



Inspired by temperature

Betriebsanleitung · Operation manual · Manual de instrucciones · Manuel d'utilisation · Manuale de d'uso · 사용 설명서 · Manual de instruções · Инструкция по эксплуатации · Kullanım talimatı · 操作说明书 · Betriebsanweisung · Manual de instrucciones · Manuel d'utilisation · Manuale de d'uso · 사용 설명서 · Manual de instruções · Инструкция по эксплуатации · Kullanım talimatı · 操作说明书 · Betriebsanweisung · Manual de instrucciones · Manuel d'utilisation · Manuale de d'uso · 사용 설명서 · Manual de instruções · Инструкция по эксплуатации · Kullanım talimatı · 操作说明书

Piccolo

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.

huber



OPERATION MANUAL

Piccolo

Piccolo

OLÉ

This operation manual is a translation of the original operation manual.

VALID FOR:

Piccolo 280 OLÉ

The control panel:
Displays and keys

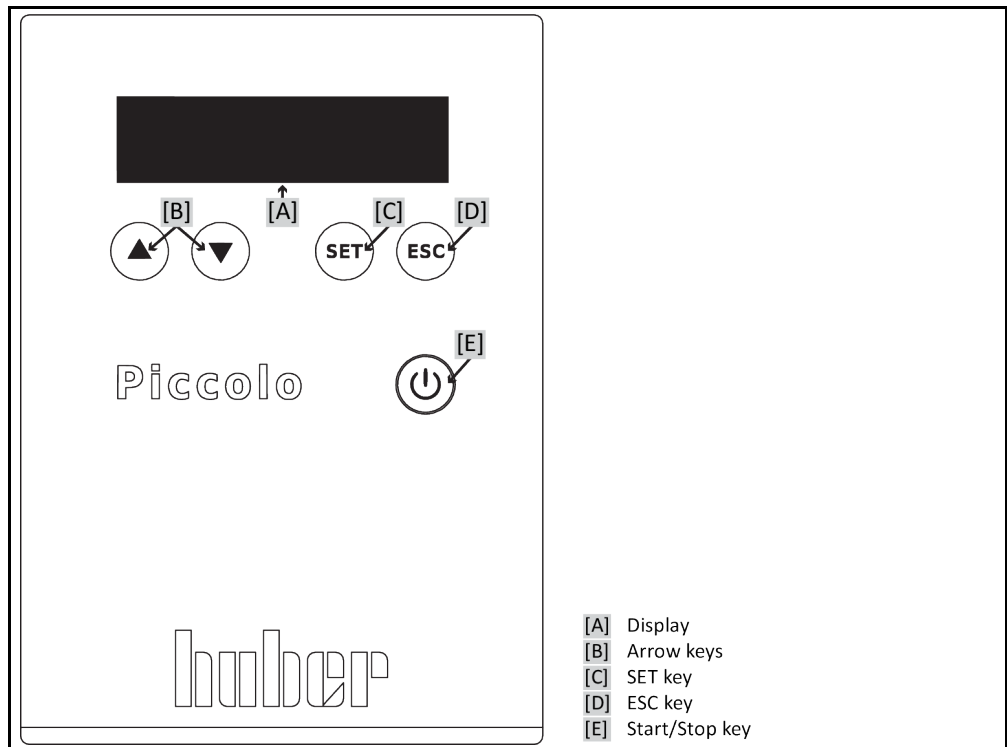


Table of contents

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1	Introduction	12
1.1	Identification / symbols in the operation manual	12
1.2	Information on the EU Declaration of Conformity	12
1.3	Safety	12
1.3.1	Symbols used for Safety Instructions	12
1.3.2	Representation of safety identifiers on the temperature control unit	13
1.3.3	Proper operation	13
1.3.4	Reasonably foreseeable misuse	14
1.4	Responsible bodies and operators – Obligations and requirements	15
1.4.1	Obligations of the responsible body	15
1.4.1.1	Proper disposal of resources and consumables	15
1.4.2	Requirements for operators	16
1.4.3	Obligations of the operators	16
1.5	General information	16
1.5.1	Description of workstation	16
1.5.2	Safety devices to DIN 12876	16
1.5.3	Further protective devices	17
1.5.3.1	Power interruption	17
1.5.3.2	Overheat protection	17
2	Commissioning	18
2.1	In-plant transport	18
2.1.1	Lifting and transporting the temperature control unit	18
2.1.1.1	Temperature control unit with lifting eyes	18
2.1.1.2	Temperature control unit without lifting eyes	19
2.1.2	Mounting/removing leveling feet	19
2.1.3	Positioning the temperature control unit	20
2.1.3.1	Temperature control unit with casters	20
2.1.3.2	Temperature control unit without casters	20
2.2	Unpacking	20
2.3	Ambient conditions	20
2.3.1	EMC-specific notes	22
2.4	Installation conditions	22
2.5	Recommended temperature control hoses	22
2.6	Preparations for operation	23
2.6.1	Unscrewing/activating the leveling feet (if any)	23
2.6.2	Installing collecting container	23
2.6.3	Connecting the functional earth	24
2.7	Connecting externally closed application	24
2.7.1	Connecting an externally closed application	24
2.8	Connecting to the power supply	24
2.8.1	Connection using socket with protective earth (PE)	25
3	Function description	26
3.1	Function description of the temperature control unit	26
3.1.1	General functions	26
3.1.2	Other functions	26

3.2	Information on the thermal fluids	26
3.3	To be noted when planning the test	27
3.4	Display and control instruments	28
3.4.1	Display	28
3.4.2	Control instruments	29
3.4.2.1	Arrow keys	29
3.4.2.2	SET key	29
3.4.2.3	ESC key	30
3.4.2.4	Start/Stop key	30
3.4.3	Adjusting settings	30
3.5	Menu function	31
3.6	Functional examples	32
3.6.1	Selecting a language	32
3.6.2	Setting the setpoint	32
3.6.3	Changing the Auto-Start function	32
4	Setup mode	33
4.1	Setup mode	33
4.1.1	Turning on the temperature control unit	33
4.1.2	Turning off the temperature control unit	33
4.2	Filling, venting and draining	33
4.2.1	Cooling circuit	34
4.2.1.1	Filling the cooling circuit	34
4.2.1.2	Draining the cooling circuit	34
4.2.2	Externally closed application	35
4.2.2.1	Filling and venting externally closed application	35
4.2.2.2	Draining externally closed applications	36
5	Normal operation	37
5.1	Automatic operation	37
5.1.1	Temperature control	37
5.1.1.1	Starting the temperature control process	37
5.1.1.2	Ending the temperature control process	37
6	Interfaces and data communication	38
6.1	Interfaces on the temperature control unit	38
6.1.1	Interfaces at the back	38
6.1.1.1	USB-2.0 interface	38
6.1.1.2	RS232 jack	38
6.2	Data communication	39
6.2.1	LAI commands	39
6.2.1.1	Command "V" (Verify)	40
6.2.1.2	Command "L" (Limit)	40
6.2.1.3	Command "G" (General)	41
6.2.2	PP commands	42
7	Service/maintenance	44
7.1	Displays in the event of faults	44
7.2	Electrical fuse	45
7.3	Maintenance	45
7.3.1	Function check and visual inspection	45
7.3.2	Replacing temperature control hoses	46
7.3.3	Testing overheat protection for functionality	47

7.4	Thermal fluid inspection, replacement and circuit cleaning	48
7.4.1	Thermal fluid inspection	48
7.4.2	Thermal fluid replacement	48
7.4.2.1	Externally closed application	48
7.4.3	Rinsing the thermal fluid circuit.....	49
7.5	Cleaning the surfaces	50
7.6	Inspect the mechanical seal	50
7.7	Plug contacts	50
7.8	Decontamination/repairs	50
8	Shutting down	52
8.1	Safety instructions and basic principles	52
8.2	Switch-off	52
8.3	Draining the temperature control unit	53
8.4	Uninstalling an external application	53
8.5	Deinstalling the collecting container	53
8.6	Draining the cooling circuit	53
8.7	Packing	53
8.8	Shipping	53
8.9	Disposal	54
8.10	Contact data	54
8.10.1	Telephone number: Customer Support	54
8.10.2	Telephone number: Sales	54
8.10.3	Email address: Customer Support.....	54
8.11	Certificate of Compliance	55
9	Annex	56

Foreword

Dear Customer,

Thank you for choosing a temperature control unit from Peter Huber Kältemaschinenbau SE. 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 intended operation.

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

Liability for errors and misprints excluded.

The following trademarks and the Huber logo are registered trademarks of Peter Huber Kältemaschinenbau SE in Germany and/or other countries worldwide: BFT®, CC®, Chili®, Com.G@te®, Compatible Control®, CoolNet®, DC®, E-grade®, Grande Fleur®, Huber Piccolo®, KISS®, Minichiller®, Ministat®, MP®, MPC®, Peter Huber Minichiller®, Petite Fleur®, Pilot ONE®, RotaCool®, Rotostat®, SpyControl®, SpyLight®, Tango®, TC®, UC®, Unical®, Unichiller®, Unimotive®, Unipump®, Unistat®, Unistat Tango®, Variostat®. The following trademarks are registered in Germany to DWS Synthesetechnik: DW-Therm®, DW-Therm HT®. The following trademark is a registered trademark of BASF SE: Glystantin®.

1 Introduction

1.1 Identification / symbols in the operation manual

The following identifications and symbols are used in the texts and illustrations.

Overview	Identification / symbol	Description
	→	Reference to information / procedure.
	»TEXT«	Reference to a chapter in the operation manual. In the digital version, the text is clickable.
	>TEXT< [NUMBER]	Reference to the wiring diagram in the annex. The designation and the search digit are specified.
	>TEXT< [LETTER]	Reference to a drawing in the same paragraph. The designation and the search digit are specified.
	▪	List, first level
	–	List, second level

1.2 Information on the EU Declaration of Conformity



The equipment complies with the basic health and safety requirements of the European Directives listed below:

- Machinery Directive
- Low Voltage Directive
- EMC Directive

1.3 Safety

1.3.1 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.



Denotes an immediate hazardous situation that will result in death or serious injuries.



Denotes a general hazardous situation that may result in death or serious injuries.



Denotes a hazardous situation that can result in injury.



Denotes a situation that can result in property material damage.

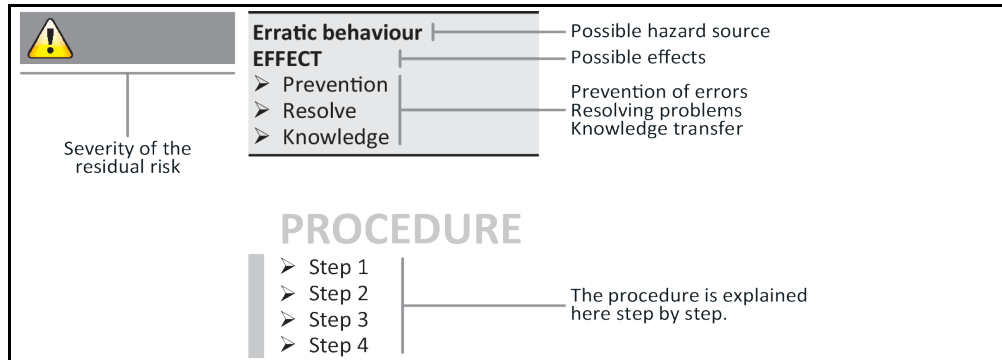


Denotes important notes and usable hints.



Notes in conjunction with Ex px cabinets.

Safety information and procedure



The safety information in this operation manual is designed to protect the operating company, the operator and the equipment from damage. First inform yourself about any residual risks due to misuse before you start an operation.

1.3.2 Representation of safety identifiers on the temperature control unit

The following pictograms are used as safety identifiers. The table gives an overview of the safety identifiers used here.

Identifier	Description
Mandatory sign	
	- Observe the instructions
Warning sign	
	- General warning sign - Observe the instructions
	- Warning of electrical voltage
	- Warning of hot surface
	- Warning of flammable substances

1.3.3 Proper operation



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.
- The EU declaration of conformity becomes invalid if any modifications are made to the temperature control unit without the approval of Huber.
- Only specialists trained by Huber 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 the start-up and repairs carried out by specialists only!
- Do not ignore, bypass, dismantle or disconnect any safety devices!

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

The temperature control unit is made for industrial use. The temperature control unit is used to maintain the temperature of applications, such as 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. Only use thermal fluids suitable for the overall system. The cooling or heating capacity is provided at the pump connections or - where present - in the tempering bath. For the technical specification, refer to the datasheet. → From page 56, section »Annex«. Install, set up and operate the temperature control unit according to the instructions in this operation manual. Any failure to comply with the operation manual is considered as improper operation. The temperature control unit was manufactured according to the state of the art and the recognized safety rules and regulations. Safety devices are installed in your temperature control unit.

1.3.4 Reasonably foreseeable misuse



Without an Ex px cabinet, the temperature control unit / accessory is **NOT** protected against explosion and must **NOT** be installed or put into operation within an ATEX Zone. When operating the temperature control unit /accessory in conjunction with an Ex px cabinet, the information in the annex (Section ATEX operation) must be observed and followed. This annex is only provided for temperature control units /accessories delivered with an Ex px cabinet. If this annex is missing, please immediately contact the Customer Support. → Page 54, section »Contact data«.

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**.

1.4 Responsible bodies and operators – Obligations and requirements

1.4.1 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 / thermal fluid drip tray below the temperature control unit.
- The use of a drip tray may be prescribed by national legislation for the installation area of the temperature control unit (incl. accessory). The responsible body must check and apply the national regulations applicable for it accordingly.
- The temperature control unit complies with all applicable safety standards.
- Your system, which uses our temperature control unit, must be equally safe.
- The responsible body must design the system 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.
- Although 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) can be locked 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 for the energy source in accordance with local regulations (e.g. CFR 1910.147 for the US).

1.4.1.1 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
	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.

1.4.2 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.

1.4.3 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).

1.5 General information

1.5.1 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.

1.5.2 Safety devices to DIN 12876

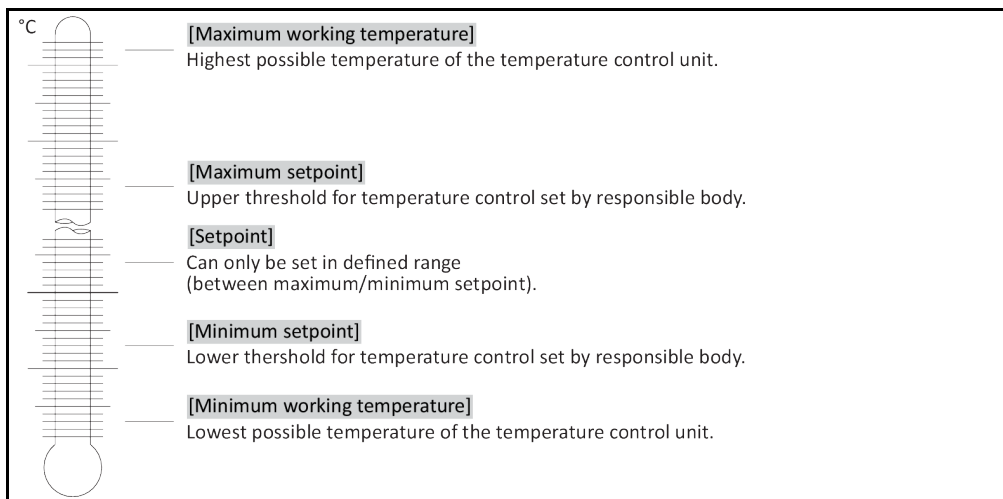
The rating of your temperature control unit is stated on the data sheet in the appendix.

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
III	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 fire point of ≥ 65 °C.
^{c)} The overheat protection can, for instance, be realized using a suitable fill level sensor or a suitable temperature limiter.
^{d)} Optional at the choice of the manufacturer.

Overview of the temperature thresholds



1.5.3 Further protective devices

INFORMATION

Emergency strategy – interrupt the power grid connection!

To determine the type of switch or switch combination your temperature control unit is equipped with, please refer to the wiring diagram. → From page 56, section »Annex«.

Temperature control units with >Mains isolator< [36] (red/yellow or gray): Turn the >Mains isolator< [36] to the "0" position.

Temperature control units with >Mains isolator< [36] (red/yellow) and additional >Appliance switch< [37] (gray): Turn the >Mains isolator< [36] to the "0" position. Then turn the >Appliance switch< [37] to the "0" position!

Temperature control units with >Mains isolator< [36] (gray) and >Emergency stop switch< [70] (red/yellow): Press the >Emergency stop switch< [70]. Then turn the >Main switch< [36] to the "0" position!

Temperature control units with >Mains switch< [37]: Power supply via socket: Disconnect the temperature control unit from the power supply. Then turn the >Mains isolator< [37] to the "0" position! Power supply via hard wiring: Disconnect the power grid supply by means of the building's circuit breaker. Then turn the >Mains isolator< [37] to the "0" position!

Temperature control units without a switch or inside a protective housing: Connection via socket: Disconnect the temperature control unit from the power supply. Connection via hard wiring: Disconnect the power grid supply by means of the building's circuit breaker!

1.5.3.1 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 switched off

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

Auto start function switched on

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

→ Page 32, section »Changing the Auto-Start function«.

1.5.3.2 Overheat protection

Your temperature control unit has a built-in overheat protection that is set to a fixed temperature at the factory. This overheat protection **only** protects the circulation pump installed in the temperature control unit. If the overheat protection has tripped: Turn off the temperature control unit and wait until the components in the temperature control unit have cooled down.

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

Filled temperature control unit is transported

MATERIAL DAMAGE DUE TO OVERFLOWING THERMAL FLUID

- Only transport an emptied temperature control unit.

- If available, use the lugs on the top side of the temperature control unit for transportation.
- Use an industrial truck for transport.
- The casters (if present) 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 at the casters (if any) must be activated and/or the leveling feet (if any) must be unscrewed/activated before the temperature control unit is put into operation. → Page 23, 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

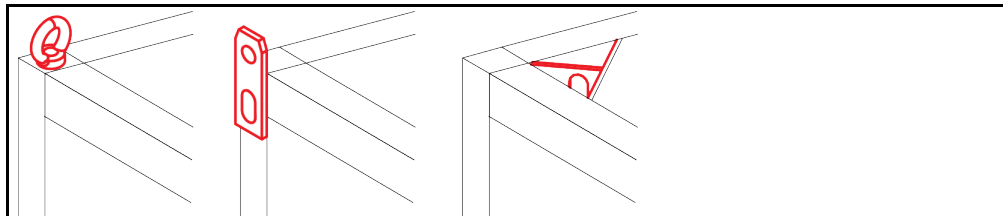
NOTE

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.

Example: lifting eyes (round, angular, and recessed (left to right))

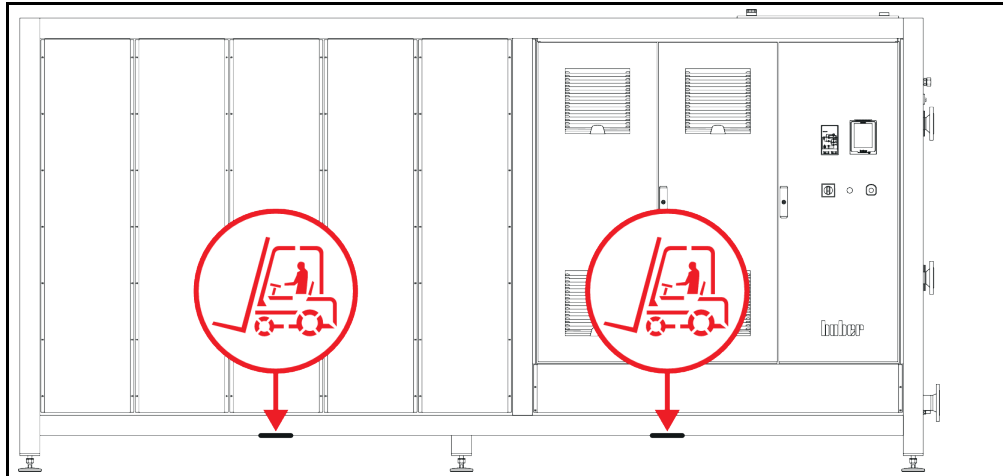


- Do not lift and transport the temperature control unit at the lifting eyes alone and without aids.
- Lift and transport the temperature control unit at the lifting eyes only with a crane or an industrial truck.
- The crane or industrial truck must have a lifting force equal to or greater than the weight of the temperature control unit. See the data sheet for the weight of the temperature control unit. → From page 56, section »Annex«.

- If the leveling feet have been removed for shipping: Only lower the temperature control unit when all leveling feet have been installed. → Page 19, section »Mounting/removing leveling feet«.

2.1.1.2 Temperature control unit without lifting eyes

Example: Supporting points for forklift arms for free-standing models from a certain overall size. For the exact position please refer to the wiring diagram in the annex.



- 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 for the weight of the temperature control unit. → From page 56, section »Annex«.
- If the leveling feet have been removed for shipping: Only lower the temperature control unit when all leveling feet have been installed. → Page 19, section »Mounting/removing leveling feet«.

2.1.2 Mounting/removing leveling feet

Only valid if the leveling feet have been removed for shipping.



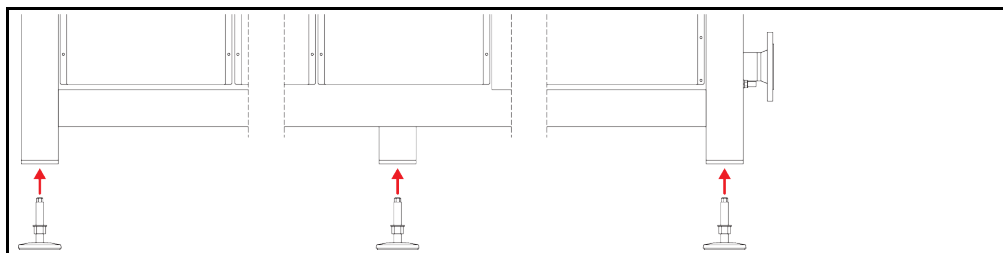
WARNING

The temperature control unit is not secured against slipping and/or lowering

DEATH OR SERIOUS INJURY DUE TO CRUSHING

- Secure the temperature control unit against slipping and/or lowering before the leveling feet are mounted.
- Do not stand or lie under the temperature control unit for mounting.

Example: mounting the leveling feet



INFORMATION

The leveling feet were removed for shipping the temperature control unit. Before placing / positioning the temperature control unit all leveling feet must be mounted. If the temperature control unit is re-shipped: Remove all leveling feet before packaging.

- The leveling feet can only be mounted while the temperature control unit is lifted.
- Secure the temperature control unit against slipping and/or lowering.
- Do not stand or lie under the temperature control unit while mounting the leveling feet.
- Do not lower the temperature control unit until all leveling feet have been mounted.

2.1.3 Positioning the temperature control unit

2.1.3.1 Temperature control unit with casters

- Do **not** use the casters for the transportation to the place of installation. → Page 18, section »**Lifting and transporting the temperature control unit**«.
- Use the casters only for positioning at the place of installation.
- Only ever move the temperature control unit on the casters if the surface is level, without 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 the 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 feet (if present) must be unscrewed/activated before the temperature control unit is put into operation. → Page 23, section »**Unscrewing/activating the leveling feet (if any)**«.

2.1.3.2 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 for the weight of the temperature control unit. → From page 56, section »**Annex**«.
- The leveling feet (if present) must be unscrewed/activated before the temperature control unit is put into operation. → Page 23, section »**Unscrewing/activating the leveling feet (if any)**«.

2.2 Unpacking

 **WARNING**

Starting up a damaged temperature control unit

DANGER TO LIFE FROM ELECTRIC SHOCK

- Do not operate a damaged temperature control unit.
- Please contact Customer Support. → Page 54, section »**Contact data**«.

PROCEDURE

- Check for damage to the packaging. Damage can indicate material 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.
- Observe the proper disposal of packaging material. → Page 15, section »**Proper disposal of resources and consumables**«.

2.3 Ambient conditions

 **CAUTION**

Unsuitable ambient conditions / unsuitable installation

SERIOUS INJURY DUE TO CRUSHING

- Comply with all requirements! → Page 20, section »**Ambient conditions**« and → Page 22, section »**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 models

For the connection data, see the data sheet. → From page 56, section »**Annex**«.

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

- Use only indoors. The illuminance must be at least 300 lx.
- Installation altitude up to 2,000 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 air exchange.
- Ambient temperature values are provided on the technical data sheet; to ensure trouble-free operation, compliance with the ambient conditions is mandatory.
- Relative humidity max 80% to 32 °C and 40 °C decreasing linearly to 50%.
- Short distance to supply connections.
- The temperature control unit must not be installed so as to hinder or even prevent access to the disconnecting device (to the power supply).
- For the magnitude of the mains voltage fluctuations, refer to the datasheet. → From page 56, section »Annex«.
- Transient surges, as would normally occur in the power supply system.
- Installation Class 3
- Applicable degree of soiling: 2.
- Surge category II.

Wall clearances

Clearance in cm	
Side	
[A2] Top	can be installed under a bench
[B] Left	min. 20
[C] Right	min. 20
[D] Front	min. 20
[E] Rear	min. 20
Clearance in cm (for operation in a bath)	
Side	
[A2] Top	can be installed under a bench
[B] Left	min. 20
[C] Right	min. 20
[D] Front	min. 20
[E] Rear	min. 20

2.3.1 EMC-specific notes

INFORMATION

Connecting cables in general

Prerequisites for a failure-free operation of the temperature control units incl. their connections with external applications: Installation and wiring must be carried out professionally. Related topics: "Electrical safety" and "EMC-compliant wiring".

Cable lengths

For flexible/fixed cable routing of more than 3 meters, the following must amongst other things be observed:

- Equipotential bonding, grounding (see also technical data sheet "Electromagnetic compatibility EMC")
- Compliance with "external" and/or "internal" lightning/overvoltage protection.
- Design protection measures, professional cable selection (UV resistance, steel pipe protection, etc.)

Attention:

The operating company is responsible for compliance with national/international directives and laws. This also includes the testing of the installation/wiring required by law or standards.

This device is suitable for 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** device according to the currently applicable **EN55011**.

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

2.4 Installation conditions

WARNING

Temperature control unit is connected to the power supply line

DEATH FROM ELECTRICAL SHOCK BY DAMAGE TO THE POWER CABLE.

- Do not put temperature control unit on power cable.

CAUTION

Operating the temperature control unit fitted with casters without brakes activated

CRUSHING OF LIMBS

- Activate brakes on the casters.

- Allow the temperature control unit to acclimate for about 2 hours when changing from a cold to a warm environment (or vice versa). Do not turn on the temperature control unit before!
- Install upright, stable and tilt-resistant.
- Use a non-combustible, sealed foundation.
- Keep the environment clean: Prevent slip and trip hazards.
- Wheels, if installed, must be locked after installation!
- Spilled/leaked thermal fluid must be removed immediately. Observe the proper disposal of thermal fluid and aids. → Page 15, section »Proper disposal of resources and consumables«.
- Observe the floor load bearing capacity for large units.
- Observe the ambient conditions.

2.5 Recommended temperature control hoses

CAUTION

Use of unsuitable/defective hoses and/or hose connections

INJURIES

- 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.

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.

2.6 Preparations for operation

2.6.1 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.

2.6.2 Installing collecting container

INFORMATION

Liquids can escape from the **>Overflow outlet<** [12a] while the cooling and thermal fluid circuit is filled or the temperature control unit is operated. This liquid must be collected and properly discarded. The collecting container used (for example a flat tub) must be compatible with the cooling agent and the thermal fluid and their temperatures.

PROCEDURE

- Place a collecting container below the **>Overflow outlet<** [12a].
- Please note:
 - The **>Overflow<** [12] and **>Overflow outlet<** [12a] may not be blocked.
 - The ventilation grille at the bottom side of the temperate control unit may not be blocked by the collecting container.
 - The fill level in the collecting container must be inspected on a regular basis and emptied regularly and emptied as needed. Observe the proper disposal of the contents.

2.6.3 Connecting the functional earth

PROCEDURE

- If required, connect the temperature control unit's **>Functional ground terminal< [87]** to the building's grounding point. Use a ground strap for this purpose. For the exact position and thread size please refer to the wiring diagram. → From page 56, section **»Annex«**.

2.7 Connecting externally closed application

Observe the wiring diagram. → From page 56, section **»Annex«**.

2.7.1 Connecting an externally closed application

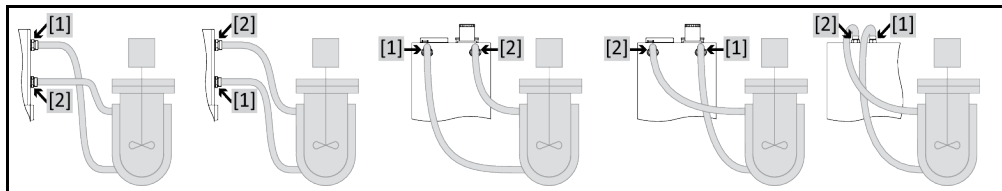
NOTE

Overpressure in the application (e.g. > 0.5 bar (g) with glass apparatus)

MATERIAL DAMAGE TO THE APPLICATION

- Provide an overpressure protective device to prevent damage to the application.
- Do not install valves/quick-release couplings in the feed/discharge lines from the temperature control unit to the application and from the application to the temperature control unit.
- **If valves/quick-release couplings are required:**
- Install burst disks on the application itself (at the feed and discharge lines).
- Install a bypass upstream of the valves/quick-release couplings for the application.
- 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.
- Fit the coupling plug to suitable temperature control hoses.
- Connect the coupling plug with the temperature control unit.
- Connect the other ends of the temperature control hoses with your application.
- Check the connections for leaks.

2.8 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.

2.8.1 Connection using socket with protective earth (PE)

DANGER**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**.

NOTE**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.

3 Function description

3.1 Function description of the temperature control unit

3.1.1 General functions

This temperature control unit is designed for **externally closed applications**. → Page 24, section »Connecting an externally closed application«.

Thanks to the **low internal volume**, you will achieve relatively **short cooling/heating rates**. Besides, the combination with **state-of-the art Peltier technology** is refrigerant-free and thus absolutely environmentally compatible.

3.1.2 Other functions

A pump ensures the thermal fluid is circulated. The following data are displayed on the **display with OLED technology** depending on the model and options: temperature of the internal and external temperature sensor, setpoint. Use the membrane keyboard to enter the controller settings.

The temperature control unit can be easily integrated in many laboratory automation systems using the **by default available RS232 and USB device interfaces**.

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 workplace; observe the proper disposal of thermal fluid and aids. → Page 15, 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!

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.

Thermal fluid: Water

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 (Na ₂ CO ₃) per liter
Not approved water	Distilled, deionized, demineralized, chloric, ferruginous, ammoniacal, contaminated or untreated river water or sea water
Volume circulated (at least)	3 l/min.
Thermal fluid: Water without ethylene glycol	
Use	≥ +4 °C
Thermal fluid: Water-ethylene glycol mixture	
Use	< +4 °C
Thermal fluid composition	Maximum viscosity: 3 mm ² /s

3.3 To be noted when planning the test

INFORMATION

Observe the intended operation. → Page 13, section »Proper operation«.

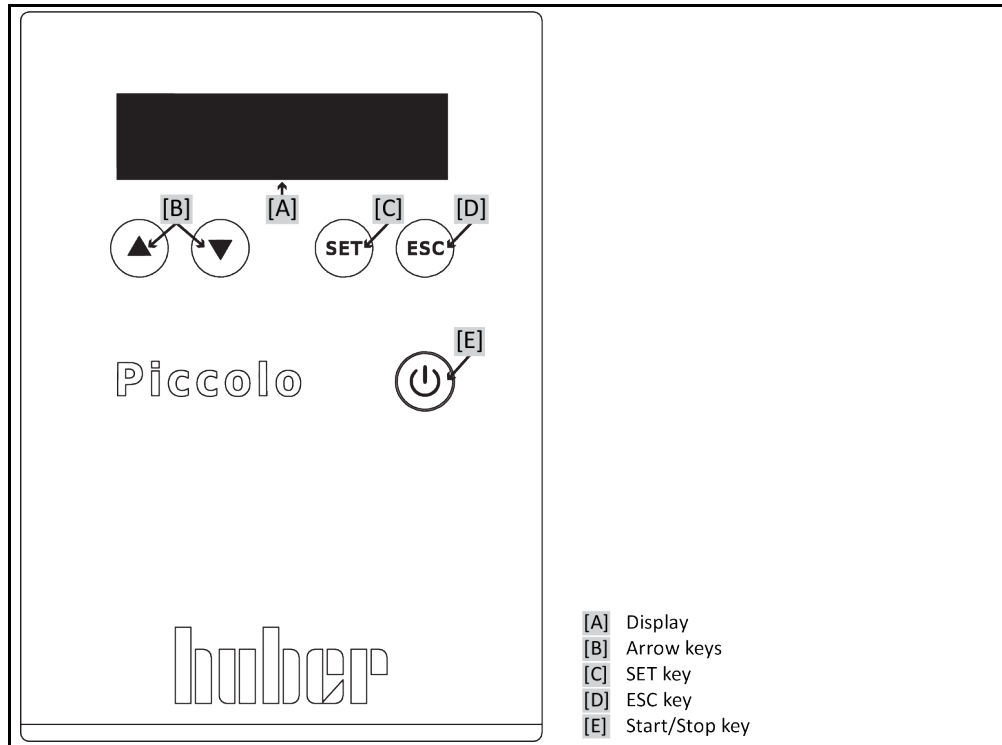
The focus is on your application. Bear in mind that system performance is influenced by heat transfer, temperature, thermal fluid viscosity, volume flow, and flow speed.

- Make sure 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 flow pressure of a temperature control unit must be taken into account in case of pressure-sensitive applications, such as glass reactors.
- Cross-section reduction or shut-off in the thermal fluid circuit must be avoided. Take appropriate measures to limit the pressure in the system. Observe the data sheet of your glass apparatus and the data sheet of your temperature control unit. → From page 56, section »Annex«.
- In order to prevent the risk of overpressure in the system, the thermal fluid must always be adjusted 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 fire 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 able to withstand the thermal fluid, the working temperatures and the admissible maximum pressure.
- Check the hoses at regular intervals for any material fatigue (e.g. cracks, leaks).
- Keep the temperature control hoses as short as possible
 - The inside diameters of the temperature control hoses must correspond at least to the pump connections. Select bigger inside diameters for longer line lengths to compensate for pressure loss in the piping.
 - The viscosity of the thermal fluid determines the pressure drop and influences the temperature control result, especially at low working 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 fluids recommended by the manufacturer and only within the usable temperature and pressure range.
- Fill the temperature control unit slowly, carefully and evenly. Wear the necessary personal protective equipment, such as goggles, heat-proof and chemically 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.

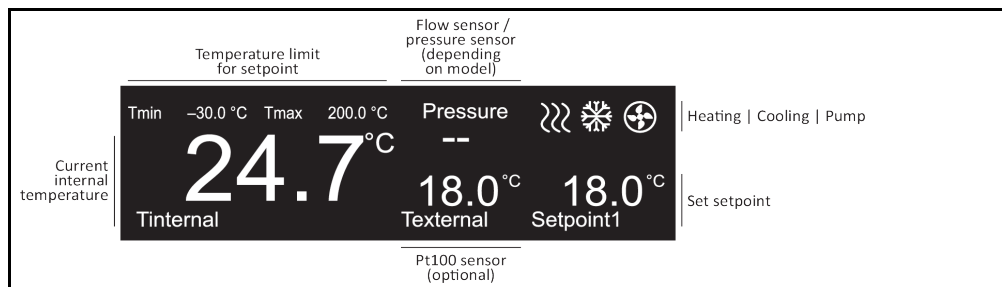
3.4 Display and control instruments

The control panel:
Displays and keys

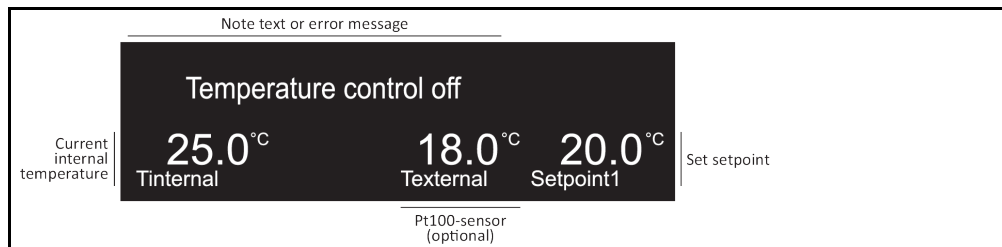


3.4.1 Display




Home screen:
Temperature control is active



Home screen:
Temperature control is inactive or an error message is displayed



Home screen:
Explanation of the
display

Designation	Description
Temperature limit for setpoint	Display of the setpoint limit. You can set the setpoint only within this range. You can change this limit in the menu item "Protection Options" and then "Setpoint Minimum" and "Setpoint Maximum". Do take the thermal fluid used and the material to be tempered into account when changing these settings. → Page 31, section »Menu function«.
Flow sensor / pressure sensor (optional, depending on model)	Display for the measured values of the built-in flow or pressure sensor. This feature is optional depending on the model and is not available in KISS controllers and other temperature control units. Use the menu item "Sensor Configuration" under "Flow Sensor / Pressure Sensor Display" to change the display or to turn it on and off. → Page 31, section »Menu function«.
 Heating	This symbol is displayed when the temperature control unit heats the thermal fluid. (Only for temperature control units with heating)
 Cooling system	This symbol is displayed when the temperature control unit cools down the thermal fluid.
 Pump	The symbol is displayed when the pump in the temperature control unit runs.
Current internal temperature	Display of the current thermal fluid temperature. The temperature is measured and controlled by the internal temperature sensor.
Pt100 sensor (optional)	Displays the measured value of the external Pt100 process display sensor. This display requires that: 1) the temperature control unit is equipped with a Pt100 port, 2) a Pt100 process display sensor has been attached, 3) the Pt100 process display sensor was placed in the application. You can turn on and off the display in the menu item "Sensor Configuration" under "Display external Pt100 sensor" only if the corresponding interface has been installed. → Page 31, section »Menu function«.
Set setpoint	Displays the setpoint set.
Info text or error message	Displays an info text or error message.

3.4.2 Control instruments

3.4.2.1 Arrow keys



Use the **>Arrow keys< [B]** to enter values (⊕ (+) or ⊖ (-)), to select a menu item (⊙ (arrow left) or ⊙ (arrow right)) or to select a different menu item (⊕ (up) or ⊖ (down)). Pressing an arrow key for an extended period changes a value faster. Pressing both **>Arrow keys< [B]** simultaneously calls up the main menu.

3.4.2.2 SET key



Pressing the **>SET key< [C]** on the home screen switches directly to the screen where you can enter the setpoint temperature. It allows you to quickly modify the setpoint temperature. The **>SET key< [C]** is also used to get to a selected menu item or to confirm changes.

3.4.2.3 ESC key



Pressing the **>ESC key<** [D] cancels changes / entries. The display changes to the previous screen without saving a change / entry. Pressing the **>ESC key<** [D] brings you back to the previous screen, all the way to the home screen. Press the **>ESC key<** [D] to acknowledged the alarm sound of an error.

3.4.2.4 Start/Stop key



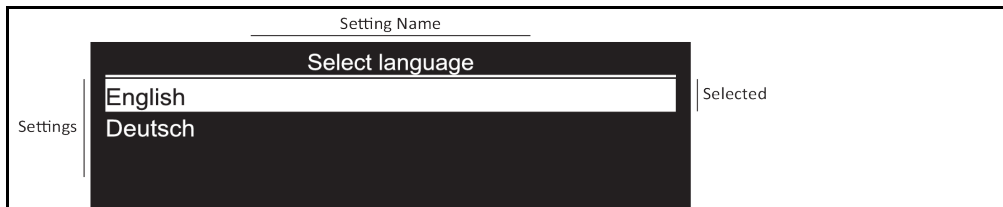
Start or stop the thermoregulation by pressing the **>Start/Stop button<** [E].

3.4.3 Adjusting settings

Exemplary setting of a numerical value



Exemplary setting by text selection



There are two ways to adjust settings:

Numerical settings:

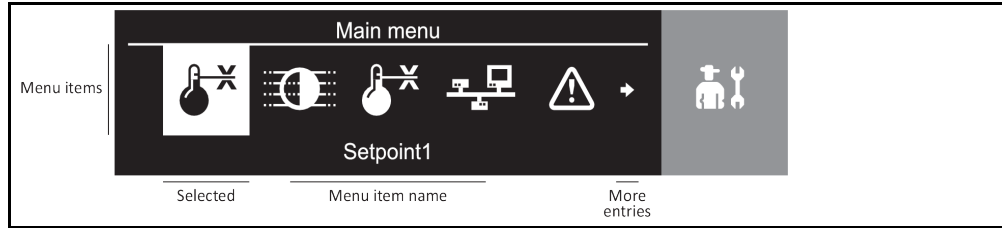
Use the **>Arrow keys<** [B] (⬆ (+) or ⬇ (-)) and confirm an entry by pressing the **>SET key<** [C]. Pressing an arrow key for an extended period changes a value faster.

Text selection:

Select the text via the **>Arrow keys<** [B] (⬆ (up) or ⬇ (down)) and confirm your entry by pressing the **>SET key<** [C].

3.5 Menu function

Main menu



Pressing both >Arrow keys< [B] simultaneously calls up the main menu. Some menu items cannot be selected depending on the configuration of the temperature control unit.

Overview of the menu items

Display	Description	KISS	OLÉ
Setpoint 1	Sets the setpoint. Use the >Arrow keys< [B] to change the setpoint.	X	X
Adjusting brightness	Adjusting the brightness of the OLED display. Use the >Arrow keys< [B] to change the brightness.	X	X
Sensor configuration	This menu item makes available: 1) Adjustment of the internal sensor (input options: Offset (K)) 2) Adjustment of the external sensor (input options: Offset (K)) 3) Temperature unit (choose between "Celsius" and "Fahrenheit") 4) Mode (choose between "Internal temperature control", "Venting" and "Circulation") 5) Display of external Pt100 sensor – (activating the display of an external Pt100 process display sensor) 6) Flow sensor / pressure sensor display – (activating the display of the optional flow sensor / pressure sensor)	X O X X O –	X O X X O M
Interfaces	This menu item makes available: 1) RS232 1 (setting of "Baud rate" and "Mode" (HuberBus)) 2) RS232 2 (setting of "Baud rate" and "Mode" (HuberBus)) 3) USB device (setting of "Baud rate" and "Mode" (HuberBus)) Only Huber service technicians may use the "STBus" mode. 4) Floating contact (selection of "Off", "Alarm" and "Unipump/PCS") 5) External control signal (selection between "Off", "Setpoint2" and "Standby")	X X X – –	X O X O O
Protection Options	This menu item makes available: 1) Setpoint2 (to input the second setpoint) 2) Setpoint minimum (to input the lower limit of the adjustable setpoint) 3) Setpoint maximum (to input the upper limit of the adjustable setpoint) 4) Power failure automatic (select between "Off" and "Automatic")	– X X X	O X X X
System	This menu item makes available: 1) Heating output (only with temperature control units; setting in %) 2) Select language (choose between "English" and "German") 3) Cooling bath (select between "Without cooling bath" (Off), "With cooling bath and common power supply" (On) and "With cooling bath and separate power supply" (On)) 4) System information (display different serial numbers (Serial Number) and version statuses) 5) Service menu (only for Huber service technicians. This submenu is password protected) 6) Factory settings (choose between "Continue" and "Cancel")	X X M X X X	M X – X X X
X = standard, O = optional, M = model-dependent – = not possible			

3.6 Functional examples

3.6.1 Selecting a language

PROCEDURE

- Press both >Arrow keys< [B] to invoke the main menu.
- Use the >Arrow keys< [B] to select the menu item "System".
- Press the >SET key< [C] to confirm your selection.
- Use the >Arrow keys< [B] to select the submenu "Select Language".
- Press the >SET key< [C] to confirm your selection.
- Use the >Arrow keys< [B] to select the desired language.
- Press the >SET key< [C] to confirm your selection.
- Press the >ESC key< [D] twice to return to the home screen.

3.6.2 Setting the setpoint

PROCEDURE

Using the home screen to set the setpoint

- Press the >SET key< [C].
- Use the >Arrow keys< [B] (⊕ (+) or ⊖ (-)) to set the new setpoint.
The longer you keep an arrow key pressed the faster the value changes.
- Press the >SET key< [C] to confirm your input.

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.

PROCEDURE

- Press both >Arrow keys< [B] to invoke the main menu.
- Use the >Arrow keys< [B] to select the menu item "Protection Options".
- Press the >SET key< [C] to confirm your selection.
- Use the >Arrow keys< [B] to select the submenu "Power Failure Automatic".
- Press the >SET key< [C] to confirm your selection.
- Use the >Arrow keys< [B] to select the desired setting.
- Press the >SET key< [C] to confirm your selection.
- Press the >ESC key< [D] twice to return to the home screen.

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.

NOTE

Turning on the temperature control unit with empty cooling and thermal fluid circuit
MATERIAL DAMAGE
 ➤ The cooling and thermal fluid circuit must be filled before turning on the temperature control unit.

4.1.1 Turning on the temperature control unit

PROCEDURE

- Before you turn on the temperature control unit using the >Mains switch< [37]:
 - The cooling circuit must be filled. → Page 34, section »Filling the cooling circuit«.
 - The thermal fluid circuit must be filled. → Page 35, section »Filling and venting externally closed application«.
- Switch on the temperature control unit using the >Mains switch< [37]. Circulation and temperature control are deactivated.

4.1.2 Turning off the temperature control unit

PROCEDURE

- Warm the thermofluid to room temperature.
- Stop the thermoregulation.
- Switch off the temperature control unit using the >Mains switch< [37].

4.2 Filling, venting and draining

Observe the wiring diagram. → From page 56, 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).

NOTE

During an active circulation, the thermal fluid circuit is shut off by shut-off valves
MATERIAL DAMAGE TO THE CIRCULATING PUMPS INSTALLED IN THE TEMPERATURE CONTROL UNIT
 ➤ Do not close the thermal fluid circuit during an active circulation by means of shut-off valves.
 ➤ Warm the thermal fluid to room temperature before stopping the circulation.

NOTE

Turning on the temperature control unit with empty cooling and thermal fluid circuit
MATERIAL DAMAGE
 ➤ The cooling and thermal fluid circuit must be filled before turning on the temperature control unit.

- 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 Cooling circuit

INFORMATION

Ambient conditions that will damage a filled cooling circuit can occur during transport and storage. That is the reason why the cooling circuit is not filled at the factory. Make sure that the cooling circuit is emptied when the temperature control unit is decommissioned / placed into storage.

The cooling agent must be compatible with the temperature range of the thermal fluid used.

4.2.1.1 Filling the cooling circuit

Cooling agent: Water

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 (Na ₂ CO ₃) per liter
Non-approved water	Distilled, deionized, demineralized, chloric, ferruginous, ammoniacal, contaminated or untreated river water or sea water
Volume circulated (at least)	3 l/min.
Cooling agent: Water without ethylene glycol	
Use	excluded
Cooling agent: Water-ethylene glycol mixture	
Use	< +4 °C
Composition of the cooling agent	Maximum viscosity: 3 mm ² /s

PROCEDURE

- Check at the top of the temperature control unit:
 - The **>Overflow<** [12] is not closed / blocked.
- Check at the bottom of the temperature control unit:
 - The **>Internal cooling circuit drain <** [8b] is closed with a knurled screw.
 - The **>Overflow outlet<** [12a] is not closed / blocked.
- Place a collecting container below the **>Overflow outlet<** [12a]. → Page 23, section »Installing collecting container«.
- Open the cover at the **>Filling port internal cooling circuit<** [17a]. For this purpose, use a socket wrench (size 8).
- Using the filling accessories (funnel and/or beaker), carefully fill suitable thermal fluid into the **>Filling port internal cooling circuit<** [17a]. For the minimum filling capacity, refer to the datasheet. → From page 56, section »Annex«. Drain the excess cooling agent in the event of overfilling. → Page 34, section »Draining the cooling circuit«.
- Close the cover at the **>Filling port internal cooling circuit<** [17a] hand-tight.

4.2.1.2 Draining the cooling circuit

PROCEDURE

- Place a collecting container below the **>Internal cooling circuit drain <** [8b]. The collecting container used (for example a flat tub) must be compatible with the cooling agent and its temperature.
- Open both knurled screws at the **>Internal cooling circuit drain <** [8b]. The thermal fluid will begin to drain as soon as you have opened the knurled screws.
- In addition open the **>Filling port internal cooling circuit<** [17a]. Thus, the cooling circuit is drained faster. For the amount of liquid in the cooling circuit, refer to the datasheet. → From page 56, section »Annex«.
- Wait until no more cooling agent escapes.
- Tilt the temperature control unit on its left side.
- Place the temperature control unit upright again. This causes the remaining cooling agent to escape.

- Wait until no more cooling agent escapes. Properly dispose the cooling agent.
- Close the **>Filling port internal cooling circuit<** [17a] hand-tight.
- Close the knurled screws at the **>Internal cooling circuit drain <** [8b] hand-tight. The draining process is complete.

4.2.2 Externally closed application

4.2.2.1 Filling and venting externally closed application

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 workplace; observe the proper disposal of thermal fluid and aids. → Page 15, section **»Proper disposal of resources and consumables«**.

INFORMATION

Calculate your system's capacity. 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]. See the data sheet for the minimum filling capacity of the temperature control unit. → From page 56, section **»Annex«**.

PROCEDURE

- Check that:
 - a collecting container is installed below the **>Overflow outlet<** [12a]. → Page 23, section **»Installing collecting container«**.
 - the external application is connected to the temperature control unit. → Page 24, section **»Connecting externally closed application«**.
- 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 from the temperature control unit via the hose connections to the external application. The fill level of the internal container can be viewed through the **>Filling port<** [17].
- Switch on the temperature control unit.
- Set the setpoint to 20 °C. → Page 32, section **»Setting the setpoint«**.
- **Start** the circulation for 5 seconds by pressing the **>Start/Stop button<** [E].
- **Stop** the circulation for 5 seconds by pressing the **>Start/Stop button<** [E].
- **Check** the fill level in the internal container. Refill thermal fluid as needed. Observe the fill level in the internal container.
- Repeat the steps "Start", "Stop" and "Check" until the temperature control unit is adequately filled/vented.

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.

- Switch off the temperature control unit.
- Follow the instructions for proper disposal when cleaning the filling accessories. → Page 15, section **»Proper disposal of resources and consumables«**.
- Check the fill level in the collecting container. Empty the container when necessary and dispose of its contents properly. → Page 15, section **»Proper disposal of resources and consumables«**.
- Place the collecting container back under the **>Overflow outlet<** [12a]
- Manually close the **>Filling port<** [17].
The temperature control unit is now filled.

INFORMATION Venting must be performed especially during commissioning and after a change of 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. Do not go below the **minimum** in the internal container when working at the “lowest” working temperature and there must be no overflow from the **>Filling port< [17]** when working at the “highest” working temperature. In case of overfilling, drain the excess amount of thermal fluid. → Page 36, section »**Draining externally closed applications**«. Check if the thermal fluid can be reused. Observe the proper disposal of thermal fluid. → Page 15, section »**Proper disposal of resources and consumables**«.

4.2.2.2 Draining externally closed applications

CAUTION

Hot or very cold thermal fluid

SEVERE BURNS/FROSTBITE 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 control the temperature of the thermal fluid when the drain is open.
- Danger of burns when draining thermal fluids at temperatures above 20 °C.
- Wear your Personal Protective Equipment for draining.
- Only drain using suitable drainage hose and collecting container. These must be compatible with the thermal fluid and its temperature.

INFORMATION The connections **>Circulation flow< [1]** and **>Circulation return< [2]** are also the **>Drain< [8]**. They are used to empty the temperature control unit. As soon as you disconnect a coupling plug from the port **>Circulation flow< [1]** or **>Circulation return< [2]**, the port is automatically closed.

PROCEDURE

- Place an adequately dimensioned collecting container underneath the ports **>Circulation flow< [1]** and **>Circulation return< [2]**. The fill level of the collecting container must be regularly checked during emptying. Empty the collecting container as needed. Check if the thermal fluid can be reused. Observe the proper disposal of thermal fluid. → Page 15, section »**Proper disposal of resources and consumables**«.
- Remove the coupling plug from the **>Circulation return< [2]**. As soon as you have opened the connection, the port at the temperature control unit is automatically closed. The thermal fluid immediately starts to flow from the external application.
- Wait until the thermal fluid has flown from the external application.
- Remove the coupling plug from the **>Circulation return< [1]**. As soon as you have opened the connection, the port at the temperature control unit is automatically closed. The remaining thermal fluid immediately starts to flow from the external application.
- Wait until the remaining thermal fluid has flown from the external application.
- Mount both coupling plugs to one draining hose each. The length of the draining hoses should be selected so that the thermal fluid can flow out of the open ends into the collection container.
- Mount a draining hose each by means of the coupling plug onto the **>Circulation flow< [1]** and **>Circulation return< [2]**. The thermal fluid immediately starts to flow from the thermal control unit.
- Wait until the thermal fluid has flown from the thermal control unit.
- Leave the drain hoses mounted on the temperature control unit for a while to dry out and the residue to drain.
- Remove the coupling plug from the **>Circulation flow< [1]** and **>Circulation return< [2]**.
- Re-fit the coupling plug on the temperature control hoses of your external application.
- Connect the coupling plug with the **>Circulation flow< [1]**.
- Connect the coupling plug with the **>Circulation return< [2]**.

5 Normal operation

5.1 Automatic operation

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).

NOTE

During an active circulation, the thermal fluid circuit is shut off by shut-off valves

MATERIAL DAMAGE TO THE CIRCULATING PUMPS INSTALLED IN THE TEMPERATURE CONTROL UNIT

- Do not close the thermal fluid circuit during an active circulation by means of shut-off valves.
- Warm the thermal fluid to room temperature before stopping the circulation.

5.1.1 Temperature control

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.

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 stops.

6 Interfaces and data communication

NOTE

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.

NOTE

The specifications of the interface used are not being met.

PROPERTY DAMAGE

- Only connect components that meet the specifications of the interface used.

6.1 Interfaces on the temperature control unit

6.1.1 Interfaces at the back

For the exact position of the interfaces, please refer to the wiring diagram. → From page 56, section »Annex«.

6.1.1.1 USB-2.0 interface

INFORMATION

The interfaces used must meet the specifications of the generally accepted standards. The necessary drivers for the interface can be found at: www.ftdichip.com/Drivers/VCP.htm

6.1.1.1.1 USB-2.0 interface, device



USB-2.0 connection (for Mini-B connector) for communicating with a computer.

6.1.1.2 RS232 jack

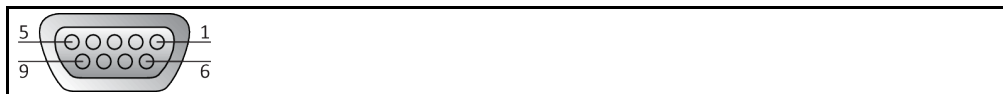


A PC, a SPS or a Process Control System (PCS) can be connected to this jack for remote control of the controller electronics. Before plugging in the cable, check the settings in the “Interfaces” category and adjust if necessary.

INFORMATION

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

Pin assignment (front view)



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

6.2 Data communication

The communication via the RS232 interface is a master-slave communication. The Master (e.g. PC or PLC) starts a communication and the slave (the temperature control unit) will only respond to a request.

Transmission format:

8 data bits, 1 stop bit, no parity, no handshake

These parameters are non-adjustable and cannot be changed! The baud rate can be set in a range from 9600 baud to 115200 baud.

Time response (timing):

The data flow of a command must not be interrupted. Pauses of more than 100 ms between the characters of a command result in the receiver aborting the incoming command. The temperature control unit will always send a response for a correctly received command. The next command can be sent once a complete response was received. The typical response time is less than 300 ms.

INFORMATION

You need the software "SpyControl" to transmit commands. The software can be downloaded from the download area of www.huber-online.com.

6.2.1 LAI commands

There are 3 commands to communicate LAI commands to the temperature control unit:

1. "V" (Verify) – to query the device ID,
2. "L" (limit) – to query the device limits,
3. "G" (General) – to control and query the temperature control unit.

The send commands always begin with "[M01", answers always with "[S01", followed by the command qualifier "V" (Verify), "L" (Limits) or "G" (General). The next two bytes specify the length or the response of the command. A check sum is transmitted to increase data safety. The checksum is the 1 byte sum of all hex values from the start character to the last character before the checksum. It is appended to the end of the command or the response and then finished off with the end character CR ("\r", 0Dh).

Structure of a send command

Byte	Command	Response	Description
1 Byte	[[Start character, fix
2 Byte	M	C	Identification of the transmitter (M = Master, S = Slave)
3 bytes	0	0	Slave address, fix
4 bytes	1	1	Slave address, fix
5 bytes	V / L / G	V / L / G	Command qualifier (V = Verify, L = Limit, G = General)
6 bytes	0	1	Length of command / response (example)
7 bytes	7	4	Length of command / response (example)
n Bytes	x	x	If applicable, content; the number of bytes depends on the command
I-2 byte	C	C	Checksum (example)
I-1 byte	6	1	Checksum (example)
I byte	\r	\r	End-of-text character CR

6.2.1.1 Command "V" (Verify)

This command is provided to check the presence of a slave and query its ID.

Byte	ASCII	Hex	Description
Master sends: [M01V07C6\r			
1. Byte	[5Bh	Start character
2. Byte	M	4Dh	Master ID
3. Byte	0	30h	Slave address
4. Byte	1	31h	Slave address
5. Byte	V	56h	Command qualifier
6. Byte	0	30h	Length of data field (0)
7. Byte	7	37h	Length of data field (7)
8. Byte	C	43h	Checksum
9. Byte	6	36h	Checksum
10. Byte	\r	0Dh	End character CR
The checksum is formed from bytes 1 to 7: $5Bh + 4Dh + 30h + 31h + 56h + 30h + 37h = 1C6h = 1 \text{ byte sum} = C6h$ The hex value C6h is appended as two ASCII characters "C" (43h) and "6" (36h).			
The slave responds: [S01V14Huber ControlC1\r The 13 bytes of the data set "Huber Control" plus the 7 bytes in front of the data set result in a data field length of 20 bytes = 14h bytes.			

6.2.1.2 Command "L" (Limit)

This command is used to query the setpoint limits.

Byte	ASCII	Hex	Description
Master sends: [M01LOF*****1B\r			
The slave responds: [S01L17F4484E20F4484E2045\r			

A response always includes four limit values (starting from the eighth byte):

1. Lower setpoint limit (4 bytes),
2. upper setpoint limits (4 bytes),
3. lower working range limit (4 bytes),
4. upper working range limit (4 bytes).

The working range limits are device-specific and cannot be changed. The lower setpoint limit can not be lower than the lower working range limit and the upper setpoint limit can not exceed the upper working range limit.

The two bytes before the last byte contain the checksum and the last byte of the response contains the end character (CR).

Each of the four values is expressed as a hex value. The values are signed, where 1 bit corresponds to 0.01 K. Thus a number range from 0000h to 7FFFh, i.e. from 0.00 °C to 327.67 °C, can be represented. Negative numbers are represented from FFFFh to 8000h, i.e. from -0.01 °C to -327.66 °C. Thus the four individual ASCII characters "F448" correspond to a 16-bit hex value of F448h and thus a temperature of -30 °C. → Page 41, section »Command "G" (General)«.

6.2.1.3 Command “G” (General)

This command transmits the most important temperatures and status information in a cycle. A modified setpoint is not stored in the permanent memory, i.e. this value is lost when switching off the machine.

Structure Command
“G” (General)

Byte	ASCII	Hex	Description
Master sends: [M01G0Dsattttpp\r			
1. Byte	[5Bh	Start character
2. Byte	M	4Dh	Master ID
3. Byte	0	30h	Slave address
4. Byte	1	31h	Slave address
5. Byte	G	47h	Command qualifier
6. Byte	0	30h	Length of the command: 0Dh = 13 bytes (number of bytes without checksum and end character)
7. Byte	D	44h	
8. Byte	s: C / I / O / *	43h / 49h / 4Fh / 2Ah	Temperature control mode Meaning of the characters in the send string: “C” (43h) = Circulation, switch circulation on; “I” (49h) = Turn internal temperature control on; “O” (4Fh) = Off, turn temperature control off; “*” (2 Ah) = Do not change the current state.
9. Byte	a: 0 / 1 / *	30h / 31h / 2Ah	Alarm acknowledgment Meaning of the characters in the send string: “0” (30h) = No alarm acknowledgment; “1” (31h) = Any pending alarm tone is acknowledged; “*” (2 Ah) = Do not change the current state.
10. Byte	t	tttt / ****	Query or set the setpoint Meaning of the characters in the send string: Setpoint with 16-bit resolution (2 bytes, thus 4 ASCII characters) “tttt” = 0000h (0.00 °C) to 7FFFh (327.67 °C) FFFFh (-0.01 °C) to 8000h (-327.68 °C) 0190h corresponds to +4 °C, (30h, 31h, 39h, 30h) FE70h corresponds to -4 °C (46h, 45h, 37h, 30h) “****” (2Ah, 2Ah, 2Ah, 2Ah) = no change to the setpoint, setpoint is only queried
11. Byte	t		
12. Byte	t		
13. Byte	t		
14. Byte	p	Checksum	Checksum
15. Byte	p	Checksum	It is generated from bytes 1 to 13.
16. Byte	\r	0Dh	End character CR
The slave responds: [S01G15sattttiiiiieepp\r			
1. Byte	[5Bh	Start character
2. Byte	C	53h	Slave ID
3. Byte	0	30h	Slave address
4. Byte	1	31h	Slave address
5. Byte	G	47h	Command qualifier
6. Byte	1	31h	Length of response: 15h = 21 Bytes
7. Byte	5	35h	
8. Byte	s: C / I / O	43h / 49h / 4Fh	Temperature control mode Meaning of the characters in the response string: “C” (43h) = Circulation, circulation is on; “I” (49h) = Internal temperature control is on; “O” (4Fh) = Off, temperature control is off.

Byte	ASCII	Hex	Description
9. Byte	a: 0 / 1	30h / 31h	Alarm status Meaning of the characters in the response string: "0" (30h) = No alarm; "1" (31h) = Any number other than "0" is an alarm
10. Byte	t	tttt / ****	Query or set the setpoint Meaning of the characters in the send string: Setpoint with 16-bit resolution (2 bytes, thus 4 ASCII characters) "tttt" = 0000h (0.00 °C) to 7FFFh (327.67 °C) FFFFh (-0.01 °C) to 8000h (-327.68 °C) 0190h corresponds to +4 °C, (30h, 31h, 39h, 30h) FE70h corresponds to -4 °C (46h, 45h, 37h, 30h) "****" (2Ah, 2Ah, 2Ah, 2Ah) = no change to the setpoint, setpoint is only queried
11. Byte	t		
12. Byte	t		
13. Byte	t		
14. Byte	i	iiii	Internal actual value Same format as setpoint
15. Byte	i		
16. Byte	i		
17. Byte	i		
18. Byte	e	eeee	External actual value Same format as setpoint, depends on device configuration
19. Byte	e		
20. Byte	e		
21. Byte	e		
22. Byte	p	Checksum	Checksum It is generated from bytes 1 to 21.
23. Byte	p	Checksum	
24. Byte	\r	0Dh	End character CR

Example:

The temperature control mode and the alarm status should remain unchanged (each "**") and a setpoint of -4.00 °C (FE70) is to be set.

The master sends: **[M01G0D**FE700A\r**

The slave responds (for example): **[S01G1500FE7009A4C504E7\r**

The temperature control unit is turned off ("O"), there is no alarm ("0"), the setpoint of -4.00 °C was set (FE70), the actual value is 24.68 °C (09A4), "C504" corresponds to -151.00 °C and indicates that no external temperature sensor is installed or connected.

6.2.2 PP commands

There is another set of commands to make the communication with the temperature control unit easy. The PP commands can be used, e.g. in conjunction with simple terminal programs. The calculation of a checksum has therefore been omitted and the commands kept very simple. Each command is terminated with Carriage Return ('\r', 0Dh) and Linefeed ('\n', 0Ah). There are read and write commands. Each correct command causes a response from the temperature control unit. Temperature and setpoint values are represented by a five-digit number, which corresponds to the temperature being expressed in hundredths of a degree (without decimal point).

Available read commands

Function	Master sends	Slave responds	Description
Read the setpoint	SP?\r\n	SP +02500\r\n	The setpoint is set to 25.00 °C.
Read the internal actual value	TI?\r\n	TI +02499\r\n	Currently, the internal actual value is 24.99 °C.
Read the external actual value	TE?\r\n	TE +02499\r\n	Currently, the external actual value is 24.99 °C.
		TE -15100\r\n	An external sensor is not connected or does not exist.
Read the temperature control mode	CA?\r\n	CA +00000\r\n	Temperature control and circulation are inactive.
		CA +00001\r\n	Temperature control and circulation are active.

Available write commands

Function	Master sends	Slave responds	Description
Setting the setpoint	SP@ -01234\r\n	SP -01234\r\n	The setpoint is set to -12.34 °C.
Starting the temperature control unit	CA@ 00001\r\n	CA +00001\r\n	The temperature control process is started.
Stopping the temperature control unit	CA@ 00000\r\n	CA +00000\r\n	The temperature control process is stopped.

7 Service/maintenance

7.1 Displays in the event of faults

An alarm signal (xx Hz) is sounded in the event of a fault and the temperature control unit displays an alarm or warning message on the OLED display.

Overview of messages

Code	Cause	Effect, measure
001	Overtemperature alarm The internal temperature is above the set value of the overtemperature protection. The overtemperature protection was triggered.	The internal temperature of the thermal fluid is in the upper allowable extreme range. The temperature control unit can be turned on again only when the temperature of the thermal fluid has returned to normal parameters. Check whether the thermal fluid used matches your required parameters if overtemperatures repeatedly shut down the unit.
002	Tmax exceeded The internal temperature is above the set setpoint limit.	The internal temperature of the thermal fluid is above the setpoint limit set in the controller. Control continues.
003	Tmin undercut The internal temperature is below the set setpoint limit.	The internal temperature of the thermal fluid is below the setpoint limit set in the controller. Control continues.
004	Error float test	Check the thermal fluid level. KISS: Is the float blocked or sticky? Please contact Customer Support if the thermal fluid level is sufficient and the float of the KISS controller moves freely.
005	Low-level alarm No enable signal, level alarm	Control is inactive. (Pump off, compressor off, heating off) Check the fill level of the thermal fluid. Restart impossible until the thermal fluid level is OK.
006	Overpressure cutout triggered The pressure in the condenser is too high. The overpressure cutout (pressure switch) has triggered.	Temperature and pressure increase in the condenser. An overpressure cutout (pressure switch) is installed to protect the temperature control unit against excessive pressure. Water cooling: a.) Is the cooling water supply correctly connected? b.) Is the suction strainer (dirt trap) clogged? c.) What is the cooling water temperature, the cooling water flow rate and the cooling water pressure? Air cooling: a.) Is the heat exchanger or the grille dirty? b.) Does the fan turn if the cooling machine is switched on? If the fan does not turn: Contact Customer Support.
009 011	Sensor F1 short Sensor F2 short Short-circuit at the internal temperature sensor F1 or at the external temperature sensor F2.	Control is inactive. (Pump off, compressor off, heating off) Check the sensor.
010 012	Sensor F1 open Sensor F2 open The internal temperature sensor F1 or the external temperature sensor F2 is open.	Control is inactive. (Pump off, compressor off, heating off) Check the sensor.

Code	Cause	Effect, measure
033	Error EP0 (Flash)	Please contact Customer Support.
034	Error EP1 (EEPROM)	
035	Error EP2 (NVRAM)	
036	Synchronization	
037	Parameters not equal	
038	Invalid status	
039	Error safety chip	
042	Pump protection activated The pump motor is overheated.	Check the ambient conditions. Check the viscosity of the thermal fluid. Turn the temperature control unit off and let it cool down.

7.2 Electrical fuse

The thermal overcurrent circuit breakers for all-pole disconnection (L and N) are located at the back. In case of a fault (no function and/or no display) please first check if the overcurrent circuit breakers have tripped. If the overcurrent circuit breakers trigger again immediately after reversing, please unplug the power cord and contact Customer Support immediately. → Page 54, section »Contact data«.

7.3 Maintenance



Cleaning/maintenance while the temperature control unit is operating

MORTAL DANGER FROM ELECTRIC SHOCK

- Stop an ongoing temperature control process.
- Turn off the temperature control unit.
- Also disconnect the temperature control unit from the power supply.



Performing maintenance work not described in these operation manual

MATERIAL DAMAGE ON THE TEMPERATURE CONTROL UNIT

- Please contact Huber for maintenance work that is not described in these operation manual.
- Maintenance work not described in these operation manual is reserved for qualified specialists trained by Huber.
- Safety-relevant components may only be replaced by equivalent ones. The specified safety values for the respective component must be observed.

7.3.1 Function check and visual inspection

Control intervals

Cooling*	Description	Maintenance interval	Comment	Person responsible
A/W	Visually inspect hoses and hose connections	Prior to switching on the temperature control unit	Exchange leaking hoses and hose connections prior to switching on the temperature control unit. → Page 46, section »Replacing temperature control hoses«.	Operating company and / or operators
A/W	Check the fill level in the collection container at the >Overflow outlet< [12a]	Prior to switching on the temperature control unit	Check the fill level in the collecting container. Empty as required. Observe the proper disposal. → Page 15, section »Proper disposal of resources and consumables«.	Operating company and / or operators

Cooling*	Description	Maintenance interval	Comment	Person responsible
A/W	Check the power supply cable	Prior to switching on the temperature control unit or on relocation	Do not start the temperature control unit if the power supply cable is damaged.	Qualified electrician (BGV A3)
A	Clean the perforated sheet	As required	Clean the perforated sheet (both side parts and underside) of the temperature control unit with a damp cloth	Operating company
A/W	Thermal fluid inspection	As required	–	Operating company and / or operators
A/W	Check the fluid in the cooling circuit	Monthly	–	Operating company and / or operators
A/W	Check the mechanical seals	Monthly	→ Page 50, section » Inspect the mechanical seal «	Operating company and / or operators
A/W	Overheat protection - functional test	Every 12 months	→ Page 47, section » Testing overheat protection for functionality «	Operating company and / or operators
A/W	Check the temperature control unit for damage and stability	Every 12 months or after a change of location	–	Operating company and / or operators
A/W	Exchange safety-relevant electric and electromechanical components	20 years	Have the exchange only carried out by certified personnel (such as Huber service engineers). Please contact Customer Support. → Page 54, section » Contact data «	Operating company

*A = Air cooling; W = Water cooling; U = Applicable only for Unistats

7.3.2 Replacing temperature control hoses

Replace defective temperature control hoses **before** turning on the temperature control unit.

PROCEDURE

- Drain the temperature control unit. → Page 36, section »**Draining externally closed applications**«.
- Replace defective temperature control hoses. Observe the proper disposal. → Page 15, section »**Proper disposal of resources and consumables**«.
- Reconnect your external application. → Page 24, section »**Connecting externally closed application**«.
- Fill the temperature control unit with thermal fluid. → Page 35, section »**Filling and venting externally closed application**«.
- Vent the temperature control unit. → Page 35, section »**Filling and venting externally closed application**«.
- Restart the temperature control unit in normal mode.

7.3.3 Testing overheat protection for functionality

CAUTION

No protective equipment is worn during the function test of the overheat protection

SERIOUS BURNS TO LIMBS

- During the function test of the overheat protection, housing parts on the temperature control unit can get extremely hot.
- Permanently wear your personal protection equipment (e.g. protective gloves) for the duration of the function test.

NOTE

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

Start the test only if the temperature of the thermal fluid used is about 20 °C. You must **NOT leave the temperature control unit unattended** during the entire test of the overheat protection. During the test, an error case is intentionally induced. For this purpose, the interior of the temperature control unit is brought to a temperature above the max. temperature range. → From page 56, section »Annex«.

PROCEDURE

- Switch off the temperature control unit.
- Place an adequately dimensioned collecting container underneath the ports >Circulation flow< [1] and >Circulation return< [2].
- Remove the external application from the >Circulation flow< [1] and >Circulation return< [2]. As soon as you have opened the connection, the port at the temperature control unit is automatically closed. The thermal fluid immediately starts to flow from the external application.
- Wait until the thermal fluid has flown from the external application.
- Cover the ventilation holes on the side and the fans on the back.
- Switch on the temperature control unit.
- Enter the max. setpoint. → Page 32, section »Setting the setpoint«. For the permissible temperature range/setpoint, refer to the datasheet. → From page 56, section »Annex«.
- Start the temperature control process. → Page 37, section »Starting the temperature control process«.
- Wait until the value („Tintern“) shown on the display rises to 80 °C (+/- 5 K). The built-in overheat protection triggers from a fixed temperature value. This test lasts approx. 20 minutes. If the overheat protection does not trip: Immediately control the temperature to room temperature. Then immediately switch off the temperature control unit. Please contact Customer Support. → Page 54, section »Contact data«.
- Switch off the temperature control unit.
- Remove the cover from the ventilation holes and the fans.
- Allow the temperature control unit to cool down until the overheat protection is deactivated.
- Switch on the temperature control unit.
- Set the setpoint to room temperature. → Page 32, section »Setting the setpoint«.
- Start the temperature control process. → Page 37, section »Starting the temperature control process«. This allows the fans to cool down the inside of the temperature control unit faster to room temperature.
- Wait until the adjusted setpoint has been reached.
- Set the setpoint to 4 °C. → Page 32, section »Setting the setpoint«.
- Start the temperature control process. → Page 37, section »Starting the temperature control process«.
- Open the cover at the >Filling port internal cooling circuit< [17a]. For this purpose, use a socket wrench (size 8).
- Squeeze a hose from the external application. The hose must be at least 14 cm long measured from the coupling plug. In the next step, this prevents air from being drawn in from the internal cooling circuit.
- Now insert the end of the hose including the coupling plug into the >filler hole internal cooling circuit< [17a]. This closes the internal cooling circuit.
- Wait until the overheat protection trips. This test lasts approx. 10 minutes. If the overheat protection does not trip: Immediately control the temperature to room temperature. Then immediately switch off the temperature control unit. Please contact Customer Support. → Page 54, section »Contact data«.

- Remove the hose from the >filler hole internal cooling circuit< [17a]. Clean the hose and the coupling plug. Observe the proper disposal of thermal fluid and aids. → Page 15, section »Proper disposal of resources and consumables«.
- Close the cover at the >filling hole internal cooling circuit< [17a] hand-tight.
- Switch off the temperature control unit.
- Switch on the temperature control unit.
- Set the setpoint to room temperature. → Page 32, section »Setting the setpoint«.
- Start the temperature control process. → Page 37, section »Starting the temperature control process«. This allows the fans to cool down the inside of the temperature control unit faster to room temperature.
- Wait until the adjusted setpoint has been reached.
- Switch off the temperature control unit.
- Connect your external application.
- Refill thermal fluid. → Page 35, section »Filling and venting externally closed application«.

7.4 Thermal fluid inspection, replacement and circuit cleaning

Observe the wiring diagram. → From page 56, 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).

NOTE

During an active circulation, the thermal fluid circuit is shut off by shut-off valves MATERIAL DAMAGE TO THE CIRCULATING PUMPS INSTALLED IN THE TEMPERATURE CONTROL UNIT

- Do not close the thermal fluid circuit during an active circulation by means of shut-off valves.
- Warm the thermal fluid to room temperature before stopping the circulation.

7.4.1 Thermal fluid inspection

CAUTION

Thermal fluid is not inspected on a regular basis BURNS DUE TO REDUCED BOILING POINT

- Regularly check your thermal fluid whether it meets the specifications in the safety data sheet.

NOTE

Thermal fluid is not inspected on a regular basis DAMAGE TO THE HEAT EXCHANGER AND/OR ELECTROMECHANICAL PARTS.

- Regularly check your thermal fluid whether it meets the specifications in the safety data sheet.

7.4.2 Thermal fluid replacement

7.4.2.1 Externally closed application

Observe the following when replacing the thermal fluid: → Page 35, section »Filling and venting externally closed application«. The draining and filling operations are described in this section.

7.4.3 Rinsing the thermal fluid circuit

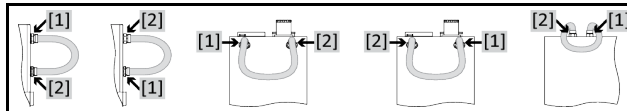
CAUTION

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 workplace; observe the proper disposal of thermal fluid and aids. → Page 15, section »**Proper disposal of resources and consumables**«.

Example: Connecting a short circuit hose



PROCEDURE

- Drain the temperature control unit. → Page 36, section »**Draining externally closed applications**«.

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.

- Check the fill level in the collecting container. Observe the proper disposal of thermal fluid. → Page 15, section »**Proper disposal of resources and consumables**«.
- Connect the ports >**Circulation flow**< [1] and >**Circulation return**< [2] to the temperature control unit using a bypass hose (temperature control hose with coupling plugs).

INFORMATION

If the application used is also soiled: Carry out the following steps without fitted bypass hose. Instead reconnect the application with the temperature control unit. → Page 24, section »**Connecting externally closed application**«. This rinses the temperature control unit and the application at the same time.

- **Fill** the system (minimum fill level) with the thermal fluid you wish to use. → Page 35, section »**Filling and venting externally closed application**«.
- **Vent** the system. → Page 35, section »**Filling and venting externally closed application**«.
- Set the setpoint to room temperature (about 20 °C). → Page 32, section »**Setting the setpoint**«.
- **Start the circulation**. The length of rinsing depends on the level of soiling.
- **Stop the circulation**.
- **Drain** the temperature control unit. → Page 36, section »**Draining externally closed applications**«.
- Reconnect the bypass hose or the application (depending on which has been used).
- Repeat the steps "Filling", "Venting", "Start/Stop temperature control process" and "Draining" until the drained thermal fluid remains clear. After the last draining process, leave the bypass hose or the application dismantled.
- Leave the connections >**Circulation flow**< [1] and >**Circulation return**< [2] open for a while to allow the thermal fluid remaining in the temperature control unit to evaporate.
- Remove the collecting container. Observe the proper disposal of thermal fluid. → Page 15, section »**Proper disposal of resources and consumables**«.
- Connect your application. → Page 24, section »**Connecting externally closed application**«.
- Fill the temperature control unit with thermal fluid. → Page 35, section »**Filling and venting externally closed application**«.
- Vent the temperature control unit. → Page 35, section »**Filling and venting externally closed application**«.
- Restart the temperature control unit in normal mode.

7.5 Cleaning the surfaces

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).

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.

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. Observe the proper disposal of thermal fluid and aids. → Page 15, section »Proper disposal of resources and consumables«.

7.6 Inspect the mechanical seal

NOTE

No visual inspection of the mechanical seal

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

- Check the mechanical seal once a month.
- If case of leakage, stop the temperature control unit and contact Customer Support. → Page 54, section »Contact data«.

Expect the formation of drops 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. → Page 45, section »Function check and visual inspection«. The tightness of the mechanical seal must be visually checked. In case of a leakage, more thermal fluid escapes at the bottom of the temperature control unit. Observe the proper disposal of thermal fluid. → Page 15, section »Proper disposal of resources and consumables«.

7.7 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.

7.8 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.

As the responsible body you are responsible for carrying out decontamination **before** third-party personnel come into contact with the temperature control unit / accessory. Decontamination must be carried out **before** the temperature control unit / accessory is returned for repair or inspection. Attach a clearly visible written notice stating that the temperature control unit / accessory has been decontaminated.

To simplify 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**.



WARNING

Risk of tipping due to unstable temperature control unit

SERIOUS INJURY AND PROPERTY DAMAGE

- Avoid risk of tipping due to unstable temperature control unit.



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 workplace; observe the proper disposal of thermal fluid and aids. → Page 15, section »**Proper disposal of resources and consumables**«.



CAUTION

Hot or very cold thermal fluid

SEVERE BURNS/FROSTBITE 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 control the temperature of the thermal fluid when the drain is open.
- Danger of burns when draining thermal fluids at temperatures above 20 °C.
- Wear your Personal Protective Equipment for draining.
- Only drain using suitable drainage hose and collecting container. These must be compatible with the thermal fluid and its temperature.

INFORMATION

All safety instructions are important and must be followed accordingly during working operations!

8.2 Switch-off

PROCEDURE

- Turn off the temperature control unit.
- Disconnect the temperature control unit from the power supply connection.

8.3 Draining the temperature control unit

PROCEDURE

- Drain the temperature control unit. → Page 36, section »Draining externally closed applications«.

8.4 Uninstalling an external application

PROCEDURE

- Disconnect the external application from the temperature control unit.

8.5 Deinstalling the collecting container

PROCEDURE

- Remove the collecting container from below the >Overflow outlet< [12a].
- Observe the proper disposal of thermal fluid. → Page 15, section »Proper disposal of resources and consumables«.

8.6 Draining the cooling circuit

PROCEDURE

- Empty the cooling circuit. → Page 34, section »Draining the cooling circuit«.

8.7 Packing

Always use the original packaging! → Page 20, section »Unpacking«.

8.8 Shipping

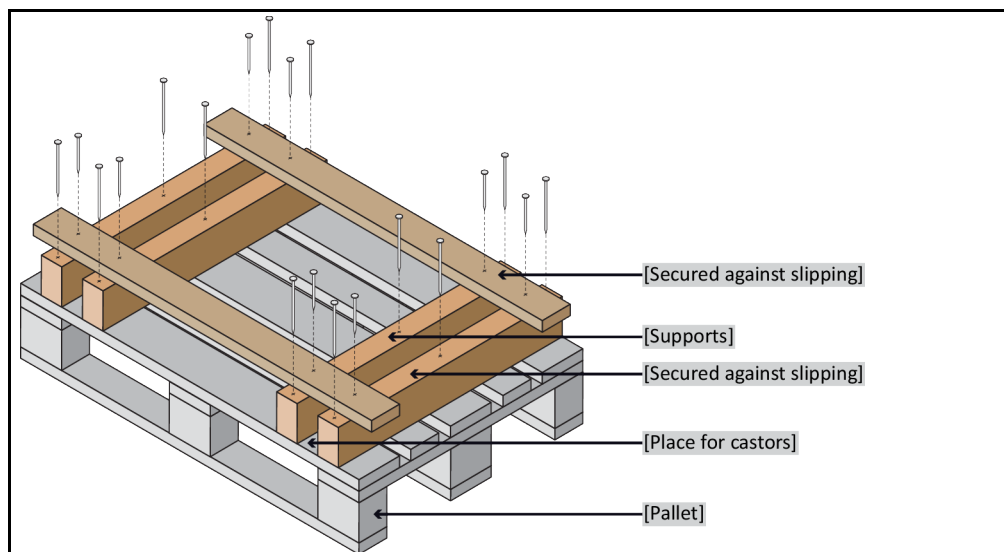
NOTE

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.

Pallet with squared timber for free-standing units



Transport using the lugs, if fitted, on the top of the temperature control unit. Do not transport the temperature control unit alone and without aids.

- Always use the original packaging for transportation.
- Indicate the upright transport position with arrows on the packaging.
- Always transport the temperature control unit upright on a pallet!
- Protect attachments from damage during transportation!
- During transport, place the temperature control unit on squared timber to protect the casters/feet.
- Secure with tensioning belts/lashing straps that are suitable for the weight.
- Additionally secure (depending on model) with plastic film, cardboard and straps.

8.9 Disposal

NOTE

Improper disposal

ENVIRONMENTAL DAMAGE

- Spilled/leaked thermal fluid must be removed. Observe the proper disposal of thermal fluid and aids. → Page 15, section »**Proper disposal of resources and consumables**«.

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 CO₂ emissions in the production of these materials. Follow the laws and regulations of your jurisdiction when disposing material.

8.10 Contact data

INFORMATION

Contact your supplier or local specialist retailer **prior** to returning the temperature control unit. The contact data can be found on our homepage www.huber-online.com under the heading „Contact“. Please keep the serial number of the temperature control unit ready. The serial number can be found on the nameplate of the temperature control unit.

8.10.1 Telephone number: Customer Support

If your country is not mentioned in the list below: The responsible service partner can be found on our homepage www.huber-online.com under the heading „Contact“.

- Huber Deutschland: +49 781 9603 244
- Huber China: +86 (20) 89001381
- Huber India: +91 80 2364 7966
- Huber Ireland: +44 1773 82 3369
- Huber Italia: +39 0331 181493
- Huber Swiss: +41 (0) 41 854 10 10
- Huber UK: +44 1773 82 3369
- Huber USA: +1 800 726 4877 | +1 919 674 4266

8.10.2 Telephone number: Sales

Telephone: +49-781-9603-123

8.10.3 Email address: Customer Support

Email: support@huber-online.com

8.11 Certificate of Compliance

This certificate must be enclosed with the temperature control unit. → Page 50, section »Decontamination/repairs«.

9 Annex

Inspired by **temperature** designed for you

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