OPERATING MANUAL

PC 160.01-NZ-DIS

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1. FOR YOUR SAFETY

1.1 Regulations

Design, construction and development of the process cooler are in compliance with the following national and international regulations.

EC Directives / Standards

- EC-EMC-Directive: 2004/108/EC
- EC-Pressure equipment directive: 97/23/EC
- EC-Directive for machines: 2006/42/EC

- EN 378 -1, -2, -3, -4	Refrigeration plants and heat pumps
- EN 60529	Degrees of protection provided by enclosures (IP)
- EN ISO 12100-1, -2	Safety of machinery
- EN ISO 13857	Safety of machinery
- EN 349	Safety of machinery
- EN 60204-1	Electrical equipment of machinery
- EN 61000-6-2	Electromagnetic compatibility - Generic immunity standard for industrial environments
- EN 61000-6-4	Electromagnetic compatibility - Generic emission standard for industrial environments

National Directives

- BGR 500	Accident prevention regulations concerning refrigeration at pumps

1.2 Signs and Symbols

Pictographs

Throughout this operating manual, the notices below are identified by the following graphical symbols (pictographs):

Danger!

Safety note pointing out an imminent danger. Failure to heed the warning may result in serious bodily injury and even death.

Caution!

Safety note to indicate the presence of a potential hazard. Failure to heed the safety notice may result in minor bodily injury or damage to the equipment.

Information!

This symbol identifies important information or a useful tip concerning the application of the equipment.

1.3 Safety Notices

For the installation, operation and maintenance of the process cooler, the following regulations and safety notices must be observed:

Any work on the process cooler may only be performed by qualified personnel

All relevant accident prevention regulations must be observed

Do not allow anybody to stand or pass underneath the forks when lifting and setting down the process cooler; stay clear of the danger area.

The process cooler must be properly secured in order to prevent it from tipping over

The safety devices must not be deactivated

The electro-technical connections of the process cooler must be performed according to and conforming with all relevant VDE, EN and IEC standards. Beyond that, the technical connection requirements of the local electrical utility company must be observed

Do not attempt to perform any work on the process cooler unless the unit is disconnected from the power supply

National provisions applicable in the country where the unit will be installed must be adhered to

The closed refrigeration circuit contains the refrigerant and refrigeration oil. These must be properly disposed of when performing service work or placing the unit out of service (environment)

The cooling water additives have a caustic effect on skin and eyes. When working with cooling water additives, eye protection devices and gloves must be worn. Follow the directions on the product's label.

Anyone working on the refrigeration circuit must be protected by personal protective equipment.

The process cooler is to be used exclusively for the cooling of water (drinking water) and de-ionised water in accordance with predefined IPG specifications.

Watch out for any incompatibilities of materials in the entire water circuit.

The water must be free of all substances that could result in mineral deposits and corrosion!

The water used in the cooling circuit must comply, at a minimum, with the values specified by the Ordinance on Drinking Water. In the case of de-ionised water, additional constructional features are necessary.

Recommended limit values:

	Drinking water	DI water
- Electric conductivity at 25 °C:	80 - 750 µS/cm	20 µS/cm
- Hydrogen concentration at 20 °C:	6.5 ... 9.5 (pH value)	6.0 ... 7.5 (pH value)
- Chloride:	< 250 mg/l	< 1 mg/l
- Total hardness:	min. 6 °dH	< 0.005 °dH
- Appearance:	clear, no sediments	clear, no sediments
- Colour:	transparent	transparent
- Total colony count at 22°C:	< 100 KBE s/ml	

1.4 Handling of Refrigerants

When handling refrigerants, all legal provisions and guidelines must be complied with. Only qualified personnel may perform these activities.

The operator of the process cooler is responsible for the proper disposal of used refrigerants and system parts.

1.5 Safety Requirements

concerning the operation of refrigeration systems within the European Union

The following information applies to refrigeration systems with closed refrigeration cycles that are used within the European Union. In some member states additional requirements may apply, e.g. due to environmental considerations.

In the refrigeration units described in this operating manual, working pressures occur that are subject to the regulations laid down in the Pressure Vessel Directive 97/23/EC and European standard EN 378 (Parts 1 – 4, version September 2000).

Apart from the requirements relating to the design, equipment and testing of the refrigeration systems prior to delivery to the customer, also the operator of such systems has to comply with requirements in accordance with European standard EN 378 and/or additional national regulations. These concern the **installation,** the **operation** and **requalification tests** of refrigeration systems.

1.5.1 Installation

If the process cooler is installed below ground level or on upper floors of a building, without any adequate number of emergency exits, requirements relating to the protection of people in accordance with EN 378 have to be complied with.
With respect to the actual refrigerant charge of the process cooler, a minimum room volume must be maintained and not be fallen short of.

Refrigerant	**R407C**
PC 160	19 m³
PC 250	29 m³
PC 400	56 m³

Minimum room sizes in [m3] are required for the installation of refrigeration units, depending on the refrigerant being used.

It can thus be ensured that in the case of refrigerant leaks caused by damage to the equipment – and thus the displacement of oxygen – will not have any detrimental effect on the health of people.

1.5.2 Operation

The owner or the operator of the process cooler is obligated to establish emergency practices (in the case of accidents and malfunctions.). A short version of the operating instructions must be drawn up by the operator – based on this present Operating Manual – and made known to the employees.

The quick reference guide must be clearly legible and affixed in the immediate vicinity of the process cooler.

See Sample Quick Reference Guide

The owner or operator of a system is obligated to keep a logbook for the process cooler.

The system logbook must either be available on site near the process cooler, or in the event that the data are stored in a computer of the owner or operator, a printout of the log must be kept in the vicinity of the process cooler. It must be ensured that these data are accessible to qualified persons for the performance of repairs and requalification tests.

See Sample System Log

1.5.3 Requalification Tests

To ensure compliance with minimum safety and health requirements as set forth in standard EN 378, regular testing (requalification testing) of the process coolers is to be carried out by competent persons.

The operator is responsible for the performance of the retests.

(See Chapter Requalification Tests).

1.6 Purpose of the Process Cooler

The process cooler described in this manual is designed exclusively for the cooling of water (drinking water) and de-ionised water within the specified operating temperature limits.

2. DESCRIPTION OF THE PROCESS COOLER

The process cooler is a unit ready for plug-in and is equipped with refrigeration and water circuits including all fittings and regulating/control devices required for automatic operation. The heat extracted from the water is given off to the ambient air via the refrigeration circuit – by means of the fans.

2.1 Refrigeration Circuit

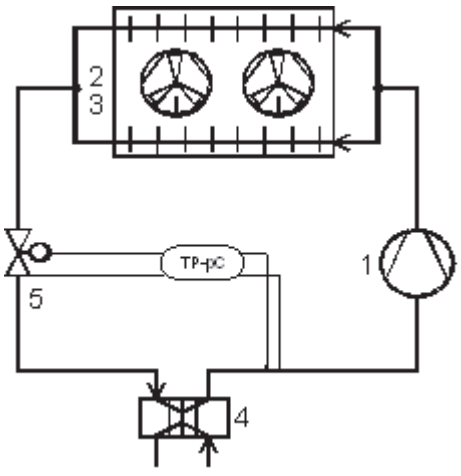
The refrigeration circuite is a closed-loop system in which the refrigerant circulates as the working medium.

The water heated by the equipment to be cooled is re-cooled in the evaporator (4). The liquid refrigerant is thereby passed through the piping in a counter-flow arrangement with respect to the water. The refrigerant evaporates as it takes up the waste heat from the cooling water of the equipment to be cooled.

The vaporised refrigerant is drawn in by the compressor (1) and is then compressed (rise in pressure and temperature). The refrigerant also absorbs the heat of the compressor motor; this heat is given off to the surrounding air by the condensers (2) - in the form of waste heat –by means of the fan (3).

The refrigerant is thus liquefied and is passed to the inlet of the expansion valve (5) via the liquid receiver, the shut-off valve, the filter drier and the sight glass. The expansion valve permits liquid refrigerant to enter the evaporator as a function of the temperature.

The circuit is now complete.



Block flow diagram, refrigeration circuit

2.2 Water Circuits

Each of the water circuits with their built-in tanks are designed as systems open to the atmosphere.

2.2.1 DI Circuit

The DI circuit is cooled by the laser circuit via a plate heat exchanger. The water outlet temperature of the DI circuit is therefore higher than the water outlet temperature of the laser circuit.

The temperature of the water outlet temperature is maintained at a constant level by the water volume inside the tank. The pump conveys the water out of the tank to the optics circuit and in parallel to the plate heat exchanger of the laser circuit and back to the tank.

In a bypass circuit, the pump conveys DI water through the ion filter, strainer and then back to the tank. The ion filter filters ions from the DI water. The conductivity of the DI water can thus be maintained within the permissible range of < 20 µS for an extended period of time. When the ion filter has been used up it must be replaced.

2.2.2 Laser Circuit

The temperature of the water outlet temperature is maintained at a constant level by the water volume inside the tank. The pump conveys the water out of the tank to the laser and in parallel to the plate heat exchanger of the laser circuit and back to the tank.

2.3 Cooling Air Supply

The heat transferred to the evaporator upon cooling the water as well as the heat of the compressor motors are absorbed by the refrigerant and given off to the cooling air, in the condenser.
The ambient air is used as cooling air, which is drawn through the condenser by the fan(s), warmed in the process and discharged in upward direction.

It must be ensured that the cooling air can be drawn in and discharged without any obstructions and adequate air changes for heat dissipation away from the installation site of the process cooler take place.
(see also Section Installation)

2.4 Safety Devices

The process cooler is equipped with the following safety devices:

High-pressure control (HP)

The high-pressure control is designed to protect the process cooler against extremely high operating pressure in the refrigeration cycle.
In the event of a malfunction, the HP control switches the process cooler off, and the malfunction is indicated on the control panel.
The process cooler cannot be restarted until the pressure has dropped to the preset pressure difference and the Reset button on the pressostat has been pressed. The high-pressure pressostat can be accessed from the service side.

Power disconnect switch (main switch)

In an emergency, the process cooler must be switched off by means of the main switch.

2.5 Monitoring Devices

Low-pressure control (LP))

The low-pressure control protects the process cooler against extremely low operating pressure in the refrigeration cycle.
In the event of a malfunction, the control switches off the process cooler, and the malfunction is indicated on the control panel.
Restarting of the process cooler is effected automatically as soon as the pressure has risen by the preset pressure difference.

Winter starting aid

The winter starting aid is designed to prevent any low pressure malfunctions in low ambient temperatures during the start-up phase of the cooling operation until normal operating conditions have been established.

Compressor overheat protection

The compressor is equipped with an overheat protection (thermal contact, Klixon). In the event of an increase in motor current in conjunction with a rise in winding temperature, the overheat protection trips, and the compressor is switched off. The overheat protection resets itself automatically after the windings have cooled down. The malfunction is indicated on the control panel.

Thermal contact - fan motor

In the event of an increase in motor current in conjunction with an increase in winding temperature, cooling operation is switched off by the thermal contact.
This malfunction is indicated on the control panel.

Circuit breakers (compressor, fan, pump)

In the event of an increase in motor current or in the case of short circuits, the circuit breaker trips and interrupts the power supply.
Such malfunctions are indicated on the control panel. The circuit breakers are located in the control cabinet.

Float switch

The float switch monitors the water level in the tank.
Maintaining the minimum water level ensures that the water outlet temperature remains constant.
In the event of a water shortage, the pump/s is/are switched off (dry run protection). These malfunctions are displayed on the control panel.
The float switch is located inside the tank.

Fan control

The condensation pressure is controlled by cycling the individual fans on and off.
This type of control permits an adaptation to different operating conditions at relatively constant condensation temperatures.

Control and operating unit

The control and operating unit controls the water circuits and the refrigeration cycle.. The control and operating unit including the control panel with display of the water temperatures, as well as the error codes in the case of a common fault alarm, is integrated in the control cabinet door.

Pressure gauge

The pressure gauge indicates the pressure at the water inlet and outlet.

Overflow valve

The overflow valve ensures the minimum flow rate in the water circuit. The evaporator and pump in the single-circuit system are thus protected.

Fixed bypass in the DI circuit

The fixed bypass consists of strainer, DI cartridge and shut-off valve.

Strainer

If there is a danger of contamination of the water by particulates with a diameter > 1 mm, a filter with a suitable mesh size must be used. The strainer has to be mounted outside the process cooler, the proper flow direction must be observed.
After commissioning, the strainer must be cleaned on a regular basis. The strainer must be fitted on the outside of the water inlet.

Digital thermometer

The thermometer senses the water inlet or outlet temperature, the readout is displayed on the control panel of the control and operating unit.

Temperature limit values

The water temperatures in the water circuit are monitored by limit values. If the preset limit values are exceeded or not reached, a common fault alarm is triggered via the control and operating unit.

Tank heater as freeze protection measure

The tank heater is designed to warm the water inside the tank. In low ambient temperatures and in the absence of any process heat (e.g. plant shutdown) the water is thus protected against freezing.
If there is a danger of frost, the circulating pump is switched on via a thermostat. The electric heater is controlled by a thermostat fitted with sensor in the water circuit.

Control cabinet heater

The control cabinet heater is installed for temperature stabilisation of the control cabinet inside temperature versus the ambient temperature (condensation water formation) and for ensuring minimum temperatures for the switchgear and controlgear inside the control cabinet.

Conductivity control - DI circuit

The conductivity sensor integrated in the control and operating unit for the process coolers monitors the conductivity value of the water circuit. In case the preset conductivity value is exceeded, a common fault alarm is released and displayed on the control panel via the appropriate error code.

24 V remote control

The process cooler is switched ON and OFF via a 24 V remote control unit. The 24 V signal is to be connected in accordance with the circuit diagram.

Condenser guard with filter mat

The condenser guard protects the condenser against mechanical damage. The filter mat protects the condenser and the process cooler against contamination.

2.6 Electrical / Control Equipment

The electro-technical equipment of the process cooler is installed in the control cabinet. All required components for the automatic switching, controlling and regulating operation are contained in the control cabinet.

The main electric circuits are of a non-fused design featuring motor protecting switches. The connection of the process cooler to the equipment to be cooled is effected via a potential-free interface.

The interface transmits the following signals:
- „ Malfunction ’’ Continuous signal from the process cooler to the equipment to be cooled.

The water outlet temperature is kept constant by the control and operating unit at a given setpoint value by activation of power stages in the refrigeration cycle. The current water outlet temperature is displayed on the control panel.

3. TECHNICAL DATA

Technical Data							
Designation		**PC 160.01-NZ-DIS**		**PC 250.01-NZ-DIS**		**PC 400.01-NZ-DIS**	
General Data		**50 Hz**	**60 Hz**	**50 Hz**	**60 Hz**	**50 Hz**	**60 Hz**
IPG laser type	YLR	5000		10000		15000	
Net refrigeration capacity	kW	20,0 kW	21.5 kW	38,0 kW	40.3	54,0 kW	60,0 kW
Refrigerant	A	R407C		R407C		R407C	
Required cooling air volumetric flow rate		8700		16400		26100	
Installation		Option: outdoor installation		Option: outdoor installation		Option: outdoor installation	
No. of compressors		2		2		2	
No. of fans		1		2		3	
No. of pumps		2		2		2	
Operating Limits							
Design operating temperature	°C	33		33		33	
Min. operating temperature	°C	-20		-20		-20	
Max. operating temperature	°C	44	41	43	40	43	39
Storage temperature min. (water circuit drained)	°C	-40		-40		-40	
Storage temperature max.	°C	60		60		60	
Cold water tank capacity	litres	140		75		240	
Electrical Data							
Power consumption at operating point w/o heater	kW	11,0 kW	13.2 kW	17.0 kW	20.4 kW	23.5 kW	29.0 kW
Power consumption at operating point with heater	kW	15	17,2	20,5 kW	24,4 kW	28,0 kW	33,5 kW
Max. power consumption	kW	19,5		27		34	41
Max. current draw	A	30		42		60,5	
Max. back-up fuse	A	35		50		80	
Start-up current	A	53		92,5		141	
Supply voltage		400 V / 3 Ph / PE	460 V / 3 Ph / PE	400 V / 3 Ph / PE	460 V / 3 Ph / PE	400 V / 3 Ph / PE	460 V / 3 Ph / PE
Tolerance of supply voltage		+/- 10 %		+/- 10 %		+/- 10 %	
Dimensions, Weights and Sound Level							
Weight without water charge	kg	350		500		900	
Sound pressure level at 5 m distance	db(A)	61		64		68	
Width	mm	1440		1440		2120	
Depth	mm	860		860		860	
Height	mm	1697		1697		1977	
Normal Water Circuit							
Cooling capacity	kW	16,0 kW	17,5 kW	34,0 kW	36,3 kW	50,0 kW	60,0 kW
Cold water outlet temperature	°C	21		21		21	
Cold water return temperature	°C	26		26		26	
Setpoint tolerance	K	1		1,2		1	
Amount of cold water vs. free pump pressure		69 l/min at 1.5 bar		90 l/min at 1.5 bar		136 l/min ati 1.5 bar	
Amount of cold water vs. free pump pressure		46 l/min at 4.0 bar		60 l/min at 3,0 bar		90 l/min at 3,0 bar	
DI Water Circuit							
Cooling capacity	kW	4,0 kW		4,0 kW		4,0 kW	
Cold water outlet temperature	°C	26		26		26	
Cold water return temperature	°C	31		31		31	
Setpoint tolerance	K	1		1		1	
Amount of cold water vs. free pump pressure		20 l/min at 1.5 bar		20 l/min at 1.5 bar		20 l/min at 1.5 bar	
Amount of cold water vs. free pump pressure		15 l/min at 4.0 bar		15 l/min at 4.0 bar		15 l/min at 4.0 bar	

4. TRANSPORT AND STORAGE

The safety notices contained in Chapter 1 must be complied with!

As a rule, the process cooler must be transported in upright position without water charge!

The in-house transport is carried out by a forklift, lift truck or crane.
This process cooler must be deposited on a level surface in order to prevent any distortion of the base-frame.

4.1 Transport Specification

- Weights	PC 160	PC 250	PC 400
Weight without tank charge	350	500	900
Weight with tank charge	515	600	1165

- Main dimensions (see Chapter Technical Data)
- Ambient temperatures –40°C to +60°C

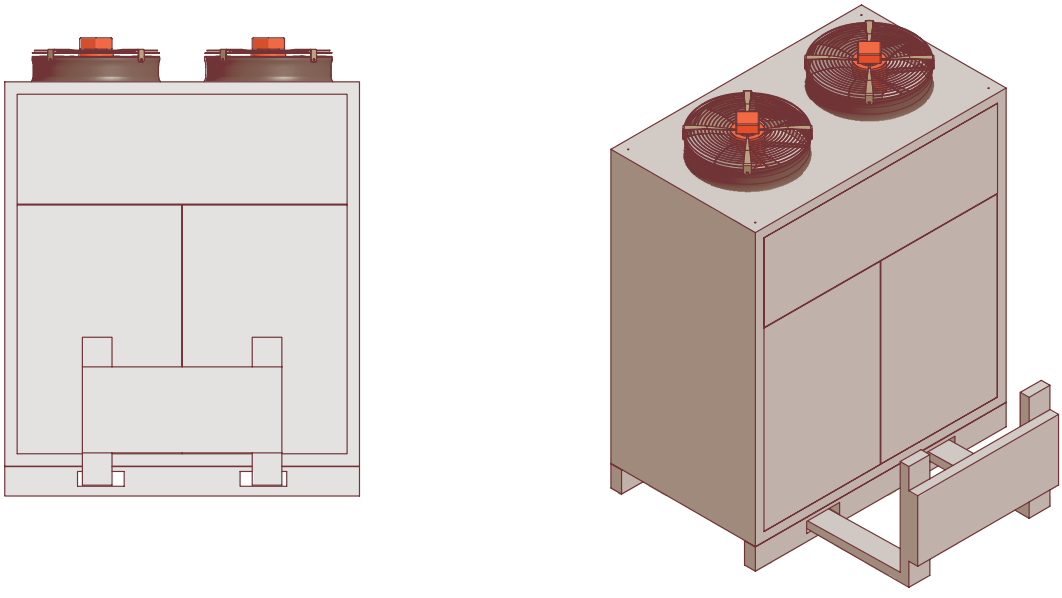
In ambient temperatures <0°C the water circuits must be completely drained, including pumps, water filters and tanks.

(See Chapter Decommissioning)

4.2 Transport Using a Forklift

To transport the process cooler with a forklift, the recesses provided at the broadside of the base-frame of the unit should exclusively be used. Do not lift the unit until the forks have been inserted horizontally all the way beneath the unit, symmetrically to the centre of gravity of the process cooler.

The lifting rate should be kept to a minimum!



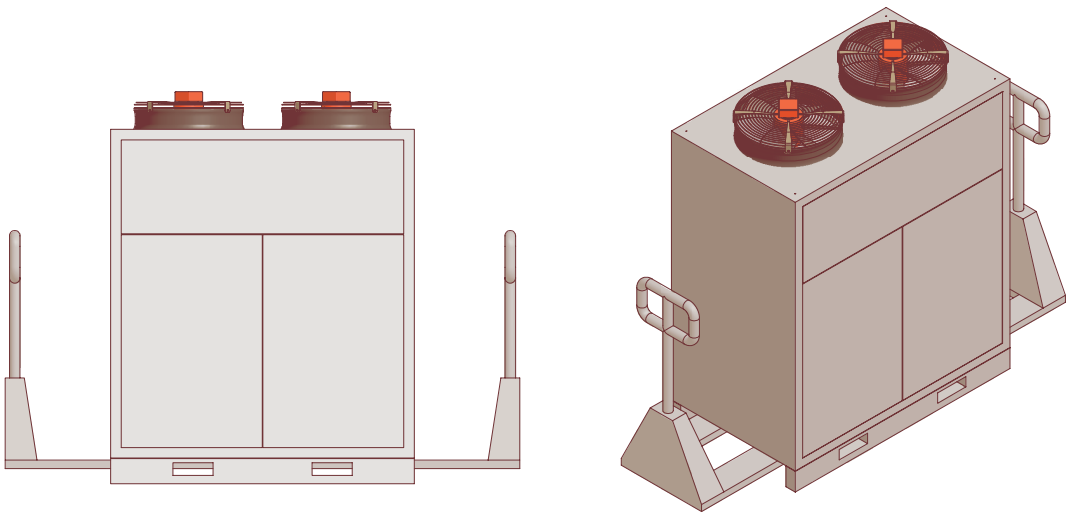
Schematic:
Transport using a forklift

4.3 Transport Using a Lift Truck

Handling the unit from the narrow side:

The process cooler can be transported by means of two lift trucks with the forks being inserted under the load from the narrow sides.
To ensure that the forks can be inserted under both cross beams, a minimum fork length must be maintained.
Both lift trucks must be actuated at the same time in order to prevent the process cooler from becoming off-centred.

The lifting rate should be kept to a minimum!



Schematic:
Transport using a lift truck

4.4 Transport Using a Crane

As a rule, the process cooler must always be transported in upright position without water charge !

For the transport of the process cooler, lifting eyes are provided in the upper frame enabling the realisation of a 4-point sling load arrangement.

Load suspension devices

Wire rope slings (lifting rope assemblies) according to DIN 3088 or sling chains (lifting chains) according to DIN 5687/5688 are to be used. Either load suspension device complies with the requirements of a sling with equal rope or chain lengths.

Rope inclination angle

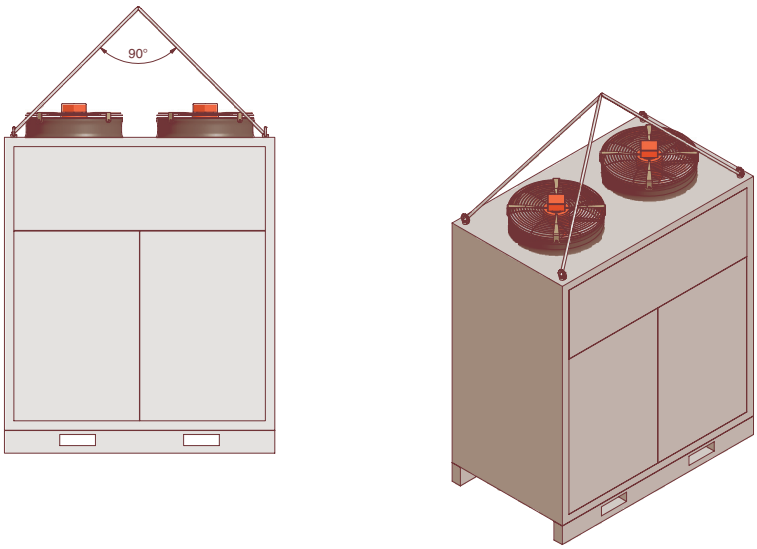
Ensure that the rope inclination angle as shown in the illustration is complied with.

Lifting rate

Keep lifting rate to a minimum
(V_{lift} <10m/min - precision lifting, jerk-free lifting)

Depositing the process cooler

To prevent any distortions of the lower frame from occurring, the process cooler must be lowered onto a level surface.



Schematic: Transport using a crane

4.5 Storage of the Process Cooler

This process cooler must be stored on a level surface, or supported on additional square beams, in a dry room, protected from frost.
Permissible storage temperatures: -40°C to +60°C.

For storage in ambient temperatures below 0°C, it is imperative that decommissioning measures be taken.
(See Chapter Decommissioning)

5. INSTALLATION

The safety notices contained in Chapter 1 must be complied with !

At storage temperatures < 10 °C allow for an appropriate acclimatisation period before turning the unit on (formation of condensation water) !

Remove transport packaging !

5.1 Indoor Installation

With regard to the required room volume for the installation of the process cooler, the requirements as per Chapter 1.5.1 (Installation) must be complied with.

The process cooler must be installed in a freeze-proof room on a level, horizontal surface capable of supporting the weight of the unit.
Any attachments to the floor, intermediate spacers or antivibration mounts are not required.
The process cooler and the equipment to be cooled must always be installed at the same level.

For different installation conditions, consult the manufacturer.

To ensure trouble-free operation of the process cooler as well as to provide adequate access for the performance of maintenance and repair work, the minimum clearances must be maintained during installation.
(See also Dimensions)

These installation requirements ensure that the cooling air can be drawn in and discharged without obstructions. it can thus be largely prevented that the hot air discharged in upward direction is reintroduced into the process cooler (air short-circuiting).

Moreover, adequate air circulation for carrying off the heat at the installation site must be ensured.

5.2 Outdoor Installation (Option)

If the process cooler is to be installed outdoors it must be equipped with this option.

In case the process cooler is installed outdoors, applicable local or national regulations concerning the protection of waterbodies/groundwater as well as noise level restrictions must be observed !

Electro-technical connection
The process cooler must be provided with a separate power feed.
It must not be supplied with power from the laser control cabinet.

When the laser equipment is placed out of service during the frost period, the disconnect switch of the process cooler must remain in the „on“ position so that the pumps and the electric heater are in the Standby mode.

To maintain the system at operating temperature (approx. 21°C) due to the danger of freezing during a shut-down period, the process cooler is equipped with the following components:
Process cooler with separate disconnect switch.

Laser circuit

- Tank heater

Do not disconnect the process cooler from the power supply when there is danger of frost.

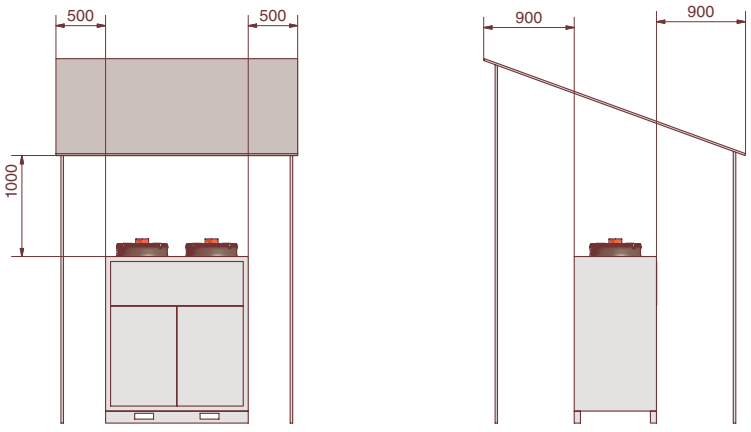
DI water circuit

- Pump start-up control

If the temperature in the DI water circuit falls to 19°C, the pump is activated. The pump is deactivated at 24°C.

To ensure trouble-free operation of the process cooler as well as to provide adequate access for the performance of maintenance and repair work, the minimum clearances - as shown on the diagram - must be maintained when installing the unit (all data in mm).

Use weather-proof shelter.



Schematic: Process cooler with weather-proof shelter

6. ASSEMBLY

The safety notices contained in Chapter 1 must be complied with!

6.1 Connection of Water Piping

The nominal widths of the pipes for the external water circuit must be selected on the basis of the available pump pressure and the expected pressure losses in the circuit of the equipment to be cooled.

The water pipes can be of the rigid or flexible type. The materials used in the equipment to be cooled must be chemically compatible with the water in order to prevent any corrosion damage. (See also Chapter Commissioning)

The supplied shut-off valves must be mounted on-site. When the on-site piping system is installed by the customer, care must be taken to ensure that the pipe system is free from impurities (lines may have to be flushed prior to connecting the process cooler)

6.2 Electro-Technical Connection

Activities to be performed:
Remove panel assemblies on the operator side
Working from below, pass the connecting cable through the cable gland provided in the base plate for this purpose (on the left or right, depending on the process cooler)
Route cable properly inside the process cooler and feed it through the screwed cable gland into the control cabinet
Establish electro-technical connection in accordance with the wiring diagram (see Appendix)

The process cooler is ready for connection to a remote control. In the condition as delivered, a jumper wire is inserted between the terminals.
The common fault indicator is wired to the terminal in the form of a potential-free contact.
(See also wiring diagram in the Appendix).

7. COMMISSIONING

The safety notices in Chapter 1 must be complied with !

At storage temperatures <0°C allow for a sufficient acclimatisation period before turning on the unit (formation of condensation water). The process cooler is designed exclusively for the cooling of water. Only water complying with IPG specifications may be used for filling the water circuits !

The disconnect switch is located either on the laser equipment control unit or on the process cooler.

The term „disconnect switch“ is used for both situations in the description below.

7.1 Laser Circuit

Place disconnect switch to the „0“ position
Place all motor protecting switches and automatic circuit breakers of the process cooler to the “0" position
Remove front panel assemblies
Remove tank filler cap
Fill up tank with water up to the -MAX- mark on the liquid level indicator
(water temperature: room temperature)
Turn all shut-off valves to the „OPEN“ position
Vent pump via the vent screw on the pump housing (see Section 7.3)
Place disconnect switch to the „1“ position
Place circuit breakers and motor protecting switches for the laser circuit pump and fans to the „1“ position
(see wiring diagram)
Enable voltage of laser equipment
Check pump and fan for proper direction of rotation
(see arrow on pump housing)

In the event that the pump rotates in the wrong direction, disconnect the process cooler from the mains power supply and reverse any 2 phases of the main power cable.

Visually inspect entire water circuit for leaks
Check that the water level is within the permissible range by inspecting the liquid level indicator and top up with water, if necessary
Mount tank filler cap

7.2 DI-Circuit

Place disconnect switch to the „0“ position
Place all motor protecting switches and automatic circuit breakers of the process cooler to the „0“ position
Remove front panel assemblies
Remove tank filler cap
Fill up tank with de-ionised water up to the -MAX- mark on the liquid level indicator
(water temperature: room temperature)
Turn all shut-off valves to the „OPEN“ position
Vent pump via the vent screw on the pump housing (see Section 7.3)
Place disconnect switch to the „1“ position
Place circuit breakers and motor protecting switches of the DI circuit pump and fans to the „1“ position
(see wiring diagram)
Enable voltage of laser equipment
Check pump and fan for proper direction of rotation
(see arrow on pump housing)

In the event that the pump rotates in the wrong direction, disconnect the process cooler from the mains power supply and reverse any 2 phases of the main power cable.

Visually inspect entire water circuit for leaks
Check that the water level is within the permissible range by inspecting the water level indicator and top up with de-ionised water, if necessary
Mount tank filler cap

After the two water circuits have been put into operation:

Mount panel assemblies
Acknowledge (reset) any non-reset fault conditions at the control and operating unit
Check preset values
(see Chapter Operation)

Turn motor protecting switches of the compressors to the „1“ position
(see wiring diagram in the Appendix).
Acknowledge (reset) any fault alarms that may still be active

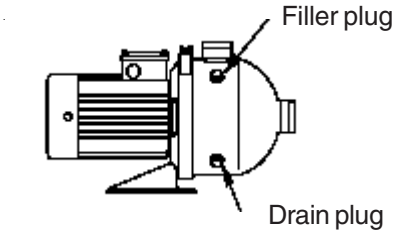
The process cooler is ready for operation, and the control and operating unit now takes over the control of the water outlet temperatures.

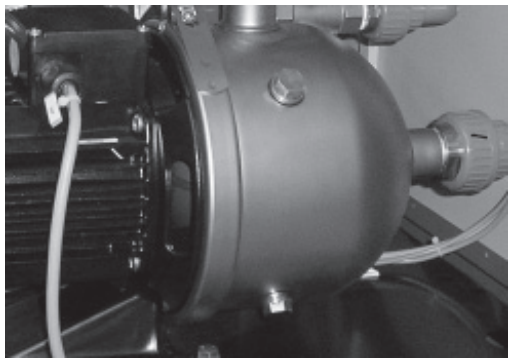
Depending on the specific version, the process cooler is optionally equipped with a control switch, a remote control unit or a stand-by button (control On /Off).
See wiring diagram

7.3 Bleeding Air From Pumps

DI circuit (CHI pump)

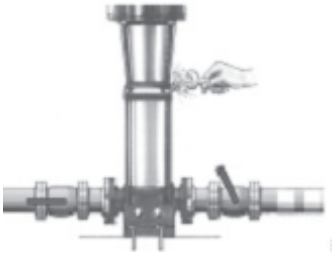
1. Remove the filler plug on the pump housing.
2. Allow pump to run until DI water emerges. Check for proper direction of rotation.
3. Re-install the filler plug and tighten firmly.

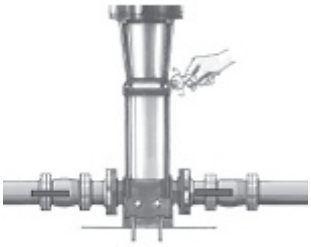


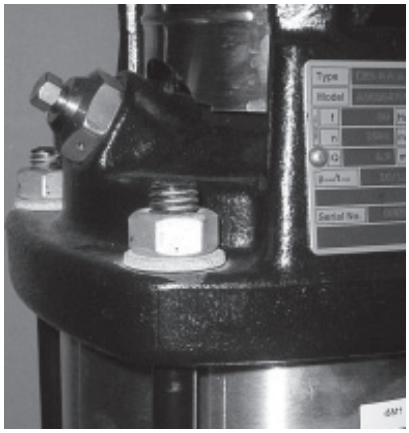


Laser circuit (CR pump)

1. Remove filler plug and slowly fill pump with water.
2. Re-install the filler plug and tighten firmly.
3. Operate the pump. Check for proper direction of rotation.
4. Bleed pump using the bleed valve in the pump head.
5. Close bleed valve as soon as water emerges from the valve.





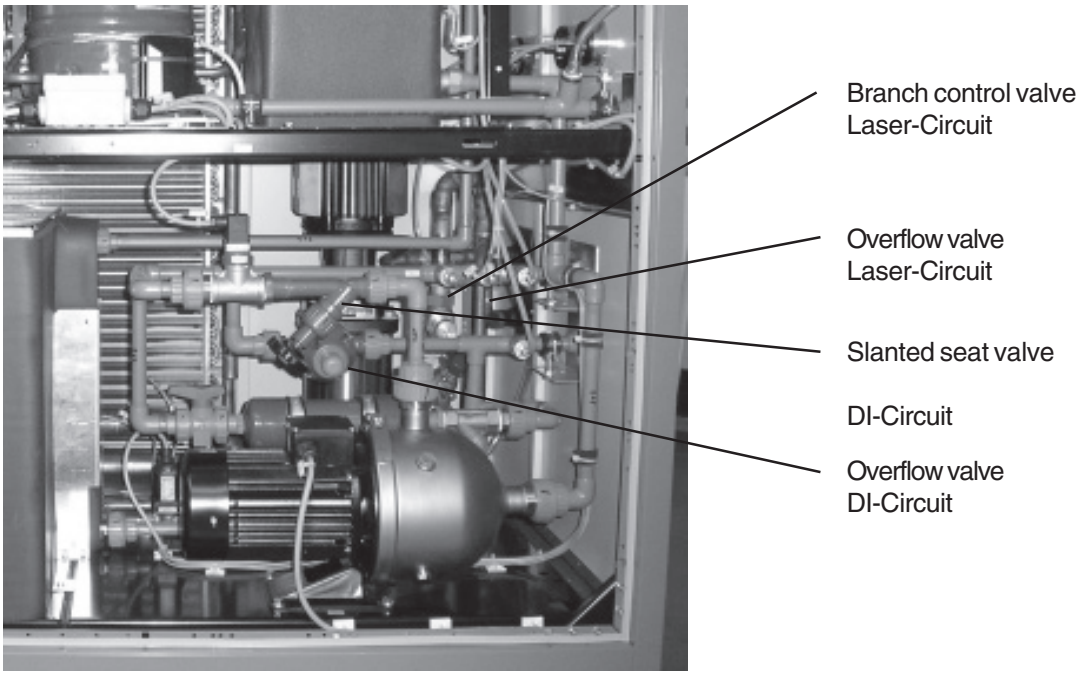


7.4 Hydraulic Settings Upon Frequency Change

This process cooler is of dual frequency design and can therefore be operated both at 50 Hz and 60 Hz.

The frequency at which the process cooler was tested at the factory and the conditions for which the factory settings were made can be seen from the adhesive label located underneath the nameplate.

If the process cooler is to be operated at a different frequency, the following hydraulic settings must be made:



Settings of DI-Circuit **Settings of Laser-Circuit**

1. Set the setpoint of the water outlet temperature to the maximum possible setpoint value firstly to prevent the compressor from starting up and secondly to avoid any possible low pressure fault.
   To this end, press the ”Set button“ and the ”UP button“ on the controller.

Settings of DI-Circuit

2. Close the slanted seat valve to prevent any liquid hammer during the pump start-up.
   Direction of rotation: right.

3. Remove the protective cap from the overflow valve.

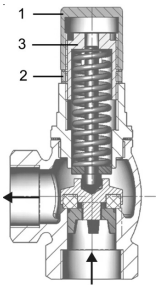
4. Loosen the lock nut using a flat wrench.
   Direction of rotation: left.

5. Close the overflow valve using an hexagon key.
   Direction of rotation: right.

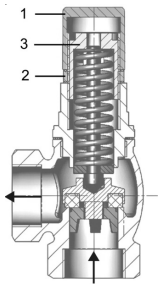
Settings of Laser-Circuit

2. Close the branch control valve to prevent any liquid hammer during the pump start-up.
   Direction of rotation: right.

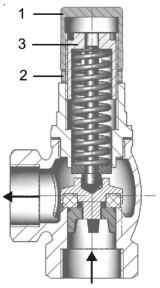
3. Loosen cap 1, unscrew slightly (do not unscrew all the way! Water will emerge!);



4. Loosen lock nut 2 and screw it in direction of cap and lock it with same.

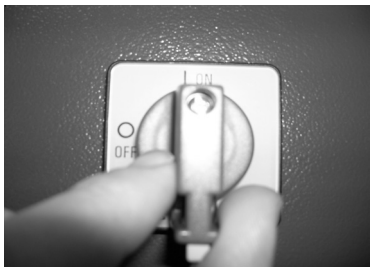


5. Close the overflow valve by screwing in the movable pressure screw 3 (in clockwise direction) = higher opening pressure
   Direction of rotation: right



Settings of DI-Circuit

6. Make sure the tank is adequately filled and start up the process cooler by actuating the main switch.



7. Open the slant seat valve until the desired flow pressure can be read off the pressure gauge.

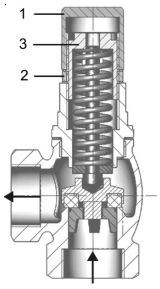
8. Open the overflow valve using a hexagon key until the outlet pressure reading on the pressure gauge decreases and the return pressure increases.
Direction of rotation: left

9. Tighten the lock nut using the flat wrench.
Direction of rotation: right.

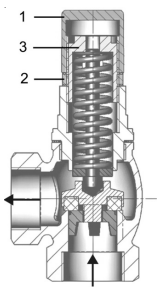
Settings of Laser-Circuit

7. Open the branch control valve until the desired flow pressure can be read off the pressure gauge.

8. Open the overflow valve using pressure screw 3 exactly until the outlet pressure reading on the pressure gauge decreases and the return pressure increases.
(in counter-clockwise direction) = lower opening pressure



9. Tighten lock nut 2.
Direction of rotation: right.

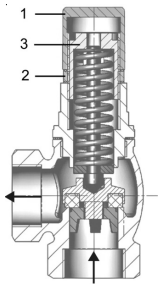


Settings of DI-Circuit

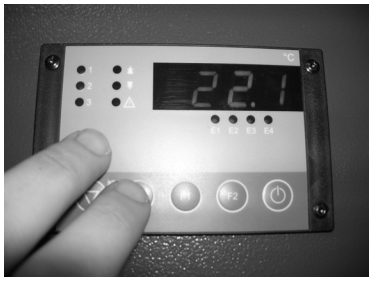
10. Cover the set screw with the protective cap

Settings of Laser-Circuit

10. Cover set screw 2 with protective cap 1



11. Set the desired setpoint value of the water outlet temperature. To this end, press the ”Set button“ and the ”DOWN button“ on the controller.



7.5 Refrigeration Circuit

After the activities on the water circuit have been completed, the motor protecting switches of the compressors have to be placed to the -1- position (see wiring diagram in the Appendix).
Reset/acknowledge all non-reset fault alarms on the control and operating unit.
The process cooler is ready for operation and the control and operating unit assumes the control of the water outlet temperature.

Check fan(s) and pump(s) for proper direction of rotation. Check setpoint setting and correct, if necessary.

8. DECOMMISSIONING

The safety notices in Chapter 1 must be complied with !

Disconnect process cooler from power supply.
Completely drain water circuit, including tank, pump(s), piping and filters
(see flow diagram of pipes and instruments in the Appendix)

CAUTION!

Do not use pump to drain the process cooler.
(Dry running of the pump will lead to the destruction of the shaft seal)

Take freeze protection measures (consult manufacturer)

9. SHUTDOWN IN EMERGENCIES

The safety notices contained in Chapter 1 must be complied with !

Turn disconnecting device (main switch) on the process cooler to ”off“

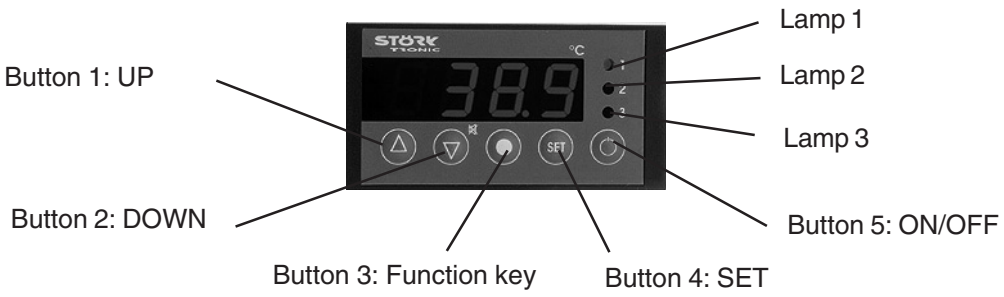
10. ENVIRONMENTAL REQUIREMENTS

When repairing or placing the process cooler out of service (decommissioning), the environment-relevant requirements regarding recovery, reuse and disposal of fuels/oils and components according to DIN EN 378 must be complied with.

The operator of the process cooler is responsible for the proper disposal of used fuels, oils and system components.

The disposal of the water containing additives is to be effected in agreement with the competent local authorities.

11. OPERATION OF CONTROL AND OPERATING UNIT



Button 1: UP

Use the UP button to advance to the next higher channel.

Button 2: DOWN

Use the DOWN button to move to the next lower channel.
It is also used for resetting fault alarms.

Button 3: Function key (Option)

Various functions are assigned to this button by way of parameterisation, see parameter A83.
(Standby mode, direct control of a contact, setpoint input P1)

Button 4: SET

Press the SET button to display the setpoint S1.
The setpoint is increased by additionally pressing the UP button, the setpoint is decreased by additionally pressing the DOWN button.

Button 5: Standby

Various functions are assigned to this button by way of parameterisation, see parameter A82.
(Standby mode, direct control of a contact, setpoint input P1)

Lamp 1:

Status display of output K1

Lamp 2:

Status display of digital input E1

Lamp 3:

Status message temperature control active or inactive

Setting Option

The setting of the controller, the so-called parameterisation, is performed at various display levels. Said display levels are accessible via the front-panel keypad whereby the access to safety-relevant parameters has intentionally been made more difficult. The first display level only permits access to the setpoint value and, if required, to the parameters that may have been assigned to the additional keys. These settings can be accomplished by direct key actuation.

At the other display levels all control parameters can be set. Access to these display levels requires a password.

Please note that the value is transferred to the non-volatile memory and is therefore retained even in the event of a power failure. After the setting operation is complete, the UP or DOWN button is always to be released first, i.e. before the SET button is released. This applies to the setpoint and all parameters alike.

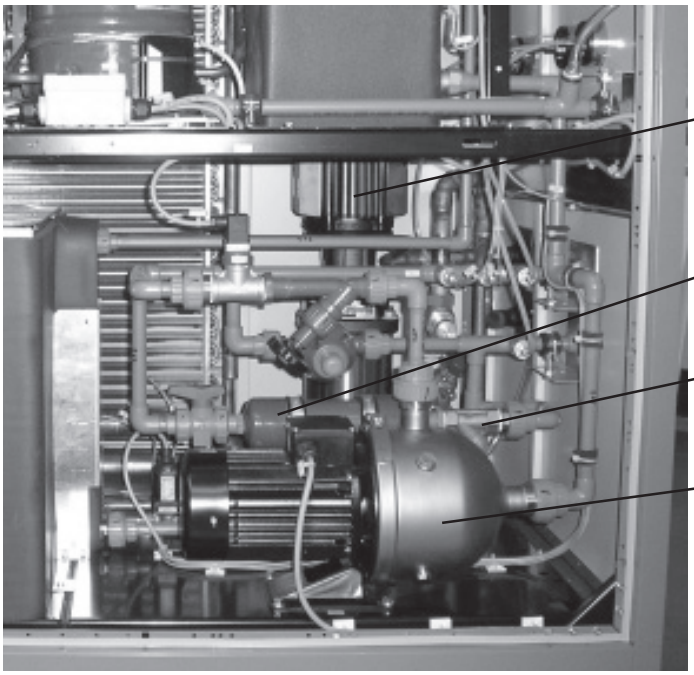
12. MAINTENANCE

The safety notices contained in Chapter 1 must be complied with!

Disconnect process cooler from mains voltage prior to opening the unit!

No specific refrigeration technology know-how is required for the performance of maintenance activities. This work can be carried out by a properly trained person with appropriate special knowledge.

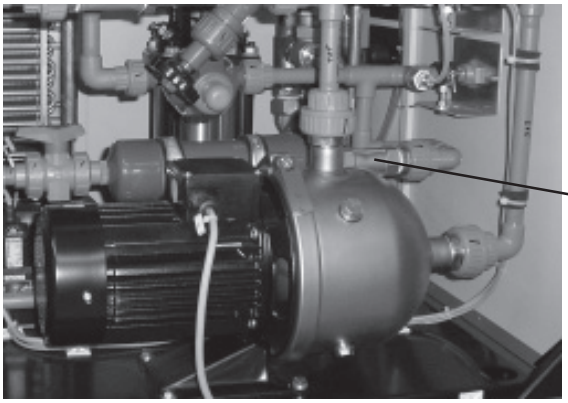
Item to be serviced	Interval	Activity
Process cooler in general	2 weeks	Visual inspection of air filter mat for contamination Visual inspection of refrigeration cycle for leaks In the case of oil leaks, call the customer service
Water circuit Cooling water Filter in water circuit DI cartridge	2 weeks	Visual inspection of water circuit for leaks Check water level, top up Clean filter at regular intervals or replace Check water quality Check DI cartridge, or replace
Cooling air circulation Filter mat Condenser	1 month	Clean filter mat or replace Clean condenser with compressed air, do not damage fins



12.1 Cleaning After-Filter of Ion Filter

Preparatory Steps

1. Turn off process cooler and take appropriate lock-out procedures to prevent accidental restarting.
2. Remove right cover panel at the front of the process cooler.
3. Close shut-off valve of DI cartridge.



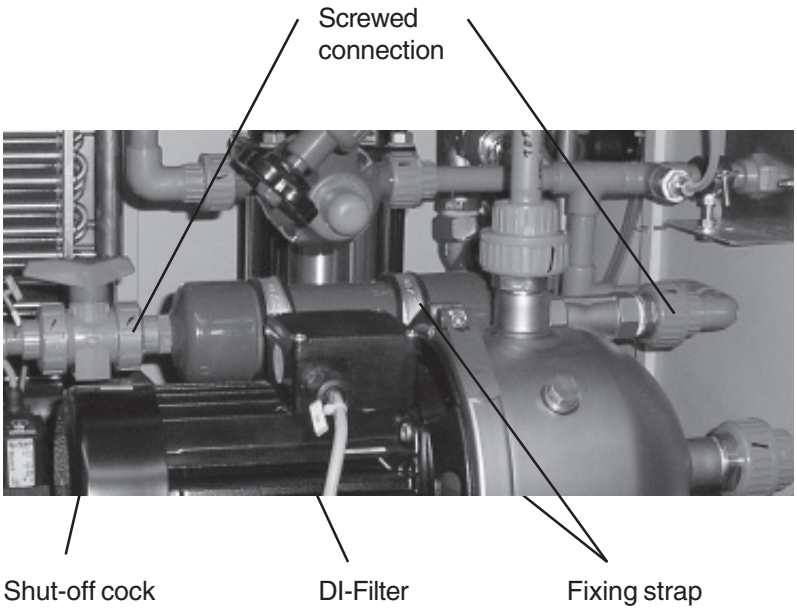
Cleaning the filter:

1. Slowly open lock nut of filter.
2. Mop up emerging water.
3. Pull perforated tube out of housing.
4. Clean perforated tube, replace if necessary.
5. Blow out perforated tube with compressed air, if necessary.
6. Install perforated tube.
7. Tighten lock nut.

12.2 Replacement of Ion Filter

Preparatory Steps

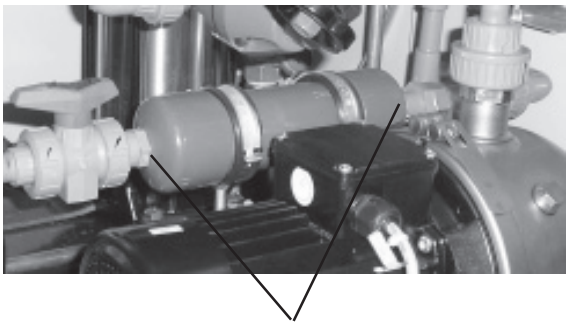
1. Turn off process cooler and take appropriate lock-out procedures to prevent accidental restarting.
2. Remove right cover panel at the front of the process cooler.



Removal of ion filter:

1. Close shut-off cock.
2. Remove screwed connections.
3. Loosen fixing device and remove fixing strap.
4. Remove ion filter together with after-filter from the process cooler.
5. Mop up any emerging water.

Replacement of ion filter:



Screws

1. Loosen screws
2. Replace ion filter

3. Use Teflon tape on the threaded screw connection

Install the ion filter including after-filter in the reverse order of sequence.

It is recommended that you replace the de-ionised water (DI water) in the tank following the replacement of the ion filter.

13. REQUALIFICATION TESTS

The safety notices contained in Chapter 1 must be compli ed with!

Throughout the service life of the process cooler, monitoring and inspection (not covered by the warranty) must be carried out in compliance with national regulations!
In the absence of relevant national provisions with respect to requalification tests, device-specific tests should be performed in accordance with EN 378-2.

Scope of tests

Test Designations	Monitoring	Checks		
	Visual inspection	Pressure test	Refrigerant leak test	Funct.check HP pressostat
M1	**X**	**X**	**X**	**X**
M2	**X**		**X**	**X**
M3	**X**		**X**	
M4	**X**		**X**[1)]	**X**

Monitoring and **testing** must be carried out by a competent person (as defined in EN13313) or a specialist refrigeration company in compliance with environmental requirements with respect to reuse and disposal of fuels/oils and component parts.

Definition of **test designations**

M1 Requalification tests must be carried out following every intervention in the refrigeration cycle due to required repair or service activities (replacement of components, elimination of leaks, replacement of filter-drier cartridges).

M2 Requalification tests must be carried out prior to restarting a process cooler following a shut-down period of more than 2 years.

M3 Following the initial start-up of the process cooler at the end customer's site, requalification tests must be carried out whenever the unit is moved to a new location. Due to special transport safety measures, the relocation of the process cooler from the manufacturer's plant to the end user's site does not result in any statistically significant increase in the failure rate and no requalification test is therefore required.

M4 The requalification test is to be performed once a year.
[1)] The refrigerant leak checks must be performed in accordance with Regulation (EC) No. 842/2006:
Refrigerant charge (see name plate)
< 30 kg annually
> 30 kg every 6 months

The **visual inspection** covers the following:

Checking the air filter mats of the condenser for cleanliness

Checking the intactness of the joint sealing in the refrigeration cycle (pipe joints at compressor) (red seals)

Visual inspection of the refrigeration cycle for oil leaks in the area of the compressor and condenser connecting lines (suction line, pressure line)

Inspection of the condenser heat exchanger surface and the refrigerant piping for corrosion damage

Inspection of the mounting and attachment of all piping and components for security

Visual inspection of the water circuits for leaks under operating conditions

Check that operating manual is available at/near the process cooler

Check sight glass in the liquid line for any formation of bubbles

The requalification tests must be recorded in the system log.

14. MALFUNCTIONS / TROUBLESHOOTING

The safety notices contained in Chapter 1 must be complied with!

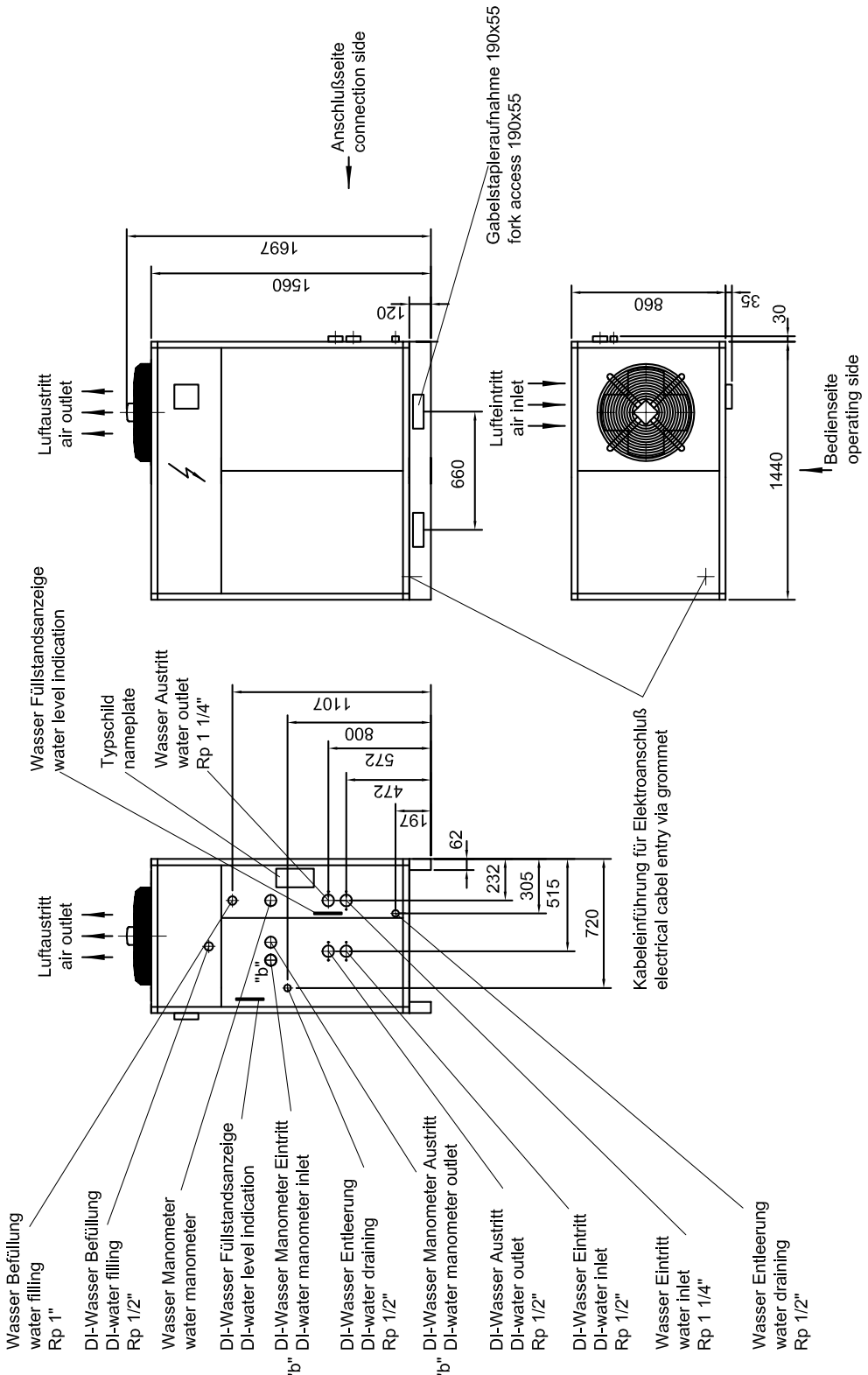
The basis for troubleshooting are the wiring diagram, the flow diagram and the messages displayed on the control panel.
The controlled variable is the main setpoint.

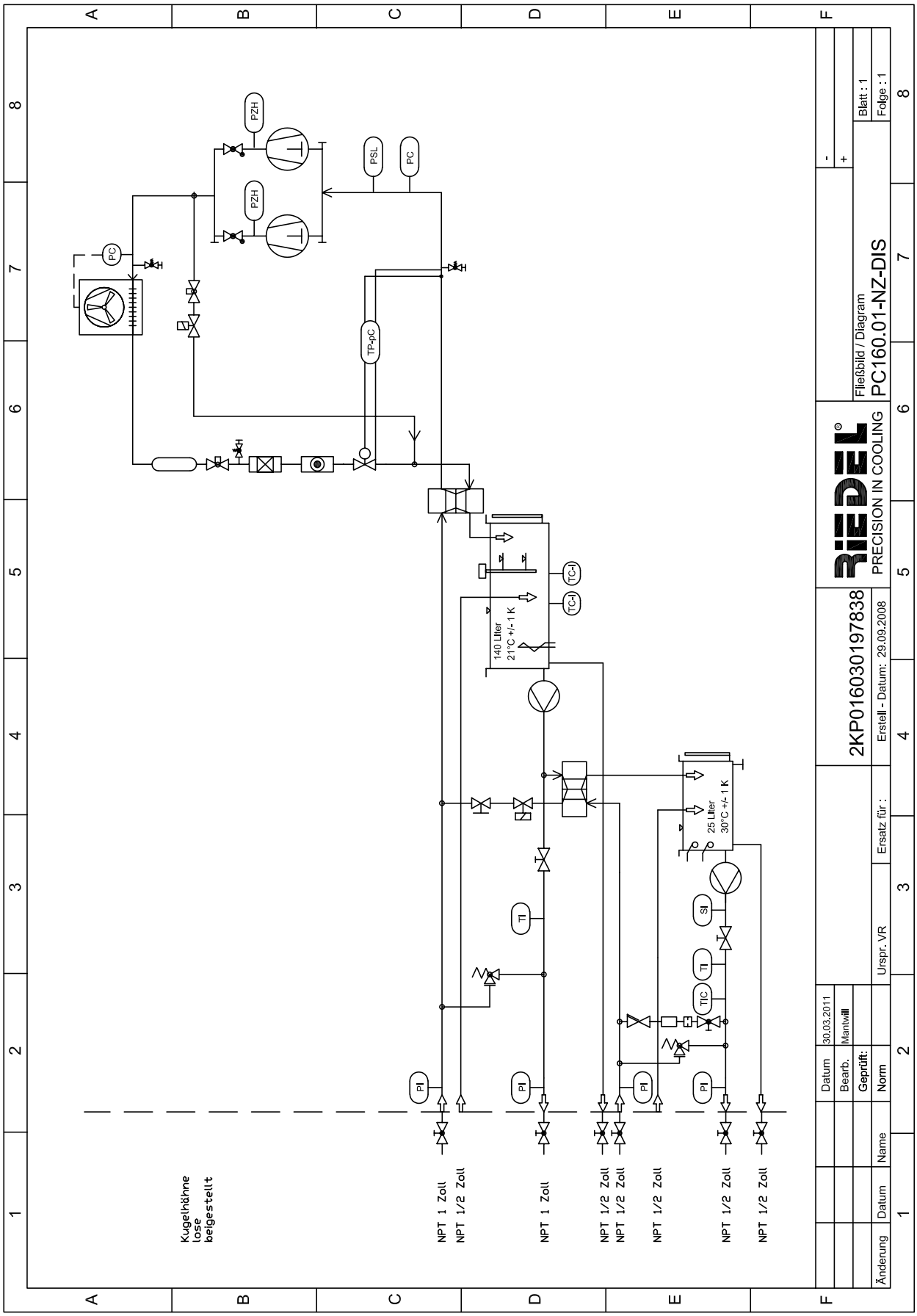
Statusanzeige ***Status indicator***	**Störung** ***Problem***	**Ursache** ***Cause***	**Behebung** ***Remedy***
H1 H2 H3	Voltage not enabled	Power supply disrupted	Check power supply
		Main switch not actuated	Main switch in position -1-
		Control circuit breaker has tripped	Check control circuit breaker
H1 H2 H3 ○	Control voltage not enabled	Remote control not activated	Check remote control, check jumper at terminals in control cabinet as per wiring diagram
		Control switch not turned on	Control switch in position -1-
	Low-pressure pressostat has tripped	Refrigerant shortage caused by a leak in the refrigeration cycle	Check refrigeration cycle for leaks Top up refrigerant, call customer service
		Refrigerator oil was not preheated despite low ambient temperature	After suction pressure rise, pressostat will reset automatically
		Pressostat fails to reset automatically	Check pressostat, call customer service if necessary

Status indicator	**Störung** ***Problem***	**Ursache** ***Cause***	**Behebung** ***Remedy***
H1 H2 H3 ○	High-pressure pressostat has tripped	Cooling air temperature too high	Heat dissipation to be ensured through increased air changes at the installation site. Actuate reset button on high-pressure pressostat.
		Dirty condenser or filter mat	Clean condenser with compressed air or replace filter mat. Actuate reset button on high-pressure pressostat.
		Fan(s) fail(s) to rotate	Perform functional check of fan. Actuate reset button on high-pressure pressostat.
		Panel assemblies removed from process cooler.	Mount panel assemblies. Actuate reset button on high-pressure pressostat.
		Pressostat fails to switch on	Check pressostat, call customer service if necessary
H1 **H2** H3 ○ ○	Thermal contact of fan has tripped	Motor winding overheated	Allow motor to cool , check thermal contact for continuity, replace fan if necessary
Water shortage indicator light is illuminated	Water below MIN mark	Liquid loss in water circuit	Check water circuit for leaks, fill up water up to the MAX mark.
Indicator lamp of pump(s) fail to illuminate	Motor protecting switch has tripped	Pump motor overload due to mechanical sluggishness	Check pump, replace if necessary Motor protecting switch to position **-1-**
		Motor overload due to phase failure	Correct phase failure, motor protecting switch in position **-1-**
Compressor fails to start up	Compressor contactor has been actuated	Star-point klixon of compressor has tripped	Restart after compressor has cooled, time delay of up to 3 hours

PC 160.01-NZ-DIS

(all dimensions in mm)




PZH
PZH
PSL
PC
PC
TP-pC
140 Liter
21°C +/- 1 K
TC-I
TC-I
25 Liter
30°C +/- 1 K
TI
SI
TI
TIC
PI
PI
PI
PI
Kugelhähne
lose
beigestellt
NPT 1 Zoll
NPT 1/2 Zoll
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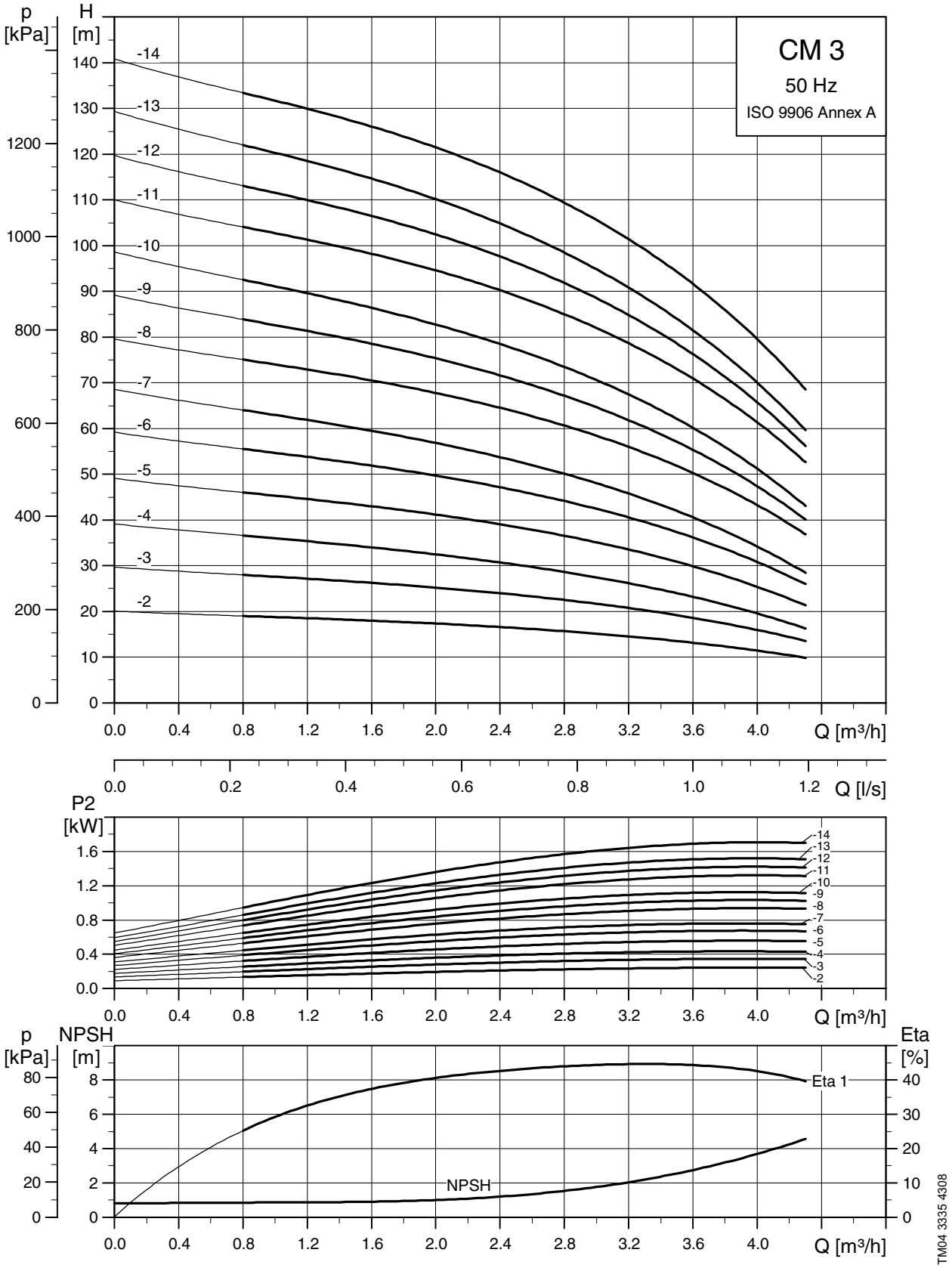
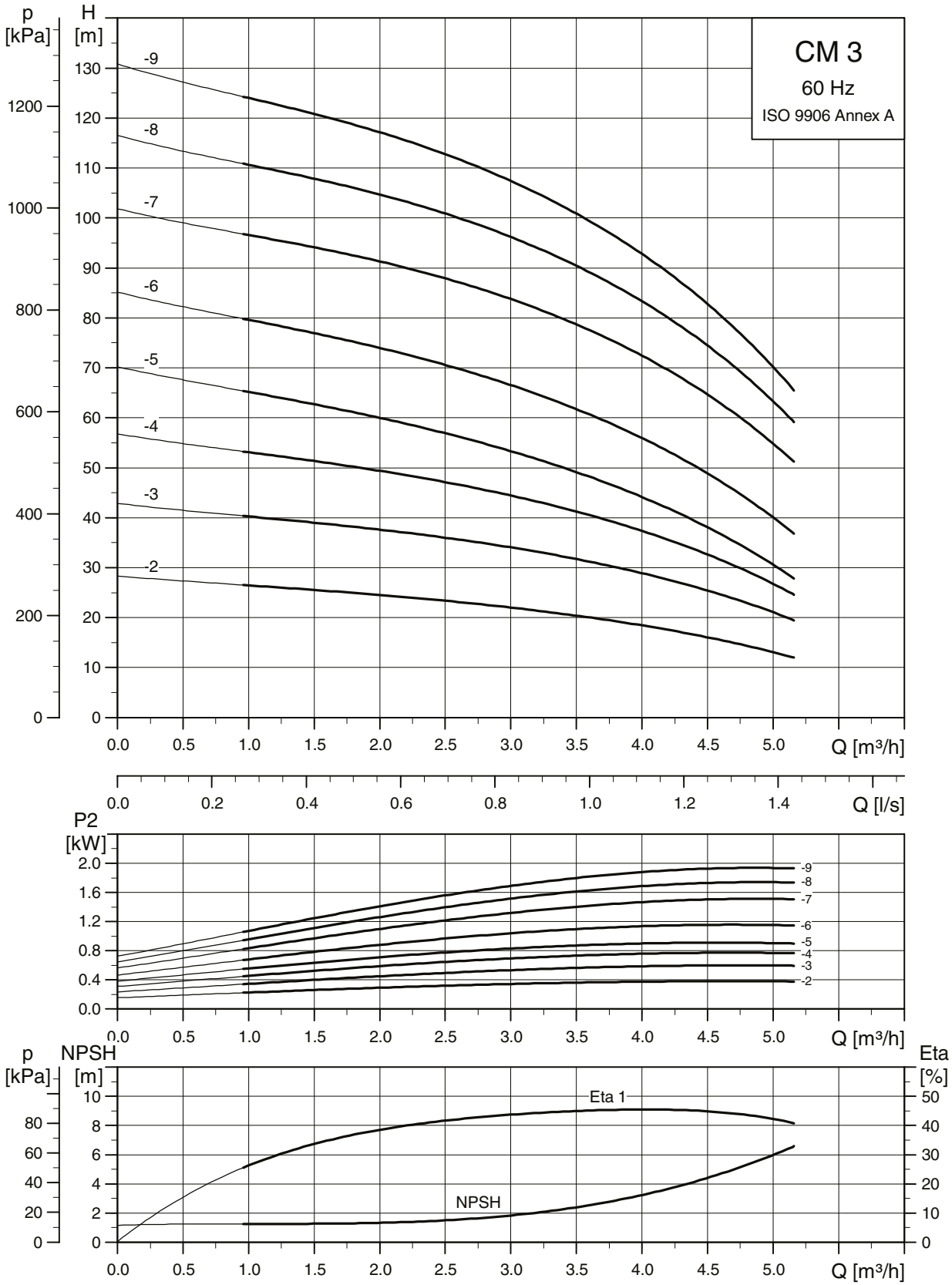
RIEDEL
PRECISION IN COOLING
Fließbild / Diagram
PC160.01-NZ-DIS
Blatt : 1
Folge : 1
2KP0160301978 38
Erstell - Datum: 29.09.2008
Ersatz für :
Urspr. VR
Datum 30.03.2011
Bearb. Manwill
Geprüft:
Norm
Name
Datum
Änderung

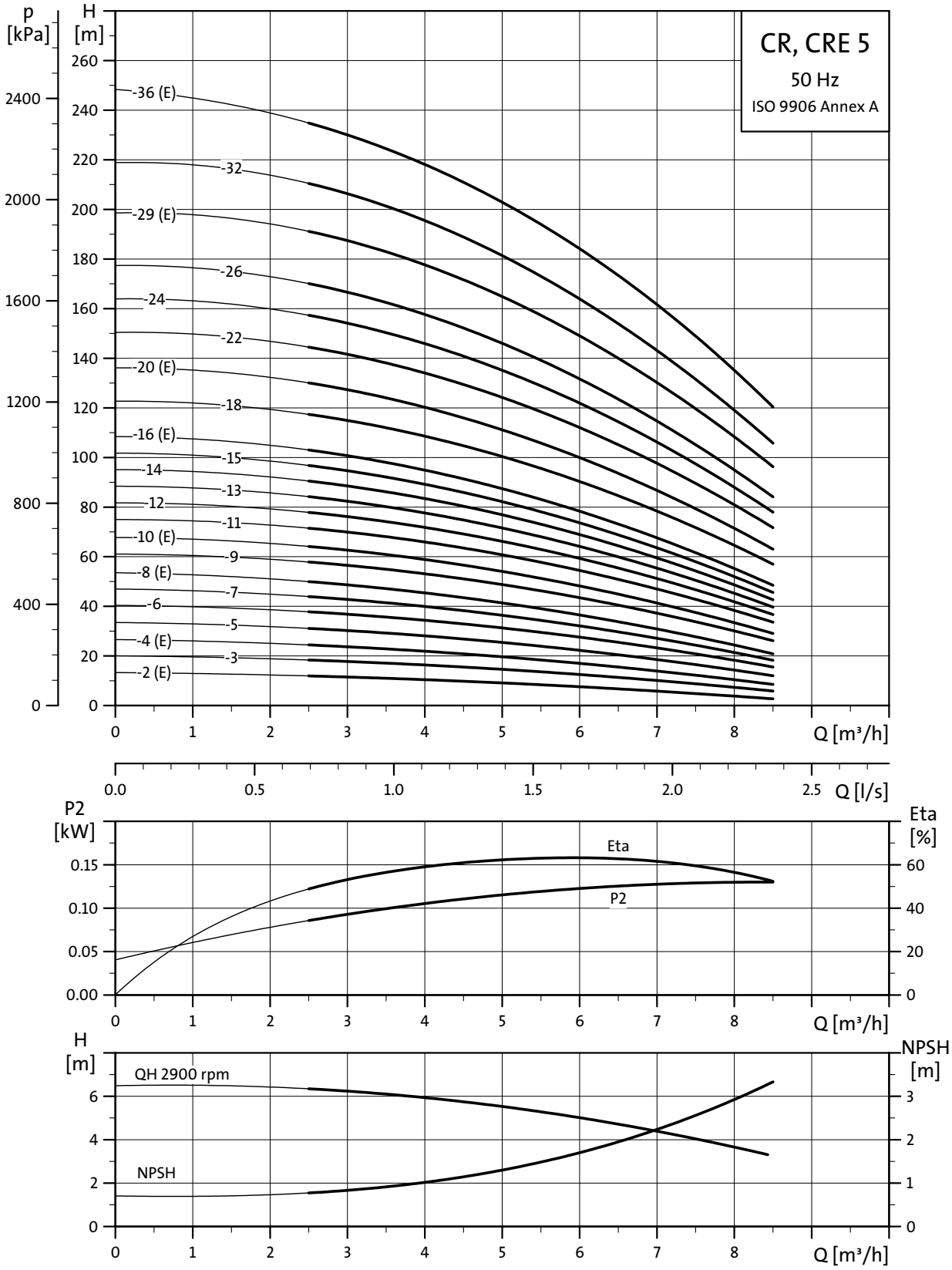
Spare Parts List

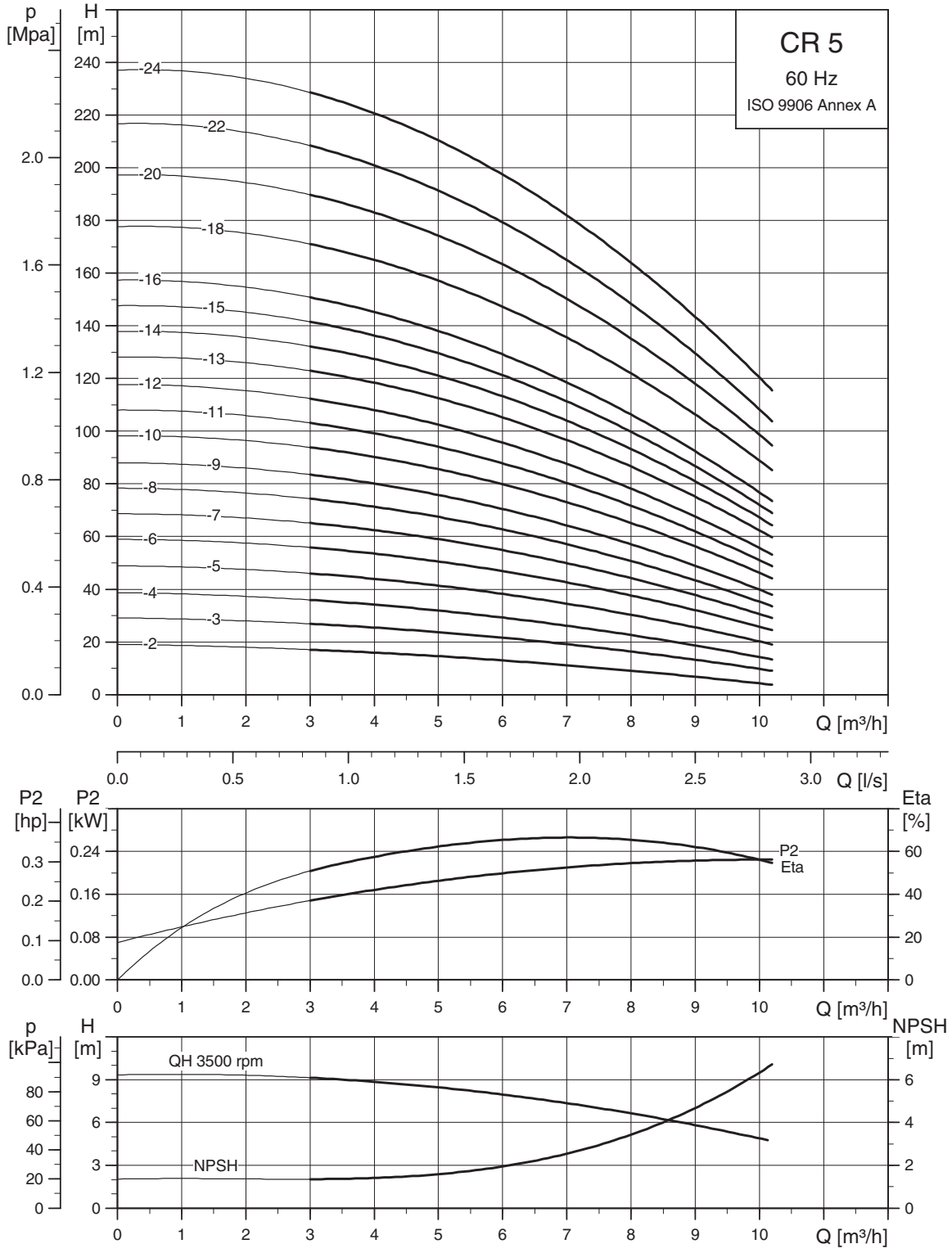
		PC 160.01-NZ-DIS	PC 250.01-NZ-DIS	PC 400.01-NZ-DIS
Item	**Designation**			
	Refrigeration Cycle			
1	Evaporator	4518024141	4518004181	4518024144
2	Expansion valve			
	... Valve - insert	4518014125	4518024157	4518024188
	... Valve - top part	4518034474	4518034462	4518034462
	... Valve - flange	4518014124	4518014146	4518024158
3	Sight glass	4521554109	4521194101	4521104115
4	Filter drier	4518034248	4518014298	4521254166
5	Shut-off valve	4518034806	4518034807	4518034808
6	Condenser	4518032811	4518032809	4518032815
	Filter mat	4518052884	4518052882	4518052883
7	Fan	4518014115	4518014115	4518014115
8	Fan pressostat	4518035337	4518035337	4518035337
9	Solenoid valve	4521474202	4521474202	4525014134
10	Shut-off valve	4518044261	4518044261	4518044259
11	Non-return valve	4521474105	4518034399	4521104117
12	HP pressostat	4518035338	4518035338	4518035338
13	Compressor	4518034694	4518034470	4518034662
14	LP pressostat	4518035340	4518035340	4518035340
15	LP switch	4518035336	4518035336	4518035336
16	Schrader valve	4525014208	4525014208	4525014208
	... Valve - insert	4518044288	4518044288	4518044288
Item	**Designation**			
	DI Circuit			
21	Tank	4518042875	4518042875	4518042875
22	Float switch 1-stage	4518014551	4518014551	4518014742
23	Ball valve - tank draining	4525054111	4525054111	4525054111
24	Pump			
25	Ball valve	4518014686	4518014686	4518014686
26	Conductivity meter	4518044756	4518044756	4518044756
27	Ball valve	4518035082	4518035082	4518035082
28	DI cartridge	4518044745	4518044745	4518044745
29	Strainer	4518045019	4518045019	4518045019
	Strainer tube	4518144189	4518144189	4518144189
30	Overflow valve	4518042896	4518042896	4518042896
31	Sensor - thermometer	4518044286	4518044286	4518044286
32	Sensor - operating thermostat	4518014203	4518014203	4518014203
33	Pressure gauge	4518044237	4518044237	4518044237
34	Pressure gauge	4518044237	4518044237	4518044237
35	Ball valve	4518104126	4518104126	4518104126
36	Ball valve	4518104126	4518104126	4518104126
37	Strainer NPT connections	external	external	external
48	Plate heat exchanger	4518035753	4518035753	4518035753

	Spare Parts List			
		PC 160.01-NZ-DIS	PC 250.01-NZ-DIS	PC 400.01-NZ-DIS
Item	Designation			
	Laser Circuit			
41	Tank	4518032822	4518032821	4518032823
42	Ball valve - tank draining	4525054111	4525054111	4525054111
43	Float sw itch 2-stage	4518034747	4518034747	4518034747
44	Sensor- operating thermostat	4518014203	4518044286	4518014203
45	Sensor-Tank heater	4518014202	4518044266	4518014202
46	Tank heater	4518014368	4518014368	4518014368
47	Pump			
48	Plate heat exchanger	4518035753	4518035753	4518035753
49	Solenoid valve	4518035801	4518035801	4518035801
	... coil	4518014651	4518014651	4518014651
50	Ball valve	4518104126	4518104126	4518104126
51	Ball valve	4518104126	4518104126	4518104126
52	Overflow valve	4518034314	4518034314	4518034314
53	Sensor - thermometer	4518044286	4518044286	4518044286
54	Pressure gauge	4518044237	4518044237	4518044237
55	Pressure gauge	4518044237	4518044237	4518044237
56	Ball valve	4518104126	4518104126	4518104126
57	Ball valve	4518104126	4518104126	4518104126
58	Strainer NPTconn.	external	external	external


CM 3
50 Hz
ISO 9906 Annex A
p [kPa]
H [m]
-14
-13
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
Q [m³/h]
Q [l/s]
P2 [kW]
p [kPa]
NPSH [m]
Eta [%]
Eta 1
NPSH
TM04 3335 4308


CM 3
60 Hz
ISO 9906 Annex A
p [kPa]
H [m]
-9
-8
-7
-6
-5
-4
-3
-2
Q [m³/h]
Q [l/s]
P2 [kW]
p [kPa]
NPSH [m]
Eta [%]
Eta 1
NPSH


CR, CRE 5
50 Hz
ISO 9906 Annex A
p [kPa]
H [m]
-36 (E)
-32
-29 (E)
-26
-24
-22
-20 (E)
-18
-16 (E)
-15
-14
-13
-12
-11
-10 (E)
-9
-8 (E)
-7
-6
-5
-4 (E)
-3
-2 (E)
Q [m³/h]
Q [l/s]
P2 [kW]
Eta [%]
Eta
P2
H [m]
QH 2900 rpm
NPSH
NPSH [m]


CR 5
60 Hz
ISO 9906 Annex A
p [Mpa]
H [m]
-24
-22
-20
-18
-16
-15
-14
-13
-12
-11
-10
-9
-8
-7
-6
-5
-4
-3
-2
Q [m³/h]
Q [l/s]
P2 [hp]
P2 [kW]
Eta [%]
P2
Eta
p [kPa]
H [m]
QH 3500 rpm
NPSH
NPSH [m]
TM02 1510 1301

Muster Anlagenprotokoll

Sample System Log

Gerätetyp / Device type: _____

Baujahr / Year of manufacture: _____

Zul. Betriebsüberdruck / Max. allowable working pressure: _____

Kältemittel / Refrigerant: _____

Kältemittelfüllmenge / Refrigerant charge weight: _____

1	Einzelheiten aller Instandhaltungs- und Instandsetzungsarbeiten	Details of all maintenance and repair activities
2	Menge und Art (neu, wiederverwendet oder recycelt) des eingefüllten Kältemittels, Menge und Art des abgelassenen Kältemittels aus dem Gerät	Whenever the system is charged the amount and type (new, reused or recycled) of the refrigerant charge, and whenever the refrigerant is drained from the WCU, the amount of refrigerant that has been drained
3	Falls eine Analyse eines wiederverwendeten Kältemittels vorliegt, die entsprechenden Ergebnisse eintragen	In the event that an analysis of any reused refrigerant is available, the results there of
4	Die Herkunft des eingesetzten Kältemittels	The origin of any reused refrigerant
5	Änderung und Austausch von Bauteilen des Gerätes	Any modification to and replacement of components of the process cooler
6	Ergebnisse aller regelmäßigen Routineprüfungen	Results of all regular routine tests
7	Längere Stillstandszeiten	Extended shutdown periods

Muster Kurzanweisung

Bitte diese Kurzanweisung sorgfältig ergänzen, ausschneiden, mit einer Folie schützen und gut lesbar am Gerät anbringen !

Sample Quick Reference Guide

Please carefully complete this quick reference guide, cut it out, cover it with protective film and affix it to the unit in an easily accessible place !

Diese Kurzanweisung enthält wichtige Informationen für Notfälle und Störungen !
This short guide contains important information for use in cases of emergency and malfunctions !

NOTFALL
EMERGENCY

Im Notfall ist das Kühlaggregat mit dem Netztrennschalter auszuschalten !

The main switch of the process cooler must be turned off in emergencies !

Vom Anwender einzutragen / To be entered by the user :

ERSTE HILFE
FIRST AID

Verantwortliche Person
Responsible person: _____

Betriebsleitung
Operating manual: _____

Notarzt
Emergency doctor: _____

Feuerwehr
Fire brigade: _____

Polizei
Police: _____

TECHNISCHE ANGABEN

siehe auch Typschild

TECHNICAL DATA

see also data plate

Gerätetyp / Device type: _____
Kältemittel / Refrigerant: _____
Kältemittelformel / Refrigerant formula: _____
Kältemittelfüllmenge / Refrigerant charge: _____
Zul. Betriebsüberdruck / Max. allow. working pressure _____

Baujahr / Year of manufacture: _____
Seriennummer / Serial number: _____
Stromart / Power requirements: ___ V / _ Ph / ___ A
Nennstrom / Rated current: _____

Gerätehersteller
Kundendienst
Equipment manufacturer
Customer service

Glen Dimplex Deutschland GmbH
GB RIEDEL Kältetechnik
Am Goldenen Feld 18
D-95326 Kulmbach
Telefon: +49 (0) 9221 / 709 555
Telefax: +49 (0) 9221 / 709 549
e-mail: info@Riedel-Cooling.de
http://www.Riedel-Cooling.com

protective note DIN 34 / DIN ISO 16016

electrical documentation

Elektro-Dokumentation

customer Auftraggeber	:	
device type Gerätetyp	:	PC 160.01-NZ-DI-S
project number Projektnummer	:	97838
drawing number Zeichnungsnummer	:	2KP016030197838
drawing num. customer Zng.Nr. Auftraggeber	:	

RIEDEL®
PRECISION IN COOLING

Glen Dimplex Deutschland GmbH
Geschäftsbereich RIEDEL

Am Goldenen Feld 18
D-95326 Kulmbach

Telefon: +49 (0)9221 / 709 545
Telefax: +49 (0)9221 / 709 529

e-mail: info@riedel-cooling.com
http://www.riedel-cooling.com

protective note DIN 34 / DIN ISO 16016

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4

technical datas

Technische Daten · données techniques

nom. voltage Nennspannung tension nominale	:	**3/PE ~ 50Hz 400V ±10%** **3/PE ~ 60Hz 460V ±10%**
max. current consumption Max. Stromaufnahme consommation de courant max.	:	**30.0A** **31.5A**
max. fusing Max. Vorsicherung protection préliminaire max.	:	**35A RK5 type fuses only**
max. power consumption Max. Leistungsaufnahme consommation de puissance max.	:	**16.0kW** **20.0kW**
apparent power Scheinleistung Puissance apparente	:	**20.0kVA** **25.0kVA**
control voltage Steuerspannung tension de commande	:	**DC 24V**
colour Farbe couleur	:	**RAL 7035 lacquer glossy**

wiring colors (DIN EN 60204-1)

Verdrahtungsfarben · couleurs de câblage

short marks according to DIN IEC 757

Kurzzeichen nach DIN IEC 757 · symbole selon DIN IEC 757

black Schwarz noir	**BK** (RAL 9005)	:	**main circuits AC and DC** Hauptstromkreise AC und DC circuits électriques principaux AC et DC
light blue Hellblau bleu clair	**BU** (RAL 5015)	:	**neutral conductor** Neutralleiter conducteur neutre
red Rot rouge	**RD** (RAL 3000)	:	**control circuits AC 230V** Steuerstromkreise AC 230V circuits électriques de commande AC 230V
red Rot rouge	**RD** (RAL 3000)	:	**control circuits AC 12V/24V** Steuerstromkreise AC 12V/24V circuits électriques de commande AC 12V/24V
dark blue Dunkelblau bleu sombre	**BU** (RAL 5010)	:	**control circuits DC 24V** Steuerstromkreise DC 24V circuits électriques de commande DC 24V
orange / yellow Orange / Gelb orange / jaune	**OG** (RAL 2003) **YE** (RAL 1021)	:	**interlock circuits, separate source voltage** Verriegelungsstromkreise, Fremdspannung circuits électriques de verrouillage, tension étrangère (yellow units for UL/CSA only) (Gelb nur bei Anlagen nach UL/CSA) (jaune uniquement pour les installation selon UL/CSa)
violet Violett violet	**VT** (RAL 4005)	:	**measuring lines** Messleitungen lignes de mesure
green-yellow Grün-Gelb vert-jaune	**GNYE** (RAL 6018-1021)	:	**protective system** Schutzleitersystem système de conducteur de protection

				date	20.04.2011		RIEDEL PRECISION IN COOLING	cover sheet 2		
				user	SCH					
				reviewed						
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	technical datas	97838	page 2 / 2 pg.

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№	planning type Planart	2nd designation layer 2.Bezeichnungsebene	page Blatt	page-designation Blattbenennung	special notes Sondervermerke	user Bearbeiter	date Datum	revision Revision	date Datum
1	**cover sheet** Deckblatt		1			SCH	20.04.2011		
2	**cover sheet** Deckblatt		2	**technical datas** Technische Daten		SCH	20.04.2011		
3	**directory** Inhaltsverzeichnis		1			SCH	20.04.2011		
4	**directory** Inhaltsverzeichnis		2			SCH	20.04.2011		
5	**circuit diagram** Stromlaufplan		1	**power supply, control voltage** Einspeisung, Steuerspannung		SCH	20.04.2011		
6	**circuit diagram** Stromlaufplan		2	**load circuit compressor** Lastkreis Verdichter		SCH	20.04.2011		
7	**circuit diagram** Stromlaufplan		3	**load circuit condenser-fans** Lastkreis Kondensatorventilatoren		SCH	20.04.2011		
8	**circuit diagram** Stromlaufplan		4	**reserve** Reserve		SCH	20.04.2011		
9	**circuit diagram** Stromlaufplan		5	**load circuit pumps** Lastkreis Pumpen		SCH	20.04.2011		
10	**circuit diagram** Stromlaufplan		6	**load circuit heatings** Lastkreis Heizungen		SCH	20.04.2011		
11	**circuit diagram** Stromlaufplan		7	**control circuit pump-control** Steuerkreis Pumpensteuerung		SCH	20.04.2011		
12	**circuit diagram** Stromlaufplan		8	**control circuit pressostats** Steuerkreis Pressostate		SCH	20.04.2011		
13	**circuit diagram** Stromlaufplan		9	**control circuit thermorelays** Steuerkreis Thermokontakte		SCH	20.04.2011		
14	**circuit diagram** Stromlaufplan		10	**control circuit compressor-control** Steuerkreis Verdichtersteuerung		SCH	20.04.2011		
15	**circuit diagram** Stromlaufplan		11	**control circuit fan-control** Steuerkreis Ventilatorsteuerung		SCH	20.04.2011		
16	**circuit diagram** Stromlaufplan		12	**control circuit control demi-circuit** Steuerkreis Regelung Demi-Kreis		SCH	20.04.2011		
17	**circuit diagram** Stromlaufplan		13	**control circuit heating control system** Steuerkreis Heizungssteuerung		SCH	20.04.2011		
18	**circuit diagram** Stromlaufplan		14	**control circuit transducer** Steuerkreis Messwandler		SCH	20.04.2011		
19	**circuit diagram** Stromlaufplan		15	**control circuit accumulative-fault** Steuerkreis Sammelstörung		SCH	20.04.2011		
20	**circuit diagram** Stromlaufplan		16	**interface** Geräteschnittstelle		SCH	20.04.2011		
21	**terminal connection diagram** Anschlussplan		1	**-X1** -X1		SCH	20.04.2011		
22	**terminal connection diagram** Anschlussplan		2	**-X2** -X2		SCH	20.04.2011		
23	**terminal connection diagram** Anschlussplan		3	**-X2** -X2		SCH	20.04.2011		
24	**terminal connection diagram** Anschlussplan		4	**-X3** -X3		SCH	20.04.2011		
25	**terminal connection diagram** Anschlussplan		5	**-X4** -X4		SCH	20.04.2011		
26	**Layout diagram** Aufbauplan		1			SCH	20.04.2011		

comments :

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				user	SCH				
				reviewed					
R.	alteration	date	name	Norm		origin	supersedure for	supersedure with	97838

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№	**planning type** Planart	**2nd designation layer** 2.Bezeichnungsebene	**page** Blatt	**page-designation** Blattbenennung	**special notes** Sondervermerke	**user** Bearbeiter	**date** Datum	**revision** Revision	**date** Datum
27	**Item list** Geräte-Stückliste		1			SCH	20.04.2011		
28	**Item list** Geräte-Stückliste		2			SCH	20.04.2011		
29	**cable list** Kabelliste		1			SCH	20.04.2011		

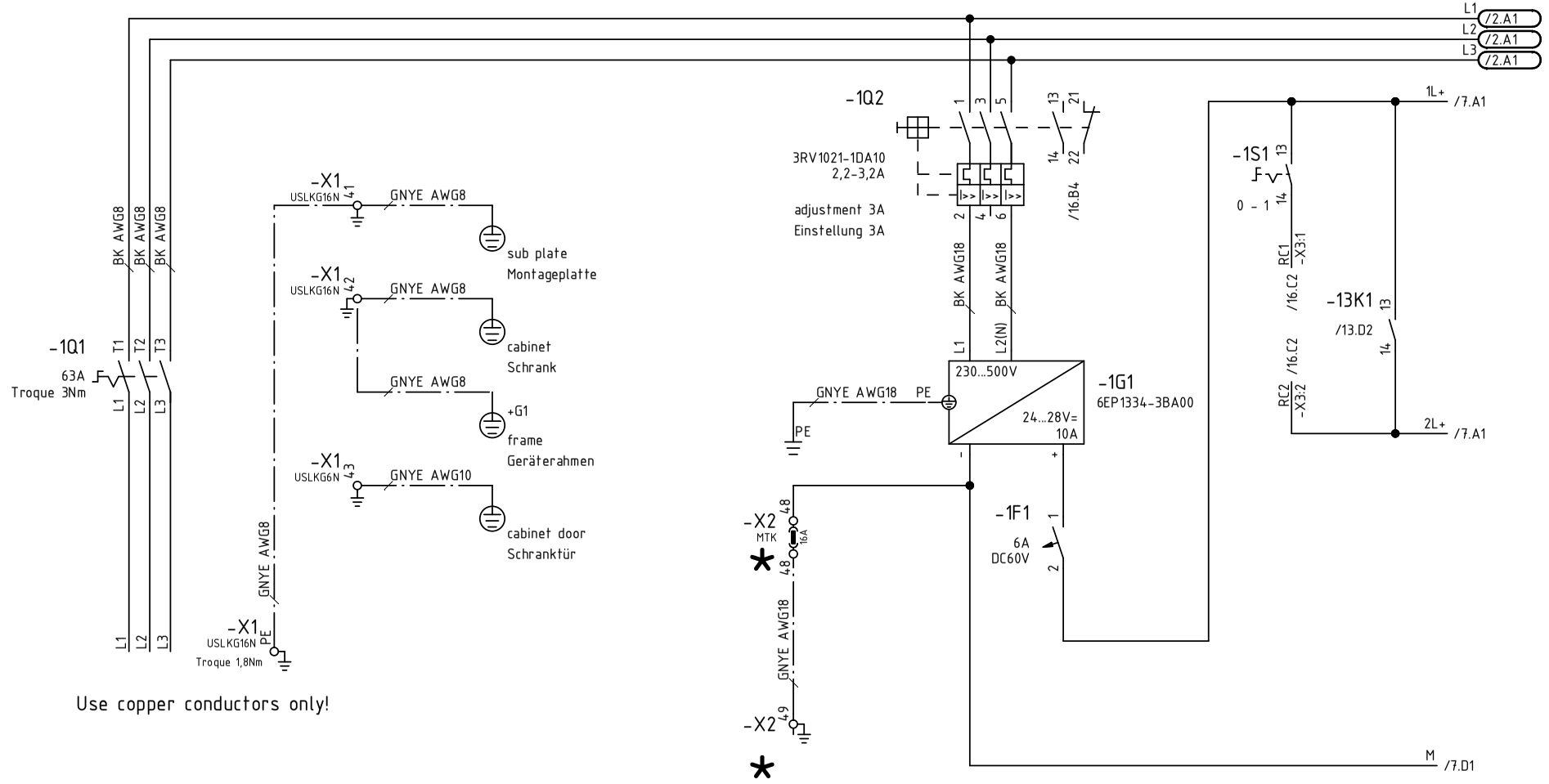
comments :

				date	20.04.2011		RIEDEL PRECISION IN COOLING	directory 2	
				user	SCH				
				reviewed					
R.	alteration	date	name	Norm		origin	supersedure for	supersedure with	97838

protective note DIN 34 / DIN ISO 16016

all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4



Use copper conductors only!

nom. voltage: Nennspannung:	3/PE ~ 50Hz 400V ±10% 3/PE ~ 60Hz 460V ±10%
max. current consumption: Max. Stromaufnahme:	30.0A · 31.5A
max. power consumption: Max. Leistungsaufnahme:	16.0kW · 20.0kW
max. fusing: Max. Vorsicherung:	35A RK5 type fuses only

* Caution!
When bridge is removed, an isolation supervision has to be installed

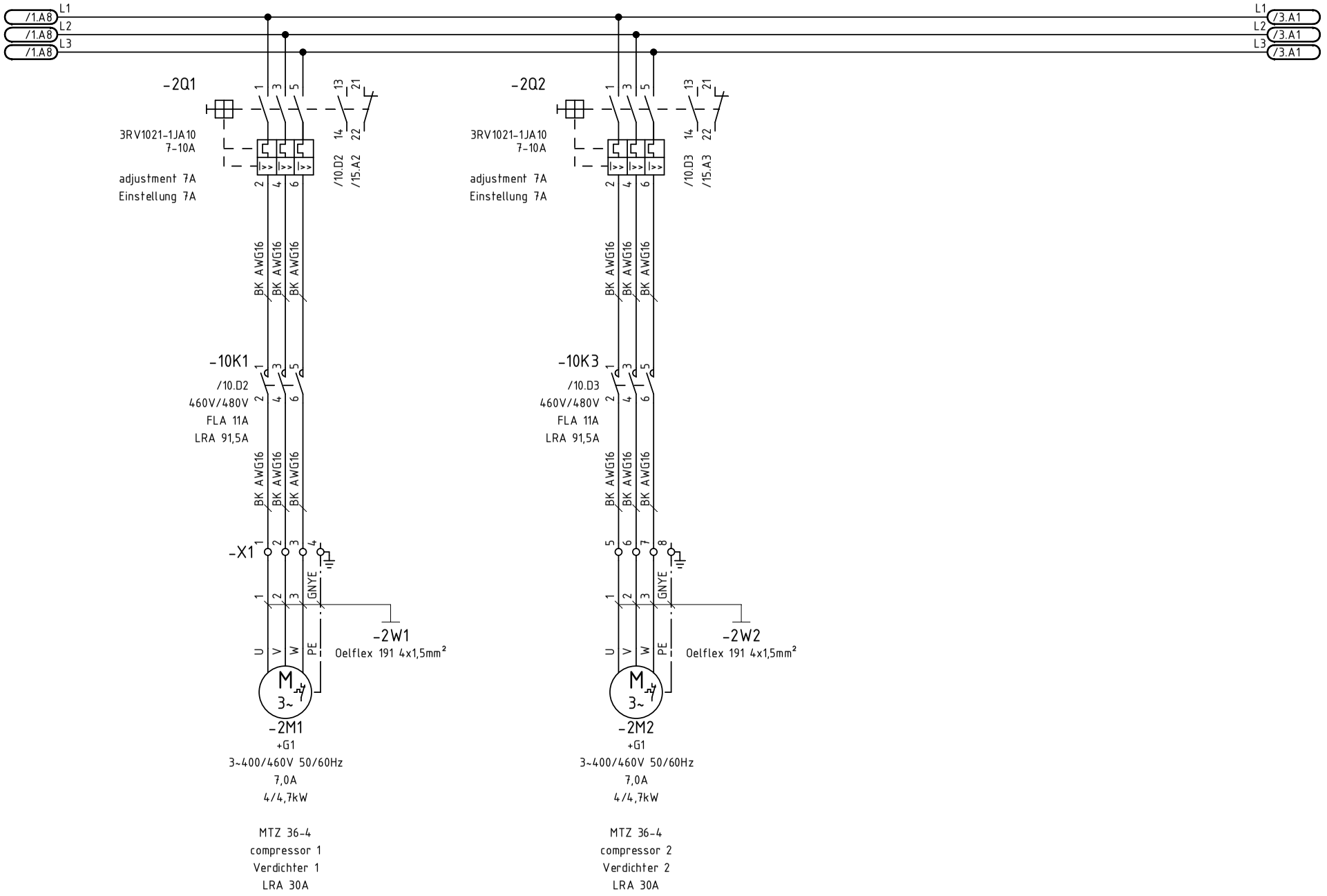
* ACHTUNG
Bei Entfernen der Brücke muß eine Isolationsüberwachung eingebaut werden

				date	20.04.2011	RIEDEL PRECISION IN COOLING	circuit diagram 1	continuation sheet « » 2	
				user	SCH				
				reviewed				97838	page 1 / 16 pg.
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	power supply, control voltage

protective note DIN 34 / DIN ISO 16016

all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4



continuation sheet
1 « » 3

				date	20.04.2011					
				user	SCH					
				reviewed						
R.	alteration	date	name	norm		origin	supersedure for	supersedure with		

RIEDEL
PRECISION IN COOLING

circuit diagram
2

load circuit compressor

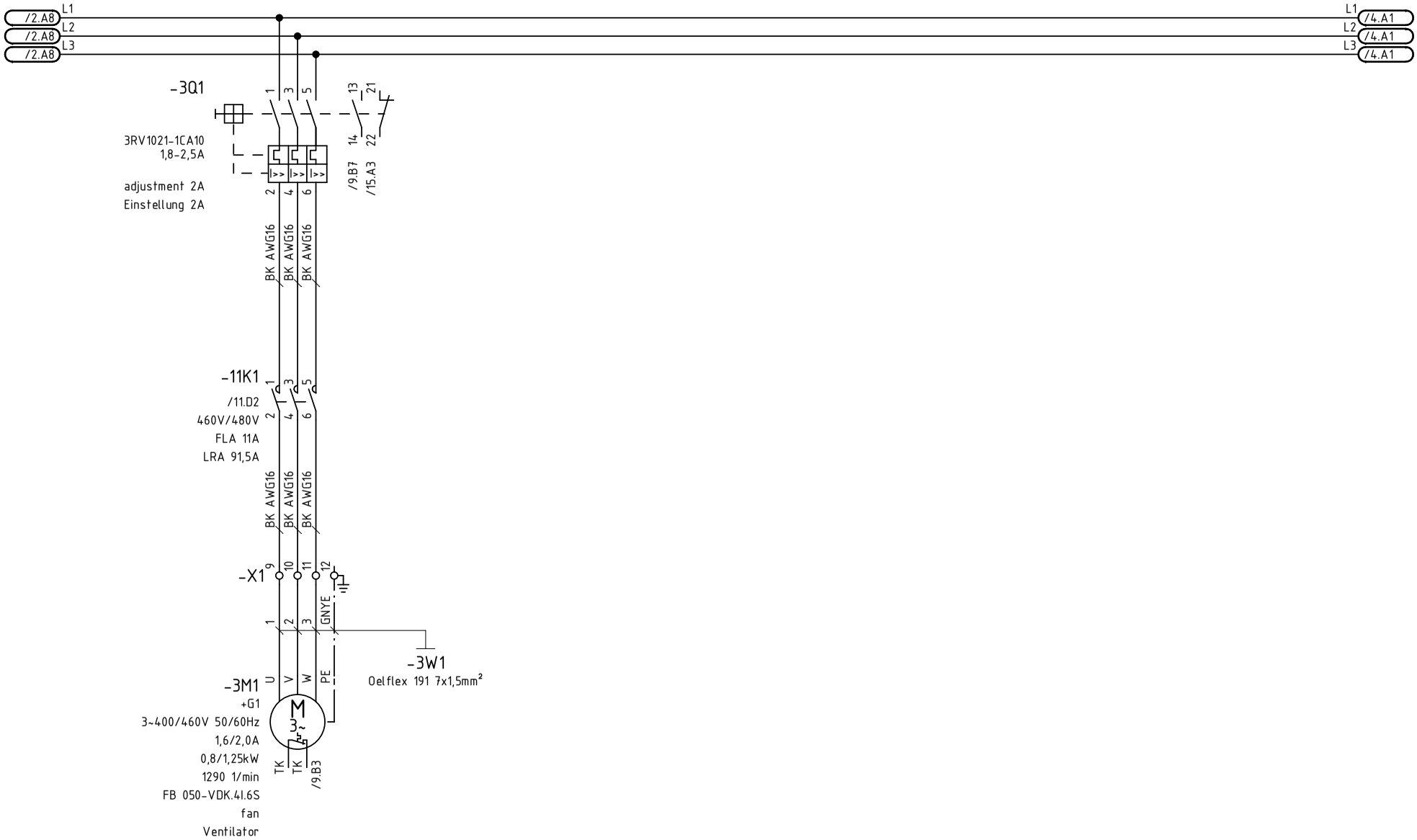
97838

page 2
16 pg.

protective note DIN 34 / DIN ISO 16016

all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4

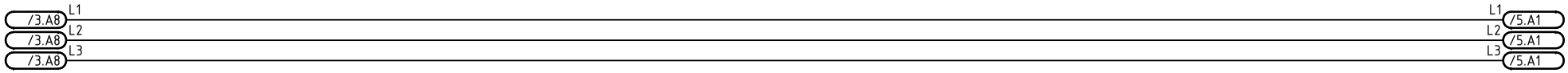


				date	20.04.2011		RIEDEL PRECISION IN COOLING	circuit diagram 3		continuation sheet 2 « » 4
				user	SCH					
				reviewed						
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	load circuit condenser-fans	97838	page 3 16 pg.

protective note DIN 34 / DIN ISO 16016

all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4



continuation sheet
3 « » 5

				date	20.04.2011				circuit diagram 4		
				user	SCH						
				reviewed							
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	reserve	97838	page 4 / 16 pg.

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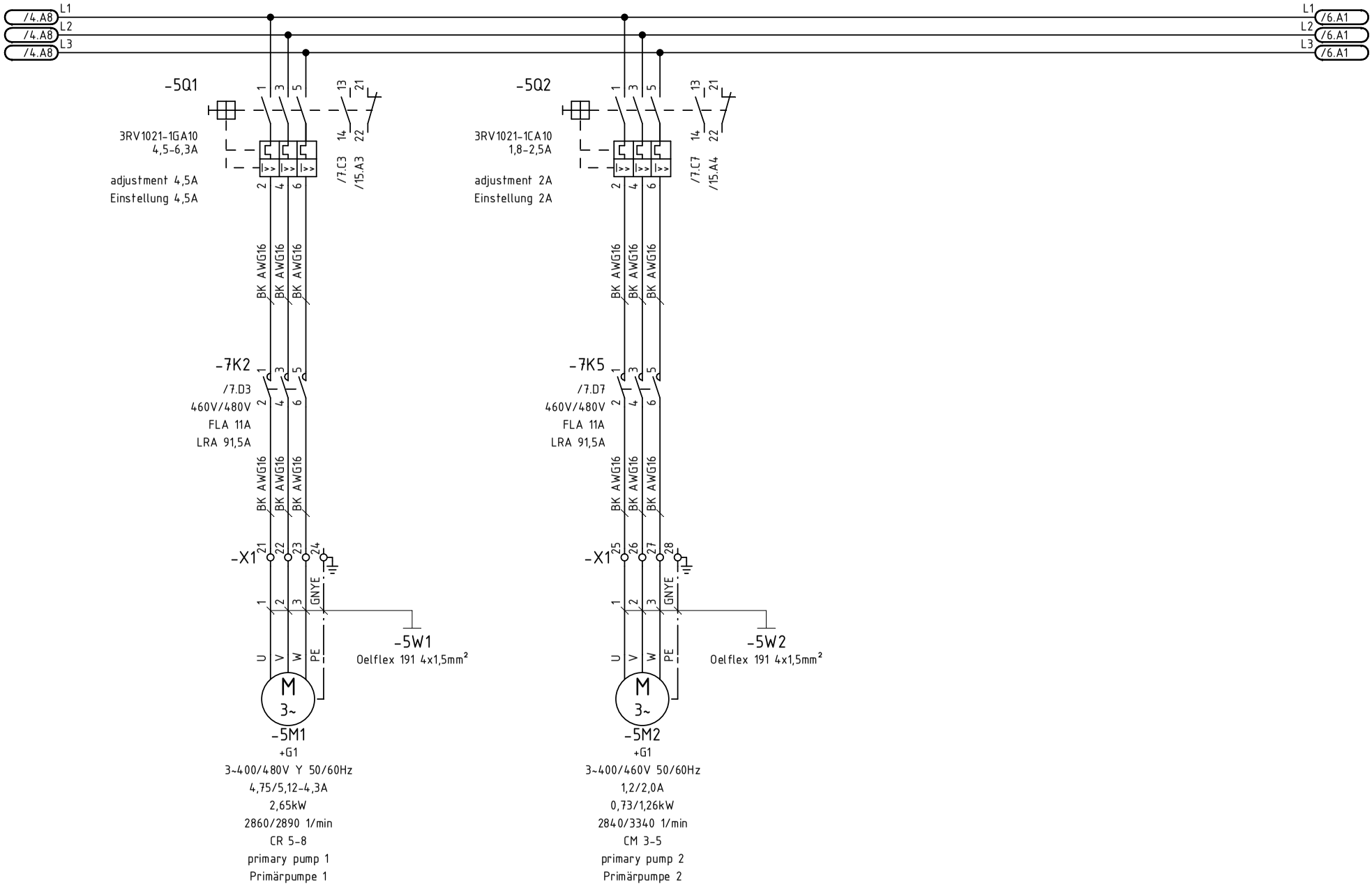
PRECISION IN COOLING

protective note DIN 34 / DIN ISO 16016

all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4



continuation sheet
4 « » 6

				date	20.04.2011			circuit diagram 5	
				user	SCH				
				reviewed					
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	load circuit pumps

RIEDEL PRECISION IN COOLING

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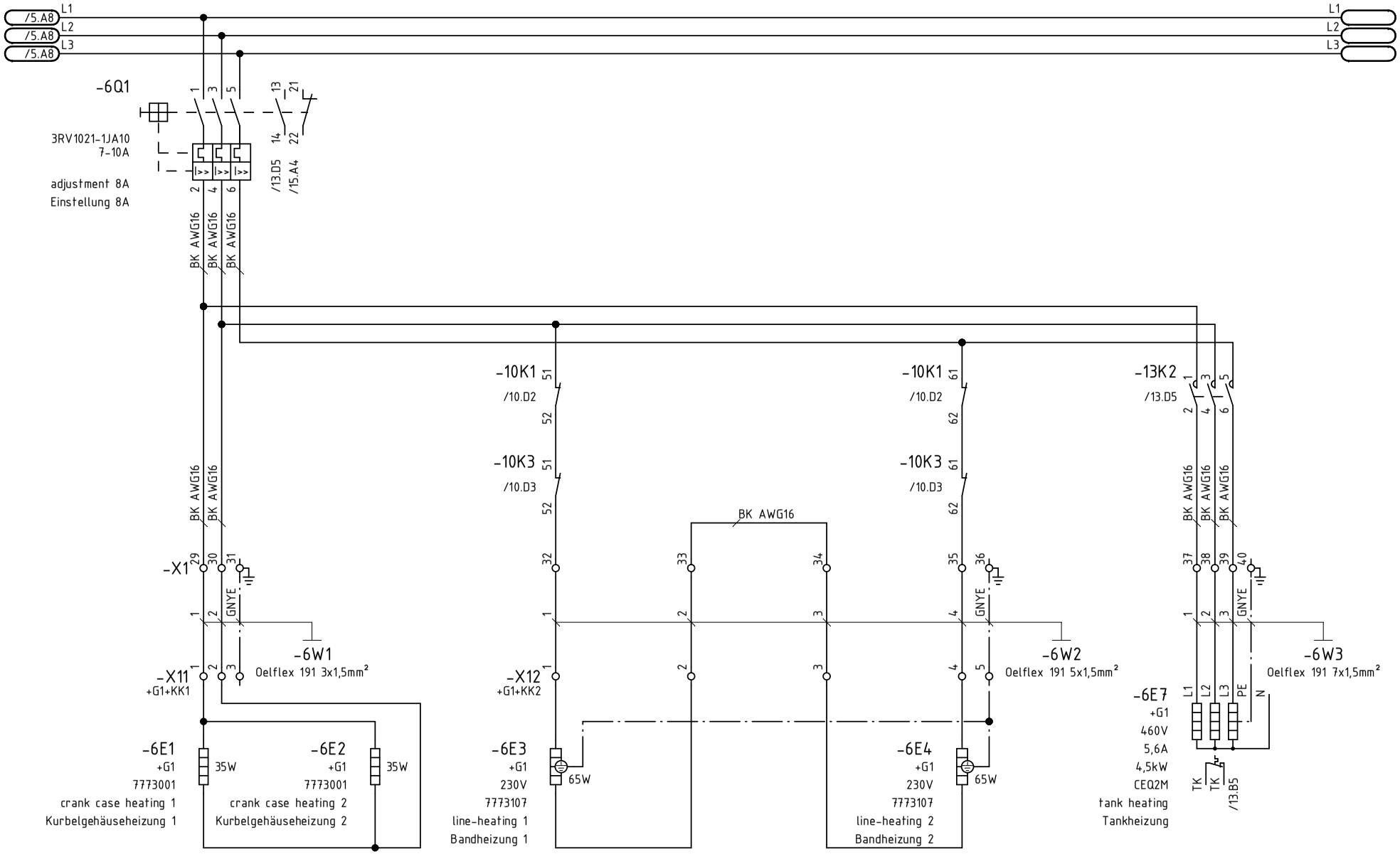
protective note DIN 34 / DIN ISO 16016

all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4



continuation sheet
5 « » 7

				date	20.04.2011			circuit diagram 6	
				user	SCH				
				reviewed					
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	load circuit heatings

RIEDEL PRECISION IN COOLING

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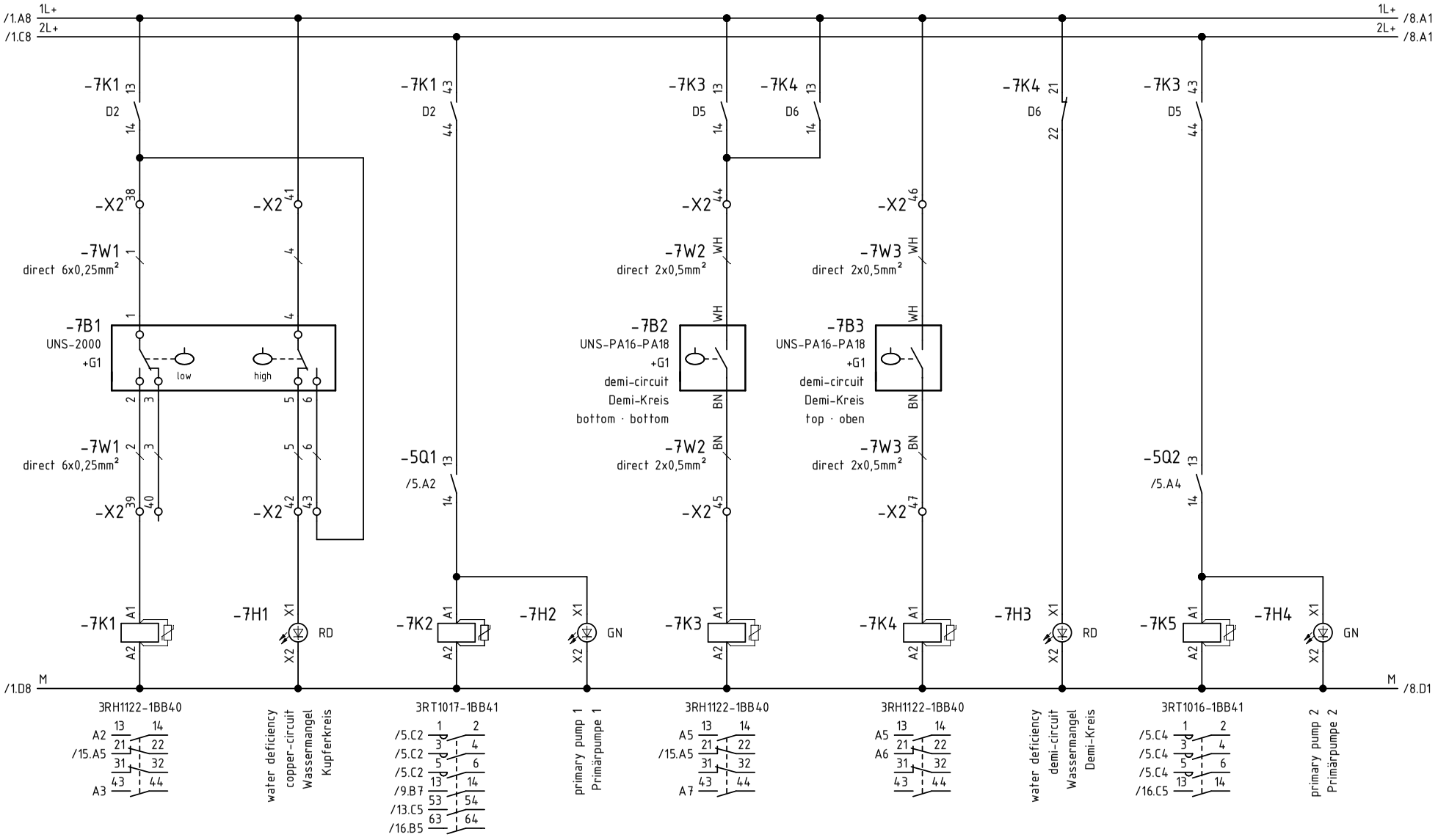
page 6
16 pg.

protective note DIN 34 / DIN ISO 16016

all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4



dry-run-protection copper-circuit
Trockenlaufschutz Kupferkreis

primary pump 1
Primärpumpe 1

dry-run-protection demi-circuit
Trockenlaufschutz Demi-Kreis

water deficiency demi-circuit
Wassermangel Demi-Kreis

primary pump 2
Primärpumpe 1

continuation sheet
6 « » 8

				date	20.04.2011			circuit diagram 7	
				user	SCH				
				reviewed					
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	control circuit pump-control

RIEDEL PRECISION IN COOLING

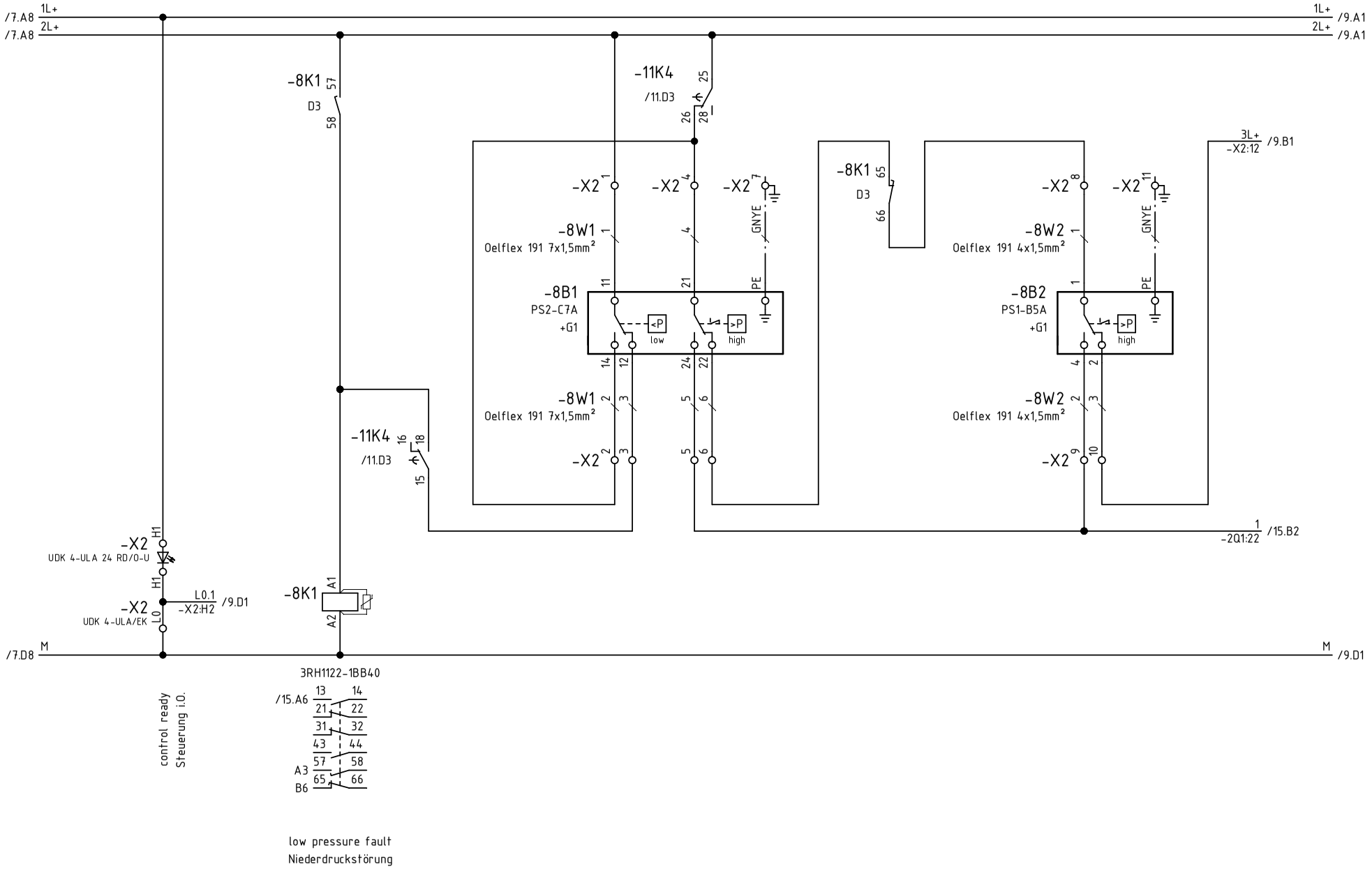
97838

page 7
16 pg.

protective note DIN 34 / DIN ISO 16016

all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4



				date	20.04.2011			circuit diagram 8		continuation sheet 7 « » 9
				user	SCH		RIEDEL PRECISION IN COOLING			
				reviewed						
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	control circuit pressostats	97838	page 8 16 pg.

protective note DIN 34 / DIN ISO 16016

all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4

/8.A8 1L+ → 1L+ /10.A1

/8.A8 2L+ → 2L+ /10.A1

/8.B8 3L+ -X2:10 → 3L+ /10.A1

-X2 12

-3W1 4
Oelflex 191 7x1,5mm²

-3M1 TK
/3.D2 +G1
TK

-3W1 5
Oelflex 191 7x1,5mm²

-X2 13

-7K2 13
/7.D3
14

-3Q1 13
/3.A2
14

-X2 H2
UDK 4-ULA 24 RD/O-U
H2

-X2 H3
UDK 4-ULA 24 RD/O-U
H3

/8.D2 L0.1 -X2:L0

/8.D8 M → M /10.D1

hp/lp-pressostats ready
HD/ND-Pressostat(e) i.O

thermo-relays ready
Thermokontakt(e) i.O.

continuation sheet
8 « » 10

				date	20.04.2011			circuit diagram 9	
				user	SCH				
				reviewed			RIEDEL PRECISION IN COOLING		
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	control circuit thermorelays

97838

page 9
16 pg.

protective note DIN 34 / DIN ISO 16016

all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4

/9.A8 1L+ → 1L+ /11.A1

/9.A8 2L+ → 2L+ /11.A1

/9.B8 3L+

-10N1
ST710-KHJV.16
351692

relay K1 / relay K2 / relay K3

88.8

12-24 V AC
16-36 V DC
F1

/16.B5

WH

BN

-10B1
KTY 81-121
+G1+Tank (copper-circuit)
tank temperature
Tanktemperatur

-10W1
direct 2x0,34mm²

-2Q1
/2.A2

-2Q2
/2.A4

-10K1

-10K3

/9.D8 M → M /11.D1

3RT1017-1BB41

/2.C2	1	2
/2.C2	3	4
/2.C2	5	6
/11.A2	13	14
/6.C4	51	52
/6.C6	61	62

compressor 1
Verdichter 1

3RT1017-1BB41

/2.C4	1	2
/2.C4	3	4
/2.C4	5	6
/11.A3	13	14
/6.C4	51	52
/6.C6	61	62

compressor 2
Verdichter 2

continuation sheet
9 « » 11

			date	20.04.2011
			user	SCH
			reviewed	
R.	alteration	date	name	norm

origin | supersedure for | supersedure with

RIEDEL
PRECISION IN COOLING

circuit diagram
10

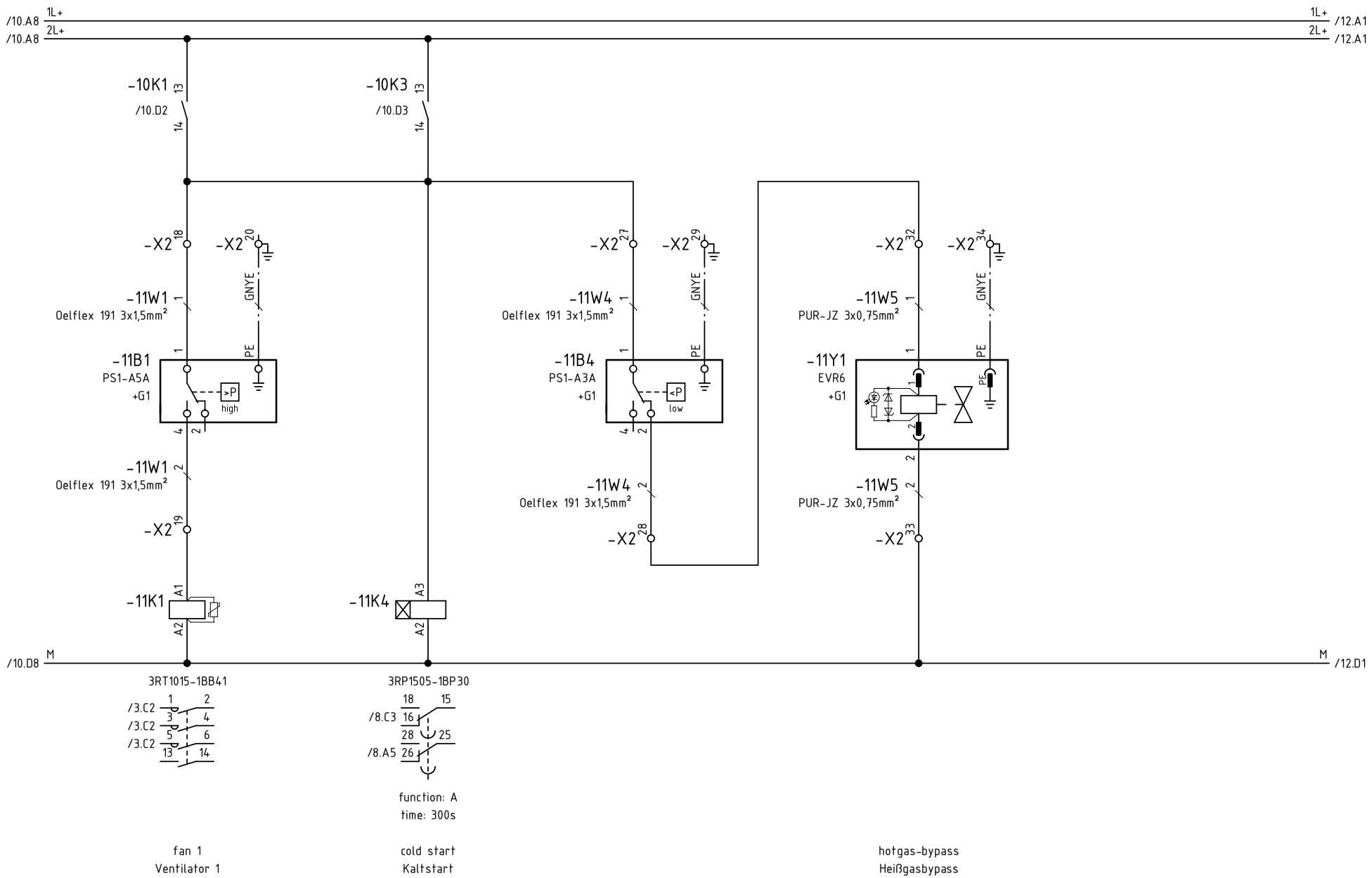
control circuit compressor-control

97838

protective note DIN 34 / DIN ISO 16016

all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4

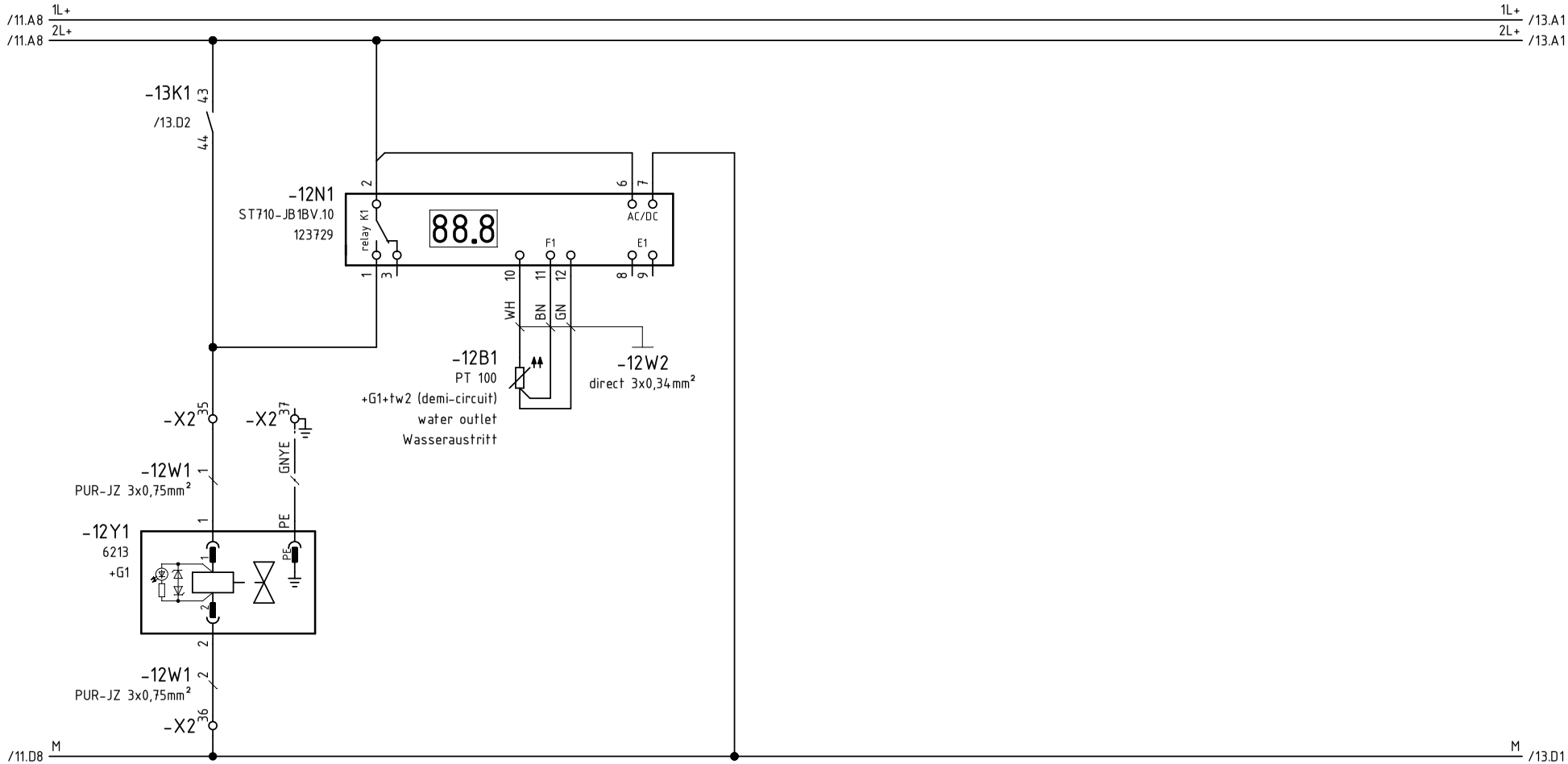


				date	20.04.2011		RIEDEL PRECISION IN COOLING	circuit diagram 11		continuation sheet 10 « » 12	
				user	SCH						
				reviewed							
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	control circuit fan-control	97838	page 11 / 16 pg.

protective note DIN 34 / DIN ISO 16016

all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4



solenoid valve demi-circuit
Magnetventil Demi-Kreis

				date	20.04.2011	RIEDEL PRECISION IN COOLING	circuit diagram 12		continuation sheet 11 « » 13
				user	SCH				
				reviewed					
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	control circuit control demi-circuit	97838	page 12 16 pg.

protective note DIN 34 / DIN ISO 16016

all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4

/12.A8 1L+
/12.A8 2L+

-13N1
ST710-JB1BV.10
123729
relay K1
88.8
AC/DC
F1
E1

-13B1
PT 100
+G1+Tank
tank temperature
Tanktemperatur

-13W1
direct 3x0,34mm²
WH
BN
GN

-13K1
A1
A2
/12.D8 M
3RH1122-1BB40
/1.B7 13 14
/16.B5 21 22
31 32
/12.A2 43 44
A5 53 54

activation tank heating
Ansteuerung Tankheizung

-13K1 53
D2
54
-X2 30
-6W3 4
Oelflex 191 7x1,5mm²
-6E7 TK
/6.E7
+G1
TK
-6W3 5
Oelflex 191 7x1,5mm²
-X2 31
-7K2 53
/7.D3
54
-6Q1 13
/6.A2
14
-13K2 A1
A2
3RT1017-1BB41
/6.C7 1 2
/6.C7 3 4
/6.C7 5 6
13 14

tank heating
Tankheizung

1L+ /14.A1
2L+ /14.A1

-13B1 1
θ
2
0-60°C
ϑ ≤ 15°C ON
ϑ ≤ 15°C EIN

-X4 1
-13E1
30W
24VUC
SH30
cabinet heating
Schaltschrankheizung
-X4 2
-X4 3
M /14.D1

continuation sheet
12 « » 14

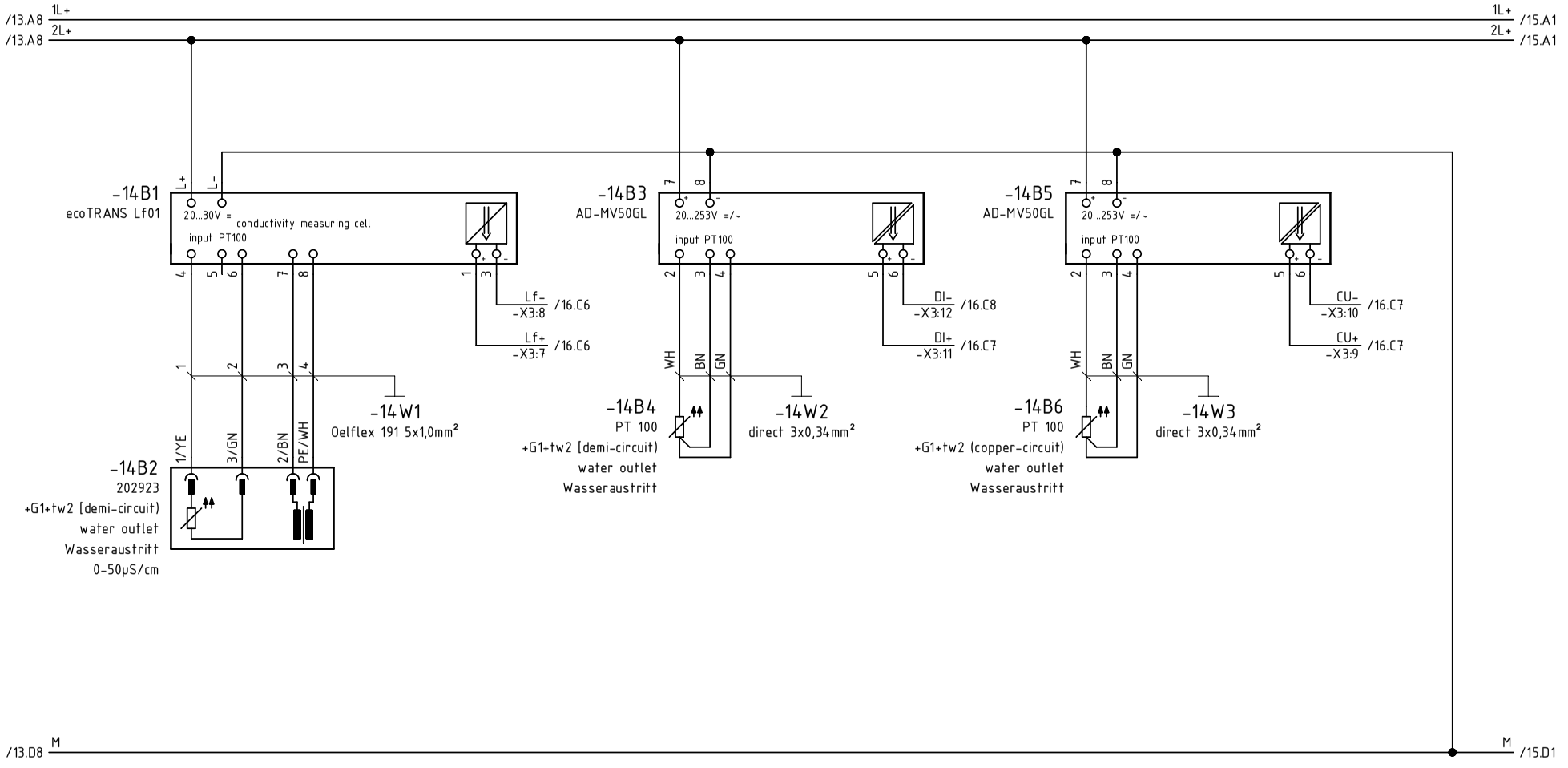
				date	20.04.2011				circuit diagram 13		
				user	SCH						
				reviewed							
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	control circuit heating control system	97838	page 13 / 16 pg.

RIEDEL
PRECISION IN COOLING

protective note DIN 34 / DIN ISO 16016

all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4

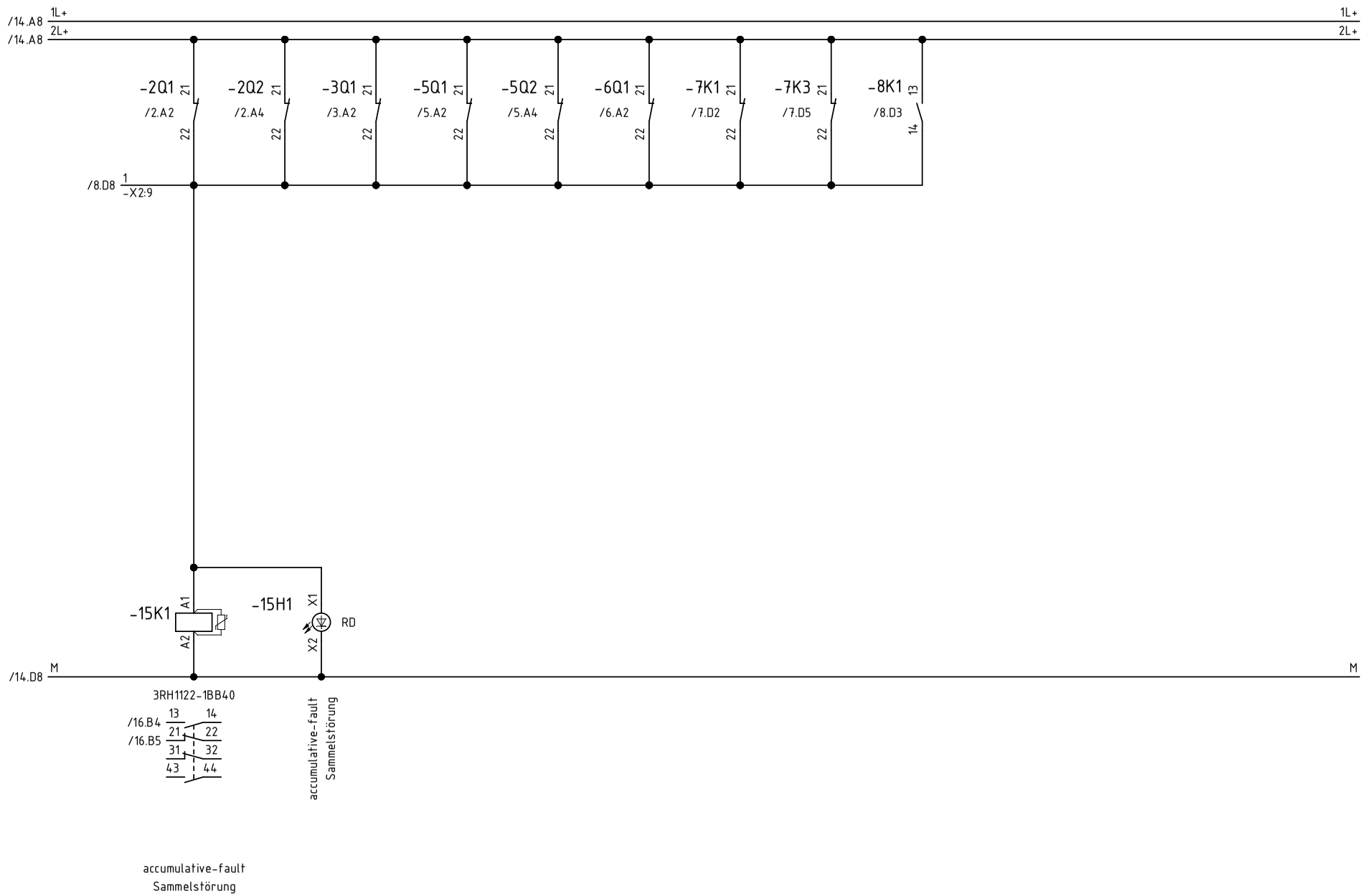


				date	20.04.2011			circuit diagram 14	continuation sheet 13 « » 15
				user	SCH				
				reviewed			RIEDEL PRECISION IN COOLING		
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	control circuit transducer	97838	page 14 16 pg.

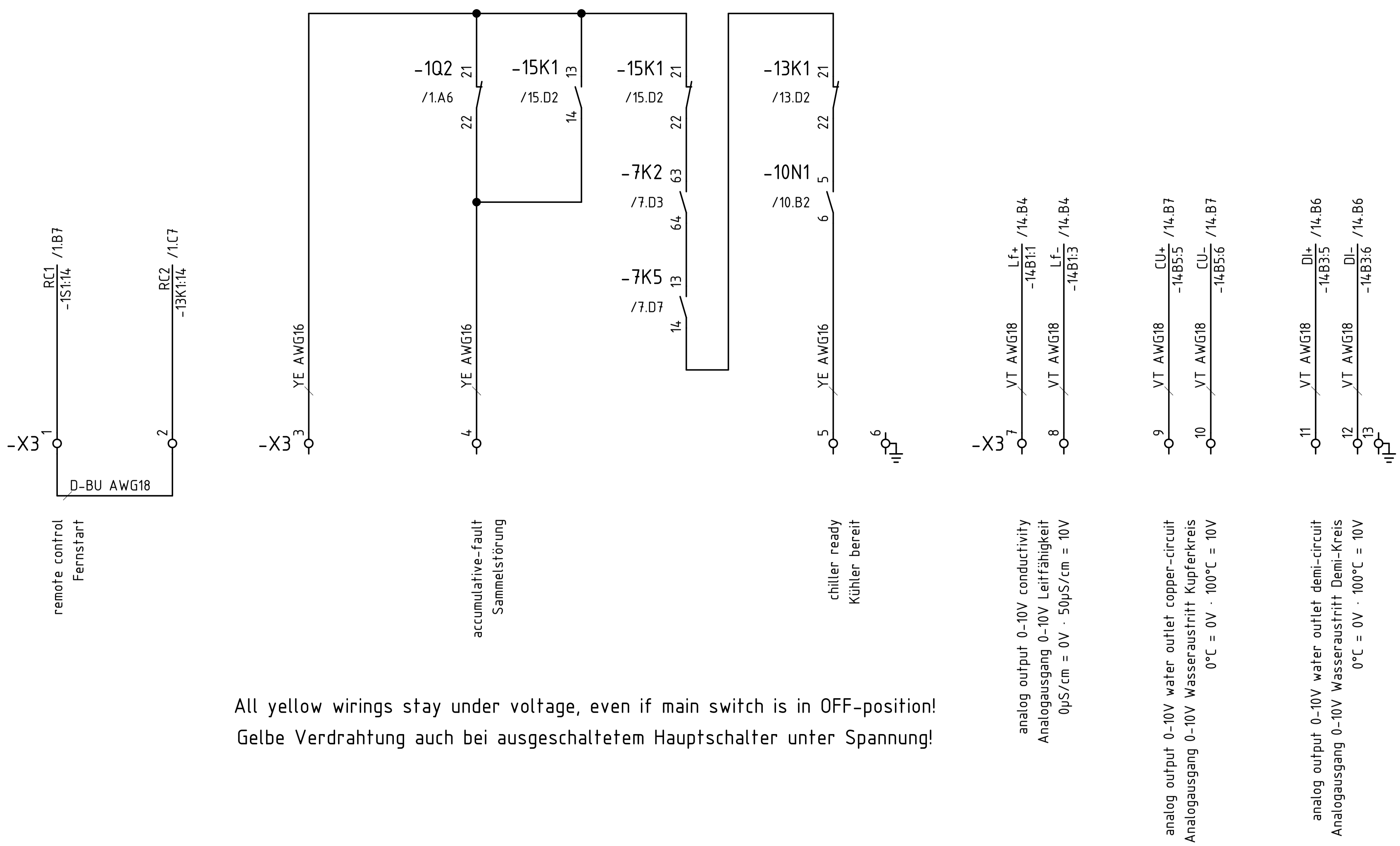
protective note DIN 34 / DIN ISO 16016

all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4



				date	20.04.2011		RIEDEL PRECISION IN COOLING	circuit diagram 15		continuation sheet 14 « » 16
				user	SCH					
				reviewed						
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	control circuit accumulative-fault	97838	page 15 16 pg.



All yellow wirings stay under voltage, even if main switch is in OFF-position!
Gelbe Verdrahtung auch bei ausgeschaltetem Hauptschalter unter Spannung!

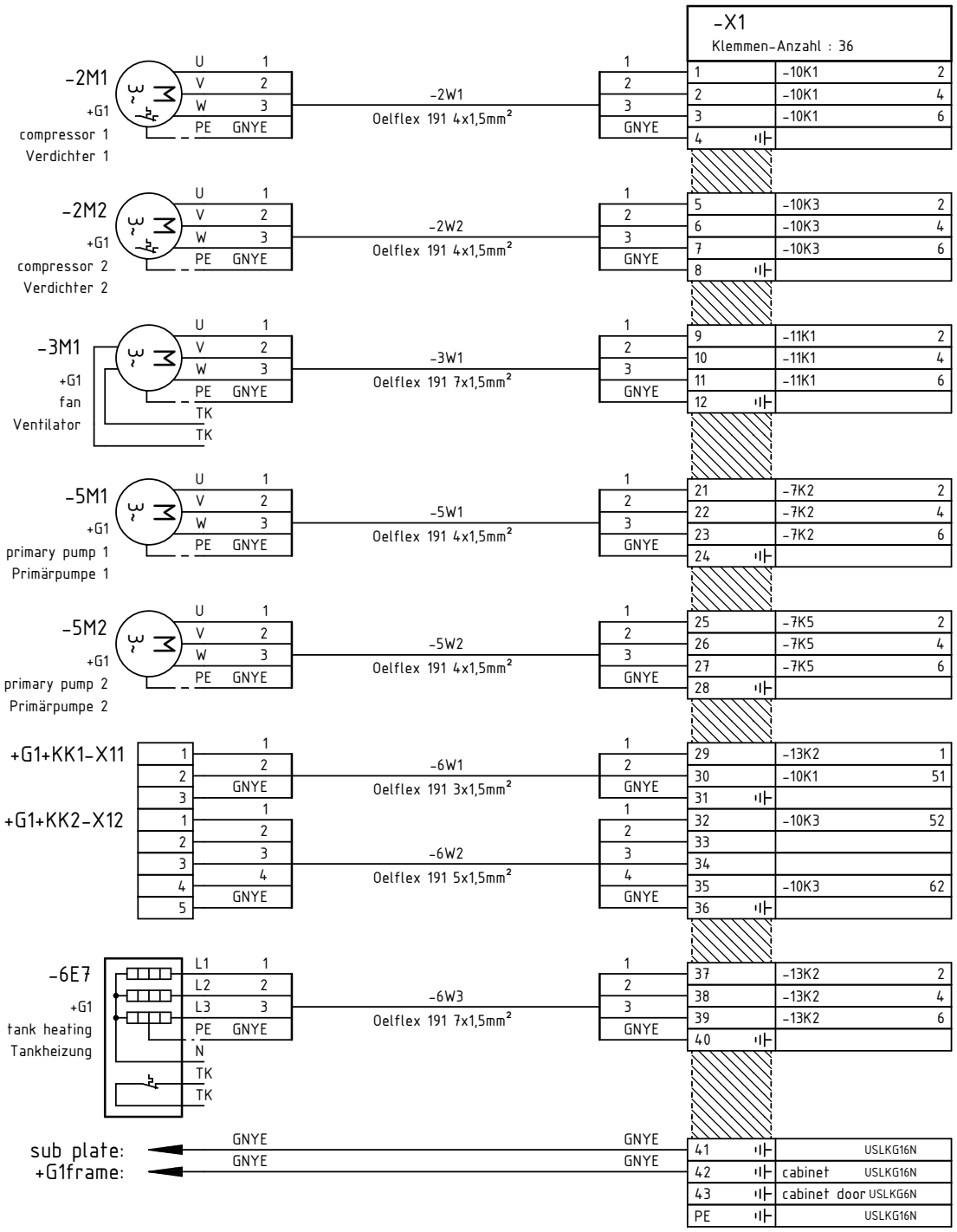
all wires without cross-section designation are H05V-K D-BU 1mm²

drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4

R.	alteration	date	name	date	20.04.2011	origin	supersedure for	supersedure with	circuit diagram 16		97838	page 16
				user	SCH			RIEDEL PRECISION IN COOLING	interface			16 pg.
				reviewed								
				norm								

continuation sheet 15 « »

protective note DIN 34 / DIN ISO 16016



R. alteration | date | name | norm | reviewed | user | SCH | date | 20.04.2011

origin

supersedure for

supersedure with

RIEDEL
PRECISION IN COOLING

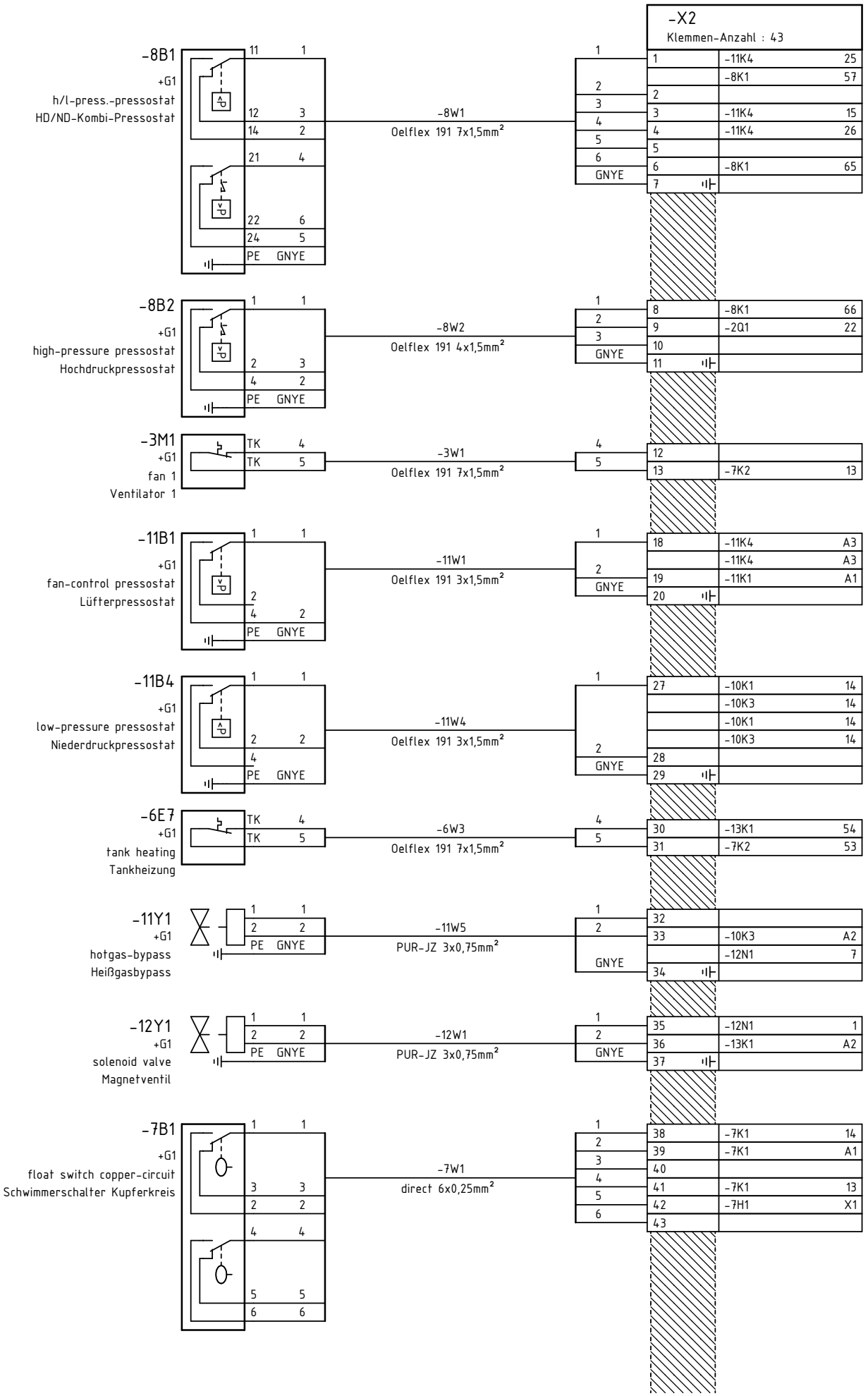
-X1

1 terminal connection diagram

97838

page 1
5 pg.

protective note DIN 34 / DIN ISO 16016



R. alteration | date | name | norm | reviewed | user | date | SCH | 20.04.2011

origin

supersedure for

supersedure with

RIEDEL PRECISION IN COOLING

-X2 2 terminal connection diagram

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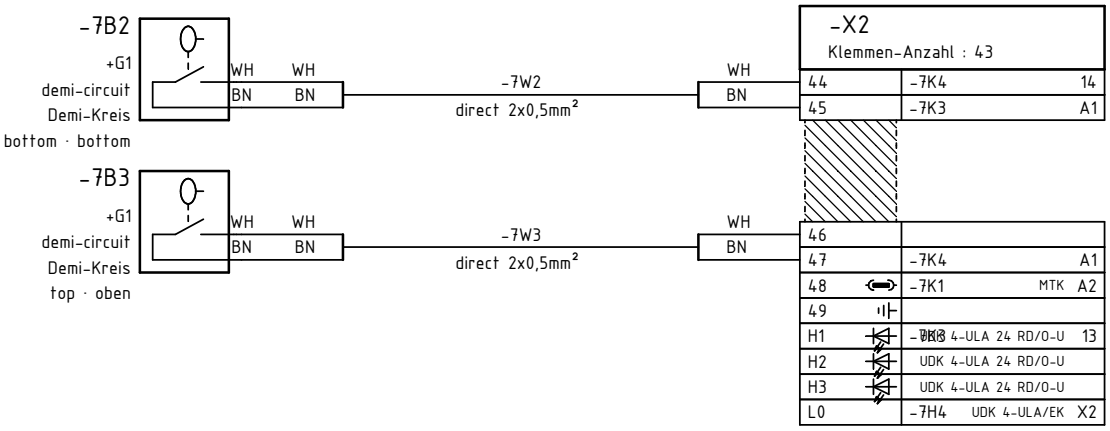
+ =.

page 2
5 pg.

protective note DIN 34 / DIN ISO 16016



R. alteration | date | name | norm | reviewed | user | SCH | date | 20.04.2011

origin

supersedure for

supersedure with

RIEDEL
PRECISION IN COOLING

-X2

3 terminal connection diagram

97838

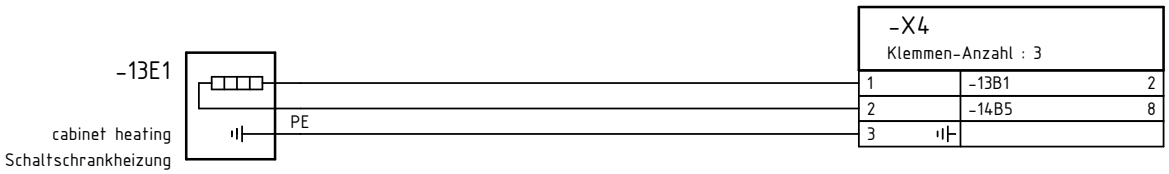
+ =.

page 3
5 pg.

protective note DIN 34 / DIN ISO 16016

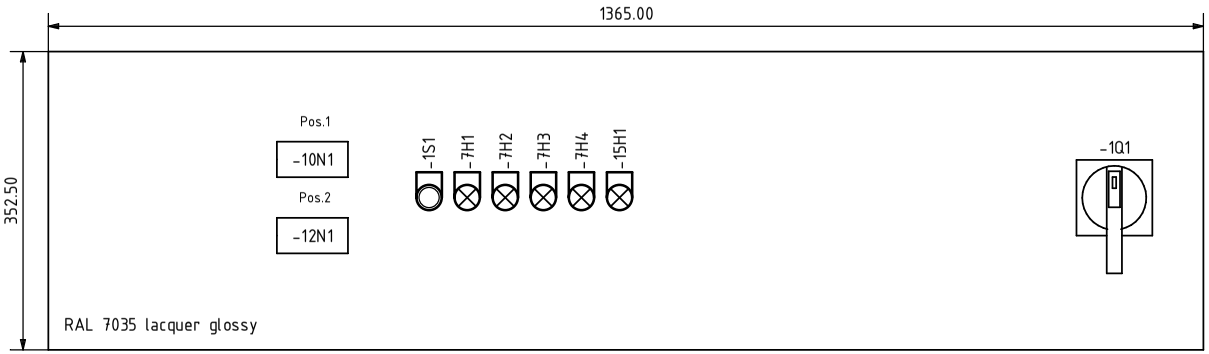
-X3 Klemmen-Anzahl : 13		
1	-1S1	14
2	-13K1	14
3	-1Q2	21
4	-1Q2	22
5	-10N1	6
6		
7	-14B1	1
8	-14B1	3
9	-14B5	5
10	-14B5	6
11	-14B3	5
12	-14B3	6
13		

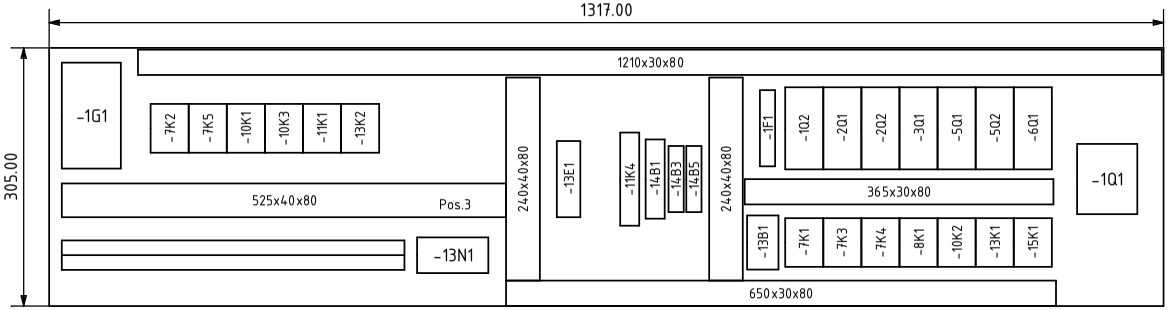
protective note DIN 34 / DIN ISO 16016

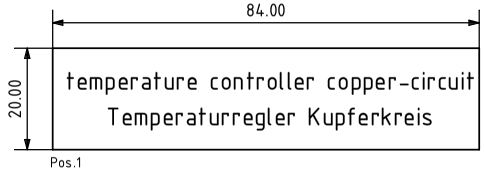


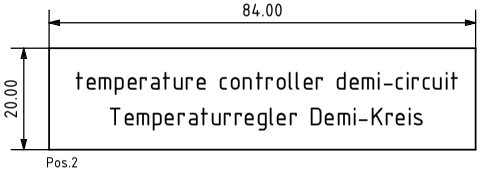
RIEDEL
PRECISION IN COOLING

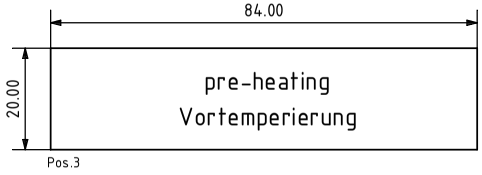
protective note DIN 34 / DIN ISO 16016











drawn with ELCAD/AUCOPLAN (R) 7.4.0 SP4

				date	20.04.2011			Layout diagram 1	
				user	SCH				
				reviewed					
R.	alteration	date	name	Norm		origin	supersedure for	supersedure with	

RIEDEL PRECISION IN COOLING

scaling scale: 1:6 (Skalierung Maßstab)

dimension unit: mm (Maßeinheit)

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1 pg.

protective note DIN 34 / DIN ISO 16016

devices-parts-list · Geräte-Stückliste

№	item Betriebsmittel	quantity Menge	identifier Bezeichnung	type Typ	part number Artikelnummer
1	**-1F1**	1	**miniature circuit breaker** Leitungsschutzschalter	5SY4106-6	451804.50.11
2	**-1G1**	1	**power supply unit single phase** Kompaktnetzgerät 1-phasig	6EP1334-3BA00	451804.49.12
3	**-1Q1**	1	**main/emergency stop-switch** Haupt/NOT-AUS-Schalter	3LD2514-0TK53	451803.57.72
4	**-1Q2**	1	**circuit breaker** Leistungsschalter	3RV1021-1DA10	451801.46.50
5	**-1Q2**	1	**auxiliary contact** Hilfsschalter	3RV1901-1E	451803.45.90
6	**-1S1**	1	**selector switch** Steuerschalter	3SB3202-2KA11	451803.50.18
7	**-1S1**	1	**plate holder** Schildträger	3SB3923-0AV	451803.54.39
8	**-1S1**	1	**legend plate** Bezeichnungsschild	3SB1906-2AA	451803.54.40
9	**-2Q1**	1	**circuit breaker** Leistungsschalter	3RV1021-1JA10	451801.45.33
10	**-2Q1**	1	**auxiliary contact** Hilfsschalter	3RV1901-1E	451803.45.90
11	**-2Q2**	1	**circuit breaker** Leistungsschalter	3RV1021-1JA10	451801.45.33
12	**-2Q2**	1	**auxiliary contact** Hilfsschalter	3RV1901-1E	451803.45.90
13	**-3Q1**	1	**circuit breaker** Leistungsschalter	3RV1021-1CA10	454507.41.03
14	**-3Q1**	1	**auxiliary contact** Hilfsschalter	3RV1901-1E	451803.45.90
15	**-5Q1**	1	**circuit breaker** Leistungsschalter	3RV1021-1GA10	454507.41.04
16	**-5Q1**	1	**auxiliary contact** Hilfsschalter	3RV1901-1E	451803.45.90
17	**-5Q2**	1	**circuit breaker** Leistungsschalter	3RV1021-1CA10	454507.41.03
18	**-5Q2**	1	**auxiliary contact** Hilfsschalter	3RV1901-1E	451803.45.90
19	**-6Q1**	1	**circuit breaker** Leistungsschalter	3RV1021-1JA10	451801.45.33
20	**-6Q1**	1	**auxiliary contact** Hilfsschalter	3RV1901-1E	451803.45.90
21	**-7H1**	1	**pilot light** Leuchtmelder	3SB3244-6AA20	451803.52.61
22	**-7H1**	1	**plate holder** Schildträger	3SB3923-0AV	451803.54.39
23	**-7H1**	1	**legend plate** Bezeichnungsschild	3SB1906-2AA	451803.54.40
24	**-7H2**	1	**pilot light** Leuchtmelder	3SB3244-6AA40	451803.52.62
25	**-7H2**	1	**plate holder** Schildträger	3SB3923-0AV	451803.54.39
26	**-7H2**	1	**legend plate** Bezeichnungsschild	3SB1906-2AA	451803.54.40
27	**-7H3**	1	**pilot light** Leuchtmelder	3SB3244-6AA20	451803.52.61
28	**-7H3**	1	**plate holder** Schildträger	3SB3923-0AV	451803.54.39
29	**-7H3**	1	**legend plate** Bezeichnungsschild	3SB1906-2AA	451803.54.40
30	**-7H4**	1	**pilot light** Leuchtmelder	3SB3244-6AA40	451803.52.62
31	**-7H4**	1	**plate holder** Schildträger	3SB3923-0AV	451803.54.39
32	**-7H4**	1	**legend plate** Bezeichnungsschild	3SB1906-2AA	451803.54.40
33	**-7K1**	1	**contactor** Schütz	3RH1122-1BB40	451803.46.55
34	**-7K1**	1	**surge supressor** Entstörmodul	3RT1916-1BB00	454102.41.09
35	**-7K2**	1	**contactor** Schütz	3RT1017-1BB41	451801.45.15
36	**-7K2**	1	**auxiliary contact** Hilfsschalter	3RH1911-1FA20	451803.57.66
37	**-7K2**	1	**surge supressor** Entstörmodul	3RT1916-1BB00	454102.41.09
38	**-7K3**	1	**contactor** Schütz	3RH1122-1BB40	451803.46.55
39	**-7K3**	1	**surge supressor** Entstörmodul	3RT1916-1BB00	454102.41.09
40	**-7K4**	1	**contactor** Schütz	3RH1122-1BB40	451803.46.55
41	**-7K4**	1	**surge supressor** Entstörmodul	3RT1916-1BB00	454102.41.09
42	**-7K5**	1	**contactor** Schütz	3RT1016-1BB41	451801.44.44
43	**-7K5**	1	**surge supressor** Entstörmodul	3RT1916-1BB00	454102.41.09
44	**-8K1**	1	**contactor** Schütz	3RH1122-1BB40	451803.46.55
45	**-8K1**	1	**contactor**	3RH1122-1BB40	3RH1911-1FB11
46	**-8K1**	1	**surge supressor** Entstörmodul	3RT1916-1BB00	454102.41.09
47	**+G1+Tank (copper-circuit-10B1**		**temperature probe** Temperaturfühler	KTY 81-121	451804.42.86
48	**-10K1**	1	**contactor** Schütz	3RT1017-1BB41	451801.45.15
49	**-10K1**	1	**auxiliary contact** Hilfsschalter	3RH1911-1FA02	
50	**-10K1**	1	**surge supressor** Entstörmodul	3RT1916-1BB00	454102.41.09
51	**-10K3**	1	**contactor** Schütz	3RT1017-1BB41	451801.45.15
52	**-10K3**	1	**auxiliary contact** Hilfsschalter	3RH1911-1FA02	

comments :

				date	20.04.2011		RIEDEL PRECISION IN COOLING	Item list 1		
				user	SCH					
				reviewed						
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	97838	page 1 2 pg.

protective note DIN 34 / DIN ISO 16016

devices-parts-list · Geräte-Stückliste

№	item Betriebsmittel	quantity Menge	identifier Bezeichnung	type Typ	part number Artikelnummer
53	**-10K3**	1	**surge supressor** Entstörmodul	3RT1916-1BB00	454102.41.09
54	**-10N1**	1	**thermostat** Thermostatregler	ST710-KHJV.16	451803.59.37
55	**-11K1**	1	**contactor** Schütz	3RT1015-1BB41	451801.44.43
56	**-11K1**	1	**surge supressor** Entstörmodul	3RT1916-1BB00	454102.41.09
57	**-11K4**	1	**electronical timing relay** Elektronisches Zeitrelais	3RP1505-1BP30	451803.57.75
58	**+G1+tw2 (demi-circuit)-12B1**		**temperature probe** Temperaturfühler	PT 100	451801.42.02
59	**-12N1**	1	**thermostat** Thermostatregler	ST710-JB1BV.10	451815.41.90
60	**+G1+Tank-13B1**	1	**temperature probe** Temperaturfühler	PT 100	451801.42.02
61	**-13B1**	1	**thermostat** Thermostatregler	TRO 60	451804.48.96
62	**-13E1**	1	**PTC-cabinet-heating** PTC-Konvektionsheizgerät	SH30	
63	**-13K1**	1	**contactor** Schütz	3RH1122-1BB40	451803.46.55
64	**-13K1**	1	**auxiliary contact** Hilfsschalter	3RH1911-1BA10	451803.46.58
65	**-13K1**	1	**surge supressor** Entstörmodul	3RT1916-1BB00	454102.41.09
66	**-13K2**	1	**contactor** Schütz	3RT1017-1BB41	451801.45.15
67	**-13K2**	1	**surge supressor** Entstörmodul	3RT1916-1BB00	454102.41.09
68	**-13N1**	1	**thermostat** Thermostatregler	ST710-JB1BV.10	451815.41.90
69	**-14B1**	1	**signal converter (conductivity)** Leitfähigkeitsmessumformer	ecoTRANS Lf01	451804.47.55
70	**+G1+tw2 (demi-circuit)-14B2**		**conductivity measuring cell** Leitfähigkeitsmesszelle	202923	451804.47.56
71	**-14B3**	1	**signal converter (temperature)** Temperaturmessumformer	AD-MV50GL	451803.58.38
72	**+G1+tw2 (demi-circuit)-14B4**		**temperature probe** Temperaturfühler	PT 100	451801.42.02
73	**-14B5**	1	**signal converter (temperature)** Temperaturmessumformer	AD-MV50GL	451803.58.38
74	**+G1+tw2 (copper-circuit)-14B6**		**temperature probe** Temperaturfühler	PT 100	451801.42.02
75	**-15H1**	1	**pilot light** Leuchtmelder	3SB3244-6AA20	451803.52.61
76	**-15H1**	1	**plate holder** Schildträger	3SB3923-0AV	451803.54.39
77	**-15H1**	1	**legend plate** Bezeichnungsschild	3SB1906-2AA	451803.54.40
78	**-15K1**	1	**contactor** Schütz	3RH1122-1BB40	451803.46.55

№	item Betriebsmittel	quantity Menge	identifier Bezeichnung	type Typ	part number Artikelnummer
79	**-15K1**	1	**surge supressor** Entstörmodul	3RT1916-1BB00	454102.41.09

comments :

					date	20.04.2011		RIEDEL PRECISION IN COOLING	Item list 2	
					user	SCH				
					reviewed					
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	97838	page 2 2 pg.

protective note DIN 34 / DIN ISO 16016

cable list · Kabelliste

№	**item** Betriebsmittel	**comment** Kommentar	**cable-length** Kabellänge	**cable type** Kabeltyp	**identifier** Bezeichnung	**part number** Artikelnummer	**cabel-route location 1** Kabelweg Ort 1	**cabel-route location 2** Kabelweg Ort 2
1	**-2W1**	**compressor 1** Verdichter 1	4.00m	**Oelflex 191** 4x1,5mm²	**PVC-control line; number coded** PVC-Steuerleitung; nummeriert			+G1
2	**-2W2**	**compressor 2** Verdichter 2	4.00m	**Oelflex 191** 4x1,5mm²	**PVC-control line; number coded** PVC-Steuerleitung; nummeriert			+G1
3	**-3W1**	**condenser fan** Kondensatorventilator	3.50m	**Oelflex 191** 7x1,5mm²	**PVC-control line; number coded** PVC-Steuerleitung; nummeriert			+G1
4	**-5W1**	**primary pump 1** Primärpumpe 1	4.00m	**Oelflex 191** 4x1,5mm²	**PVC-control line; number coded** PVC-Steuerleitung; nummeriert			+G1
5	**-5W2**	**primary pump 2** Primärpumpe 2	4.00m	**Oelflex 191** 4x1,5mm²	**PVC-control line; number coded** PVC-Steuerleitung; nummeriert			+G1
6	**-6W1**	**crank case heating** Kurbelgehäuseheizung	4.00m	**Oelflex 191** 3x1,5mm²	**PVC-control line; number coded** PVC-Steuerleitung; nummeriert			+G1+KK1
7	**-6W2**	**crankcase heatings** Bandheizungen	4.00m	**Oelflex 191** 5x1,5mm²	**PVC-control line; number coded** PVC-Steuerleitung; nummeriert	6006153		
8	**-6W3**	**tank heating** Tankheizung	4.00m	**Oelflex 191** 7x1,5mm²	**PVC-control line; number coded** PVC-Steuerleitung; nummeriert			+G1
9	**-7W1**	**float switch** Schwimmerschalter	2.00m	**direct** 6x0,25mm²				+G1
10	**-7W2**	**level switch** Niveauwächter	2.00m	**direct** 2x0,5mm²				+G1
11	**-7W3**	**level switch** Niveauwächter	2.00m	**direct** 2x0,5mm²				+G1
12	**-8W1**	**h/l-press.-pressostat** HD/ND-Kombi-Pressostat	2.00m	**Oelflex 191** 7x1,5mm²	**PVC-control line; number coded** PVC-Steuerleitung; nummeriert			+G1
13	**-8W2**	**high-pressure pressostat** Hochdruckpressostat	2.00m	**Oelflex 191** 4x1,5mm²	**PVC-control line; number coded** PVC-Steuerleitung; nummeriert			
14	**-10W1**	**temperature probe** Temperaturfühler	4.00m	**direct** 2x0,34mm²				+G1+Tank (copper-circuit)
15	**-11W1**	**fan-control pressostat** Lüfterpressostat	2.00m	**Oelflex 191** 3x1,5mm²	**PVC-control line; number coded** PVC-Steuerleitung; nummeriert			+G1
16	**-11W4**	**low-pressure pressostat** Niederdruckpressostat	2.00m	**Oelflex 191** 3x1,5mm²	**PVC-control line; number coded** PVC-Steuerleitung; nummeriert			+G1
17	**-11W5**	**hotgas-bypass** Heißgasbypass	5.00m	**PUR-JZ** 3x0,75mm²	**connector; Z-Diode UC24V; LED; UL** Ventilstecker; Z-Diode UC24V; LED; UL	451804.49.44		+G1
18	**-12W1**	**solenoid valve** Magnetventil	5.00m	**PUR-JZ** 3x0,75mm²	**connector; Z-Diode UC24V; LED; UL** Ventilstecker; Z-Diode UC24V; LED; UL	451804.49.44		+G1
19	**-12W2**	**temperature probe** Temperaturfühler	4.00m	**direct** 3x0,34mm²				+G1+tw2 (demi-circuit)
20	**-13W1**	**temperature probe** Temperaturfühler	4.00m	**direct** 3x0,34mm²				+G1+Tank
21	**-14W1**	**measuring cell** Messzelle	4.00m	**Oelflex 191** 5x1,0mm²	**PVC-control line; number coded** PVC-Steuerleitung; nummeriert	6006086		+G1+tw2 [demi-circuit)
22	**-14W2**	**temperature probe** Temperaturfühler	4.00m	**direct** 3x0,34mm²				+G1+tw2 [demi-circuit)
23	**-14W3**	**temperature probe** Temperaturfühler	4.00m	**direct** 3x0,34mm²				+G1+tw2 (copper-circuit)

comments :

				date	20.04.2011		RIEDEL PRECISION IN COOLING	cable list 1		
				user	SCH					
				reviewed						
R.	alteration	date	name	norm		origin	supersedure for	supersedure with	97838	page 1 1 pg.

ST710-KHJV.16	**Ident: 351692**
Projekt: 2KP0160xx1	
Sollwert: 21°C +/-1K	

Thermostatregler mit 3 Relaisausgängen und sequentiellem Betrieb

Frontansicht

Allgemeine Angaben

Das Gerät ist als Einbauregler im Kleinformat konzipiert und dient zur Temperaturregelung bei hoher Messgenauigkeit. Es ist der Anschluß eines PTC-Temperaturfühlers vorgesehen.

Auf der Frontseite sind eine Folientastatur mit fünf Bedientasten, eine dreistellige Anzeige und drei Leuchtdioden vorhanden. Nach dem Einschalten der Netzspannung weist die Anzeige bei aktivierter Standbyfunktion “AUS” oder andernfalls den aktuellen Istwert aus. Hierbei wird stets der Zustand des Abschaltmoments wieder eingenommen.

Der Anschluß aller Ein- und Ausgänge wird rückseitig über Steck-Klemmleisten vorgenommen. Ein Digitaleingang ermöglicht die Aktivierung eines Nebensollwertes oder das externe Umschalten auf Standby. Als Ausgangsrelais sind drei Schließer vorhanden, von denen zwei für die Regelung vorgesehen sind. Das dritte Relais dient als Alarmkontakt.

Die Einstellung der Sollwerte und Parameter wird in insgesamt drei Bedienebenen vorgenommen. Dabei ist die Einstellung des Hauptsollwertes für jedermann leicht möglich, der Zugriff auf die Parameter jedoch bewußt erschwert, um unbefugte Manipulationen zu vermeiden. Sicherheitsrelevante Einstellungen sind sogar nur über einen besonders verschlüsselten Zugriff erreichbar. Die Vorgehensweise hierzu sollte Endkunden nicht mitgeteilt werden.

Das Gerät erfüllt bei entsprechender Parametrierung die Funktion eines mehrstufigen Temperaturreglers und bietet einige für die Kälteindustrie bestimmte Besonderheiten. Die Regelfunktion läßt sich mit einer Fülle von Möglichkeiten in der Parametrierung auswählen. Eine spezielle Tausch- und Ablösemimik sorgt bei Teillastbetrieb für eine ausgewogene Belastung der angeschlossenen Komponenten. Mindestauszeiten zur Schonung angeschlossener Verdichter können für jeden Ausgang getrennt vorgegeben werden, ferner ist eine gegenseitige Einschaltverzögerung möglich.
Ein in der Parametrierung einstellbares Grenzwertpaar erlaubt einen Temperaturalarm bezogen auf den Regelistwert und den Hauptsollwert, wobei Grenzwert- und Bandalarm sowie relative und absolute Grenzwerte wählbar sind. In diesen Alarmfällen läuft die Regelung weiter.

Funktion der Bedientasten

Taste 1: AUF
Durch Drücken dieser Taste wird zum nächsten Parameter gewechselt oder im Verbund mit der SET-Taste der Parameterwert vergrößert.

Taste 2: AB
Durch Drücken dieser Taste wird zum vorhergehenden Parameter gewechselt oder im Verbund mit der SET-Taste der Parameterwert verkleinert. Bei Alarm wird die Summer quittiert.

Taste 3: Universell
Verschiedene Funktionen werden dieser Taste mit Hilfe der Parametrierung zugeordnet, siehe Parameter A83 (Standbyfunktion, Sollwertvorgabe P1, Direktschaltung eines Kontaktes).

Taste 4: SET
Während diese Taste gedrückt ist, wird der Sollwert bzw. der angewählte Parameter angezeigt. Im Verbund mit der Taste AUF oder AB wird der angewählte Parameter verstellt.

Taste 5: Universell
Verschiedene Funktionen werden dieser Taste mit Hilfe der Parametrierung zugeordnet, siehe Parameter A82 (Standbyfunktion, Sollwertvorgabe P1, Direktschaltung eines Kontaktes)

Projekt / project: **2KP0160xx1**

Regler / controller: **ST710-KHJV.16 (-10N1)**
Sollwert / setpoint: **21°C +/-1K**
Funktion / function: **Betriebsthermostat**

Erste Bedienebene

Einstellung der Sollwerte

Der Sollwert ist direkt durch Drücken der SET-Taste anwählbar, unabhängig vom Standby-Mode.
Durch zusätzliches Drücken der AUF- oder AB-Taste kann er verstellt werden.

Para-meter	Funktionsbeschreibung	Einstellbereich	Standard-wert	Kunden-wert
S1	Sollwert Regelkontakt 1	P4...P5	0,0 °C	**21°C**
S1‘	Bei A33„0 und A81=2 bzw. 3: Sollwert bei geschlossenem Eingang E1	-99...+99,9K falls A33=1 P4...P5, falls A33=2	0,0 °C/K	

Der Sollwert für Regelkontakt 2 ist als Parameter P1 nur über die zweite Bedienebene eingestellbar.

Zweite Bedienebene

Para-meter	Funktionsbeschreibung	Einstellbereich	Standard-wert	Kunden-wert
P0	Istwert	-----	-----	-----
P1	Sollwert / Delta W Regelkontakt 2	P4...P5, falls A5=0 -99...+99,9 K falls A5=1	10,0 °C/K	**0,6K**
P2	Hysterese Regelkontakt 1	0,1...99,0 K	1,0 K	**1,2K**
P3	Hysterese Regelkontakt 2	0,1...99,0 K	1,0 K	**1,2K**
P4	Sollwertbegrenzung unten	-99 °C...P5	-99 °C	**19°C**
P5	Sollwertbegrenzung oben	P4...999 °C	999 °C	**24°C**
P6	Istwertkorrektur	-20,0...+20,0 K	0,0 K	
P19	Tastenverriegelung (Sollwertverstellung gesperrt)	0: Nicht verriegelt 1: Verriegelt	0	
P30	unterer Grenzwert für Alarm	-99...999 °C/K	-99 °C	**18°C**
P31	oberer Grenzwert für Alarm	-99...999 °C/K	100 °C	**25°C**
P32	Hysterese Alarm, einseitig	0,1...99,9 K	1,0 K	**1K**

Dritte Bedienungsebene

Para-meter	Funktionsbeschreibung	Einstellbereich	Standard-wert	Kunden-wert
A1	Schaltsinn Regelkontakt 1	0: Heizkontakt **1: Kühlkontakt**	 1	
A2	Schaltsinn Regelkontakt 2	0: Heizkontakt **1: Kühlkontakt**	 1	
A3	Funktion von Regelkontakt 1 bei Fühlerfehler	**0: Bei Fehler ab** 1: Bei Fehler an	0	
A4	Funktion von Regelkontakt 2 bei Fühlerfehler	**0: Bei Fehler ab** 1: Bei Fehler an	0	
A5	Auswahl Sollwert / DeltaW Regelkontakt 2	0: Betrieb mit Sollwert **1: Betrieb mit Delta W**	 1	
A8	Anzeigemodus Istwert (Parameterwerte werden stets mit 0,1 K dargestellt)	0: Ganzzahlig **1: Auflösung 0,5 K** 2: Auflösung 0,1 K	 1	**2**
A9	Wichtungsfaktor	0,50...1,50	1,00	
A19	Parameterverriegelung	**0: Keine Verriegelung** 1: A-Parameter verriegelt 2: A- und P-Parameter verriegelt	0	
A20	Tastenklick	0: Ohne Tastenklick **1: Mit Tastenklick**	 1	
A30	Funktion Ausgang Alarm	**0: Grenzwertalarm, relativ** 1: Grenzwertalarm, absolut 2: Bandalarm, relativ 3: Bandalarm, absolut 4: Grenzwertalarm, relativ Alarmkontakt invers 5: Grenzwertalarm, absolut Alarmkontakt invers 6: Bandalarm, relativ Alarmkontakt invers 7: Bandalarm, absolut Alarmkontakt invers	0	**3**
A31	Sonderfunktion bei Alarm	**0: Nicht aktiv** 1: Anzeige blinkt 2: Summer aktiv 3: Anzeige blinkt und Summer aktiv 4: wie 3, Summer quittierbar 5: wie 4, nach 10 Min. wiederkehrend 6: wie 4, nach 30 Min. wiederkehrend	0	**0**
A32	Art der Anzeige	**0: Istwertanzeige** 1: Sollwertanzeige S1 (S1‘)	0	
A33	Art von Sollwert S1‘ (Sollwertabsenkung)	0: Nicht aktivierbar **1: Relativ zu Sollwert S1** 2: Absolut (frei einstellbar)	 1	**0**

A34	Zeitbedingte Vertauschung Regelkontakt 1, 2	**0: Nicht aktiv** 1: Tausch entsprechend A36, A37	0	**1**
A35	Sequentieller Betrieb Regelkontakt 1, 2	**0: Nicht aktiv** 1: Stets Wechsel	0	**1**
A36	Laufzeit vor zeitbedingter Vertauschung	0...999 Sek. bzw. Min.	240 Min.	
A37	Zeiteinheit der Laufzeit A36	0: Sekunden **1: Minuten**	1	
A40	Hysteresemodus Regelkontakt 1	0: Symmetrisch **1: Einseitig**	1	**0**
A41	Hysteresemodus Regelkontakt 2	0: Symmetrisch **1: Einseitig**	1	**0**
A50	Mindestaktionszeit Regelkontakt 1 "Ein"	0…600 Sek.	0 Sek.	**5 Sek.**
A51	Mindestaktionszeit Regelkontakt 1 "Aus"	0…600 Sek.	0 Sek.	**120 Sek.**
A52	Mindestaktionszeit Regelkontakt 2 "Ein"	0…600 Sek.	0 Sek.	**5 Sek.**
A53	Mindestaktionszeit Regelkontakt 2 "Aus"	0…600 Sek.	0 Sek.	**120 Sek.**
A54	Verzögerung nach "Netz-Ein"	0…600 Sek.	0 Sek.	**180 Sek.**
A55	Gegenseitige Verzögerung Regelkontakt 1, 2	0...600 Sek.	0 Sek.	**5 Sek.**
A56	Alarmunterdrückung nach "Netz-Ein"	0…240 Min.	0 Min.	**5 Sek.**
A60	Fühlerauswahl	**21: PTC** 22: Pt1000 Zweileiteranschluss	21	
A70	Softwarefilter	1: Nicht aktiv **Mittelwert über** : 2: 2 Messwerte (ca. 0,6 Sek.) 4: 4 Messwerte (ca. 1,2 Sek.) **8: 8 Messwerte (ca. 2,4 Sek.)** 16: 16 Messwerte (ca. 4,8 Sek.) 32: 32 Messwerte (ca. 9,6 Sek.) 64: 64 Messwerte (ca. 19,2 Sek.) 128: 128 Messwerte (ca. 38,4 Sek.)	8	
A80	Temperaturskala und Anzeige im Standby-Mode	0: Fahrenheit (AUS) **1: Celsius (AUS)** 2: Fahrenheit (OFF) 3: Celsius (OFF)	1	
A81	Funktion externer Eingang E1	**0: Keine Funktion** 1: Regler Ein/Aus (Standby) 2: Sollwert S1' aktivieren 3. wie 2, LED 3 zeigt den Zustand	0	
A82	Funktion Taste 5	**0: Keine Funktion** 1: Regler Ein/Aus (Standby) 2: Sollwert P1 3: direkt Relais, bei Standby aus 4: direkt Relais, unabhängig von Standby	0	
A83	Funktion Taste 3	**0: Keine Funktion** 1: Regler Ein/Aus (Standby) 2: Sollwert P1 3: direkt Relais, bei Standby aus 4: direkt Relais, unabhängig von Standby	0	
A90	Ausgangsverbindung K1	0: Keine Verbindung **1: Verbindung zu Regelkontakt 1** 2: Verbindung zu Regelkontakt 2 3: Verbindung zu Alarmkontakt 4: Verbindung zu Summerfunktion 5: Verbindung zu Taste 3 bzw. 5	1	

		6: Verbindung, wenn Regler an		
A91	Ausgangsverbindung K2	0: Keine Verbindung 1: Verbindung zu Regelkontakt 1 **2: Verbindung zu Regelkontakt 2** 3: Verbindung zu Alarmkontakt 4: Verbindung zu Summerfunktion 5: Verbindung zu Taste 3 bzw. 5 6: Verbindung, wenn Regler an	2	
A92	Ausgangsverbindung K3	0: Keine Verbindung 1: Verbindung zu Regelkontakt 1 2: Verbindung zu Regelkontakt 2 **3: Verbindung zu Alarmkontakt** 4: Verbindung zu Summerfunktion 5: Verbindung zu Taste 3 bzw. 5 6: Verbindung, wenn Regler an	3	
Pro	Anzeige Programmversion	-----	-----	

Statusmeldungen

Anzeige	**Fehlerursache**	**Massnahmen**
F1L	Fühlerfehler, Kurzschluss	Fühler kontrollieren
F1H	Fühlerfehler, Fühlerbruch	Fühler kontrollieren
"---"	Tastenverriegelung aktiv	siehe Parameter P19 bzw. A19
Blinkende Anzeige	Temperaturalarm	siehe Parameter A31
EP	Datenverlust im Parameterspeicher	Reparatur des Reglers (Regelkontakt 1 und 2 sind stromlos)

Fühlerfehlermeldungen gehen in jedem Fall mit einem Hupsignal einher. Durch Quittieren mit der AB-Taste kann das Hupsignal gelöscht werden. Ein Beseitigen der Fehlerursache führt zum selbsttätigen Verschwinden der Fehlermeldung und des Hupsignals.

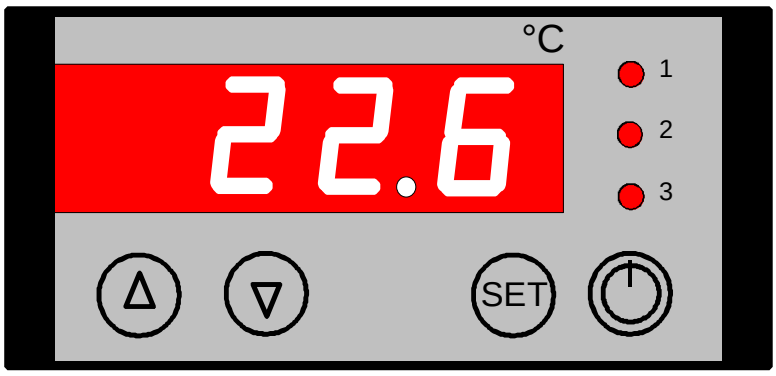
Projekt / project: **2KP0160x01, 2KP160x11**
2KP0250x01, 2KP250x11
2KP0400x01

Regler / controller: **ST710-JB1BV.10 (-12N1)** **451808.60.01**
Sollwert / setpoint: **30°C +/-1K**
Funktion / function: **Regelung DI-Kreis / controller Di-circuit**

Mikroprozessorgesteuerter Temperaturregler

Allgemeine Angaben

Der mikroprozessorgesteuerte Regler ST710-XX(1)XX.10 wird für thermostatische Temperaturregelung verwendet und verfügt dazu über einen Anschluß für Widerstandsfühler PTC oder Pt100.
Das Gerät wird mit 230V AC versorgt und hat ein Ausgangsrelais.



Beschreibung

Die Funktion des Temperatur-Reglers läßt sich durch Parametrierung aus einer Vielzahl von Möglichkeiten auswählen.

 Taste 1: AUF-Taste:
Durch Betätigung dieser Taste für mindestens 3 Sek. wird eine Abtauung angefordert und das Abtauintervall neu gestartet (Synchronisation der Abtauung). Die nächste automatische Abtauung erfolgt nun wieder nach der Zeit d0

 Taste 2: AB-Taste
Mit dieser Taste kann ein Alarm quittiert werden.

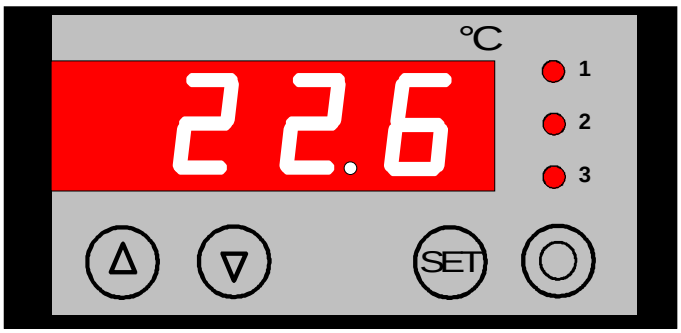
 Taste 4: SET-Taste

 Taste 5: Stand-By

Temperature controller

General Data

The control unit ST710-XX(1)XX.10 is specially designed for thermostatic control-applications. The unit works together with resistance sensors (PTC or PT100).
The unit offers beyond the temperature regulation a wide range of other functions.



Description

The output can be programmed to different functions (Parameter A1).

Stand-By key:
The Stand-By function for this key can be selected by setting the parameter A82. The key has to be pressed for at least half a second.

SET-key:
The display normally shows the actual value. When the SET button is pressed , the display changes to show the Control Setpoint.

UP-key:
With the UP key it is possible to start a manual defrost.

DOWN-key:
With the DOWN key it is possible to cancel the alarm buzzer.

Einstellmöglichkeiten
Setting options

Erste Bedienungsebene
Parametrierung des Sollwertes

Der Sollwert S1 ist direkt durch Drücken der SET-Taste anwählbar.

Durch zusätzliches Drücken der AUF- oder AB-Taste kann er verstellt werden.

Durch entsprechende Parametereinstellungen (siehe A81) kann mit dem Schalteingang E1 eine Sollwertumschaltung (Funktion „Nachtabsenkung“) durchgeführt werden.
Bei geschlossenem Schalteingang E1 wird dann auf den modifizierten Sollwert S1‘ geregelt und entsprechend wird durch Drücken der SET-Taste der Sollwert S1‘ angezeigt.
S1‘ kann als Differenz zum Sollwert S1 definiert werden, oder als absoluter Sollwert (siehe Parameter A33).

First parameter level
Setpoint Adjustment

The display normally shows the actual value of the process temperature. When the SET button is pressed , the display changes to show the control setpoint (desired temperature)

Simultaneously press the SET button with either the UP or DOWN button to increase or decrease the Setpoint. Please release the UP or DOWN button before releasing the SET button and the new value is loaded into the non-volatile memory.

Parameter ***parameter***	**Funktionsbeschreibung** ***function***	**Einstellbereich** ***adjustable range***	**Standard** ***standard***	**Kunde** ***customer***
S1	Sollwert 1 ***setpoint***	P4...P5	0,0 °C	**30°C**
S1‘	Differenz zu Sollwert S1 (A33=1) (Sollwertanzeige blinkt) ***difference to setpoint S1 (A33=1)*** ***(display setpoint flashing)*** Absoluter Sollwert S1‘ (A33=2) (Sollwertanzeige statisch) ***absolute setpoint S1’ (A33=2)*** ***(display setpoint static)***	-99,0...999,0 K P4...P5	0,0 K 0,0 °C	

Liste der P-Parameter (2. Bedienungsebene)
P-level parameters (second level)

Parameter ***parameter***	**Funktionsbeschreibung** ***function***	**Einstellbereich** a***djustable range***	**Standard** ***standard***	**Kunde** ***customer***
P2	Hysterese K1 ***Hysteresis K1***	0,1...99,9 K	1,0 K	**0,4K**
P4	Sollwertbegrenzung unten ***Control range limitation minimum setpoint***	-99...P5	-99 °C	**25°C**
P5	Sollwertbegrenzung oben ***Control range limitation maximum setpoint***	P4...999°C	999 °C	**32°C**
P6	Istwertkorrektur ***Actual value correction***	-20,0...+20,0 K	0,0 K	
P19	Tastenverriegelung (Sollwertverstellung gesperrt) ***Keyboard lock*** ***(Setpoint lock)***	0: Nicht verriegelt ***0: not locked*** 1: Verriegelt ***1: locked***	0	
P30	unterer Grenzwert für Alarm ***Lower boundary value for alarm***	-99...999°C	-99 °C	
P31	oberer Grenzwert für Alarm ***Upper boundary value for alarm***	-99...999°C	999 °C	
P32	Alarmhysterese, einseitig ***Hysteresis alarm value, one-side***	0,5...99,9 K	1,0 K	
d 0	Abtauintervall ***Defrost interval***	0...99 h 0: keine Abtauung ***0: no defrost function***	0	
d 2	Abtautemperatur ***Defrost temperatur***	-99,0…999,0°C	10,0 °C	
d 3	Abtauzeitbegrenzung ***Defrost time limit***	0…99 min 0: ohne Zeitbegrenzung ***0: without time limit***	30 min	

Liste der A-Parameter (3. Bedienungsebene)
A-level parameters (third level)

Parameter ***parameter***	**Funktionsbeschreibung** ***function***	**Einstellbereich** ***adjustable range***	**Standard** ***standard***	**Kunde** ***customer***
A1	Schaltsinn K1 ***Switch mode K1***	0: Heizkontakt ***0: Heating contact*** 1: Kühlkontakt ***1: Cooling contact*** 2: Alarmfunktion K1 ***2: Alarm contact (P30 + P31)*** 3: Alarmfunktion (K1 invertiert) ***3: Alarm contact (function K1 inverted)***	0	**1**
A3	Funktion von K1 bei Fühlerfehler ***On Sensor Error*** ***(K1 Relay action)***	0: Bei Fehler ab ***0: Relay off*** 1: Bei Fehler an ***1: Relay on***	0	
A8	Istwert – Anzeigemodus (die sonstigen Parameter werden mit Auflösung 0,1K dargestellt) ***Actual value display*** ***(all other Parameters remain 0.1 °K resolution)***	0: Ganzzahlig ***0: Whole numbers*** 1: Auflösung 0,5K ***1: 0,5 °K resolution*** 2: Auflösung 0,1K ***2: 0,1 °K resolution***	1	**2**
A10	Anzeigewert für 0V (nur bei Linearfühler) ***Voltage input Tu***	-99...999	0	
A11	Anzeigewert für 10V (nur bei Linearfühler) ***Voltage input To***	-99...999	100	
A19	Parameterverriegelung ***Parameter locking***	0: keine Verriegelung ***0: no lock*** 1: A-Parameter verriegelt ***1: A-parameters locked*** 2: A- und P-Parameter verriegelt ***2: A+P-parameters locked***	0	
A30	Art der Alarmfunktion ***alarm functions***	0: Grenzwertalarm relative Grenzen ***0: Boundary alarm relative boundaries*** 1: Grenzwertalarm, absolute Grenzen ***1: Boundary alarm, absolute boundaries*** 2: Bandalarm, relative Grenzen ***2: Range alarm, relative boundaries*** 3: Bandalarm, absolute Grenzen ***3: Range alarm, absolute boundaries***	0	

A31	Sonderfunktion für Alarm (Summer und Anzeige) ***Other alarm functions (buzzer+display)***	0: Nicht aktiv ***0: Without function*** 1: blinkende Anzeige bei Alarm ***1: Display flashing*** 2: Summer ertönt bei Alarm ***2: Buzzer active*** 3: blinkende Anzeige und Summer ***3: Display flashes and buzzer active***	0	
A32	Art der Anzeige ***Display mode***	0: Istwertanzeige ***0: actual value*** 1: Sollwertanzeige ***1: Setpoint***	0	
A33	Art von Sollwert S1‘ ***Setpoint 1’ configuration***	0: Keine Funktion ***0: not activated*** 1: Relativ zu Sollwert S1 ***1: relative to Setpoint S1*** 2: Frei einstellbar (absolut) ***2: Free adjust (absolute)***	0	
A40	Hysteresemodus K1 ***Hysteresis-mode K1***	0: Symmetrisch ***0: Symmetrical*** 1: Einseitig ***1: One side of Setpoint***	1	**0**
A50	Mindestaktionszeit K1 ”Ein” ***Minimum ON time K1***	0…400 s	0 s	
A51	Mindestaktionszeit K1 ”Aus” ***Minimum OFF time K1***	0…400 s	0 s	
A54	Verzögerung K1 nach ”Netz-Ein” ***Time delay relay K1 after mains ON***	0…400 s	0 s	
A56	Alarmunterdrückung nach ”Netz-Ein” ***Alarm signal delay after mains ON***	0…60 min	20 min	
A60	Fühlerauswahl ***Sensor selection***	11: PT100 Zweileiteranschluss ***11: PT100 2-wire*** 12: PT100 Dreileiteranschluss ***12: PT100 3-wire*** 21: PTC ***21: KTY81-121 2-wire*** 22: PT1000 Zweileiteranschluss ***22: PT1000 2-wire*** 23: PT1000 Dreileiteranschluss ***23: PT1000 3-wire***	Abhängig von Hardware ***Depends On hardwear***	**12**

A70	Softwarefilter *Software time constant*	1: nicht aktiv 1: not active **Mittelwert über**: ***average value**:* 2: 2 Messwerte (ca. 0,6s) *2: 2 measurands (ca. 0,6s)* **4: 4 Messwerte (ca. 1,2s)** *4: 4 measurands (ca. 1,2s)* 8: 8 Messwerte (ca. 2,4s) *8: 8 measurands (ca. 2,4s)* 16: 16 Messwerte (ca. 4,8s) *16: 16 measurands (ca. 4,8s)* 32: 32 Messwerte (ca. 9,6s) *32: 32 measurands (ca. 9,6s)* 64: 64 Messwerte (ca. 19,2s) *64: 64 measurands (ca. 19,2s)* 128: 128 Messwerte (ca. 38,4s) *128: 128 measurands (ca. 38,4s)*	32	
A80	Temperaturskala und Darstellung von Stand-By ***Temperature scale and display at Stand-By***	0: Fahrenheit und AUS ***0: Fahrenheit and "AUS"*** 1: Celsius und AUS ***1: Celsius and "AUS"*** 2: Fahrenheit und OFF ***2: Fahrenheit and "OFF"*** 3: Celsius und OFF ***3: Celsius and "OFF"***	1	
A81	Funktion E1 ***Function E1***	0: Keine Funktion ***0: no function*** 1: Regler Ein/Aus (StandBy) ***1: Controller ON/OFF (Stand-By)*** 2: Sollwert S1´ aktiviert ***2: Setpoint S1' activated***	0	
A82	Funktion Taste 5 ***Function button 5***	0: Keine Funktion ***0: no function*** 1: Regler Ein/Aus (StandBy) ***1: Controller ON/OFF (Stand-By)***	0	
Pro	Programmversion ***Program version***	-	-	

Status-/Fehlermeldungen
Status and error messages

Anzeige ***display***	**Fehlerursache** ***cause***	**Massnahmen** ***Action***
F1L	Fühlerfehler, Kurzschluss ***Sensor failure F1*** ***(short circuit at sensor)***	Fühler kontrollieren bzw. tauschen ***Check sensor, possibly change sensor***
F1H	Fühlerfehler, Fühlerbruch ***Sensor failure F1*** ***(broken sensor or no sensor connected)***	Fühler kontrollieren bzw. tauschen ***Check sensor, possibly change sensor***
_ _ _	Tastenverriegelung aktiv ***Keyboard lock.*** ***Message appears while trying to change setpoint but keyboard is locked at parameter P19/A19***	siehe Parameter P19 oder A19 ***Check out parameter P19 or A19***
Blinkende Anzeige ***Flashing display***	Temperaturalarm (siehe A31) ***Limit value alarm (A31)***	
EP	Datenverlust im Parameterspeicher ***Error in EEPROM (data lost)***	Reparatur des Reglers durch Hersteller **Repair of the controller by manufacturer, change controller**

Durch quittieren mit der AB-Taste kann der Summer ausgeschalten werden.
Buzzer can be switched off by pressing the DOWN-button.

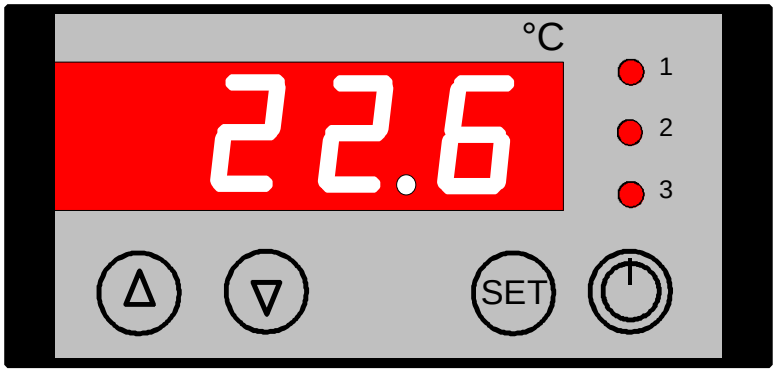
Projekt / project: **2KP0063x02, 2KP0063x12**
2KP0160x01, 2KP160x11
2KP0250x01, 2KP250x11
2KP0400x01

Regler / controller: **ST710-JB1BV.10 (-13N1)**
Sollwert / setpoint: **18°C**
Funktion / function: **Vortemperierung / pre-heating**

Mikroprozessorgesteuerter Temperaturregler

Allgemeine Angaben

Der mikroprozessorgesteuerte Regler ST710-XX(1)XX.10 wird für thermostatische Temperaturregelung verwendet und verfügt dazu über einen Anschluß für Widerstandsfühler PTC oder Pt100.
Das Gerät wird mit 230V AC versorgt und hat ein Ausgangsrelais.



Beschreibung

Die Funktion des Temperatur-Reglers läßt sich durch Parametrierung aus einer Vielzahl von Möglichkeiten auswählen.

 Taste 1: AUF-Taste:
Durch Betätigung dieser Taste für mindestens 3 Sek. wird eine Abtauung angefordert und das Abtauintervall neu gestartet (Synchronisation der Abtauung). Die nächste automatische Abtauung erfolgt nun wieder nach der Zeit d0

 Taste 2: AB-Taste
Mit dieser Taste kann ein Alarm quittiert werden.

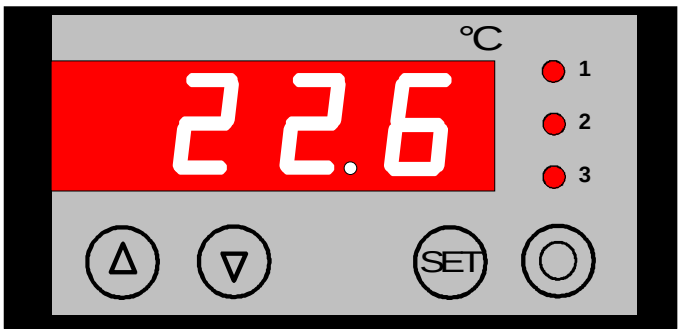
 Taste 4: SET-Taste

 Taste 5: Stand-By

Temperature controller

General Data

The control unit ST710-XX(1)XX.10 is specially designed for thermostatic control-applications. The unit works together with resistance sensors (PTC or PT100).
The unit offers beyond the temperature regulation a wide range of other functions.



Description

The output can be programmed to different functions (Parameter A1).

Stand-By key:
The Stand-By function for this key can be selected by setting the parameter A82. The key has to be pressed for at least half a second.

SET-key:
The display normally shows the actual value. When the SET button is pressed , the display changes to show the Control Setpoint.

UP-key:
With the UP key it is possible to start a manual defrost.

DOWN-key:
With the DOWN key it is possible to cancel the alarm buzzer.

Einstellmöglichkeiten
Setting options

Erste Bedienungsebene
Parametrierung des Sollwertes

SET Der Sollwert S1 ist direkt durch Drücken der SET-Taste anwählbar.

△ ▽ Durch zusätzliches Drücken der AUF- oder AB-Taste kann er verstellt werden.

Durch entsprechende Parametereinstellungen (siehe A81) kann mit dem Schalteingang E1 eine Sollwertumschaltung (Funktion „Nachtabsenkung“) durchgeführt werden.
Bei geschlossenem Schalteingang E1 wird dann auf den modifizierten Sollwert S1‘ geregelt und entsprechend wird durch Drücken der SET-Taste der Sollwert S1‘ angezeigt.
S1‘ kann als Differenz zum Sollwert S1 definiert werden, oder als absoluter Sollwert (siehe Parameter A33).

First parameter level
Setpoint Adjustment

SET The display normally shows the actual value of the process temperature. When the SET button is pressed , the display changes to show the control setpoint (desired temperature)

△ ▽ Simultaneously press the SET button with either the UP or DOWN button to increase or decrease the Setpoint. Please release the UP or DOWN button before releasing the SET button and the new value is loaded into the non-volatile memory.

Parameter ***parameter***	**Funktionsbeschreibung** ***function***	**Einstellbereich** ***adjustable range***	**Standard** ***standard***	**Kunde** ***customer***
S1	Sollwert 1 ***setpoint***	P4...P5	0,0 °C	**18°C**
S1‘	Differenz zu Sollwert S1 (A33=1) (Sollwertanzeige blinkt) ***difference to setpoint S1 (A33=1)*** ***(display setpoint flashing)*** Absoluter Sollwert S1‘ (A33=2) (Sollwertanzeige statisch) ***absolute setpoint S1’ (A33=2)*** ***(display setpoint static)***	-99,0...999,0 K P4...P5	0,0 K 0,0 °C	

Liste der P-Parameter (2. Bedienungsebene)
P-level parameters (second level)

Parameter ***parameter***	**Funktionsbeschreibung** ***function***	**Einstellbereich** a***djustable range***	**Standard** ***standard***	**Kunde** ***customer***

P2	Hysterese K1 ***Hysteresis K1***	0,1...99,9 K	1,0 K	**2K**
P4	Sollwertbegrenzung unten ***Control range limitation minimum setpoint***	-99...P5	-99 °C	**9°C**
P5	Sollwertbegrenzung oben ***Control range limitation maximum setpoint***	P4...999°C	999 °C	**19°C**
P6	Istwertkorrektur ***Actual value correction***	-20,0...+20,0 K	0,0 K	
P19	Tastenverriegelung (Sollwertverstellung gesperrt) ***Keyboard lock (Setpoint lock)***	0: Nicht verriegelt ***0: not locked*** 1: Verriegelt ***1: locked***	0	
P30	unterer Grenzwert für Alarm ***Lower boundary value for alarm***	-99...999°C	-99 °C	
P31	oberer Grenzwert für Alarm ***Upper boundary value for alarm***	-99...999°C	999 °C	
P32	Alarmhysterese, einseitig ***Hysteresis alarm value, one-side***	0,5...99,9 K	1,0 K	
d 0	Abtauintervall ***Defrost interval***	0...99 h 0: keine Abtauung ***0: no defrost function***	0	
d 2	Abtautemperatur ***Defrost temperatur***	-99,0…999,0°C	10,0 °C	
d 3	Abtauzeitbegrenzung ***Defrost time limit***	0…99 min 0: ohne Zeitbegrenzung ***0: without time limit***	30 min	

Liste der A-Parameter (3. Bedienungsebene)
A-level parameters (third level)

Parameter ***parameter***	**Funktionsbeschreibung** ***function***	**Einstellbereich** ***adjustable range***	**Standard** ***standard***	**Kunde** ***customer***
A1	Schaltsinn K1	0: Heizkontakt	0	

	Switch mode K1	***0: Heating contact*** 1: Kühlkontakt ***1: Cooling contact*** 2: Alarmfunktion K1 ***2: Alarm contact (P30 + P31)*** 3: Alarmfunktion (K1 invertiert) ***3: Alarm contact (function K1 inverted)***		
A3	Funktion von K1 bei Fühlerfehler ***On Sensor Error*** ***(K1 Relay action)***	0: Bei Fehler ab ***0: Relay off*** 1: Bei Fehler an ***1: Relay on***	0	
A8	Istwert – Anzeigemodus (die sonstigen Parameter werden mit Auflösung 0,1K dargestellt) ***Actual value display*** ***(all other Parameters remain 0.1 °K resolution)***	0: Ganzzahlig ***0: Whole numbers*** 1: Auflösung 0,5K ***1: 0,5 °K resolution*** 2: Auflösung 0,1K ***2: 0,1 °K resolution***	1	**2**
A10	Anzeigewert für 0V (nur bei Linearfühler) ***Voltage input Tu***	-99...999	0	
A11	Anzeigewert für 10V (nur bei Linearfühler) ***Voltage input To***	-99...999	100	
A19	Parameterverriegelung ***Parameter locking***	0: keine Verriegelung ***0: no lock*** 1: A-Parameter verriegelt ***1: A-parameters locked*** 2: A- und P-Parameter verriegelt ***2: A+P-parameters locked***	0	
A30	Art der Alarmfunktion ***alarm functions***	0: Grenzwertalarm relative Grenzen ***0: Boundary alarm relative boundaries*** 1: Grenzwertalarm, absolute Grenzen ***1: Boundary alarm, absolute boundaries*** 2: Bandalarm, relative Grenzen ***2: Range alarm, relative boundaries*** 3: Bandalarm, absolute Grenzen ***3: Range alarm, absolute boundaries***	0	
A31	Sonderfunktion für Alarm (Summer und Anzeige) ***Other alarm functions (buzzer+display)***	0: Nicht aktiv ***0: Without function*** 1: blinkende Anzeige bei Alarm ***1: Display flashing***	0	

		2: Summer ertönt bei Alarm ***2: Buzzer active*** 3: blinkende Anzeige und Summer ***3: Display flashes and buzzer active***		
A32	Art der Anzeige ***Display mode***	0: Istwertanzeige ***0: actual value*** 1: Sollwertanzeige ***1: Setpoint***	0	
A33	Art von Sollwert S1‘ ***Setpoint 1’ configuration***	0: Keine Funktion ***0: not activated*** 1: Relativ zu Sollwert S1 ***1: relative to Setpoint S1*** 2: Frei einstellbar (absolut) ***2: Free adjust (absolute)***	0	
A40	Hysteresemodus K1 ***Hysteresis-mode K1***	0: Symmetrisch ***0: Symmetrical*** 1: Einseitig ***1: One side of Setpoint***	1	**0**
A50	Mindestaktionszeit K1 ”Ein” ***Minimum ON time K1***	0…400 s	0 s	**120s**
A51	Mindestaktionszeit K1 ”Aus” ***Minimum OFF time K1***	0…400 s	0 s	
A54	Verzögerung K1 nach ”Netz-Ein” ***Time delay relay K1 after mains ON***	0…400 s	0 s	
A56	Alarmunterdrückung nach ”Netz-Ein” ***Alarm signal delay after mains ON***	0…60 min	20 min	
A60	Fühlerauswahl ***Sensor selection***	11: PT100 Zweileiteranschluss ***11: PT100 2-wire*** 12: PT100 Dreileiteranschluss ***12: PT100 3-wire*** 21: PTC ***21: KTY81-121 2-wire*** 22: PT1000 Zweileiteranschluss ***22: PT1000 2-wire*** 23: PT1000 Dreileiteranschluss ***23: PT1000 3-wire***	Abhängig von Hardware ***Depends On hardwear***	**12**
A70	Softwarefilter *Software time constant*	1: nicht aktiv 1: not active **Mittelwert über**: ***average value****:* 2: 2 Messwerte (ca. 0,6s) *2: 2 measurands (ca. 0,6s)* **4: 4 Messwerte (ca. 1,2s)** *4: 4 measurands (ca. 1,2s)* 8: 8 Messwerte (ca. 2,4s) *8: 8 measurands (ca. 2,4s)* 16: 16 Messwerte (ca. 4,8s)	32	8

		16: 16 measurands (ca. 4,8s) 32: 32 Messwerte (ca. 9,6s) *32: 32 measurands (ca. 9,6s)* 64: 64 Messwerte (ca. 19,2s) *64: 64 measurands (ca. 19,2s)* 128: 128 Messwerte (ca. 38,4s) *128: 128 measurands (ca. 38,4s)*		
A80	Temperaturskala und Darstellung von Stand-By ***Temperature scale and display at Stand-By***	0: Fahrenheit und AUS ***0: Fahrenheit and "AUS"*** 1: Celsius und AUS ***1: Celsius and "AUS"*** 2: Fahrenheit und OFF ***2: Fahrenheit and "OFF"*** 3: Celsius und OFF ***3: Celsius and "OFF"***	1	
A81	Funktion E1 ***Function E1***	0: Keine Funktion ***0: no function*** 1: Regler Ein/Aus (StandBy) ***1: Controller ON/OFF (Stand-By)*** 2: Sollwert S1´ aktiviert ***2: Setpoint S1' activated***	0	
A82	Funktion Taste 5 ***Function button 5***	0: Keine Funktion ***0: no function*** 1: Regler Ein/Aus (StandBy) ***1: Controller ON/OFF (Stand-By)***	0	
Pro	Programmversion ***Program version***	-	-	

Status-/Fehlermeldungen
Status and error messages

Anzeige ***display***	**Fehlerursache** ***cause***	**Massnahmen** ***Action***
F1L	Fühlerfehler, Kurzschluss ***Sensor failure F1***	Fühler kontrollieren bzw. tauschen ***Check sensor, possibly change sensor***

	(short circuit at sensor)	
F1H	Fühlerfehler, Fühlerbruch ***Sensor failure F1 (broken sensor or no sensor connected)***	Fühler kontrollieren bzw. tauschen ***Check sensor, possibly change sensor***
_ _ _	Tastenverriegelung aktiv ***Keyboard lock. Message appears while trying to change setpoint but keyboard is locked at parameter P19/A19***	siehe Parameter P19 oder A19 ***Check out parameter P19 or A19***
Blinkende Anzeige ***Flashing display***	Temperaturalarm (siehe A31) ***Limit value alarm (A31)***	
EP	Datenverlust im Parameterspeicher ***Error in EEPROM (data lost)***	Reparatur des Reglers durch Hersteller **Repair of the controller by manufacturer, change controller**

Durch quittieren mit der AB-Taste kann der Summer ausgeschalten werden.
Buzzer can be switched off by pressing the DOWN-button.