacing the water filter

Undo the filter cup of the water filter with the filter wrench and remove. Make sure that the O-ring doesn't get lost. Replace the water filter with the same type. Make sure that the O-ring sits uniformly in the groove of the filter cup. Screw the filter cup into the filter head. Tighten slightly with the filter wrench.

After switching the cooling unit back on, check the O-ring for leaks. Flow alarms appear if air is expelled from the filters and the lines. Wait one minute to acknowledge the fault. Check the water level. If necessary, top up the water / propylenglycol mixture to the "Max." mark.

### 9.2.3 Replacing the operating media

To replace the operating medium, see Chap. [4.2.1 Emptying \(frost protection\)](#).

If necessary, clean the tank with a brush and rinse out.

*Important sequence for filling the water tank:*

1. First remove the filter cup. Fill the tank with fresh medium.
2. Only fill in a mixture of 33 % propylenglycol / 67 % clean water.
3. Insert the new water filter.

Make sure that the O-ring sits uniformly in the groove of the filter cup. Screw the filter cup into the filter head. Tighten slightly with the filter wrench.

After switching the cooling unit back on, check the O-ring for leaks. Flow alarms appear if air is expelled from the filters and the lines. Wait one minute to acknowledge the fault. Check the water level. If necessary, top up the water to the "Max." mark.

## 9.3 Replacing defective components

Working on and the replacement of components in the refrigerant circuit are only permitted by qualified personnel of a specialist refrigeration company. Observe the legal environmental regulations.

When replacing components in the medium circuit, also empty the cooling unit, see Chap. [4.2.1 Emptying \(frost protection\)](#).

## 9.4 Troubleshooting at repair level

For a list of warning and alarm messages, possible causes of faults and how to rectify them, see Chap. [13.7 PLC manual](#).

**If the malfunction cannot be remedied with the aid of this malfunction table, please contact the Customer Service of your supplier or the Customer Service of Ernst H. Furrer AG directly. The address is given in the chapter [12.1 Address](#).**

## 10 Decommissioning/Storage

### 10.1 Safety

**Danger**

Unintentional start-up of the cooling unit can result in considerable danger. Before commencing any disassembly work, the cooling unit must be switched off at the main switch and secured against being switched back on without authorisation. Non-observance of this instruction can lead to serious physical injury with fatal consequences.

**Danger**

Suspended loads can fall. Never step or remain under suspended loads. Non-observance of this instruction can lead to fatal injury.

**Danger**

Unsuitable or under-dimensioned lifting gear can break and the load can fall. Only use suitable lifting gear with the required lifting capacity (see weight specifications in "Technical data"). Only suspend the cooling unit at the suspension points provided. Non-observance of this instruction can lead to fatal injury.

#### 10.1.1 Personnel qualification

This cooling unit must only be taken out of service and disassembled by personnel who fulfil the following requirements:

- Have read and understood Chap. [2 Safety](#)
- Have completed basic mechanical and electrical training

### 10.2 Disassembly

First disconnect all energy connections from the cooling unit and secure.

The medium circuit must be completely emptied.

Before any fasteners are undone on the cooling unit, the unit must be secured to prevent it from tipping over. The cooling unit may only be suspended from the suspension straps provided.


Only a suitable lifting device, offering the necessary lifting capacity, may be used for this purpose. (See Chap. [4.4 Transport](#)).

### 10.3 Storage

The cooling unit must be stored on a level surface in a dry, frost-free room. Permissible storage temperatures: -15°C to +63 °C. If temperatures below -15 °C can occur, the water / propylenglykol circuit must be completely emptied (see Chap. [4.2.1 Emptying \(frost protection\)](#)).

# 11 Disposal


## 11.1 Safety

	<p><b>Warning</b> The refrigerant in the refrigerant circuit is pressurised.</p> <p>Protective goggles and safety gloves must be worn when working on the refrigerant circuit.</p> <p>Escaping refrigerant can lead to serious injury of the eyes and skin as well as respiratory distress (displacement of oxygen in the air).</p>
---	---

### 11.1.1 Personnel qualification

This cooling unit must only be disposed of by personnel who fulfil the following requirements:

- Have read and understood Chap. 2 [Safety](#)
- Knowledge of materials
- Knowledge of the hazardous material ordinance

	<p><b>Note</b> All work on the refrigerant circuit must be carried out by trained refrigeration specialists. Comply with the local laws and regulations.</p>
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## 11.2 Procedure

The disposal of the cooling unit and its components must be carried out in accordance with the locally applicable legislation.

After definitive decommissioning of the cooling unit, all components must be taken for professional disposal or recycling in the interest of environmental protection:

- **Refrigerant** (refrigerant circuit) and **refrigerant oil** (compressor) **must** be drained by an authorised refrigeration company and properly disposed of.
- Separate out and sort plastic parts
- Sort metal parts according to type of metal
- Dispose of electrical components in the proper manner

## 12 Customer Service

Please use the spare parts list for ordering spare and wear parts (see Chap. [13.3 Bill of materials/Spare parts list](#)).

Keep the following information ready for the order in accordance with the nameplate:

- Cooling unit type
- Serial no.
- Year of construction
- Article number and quantity

### 12.1 Address

Ernst H. Furrer AG  
Customer Service  
Hüttenwiesenstrasse 8  
CH-8108 Dällikon

Tel: +41 44 849 79 00

**[support@efcooling.com](mailto:support@efcooling.com)**

**[www.efcooling.com](http://www.efcooling.com)**





## **13      Technical documents**

### **13.1    Technical data**



# Technical data

<b>Unit type:</b>	<b>WKL 390 / EVO 45 / 60Hz</b>		<b>Serial number:</b>	<b>0390.013</b>	
<b>Refrigeration data</b>					
Updated 01.06.2015 FRLO					
Cooling capacity	<b>46.6</b>	kW	at	(to / tc)	<b>3/60</b> °C
Condensing capacity	<b>66.2</b>	kW			
Number of refrigeration circuits	<b>1</b>				
Refrigerant	<b>R407c, 18kg</b>				
Compressor	Quantity	<b>2</b>			
	Type	<b>ZR108 KCE-TFD</b>			
	Power consumption	<b>10.3</b>	kW	total	<b>20.6</b> kW
	Current consumption	<b>15.3</b>	A	total	<b>30.6</b> A
Condenser	Type	<b>C01/C02</b>			
	Airflow	<b>26100</b>	m <sup>3</sup> /h		
	Quantity of fans	<b>3</b>	Type:		
	Power consumption	<b>1.10</b>	kW	total	<b>3.30</b> kW
	Current consumption	<b>2.10</b>	A	total	<b>6.30</b> A
<b>Operating media</b>					
Medium to be cooled	<b>Propylenglykol</b>	<b>34% / 66% Wasser</b>			
Medium to be cooled	<b>Tank capacity</b>	<b>160 Liter</b>			
<b>Hydraulic data (Producer circuit)</b>					
Pump	Type	<b>CM 10-3</b>			
	Quantity	<b>1</b>			
	Flow rate	<b>125</b>	l/min	at	<b>6.5</b> bar
	Max. delivery height	<b>7.0</b>	bar	<b>Bypass 6.6 bar @ 7.2m<sup>3</sup>/h(120L/min)</b>	
	Power consumption	<b>4.00</b>	kW	total	<b>4.00</b> kW
	Current consumption	<b>7.20</b>	A	total	<b>7.20</b> A
Heat exchanger	<b>SWEP</b>	Type	<b>V80x60</b>		
		Quantity	<b>1</b>		
		Flow rate	<b>150</b>	l/min	Pressure loss <b>40</b> kPa
<b>Control</b>					
High pressure control	Typ	<b>efcooltronic</b>	Set	<b>40</b> °C	P-Band <b>10</b> K
Temperature control	Typ	<b>efcooltronic</b>	Set	<b>6</b> °C	P-Band <b>1</b> K
<b>Safety device</b>					
High pressure monitoring	Typ	<b>efcooltronic</b>	OFF	<b>26</b> bar	ON <b>man.</b> bar
High pressure safety switch	Typ	<b>PS-3W6S 27/22</b>	OFF	<b>27</b> bar	ON <b>man.</b> bar
Low pressure monitoring	Typ	<b>efcooltronic</b>	OFF	<b>1</b> bar	ON <b>man.</b> bar
Antifreeze monitoring	Typ	<b>efcooltronic</b>	OFF	<b>-18</b> °C	ON <b>-15</b> °C
Flow switch	Typ	<b>DBSF-1K-PL, IP65</b>	OFF	l/min	ON l/min
<b>Limitation of use (consumer circuit)</b>					
Cooling circuit	from	<b>5</b>	°C	to	<b>7</b> °C
<b>Limitation of use (refrigeration circuit)</b>					
Ambient temperature	from	<b>-15</b>	°C	to	<b>45</b> °C
Evaporating temperature	from	<b>-5</b>	°C	to	<b>15</b> °C
Condensing temperature	from	<b>30</b>	°C	to	<b>60</b> °C
max. operation pressure (PS)		<b>28</b>	bar	PED category	<b>II</b>
<b>Electrical data</b>					
Power supply	Voltage	<b>3x460</b>	V	Fuse:	<b>63</b> A
	Frequency	<b>60</b>	Hz	Starting current:	<b>150</b> A
	Contol	<b>24</b>	Vdc		
Total power consumption	P <sub>Operation</sub>	<b>27.9</b>	kW	P <sub>MAX</sub>	<b>31.3</b> kW
Total curent consumption	I <sub>Operation</sub>	<b>44.1</b>	A	I <sub>MAX</sub>	<b>47.4</b> A
<b>Dimensions</b>					
Weight		<b>1000</b>	kg		
Length		<b>2590</b>	mm		
Width		<b>1000</b>	mm		
Height		<b>1935</b>	mm		
<b>Circuit joints</b>					
Circuit	Forward	<b>1 1/2"</b>			
	Return	<b>1 1/2"</b>			

# Technical data / US units

Unit type: **WKL 390 / EVO 45 / 60Hz** Serial number: **0390.013**

**Refrigeration data** Updated 01.06.2015 FRLO

Cooling capacity	<b>46.6</b>	kW	at	(to / tc)	<b>37/140</b>	°F
Condensing capacity	<b>66.2</b>	kW				
Number of refrigeration circuits	<b>1</b>					
Refrigerant	<b>R407c, 18kg</b>					
Compressor	Quantity	<b>2</b>				
	Type	<b>ZR108 KCE-TFD</b>				
	Power consumption	<b>10.3</b>	kW	total	<b>20.6</b>	kW
	Current consumption	<b>15.3</b>	A	total	<b>30.6</b>	A
Condenser	Type	<b>C01/C02</b>				
	Airflow	<b>15360</b>	cfm			
	Quantity of fans	<b>3</b>	Type:			
	Power consumption	<b>1.10</b>	kW	total	<b>3.30</b>	kW
	Current consumption	<b>2.10</b>	A	total	<b>6.30</b>	A

**Operating media**

Medium to be cooled	<b>Propylengl. / Water</b>	<b>34% / 66%</b>
Medium to be cooled	<b>Tank capacity</b>	<b>42 US gal</b>

**Hydraulic data (Producer circuit)**

Pump	Type	<b>CM 10-3</b>				
	Quantity	<b>1</b>				
	Flow rate	<b>33</b>	US gpm	at	<b>94</b>	psi
	Max. delivery height	<b>102</b>	psi	<b>Bypass 96 psi at 32 US gpm</b>		
	Power consumption	<b>4.00</b>	kW	total	<b>4.00</b>	kW
	Current consumption	<b>7.20</b>	A	total	<b>7.20</b>	A
Heat exchanger	<b>SWEP</b>	Type	<b>V80x60</b>			
		Quantity	<b>1</b>			
		Flow rate	<b>39</b>	US gpm	Pressure loss	<b>5.8</b> psi

**Control**

High pressure control	Typ	<b>efcooltronic</b>	Set	<b>104</b>	°F	P-Band	<b>10</b>	K
Temperature control	Typ	<b>efcooltronic</b>	Set	<b>45</b>	°F	P-Band	<b>1</b>	K

**Safety device**

High pressure monitoring	Typ	<b>efcooltronic</b>	OFF	<b>377</b>	psi	ON	<b>man.</b>	psi
High pressure safety switch	Typ	<b>PS-3W6S 27/22</b>	OFF	<b>392</b>	psi	ON	<b>man.</b>	psi
Low pressure monitoring	Typ	<b>efcooltronic</b>	OFF	<b>15</b>	psi	ON	<b>man.</b>	psi
Antifreeze monitoring	Typ	<b>efcooltronic</b>	OFF	<b>-0.5</b>	°F	ON	<b>5</b>	°F
Flow switch	Typ	<b>DBSF-1K-PL, IP65</b>	OFF		l/min	ON		l/min

**Limitation of use (consumer circuit)**

Cooling circuit	from	<b>41</b>	°F	to	<b>45</b>	°F
-----------------	------	-----------	----	----	-----------	----

**Limitation of use (refrigeration circuit)**

Ambient temperature	from	<b>5</b>	°F	to	<b>113</b>	°F
Evaporating temperature	from	<b>23</b>	°F	to	<b>59</b>	°F
Condensing temperature	from	<b>86</b>	°F	to	<b>140</b>	°F
max. operation pressure (PS)		<b>406</b>	psi			PED category <b>II</b>

**Electrical data**

Power supply	Voltage	<b>3x460</b>	V	Fuse:	<b>63</b>	A
	Frequency	<b>60</b>	Hz	Starting current:	<b>150</b>	A
	Contol	<b>24</b>	Vdc			
Total power consumption	P <sub>Operation</sub>	<b>27.9</b>	kW	P <sub>MAX</sub>	<b>31.3</b>	kW
Total curent consumption	I <sub>Operation</sub>	<b>44.1</b>	A	I <sub>MAX</sub>	<b>47.4</b>	A

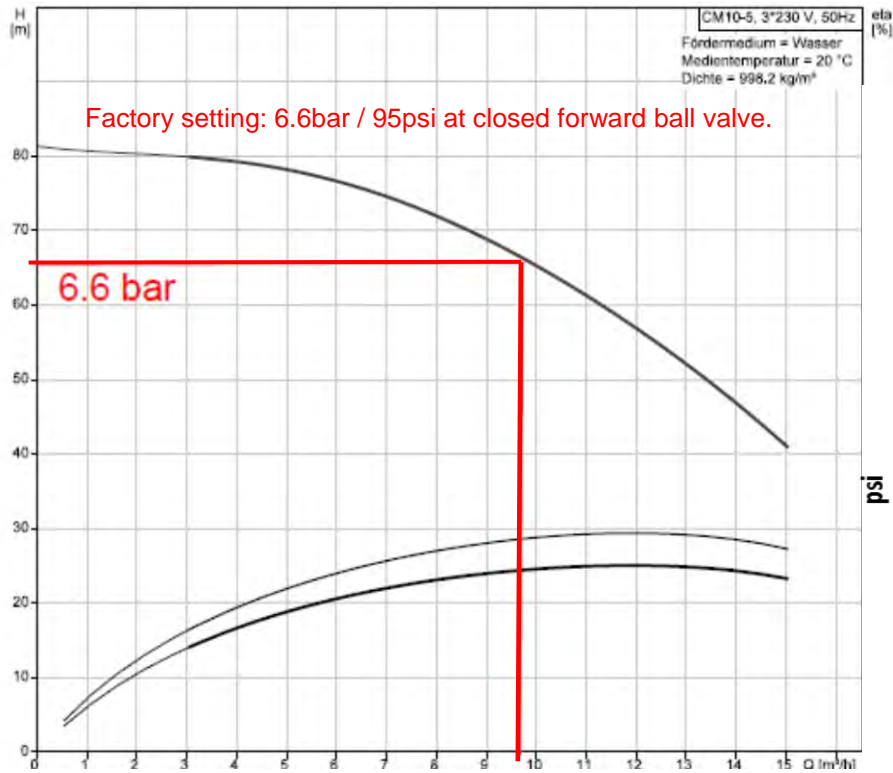
**Dimensions**

Weight	<b>2205</b>	lb
Length	<b>102</b>	"
Width	<b>39</b>	"
Height	<b>76</b>	"

**Circuit joints**

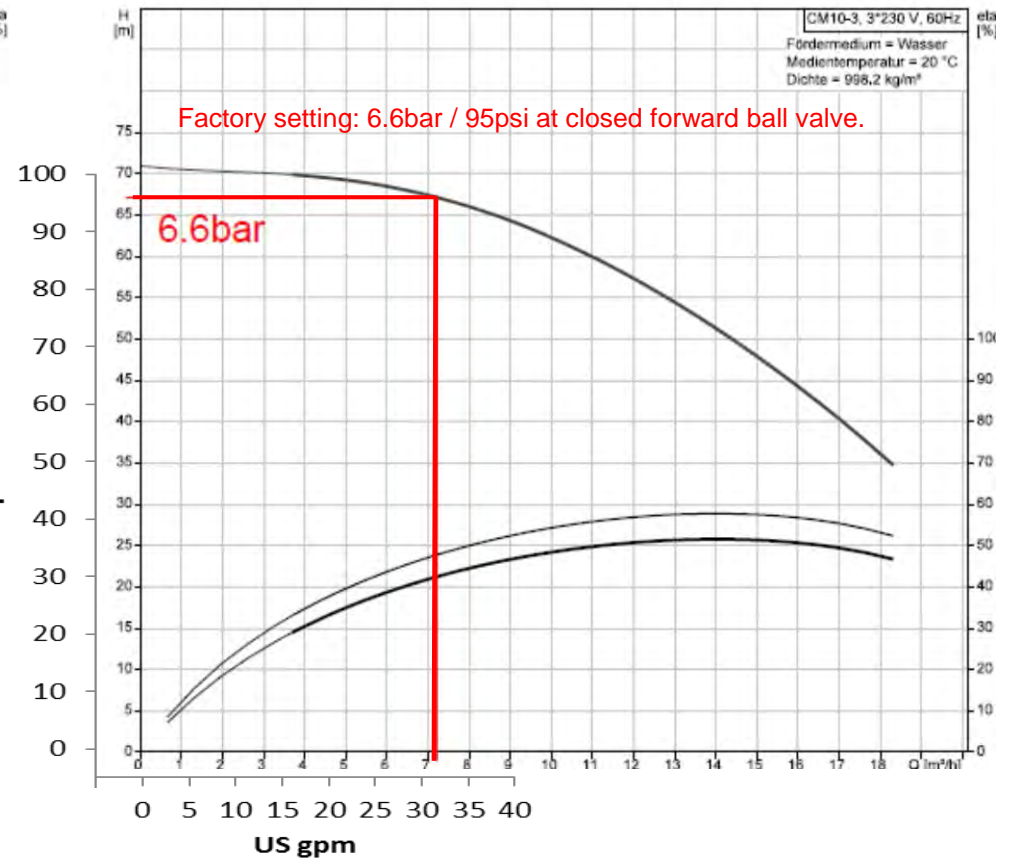
Circuit	Forward	<b>1 1/2"</b>
	Return	<b>1 1/2"</b>

Pump diagram 3 x 400V, 50Hz



Rated flow: 9.6 m<sup>3</sup>/h = 160 L/min

Pump diagram 3 x 480V, 60Hz



Rated flow: 7.2 m<sup>3</sup>/h = 120 L/min = 31.7 US gpm



## **13.2 Statement of Conformity**





# DECLARATION OF CONFORMITY CE 1250

**DE**

## KONFORMITÄTS- ERKLÄRUNG

Hiermit erklären wir eigenverantwortlich, dass die Maschine den folgenden Richtlinien entspricht:

- Maschinenrichtlinie 2006/42/EC
- EMV Richtlinie 2004/108/EC
- Niederspannung Richtlinie 2006/95/EC
- Druckgeräte-Richtlinie 97/23/EC
- EN 378 / AD 2000

**SP**

## DECLARACION DE CONFORMIDAD

Declara bajo su única responsabilidad que la máquina es conforme a:

- Directivas máquina 2006/42/EC
- Directivas EMC 2004/108/EC
- Directivas 2006/95/EC
- Directivas 97/23/EC
- EN 378 / AD 2000

**EN**

## DECLARATION OF CONFORMANCE

We declare under our responsibility that the unit is in accordance with:

- Machine directives 2006/42/EC
- EMC directives 2004/108/EC
- Low tension directives 2006/95/EC
- Directive 97/23/EC
- EN 378 / AD 2000

Type:

**WKL 390**

Series:

**0390.013**

Max. allowable pressure PS:

28.0 bar

Allowable max./min. temperatur TS:

45 / -15 °C

Performance Pc:

67 kW

Fluid (contained) – fluid group:

Group 2 (gaseous or liquid)

**FR**

## DECLARATION DE CONFORMITE

Déclare, sous sa totale responsabilité, que la machine est conforme aux:

- Machine directives 2006/42/EC
- EMC directives 2004/108/EC
- Bas tension directives 2006/95/EC
- Directive 97/23/EC
- EN 378 / AD 2000

Conformity assessment procedures.:

Modul H: full assurance

The Pressure Equipment

Directive Notified Body:

The Certification Body CE1250

Schweizerische Vereinigung  
für Qualitäts- und Management-  
Systeme (SQS)  
Bernstrasse 103 Zollikofen  
CH-3052 Zollikofen

**IT**

## DICHIARAZIONE DI CONFORMITA

Dichiariamo sotto la nostra responsabilità che la macchina é conforme a:

- Direttiva macchine 2006/42/EC e successive modifiche
- Direttiva compatibilità elettromagnetica 2004/108/EC
- Direttiva Bassa tensione 2006/95/EC
- Direttiva 97/23/CE
- EN 378 / AD 2000

Responsible for documentation: Franz Loosli, phone: +41 44 849 79 23

Name

Valla

Nellen

Firstname

Roman

Silvan

Position

Sales manager

Head of technic

Town, Date

Dällikon,

28.05.2015

Signature



# DECLARATION OF CONFORMITY CE 1250

**BEILAGE ZUR KONFORMITÄTSERKLÄRUNG  
DECLARATION OF CONFORMITY - ANNEX  
ANNEXE À LA DÉCLARATION DE CONFORMITÉ  
ALLEGATO ALLA DICHIARAZIONE DI CONFORMITÀ  
ADJUNTO A LA DECLARACIÓN DE CONFORMIDAD**

Beschreibung der Druckgeräte, aus denen sich die Einheit zusammensetzt:

Description of the pressure equipment comprising the assembly:

Description des équipements sous pression qui constituent l'ensemble:

Descrizione delle attrezzature a pressione che compongono l'insieme:

Descripción de los equipos a presión que forman parte del conjunto:

Typ Type Type  
Tipo Tipo Tipo

**WKL 390**

Serie Series Série

Serie Série

**0390.013**

Beschreibung Description Description Descrizione Descripción	Kategorie Category Catégorie Categoria Categoría	Formular zur Konformitätsbewertung Conformity assessment procedure Module d'évaluation conformité Modulo valutazione conformità Modelo evaluación conformidad
FD	ART.3 PAR.3	-
SG	ART.3 PAR.3	-
CO	II	MOD.D1
CD	-	-
PT	ART.3 PAR.3	-
PR	IV	MOD.B+D
EXV	ART.3 PAR.3	-
SOV	ART.3 PAR.3	-
SV	-	-
EV	I	MOD.B+D
SA	-	-
OS	-	-
CT	I	MOD.A

## DECLARATION OF CONFORMITY CE 1250

	DE	EN	FR	IT	SP
FD	Filtertrockner	Filter drier	Filtre sécheur	Filtro essicatore	Filtro secador
SG	Schauglas	Sight glass	Voyant	Vetro spia	Mirilla de inspección
CO	Verdichter	Compressor	Compresseur	Compressore	Compresor
CD	Verflüssiger	Condenser	Condenseur	Condensatore	Condensador
PT	Drucktransmitter	Pressure transducer	Transmetteur de pression	Trasmettitore pressione	Transductor de presión
PR	HD Pressostat	Pressostat HP	Pressostat HP	Pressostato AP	Presóstato AP
EXV	Expansionsventile	Expansion valve	Détendeur	Valvola di espansione	Válvula de expansión
SOV	Magnetventil	Solenoid valve	Vanne solénoide	Elettrovalvola	Válvula magnética
SV	Sicherheitsventil	Safety valve	Soupape de sûreté	Valvola di sicurezza	Válvula de seguridad
EV	Verdampfer	Evaporator	Évaporateur	Evaporatore	Evaporador
SA	Kältemittel Sammler	Liquid receiver	Réservoir de liquide	Ricevitore di liquido	Receptor de líquido
OS	Ölabscheider	Oil separator	Séparateur d'huile	Separatore olio	Separador de aceite
CT	Kupferrohr-Leitung	Copper tube	Tubes en cuivre	Tubi rame	Tubos de cobre

# DECLARATION OF CONFORMITY COPPER TUBE

**DE**

## KONFORMITÄTS- ERKLÄRUNG

Hiermit erklären wir eigenverantwortlich, dass die Maschine betreffend den Kupferleitungen den folgenden Richtlinien entspricht:

- EN 12735-1:2010
- EN 378 / AD 2000

**EN**

## DECLARATION OF CONFORMANCE

We declare under our responsibility that the unit, relating to the copper tubes, is in accordance with:

- EN 12735-1:2010
- EN 378 / AD 2000

**FR**

## DECLARATION DE CONFORMITE

Nous déclarons sous notre responsabilité, que la machine, concernant à des tubes en cuivre, est conforme aux:

- EN 12735-1:2010
- EN 378 / AD 2000

**IT**

## DICHIARAZIONE DI CONFORMITA

Dichiariamo sotto la nostra responsabilità che la macchina, concernente re tubazioni di rame, é conforme a:

- EN 12735-1:2010
- EN378 / AD 2000

**SP**

## DECLARACION DE CONFORMIDAD

Declara bajo su única responsabilidad que la máquina, concerniente a tubos de cobre, es conforme a:

- EN 12735-1:2010
- EN 378 / AD 2000

**PO**

## DECLARACAO DE CONFORMIDADE

Declara, sob inteira responsabilidade, que a máquina, em relação aos tubos de cobre, está conformidade em:

- Directivas da máquina 2006/42/EC
- EN 378 / AD 2000

**SE**

## FÖRKLARING OM ÖVERENSSTÄMMELSE

Vi försäkrar under vårt enda ansvar att enheten, i samband med kopparrör, är i enlighet med:

- EN 12735-1:2010C
- EN 378 / AD 2000

**PL**

## DEKLARATIA OF CGODNOSCI

Deklarujemy, na naszą odpowiedzialność, że tylko jednostki, związane z miedzi rury, jest zgodne z:

- EN 12735-1:2010
- EN 378 / AD 2000

**RUS**

## Декларацию соответствия

Мы заявляем под свою ответственность, что блок, относящийся к меди Трубы, в соответствии с:

- EN 12735-1:2010
- EN 378 / AD 2000

**CN**

## 一致性声明

我们在此声明·本机器的铜导线符合下述准则·我们对此声明完全负责:



- EN 12735-1:2010
- EN 378 / AD 2000

**JP**

## 適合宣言書

弊社の責任により、本ユニットは次の事項に適合することを宣言します:

- EN 12735-1:2010
- EN 378 / AD 2000

<b>Type:</b>	<b>WKL 390</b>	
<b>Series:</b>	<b>0390.013</b>	
Max. allowable pressure in refriger. circuit PS:	28.0	bar
Allowable ambient temperature TS, max./min.:	45 / -15	°C
Performance Pc:	67	kW
Responsible for documentation: Franz Loosli, phone: +41 44 849 79 23		
Name	Valla	Nellen
Firstname	Roman	Silvan
Position	Sales manager	Head of technic
Town, Date	Dällikon,	28.05.2015
Signature		



## **13.3 Bill of materials/Spare parts list**



					<b>EVO 45 60Hz. version</b> <b>Spannung</b> <b>3 x 460V / 60 Hz</b>		<b>ef cooling</b> Ernst H. Furrer AG Hüttenwiesenstrasse 8 CH-8108 Dallikon Fon +41 44 849 79 00 Fax +41 44 849 79 01 info@efcooling.com www.efcooling.com 		
		<b>Kältemaschine</b> <b>Schaltschrank</b>			<b>WKL 390 / 0390.013</b>				
Pos	Pos	Stk/E	Stk/E	Stk/E	Artikel-Nr.	Artikel-Bezeichnung	Benennung	Description	Désignation
mech	elektr								
1		2	2		1010120	0-6 bar	Druckmessgerät	manometer	Manomètre
2		1	1		1010185	0-10 bar	Druckmessgerät	manometer	Manomètre
3		1	1		1060126	1", 2.0 - 8.0 bar	Überströmventil	overflow valve	soupape de décharge
4		5	5		1100112	1200 x 600 mm; Efcooling	Filtermatten	filter mats	cartouche filtrante
5		1	1		1100115	10" Gehäuse, 11/2, ohne Entlüftung	Filtergehäuse	water filter casing	boîtier de filtre
6		1	1		1100116	Schlüssel zu Filtergehäuse Big Blue 10/20	Schlüssel	Filter key	Clé de boîtier de filtre
7		1	1		1100118	10", 50µm filter cartridge Big Blue	Filtereinsatz	Filter insert	Garniture de filtre
8		1	1		1100238	7/8" löt, 4132/7S	Filtertrockner	Filter drier	Dessiccateur de filtre
13	8B1	1	1		1130005	NTC, Kabel 6 m, zu CAREL-Regler S 90 (Tank)	Temperaturfühler	Temperature probe	Sonde de temperature
14	8B2	1	1		1130005	NTC, Kabel 6 m, zu CAREL-Regler S 90 (Verdampfer)	Temperaturfühler	Temperature probe	Sonde de temperature
16		1	1		1141235	400 x 530 x 800 mm, 160 L	Tank	Tank	Réservoir
17		1	1		1141661	zu WKL 560, NCS S 7502-R Str.	Gehäuse	housing	logement
18		1	1		1141942	990 x 700 x 660 mm	Einbaurahmen Hydraulik	frame hydraulic	cadre hydrauliques
19		1	1		1160046	d=50mm, mit Schlitz, 24VDC/10W	Heizfolie	Heating foil	Feuille de chauffage
21	3M3	1	1		1210221	ZR 08 KCE-TFD-550 (Summit)	Verdichter	Compressor	Compresseur
22	3M5	1	1		1210221	ZR 08 KCE-TFD-550 (Summit)	Verdichter	Compressor	Compresseur
23	4E7	1	1		1210226	480 V, 90 W (400 V, 70 W)	Carterheizung	Crankcase heater	Résistance carter
24	4E8	1	1		1210226	480 V, 90 W (400 V, 70 W)	Carterheizung	Crankcase heater	Résistance carter
27		1	1		1220082	2100 (2170) x 696 x 100 mm, links	Verflüssiger	Condenser	Condenseur
28		1	1		1220083	2100 (2170) x 696 x 100 mm, rechts	Verflüssiger	Condenser	Condenseur
31	7B2	1	1		1300015	L1 = 70mm NC / L2 = 190mm NO	Schwimmerschalter	Level switch	Niveau interrupteur
32	3M6	1	1		1310719	CM 10-3	Kreiselpumpe	Pump	Pompe
33	6B2	1	1		1320060	PA-21 G, 0-30 bar g, 4-20 mA	Drucksensor	Pressure Transducer	Pression transmetteur
34	6B3	1	1		1320061	PAA-21 G, 0-15 bar a, 4-20 mA	Drucksensor	Pressure Transducer	Pression transmetteur
35	7B5	1	1		1320063	PS3-W6S 27/22 O, HD-Pressostat, 27/22 bar	Pressostat	HP Pressostat	HP Pressostat
36		1	1		1320065	zu PS3 3P+E	Stecker	plug	plug
37	7B4	1	1		1400002	DBSF-1K-PL, IP65, max. 11 bar, mit V4A Paddel	Strömungswächter	Flow switch	Sonde de détection
40	4M1 (7B6)	1	1		1570007	3x400/460 V, 50/60 Hz, UL-zertifiziert	Ventilator	Fan	Ventilateur
41	4M3 (7B7)	1	1		1570007	3x400/460 V, 50/60 Hz, UL-zertifiziert	Ventilator	Fan	Ventilateur
42	4M5 (7B8)	1	1		1570007	3x400/460 V, 50/60 Hz, UL-zertifiziert	Ventilator	Fan	Ventilateur
43		3	3		1580045	1/2" i/a, PN 10, Mini	Kugelhahn	Ball valve	Vanne sphérique
44		1	1		1580100	7/8" Löt	Kugelventil	Ball valve	Vanne sphérique
45	10Y3	1	1		1580107	Spule mit Klemmdose, 24 V DC	Magnetventilspule	Solenoid	Bobine excitatrice
46		1	1		1580126	TEZ 12, MOP +15°C, R407C	Thermoteil	Thermostatic element	Élément thermosensible
47		1	1		1580128	TE 12, Löt-Eck 7/8 x 1 1/8"	Ventilgehäuse	Casing solder - corner	Boîte soudé - coin
48		1	1		1580146	TEZ 12, Düse Nr. 5	Düseneinsatz	Orifice assembly	Cartouches d'orifices
49		1	1		1580287	EVR 6, 5/8" Löt	Magnetventil	Solenoid valve	Electrovanne
50		2	2		1580304	1 1/2" i/i, mit Flachstahlgriff, PN 25	Kugelhahn	Ball valve	Vanne sphérique
51		1	1		1580372	1 1/8" Löt, mit Schraderventil	Kugelventil	Ball valve	Vanne sphérique
52		1	1		1610318	V80Hx60/1P-SC-S	Verdampfer	Evaporator	Evaporateur

					<b>EVO 45 60Hz. version</b> <b>Spannung</b> <b>3 x 460V / 60 Hz</b>		<b>ef cooling</b> Ernst H. Furrer AG Hüttenwiesenstrasse 8 CH-8108 Dallikon Fon +41 44 849 79 00 Fax +41 44 849 79 01 info@efcooling.com www.efcooling.com 		
		<b>Kältemaschine</b> <b>Schaltschrank</b>			<b>WKL 390 / 0390.013</b>				
Pos	Pos	Stk/E	Stk/E	Stk/E	Artikel-Nr.	Artikel-Bezeichnung	Benennung	Description	Désignation
mech	elektr								
200		1		1	1081002	800 x 800 x 210mm	Schaltschrank	Switch board	cabinet
201		1		1	1080909	331 x 277 x 23mm	Sichtfenster	windowed	fenêtré
202	3S1	1		1	1400149	37 kW, 3-polig	Hauptschalter	Main switch	Interrupteur principal
203	10K3	1		1	1080622	Microcompact 24 V DC, 1,7 A	Optokoppler / Relais	Relay	Relais
204	3Q3	1		1	1460764	S00..S3, 1S, Ö, quer liegend	Hilfsschalter quer	Auxilliary contact	Bloc de contact auxilliare
205	3Q5	1		1	1460764	S00..S3, 1S, Ö, quer liegend	Hilfsschalter quer	Auxilliary contact	Bloc de contact auxilliare
206	3Q6	1		1	1460764	S00..S3, 1S, Ö, quer liegend	Hilfsschalter quer	Auxilliary contact	Bloc de contact auxilliare
207	4Q1	1		1	1460764	S00..S3, 1S, Ö, quer liegend	Hilfsschalter quer	Auxilliary contact	Bloc de contact auxilliare
208	4Q3	1		1	1460764	S00..S3, 1S, Ö, quer liegend	Hilfsschalter quer	Auxilliary contact	Bloc de contact auxilliare
209	4Q5	1		1	1460764	S00..S3, 1S, Ö, quer liegend	Hilfsschalter quer	Auxilliary contact	Bloc de contact auxilliare
210	4Q7	1		1	1460764	S00..S3, 1S, Ö, quer liegend	Hilfsschalter quer	Auxilliary contact	Bloc de contact auxilliare
211		1		1	1460328	S00, S0, 4 Schalter, 3 Phasen	Sammelschiene	bus bar	barre collectrice
212		2		2	1460781	Schütz S0 - MS S0	Verbindungsbaustein	link module	link module
213		4		4	1460770	Schütz S00 - MS S00	Verbindungsbaustein	link module	link module
214	11K1	1		1	1460733	S0, 15 kW, 24 V DC	Schütz	Contacteur	Contacteur
215	11K2	1		1	1460733	S0, 15 kW, 24 V DC	Schütz	Contacteur	Contacteur
216	3Q3	1		1	1460682	S0, 14-20 A, 11 kW	Motorschutzschalter	Motor protection switch	Disjoncteur moteur
217	3Q5	1		1	1460682	S0, 14-20 A, 11 kW	Motorschutzschalter	Motor protection switch	Disjoncteur moteur
218		1		1	1460385	S00, S0, 2 Schalter, 3 Phasen	Sammelschiene	bus bar	barre collectrice
219									
220		2		2	1460452	S0, 3 Phasen	Einspeiseklemme	Power Terminal	borne d'entrée
221	3Q6	1		1	1460677	S00, 5,5..8.8 A, 3,0 kW	Motorschutzschalter	Motor protection switch	Disjoncteur moteur
222	4Q7	1		1	1460668	S00, 0,7..1,0 A, 0,25 kW	Motorschutzschalter	Motor protection switch	Disjoncteur moteur
223	5Q3	1		1	1460670	S00, 1,1..1.6 A, 0,55 kW	Motorschutzschalter	Motor protection switch	Disjoncteur moteur
224	4Q1	1		1	1460672	S00, 1,8..2,5 A, 0,75 kW	Motorschutzschalter	Motor protection switch	Disjoncteur moteur
225	4Q3	1		1	1460672	S00, 1,8..2,5 A, 0,75 kW	Motorschutzschalter	Motor protection switch	Disjoncteur moteur
226	4Q5	1		1	1460672	S00, 1,8..2,5 A, 0,75 kW	Motorschutzschalter	Motor protection switch	Disjoncteur moteur
227	9K6	1		1	1460718	S00, 4 kW, 24 V DC	Schütz	Contacteur	Contacteur
228	9K7	1		1	1460718	S00, 4 kW, 24 V DC	Schütz	Contacteur	Contacteur
229	9K8	1		1	1460718	S00, 4 kW, 24 V DC	Schütz	Contacteur	Contacteur
230	10K5	1		1	1460718	S00, 4 kW, 24 V DC	Schütz	Contacteur	Contacteur
231	5T4	1		1	1550267	200-500 V AC, 24 V DC, 5,0 A	Netzgerät	Power pack	Appareil d'alimentation
232	6A1	1		1	1710013	pCO3-medium	Speicherprogrammierbare S	PLC	SPE
233		1		1	1710014	Federzugklemmen	Federzugklemmen	spring clamp	pince à ressort
234		1		1	1710017	0,8 m	Verbindungskabel	connection cable	câble de connexion
235	9A4	1		1	1710042	Steuereinheit zu pCO-SPS	Display	Display	panneau de visualisation
<b>OPTION</b>									
					<b>0390.008OPT4</b>		<b>Rücklaufsicherung</b>	<b>Non return protect.</b>	<b>Protect. anti retour</b>
53		1	1		1580025	1 1/2"	Rückschlagventil	Check valve	Clapet anti-retour
54	10Y7	1	1		1580311	1 1/2", 24 VDC	Magnetventil	Solenoid valve	Electrovanne



					<b>EVO 45 60Hz. version</b>		<b>Spannung 3 x 460V / 60 Hz</b>		<b>ef cooling</b> Ernst H. Furrer AG Hüttenwiesenstrasse 8 CH-8108 Dallikon Fon +41 44 849 79 00 Fax +41 44 849 79 01 info@efcooling.com www.efcooling.com 		
					<b>Kältemaschine Schaltschrank</b>		<b>WKL 390 / 0390.013</b>				
Pos mech	Pos elektr	Stk/E	Stk/E	Stk/E	Artikel-Nr.	Artikel-Bezeichnung	Benennung	Description	Désignation		
<b>OPTION</b>					<b>4050045</b>		<b>Winter kit</b>		<b>Winter kit</b>		<b>Kit d'hiver</b>
55	10B8	1	1		1130027	NTC 015 WH01	Temperaturfühler (Umgebun	Temperature probe	Sonde de temperature		
56	3E8	1	1		1160003	EHK 600/44-CB	Einschraubheizung	Heating	Chauffage		
57	11E3	1	1		1160046	10W, 24 VDC, d 50mm	Heizung	Heating	Chauffage		
237	3Q8	1		1	1460764	S00..S3, 1S, Ö, quer liegend	Hilfsschalter quer	Auxilliary contact	Bloc de contact auxilliare		
238		1		1	1460328	S00, S0, 4 Schalter, 3 Phasen	Sammelschiene	bus bar	barre collectrice		
239		1		1	1460770	Schütz S00 - MS S00, DC	Verbindungsbaustein	link module	link module		
240	10K1	1		1	1460724	S00, 7,5 kW, 24 V DC	Schütz	Contacteur	Contacteur		
241	3Q8	1		1	1460679	S00, 9..12,5 A, 5,5 kW	Motorschutzschalter	Motor protection switch	Disjoncteur moteur		
242	11K3	1		1	108 0622	Microcompact 24 V DC, 1,7 A	Optokoppler / Relais	Relay	Relais		
<b>OPTION</b>					<b>4050047</b>		<b>Fernbedienung</b>		<b>Remote control</b>		<b>Télécommande</b>
300		1	1		1080998		Abzweigdose	connection box	Boîtier de connexion		
301	11H7	1	1		1240053	24 V AC/DC, LED	Leuchtmelder, rot	Indicator light, red	Indicateur lumineux, rouge		
302	9X3	1		1	1710034	TC0NN6J000	Zusatz Anschluss Platine	Additional terminal panel	Panneau de terminal suppl.		
303	9A3	1	1		1710042	PGD1000FW00/01	Display	Display	Display		

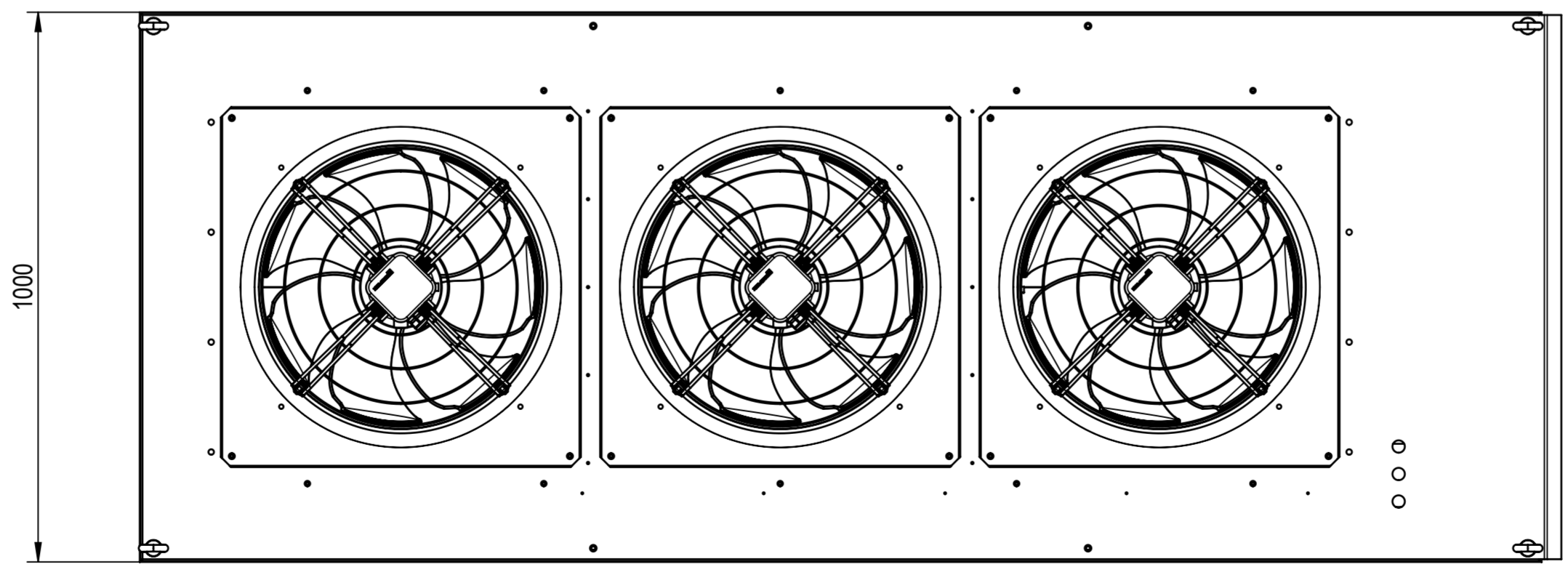
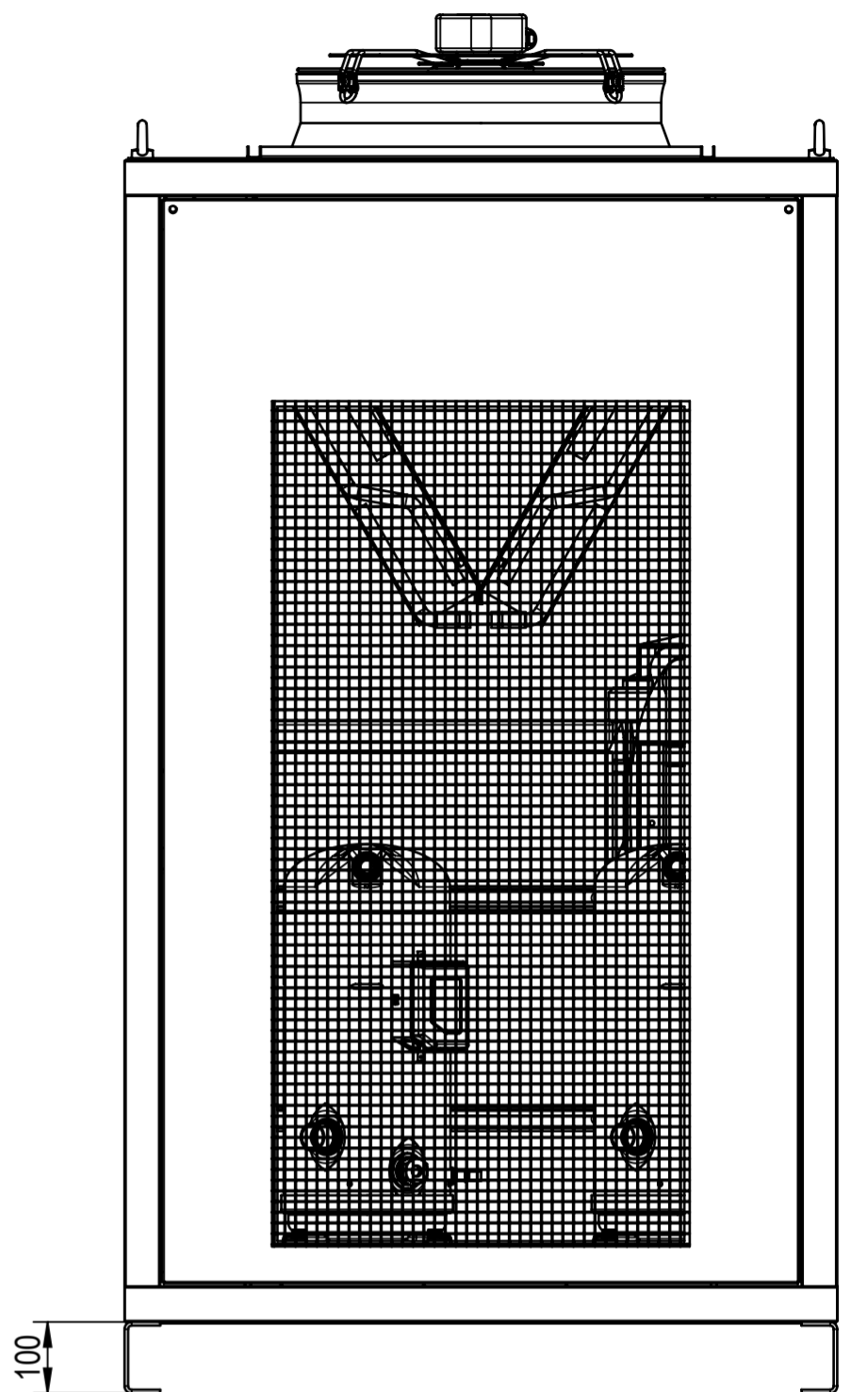
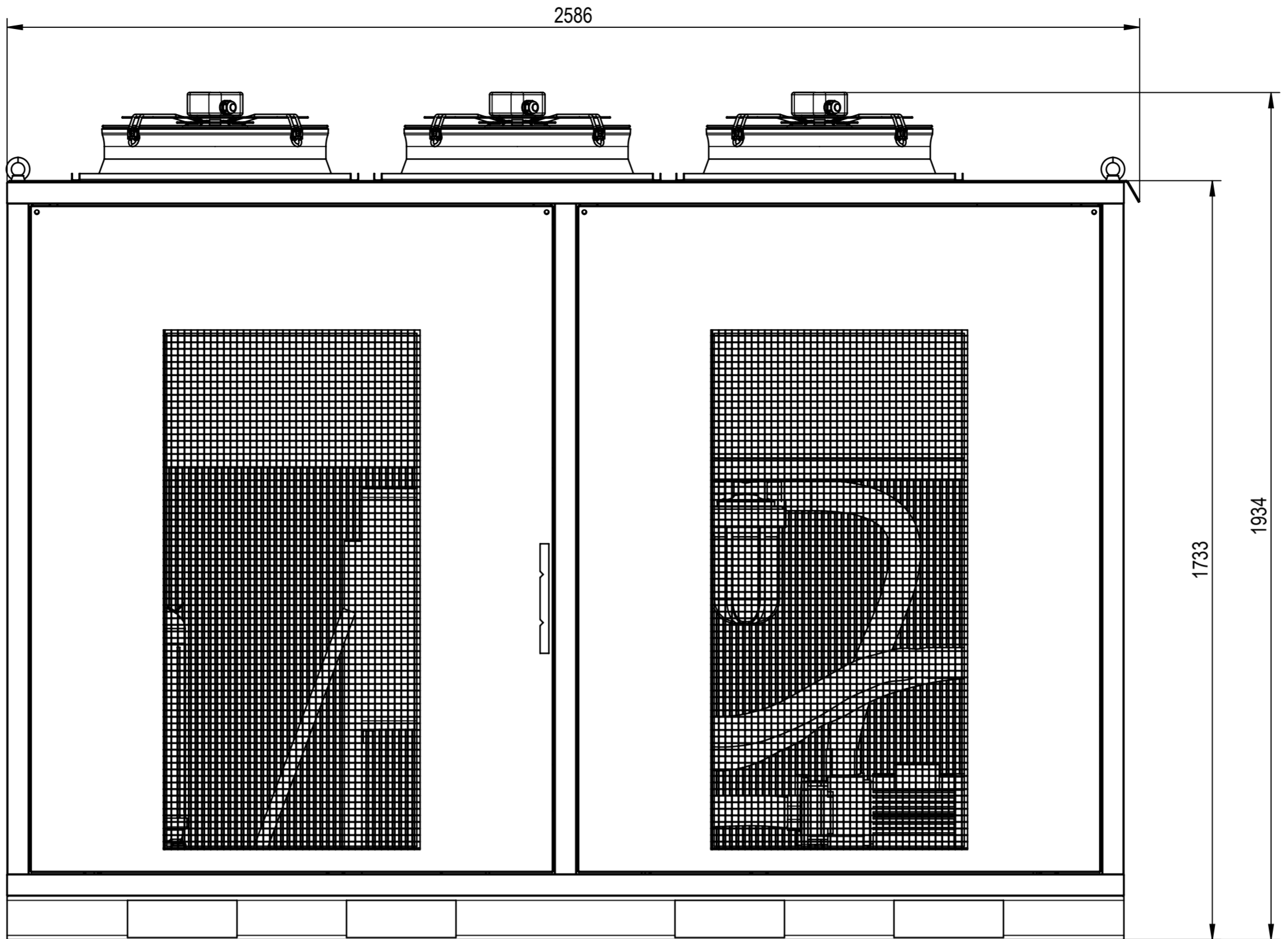
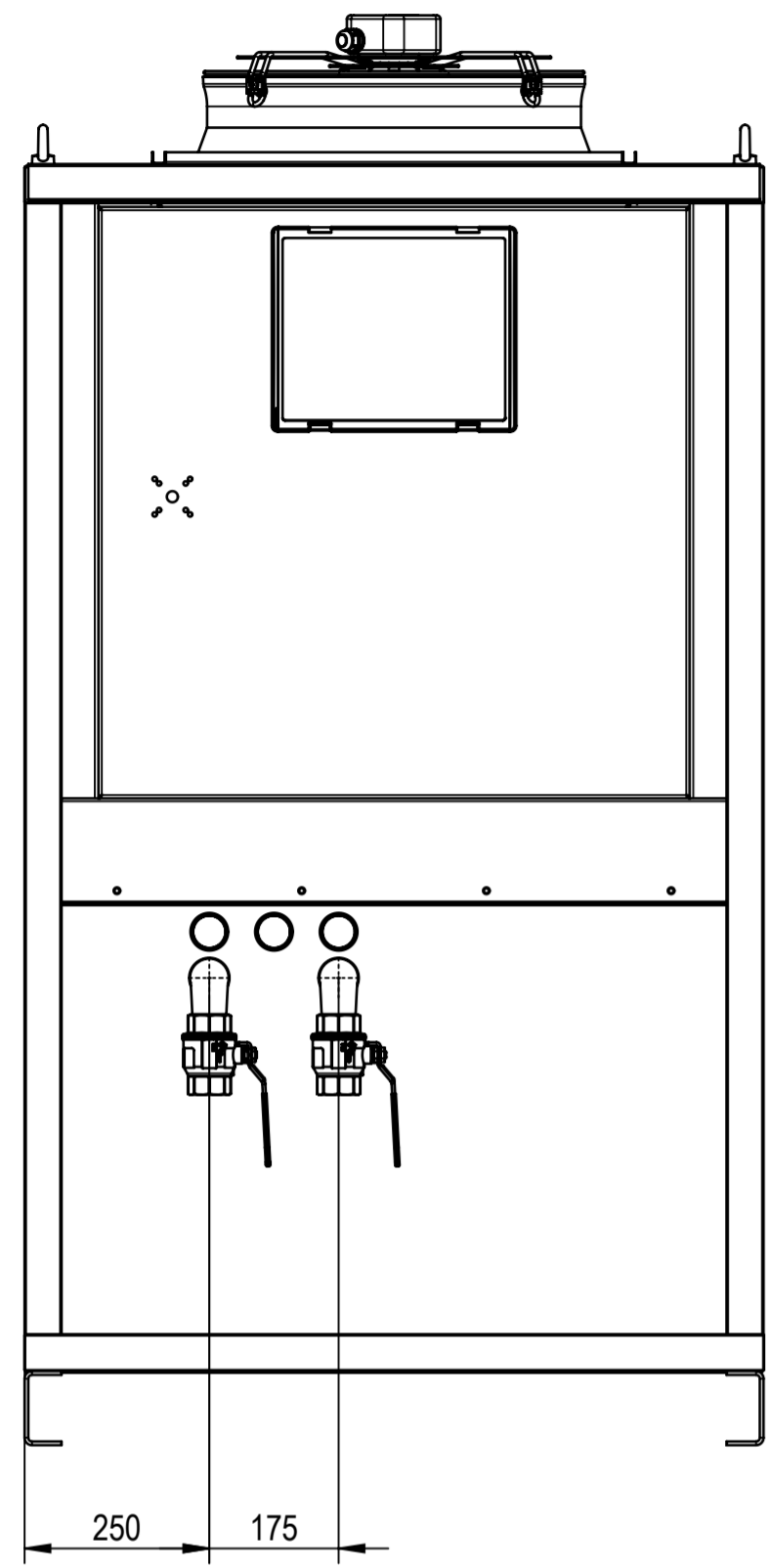


## 13.4 Drawings



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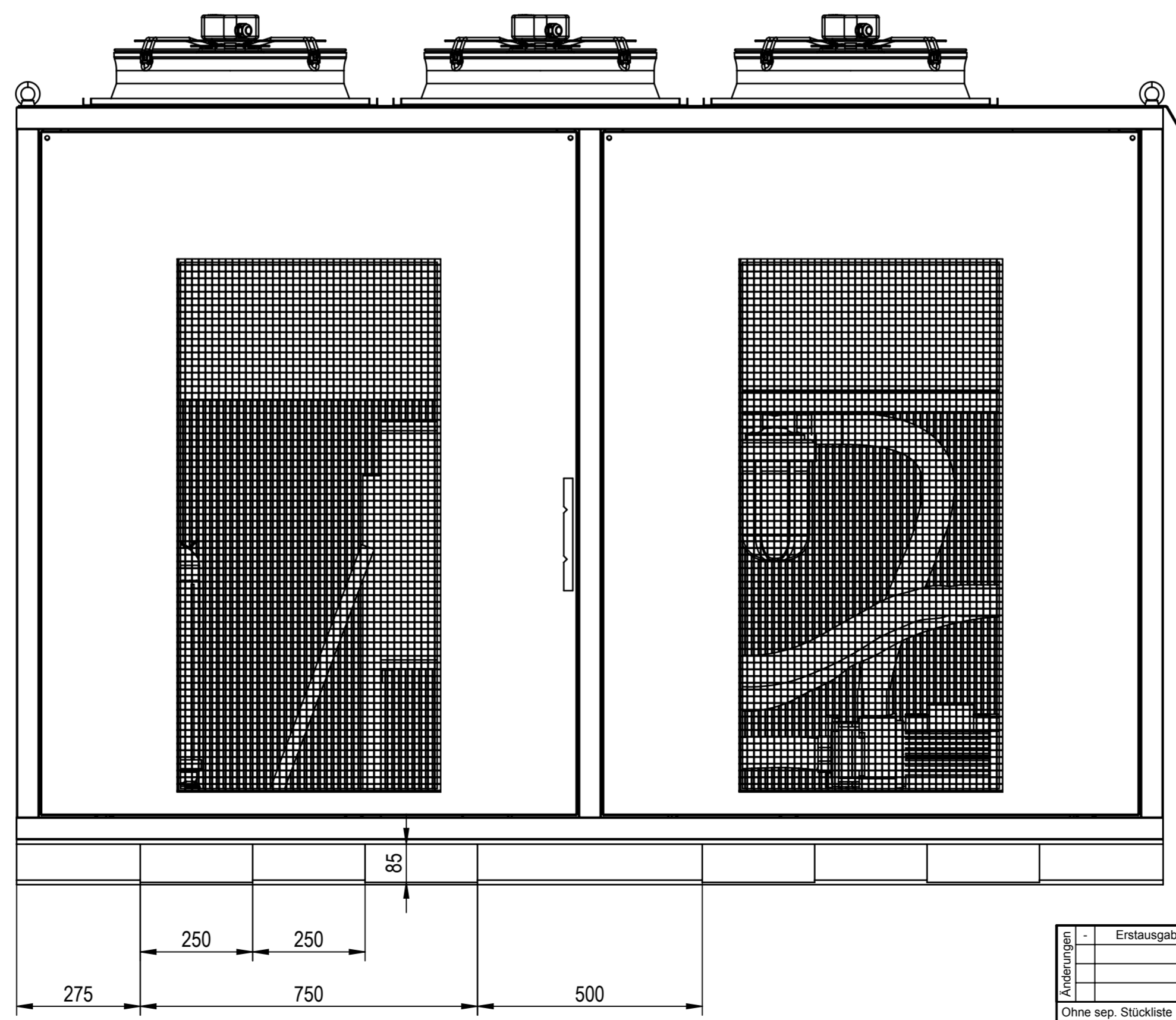
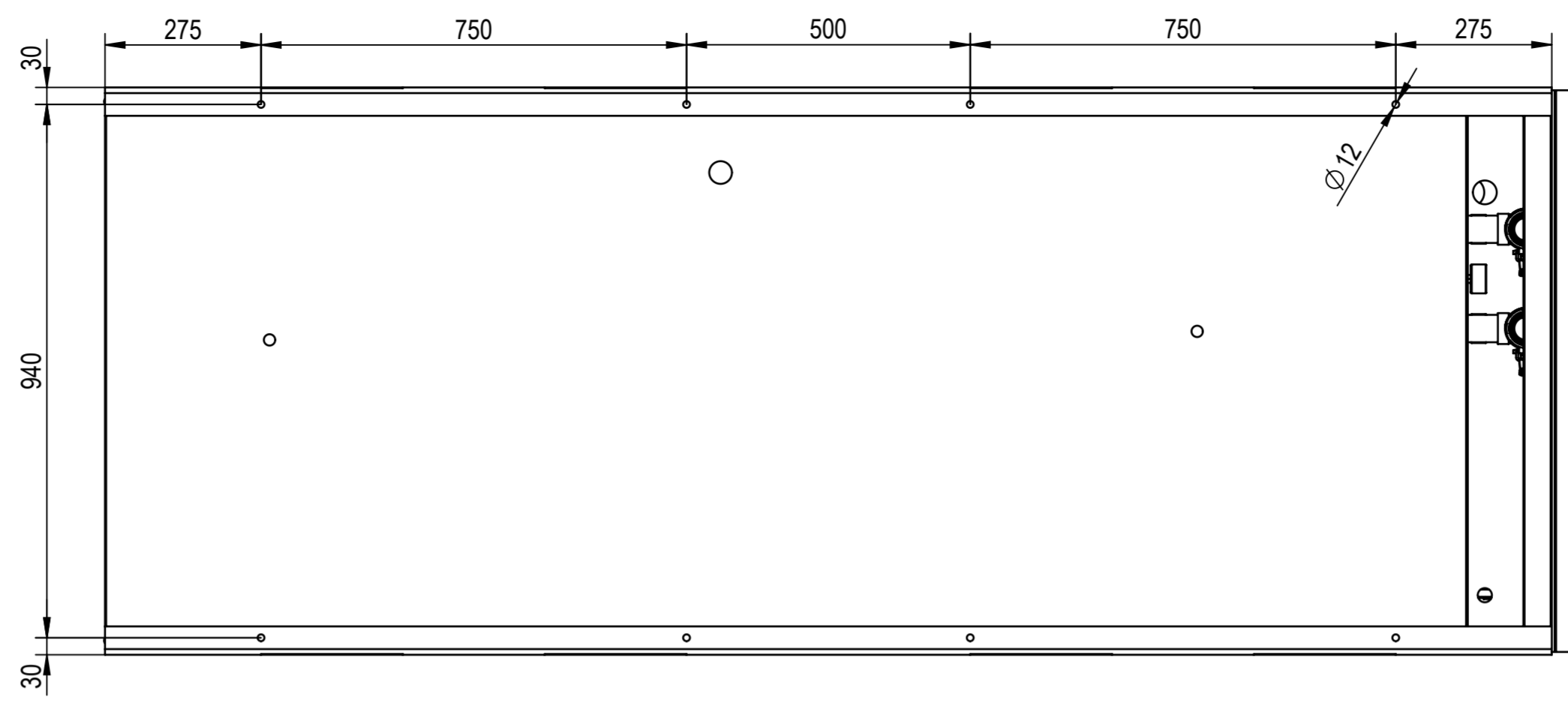


- Erstausgabe		Erstellt 12.06.2014 peter.schaller		Massstab 1:10	
		Geprüft			
		Freigegeben 08.07.2015 CHME			
Änderungen		Auftrags-Nr.		Blatt / Anz. 2 / 3	
Ohne sep. Stückliste		Verwendungsbereich, Projekt		Status Freigegeben	
Sep. Stückliste gleicher Nr.		0390.013		Format A2	
Sep. Stückliste anderer Nr.		Sach- / Artikel-Nr. 0390.013		Ersatz für	
ef cooling		Benennung		Zeichnungs-Nr. 0390.013 -	
Ernst H. Furer AG		Maschinenzeichnung 0390.013		Index	
Kilchenerstrasse 8		0390.013		Plotdatum: 08.07.2015	
CH-8120 Stäben		www.efcooling.com			

CAD-System: SolidWorks

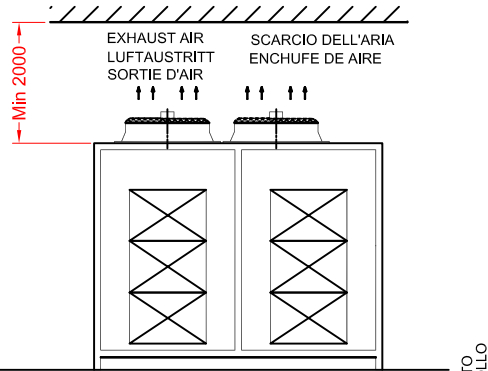
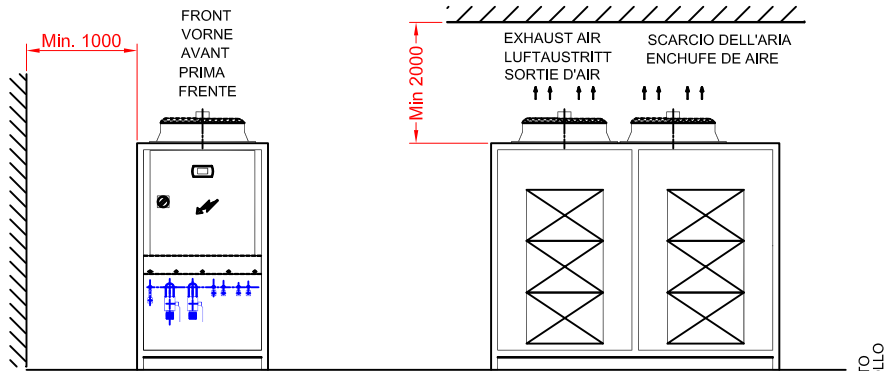
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- Erstausgabe		Erstellt 12.06.2014 peter.schaller		Masstab 1:10	
		Geprüft			
		Freigegeben 08.07.2015 CHME			
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Ursprung		Ersatz für		Format A2	
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Sep. Stückliste gleicher Nr. <input type="checkbox"/>		0390.013		Index	
Sep. Stückliste anderer Nr. <input type="checkbox"/>		Sach- / Artikel-Nr. 0390.013		Benennung	
ef cooling		Maschinenzeichnung 0390.013		0390.013 -	
<small>           ef cooling            Ernst H. Furrer AG            Hiltnerstrasse 8            CH-8108 Dällikon            Tel: +41 44 849 79 00            Fax: +41 44 849 79 02            info@efcooling.com            www.efcooling.com         </small>		<small>           Benennung            Maschinenzzeichnung 0390.013         </small>		<small>           Zeichnungs-Nr.            0390.013 -         </small>	
<small>           Plottedatum: 08.07.2015         </small>					

CAD-System: SolidWorks



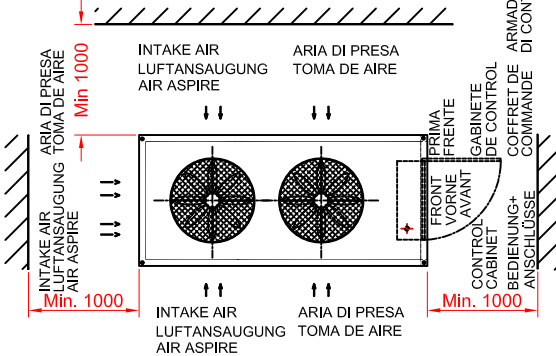
**Normale Aufstellung Im Gebäude.** Frostfreier Raum. Ausreichender Luftwechsel zur Wärmeabfuhr beachten!

**Normal indoor installation.** Frost-free space. Note: Adequate air exchange for heat dissipation!

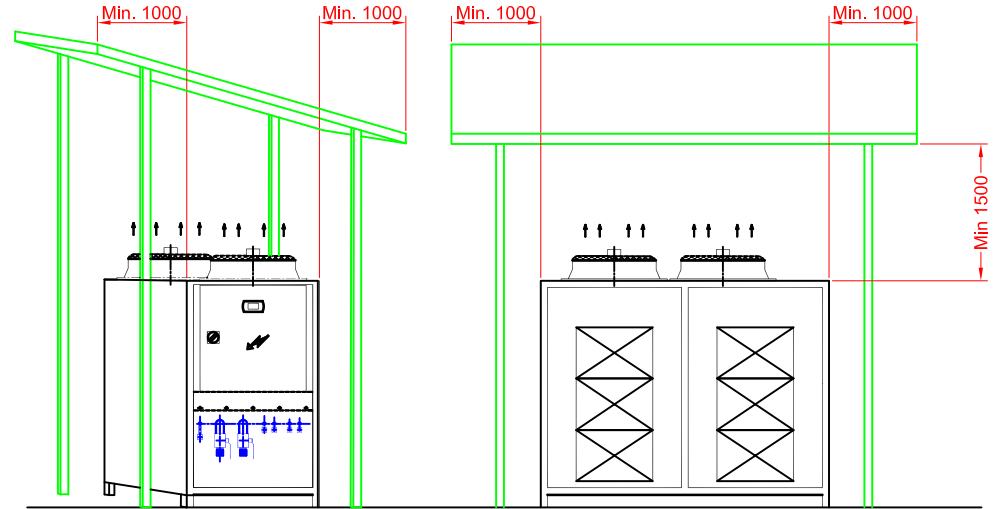
**Installation normale à l'intérieur.** Espace sans gel. Remarque: L'échange d'air suffisant pour la dissipation thermique!

**Installazione normale Interna.** Spazio al riparo dal gelo. Nota: ricambio d'aria adeguato per la dissipazione del calore!

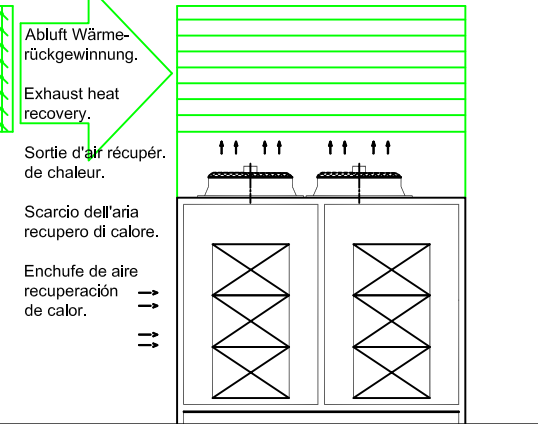
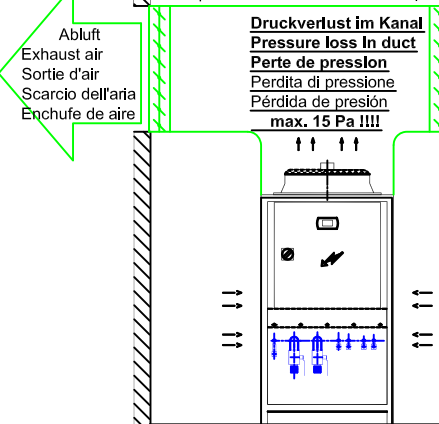
**Instalación Interior normal.** Habitación libre de heladas. Nota: intercambio adecuado de aire para disipar el calor!



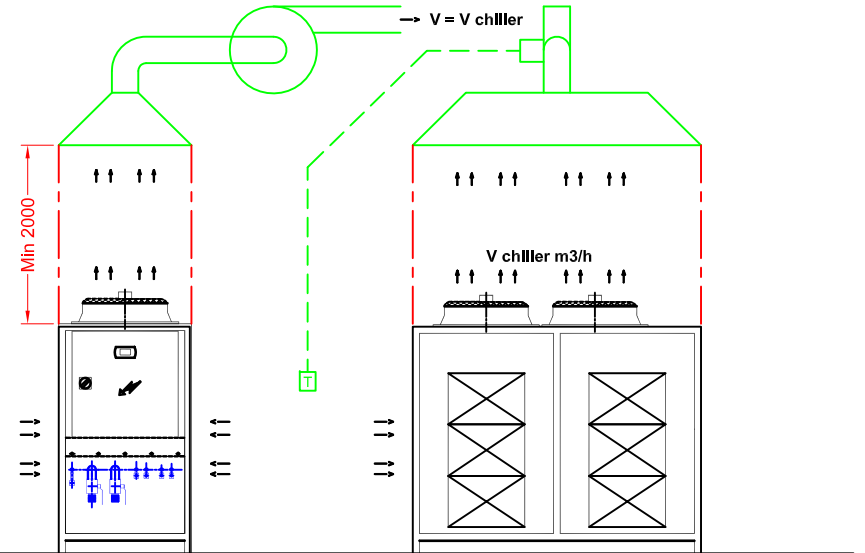
**Aufstellung Im Freien.** Nicht für Alle Anwendungen geeignet! Optionen für Frostschutz beachten! Nur nach Freigabe von efcooling.  
**Outdoor Installation.** Not suitable for all applications! Note: Options for frost protection! Only after approval by efcooling.  
**Installation à l'extérieur.** Ne convient pas pour toutes les applications! Remarque l'option antigèle! Seulement après l'approbation par efcooling.  
**Installazione esterna.** Non adatto per tutte le applicazioni! Nota: Opzioni per la protezione dal gelo! Solo dopo il rilascio di efcooling!  
**Instalación al aire libre.** No es apto para todas las aplicaciones! Opciones para las heladas! Sólo después de la aprobación por parte de efcooling.



Klappe Sommer / Flap summer / Klappe Winter / Flap winter / Rabat été / Falda estate / Rabat hiver / Falda inverno / Solapa verano / Solapa invierno



**Abluftkanal mit internen Ventilatoren betrieben.**  
**Exhaust duct.** Operation with internal fans.  
**Conduit d'évacuation d'air.** Fonctionnement avec des ventilateurs internes.  
**Condotto di scarico dell'aria.** Funzionamento con ventilatori interni.  
**Conducto de escape de aire.** Operación con los ventiladores internos.



**Abluftkanal mit externem Ventilator.** V = Luftmenge: siehe tech. Daten Kühlgerät.  
**Exhaust duct.** Operation with external fan. V = Airflow: see technical data chiller.  
**Conduit d'évacuation d'air.** Fonctionnement avec ventilateur externe. V = voir données technique app. frigo.  
**Condotto di scarico dell'aria.** Funzionamento con ventilatore esterno. V = vedi dati tecnici chiller.  
**Conducto de escape de aire.** Funcionación con un ventilador externo. V = consulte datos técnicos enfriador.

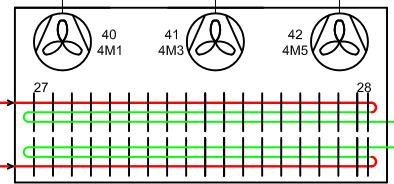
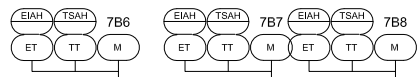
AENDER.	DATUM	VISUM	DATUM	VISUM
		GEZ.	30.11.11	FRLO
A. Logo	26.05.15	FRLO	GEPR.	07.12.11



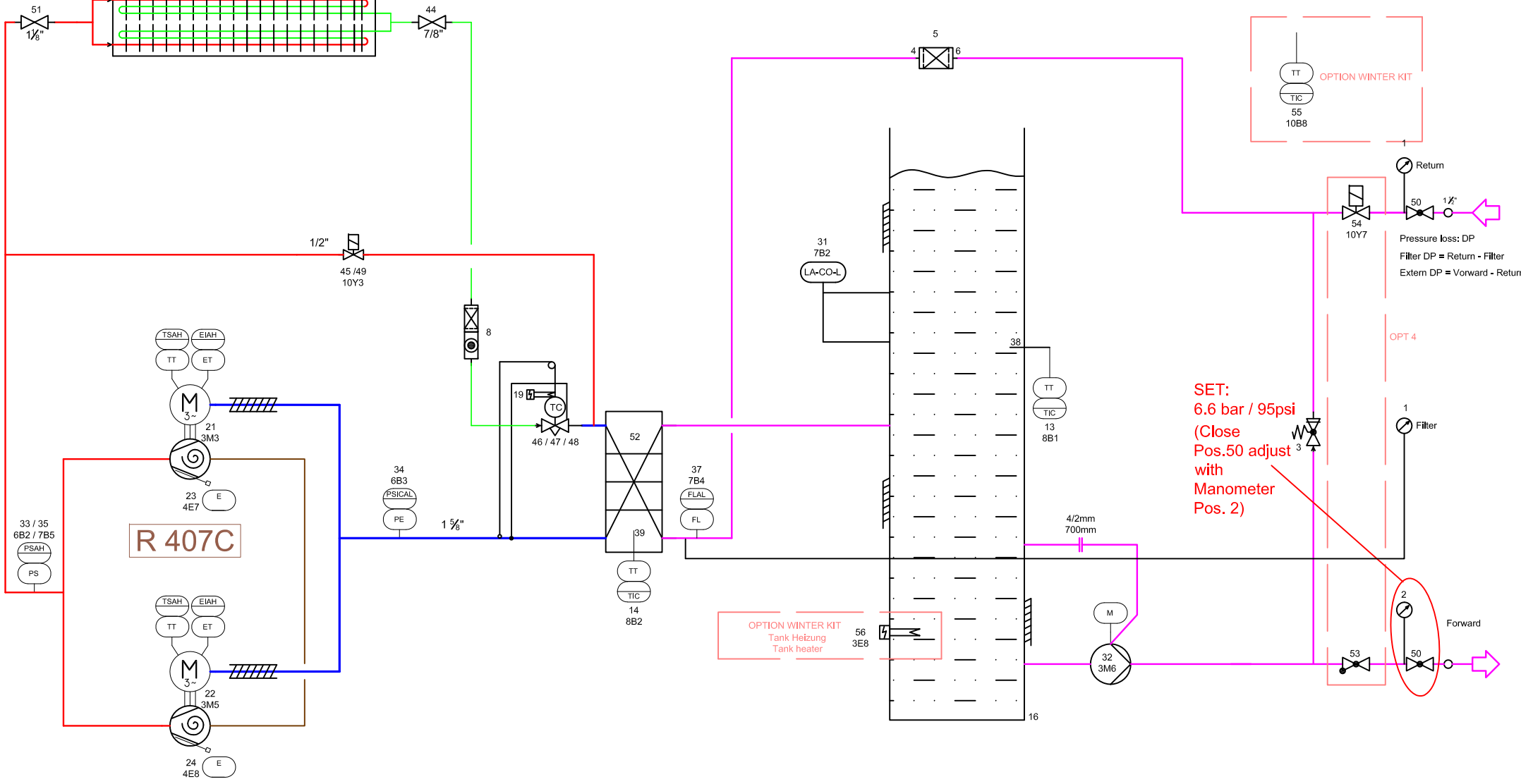


## **13.5 Refrigeration/hydraulics diagram**





Discharge line	Heissgasleitung	R-407C	max. 28 bar
Liquide line	Flüssigkeitsleitung	R-407C	max. 28 bar
Suction line	Sauggasleitung	R-407C	max. 28 bar
Cold water circuit	Kühlwasser Kreislauf	66%Water (34%Propylenglycol)	



SET:  
6.6 bar / 95psi  
(Close  
Pos.50 adjust  
with  
Manometer  
Pos. 2)

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info@efcooling.com  
www.efcooling.com



		Datum	Name	Typ <b>EVO 45</b>	
		Bearb.	10.06.14	MILI	R+I Schemata
R3	Bypass set	20.05.15	FRLO	Gepr.	-
R2	Entfernung Kugelhähne (Pos 43)	30.06.14	URSC	Mass-Stab	Format
R1	Anpassungen Pos. gem. aktueller Stückliste	30.06.14	URSC	1:1	A4
Rev.	Änderung	franz.loosli Kälteschema_0390.013.dwg	20.05.2015 11:09	Datum	Name
				(Urspr.)	URSPRUNG
				(Ers. f.)	ERS_F
				(Ers. d.)	ERS_D
Zeichnungsnummer					Blatt 1
<b>0390.013_60HZ_KS</b>					von 1



## 13.6 Wiring diagram



# ELEKTROSCHEMA

# SCHEMA ELECTRIQUE

# ESQUEMA ELÉCTRICO

# ELECTRICAL DIAGRAM

# SCHEMA ELETTRICO



*the smart way of cooling!*

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 Ernst H. Furrer AG  
 Hüttenwiesenstrasse 8  
 CH-8108 Dällikon



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 Fax. +41 44 849 79 01

info@efcooling.com  
 www.efcooling.com

Project: HP Indigo 10000

Typ: EVO 45 60Hz. Version

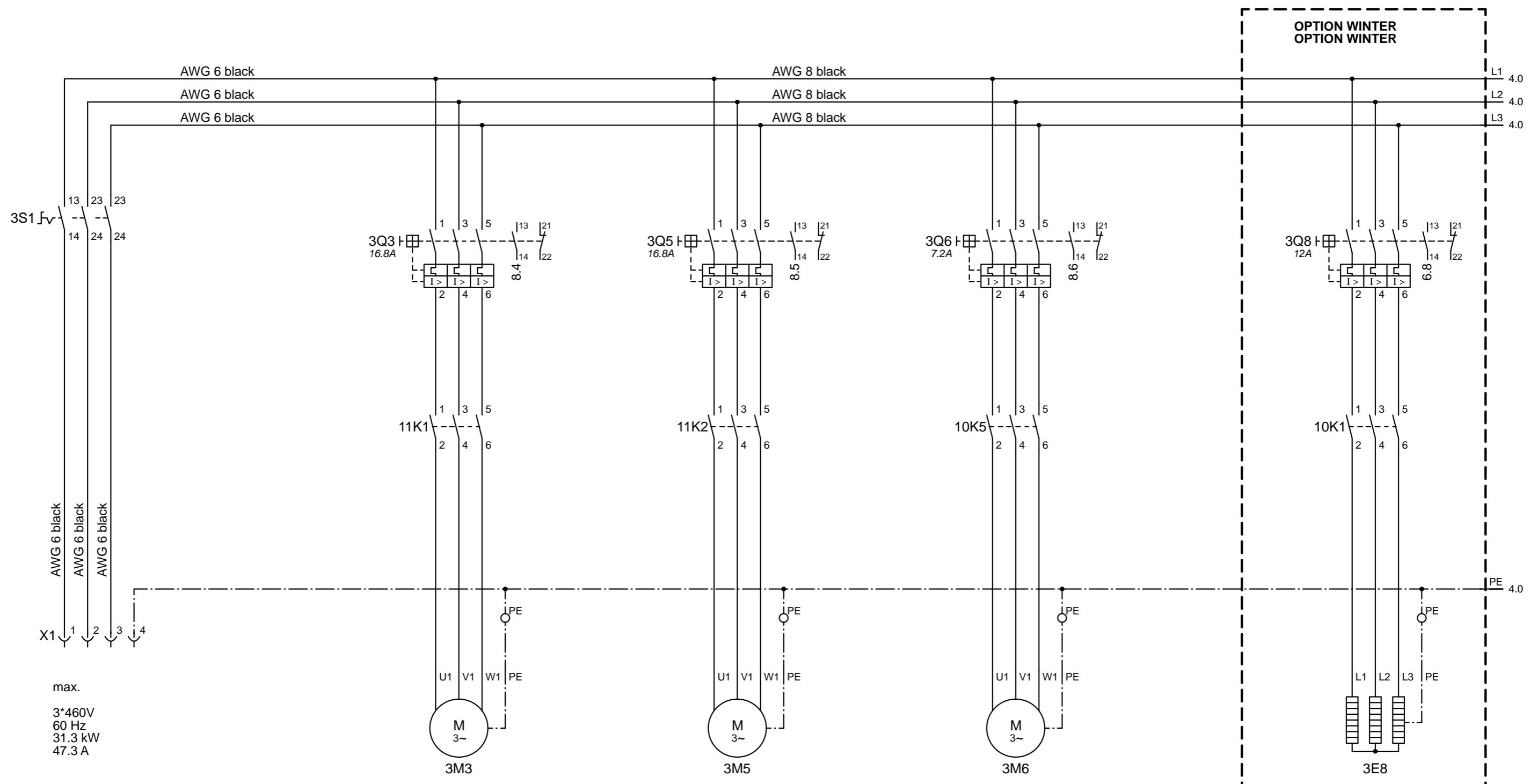
Schema/Diagram Nr: 0390.013\_ES

Erstellt am: 10.06.14	a	<b>ef cooling</b> Ernst H. Furrer AG Hüttenwiesenstrasse 8 CH-8108 Dällikon Fon +41 44 849 79 00 Fax +41 44 849 79 01 info@efcooling.com www.efcooling.com 	Projekt/Kunde	HP Indigo 10000	Titel	Projekt Nr.	=ANLAGE +ORT			
Name: MILI	b		Adresse (Ort)				Maschinentyp	EVO 45 60Hz. Version	Schema Nummer	0390.013_ES
Geprüft am: 11.06.14	c		Maschinenart							
Name: FRLO	d									

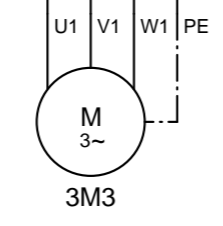
ADERNFARBEN  
WIRE COLOURS  
COLEUR DU FIL

HAUPTSTROM: MAIN CURRENT: MAIN COURANT:				BEISPIEL: SAMPLE: EXEMPLE:	STEUERSTROM: CONTROL CURRENT: CONTROLE COURANT:	BEISPIEL: SAMPLE: EXEMPLE:
L1	SCHWARZ	BLACK	NOIR	_____	24 V DC	
L2	SCHWARZ	BLACK	NOIR	_____	+    DUNKELBLAU    DARK BLUE    DARK BLEU	_____
L3	SCHWARZ	BLACK	NOIR	_____	-    WEISS / BLAU    WHITE / BLUE    BLANC / BLEU	_____
N	HELLBLAU	LIGHT BLUE	BLEU CLAIR	_____		
PE	GRÜN-GELB	GREEN-YELLOW	VERT-JAUNE	_____		
					FREMDSPANNUNG: EXTERNAL VOLTAGE: TENSION EXTERNE:	BEISPIEL: SAMPLE: EXEMPLE:
					GELB                  YELLOW                  JAUNE	_____

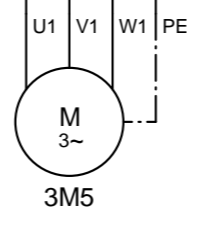




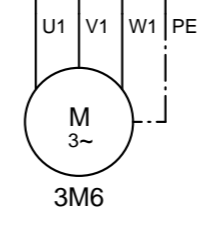
max.  
3\*460V  
60 Hz  
31.3 kW  
47.3 A



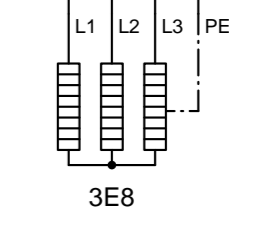
10.2 kW (12 kW)  
15.3 A (16.8) A  
3000 min<sup>-1</sup>



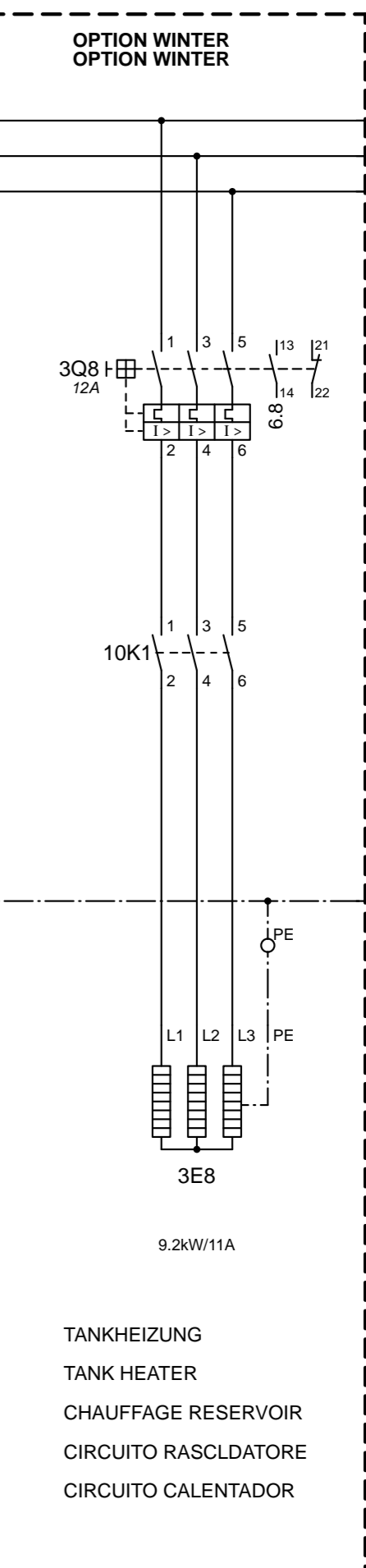
10.2 kW (12 kW)  
15.3 A (16.8) A  
3000 min<sup>-1</sup>



4 kW  
7.2 A  
2900min<sup>-1</sup>



9.2kW/11A



EINSPEISUNG  
POWER SUPPLY  
ALIMENTATION  
ALIMENTAZIONE  
FUENTE DE ALIMENTACIÓN

VERDICHTER 1  
COMPRESSOR 1  
COMPRESSEUR 1  
COMPRESSORE 1  
COMPRESOR 1

VERDICHTER 2  
COMPRESSOR 2  
COMPRESSEUR 2  
COMPRESSORE 2  
COMPRESOR 2

VERBRAUCHERPUMPE  
CONSUMER PUMP  
POMPE CONSOMMATEUR  
CONSUMATORI POMPA  
CONSUMIDORES DE LA BOMBA

TANKHEIZUNG  
TANK HEATER  
CHAUFFAGE RESERVOIR  
CIRCUITO RASCLDATORE  
CIRCUITO CALENTADOR

Erstellt am:	10.06.14	a	
Name:	MILI	b	
Geprüft am:	11.06.14	c	
Name:	FRLO	d	

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Fax +41 44 849 79 01  
info@efcooling.com  
www.efcooling.com

Projekt/Kunde **HP Indigo 10000**

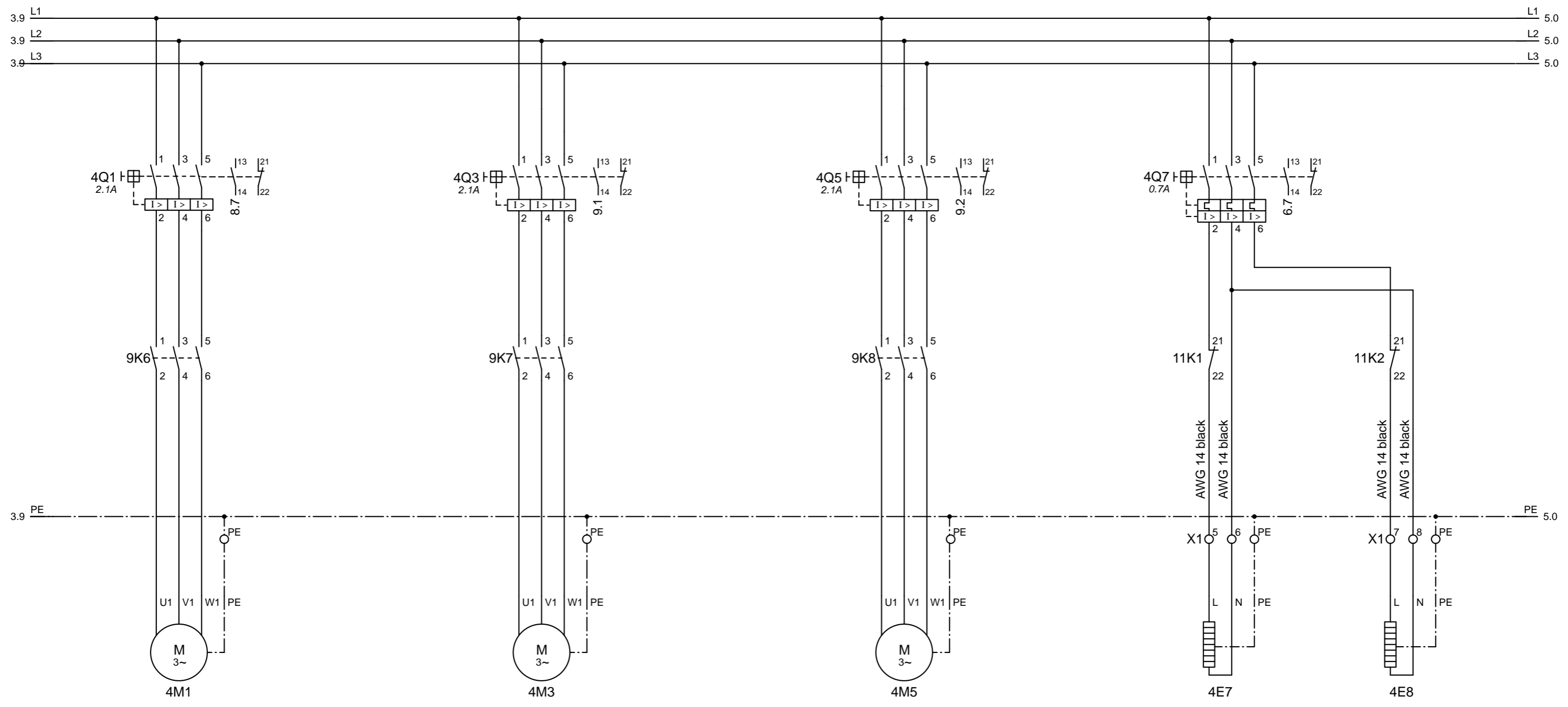
Adresse (Ort)

Maschinenart

Titel **compressor, pump**

Maschinentyp **EVO 45 60Hz. Version**

Projekt Nr.	=ANLAGE +ORT		
Schema Nummer	Bl. total	Blatt Nr.	Idx.
0390.013_ES	11	3	-



△ 1.1 kW  
2.1 A  
1520 min<sup>-1</sup>

- VENTILATOR 1
- FAN 1
- FAN 1
- VENTILAORE 1
- VENTILADOR 1

△ 1.1 kW  
2.1 A  
1520 min<sup>-1</sup>

- VENTILATOR 2
- FAN 2
- FAN 2
- VENTILAORE 2
- VENTILADOR 2


△ 1.1 kW  
2.1 A  
1520 min<sup>-1</sup>

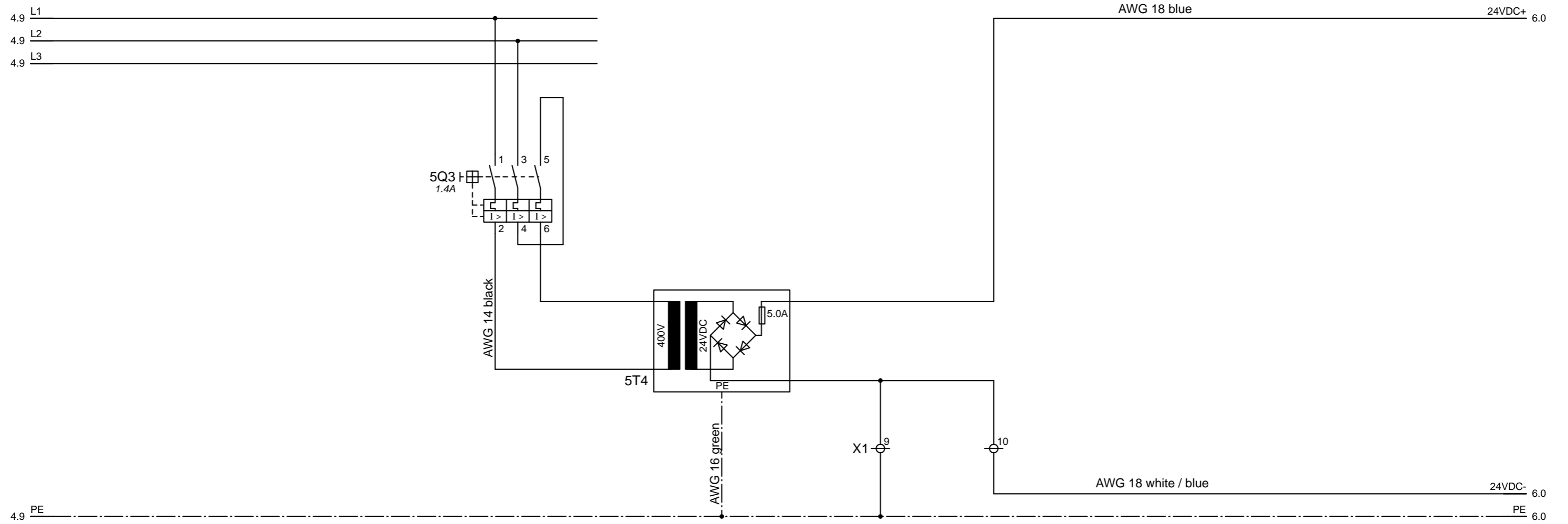
- VENTILATOR 3
- FAN 3
- FAN 3
- VENTILAORE 3
- VENTILADOR 3

70 W  
0.175 A


- CARTERHEIZUNG 1 & 2
- CRANKCASE HEATER 1 & 2
- CHAUFFE-CARTER 1 & 2
- RISCALDAMENTO DI CARTER 1 & 2
- CALENTAMIENTO DE CARTER 1 & 2

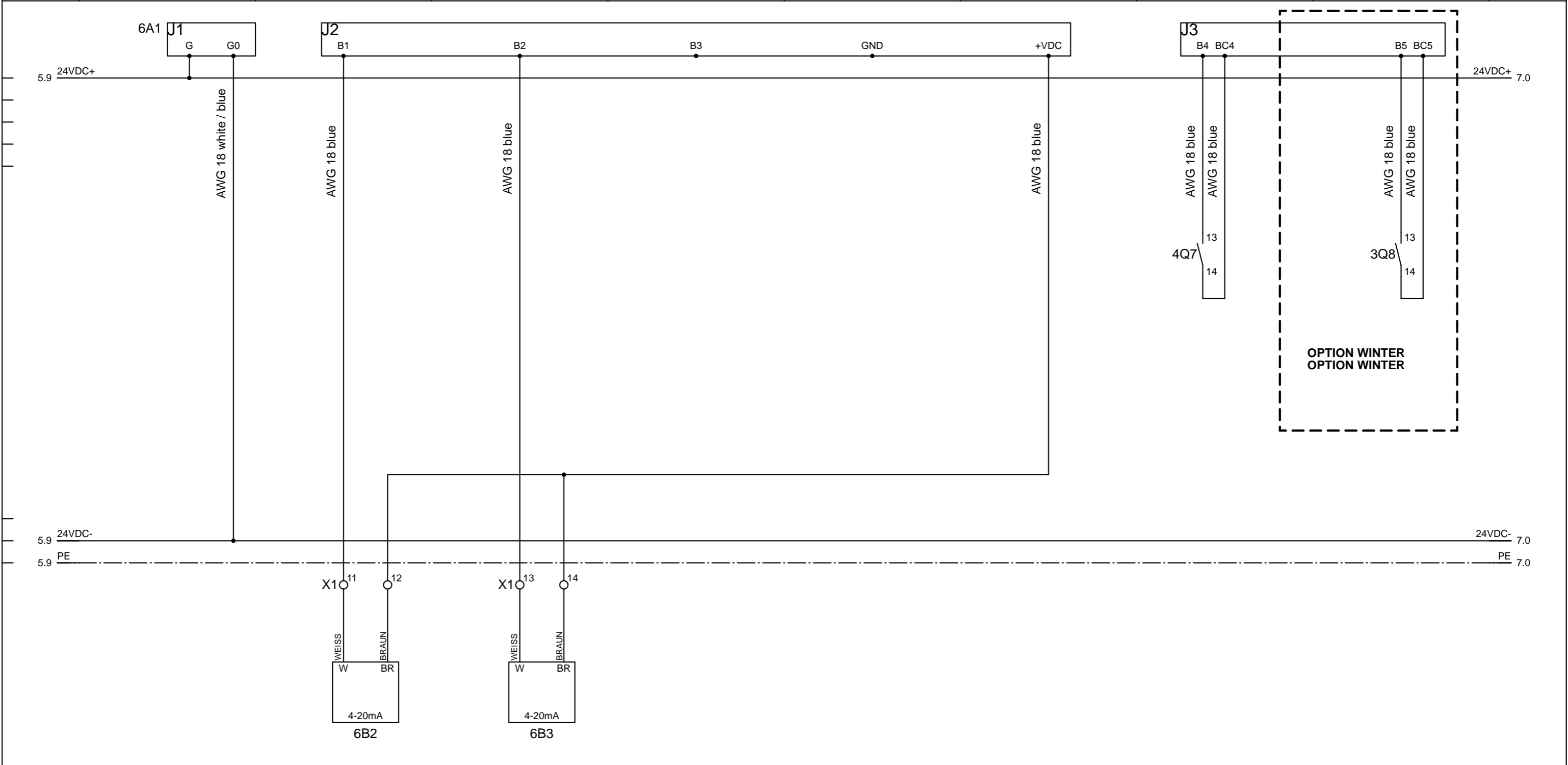
70 W  
0.175 A

Erstellt am: 10.06.14	a	<b>ef cooling</b> Ernst H. Furrer AG Hüttenwiesenstrasse 8 CH-8108 Dällikon	Fon +41 44 849 79 00 Fax +41 44 849 79 01 info@efcooling.com www.efcooling.com	 the smart way of cooling!	Projekt/Kunde	HP Indigo 10000	Titel	condenser fan, carterheat		Projekt Nr.	=ANLAGE +ORT		
Name: MILI	b				Adresse (Ort)		Maschinenart		Schema Nummer	EVO 45 60Hz. Version		0390.013_ES	Bl. total
Geprüft am: 11.06.14	c									11	4	-	
Name: FRLO	d												

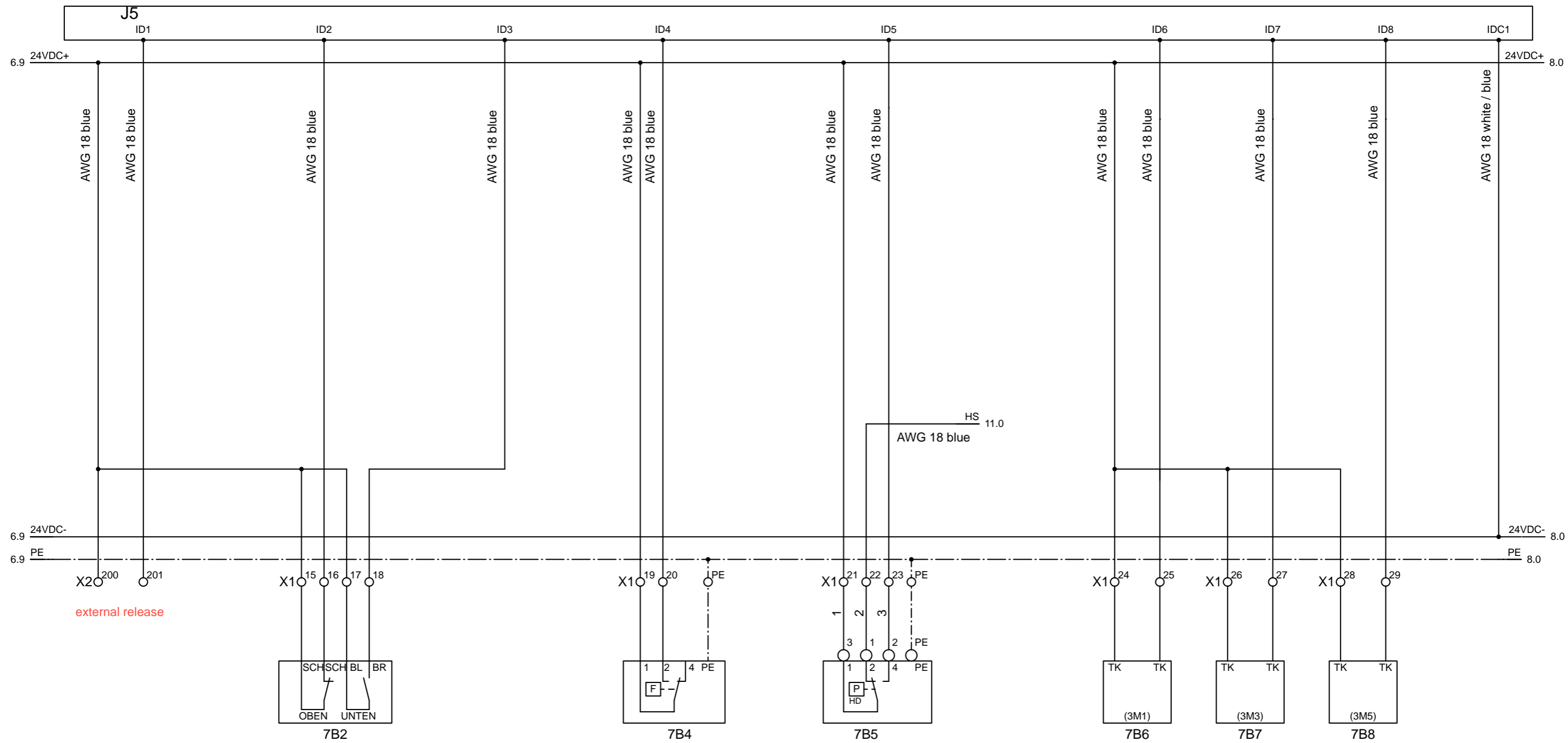


NETZGERÄT  
 POWER PACK  
 APPAREIL D'ALIMENTATION  
 ALIMENTAZIONE  
 FUENTE DE ALIMENTACIÓN

Erstellt am: 10.06.14	a	<b>ef cooling</b> Ernst H. Furrer AG Hüttenwiesenstrasse 8 CH-8108 Dällikon	Fon +41 44 849 79 00 Fax +41 44 849 79 01 info@efcooling.com www.efcooling.com		Projekt/Kunde	HP Indigo 10000	Titel power pack 24Vdc	Projekt Nr.	=ANLAGE +ORT		
Name: MILI	b				Adresse (Ort)			Maschinentyp	<b>EVO 45 60Hz. Version</b>	Schema Nummer	0390.013_ES
Geprüft am: 11.06.14	c				Maschinenart				11	5	-
Name: FRLO	d										



HOCHDRUCK TRANSMITTER	NIEDERDRUCK TRANSMITTER
HIGH PRESSURE TRANSDUCER	LOW PRESSURE TRANSDUCER
HAUTE PRESSION TRANSMETTEUR	BASE PRESSION TRANSMETTEUR
ALTA PRESSIONE TRASMETTITORE	BASSA PRESSIONE TRASMETTITORE
ALTA PRESIÓN TRANSDUCTOR	BAJA PRESIÓN TRANSDUCTOR



EIN-AUS  
ON-OFF  
ARRÊT-MARCHE  
ON-OFF  
CONEXIÓN-DESCONEXIÓN

TANKNIVEAU  
TANK LEVEL  
NIVEAU RÉSERVOIR  
LIVELLO SERBATOIO  
NIVEL DEPÓSITO

STRÖMUNGSWÄCHTER  
FLOW CONTROL SWITCH  
CONTRÔLEUR DE FLUX  
CONTROLLO DI FLUSSA  
CONTROLL DEL FLUJO

PRESSOSTAT  
HOCHDRUCK SICHERHEIT  
HIGH PRESSURE SAFETY  
HAUTE PRESSION SECURITÉ  
ALTA PRESSIONE SICUREZZA  
ALTA PRESIÓN SEGURIDAD

VENTILATOREN WICKLUNGSSCHUTZ  
WINDING PROTECTION FANS  
PROTECTION DE BOBINAGE DES VENTILATEURS  
PROTEZIONE DI AVVOLGIMENTO VENTILATORI  
PROTECCIÓN DE BOBINADO VENTILADORES

Erstellt am: 10.06.14	a	
Name: MILI	b	
Geprüft am: 11.06.14	c	
Name: FRLO	d	

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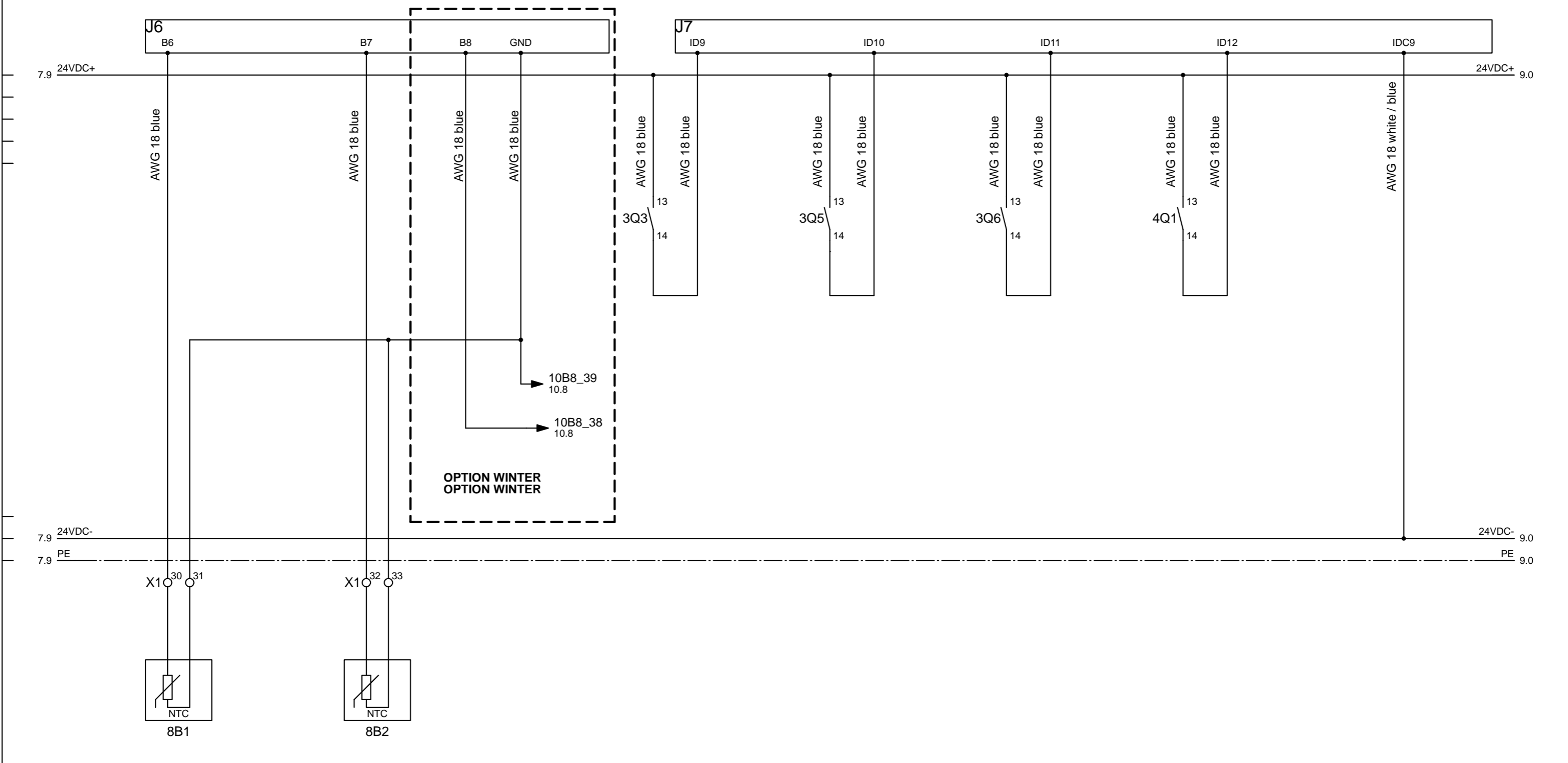
Fon +41 44 849 79 00  
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www.efcooling.com



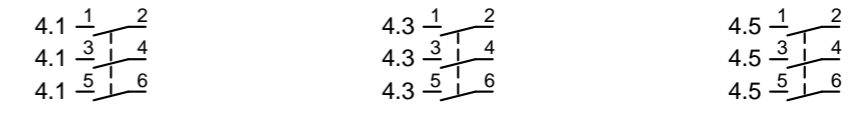
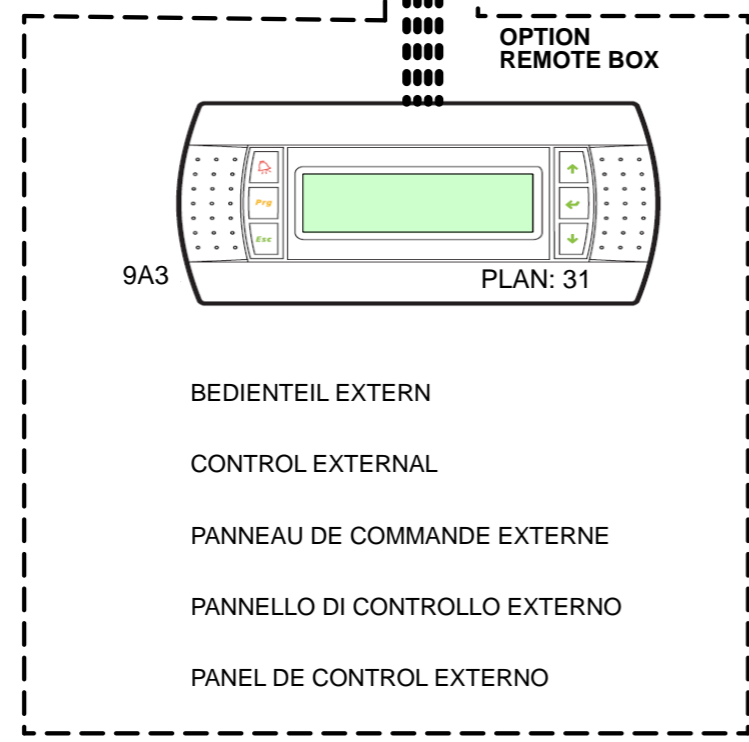
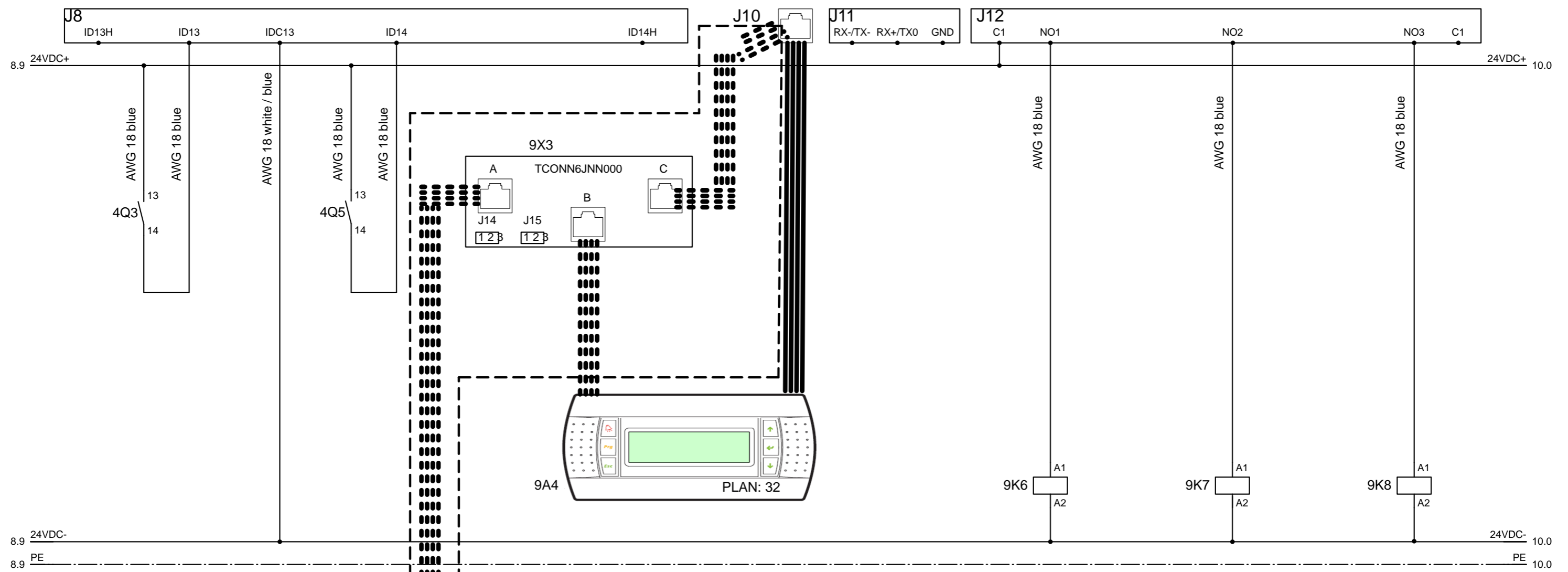
Projekt/Kunde **HP Indigo 10000**  
Adresse (Ort)  
Maschinenart

Titel **external release, tank, flow, high pressure safety, winding protect**  
Maschinentyp **EVO 45 60Hz. Version**

Projekt Nr.	=ANLAGE +ORT		
Schema Nummer	Bl. total	Blatt Nr.	Idx.
<b>0390.013_ES</b>	<b>11</b>	<b>7</b>	<b>-</b>



TANKTEMPERATURFÜHLER	VERDAMPFER AUSTRITT TEMPERATURFÜHLER
TANK TEMPERATURE PROBE	EVAPORATOR OUTLET TEMPERATURE PROBE
SONDE DE TEMPERATURE RÉSERVOIR	ÉVAPORATEUR SORTIE SONDE DE TEMPERATURE
SENSORE DIE TEMPERATURA SERBATOIO	EVAPORATORE USCITA SENSORE DIE TEMPERATURA
SENSOR DE TEMPERATURA DEPÓSITO	EVAPORADOR SALIDA SENSOR DE TEMPERATURA



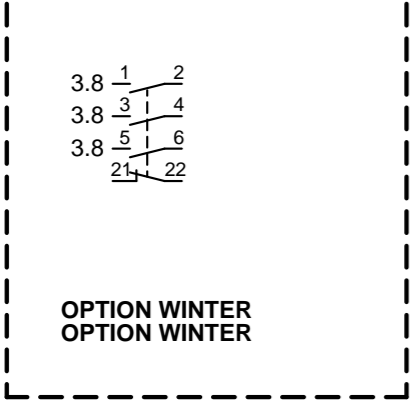
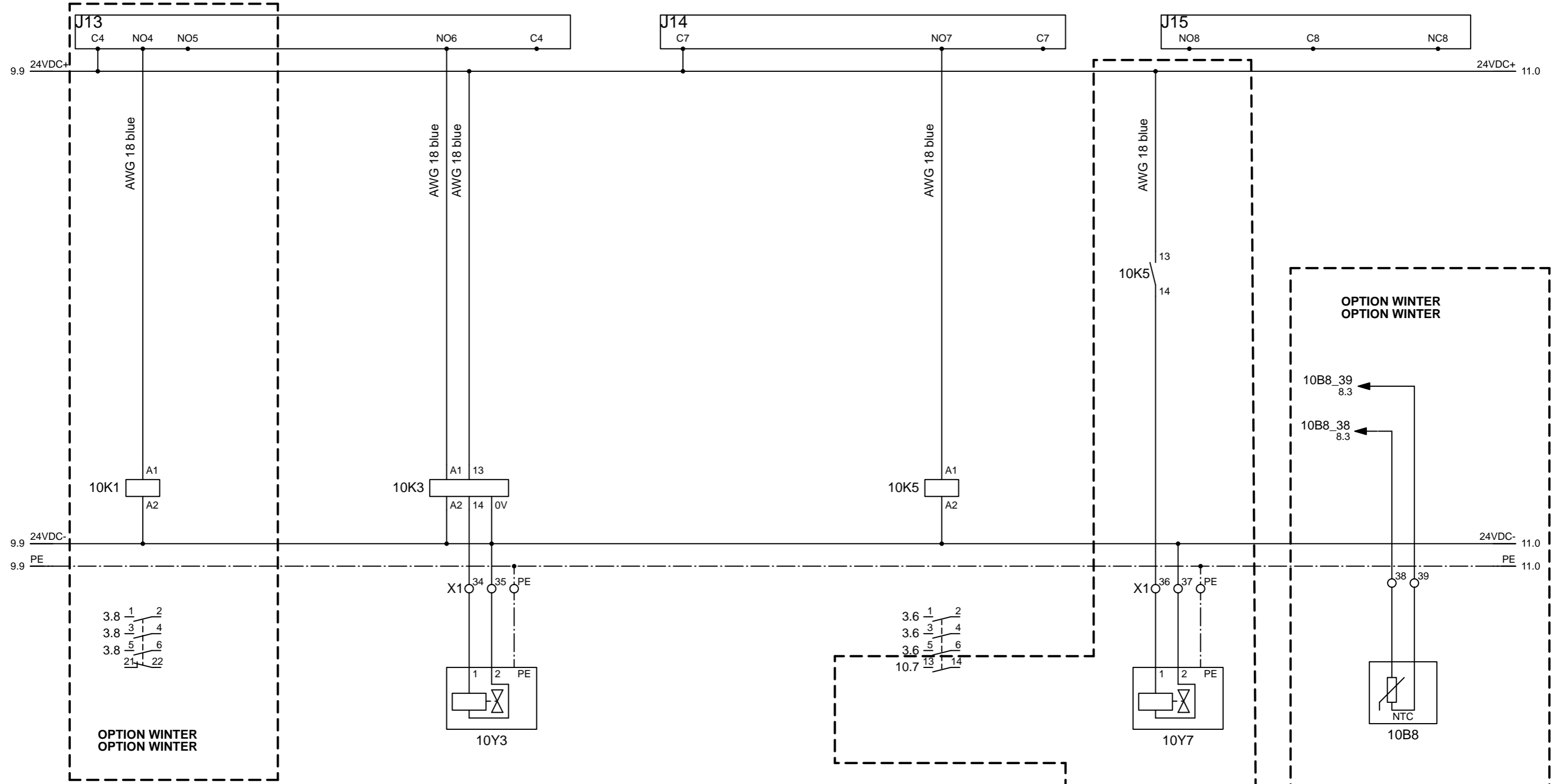
BEDIENTEIL EXTERN  
CONTROL EXTERNAL  
PANNEAU DE COMMANDE EXTERNE  
PANNELLO DI CONTROLLO ESTERNO  
PANEL DE CONTROL EXTERNO

BEDIENTEIL  
CONTROL PANEL  
PANNEAU DE COMMANDE  
PANNELLO DI CONTROLLO  
PANEL DE CONTROL

VENTILATOR 1  
FAN 1  
FAN 1  
VENTILAORE 1  
VENTILADOR 1

VENTILATOR 2  
FAN 2  
FAN 2  
VENTILAORE 2  
VENTILADOR 2

VENTILATOR 3  
FAN 3  
FAN 3  
VENTILAORE 3  
VENTILADOR 3



LEISTUNGSREGLER  
MAGNETVENTIL

CAPACITY CONTROLLER  
SOLENOID VALVE

VANNE SOLÉNOIDE,  
REGULATEUR DE PUISSANCE

REGOLATORE DELLA POTENZA  
VALVOLA SOLENOIDE

REGULADOR DE POTENCIA  
ELECTROVALVULA

VERBRAUCHERPUMPE  
CONSUMER PUMP

POMPE CONSOMMATEUR

CONSUMATORI POMPA

CONSUMIDORES DE LA  
POMBA

OPT4: RÜCKLAUF  
MAGNETVENTIL

OPT4: RETURN LINE  
SOLENOID VALVE

OPT4: LIGNE RETOUR  
ELECTROROBINET

OPT4: LINEA RITORNO  
VALVOLA A SOLENOIDE

OPT4: LINEAS VUELTA  
ELECTROVALVULA

OPTION WINTER  
OPTION WINTER

REFERENZ  
TEMPERATURFÜHLER

REFERENCE  
TEMPERATURE PROBE

RÉFÉRENCE  
SONDE DE TEMPERATURE

RIFERIMENTO  
SENSORE I TEMPERATURA

REFERENCIA  
SENSOR DE TEMPERATURA

Erstellt am: 10.06.14	a	
Name: MILI	b	
Geprüft am: 11.06.14	c	
Name: FRLO	d	

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Projekt/Kunde **HP Indigo 10000**

Adresse (Ort)

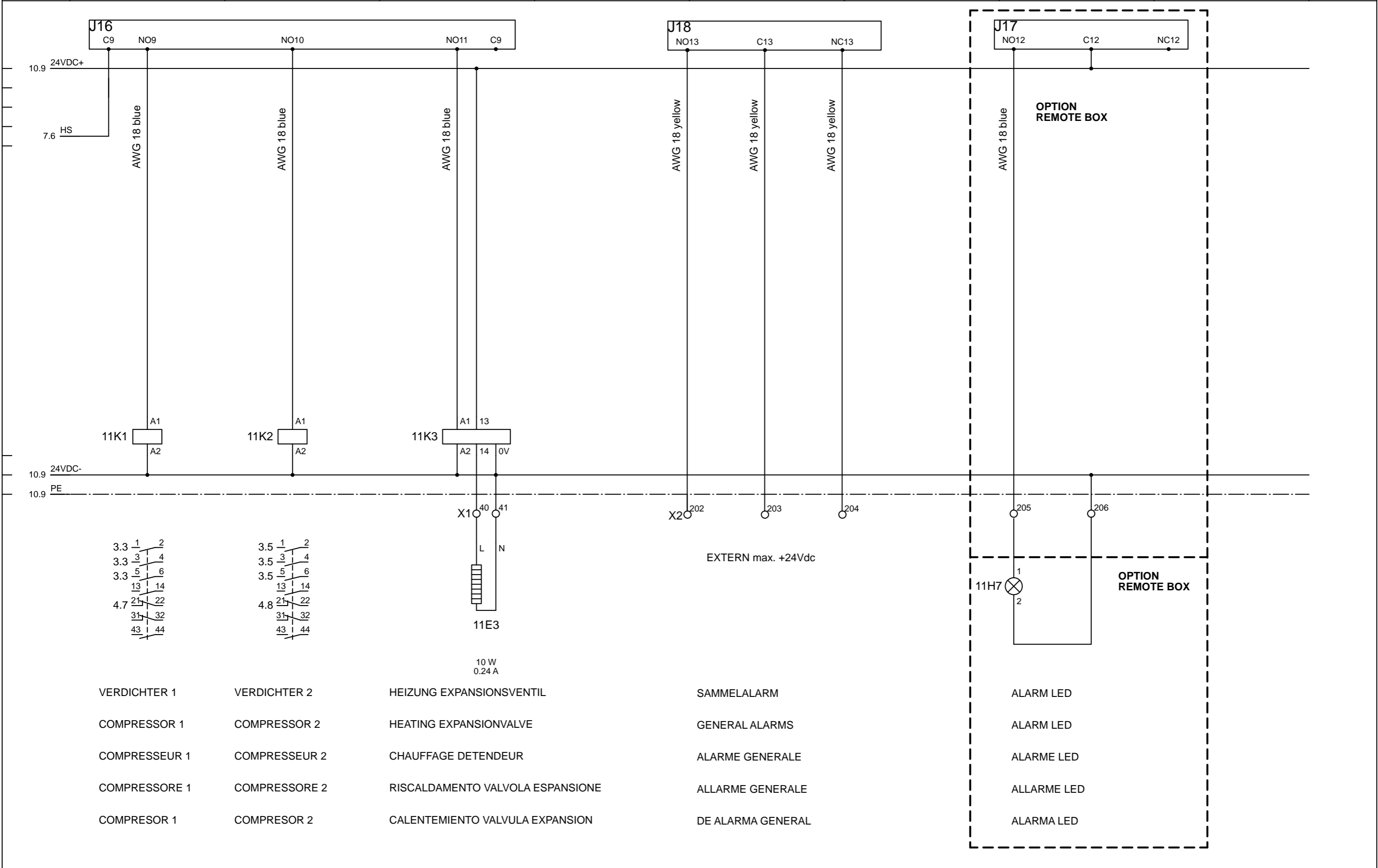
Maschinenart

Titel **capacity controller  
pump release**

Maschinentyp **EVO 45 60Hz. Version**

Projekt Nr.	=ANLAGE +ORT		
Schema Nummer <b>0390.013_ES</b>	Bl. total <b>11</b>	Blatt Nr. <b>10</b>	Idx. <b>-</b>





Erstellt am: 10.06.14	a	<b>ef cooling</b> Ernst H. Furrer AG Hüttenwiesenstrasse 8 CH-8108 Dällikon Fon +41 44 849 79 00 Fax +41 44 849 79 01 info@efcooling.com www.efcooling.com	Projekt/Kunde <b>HP Indigo 10000</b> Adresse (Ort) Maschinenart	Titel <b>general alarms                  compressor release 1 &amp; 2</b> Maschinentyp <b>EVO 45 60Hz. Version</b>	Projekt Nr.	=ANLAGE +ORT		
Name: MILI	b				Schema Nummer	Bl. total	Blatt Nr.	Idx.
Geprüft am: 11.06.14	c				0390.013_ES	11	11	-
Name: FRLO	d							



## 13.7 PLC manual



# EVO<sup>45</sup>

# PLC Manual

# EN

Erstellt : 16.04.2012 MAAR  
Änderung: 18.04.2013 SINE / 25.07.2013 SINE  
Rev.: Version 4

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5. Setting date and time .....	8
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### Key description

**ALARM**  
key

**PROGRAMM**  
key

**ESCAPE**  
key



**UP**  
key

**ENTER**  
key

**DOWN**  
key

#### **ALARM key**

- If the key is flashing (red); one or more alarms / errors are present
- By pressing the alarm key, the display shows all active alarms / warnings.

#### **PRG key**

- By pressing the PRG key, the display change to the "Menu overview" display
- If the PRG key is flashing (yellow), a manual mode (manual software shift) is active.

#### **ESCAPE key**

- By pressing the ESCAPE key, the display move to the next upper level

#### **UP and Down key**

- Scrolling through the „Menu overview“ display.
- Adjustment of a elected set point.

#### **ENTER key**

- Select the electet sub menu or confirm and store a adjusted set point.

#### **Illumination of the display background**

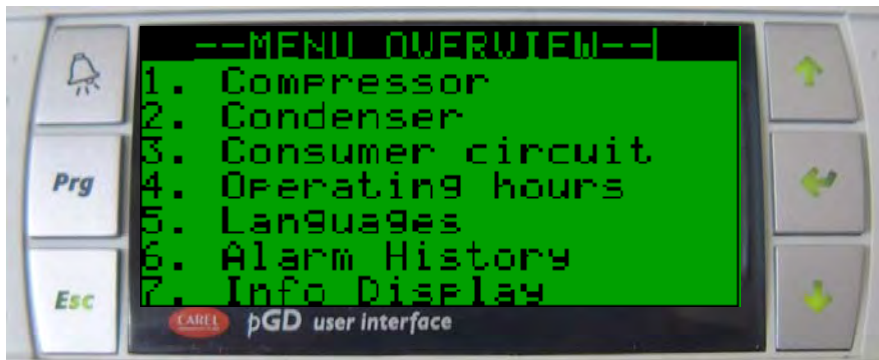
If the illumination is on, it means that the external release is present (operation mode), otherwise the illumination is off.

Handling "overview" display








Press PRG key → Display move to the „Menu overview“.

Handling „menu overview“ display 1.



**Adjust set point:**

- Press **ENTER** key once, the cursor jump to the adjustable field.
- Press **UP** or **DOWN** key to adjust the set point.
- With pressing **1 time** the **ENTER** key, the cursor jump back to the home position and the new value is stored.
- With pressing the **ESCAPE** key, the cursor jump back to the home position without storing the value.

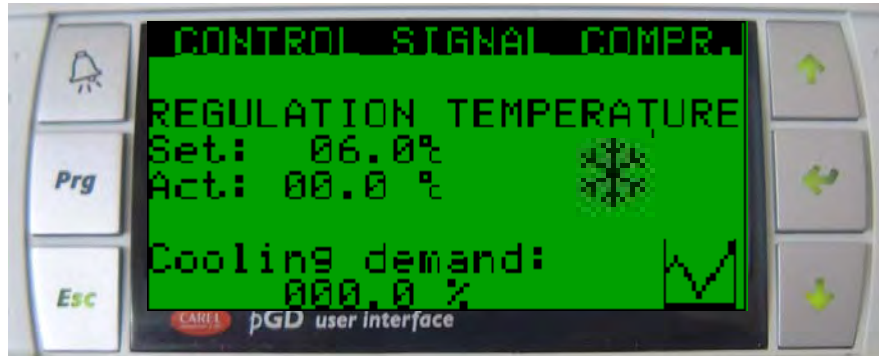
-  Compressor running.
-  Consumer Pump running.
-  Condenser Fan running.
-  Compressor / Consumer Pump / Condenser Fan off.
-  Compressor / Consumer Pump / Condenser Fan not ready.

**Choose sub menu:**

- Press **UP** or **DOWN** key to move the cursor to the sub menu of your choice.
- Press **ENTER** key to switch into the choosen sub menu.
- Press the **ESC** key to leave the sub menu and return to the "Overview".



Menu page



**Menu page:**

- Press the **ENTER** key to change between the menu parameters
- Press **UP** or **DOWN** key to change parameter values

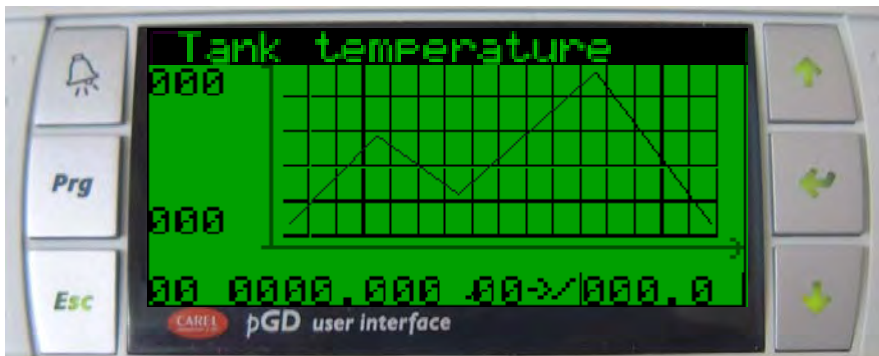


Cooling operation



Press the **ENTER** key to change to the Trend Display

Trend display



**Trend Display:**





The trend display records an analog value for the displayed length of time. Recording interval and scaling of the measurement value can be set in the parameter setting window of the trend display.

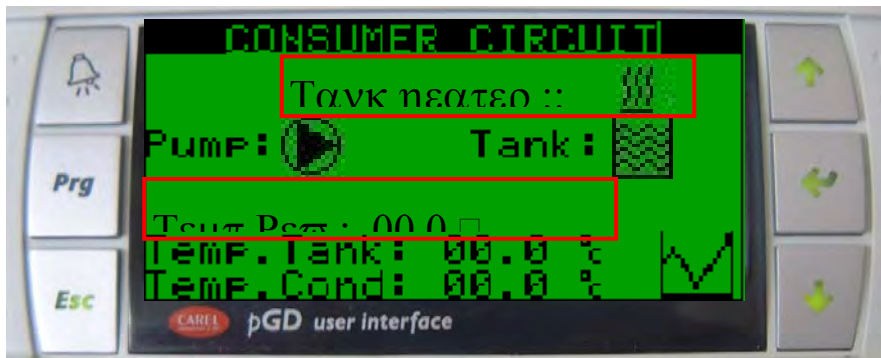
- Press **UP** or **DOWN** key to change between Trend Display and Parameter Setting display.
- Press the **ESC** key to leave the Trend Display and return to the Menu page.

Menu page






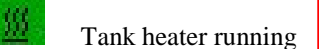



Menu page:

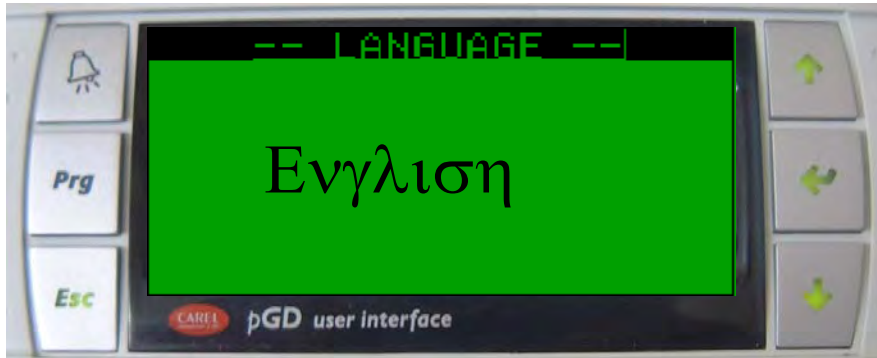
-  Condenser Fan running.
-  Condenser Fan off.
-  Condenser Fan not ready.
-  Controller Signal



Menu page:

-  Pump running.
-  Pump / Tank heater off.
-  Pump / Tank heater not ready.
-  Tank ok. / Level low / Alarm
-  Press the **ENTER** key to change to the Trend Display
-  Tank heater running
-  Only with optional tank heater

### Change display language

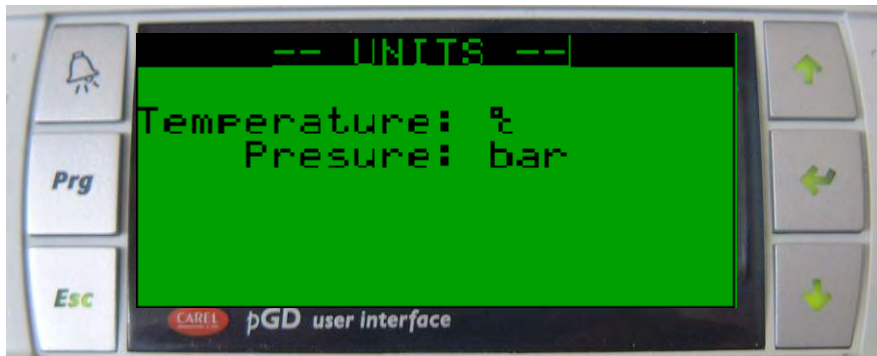


#### Language selection:

Go to the sub-menu „language“ → consider page 4 for instructions.

- Press the **ENTER** key once.
- Press **UP** or **Down** key.
- Language changes between German and English.
- Press the **ENTER** key at the favored language.

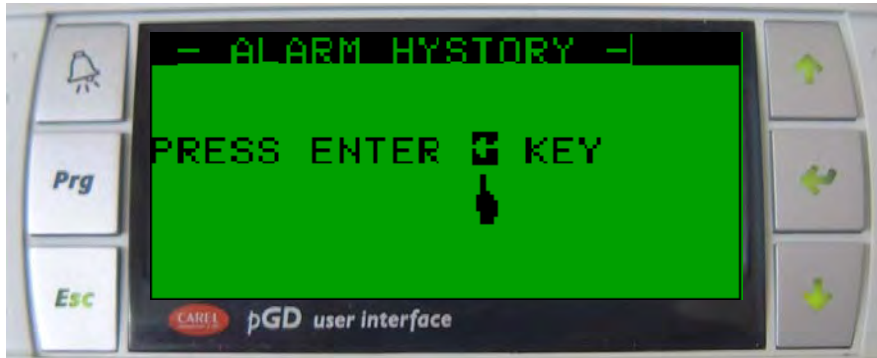
### Change units (only from SV2.0)



#### Units selection:

- Press the **ENTER** key once.
- Press **UP** or **DOWN** key.
- Press the **ENTER** key at the favored unit.

Alarm History



**Handling of the alarm history:**

- Go to the sub-menu „alarm history“ → consider page 4 for instructions.
- Press the **ENTER** key. → last stored alarm with time / date stamp is getting displayed.
- By pressing the **UP** or **DOWN** key the display shows the next older / newer stored alarm.
- Press the **ESC** key to switch back to the main menu.

Alarm History



**Alarm number:**

Consider page 11-15 for description of the alarm number.

Date and time at which the alarm was activated.

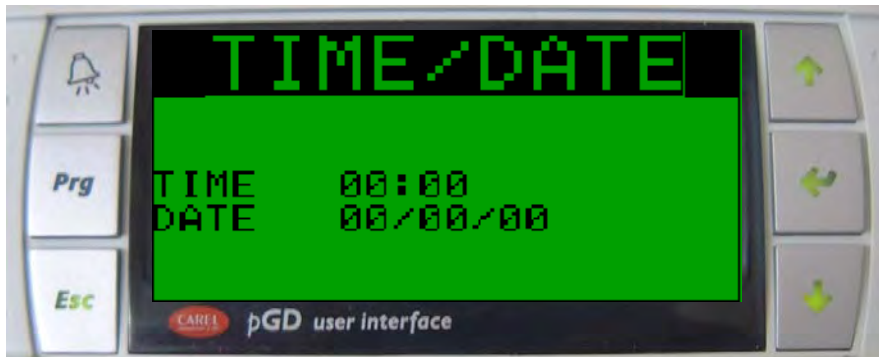
Setting date and time



**Setting date and time:**

- Go to sub-menu „info“ → consider page 4 for instructions
- Press the **UP** and **DOWN** keys together → Display switches to the time/date Sub-menu.
- By pressing the **ENTER** key the cursor is moving to the next field (hours/minutes/day/month/year.)
- Press **UP** or **DOWN** key to adjust the selected value.
- Press the **ESC** key to leave the time/date sub-menu.

Setting date and time



Alarm display



**Handling of present alarms and warnings:**

- Is one or more alarms / warnings present, the display switch automatically to the alarm display mask and the ALARM key is flashing.
- By pressing the UP or DOWN key it's possible to change between the active alarms (just possible if more than one alarm is present)
- Press the ESC key to leave the alarm display and switch to the main display
- Press the ALARM key again to move back to the alarm display.

Reset of a present alarm



**Alarm reset**

- After the reason for the alarm is eliminated is it possible to reset the alarm by pressing the alarm key.
- Is no other alarm active, the ALARM key stop flashing and the display shows **\*\*NO ALARMS\*\***

	Fault message	Fault cause	Remedy
<b>ALARM 80</b>	High pressure transducer refrigerant circuit defective!	-loose connection. -control wire defect or broken. -pressure transducer outside of the range. -pressure transducer is defective.	-check it terminals are tight. -locate loose contact and solve it. -check wire for a defect. -replace pressure transducer.
<b>ALARM 81</b>	Low pressure transducer refrigerant circuit defective!	-loose connection. -control wire defect or broken. -pressure transducer outside of the range. -pressure transducer is defective.	-check it terminals are tight. -locate loose contact and solve it. -check wire for a defect. -replace pressure transducer.
<b>ALARM 85</b>	Temperature probe tank defective!	-loose connection. -control wire defect or broken. -temperature probe outside of the range. -temperature probe is defective.	-check it terminals are tight. -locate loose contact and solve it. -check wire for a defect. -replace temperature probe.
<b>ALARM 86</b>	Temperature probe evaporator outlet defective!	-loose connection. -control wire defect or broken. -temperature probe outside of the range. -temperature probe is defective.	-check it terminals are tight. -locate loose contact and solve it. -check wire for a defect. -replace temperature probe.
<b>ALARM 87</b> <b>OPTION</b>	Temperature probe reference defective!	-loose connection. -control wire defect or broken. -temperature probe outside of the range. -temperature probe is defective.	-check it terminals are tight. -locate loose contact and solve it. -check wire for a defect. -replace temperature probe.
<b>Alarm 1</b>	Low pressure alarm refrigerant circuit!	-loose connection. -leak in the refrigeration system -loos of refrigerant. -expansion valve is defective. -solenoid valve is defective.	-check if terminals are tight. -call <a href="http://www.efcooling.com">ef cooling</a> to find e solution.

	Fault message	Fault cause	Remedy
<b>Alarm 2</b>	High pressure alarm refrigerant circuit!	-loose connection. -condenser fins are dirty. -one or more fans are defective. -ambient temperature is too high.	-check if terminals are tight. -clean condenser fins. -check fans for correct operation, if necessary replace them.
<b>Alarm 3</b>	High pressure safety switch refrigerant circuit has triggered!	-loose connection. -condenser fins are dirty. -one or more fans are defective. -ambient temperature is too high.	-check if terminals are tight. -clean condenser fins. -check fans for correct operation, if necessary replace them.
<b>Alarm 17</b>	Over temperature consumer circuit!	-cooling power not sufficient. -cooling load too high -not enough cooling liquid -expansion valve defective	-reduce cooling load -contact ef cooling After Sales
<b>Alarm 20</b>	Flow alarm consumer circuit!	-loose connection. -flow switch is defective -evaporator pump has a problem.	-check if terminals are tight. -locate loose contact and solve it. -replace defective flow switch. -check evaporator pump for correct function
<b>Alarm 34.1</b>	Winding protection condenser fan 1 has triggered!	-voltage interruption on one or more phases. -current consumption of the fan is too high. -set point of the circuit breaker is too low. -fan is defective. -fan blocked.	-check if on all three phases 400V is present. -check current consumption of the compressor and compare it with the value in the wiring diagram. -check the set point of the circuit breaker and compare it with the value in the wiring diagram. -check if all terminals are tight -replace defective fan.



	Fault message	Fault cause	Remedy
<b>Alarm 34.2</b>	Winding protection condenser fan 2 has triggered!	<ul style="list-style-type: none"> <li>-voltage interruption on one or more phases.</li> <li>-current consumption of the fan is too high.</li> <li>-set point of the circuit breaker is too low.</li> <li>-fan is defective.</li> <li>-fan blocked.</li> </ul>	<ul style="list-style-type: none"> <li>-check if on all three phases 400V is present.</li> <li>-check current consumption of the compressor and compare it with the value in the wiring diagram.</li> <li>-check the set point of the circuit breaker and compare it with the value in the wiring diagram.</li> <li>-check if all terminals are tight</li> <li>-replace defective fan.</li> </ul>
<b>Alarm 34.3</b>	Winding protection condenser fan 3 has triggered!	<ul style="list-style-type: none"> <li>-voltage interruption on one or more phases.</li> <li>-current consumption of the fan is too high.</li> <li>-set point of the circuit breaker is too low.</li> <li>-fan is defective.</li> <li>-fan blocked.</li> </ul>	<ul style="list-style-type: none"> <li>-check if on all three phases 400V is present.</li> <li>-check current consumption of the compressor and compare it with the value in the wiring diagram.</li> <li>-check the set point of the circuit breaker and compare it with the value in the wiring diagram.</li> <li>-check if all terminals are tight</li> <li>-replace defective fan.</li> </ul>
<b>Alarm 40.1</b>	Circuit breaker compressor 1 has triggered!	<ul style="list-style-type: none"> <li>-voltage interruption on one or more phases.</li> <li>Current consumption of the consumer is too high.</li> <li>-set point of the circuit breaker is too low</li> <li>-compressor defective.</li> <li>--loose connection.</li> </ul>	<ul style="list-style-type: none"> <li>-check if on all three phases 400V is present.</li> <li>-check current consumption of the compressor and compare it with the value in the wiring diagram.</li> <li>-check the set point of the circuit breaker and compare it with the value in the wiring diagram.</li> <li>-check if all terminals are tight</li> <li>-replace defective compressor.</li> </ul>
<b>Alarm 40.2</b>	Circuit breaker compressor 2 has triggered!	<ul style="list-style-type: none"> <li>-voltage interruption on one or more phases.</li> <li>Current consumption of the consumer is too high.</li> <li>-set point of the circuit breaker is too low</li> <li>-compressor defective.</li> <li>-loose connection.</li> </ul>	<ul style="list-style-type: none"> <li>-check if on all three phases 400V is present.</li> <li>-check current consumption of the compressor and compare it with the value in the wiring diagram.</li> <li>-check the set point of the circuit breaker and compare it with the value in the wiring diagram.</li> <li>-check if all terminals are tight</li> <li>-replace defective compressor.</li> </ul>

	Fault message	Fault cause	Remedy
<b>Alarm 41</b>	Circuit breaker consumer pump has triggered!	<ul style="list-style-type: none"> <li>-voltage interruption on one or more phases.</li> <li>Current consumption of the consumer pump is too high.</li> <li>-set point of the circuit breaker is too low</li> <li>-consumer pump defective.</li> <li>-loose connection.</li> </ul>	<ul style="list-style-type: none"> <li>-check if on all three phases 400V is present.</li> <li>-check current consumption of the consumer pump and compare it with the value in the wiring diagram.</li> <li>-check the set point of the circuit breaker and compare it with the value in the wiring diagram.</li> <li>-check if all terminals are tight</li> <li>-replace defective consumer pump.</li> </ul>
<b>Alarm 44.1</b>	Circuit breaker condenser fan 1 has triggered!	<ul style="list-style-type: none"> <li>-voltage interruption on one or more phases.</li> <li>Current consumption of the condenser fan is too high.</li> <li>-set point of the circuit breaker is too low</li> <li>-condenser fan defective.</li> <li>-loose connection.</li> </ul>	<ul style="list-style-type: none"> <li>-check if on all three phases 400V is present.</li> <li>-check current consumption of the condenser fan and compare it with the value in the wiring diagram.</li> <li>-check the set point of the circuit breaker and compare it with the value in the wiring diagram.</li> <li>-check if all terminals are tight</li> <li>-replace defective consumer pump.</li> </ul>
<b>Alarm 44.2</b>	Circuit breaker condenser fan 2 has triggered!	<ul style="list-style-type: none"> <li>-voltage interruption on one or more phases.</li> <li>Current consumption of the condenser fan is too high.</li> <li>-set point of the circuit breaker is too low</li> <li>-condenser fan defective.</li> <li>-loose connection.</li> </ul>	<ul style="list-style-type: none"> <li>-check if on all three phases 400V is present.</li> <li>-check current consumption of the condenser fan and compare it with the value in the wiring diagram.</li> <li>-check the set point of the circuit breaker and compare it with the value in the wiring diagram.</li> <li>-check if all terminals are tight</li> <li>-replace defective consumer pump.</li> </ul>
<b>Alarm 44.3</b>	Circuit breaker condenser fan 3 has triggered!	<ul style="list-style-type: none"> <li>-voltage interruption on one or more phases.</li> <li>Current consumption of the condenser fan is too high.</li> <li>-set point of the circuit breaker is too low</li> <li>-condenser fan defective.</li> <li>-loose connection.</li> </ul>	<ul style="list-style-type: none"> <li>-check if on all three phases 400V is present.</li> <li>-check current consumption of the condenser fan and compare it with the value in the wiring diagram.</li> <li>-check the set point of the circuit breaker and compare it with the value in the wiring diagram.</li> <li>-check if all terminals are tight</li> <li>-replace defective consumer pump.</li> </ul>

	Fault message	Fault cause	Remedy
<b>Alarm 46</b> <b>OPTION</b>	Circuit breaker tank heater has triggered !	<ul style="list-style-type: none"> <li>-voltage interruption on one or more phases.</li> <li>-current consumption of the crankcase heater is too high.</li> <li>-set point of the circuit breaker is too low</li> <li>-tank heater defective.</li> <li>-loose connection.</li> </ul>	<ul style="list-style-type: none"> <li>-check if on all three phases 400V is present.</li> <li>-check current consumption of the tank heater and compare it with the value in the wiring diagram.</li> <li>-check the set point of the circuit breaker and compare it with the value in the wiring diagram.</li> <li>-check if all terminals are tight</li> <li>-replace defective crankcase heater.</li> </ul>
<b>Alarm 47</b>	Circuit breaker crankcase heater has triggered!	<ul style="list-style-type: none"> <li>-voltage interruption on one or more phases.</li> <li>-current consumption of the crankcase heater is too high.</li> <li>-set point of the circuit breaker is too low</li> <li>-crankcase heater defective.</li> <li>-loose connection.</li> </ul>	<ul style="list-style-type: none"> <li>-check if on all three phases 400V is present.</li> <li>-check current consumption of the crankcase heater and compare it with the value in the wiring diagram.</li> <li>-check the set point of the circuit breaker and compare it with the value in the wiring diagram.</li> <li>-check if all terminals are tight</li> <li>-replace defective crankcase heater.</li> </ul>
<b>Alarm 50</b>	Freeze alarm evaporator outlet!	-water temperature of the evaporator outlet is too low.	-check water temperature set point, if necessary adjust it.
<b>Alarm 71</b>	Water level tank to low!	<ul style="list-style-type: none"> <li>-water level in the tank is to low</li> <li>-upper level switch defective</li> </ul>	<ul style="list-style-type: none"> <li>-add water</li> <li>-check level switch</li> </ul>
<b>Warning 71</b>	Water level tank low !	<ul style="list-style-type: none"> <li>-water level in the tank is low</li> <li>-lower level switch defective</li> </ul>	<ul style="list-style-type: none"> <li>-add water</li> <li>-check level switch</li> </ul>



**ef cooling** is established worldwide

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- Sales and Service office
- Service partner networks

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**GERMANY** – Sales & Service  
**USA & CANADA** – Sales & Service

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