



Installation and maintenance manual

for

Stand alone chiller

1.0 Model code

<i>Example</i>	RFCS-	G4-	013000-	W-	L-	R25-	3-	IW-
Type								
RFCS = active cooling								
Series								
Cooling capacity in watts(W)								
Coolant/refrigerant								
W = water O = oil C = chemical media								
Design of heat-dissipating side (heat exchanger)								
W = water-cooled L = air-cooled								
Controller type								
Voltage range								
IW = non-ferrous metal parts, in contact with water DI = free from non-ferrous metal, in contact with water C = chemical media								
Other information (optional, for example UL)								

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!



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.

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 cases 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. The operator of the cooler shall ensure that all written information and warnings are in the official language(s) of the community where the chiller is placed on the market / put into service.

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2.0 Foreword

The Installation and Maintenance Instructions are intended to help you to become acquainted with the cooler/system and make use of its possible applications as intended.

The Installation and Maintenance Instructions aim to increase the safety of the workers and consumers in all life phases of the device.

The Installation and Maintenance Instructions should only be used in conjunction with the attached additional documents. The additional documents are supplementary. If both documents describe the same function, the additional documents have a higher priority.

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 chiller / unit is in use.

The Installation and Maintenance Instructions must be read and applied by everyone:

- **Operation**
- **Specialist electrician**
- **Specialist personnel**
- **Cooling specialist**
- **Qualified personnel for transport and storage**

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.



WARNING

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.

3.0 Machinery Directive 2006/42/EC

The Installation and Maintenance Instructions were revised on 2020-04-29 in accordance with the Machinery Directive 2006/42/EC.

Equivalent in the Machinery Directive	Implementation measures
Avoid accidents by increasing the safety in the design of the device	Inherent design, potential hazards are discovered and reduced in the design process. Design manual with key information on inherent design available to all designers.
Provision of safety of persons, in particular through employees and consumers	Installation of electric and mechanical safety parts
CE marking in accordance with industrial standard alongside manufacturer's information	CE marking alongside name plate
Risk assessment	Risk assessment and risk minimisation measures carried out
Documentation	Adapted
Compliance with harmonised industrial standards	Taken into account in the risk analysis

Table in accordance with number 34 of the Inter-institutional Agreement on Better Lawmaking Equivalencies between the Machinery Directive 2006/42/EC and implementation measures.

4.0 Warning notes and symbols

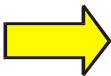
4.1 Symbols



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.

4.1.1 Warning notices and symbols used

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

 <p>WARNING General hazards</p>	 <p>WARNING Hazard by electrical current</p>	 <p>WARNING Automatic start</p>	 <p>WARNING Hot surface</p>
 <p>WARNING Danger by suspended load</p>	 <p>WARNING Explosive substances</p>	 <p>WARNING Corrosive substances</p>	 <p>WARNING Danger of freezing</p>
 <p>WARNING Warning against cuts</p>	 <p>INFORMATION Position of the centre of gravity</p>		
 <p>MANDATORY Wear protective gloves</p>	 <p>MANDATORY Wear protective clothing</p>	 <p>MANDATORY Wear eye protection</p>	 <p>MANDATORY Wear foot protection</p>

4.1.2 Personal protective equipment (PPE)

Pictogram	Description
	Protective gloves, mechanical hazard (7010-M009) Protective gloves are used to protect the hands from friction, grazing, piercing injuries or deeper injuries and from making contact with hot surfaces.
	Protective work clothing (7010-M010) Protective work clothing is tight-fitting work clothing with low tearing strength, with tight sleeves and without any protruding parts.
	Safety goggles (7010-M004) Safety goggles serve to protect the eyes from flying parts and spraying liquid.
	Wear foot protection (7010-M008). The mandatory action signs label work areas where suitable work protection shoes or boots must be worn.

4.2 Safety / Prevention of accidents

4.2.1 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.

Commissioning refers to the initial use, as intended, of a device covered by the Machinery Directive in the European Community, i.e. the time at which the device must be compliant with the Machinery Directive and all other EU directives and EU regulations that apply to the device.

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

4.2.2 Observe regulatory information

Observe the following regulatory information and directives:

- Legal and local regulations for accident prevention
- Legal and local regulations for environmental protection
- Country-specific regulations, organisation-specific regulations

4.2.3 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.

Designation	Description
Operator	Operators have been instructed by the owner about the tasks allocated to them and possible risks in case of inappropriate behaviour. Tasks which go beyond the scope of normal operation may only be performed by the operator if specified in these Operating Instructions and expressly authorised by the owner.
Specialist electrician	Specialist electricians have sufficient specialist training, knowledge and experience and awareness of the relevant industrial standards and regulations to allow them to perform work on electrical systems and independently recognise and avoid potential hazards. Specialist electricians have been specially trained for the specific operating location in which they work and are aware of the relevant industrial standards and regulations.
Specialist personnel	Specialist personnel have sufficient specialist training, knowledge and experience and awareness of the relevant industrial standards and regulations to allow them to perform work assigned to them and independently recognise and avoid potential hazards.
Cooling specialist	Cooling specialists have been trained and certified for the specific operating area in which they work and are aware of the relevant industrial standards and regulations. The certification includes the required skills for the prevention of emissions, the recovery of fluorinated greenhouse gases and safe handling of cooling equipment of the relevant type and size. Cooling specialists have sufficient specialist training and experience to allow them to perform work on cooling systems and independently recognise and avoid potential hazards.
Skilled personnel for transport and storage	These personnel must be familiar with and have received instruction in the handling of lifting equipment and accessories for transporting machinery and machine parts, in addition to hydraulic units.

4.2.4 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.

4.2.5 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.

4.2.6 Notes on safety for the user / operator

Any guard preventing accidental contact of moving parts must not be removed when the system / 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).



It must not under any circumstances be possible for the following types of foreseeable misuse to occur:

WARNING

- Use as a cooling system for non-approved refrigerants and coolants.
- Operating of the cooling system with the tank not filled
- Unauthorised modification or conversion of the cooling system and its guard devices
- Failure to comply with the prescribed distancing for the waste air when the cooling system is being set up
- Bypassing or deactivation of safety and guard devices

Any alterations and non-conformities with the technical data sheet must be clarified with the manufacturer in advance

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)

4.2.7 Notes on safety for maintenance, inspection and assembly work

On principle, cleaning and maintenance of the chiller / unit must be carried out with the chiller / 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.

4.2.8 Unauthorised modification or use of spare parts

Modification of or changes to the chiller / 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 other parts will void the liability for the resulting consequences.

5.0 Reference

5.1 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.

5.2 Residual risks, arranged by risk reduction measures

(according to DIN EN ISO 12100)

5.2.1 Residual risks on the housing

Risk	Risk reduction	Residual risk
Shape, edges, corners	Avoidance of sharp edges and corners, protective clothing	Quality of sheet metal and other purchased parts
Mechanical stability	Design-based	Negligent behaviour
Stability against tipping over	Design-based	Incorrect transport
Kinetic energy, fan	Guard device	Power failure during testing. Negligence
Hazards arising from noise	Fans configured in accordance with legal limits	Personal hypersensitivity

5.2.2 Residual risks in the cooling circuit

Risk	Risk reduction	Residual risk
Mechanical stability	Design-based, according to DIN EN 378-2:2018-04	Transport damage, negligent behaviour
Pressurised fluid escaping	Design-based, warning in the Operating Instructions, protective equipment, maintenance and service only by specialist personnel	Negligent behaviour
Components with extreme temperatures	Maintenance and service only by specialist personnel, stickers, protective equipment	Contact during mechanical maintenance work and prescribed inspections

5.2.3 Residual risks in the water circuit

Risk	Risk reduction	Residual risk
Shape, edges, corners	Avoidance of sharp edges and corners, protective clothing	Quality of fittings and other purchased parts
Mechanical stability	Design-based, components selected on basis of suitability and specification	Transport damage, installation error
Contact with coolant	Organisational, maintenance schedule of the hoses, safe access for filling and draining	Hoses hard to reach

5.2.4 Residual risks of electric system/electronics

Risk	Risk reduction	Residual risk
Shape, edges, corners	Design-based, avoidance of sharp edges and corners	Negligent behaviour, quality of sheet metal and purchased parts
Stability against falling off, breaking off	Design-based, prescribed distancing and regulations are observed.	Negligent behaviour
Mechanical stability	Design-based, mechanical components and other purchased parts are used on basis of suitability and specification.	Part error, installation error
Live components	Training and instruction, earthing/protective conductor, secure covering, use of warning signs	During inspection and service work, it may be necessary to work on live parts.
Live components, controller in faulty condition	Training and instruction, earthing/protective conductor	During inspection and service work, it may be necessary to work on live parts.
Live equipment, faulty condition	Design-based, coordination between the grid form, the earthing system and the fuses, warning signs, electrical inspections	During inspection and service work, it may be necessary to work on live parts.
Live components, sensors, faulty condition	Design-based, safety extra-low voltage, qualified personnel	Negligent behaviour
Short circuit or overload	Design-based, overload protection, earthing, warning signs	Negligent behaviour Misuse

5.3 Safety instructions

5.3.1 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 chiller / unit is running. Take appropriate steps to preclude any hazard by electric power.



WARNING

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

- On principle, cleaning and maintenance of the chiller / unit must be carried out with the chiller / 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 chiller 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 other parts will void the liability for the resulting consequences.

5.3.2 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.

5.3.3 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 / chiller. 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.

5.3.4 Staff qualifications and training

The personnel for operation, maintenance, inspection and installation must be suitably qualified for this work. Work on the system may only be carried out by trained specialists in the fields of electrical, mechanical or refrigeration engineering. The area of responsibility, competence and supervision of the personnel must be precisely regulated by the operator.

5.3.5 Plant log (Compressor-cooled system)

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

5.3.6 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 chiller. 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.

5.3.7 The device's emission of airborne noise (see technical data sheet)

As the work area or work areas are not specified or cannot be specified, the measurements of the A-weighted sound pressure value are taken at a distance of 1m from the device surface and 1.60m above the ground. The highest emission sound pressure value is given (see technical data sheet).

6.0 General description of the unit

6.1 Usage to the intended purpose

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

The unit is designed as stand-alone or integrated device, depending on the configuration concerned. For better understanding of the system, use the flow chart in the appendix.



WARNING

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

6.2 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.

Optional: 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.

6.2.1 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.

6.3 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.

Optional: 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“.

6.3.1 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.

6.3.2 Specification of coolant (for mixing water additive) and of external water (optional)Specification of external water (optional)

- Coolant: contaminant particles <50µm
- External water: contaminant particles <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

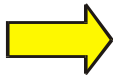
Hydrogen sulfide H ₂ S	mg/l	<0,05
Ammoniac (NH ₃ /NH ₄ ⁺)	mg/l	<2
Sulfate	mg/l	<100
Hydrogen carbonate	mg/l	<300
Hydrogen carbonate / Sulfate	mg/l	>1
Sulfide	mg/l	<1
Nitrate	mg/l	<100
Nitrite	mg/l	<0,1
Dissolved iron	mg/l	<0,2
Manganese	mg/l	<0,1
Dissolved aggressive carbon dioxide	mg/l	<20

6.4 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 coolant temperature faster or to maintain it. The unit controller will cut the heating element in if required.

6.5 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 operational reliability. The user of the control must ensure that all plant components are operated in accordance with the intended purpose.

7.0 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 chiller / unit is given another place in a plant, all connections of the chiller / unit must be disconnected. Any dislocating of the chiller / 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.



WARNING

In the special regulations for individual modes of transport, refrigerating machines up to **12 kg** are not subject to the hazardous goods regulations for road, sea or air transport. If the individual pre-filled device exceeds this filling limit, however, then the refrigerating machine (RFCS) is transported as a hazardous good.

Hazardous goods must be classified and sorted. Refrigerating machines are listed under the UN number **UN 2857**.



WARNING

The chiller may only be transported upright and in position for use.

The chiller / unit has a weight of (see appendix, Technical Data).



WARNING

All existing eyebolts must be equally loaded!

Use only a portion of the existing lifting lugs are not allowed



WARNING

For Transport, appropriate tools must be used. Only use suitable and approved hoists. Don't step under suspended load. Wear safety shoes. Load-suspension attachments may only be applied from a vertical line with an angle less than 30°. Observe all relevant safety regulations without fail.



WARNING

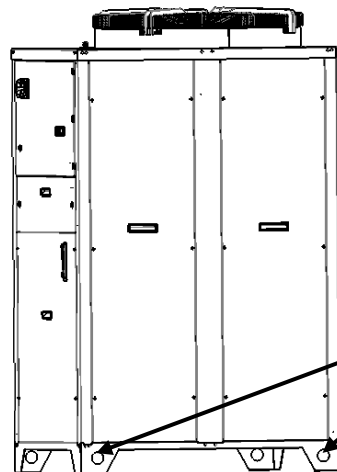
As a rule work on the electrical system must be carried out by expert personnel; the valid wiring diagram and the VDE guidelines must be observed.



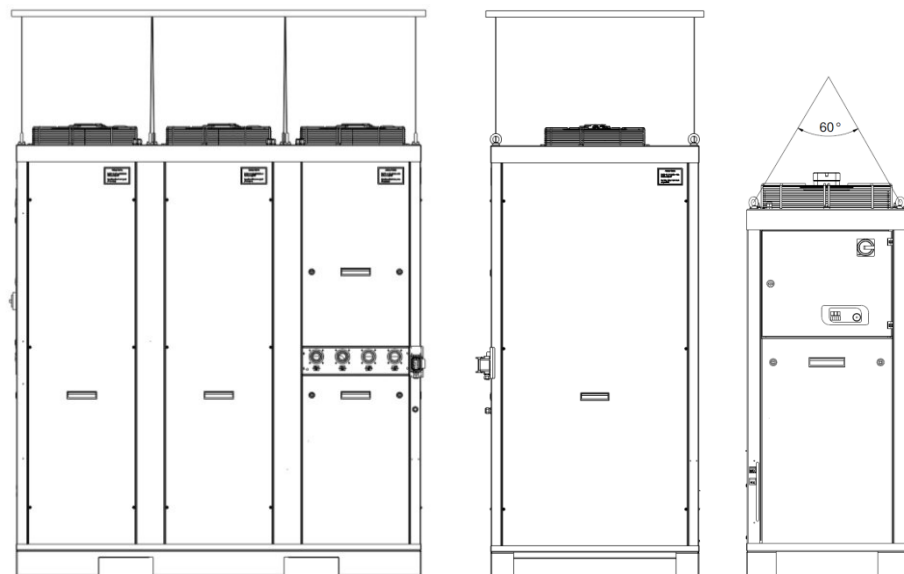
For transport, observe the location of the centre of gravity



Wear safety boots during transport.



Transport of S7 with steel tube (diameter 40 – 50mm) and with transport belts

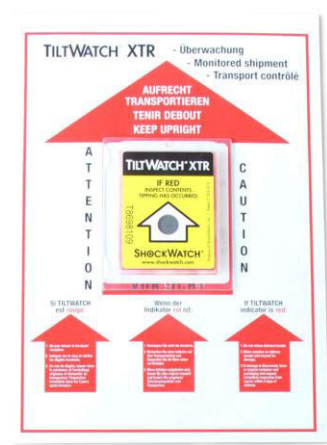


Transport of G7/G8 with traverse or forklift!

schematic diagrams

7.1 Transport monitoring

(only for devices at risk of tipping over during transport)



The Tilt indicator checks whether the cooler product was transported and stored as prescribed.

The indicator field turns red if the cooler has been tilted more than 83°. Sequential serial numbers on the tipping indicator make tampering impossible.

8.0 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 devices’ 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.

8.1 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 chillers following standards were used:

- EG- Machinery Directive 2006/42/EG
- Druckgeräterichtlinie 2014/68/EG
- DIN EN ISO12100-1, -2 Safety of machinery
- DIN EN ISO13732-1:2008-12 Ergonomics of the thermal environment
- DIN EN 378-2:2018-04 Refrigerating systems and heat pumps - Safety and environmental requirements
- DIN EN 60204-1 Electrical equipment of machines

The chiller has been checked at the factory as regards its seals. It is certified that the chiller has been subjected to an electrical safety test in the factory before being dispatched. (See test report)

8.2 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 chiller.

9.0 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 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.

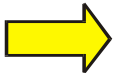
The device is used to recool liquid media such as water or brine in industrial or commercial machines, plant or processes.

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



WARNING

If the chiller 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 chiller may be operated only with the coolant stated in technical data.

10.0 Installation / Startup

10.1 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. The chiller has to be under a roof and protected against humidity. If the unit is to be installed in areas where there is danger of frost, it must be specially equipped. (optional)

The owner of the cooler must observe the local water protection and noise protection regulations.



ATTENTION

The distance between rear side and wall should be at least 700mm (S7/G7/G8=2000mm). The lowest distance to other surfaces above the refrigerating plant must not be below 1500mm (S7/G7/G8=5000mm).



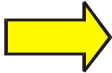
WARNING

Place the unit only on level foundations of good bearing capacity. Align the unit horizontally and vertically to start-up.



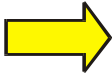
WARNING

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



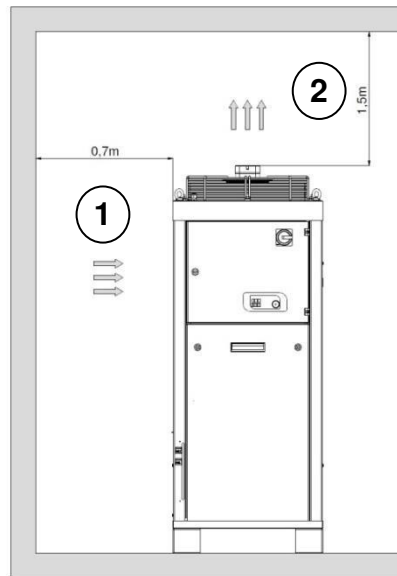
ATTENTION

The operating equipment must be easily accessible. Between 0.6 and 1.9 metres (1.7 metres recommended) above the access level.



ATTENTION

The cooling air must be able to circulate freely. Any air intake and outlet channels must provide their own suction i.e. they must contain compensation bellows. The fitting of air-conducting device has to be agreed with the manufacturer.



schematic diagram (see dimension sheet)

Pos.	description
1.	Air inlet - S7/G7/G8 = 2,0m
2.	Air outlet - S7/G7/G8 = 5,0m

Recommended distance may be less than for compressor / water or water / water chiller.

10.2 Hydraulic connection

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

The following must be observed:

- Select suitable material for the hydraulic connection of the cooler
- Select a suitable cross section to avoid pressure loss
- Insulate tubes 5m long and over to prevent heat loss
- If the consumer is located above the cooler, attach a solenoid valve in the return flow and a non-return valve in the supply flow of the cooler. Reason: tank overflow



ATTENTION

If parts of the cable or other connected elements are 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.

10.3 Electrical connection

The cooling device is designed in accordance with the electrical circuit diagram (See annex). The direction or rotation of the axial fan is to be checked. If the direction of rotation is wrong please switch over the phases on the mains lead (Switch over L1 and L2).



WARNING

It must be safeguarded in accordance with the current consumption of the chiller 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 must be integrated into the EMERGENCY-STOP circuit on the customer side and can thus be switched off without voltage.



WARNING

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

11.0 Start up and Operation

11.1 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.
- The owner must provide protection according to the applicable standards by means of a temperature fuse gL/gG and an RCD (envisaged 300mA, \geq type F). All other data on selection can be found in the circuit diagram. The local regulations and directives must be adhered to.
- The owner must provide sufficient lightning protection, rotating field protection and overvoltage protection. The local regulations and directives must be adhered to here.
- 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.

11.2 Commissioning

The following points must be observed before commissioning:

1. Hydraulic connections of the cooling system – see section 10.2 Hydraulic connection.
2. All supply lines must be connected correctly – see section 10.3 Electrical connection and section 11.1 Preparation.
3. Make sure all shut-off devices are open. Check there is free flow in all lines.
4. Before filling, check the concentration of the operating medium to ensure adequate antifreeze and corrosion protection as required.
5. Before commissioning, fill the tank (optional) with permitted operating medium:



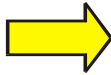
WARNING

Use only the approved coolant!



MANDATORY

Wear protective equipment during the filling process

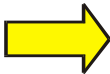


ATTENTION

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

- If required, open maintenance flap:
- Open filler neck (1) of the tank and fill up with operating medium slowly (5–10 l/min) until the MAX level (2) is reached.
- During filling, constantly check the filling level in the tank (if tank present)
- For systems without their own tank, the entire overall system must be completely filled with coolant. (Please ensure that the lines have been vented!)
- Switch on cooler and fill up operating medium, multiple times if needed, until the MAX level is reached.
- Operating medium circuit is completely filled and vented
- Seal the filler neck of the tank
- Re-attach the maintenance flap (optional)

6. Check:



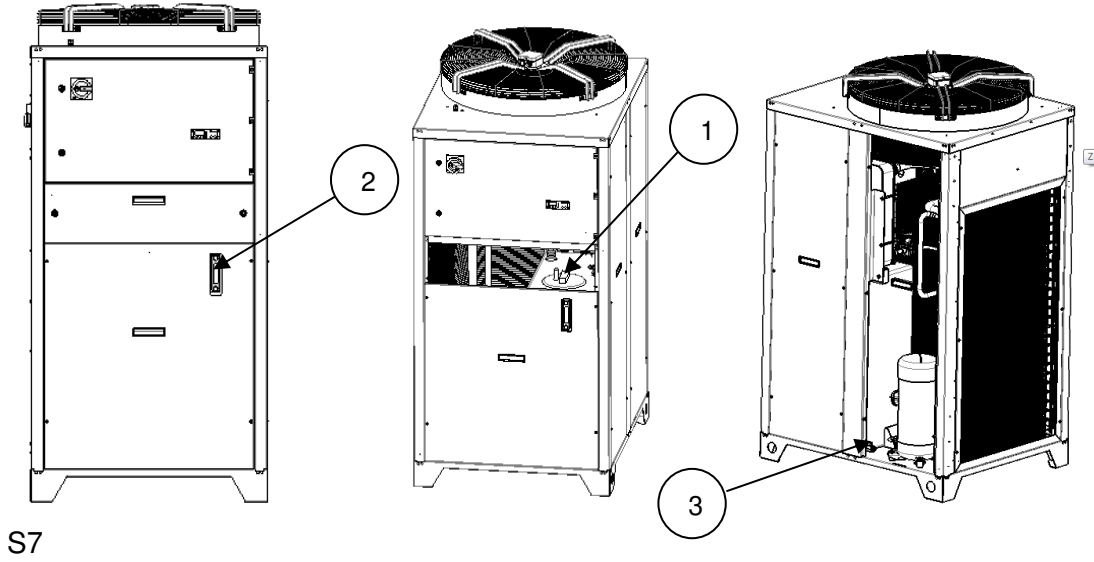
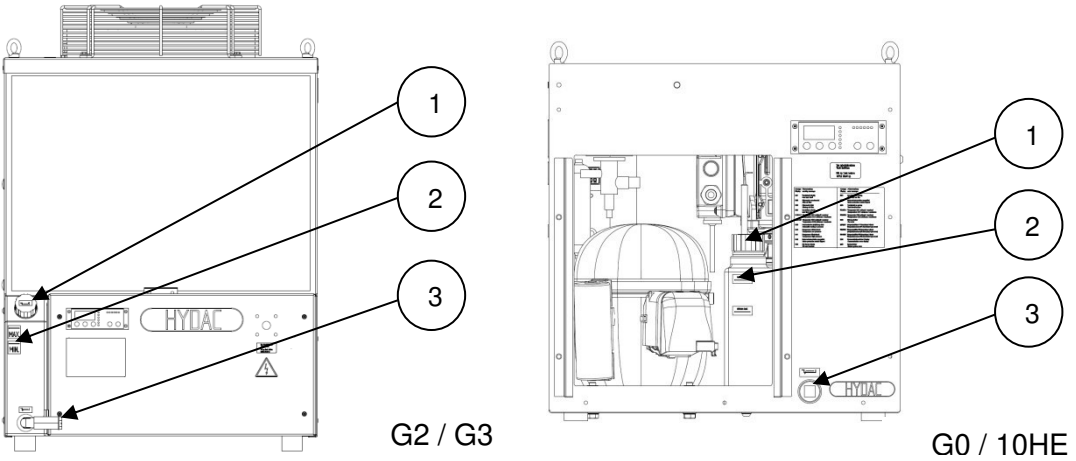
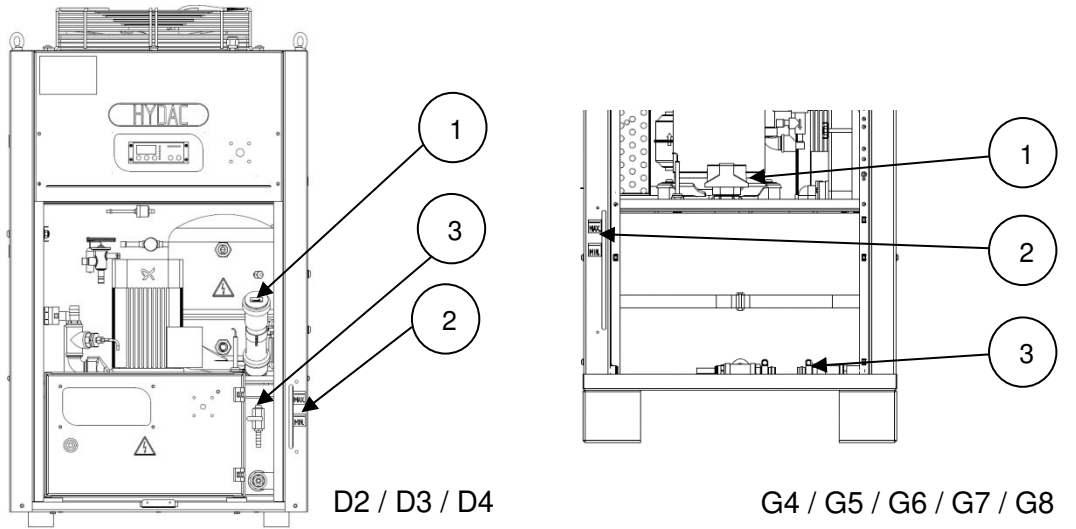
ATTENTION

Leaktightness of the supply lines



ATTENTION

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



schematic diagrams

Pos.	description
1.	filling
2.	min./max. level
3.	Draining / ball valve

11.3 Empty the tank (optional)



MANDATORY

To drain the tank, open the ball valve and/or tank screw plug (3) and drain the cooling medium via the hose. The coolant must be disposed of properly.

12.0 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

13.0 Service and maintenance

All maintenance and service work on the cooler must be performed only by specialist personnel, cooling specialists or specialist electricians, depending on the activity.

13.1 Inspection

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

13.2 Maintenance schedule

What needs to be checked?	When are checks needed?	How should checks be performed?
Fill level	Every week	Visual inspection, refill medium
Particle filter in the water circuit (optional)	Customer-specific (depending on filter contamination) (every three months recommended)	Visual inspection, replace
Cooling fluid	Customer-specific (depending on contamination level and visual change)	Visual inspection, medium exchange
All hoses	Every six months	Visual inspection
Electric system, safety	Every year	Visual inspection
Leakage test, refrigerant (optional)	Every year	See 5.3.6 Leak check
DI cartridge (optional)	Customer-specific	Replace or clean
Ribs of the condenser	Customer-specific (depending on air contamination) (every three months recommended)	Inspection
Air filter	Customer-specific (depending on air contamination) (every three months recommended)	Inspection (replace or clean as required)
Dirt trap for external water (optional)	Customer-specific (every three months and after commissioning recommended)	See 13.5 Dirt trap cleaning / replacing of the metal sleeve

13.3 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!



MANDATORY

When working on the cooler, wear protective gloves, work clothing and safety goggles.



WARNING

Do not reach within the range of rotation of the fan blade. Danger of injuries when the fan blade starts 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 (water-glycol mixture, see "Use and function") 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.

13.4 Cleaning the metal air filter and condenser (optional)

The metal air filter is to be checked for dirt at regular intervals. Cleaning with compressed air is sufficient for normal dirt contamination.

Dust is to be removed from the condenser fins from time to time. Careful brushing or cleaning with compressed air is sufficient for normal dirt contamination. The maintenance interval depends on the ambient conditions at the installation site.



WARNING

Take care. The condenser fins are very delicate. Do not damage the condenser fins while cleaning them.



MANDATORY

When working on the condenser, wear protective gloves, work clothing and safety goggles. Risk of injury on sharp ribs.



WARNING

The filter mat may be replaced by instructed personnel only.

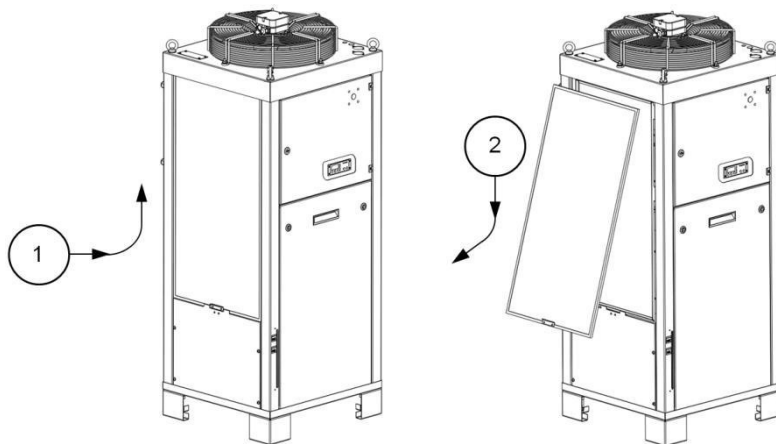
NOTE

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 / chiller will drop considerably.



WARNING

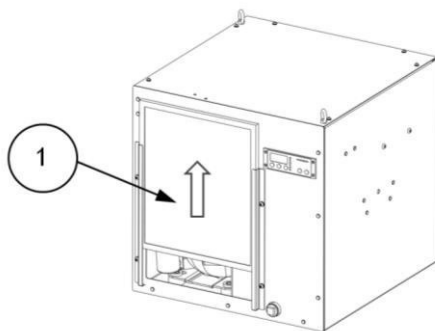
Behind the cover, there are hot system parts with sharp edges. When the covers are removed for maintenance or repair work, make sure not to touch these components!



Pos.	Description
------	-------------

- | | |
|----|---|
| | Push the filter upwards |
| 1. | Push the filter upwards |
| 2. | Pull filter away from the cooler |

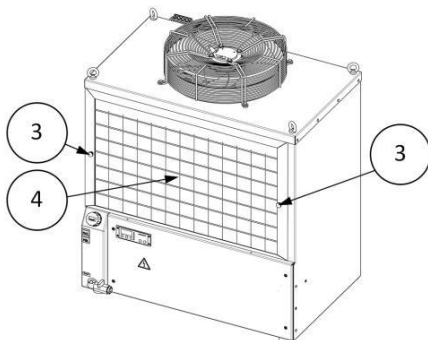
Schematic diagrams **G4,G5,G6,G7,G8,D3,D4**



Pos.	Description
------	-------------

- | | |
|----|---------------------------------|
| 1. | Slide the filter upwards |
|----|---------------------------------|

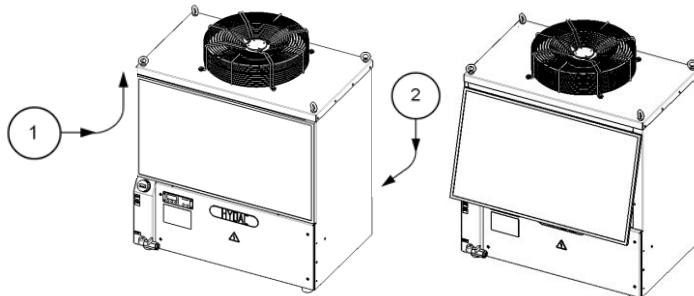
Schematic diagrams **G0, D2, D5**



Pos.	Description
------	-------------

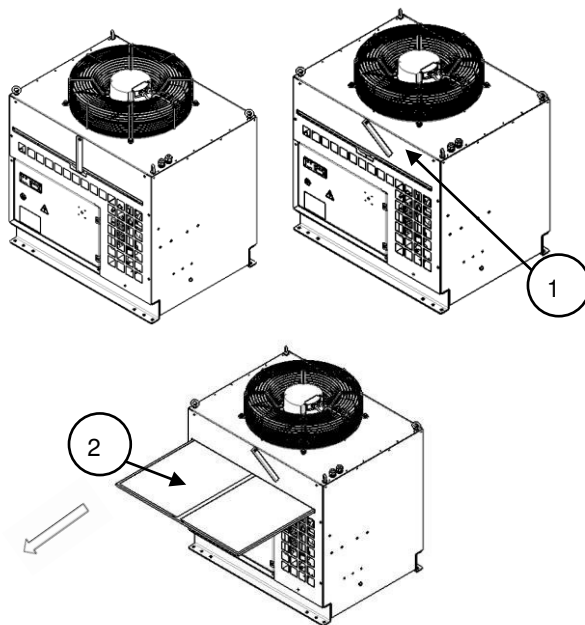
- | | |
|----|---|
| 1. | Remove the screws (2x) |
| 2. | Remove cover and remove filter mat |

Schematic diagrams **G3 with filter mat**



Pos.	Description
1.	Push the filter upwards
2.	Pull the filter away from the chiller and downwards

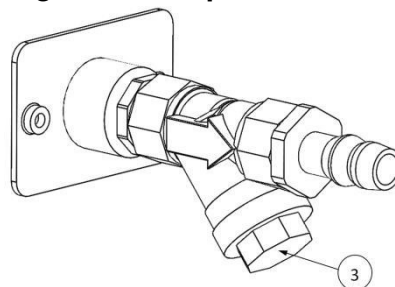
Schematic diagrams **G2,G3 with metal mesh filter**



Pos.	Description
1.	Push the sheet metal angle to the side.
2.	Pull the filter away from the cooler and downwards.

Schematic diagrams **Fluid chiller**

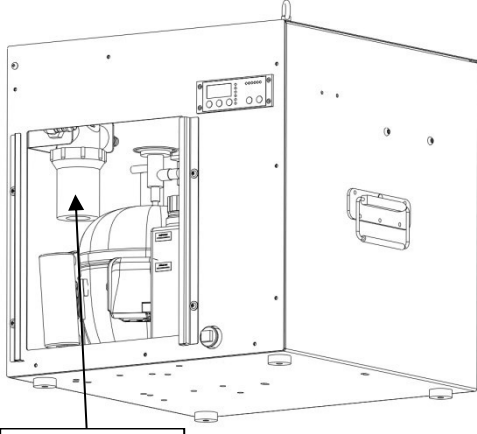
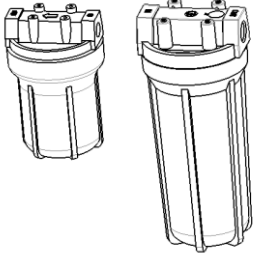
13.5 Cleaning the dirt trap - external water (optional)



Pos.	description
1.	Turn the chiller off and secure it against inadvertent
2.	Make sure the water supply is blocked.
3.	Screw out, clean and reinsert the strainer

13.6 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.

 <p>Particle filter</p> <p>schematic diagram</p>  <p>schematic diagram of the particle filters</p>	<p>work routine</p> <ol style="list-style-type: none"> 1. Turn it off and secure it against inadvertent 2. Remove metal mesh filter / cover 3. Unscrew the filter bowl (lower part) 4. Remove the filter cup 5. Clean the filter cup 6. Insert a new filter cartridge 7. Mount the filter cup 8. Insert metal mesh filter / cover 9. Deaerate the coolant circuit
---	---

14.0 Guarantee terms and conditions

For the warranty provided by us, please refer to the General Conditions of Sale and Delivery of HYDAC Cooling GmbH. You will find these under www.hydac.com / AGB (General terms and conditions).

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 chiller has been changed or made illegible.

The chiller 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:

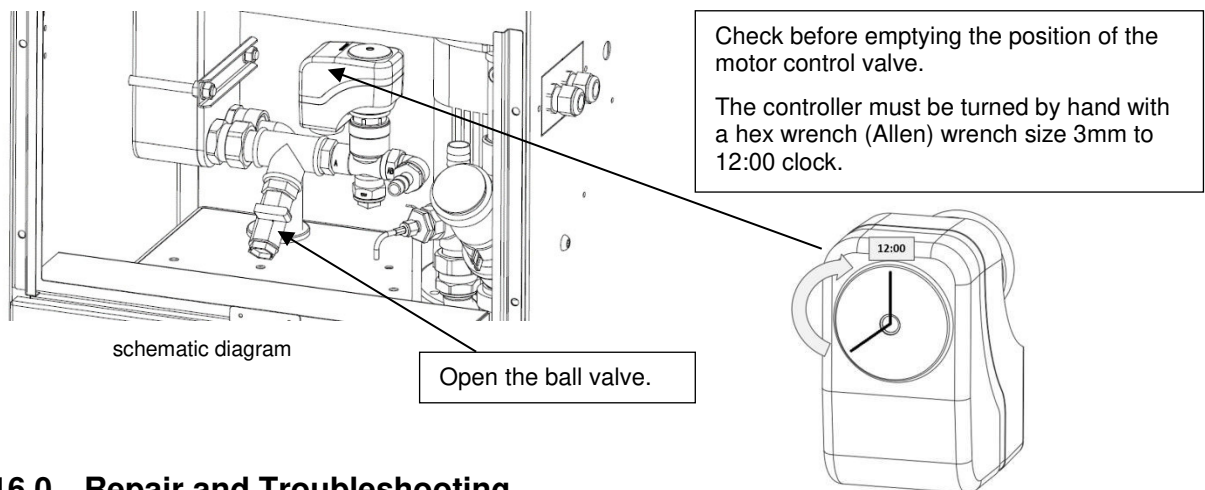
- Enclose a precise description of the defect with your letter.
- Enclose the proof of purchase in the form of a copy of a delivery note or invoice.
- Note on it the type and manufacturing reference number and serial number of the device.

15.0 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.

15.1 Emptying the PHE during shipping or storage below 0 ° C (optional)

Empty the tank. (see section - Empty the tank)
Open the ball valve completely to empty the PHE.



16.0 Repair and Troubleshooting

If the operation a failure occur at the last chiller 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).

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

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



WARNING

Repairing the refrigerant circuit may be done by an expert firm only, please contact the manufacturer



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.



WARNING

After two short-circuit shutdowns, the power, motor and main switch (if present) must be revised or replaced.

17.0 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.

The customer can contact the H-I-B service department for the disposal of the entire device or individual operating materials.

18.0 Dismounting

18.1 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.

18.2 Scrapping



WARNING

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

18.3 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.

18.4 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.

18.5 External water (optional)



WARNING

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

19.0 Operating faults and causes of faults

See controller manual.

20.0 Annex

20.1 Technical data

20.2 Spare parts list

20.3 Dimension sheet

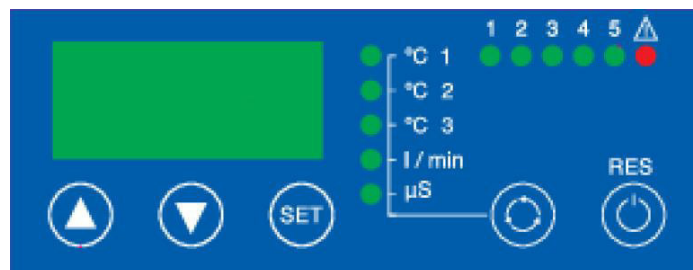
20.4 Flow chart

20.5 Wiring diagramm

20.6 Special functions (optional)

20.7 Test report

20.8 Declaration of Incorporation / CE Declaration of Conformity



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

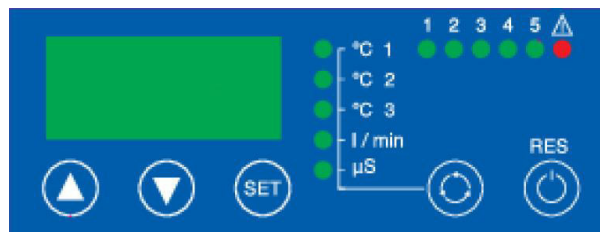


Key 5 RESET (short press on key)

- 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