



Installation and maintenance manual

for
slide-in chiller

Scope of the installation and maintenance manual

This Installation and maintenance manual covers the dry cooler:

See Annex and technical data sheet.

Read the Installation and maintenance manual before start-up .

Keep and make available these Installation and maintenance manual for further use!



WARNUNG

The unit is not suitable for use in an explosible atmosphere.

The unit must not be used for cooling flammable or explosible substances.

This operating manual was made to the best of our knowledge. Nevertheless and despite the greatest care, it cannot be excluded that mistakes could have crept in. Therefore please understand that in the absence of any provisions to the contrary hereinafter our warranty and liability – for any legal reasons whatsoever – are excluded in respect of the information in this operating manual. In particular, we shall not be liable for lost profit or other financial loss. This exclusion of liability does not apply in causes of intent and gross negligence. Moreover, it does not apply to defects which have been deceitfully concealed or whose absence has been guaranteed, nor in cases of culpable harm to life, physical injury and damage to health. If we negligently breach any material contractual obligation, our liability shall be limited to foreseeable damage. Claims due to the Product Liability shall remain unaffected. In the event of translation, only the original version of the operating manual in German is legally valid.

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1.0 Foreword

This Installation and maintenance manual is designed to familiarize the user with the machine / unit and its designated use.

This manual contains important notes which are to be observed during the installation, operation and maintenance of the unit, in order to guarantee safe, proper and economical use of the system.

The operating manual must always be available wherever the machine / unit is in use.

This manual must be read and applied by any person in charge of carrying out work with and on the machine / unit, such as

- **operation**, including setting up, troubleshooting in the course of work, evacuation of production waste, care and disposal of fuels and consumables
- **installation, set-up, wiring**
- **maintenance** (serving, inspection, repair)
- **transport**

In addition to the operating manual and to the mandatory rules and regulations for accident prevention and environmental protection in the country and place of use of the machine / unit, the generally recognized technical rules for safe and proper working must also be observed.



WARNUNG

The marking for transport and stocking indicated on the packaging have to be observed under all circumstances

NOTE

Please check the type of manual (see Annex, Type List) against the label on your device. This installation and maintenance manual is only valid for the device mentioned in annex.

2.0 Warning notes and symbols

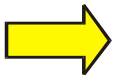
2.1 Symbols



WARNING

WARNING:

This heading is used whenever the ignorance or inaccurate obeying of factory rules, working rules, laid down work routines, etc. can lead to the death, injury to or an accident of a person.



ATTENTION

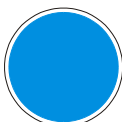
ATTENTION:

This heading is used whenever the ignorance or inaccurate obeying of factory rules, working rules, laid down work routines, etc. can lead to damage to the system.

NOTE

NOTE:

This heading is used when an exceptional feature should be taken notice of.



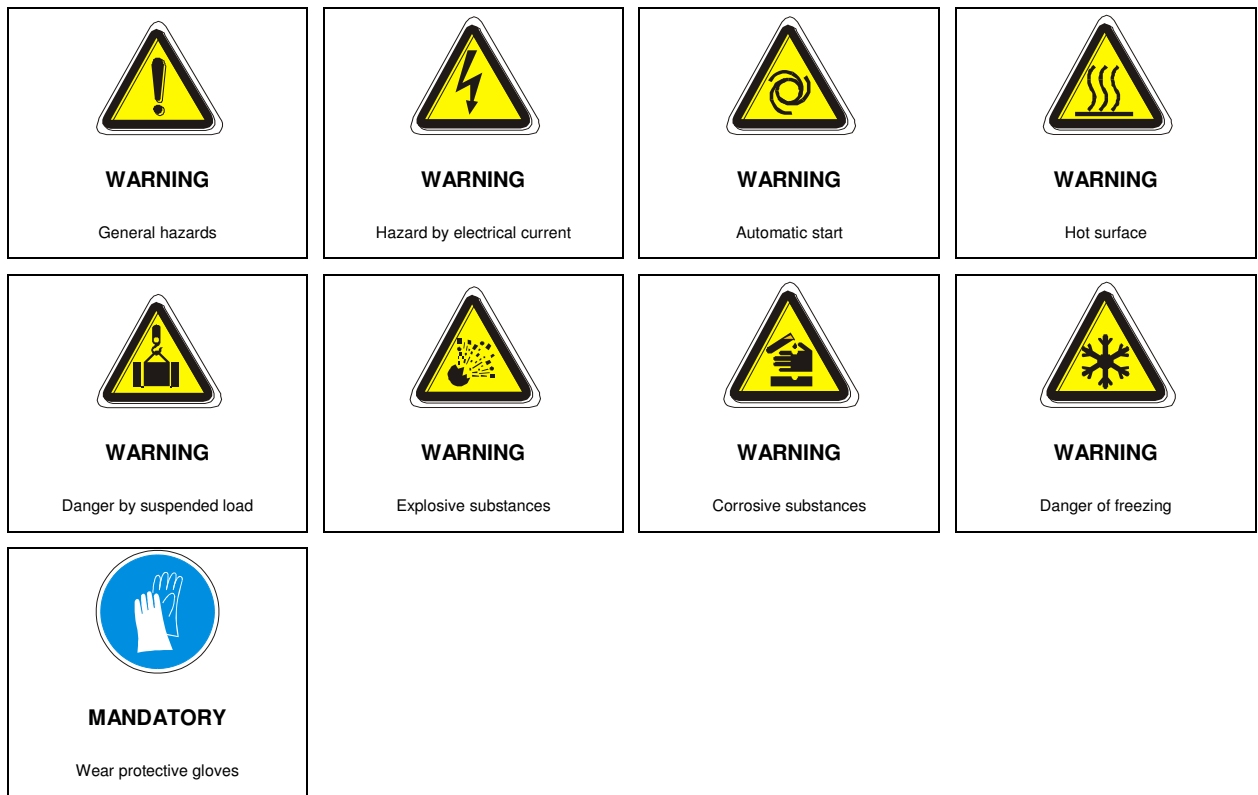
MANDATORY

MANDATORY:

This heading is used when technical rules or regulations require that a course of action be observed.

2.1.1 Warning notices and symbols used

The following warning notices and symbols are used in this manual:



2.2 Safety / Prevention of accidents

2.2.1 General notes

This installation and maintenance manual contains basic notes to be observed for startup, operation and maintenance. Read before starting the unit without fail.

The manufacturer declines any responsibility for damage and breakdowns resulting from a failure to observe this operating manual.

2.2.2 Qualification and training of personnel

The personnel for operation, maintenance, inspection and assembly must be adequately qualified for the work concerned. The user must clearly specify the sphere of responsibility, competence and supervision of the personnel.

2.2.3 Dangers when the notes on safety are ignored

Ignoring the safety regulations can have a harmful effect on persons or cause damage to the system or environment. Ignoring the safety regulations may cause a loss of claim for damages.

2.2.4 Safety - conscious working

Observe the notes and safety given in the manual, the national rules for prevention of accidents in force, as well as any internal instructions by the user for working, operation and safety.

2.2.5 Notes on safety for the user / operator

Any guard preventing accidental contact of moving parts must not be removed when the machine / unit is running. Take appropriate steps to preclude any hazard by electric power. (For relevant details see the rules of the VDE and the local energy supply companies).



Mechanical, pneumatic, hydraulic or electrical components of the unit must in no case be overridden or changed.

WARNING

The employer shall instruct the insured person on:

- the dangers when handling refrigerating plants and cooling
- The safety regulations
- the conduct in the case of accidents and failures and the Steps to be taken in such cases

Before they start their work for the first time and at reasonable intervals, however, at least once a year. (see VBG 20§19)

2.2.6 Notes on safety for maintenance, inspection and assembly work

On principle, cleaning and maintenance of the machine / unit must be carried out with the machine / unit at standstill only. The procedure for shutdown of the unit given in the operating manual must be observed without fail. Immediately after completing the work all safety and guarding devices must be replaced and / or put into service again.

2.2.7 Unauthorised modification or use of spare parts

Modification of or changes to the machine / unit are only permitted after previous consultation of the manufacturer. Original spare parts and accessories authorised by the manufacturer serve for ensuring safety. The use of any other parts may make the liability for the ensuing consequences invalid.

3.0 Reference

3.1 Instructions for use

- Please find out even before starting up about the measures for installation, set up, operation and maintenance
- These operating instructions contain basic advice that is to be observed during start-up, operation and maintenance
- No liability is accepted by the manufacturer for damage and operating faults that arise from a failure to observe these manual.

3.2 Safety instructions

3.2.1 When removing housings

- The device should be disconnected from the
- It is possible that the copper wires and the compressor will still have hot surfaces even when the device is disconnected from the mains
- You should check whether the fan has stopped turning. If this is the case, then the repairs and maintenance may be carried out.
- Any guard preventing accidental contact of moving parts must not be removed when the machine / unit is running. Take appropriate steps to preclude any hazard by electric power.



Affixed on the packaging instructions for transport and storage must be observed!

WARNING

- On principle, cleaning and maintenance of the machine / unit must be carried out with the machine / unit at standstill only. The procedure for shutdown of the unit given in the manual must be observed without fail.
- Immediately after completing the work all safety and guarding devices must be replaced and / or put into service again.

- Modification of or changes to the machine / unit are only permitted after previous consultation of the manufacturer. Original spare parts and accessories authorized by the manufacturer serve for ensuring safety.
- The use of any other parts may make the liability for the ensuing consequences invalid.

3.2.2 Improper operating modes

The operating safety of the delivered machine / unit is only guaranteed with proper use. The limit stated in the technical data must never be exceeded.



WARNING

The unit is not suitable for use in an explosion-endangered atmosphere.
The unit must not be used for cooling flammable or explosive substances.

3.2.3 Handling of refrigerants (optional)

The refrigerant has some kind of irritant effect on skin and mucous membranes. Liquid refrigerants on the skin may cause frostbite.

Refrigerants may decompose and form toxic decomposition products (e.g. hydrogen chloride, phosgene) in the presence of naked flames or hot surfaces. The refrigerant volatilizes when it escapes in gaseous form the air. Intentionally blowing off and / or discharging the refrigerant is not permitted.

Transport and / or install refrigerating plants in such a way that they cannot be damaged by inhouse transportation or traffic.



WARNING

When refrigerant is escaping the unit, you must never smoke in the vicinity of the unit / machine.
The gases will decompose to cauterizing acids in the burning cigarette that will damage your lungs.



WARNING

Repairing the cooling circuit may be by an expert firm only.

3.2.4 Staff qualifications and training

The personnel for the operation, maintenance, inspection and installation must be suitably qualified for this work. The staff's areas of responsibility and supervision must be precisely specified by the operating firm.

3.2.5 Plant log

The user is obliged to keep a plant log up to date in accordance with ES 378-2 paragraph 11.5.

The following data shall be entered into the log:

- Details of all maintenance and repair work
- Amount and kind of (new, re-used or recycled) of the refrigerant filled up, for each filling-up
- Amount of refrigerant drained of the plant, for each draining
- If there is an analysis of the re-used refrigerant, the results shall also be recorded in the log
- Origin of the re-used refrigerant
- Change and replacement of components of the plant
- Results of all periodic routine checks
- Prolonged periods of downtime

3.2.6 Leak check

Certified personnel must perform legally prescribed periodic leakage tests on the coolant circuit at fixed intervals. The personnel must verify their certified status to the owner.

The testing interval is determined by the particular CO₂ equivalent of the coolant in the coolant circuit.

The CO₂ equivalent of the cooling system is given on the coolant ID plate (attached next to the serial no. plate) or the test log.

At 5 metric tons of CO₂ equivalent or more, tests must be performed every year, at 50 tons or more every six months and at 500 tons or more every three months.

Source: Regulation (EU) No. 517/2014 of the European Parliament and of the Council on fluorinated greenhouse gases and repealing Regulation (EC) No. 842/2006, Germany (2017)

All European member states have the option of taking stricter protective measures by means of national law in addition to Regulation (EU) Nr. 517/2014. This may involve a requirement for shorter leakage test intervals or a complete prohibition of a particular coolant.

The owners are themselves responsible for being adequately informed of the national law in the country where the coolant circuit is being used.

The tests must be documented in an operator's manual intended for the system. The operator's manual can be ordered from the manufacturer.

This operator's manual contains the basic technical data and documents the history of the machine. The manual must be updated by specialist personnel whenever the coolant circuit is broken into and whenever repair, maintenance, leak detection and leakage tests are performed.

Such work must always be performed in compliance with state-of-the-art technical standards.

4.0 General description of the unit

4.1 Usage to the intended purpose

The unit serves for cooling the water or refrigerant required for the working or finishing process.

The unit is designed as stand-alone or integrated device, depending on the configuration concerned.



WARNING

Unauthorized modifications of and changes to the unit as well as using the chiller for any other purpose are forbidden for safety reasons.

4.2 Description of operation of compressor-cooled (RFCS):

The coolant is supplied to the consumer and back by the circulating pump. The flow controller (optional) mounted in the coolant-circuit monitors the flow. The absorbed heat is dissipated via the refrigeration-circuit to the ambient air or an external water circuit. A low-level float switch mounted in the storage tank protects the circulating pump against running dry.

A flow sensor monitors the level and reports not enough coolant.

Option: Another level sensor monitors the level and automatically fills the cooling system via a 2/2 way valve.

Refrigerating Operation: Absorbed heat is dissipated to the refrigerant gas by the evaporator. Any refrigerant that evaporates during this process is drawn in and compressed by the compressor. The compressed refrigerant (hot gas) is then cooled and liquefied in the condenser. Depending on the refrigerating system, the heat released during this process is dissipated to the ambient air or an external cooling system. Liquefied refrigerant is again injected into the evaporator via the expansion valve and absorbs heat during this process. A high-pressure relief valve integrated in the system protects the cooling system against excess pressure.

Optional: Hot gas bypass operation

A 2/2 way valve mounted in the refrigeration circuit controls the required cooling capacity as a function of the measured coolant-temperature via the temperature sensor and the temperature controller.

Option: Flow control

A motorized control valve mounted in the cooling circuit controls the required cooling capacity as a function of the measured coolant temperature via the temperature sensor and the temperature controller.

4.2.1 Function diagram compressor-cooled system (RFCS):

See Annex (optional)

NOTE

The machine performance of air-cooled cooling units depends on the ambient temperature and the coolant temperature to a considerable extent. The lower the ambient temperature, the higher the overall performance of the unit.

NOTE

The machine performance of water-cooled cooling units depends on the external water temperature. The lower the external water temperature, the higher the overall performance of the unit.

4.3 Description of operation of water-cooled systems (FWKS):

The coolant is supplied to the consumer and back by the circulating pump. The flow controller (optional) mounted in the coolant circuit monitors the flow. The heat absorbed in this process is dissipated to the external water circuit via the plate-type heat exchanger. A flow switch mounted in the storage tank protects the circulating pump against running dry.

A flow switch monitors the level and reports not enough coolant.

Option: The flow sensor monitors the level and automatically fills the cooling system via a 2/2 way valve.

Refrigerating Operation: A motorized control valve arranged in the external water circuit controls the amount of in- water and thus the required refrigerating capacity in dependence on the measured coolant temperature via the temperature sensor and the temperature controller.

Optional: A 2/2 way valve mounted in the supply line opens or closes the external water circuit as required at the end or start of work.

Optional: A pressure switch mounted in the external water circuit will give the message „No external water“.

4.3.1 Functional diagram of water-cooled system (FWKS):

See Annex (optional)

NOTE

The machine performance of water-cooled cooling units depends on the water temperature. The lower the water temperature, the higher the overall performance of the unit.

4.3.2 Specification of industrial water (optional)

Dirt particles have to be <200µm.

Visual nature: transparent, pure, free from oils and fats.

Dissoved matter in water	Unit	
pH-value considering to SI- Index		7 to 9
Saturation index (SI) (Delta pH-value)		-0,2<0<+0,2
Total hardness	°dH	<6
Conductivity	µS/cm	>200
filterable material mg/l	mg/l	<30
Chloride	mg/l	<100
Free chlorine	mg/l	<0,5
Hydrogen sulfide H2S	mg/l	<0,05
Ammoniac (NH3/NH4+)	mg/l	<2

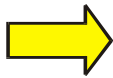
Sulfate	mg/l	<100
Hydrogen carbonate	mg/l	<300
Hydrogen carbonate / Sulfate	mg/l	>1
Sulfide	mg/l	<1
Nitrate	mg/l	<100
Nitrite	mg/l	<0,1
Dissolved iron	mg/l	<0,2
Manganese	mg/l	<0,1
Dissolved aggressive carbon dioxide	mg/l	<20

4.4 Heating Operation (optional)

After prolonged periods of standstill or under certain operating conditions it may become necessary to heat the coolant by means of a heating element to reach the process temperature faster or to maintain it. The unit controller will cut the heating element in if required.

4.5 External Control (optional)

The customer may integrate control functions of the cooling device in his control after consultation with the manufacturer.



ATTENTION

Devices with external control, i.e. devices without integrated control must be adjusted along with the manufacturer for the operational reliability. The user of the control must ensure that all plant components are operated in accordance with the intended purpose.

5.0 Transport

The chiller / unit may be transported in the original packing only until the first startup. Empty the chiller / system before transport. Notify the manufacturer immediately if you detect any damage. When the machine / unit is given another place in a plant, all connections of the chiller / unit must be disconnected. Any dislocating of the machine / unit must be done in such a way that damage is excluded.

Should there be a damage despite these notes, have the chiller / unit inspected and/or repaired, if required, by an expert before you start it again.



WARNUNG

The chiller may only be transported upright and in position for use.
The chiller / unit has a weight of (see appendix, Technical Data).



WARNUNG

For Transport, appropriate tools must be used. Only use suitable and approved hoists.
Wear safety shoes.

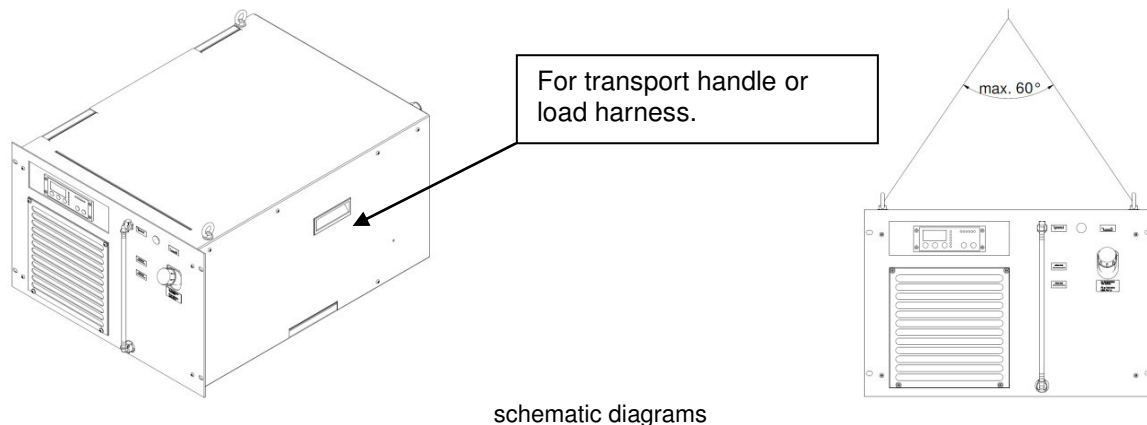
Observe all relevant safety regulations without fail.

The unit has a weight of [see technical data in annex]



WARNUNG

As a rule, work on the electrical system must be carried out by expert personnel; the valid wiring diagram and the VDE guidelines must be observed.



6.0 Unpacking and handling

A visual inspection must be performed before and during unpacking in order to discover any damage that might have occurred during transportation.

Please watch out for loose parts, dents, scratches etc.

Any damage is to be reported immediately to the transport company (Note „Terms concerning instances of damage“). More over ZVEI's "Standard supply terms and conditions" in the relevant latest version apply.

Before the packaging material is disposed of, it is necessary to check whether there are any loose functional parts still in it.

To permit claims under the guarantee to be processed, we request precise information of the defect (possibly a photo) and a statement of the description of the device's serial number.

To protect the device from damage, it must only be transported and stored in its operating orientation. Failure to observe this will result in the guarantee becoming void.

6.1 General information

In the event of transportation, we recommend emptying the device's liquid container. Please always keep the device in its operating orientation when handling it.

Work on the device may only be performed by experts. The relevant safety and environmental regulations are to be observed.

In the design of the devices following standards were used:

EG- machinery Directive 2006/42/EG

EG- Low Voltage Directive

DIN EN ISO12100-1, -2 Safety of machinery

EN 60204-1 Electrical equipment of machines

The device has been checked at the factory as regards its seals.

It is certified that the device has been subjected to an electrical safety test in the factory before being dispatched.

6.2 Technical Data and type plate

Please find the technical data in the annex.

The information on the plate is to be noted when giving statements and for maintenance. It is located on the side of the device.

7.0 Use and function

This water recooling device is a compact device to which only electricity and hydraulics or technical water systems still need to be connected and after it has been filled with the primary coolant it can be started up straight away.

Cooling of the coolant occurs in an insulated open container with a plate heat exchanger as an

evaporator. The heat absorbed by the refrigerant in the evaporator is released to the environment by the air-cooled condenser.

The device is used to recool liquid media such as water or brine in industrial or commercial machines, plant or processes.

Any use other than this is deemed not to be in accordance with the constructions.



WARNING

If the device is to be operated in accordance with the instructions but with water temperatures of $<12^{\circ}\text{C}$, then an antifreeze should be added to the water to provide protection against freezing.



ATTENTION

Here it should be noted that although the lower limit of use extends downwards, the cooling performance changes considerably. Moreover, the pump performance is to be checked. Please checked to an expert before changing over



WARNING

The device may be operated only with the coolant stated in technical data.

8.0 Installation / Startup

8.1 Installation

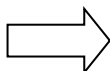
The location of the unit should be selected in such a way that it will always be easily accessible for the operating personnel and that it is not subjected to extreme heat, e.g. near a heating Protect the unit against humidity. If the unit is to be installed in areas where there is danger of frost, it must be specially equipped for such an installation. (optional)

The unit has been specially designed for mounting in 19" racks

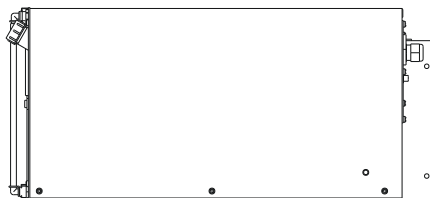


WARNING

Before you install the unit outdoors or in areas where there is danger of frost, contact the Manufacturer



1



schematic diagram



2

Pos.	description
1.	front
2.	rear

8.2 Hydraulic connection

The connections and the liquid circuits are to be positioned by experts in accordance with the technical regulations.



ATTENTION

If parts of the cable or other connected elements is higher than the intended level of liquid placed as the return flow of the coolant at a stationary plant is to be prevented with proper facilities.

8.3 Electrical connection

The cooling device is designed in accordance with the electrical circuit diagram. (See annex)



WARNING

It must be safeguarded in accordance with the current consumption of the device provided. See technical data sheet.



WARNING

Mains voltage and mains frequency must match the nominal values stated on the device's type plate.



WARNING

The chiller needs to be integrated into the customer EMERGENCY district and must be disconnected from the power supply.



WARNING

Work on electrical systems may only be performed by experts. The relevant local safety regulations are to be observed.

9.0 Start up and Operation

9.1 Preparation

- The unpacked unit has to be left in operating position for some 24 hours prior to start up so that the refrigerant may collect after transport.
- Before using the correct connection of the proposed utility lines (pipes / tubes for Prior-to-and return) and their tightness.
- The tank through the filler neck, to the max. Filled with a suitable coolant. (See technical data sheet.)
- In systems without tank, the entire plant system to be completely filled with coolant. (Please take care that the lines are deaerated!)
- Creating a main power supply.



WARNING

As a rule, work on the electrical system must be carried out by expert personnel; the valid wiring diagram and the VDE guidelines must be observed. Compare the mains voltage at side with the nameplate of the unit.

9.2 Operation

- Switch on device



ATTENTION

The device may only be operated with closed housing. Otherwise it can cause failure of the device.



ATTENTION

After a short period of operation it is necessary to check whether the coolant needs to be topped up.

Check tightness of the supply lines.

If the system could be closed, a bypass must be provided by the customer. (Optionally available)

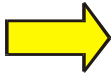
9.3 Tank filling (optional)



WARNING

Use only the approved coolant!

For filling, remove the fuel cap and fill the coolant to the mark (maximum level). Check the Level indicator. Be careful about the cleanliness during the filling process.

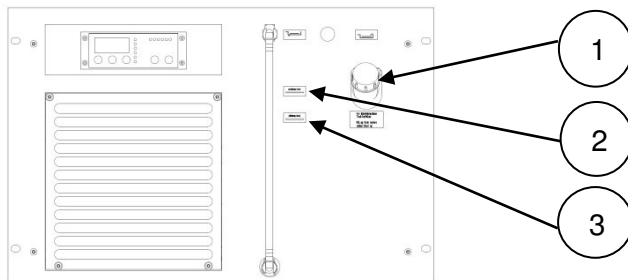


Use only clean coolant. Make sure no dirt gets into the tank.

ATTENTION

Check that:

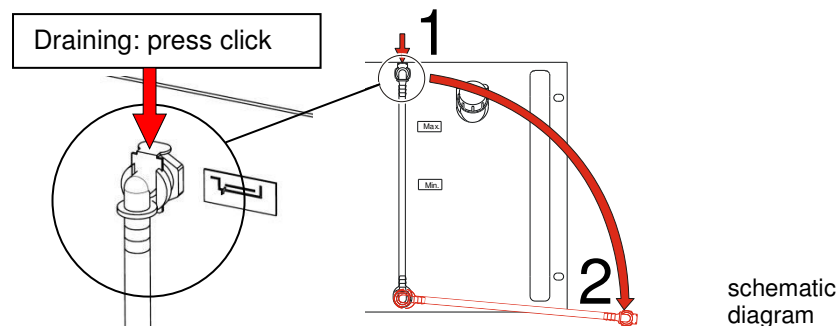
- The hoses are routed correctly and installed in accordance with labeling
- Is the system filled and vented.
- Tanklevel maximum.
- Power supply available.
- The circulation pump is connected and vented.



Pos.	description
1.	filling
2.	min./max. level
3.	draining

schematic diagram

9.4 Empty the tank (optional)



schematic diagram

The coolant must be disposed of properly.

10.0 Operation of the temperature controller (optional)

(Separate instruction: see annex)

General functional description:

The electronic regulator displays the temperature determined by the sensor in the buffer store and compares it with the target value. Depending on the temperature, the output relay is activated in accordance with the preset target value, the status of the circuit being displayed by the display

11.0 Service and maintenance

11.1 Inspection

When the mechanical parts are running irregularly or when there are strange noises, switch off the chiller / unit.

11.2 Maintenance schedule

WHEN	WHAT	WHERE
weekly	check	level
Half-yearly	exchange	particle filter (optional)
Yearly	check	electric system, safety
Yearly	check	tightness test refrigerant (optional)
Customer-specific	exchange or clean	DI- cartridge (optional)
Customer-specific (Depending on air pollution) (Recommended every 3 months)	check	fins from the condenser
Customer-specific (Depending on air pollution) (Recommended every 3 months)	check (Replace or clean if necessary)	air filter
Customer-specific (Recommended every 3 months and after commissioning)	cleaning	dirt trap external water (optional)

11.3 Maintenance generally



WARNING

Disconnect the chiller from all electrical power supplies and secure against inadvertent switching-on while carrying out maintenance.



WARNING

There are hot components behind the covers.

When the covers are removed for maintenance or repair work, make sure not to touch these components!



GEBOT

Wear protective gloves when you reach into this area. Increased risk of injury because of the sharp fins.



WARNING

Do not reach within the range of rotation of the fan blade. Danger of injuries when the fan blade start to rotate. Before you open the front cover, the plant must be switched off by means of the master switch and must be secured against inadvertent switching on.

The level of the coolant is to be checked at regular intervals and if necessary the coolant (see Technical Data) topped up. It is recommended that the bolt fixings of the primary circuit be regularly checked for tightness. This applies in particular if the coolant is frequently low.

11.4 Change the Air filter

Make sure that the filter mat upstream of the condenser remains sufficiently pervious to ensure the required heat exchange. Replace the filter mat at intervals that determine yourself considering the service conditions concerned.

HINWEIS

A soiled filter mat will cause the refrigerating capacity of the unit to decrease. As a result of the additionally increasing power consumption of the compressor, the efficiency of the plant / machine will drop considerably.



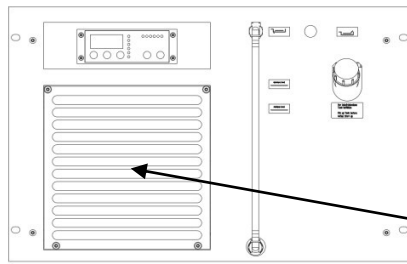
WARNING

The filter mat may be replaced by instructed personnel only.



WARNING

There are hot components behind the covers. When the covers are removed for maintenance or repair work, make sure not to touch these components!



schematic diagram

Pos. Process as follows

1. Dismount cover
2. Replace filter by new one
3. Mount cover.

Cover of air inlet

11.5 Cleaning the condenser (optional)

Make sure with air-cooled units that the fins of the compressor are always clean to ensure the required heat exchange. Clean the fins of the condenser of dust and fluffing by means of compressed air. Determine the intervals for cleaning yourself taking the service conditions into consideration..



WARNING

Cleaning may be done by instructed personnel only

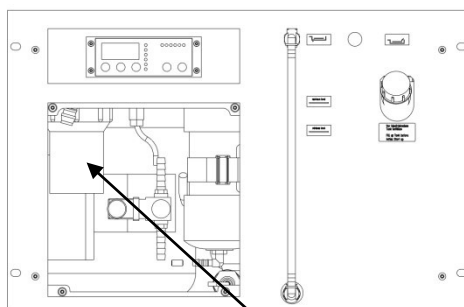


MANDATORY

Wear protective gloves during work at the condenser. Increased risk of injury because of the sharp fins.

11.6 Replacing the particle filter (optional)

Check the particle filter for soiling at regular intervals (also see maintenance schedule) Replace the filter cartridge in time, before the flow volume is reduced.



schematic diagram

particle filter

Process as follows

1. Switch the unit off and secure it against being switched on
2. drain the tank
3. Remove filter mat
4. Unscrew the filter case (transparent bottom part)
5. Pull the filter cartridge off to the bottom
6. Mount new filter cartridge
7. Clean filter case
8. Mount filter case
9. mounted air intake panel and filter mat
10. Fill the tank
11. Deaerate the coolant circuit

11.7 Replacing the Deionising Cartridge (optional)

Check the deionising cartridge for efficiency at regular intervals (also see maintenance schedule).



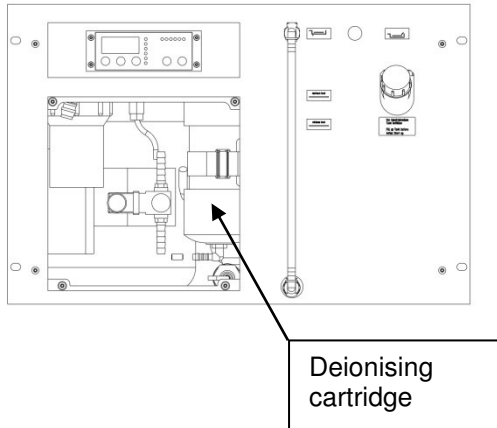
WARNING

This maintenance job may be carried out by instructed personnel only.



WARNING

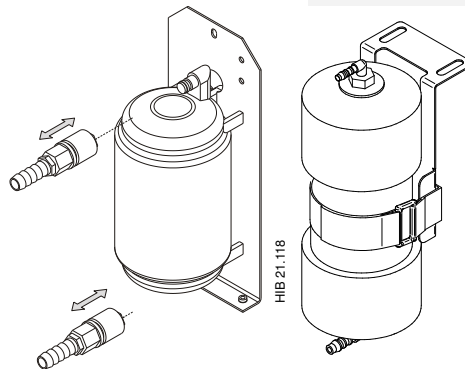
There are hot components behind the covers. When the covers are removed for maintenance or repair work, make sure not to touch these components.



schematic diagram

Process as follows

1. Switch the unit off and secure it against being switched on
2. drain the tank
3. Remove the filter mat
4. Disconnect connections at the deionising cartridge
5. Remove the deionising cartridge.
6. Mount new deionising cartridge
7. couple the connections at the deionising cartridge
8. Mount filter mat
9. Fill the tank
10. Deaerate the coolant circuit



Shows the different versions of the DI cartridge (optional)

12.0 Guarantee terms and conditions

Within the legal guarantee period, functional faults that are attributable to defective manufacture or defects in materials will be corrected free of charge within the country. Only the materials costs are covered abroad.

Further claims, in particular for consequential loss, are excluded.

Damage and functional faults caused by incorrect handling or failure to observe the operating instructions do not fall within the terms of the guarantee.

The guarantee is extinguished if the system structure has been interfered with or the serial number on the device has been changed or made illegible.

The device has been carefully tested and set in the factory. If you nevertheless have a complaint, please contact your contract partner with confidence. Please do not forget to tell us the name of your specialist or technician responsible in case of further enquiries.

For the conservation of the following warranty please:

- Enclose a precise description of the defect with your letter.
- Enclose the proof of purchase in the form of a copy of a delivery note or invoice
- Note on it the type and manufacturing reference number of the device.

13.0 Shutdown of the unit

If the unit some time out of service, we recommend the coolant drained off. Frost damage is excluded from all liability. Please be aware if a turbine flow control is installed in the chiller, it is not allowed to blow out the tube system by compressed air. In this case the flow control can be damaged.

14.0 Repair and Troubleshooting

If the operation a failure occur at the last device that you want to search using the interference of the table makes it easier in the plant. If in doubt, you should always consult a specialist (expert).



WARNING

Repairing the refrigerant circuit may be done by an expert firm only. Should there be any problems, please contact the manufacturer

When working in the refrigeration cycle is to ensure adequate ventilation.



WARNING

As a rule, work on the electrical system must be carried out by expert personnel; the valid wiring diagram and the VDE guidelines must be observed. Compare the mains voltage at site with the nameplate of the unit.

Check available power supply voltages to the nameplate of the unit.

15.0 Possible causes of errors and breakdowns

15.1 Lack of refrigerant (optional)

You will notice a lack of refrigerant by a marked drop in the refrigerating capacity. If this is the case, there is a leak in the cooling circuit. You will see a lot of gas bubbles in the sight glass.



WARNING

Repairing the cooling circuit may be by an expert firm only.



WARNING

When refrigerant is escaping the unit, you must never smoke in the vicinity of the unit / machine. The gases will decompose to cauterizing acids in the burning cigarette that will damage your lungs. Never use a naked flame when checking for leaks!

15.2 Compressor overloaded – High pressure cut-out triggers (optional)

Possible reasons for the release of the pressure switch can be:

Compressor water:	Compressor Air:
<ul style="list-style-type: none"> • High external water temperature • Excessive coolant temperature (→ pay attention to the area of application) 	<ul style="list-style-type: none"> • High ambient temperature (>+42 °C) • non-compliance of necessary clearances (→see Installation / Startup) • broken fan • dirty fan / dirty condenser (→see Maintenance) • Excessive coolant temperature (→ pay attention to the area of application)

15.3 Compressor constantly switching on and off – Low pressure cut-out triggers (optional)

A possible cause for constant switching on and off is:

Compressor water / air

- Excess refrigerating capacity of the chilling unit (→ pay attention to the area of application)
- Loss of refrigerant
- Flow rate too low (→ pay attention to the area of application)

15.4 Excessive coolant temperature

During operation, the cooling unit is running into a reliable condition. The refrigerating unit keeps the coolant temperature at the set point adjusted. Possible causes for a deviation are:

Compressor water / Water - water	Compressor Air:
<ul style="list-style-type: none"> • Heat input > the refrigerating capacity at this operating point (Annex range of usability – Technical data) • At high external water temperature • Lack of refrigerant (optional) • Coolant level too low (optional) 	<ul style="list-style-type: none"> • Heat input > the refrigerating capacity at this operating point (Annex range of usability – Technical data) • At high temperature (>42 °C) • failure to meet the required clearances (→ see Installation and Startup) • defekt cooling fan (air cooled units) • dirty condenser (→ see Maintenance) • Lack of refrigerant • Coolant level too low (optional)

15.5 General malfunction

Overload current

All electrical drive mechanismus of the refrigerating plant are protectec by motorprotecting switches. The motor protecting switvh may trigger in the following cases:

- Wrong rotary field
- One phase missing
- Overloading of the plant
- Wrong mains voltage
- Wrong frequency
- Motor defective
- Defective supply lead of motor concerned
- Excess temperature in control cabinet

No pump power (optional)

This fault may be due to the following causes:

- Pump rotating in the wrong direction
- Pump not vented
- Back pressure in the primary to high
- Coolant level in tank below minimum
- Filter / coolant soiled

16.0 For waste and recycling

The environmental requirements for recovery, recycling and disposal of materials and the refrigeration unit must be respected in accordance with DIN EN 378 and ROHS directives. For this purpose, the operator should be responsible.

17.0 Dismounting

17.1 Electric connection



WARNING

As a rule, work on the electrical system must be carried out by expert personnel; the valid wiring diagram and the VDE guidelines must be observed. Disconnect the chiller from all electrical power supplies.

17.2 Scrapping



WARNING

All components of the unit must be disposed of according to the applicable rules and regulations.

17.3 Refrigerant (optional)



WARNING

The refrigerant may only be drained by a specialised firm for refrigeration air-condition engineering and must then be disposed of in accordance with the relevant rules and regulations.

17.4 Coolant



WARNING

The coolant must be disposed of in accordance with the relevant rules and regulations.

Draw of the coolant by means of a pump and dispose of it according to the relevant regulations. In the case of plants with a draining plug, the coolant may be discharged by means of this. Make sure that the system is drained completely.

17.5 External water (optional)



WARNING

The external water system must be completely emptied by to avoid frost damage.

18.0 Annex

18.1 Regulator description

18.2 Declaration of incorporation

18.3 Technical data

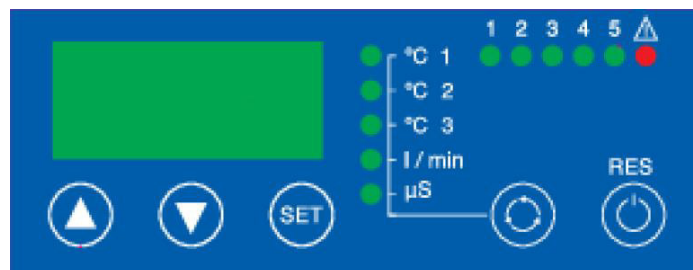
18.4 Spare parts list

18.5 Dimension sheet

18.6 Flow chart

18.7 Wiring diagramm

18.8 Special features (optional)



USER MANUAL

Temperature Controller Display HIB123

Part-No.: 3756766
Document Version: I

1. GENERAL NOTES

a) Control Elements

The display is operated by pressing keys.



Key 1 UP

- Increase a value
- Navigation



Key 2 DOWN

- Decrease a value
- Navigation



Key 3 SET

- Show set point value
- Show/Change a parameter value
- Enter a parameter level (Menus)



Key 4 SELECT

- Change between actual values: actual temperature, flow rate, conductance

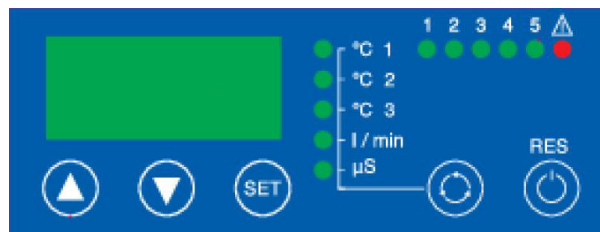


Key 5 RESET (short press on key)

- Reset errors
- Exit the parameter level

Key 5 POWER / STANDBY (long press on key)






- Chiller on / Chiller off
- Attention: The device is in standby still energized!



b) Display Elements

A seven-segment indicator with three digits shows parameters and actual values. If the value can't be displayed due to the limited number of digits, the display shows —.






Five vertically arranged LEDs indicate which measurement refers to the display value.

- 
Measured Value 1 °C 1
 flow temperature of KK 1 (actual temperature)
- 
Measured Value 2 °C 2 (optional)
 flow temperature of KK 2 (actual temperature)
- 
Measured Value 3 °C 3 (optional)
 flow temperature of KK 3 (actual temperature)
- 
Measured Value 4 l/min (optional)
 flow rate 1
- 
Measured Value 5 μS (optional)
 conductance 1 (unit: μS/cm)

Use the **SELECT** button to switch between the measured values. When switching, measurement values are automatically skipped if they are not present.



Six horizontally arranged LEDs indicate the state of each component (actuators).

Basic functions:

- 
Status 1 '1'
 Output K1: compressor
- 
Status 2 '2'
 Output K2: pump
- 
Status 3 '3'
 Output K3: heater
- 
Status 4 '4'
 Output K4: hot-gas bypass valve
- 
Status 5 '5'
 Output K5: fan

for compressor combination systems:

- Status 1**
Compressor 1
- Status 2**
Pump
- Status 3**
Compressor 4 (or heater)
- Status 4**
Compressor 2
- Status 5**
Compressor 3 (or fan)

- 
Error  **(triangle with exclamation mark)**
 Flashing light: warning (cooler still active, error code is displayed)
 Continuous light: alarm (cooler has switched off, error code is displayed)

for compressor combination systems:

Statuses that have been assigned to meanings are based on the number of compressors. If fewer compressors are installed, the basic function will be retained.

2. BASIC FUNCTIONS

Once the chiller is powered on, the display initializes and returns to home screen.

a) Home Screen

If the chiller is in standby mode, the display shows „OFF“.

If the chiller is turned on, the display shows the actual temperature.

Turn chiller on/off



The chiller can be turned on with the **POWER** button. For this, a long press is required. (around 1-2 seconds)

*Note: The **POWER** button is disabled if an external remote start signal is used to turn on and off.*

Selecting a measured value



After switching on, the display generally shows the measured value 1 (flow temperature KK 1). The corresponding measured value LED (°C 1) lights up.

Use the **SELECT** button to change between the measured values. If a different measured value has been selected, the display automatically changes back to the flow temperature display after a delay period.

Display/change nominal temperature value

While the **SET** button is pressed, the display will show the nominal temperature.

If there are several independent cooling circuits, the nominal temperature refers to the circuit that was previously selected with the **SELECT** button (°C 1, °C 2, °C 3). If a measured value with no nominal value has been selected, the SET button continues to have no function.



For fixed-value regulation:

With the **SET** button held down, you can change the nominal temperature by pressure the **UP** or **DOWN** button. The new value will be applied when you release the **SET** button.

For closed-loop control with ambient temperature reference (optional):

Only the current nominal temperature is displayed. This temperature cannot be changed.

Notice: the nominal value can only be set within the nominal value limits. The limits were defined by the manufacturer and are specially designed for the cooler.



Reset an error

In the event of a fault (*FAULT-LED flashes or lights*), all error messages displayed alternately. If the problem is resolved, warning messages (*Uxx*) will be reset automatically. An alarm message (*Exx*) must be acknowledged by pressing shortly the **RESET** button.

b) Error messages in home screen

Error messages (warnings & alarms) are automatically displayed in the home screen whenever an error is pending. At the same time, the red status LED will flash (for a warning) or light up continuously (for an alarm).

If several errors are pending simultaneously, the error messages will be displayed alternately, changing once per second.

c) Enter the parameter level

Initial point: The display shows the home screen.



+



Enter the parameter level

Press and hold **UP** and **DOWN** buttons for at least 3 seconds pressed, until the display changes to the view of the parameter groups. Use now the **UP** or **DOWN** button to set the parameter group *USR* or *OPH* be selected. The parameter group is entered with the **SET** button.

Note: The user has no access to parameter groups PA and PAE.



Exit the parameter level

The parameter level can be left by pressing shortly the **RESET** button to return step by step to home screen.

Within the parameter groups *USR* or *OPH* following navigation applies:



or



Scroll in parameter list

Use **UP** or **DOWN** button to select a parameter.



Show parameter value

The value of a parameter is displayed as long as the **SET** key is pressed.



Change parameter value

The value of a parameter is displayed as long as the **SET** key is pressed. Now you can change the value using the **UP** or **DOWN** buttons. If you hold the **UP** or **DOWN** button, then the value is automatically increased or decreased. When you release the **SET** button, the value is stored.

d) Parameter group USR (Parameterlist)

Parameter group *USR*: parameter list for customers

Not all parameters in the USR group are listed. The parameter selection is dependent on the target system and the current control mode.

Parameter	Functional description	Adjustment range
H 1	KK 1 Control mode	0: always read only 1: always on ambient 2: automatic switching
S 1	KK 1 nominal value, flow temperature Adjustable: For fixed-value closed-loop control Display only: for closed-loop control with ambient temperature reference Notice: corresponds to the value when the SET button is pressed in the home screen (for measured value LED °C1)	depends on chiller
S 11	KK 1 Set point offset to ambient temperature Use at ambient-temperature control	depends on chiller
A 3	KK 1 Lower limit for warning U10 relative value to set point parameter S1	-99,9K ... +99,9K
A 4	KK 1 Upper limit for warning U11 relative value to set point parameter S1	-99,9K ... +99,9K
H 2	KK 2 Control mode	0: always read only 1: always on ambient 2: automatic switching
S 2	KK 2 nominal value, flow temperature Adjustable: For fixed-value closed-loop control Display only: for closed-loop control with ambient temperature reference Notice: corresponds to the value when the SET button is pressed in the home screen (for measured value LED °C2)	depends on chiller
S 12	KK 2 Set point offset to ambient temperature Use at ambient-temperature control	depends on chiller
A43	KK 2 Lower limit for warning U20 relative value to set point parameter S2	-99,9K ... +99,9K
A44	KK 2 Upper limit for warning U21 relative value to set point parameter S2	-99,9K ... +99,9K
H 3	KK 3 Control mode	0: always read only 1: always on ambient 2: automatic switching

5 3	KK 3 nominal value, flow temperature Adjustable: For fixed-value closed-loop control Display only: for closed-loop control with ambient temperature reference Notice: corresponds to the value when the SET button is pressed in the home screen (for measured value LED °C3)	depends on chiller
5 13	KK 3 Set point offset to ambient temperature Use at ambient-temperature control	depends on chiller
A53	KK 3 Lower limit for warning U30 relative value to set point parameter S3	-99,9K ... +99,9K
A54	KK 3 Upper limit for warning U31 relative value to set point parameter S3	-99,9K ... +99,9K
A 6	Conductance set point	depends on chiller
A20	Lower limit for flow alarm E01	depends on chiller
A24	Flow warning U04 offset to A20	0...99,9l/min
L 6	Software-Version (f.e. V1.04.0)	read only

Notes:

- H 1 is shown only, when an ambient temperature sensor is activated internally.
 S 1 is shown only, when the current control mode „fixed value“.
 S 11 is shown only, when the current control mode „ambient value“.
 A 6 is shown only when a conductance control is possible.
 A20 is shown only when a flow sensor with analogue output is available.
 A24 is shown only when a flow warning is supported by the controller.
 L 6 is shown only when the view is supported by the controller.

For 2-circuit/3-circuit closed-loop control:

- H 2 only displayed if an ambient sensor was also internally activated.
 S 2 only displayed if the current control mode for KK 2 is “fixed value”.
 S 2 only displayed if the current control mode for KK 2 is “ambient reference”.
 A43 only displayed if KK 2 is present.
 A43 only displayed if KK 2 is present.

For 3-circuit closed-loop control:

- H 3 only displayed if an ambient sensor was also internally activated.
 S 2 only displayed if the current control mode for KK 3 is “fixed value”.
 S 2 only displayed if the current control mode for KK 3 is “ambient reference”.
 A43 only displayed if KK 3 is present.
 A43 only displayed if KK 3 is present.

e) Parameter group OPH (Operating hours)

The parameter group OPH shows the operating hours of each component (actuators).

Example: $0_H = 1$ $0_L = 85$ → Operating time of the compressor is 1085 hours ($1 * 1000 + 85$).

Parameter	Component / Actuator	Multiplication factor
0_L 0_H	Compressor (at multi-compressor systems: Compressor 1)	1 1000
1_L 1_H	Pump	1 1000
2_L 2_H	Heating	1 1000
3_L 3_H	HGB-Valve (at multi-compressor systems: Compressor 2)	1 1000
4_L 4_H	Fan or DI-Valve (at multi-compressor systems ≥ 3 compressors: Compressor 3)	1 1000
5_L 5_H	DI-Valve (at multi-compressor systems ≥ 4 compressors: Compressor 4)	1 1000
6_L 6_H	No parameter assigned (for compressor with systems ≥ 5 compressors: compressor 5)	1 1000
7_L 7_H	No parameter assigned (for compressor with systems ≥ 6 compressors: compressor 6)	1 1000

Notice:

4_L / 4_H

For conductance control, the operating hours counter refers to the DI valve.

In this case the operating hours of the fan correspond to the running time of the compressor ($0_L / 0_H$)

3. ERROR CODES

Once an error (warning or alarm) is present, the error code is displayed automatically.

The following tables give you a complete overview over all error messages. Please note that not all error codes are displayed because the technical requirements therefore are maybe missing.

Before acknowledging an error code, at first take listed actions. Additionally check possible causes and fix them if necessary.

a) Warnings

Warnings are self-acknowledging, that means, a manual reset using the **RESET** button is not required. When a warning appears, all electrical components (actuators) will remain in operation. If a warning is present, it is signalled via the collective output "warning" (pre-interlock via potential-free relay).

The following warnings have a different functionality:

U33, U34, U35, U40, U41, U42

- The signaling of these messages via the alarm interlock or the MFO Interlock (depending on the parameter).

U33

- All actuators are switched off during the venting process.
- A restart (RESET) of the installation is automatic. A manual RESET is not possible.
- This warning is automatically reset (after a waiting time of max. 300 seconds).

U34, U35

- All actuators remain in operation.
- No manual reset possible.
- This warning is automatically reset (when the temperature is within the valid range again).

U40, U41, U42

- The pump remains switched on. All other actuators switch off.
- This warning must be acknowledged with the reset button.

b) Alarms / Errors

An alarm must be reset manually using the **RESET** button if the fault is no longer present. When an alarm appears, all electrical components (actuators) will turn off automatically. If an alarm is present, it is signalled via the collective output "alarm" (interlock via potential-free relay).

Warnings

Code	Short description	Causes & Actions
U01	Low tank level	refill the coolant up to the MAX-mark (tank) causes: leakage, evaporation, defective level switch
U02	Air filter soiled	clean or change air filter causes: defective (differential) pressure switch
U03	Missing air filter	insert air filter causes: defective monitoring switch
U04	Low flow rate	check coolant circuit causes: defective pump/valves/hoses, defective flow sensor, soiled filter (if present)
U06	Misc. warning 1 (definition: see circuit diagram input E03)	depending on the function
U07	Misc. warning 2 (definition: see circuit diagram input E04)	depending on the function
U10	KK 1 Low temperature warning	temperature is less than parameter A3 (see parameter group USR)
U11	KK 1 High temperature warning	temperature is greater than parameter A4 (see parameter group USR)
U20	KK 2 Low temperature warning	temperature is less than parameter A43 (see parameter group USR)
U21	KK 2 High temperature warning	temperature is greater than parameter A44 (see parameter group USR)
U30	KK 3 Low temperature warning	temperature is less than parameter A53 (see parameter group USR)
U31	KK 3 High temperature warning	temperature is greater than parameter A54 (see parameter group USR)
U32	High conductance value	change DI cartridge causes: no use of DI water, defective valve for conductance control
U33	Automatic venting process (Time delayed, automatic restart of the plant) * signalling via alarm interlock	Valve setting not in air vent position No action required: automatic restart after max. 300 seconds
U34	Low temperature warning * signalling via alarm interlock / MFO-Interlock	temperature is less than parameter A28
U35	High temperature warning * signalling via alarm interlock / MFO-Interlock	temperature is greater than parameter A29
U40	Refrigeration Circuit low pressure warning *signalling via alarm interlock / MFO-Interlock	contact service hotline causes: loss of refrigerant, defective refrigerant component
U41	Refrigeration Circuit high pressure warning * signalling via alarm interlock / MFO-Interlock	Air cooled: Clean air filter and check air supply Water cooled: Clean strainer Contact service hotline if necessary causes: defective fan, no flow in external water circuit, open housing
U42	Refrigeration Circuit Motor circuit breaker has triggered * signalling via alarm interlock / MFO-Interlock	open switch cabinet and reset motor circuit breaker cause: defective live component
U96 U97	Defective conductance sensor	measured value out of range check electrical connection change conductance sensor

*Notes on U33, U34, U35, U40, U41, U42 on the previous page.

Alarms

Code	Short description	Causes & Actions
E01	Flow rate too low	check coolant circuit causes: defective pump/valves/hoses, defective flow sensor, soiled filter (if present)
E02	Motor circuit breaker has triggered	open switch cabinet and reset motor circuit breaker causes: live components or input voltage defective
E03	Tank level too low	check coolant circuit refill the coolant up to the MAX-mark (tank) causes: leakage, evaporation, defective level switch
E06	Misc. error 1 (definition: see circuit diagram input E03)	depending on the function
E07	Misc. error 2 (definition: see circuit diagram input E04)	depending on the function
E10	KK 1 Low temperature alarm	temperature less than absolute limit parameter A1 →protection shutdown (defined by manufacturer) causes: defective electrical connection to compressor, defective compressor or HGB-valve
E11	KK 1 High temperature alarm	temperature greater than absolute limit parameter A2 →protection shutdown (defined by manufacturer) causes: compressor system: defective electrical connection to compressor, defective compressor or HGB-valve, refrigerant shortage, defective fan or throughput too low (air-cooled) Water cooled: low flow rate of external water circuit
E20	KK 2 Low temperature alarm	temperature less than absolute limit parameter A41 →protection shutdown (defined by manufacturer) causes: defective electrical connection to compressor, defective compressor or HGB-valve
E21	KK 2 High temperature alarm	temperature greater than absolute limit parameter A42 →protection shutdown (defined by manufacturer) causes: compressor system: defective electrical connection to compressor, defective compressor or HGB-valve, refrigerant shortage, defective fan or throughput too low (air-cooled) Water cooled: low flow rate of external water circuit
E30	KK 3 Low temperature alarm	temperature less than absolute limit parameter A51 →protection shutdown (defined by manufacturer) causes: defective electrical connection to compressor, defective compressor or HGB-valve
E31	KK 3 High temperature alarm	temperature greater than absolute limit parameter A52 →protection shutdown (defined by manufacturer) causes: compressor system: defective electrical connection to compressor, defective compressor or HGB-valve, refrigerant shortage, defective fan or throughput too low (air-cooled) Water cooled: low flow rate of external water circuit
E44	Phase sequence error (wrong rotating field)	check connection of phases L1-L2-L3 cause: defective phase sequence relay
E53	Fan malfunction	check function of fan causes: over temperature, overload, under-/overvoltage
E80	Temperature sensor F5 (KK 2) short circuit	check electrical connection to sensor F5, replace sensor F5
E81	Temperature sensor F5 (KK 2) cable break	check electrical connection to sensor F5, replace sensor F5
E82	Temperature sensor F6 (tank / KK 3) short circuit	check electrical connection to sensor F6, replace sensor F6
E83	Temperature sensor F6 (tank / KK 3) cable break	check electrical connection to sensor F6, replace sensor F6
E90	Temperature sensor F1 (KK 1) short circuit	check electrical connection to sensor F1, replace sensor F1
E91	Temperature sensor F1(KK 1) cable break	check electrical connection to sensor F1, replace sensor F1
E92	Temperature sensor F2 (ambient) short circuit	check electrical connection to sensor F2, replace sensor F2
E93	Temperature sensor F2 (ambient) cable break	check electrical connection to sensor F2, replace sensor F2
E98	Communication error with display	check electrical connection, change display or controller
E99	System error	restart chiller (hard power reset) contact service hotline if necessary causes: under-/overvoltage, data storage error, software bug, defective controller