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Betriebsan instruccion · <mark>사용 설명</mark>

- по Эксплу
- Betriebsa
 instruccion

MPC Minichiller[®] MPC Unichiller[®]

Manual de ale de d'uso нструкция **操作说明书** Manual de ale de d'uso

· 사용 설명서 · Manual de instruções · Инструкция по Эксплуатации · Kullanım talimatı · 操作说明书

This documentation does not contain a device-specific technical appendix.

You can request the full operating instructions from info@huber-online.com. Please give the model designation and serial number of your temperature control unit in your e-mail.





OPERATION MANUAL

MPC Minichiller[®] MPC Unichiller[®]

V2.1.0



Minichiller[®] Unichiller[®]

MPC

This operation manual is a translation of the original operation manual. Also for models with heater.

VALID FOR:

TABLE-TOP MODELS

Minichiller[®] 280 Minichiller[®] 300 Minichiller[®] 600 Minichiller[®] 900w Unichiller[®] 007-MPC[®] Unichiller[®] 01x-MPC[®] Unichiller[®] 02x-MPC[®]

Abbreviations used in model names: Without = with air cooling, w = with water cooler, -H = with heater, plus = with RS232 Interface

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The variants of the MPC controller. Mini Chiller/Unichiller, Unichiller, MPC Immersion circulator (top to bottom)



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Foreword

Dear Customer,

Thank you for choosing a temperature control unit from Peter Huber Kältemaschinenbau AG. You have made a good choice. Thank you for your trust.

Please read the operation manual carefully before putting the unit into operation. Strictly follow all notes and safety instructions.

Follow the operation manual with regard to transport, start-up, operation, maintenance, repair, storage and disposal of the temperature control unit.

We fully warrant the temperature control unit for the specified normal operation.

The models listed on page 5 are referred to in this operation manual as temperature control units and Peter Huber Kältemaschinenbau AG as Huber company or Huber.

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Minichiller[®], Unichiller[®]

1 Introduction

1.1 Details on the declaration of conformity

CE

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- The equipment complies with the basic health and safety requirements of the European Directives listed below:
 - Machinery Directive 2006/42/EC
 - Low Voltage Directive 2006/95/EC
 - EMC Directive 2004/108/EC

1.2 Safety

1.2.1 Symbols used for Safety Instructions

Safety instructions are marked by the below combinations of pictograms and signal words. The signal word describes the classification of the residual risk when disregarding the operation manual.

DANGER Denotes an immediate hazardous situation that will result in death or serious injuries. WARNING Denotes a general hazardous situation that may result in death or serious injuries. CAUTION Denotes a hazardous situation that can result in injury. NOTE Denotes a situation that can result in property material damage. INFORMATION Denotes important notes and usable hints. Safety information and Erratic behaviour Possible hazard source T procedure EFFECT Possible effects > Prevention Prevention of errors Resolving problems Knowledge transfer ≻ Resolve > Knowledge Severity of the residual risk PROCEDURE ≻ Step 1 Step 2 The procedure is explained here step by step. Step 3 ۶ Step 4

> The safety information in this operation manual is designed to protect the responsible body, operator and the equipment from damage. Safety information must always appear BEFORE instructions and at the beginning of each chapter. You should be first informed about the residual risks due to misuse before you begin an operation.



1.2.2	Proper operation
DANGER	 Operating the temperature control unit in a potentially explosive area DEATH THROUGH EXPLOSION Do NOT install or start up the temperature control unit within an ATEX zone.
WARNING	 Improper use SERIOUS INJURY AND PROPERTY DAMAGE Store the operation manual where it is easy to access in close proximity to the temperature control unit. Only adequately qualified operators may work with the temperature control unit. Operators must be trained before handling the temperature control unit. Check that the operators have read and understood the operation manual. Define precise responsibilities of the operators. Personal protective equipment must be provided to the operators. Be sure to follow the responsible body's safety rules to protect life and limb and to limit damages!
NOTE	 Modifications to the temperature control unit by third-parties DAMAGE TO THE TEMPERATURE CONTROL UNIT Do not allow third parties to make technical modifications to the temperature control unit. In case of any modification of the temperature control unit not approved by the manufacturer, the CE declaration of conformity becomes invalid. Only specialists trained by the manufacturer may carry out modifications, repairs or maintenance work. The following must be observed without fail: Only use the temperature control unit in a fault-free condition! Have start-up and repairs carried out only by specialists! Do not ignore, bypass, dismantle or disconnect any safety devices!

The temperature control unit is manufactured for industrial use. The temperature control unit maintains the temperature of certain applications, including glass or metal reactors or other expedient items in laboratories and industry. Flow-through coolers and calibration baths must be used only in combination with Huber temperature control units. Thermal fluids suitable for the overall system are used. The chilling and heating capacity is provisioned at the pump connections or - where present - in the tempering bath. The technical specification of the temperature control unit is given in the data sheet (from page 55 in section **»Annex«**). The temperature control unit must be installed, configured and operated according to the handling instructions in this operating manual. Failure to comply with the operation manual is deemed improper use. The temperature control unit conforms to state-of-the-art technology and the recognized safety regulations. Safety devices are built into your temperature control unit.

1.2.3 Reasonably foreseeable misuse

Use with medical devices (e.g. in Vitro diagnostic procedure) or for direct foodstuff temperature control is **NOT** permissible.

The temperature control unit must **NOT** be used for any purposes other than temperature control in accordance with the operation manual.

The manufacturer accepts **NO** liability for damage caused by **technical modifications** to the temperature control unit, **improper handling** or use of the temperature control unit if the operation manual is **not observed**.

1.3 Responsible bodies and operators – Obligations and requirements

1.3.1 Obligations of the responsible body

The operation manual is to be stored where it is easy to access in close proximity to the temperature control unit. Only adequately qualified operators (e.g. chemists, CTA, physicists etc.) are permitted to work with the temperature control unit. Operators must be trained before handling the temperature control unit. Check that the operators have read and understood the operation manual. Define precise responsibilities of the operators. Personal protective equipment must be provided to the operators.

- The responsible body must install a condensation water / thermofluid drip tray below the temperature control unit.
- The responsible body must check whether national regulations require the mandatory installation of a drain tray for the installation area of the temperature control unit/the entire system.
- Our temperature control unit complies with all applicable safety standards.
- Your system, which uses our temperature control unit, must be as safe.
- The responsible body must design the system so as to ensure it is safe.
- Huber is not responsible for the safety of your system. The responsible body is responsible for the safety of the system.
- Whilst the temperature control unit provided by Huber meets all the applicable safety standards, integration into a system may give rise to hazards that are characteristic of the other system's design and beyond the control of Huber.
- It is the responsibility of the system integrator to ensure that the overall system, into which this temperature control unit is integrated, is safe.
- The >Mains isolator< [36] (if present) may be provided with a facility to lock the main isolator in the off position to facilitate safe system installation and maintenance of the temperature control unit. It is the responsibility of the responsible body to develop any lock-out/tag-out procedure in accordance with local regulations (e.g. CFR 1910.147 for the US).

1.3.1.1 Proper disposal of resources and consumables

Do comply with all national disposal regulations applicable for you. Contact your local waste management company for any questions concerning disposal.

Overview	Material / Aids	Disposal / Cleaning
	Temperature control unit packaging material	Keep the packaging material for future use (e.g. transport).
	Thermal fluid	Please refer to the safety data sheet of the thermal fluid used for information on its proper disposal. Use the original thermal fluid container when disposing it.
	Filling accessories, e.g. beaker	Clean the filling accessories for reuse. Make sure that the materials and cleaning agents used are properly disposed of.
	Aids such as towels, cleaning cloths	Tools used to take up spilled thermal fluid must be disposed of in the same fashion as the thermal fluid itself. Tools used for cleaning must be disposed of depending on the cleaning agent used.
	Cleaning agents such as stainless steel cleaning agents, sensitive-fabrics detergents	Please refer to the safety data sheet of the cleaning agent used for information on its proper disposal. Use the original containers when disposing of large quantities of cleaning agents.
	Consumables such as air filter mats, temperature control hoses	Please refer to the safety data sheet of the consumables used for information on their proper disposal.

1.3.1.2 Temperature control unit with natural refrigerants (NR)

WARNING

Over 8 g refrigerant per m³ room air DEATH OR SERIOUS INJURY DUE TO EXPLOSION

- Observe the rating plate (amount of natural refrigerant contained) and the room size (maximum room concentration of natural refrigerant in case of leakage) when installing the temperature control unit.
- > Over 8 g refrigerant per m³ room air: A gas warning sensor must be fitted and functioning.
- The gas warning sensor must be calibrated and maintained at regular intervals (between 6 and 12 months).
- > The temperature control unit is not approved for operation in an ATEX zone.

Huber products with natural refrigerants work with numerous proven, safe and highly-sustainable technologies. The relevant standards and regulations for temperature control units with natural refrigerants contain a number of stipulations, the importance of complying with which is set out below. Also observe on page 13 the section **»Proper operation«**.

Huber temperature control units are constructed to be permanently sealed and are carefully checked for leak tightness. Temperature control units with more than 150 g natural refrigerant are equipped with an additional gas warning sensor. To find out whether your temperature control unit is equipped with a gas warning sensor, refer to the data sheet from page 55 in section **»Annex«**.

The fill quantity of your temperature control unit is stated on the data sheet (from page 55 in section **»Annex**«) or on the rating plate on the rear of the temperature control unit. Observe page 23, section **»Ambient conditions**« and page 24, section **»Installation conditions**«.

Classifying the applica

tion field

n- d	Class of application field	Application field	Example of the installation location	Max. quantity of refrigerant		Max. permissible quantity above ground level (GL)
	А	General	Publicly accessible area in a public building		DND	1.5 kg
	В	Monitored	Laboratories	8 g/m ³	4	2.5 kg
	С	Access only for authorized persons	Production equipment	ambient air		10.0 kg
	Tomporatura	control units with m	ere then 1 kg refrigerent must not	t he installed held	w group	

Temperature control units with more than 1 kg refrigerant must not be installed below ground level (GL).

Temperature control units with up to 150 g natural refrigerant

- The temperature control unit has been constructed to the requirements of EU and EFTA countries.
- Use the table as guidance for classifying the application field. Respect the max. refrigerant quantity stated therein.

Temperature control units WITH pre-installed gas warning sensor and > 150 g natural refrigerant

- The temperature control unit has been constructed to the requirements of EU and EFTA countries.
- Use the table as guidance for classifying the application field. Respect the max. refrigerant quantity or the permissible highest quantity above ground level (GL) stated therein.
- Ventilation with optional supply and exhaust air connection: Use the temperature control unit's supply and exhaust air connection to connect it to the building's exhaust system (see wiring diagram from page 55 in Section »Annex«). First, remove the cover to the air inlet connection; an air filter mat is installed behind it. This air filter mat must be checked / replaced at regular intervals so that the air flowing into the temperature control unit is not reduced (see page 43, Section »Function check and visual inspection«). Connect the building's exhaust system with the temperature control unit's exhaust air port. The cover of the supply air port mustnot be removed if the exhaust system provided in a building is not used.

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- The mounting plate for mounting a gas warning sensor is located inside the temperature control unit in the vicinity of the >Cable entry gas warning sensor<[100].
- For the position of the **>Cable entry gas warning sensor<** [100], please refer to the wiring diagram from page 55 in Section **>Annex**«.
- Additional information on the pre-installed gas detection sensor:
 - The built-in gas detection sensor enables a safety shutdown at 20% of the lower explosive limit via a power disconnect relay that is to be installed by the responsible body. The temperature control unit is thus switched off early and safely in case of fault.
 - A 24 V DC external power supply must be available for the pre-installed gas warning sensor. The alarm output of the gas warning sensor uses a 4 20 mA signal. Please refer to the data sheet of the gas warning sensor for further technical information. A separate processing unit is available as an accessory for the control of the power disconnect relay. The processing unit provides a potential-free switching contact and simultaneously supplies power to and analyzes the gas warning sensor. Both variants require the responsible body to provide the necessary dimensioning and installation. Please refer to the data sheet of the gas warning sensor for the technical information. The alarm of the gas detection system can be connected to the responsible body's alarm control unit. The responsible body is responsible for this and other measures.
 - The responsible body is responsible for the calibration of the gas detection sensor prior to initial operation and the observance of calibration and maintenance intervals specified in the operating manual. We recommend to set calibration and maintenance intervals between 6 and 12 months if no information is provided. For increased safety requirements, shorter intervals can be specified. On request, we will recommend a specialist company to carry out calibration and maintenance.

Temperature control units WITHOUT pre-installed gas warning sensor and > 150 g natural refrigerant

WARNING Over 8 g refrigerant per m³ room air DEATH OR SERIOUS INJURY DUE TO EXPLOSION Observe the rating plate (amount of natural refrigerant contained) and the room size (maximum room concentration of natural refrigerant in case of leakage) when installing the temperature control unit. Over 8 g refrigerant per m³ room air: A gas warning sensor must be fitted and functioning. The gas warning sensor must be calibrated and maintained at regular intervals (between 6 and 12 months). The temperature control unit is not approved for operation in an ATEX zone. The temperature control unit has been constructed to the requirements of EU and EFTA countries. Use the table as guidance for classifying the application field. Respect the max. refrigerant quantity or the permissible highest quantity above ground level (GL) stated therein. Ventilation with optional supply and exhaust air connection: Use the temperature control unit's supply and exhaust air connection to connect it to the building's exhaust system (see wiring diagram from page 55 in Section »Annex«). First, remove the cover to the air inlet connection; an air filter mat is installed behind it. This air filter mat must be checked / replaced at regular intervals so that the air flowing into the temperature control unit is not reduced (see page 43, Section »Function check and visual inspection«). Connect the building's exhaust system with the temperature control unit's exhaust air port. The cover of the supply air port mustnot be removed if the exhaust system provided in a building is not used.

- NO gas warning sensor is installed in this temperature control unit! Make sure that the installation site of the temperature control unit is sufficiently protected in the event of malfunction. These include:
 - Installation of a gas warning sensor for the building (room monitoring).
 - Permanent ventilation of the temperature control unit and/or the installation site.
 - All-pole disconnection in the event of malfunction of the temperature control unit.



1.3.1.3 Temperature control units with fluorinated greenhouse gases/refrigerants

F gases regulation (EC) No. 517/2014 of April 16, 2014, on fluorinated greenhouse gases, and repealing Regulation (EC) No. 842/2006.

These regulations deal with all systems that contain fluorinated refrigerants. The substances dealt with in Directive (EC) No. 1005/2009 of the European Parliament and of the Council of 16 September 2009 that deplete the ozone layer are excluded (CFC/HCFC).

The directive regulates the reduction of the emission, utilization, recovery, and destruction of certain fluorinated greenhouse gases. It also regulates the identification and disposal of products and devices that contain these gases. Since July 4, 2007, responsible bodies must check their stationary refrigeration systems for leaks at regular intervals, and have any leaks eliminated immediately.

Directive (EC) No. 303/2008 contains stipulations on the training and certification of companies and personnel that are permitted to execute the specified activities.

Obligations of the responsible bodies:

- Directive (EC) No. 842/2006 already imposed a number of obligations upon responsible bodies regarding certain fluorinated greenhouse gases. The new Ordinance on Fluorinated Greenhouse Gases upholds these to a large extent. Some duties are added while others are designed differently by this new ordinance. Please refer to the text of this ordinance for a complete overview of the individual responsibilities of responsible bodies.
- General obligation to reduce emissions.
- Only certified companies may maintain, repair or decommission refrigeration systems. The responsible bodies must verify that these companies are certified.
- Regular leak tests of stationary refrigeration systems by certified personnel (such as Huber service engineers). The required test interval is based on the refrigerant filling capacity and the type of refrigerant, converted to CO₂2 equivalent.
- Responsibility of responsible bodies operating a plant to recover F-gases by certified personnel.
- Obligatory documentation requirement in the refrigeration system's operation manual, specifying type and volume of refrigerant used or recovered. The responsible body must keep the records for at least 5 years after their creation and present it to the responsible authority upon request.
- Temperature control units with natural refrigerants (NR) are exempt from this Directive.
- Please refer to the data sheet or name plate of your temperature control unit for the quantity and type of refrigerant.
- Additional information about the definition of the inspection interval can be found on our website.

1.3.2 Requirements for operators

Work on the temperature control unit is reserved for appropriately qualified specialists, who have been assigned and trained by the responsible body to do so. Operators must be at least 18 years old. Under 18-year olds may operate the temperature control unit only under the supervision of a qualified specialist. The operator is responsible vis-a-vis third-parties in the work area.

1.3.3 Obligations of the operators

Carefully read the operation manual before operating the temperature control unit. Please observe the safety instructions. When operating the temperature control unit, wear appropriate personal protective equipment (e.g. safety goggles, protective gloves, non-slip shoes).

1.4 General information

1.4.1 Description of workstation

The workstation is located at the control panel in front of the temperature control unit. The workstation is determined by the customer's connected peripheries. Accordingly, it must be designed safe by the responsible body. The workstation design also depends on the applicable requirements of the German occupational health and safety regulations [BetrSichV] and the risk analysis for the workstation.



1.4.2 Safety devices to DIN 12876

The rating of your temperature control unit is stated on the data sheet in the appendix.

Rating of laboratory thermostats and laboratory baths	Classification	Temperature control medium	Technical requirements	Identification ^{d)}
	I	Non-combustible ^{a)}	Overheat protection ^{c)}	NFL
	II	Combustible ^{b)}	Adjustable overheat protection	FL
	Ш	Combustible ^{b)}	Adjustable overtemperature protection and additional low-level protection	FL
	 ^{a)} Usually water; other fluids only if non-combustible even within the temperature range of an individual fault. ^{b)} The temperature control media must have a combustion point of ≥ 65 °C. ^{c)} The overheat protection can, for instance, can be realized using a suitable fill level sensor or a suitable temperature limiter. ^{d)} Optional at the choice of the manufacturer. 			

• Temperature control units with heating correspond to class number III/FL. These temperature control units are characterized by an "H" in the device name.

Temperature control units without heating correspond to class number I/NFL.

Overview of the tem- perature thresholds	C [Maximum working temperature] Highest possible temperature of the temperature control unit.
	[Over-temperature treshold] 25 K below combustion point of the thermal fluid.
	[Setpoint] Can be set between max./min. working temperature only.
	[Minimum working temperature] Lowest possible temperature of the temperature control unit.

1.4.2.1 Mechanical overtemperature protection

Only temperature control units with a heater are fitted with a mechanical overtemperature protection. Set the overtemperature protection as described on page 34 in section **»Setting the overtemperature (OT) protection**«.

INFORMATION

Emergency strategy – isolate the power supply!

Disconnect the temperature control unit from the power supply!

1.4.3.1 Power interruption

Following a power outage (or when switching on the temperature control unit), this function can be used to determine how the temperature control unit is supposed to respond.

Auto-Start function is turned off

The temperature control is started only by manual input when the temperature control unit is turned on.

Auto-Start function is turned on

The temperature control unit is set to the same state it was in before the power outage. For example, before the power outage: Thermoregulation is off; after power outage: Thermoregulation is off. If temperature control is active during a power outage, the process will automatically continue after the power outage.

Further information can be found on page 33 in section »Changing the Auto-Start function«.



1.5 Exemplary illustrations of the cooling variants



1.5.2 Water cooling



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1.5.3 Consequence of inadequate energy dissipation

Room air/cooling water

Consequences of, for instance, contamination of the liquefier fins, inadequate clearance between temperature control unit to wall/bath wall, room air/cooling water too warm, cooling water differential pressure too low, suction strainer contamination: The refrigerant in the coolant circuit can no longer fully discharge the admitted energy to the room air/cooling water. Thus there is not sufficient liquefied refrigerant available, the condensation temperature and the energy consumption to rise.

Coolant circuit

Consequences of inadequate refrigerant quantity/rising condensation temperature: Not all the cooling capacity from the coolant circuit is available at the evaporator. This means reduced energy transmission from the thermal fluid circuit.

Thermal fluid circuit

Consequence of inadequate energy dissipation from the thermal fluid: The thermal fluid can only dissipate the energy from your application to a limited extent.

Application

Consequences of inadequate energy dissipation from the application: The energy created (exothermic) in the application can no longer be fully dissipated.

Temperature control unit

An electronically-controlled expansion valve is used in the temperature control unit to optimize the power adjustment. The expansion valve always provisions the maximum possible cooling capacity within the permissible ambient temperature range. The temperature control unit switches off when the upper range is reached (maximum permissible ambient temperature).



2 Commissioning

2.1 In-plant transport

WARNING

Temperature control unit is not transported / moved according to the specifications in this operation manual

DEATH OR SERIOUS INJURY DUE TO CRUSHING

- Always transport / move the temperature control unit according to the specifications in this operation manual.
- Wear personal protective equipment during transport.
- Always work with the specified number of persons when moving the temperature control unit on casters (if any).
- If the temperature control unit is equipped with casters and parking brakes:
 2 parking brakes are always freely accessible when moving the temperature control unit. Activate the 2 parking brakes in an emergency!
 - If only **one** parking brake is activated on the casters in an emergency: The temperature control unit is not stopped but rotates around the axis of the caster with the
 - activated parking brake!

NOTE

Temperature control unit transported in a horizontal position DAMAGE TO THE COMPRESSOR

Only transport the temperature control unit in an upright position.

- If available, use the lugs on the top side of the temperature control unit for transportation.
- Use an industrial truck for transport.
- The casters on the temperature control unit are not suitable for transport. The casters are symmetrically loaded with 25% of the total mass of the temperature control unit.
- Remove the packing material (e.g. the palette) only at the place of installation.
- Protect the temperature control unit from transport damage.
- Do not transport the temperature control unit alone and without aids.
- Check the load bearing capacity of the transportation route and the place of installation.
- The parking brakes must be activated at the casters (if any) and/or the leveling feet (if any) must be unscrewed/activated before the temperature control unit is put into operation (see page 27, section »Unscrewing/activating the leveling feet (if any)«).

2.1.1 Lifting and transporting the temperature control unit

2.1.1.1 Temperature control unit with lifting eyes

NOTE

The temperature control unit is raised at the lifting eyes without load handling attachments DAMAGE TO THE TEMPERATURE CONTROL UNIT

- Always use load handling attachments when lifting and transporting the temperature control unit.
- The lifting eyes are only designed for a load without inclination (0°).
- The load handling attachment used must be adequately dimensioned. Take the dimensions and weight of the temperature control unit into account.
- Do not lift and transport the temperature control unit at the lifting eyes alone and without aids.
- Lift and transport the temperature control unit at the lifting eyes only with a crane or an industrial truck.
- The crane or industrial truck must have a lifting force equal to or greater than the weight of the temperature control unit. See the data sheet (from page 55 in section »Annex«) for the weight of the temperature control unit.



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2.1.1.2 Temperature control unit without lifting eyes

- Do not lift and transport the temperature control unit alone and without aids.
- Lift and transport the temperature control unit only with an industrial truck.
- The industrial truck must have a lifting force equal to or greater than the weight of the temperature control unit. See the data sheet (from page 55 in section »Annex«) for the weight of the temperature control unit.

2.1.2 Positioning the temperature control unit

2.1.2.1 Temperature control unit with casters

- Do not use the casters for transportation to the place of installation. Observe page 21, section
 »Lifting and transporting the temperature control unit« for the transport to the place of installation.
- Use the rollers only for positioning at the place of installation.
- Only ever move the temperature control unit on casters if the surface is level, without a gradient, non-slip and stable.
- Do not move the temperature control unit alone.
- At least 2 persons are required to move the temperature control unit on casters. At least 5 persons are required to move the temperature control unit on casters if the total weight of the temperature control unit is over 1.5 tons.
- The parking brakes must be activated at the casters and/or the leveling feet (if any) must be unscrewed/activated before the temperature control unit is put into operation (see page 27, section »Unscrewing/activating the leveling feet (if any)«).

2.1.2.2 Temperature control unit without casters

- An industrial truck must be used for positioning the temperature control unit.
- Do not move the temperature control unit alone.
- At least 2 persons are required to move the temperature control unit.
- The industrial truck must have a lifting force equal to or greater than the weight of the temperature control unit. See the data sheet (from page 55 in section **»Annex«**) for the weight of the temperature control unit.
- The leveling feet (if any) must be unscrewed/activated before the temperature control unit is put into operation (see page 27, section **»Unscrewing/activating the leveling feet (if any)**«).

2.2 Unpacking

WARNING

Starting up a damaged temperature control unit MORTAL DANGER FROM ELECTRIC SHOCK

- > Do not operate a damaged temperature control unit.
- Please contact the Customer Support. The telephone number can be found on page 54, section »Phone number and company address«.

PROCEDURE

- Check for damage to the packaging. Damage can indicate property damage to the temperature control unit.
- Check for any transport damage when unpacking the temperature control unit.
- Always contact your forwarding agent regarding the settlement of claims.
- Follow the instructions on page 14, section »Proper disposal of resources and consumables« for the disposal of packaging material.



2.3 Ambient conditions CAUTION Unsuitable ambient conditions/unsuitable installation SERIOUS INJURY DUE TO CRUSHING

Comply with the requirements under sections »Ambient conditions« and »Installation conditions«.

INFORMATION Make sure there is adequate fresh air available at the site for the circulation pump and the compressors. The warm exhaust air must be able to escape upwards unhindered.

Free-standing model

For the connection data, see the data sheet (from page 55 in section »Annex«).

Use of the temperature control unit is permitted only under normal ambient conditions in accordance with DIN EN 61010-1:2011:

- Use only indoors. The illuminance must be at least 300 lx.
- Installation altitude up to 2000 meters above sea level .
- Maintain wall and ceiling clearance for adequate air exchange (dissipation of waste heat, supply
 of fresh air for the temperature control unit and work area). Ensure adequate floor clearance for
 air-cooled temperature control units. Do not operate this temperature control unit from within
 the box or with an inadequately dimensioned bath. This inhibits the exchange of air.
- Ambient temperature values are provided on the technical data sheet; compliance with the ambient conditions is mandatory, to ensure trouble-free operation.
- Relative humidity up to 32 °C max. 80% and decreasing linearly to 50% up to 40 °C.
- Short distance to supply connections.
- The temperature control unit must not be installed so as to hinder or prevent access to the isolator (to the power supply).
- Magnitude of the power supply fluctuations: see data sheet from page 55 in section »Annex«.
- Transient surges, as would normally occur in the power supply system
- Installation Class 3
- Applicable degree of soiling: 2.
- Surge category II.

Observe page 19 of section »Exemplary illustrations of the cooling variants«.

Wall clearance to		Clearance to the temperature control unit in cm		
temperature control unit		Air cooling	Water cooling	
	Side of the temperature control unit			
	[A1] Top	Air outlet on top of unit: free standing	-	
	[A2] Top	can be located under a bench	can be located under a bench	
	[B] Left	min. 20	min. 10	
	[C] Right	min. 20	min. 10	
	[D] Front	min. 20	min. 10	
	[E] Rear	min. 20	min. 20	



	Clearance to the temperature control unit in cm (for operation in a bat		
	Air cooling	Water cooling	
Side of the temperature control unit			
[A1] Top	Air outlet on top of unit: free standing	-	
[A2] Top	can be located under a bench	can be located under a bench	
[B] Left	min. 20	min. 20	
[C] Right	min. 20	min. 20	
[D] Front	min. 20	min. 20	
[E] Rear	min. 20	min. 20	

2.3.1 EMC-specific notes

These devices are suitable for the operation in **"industrial electromagnetic environments"**. It meets the **"immunity requirements"** of the currently applicable **EN61326-1**, which are required for this environment.

It also meets the **"interference emission requirements"** for this environment. It is a **Group 1** and **Class A** unit according to the currently applicable **EN55011**.

Group 1 specifies that high frequency (HF) is only used for the function of a device. **Class A** specifies the interference emission limits to be observed.

2.4 Installation conditions



• Observe the ambient conditions.



2.5 Recommended temperature control and cooling water hoses

Use of unsuitable/defective hoses and/or hose connections
INJURIES

- > Thermal fluid
- > Use appropriate hoses and/or hose connections.
- Check periodically for leaks and the quality of the hose and hose connections and take suitable measures (replace) as required.
- ▶ Isolate and protect temperature control hoses against contact/mechanical load.
- > Cooling water
- Reinforced hoses must be used to satisfy tougher safety requirements.
- Shut off the cooling water supply to the temperature control unit even for shorter downtimes (e.g. overnight).

CAUTION

Hot or cold thermal fluid and surfaces

BURNS TO LIMBS

- Avoid direct contact with the thermal fluids or the surfaces.
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear).

To connect applications, use only temperature control hoses that are compatible with the thermal fluid used. When selecting temperature control hoses, also pay attention to the temperature range in which the hoses are to be used.

- We recommend you use only temperature-insulated temperature control hoses with your temperature control unit. The responsible body is responsible for the insulation of connection valves.
- We **exclusively** recommend reinforced hoses for connecting to the cooling water supply. Cooling water and insulated temperature control hoses can be found in the Huber catalogue under Accessories.

2.6 Wrench sizes and torques

Note the wrench sizes that result for the pump connection on the temperature control unit. The following table lists the pump connections and the resulting wrench sizes, and torque values. A leak test must always be performed, and the connections tightened if necessary. The values of the maximum torque (see table) must **not** be exceeded.

Overview wrench sizes and torques	Pump connection	Sleeve nut wrench size	Connector wrench size	Recommended torques in Nm	Maximum torques in Nm
	M16x1	19 AF	17 AF	20	24
	M24x1.5	27 AF	27 AF	47	56
	M20-1 F	36 AF	32 AF	79	93
	WI30X1.5	36 AF	36 AF	79	93
	M38x1.5	46 AF	46 AF	130	153

2.7 Temperature control units with water cooling

WARNING

Open electrical wires below the temperature control unit if the temperature falls below the dew point.

DEATH FROM ELECTRICAL SHOCK BY WATER ENTRY INTO THE ELECTRIC LINES.

- A temperature below the dew point may result in condensation in the temperature control unit and at the cooling water connections. The condensation is caused by high humidity at the cooling waterbearing components. The condensation exists the temperature control unit at the bottom.
- Electrical lines directly below the temperature control unit must be protected against liquid ingress.



	Use of unsuitable/defective hoses and/or hose connections			
	INJURIES			
	> Thermal fluid			
	 Use appropriate hoses and/or hose connections. Check pariodically for loaks and the guality of the base and hose connections and take suitable. 			
	measures (replace) as required.			
	Isolate and protect temperature control hoses against contact/mechanical load.			
	> Cooling water			
	Reinforced hoses must be used to satisfy tougher safety requirements. Shut off the cooling water supply to the temperature control unit even for shorter downtimes.			
	(e.g. overnight).			
NOTE	No protection against corrosion			
	DAMAGE TO THE TEMPERATURE CONTROL UNIT			
	> The addition of anti-corrosion agents is mandatory if salts (chlorides, bromide) have been			
	added to the water circuit.			
	Ensure that the materials used in the cooling water circuit are resistant with respect to the			
	cooling water. See the data sheet from page 55 in section »Annex « for information on the ma-			
	 Take suitable measures to maintain the warranty conditions. 			
	For information about water quality, see www.huber-online.com.			
ΝΟΤΕ	Usage of un-filtered river or sea water as cooling water			
	DAMAGE TO THE TEMPERATURE CONTROL UNIT			
	> Un-filtered river or sea water is not suitable for use as cooling water due to the contaminants.			
	Use drinking water of filtered river or sea water for cooling.			
	For information about water quality, see www.huber-online.com.			
INFORMATION	To minimize cooling water consumption, Huber temperature control units with water cooling are			
	by the current load situation. If only a low cooling capacity is requested, only a small amount of			
	cooling water is consumed. It cannot be ruled out that cooling water flows when the machine is			
	switched off. Shut off the cooling water supply to the temperature control unit even for shorter			
	downtimes (e.g. overnight).			
Connection diagram				
	Water supply Water drain Draining/			
	Water			
	Preparing the temperature control unit with water cooling:			
INFORMATION	The minimum pressure differential in the cooling water circuit and the recommended cooling			
	water inlet temperature can be found on the data sheet (from page 55 in section »Annex «).			
	The illustration "connection diagram" can be found on page 55 in section »Annex« .			
	PROCEDURE			
	Close (if fitted) the >Cooling water drain< [15].			
	Connect the >Cooling water outlet< [14] to the water return flow. A seal must be used.			
	Connect the >Cooling water inlet< [13] to the water supply. A seal must be used.			
ΝΟΤΕ	Leaking cooling water connections			
	DAMAGE BY ROOM FLOODING			
	Slowly open the building-side shut-off valves of the cooling water supply and return line.			
	In water leaks from the cooling water connections: shut on the cooling water supply and return line immediately.			
	 Provide leakproof cooling water connections. 			



Open the shut-off valves in the water line on the temperature control unit and on the building side.
 Check the connections for leaks.

2.8 Preparations for operation

2.8.1 Unscrewing/activating the leveling feet (if any)

WARNING

The leveling feet are not unscrewed/activated before switching on the temperature control unit DEATH OR SERIOUS INJURY DUE TO CRUSHING

- The parking brakes must be activated at the casters (if any) and/or the leveling feet must be unscrewed/activated before the temperature control unit is put into operation.
- The temperature control unit may move if the parking brakes of the casters (if any) are not activated and/or the leveling feet are not unscrewed/activated.

Always unscrew/activate the leveling feet before switching on the temperature control unit. Uneven floors can be compensated by adjusting these leveling feet.

PROCEDURE

- Verify that the parking brakes of the casters (if any) have been activated.
- Unscrew the leveling feet.
- Compensate uneven floors by adjusting these leveling feet, if necessary. Use a spirit level to horizontally align the temperature control unit.
- Tighten the lock screws on the leveling feet after aligning the temperature control unit. This prevents the leveling feet from changing their height during operation.

2.8.2 Opening/closing the bypass valve

Some temperature control units are fitted with an adjustable bypass and the associated pressure gauge to protect fragile applications (e.g. a glass apparatus). To find out whether your temperature control unit is equipped with an adjustable bypass and a pressure gauge, refer to the "connection diagram" from page 55 in Section **»Annex«**.

The **>Bypass valve**< [62] is located on top of the temperature control unit. The set pressure is indicated by the **>Pressure gauge**< [63]. The **>Bypass valve**< [62] must be fully open before the circulation starts:

- at the initial fill of machine;
- when switching to another thermal fluid;
- when switching to another application.

Opening and closing the bypass valve



INFORMATION

Opening the bypass valve:

Open the valve by turning it counterclockwise (turn 90° left as far as it will go). **Closing the bypass valve:** Close the valve by turning it clockwise (turn 90° right as far as it will go).

PROCEDURE

- > Check whether the >Bypass valve< [62] is open.
- > Open the >Bypass valve< [62] by turning it counterclockwise (turn 90° left as far as it will go).



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2.8.3 Enable / Disable silent operation (optional)





Activating silent operation on the temperature control unit reduces the noise level by decreasing the pumping capacity. For the exact position of the button **>Change pump speed< [114]** please refer to the "Wiring diagram" from page 55 in Section **>Annex**«.

PROCEDURE

- To activate silent operation, press the button >Change pump speed< [114] on the temperature control unit. The pumping capacity and the noise level are reduced.</p>
- To deactivate silent operation, re-press the button >Change pump speed< [114] on the temperature control unit. The pumping capacity and the noise level are increased.
- Select the silent operation mode by activation and deactivation.

2.9 Connecting externally closed application

The illustration "connection diagram" can be found on page 55 in section »Annex«.

2.9.1 Connecting an externally closed application

NOTE

Pressure > 0.5 bar (g) with glass apparatus

MATERIAL DAMAGE CAUSED BY CRACK FORMATION AT THE GLASS APPARATUS.

- Provide an over-pressure protective device to prevent damage to the glass apparatus.
- Do not install valves/quick-release couplings in the feed/discharge lines from the temperature control unit to the glass apparatus and from the glass apparatus to the temperature control unit.
- > If valves/quick-release couplings are required:
- Install burst disks on the glass apparatus itself (at the feed and discharge lines).
- Install a bypass upstream of the valves/quick-release couplings for the glass apparatus.
- Matching accessories (e.g. bypasses to reduce pressure) can be found in the Huber catalog.

Example: Connecting an externally closed application



To enable your application to be operated correctly and eliminate air bubbles from the system, you must ensure that the **>Circulation flow< [1]** connection from the temperature control unit is attached to the lower connection point of the application and the **>Circulation return< [2]** into the temperature control unit is attached to the higher connection point of the application.

PROCEDURE

- ➢ Remove the screw plugs from the >Circulation flow< [1] and >Circulation return< [2] connections.</p>
- Then connect your application to the temperature control unit using suitable thermal fluid hoses. The corresponding wrench sizes can be found in the table on page 25 in section **Wrench sizes** and torques«.
- Check the connections for leaks.



2.10 Connecting to the power supply

INFORMATION	Based on local circumstances, it may be that you need to use an alternative power cable instead of the supplied original power cable. Do not use a power cable that is longer than 3 m to be able to disconnect the temperature control unit at any time from the mains. Have the mains cable only replaced by a qualified electrician.		
2.10.1	Connection using socket with protective earth (PE)		
	 Connecting to a power socket without protective earth (PE) MORTAL DANGER FROM ELECTRIC SHOCK Always connect the temperature control unit to safety sockets (PE). 		
DANGER	 Damaged power cable/power cable connection MORTAL DANGER FROM ELECTRIC SHOCK Do not start up the temperature control unit. Isolate the temperature control unit from the power supply. Have the power supply cable/power supply connection replaced and inspected by an electrician. Do not use a power cable that is longer than 3 m. 		
ΝΟΤΕ	 Incorrect power supply connection DAMAGE TO THE TEMPERATURE CONTROL UNIT Your building's existing power supply voltage and frequency must match the data provided on the rating plate of the temperature control unit. 		
INFORMATION	In case of uncertainties about an existing protective earth (PE), have the connection inspected by an electrician.		
2.10.2	Connection via hard wiring		
DANGER	Connection/adjustment to the power supply not carried out by an electricianMORTAL DANGER FROM ELECTRIC SHOCK➤ Have the connection/adjustment to the power supply carried out by an electrician.		
DANGER	 Damaged power cable/power cable connection MORTAL DANGER FROM ELECTRIC SHOCK > Do not start up the temperature control unit. > Isolate the temperature control unit from the power supply. > Have the power supply cable/power supply connection replaced and inspected by an electrician. > Do not use a power cable that is longer than 3 m. 		
ΝΟΤΕ	Incorrect power supply connection DAMAGE TO THE TEMPERATURE CONTROL UNIT → Your building's existing power supply voltage and frequency must match the data provided on		

the rating plate of the temperature control unit.

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3 Function description

3.1 Function description of the temperature control unit

3.1.1 General functions

Circulating coolers are temperature control units, which are mainly used to dissipate process heat as well as a cost effective alternative to cooling water (drinking water).

Due to powerful refrigeration engineering, short cooling rates can be achieved.

3.1.2 Other functions

A pump ensures good circulation of the thermal fluid. The **LED display** shows the current temperature. A new setpoint can be easily entered with a simple keyboard.

Optionally, you can add a digital interface (RS232) to your temperature control unit.

Temperature control units with a heater have an **overtemperature protection to DIN EN 61010-2-010 that is independent** of the control circuit.

3.2 Information on the thermal fluids

CAUTION

Non-compliance with the safety data sheet for the thermal fluid to be used

- INJURIES
- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the thermal fluid to be used must be read prior to using it and its content must be respected.
- Observe the local regulations/work instructions.
- Wear your personal protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear).
- Danger of slipping because floor and work area are contaminated. Clean the work station and follow the instructions for the disposal of thermal fluid and material on page 14 in Section »Proper disposal of resources and consumables«.

NOTE

Non-compliance with the compatibility between the thermal fluid and your temperature control unit MATERIAL DAMAGE

- > Observe the classification of your temperature control unit according to DIN 12876.
- Ensure the following materials are resistant with respect to the thermal fluid: Stainless steel
- 1.4301/ 1.4401 (V2A), copper, nickel, FKM, red bronze/brass, silver solder and plastic.
 The maximum viscosity of the thermal fluid must not exceed 50 mm²/s at the lowest working temperature!
- The maximum density of the thermal fluid may not exceed 1 kg/dm³!

 Designation
 Specification

 Calcium carbonate per liter
 ≤ 1.5 mmol/l; corresponds to a water hardness of: ≤ 8.4 °dH (soft)

 PH value
 between 6.0 and 8.5

 Ultrapure water, distillates
 Add 0.1 g of sodium carbonate (Na2CO3) per liter

 Not approved water
 Distilled, deionized, demineralized, chloric, ferruginous, ammoniacal, or contaminated river water or sea water

 Volume circulated (at least)
 3 l/min.

Designation	Specification	
Thermal fluid: Water without ethylene glycol		
Use	≥ +3 °C	
Thermal fluid: Water-ethylene glycol mixture		
Use	< +3 °C	
Thermal fluid composition	The mixture's temperature must be 10 K below the permissible min. tem- perature. For the permissible temperature range, refer to the datasheet from page 55 in Section »Annex«.	

3.3 To be noted when planning the test

INFORMATION	Also observe page 13 in section »Proper operation «.
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The focus is on your application. Bear in mind that system performance is influenced by heat transfer, temperature, thermal fluid viscosity, volume flow, and flow speed.

- Make sure that the electrical connection is adequately dimensioned.
- The installation location of the temperature control unit should be selected so as to ensure adequate fresh air, even with water-cooled chillers.
- The maximum forward flow pressure of a temperature control unit must be taken into account in case of pressure-sensitive applications, such as glass reactors.
- A cross-section reduction or shut-off in the thermal fluid circulation must be avoided. Take corresponding measures to limit the pressure in the system; see data sheet from page 55 in Section
 »Annex« and the data sheet for your glass apparatus.
- Check whether it is necessary to use an external bypass for temperature control units without pressure limitation.
- To prevent the danger of over-pressure in the system, the thermal fluid must always be brought to room temperature before switching off. This will prevent damage to the temperature control unit or the application. Any isolating valves must remain open (pressure equalization).
- Select the thermal fluid to be used in such a way that it not only permits the minimum and maximum working temperature but is also suitable with regard to combustion point, boiling point, and viscosity. In addition, the thermal fluid must be compatible with all the materials in your system.
- Avoid bending the temperature control and cooling water hoses (if required). Use suitable angle
 pieces and lay the hose connections with a large radius. Take the minimum bending radius from
 the data sheet of the temperature control hoses used.
- The selected hose connections must be resistant to the thermal fluid, the working temperatures and the permitted maximum pressure.
- Check the hoses at regular intervals for any material fatigue (e.g. cracks, leaks).
- Keep the length of temperature control hoses as short as possible.
 - Always adjust the inside diameter of temperature control hoses to the pump connections.
 - The viscosity of the thermal fluid determines the pressure drop and affects the temperature control results, particularly at low operating temperatures.
 - Too small connectors and couplers and valves can generate significant flow resistance.
 Your application will therefore be slower to reach its design temperature.
- Basically, you should only use the thermal fluid recommended by the manufacturer and only within the usable temperature and pressure range.
- The application should be roughly at the same height of or below the temperature control unit if the thermoregulation is close to the boiling temperature of the thermal fluid.
- Fill the temperature control unit slowly, carefully and evenly. Wear the necessary personal protective equipment, such as goggles, heat-proof and chemical-resistant gloves, etc.
- The temperature control circuit must be vented after filling and setting all required parameters. This is required to ensure trouble-free operation of the temperature control unit and hence your application.

INFORMATION

For water-cooled temperature control units, please take the cooling water temperature necessary for perfect operation and the required differential pressure from the data sheet from page 55 onward in the Section **»Annex«**.

OPERATION MANUAL



OPERATION MANUAL

Chapter 3

Display and control instruments 3.4

The control panel: Displays and keys



3.4.1 Display

The value of the internal temperature is displayed. For example, this is the bath temperature for temperature control units with a bath, or the flow temperature of chillers. Different key combinations also display the setpoint, a menu item or settings.

3.4.2 LED display status

These LEDs indicate the current operating condition.

3.4.3 Arrow keys

These keys are used to (\bigcirc increase or decrease \bigcirc) the setpoint or select or change a menu item. The >Arrow keys< [C] are also required to call the menu up.

3.4.4 SET key

The >SET key< [D] is used to switch to the setpoint temperature. It is used to display and modify the setpoint temperature. The >SET key< [D] is also used to display the values of the various menu items.

3.4.5 Start/Stop key

This key starts or stops the thermoregulation.

3.5 Menu function

Your temperature control unit is equipped with a menu function.

Overview of the menu	Menu item	Display	Description
items	ADR	Rdr	Without a function
	C40	E . H . B .	Auto-Start function
	PA	8.8.8.	Service menu Only for Huber service personnel.
		8.8.8.	



3.6 Function examples

3.6.1 Display setpoint

PROCEDURE

- > Press the **>SET key<** [D] and keep it pressed. The setpoint is displayed.
- > Release the >SET key< [D]. The internal temperature is displayed again.

3.6.2 Set/change setpoint

PROCEDURE

- > Press the **>SET key**< [D] and keep it pressed. The setpoint is displayed.
- > Use the >Arrow keys< [C] to select the required value.
- igodot (up) the temperature increases, igodot (down) the temperature decreases.
- Release the >SET key< [D]. The new setpoint is set.</p>

3.6.3 Changing the Auto-Start function

Following a power outage (or when switching on the temperature control unit), this function can be used to determine how the temperature control unit is supposed to respond.

Auto-Start function is turned off

The temperature control is started only by manual input when the temperature control unit is turned on.

Auto-Start function is turned on

The temperature control unit is set to the same state it was in before the power outage. For example, before the power outage: Thermoregulation is off; after power outage: Thermoregulation is off. If temperature control is active during a power outage, the process will automatically continue after the power outage.

Settings in the menu	Setting	Display	Description
item "C40" auto-start function	0	8.8.8.	The auto-start function is turned on.
	1	8.8.8.	The auto-start function is turned off.

PROCEDURE

- ➢ Press the >Arrow keys< [C] ⓐ and ☺ simultaneously for 3 seconds. The display changes from the display of the temperature to the display of the first menu item.</p>
- > Press the >Arrow key< [C] 🗇 until the menu item "C40" is displayed.
- > Press the >SET key< [D] and keep it pressed.
- Press the >SET key< [D] and simultaneously the >Arrow keys< [C] (and (). The display changes from "0" (auto-start function is ON) to "1" (auto-start function is OFF). Release the >SET key< [D] after the required setting was made.
 Press the >Arrow keys< [C] (and () simultaneously for 1 second. Or wait a few seconds after
- Press the >Arrow keys< [C] and simultaneously for 1 second. Or wait a few seconds after releasing the >SET key< [D]. The selected function is saved and menu is exited. The display shows the temperature again.</p>

4 Setup mode

4.1 Setup mode

CAUTION

Moving the temperature control unit during operation
 SERIOUS BURNS/FREEZING OF THE HOUSING PARTS/ESCAPING THERMAL FLUID
 Do not move temperature control units that are in operation.

4.1.1 Turning on the temperature control unit

PROCEDURE

Switch on the temperature control unit using the >Mains switch< [37]. Circulation and thermoregulation are turned off.

4.1.2 Setting the overtemperature (OT) protection

DANGER

The overtemperature protection is set higher than the ignition temperature of the thermal fluid used MORTAL DANGER FROM FIRE

- The overtemperature protection must be correctly set to the thermal fluid you are using.
- Always observe the safety data sheet of the thermal fluid.
- Set the cut-out value of the overtemperature protection at least 25 K below the combustion point of the thermal fluid.

4.1.2.1 General information on the overtemperature protection

Example of a potentiometer at the temperature control unit



The overtemperature protection is installed only in temperature control units that have a heater. The flow temperature is monitored to ensure the safety of your system. It is set immediately after you have filled the system with thermal fluid.

Upon delivery, the cut-out value of the overtemperature protection is set to 35 °C. An alarm is triggered by the temperature control unit shortly after turning on the power if the temperature of the thermal fluid just filled is higher than the cut-out value set for the overtemperature protection. Set the overtemperature protection to the thermal fluid you are using.

4.1.2.2 Setting the overtemperature protection

Setting the cut-out value

INFORMATION

You need a screwdriver (flat blade 1.0 x 5.5) to set the cut-out value of the overtemperature protection.



PROCEDURE

Use a screwdriver to set the cut-off value on the potentiometer. The cut-out value must be set to match the thermal fluid you are using. It is not required to switch on the temperature control unit.

4.1.3	Testing the overtemperature protection for functionality			
DANGER	Overtemperature protection (OT) does not trip			
	MORTAL DANGER FROM FIRE			
	Test the response of the device every month and after each change of the thermal fluid in order to assure proper functioning.			
ΝΟΤΕ	The steps below are carried out without permanent monitoring of the temperature control unit			
	DAMAGE TO AND IN THE VICINITY OF THE TEMPERATURE CONTROL UNIT			
	The following actions may only be carried out while constantly monitoring the temperature control unit and the application!			
INFORMATION	The overtemperature protection is installed only in temperature control units that have a heater. You need a sufficiently large-sized screwdriver to check the overtemperature protection for functionality.			

Steps to test the correct functioning of the overtemperature protection:

PROCEDURE

- Note the cut-out value of the overtemperature protection set on the potentiometer.
- Switch on the temperature control unit using the >Mains switch< [37].
 Enter a setpoint (room temperature). Further information on
- Page 33 in section **set/change setpoint**
- Start the thermoregulation by pressing the >Start/Stop button< [E].</p>
- Use a screwdriver to set the new cut-off value on the potentiometer. This cut-out value must be below the indicated internal temperature. The overtemperature protection is triggered.
- Switch off the temperature control unit using the >Mains switch< [37].</p>
- > Use a screwdriver to reset the cut-off value on the potentiometer to the original value.

INFORMATION

Immediately take the temperature control unit out of operation if the overtemperature protection is not triggered. Immediately contact Customer Support. The telephone number can be found on page 54, section **»Phone number and company address«**. Do not put the temperature control unit back into operation.

4.1.4 Setting the setpoint

PROCEDURE

- > Switch on the temperature control unit using the >Mains switch< [37].
- Press the >SET key< [D] and keep it pressed. The setpoint is displayed.</p>
- > Use the >Arrow keys< [C] to select the required value.
- \bigcirc (up) the temperature increases, \bigcirc (down) the temperature decreases.
- Release the >SET key< [D]. The new setpoint is set.</p>

4.2 Filling, venting, degassing and draining

The illustration "connection diagram" can be found on page 55 in section »Annex«.

CAUTION

Extremely hot / cold surfaces, connections and thermal fluids

BURNS/FREEZING OF LIMBS

- Surfaces, connections and tempered thermal fluids can be extremely hot or cold depending on the operating mode.
- Avoid direct contact with surfaces, connections and thermal fluids!
- > Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles).



OPERATION MANUAL

4.2.1	Filling and venting externally closed application		
	 Non-compliance with the safety data sheet for the thermal fluid to be used INJURIES Risk of injury to the eyes, skin, respiratory tract. The safety data sheet for the thermal fluid to be used must be read prior to using it and its content must be respected. Observe the local regulations/work instructions. Wear your personal protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear). Danger of slipping because floor and work area are contaminated. Clean the work station and follow the instructions for the disposal of thermal fluid and material on page 14 in Section »Proper disposal of resources and consumables«. 		
NOTE	 Semi-automatic venting DAMAGE TO THE TEMPERATURE CONTROL UNIT An elevated tolerance time for the pressure drop can damage the pump if the thermal fluid level in the system is also too low. Constantly observe the thermal fluid level on the >Sight glass< [23] or the >Level indicator and drain< [38]. Fill up the thermal fluid during the venting phase so the thermal fluid level does not fall below the minimum mark in the >Sight glass< [23] or the >Level indicator and drain< [38]. 		
NOTE	 The >Bypass valve< [62] (if any) is not adapted to the external application MATERIAL DAMAGE TO THE EXTERNAL APPLICATION A closed >Bypass valve< [62] can cause the pressure in the thermal fluid circuit to become too high for the external application used. It may cause the thermal fluid to overflow in the external application and/or damage the external application. > Initial filling, switching to another thermal fluid or another external application: The >Bypass valve< [62] must be fully open before the circulation is started. As a result, the pressure in the thermal fluid circuit is at the lowest point. > Note the >Pressure gauge< [63] when starting the circulation. The allowable pressure of your external application must not be exceeded. 		
INFORMATION	 Calculate whether the capacity of the >Expansion vessel< [18] can absorb the expansion volume during operation. Assume the following volumes for this calculation: [Minimum filling capacity of the temperature control unit] + [Volume of the thermal fluid hoses] + [Jacket volume of your application] + [10% / 100 K]. During the fill process, ensure any necessary measures, such as earthing the tanks, funnels and other aids, have been taken. 		

• Fill to the lowest possible height.

4.2.1.1 Filling and venting with >Sight glass< [23]





	PROCEDURE	
	 For temperature control units with a >Bypass valve< [62], verify that it has been completely opened. Connect a suitable hose to the >Overflow< [12] (if any). Place the other end of the hose in a suitable collecting container. Excess thermofluid will flow into this container when overfilling the temperature control unit. Hose and container must be resistant to the thermal fluid and the temperature. Manually open the >Filling port< [17]. Carefully pour suitable thermal fluid, using the filling accessories (funnel and/or beaker) into the >Filling port< [17]. The thermal fluid flows into the temperature control unit and over the hose connection to the external application. The fill levels are displayed in the >Sight glass<[23]. Follow the instructions on page 14, section »Proper disposal of resources and consumables« for the cleaning of the filling accessories. Switch on the temperature control unit using the >Mains switch< [37]. Set the setpoint to 20 °C. Further information on page 33 in section »Set/change setpoint«. Start the circulation by pressing the >Start/Stop button< [E]. Refill thermal fluid as needed. Observe the fill level in the >Sight glass< [23]. The filling/venting process is complete when the temperature control unit is filled sufficiently. 	
INFORMATION	If, with externally closed applications (reactors), the fluid level in the fill level display remains the same when the pump is running and when the pump has stopped, the application has been vented.	
	 Adjust the pressure in the thermal fluid circuit for temperature control units with a >Bypass valve< [62] to the external application used. To do this, use the >Bypass valve< [62] and the >Pressure gauge< [63]. Stop the circulation by pressing the >Start/Stop button< [E]. Switch off the temperature control unit using the >Mains switch< [37]. Dismount the hose at the >Overflow< [12] and remove the collecting container, if any. Manually close the >Filling port< [17]. The temperature control unit is now filled. 	
INFORMATION	ON Venting must be performed especially during commissioning and after changing the thermal fluid. This is the only way to ensure trouble-free operation.	
	Note that the volume expansion of the thermal fluid depends on the working temperature range you wish to work in. At the "lowest" working temperature, do not go beyond the minimum mark of the >Sight glass< [23] and at the "highest" working temperature there should be no overflow from the >Expansion vessel< [18]. In case of overfilling, drain the excess amount of thermal fluid (see page 38 in Section »Draining with >Sight glass< [23] «). Check if the thermal fluid can be re-	

4.2.1.2 Filling and venting with >Level indicator and drain< [38]

>Level indicator and drain< [38]	minimum
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used. On page 14 observe Section »Proper disposal of resources and consumables«.

PROCEDURE

- > Verify that the hose of the >Level indicator and drain< [38] has not been pulled out.
- Manually open the >Filling port< [17].
 Carefully pour suitable thermal fluid, using the filling accessories (funnel and/or beaker) into the >Filling port< [17]. The thermal fluid flows into the temperature control unit and over the hose

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connection to the external application. Fill the temperature control unit up to 1 cm below the hose end of the **>Level indicator and drain< [38]**. Follow the instructions on page 14, section **»Proper disposal of resources and consumables**« for the cleaning of the filling accessories.

- Switch on the temperature control unit using the **>Mains switch<** [37].
- Set the setpoint to 20 °C. Further information on page 33 in section **»Set/change setpoint**«.
- > Start the circulation by pressing the >Start/Stop button< [E].
- Refill thermal fluid as needed. Observe the fill level in the >Level indicator and drain< [38] Never fall below the minimum level marking. The filling/venting process is complete when the temperature control unit is filled sufficiently.</p>

INFORMATION

If, with externally closed applications (reactors), the fluid level in the fill level display remains the same when the pump is running and when the pump has stopped, the application has been vented.

- Stop the circulation by pressing the >Start/Stop button< [E].</p>
- Manually close the >Filling port< [17]. The temperature control unit is now filled.

INFORMATION Venting must be performed especially during commissioning and after changing the thermal fluid. This is the only way to ensure trouble-free operation.

Note that the volume expansion of the thermal fluid depends on the working temperature range you wish to work in. At the "lowest" working temperature, do not go beyond the **minimum** mark of the **>Level indicator and drain< [38]** and at the "highest" working temperature there should be no overflow at the **>Level indicator and drain< [38]**. Fill the temperature control unit up to about 1 cm below the hose end. In case of overfilling, drain the excess amount of thermal fluid (see page 39 in Section **»Draining with >Level indicator and drain< [38]**«). Check if the thermal fluid can be reused. On page 14 observe Section **»Proper disposal of resources and consumables**«.

4.2.2 Draining externally closed applications

CAUTION

Hot or very cold thermal fluids

SERIOUS BURNS/FREEZING OF LIMBS

- > Before draining, ensure that the thermal fluid has room temperature (20 °C).
- If, at this temperature, the thermal fluid is too viscous to be drained: Control the temperature of the thermal fluid for a few minutes until the viscosity will allow drainage. Never thermoregulate the thermal fluid when the >Drain< [8] and/or >Emptying of residues< [10] is open or the hose at the >Level indicator and drain< [38] is pulled out.</p>
- Close the >Drain< [8] and/or >Emptying of residues< [10] and do not pull out the hose at the >Level indicator and drain< [38].</p>
- > Danger of burns when draining thermal fluids at temperatures above 20 °C.
- > Wear your personal protective equipment when carrying out the drainage operation.
- Only drain with a suitable draining hose and container (these must be resistant to the thermal fluid and temperature).

4.2.2.1 Draining with >Sight glass< [23]

PROCEDURE

Temperature control units without >Emptying of residues< [10]

- Have a suitable container ready to catch the thermal fluid.
- Remove the knurled screw at the >Drain< [8]. As soon as you have opened the knurled screw, the thermal fluid will flow from the external application over the temperature control unit and into the container. Check if the thermal fluid can be reused. On page 14 observe Section »Proper disposal of resources and consumables«.</p>
- Wait until the external application and the temperature control unit are empty.
- Open the connection >Circulation flow< [1].</p>
- Open the connection >Circulation return< [2].</p>
- > Leave the temperature control unit open for a while to allow it to dry out and the residue to drain.
- Close the connection >Circulation flow< [1].</p>
- Close the connection >Circulation return< [2].</p>
- Re-fit the knurled screw to the >Drain< [8]. The temperature control unit is now drained.



PROCEDURE

Temperature control units with >Emptying of residues< [10]

- Have a suitable container ready to catch the thermal fluid.
- Remove the knurled screw at the >Drain< [8]. As soon as you have opened the knurled screw, the thermal fluid will flow from the external application over the temperature control unit and into the container. Check if the thermal fluid can be reused. On page 14 observe Section »Proper disposal of resources and consumables«.</p>
- > Wait until no more thermal fluid flows from the **>Drain<** [8].
- Remove the knurled screw from the >Emptying of residues< [10]. The remaining thermal fluid will flow from the temperature control unit into the container as soon as you have opened the knurled screw. Check if the thermal fluid can be reused. On page 14 observe Section »Proper disposal of resources and consumables«.</p>
- > Wait until the temperature control unit is empty.
- Open the connection >Circulation flow< [1].</p>
- > Open the connection >Circulation return< [2].
- Leave the temperature control unit open for a while to allow it to dry out and the residue to drain.
- > Close the connection >Circulation flow< [1].
- Close the connection >Circulation return< [2].</p>
- Re-fit the knurled screw to the >Emptying of residues< [10].</p>
- Re-fit the knurled screw to the >Drain< [8].</p>
- The temperature control unit is now drained.

4.2.2.2 Draining with >Level indicator and drain< [38]

PROCEDURE

- > Have a suitable container ready to catch the thermal fluid.
- Pull the hose from the >Level indicator and drain< [38]. As soon as you have pulled out the hose, the thermal fluid will flow from the external application over the temperature control unit and into the container. Check if the thermal fluid can be reused. On page 14 observe Section »Proper disposal of resources and consumables«.</p>
- > Wait until the external application and the temperature control unit are empty.
- Open the connection >Circulation flow< [1].</p>
- > Open the connection >Circulation return< [2].
- > Leave the temperature control unit open for a while to allow it to dry out and the residue to drain.
- Close the connection >Circulation flow< [1].</p>
- Close the connection >Circulation return< [2].</p>
- Reinsert the hose into the >Level indicator and drain< [38]. The temperature control unit is now drained.

5 Normal operation

5.1 Automatic operation

Extremely hot / cold surfaces, connections and thermal fluids

BURNS/FREEZING OF LIMBS

- Surfaces, connections and tempered thermal fluids can be extremely hot or cold depending on the operating mode.
- Avoid direct contact with surfaces, connections and thermal fluids!
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles).

5.1.1 Temperature control

The control panel: Displays and keys



5.1.1.1 Starting the temperature control process

The temperature control process can be started after filling and complete venting.

PROCEDURE

With the temperature control unit switched on and thermoregulation/circulation stopped, press the >Start/Stop button< [E]. Thermoregulation starts

Thermoregulation starts.

5.1.1.2 Ending the temperature control process

NOTE

When the temperature control unit is switched off, the thermal fluid temperature is higher/lower than room temperature

DAMAGE TO THE TEMPERATURE CONTROL UNIT AND THE GLASS APPARATUS/APPLICATION

- > Bring the thermal fluid up to room temperature using the temperature control unit.
- > Do not close the shut-off valves in the thermal fluid circuit.

Thermoregulation can be terminated at any time. Thermoregulation and circulation are switched off immediately afterwards.

PROCEDURE

With the temperature control unit switched on and thermoregulation/circulation started, press the >Start/Stop button< [E]. Thermoregulation starts

Thermoregulation stops.





6.1 Interfaces on the temperature control unit (optional)

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NOTE
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Connecting to the interfaces at the temperature control unit during operation DAMAGE TO THE INTERFACES

- > When devices in operation are connected with interfaces of the temperature control unit,
- interfaces may get damaged.
 Before connecting, ensure the temperature control unit and the device to be connected are turned off.

Interface at the top of the temperature control unit



6.1.1 RS232 jack



A PC, a SPS or a Process Control System (PCS) can be connected to this jack for remote control of the controller electronics.

INFORMATION

The interfaces used must meet the specifications of the generally accepted standards.

Pin assignment

Pin	Signal	Description
2	RxD	Receive Data
3	TxD	Transmit Data
5	GND	Signal GND



7 Service/maintenance

7.1 Displays in the event of faults

The device displays an alarm or warning message in the event of a fault.

Overview of messages	Display	Cause	Effect, measure
	BBBB Flashing display of the temperature value	Warning: Over or under temperature.	Control continues. Setpoint limit values: Minichiller (Plus) – 5 K/+ 2 K Minichiller w (Plus) – 5 K/+ 2K Minichiller H (Plus) ± 5 K all Unichiller ± 5 K Exceptions: Unichiller 003 – 5 K/+ 2 K Unichiller 012 ± 2 K
	F 1 - flashing	Error Sensor1 Break or short circuit	Control is inactive. (Pump off, compressor off, heating off) Check the sensor.
	EI - flashing	Input E1 reports an error. a) No enable signal, level alarm b) Valid for temperature control units with heater: The internal temperature is above the set value of the overtempera- ture protection. The overtemperature protection was triggered.	 a) Control is inactive. (Pump off, compressor off, heating off) Check level. Restart only possible when level OK. b) The value of the overtemperature protection must be above the internal temperature and/or the setpoint. Do not set the setpoint above the temperature set for the overtemperature protection.
	E2 - flashing	 Input E1 reports an error. a) Pump runs and no flow or pump is running and no water pressure. b) Valid for temperature control units with heater: The internal temperature is above the set value of the overtempera- ture protection. The overtemperature protection was triggered. 	 a) Control is inactive. (Pump off, compressor off, heating off) Restart only possible by interrupting the power supply. b) The value of the overtemperature protection must be above the internal temperature and/or the setpoint. Do not set the setpoint above the temperature set for the overtemperature protection.
	E 3 - flashing	Although the control is off, the input E1 signals a flow	Control is inactive. (Pump off, compressor off, heating off) The error is corrected automatically when input E1 is open in standby again.
	EP - flashing	Loss of data in the parameter memory	Control is inactive. (Pump off, compressor off, heating off)

INFORMATION

During the output of the error message, the error message and the actual value are displayed alternately.

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Chapter 7

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1.2	Cleaning/maintenance while the temperature control unit is operating MORTAL DANGER FROM ELECTRIC SHOCK		
DANGER			
	 Stop an ongoing temperature control process. Disconnect the temperature control unit from the power supply by turning the >Mains switch [37] on the temperature control unit to "0". Also disconnect the temperature control unit from the current supply. 		
NOTE	Carpying out maintenance work not described in this operation manual		
NOTE	DAMAGE TO THE TEMPERATURE CONTROL UNIT		
	 For maintenance work not described in the operation manual, contact the Huber company. Maintenance work not described in this operation manual is reserved for gualified specialists 		

- trained by Huber.
- Only perform the following maintenance work on the temperature control unit yourself.

7.2.1 Function check and visual inspection

Monitoring intervals	Cooling*	Description	Maintenance interval	Comment	Person re- sponsible
	L/W	Visually inspect hoses and hose connections	Prior to switching on the tempera- ture control unit	Replace leaking hoses and hose connections prior to switching on the temperature control unit. See page 44, section »Replacing tem- perature control or coolant hos- es «	Responsible body and/or operators
	L/W	Inspection in ac- cordance with the F-Gas Directive	In accordance with the F-Gas Directive	See page 17, section »Temperature control units with fluorinated greenhouse ga- ses/refrigerants «	Responsible body
	L/W	Inspect power supply cable	Prior to switching on the tempera- ture control unit or on relocation	Do not start-up the temperature control unit if the power cable is damaged.	Qualified electrician (BGV A3)
	L	Clean air inlet grille	As required	Clean the perforated sheet of the temperature control unit with a damp cloth	Responsible body
	L/W	Thermofluid in- spection	As required		Responsible body and/or operators
	L/W	Inspect the me- chanical seals	Monthly	See page 49, section »Inspect the mechanical seal«	Responsible body and/or operators
	L	Check liquefier fins	As required, after 3 months at the latest	See page 44, section »Clean lique- fier fins (air-cooled temperature control unit)«	Responsible body and/or operators
	w	Check suction strainer (dirt trap)	As required, after 3 months at the latest	See page 45, section »Clean hat- type strainer (dirt trap) (water- cooled temperature control unit)«	Responsible body and/or operators
	L/W	Overtemperature protection (OT) - functional check	Every month or after changing the thermofluid	See page 34, section »Setting the overtemperature (OT) protec- tion«	Responsible body and/or operators
	L/W	Inspect tempera- ture control unit for damage and stabil- ity	Every 12 months or after a change of location		Responsible body and/or operators

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Cooling*	Description	Maintenance interval	Comment	Person re- sponsible
w	Inspect water quality	Every 12 months	Descale the cooling water circuit as required. Documentation on water quality available at: www.huber-online.com	Responsible body and/or operators
*L = Air cooling; W = Water cooling; U = Applicable only for Unistats				

7.2.2 Replacing temperature control or coolant hoses

Replace defective temperature control and/or coolant hoses **before** turning on the temperature control unit.

7.2.2.1 Replacing temperature control hoses

PROCEDURE

- Drain the temperature control unit as described on page 38 in section »Draining externally closed applications«.
- Replace defective temperature control hoses. When disposing of them, observe page 14, section »Proper disposal of resources and consumables«.
- Reconnect your external application as described on page 28 in section »Connecting externally closed application«.
- Fill the temperature control unit with thermofluid as described on page 36 in section **»Filling and venting externally closed application«**.
- Vent the temperature control unit as described on page 36 in section »Filling and venting externally closed application«.
- Restart the temperature control unit in normal mode.

7.2.2.2 Replacing coolant hoses

PROCEDURE

- > Drain the cooling water as described on page 52 in section »Draining the cooling water«.
- Replace the defective coolant hoses. When disposing of them, observe page 14, section »Proper disposal of resources and consumables«.
- Reconnect the temperature control unit to the building's cooling water supply. Proceed as described on page 25 in section **»Temperature control units with water cooling**«.
- Restart the temperature control unit in normal mode.

7.2.3 Clean liquefier fins (air-cooled temperature control unit)

CAUTION Manual cleaning **RISK OF BEING CUT ON THE LIQUEFIER FINS** Wear suitable cut-resistant gloves for cleaning work. Depending on the ambient conditions, use cleaning equipment such as vacuum cleaners and/or a hand brush/brush. Follow the local regulations when cleaning. Do not clean the liquefier fins in a clean room with items like a brush and do not use a vacuum cleaner without an extra-fine particle filter. NOTE Cleaning using pointed or sharp-edged tools DAMAGE TO THE LIQUEFIER FINS Clean the liquefier fins using suitable cleaning appliances. Make sure there is adequate ventilation (removal of waste heat, fresh air supply) for the tempera-INFORMATION ture control unit, in case of air cooling, maintain wall clearance (see page 19, section »Exemplary illustrations of the cooling variants« and page 23, section »Ambient conditions«). The liquefier fins must be cleaned (dust) from time to time as only then will the temperature control unit perform at its maximum cooling capacity.

Identify the position of the ventilation grille, usually located on the front. With some temperature control units, the ventilation grilles on the side wall, rear or on the underside (table units) of the temperature control unit.

PROCEDURE

Ventilation grille on the front/rear or on a side wall

- Switch off the temperature control unit. Do this by turning the >Mains switch< [37] to the "0" position!</p>
- Disconnect the temperature control unit from the current supply.
- Remove the ventilation grille to create unhindered access to the liquefier fins.
 Clean the liquefier fins using suitable cleaning appliances. Observe the local regulations and
- ambient conditions when selecting cleaning devices.
- ▶ Make sure the liquefier fins are not damaged or deformed as this will impair the air flow.
- > Re-mount the ventilation grille after cleaning work.
- Connect the temperature control unit to the power supply.
- Switch the temperature control unit on.

PROCEDURE

Ventilation grille on the underside (table-top units)

NOTE Cleaning of liquefier fins at the underside when the temperature control unit is filled DAMAGE CAUSED BY THERMAL FLUID PENETRATING THE TEMPERATURE CONTROL UNIT Empty the temperature control unit before cleaning the liquefier fins at the underside of the \triangleright temperature control unit. Switch off the temperature control unit. Do this by turning the >Mains switch< [37] to the "0"</p> position! Disconnect the temperature control unit from the current supply. > Drain the thermal fluid from the temperature control unit. Further information on page 38 in section »Draining externally closed applications«. Tilt the temperature control unit to remove the grille (if available) in front of the liquefier fins. > Clean the liquefier fins using suitable cleaning appliances. Observe the local regulations and ambient conditions when selecting cleaning devices. Make sure the liquefier fins are not damaged or deformed as this will impair the air flow. Re-mount the ventilation grille after cleaning work. \triangleright Connect the temperature control unit to the power supply. Refill the temperature control unit with thermal fluid. Further information on page 36 in section »Filling and venting externally closed application«. 7.2.4 Clean hat-type strainer (dirt trap) (water-cooled temperature control unit) Building side shut-off valves are not closed NOTE DAMAGE BY ROOM FLOODING Close the building's shut-off valves in the cooling water supply and return lines. For table-top models, place a collection container below the >Cooling water drain< [15] (see connection diagram page 55, section »Annex«).

INFORMATION The strainer at the cooling water inlet must be inspected and cleaned on a regular basis, depending on water quality.

PROCEDURE

Table-top models:

Switch off the temperature control unit. Do this by turning the >Mains switch< [37] to the "0" position!</p>

- Disconnect the temperature control unit from the current supply.
- Close the customer's shut-off valves in the cooling water supply and return lines.
- Place the collecting container below the >Cooling water inlet< [13].</p>



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- Remove the cooling water supply line and take out the hat-type strainer for inspection and cleaning.
- Clean the suction strainer under running water.
- Following inspection/cleaning, reinsert the hat-type strainer and fasten the cooling water supply line.
- Remove the collecting container from below the >Cooling water inlet< [13].</p>
- Open the customer's shut-off valves in the cooling water supply and return lines.
- Connect the temperature control unit to the power supply.
- Switch the temperature control unit on.

PROCEDURE

Free-standing models:

- Switch off the temperature control unit. Do this by turning the >Mains switch< [37] to the "0" position!</p>
- Disconnect the temperature control unit from the current supply.
- > Close the customer's shut-off valves in the cooling water supply and return lines.
- > Remove the panel around the >Cooling water inlet< [13] and >Cooling water outlet< [14]. In-
- formation: Located immediately behind the **>Cooling water inlet<** [13] is the dirt trap.
- Carefully detach the cover (hexagonal).
- Remove and clean the metal strainer located below.
- Clean the metal strainer under running water.
- Re-insert the metal strainer after cleaning work.
- Carefully fasten the cover (hexagonal).
- Re-mount the panel around the >Cooling water inlet< [13] and >Cooling water outlet< [14].</p>
- > Open the customer's shut-off valves in the cooling water supply and return lines.
- Connect the temperature control unit to the power supply.
- Switch the temperature control unit on.

INFORMATION We also provide service training. Please contact the Customer Support. The telephone number can be found on page 54, section **»Phone number and company address**«.

7.3 Thermal fluid inspection, replacement and circuit cleaning

The illustration "connection diagram" can be found on page 55 in section »Annex«.

Extremely hot / cold surfaces, connections and thermal fluids

- BURNS/FREEZING OF LIMBS
- Surfaces, connections and tempered thermal fluids can be extremely hot or cold depending on the operating mode.
- Avoid direct contact with surfaces, connections and thermal fluids!
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles).

7.3.1 Thermal fluid replacement

NOTE

Mixing different thermofluids in a thermal fluid circuit PROPERTY DAMAGE

- Do not mix different types of thermofluid (such as mineral oil, silicone oil, synthetic oil, water, etc.) in a thermofluid circuit.
- The thermal fluid circuit must be rinsed when changing from one type of thermal fluid to another. No residues of the previous type of thermal fluid may remain in the thermal fluid circuit.

7.3.1.1 Externally closed application

To replace the thermal fluid, proceed as described from page 36 in Section **»Filling and venting externally closed application«**. The draining and filling operations are described in this section.



7.3.2	
DANGER	Setpoint and overtemperature protection are not adjusted to the thermofluid
	 The cut-out value of the overtemperature protection must be adapted to the thermofluid. Set the cut-out value of the overtemperature protection 25 K below the combustion point of the thermofluid.
	The setpoint set during rinsing must be adjusted to the thermofluid used.
	Non-compliance with the safety data sheet for the thermal fluid to be used
<u> </u>	INJURIES
	 Risk of injury to the eyes, skin, respiratory tract. The safety data sheet for the thermal fluid to be used must be read prior to using it and its content must be respected.
	 Observe the local regulations/work instructions. Wear your personal protective equipment (e.g. temperature-resistant safety gloves, safety
	 goggles, safety footwear). Danger of slipping because floor and work area are contaminated. Clean the work station and follow the instructions for the disposal of thermal fluid and material on page 14 in Section Proper disposal of resources and consumables
NOTE	Mixing different thermofluids in a thermal fluid circuit
	 Do not mix different types of thermofluid (such as mineral oil, silicone oil, synthetic oil, water,
	 etc.) in a thermofluid circuit. The thermal fluid circuit must be rinsed when changing from one type of thermal fluid to another. No residues of the previous type of thermal fluid may remain in the thermal fluid circuit.
mple: Connecting a short circuit hose	
	The inner components of the temperature control unit must be dried out Need to avoid boiling retardation during future uses (e.g. use of a silicone oil at temperatures above about 100 °C).
7.3.2.1	Rinsing a thermofluid circuit with >Sight glass< [23]
	PROCEDURE
	Drain the temperature control unit as described on page 38 in section »Draining with >Sight glass< [23]«.
INFORMATION	Residual thermal fluid can remain in the pump chamber and the internal lines after draining. Leave the temperature control unit with open valves for a while.
- 1	 Check the fill level in the collecting container. Follow the instructions on page 14, section »Proper disposal of resources and consumables for the disposal of thermofluid. Re-fit the knurled screw to the >Emptying of residues [10] (if present). Re-fit the knurled screw to the >Drain
	 Connect the >Circulation flow< [1] with the >Circulation return< [2] to the temperature control using a bypass hose.
INFORMATION	Perform the following steps without attaching a short circuit hose, if the application used by you (exter- nally closed) is also dirty. In this case, leave your externally closed application connected to the tempera- ture control unit. This rinses the temperature control unit and your application at the same time.
	 Fill the system (minimum fill level) with the thermofluid you wish to use. The description can be found on page 36 in section »Filling and venting with >Sight glass< [23]«. Vent the system as described on page 36 in section »Filling and venting with >Sight glass< [23]« Adjust the setpoint and the cut-out value of the overtemperature protection to the thermofluid

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	 Section »Setting the overtemperature (OT) protection«. Start the circulation. The length of rinsing depends on the level of soiling. Stop the circulation. Drain the thermofluid from the system, using a suitable container (e.g. original canister, which is compatible with the thermofluid). The description for draining can be found on page 38 in section »Draining with >Sight glass< [23]«. Follow the instructions on page 14, section »Proper disposal of resources and consumables« for the disposal of thermofluid. Repeat the steps "Filling", "Venting", "Start/Stop circulation" and "Draining" until the drained thermofluid remains clear. Remove the bypass hose.
INFORMATION	Leave an application connected, if you have simultaneously rinsed a used application (externally closed).
	 Leave the >Drain< [8] and >Emptying of residues< [10] (if any) open for a while to allow the thermofluid to evaporate in the temperature control unit. Close the >Drain< [8] and >Emptying of residues< [10] (if any) once the thermofluid has evaporated. Remove the collecting container. Follow the instructions on page 14, section »Proper disposal of resources and consumables« for the disposal of thermofluid. Re-connect your application. (Only if you have rinsed the thermofluid circuit using a bypass hose.) Fill the temperature control unit with thermofluid as described on page 36 in section »Filling and venting with >Sight glass< [23]«. Vent the temperature control unit as described on page 36 in section »Filling and venting with >Sight glass< [23]«. Restart the temperature control unit in normal mode.
7.3.2.2	Rinsing the thermofluid circuit with >Level indicator and drain< [38]
INFORMATION	 PROCEDURE > Drain the temperature control unit as described on page 39 in section »Draining with >Level indicator and drain< [38]«.
	 Therefore leave the temperature control unit open for a while. Check the fill level in the collecting container. Follow the instructions on page 14, section <i>»Proper disposal of resources and consumables</i>« for the disposal of thermofluid. Reinsert the hose into the >Level indicator and drain< [38]. Connect the >Circulation flow< [1] with the >Circulation return< [2] to the temperature control using a bypass hose.
INFORMATION	Perform the following steps without attaching a short circuit hose, if the application used by you (externally closed) is also dirty. In this case, leave your externally closed application connected to the temperature control unit. This rinses the temperature control unit and your application at the same time.
	 Fill the system (minimum fill level) with the thermofluid you wish to use. The description can be found on page 37 in section »Filling and venting with >Level indicator and drain< [38]«. Vent the system as described on page 37 in section »Filling and venting with >Level indicator and drain< [38]«. Adjust the setpoint and the cut-out value of the overtemperature protection to the thermofluid used. The procedure is described on page 33 in Section »Set/change setpoint« and on page 34 in Section »Setting the overtemperature (OT) protection«. Start the circulation. The length of rinsing depends on the level of soiling. Stop the circulation. Drain the thermofluid from the system, using a suitable container (e.g. original canister, which is compatible with the thermofluid). The description for draining can be found on page 39 in section »Draining with >Level indicator and drain< [38]«. Follow the instructions on page 14, section »Proper disposal of resources and consumables« for the disposal of thermofluid. Repeat the steps "Filling", "Venting", "Start/Stop circulation" and "Draining" until the drained thermofluid remains clear. Remove the bypass hose.

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INFORMATION	Leave an application connected, if you have simultaneously rinsed a used application (externally closed).
	 Leave the temperature control unit open for a longer while to allow the thermofluid remaining in the temperature control unit to evaporate. Reinsert the hose into the >Level indicator and drain
	 Remove the collecting container. Follow the instructions on page 14, section »Proper disposal of resources and consumables« for the disposal of thermofluid. Re-connect your application. (Only if you have rinsed the thermofluid circuit using a bypass
	 hose.) Fill the temperature control unit with thermofluid as described on page 37 in section »Filling and venting with >Level indicator and drain< [38]«.
	 Vent the temperature control unit as described on page 37 in section »Filling and venting with >Level indicator and drain< [38]«. > Restart the temperature control unit in normal mode.
7.4	Cleaning the surfaces
	Extremely hot / cold surfaces, connections and thermal fluids

BURNS/FREEZING OF LIMBS \triangleright Surfaces, connections and tempered thermal fluids can be extremely hot or cold depending on the operating mode. Avoid direct contact with surfaces, connections and thermal fluids! Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles). Exposed plug contacts NOTE DAMAGE CAUSED BY FLUID INGRESS Protect unused plug contacts with the protective caps supplied. \triangleright Clean surfaces only with a damp cloth.

> A standard stainless steel cleaning agent is suitable for cleaning the stainless steel surfaces. Carefully clean painted surfaces (damp only) using a solution of sensitive-fabrics detergent. Follow the instructions on page 14, section »Proper disposal of resources and consumables« for the disposal of cleaning agents and material.

7.5 Inspect the mechanical seal

NOTE

No visual inspection of the mechanical seals

MATERIAL DAMAGE IN THE TEMPERATURE CONTROL UNIT CAUSED BY LEAKING MECHANICAL SEALS

- Check the mechanical seals once a month.
- If case of leakage, stop the temperature control unit and contact Customer Support. The telephone number can be found on page 54, section »Phone number and company address«.

Expect drop formation at the mechanical seal when operating with thermal fluids that evaporate only very slowly, as mechanical seals are never absolutely tight. These drops must be removed if necessary (see page 43, section »Function check and visual inspection«). The tightness of the mechanical seal must be visually checked. In case of a leakage, more thermal fluid exits at the bottom of the temperature control unit. Follow the instructions on page 14, section »Proper disposal of resources and consumables« for the disposal of thermofluid.



7.6 Plug contacts

NOTE

Exposed plug contacts

DAMAGE CAUSED BY FLUID INGRESS

- > Protect unused plug contacts with the protective caps supplied.
- Clean surfaces only with a damp cloth.

Protective caps are supplied for all plug contacts. Make sure that any plug contacts not required are protective with the caps.

7.7 Decontamination/repairs

CAUTION

Returning a not decontaminated temperature control unit for repair

PHYSICAL INJURY AND PROPERTY DAMAGE CAUSED BY HAZARDOUS MATERIALS IN OR ON THE TEMPERATURE CONTROL UNIT

- > Carry out appropriate decontamination.
- > The decontamination process depends on the type and quantity of the materials used.
- Consult the relevant safety data sheet.
- > You will find a prepared return receipt at www.huber-online.com.

You as the responsible body are responsible for carrying out decontamination **BEFORE** third-party personnel come into contact with the temperature control unit. Decontamination must be carried out **BEFORE** the temperature control unit is returned for repair or inspection (clearly stating in writing on the temperature control unit that decontamination has been carried out).

To simply the process, we have prepared a form for you. This is available for download at www.huber-online.com.



8 Shutting down

8.1	Safety instructions and basic principles		
DANGER	Connection/adjustment to the power supply not carried out by an electrician and/or connection to a power socket without protective earth (PE)		
	MORTAL DANGER FROM ELECTRIC SHOCK		
	 Have the connection/adjustment to the power supply carried out by an electrician. Always connect the temperature control unit to safety sockets (PE). 		
DANGER	Damaged power cable/power cable connection MORTAL DANGER FROM ELECTRIC SHOCK		
	 Do not start up the temperature control unit. Isolate the temperature control unit from the power supply. Have the power supply cable/power supply connection replaced and inspected by an electrician. Do not use a power cable that is longer than 3 m. 		
	Risk of tipping due to unstable temperature control unit		
	SERIOUS INJURY AND PROPERTY DAMAGE		
	Avoid risk of tipping due to unstable temperature control unit.		
	Non-compliance with the safety data sheet for the thermal fluid to be used		
ZI_CAUTION	INITIALE with the safety data sheet for the thermal huid to be used		
	 Risk of injury to the eyes, skin, respiratory tract. The safety data sheet for the thermal fluid to be used must be read prior to using it and its content must be respected. Observe the local regulations/work instructions. Wear your personal protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear). Danger of slipping because floor and work area are contaminated. Clean the work station and 		
	follow the instructions for the disposal of thermal fluid and material on page 14 in Section Proper disposal of resources and consumables «.		
	Hot or very cold thermal fluids		
Z. CAUTION	SERIOUS BURNS/FREEZING OF LIMBS		
	 Before draining, ensure that the thermal fluid has room temperature (20 °C). If, at this temperature, the thermal fluid is too viscous to be drained: Control the temperature of the thermal fluid for a few minutes until the viscosity will allow drainage. Never thermoregulate the thermal fluid when the >Drain< [8] and/or >Emptying of residues< [10] is open or the hose at the >Level indicator and drain< [38] is pulled out. Close the >Drain< [8] and/or >Emptying of residues< [10] and do not pull out the hose at the >Level indicator and drain< [38]. 		
	 Danger of burns when draining thermal fluids at temperatures above 20 °C. Wear your personal protective equipment when carrying out the drainage operation. Only drain with a suitable draining hose and container (these must be resistant to the thermal fluid and temperature). 		
INFORMATION	All safety instructions are important and must be followed accordingly during working operations!		

Shutting down

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8.2 Switch-off

PROCEDURE

- >Mains switch< [37] set to "0".
- Disconnect the temperature control unit from the power supply.

8.3 Draining the cooling water

INFORMATION	This section must be observed when using water-cooled temperature control units.
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8.3.1 Draining process

Pressurized cooling water connections

RISK OF INJURY

- > Wear your personnel protective equipment (e.g. safety goggles).
- Carefully open the cooling water connection. Open slowly (1-2 signal edges) and drain the cooling water slowly.

NOTE

The building's isolating valves are not closed DAMAGE BY ROOM FLOODING

- Close the building's isolating valves in the cooling water supply and return lines.
- For table-top models, place a collection container below the >Cooling water outlet< [14] and/or >Cooling water drain< [15] (if any).</p>

PROCEDURE

Temperature control units with >Cooling water drain< [15]

- Close the building's isolating valves in the cooling water supply and return lines.
- Place a collecting container below the >Cooling water outlet< [14] and >Cooling water drain< [15].</p>
- Undo the screw cap on the >Cooling water drain< [15]. The cooling water will begin to drain out. Allow all the cooling water to drain out to prevent the risk of freezing during transport and storage!

PROCEDURE

Tempering without >Cooling water drain< [15]

- > Close the building's isolating valves in the cooling water supply and return lines.
- Place the collecting container below the >Cooling water outlet< [14].</p>
- Open the >Cooling water outlet< [14]. The cooling water will begin to drain out. Allow all the cooling water to drain out to prevent the risk of freezing during transport and storage!</p>

8.4 Packing

Use the original packaging wherever possible! Further information can be found on page 22 in section **»Unpacking**«.



8.5 Shipping

NOTE	Temperature control unit transported in a horizontal position			
	DAMAGE TO THE COMPRESSOR			
	Only transport the temperature control unit in an upright position.			
NOTE	Temperature control unit transported incorrectly			
	PROPERTY DAMAGE			
	 Do not transport by truck on the castors or feet. Comply all requirements in this section to avoid damage to the temperature control unit. 			
	temperature control unit alone and without aids.			
	Always transport the temperature control unit upright on a pallet!			
	Protect attachments from damage during transport!			
	 During transport, place the temperature control unit on squared timber to protect the castors/feet. 			
	 Secure with tensioning belts/lashing straps rated for the weight concerned. 			
	 Additionally secure (depending on model) with plastic film, cardboard and straps. 			
	 Additionally secure (depending on model) with plastic film, cardboard and straps. 			

8.6 Disposal

CAUTION

Uncontrolled or incorrect opening of the coolant circuit

- RISK OF INJURY AND ENVIRONMENTAL DAMAGE
- Work on the coolant circuit and disposal of the refrigerant must be carried out by approved refrigeration/air-conditioning system contractors.
- Also see page 17, section »Temperature control units with fluorinated greenhouse gases/refrigerants«.

NOTE

Improper disposal ENVIRONMENTAL DAMAGE

- Spilled/leaked thermofluid must be disposed of immediately and properly. Follow the instructions on page 14, section »Proper disposal of resources and consumables« for the disposal of thermofluid and material.
- To avoid environmental damage, have "old" temperature control units disposed of exclusively by approved waste management companies (e.g. refrigeration and air conditioning companies).
- Also see page 17, section »Temperature control units with fluorinated greenhouse gases/refrigerants«.

Huber temperature control units and Huber accessories are made of high quality, recyclable materials. For example: Stainless steel 1.4301 / 1.4401 (V2A), copper, nickel, FKM, Perbunan, NBR, ceramic, carbon, Al-Oxid, red brass, brass, nickel-plated brass and silver solder. Proper recycling of the temperature control unit and accessories can actively help reduce CO_2 emissions in the production of these materials. Follow the laws and regulations of your jurisdiction when disposing material.

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8.7 Phone number and company address

INFORMATION

Contact Customer Support **prior** to returning your temperature control unit. Have the serial number of your temperature control unit to hand. The serial number can be found on the rating plate on the temperature control unit.

- 8.7.1 Telephone number: Customer Support Telephone: +49-781-9603-244
- 8.7.2 Telephone number: Sales Telephone: +49-781-9603-123
- 8.7.3 Email address: Customer Support Email: support@huber-online.com
- 8.7.4 Service/return address

Peter Huber Kältemaschinenbau AG Werner-von-Siemens-Straße 1 77656 Offenburg

8.8 Certificate of Compliance

Please read page 50, section »Decontamination/repairs«.



9 Annex

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Inspired by **temperature** designed for you

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