# Operating Manual

## Cooling unit EVO 45

Type: WKL 390

Article no.: 0390.017

3x400V, 50Hz


SWISS MADE

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 | 09.2016 |
| Revision of BOM, refrigeration and wiring diagram | 13.3 ; 13.5 ; 13.6 | 07.2019 |
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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 |
| $V_{AC}$ | AC voltage |
| $V_{DC}$ | 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 media 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:

**Danger**
**These safety instructions warns of dangers which can result in fatal physical injury if not observed.**

**Warning**
**These safety instructions warns of dangers which can result in serious physical injury if not observed.**

**Caution**
**These safety instructions warn of dangers which can result in minor physical injury or material damage if not observed.**

**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 Media quality

The operating media to be used are defined in Chap. 13.1 Technical data.

Only fill with water, water/glycol, or oil in accordance with the specifications in the Technical data.

## 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 Media circuit

The media 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. **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. **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. **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

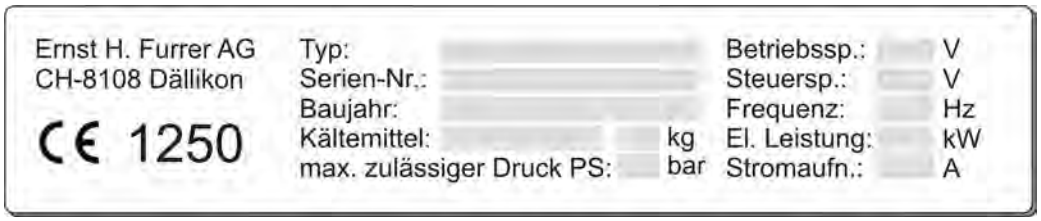



Fig. 3.1 Installation of the nameplate

**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.

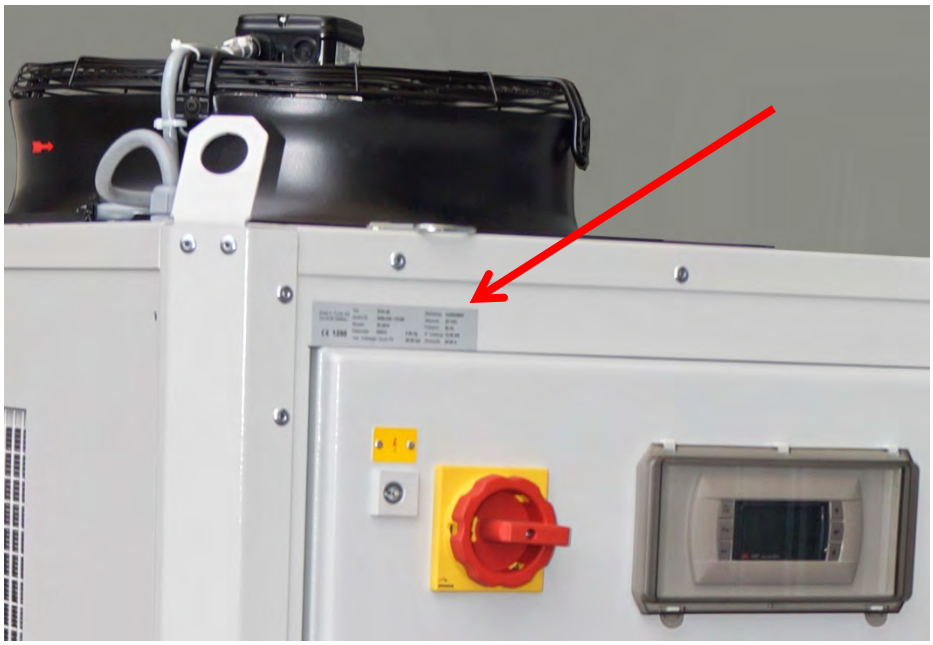


Fig. 3.2 Position of the nameplate

### 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 media circuits, the control cabinet, and all control, regulating and monitoring devices that are necessary for automatic operation.

The operating media to be used are defined in Chap. 13.1Technical data.

### 3.2.2 Controller

The programmable logic controller (PLC) is responsible for the 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 media 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 Media circuits

#### Media circuit with tank

Through the installed tank, the media circuit is designed as a system that is open to the atmosphere. The generously dimensioned tank increases the constancy of the media outlet temperature. The pump conveys the media 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 media circuit: See Chap.* 13 Technical documents

# 4 Packing and transport

## 4.1 Safety

**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 Chap. 13.1 Technical data). Only suspend the cooling unit on the suspension straps provided.**

**Non-observance of this instruction can lead to fatal injury.**

**Caution**

**Material damage due to frost.**

**Transport or storage in a frost-exposed environment leads to material damage if the water circuits have not been fully drained beforehand.**

### 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)

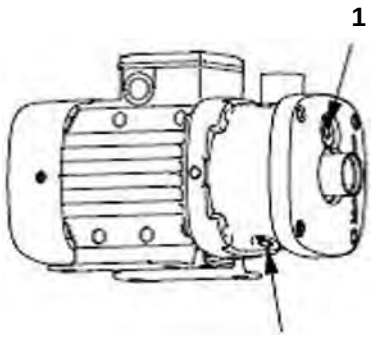
**Storage and transport in environments subject to freezing**

The tank, pumps and all water circuits must be fully emptied prior to storage.

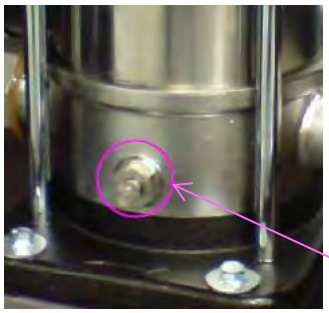
Unscrew the filter cups. **Make sure that the O-rings do not get lost.**

### Emptying the pumps

The emptying procedure is determined by the design of the pump.




Horizontal pump




Upright pump

Fig. 4.1 Emptying the pumps

1 Filling opening
2 Drain opening

*Procedure:*

The pumps must be completely emptied to avoid damage. Remove the filler caps and drain plugs from the pump (see Fig. 4.1).

Reinstall the filler caps and the drain plugs in the pumps after completely emptying.

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

## 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 media when transported.

### Transport damage

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 circuits (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 straps (4-point attachment) must be used for transportation by crane.

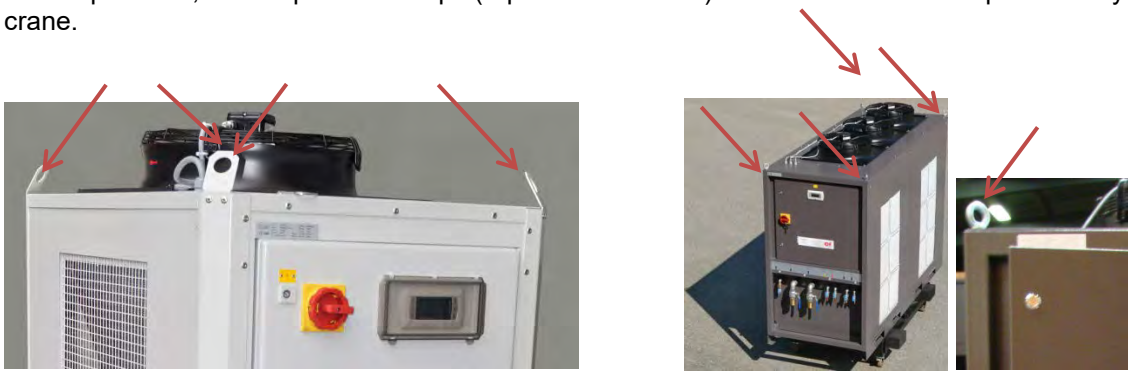


Fig. 4.2 Suspension straps

*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

**Danger**

**Suspended loads can fall.**

**Never step or remain under suspended loads.**

**Non-observance of this instruction can lead to fatal injury.**

**Note**

**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.**

### 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 media circuits

: 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 media circuits must be determined based on the available pump pressure and the expected loss in pressure in the consumer circuit. The media lines can be implemented with a fixed or flexible design.

Ensure material compatibility throughout the entire media 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 media circuits, avoid contamination in the external line system (rinse the lines prior to connecting if necessary).**

# 6 Commissioning

## 6.1 Safety

**Danger**

**Caution - dangerous voltage!**

**Before commencing commissioning, switch off the main switch and secure against being switched back on without authorisation.**

**Non-observance of this safety instruction can result in electrocution with fatal physical injury.**

### 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 pumps

**Note**

**Before filling the media tank, remove the filter cups so that the pumps are vented. Depending on the device and the arrangement of the pumps, the pumps are either vented automatically, or the must be vented separately. (See Chap. 6.4.1.2 Commissioning the media circuits)**

## 6.3 Checks prior to commissioning

- All transport aids and assembly fixtures are removed
- Filter cups 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 media circuits are connected correctly (see Chap. 5.4.3 Connections of media circuits)

### 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 Media circuits

#### 6.4.1.1 Media requirements

The operating media to be used are defined in Chap. 13.1 Technical data.

Only fill with water, water/glycol, or oil in accordance with the specifications in the Technical data.

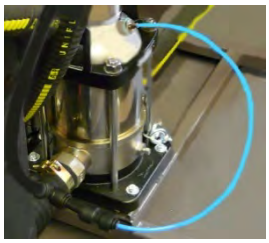
#### 6.4.1.2 Commissioning the media circuits

*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 cups of the water filters with the corresponding filter wrench and remove. **Make sure that the O-rings do not get lost.**
- The filter cups must be removed so the pumps can vent
- Remove the tank lid
- Fill the tank with the operating media to the "Max" mark
- Install the filter cartridges in the corresponding filter cups
- Make sure that the O-rings sit uniformly in the groove of the filter cups

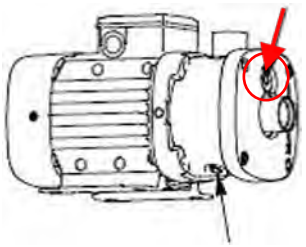
**Venting the pumps:**

- 1. Pumps equipped with a bypass are vented automatically. Manual venting is not necessary. Horizontal pumps with a water filter mounted immediately above the pump are vented by removing the filter cup.



- 2. Pumps without automatic venting must be vented manually:
- Undo the vent screw 2 – 3 turns. Tighten as soon as water emerges.

Upright pumps



Horizontal pumps

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 |
|---|---|---|
| **Warning 13.1.**<br>MEDIA CIRCUIT OVERTEMPERATURE | – Insufficient cooling capacity<br><br>- Other causes | – Control signal cooling should show 100%<br>– There should be no bubbles in the sight glass of the refrigerant circuit<br>– Check if any other alarm messages are pending<br><br>– Request Customer Service |
| **Warning 60**<br>CONDUCTANCE EXCEEDED | – Water treatment cartridge depleted | – Replace water treatment cartridge |
| **Warning 70**<br>WATER LEVEL INSUFFICIENT | – Insufficient water level<br>– Leakage | – Top up water<br>– Check the pipes for leaks<br>– Request Customer Service |
| **Warning 130**<br>WATER FILTER FOULED | – Water filter fouled<br>– Hoseline kinked | – Clean/replace water filter<br>– Straighten kink in hoselines |
| **Warning 133**<br>AIR FILTER FOULED | – Air filter fouled<br>– Condenser fouled<br>– Air supply or removal obstructed<br>– Air inlet temperature > 45°C<br>– Intake air and waste air "short circuited" | – Clean/replace air filter<br>– Clean condenser<br>– Remove obstructions<br>– Thoroughly ventilate the area with additional fans<br>– Change the set-up location |

| Alarm | Possible causes | Remedy |
|---|---|---|
| **Alarm 01**<br>LOW PRESSURE | – Refrigerant loss Leakage<br>– Expansion valve (thermal part / nozzle insert) defective | – Request Customer Service |
| **Alarm 02**<br>HIGH PRESSURE | – **Air-cooled units:**<br>– Air filter mats fouled<br>– Condenser fouled<br>– Air supply or removal obstructed<br>– Air inlet temperature > 45°C<br>– Intake air and waste air “short circuited”<br>– **Water-cooled units:** Water supply or recooling system defective | – **Air-cooled units:**<br>– Clean/replace filter mats<br>– Clean condenser<br>– Remove obstructions<br>– Thoroughly ventilate the area with additional fans<br>– Change the set-up location<br>– Request Customer Service<br>– **Water-cooled units:** Check water supply or recooling system<br>– Request Customer Service |
| **Alarm 03**<br>HIGH PRESSURE SAFETY | – **Air-cooled units:**<br>– Air filter mats fouled<br>– Condenser fouled<br>– Air supply or removal obstructed<br>– Air inlet temperature > 45°C<br>– Intake air and waste air “short circuited”<br>– **Water-cooled units:** Water supply or recooling system defective | – **Air-cooled units:**<br>– Clean/replace filter mats<br>– Clean condenser<br>– Remove obstructions<br>– Thoroughly ventilate the area with additional fans<br>– Change the set-up location<br>– If necessary, request Customer Service<br>– **Water-cooled units**: Check water supply or recooling system<br>– Request Customer Service |
| **Alarm 20**<br>FLOW IN MEDIA CIRCUIT INSUFFICIENT | – No water flow or insufficient water flow<br>– Flow meter or pump defective | – Clean/replace water filter<br>– Check hoses for kinks<br>– Request Customer Service |
| **Alarm 50**<br>PROTECTION AGAINST FREEZING | – Insufficient water flow (if compressor is in operation)<br>– Ambient temperature too low | – Pumps should be operating at temperatures below 8°C<br>– Heating should be operating at below 4 °C<br>– Request Customer Service |
| **Alarm 60**<br>CONDUCTANCE EXCEEDED | – Water treatment cartridge depleted | – Replace water treatment cartridge |
| **Alarm 71**<br>WATER LEVEL INSUFFICIENT | – Water level is too low<br>– Leakage | – Top up water<br>– Check the pipes for leaks<br>– Request Customer Service |

**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.**

**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

**Danger**
**Unintentional start-up of the cooling unit can result in considerable danger.**

**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.**

**Non-observance of this instruction can lead to serious physical injury with fatal consequences.**

**Note**
**Proper execution of the maintenance work is prerequisite for safe and fault-free operation.**

### 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 media circuit

Check tank level –> if necessary, top up media

Check media for fouling –> if fouled, drain and clean the media circuit and tank, and fill with new media.

Check whether media 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.

**Caution**
**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.**

**Carefully clean the condenser with compressed air**.

**Note**
**The aluminium fins are razor-thin and must not be bent as otherwise proper functioning is no longer ensured.**

#### 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 |
|---|---|---|---|
| **Air-cooled cooling units:** Check air filter mats for fouling, clean or replace as required **Water-cooled cooling units:** Check water supply | X | | |
| Check **media filter** for fouling, clean or replace as required | X | | |
| Check **tank level,** top up media as required | X | | |
| Inspect **media lines** for leaks and kinks | | X | |
| Inspect **refrigerant circuit** for refrigerant leaks (watch out for traces of refrigerant oil) | | X | |
| Tighten **screw clamps** in the control cabinet and in the connection boxes of electrical components | | X | |
| Check **media quality,** replace media as required | | | X |
| **Opt. water treatment cartridge** Replace at least 1x year, or upon conductance warning/alarm | | | X |
| Refill **media circuit** / replace media | | | X |

# 9 Repair

## 9.1 Safety

**Danger**
**Unintentional start-up of the cooling unit can result in considerable danger.**

**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.**

**Non-observance of this instruction can lead to serious physical injury with fatal consequences.**

**Note**
**Proper execution of the repair work is prerequisite for safe and fault-free operation.**

### 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 make waves.

### 9.2.2 Replacing the water filter/water treatment cartridge

Undo the filter cups of the water filters with the corresponding filter wrench and remove. Make sure that the O-rings do not get lost. Pour away the water. Replace the water filter with the same type. Make sure that the O-rings sit uniformly in the groove of the filter cups. Screw the filter cup into the filter head. Tighten slightly with the filter wrench.

After switching the cooling unit back on, check the O-rings 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.

### 9.2.3 Replacing the operating media

To replace the operating media, 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 fill the tank with fresh media. The pumps are vented via the open filter connections, or depending on the unit in question it may be necessary to vent the pumps separately.
2. The operating media to be used are defined in Chap. 13.1 Technical data.
   Only fill with water, water/glycol, or oil in accordance with the specifications in the Technical data.
3. Insert the new water filters / water treatment cartridge accordingly.

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

After switching the cooling unit back on, check the O-rings 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 media 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**<br>**Unintentional start-up of the cooling unit can result in considerable danger.**<br>**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.**<br>**Non-observance of this instruction can lead to serious physical injury with fatal consequences.** |

| | |
|---|---|
|  | **Danger**<br>**Suspended loads can fall.**<br>**Never step or remain under suspended loads.**<br>**Non-observance of this instruction can lead to fatal injury.** |

| | |
|---|---|
|  | **Danger**<br>**Unsuitable or under-dimensioned lifting gear can break and the load can fall.**<br>**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.**<br>**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 media circuits 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: +5 °C to +63 °C. If temperatures below +5 °C can occur, the water circuits must be completely emptied (see Chap. 4.2.1 Emptying (frost protection)).

# 11 Disposal

## 11.1 Safety

**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).**

### 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

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

## 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**

**www.efcooling.com**

# 13 Technical documents

## 13.1 Technical data

# Technical data

ef cooling
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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!

**Unit type:** ***EVO 45 / WKL 390 / 50Hz*** **Serial number:** ***0390.017***

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Refrigeration data** | | | | | | | | Updated | 02.10.2018 | FRLO |
| Cooling capacity | | | ***45*** | kW | at | (to / tc) | ***1/58*** | °C | | |
| Condensing capacity | | | ***66.5*** | kW | | | | | | |
| Number of refrigeration circuits | | | ***1*** | | | | | | | |
| Refrigerant | | | ***R410A, 5.8kg*** | | | | | | | |
| Compressor | Quantity | | ***2*** | | | | | | | |
| | Type | | ***C-SCP400H38B*** | | | | | | | |
| | Power consumption | | ***13.8*** | kW | | total | ***27.6*** | kW | | |
| | Current consumption | | ***24*** | A | | total | ***48*** | A | | |
| Condenser | Type | | ***CO1 / CO2*** | | | | | | | |
| | Airflow | | ***13000*** | $m^3/h$ | | | | | | |
| | Quantity of fans | | ***2*** | Type: | | | | | | |
| | Power consumption | | ***1.05*** | kW | | total | ***2.1*** | kW | | |
| | Current consumption | | ***2.2*** | A | | total | ***4.4*** | A | | |
| **Operating media** | | | | | | | | | | |
| Medium to be cooled | ***Propylen clycol*** | | ***34% / 66% water*** | | | | | | | |
| Medium to be cooled | ***Tank capacity*** | | ***320 Liter*** | | | | | | | |
| **Hydraulic data (Producer circuit)** | | | | | | | | | | |
| Pump | Type | | ***CM 10-5, Grundfos*** | | | | | | | |
| | Quantity | | ***1*** | | | | | | | |
| | Flow rate | | ***120*** | l/min | | at | ***7.3*** | bar | | |
| | Max. delivery height | | ***8.0*** | bar | | Bypass 6.6 bar @ 9.6m3/h(160L/min) | | | | |
| | Power consumption | | ***4.00*** | kW | | total | ***4.00*** | kW | | |
| | Current consumption | | ***8*** | A | | total | ***8*** | A | | |
| Heat exchanger ***SWEP*** | Type | | ***V80x54*** | | | | | | | |
| | Quantity | | ***1*** | | | | | | | |
| | Flow rate | | ***150*** | l/min | | Pressure loss | ***40*** | kPa | | |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Control** | | | | | | | | | | |
| High pressure control | Typ | ***efcooltronic*** | | Set | ***40*** | °C | P-Band | ***10*** | K | |
| Temperature control | Typ | ***ef-cooltronic*** | | Set | ***6*** | °C | P-Band | ***1*** | K | |
| **Safety device** | | | | | | | | | | |
| High pressure monitoring | Typ | ***ef-cooltronic*** | | OFF | ***41*** | bar | ON | ***man.*** | bar | |
| High pressure safety switch | Typ | ***ACB-2UB515W*** | | OFF | ***42*** | bar | ON | ***man.*** | bar | |
| Low pressure monitoring | Typ | ***ef-cooltronic*** | | OFF | ***3*** | bar | ON | ***man.*** | bar | |
| Antifreeze monitoring | Typ | ***ef-cooltronic*** | | OFF | ***-18*** | °C | ON | ***-15*** | °C | |
| **Limitation of use (consumer circuit)** | | | | | | | | | | |
| Cooling circuit | | | from | ***0*** | °C | to | ***7*** | °C | | |
| **Limitation of use (refrigeration circuit)** | | | | | | | | | | |
| Ambient temperature | | | from | ***-15*** | °C | to | ***45*** | °C | | |
| Evaporating temperature | | | from | ***-5*** | °C | to | ***+4*** | °C | | |
| Condensing temperature | | | from | ***30*** | °C | to | ***64*** | °C | | |
| max. operation pressure (PS) | | | | ***42*** | bar | | | PED category | **II** | |

# Technical data

**ef cooling**
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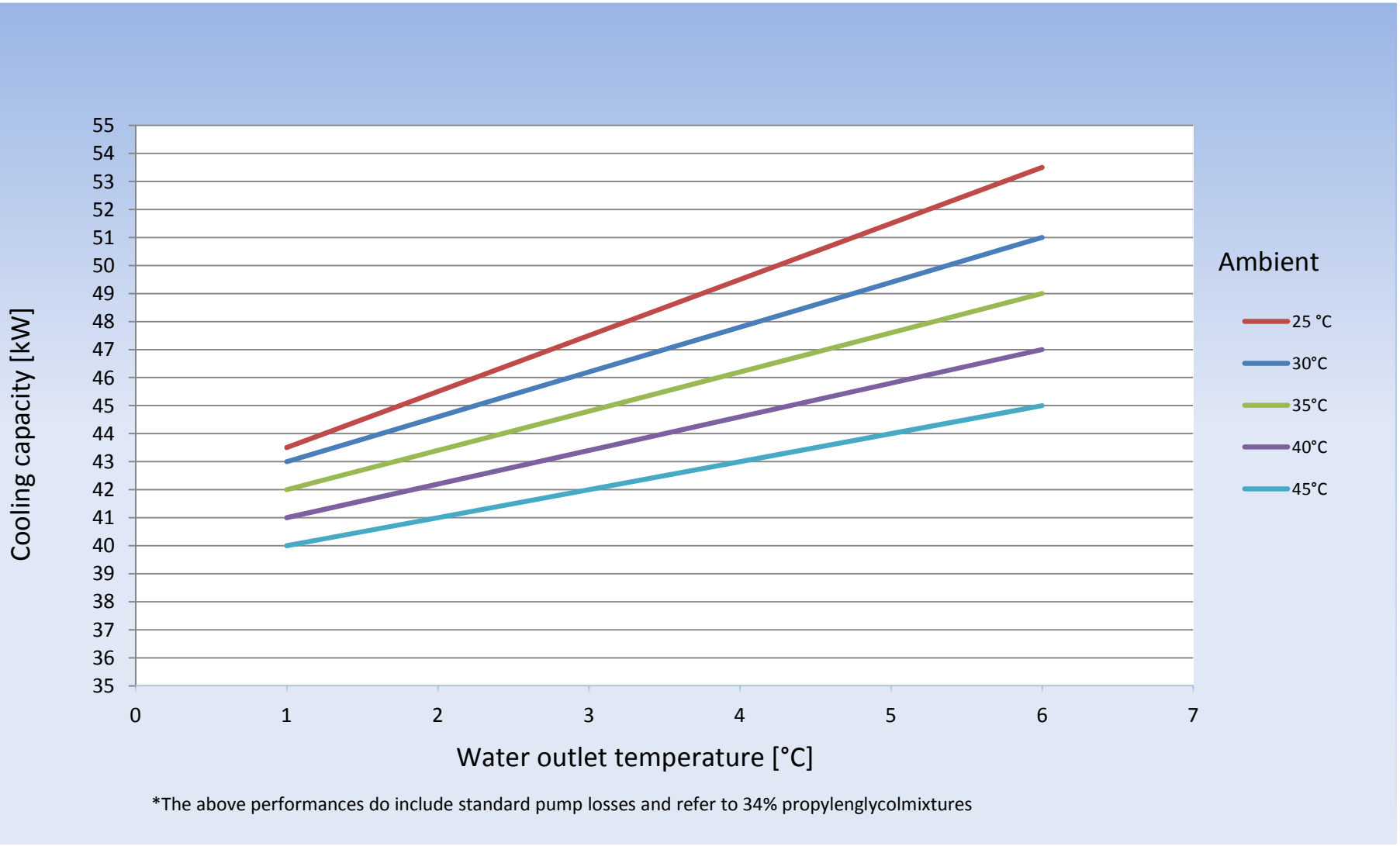
info@efcooling.com
www.efcooling.com


**Unit type:** ***EVO 45 / WKL 390 / 50Hz*** **Serial number:** ***0390.017***

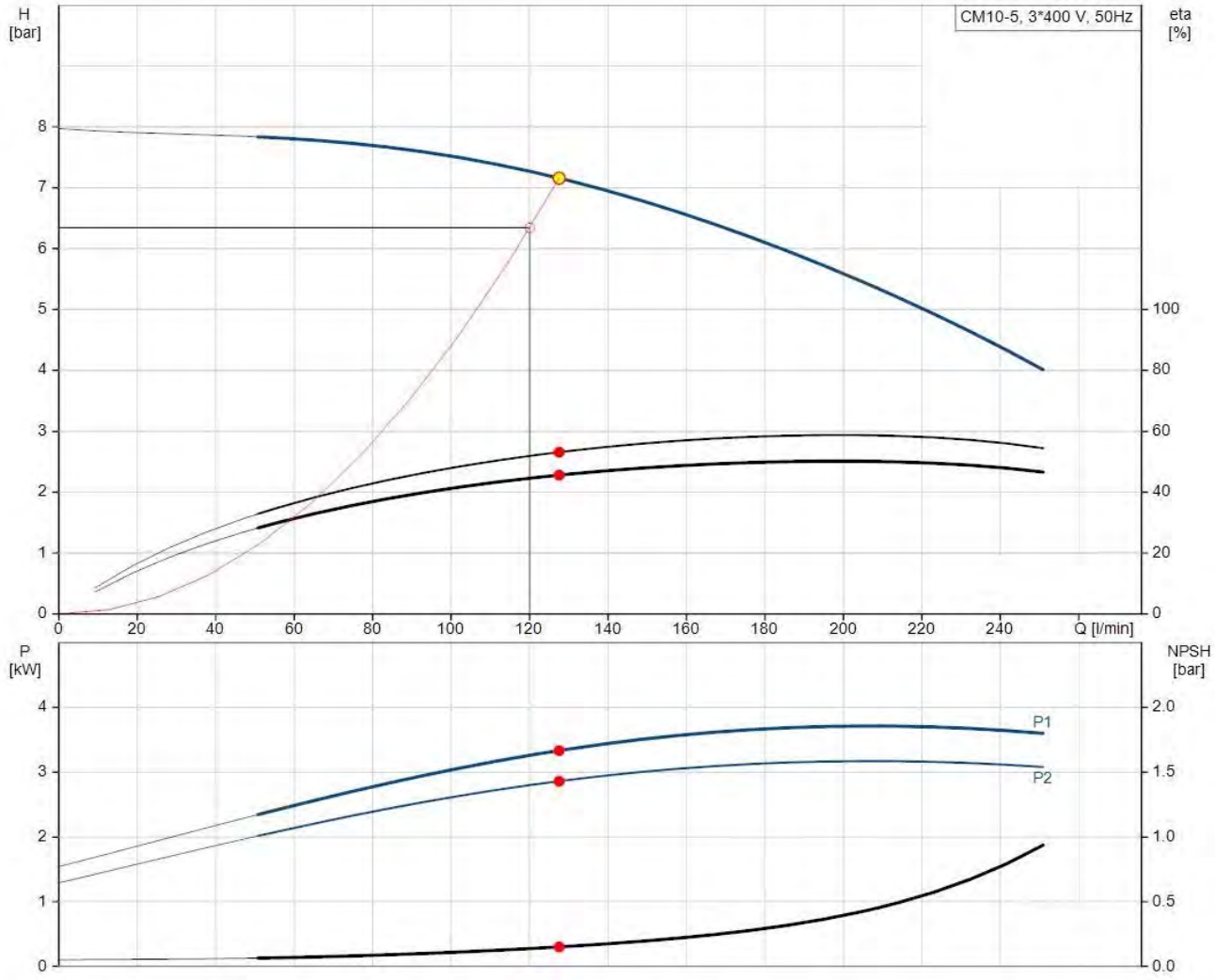
| | | | | | | |
|---|---|---|---|---|---|---|
| **Electrical data** | | | | | | |
| Power supply | Voltage | ***3x400*** | V | Fuse: | ***63*** | A |
| | Frequency | ***50*** | Hz | Starting current: | ***113*** | A |
| | Contol | ***24*** | Vdc | | | |
| Total power consumption | $P_{Operation}$ | ***29.7*** | kW | $P_{MAX}$ | ***33.7*** | kW |
| Total curent consumption | $I_{Operation}$ | ***51.4*** | A | $I_{MAX}$ | ***60.9*** | A |
| **Dimensions (Transport)** | | | | | | |
| Weight | | ***620 (675)*** | kg | | | |
| Length | | ***1800 (1930)*** | mm | | | |
| Width | | ***850 (980)*** | mm | | | |
| Height | | ***2074 (2240)*** | mm | | | |
| **Circuit joints** | | | | | | |
| Circuit | Forward | ***G 1 1/2"*** | | | | |
| | Return | ***G 1 1/2"*** | | | | |

## 13.1.1 Performance




*The above performances do include standard pump losses and refer to 34% propylenglycolmixtures

## 13.1.2 Pump curve


CM10-5, 3*400 V, 50Hz
H
[bar]
eta
[%]
Q [l/min]
P
[kW]
NPSH
[bar]
P1
P2

# 13.2 Statement of Conformity

**ef cooling**
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# 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**

## EN

**DECLARATION OF CONFORMANCE**

**We declare under our responsability 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**

## 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**

## 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**

## SP

**DECLARACION DE CONFORMIDAD**

**Declara bajo su ùnica responsabilidad que la màquina es conforme a:**

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

| | | |
|---|---|---|
| Type: | **WKL 390** | |
| Series: | **0390.017** | |
| Max. allowable pressure PS: | 42.0 | bar |
| Allowable max./min. temperatur TS: | 45 / -15 | °C |
| Performance Pc: | 67 | kW |
| Fluid (contained) – fluid group: | Group 2 (gaseous or liquid) | |
| Conformity assessment procedures.: | Modul H: full quality assurance | |
| The Pressure Equipment Directive Notified Body: | The Certification Body CE1250<br>Schweizerische Vereinigung für Qualitäts- und Managenent-Systeme (SQS)<br>Bernstrasse 103<br>CH-3052 Zollikofen | |

Responsable 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, | 25.11.2016 |
| Signature |  |  |

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# DECLARATION OF CONFORMITY CE 1250

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

Typ Type Type
Tipo Tipo
**WKL 390**

Serie Series Série
Serie Serie
**0390.017**

Beschreibung der Druckgeräte, aus denen sich die Einheit zusammensetzt:
Description of the pressure equipment comprising the assembly:
Descriptiondes 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:

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

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# 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 | Vàlvula magnética |
| SV | Sicherheitsventil | Saftey valve | | Soupape de sûreté | Valvola di sucurezza | Vàlvula de seguridad |
| EV | Verdampfer | Evaporator | | Evaporateur | 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 |

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# 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 responsability 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 déclareons 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 ùnica responsabilidad que la màquina, 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:
- EN 12735-1:2010
- EN 378 / AD 2000

**SE**

**FÖRKLARING OM ÖVERENSSTàMMELSE**
Vi försäkrar under vårt enda ansvar att enheten, i samband med kopparrör, är i enlighet med:
- EN 12735-1:2010
- 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

| | | |
|---|---|---|
| **Type:** | **WKL 390** | |
| **Series:** | **0390.017** | |
| Max. allowable pressure in refrig. circuit PS: | 42.0 | bar |
| Allowable ambient temperature TS, max./min.: | 45 / -15 | °C |
| Performance Pc: | 67 | kW |

Responsable 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, | 24.11.2016 |
| Signature |  |  |

# 13.3 Bill of materials/Spare parts list

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *EVO 45 50Hz. version* | **Spannung** *3 x 400V / 50 Hz* | | | | |
| | | | | | | *Kältemaschine* *Schaltschrank* | **WKL 390 / 0390.017** | | | | |
| **Pos** mech | **Pos** elektr | **Stk/E** | Stk/E | Stk/E | **Artikel-Nr.** | **Artikel-Bezeichnug** | **Benennung** | **Description** | **Désignation** | **Definizione** | **Designación** |
| 1 | | **2** | 2 | | 1010204 | 0-12 bar | Druckmessgerät | manometer | Manométre | Manometro | Manómetro |
| 2 | | **1** | 1 | | 1060126 | 1", 2.0 - 7.0 bar | Überströmventil | overflow valve | soupape de dècharge | valvola di troppo pieno | vàlvula de desbordamiento |
| 3 | | **5** | 5 | | 1100112 | 1200 x 600 mm; Efcooling | Filtermatten | filter mats | cartouche filtrante | filtro tappeto | filtro de alfombra |
| 4 | | **1** | 1 | | 1100115 | 10" Gehäuse, 11/2, ohne Entlüftung | Filtergehäuse | water filter casing | boîtier de filtre | scatola del filtro | caja de filtro |
| 5 | | **1** | 1 | | 1100116 | Schlüssel zu Filtergehäuse Big Blue 10/20 | Schlüssel | Filter key | Clé de boîtier de filtre | chiave scatola del filtro | llave de caja de filtro |
| 6 | | **1** | 1 | | 1100118 | 10", 50µm filter cartridge Big Blue | Filtereinsatz | Filter insert | Garniture de filtre | Inserto filtro | Suplemente filtro |
| 7 | | **1** | 1 | | 1100237 | 5/8" löt, 4116/5S | Filtertrockner mit Schauglas | Filter drier and sightglass | Dessicateur de filtre | Essicatore del filtro | Secador de filtro |
| 8 | 5R3 | **1** | 1 | | 1130070 | NTC, Kabel 6 m | Temperaturfühler (Überhitzungtemperatur) | Temperature probe | Sonde de temperature | Sensore di temperatura | Sensor de temperatura |
| 9 | 5R7 | **1** | 1 | | 1130073 | NTC, Kabel 3,2 m | Temperaturfühler (Verdampferaustritt) | Temperature probe | Sonde de temperature | Sensore di temperatura | Sensor de temperatura |
| 10 | 6R2 | **1** | 1 | | 1130027 | NTC, Kabel 1.5 m | Temperaturfühler (Tank) | Temperature probe | Sonde de temperature | Sensore di temperatura | Sensor de temperatura |
| 11 | | **1** | 1 | | 1142175 | 800 x 530 x 800 mm, 320 L | Tank | Tank | Réservoir | Serbatoio | Depésito |
| 12 | | **1** | 1 | | 1142178 | zu WKL 390, RAL 7035 Str. | Gehäuse | housing | logement | alloggiamento | viviendas |
| 13 | 3E7 | **1** | 1 | | 1210296 | 480 V, 70 W (400 V, 55 W) | Carterheizung | Crankcase heater | Résistance carter | Riscaldemento carter | Calefacción del carter |
| 14 | 3E8 | **1** | 1 | | 1210296 | 480 V, 70 W (400 V, 55 W) | Carterheizung | Crankcase heater | Résistance carter | Riscaldemento carter | Calefacción del carter |
| 15 | 2M3 | **1** | 1 | | 1210551 | C-SCP-400-H38B | Verdichter | Compressor | Compresseur | Compressore | Compresor |
| 16 | 2M5 | **1** | 1 | | 1210551 | C-SCP-400-H38B | Verdichter | Compressor | Compresseur | Compressore | Compresor |
| 17 | | **1** | 1 | | 1220607 | 780 x 1400 x 52 mm, links | Verflüssiger | Condenser | Condenseur | Condensatore | Condensador |
| 18 | | **1** | 1 | | 1220608 | 780 x 1400 x 52 mm, rechts | Verflüssiger | Condenser | Condenseur | Condensatore | Condensador |
| 19 | 12B3 | **1** | 1 | | 1300015 | L1 = 70mm NC / L2 = 190mm NO | Schwimmerschalter | Level switch | Niveau interrupteur | Dispositivo di contr. automatic | Controlador del nivel |
| 20 | 2M6 | **1** | 1 | | 1310718 | CM 10-5 | Kreiselpumpe | Pump | Pompe | Pompa | Bomba |
| 21 | 6B1 | **1** | 1 | | 1320159 | PA-21 Y 0-50 bar g, 4-20 mA, | Drucksensor | Pressure Transducer | Pression transmetteur | Pressione trasmettitore | Presión transductor |
| 22 | 5B2 | **1** | 1 | | 1320160 | PAA-21 Y 0-18 bar a, 4-20 mA, | Drucksensor | Pressure Transducer | Pression transmetteur | Pressione trasmettitore | Presión transductor |
| 23 | 12B5 | **1** | 1 | | 1320162 | ACB-2Ub515W, HD -Auto 42 bar | Pressostat | HP Pressostat | HP Pressostat | AP Pressostato | AP Presóstato |
| 24 | 3M2 (11B3) | **1** | 1 | | 1570079 | FN 056 3x400/460 V, 50/60 Hz | Ventilator (inkl. Wicklungsschutz) | Fan | Ventilateur | Ventilatore | Ventilador |
| 25 | 3M4 (11B4) | **1** | 1 | | 1570079 | FN 056 3x400/460 V, 50/60 Hz | Ventilator (inkl. Wicklungsschutz) | Fan | Ventilateur | Ventilatore | Ventilador |
| 26 | | **2** | 2 | | 1580668 | 1 1/2" i/i, mit Flachstahlgriff, PN 25 | Kugelhahn | Ball valve | Vanne sphérique | Valvola a sfera | Válvula de pelota |
| 27 | | **1** | 1 | | 1580684 | E3V35, Kupfer-Lötanschluss | El. Expansionsventil | El. expansion valve | Détendeur électronique | Valvola di espansione el. | válvula de expansión |
| 28 | 8Y2 | **1** | 1 | | 1580685 | Stator Unipolar, 0.3 m Kabel | Stator | Stator | Stator | Statore | Estator |
| 29 | | **1** | 1 | | 1610330 | V80Hx54/1P-SC-S | Verdampfer | Evaporator | Evaporateur | Evaporatore | Evaporador |
| 32 | | **1** | 1 | | 1580025 | 1 1/2" | Rückschlagventil | Check valve | Clapet anti-retour | valvola di ritegno | válvula de retención |

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| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *EVO 45 50Hz. version* | | **Spannung** *3 x 400V / 50 Hz* | | | | |
| | | | | | | *Kältemaschine* *Schaltschrank* | **WKL 390 / 0390.017** | | | | | |
| | | | | | | | | | | | | |
| **Pos** mech | **Pos** elektr | **Stk/E** | Stk/E | Stk/E | **Artikel-Nr.** | **Artikel-Bezeichnug** | **Benennung** | **Description** | **Désignation** | **Definizione** | **Designación** |
| 201 | | **1** | | 1 | 1080909 | 331 x 277 x 23mm | Sichtfenster | windowed | fenêtré | Finestra | de ventana |
| 202 | 8R1 | **1** | | 1 | 1080952 | Metallfilm-Widerstand 120 Ohm | Widerstand | Resistance | Résistance | Resistenza | Resistencia |
| 203 | | **1** | 1 | | 1081086 | | Elektroschaltschrank | Electrical cabinet | Tableau electric | Armadio elettrico | Armario eléctrico |
| 204 | 12K4 | **1** | | 1 | 1350127 | 700-HLT1Z24 | Relais | Relay | Relais | Rele | Relé |
| 205 | 11S2.1 | **1** | | 1 | 1400067 | ZB4-BK1333 | Leuchtwahlschalter | Selector | Sélecteur | Selettore | selector |
| 206 | 11S2.1 | **1** | | 1 | 1400069 | ZBY 2385 | Bezeichnungsschild | Nam plate | étiquette d'inscription | Etichetta d'identificazione | Placa de identificación |
| 207 | 11S2.1 | **1** | | 1 | 1400094 | ZB4-BW0B33 | Hilfschalterblock | Auxilliary contact | Bloc de contact auxilliare | Contatto ausiliaro | Contacto auxiliar |
| 208 | | **1** | | 1 | 1460385 | S00, S0, 2 Schalter, 3 Phasen | Sammelschiene | bus bar | barre collectrice | barra collettrice | barra de bus |
| 209 | 3Q7 | **1** | | 1 | 1460668 | S00, 0,7..1,0 A, 0,25 kW | Motorschutzschalter | Motor protection switch | Disjoncteur moteur | Interruttore protez. Motore | Guardamotor |
| 210 | 4Q3 | **1** | | 1 | 1460670 | S00, 1,1..1,6 A, 0,55 kW | Motorschutzschalter | Motor protection switch | Disjoncteur moteur | Interruttore protez. Motore | Guardamotor |
| 211 | 3Q2 | **1** | | 1 | 1460672 | S00, 1,8..2,5 A, 0,75 kW | Motorschutzschalter | Motor protection switch | Disjoncteur moteur | Interruttore protez. Motore | Guardamotor |
| 212 | 3Q4 | **1** | | 1 | 1460672 | S00, 1,8..2,5 A, 0,75 kW | Motorschutzschalter | Motor protection switch | Disjoncteur moteur | Interruttore protez. Motore | Guardamotor |
| 213 | 2Q6 | **1** | | 1 | 1460677 | S00, 5.5..8.0 A, 3 kW | Motorschutzschalter | Motor protection switch | Disjoncteur moteur | Interruttore protez. Motore | Guardamotor |
| 214 | 2Q3 | **1** | | 1 | 1460684 | S0, 20,00..25,00 A, 11,00 kW | Motorschutzschalter | Motor protection switch | Disjoncteur moteur | Interruttore protez. Motore | Guardamotor |
| 215 | 2Q4 | **1** | | 1 | 1460684 | S0, 20,00..25,00 A, 11,00 kW | Motorschutzschalter | Motor protection switch | Disjoncteur moteur | Interruttore protez. Motore | Guardamotor |
| 216 | 8K7 | **1** | | 1 | 1460709 | S0, 15 kW, 24 V DC | Schütz | Contactor | Contacteur | Contattatore | Contactor |
| 217 | 10K1 | **1** | | 1 | 1460709 | S0, 15 kW, 24 V DC | Schütz | Contactor | Contacteur | Contattatore | Contactor |
| 218 | 10K3 | **1** | | 1 | 1460718 | S00, 4 kW, 24 V DC | Schütz | Contactor | Contacteur | Contattatore | Contactor |
| 219 | 10K5 | **1** | | 1 | 1460718 | S00, 4 kW, 24 V DC | Schütz | Contactor | Contacteur | Contattatore | Contactor |
| 220 | 9K1 | **1** | | 1 | 1460718 | S00, 4 kW, 24 V DC | Schütz | Contactor | Contacteur | Contattatore | Contactor |
| 221 | 2Q3 | **1** | | 1 | 1460764 | S00..S3, 1S, Ö, quer liegend | Hilfsschalter quer | Auxilliary contact | Bloc de contact auxilliare | Contatto ausiliaro | Contacto auxiliar |
| 222 | 2Q4 | **1** | | 1 | 1460764 | S00..S3, 1S, Ö, quer liegend | Hilfsschalter quer | Auxilliary contact | Bloc de contact auxilliare | Contatto ausiliaro | Contacto auxiliar |
| 223 | 2Q6 | **1** | | 1 | 1460764 | S00..S3, 1S, Ö, quer liegend | Hilfsschalter quer | Auxilliary contact | Bloc de contact auxilliare | Contatto ausiliaro | Contacto auxiliar |
| 224 | 3Q2 | **1** | | 1 | 1460764 | S00..S3, 1S, Ö, quer liegend | Hilfsschalter quer | Auxilliary contact | Bloc de contact auxilliare | Contatto ausiliaro | Contacto auxiliar |
| 225 | 3Q4 | **1** | | 1 | 1460764 | S00..S3, 1S, Ö, quer liegend | Hilfsschalter quer | Auxilliary contact | Bloc de contact auxilliare | Contatto ausiliaro | Contacto auxiliar |
| 226 | 4Q3 | **1** | | 1 | 1460764 | S00..S3, 1S, Ö, quer liegend | Hilfsschalter quer | Auxilliary contact | Bloc de contact auxilliare | Contatto ausiliaro | Contacto auxiliar |
| 227 | 3Q7 | **1** | | 1 | 1460764 | S00..S3, 1S, Ö, quer liegend | Hilfsschalter quer | Auxilliary contact | Bloc de contact auxilliare | Contatto ausiliaro | Contacto auxiliar |
| 228 | | **4** | | 4 | 1460770 | Schütz S00 - MS S00 | Verbindungsbaustein | link module | link module | link module | link modul |
| 229 | | **2** | | 2 | 1460781 | Schütz S0 - MS S0 | Verbindungsbaustein | link module | link module | link module | link modul |
| 230 | 4F6 | **1** | | 1 | 1470029 | T 4 A, 250 V, 5 x 20 mm | Sicherungseinsatz | Fuse | liaison fusible | Fusibile | Fusible |
| 231 | 5A1 | **1** | | 1 | 1710112 | pCO-OEM | Speicherprogrammierbare Steuerung | PLC | SPE | SPE | SPE |
| 232 | 2S1 | **1** | | 1 | 1400149 | 37 kW, 3-polig | Hauptschalter | Main switch | Interrupteur principal | Interruttore principale | Interraptor principal |
| 233 | | **1** | | 1 | 1460328 | S00, S0, 4 Schalter, 3 Phasen | Sammelschiene | bus bar | barre collectrice | barra collettrice | barra de bus |
| 234 | | **2** | | 2 | 1460452 | S0, 3 Phasen | Einspeiseklemme | Power Terminal | borne d'entrée | terminale di ingresso | Terminal de entrada |
| 235 | 4T4 | **1** | | 1 | 1550267 | 200-500 V AC, 24 V DC, 5,0 A | Netzgerät | Power pack | Appareil d'alimentation | Apparecchio di alimentazione | Alimentos aislamiento |
| 236 | | **1** | | 1 | 1710017 | 0,8 m | Verbindungskabel | connection cable | câble de connexion | cavo di collegamento | cable de conexión |
| 237 | 8A6 | **1** | | 1 | 1710042 | Steuereinheit zu pCO-SPS | Display | Display | panneau de visualisation | pannello di visualizzazione | panel de visualización |

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| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | *EVO 45 50Hz. version* | | **Spannung** *3 x 400V / 50 Hz* | | | | |
| | | | | | *Kältemaschine* *Schaltschrank* | **WKL 390 / 0390.017** | | | | | |
| **Pos** mech | **Pos** elektr | **Stk/E** | Stk/E | Stk/E | **Artikel-Nr.** | **Artikel-Bezeichnug** | **Benennung** | **Description** | **Désignation** | **Definizione** | **Designación** |
| | | | | | | | **Winter kit** | **Winter kit** | **Kit d'hiver** | **Kit inverno** | **Kit invierno** |
| 30 | 6R6 | **1** | 1 | | 1130075 | NTC Kabel 1.1m | Temperaturfühler (Umgebung) | Temperature probe | Sonde de temperature | Sensore di temperatura | Sensor de temperatura |
| 31 | 3E5 | **1** | 1 | | 1160003 | EHK 600/44-CB | Einschraubheizung | Heating | Chauffage | Riscaldamento | Calefacción |
| 234 | 3Q5 | **1** | | 1 | 1460764 | S00..S3, 1S, Ö, quer liegend | Hilfsschalter quer | Auxilliary contact | Bloc de contact auxilliare | Contatto ausiliaro | Contacto auxiliar |
| 235 | | **1** | | 1 | 1460328 | S00, S0, 4 Schalter, 3 Phasen | Sammelschiene | bus bar | barre collectrice | barra collettrice | barra de bus |
| 236 | | **1** | | 1 | 1460770 | Schütz S00 - MS S00, DC | Verbindungsbaustein | link module | link module | link module | link modul |
| 237 | 9K3 | **1** | | 1 | 1460724 | S00, 7,5 kW, 24 V DC | Schütz | Contactor | Contacteur | Contattatore | Contactor |
| 238 | 3Q5 | **1** | | 1 | 1460679 | S00, 9..12,5 A, 5,5 kW | Motorschutzschalter | Motor protection switch | Disjoncteur moteur | Interruttore protez. Motore | Guardamotor |
| | | | | | | | | | | | |
| **OPTION** | | | | | **4050051** | | **Rücklaufsicherung** | **Non return protect.** | **Protect. anti retour** | **Protez. di non ritorno** | **Prot. de non retencion** |
| | | | | | | | | | | | |
| 33 | 9Y4 | **1** | 1 | | 1580311 | 1 1/2", 24 VDC | Magnetventil | Solenoid valve | Electrovanne | Elettrovalvola | Vàlvula magnética |
| | | | | | | | | | | | |
| **OPTION** | | | | | **4050047** | | **Fernbedienung** | **Remote control** | **Télécommande** | **Telecomando** | **Control remoto** |
| 300 | | **1** | | 1 | 1080998 | | Abzweigdose | connection box | Boîtier de connexion | Scatola di connessione | Caja de conexión |
| 301 | 13H3 | **1** | | 1 | 1240053 | 24 V AC/DC, LED | Leuchtmelder, rot | Indicator light, red | Indicateur lumineux, rouge | Indicatore di luce, rosso | Indicador de luz, rojo |
| 302 | 11S2 | **1** | | 1 | 1400035 | XB4-BJ21 | Wahlschalter | Selector | Sélecteur | Selettore | selector |
| 303 | 11S2 | **1** | | 1 | 1400042 | ZBY-2178 | Bezeichnungsschild | Nam plate | étiquette d'inscription | Etichetta d'identificazione | Placa de identificación |
| 304 | 8X5 | **1** | | 1 | 1710034 | TC0NN6J000 | Zusatz Anschluss Platine | Additional terminal panel | Panneau de terminal suppl. | Pannello terminale aggiuntivo | Panel de terminal adicional |
| 305 | 8A4 | **1** | | 1 | 1710042 | PGD1000FW00/01 | Display | Display | Display | Display | Display |

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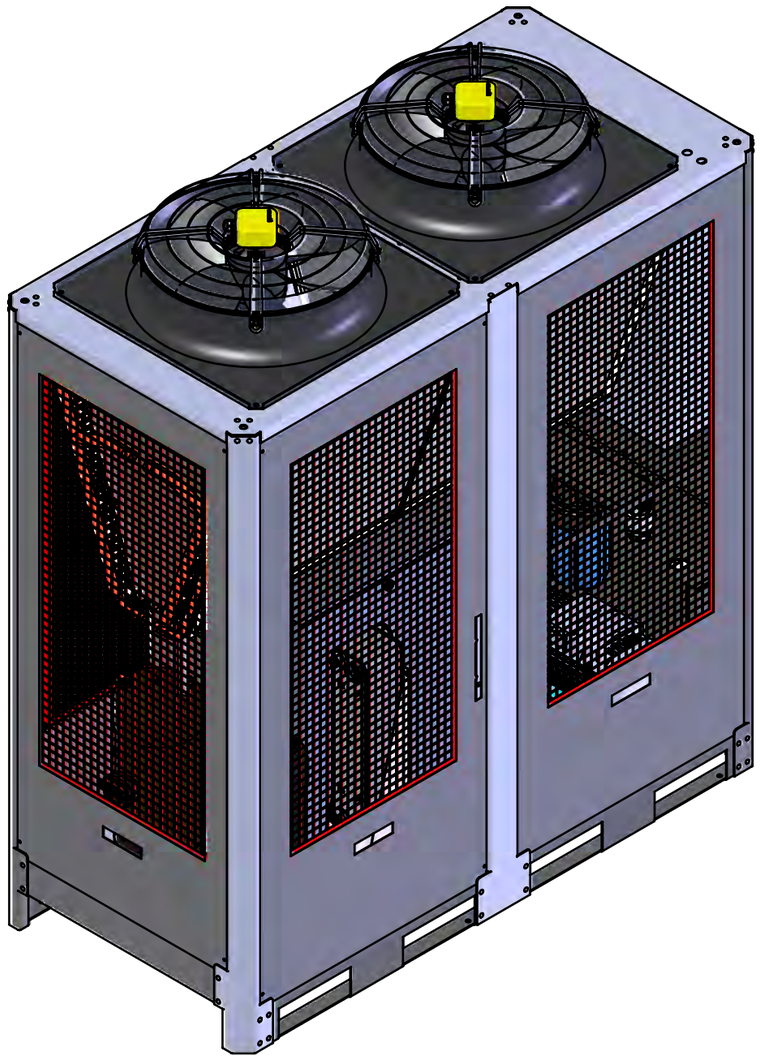
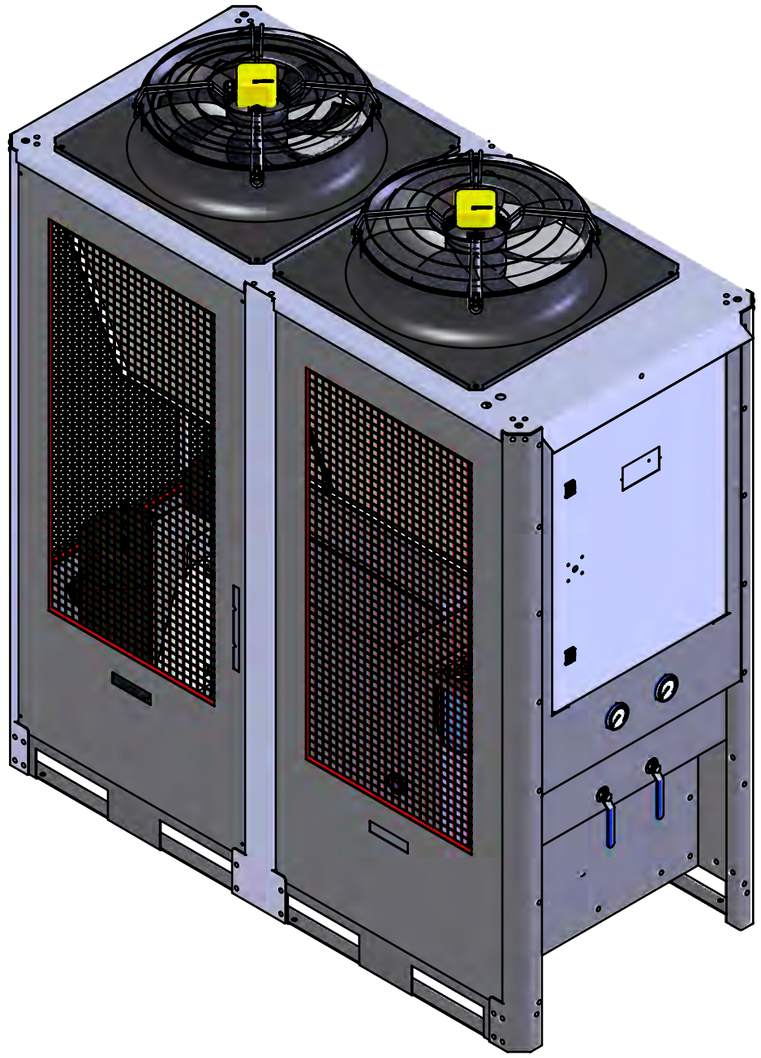
# 13.4 Drawings







| Änderungen | | | | | | Massstab |
|---|---|---|---|---|---|---|
| | A | 20.06.2016 AYBO Anpassungen<br> | Erstellt | 09.03.2016 | CHME | 1:15 |
| | - | Erstausgabe | Geprüft | | | |
| | | | Freigegeben | 28.09.2016 | CHME | |
| | | | Auftrags-Nr. | | | |
| Ohne sep. Stückliste ☐ | | Verwendungsbereich, Projekt | Status | Freigegeben | | |
| Sep. Stückliste gleicher Nr. ☐ | | 0390.017 | Ursprung | | Format A3 | Blatt / Anz. 1 / 2 |
| Sep. Stückliste anderer Nr. ☐ | | Sach- / Artikel-Nr. 0390.017 | Ersatz für | | | |

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CH-8108 Dällikon

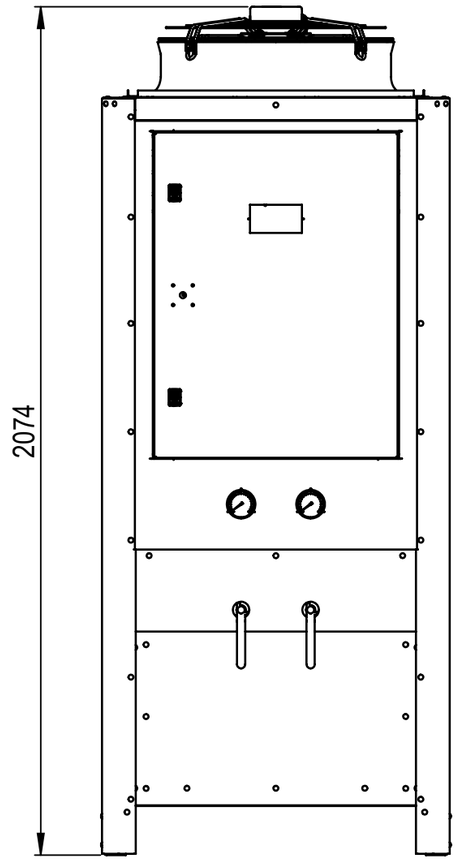
Benennung: Maschinenzeichnung EVO 45

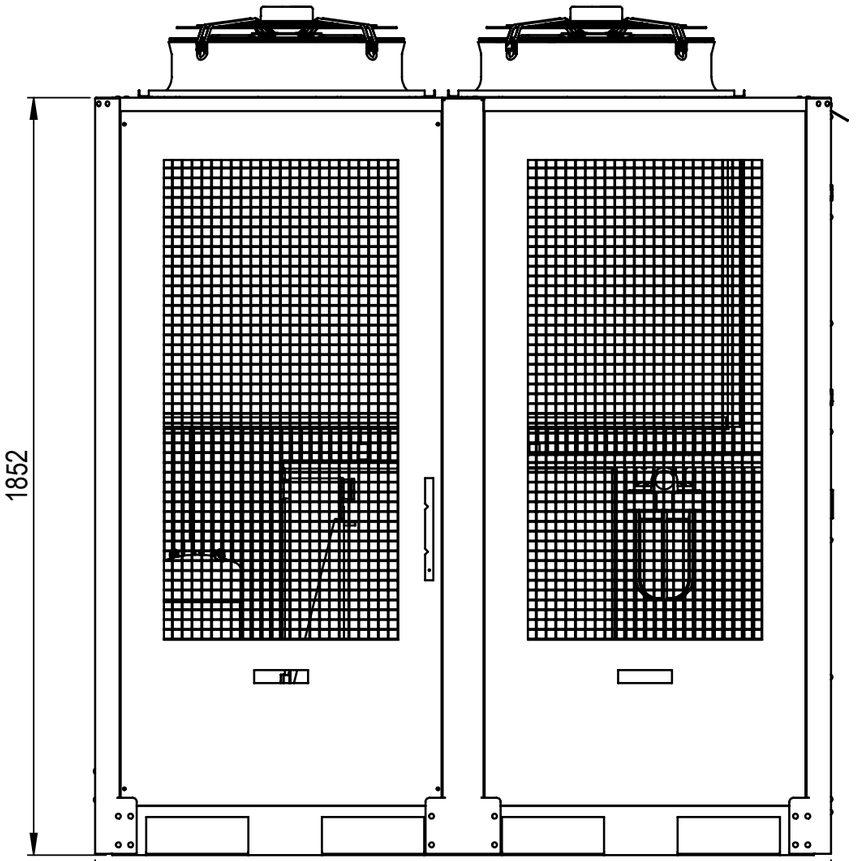
Zeichnungs-Nr.: 0390.017 A

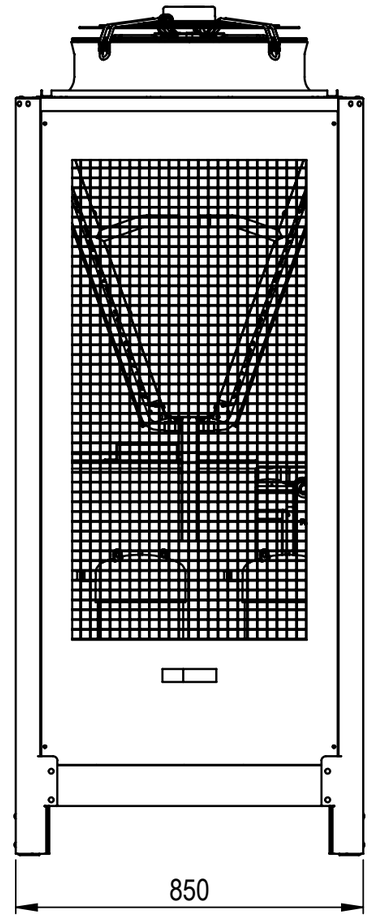
Index

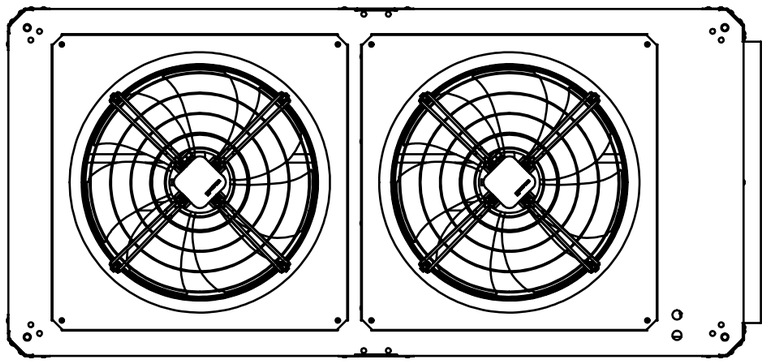
CAD-System: SolidWorks

Plotdatum: 28.09.2016



| Änderungen | | | | | |
|---|---|---|---|---|---|
| A | 20.06.2016 AYBO Anpassungen<br> | Erstellt | 09.03.2016 | CHME | Massstab |
| - | Erstausgabe | Geprüft | | | 1:15 |
| | | Freigegeben | 28.09.2016 | CHME | |
| | | Auftrags-Nr. | | | |
| Ohne sep. Stückliste ☐ | Verwendungsbereich, Projekt | Status | Freigegeben | | |
| Sep. Stückliste gleicher Nr. ☐ | 0390.017 | Ursprung | | Format | Blatt / Anz. |
| Sep. Stückliste anderer Nr. ☐ | Sach- / Artikel-Nr. 0390.017 | Ersatz für | | A3 | 2 / 2 |

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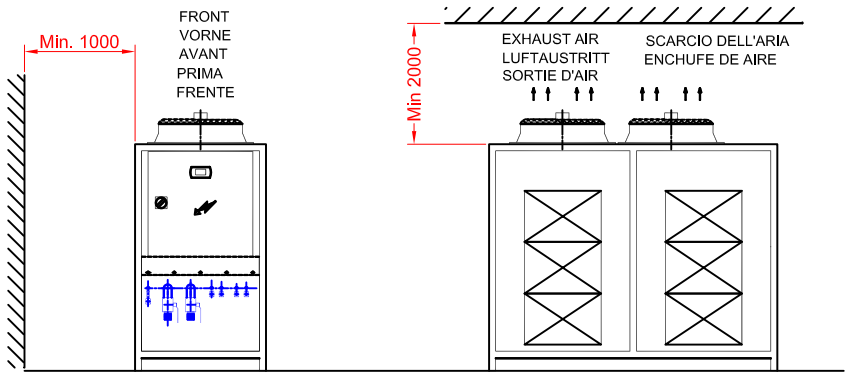
Benennung
# Maschinenzeichnung EVO 45

Zeichnungs-Nr. 0390.017 A

Index

CAD-System: SolidWorks

Plotdatum: 28.09.2016



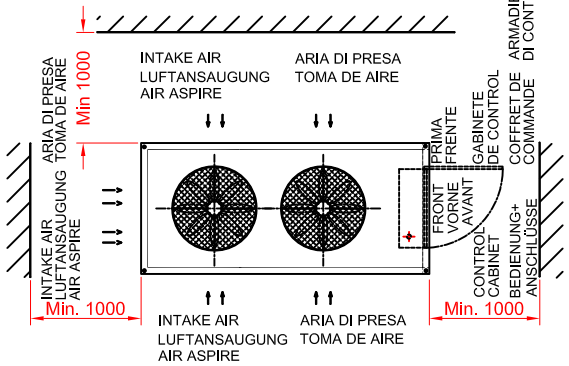

**Normale Aufstellung Im Gebäude.** Frostfreier Raum. Ausreichender Luftwechsel zur Wärmeabfuhr beachten!

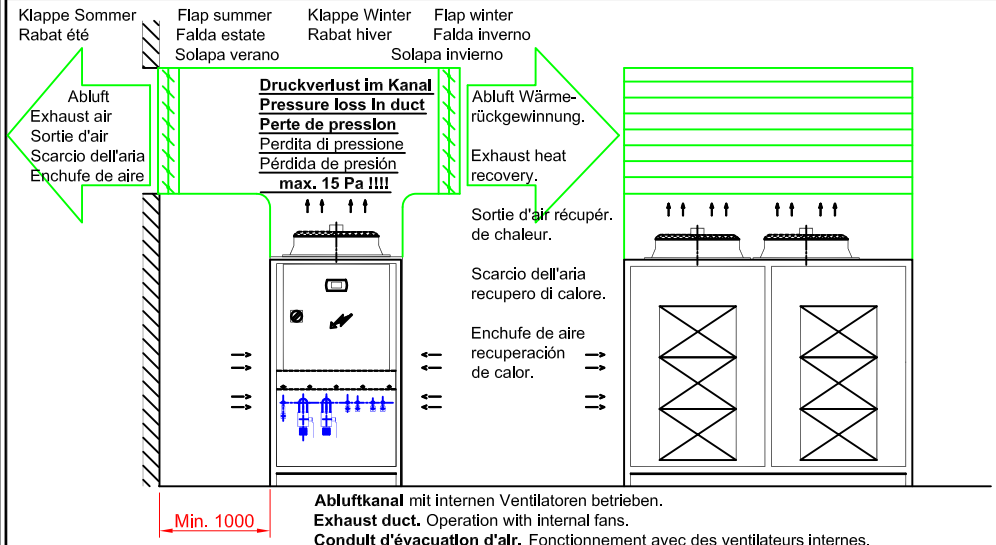
**Normal indoor installation.** Frost-free space. Note: Adequate air exchange for heat dissipation!

**Installation normale à l'Intérieure.** 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!

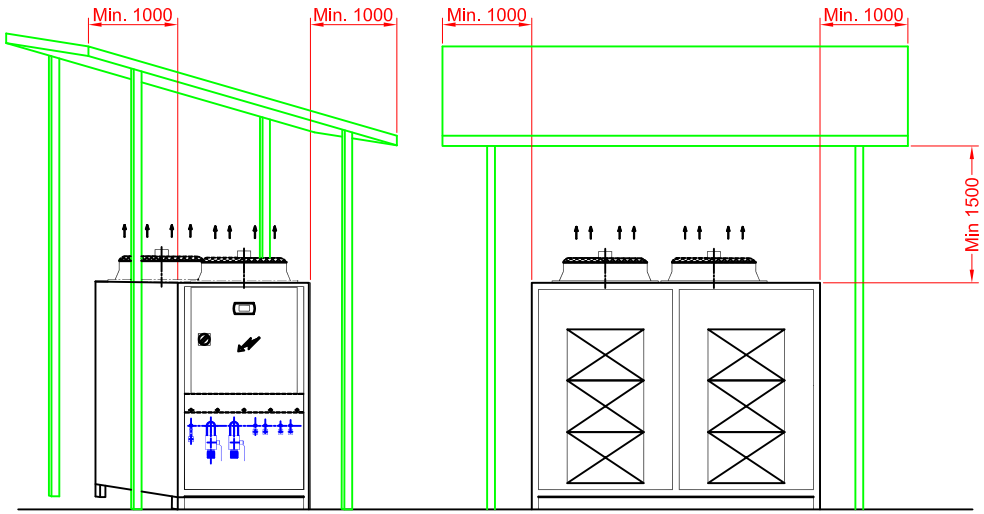
**Instalación Interior normal.** Habitación libre de heladas. Nota: intercambio adecuado de aire para disipar el calor!

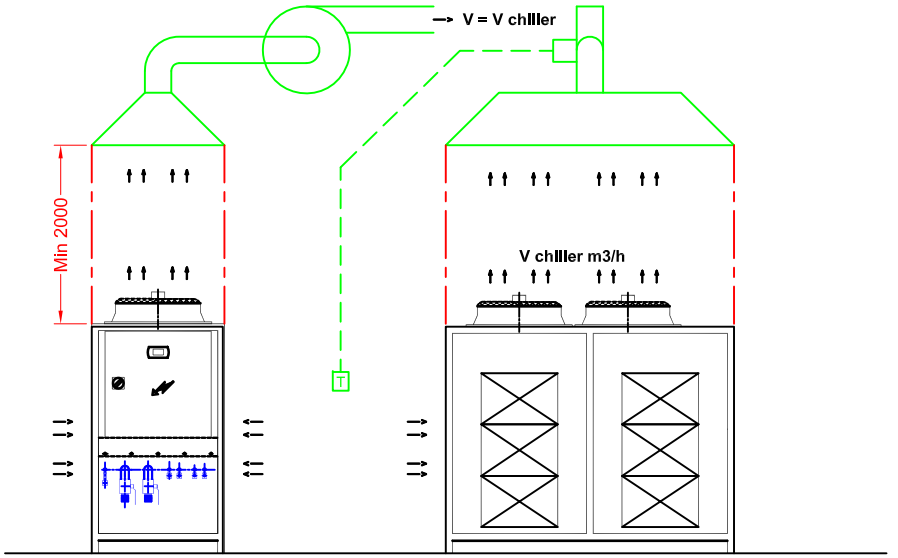



**Abluftkanal** mit internen Ventilatoren betrieben.
**Exhaust duct.** Operation with internal fans.
**Conduit d'évacuation d'air.** Fonctionnement avec des ventilateurs internes.
**Condotto di scarico dell'aria.** Funzionamento con ventilatori interni.
**Conducto de escape de aire.** Operación con los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

**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 antigel! 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 l'aprobación por parte d' efcooling.




**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.** Operación con un ventilador externo. V = consulte datos técnocos enfriador.

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www.efcooling.com

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

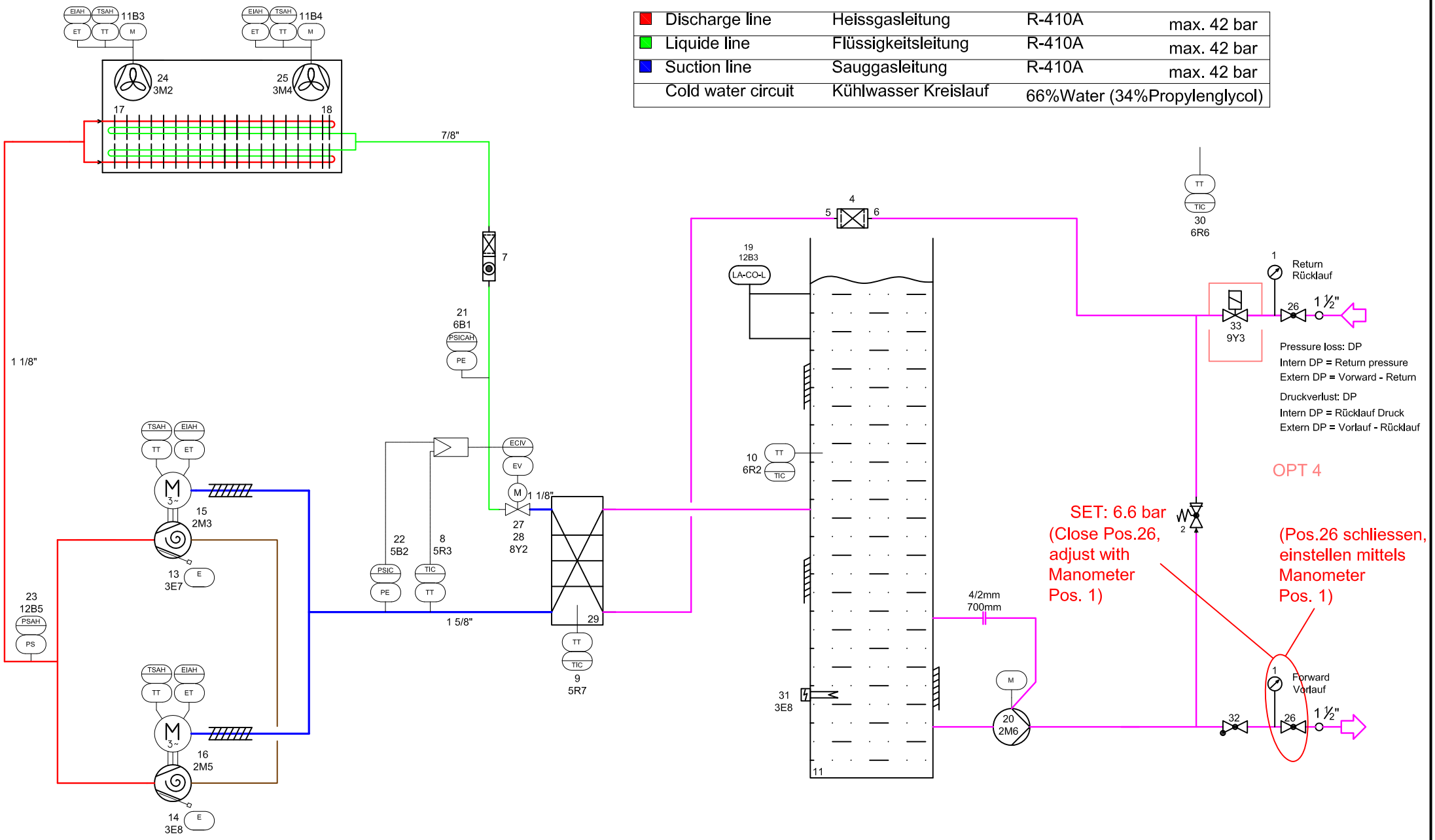
# Installation plan. Plan d'installation. Aufstellungsplan

SCHEMA - NR.: V-K23-011 Aufstellungsplan

BLATT: 1 VON: 1

ORDNUNGS-NR.:

# 13.5 Refrigeration/hydraulics diagram





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| Rev. | Änderung | Datum | Name |
|---|---|---|---|
| 01 | Option Non Return changed: Check valve always installed | 03.07.19 | PAPE |

franz.loosli Kälteschema_0390.017.dwg 11.01.2017 16:46

| | Datum | Name |
|---|---|---|
| Bearb. | 27.09.16 | PAPE |
| Gepr. | 11.01.17 | FRLO |
| Mass-Stab | 1:1 | |
| Format | A4 | |

Typ EVO 45
R+I Schema
Zeichnungsnummer KS_0390.017
Blatt 1 von 1

(Urspr.) URSPRUNG | (Ers. f.:) ERS_F | (Ers. d.:) ERS_D

# 13.6 Wiring diagram

# ELEKTROSCHEMA
# SCHÉMA ÉLECTRIQUE
# ESQUEMA ELÉCTRICO

# WIRING DIAGRAM
# SCHEMA ELETTRICO

SWISS MADE

*the smart way of cooling!*

Project:

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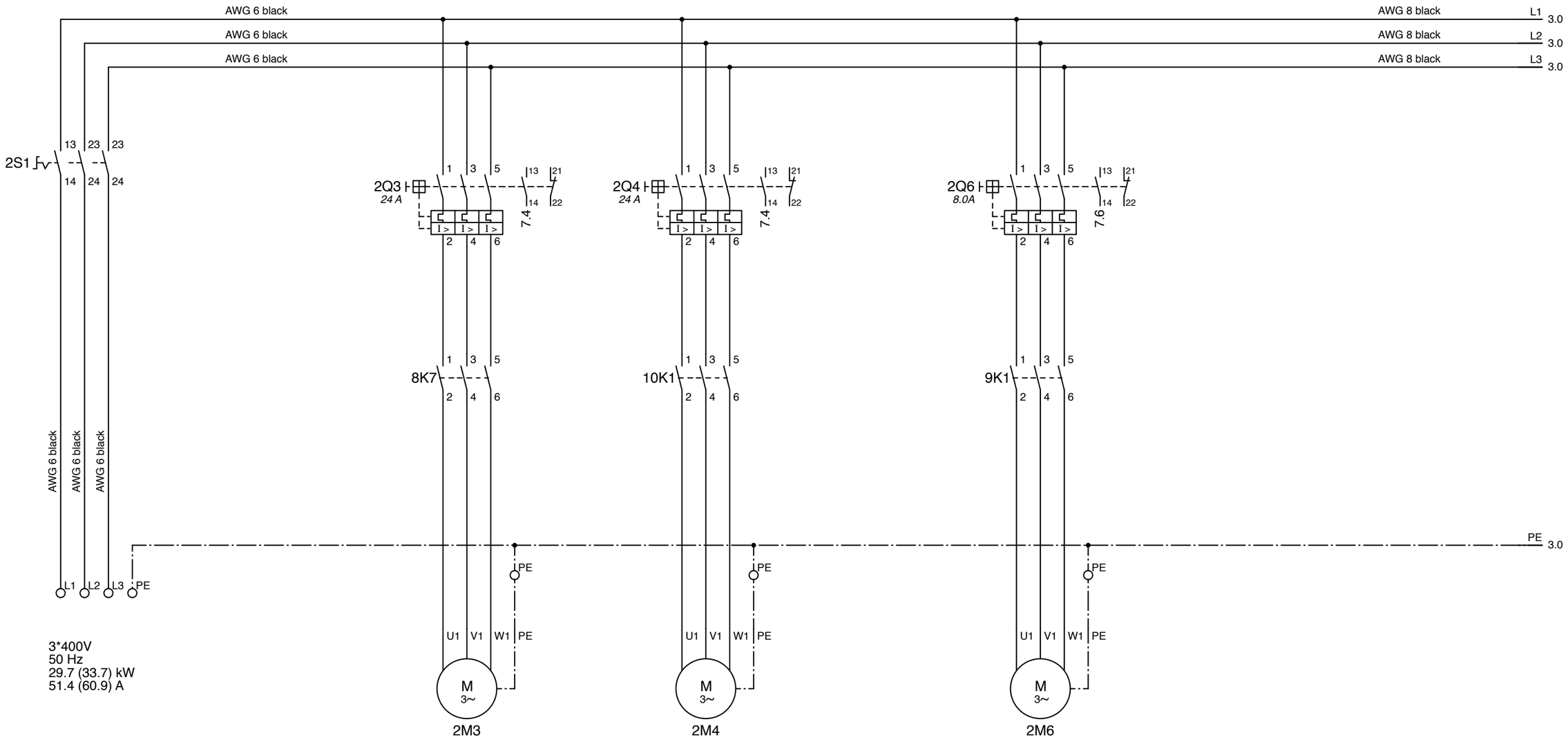
Fax. +41 44 849 79 01

info@efcooling.com
www.efcooling.com

Typ: EVO 45 / 50Hz

Schema/Diagram Nr: ES 0390.017

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Erstellt am: 15.02.16 | a | 02.02.18 KEPA | ef cooling | Fon +41 44 849 79 00 | Projekt/Kunde | Titel | Projekt Nr. | =ANLAGE +ORT |
| Name: PAPE | b | 02.10.18 BERE | Ernst H. Furrer AG | Fax +41 44 849 79 01 | Adresse (Ort) | | | |
| Geprüft am: 05.03.19 | c | | Hüttenwiesenstrasse 8 | info@efcooling.com | Maschinenart | Maschinentyp **EVO 45 / 50Hz** | Schema Nummer ES 0390.017 | Bl. total 13 / Blatt Nr. 1 / Idx. - |
| Name: FRLO | d | | CH-8108 Dällikon | www.efcooling.com | | | | |



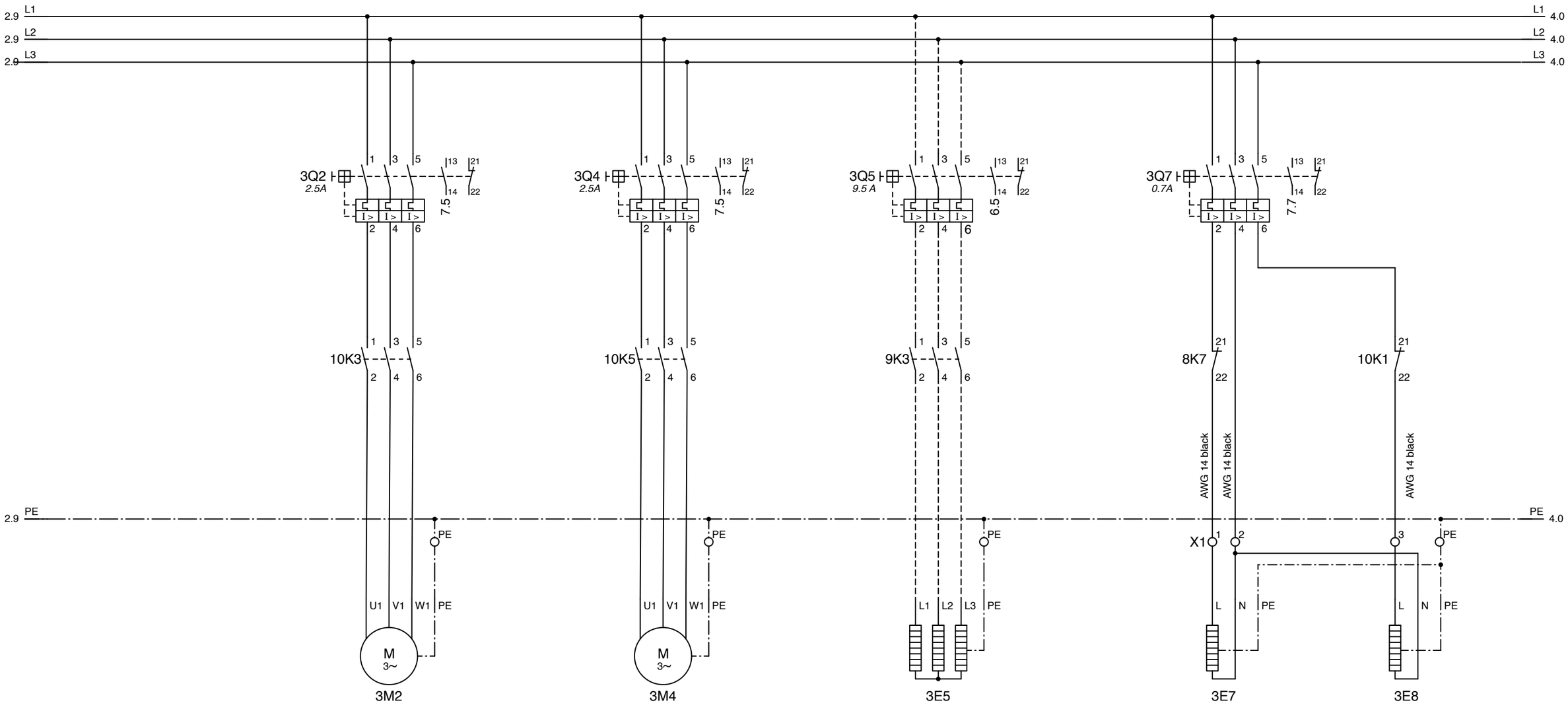

EINSPEISUNG
POWER SUPPLY
ALIMENTATION
ALIMENTAZIONE
FUENTE DE ALIMENTACIÓN

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
POMPA PER UTILIZZO
LOS CONSUMIDORES
DE LA POMBA

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Erstellt am: 15.02.16 | a | 02.10.18 BERE | ef cooling | Fon +41 44 849 79 00 | Projekt/Kunde | Titel compressor, pump | Projekt Nr. | =ANLAGE +ORT |
| Name: PAPE | b | 03.07.19 PAPE | Ernst H. Furrer AG | Fax +41 44 849 79 01 | Adresse (Ort) | | Schema Nummer ES 0390.017 | Bl. total 13 / Blatt Nr. 2 / Idx. - |
| Geprüft am: 05.03.19 | c | | Hüttenwiesenstrasse 8 | info@efcooling.com | Maschinenart | Maschinentyp **EVO 45 / 50Hz** | | |
| Name: FRLO | d | | CH-8108 Dällikon | www.efcooling.com | | | | |




| | | |
|---|---|---|
| 1.05 kW<br>2.2 A<br>1310 min-1 | 1.05 kW<br>2.2 A<br>1310 min-1 | 6 kW<br>9.2 A |
| VENTILATOR 1 | VENTILATOR 2 | TANKHEIZUNG |
| FAN 1 | FAN 2 | TANK HEATER |
| FAN 1 | FAN 2 | CIRCUIT CHAUFFER |
| VENTILATORE 1 | VENTILATORE 2 | RISCALDAMENTO SERBATOIO |
| VENTILADOR 1 | VENTILADOR 2 | CALENTAMIENTO DEL TANQUE |

| 70 W<br>0.175 A | 70W<br>0.175 A |
|---|---|
| CARTERHEIZUNG 1 & 2 | |
| CRANKCASE HEATER 1 & 2 | |
| CHAUFFE-CARTER 1 & 2 | |
| RISCALDAMENTO DI CARTER 1 & 2 | |
| CALENTAMIENTO DE CARTER 1& 2 | |

| | | | |
|---|---|---|---|
| Erstellt am: 15.02.16<br>Name: PAPE | a | 02.02.18 KEPA | |
| | b | 03.07.19 PAPE | |
| Geprüft am: 05.03.19<br>Name: FRLO | c | | |
| | d | | |

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info@efcooling.com
www.efcooling.com
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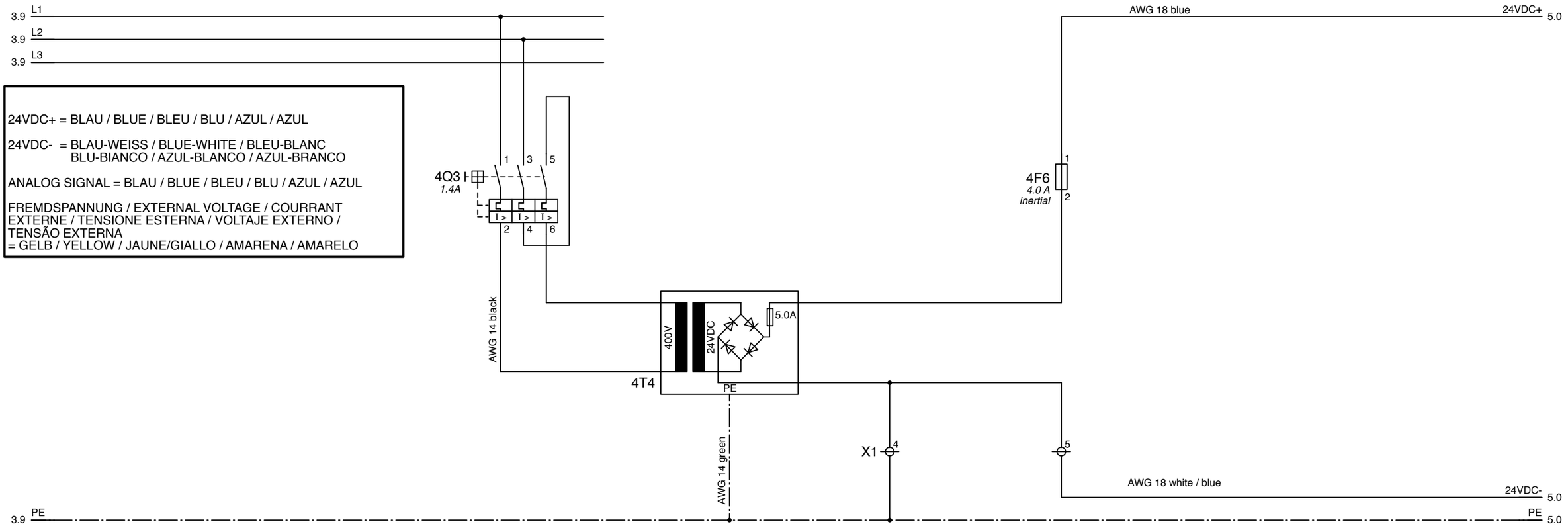
| | | | | | |
|---|---|---|---|---|---|
| Projekt/Kunde | Titel | condenser fan, carterheat, opt winter | Projekt Nr. | | =ANLAGE +ORT |
| Adresse (Ort) | | | Schema Nummer | Bl. total | Blatt Nr. / Idx. |
| Maschinenart | Maschinentyp | **EVO 45 / 50Hz** | ES 0390.017 | 13 | 3 / - |




NETZGERÄT

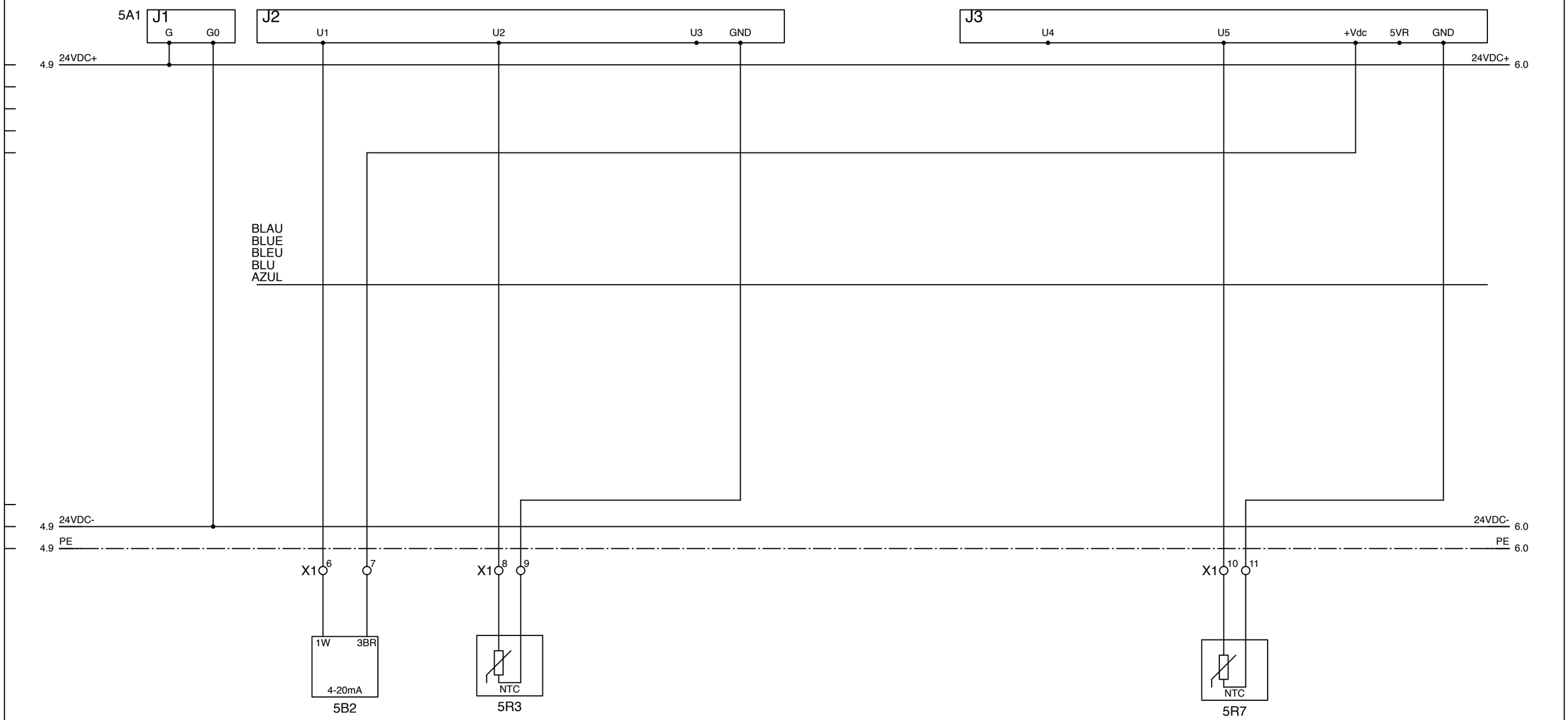
POWER PACK

APPAREIL D'ALIMENTATION

ALIMENTAZIONE

FUENTE DE ALIMENTACIÓN

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Erstellt am: 15.02.16<br>Name: PAPE | a | 03.07.19 PAPE | **ef cooling**<br>Ernst H. Furrer AG<br>Hüttenwiesenstrasse 8<br>CH-8108 Dällikon | Fon +41 44 849 79 00<br>Fax +41 44 849 79 01<br>info@efcooling.com<br>www.efcooling.com | Projekt/Kunde<br>Adresse (Ort)<br>Maschinenart | Titel power pack 24Vdc<br>Maschinentyp **EVO 45 / 50Hz** | Projekt Nr. | =ANLAGE<br>+ORT |
| Geprüft am: 05.03.19<br>Name: FRLO | b | | | | | | Schema Nummer<br>ES 0390.017 | Bl. total 13 / Blatt Nr. 4 / Idx. - |
| | c | | | | | | | |
| | d | | | | | | | |




NIEDERDRUCK TRANSMITTER

LOW PRESSURE TRANSCDUCER

TRANSMETTEUR BASSE PRESSION

TRASMETTITORE BASSA PRESSIONE

TRANSDUCTOR BAJA PRESION

UBERHIZTUNG TEMPERATURFÜHLER

SUPERHEATING TEMPERATURE PROBE

SONDE DE TEMPERATURE SURCHAUFFE

SENSORE DI TEMPERATURA SURRISCALDAMENTO

SENSOR DE TEMPERATURA SOBRECALENTAMENTO

VERDAMPFER AUSTRITT TEMPERATURFÜHLER

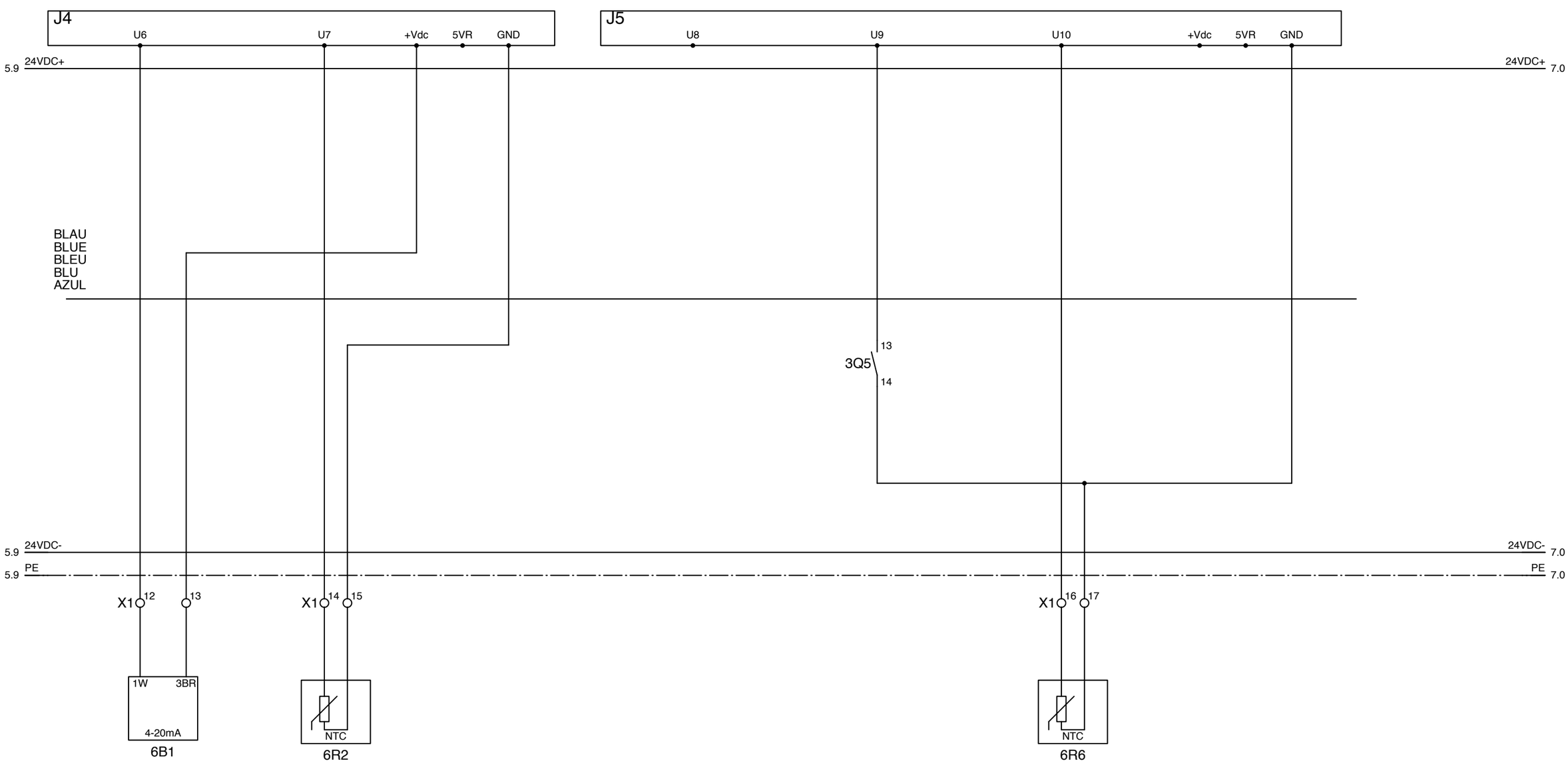
EVAPORATOR OUTLET TEMPERATURE PROBE

ÉVAPORATEUR SORTIE SONDE DE TEMPERATURE

SENSORE DI TEMPERATURA USCITA EVAPORATORE

EVAPORADOR SALIDA SENSOR DE TEMPERATURA

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Erstellt am: 15.02.16<br>Name: PAPE | a | 03.07.19 PAPE | **ef cooling**<br>Ernst H. Furrer AG<br>Hüttenwiesenstrasse 8<br>CH-8108 Dällikon<br>Fon +41 44 849 79 00<br>Fax +41 44 849 79 01<br>info@efcooling.com<br>www.efcooling.com | Projekt/Kunde<br>Adresse (Ort)<br>Maschinenart | Titel<br>Maschinentyp | pressure transmitter, temperature probes<br>**EVO 45 / 50Hz** | Projekt Nr. | =ANLAGE +ORT |
| Geprüft am: 05.03.19<br>Name: FRLO | b | | | | | | Schema Nummer<br>ES 0390.017 | Bl. total 13 / Blatt Nr. 5 / Idx. - |
| | c | | | | | | | |
| | d | | | | | | | |




| | |
|---|---|
| HOCHDRUCK TRANSMITTER | TANK TEMPERATURFÜHLER |
| HIGH PRESSURE TRANSCDUCER | TANK TEMPERATURE PROBE |
| TRANSMETTEUR HAUTE PRESSION | SONDE DE TEMPERATURE RÉSERVOIR |
| TRASMETTITORE ALTA PRESSIONE | SENSORE DI TEMPERATURA SERBATOIO |
| TRANSDUCTOR ALTA PRESIÓN | SENSOR DE TEMPERATURA TANQUE |

| | |
|---|---|
| TANKHEIZUNG | REFERENZ TEMPERATURFÜHLER |
| TANK HEATER | REFERENCE TEMPERATURE PROBE |
| CIRCUIT CHAUFFER | REFERENCE SONDE DE TEMPERATURE |
| RISCALDAMENTO SERBATOIO | RIFERIMENTO SENSORE DI TEMPERATURA |
| CALENTAMIENTO DEL TANQUE | REFERENCIA SENSOR DE TEMPERATURA |

| | | |
|---|---|---|
| Erstellt am: 15.02.16 | a | 03.07.19 PAPE |
| Name: PAPE | b | |
| Geprüft am: 05.03.19 | c | |
| Name: FRLO | d | |

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www.efcooling.com
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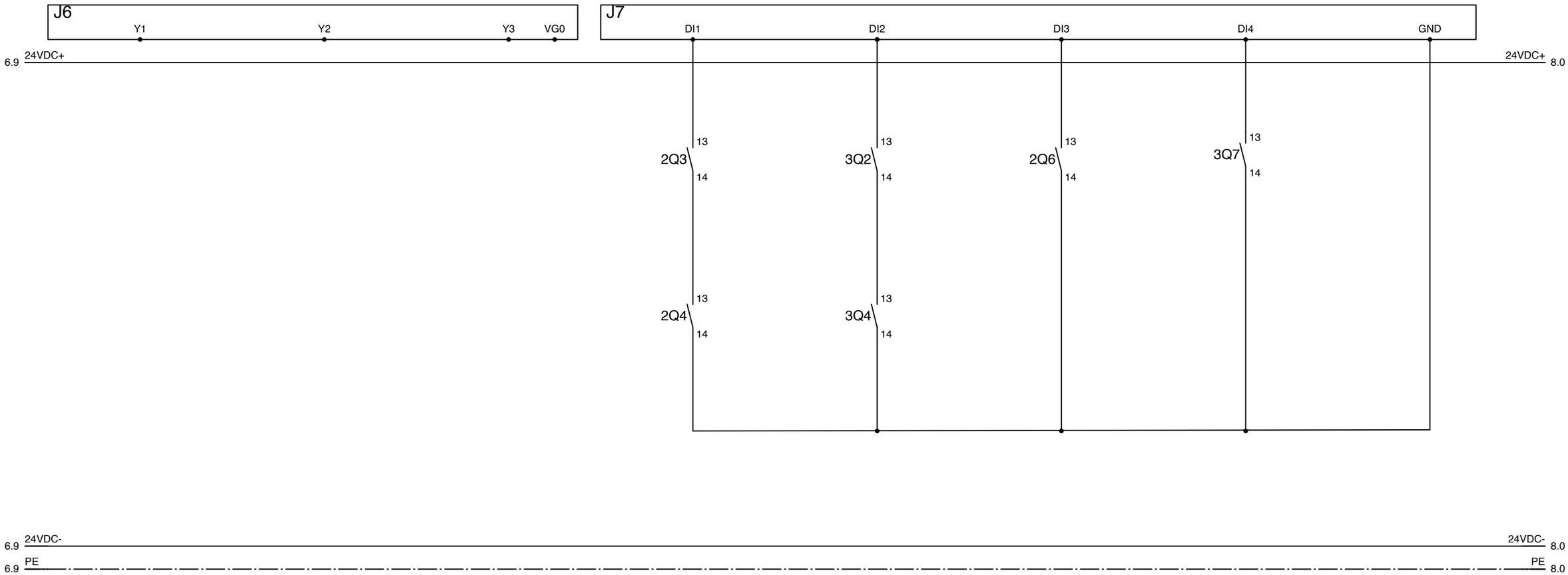
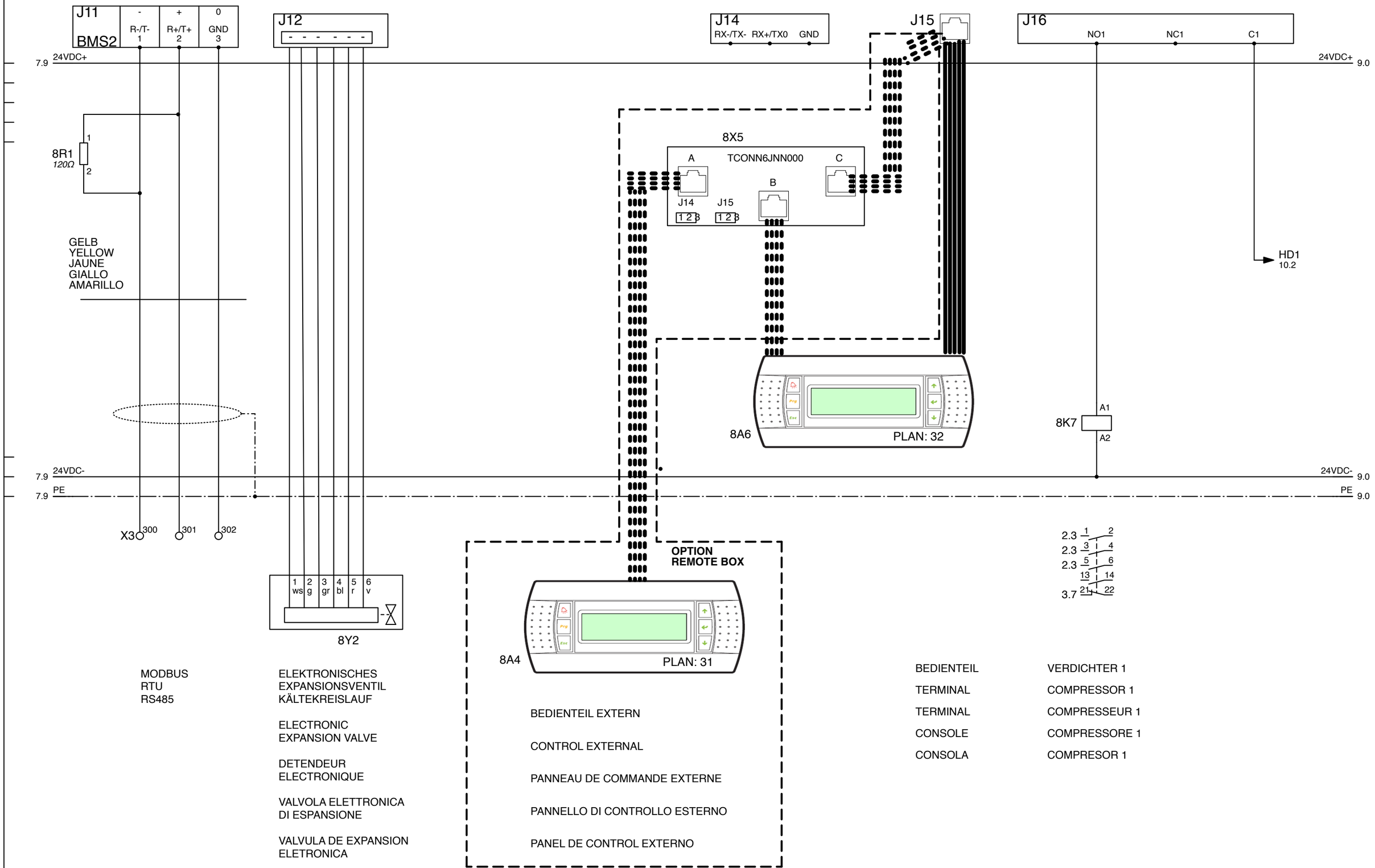
| | | | | | |
|---|---|---|---|---|---|
| Projekt/Kunde | Titel | pressure transmitter, temperature probe, opt. winter kit | Projekt Nr. | =ANLAGE +ORT | |
| Adresse (Ort) | | | Schema Nummer ES 0390.017 | Bl. total 13 | Blatt Nr. 6 / Idx. - |
| Maschinenart | Maschinentyp | **EVO 45 / 50Hz** | | | |




| | | | |
|---|---|---|---|
| VERDICHTER 1 | VENTILATOR 1 | VERBRAUCHERPUMPE | CARTERHEIZUNG 1 & 2 |
| COMPRESSOR 1 | FAN 1 | CONSUMER PUMP | CRANKCASE HEATER 1 & 2 |
| COMPRESSEUR 1 | FAN 1 | POMPE CONSOMMATEUR | CHAUFFE-CARTER 1 & 2 |
| COMPRESSORE 1 | VENTILATORE 1 | POMPA PER UTILIZZO | RISCALDAMENTO DI CARTER 1 & 2 |
| COMPRESOR 1 | VENTILADOR 1 | LOS CONSUMIDORES DE LA POMBA | CALENTAMIENTO DE CARTER 1& 2 |
| VERDICHTER 2 | VENTILATOR 2 | | |
| COMPRESSOR 2 | FAN 2 | | |
| COMPRESSEUR 2 | FAN 2 | | |
| COMPRESSORE 2 | VENTILATORE 2 | | |
| COMPRESOR 2 | VENTILADOR 2 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Erstellt am: 15.02.16<br>Name: PAPE | a | | ef cooling<br>Ernst H. Furrer AG<br>Hüttenwiesenstrasse 8<br>CH-8108 Dällikon | Fon +41 44 849 79 00<br>Fax +41 44 849 79 01<br>info@efcooling.com<br>www.efcooling.com | Projekt/Kunde<br>Adresse (Ort)<br>Maschinenart | Titel<br>compressor, fan, pump cranckcase heater alarms<br>Maschinentyp **EVO 45 / 50Hz** | Projekt Nr.<br>Schema Nummer ES 0390.017 | =ANLAGE +ORT<br>Bl. total 13 / Blatt Nr. 7 / Idx. - |
| Geprüft am: 05.03.19<br>Name: FRLO | b | | | | | | | |
| | c | | | | | | | |
| | d | | | | | | | |




MODBUS
RTU
RS485

ELEKTRONISCHES
EXPANSIONSVENTIL
KÄLTEKREISLAUF

ELECTRONIC
EXPANSION VALVE

DETENDEUR
ELECTRONIQUE

VALVOLA ELETTRONICA
DI ESPANSIONE

VALVULA DE EXPANSION
ELETRONICA

BEDIENTEIL EXTERN

CONTROL EXTERNAL

PANNEAU DE COMMANDE EXTERNE

PANNELLO DI CONTROLLO ESTERNO

PANEL DE CONTROL EXTERNO

| | |
|---|---|
| BEDIENTEIL | VERDICHTER 1 |
| TERMINAL | COMPRESSOR 1 |
| TERMINAL | COMPRESSEUR 1 |
| CONSOLE | COMPRESSORE 1 |
| CONSOLA | COMPRESOR 1 |

| | | | |
|---|---|---|---|
| Erstellt am: 15.02.16 | a | 03.07.19 PAPE | |
| Name: PAPE | b | | |
| Geprüft am: 05.03.19 | c | | |
| Name: FRLO | d | | |

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www.efcooling.com

ef SWISS MADE the smart way of cooling!

| | | | |
|---|---|---|---|
| Projekt/Kunde | Titel | display, modbus, electronic ex. valve, compressor 1 release | Projekt Nr. |
| Adresse (Ort) | | | =ANLAGE +ORT |
| Maschinenart | Maschinentyp | **EVO 45 / 50Hz** | Schema Nummer ES 0390.017 |

| Bl. total | Blatt Nr. | Idx. |
|---|---|---|
| 13 | 8 | - |

J17 Out2 C2

J18 Out3 C2

J19 Out4 C2

J20 Out5 C2

J21 V-IN C2

8.9 24VDC+ — 24VDC+ 10.0

8.9 24VDC- — 24VDC- 10.0

8.9 PE — PE 10.0

9K1 A1 / A2

9K3 A1 / A2

9K1 13 / 14

2.6 1 2 / 3 4 / 5 6 / 9.4 13 14

3.5 1 2 / 3 4 / 5 6 / 13 14 / 21 22

X1 18 19 PE

1 2 PE

9Y4

VERBRAUCHERPUMPE

CONSUMER PUMP

POMPE CONSOMMATEUR

POMPA PER UTILIZZO

LOS CONSUMIDORES DE LA POMBA

TANKHEIZUNG

TANK HEATER

CIRCUIT CHAUFFER

RISCALDAMENTO SERBATOIO

DE CALENTAMIENTO DEL TANQUE

OPT4: RÜCKLAUF MAGNETVENTIL

OPT4: RETUNR LINE SOLENOID VALVE

OPT4: LIGNE RETOUR ELECTROROBINET

OPT4: LINEA RITORNO VALVOLA A SOLENOIDE

OPT4: LINEAS VUELTA ELECTROVALVULA

| | | | |
|---|---|---|---|
| Erstellt am: 15.02.16 | a | | |
| Name: PAPE | b | | |
| Geprüft am: 05.03.19 | c | | |
| Name: FRLO | d | | |

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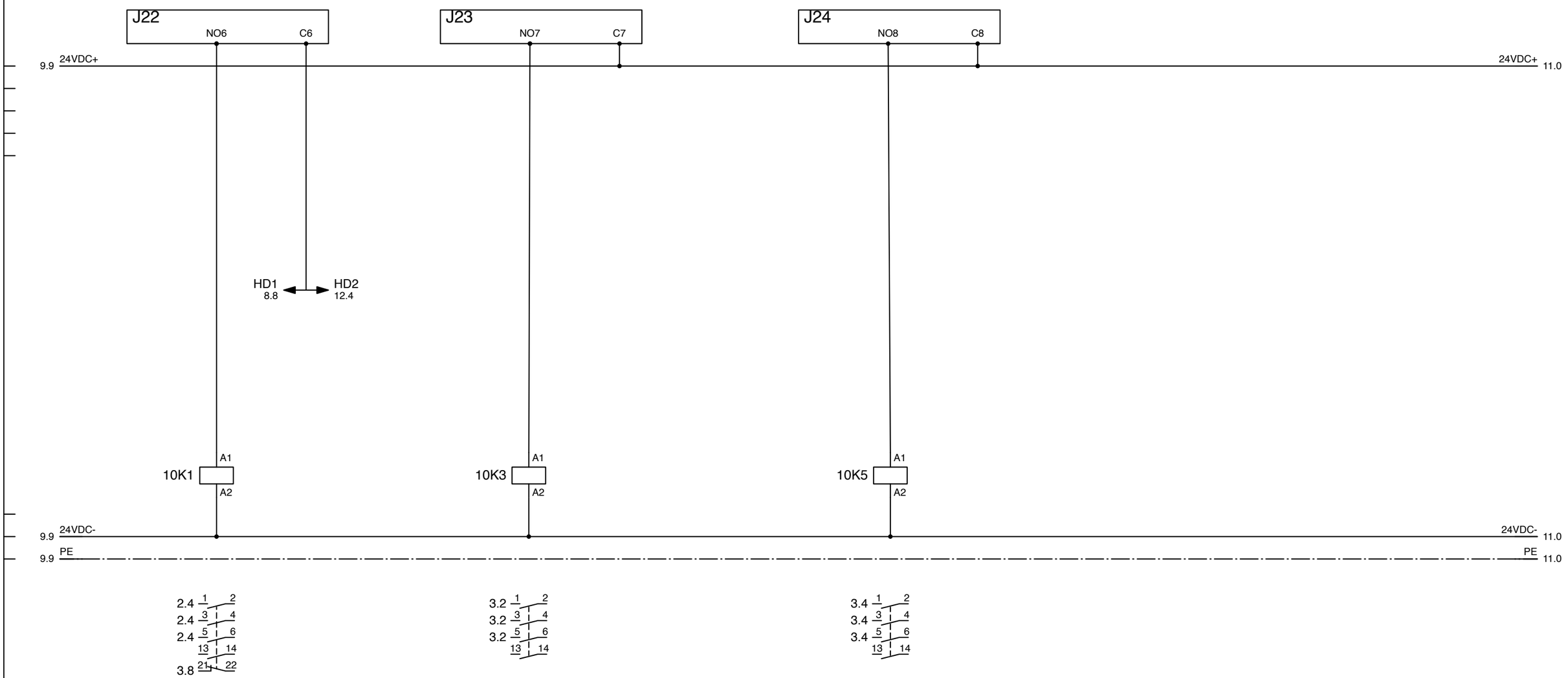
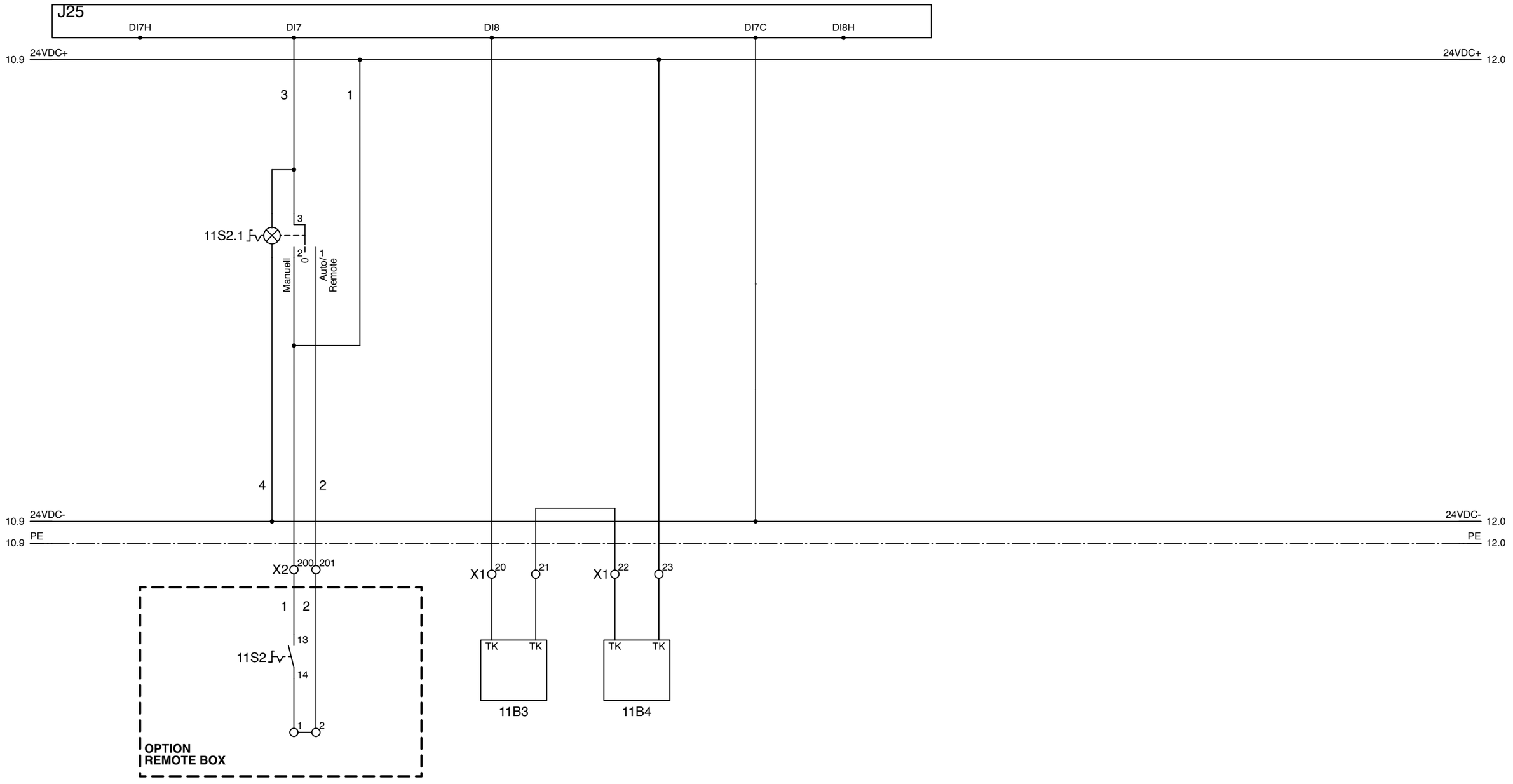
www.efcooling.com
the smart way of cooling!

| | | | | |
|---|---|---|---|---|
| Projekt/Kunde | Titel | pump release, opt. wtinter, opt. 4 | Projekt Nr. | =ANLAGE +ORT |
| Adresse (Ort) | | | Schema Nummer ES 0390.017 | Bl. total 13 / Blatt Nr. 9 / Idx. - |
| Maschinenart | Maschinentyp | **EVO 45 / 50Hz** | | |




| | | |
|---|---|---|
| VERDICHTER 2 | VENTILATOR 1 | VENTILATOR 2 |
| COMPRESSOR 2 | FAN 1 | FAN 2 |
| COMPRESSEUR 2 | VENTILATEUR 1 | VENTILATEUR 2 |
| COMPRESSORE 2 | VENTILATORE 1 | VENTILATORE 2 |
| COMPRESOR 2 | VENTILADOR 1 | VENTILADOR 2 |

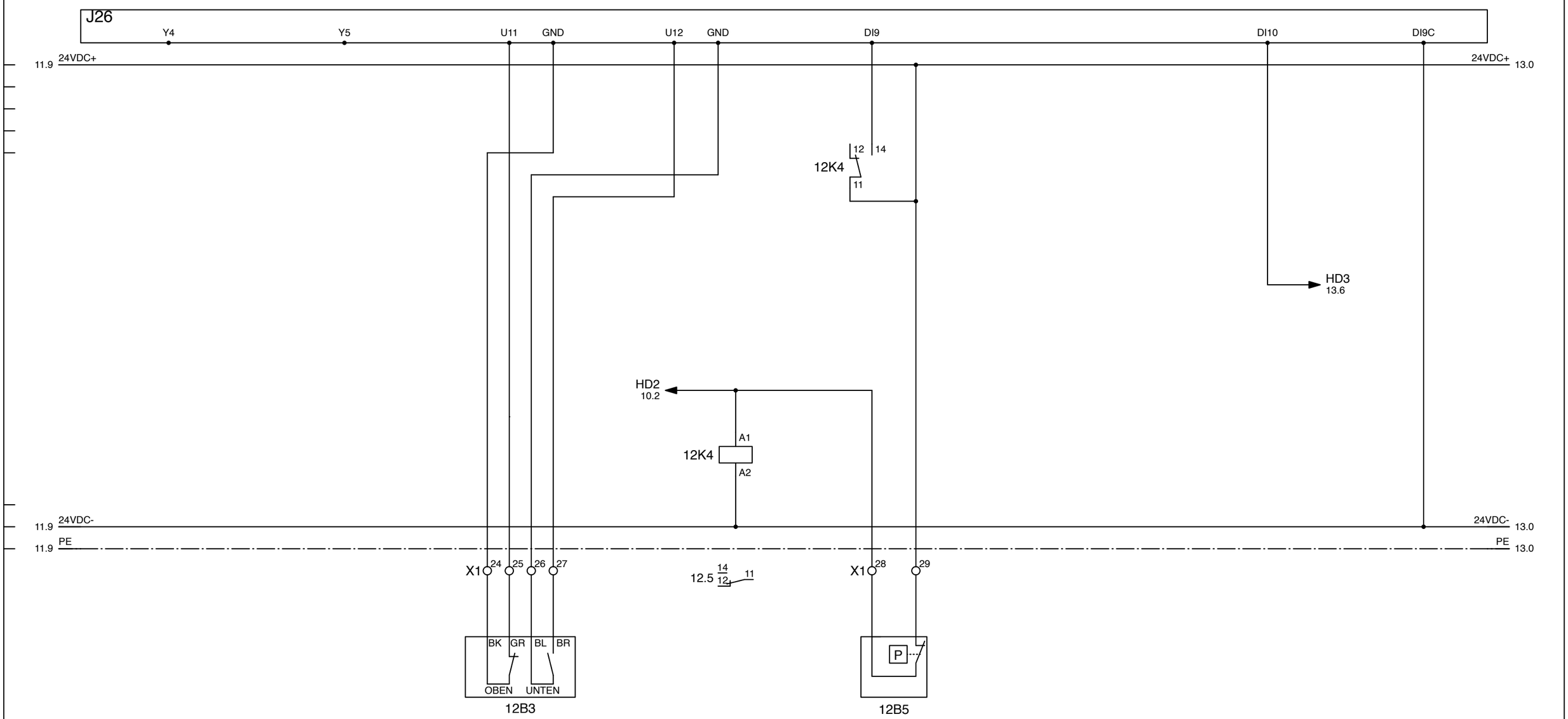
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Erstellt am: 15.02.16 | a | | ef cooling | Fon +41 44 849 79 00 | Projekt/Kunde | Titel compressor, fan 1/2 release | Projekt Nr. | =ANLAGE +ORT |
| Name: PAPE | b | | Ernst H. Furrer AG | Fax +41 44 849 79 01 | Adresse (Ort) | | | |
| Geprüft am: 05.03.19 | c | | Hüttenwiesenstrasse 8 | info@efcooling.com | Maschinenart | Maschinentyp **EVO 45 / 50Hz** | Schema Nummer ES 0390.017 | Bl. total 13 / Blatt Nr. 10 / Idx. - |
| Name: FRLO | d | | CH-8108 Dällikon | www.efcooling.com | | | | |




| | |
|---|---|
| EIN-AUS | VENTILATOR WICKLUNGSSCHUTZ |
| ON-OFF | FAN WINDING PROTECTOR |
| ARRÉT-MARCHE | PROTECTEUR BOBINAGE DU VENTILATEUR |
| ON-OFF | PROTECTOZIONE BOBINA DEL VENTILATORE |
| CONEXIÓN-DESCONEXION | PROTECTOR DE LA BOBINA DEL VENTILADOR |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Erstellt am: 15.02.16 | a | | ef cooling | Fon +41 44 849 79 00 | Projekt/Kunde | Titel | external release, winding protection |
| Name: PAPE | b | | Ernst H. Furrer AG | Fax +41 44 849 79 01 | Adresse (Ort) | | |
| Geprüft am: 05.03.19 | c | | Hüttenwiesenstrasse 8 | info@efcooling.com | Maschinenart | Maschinentyp | **EVO 45 / 50Hz** |
| Name: FRLO | d | | CH-8108 Dällikon | www.efcooling.com | | | |

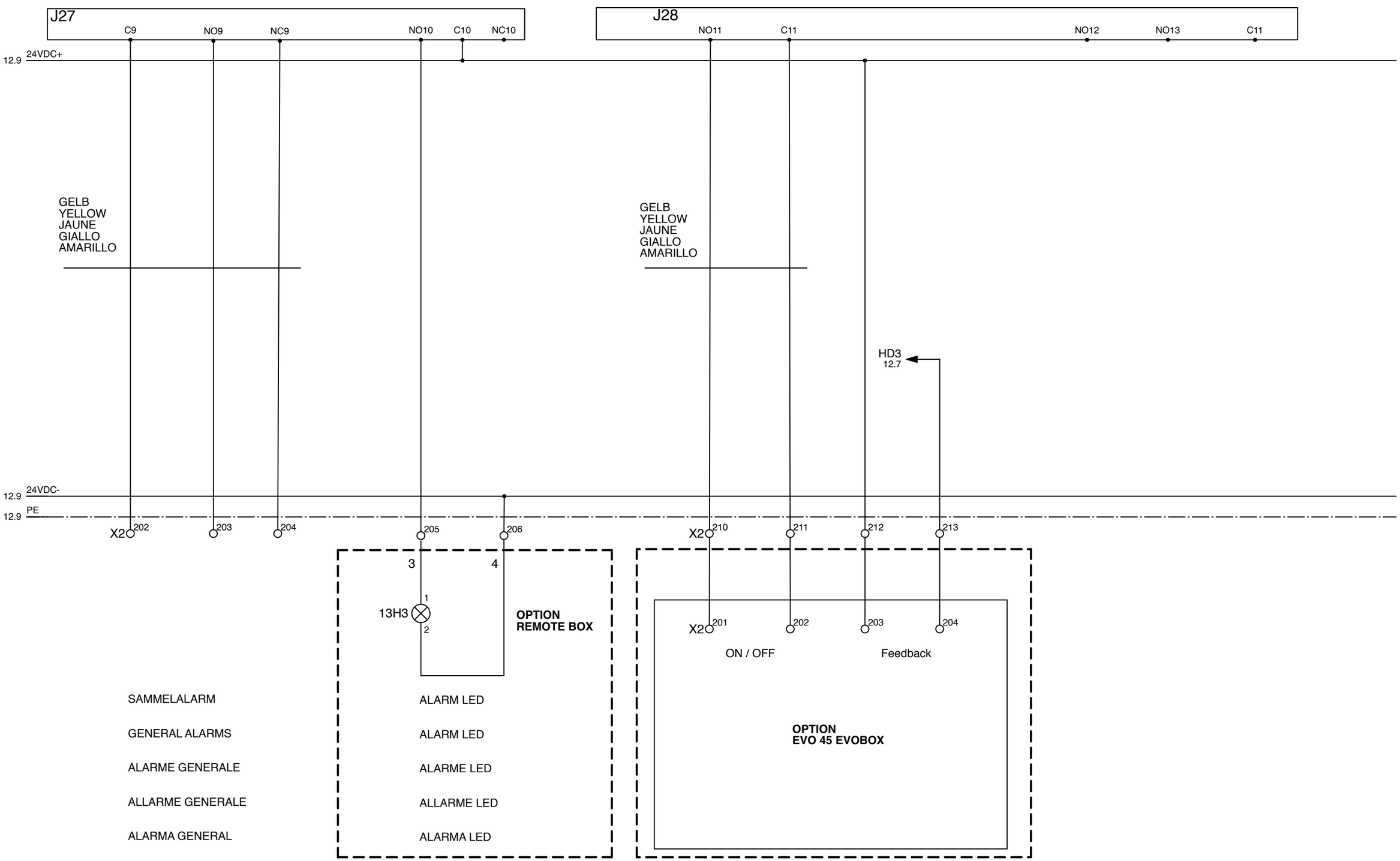
| Projekt Nr. | =ANLAGE +ORT | | |
|---|---|---|---|
| Schema Nummer | Bl. total | Blatt Nr. | Idx. |
| ES 0390.017 | 13 | 11 | - |




| | |
|---|---|
| TANKNIVEAU | HOCHDRUCK SICHERHEITS PRESSOSTAT |
| TANK LEVEL | HIGH PRESSURE SAFETY SWITCH |
| NIVEAU RÉSERVOIR | PRESSOSTAT HAUTE PRESSION |
| LIVELLO SERBATOIO | PRESSOSTATO ALTA PRESSIONE |
| NIVEL TANQUE | PRESOSTATO ALTA PRESION |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Erstellt am: 15.02.16<br>Name: PAPE | a | | **ef cooling**<br>Ernst H. Furrer AG<br>Hüttenwiesenstrasse 8<br>CH-8108 Dällikon | Fon +41 44 849 79 00<br>Fax +41 44 849 79 01<br>info@efcooling.com<br>www.efcooling.com | Projekt/Kunde<br>Adresse (Ort)<br>Maschinenart | Titel<br>Maschinentyp **EVO 45 / 50Hz** | tank level, high pressure safety switch |
| Geprüft am: 05.03.19<br>Name: FRLO | b<br>c<br>d | | | | | | |

| Projekt Nr. | =ANLAGE +ORT | | |
|---|---|---|---|
| Schema Nummer<br>ES 0390.017 | Bl. total<br>13 | Blatt Nr.<br>12 | Idx.<br>- |




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Erstellt am: 15.02.16<br>Name: PAPE | a | 03.07.19 PAPE | **ef cooling**<br>Ernst H. Furrer AG<br>Hüttenwiesenstrasse 8<br>CH-8108 Dällikon | Fon +41 44 849 79 00<br>Fax +41 44 849 79 01<br>info@efcooling.com<br>www.efcooling.com | Projekt/Kunde<br>Adresse (Ort)<br>Maschinenart | Titel<br>general alarms<br>opt. remote, option ecobox<br>Maschinentyp **EVO 45 / 50Hz** | Projekt Nr. / =ANLAGE +ORT |
| Geprüft am: 05.03.19<br>Name: FRLO | b | | | | | | Schema Nummer ES 0390.017 / Bl. total 13 / Blatt Nr. 13 / Idx. - |
| | c | | | | | | |
| | d | | | | | | |

# 13.7 PLC manual

# EVO45

## 0309.017_018

# PLC Manual

# EN

Appendix 11

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Erstellt : 20.10.2016 SINE
Änderung:
Rev.:

# Index

EVO[45]

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**Seite**

**1. Display handling / key description** ..... **3**

**2. Handling Overview / Menu Overview** ..... **4-6**

**3. Language selection** ..... **7**

**4. Alarm History** (Alarm Memory) ..... **8**

**5. Setting date and time** ..... **9**

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## Key description


**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 / Menu Overview

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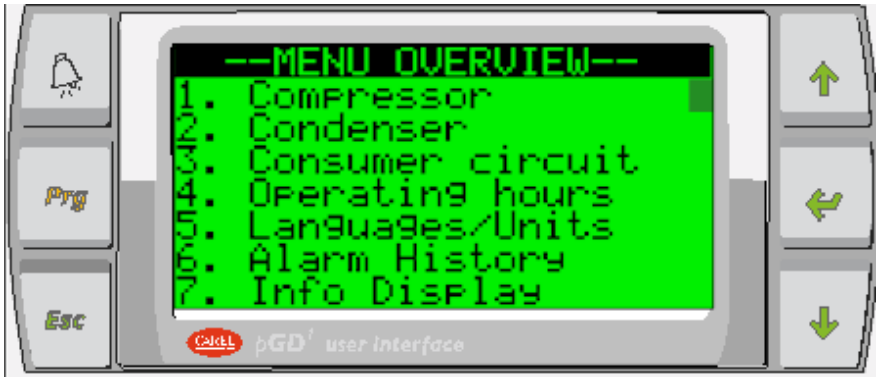
## Handling "overview" display


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.


OPTION ECOBOX

ECOBOX ausgeschaltet

ECOBOX im Kühlbetrieb

ECOBOX Standby

**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".

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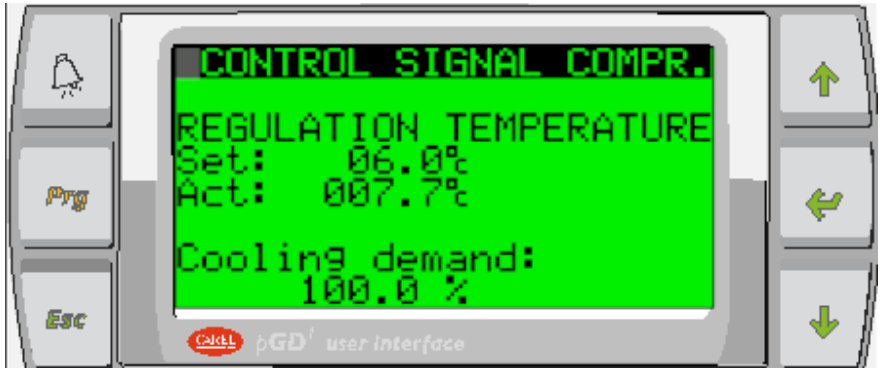
**Menu page**




**Menu page CONTROIL SIGNAL COMPR:**

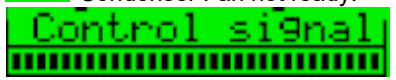
**Adjust set point:**
- Press **ENTER** key once, the cursor jump to the adjustable field.
- Press **UP** or **DOWN** key to adjust the set point.
- With pressing **1 time** the **ENTER** key, the cursor jump back to the home position and the new value is stored.


**Menu page:**

 Condenser Fan running.

 Condenser Fan off.

 Condenser Fan not ready.




Controller Signal

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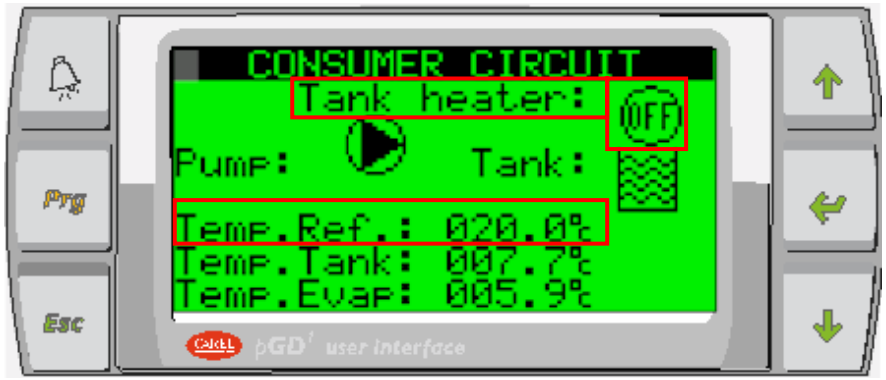
**Menu page**




**Menu page:**

Pump running.

Pump / Tank heater off.

Pump / Tank heater not ready.

Tank ok. / Level low / Alarm

Tank heater running

Only with optional tank heater

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## 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


**Units selection:**

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

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## 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.

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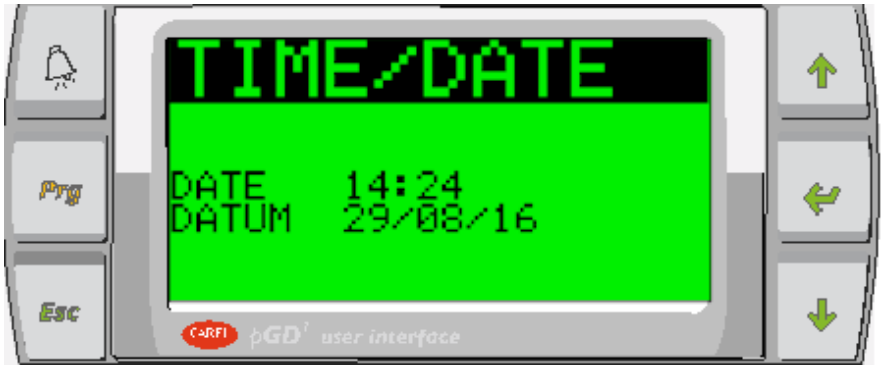
## Setting date and time


**Setting date and time:**

-Go to sub-menu „info“ → consider page 4 for instructions
-Press the **UP** an **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



# Alarms / error messages

EVO[45]

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## 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**

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| | Fault message | Fault cause | Remedy |
|---|---|---|---|
| **ALARM 84** | Temperature probe evaporator outlet defective! | -loose connection.<br>-control wire defect or broken.<br>-temperature probe outside of the range.<br>-temperature probe is defective. | -check it terminals are tight.<br>-locate loose contact and solve it.<br>-check wire for a defect.<br>-replace temperature probe. |
| **ALARM 85** | High pressure transducer refrigerant circuit defective! | -loose connection.<br>-control wire defect or broken.<br>-pressure transducer outside of the range.<br>-pressure transducer is defective. | -check it terminals are tight.<br>-locate loose contact and solve it.<br>-check wire for a defect.<br>-replace pressure transducer. |
| **ALARM 85** | Temperature probe tank defective! | -loose connection.<br>-control wire defect or broken.<br>-temperature probe outside of the range.<br>-temperature probe is defective. | -check it terminals are tight.<br>-locate loose contact and solve it.<br>-check wire for a defect.<br>-replace temperature probe. |
| **ALARM 89 OPTION** | Temperature probe reference defective! | -loose connection.<br>-control wire defect or broken.<br>-temperature probe outside of the range.<br>-temperature probe is defective. | -check it terminals are tight.<br>-locate loose contact and solve it.<br>-check wire for a defect.<br>-replace temperature probe. |
| **Alarm 1** | Low pressure alarm refrigerant circuit! | -loose connection.<br>-leak in the refrigeration system<br>-loos of refrigerant.<br>-expansion valve is defective.<br>-solenoid valve is defective. | -check if terminals are tight.<br>-call ef cooling to find e solution. |

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| | Fault message | Fault cause | Remedy |
|---|---|---|---|
| **Alarm 2** | High pressure alarm refrigerant circuit! | -loose connection.<br>-condenser fins are dirty.<br>-one or more fans are defective.<br>-ambient temperature is too high. | -check if terminals are tight.<br>-clean condenser fins.<br>-check fans for correct operation, if necessary replace them. |
| **Alarm 3** | High pressure safety switch refrigerant circuit has triggered! | -loose connection.<br>-condenser fins are dirty.<br>-one or more fans are defective.<br>-ambient temperature is too high. | -check if terminals are tight.<br>-clean condenser fins.<br>-check fans for correct operation, if necessary replace them. |
| **Alarm 17** | Over temperature consumer circuit! | -cooling power not sufficient.<br>-cooling load to high<br>-not enough cooling liquid<br>-expansion valve defective | -reduce cooling load<br>-contact ef cooling After Sales |
| **Alarm 34.** | Winding protection condenser fan 1 +2 has triggered! | -voltage interruption on one or more phases.<br>-current consumption of the fan is too high.<br>-set point of the circuit breaker is too low.<br>-fan is defective.<br>-fan blocked. | -check if on all three phases 400V is present.<br>-check current consumption of the compressor and compare it with the value in the wiring diagram.<br>-check the set point of the circuit breaker and compare is with the value in the wiring diagram.<br>-check if all terminals are tight<br>-replace defective fan. |
| **Alarm 40.** | Circuit breaker compressor 1 +2 has triggered! | -voltage interruption on one or more phases.<br>Current consumption of the consumer is too high.<br>-set point of the circuit breaker is too low<br>-compressor defective.<br>--loose connection. | -check if on all three phases 400V is present.<br>-check current consumption of the compressor and compare it with the value in the wiring diagram.<br>-check the set point of the circuit breaker and compare it with the value in the wiring diagram.<br>-check if all terminals are tight<br>-replace defective compressor. |

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| | Fault message | Fault cause | Remedy |
|---|---|---|---|
| **Alarm 41** | Circuit breaker consumer pump has triggered! | -voltage interruption on one or more phases.<br>Current consumption of the consumer pump is too high.<br>-set point of the circuit breaker is too low<br>-consumer pump defective.<br>-loose connection. | -check if on all three phases 400V is present.<br>-check current consumption of the consumer pump and compare it with the value in the wiring diagram.<br>-check the set point of the circuit breaker and compare it with the value in the wiring diagram.<br>-check if all terminals are tight<br>-replace defective consumer pump. |
| **Alarm 44** | Circuit breaker condenser fan 1 +2 has triggered! | -voltage interruption on one or more phases.<br>Current consumption of the condenser fan is too high.<br>-set point of the circuit breaker is too low<br>-condenser fan defective.<br>-loose connection. | -check if on all three phases 400V is present.<br>-check current consumption of the condenser fan and compare it with the value in the wiring diagram.<br>-check the set point of the circuit breaker and compare it with the value in the wiring diagram.<br>-check if all terminals are tight<br>-replace defective consumer pump. |
| **Alarm 46 OPTION** | Circuit breaker tank heater has triggered ! | -voltage interruption on one or more phases.<br>-current consumption of the crankcase heater is too high.<br>-set point of the circuit breaker is too low<br>-tank heater defective.<br>-loose connection. | -check if on all three phases 400V is present.<br>-check current consumption of the tank heater and compare it with the value in the wiring diagram.<br>-check the set point of the circuit breaker and compare it with the value in the wiring diagram.<br>-check if all terminals are tight<br>-replace defective crankcase heater. |
| **Alarm 47** | Circuit breaker crankcase heater has triggered! | -voltage interruption on one or more phases.<br>-current consumption of the crankcase heater is too high.<br>-set point of the circuit breaker is too low<br>-crankcase heater defective.<br>-loose connection. | -check if on all three phases 400V is present.<br>-check current consumption of the crankcase heater and compare it with the value in the wiring diagram.<br>-check the set point of the circuit breaker and compare it with the value in the wiring diagram.<br>-check if all terminals are tight<br>-replace defective crankcase heater. |

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| | Fault message | Fault cause | Remedy |
|---|---|---|---|
| **Alarm 50** | Freeze alarm evaporator outlet! | -water temperature of the evaporator outlet is too low. | -check water temperature set point, if necessary adjust it. |
| **Alarm 71** | Water level tank to low! | -water level in the tank is to low<br>-upper level switch defective | -add water<br>-check level switch |
| **Alarm EEV 1.1 S1** | Low pressure pressure transducer refrigerant circuit defective! | -loose connection.<br>-control wire defect or broken.<br>-pressure transducer outside of the range.<br>-pressure transducer is defective. | -check it terminals are tight.<br>-locate loose contact and solve it.<br>-check wire for a defect.<br>-replace pressure transducer. |
| **Alarm EEV 1.2 S2** | Temperature probe suction gas refrigerant circuit defective! | -loose connection.<br>-control wire defect or broken.<br>-temperature probe outside of the range.<br>-temperature probe is defective. | -check it terminals are tight.<br>-locate loose contact and solve it.<br>-check wire for a defect.<br>-replace temperature probe. |
| **Alarm EEV 2.1** | Low superheat (LowSH) | -electronic expansion valve is defective | -contact the ef cooling support<br>-replace electronic expansion valve |
| **Alarm EEV 3.1** | Low evaporation temperature (LOP) | -electronic expansion valve is defective | -contact the ef cooling support<br>-replace electronic expansion valve |
| **Alarm EEV 4.1** | High evaporation temperature (MOP) | -electronic expansion valve is defective | -contact the ef cooling support<br>-replace electronic expansion valve |
| **Alarm EEV 6.1** | Low suction temperature | -electronic expansion valve is defective | -contact the ef cooling support<br>-replace electronic expansion valve |

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| | Fault message | Fault cause | Remedy |
|---|---|---|---|
| **Warning 71** | Water level tank low ! | -water level in the tank is low<br>-lower level switch defective | -add water<br>-check level switch |

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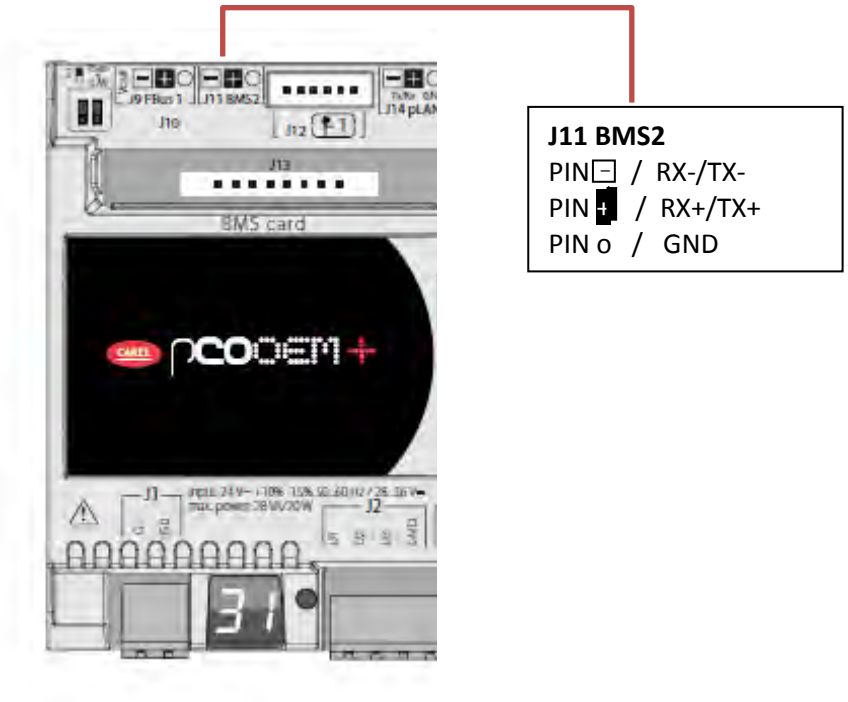
## Carel Modbus RS485 RTU

-Protokoll: Modbus RTU
-Interface RS485
-Com speed: 19200bps
-Adresse: 1
-8bits, Parity No, Stop Bits 2
-The cooling unit is a Modbus Server (Slave)



# Modbus List

# EVO45

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the smart way of cooling!

| Function | Signal Typ | ModBus Index | Signal Direction |
|---|---|---|---|
| Circuit breaker compressor 1+2 | Boolean | 1 | Output |
| Circuit breaker fan 1+2 | Boolean | 2 | Output |
| Circuit breaker consumer pump | Boolean | 3 | Output |
| Circuit breaker crankcase heater | Boolean | 4 | Output |
| Release regulation | Boolean | 5 | Output |
| Winding protection condenser fan 1+2 | Boolean | 6 | Output |
| High pressure safety switch | Boolean | 7 | Output |
| Feedback operation Ecobox | Boolean | 8 | Output |
| Circuit breaker tank heater | Boolean | 9 | Output |
| Water level tank to low | Boolean | 10 | Output |
| Water level tank to low | Boolean | 11 | Output |
| Spare | Boolean | 12 | Output |
| Compressor 1 in operation | Boolean | 13 | Output |
| Consumer pump in operation | Boolean | 14 | Output |
| Tank heater in operation | Boolean | 15 | Output |
| Compressor 2 in operation | Boolean | 16 | Output |
| Fan 1 in operation | Boolean | 17 | Output |
| Fan 2 in operation | Boolean | 18 | Output |
| Alarm | Boolean | 19 | Output |
| Release Ecobox | Boolean | 20 | Output |
| Spare | Boolean | 21 | Output |
| Spare | Boolean | 22 | Output |
| Spare | Boolean | 23 | Output |
| Spare | Boolean | 24 | Output |
| Alarm EEV 1.1 Probe S1 Low pressure transducer refrigerant circuit defective! | Boolean | 25 | Output |
| Alarm EEV 1.2 Probe S2 Temperature probe suction gas refrigerant circuit defective! | Boolean | 26 | Output |
| Alarm Temperature probe evaporator outlet defective! | Boolean | 27 | Output |
| Alarm High presure transducer refrigerant circuit defective! | Boolean | 28 | Output |
| Alarm Temperature probe tank devective! | Boolean | 29 | Output |
| Spare Temperature probe referenz defective! | Boolean | 30 | Output |
| Spare | Boolean | 31 | Output |
| Spare | Boolean | 32 | Output |
| Spare | Boolean | 33 | Output |
| Spare | Boolean | 34 | Output |
| Display switching units °C °F | Boolean | 35 | Output |
| Display switching units bar psi | Boolean | 36 | Output |
| Alarm Low pressure alarm refrigerant circuit! | Boolean | 37 | Output |
| Alarm High pressure alarm refrigerant circuit! | Boolean | 38 | Output |
| Alarm High pressure safty switch refrigerant circuit has triggered! | Boolean | 39 | Output |
| Alarm Over temperature consumer circuit! | Boolean | 40 | Output |
| Alarm Winding protection condenser fan 1+2 has triggered! | Boolean | 41 | Output |
| Alarm Circuit breaker compressor 1+2 has triggered! | Boolean | 42 | Output |
| Alarm Circuit breaker consumer pump has triggered! | Boolean | 43 | Output |

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| Funktion | Signal Typ | ModBus Index | Signal Direction |
|---|---|---|---|
| Alarm Circuit breaker condenser fan 1+2 has triggered! | Boolean | 44 | Output |
| Alarm Circuit breaker tank heater has triggered! | Boolean | 45 | Output |
| Alarm Circuit breaker crankcase heater has triggered! | Boolean | 46 | Output |
| Alarm Freeze alarm evaporator outlet! | Boolean | 47 | Output |
| Alarm Water level tank to low! | Boolean | 48 | Output |
| Alarm EEV 2.1 Low superheat (LowSH) | Boolean | 49 | Output |
| Alarm EEV 3.1 Low evaporation temperature (LOP) | Boolean | 50 | Output |
| Alarm EEV 4.1 High evaporation temperature (MOP) | Boolean | 51 | Output |
| Alarm EEV 5.1 High condensing temperature (Hi-Tcond) | Boolean | 52 | Output |
| Alarm EEV 6.1 Low suction temperature | Boolean | 53 | Output |
| Alarm EEV 7.1 Autotune | Boolean | 54 | Output |
| Spare | Boolean | 55 | Output |
| Spare | Boolean | 56 | Output |
| Spare | Boolean | 57 | Output |
| Spare | Boolean | 58 | Output |
| Spare | Boolean | 59 | Output |
| Spare | Boolean | 60 | Output |
| Warnung  Temperature warning consumer circuit! | Boolean | 61 | Output |
| Warnung  Watter levle tank to low! | Boolean | 62 | Output |
| Spare | Boolean | 63 | Output |
| Spare | Boolean | 64 | Output |
| Spare | Boolean | 65 | Output |
| Spare | Boolean | 66 | Output |
| Spare | Boolean | 67 | Output |
| Spare | Boolean | 68 | Output |
| Spare | Boolean | 69 | Output |
| Spare | Boolean | 70 | Output |
| Spare | Boolean | 71 | Output |
| Spare | Boolean | 72 | Output |
| Spare | Boolean | 73 | Output |
| Spare | Boolean | 74 | Output |
| Spare | Boolean | 75 | Output |
| Spare | Boolean | 76 | Output |
| Spare | Boolean | 77 | Output |
| Spare | Boolean | 78 | Output |
| Spare | Boolean | 79 | Output |
| Spare | Boolean | 80 | Output |
| Spare | Boolean | 81 | Output |
| Spare | Boolean | 82 | Output |
| Spare | Boolean | 83 | Output |
| Spare | Boolean | 84 | Output |

# Modbus List

## EVO45

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| Funktion | Signal Typ | ModBus Index | Signal Direction |
|---|---|---|---|
| Low pressure (bar/psi) | Analog | 1 | Output |
| High pressure (bar/psi) | Analog | 2 | Output |
| Evaporator outlet temperature (°C/F) | Analog | 3 | Output |
| Condensation temperature (°C/F) | Analog | 4 | Output |
| Evaporator outlet temperature (°C/F) | Analog | 5 | Output |
| Tank temperature (°C/F) | Analog | 6 | Output |
| Overheating temperature (°C/F) | Analog | 7 | Output |
| Referenz Temperatur | Analog | 8 | Output |
| Spare | Analog | 9 | Output |
| Spare | Analog | 10 | Output |
| Spare | Analog | 11 | Output |
| Spare | Analog | 12 | Output |
| Set point Tank °C | Analog | 13 | Output |
| Set point Tank °F | Analog | 14 | Output |
| Spare | Analog | 15 | Output |
| Spare | Analog | 16 | Output |
| Spare | Analog | 17 | Output |
| Spare | Analog | 18 | Output |
| Spare | Analog | 19 | Output |
| Spare | Analog | 20 | Output |
| Spare | Analog | 21 | Output |
| Spare | Analog | 22 | Output |
| Spare | Analog | 23 | Output |
| Spare | Analog | 24 | Output |
| Spare | Analog | 25 | Output |
| Spare | Analog | 26 | Output |
| Spare | Analog | 27 | Output |
| Spare | Analog | 28 | Output |
| Spare | Analog | 29 | Output |
| Spare | Analog | 30 | Output |
| Spare | Analog | 31 | Output |
| Spare | Analog | 32 | Output |
| Spare | Analog | 33 | Output |
| Spare | Analog | 34 | Output |
| Spare | Analog | 35 | Output |
| Spare | Analog | 36 | Output |
| Spare | Analog | 37 | Output |
| Spare | Analog | 38 | Output |
| Spare | Analog | 39 | Output |
| Spare | Analog | 40 | Output |
| Spare | Analog | 41 | Output |
| Spare | Analog | 42 | Output |
| Spare | Analog | 43 | Output |
| Spare | Analog | 44 | Output |
| Spare | Analog | 45 | Output |
| Spare | Analog | 46 | Output |
| Spare | Analog | 47 | Output |
| Spare | Analog | 48 | Output |
| Current Hour | Analog | 49 | Output |
| Current minute | Analog | 50 | Output |
| Current second | Analog | 51 | Output |

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| Funktion | Signal Typ | ModBus Index | Signal Direction |
|---|---|---|---|
| Current day | Analog | 52 | Output |
| Current month | Analog | 53 | Output |
| Current year | Analog | 54 | Output |
| Spare | Analog | 55 | Output |
| Spare | Analog | 56 | Output |
| Spare | Analog | 57 | Output |
| Spare | Analog | 58 | Output |
| Spare | Analog | 59 | Output |
| Spare | Analog | 60 | Output |
| Spare | Analog | 61 | Output |
| Spare | Analog | 62 | Output |
| Spare | Analog | 63 | Output |
| Spare | Analog | 64 | Output |
| Spare | Analog | 65 | Output |
| Spare | Analog | 66 | Output |
| Spare | Analog | 67 | Output |
| Spare | Analog | 68 | Output |
| Spare | Analog | 69 | Output |
| Spare | Analog | 70 | Output |
| Spare | Analog | 71 | Output |
| Spare | Analog | 72 | Output |

# Modbus List

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| Funktion | Signal Typ | ModBus Index | Signal Direction |
|---|---|---|---|
| Set Point Tank °C | Analog | 73 | Input / Output |
| Set point Tank °F | Analog | 74 | Input / Output |
| Spare | Analog | 75 | Input / Output |
| Spare | Analog | 76 | Input / Output |
| Spare | Analog | 77 | Input / Output |
| Spare | Analog | 78 | Input / Output |
| Spare | Analog | 79 | Input / Output |
| Spare | Analog | 80 | Input / Output |
| Spare | Analog | 81 | Input / Output |
| Spare | Analog | 82 | Input / Output |
| Spare | Analog | 83 | Input / Output |
| Spare | Analog | 84 | Input / Output |

**ef cooling** operates globally
- Production facilities
- Sales and Service office
- Service partner networks

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SWISS MADE

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