



# 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

**Unistat®**

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

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

**huber**





## OPERATION MANUAL

**Unistat®**



# Unistat®

## Pilot ONE®

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

### VALID FOR:

#### TABLE-TOP MODELS

Unistat tango®

Unistat® 40x

Unistat® 705

#### FREE-STANDING MODELS

Unistat® 4xx

Unistat® 5xx

Unistat® 6xx

Unistat® 8xx

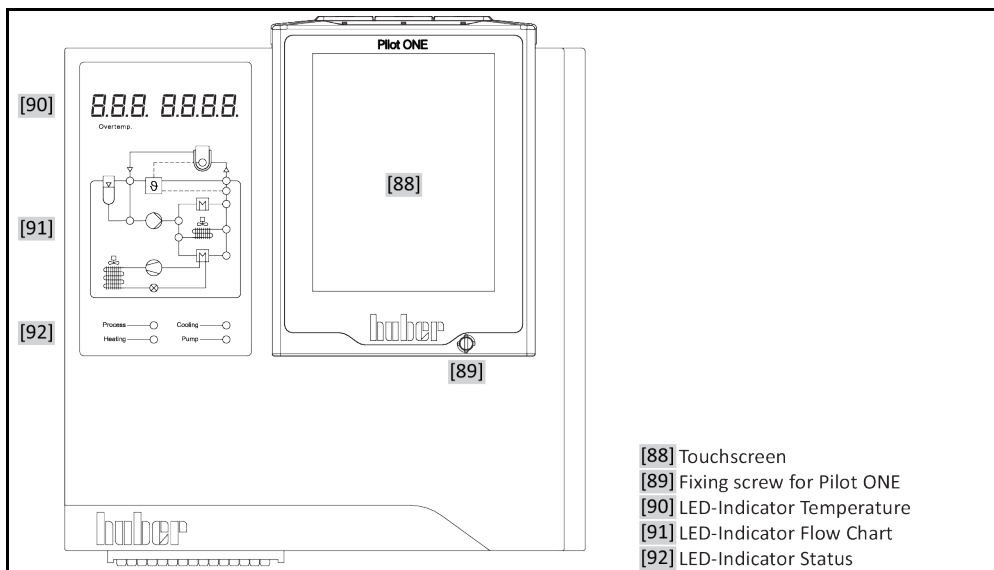
Unistat® 9xx

Unistat® 10x5

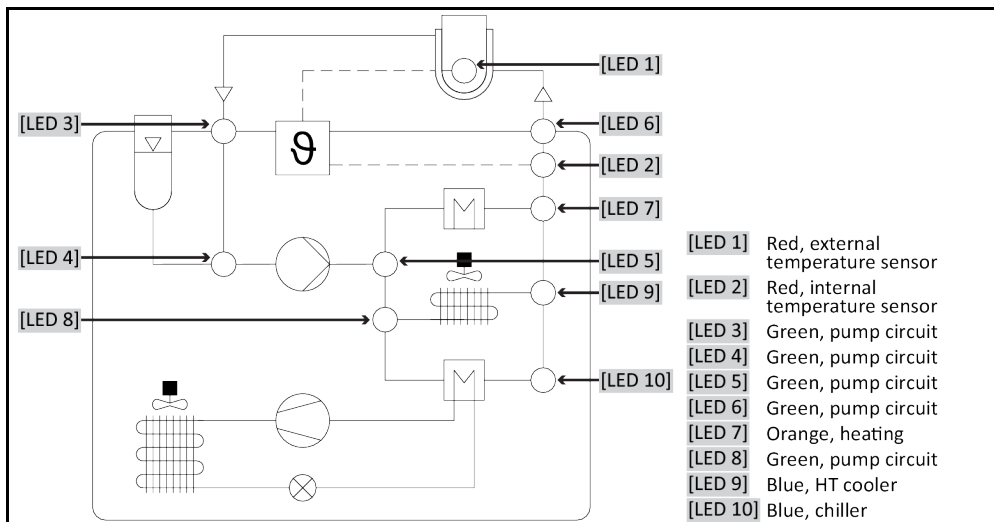
Abbreviations used in model names:

Without = with air cooling, GL = refrigerant CO<sub>2</sub>, P = for applications with high pressure drop,  
w = water cooled, wl = water/air cooled

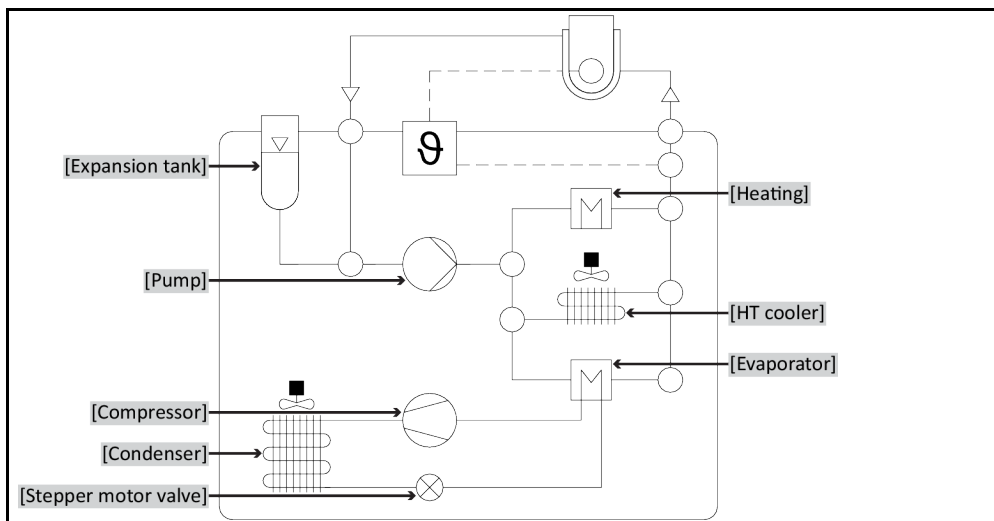
“Unistat Control ONE”  
(model-dependent)  
and “Pilot ONE”  
(standard)



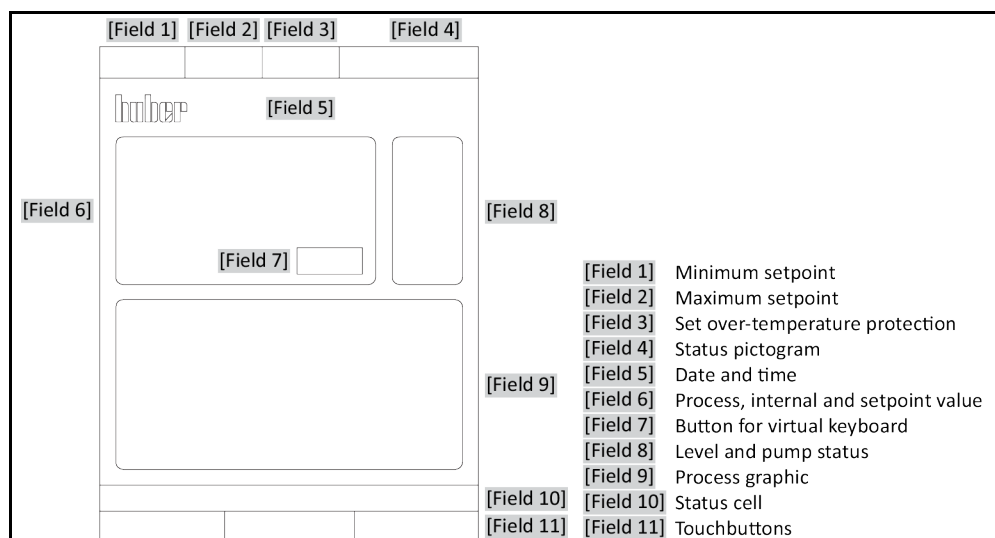
Description of the  
LEDs in the flow dia-  
gram



Components illustrat-  
ed in the  
LED flow diagram



Layout of the "Home" screen



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V3.0.0en/20.07.26//17.12

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## Foreword

Dear customer,

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

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

Follow the operation manual concerning transport, start-up, operation, maintenance, repair, storage and disposal.

Subject to proper operation, we offer a full warranty for your temperature control unit.

In this operation manual, the models listed on page 5 are referred to as temperature control unit, and Peter Huber Kältemaschinenbau SE as Huber company or Huber.

Liability for errors and misprints excluded.

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DW-Therm®, DW-Therm HT®.

The following trademark is a registered trademark of BASF SE:

Glystantin®.

# 1 Introduction

## 1.1 Representation of textual emphases

The following emphases are used in the texts and illustrations.

| Overview | Emphasis                                                                                | Description                                                                                                   |
|----------|-----------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
|          |  > Abc | Step-by-step explanation of the procedure.                                                                    |
|          | →                                                                                       | Reference to information or procedures.                                                                       |
|          | »Abc«                                                                                   | Reference to a paragraph in the document.                                                                     |
|          | >Abc< [123]                                                                             | Reference to the wiring diagram in the annex, specifying the designation and search string (number).          |
|          | >Abc< [ABC]                                                                             | Reference to a drawing in the same paragraph with specification of designation and search string (character). |
|          | ▪                                                                                       | List, first level                                                                                             |
|          | –                                                                                       | List, second level                                                                                            |

## 1.2 Information on the EU Declaration of Conformity

 The temperature control unit complies with the basic safety and occupational health requirements of the European guidelines listed below:

- Machinery Directive
- Low Voltage Directive
- EMC Directive

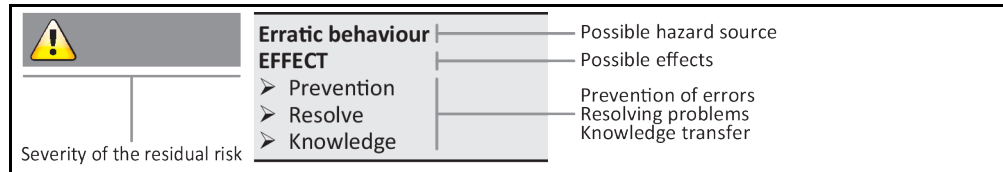
## 1.3 Safety

### 1.3.1 Symbols used for Safety Instructions

The documentation uses the following combinations of characters and signal word as safety information. The signal word describes the classification of the residual risk when the safety information is disregarded.

|                                                                                                    |                                                                                         |
|----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
|  <b>DANGER</b>  | Denotes an immediate hazardous situation that will result in death or serious injuries. |
|  <b>WARNING</b> | Denotes a general hazardous situation that may result in death or serious injuries.     |
|  <b>CAUTION</b> | Denotes a hazardous situation that can result in injury.                                |
| <b>NOTE</b>                                                                                        | Denotes a situation that can result in property material damage.                        |
| <b>INFORMATION</b>                                                                                 | Denotes important notes and usable hints.                                               |
|                 | Notes in conjunction with Ex px cabinets.                                               |

Explanation



The safety information is designed to protect the operating company, the operators and the equipment from damage. Before starting the respective activity, you must inform yourself about the residual risks involved with incorrect handling.

### 1.3.2 Representation of symbols on the temperature control unit

The following characters are used.

Overview

| Sign                  | Description                                                                           |
|-----------------------|---------------------------------------------------------------------------------------|
| <b>Mandatory sign</b> |                                                                                       |
|                       | - Observe the instructions                                                            |
| <b>Warning sign</b>   |                                                                                       |
|                       | - General warning sign<br>- Observe the instructions                                  |
|                       | - Warning of electrical voltage                                                       |
|                       | - Warning of hot surface                                                              |
|                       | - Warning of flammable substances                                                     |
| <b>Miscellaneous</b>  |                                                                                       |
|                       | Follow the national and local instructions for the disposal of electrical appliances. |

### 1.3.3 Proper operation

**DANGER**

**Operating the temperature control unit in a potentially explosive area**

**DEATH THROUGH EXPLOSION**

- Do NOT install or start up the temperature control unit within an ATEX zone.

**WARNING**

**Improper use**

**SERIOUS INJURY AND PROPERTY DAMAGE**

- Store the operation manual where it is easy to access in close proximity to the temperature control unit.
- Only adequately qualified operators may work with the temperature control unit.
- Operators must be trained before handling the temperature control unit.
- Check that the operators have read and understood the operation manual.
- Define precise responsibilities of the operators.
- Personal protective equipment must be provided to the operators.
- Be sure to follow the responsible body's safety rules to protect life and limb and to limit damages!

NOTE

**Modifications to the temperature control unit by third-parties**

**DAMAGE TO THE TEMPERATURE CONTROL UNIT**

- Do not allow third parties to make technical modifications to the temperature control unit.
- 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 heat transfer 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 98, 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

NOTE

**The temperature control unit is operated outside of its specifications**

**MATERIAL DAMAGE CAUSED BY PREMATURE AGING / MATERIAL FATIGUE OF THE PLATE HEAT EXCHANGER**

- Do not **permanently** operate the temperature control unit together with **very dynamic** and **high** temperature changes recurring at **short intervals**.
- The **guarantee will expire** if the temperature control unit is exposed to this type of application.
- Huber offers tried and tested technical solutions for these types of applications.



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. Only the temperature control unit specified on the rating plate of the Ex px cabinet (model and serial number) is suitable for operation inside the Ex px cabinet. 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 in conjunction with an Ex px cabinet. If this annex is missing, please immediately contact the Customer Support. → Page 97, section »Contact data«.

INFORMATION

The temperature control units Unistat tango (w/wl), Unistat 405(w), Unistat 410(w) und Unistat 705(w) do not have a plate heat exchanger.

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 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 / heat transfer 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 Temperature control units with refrigerants



#### WARNING

**Exceedance of the refrigerant limit value per m<sup>3</sup> ambient air**

**DEATH OR SERIOUS INJURY DUE TO EXPLOSION OR SUFFOCATION**

- Observe the amount of refrigerant (see data sheet/rating plate) and the room size when installing the temperature control unit.
- National laws and local regulations can demand additional safety measures for the place of installation.
- The temperature control unit is **not** approved for operation in an **ATEX zone**.

In the following sections we inform you about the refrigerants used and familiarize you with a number of necessary responsibilities.

Since 1980, our temperature control units work with natural refrigerants. The technology has proven itself many times over. This makes it safe and highly sustainable. The temperature control units are manufactured to the requirements of EU and EFTA countries. The standards and regulations for temperature control units with refrigerants contain a number of requirements. Compliance with these requirements is pointed out in the following.

- The cooling circuit is permanently technically tight. It was tested with an indicator device with a sensitivity from 10<sup>-4</sup> Pa m<sup>3</sup>/s or better.
- The temperature control unit is a permanently closed individual compact unit (i.e. a functional unit inside a housing).
- The filling capacity of the refrigerant can be found on the data sheet and on the rating plate.
- Maintenance of the refrigerant circuit.

#### 1.4.1.1 Optional exhaust air connection

Stand-alone units only: Depending on their design, temperature control units with water cooling can be connected to a building's exhaust air system. The **>Exhaust air< [105]** connection required for this is marked in the wiring diagram. Stand-alone and table-top units: Temperature control units with air cooling dissipate the exhaust air directly to the installation site.

## 1.4.1.2 Optional gas detection sensor

Stand-alone units only: A mounting plate is integrated in the temperature control unit. The optionally available gas detection sensor can be mounted on this mounting plate. Assembly, electrical connection and function test are the responsibility of the operating company.

### INFORMATION

Please refer to the documentation of the gas detection sensor or processing unit manufacturer for more detailed information.

## 1.4.1.3 Optional processing unit

The processing unit provides a potential-free switching contact to control a power disconnect relay. It simultaneously provides the power supply and analysis of the gas detection sensor. The operating company is responsible for the dimensioning and installation on site. The alarm of the gas detection system can be connected to an alarm control unit. The operating company is responsible for this and for the other measures.

## 1.4.1.4 Example of the place of installation

Follow the national laws and local regulations.

## 1.4.1.5 Fluorinated greenhouse gases as refrigerants

### INFORMATION

Exempted from this are temperature control units using natural refrigerants (NR). The amount of refrigerant, refrigerant type and the CO<sub>2</sub> equivalent are specified on the data sheet or rating plate.

The EU-F-Gas-Regulation regulates the handling of certain fluorinated greenhouse gases in the European Union. It issues bans regarding the use and placing on the market of these gases. The provisions, for instance with regard to leak tests, certification, disposal and identification, are retained and supplemented.

Many countries and regions outside the EU have published similar regulations. These include among others Switzerland, Great Britain, the USA and Canada. The operating company must check and apply the valid national and local regulations.

A number of obligations for the operating company regarding the use of certain fluorinated greenhouse gases were already stipulated in earlier EU regulations. These are for the most part also retained with the current EU-Regulation on fluorinated greenhouse gases. Please refer to the current text of the regulation for a complete overview of the operating company's obligations.

## 1.4.1.6 Natural Refrigerants (NR)

Follow the national laws and local regulations.

## 1.4.1.7 Transportation

The UN ID determines the possible transportation route: UN ID = type/quantity of refrigerant = transportation route. Onward transportation after filling with refrigerant also follows the same rules.

Overview of transportation routes

| Refrigerants                                                                                                                                                                                                                                |                        | Refrigerant filling ex factory |                        |                        |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------------|------------------------|------------------------|
| Type                                                                                                                                                                                                                                        | Quantity               | Air freight                    | Road transportation    | Sea freight            |
| UN 3358                                                                                                                                                                                                                                     | ≥ 0.1 kg to ≤ 11.99 kg | not possible <sup>a)</sup>     | possible               | possible               |
|                                                                                                                                                                                                                                             | ≥ 12 kg                |                                | possible <sup>b)</sup> | possible <sup>b)</sup> |
| UN 3358 SP A103                                                                                                                                                                                                                             | ≤ 99.9 g               | possible                       | possible               | possible               |
| UN 2857                                                                                                                                                                                                                                     | ≤ 11.99 kg             | possible                       | possible               | possible               |
|                                                                                                                                                                                                                                             | ≥ 12 kg                | not possible <sup>a)</sup>     | possible <sup>b)</sup> | possible <sup>b)</sup> |
| <sup>a)</sup> Filling for transportation: Nitrogen. On-site filling with refrigerants: Only permitted by partners certified by Huber (branch, service partner, dealer or end customer).<br><sup>b)</sup> Transportation as hazardous goods. |                        |                                |                        |                        |

### 1.4.2 Proper disposal

The operating company must check and apply the national and local regulations applicable for it accordingly.

Overview

| Material            | Description                                                                                                                                                                                                                                                                              |
|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Packaging material  | Keep the packaging material for future use (e.g. transport).                                                                                                                                                                                                                             |
| Heat transfer fluid | Disposal see safety data sheet of heat transfer fluid. Use original containers to dispose of larger amounts.                                                                                                                                                                             |
| Filling accessories | Clean filling accessories (such as beaker) for re-use. Auxiliary material and cleaning agents used must also be properly disposed of.                                                                                                                                                    |
| Aids                | Absorption of heat transfer fluid: The aids used (such as cloths and cleaning rags) must be disposed of according to the heat transfer fluid used.<br>Use of cleaning agents: The aids used (such as cloths and cleaning rags) must be disposed of according to the cleaning agent used. |
| Cleaning agent      | Disposal see safety data sheet of cleaning agent. Use original containers to dispose of larger amounts.                                                                                                                                                                                  |
| Consumables         | Disposal see data sheet of consumables (such as air filter mats, temperature control hoses).                                                                                                                                                                                             |
| Refrigerants        | Work on the coolant circuit must be carried out by approved refrigeration/air-conditioning system contractors!                                                                                                                                                                           |

## 1.5 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).

### 1.5.1 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. Persons under the age of 18 years may operate the temperature control unit only under the supervision of a qualified specialist. The operators are responsible for third parties within the unit's working range.

## 1.6 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 peripherals. 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.

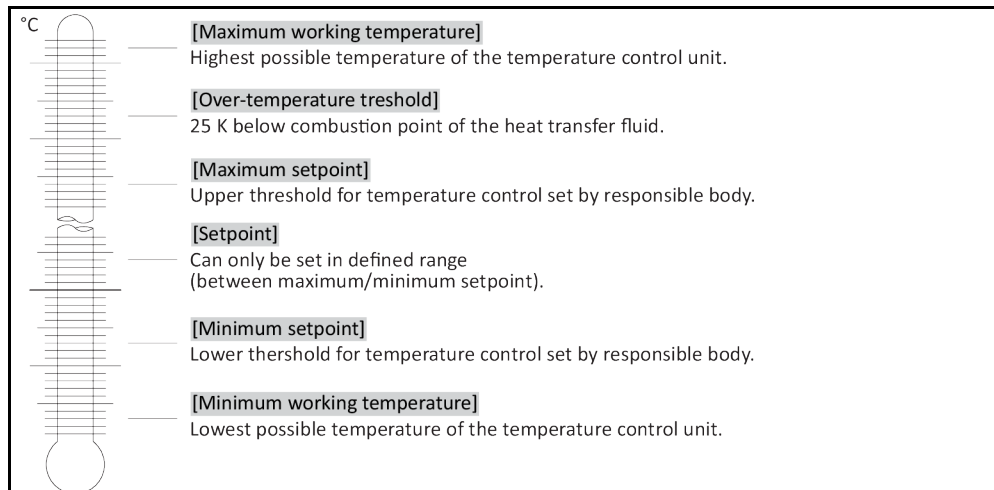
## 1.7 Safety devices to DIN 12876

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

Rating of laboratory thermostats and laboratory baths

| Rating                                                                                                                                                                                                                                                                                    | Heat transfer fluid         |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| NFL                                                                                                                                                                                                                                                                                       | Non-flammable <sup>a)</sup> |
| FL                                                                                                                                                                                                                                                                                        | flammable <sup>b)</sup>     |
| <sup>a)</sup> Usually water; other heat transfer fluids only if non-flammable even within the temperature range of an individual fault.<br><sup>b)</sup> The heat transfer fluid must have a fire point of $\geq 65$ °C; i.e. if ethanol is used, only supervised operation is permitted. |                             |

Overview of the temperature thresholds



## 1.7.1 Electronic low level and overtemperature protection

Depending on the model, the low level protection and the overtemperature protection (only temperature control units with heating) are either installed in combination or as individual systems.

### 1.7.1.1 Low level protection

#### In combination (only for temperature control units with heating)

Instead of a mechanical float switch, temperature sensors are employed on the surface of the heating coils. These sensors monitor a low level and a resulting potential ignition source.

#### Independent

The low level protection operates via a pressure sensor in the heat transfer fluid circuit. The pump and the heat transfer fluid provide the required pressure at the pressure sensor. Air in the system (fill level too low, inadequately vented) prevents the pressure from reaching the value specified at the pressure sensor. Temperature control and circulation are interrupted.

### 1.7.1.2 Overtemperature protection

#### In combination

Temperature sensors on the surface of the heating coils monitor an overtemperature. Through this, the controller regulates the heating coil temperatures below the critical temperature (fire point of the heat transfer fluid).

#### In combination and independent

The overtemperature protection is adjusted by means of a software tool.

## 1.7.2 Process safety

The reason for this operating mode is the increased protection of operators and system. This operating mode can for example reduce the danger from breakage of glass or uncontrolled phase transitions. When the set trigger value is reached, a conventional overtemperature protection switches off all poles of the temperature control. This takes away the only possibility to extract heat from the process. Exothermic conditions can thus lead to system parts reaching inadmissibly high temperatures. The operating mode **Process safety** releases the maximum cooling capacity as soon as the set trigger value of the overtemperature protection is detected by the controller. The possibility of the temperature in the application increasing further is therefore kept as low as possible. → Page 56, Section »Setting "Process Safety"« and → Page 54, Section »Setting the overtemperature protection«.

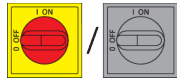
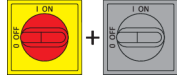
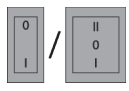
## 1.8 Further protective devices

### INFORMATION

Emergency strategy – interrupt the power grid connection!

To determine the type of switch used or the switch combination installed, please refer to the connection sketch. → From page 98, section »Annex«.

Overview of switch types

| Switch                                                                            | Designation                                                                             | Interrupting the power grid connection                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | >Mains isolator< [36] (red-yellow)<br>or<br>>Mains isolator< [36] (grey)                | Turn the >Mains isolator< [36] to the "0" position.                                                                                                                                                                                      |
|  | >Mains isolator< [36] (red-yellow)<br>and additional<br>>Appliance switch< [37] (gray): | Turn the >Mains isolator< [36] to the "0" position, then the >Appliance switch< [37] to the "0" position.                                                                                                                                |
|  | >Emergency stop switch< [70] (red-yellow)<br>and<br>>Mains isolator< [36] (gray):       | Press the >Emergency stop switch< [70], then set the >Mains isolator< [36] to the "0" position.                                                                                                                                          |
|  | >Power switch< [37]                                                                     | <b>Power connection via socket:</b> Pull the plug, then set the >Power switch< [37] to the "0" position.<br><b>Connection via hard wiring:</b> Use the building's circuit breaker, then set the >Power switch< [37] to the "0" position. |
| –                                                                                 | Without a switch or inside a protective housing                                         | <b>Power connection via socket:</b> Pull the plug.<br><b>Power connection via hard wiring:</b> Use the building's circuit breaker.                                                                                                       |

### 1.8.1 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. This response can be determined via "Pilot ONE".

#### Off/Standby (default setting)

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

#### ON/Temperature control active

Temperature control is always started after turning on the temperature control unit. An INFO appears for a few seconds. This allows you to disable the automatic startup.

#### Only valid for temperature control units with emergency stop switch:

After installing the >Emergency stop switch< [70], automatic starting of the temperature control process is **not possible** when turning on the temperature control unit.

#### Power Failure Auto

If temperature control was active during a power outage, the process will automatically continue after the power outage.

#### Only valid for temperature control units with emergency stop switch:

After installing the >Emergency stop switch< [70], automatic continuation of the temperature control process is **not possible** after a power outage.

### 1.8.2 Alarm functions

An alarm is a system state that signals unfavorable process conditions. The temperature control unit can be programmed so that the plant operator is warned when defined limit values are exceeded.

The response of the temperature control unit to an alarm can be determined. Possible responses are: Switch off temperature control or control temperature to a safe setpoint (2nd setpoint).

### 1.8.3 Warning messages

Warning messages contain a message about the irregularity of the temperature control unit. These messages have no further consequences. The plant operator evaluates the relevance of the message and takes action where necessary.

### 1.8.4 Emergency stop switch

**Only valid for temperature control units with emergency stop switch.**

The **>Emergency stop switch< [70]** immediately disconnects all poles of the temperature control unit. More detailed information on the **>Emergency stop switch< [70]**: → Page 53, section »**Activating / deactivating the emergency stop switch**«.

## 1.9 Consequence of inadequate energy dissipation

### Room air/cooling water

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

### Coolant circuit

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

### Heat transfer fluid circuit

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

### Application

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

### Temperature control unit

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

## 2 Commissioning

### 2.1 In-plant transport

#### WARNING

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

#### DEATH OR SERIOUS INJURY DUE TO CRUSHING

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

#### NOTE

Temperature control unit transported in a horizontal position

#### DAMAGE TO THE COMPRESSOR

- Only transport the temperature control unit in an upright position.

#### NOTE

Filled temperature control unit is transported

#### MATERIAL DAMAGE DUE TO OVERFLOWING HEAT TRANSFER FLUID

- Only transport an emptied temperature control unit.

- If available, use the eyes on the top side of the temperature control unit for transport.
- 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 present) must be activated and/or the leveling feet (if present) must be unscrewed/activated before the temperature control unit is put into operation.  
→ Page 33, section »Activating the leveling feet«.
- For temperature control units with transportation lock, strictly observe the following: → Page 25, section »Transportation lock«.

#### 2.1.1 Lifting and transporting the temperature control unit

##### 2.1.1.1 Temperature control unit with lifting eyes

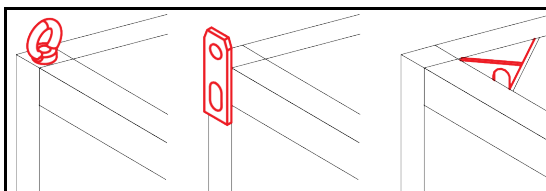
#### NOTE

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.

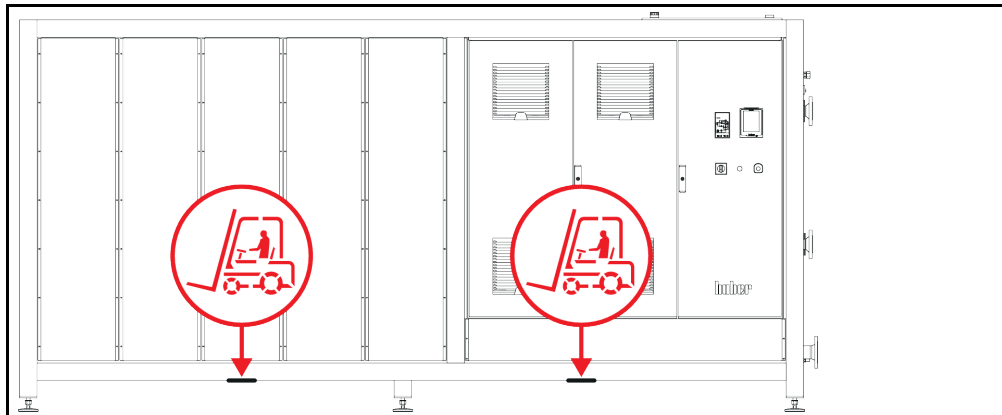
Example: lifting eyes  
(round, angular, and  
recessed (left to right))



- 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 98, 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 24, 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 98, 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 24, section »Mounting/removing leveling feet«.

### 2.1.2 Mounting/removing leveling feet

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

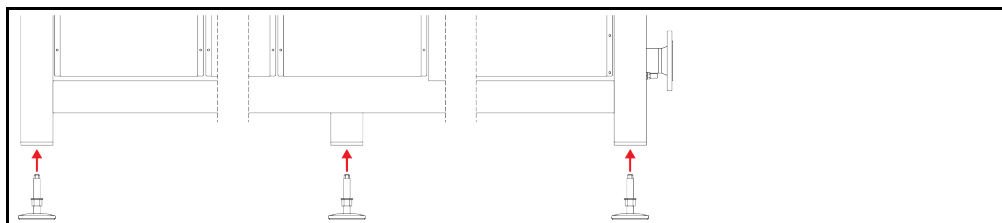


**WARNING**

**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 23, 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 33, section »**Activating the leveling feet**«.

### 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 98, section »**Annex**«.
- The leveling feet (if present) must be unscrewed/activated before the temperature control unit is put into operation. → Page 33, section »**Activating the leveling feet**«.

## 2.2 Transportation lock

### NOTE

#### Commissioning with active transportation lock

#### DAMAGE TO THE TEMPERATURE CONTROL UNIT

- Check the position of the transportation locks.
- Prior to commissioning of the temperature control unit, bring the transportation locks of the compressor into the operating position.

The temperature control unit can be equipped with a transportation lock for the compressor. In that case, a label specifying the type used is located below the **>Mains isolator<** [36]. The transportation lock must be unlocked prior to commissioning. For transport to another place of installation, the transportation lock must be reactivated.

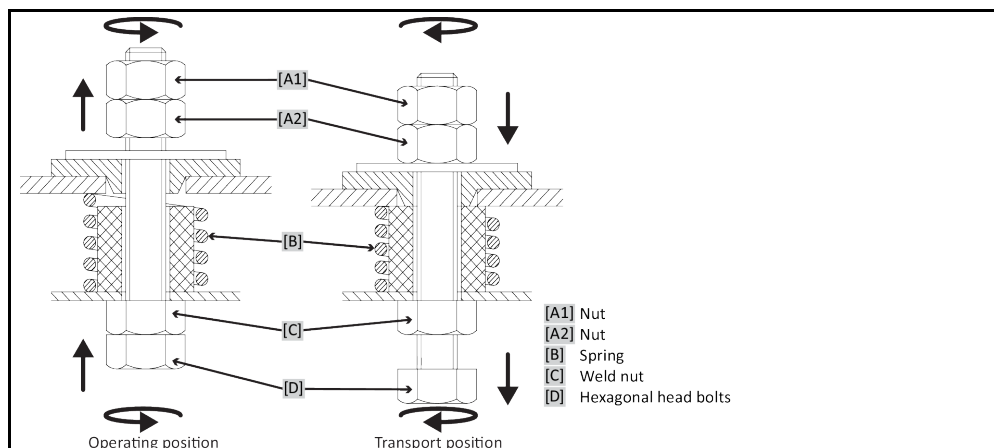
Special or temperature control unit variants may vary from those listed in the table. These temperature control units have a sticker next to the nameplate that indicates the type of transportation lock used.

Overview of transportation locks

| Temperature control units                                                                                                                     | Transportation lock |
|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------------|
| - Unimotive 0x, 1x, 2x, 3x<br>- All Unistat table-top models<br>- Unistat series: 4xx; 5xx; 7xx; 8xx; 90x; 91xw (water cooling); 1005w; 1015w | without             |
| - Unistat series: 61x; 62x; 63x; 640; 68x; 91x (air cooling); 92x, 93x                                                                        | Type A              |
| - Unistat series: 645; 650                                                                                                                    | Type B              |
| - Unistat series: 680w spez                                                                                                                   | Type B              |
| - Unistat series: 95x                                                                                                                         | Type A and Type B   |

## 2.2.1 Transportation lock Type A

Figures showing the transportation lock



### INFORMATION

The transportation lock can not be reached in all temperature control units from below ([C] + [D]). On temperature control units with transformer base, part of the paneling must be removed and the transportation lock released or engaged from above ([A1] + [A2]).

The paneling on the temperature control unit must be removed to check the transportation lock.

### 2.2.1.1 Deactivating for operation

**From below:** Turn the >Hexagon bolt< [D] at the bottom of the temperature control unit upwards (counter-clockwise) with a socket wrench AF17 and tighten it against the >weld nut< [C] (hand-tight).

**From above (after removing the panels):** Turn the >Nut< [A2] upwards from above with a socket wrench AF17 (counter-clockwise) and tighten against the >Weld nut< [C] (hand-tight).

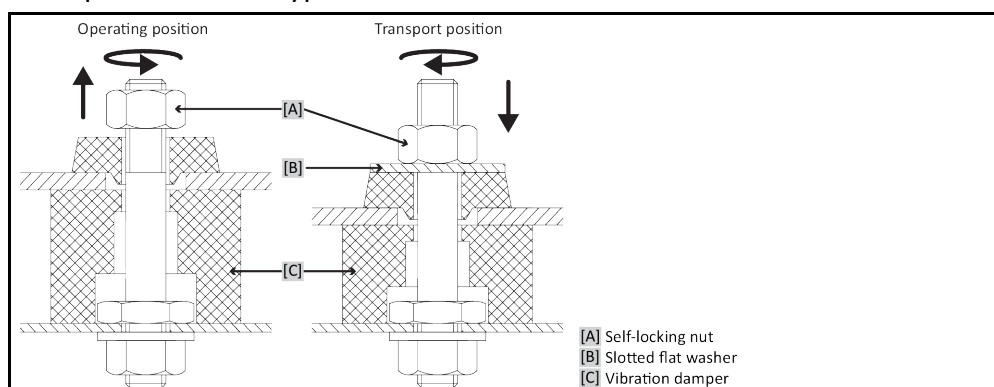
### 2.2.1.2 Activating for transportation

**From below:** Turn the >Hexagon bolt< [D] at the bottom of the temperature control unit downwards (clockwise) with a socket wrench AF17 and tighten it against the two check nuts (hand-tight).

**From above (after removing the panels):** Turn the >Nut< [A1] downwards from above with a socket wrench AF17 (clockwise) and tighten the two check nuts (hand-tight).

## 2.2.2 Transportation lock Type B

Picture of transportation lock Type B



Remove the side panel on the temperature control unit to loosen and tighten the transportation locks.

### 2.2.2.1 Deactivating for operation

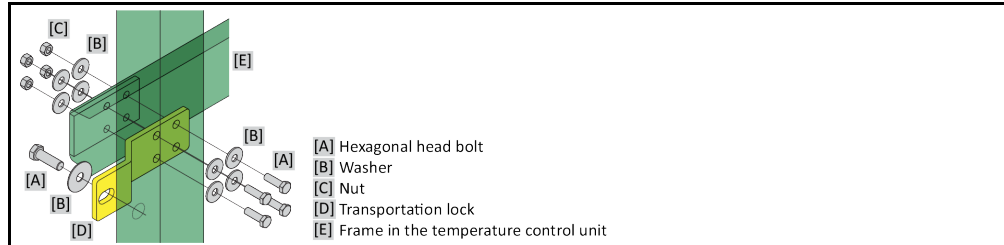
Loosen the >Self-locking nut< [A] until the >Slotted flat washer< [B] can be removed. Remove the >Slotted flat washer< [B].

### 2.2.2.2 Activating for transportation

Insert a >Slotted flat washer< [B] under the >Self-locking nut< [A]. Tighten the >Self-locking nut< [A] until the >Vibration damper< [C] is compressed by about 1 to 2 mm.

### 2.2.3 Transportation lock Type C

Example:  
Transportation lock  
Type C



Remove the side panel on the temperature control unit to loosen and tighten the transportation locks.

#### 2.2.3.1 Deactivating for operation

Loosen the >Hexagonal head bolt< [A] from the >Nut< [C]. Remove the >Hexagonal head bolt< [A], >Washer< [B], >Transportation lock< [D] and >Nut< [C] from the temperature control unit. Keep all individual parts for later use.

#### 2.2.3.2 Activating for transportation

Mount the >Hexagonal head bolt< [A], >Washer< [B], >Transportation lock< [D], >Washer< [B] and >Nut< [C] inside the temperature control unit.

## 2.3 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 97, 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 19, section »Proper disposal«.

## 2.4 Ambient conditions



### CAUTION

#### Unsuitable ambient conditions / unsuitable installation

##### SERIOUS INJURY DUE TO CRUSHING

- Comply with all requirements! → Page 27, section »Ambient conditions« and → Page 29, 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 98, section »Annex«.

### INFORMATION

Only valid for free-standing models:

Depending on the type of maintenance to be carried out on a temperature control unit, a wall clearance of 50 to 200 cm is required on either side. If the temperature control unit has to be moved to carry out the maintenance work: → Page 23, section »In-plant transport«.

Additionally valid for free-standing models with >Electrical cabinet< [118]:

A wall clearance of 150 to 200 cm is required at the place of installation to open the doors of the electrical cabinet. The doors of the electrical cabinet can only be opened by 90°. For the exact position of the >Electrical cabinet< [118], please refer to the wiring diagram. → From page 98, 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 98, section »Annex«.
- Transient surges, as would normally occur in the power supply system.
- Installation Class 3
- Applicable degree of soiling: 2.
- Surge category II.

Please note: → Page 22, Section »Consequence of inadequate energy dissipation«.

Wall clearances

| Side  | Minimum clearance in cm |            |               |             |
|-------|-------------------------|------------|---------------|-------------|
|       | Air cooling             |            | Water cooling |             |
| Top   | [A] 0 / –               | [A] 0 / 20 | [A1] 0 / –    | [A1] 0 / 20 |
| Left  | [B] 0 / 20              | [B] 0 / 10 | [B1] 0 / 20   | [B1] 0 / 20 |
| Right | [C] 0 / 20              | [C] 0 / 10 | [C1] 0 / 20   | [C1] 0 / 20 |
| Front | [D] 0 / 20              | [D] 0 / 10 | [D1] 0 / 20   | [D1] 0 / 20 |
| Rear  | [E] 0 / 20              | [E] 0 / 20 | [E1] 0 / 20   | [E1] 0 / 20 |

a.) [A] - [E]: Operation without bath, [A1] - [E1]: Operation in a bath  
b.) Values in the table: without air outlet or connections / with air outlet or connections  
c.) Value "–" in the table: free standing

### 2.4.1 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**.

When operating the temperature control unit in another environment, its electromagnetic compatibility can in rare cases not be ensured.

**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.

## 2.5 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 heat transfer fluid must be removed immediately. Observe the proper disposal of heat transfer fluid and aids. → Page 19, section »**Proper disposal**«.
- Observe the floor load bearing capacity for large units.
- Observe the ambient conditions.

## 2.6 Recommended temperature control and cooling water hoses

### CAUTION

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

##### INJURIES

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

### CAUTION

#### Hot or cold heat transfer fluid and surfaces

##### BURNS TO LIMBS

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

### CAUTION

#### Uncontrolled formation of ice at the connections and hoses of the heat transfer fluid circuit

##### SLIP AND TRIP HAZARD

- If the temperature is controlled in the minus range, ice forms at the hoses and connections of the heat transfer fluid circuit. This occurs by condensing and freezing of atmospheric humidity.
- Check the strength of the ice formation. If too much ice is formed, this increases the risk of the temperature control unit tipping over. Secure the temperature control unit against tipping if this is the case.
- Check the ground below the ice formation for condensation water. Collect the condensation water with a suitable container or thoroughly remove it at regular intervals. You thus prevent the danger of slipping caused by condensation.

To connect applications, use only temperature control hoses that are compatible with the heat transfer fluid used.

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

## 2.7 Wrench sizes and torques

Sizes of the connections vary depending on the model. Please refer to the table for the correct wrench sizes and torques. The maximum torque values must **not** be exceeded. To avoid twisting the connections during assembly, they must be secured by holding them in place. Carry out a leak test after connecting.

Overview  
Wrench size and  
torques

| Connection              | Sleeve nut wrench size                                                                                                                                                                                                                                               | Connector wrench size | Recommended torques in Nm | Maximum torques in Nm |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|---------------------------|-----------------------|
| M16x1                   | 19                                                                                                                                                                                                                                                                   | 17                    | 30                        | 35                    |
| M24x1.5                 | 27                                                                                                                                                                                                                                                                   | 27                    | 47                        | 56                    |
| M30x1.5                 | 36                                                                                                                                                                                                                                                                   | 32                    | 79                        | 93                    |
|                         | 36                                                                                                                                                                                                                                                                   | 36                    | 79                        | 93                    |
| M38x1.5                 | 46                                                                                                                                                                                                                                                                   | 41/46                 | 130                       | 153                   |
| M45x1.5                 | 50                                                                                                                                                                                                                                                                   | 50                    | 200                       | 210                   |
| G-thread (flat-sealing) | Adapt the torque to the material of the flat seal used. Only hand-tighten the connection at first. When using adapter pieces, do not overtighten the G thread. To avoid twisting the adapter piece during installation, it must be secured by holding them in place. |                       |                           |                       |

## 2.8 Temperature control units with water cooling

### WARNING

**Open electrical wires below the temperature control unit if the temperature falls below the dew point.  
DEATH FROM ELECTRICAL SHOCK BY WATER ENTRY INTO THE ELECTRIC LINES.**

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

### CAUTION

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

#### INJURIES

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

### NOTE

**No protection against corrosion**

#### DAMAGE TO THE TEMPERATURE CONTROL UNIT

- The addition of anti-corrosion agents is mandatory if salts (chlorides, bromide) have been added to the water circuit.
- Ensure that the materials used in the cooling water circuit are resistant with respect to the cooling water. For information on materials used see the data sheet. → From page 98, section »Annex«.
- Take suitable measures to maintain the warranty conditions.
- For information about water quality, see [www.huber-online.com](http://www.huber-online.com).

### NOTE

**Usage of un-filtered river/sea or ocean water as cooling water**

#### DAMAGE TO THE TEMPERATURE CONTROL UNIT

- Un-filtered river or sea water is not suitable for use as cooling water due to its contaminants.
- Use drinking water or filtered river or sea water for cooling.
- Sea water must not be used for water cooling.
- For information about water quality, see [www.huber-online.com](http://www.huber-online.com).

The following icons can be found near the cooling water connection on the temperature control unit. The table gives an overview of the icons used.

Overview

| Icon                                                                                | Description              |
|-------------------------------------------------------------------------------------|--------------------------|
|  | Cooling water connection |
|  | Cooling water inlet      |
|  | Cooling water outlet     |
|  | Cooling water drain      |

### Preparing the temperature control unit with water cooling:

#### INFORMATION

To minimize cooling water consumption, Huber temperature control units with water cooling are equipped with a cooling water regulator. It limits the flow of cooling water to the amount required by the current load situation of the temperature control unit. If only a low cooling capacity is requested, only a small amount of cooling water is consumed. It cannot be ruled out that cooling water flows when the machine is switched off. Shut off the cooling water supply to the temperature control unit even for shorter downtimes (e.g. overnight).

Use of drinking water for water cooling: A backflow from the cooling water line into the drinking water supply must be prevented on the building side. The operating company must check and apply the national and local regulations applicable for it accordingly.

In the event of outdoor installation, the responsible body must ensure that the cooling water supply and cooling water return lines are laid frost-protected. The cooling water temperature must not fall below 5 °C. The cooling water supply must be heated if the ambient temperature is below 5 °C.

The minimum pressure differential in the cooling water circuit and the recommended cooling water inlet temperature can be found on the data sheet. → From page 98, Section »Annex«.

Observe the wiring diagram. → From page 98, section »Annex«.

## PROCEDURE

- Close (if present) the >Cooling water drain< [15].
- Connect the >Cooling water outlet< [14] to the water return flow. A seal must be used for this (not for table-top models).
- Insert the hat-type strainer into the >Cooling water inlet< [13] (only for table-top models).
- Connect the >Cooling water inlet< [13] to the water supply. A seal must be used for this.

#### NOTE

##### Leaking cooling water connections

##### DAMAGE BY FLOODING OF ROOMS

- Slowly open the building-side isolating valves of the cooling water supply and return line.
- If water leaks from the cooling water connections: Shut off the cooling water supply and return line immediately.
- Provide leakproof cooling water connections.

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

## 2.9 Temperature control unit for outdoor installation incl. winter operation

#### NOTE

##### Shut down temperature control unit with water cooling in outdoor operation

##### MECHANICAL DAMAGE CAUSED BY WATER FREEZING IN THE COOLING WATER LINE

- Leave the temperature control unit permanently enabled.
- Only turn off the temperature control unit permanently if the temperature control unit was separated from the cooling water circuit and discharged at ambient temperatures below freezing point.

#### NOTE

##### At temperatures below dew point, the temperature control unit is turned off and on again.

##### MATERIAL DAMAGE CAUSED BY SHORT CIRCUITS AS A RESULT OF CONDENSATION IN THE ELECTRICAL CABINET

- At ambient temperatures below dew point, leave the temperature control unit permanently turned on.
- If the temperature control unit is turned off at ambient temperatures below dew point: Check the interior of the electrical cabinet for condensation formation. Turn on the temperature control unit only after the condensate was removed.

**NOTE**

**The temperature control unit is switched on with a snow load on the unit or an ice-covered fan  
DAMAGE TO THE TEMPERATURE CONTROL UNIT**

- Do not switch on the temperature control unit with a snow load on the unit or an ice-covered fan.
- Remove the snow from the unit before switching on the temperature control unit.
- Check the fan for freedom of movement before switching on the temperature control unit.

**INFORMATION**

A heater and a fan are installed in the electrical cabinet of the temperature control unit for outdoor installation. This will prevent the formation of condensation in the electrical cabinet. If the temperature control unit is turned off at an ambient temperature below dew point, the temperature difference between electrical cabinet and surrounding area cannot be compensated by the heater/fan. This results in the formation of condensation inside the electrical cabinet. A short circuit occurs in the electrical cabinet if the temperature control unit is then turned on again.

**Applicable for models designed for winter operation and outdoor installations!**

To operate the temperature control unit within a laboratory or office, the temperature control unit is equipped with a remote control option. On the side of the temperature control unit is an opening for the extension cable between "Unistat Control ONE" and "Pilot ONE". Likewise, lines for the optional Com.G@te, external temperature sensor, etc. can be routed through this opening.

The responsible body must install a drip tray below the temperature control unit. The use of a drain tray may be prescribed by national law for the installation area of the temperature control unit (including accessories). The responsible body must check and apply the applicable national regulations.

## 2.10 Preparations for operation

**INFORMATION**

Please, check whether the coolant circuit was emptied for transportation. Only commission approved specialized companies in the field of cooling and air conditioning to refill the system. A temperature control unit without a filled coolant circuit is protected from being switched on by a seal. The seal is either located directly above the **>Mains isolator<** [36] or above the power supply connection (for temperature control units with a **>Mains switch<** [35]). After the coolant circuit is filled on site, these seals are broken as the commissioning process continues.

### 2.10.1 Activating the leveling feet

**Only valid for temperature control units with extendible leveling feet.**

**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

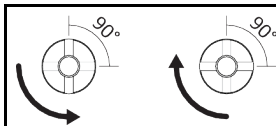
- Verify that the parking brakes of the casters (if any) have been activated.
- Unscrew the leveling feet.
- Compensate uneven floors by adjusting these leveling feet, if necessary. Use a spirit level to horizontally align the temperature control unit.
- Tighten the lock screws on the leveling feet after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

### 2.10.2 Opening/closing valves

**Only valid for temperature control units with mechanical draining**

If no valves are installed on the temperature control unit, this model is equipped with electrical draining.

## Opening and closing valves



## INFORMATION

**Opening valves:**

Open valves by turning them counterclockwise (turn 90° left as far as it will go).

**Closing valves:**

Close valves by turning them clockwise (turn 90° right as far as it will go).

## PROCEDURE

- Check that all valves are closed.
- Close all valves by turning them clockwise (turn 90° right as far as it will go).

### 2.10.3 Checking the knurled screws

## PROCEDURE

- Check whether the knurled screw at the **>Drain<** [8] has been mounted (hand-tight).

#### 2.10.4 Locking/unlocking the expansion vessel [18]

## INFORMATION

In the condition as supplied to the customer, the temperature control unit is prepared for use with an externally closed application. To be able to use an externally open application with the temperature control unit, it must be equipped with an isolating sleeve or an isolating kit. The isolating sleeve or isolating kit is **not** pre-mounted and is **not** included in the scope of supply. Provide for safe operation by retrofitting the temperature control unit to the respectively used application.

- Isolating sleeve: Round >**Expansion vessel cap**< [22].
- Isolating kit: Square >**Expansion vessel cap**< [22].
- Shut-off valves: Entry >**Isolating device expansion vessel inside**< [124] in the wiring diagram.

## INFORMATION

**Use of an externally closed application:**

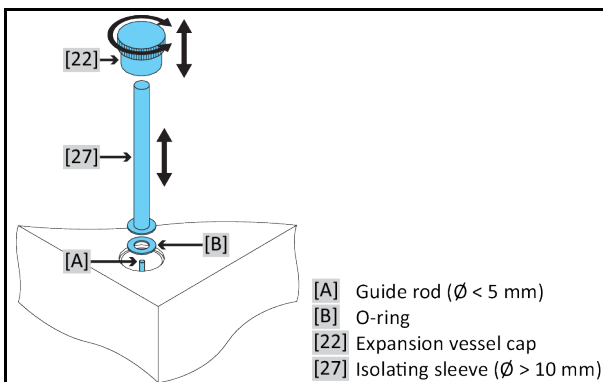
- The **>Expansion vessel<** [18] **may not** be locked! It must be able to accommodate and discharge the temperature-dependent volume of the heat transfer fluid.
- If the **>Expansion vessel<** [18] is locked, this will damage the externally closed application due to overpressure.

### Using an externally open application:

- The **>Expansion vessel<** [18] **must** be locked! The externally open application must be able to accommodate and discharge the temperature-dependent volume of the heat transfer fluid.
- If the **>Expansion vessel<** [18] is not locked, heat transfer fluid leaks from the **>Expansion vessel<** [18] and the **>Sight glass<** [23] (if present).

#### 2.10.4.1 Isolating sleeve

Exemplary illustration  
of the isolating sleeve



## 2.10.4.1.1 Locking the expansion vessel

## PROCEDURE

- Check the >O-Ring< [B] on the >Isolating sleeve< [27] for damage. Replace the O-ring if necessary.
- Remove the >Expansion vessel cap< [22].
- Mount the >Isolating sleeve< [27] with the aid of the fitted >Guide rod< [A].
- Close the >Expansion vessel cap< [22].
- In case of free-standing units, close the >Venting valve expansion vessel< [21] by turning it clockwise (turn 90° right as far as it will go). The temperature control unit can now be used with an externally open application.

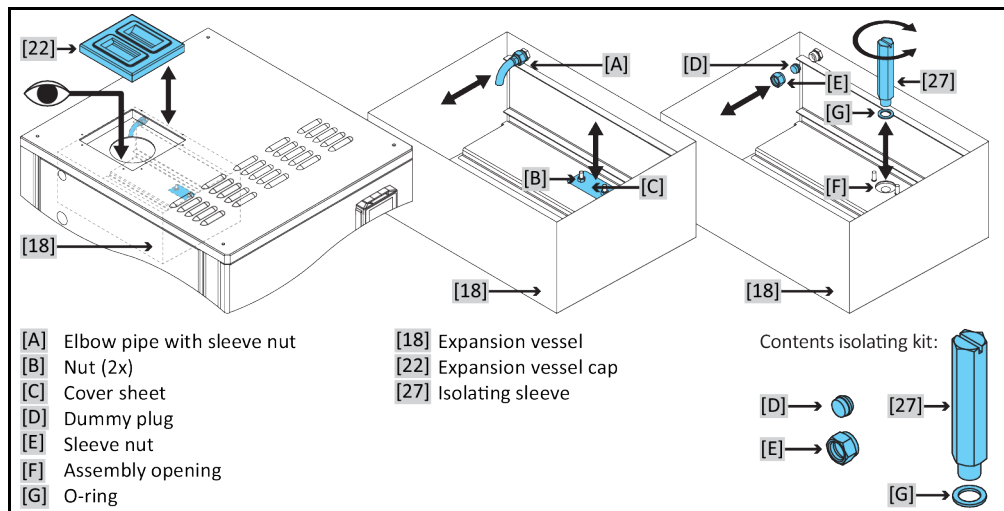
## 2.10.4.1.2 Unlocking the expansion vessel

## PROCEDURE

- Remove the >Expansion vessel cap< [22].
- Remove the >Isolating sleeve< [27]. The permanently fitted >Guide rod< [A] remains in the housing. The >O-Ring< [B] that is pre-mounted on the isolating sleeve must not remain in the >Expansion vessel< [18]. Keep the isolating sleeve and O-ring for later use.
- Close the >Expansion vessel cap< [22].
- In case of free-standing units, open the >Venting valve expansion vessel< [21] by turning it anti-clockwise (turn 90° left as far as it will go). The temperature control unit can now be used with an externally closed application.

## 2.10.4.2 Isolating kit

Exemplary illustration  
of the isolating kit



## 2.10.4.2.1 Locking the expansion vessel

## PROCEDURE

- Check the >O-Ring< [G] on the >Isolating sleeve< [27] for damage. Replace the O-ring if necessary.
- Remove the >Expansion vessel cap< [22].
- At the bottom of the >Expansion vessel< [18], remove the >Nut< [B] (2x) and the >Cover sheet< [C]. The >Assembly opening< [F] for the >Isolating sleeve< [27] is located underneath the cover sheet. Keep the cover sheet and nuts for later use.
- Screw the >Isolating sleeve< [27] with the pre-mounted >O-ring< [G] into the >Assembly opening< [F]. The isolating sleeve must not be tilted in doing so.
- Only hand-tighten the >Isolating sleeve< [27].
- From the inside of the >Expansion vessel< [18], remove the >Elbow pipe with sleeve nut< [A]. To this end, loosen the sleeve nut. The sleeve nut cannot be removed from the elbow pipe. Keep the elbow pipe with sleeve nut for later use.
- Close the opening with the >Dummy plug< [D] and the >Sleeve nut< [E].
- Only hand-tighten the >Sleeve nut< [E].
- Close the >Expansion vessel cap< [22]. The temperature control unit can now be used with an externally open application.

## 2.10.4.2.2 Unlocking the expansion vessel

### PROCEDURE

- Remove the **>Expansion vessel cap< [22]**.
- From the inside of the **>Expansion vessel< [18]** remove the **>Sleeve nut< [E]** and the **>Dummy plug< [D]**. To this end, loosen the sleeve nut. Keep sleeve nut and dummy plug for later use.
- Mount the **>Elbow pipe with sleeve nut< [A]** on the opening.
- Only hand-tighten the sleeve nut.
- Unscrew the **>Isolating sleeve< [27]** from the **>Expansion vessel< [18]**. The **>O-ring< [G]** that is pre-mounted on the isolating sleeve must not remain in the **>Assembly opening< [F]**. Keep the isolating sleeve and O-ring for later use.
- At the bottom of the **>Expansion vessel< [18]**, close the **>Assembly opening< [F]** with the **>Cover sheet< [C]** and **>Nut< [B]** (2x).
- Only hand-tighten each of the **>Nuts< [B]** (2x).
- Close the **>Expansion vessel cap< [22]**. The temperature control unit can now be used with an externally closed application.

## 2.10.4.3 Shut-off valves

Exemplary illustration of the shut-off valves



### 2.10.4.3.1 Locking the expansion vessel

### PROCEDURE

- Remove the side panel on the temperature control unit in front of the **>Isolating device expansion vessel inside< [124]**. For the exact position please refer to the wiring diagram. → From page 98, section »Annex«.
- Close the respective **>Isolating device expansion vessel inside< [124]** by clockwise turning (turn 90° right as far as it will go).
- Install the side panel. The temperature control unit can now be used with an externally open application.

### 2.10.4.3.2 Unlocking the expansion vessel

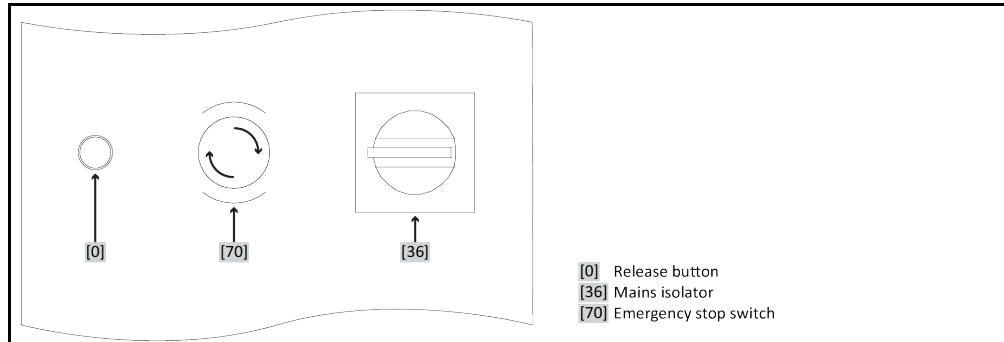
### PROCEDURE

- Remove the side panel on the temperature control unit in front of the **>Isolating device expansion vessel inside< [124]**. For the exact position please refer to the wiring diagram. → From page 98, section »Annex«.
- Open the respective **>Isolating device expansion vessel inside< [124]** by counter-clockwise turning (turn 90° left as far as it will go).
- Install the side panel. The temperature control unit can now be used with an externally closed application.

### 2.10.5 Checking the switching status of the emergency stop switch

Only valid for temperature control units with emergency stop switch.

Exemplary layout of the switches



## PROCEDURE

- Check the **>Emergency stop switch< [70]**.  
This switch must not be pressed (activated) when taking the temperature control unit into operation.
- If required, release the **>Emergency stop switch< [70]** by turning it clockwise. A built-in spring in the **>Emergency stop switch< [70]** returns it to its original state.

### 2.10.6 Connecting the exhaust air [105]

Only valid for temperature control units with **>Exhaust air< [105]**

The building's exhaust air system can be connected to the temperature control unit by means of the **>Exhaust air< [105]** connection. Please refer to the wiring diagram for the exact position of the connection.

## PROCEDURE

- Remove the cover at the **>Exhaust air< [105]** connection. This cover must only be removed when the building's exhaust air system is used! Keep the cover for later use.
- If necessary, install the model-dependent adapter.
- Connect the **>Exhaust air< [105]** connection with the building's exhaust air system.

### 2.10.7 Connecting the functional ground

## PROCEDURE

- If required, connect the temperature control unit's **>Functional ground terminal< [87]** to the building's grounding point. Depending on the design, there may be another functional ground terminal on the switch cabinet. Use a ground strap in each case. For the exact positions please refer to the wiring diagram. → From page 98, section »Annex«.

## 2.11 Connecting an externally closed/open application

Observe the wiring diagram. → From page 98, section »Annex«.

### 2.11.1 Connecting an externally closed application



**WARNING**

**Operating an externally closed application with locked >Expansion vessel< [18]  
BURSTING DUE TO OVERPRESSURE DURING TEMPERATURE CONTROL.**

- Shut down the temperature control unit immediately.
- Allow the heat transfer fluid to cool to room temperature.
- Prior to commissioning the temperature control unit with an externally closed application, unlock the **>Expansion vessel< [18]**. → Page 34, section »Locking/unlocking the expansion vessel [18]«.

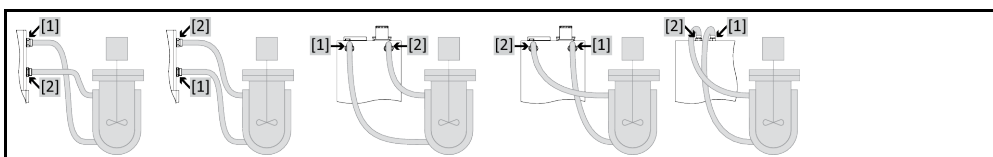
## NOTE

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

#### MATERIAL DAMAGE TO THE APPLICATION

- Observe the max. system pressure specified in the data sheet of the temperature control unit.  
→ From page 98, Section »Annex«.
- 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.
- The specified maximum discharge pressure can be briefly exceeded: In case of a sudden shut-off of the system return or an unexpected error occurring.
- **If valves/quick-release couplings are required:**
- Install an overpressure protection device 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. Make sure that on temperature control units without **>Expansion vessel< [18]**, the lower connection point of the application is at the same level or slightly higher than the **>Circulation return< [2]** connection.

## PROCEDURE

- Remove the screw plugs from the **>Circulation flow< [1]** and **>Circulation return< [2]** connections.
- Then connect your application to the temperature control unit using suitable heat transfer fluid hoses. Observe the table with the wrench sizes. → Page 30, section »Wrench sizes and torques«.
- Check the connections for leaks.

### 2.11.2 Connecting an externally open application (bath)

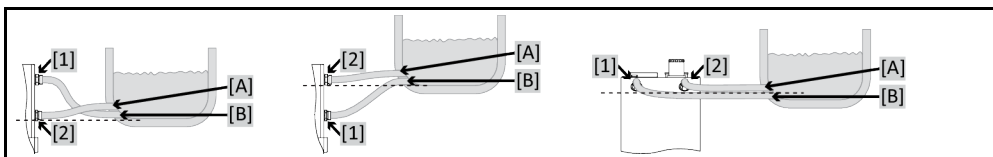
## CAUTION

#### Operating an externally open application with unlocked **>Expansion vessel< [18]**

#### BURNS/FROSTBITE DUE TO OVERFLOWING EXPANSION VESSEL

- Prior to commissioning the temperature control unit with an externally open application, lock the **>Expansion vessel< [18]**. → Page 34, section »Locking/unlocking the expansion vessel [18]«.

Example: Connecting an externally open 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 **[B]** of the application and the **>Circulation return< [2]** connection is attached to the higher connection point **[A]** of the application. Make sure that the connection point **[B]** of the application is at the same level or slightly higher than the connection **>Circulation return< [2]**.

## PROCEDURE

- Remove the screw plugs from the **>Circulation flow< [1]** and **>Circulation return< [2]** connections.
- Then connect your application to the temperature control unit using suitable heat transfer fluid hoses. Observe the table with the wrench sizes. → Page 30, section »Wrench sizes and torques«.
- Check the connections for leaks.

## 2.12 Connecting to the power supply

### DANGER

#### Connecting to a power socket without protective earth (PE)

##### RISK OF DEATH FROM ELECTRIC SHOCK

- Always connect the temperature control unit to a power socket with protective earth (PE).
- In case of uncertainties about an existing protective earth (PE), have the connection inspected by a qualified (certified) electrician.

### DANGER

#### Connection/adjustment through hardwiring is not carried out by a qualified (certified) electrician

##### RISK OF DEATH FROM ELECTRIC SHOCK

- Have the connection/adjustment through hardwiring carried out by a qualified (certified) electrician.

### DANGER

#### Damaged power cable/power cable connection

##### MORTAL DANGER FROM ELECTRIC SHOCK

- Do not start up the temperature control unit.
- Isolate the temperature control unit from the power supply.
- Have the power cable/power cable connection replaced and inspected by a qualified (certified) electrician.

### 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

Do not exceed the maximum length when replacing the power cable. Connections with 1 or 2 phases have a maximum length of **3 meters**; connections with 3 phases a maximum length of **4 meters**. Have the replacement performed only by a qualified (certified) electrician. If there are several power supply connections: Operation is only possible once all power supply connections have been properly connected to the building's power supply.

### 2.12.1 Converting the power supply connection

#### INFORMATION

To restore the factory settings, the connection values must be **re-entered**.

Please refer to the data sheet to determine whether your temperature control unit can be converted from 230 V, 1~, 50 Hz to 400 V, 3~N, 50 Hz. → From page 98, section »Annex«.

Standard connection of the model series Unistat tango and Unistat 405: 230 V, 1~, 50 Hz. To operate the unit on a 400 V, 3~N, 50Hz connection: Adapter required or conversion by a qualified (certified) electrician.

- The maximum current consumption at 230 V operation is just below 16 A. However, there are 230 V power supplies with a smaller fuse protection. During initial startup you will be prompted to adjust the power consumption of the temperature control unit to your current power supply. The following can be selected:
  - 16 A (100 % heating power with **switched on** compressor)
  - 13 A (reduced heating power with **switched on** compressor)
  - 10 A (reduced heating power with **switched on** compressor)
 A disconnected compressor does not effect the heating power:
  - 16 A (100 % heating power with **switched off** compressor)
  - 13 A (100 % heating power with **switched off** compressor)
  - 10 A (100 % heating power with **switched off** compressor)
 There is no effect on the control behavior. You can also subsequently change the maximum power consumption in the Pilot ONE menu.
- The supply voltage for some temperature control units must be selected during initial start-up. This selection can be subsequently changed in the Pilot ONE menu ([Category menu] > [Installation] > [Voltage supply]). The menu item "Voltage Supply" is visible only if the temperature control unit supports the manual conversion of the voltage supply. The supply voltage must be reselected if the temperature control unit has been reset to the factory settings.

## 3 Function description

### 3.1 Function description of the temperature control unit

#### 3.1.1 General functions

**Unistats** are **extremely dynamic temperature control units**, designed both for **externally closed** and for **externally open** applications. → Page 37, section »**Connecting an externally closed application**« and → Page 38, section »**Connecting an externally open application (bath)**«. Unlike conventional bath and circulation thermostats however, these temperature control units have no **internal bath**.

The tempering bath, which in conventional bath and circulation thermostats also compensates the expansion of the heat transfer fluids according to their temperature, is replaced by a **temperature-decoupled >Expansion vessel< [18]**, which usually maintains the temperature of the heat transfer fluid in the **>Expansion vessel< [18]** close to room temperature.

Thanks to the **low internal volume** combined with **efficient chilling/heating technology**, you achieve **short cooling/heating rates** compared to conventional bath and circulation thermostats.

Temperature control units with "P" in model name: This temperature control unit is particularly suitable for applications requiring high pressure drops.

#### 3.1.2 Other functions

The integrated **speed-controlled pump** enables the **speed** or the **pressure** to be controlled and hence optimally matched to the respective application. On temperature control units with higher pumping and cooling capacities or without speed-controlled pump, this function can be performed by optional accessories.

The **self-optimizing cascade control** delivers **optimal controller results** for regulating levels up and down, both with **setpoint changes** and also with **exothermic reactions**. Temperature control can be either a-periodic or with a slight overshoot (faster).

The **Ethernet, USB device and USB host interfaces supplied as standard with "Pilot ONE"**, as well as the **Pt100, ECS and POKO interfaces at the "Unistat Control ONE"** enable the temperature control units to be seamlessly integrated into numerous automated laboratory systems.

The **removable control panel ("Pilot ONE")** can also be used as a **remote control**. Please contact your dealer or Huber Sales Department if you need an extension cable. → Page 97, section »**Contact data**«.

A **connection jack for Pt100 process controller sensor** enables you to accomplish **external temperature control tasks** with ease.

The temperature control unit is fitted with an **integrated temperature ramp function** and an **internal temperature programmer**. The integrated programmer offers the option of creating and recalling 10 different temperature control programs with a total of 100 program steps.

The temperature control unit has **overtemperature protection to DIN EN 61010-2-010, independent of the control circuit itself**.

**Only valid for temperature control units with emergency stop switch:**

By installing the **>Emergency stop switch< [70]**, an additional protective device has been installed in the temperature control unit. When the **>Emergency stop switch< [70]** is pressed (activated), all poles of the temperature control unit are **immediately disconnected**.

## 3.2 Information on the heat transfer fluids

### CAUTION

#### Non-compliance with the safety data sheet for the heat transfer fluid to be used

##### INJURIES

- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the heat transfer 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 heat transfer fluid and aids. → Page 19, section »Proper disposal«.

### NOTE

#### Non-compliance with the compatibility between the heat transfer 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 heat transfer fluid: Stainless steel 1.4301 / 1.4401 (V2A), copper, nickel, viton (FKM) or nitrile rubber (NR) / NBR / HNBR / ceramic, carbon, al-oxide / red brass, brass, nickel-plated brass and silver solder.
- The maximum viscosity of the heat transfer fluid must not exceed 50 mm<sup>2</sup>/s at the lowest working temperature!
- The maximum density of the heat transfer fluid may not exceed 1 kg/dm<sup>3</sup>!

### NOTE

#### Mixing different heat transfer fluids in a heat transfer fluid circuit

##### PROPERTY DAMAGE

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

### NOTE

#### Inert gas overlay of the >Expansion vessel< [18] over 0.1 bar (g)

##### MATERIAL DAMAGE CAUSED BY MECHANICAL DAMAGE TO THE >EXPANSION VESSEL< [18]

- When using the optional sealing set for Unistats in connection with a static inert gas overlay, a pressure limit of 0.1 bar (g) must be used.

### INFORMATION

For heat transfer fluids we recommend the media listed in the Huber catalog. The name of a heat transfer fluid is derived from its working temperature range and its viscosity at 25 °C.

We recommend inert gas overlay for your temperature control unit. For this we offer the sealing set for Unistats from our range of accessories. The 400-series and TR-series temperature control units are as standard equipped with inert gas overlay connections.

The heat transfer fluid is protected from environmental influences when using a Unistat. This prevents an increased accumulation of moisture or the oxidative degradation of the heat transfer fluid. A further significant extension of the useful life of the heat transfer fluid can be achieved by a static overlay with inert gas. This is especially true if it is intended to work at the operating temperature limits of the heat transfer fluid over an extended period of time. (Hygrosocopy, oxidation).

Heat transfer 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 <sub>2</sub> CO <sub>3</sub> ) per liter                                              |
| Non-approved water                                        | Distilled, deionized, demineralized, chloric, ferruginous, ammoniacal, contaminated, untreated river water or sea water |
| <b>Heat transfer fluid: Water without ethylene glycol</b> |                                                                                                                         |
| Use                                                       | excluded                                                                                                                |

| Designation                                                                                                                                                                                                      | Specification                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Heat transfer fluid: Water-ethylene glycol mixture</b><br>Only valid for Unistat models tango (w/wl), (P)405(w), 410(w), (P)425(w), (P)430(w) as well as customized models (see entry in technical Bulletin). |                                                                                                                                                                                                                                                                                                                                                                                                        |
| Use                                                                                                                                                                                                              | -30 °C to +95 °C                                                                                                                                                                                                                                                                                                                                                                                       |
| Heat transfer fluid composition                                                                                                                                                                                  | Adapting the minimum and maximum setpoint: <b>Must</b> be adapted to the heat transfer fluid used. → Page 67, Section » <b>Setting the setpoint thresholds</b> «. Refer to the data sheet for the temperature range of the temperature control unit. → From page 98, Section » <b>Annex</b> «.<br><b>Mixture:</b> A) 10 K below the set minimum setpoint. <b>OR</b> B) At a maximum mixture of -50 °C. |

## 3.3 To be noted when planning the test

### INFORMATION

Observe the intended operation. → Page 15, section »**Proper operation**«.

The focus is on your application. Bear in mind that system performance is influenced by heat transfer, temperature, heat transfer 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 heat transfer fluid circuit must be avoided. Take appropriate measures to limit the pressure in the system. Observe the data sheet of the temperature control unit and the glass apparatus. → From page 98, section »**Annex**«.
- Check whether it is necessary to use an external bypass for temperature control units without pressure limitation.
- In order to prevent the risk of overpressure in the system, the heat transfer 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).
- The temperature and the dynamics of the process are determined by the flow temperature. A differential temperature (Delta T) forms between flow temperature and process temperature. This differential temperature may have to be limited, because Delta T might exceed limits of the application (glass apparatus) and cause bursting. Adjust the Delta T value to your application.
- Select the heat transfer 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 heat transfer 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 heat transfer 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 heat transfer 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 heat transfer fluid recommended by the manufacturer and only within the usable temperature and pressure range.
- The application should be roughly at the same height of or below the temperature control unit if the temperature control process is close to the boiling temperature of the heat transfer fluid.

- 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.

**INFORMATION**

For water-cooled temperature control units, please take the cooling water temperature necessary for perfect operation and the required differential pressure from the data sheet. → From page 98, section »Annex«.

### 3.4 “Pilot ONE®” controller

The basic version of “Pilot ONE” (Basic) can be upgraded in three stages (“Basic” > “Exclusive” > “Professional” > “Explore”).

#### 3.4.1 Functional overview of “Pilot ONE®”

You can verify, and optionally upgrade, the delivery version of your temperature control unit using Pilot ONE, category “E-grade”.

Overview of the  
E-grade variants

| Temperature control units / E-grade                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | E-grade<br>Basic | E-grade<br>Exclusive | E-grade<br>Profes-<br>sional |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|----------------------|------------------------------|
| Beer force-aging thermostats                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | –                | X                    | O                            |
| Unistat temperature control units                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | –                | –                    | X                            |
| UniCAL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | –                | –                    | X                            |
| Other temperature control units                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | X                | O                    | O                            |
| <b>E-grade “Explore”</b> (only for “Unistat” series temperature control units)<br>The E-grade includes E-grade “Professional” functionalities.<br>In addition it includes:<br>– Sensor calibration for return sensor: 5 points<br>– Return temperature display<br>– Display of performance (estimated or calculated from volume flow)<br>– Display mode “Explore” instead of “numerically large”<br>– PB commands correspond to DV-E-grade, except: Temperatures only in 0.01 °C and volume flows only in 0.1 l/min. | –                | –                    | O                            |
| <b>E-grade “DV-E-grade”</b><br>– All interface commands are enabled.<br>– Temperatures in 0.001 °C, volume flows in 0.001 l/min possible (cf. E-grade Explore)<br><b>Note:</b> Only the interface commands are enabled, not the corresponding menu items in Pilot ONE!                                                                                                                                                                                                                                               | O                | O                    | O                            |
| <b>E-grade “OPC-UA”</b><br>– OPC-UA interface via Ethernet.<br>This E-grade additionally includes DV-E-grade functionalities.                                                                                                                                                                                                                                                                                                                                                                                        | O                | O                    | O                            |
| X = standard equipment, O = optional, – = not possible                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                  |                      |                              |

Overview of  
E-grade functions

| Function                                                                                   | E-grade<br>Basic | E-grade<br>Exclusive | E-grade<br>Professi-<br>onal |
|--------------------------------------------------------------------------------------------|------------------|----------------------|------------------------------|
| <b>Temperature control</b>                                                                 |                  |                      |                              |
| Controller parameterization: predefined <sup>1</sup> / TAC <sup>2</sup>                    | X/–              | –/X                  | –/X                          |
| Find parameters: Fast Identification / With Preliminary Test / Estimate Control Parameters | –/–/X            | X/X/–                | X/X/–                        |

<sup>1</sup> TAC function available as a 30 day evaluation version.

<sup>2</sup> True Adaptive Control.

| Function                                                                 | E-grade Basic  | E-grade Exclusive | E-grade Professional |
|--------------------------------------------------------------------------|----------------|-------------------|----------------------|
| Sensor calibration for control sensor <sup>1</sup> : x -point            | 2              | 5                 | 5                    |
| Monitoring: Low level and overtemperature <sup>2</sup>                   | X              | X                 | X                    |
| Adjustable alarm thresholds                                              | X              | X                 | X                    |
| VPC <sup>3</sup> (Variable Pressure Control)                             | X              | X                 | X                    |
| Ventilation program                                                      | X              | X                 | X                    |
| Automated compressor                                                     | X              | X                 | X                    |
| Setpoint limitation                                                      | X              | X                 | X                    |
| Program controller: x programs / max x steps                             | –/–            | 3/15              | 10/100               |
| Ramp function: linear / non-linear                                       | –/–            | X/–               | X/X                  |
| Temperature control mode: Internal and process                           | –              | X                 | X                    |
| Adjustable max. heating and cooling capacity                             | –              | X                 | X                    |
| <b>Display &amp; operation</b>                                           |                |                   |                      |
| Temperature display: 5.7" Touchscreen                                    | X              | X                 | X                    |
| Display mode: graphically / numerically large / Explore                  | –/X/–          | –/X/–             | X/X/–                |
| Display resolution: 0.1 °C / 0.01 °C                                     | X/–            | X/X               | X/X                  |
| Graphic display for temperature curves: Window, full screen and scalable | X              | X                 | X                    |
| Calendar, date and time                                                  | X              | X                 | X                    |
| Language: CZ, DE, EN, ES, FR, IT, JP, KO, PL, PT, RU, TR, ZH             | X              | X                 | X                    |
| Temperature format can be switched: °C, °F and K                         | X              | X                 | X                    |
| Display mode (screen) can be switched by swiping                         | X              | X                 | X                    |
| Favorites menu                                                           | X              | X                 | X                    |
| User menu (administrator level)                                          | –              | –                 | X                    |
| 2nd setpoint                                                             | –              | –                 | X                    |
| <b>Connections</b>                                                       |                |                   |                      |
| Digital interface RS232                                                  | X              | X                 | X                    |
| USB interfaces: Host and device                                          | X              | X                 | X                    |
| Ethernet RJ45 interface                                                  | X              | X                 | X                    |
| Pt100 external sensor connection                                         | –              | X                 | X                    |
| External control signal (ECS STANDBY <sup>4</sup> )                      | X              | X                 | X                    |
| Programmable potential-free contact (ALARM <sup>5</sup> )                | X              | X                 | X                    |
| AIF (analog interface) 0/4–20 mA or 0–10 V <sup>6</sup>                  | X <sup>7</sup> | X                 | X                    |
| Digital interface RS485 <sup>8</sup>                                     | X              | X                 | X                    |

<sup>1</sup> Internal Pt100 and External Pt100.

<sup>2</sup> For temperature control units with integrated overtemperature protection.

<sup>3</sup> For units with variable-speed pump or external bypass.

<sup>4</sup> Standard on Unistats, otherwise via optional Com.G@te or POKO/ECS interface.

<sup>5</sup> Depends on Unistat model, otherwise via optional Com.G@te or POKO/ECS interface.

<sup>6</sup> Via optional Com.G@te.

<sup>7</sup> Restricted, see entries under “Temperature Control”.

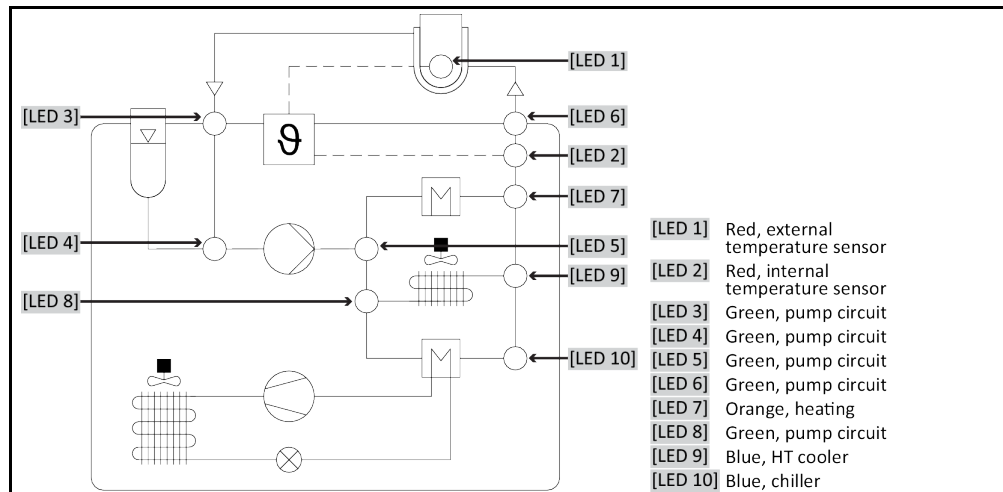
<sup>8</sup> Via optional Com.G@te.

| Function                                                                                                                                                                                            | E-grade Basic | E-grade Exclusive | E-grade Professional |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|-------------------|----------------------|
| <b>Comfort &amp; other</b>                                                                                                                                                                          |               |                   |                      |
| Visual / audible alarm signal                                                                                                                                                                       | X             | X                 | X                    |
| Autostart (Power Failure Auto)                                                                                                                                                                      | X             | X                 | X                    |
| Plug & Play technology                                                                                                                                                                              | X             | X                 | X                    |
| Technology glossary                                                                                                                                                                                 | X             | X                 | X                    |
| Remote control / data visualization via Spy software                                                                                                                                                | X             | X                 | X                    |
| E-grade evaluation versions available (valid for 30 days)                                                                                                                                           | X             | X                 | X                    |
| Storage/loading temperature control programs onto USB stick                                                                                                                                         | –             | X                 | X                    |
| Copying settings                                                                                                                                                                                    | –             | –                 | X                    |
| Service data recorders (flight recorder)                                                                                                                                                            | X             | X                 | X                    |
| PB commands <sup>1</sup>                                                                                                                                                                            | X             | X                 | X                    |
| Communication watchdog                                                                                                                                                                              | –             | –                 | X                    |
| Process data recording directly to a USB stick: Setpoint, Actual Value Internal and Actual Value Process / Heating Capacity %, Cooling Capacity %, and Pump Pressure / Pump Speed, and VPC Pressure | –/–/–         | X/X/–             | X/X/X                |
| Calendar start                                                                                                                                                                                      | –             | –                 | X                    |

### 3.5 Unistat® LED flow diagram

Only valid for temperature control units with “Unistat® Control ONE”.

Diagram



#### Operating states

- **Stand-by:** [LED 2] (when selecting Jacket temperature control) or [LED 1] (when selecting Process temperature control).
- **Circulation active:** [LED 3], [LED 4], [LED 5] and [LED 6] illuminate.
- **Cooling active:** [LED 8] and [LED 9] illuminate. Only in connection with the operating state “Circulation active”.
- **HT cooling active:** [LED 8] and [LED 9] illuminate. Only in connection with the operating state “Circulation active”. Only for temperature control units with HT cooling.
- **Heating active:** [LED 7] illuminates. Only in connection with the operating state “Circulation active”.

<sup>1</sup> See Data Communication Manual. Anything controllable via the graphical user interface of the Pilot ONE can be controlled by PB commands.

## 3.6 Clock/event function

### 3.6.1 Rechargeable accumulator

“Pilot ONE” is fitted with a clock that continues to run even when the temperature control unit is switched off. The energy required for this purpose is provided by a rechargeable accumulator, which is automatically charged when the temperature control unit is switched on. The accumulator is dimensioned so that the clock can also continue to run for prolonged switch-off intervals (up to several months). If, after extremely prolonged switch-off time, time and date have been deleted, leaving the temperature control unit switched on for a few hours will usually suffice (no temperature control required). During this time, you can reset the time and date.

If after switching the unit off and back on again, the previously set time and date re-appear, it can be safely assumed that the rechargeable accumulator is defective. In this case, please contact Customer Support. → Page 97, section »Contact data«.

### 3.6.2 Programmable event function

The “Calendar Start” offers a programmable event function. This enables you to enter a time at which the event is repeatedly triggered on a daily basis (until the activity in the menu is reset). 2 event types are currently selectable:

#### 3.6.2.1 Event function “Alarm clock event”

Several acoustic signals are used.

#### 3.6.2.2 Event function “Program event”

After selecting “Program event” when configuring the event function, you will be prompted for the number of the program to be started. The program will be started automatically when the programmed event time is reached. If the temperature control unit is not active, this will also be started.

## 3.7 Operation via the touch screen

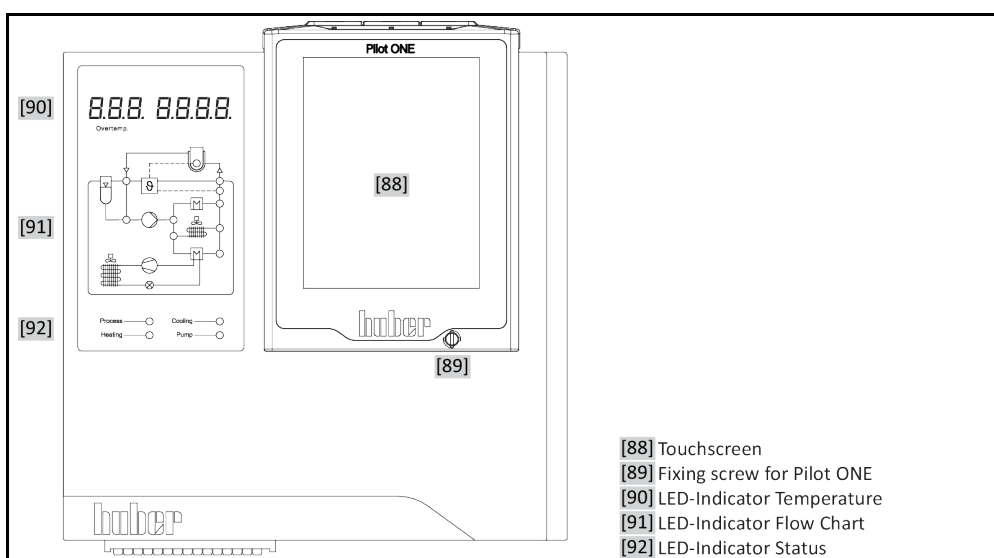
The entire operation is via the >Touchscreen< [88]. These functions can be activated by tapping the displayed text boxes/icons once. This also changes the display.

### INFORMATION

You can cancel the current dialog or dialog sequence at any time by pressing the “ESC” touch button. When canceling a dialog or dialog sequence, it may be necessary to confirm the cancellation again. When canceling a dialog sequence, settings made earlier in the dialog sequence are discarded. Check your already carried out settings and re-enter as needed.

## 3.8 Display instruments

“Unistat Control ONE”  
(model-dependent)  
and “Pilot ONE”  
(standard)



### 3.8.1 The touchscreen [88]

The most important display and operating instrument. Shows both standard variables (setpoint, actual value, setpoint thresholds...), and also menu guidance, error information output and operation.

### 3.8.2 The LED-Indicator Temperature [90]

**Only valid for temperature control units with "Unistat Control ONE"**

The red display represents the set cut-out value (overtemperature). Upon reaching this OT cut-out value, the temperature control unit switches off automatically **<Safety function!>**. The green display shows the actual value. In the internal control mode the internal temperature (flow/jacket temperature) and during cascade control the process temperature (reactor temperature) is displayed.

### 3.8.3 The LED-Indicator Flow Chart [91]

**Only valid for temperature control units with "Unistat Control ONE"**

Shows status information about the operating state of the temperature control unit (e.g. circulation active, chiller active, heating active, internal/process control mode active). Active states are displayed by illuminated LEDs.

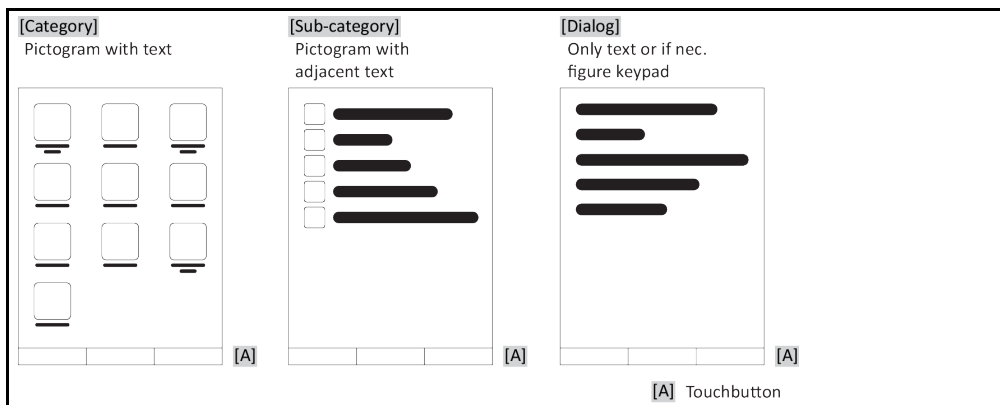
### 3.8.4 The LED-Indicator Status [92]

**Only valid for temperature control units with "Unistat Control ONE"**

Displays status information about the operating state of the temperature control unit (process temperature, heating, cooling, pump). Active states are displayed by LEDs.

## 3.9 Control instruments

Example "Control instruments"



### INFORMATION

To exit the "Categories Menu", sub-categories, menu items, press the "Home" touch button (house) or the arrow. After 2 minutes of inactivity, the category/ sub-category or the Favourites menu is automatically closed and you return to the "Home" screen. Dialogs are **not** canceled/closed after 2 minutes of inactivity.

### 3.9.1 The touchbuttons

Depending on the situation, the touch buttons can be assigned different functions. For example:

- Select the "Home" screen (house)
- Back (arrow to left)
- Favourites (star)
- Add to favorites (star with a plus sign)
- Select the "Categories menu" (menu)
- Confirm entry
- Start/stop
- etc.

### 3.9.2 The categories

For clarity we have grouped the Operation and Setting of Pilot ONE in various categories. A category is selected by tapping it.

### 3.9.3 The sub-categories

The sub-categories are parts of a category. This is where you will find the entries that we have grouped together for you in the selected category. Not all the categories also contain sub-categories. Tap on a sub-category to select it.

### 3.9.4 The dialogs

Tapping on a category or sub-category displays its dialogs. Dialogues may appear e.g. as text, a numeric or a alphanumeric keyboard. Dialogs allow you for example to enter settings or start created temperature control programs. Within a dialog, selection must always be confirmed with the "OK" touch button. When cancelling a dialog with the "ESC" touch button it may be necessary to confirm the cancellation again.

## 3.10 Function examples

### 3.10.1 Display of software version

#### PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "System Settings".
- Tap on the category "System Info".
- Tap on the sub-category "Software Version".

The software versions of the electronics will be displayed:

Display of  
software versions

|                                            |                             |
|--------------------------------------------|-----------------------------|
| Device name                                | Operating temperature range |
| Serial number: xxxxx                       |                             |
| Load Code: xxxxxxxxx                       |                             |
| Create Code: xxxxxxxxx                     |                             |
| Pilot version: xxxxxxxxx.xx.xxxxxxx.x      |                             |
| jjjj-mm-tt 00:00:00                        |                             |
| Serial number: xxxxxxxx                    |                             |
| OS version: x.x                            |                             |
| CAN controller: Vxx.xx.xxx                 |                             |
| Bootloader version: xxxxxxxxx.xx.xxxxxxx.x |                             |
| Active Board: Vxx.xx.xxx                   |                             |
| mmm tt jjjj 00:00:00                       |                             |
| Serial number: xxxxxxxx                    |                             |
| Active Board bootloader revision: x.x      |                             |

- Tap either the "ESC" or "OK" touchbutton. You will be returned to the previous screen.
- Tap on the "Home" touchbutton (house) to return to the "Home" screen.

### 3.10.2 Start & Stop

How to start and stop the temperature control process. Prerequisites: You have entered a setpoint.

#### PROCEDURE

- Go to the "Home" screen.

#### Start

- Tap on the "Start" touchbutton.
- Confirm the start of temperature control by tapping on "OK".  
The correct selection will be displayed graphically and temperature control will start immediately. If tapping on "OK" is not correct, this is displayed graphically for 2 seconds. After this, the display will return to the "Home" screen again. Try to start the temperature control unit again.

**Stop**

- Tap on the “Stop” touchbutton.
- Confirm the stop of temperature control by tapping on “OK”.  
The correct selection will be displayed graphically and temperature control will stop immediately and the pump with overrun for about 30 seconds. Wait until the pump stops. If tapping on “OK” is not correct, this is displayed graphically for 2 seconds. After this, the display will return to the “Home” screen again. Try to stop the temperature control unit again.

**INFORMATION**

With the “Stop” touchbutton, you can also stop Degassing, Venting and Circulation. The requirement for this is that the corresponding task is active.

**3.10.3 Copying the settings to a data carrier****Only valid for E-grade Professional**

The current settings of the temperature control unit are saved as a file to a connected USB flash drive. Use this file to restore the settings of a temperature control unit or to copy them to another temperature control unit. The models of the temperature control units used must be identical to copy the settings between temperature control units. You cannot transfer data between different models.

You can also transfer the set value of the overtemperature protection to another temperature control unit. You must **always** verify this value on the respective temperature control unit and adjust it if necessary. Make sure that the value of the overtemperature protection has been adapted to the heat transfer fluid used.

**3.10.3.1 Saving to a USB flash drive****PROCEDURE**

- Insert a USB flash drive into the “USB 2.0 interface host”. The USB flash drive must have at least 1 MB of free space.
- Go to the “Categories Menu”.
- Tap on the category “System Settings”.
- Tap on the category “Copy Settings”.
- Tap on the dialog entry “Save to USB flash drive”.
- Confirm your choice by tapping on “OK”. The content of the USB flash drive is displayed. If necessary, select the location (folder) on the USB flash drive.
- Confirm the selection of the memory location by tapping on “OK”.
- Enter a name for the file to be saved. Confirm the entry by tapping on “OK”. Alternatively, you can accept the proposed name by tapping on “OK”.
- Read the message and confirm by tapping on “OK”. The file with the settings was created on the USB flash drive.
- Remove the USB flash drive from the temperature control unit.

**3.10.3.2 Loading from a USB flash drive****PROCEDURE**

- Insert a USB flash drive with the saved file into the “USB 2.0 interface host”.
- Go to the “Categories Menu”.
- Tap on the category “System Settings”.
- Tap on the category “Copy Settings”.
- Tap on the dialog entry “Load from USB flash drive”.
- Confirm your choice by tapping on “OK”. The content of the USB flash drive is displayed.
- Select the file you want to load.
- Confirm the selection of the file by tapping on “OK”.
- Select the setting group to be loaded from the list. A multiple selection is possible.
- Confirm your choice by tapping on “OK”.
- Read the message on the >Touchscreen< [88].
- Switch off the temperature control unit. The settings have been loaded to the temperature control unit.
- Remove the USB flash drive from the temperature control unit.

### 3.10.4 Restore factory settings

Use this function to reset the temperature control unit to various basic states. This is useful if you want to reverse various settings relatively quickly.

#### INFORMATION

Restoring the factory settings is **only** possible if the temperature control unit is **not** carrying out a task. If a task is active, do not switch off the temperature control unit until the application allows this. Restoring the factory settings cannot be revoked. Depending on the type of resetting to factory settings performed you may have to enter parameters (process safety, heat transfer fluid used, cut-out value etc.) again.

“X” = Value is reset, “–” = Value is not reset

(A) = All together; (B) = Device parameters without OT; (C) = Device Parameter; (D) Program Controller; (E) = Menu; (F) = Com.G@te

| Description                                                                                                                                                                                                                                                                                                                                                      | (A) | (B) | (C) | (D) | (E) | (F) |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|-----|-----|-----|
| <b>Acoustics</b>                                                                                                                                                                                                                                                                                                                                                 | X   | X   | X   | –   | –   | –   |
| <b>Display functions</b><br>Warnings; messages; inactive menu items; resolution temperature                                                                                                                                                                                                                                                                      | X   | X   | X   | –   | –   | –   |
| <b>Display modes</b>                                                                                                                                                                                                                                                                                                                                             | X   | X   | X   | –   | –   | –   |
| <b>Autostart response</b>                                                                                                                                                                                                                                                                                                                                        | X   | X   | X   | –   | –   | –   |
| <b>Limitations</b><br>DeltaT limit; max. heating variable; max. cooling variable; max. permissible current consumption (for 230 V temperature control units)                                                                                                                                                                                                     | X   | X   | X   | –   | –   | –   |
| <b>Com.G@te (only if Com.G@te is connected)</b><br>Analogue interface (configuration input)                                                                                                                                                                                                                                                                      |     |     |     |     |     |     |
| Meaning of AIF input; response on cable break; measurement range setting                                                                                                                                                                                                                                                                                         | X   | X   | X   | –   | –   | X   |
| Calibration                                                                                                                                                                                                                                                                                                                                                      | –   | –   | –   | –   | –   | X   |
| In case of analog error; current / voltage switching; filter constant                                                                                                                                                                                                                                                                                            | X   | X   | X   | –   | –   | X   |
| <b>Configuration output</b><br>AIF output variable; output range setting                                                                                                                                                                                                                                                                                         | X   | X   | X   | –   | –   | X   |
| Calibration                                                                                                                                                                                                                                                                                                                                                      | –   | –   | –   | –   | –   | X   |
| RS232/RS485 (hardware RS, Baud rate, device address); ECS standby; POKO alarm                                                                                                                                                                                                                                                                                    | X   | X   | X   | –   | –   | –   |
| <b>Properties (other)</b><br>Change heat transfer fluid (heat transfer fluid, liter indicator, bypass usage); cooling bath/cooling (CC-E only)                                                                                                                                                                                                                   | X   | X   | X   | –   | –   | –   |
| <b>Sensor calibration</b>                                                                                                                                                                                                                                                                                                                                        | –   | –   | –   | –   | –   | –   |
| <b>Automated compressor</b>                                                                                                                                                                                                                                                                                                                                      | X   | X   | X   | –   | –   | –   |
| <b>Enter program</b>                                                                                                                                                                                                                                                                                                                                             | X   | –   | –   | X   | –   | –   |
| <b>Pump settings</b><br>Pump speed setpoint; pump pressure setpoint; control mode                                                                                                                                                                                                                                                                                | X   | X   | X   | –   | –   | –   |
| <b>Fluid properties</b><br>Heat transfer fluid; liter indication; pressurisation (only with XT models)                                                                                                                                                                                                                                                           | X   | X   | X   | –   | –   | –   |
| Configuration manual parameters                                                                                                                                                                                                                                                                                                                                  |     |     |     |     |     |     |
| <b>Safety function</b><br>High limit alarm internal; low limit alarm internal; high limit alarm process; low limit alarm process; hydrostatic correction; warning time limit (CC-E only); min. level (for temperature control units with analogue level sensor); max. level (for temperature controllers with analogue level sensor); optional freeze protection | X   | X   | X   | –   | –   | –   |

| Description                                                  | (A) | (B) | (C) | (D) | (E) | (F) |
|--------------------------------------------------------------|-----|-----|-----|-----|-----|-----|
| setpoint                                                     | X   | X   | X   | –   | –   | –   |
| Setpoint limitation<br>Min. setpoint; max. setpoint          | X   | X   | X   | –   | –   | –   |
| Language                                                     | X   | X   | X   | –   | –   | –   |
| Temperature format                                           | X   | X   | X   | –   | –   | –   |
| Temperature control mode                                     | X   | X   | X   | –   | –   | –   |
| Favorites menu                                               | X   | –   | –   | –   | X   | –   |
| Pilot ONE Ethernet<br>IP address; subnet mask; remote access | X   | X   | X   | –   | –   | –   |
| Time unit                                                    | X   | X   | X   | –   | –   | –   |
| 2nd setpoint                                                 | X   | X   | X   | –   | –   | –   |

#### 3.10.4.1 Restore to factory settings without overtemperature protection

### PROCEDURE

- Go to the “Categories menu”.
- Tap on the category “System settings”.
- Tap on the category “Factory settings”.
- Select from the dialog entries “Device parameters without OT”, “Menu”, “Programmer”, and “Com.G@te”. These entries do **not** reset the overtemperature protection. Tap on the selected dialog entry.
- Tap on the “OK” touch button to confirm your selection.
- Read the message displayed. Tapping on “Yes” restores the factory settings, tapping on “No” cancels the procedure. The message “Restart system!” appears on the >Touchscreen< [88].
- Switch off the temperature control unit. The selected parameters have been reset.

#### 3.10.4.2 Restore to factory settings including overtemperature protection

### PROCEDURE

- Go to the “Categories Menu”.
- Tap on the category “System Settings”.
- Tap on the category “Factory Settings”.
- Choose between the dialog entries “Unit Control Data” and “All together”. These entries **also** reset the overtemperature protection. Tap on the required dialog entry.
- Tap on the “OK” touchbutton to confirm your choice.
- Read the message displayed. Tapping on “Yes” restores the factory settings, tapping on “No” cancels the procedure.

### INFORMATION

In the following dialog, enter the overtemperature protection suitable to the heat transfer fluid used. To reset the cut-out values of the overtemperature protection to the factory setting from within the controller of Pilot ONE, enter 35 °C for “Heater” and 45 °C for the expansion vessel (if installed). “Process Safety” is factory set to “Stop” and is automatically reset to “Stop” when restoring the factory settings.

- Enter the temperature unit you want to use with Pilot ONE. The available choices are “Celsius (°C)”, “Kelvin (K)” and “Fahrenheit (°F)”.
- Tap on “OK” to confirm your selection.
- Read the message and confirm by tapping on “OK”.
- Read the safety warning and confirm by tapping on “OK”.
- Read the note and confirm by tapping on “OK”.
- Tap on the temperature unit set by you in the controller (green text).
- Enter the displayed red safety code using the number keypad that appears.
- Enter the value 35 °C for the “Heating OT value” using the number keypad that appears.
- Tap on “OK” to confirm your entry.
- Read the message and confirm by tapping on “OK”.
- Read the safety warning and confirm by tapping on “OK”.

- Tap on the temperature unit set by you in the controller (green text).
- Enter the displayed red safety code using the number keypad that appears.
- Enter the value 45 °C for the “Exp. vessel OT value” using the number keypad that appears.
- Tap on “OK” to confirm your entry. The message “Restart system!” appears on the >Touchscreen< [88].
- Switch off the temperature control unit. The temperature control unit is reset.

## 4 Setup mode

### 4.1 Setup mode

#### ! CAUTION

Moving the temperature control unit during operation

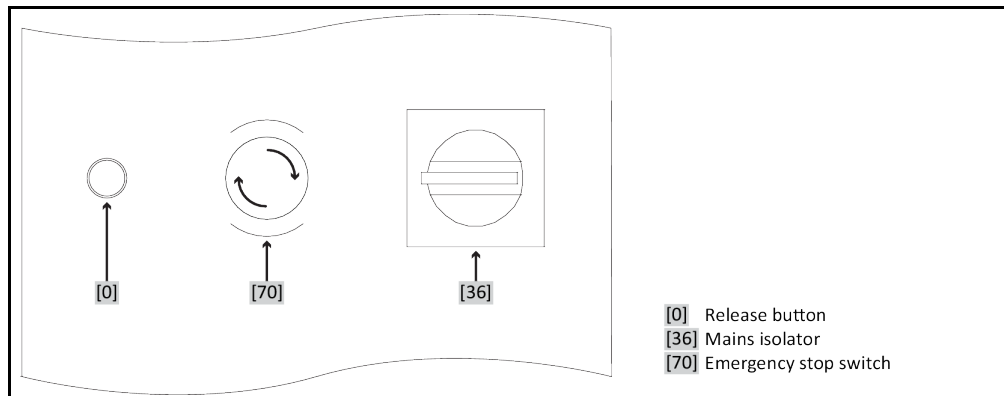
**SERIOUS BURNS/FREEZING OF THE HOUSING PARTS/ESCAPING HEAT TRANSFER FLUID**

➤ Do not move temperature control units that are in operation.

#### 4.1.1 Activating / deactivating the emergency stop switch

Only valid for temperature control units with emergency stop switch.

Exemplary layout of the switches



#### INFORMATION

By activating the **>Emergency stop switch< [70]**, all poles of the temperature control unit are disconnected **immediately**.

#### 4.1.1.1 Activating

### PROCEDURE

- Press the **>Emergency stop switch< [70]**.  
All poles of the temperature control unit are disconnected **immediately**.

#### 4.1.1.2 Deactivating

### PROCEDURE

- Turn the **>Mains isolator< [36]** to the "0" position.
- Release the **>Emergency stop switch< [70]** by turning it clockwise. A built-in spring in the **>Emergency stop switch< [70]** returns it to its original state.

#### 4.1.2 Turning on the temperature control unit

### PROCEDURE

- Switch on the temperature control unit using the **>Mains isolator< [36]**.

**Temperature control units with additional >Appliance switch< [37]:**

Switch on the Pilot ONE using the **>Appliance switch< [37]**.

**Temperature control units with emergency stop switch:**

The safety relay is tested. The **>Release button< [0]** illuminates if the test is positive. Press the illuminated **>Release button< [0]**. The temperature control unit is started and the illumination in the **>Release button< [0]** is turned off.

A system test is carried out subsequently. With this test, the full functionality of the temperature control unit is checked. All sensors, the all-pole disconnecting power disconnect relay and the power electronics of the main heater and the main heater itself are checked. A message appears

on the **>Touchscreen< [88]** in case of an error or if a warning is issued. If in doubt, please contact Customer Support. → Page 97, Section **»Contact data«**.

## INFORMATION

The following entries depend on the model and need only be made in case of:

- a.) Initial start-up
- b.) After resetting to the factory settings

- After switching on the temperature control unit, tap on the required system language. Confirm your selection with "OK".
- Read the message and confirm the message with "OK".
- Tap on the power draw you would like to use. Confirm your selection with "OK".
- Tap on the heat transfer fluid you would like to use. Confirm your selection with "OK".
- Read the message and confirm the message with "OK".
- Enter the overall filling capacity in the heat transfer fluid circuit by means of the displayed keypad. Confirm your entry with "OK".
- Set the setpoint limits depending on the heat transfer fluid used. → Page 41, Section **»Information on the heat transfer fluids«** and → Page 67, Section **»Setting the setpoint thresholds«**.
- Switch the temperature control unit on and off using the **>Mains isolator< [36]**.

### Temperature control units with an emergency stop switch:

The safety relay is tested. The **>Release button< [0]** illuminates if the test is positive. Press the illuminated **>Release button< [0]**. The temperature control unit is started and the illumination in the **>Release button< [0]** is turned off.

## INFORMATION

### Temperature control units with emergency stop switch:

Proceed as follows, if the **>Release button< [0]** is not illuminated when turning on the temperature control unit via the **>Mains switch< [36]**:

- a.) Check whether the temperature control unit is properly connected to a **functioning power supply**. Solution: Properly connect the temperature control unit to a functioning power supply.
- b.) Check whether the **>Emergency stop switch< [70]** is activated. → Page 53, Section **»Activating / deactivating the emergency stop switch«**.

Solution: Deactivate the **>Emergency stop switch< [70]**. → Page 53, Section **»Deactivating«**.

If the illuminated **>Release button< [0]** does not turn off when pressed and/or the temperature control unit cannot be turned on:  
Please contact our Customer Support.

## 4.1.3 Turning off the temperature control unit

### PROCEDURE

- Control the temperature of the heat transfer fluid to room temperature.
- Stop the temperature control process.
- **Temperature control units with additional >Appliance switch< [37]:**  
Switch off the Pilot ONE using the **>Appliance switch< [37]**.

Switch off the temperature control unit using the **>Mains switch< [36]**.

## 4.1.4 Setting the overtemperature protection



### The overtemperature protection is not correctly set to the heat transfer fluid used

#### MORTAL DANGER FROM FIRE

- The overtemperature protection must be correctly set to the heat transfer fluid you are using.
- Always observe the safety data sheet of the heat transfer fluid.
- Different working temperature ranges may apply for open and closed systems.
- **For Huber heat transfer fluids:**
- For Huber heat transfer fluids, the maximum usable working temperature range is already indicated.
- Set the cut-out value of the overtemperature protection to the **upper temperature limit of the working range** of the heat transfer fluid.
- **For heat transfer fluids of other manufacturers:**
- Set the cut-out value of the overtemperature protection at least 25 K below the fire point of the heat transfer fluid.

**INFORMATION**

The maximum settable cut-out value of the OT corresponds, for Huber heat transfer fluids, to the specified upper working temperature of the heat transfer fluid. The usable working temperature range may be less, if the overtemperature protection is correctly set. Due to tolerances, the overtemperature protection can trigger when the temperature is controlled near the upper operating temperature limit.

**4.1.4.1 General information on the overtemperature protection**

The overtemperature protection is a device in the temperature control unit that works independently of the controller. The software and hardware is designed to test key functions and operating states during a self-test after the power supply has been switched on. If faults are detected, the enabling of the electrical assemblies in the temperature control unit is blocked. During operation, the sensors are tested for short-circuit and interruption.

The bath or flow temperature is monitored to ensure the safety of your system. It is set immediately after you have filled the system with heat transfer fluid.

Our temperature control units not only offer the possibility to specify the cut-out value of the overtemperature protection but also provide the possibility to specify the shutdown mode of the temperature control unit. In a typical setting the temperature control unit switches off both the temperature control as well as the circulation (**stop according to DIN EN 61010**) after reaching the cut-out value. This monitors a possible defect in the control of the heater. A strong exothermic reaction near the cut-out value can also, under certain circumstances, result in a shutdown of the temperature control unit. In this case, however, a shutdown would be fatal.

Our temperature control units provide the possibility to work with the shutdown mode **Process Safety**. In this mode, temperature control (cooling) and circulation work as always. This is therefore a possibility to respond to exothermic reactions.

**INFORMATION**

The default shutdown mode of the overtemperature protection is **"Stop according to DIN EN 61010"**. When resetting to factory settings, the overtemperature protection is **reset** to the default shutdown mode "Stop according to DIN EN 61010"!

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

**4.1.4.2 Setting "OT limit: heating"****PROCEDURE**

- Go to the "Categories menu".
- Tap on the category "Safety".
- Tap on the category "Overtemperature".
- Read the safety warning and confirm by tapping on "OK".
- Read the note and confirm by tapping on "OK".
- Tap on the dialog entry "OT limit: heating".
- Tap on "OK" to confirm your selection.
- Tap on the temperature unit set by you in the controller (green text).
- Enter the value for the "Heating OT value" using the numeric keypad that appears. This value must be 25 K below the fire point of the heat transfer fluid you are using.
- Tap on "OK" to confirm your entry.

**4.1.4.3 Setting "OT expansion vessel"****PROCEDURE**

- Go to the "Categories menu".
- Tap the category "Safety".
- Tap the category "Overtemperature".
- Read the safety warning and confirm by tapping "OK".
- Read the note and confirm by tapping "OK".
- Tap dialog entry "OT limit: Expansion vessel".
- Tap "OK" to confirm your selection.
- Tap the temperature unit set by you in the controller (green text).
- Enter the value for the "Exp. vessel OT value" using the number keypad that appears.
- Tap "OK" to confirm your entry.

#### 4.1.4.4 Setting "Process Safety"

You have two options.

##### "Stop" in accordance with DIN EN 61010

Once the overtemperature protection cut-out value is reached, the temperature control unit (heating, cooling circuit and circulation pump) switches off (default setting).

##### "Process Safety"

Once the overtemperature protection cut-out value is reached, the heating switches off and the cooling circuit and circulation pump continue to operate. In case of an emergency (possible exothermic reaction), the full cooling capacity is thus available. Please ensure that the automatic compressor is set to **Always on**.

## PROCEDURE

- Go to the "Categories menu".
- Tap on the category "Safety".
- Tap on the category "Process Safety".
- Read the safety warning and confirm by tapping on "OK".
- Choose between the modes "Stop" and "process safety".
- Tap on "OK" to confirm your selection.
- Only valid for the selection of "Process safety":
  - Go to the "Categories menu".
  - Tap on the category "System settings".
  - Tap on the category "Energy/ECO settings".
  - Tap on the sub-category "Compressor ON/OFF/AUTO".
  - Tap on the dialog entry "Always on".
  - Tap on "OK" to confirm your selection.

#### 4.1.4.5 Monitoring via "Display OT values"

## PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Safety".
- Tap on the category "Display OT values".
  - You will receive an overview of the current measured temperature value of the overtemperature protection sensor, the set cut-out values and the set cut-out mode (Process Safety). Some temperature control units have 2 overtemperature protection sensors, and so 2 values are shown for these temperature control units.
- Tap on the "OK" touchbutton after you have read/checked the information.

#### 4.1.5 Testing overtemperature protection for functionality



**Overtemperature protection (OT) does not trip**

**MORTAL DANGER FROM FIRE**

- Test the response of the device every month and after each change of the heat transfer fluid in order to assure proper functioning.

#### 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

Run the test only if the temperature of the heat transfer fluid used is about 20 °C. You must **NOT leave the temperature control unit unattended** during the entire test of the overtemperature protection.

The Pilot ONE controller contains a description for carrying out the overtemperature protection test.

## PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Safety".
- Tap on the category "OT Test".  
The description for carrying out the overtemperature protection test is displayed.
- Tap on the "OK" touch button after you have read the information.

### 4.1.6 Adjusting the Delta T limiter

#### NOTE

**The Delta T limiter has not been adjusted to the used glass apparatus**

#### DAMAGE CAUSED BY GLASS APPARATUS BURSTING

- Adjust the Delta T value to your application.

#### INFORMATION

The temperature dynamics inside the reactor/process temperature are dictated by the flow temperature. A differential temperature (Delta T) forms between the flow temperature and the temperature inside the reactor. The greater the permitted Delta T, the better the energy transmission and hence the faster the speed reaches the desired setpoint. However, the temperature difference could exceed permissible limits and this could lead to bursting of the application (e.g. glass apparatus). This difference in temperature may have to be restricted depending on the application (glass apparatus).

#### 4.1.6.1 Changing the Delta T limiter

## PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Protection Options".
- Tap on the sub-category "Delta T limiter".
- Set the value of Delta T in line with the glass apparatus.
- Confirm your entry by tapping on the "OK" touchbutton.

## 4.2 The temperature control circuit

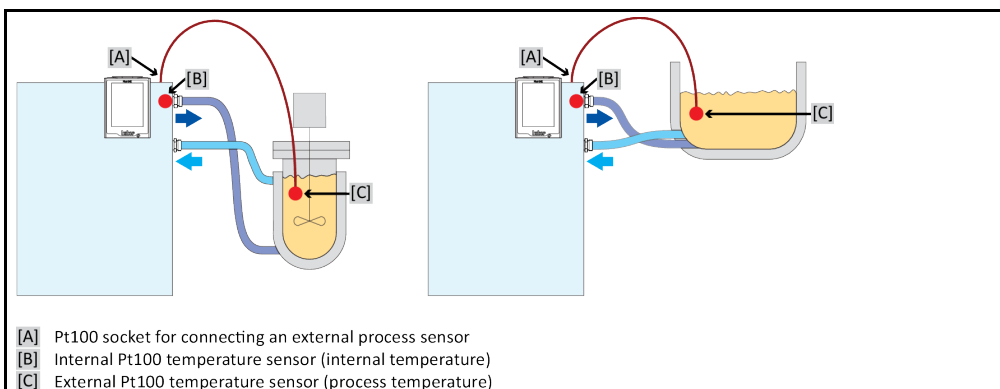
Every temperature control unit with a Pilot ONE control panel has its own PID controller for internal and process temperature control. For many temperature control tasks it is sufficient to use the factory-set control parameter. Our years of experience and current developments in control technology are used in these control parameters.

If a process control system is used, ideally send the specification of the temperature setpoint digitally to the temperature control unit. For this purpose, an Ethernet and USB port is available at the Pilot ONE and a RS232 interface at the temperature control unit. With the optional Com.G@te, an additional RS485 interface is added to your temperature control unit. Optionally you can integrate the temperature control unit in a Profibus environment. → From page 80, section »Interfaces and software update«.

#### INFORMATION

The capacity adjustment of the temperature control unit is optimized so that the specified processes are run through in the fastest possible time. This increases the productivity of the system as a whole and thus saves energy in the long term.

Diagram of temperature control circuit



### 4.2.1 Select temperature control: Internal or process

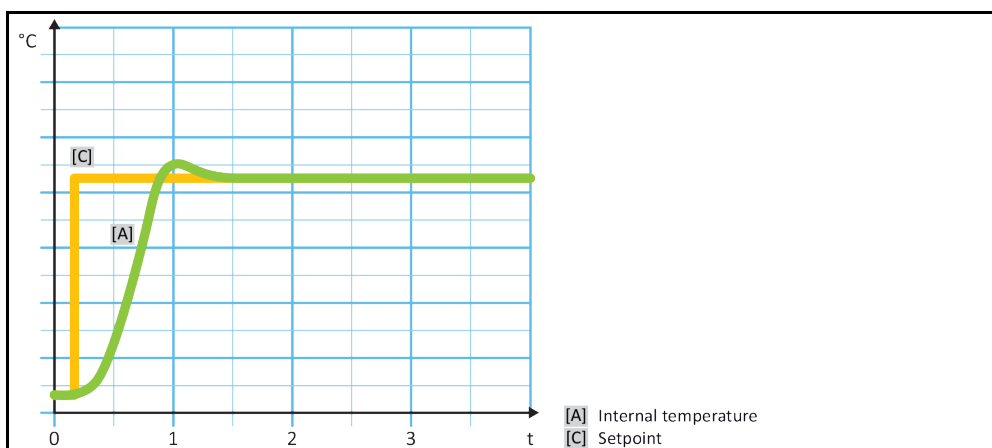
#### PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "Process/Internal".
- Choose between the entries "Internal" and "Process (Cascade)".
- Confirm your choice by tapping on "OK".

### 4.2.2 Temperature control to internal temperature

With internal temperature control, a control circuit is used to control the temperature at the internal Pt100 temperature sensor. This Pt100 temperature sensor is built into the device and is located close to heat transfer fluid outlet (forward flow) or in the bath tank.

Representation of an optimum internal temperature control



### 4.2.3 Temperature control to process temperature

Certain temperature control tasks require that the temperature is recorded elsewhere for best results than described. Setting the temperature to process temperature makes alternatives available. When setting the temperature to process temperature, an additionally connected external Pt100 temperature sensor is used in conjunction with a master controller (cascade controller). The internal sensor at the supply line is integrated with the slave controller. This temperature control method is used e. g. for the thermostatic control of jacket vessels. The setpoint setting is valid for the process controller. It in turn calculates a target value for the internal controller to optimally adjust the process setpoint.

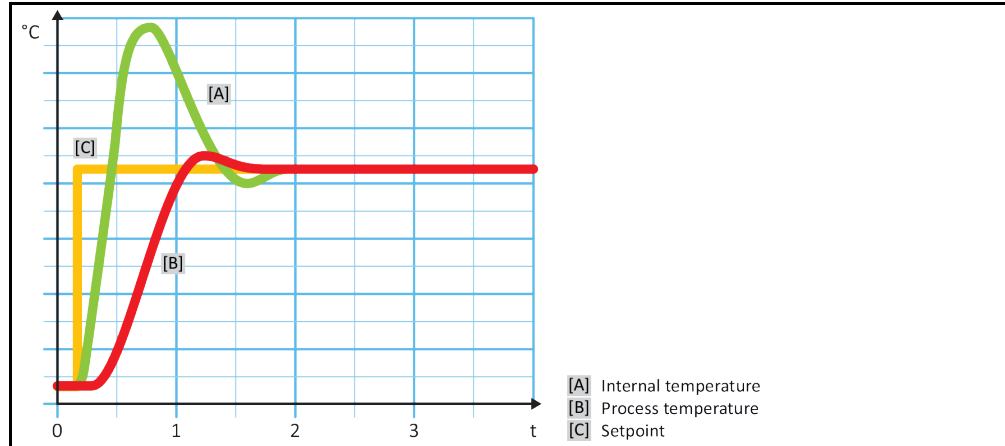
#### NOTE

##### Incorrect installation of the process sensor (Pt100)

##### MATERIAL DAMAGE CAUSED BY FAULTY TEMPERATURE CONTROL

- Disruption of measured value recording due to static build-up.
- The process sensor (Pt100) must have a screened supply cable.
- If the sensor tube is metallic, take care to avoid ground loops.
- The connection cable should not be unnecessarily long.
- Make sure that the process sensor is properly attached at the measurement point and that there is good thermal coupling
- The sensor itself must have good insulation from the screen or the protective grounding ( $R > 20 \text{ M}\Omega$ ).

Representation of an optimum process temperature control



#### 4.2.4 Delta T limiter

The Delta T limiter is a part of the temperature control which protects the system or the process. The Delta T limiter is given a limit value. The Delta T limiter then reacts when the limit value is reached during heating or cooling.

The temperature control mode "Process (Cascade)" evaluates the temperature difference between the flow temperature and the process temperature. The default setting of the limit value is 100 K. If the limit value and the temperature sensor are set properly, the load limits, e.g. from a glass apparatus, are not exceeded. As the limit value is approached, the cooling or heating capacity is adjusted. The DeltaT limiter is **not** a safety device.

#### 4.2.5 Monitoring the Pt100 temperature sensors

The Pt100 temperature sensors are constantly monitored for their electrical status. If the status "Sensor faulty" occurs during temperature control, the temperature control process is stopped immediately and a device message is displayed. This applies for all temperature sensors connected within the temperature control unit.

#### 4.2.6 Optimum control parameters for optimum temperature control

If the adjustment of the temperature does not correspond to the quality of the illustrations shown above, you can adjust the control parameters. With Huber temperature control units, there are various ways of finding the optimum control parameters. Depending on the facilities of the temperature control unit, you can choose the following processes:

- Use ex-factory parameters (standard)
- Estimate Control Parameters (only useful for bath thermostats with E-grade Basic and internal control)
- Fast Identification (from E-grade Exclusive)
- With Preliminary Test (from E-grade Exclusive)

#### 4.2.7 Sub-category: "Select auto/expert mode".

##### NOTE

Use of the "Expert mode" without a thorough knowledge of I&C technology.  
**MATERIAL DAMAGE TO THE APPLICATION**

➤ Only use this mode if you have a thorough knowledge of I&C technology.

Here you can select whether the control parameters are set in the "Automatic mode" or in the "Expert mode". To enter settings in "Expert mode" requires in-depth knowledge of process measuring and control technology. Incorrect or insufficient settings can severely impair the function of the temperature control unit.

## INFORMATION

In "Expert mode", "Configuration auto" is deactivated and only "Configuration manual" is possible.

This is how to change mode:

## PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Select auto/expert".
- Choose between the dialog entries "Automatic mode" and "Expert mode".
- Confirm your choice by tapping on "OK".

### 4.2.8 Sub-category: "Configuration auto"

## INFORMATION

You can only select this menu entry if "Automatic mode" is set.

#### 4.2.8.1 Sub-category: "Find parameters"

##### 4.2.8.1.1 Dialog entry: "Fast Identification"

Considering the small effort, the "Fast Identification" function of the controlled system provides you with very quick and reliable adapted control parameters. These control parameters achieve a fast and very accurate tuning performance. The more complex but also more precise identification "With Preliminary Test" is only very rarely required.

## INFORMATION

Do not make any changes to the temperature control unit and to the application (temperature control unit / external application) after your system has been started. Changes include e.g. filling / draining process chamber, changing the mixer speed, change of position of Pt100 process control sensor etc.

## PROCEDURE

- Before setting the control parameters, make sure that the temperature control unit has reached the set setpoint and has been controlling the temperature at this setpoint for a few minutes. Do not stop the temperature control.
- Do not make any changes to the temperature control unit and the application during parameter determination.
- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Configuration auto".
- Tap on the sub-category "Find parameters".
- Tap on the dialog entry "Fast Identification".
- Confirm your choice by tapping on "OK".
- Read the message displayed and confirm it by tapping on "OK".
- Select the heat transfer fluid used from the list.
- Confirm your choice by tapping on "OK".
- Choose between the dialog entries "Internal" and "Process (Cascade)".
- Confirm your choice by tapping on "OK".
- Enter a new setpoint using the number keypad that appears. This should be at least 10 K away from the current setpoint.
- Confirm your entry by tapping on "OK". Setting of the control parameters using "Fast Identification" starts and after a while a message appears on the display.
- Read the message displayed and confirm it by tapping on "OK".

##### 4.2.8.1.2 Dialog entry: "With Preliminary Test"

In some complex applications, the "Fast Identification" of the control circuit may not yet lead to optimum control. This can happen, in particular, if the hydraulic build-up cannot be adjusted to the necessary circulation volumes. → Page 42, section »To be noted when planning the test«.

A further optimization of control behavior can be achieved if you select the control parameterization "With Preliminary Test". With this, the control parameters within the set limits of the minimum and maximum setpoint are determined. Temperature control is then also carried out to the setpoint limits in some circumstances.

**INFORMATION**

Before starting the automatic controller parameterization, verify the correct setting of the minimum and maximum setpoint. A limitation to the actually used operating temperature range is advantageous. Do not make any changes to the temperature control unit and to the application (temperature control unit / external application) after your system has been started. Changes include e.g. filling / draining process chamber, changing the mixer speed, change of position of Pt100 process sensor etc.

Since the working temperature range can sometimes be very large, finding the parameters takes correspondingly longer in this mode. The control defines up to three temperature setpoints and automatically processes them one after another. One of these is below room temperature, one roughly at room temperature and one above room temperature, if the setpoint limits allow this.

**PROCEDURE**

- Before setting the control parameters, make sure that the temperature control unit has reached the set setpoint and has been controlling the temperature at this setpoint for a few minutes. Do not stop the temperature control.
- Do not make any changes to the temperature control unit and the application during parameter determination.
- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Configuration auto".
- Tap on the sub-category "Find parameters".
- Tap on the dialog entry "With Preliminary Test".
- Confirm your choice by tapping on "OK".
- Read the message displayed and confirm it by tapping on "OK".
- Select the heat transfer fluid used from the list.
- Confirm your choice by tapping on "OK".
- Choose between the dialog entries "Internal" and "Process (Cascade)".
- Confirm your choice by tapping on "OK". Setting the control parameters using "With Preliminary Test" starts and a message appears on the touchscreen after a while.
- Read the message displayed and confirm it by tapping on "OK".

## 4.2.8.1.3 Dialog entry: "Estimate Control Parameters"

Even with the simple temperature control units, we offer a further advantage in comparison with comparable bath thermostats available on the market. You can modify an existing control parameter by entering the heat transfer fluid used and the quantity of heat transfer fluid. This version is available with bath thermostats without connected external application.

**INFORMATION**

All the necessary technical data for the heat transfer fluids listed for Pilot ONE are stored in the controller. If the heat transfer fluid that you use is not shown in the list, choose the most similar heat transfer fluid with regard to temperature range and viscosity. → Page 41, section »**Information on the heat transfer fluids**«.

**PROCEDURE**

- Before setting the control parameters, make sure that the temperature control unit has reached the set setpoint and has been controlling the temperature at this setpoint for a few minutes. Do not stop the temperature control.
- Do not make any changes to the temperature control unit and the application during parameter determination.
- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Configuration auto".
- Tap on the sub-category "Find parameters".

- Tap on the dialog entry "Estimate Control Parameters".
- Confirm your choice by tapping on "OK".
- Read the message and confirm it by tapping on "Yes". The current control parameters will be overwritten.
- Select the heat transfer fluid used from the list.
- Confirm your choice by tapping on "OK".
- Read the message displayed and confirm it by tapping on "OK".
- Enter the filling volume using the number keypad that appears.
- Confirm your entry by tapping on "OK".
- Tap twice on the "Arrow" touchbutton to return to the category "Temperature Control".
- Tap on the category "Process/Internal".
- Choose between the dialog entries "Internal" and "Process (Cascade)".
- Tap on "OK" to confirm your choice.

#### 4.2.8.2 Sub-category: "Control Dynamics"

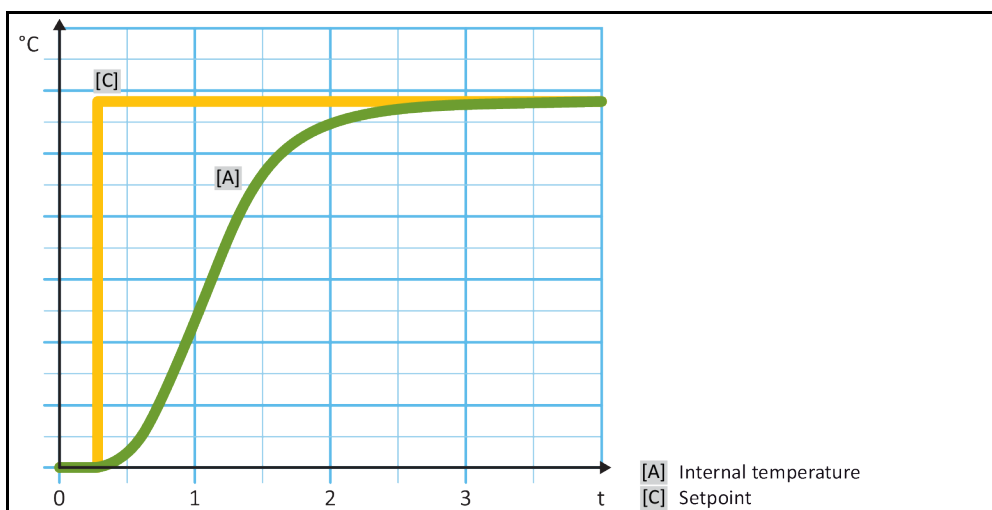
You can choose between a faster tuning performance with a possible and accepted small temperature overshoot and a tuning performance without temperature overshoot. The default setting is "Fast, small overshoot".

The overshoot always refers to the leading temperature. If, for example, you have activated the process temperature control, this will be the leading temperature. Contrary to this, the bath or flow temperature must always be ahead of the process temperature. To achieve the best possible transmission of energy the largest possible temperature difference between bath and flow temperature and the process temperature is required. Note the illustration "Representation of an optimum process temperature control". → From page 58, section »Temperature control to process temperature«. This can only ever be done with the largest possible volume flow of heat transfer fluid. In the setting "Fast, small overshoot", the combination of high heat transfer fluid flow rate and the superbly designed control electronics hardly ever results in an overshoot, while reaching the setpoint as quickly as possible. Contrary to the mode "Faster, small overshoot" there is the setting "Without overshoot". The target temperature is approached more cautiously and thus aperiodically. It takes longer to adjust to the selected setpoint. The statement "without overshoot" is only valid with little external disturbance influence. Please note the specifications. → Page 42, section »To be noted when planning the test«.

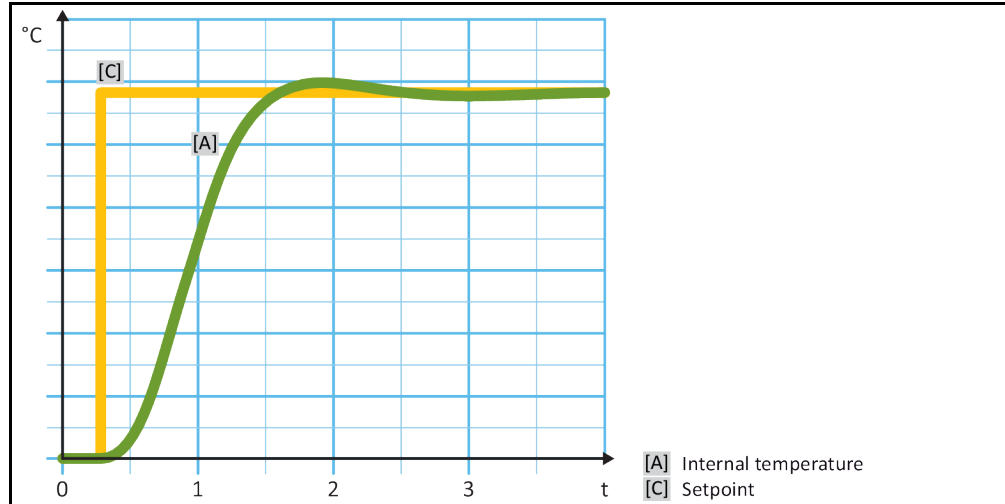
#### INFORMATION

The adjustment behavior can be selected at any time without reactivating the "Find control parameters".

Internal, aperiodic temperature control



Internal, dynamic temperature control with possible overshooting of the temperature



## PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Configuration auto".
- Tap on the sub-category "Control Dynamics".
- Choose between the dialog entries "Fast, small overshoot" and "Without overshoot".
- Confirm your choice by tapping on "OK".

### 4.2.8.3 Sub-category: "Fluid Properties"

#### 4.2.8.3.1 Sub-category "Select Fluid"

Under this entry, you can select the heat transfer fluid used from a list.

## PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Configuration auto".
- Tap on the sub-category "Fluid Properties".
- Tap on the sub-category "Select Fluid".
- Select the heat transfer fluid used from the list.
- Confirm your choice by tapping on "OK".

#### 4.2.8.3.2 Sub-category: "Bath/Circulation Volume"

Under this entry, you can enter the filling volume of the heat transfer fluid in your bath/circuit.

## PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Configuration auto".
- Tap on the sub-category "Fluid Properties".
- Tap on the sub-category "Bath/Circulation Volume".
- Read the message and confirm it by tapping on "OK".
- Enter the filling volume using the number keypad that appears.
- Confirm your entry by tapping on "OK".

#### 4.2.8.3.3 Sub-category: "Show Fluid"

This entry provides you with an overview of the settings entered.

### PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Configuration auto".
- Tap on the sub-category "Fluid Properties".
- Tap on the sub-category "Show Fluid".
- Tap on "OK" after you have read/checked the entries.

#### 4.2.8.4 Sub-category: "Display parameters"

Here you can display the set parameters in "Automatic mode".

### PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Configuration auto".
- Tap on the sub-category "Display parameters".
- Tap on "OK" after you have read/checked the parameters.

#### 4.2.9 Sub-category: "Configuration manual"

##### NOTE

**Use of the "Expert mode" without a thorough knowledge of I&C technology.**

##### MATERIAL DAMAGE TO THE APPLICATION

- Only use this mode if you have a thorough knowledge of I&C technology.

##### INFORMATION

In "Expert mode", "Configuration auto" is deactivated only "Configuration manual" is possible.

To enter settings in "Expert mode" requires in-depth knowledge of process measuring and control technology. Incorrect or insufficient settings can severely impair the function of the temperature control unit.

#### 4.2.9.1 Sub-category: "Change parameters"

In this menu you manually configure the control parameters. If only the internal temperature is used as a target value, the control parameters are entered only under "Internal". If the process temperature is used as the target value, also the internal controller can be used, for example, when reaching the set point limit or in case of a Delta T limit. Consequently, parameter sets must be entered under all three items ("Internal", "Jacket" and "Process") when using the process temperature as a target value.

##### 4.2.9.1.1 Sub-category: "Internal"

Enter the new values for "KP", "Tn" and "Tv" here one after the other.

### PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Configuration manual".
- Tap on the sub-category "Change parameters".
- Tap on the sub-category "Internal".
- Enter the new "KP" value using the number keypad that appears.

- Confirm your entry by tapping on "OK".
- Enter the new "Tn" value using the number keypad that appears.
- Confirm your entry by tapping on "OK".
- Enter the new "Tv" value using the number keypad that appears.
- Confirm your entry by tapping on "OK".

#### 4.2.9.1.2 Sub-category: "Jacket"

Enter the new value for "KP" here.

### PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Configuration manual".
- Tap on the sub-category "Change parameters".
- Tap on the sub-category "Jacket".
- Enter the new "KP" value using the number keypad that appears.
- Confirm your entry by tapping on "OK".
- Read the message and confirm it by tapping on "OK".

#### 4.2.9.1.3 Sub-category: "Process"

Enter the new values for "KP", "Tn" and "Tv" here one after the other.

### PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Configuration manual".
- Tap on the sub-category "Change parameters".
- Tap on the sub-category "Process".
- Enter the new "KP" value using the number keypad that appears.
- Confirm your entry by tapping on "OK".
- Enter the new "Tn" value using the number keypad that appears.
- Confirm your entry by tapping on "OK".
- Enter the new "Tv" value using the number keypad that appears.
- Confirm your entry by tapping on "OK".

#### 4.2.9.2 Sub-category: "Display parameters"

In this function, the set manual parameters are displayed.

### PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Configuration manual".
- Tap on the sub-category "Display parameters".
- Tap on "OK" after you have read/checked the parameters.

#### 4.2.9.3 Sub-category: "Control structure"

With this function, you have two different control structures available.

**"Huber PID controller":** Default setting

**"Classic PID controller":** This setting is exclusively used by Huber service engineers for service purposes.

## PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Configuration manual".
- Tap on the sub-category "control structure".
- Choose between the dialogue entries "Huber PID controller" and "Classic PID controller".
- Confirm your choice by tapping on "OK".

### 4.2.10 Sub-category: "Reset parameters"

With this function, you can reset the control parameters to the factory setting.

## PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Reset parameters".
- Read the message and confirm it by tapping on "Yes". The control parameters are reset/deleted.  
**The temperature control unit can only be operated again after a complete restart.**
- To do so, switch the temperature control unit off and back on again. The parameters have been reset.

### 4.2.11 Sub-category: "Display parameters"

In this function, the set parameters are displayed. Depending on the previous setting, these will be the "Automatic control parameters" or the "Manual control parameters".

## PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "TAC/Manual".
- Tap on the sub-category "Display parameters".
- Tap on "OK" after you have read/checked the parameters.

### 4.2.12 Category "Freeze protection"

Valid only for temperature control units in which water is approved as heat transfer fluid.

#### NOTE

**Non-compliance with the compatibility between the heat transfer 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 heat transfer fluid: Stainless steel 1.4301 (V2A)/1.4401 (V4A), copper, nickel, HNBR (Unichiller 017 to Unichiller 045), EPDM (from Unichiller 055), red bronze/brass and silver solder.
- The maximum viscosity of the heat transfer fluid must not exceed 50 mm<sup>2</sup>/s at the lowest working temperature!
- The maximum density of the heat transfer fluid may not exceed 1 kg/dm<sup>3</sup>!

#### NOTE

#### Operation without freeze protection activated

#### COMPLETE DESTRUCTION OF THE TEMPERATURE CONTROL UNIT

- When using water as a heat transfer fluid, freeze protection must be activated in the category "protective devices".

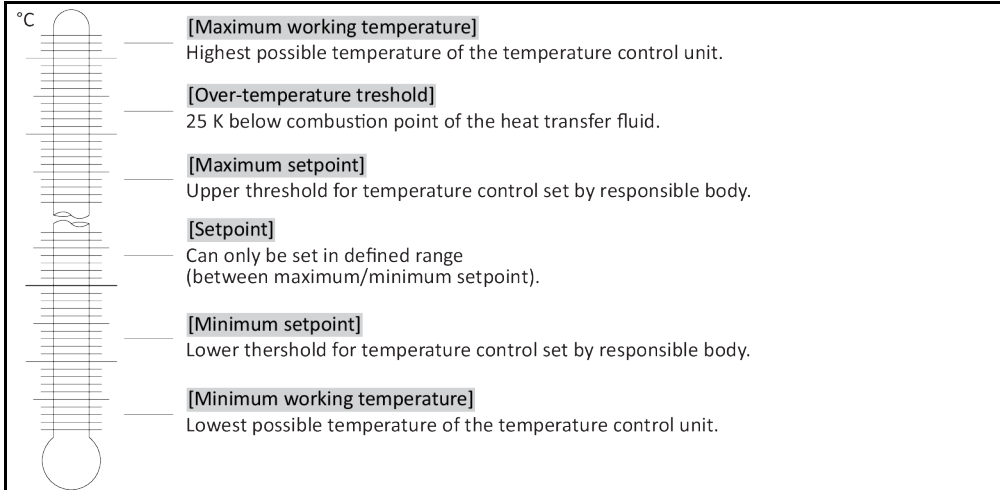
Freeze protection can only be activated on temperature control units designed to use water as a heat transfer fluid. History: The internal heat exchanger can freeze if the temperature of the heat transfer fluid is below 5 °C. Activating the freeze protection actively prevents the temperature from dropping below this threshold. When freeze protection is activated, a green flashing ice crystal appears on the touchscreen.

## PROCEDURE

- Go to the “Categories Menu”.
- Tap on the category “Protection Options”.
- Tap on the category “Freeze Protection”.
- Either tap on the dialog entry “off” or “on” to turn the freeze protection on or off.
- Confirm your choice by tapping on “OK”.

### 4.2.13 Setting the setpoint thresholds

Overview of the temperature thresholds



The limits for the minimum and maximum setpoint protect your system. Before the first temperature control and when changing the heat transfer fluid **both values must** be set according to the application field. The maximum setpoint limits the setpoint specification for the bath or flow temperature. The minimum setpoint protects against high viscosity or freezing at low temperatures. This temperature range defines the limits for setpoint entry.

## PROCEDURE

- Go to the “Categories Menu”.
- Tap on the category “Protection Options”.
- Tap on the category “Setpoint Limits”.
- Tap on the sub-category “Minimum Setpoint”.
- Enter the new value, using the numeric keypad that appears.
- Confirm your entry by tapping on “OK”.
- In the display that follows, confirm your entry again by tapping on “OK”.  
The correct selection will be displayed graphically and the “Min. setpoint” will be changed promptly. If tapping on “OK” is not correct, it will be displayed graphically for 2 seconds. The display will then return to the category “Setpoint Limits”. Try changing the “Min. Setpoint” again.
- Tap on the sub-category “Maximum Setpoint”.
- Enter the new value, using the numeric keypad that appears.
- Confirm your entry by tapping on “OK”.
- In the display that follows, confirm your entry again by tapping on “OK”.  
The correct selection will be displayed graphically and the “Max. Setpoint” will be changed promptly. If tapping on “OK” is not correct, it will be displayed graphically for 2 seconds. The display will then return to the category “Setpoint Limits”. Try changing the “Max. Setpoint” again.

### INFORMATION

Check the set values for the minimum and maximum setpoint at any system change, especially when changing the heat transfer fluid.

### 4.2.14 Setting the setpoint

## PROCEDURE

- Go to the “Home” screen.
- Tap on the keypad symbol next to “T<sub>Setpoint</sub>”.
- Enter a new setpoint using the number keypad that appears.

**The following must apply:**

[Minimum setpoint limit] ≤ [Setpoint] ≤ [Maximum setpoint limit].

If these conditions are not met, a message will appear on the >Touchscreen< [88] and the entry will be ignored. In this case, delete the value just entered either with the "Arrow" key or with the "Clear" key. Enter the setpoint again.

- Tap on "OK" to confirm your entry.
- In the display that follows, confirm your entry again by tapping on "OK".  
The correct selection will be displayed graphically and the setpoint will be changed immediately. If tapping on "OK" is not correct, it will be displayed graphically for 2 seconds. The display will return to the "Home" screen. Try changing the setpoint again.

## 4.3 Filling, venting, degassing and draining

Observe the wiring diagram. → From page 98, section »Annex«.

### CAUTION

#### Extremely hot or cold surfaces, connections and heat transfer fluids

##### BURNS OR FREEZING OF LIMBS

- Surfaces, connections and the tempered heat transfer fluid can be extremely hot or cold depending on the operating mode.
- Avoid direct contact!
- Wear personnel protective equipment. For example heat-resistant protective gloves and safety goggles.

### NOTE

#### During an active circulation, the heat transfer 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 heat transfer fluid circuit during an active circulation by means of shut-off valves.
- Warm the heat transfer fluid to room temperature before stopping the circulation.

### 4.3.1 Externally closed application

### WARNING

#### Operating an externally closed application with locked >Expansion vessel< [18]

##### BURSTING DUE TO OVERPRESSURE DURING TEMPERATURE CONTROL.

- Shut down the temperature control unit immediately.
- Allow the heat transfer fluid to cool to room temperature.
- Prior to commissioning the temperature control unit with an externally closed application, unlock the >Expansion vessel< [18]. → Page 34, section »Locking/unlocking the expansion vessel [18]«.

#### 4.3.1.1 Filling and venting externally closed application

### CAUTION

#### Non-compliance with the safety data sheet for the heat transfer fluid to be used

##### INJURIES

- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the heat transfer 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 heat transfer fluid and aids. → Page 19, section »Proper disposal«.

### NOTE

#### Semi-automatic venting

##### DAMAGE TO THE TEMPERATURE CONTROL UNIT

- An elevated tolerance time for the pressure drop can damage the pump if the heat transfer fluid level in the system is also too low.
- Constantly observe the heat transfer fluid level in the >Sight glass< [23] or on the >Touchscreen< [88]. Fill up the heat transfer fluid during the venting phase so the heat transfer fluid level in the >Expansion vessel< [18] does not fall below the minimum mark.

**INFORMATION**

Calculate whether the capacity of the >Expansion vessel< [18] can absorb the expansion volume during operation. Assume the following volumes for this calculation: [Minimum filling capacity of the temperature control unit] + [Volume of the optional >Extra expansion vessel< [19]] + [Volume of the temperature control hose] + [Jacket volume of your application] + [10%/100 K].

**INFORMATION**

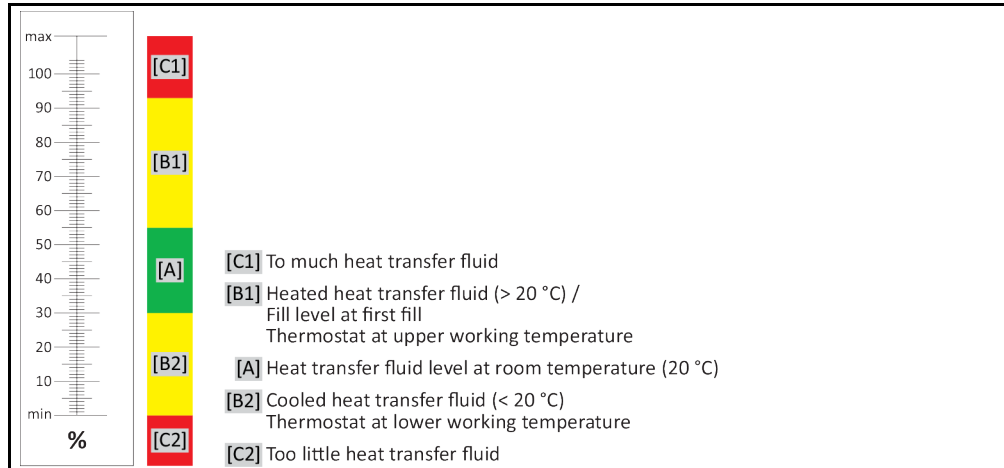
If, with externally closed applications (reactors), the fluid level in the fill level display remains the same when the pump is running and when the pump has stopped, the application has been vented.

**INFORMATION**

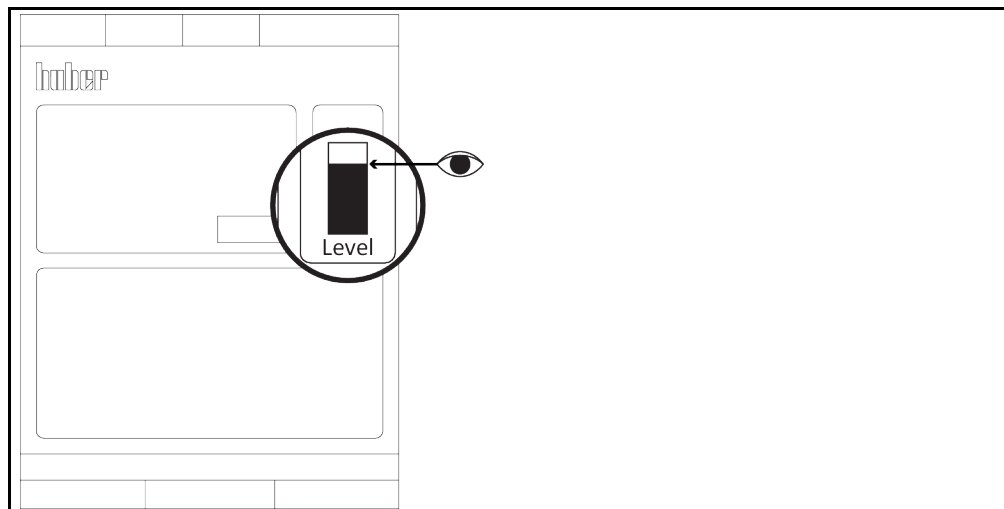
**Venting and degassing** must be performed especially during commissioning and after changing the heat transfer fluid. This is the only way to ensure trouble-free operation. Follow venting with the degassing operation. → Page 70, section »**Degassing externally closed applications**«.

Note that the volume expansion of the heat transfer fluid depends on the working temperature range you wish to work in. At the “lowest” working temperature, do not go below the **minimum** mark of the >Sight glass< [23] or on the >Touchscreen< [88] and at the “highest” working temperature there should be no overflow from the >Expansion vessel< [18]. In case of overfilling, drain the excess amount of heat transfer fluid. → Page 72, section »**Draining externally closed applications**«. Check if the heat transfer fluid can be reused. Follow the instructions for the proper disposal of heat transfer fluid. → Page 19, section »**Proper disposal**«.

Fill levels in the Sight glass< [23]



Heat transfer fluid level on the >Touchscreen< [88]



- Please observe any measures that may be required during filling, e.g. grounding the container, the funnel and other aids.
- Fill from the lowest possible height.

## PROCEDURE

- Check that the >Expansion vessel< [18] was unlocked. → Page 34, section »Locking/unlocking the expansion vessel [18]«. The >Expansion vessel< [18] may **only** be locked when an **externally open** application is used.
- Open the >Pump filling valve< [122] (model-dependent) by turning it counter-clockwise (turn 90° left as far as it will go). This will accelerate the filling process.
- **Temperature control unit with >Sight glass< [23]**: Open the >Sight glass cover< [24]. This makes filling easier as it prevents an air cushion from forming in the >Sight glass< [23]. No heat transfer fluid may leak from the >Sight glass< [23] when filling!
- Carefully pour suitable heat transfer fluid, using the filling accessories (funnel and/or beaker) into the >Filling port< [17]. The heat transfer fluid flows from the >Expansion vessel< [18] into the temperature control unit and via the hose connections to the external application. The fill level is displayed in the >Sight glass< [23] or on the >Touchscreen< [88]. Follow the instructions for the proper disposal when cleaning filling accessories. → Page 19, section »Proper disposal«.
- Before starting the venting process, fill the >Expansion vessel< [18] from 50 to 70 %. The heat transfer fluid flows via the >Expansion vessel< [18] into the temperature control unit.
- Wait until the level in the >Sight glass< [23] or on the >Touchscreen< [88] no longer drops. Refill the >Expansion vessel< [18] from 50 to 70 %.
- **Temperature control unit with >Sight glass< [23]**: Close the >Sight glass cover< [24].
- Go to the "Categories menu".
- Tap on the category "Temperature control".
- Tap on the category "Start/Stop".
- Tap on the dialog entry "Start venting".
- Tap on "OK" to confirm your selection.
- Confirm the preset time interval by tapping on "OK". Alternatively, use the numeric keypad that appears to enter an individual time interval. Tap on "OK" to confirm your entry. Venting will start. Venting stops if the level in the >Sight glass< [23] or on the >Touchscreen< [88] drops too much. Refill heat transfer fluid (fill level 50 to 70%) and restart venting. Depending on the temperature control unit and the connected application, this process must be repeated several times. The venting process can only be restarted after the time interval has elapsed if a time interval indicated in the >Status line< [Field 10] runs backwards.
- Stop venting. To do this, go to the category "Temperature control".
- Tap on the category "Start/Stop".
- Tap on the dialog entry "Stop venting".
- Tap on "OK" to confirm your selection. Venting is stopped and the pump continues to run for approx. 30 seconds. Wait until the pump stops.
- Close the >Pump filling valve< [122] (model-dependent) by turning it clockwise (turn 90° right as far as it will go).
- Close the >Expansion vessel cap< [22] by hand.

### 4.3.1.2 Degassing externally closed applications

#### CAUTION

With a fluid mix, rapid heating can cause heat transfer fluid to suddenly escape from the >Expansion vessel< [18]

#### BURNS/PROPERTY DAMAGE

- Due to the rapid heating of the low-boiling component contained in the mixture, a sudden overflow from the >Expansion vessel< [18] is to be expected.

#### CAUTION

Hot surface on the >Expansion vessel< [18] in "degassing" setup mode

#### BURNS TO LIMBS

- Do not touch the >Expansion vessel< [18] during "degassing" setup mode!
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles).

#### NOTE

Inert gas overlay of the >Expansion vessel< [18] over 0.1 bar (g)

#### MATERIAL DAMAGE CAUSED BY MECHANICAL DAMAGE TO THE >EXPANSION VESSEL< [18]

- When using the optional sealing set for Unistats in connection with a static inert gas overlay, a pressure limit of 0.1 bar (g) must be used.

**INFORMATION**

When changing from low-boiling heat transfer fluid (low-boiling components) to higher boiling heat transfer fluids, remains of the low-boiling component may remain in the temperature control unit. Depending on the working temperature, the low-boiling component begins to boil and gas bubbles are formed that cause the pump pressure to momentarily collapse. This may cause a safety shutdown. The gas bubbles reach the **>Expansion vessel< [18]** and can escape via the **>Expansion vessel cap< [22]**, and the **>Filling port< [17]**. Outgassing will remove residues of the low-boiling component from the heat transfer fluid.

We recommend inert gas overlay for your temperature control unit. For this we offer the sealing set for Unistats from our range of accessories. The 400-series and TR-series temperature control units are as standard equipped with inert gas overlay connections.

The heat transfer fluid is protected from environmental influences when using a Unistat. This prevents an increased accumulation of moisture or the oxidative degradation of the heat transfer fluid. A further significant extension of the useful life of the heat transfer fluid can be achieved by a static overlay with inert gas. This is especially true if it is intended to work at the operating temperature limits of the heat transfer fluid over an extended period of time. (HygroscoPy, oxidation).

The temperature in the **>Expansion vessel< [18]** is measured by a temperature sensor. The temperature in the **>Expansion vessel< [18]** may rise due to the expansion of the hot heat transfer fluid during de-gassing. The factory setting for this is 45 °C. However, rising bubbles can briefly create temperatures **> 70 °C** in the **>Expansion vessel< [18]**. This is caused by aging and the nature and quantity of the low-boiling heat transfer fluid contained in the temperature control circuit.

Under the category **"Safety"** in the section **"Overtemperature"**, the cut-out value of the installed temperature sensor can be set up to 100 °C in degassing mode. In normal mode, only max. 70 °C can be set for the **>Expansion vessel< [18]**.

Heat transfer fluid are more or less hygroscopic (water-attracting). This effect increases, the lower the working temperature. The de-gassing mode described below, which must be **permanently monitored**, also helps to remove any water residues from the temperature control circuit.

**PROCEDURE**

- Activate the menu item "Degassing" after completing the venting operation.  
Prerequisite: You have filled and/or cleaned the temperature control unit in accordance with the instructions. → Page 68, section **»Filling and venting externally closed application«** and/or → Page 89, section **»Rinsing the heat transfer fluid circuit«**.
- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "Start/Stop".
- Tap on the dialog entry "Start degassing".
- Touch "OK" to confirm your selection.
- Read the Note and confirm by tapping on "OK".
- Go to the "Home" screen.
- Tap on the keypad symbol next to "T<sub>Setpoint</sub>".
- Enter a setpoint using the number keypad that appears. This setpoint **must** be below the boiling point of the low-boiling heat transfer fluid. The setpoint will be increased in 10 K steps during the degassing process up to the maximum working temperature.
- Touch "OK" to confirm your entry.
- In the display that follows, confirm your entry again by tapping on "OK".  
The correct selection will be displayed graphically and the "setpoint" will be changed immediately. If tapping on "OK" is not correct, it will be displayed graphically for 2 seconds. The display will return to the "Home" screen. Try changing the "setpoint" again.
- Carry out temperature control to this setpoint until the temperature in the **>Expansion vessel< [18]** no longer rises or even falls.

**Monitoring the temperature in the >Expansion vessel< [18].**

- Go to the "Categories menu".
- Tap on the category "Safety".
- Tap on the category "Display OT values". All measured safety temperatures are displayed.
- Check the temperature in the **>Expansion vessel< [18]**. The degassing process is active if it increases. Wait until the temperature in the **>Expansion vessel< [18]** no longer rises or even falls.

- Go to the "Home" screen.
- Tap on the keypad symbol next to "T<sub>Setpoint</sub>".
- Increase the setpoint by 10 K.
- Tap on "OK" to confirm your entry.
- In the display that follows, confirm your entry again by tapping on "OK".  
The correct selection will be displayed graphically and the "setpoint" will be changed immediately. If tapping on "OK" is not correct, it will be displayed graphically for 2 seconds. The display will return to the "Home" screen. Try changing the "setpoint" again.
- Carry out temperature control until the temperature in the >Expansion vessel< [18] no longer rises or even falls.
- Check the temperature in the >Expansion vessel< [18] again.
- Continue to increase the setpoint by 10 K increments until the temperature in the >Expansion vessel< [18] no longer rises during an increase.
- Now maintain the heat transfer fluid at the last temperature set until the >Expansion vessel< [18] has reached ambient temperature.

### INFORMATION

The entire process can take several hours, depending on the degree of contamination and the application size. Continue the temperature control process until the temperature in the >Expansion valve< [18] has returned to ambient temperature.

- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "Start/Stop".
- Tap on the dialog entry "Stop degassing".
- Confirm your choice by tapping on "OK".
- Read the note and confirm by tapping on "OK". Degassing stops immediately and the pump continues to run for approx. 30 seconds. Wait until the pump stops.
- Connect a suitable drain hose (must be compatible with the heat transfer fluid) to the >Expansion vessel drain< [9] (if present) or >Drain< [8].
- Place the other end of the hose in a suitable container, which is compatible with the heat transfer fluid and the heat transfer fluid temperature.
- Drain the >Expansion vessel< [18]. Open the >Expansion vessel drain valve< [5] by turning it counterclockwise (turn 90° left as far as it will go). Pay attention to the high temperature of the heat transfer fluid. Follow the instructions for the proper disposal of heat transfer fluid. → Page 19, section »Proper disposal«.
- Close the >Expansion vessel drain valve< [5] by turning it clockwise (turn 90° right as far as it will go).
- Remove the drain hose and the container. Follow the instructions for the proper disposal. → Page 19, section »Proper disposal«.
- Open the >Expansion vessel cap< [22] by hand.
- Carefully pour new, original heat transfer fluid into the >Filling port< [17], using the filling accessories (funnel and/or beaker). The fill level is displayed in the >Sight glass< [23], on the >Touchscreen< [88] or by means of the >Level indicator< [25]. Do not mix different heat transfer fluids. Follow the instructions for the proper disposal when cleaning filling accessories. → Page 19, section »Proper disposal«.
- Close the >Expansion vessel cap< [22] by hand.
- The de-gassing process is complete.

#### 4.3.1.3

#### Draining externally closed applications



##### Hot or very cold heat transfer fluid

##### SEVERE BURNS/FROSTBITE OF LIMBS

- Before draining, ensure that the heat transfer fluid has room temperature (20 °C).
- If, at this temperature, the heat transfer fluid is too viscous to be drained: Control the temperature of the heat transfer fluid for a few minutes until the viscosity will allow drainage. Never control the temperature of the heat transfer fluid when the drain is open.
- Danger of burns when draining heat transfer 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 heat transfer fluid and its temperature.

### INFORMATION

Not all temperature control units are equipped with the same combination of connections/drains. Skip the step in the procedure if the connection / drain is not available on your temperature control unit.

## 4.3.1.3.1 Emptying the heat transfer fluid circuit

## PROCEDURE

- Remove the knurled screw at the >Drain< [8].
- Connect a suitable drain hose to the >Drain< [8].
- Remove the knurled screw at the >Expansion vessel drain< [9].
- Connect a suitable drain hose to the >Expansion vessel drain< [9].
- Stick both ends of the hoses into suitable containers (e.g. original canister, which is compatible with the heat transfer fluid).
- **Only valid for temperature control units with the function "Drain" or Draining "Heat transfer fluid":**  
To completely drain the heat transfer fluid circuit, the function „Draining“ or Draining „Heat transfer fluid“ must be activated. If the dialog entry „Draining“ or Draining „Heat transfer fluid“ is not available, the following instruction must be skipped. For water-cooled temperature control units, the function „Draining“ also opens the control valve in the cooling water circuit, depending on the model. This can cause the cooling water consumption to increase during draining. This does not apply to temperature control units with the function Draining „Cooling water“.
  - Tap in succession "Category menu", "Temperature control", "Start/stop".
  - Tap on the dialog entry: "Drain" or subsequently on Draining "Heat transfer fluid".
  - Confirm your choice by tapping on "OK".
  - Read the message and confirm by tapping on "OK".
  - Do **not** confirm the subsequent message by touching "OK".
- Open the >Drain valve heat transfer fluid< [3] by turning it counterclockwise.
- Open the >Drain valve< [4] by turning it counterclockwise.
- Open the >Expansion vessel drain valve< [5] by turning it counterclockwise.
- Wait until the heat transfer fluid has drained from the external application via the pump chamber and the draining hoses into the containers.
- Have another suitable container (e.g. a tub) ready to catch the heat transfer fluid from the >Residues drain< [10].
- Remove the knurled screw from the >Residues drain< [10]. The remaining heat transfer fluid will flow from the temperature control unit into the container as soon as you have opened the knurled screw.
- Open the >Drain valve water separator< [76] by turning it counterclockwise.
- **Only valid for temperature control units with the function "Drain" or Draining "Heat transfer fluid":**  
Read the message on the >Touchscreen< [88] and confirm it with "OK". With that, the temperature control unit has been drained. For water-cooled temperature control units, this function also closes the control valve in the cooling water circuit, depending on the model.
- Drain the external application. The description for the draining process can be found in the documents you received with the application.

## 4.3.1.3.2 Dismantling/mounting the application

## PROCEDURE

## Continuation of the procedure »Emptying the heat transfer fluid circuit«

- Disconnect the external application from the connection >Circulation flow< [1].
- Disconnect the external application from the connection >Circulation return< [2]. Leave the temperature control unit open for a while to allow it to dry out (without seal cap and with open drains).
- Connect the external application with the connection >Circulation flow< [1].
- Connect the external application with the connection >Circulation return< [2].

## 4.3.1.3.3 Closing the valves

## PROCEDURE

## Continuation of the procedure »Dismantling/mounting the application«

- Close the >Drain valve water separator< [76] by turning it clockwise.
- Fit the knurled screw to the >Residues drain< [10].
- Close the >Drain valve heat transfer fluid< [3] by turning it clockwise.
- Close the >Drain valve< [4] by turning it clockwise.
- Close the >Expansion vessel drain valve< [5] by turning it clockwise.
- Remove the drain hose from the >Expansion vessel drain< [9].
- Install the knurled screw at the >Expansion vessel drain< [9].
- Remove the drain hose from the >Drain< [8].
- Install the knurled screw at the >Drain< [8].
- Remove the containers used to collect the heat transfer fluid. Check if the heat transfer fluid can be reused. Follow the instructions for the proper disposal. → Page 19, Section »Proper disposal«.

### 4.3.2 Externally open application

#### CAUTION

##### Operating an externally open application with unlocked >Expansion vessel< [18]

##### BURNS/FROSTBITE DUE TO OVERFLOWING HEAT TRANSFER FLUID

- Shut down the temperature control unit immediately.
- Allow the heat transfer fluid to cool down/heat up to room temperature.
- If the temperature control unit is installed below the externally open application, the heat transfer fluid will escape from the >Expansion vessel< [18] and from the >Sight glass< [23] (if present).
- If the externally open application stands below the temperature control unit, overflowing from the externally open application will occur.
- Prior to commissioning the temperature control unit with an externally open application, lock the >Expansion vessel< [18]. → Page 34, section »Locking/unlocking the expansion vessel [18]«.

#### 4.3.2.1 Filling and venting externally open application

#### CAUTION

##### Non-compliance with the safety data sheet for the heat transfer fluid to be used

##### INJURIES

- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the heat transfer 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 heat transfer fluid and aids. → Page 19, section »Proper disposal«.

#### NOTE

##### Heat transfer fluid flowing over into the temperature control unit

##### MATERIAL DAMAGE

- If the temperature control unit is installed below the externally open application, the heat transfer fluid will escape from the >Expansion vessel< [18] and from the >Sight glass< [23] (if present).
- Shut down the temperature control unit immediately.
- Isolate the temperature control unit from the power supply.
- Have the temperature control unit only serviced and cleaned by staff trained by Huber. Follow the instructions for the proper disposal. → Page 19, section »Proper disposal«.

#### NOTE

##### Semi-automatic venting

##### DAMAGE TO THE TEMPERATURE CONTROL UNIT

- An elevated tolerance time for the pressure drop can damage the pump if the heat transfer fluid level in the system is also too low.
- Constantly observe the heat transfer fluid level in the >Sight glass< [23] or on the >Touchscreen< [88]. Fill up the heat transfer fluid during the venting phase so the heat transfer fluid level in the >Expansion vessel< [18] does not fall below the minimum mark.

#### INFORMATION

Overflowing heat transfer fluid will create a film on surfaces, and therefore must be collected and disposed of immediately after the event in accordance with the safety data sheet. Observe the proper disposal of heat transfer fluid and aids. → Page 19, section »Proper disposal«.

If this is not complied with, it is assumed that the temperature control unit does not comply with all requirements of DIN EN 61010-2-010.

#### INFORMATION

**Venting** must be performed especially during commissioning and after a change of heat transfer fluid. This is the only way to ensure trouble-free operation.

Note that the volume expansion of the heat transfer fluid depends on the working temperature range you wish to work in. At the "lowest" working temperature do not go below the "**minimum**" mark (temperature control unit) and the "**min mark**" (application). The heat transfer fluid level in the application must be above the return to the >Circulation return< [2]. This prevents air from being drawn in. At the "highest" working temperature, there may be no overflow from the >Sight glass< [23]. The "**Max mark**" in the application may also not be exceeded. In case of overfilling, drain the excess amount of heat transfer fluid. → Page 76, Section »Draining externally open applications«.

- Please observe any measures that may be required during filling, e.g. grounding the container, the funnel and other aids.
- Fill from the lowest possible height.

## PROCEDURE

- Check that the **>Expansion vessel< [22]** was locked. → Page 34, section »**Locking/unlocking the expansion vessel [18]**«. The **>Expansion vessel< [18]** must be locked when an **externally open** application is used. Consequently, the **>Expansion vessel< [18]** is closed off from the externally open application and you can also place the temperature control unit below the externally open application.
- Close the **>Pump filling valve< [122]** (model-dependent) by turning it clockwise (turn 90° right as far as it will go).
- Fill suitable heat transfer fluid into the bath vessel. The heat transfer fluid flows via the return line into the temperature control unit and via the flow line to the bath vessel. Thereby the air in the temperature control unit reaches the outside. Follow the instructions for the proper disposal when cleaning filling accessories. → Page 19, section »**Proper disposal**«.
- Go to the "Categories menu".
- Tap on the category "Temperature control".
- Tap on the category "Start/Stop".
- Tap on the dialog entry "Start venting".
- Tap on "OK" to confirm your selection.
- Confirm the preset time interval by tapping on "OK". Alternatively, use the numeric keypad that appears to enter an individual time interval. Tap on "OK" to confirm your entry. Venting will start. Make sure the **"Min" mark** in the bath vessel (top edge of the back flow + approx. 1 cm safety) is not undercut. Venting stops if the level in the bath vessel falls below the **"Min" mark**. Refill heat transfer fluid and restart venting. Depending on the temperature control unit and the connected application, this process must be repeated several times. The venting process can only be restarted after the time interval has elapsed if a time interval indicated in the **>Status line< [Field 10]** runs backwards.
- Stop venting. To do this, go to the category "Temperature control".
- Tap on the category "Start/Stop".
- Tap on the dialog entry "Stop venting".
- Tap on "OK" to confirm your selection. Venting is stopped and the pump continues to run for approx. 30 seconds. Wait until the pump stops.

### 4.3.2.2 Degassing externally open applications



#### CAUTION

#### Hot or cold heat transfer fluid and surfaces

#### BURNS TO LIMBS

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

#### INFORMATION

When changing from low-boiling heat transfer fluid (low-boiling component) to higher boiling heat transfer fluid, remains of the low-boiling component may remain in the temperature control unit. Depending on the working temperature, the low-boiling component begins to boil, gas bubbles form and cause the pump pressure to momentarily collapse. This may cause a safety shutdown. The gas bubbles reach the bath opening and can escape.

If ice crystals form on the evaporator coil, water has accumulated in the heat transfer fluid. If this is the case, degas to avoid damage to the temperature control unit.

Heat transfer fluids are hygroscopic (water-attracting) to a greater or lesser degree. This effect increases as the working temperature decreases. The off-gassing mode below, which must be **permanently monitored**, also helps you remove any water residues from the temperature control circuit.

## PROCEDURE

- Follow venting with the degassing operation. Prerequisite: You have filled and/or cleaned the temperature control unit in accordance with the instructions. → Page 74, section »**Filling and venting externally open application**« and/or → Page 89, section »**Rinsing the heat transfer fluid circuit**«.

- Go to the "Home" screen.
- Tap on the keypad symbol next to " $T_{\text{Setpoint}}$ ".
- Enter a setpoint using the number keypad that appears. This setpoint **must** be below the boiling point of the low-boiling heat transfer fluid. The setpoint will be increased in 10 K steps during the degassing process up to the maximum working temperature.
- Touch "OK" to confirm your entry.
- In the display that follows, confirm your entry again by tapping on "OK". The correct selection will be displayed graphically and the "setpoint" will be changed immediately. If tapping on "OK" is not correct, it will be displayed graphically for 2 seconds. The display will return to the "Home" screen. Try changing the setpoint again.
- Tap on the "Start" touch button.
- Confirm the start of temperature control by tapping on "OK". The correct selection will be displayed graphically and temperature control will start immediately. If tapping on "OK" is not correct, it will be displayed graphically for 2 seconds. The display will return to the "Home" screen. Try starting the temperature control again.
- Carry out temperature control to the entered setpoint until no more gas bubbles rise up.
- Increase the setpoint by 10 K and carry out temperature control until no more gas bubbles rise up.
- Repeat increasing the setpoint by 10 K until the maximum working temperature of the heat transfer fluid has been reached.
- Tap on the "Stop" touch button as soon as no more gas bubbles rise up at the heat transfer fluids maximum working temperature.
- Confirm the stop of the temperature control process by tapping on "OK". The correct selection will be displayed graphically. Temperature control is stopped immediately and the pump continues to run for approx. 30 seconds. Wait until the pump stops. If tapping on "OK" is not correct, it will be displayed graphically for 2 seconds. The display will return to the "Home" screen. Try stopping the temperature control process again. The de-gassing process is complete.

#### 4.3.2.3 Draining externally open applications



##### Hot or very cold heat transfer fluid

##### SEVERE BURNS/FROSTBITE OF LIMBS

- Before draining, ensure that the heat transfer fluid has room temperature (20 °C).
- If, at this temperature, the heat transfer fluid is too viscous to be drained: Control the temperature of the heat transfer fluid for a few minutes until the viscosity will allow drainage. Never control the temperature of the heat transfer fluid when the drain is open.
- Danger of burns when draining heat transfer 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 heat transfer fluid and its temperature.

#### INFORMATION

Not all temperature control units are equipped with the same combination of connections/drains. Skip the step in the procedure if the listed connection / drain is not available on your temperature control unit.

#### 4.3.2.3.1 Emptying the heat transfer fluid circuit

### PROCEDURE

- Remove the knurled screw at the >Drain< [8].
- Connect a suitable drain hose to the >Drain< [8].
- Remove the knurled screw at the >Expansion vessel drain< [9].
- Connect a suitable drain hose to the >Expansion vessel drain< [9].
- Stick both ends of the hoses into suitable containers (e.g. original canister, which is compatible with the heat transfer fluid).
- **Only valid for temperature control units with the function "Drain" or Draining "Heat transfer fluid":** To completely drain the heat transfer fluid circuit, the function „Draining“ or Draining „Heat transfer fluid“ must be activated. If the dialog entry „Draining“ or Draining „Heat transfer fluid“ is not available, the following instruction must be skipped. For water-cooled temperature control units, the function "Draining" also opens the control valve in the cooling water circuit, depending on the model. This can cause the cooling water consumption to increase during draining. This does not apply to temperature control units with the function Draining "Cooling water".
  - Tap in succession "Category menu", "Temperature control", "Start/stop".
  - Tap on the dialog entry: "Drain" or subsequently on Draining "Heat transfer fluid".

- Confirm your choice by tapping on "OK".
- Read the message and confirm by tapping on "OK".
- Do **not** confirm the subsequent message by touching "OK".
- Open the **>Drain valve heat transfer fluid<** [3] by turning it counterclockwise.
- Open the **>Drain valve<** [4] by turning it counterclockwise.
- Open the **>Expansion vessel drain valve<** [5] by turning it counterclockwise.
- Wait until the heat transfer fluid has drained from the external application via the pump chamber and the draining hoses into the containers.
- Have another suitable container (e.g. a tub) ready to catch the heat transfer fluid from the **>Residues drain<** [10].
- Remove the knurled screw from the **>Residues drain<** [10]. The remaining heat transfer fluid will flow from the temperature control unit into the container as soon as you have opened the knurled screw.
- Open the **>Drain valve water separator<** [76] by turning it counterclockwise.
- **Only valid for temperature control units with the function "Drain" or Draining "Heat transfer fluid":** Read the message on the **>Touchscreen<** [88] and confirm it with "OK". With that, the temperature control unit has been drained. For water-cooled temperature control units, this function also closes the control valve in the cooling water circuit, depending on the model.
- Drain the external application. The description for the draining process can be found in the documents you received with the application.

#### 4.3.2.3.2 Dismantling/mounting the application

### PROCEDURE

#### Continuation of the procedure »Emptying the heat transfer fluid circuit«

- Disconnect the external application from the connection **>Circulation flow<** [1].
- Disconnect the external application from the connection **>Circulation return<** [2]. Leave the temperature control unit open for a while to allow it to dry out (without seal cap and with open drains).
- Connect the external application with the connection **>Circulation flow<** [1].
- Connect the external application with the connection **>Circulation return<** [2].

#### 4.3.2.3.3 Closing the valves

### PROCEDURE

#### Continuation of the procedure »Dismantling/mounting the application«

- Close the **>Drain valve water separator<** [76] by turning it clockwise.
- Fit the knurled screw to the **>Residues drain<** [10].
- Close the **>Drain valve heat transfer fluid<** [3] by turning it clockwise.
- Close the **>Drain valve<** [4] by turning it clockwise.
- Close the **>Expansion vessel drain valve<** [5] by turning it clockwise.
- Remove the drain hose from the **>Expansion vessel drain<** [9].
- Install the knurled screw at the **>Expansion vessel drain<** [9].
- Remove the drain hose from the **>Drain<** [8].
- Install the knurled screw at the **>Drain<** [8].
- Remove the containers used to collect the heat transfer fluid. Check if the heat transfer fluid can be reused. Follow the instructions for the proper disposal. → Page 19, Section »Proper disposal«.

## 5 Normal operation

### 5.1 Automatic operation

#### CAUTION

**Extremely hot or cold surfaces, connections and heat transfer fluids**

**BURNS OR FREEZING OF LIMBS**

- Surfaces, connections and the tempered heat transfer fluid can be extremely hot or cold depending on the operating mode.
- Avoid direct contact!
- Wear personnel protective equipment. For example heat-resistant protective gloves and safety goggles.

#### NOTE

**During an active circulation, the heat transfer 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 heat transfer fluid circuit during an active circulation by means of shut-off valves.
- Warm the heat transfer 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

- Go to the "Home" screen.
- Tap on the "Start" touchbutton.
- Confirm the start of temperature control by tapping on "OK".  
The correct selection will be displayed graphically and temperature control will start immediately. If tapping on "OK" is not correct, this is displayed graphically for 2 seconds. After this, the display will return to the "Home" screen again. Try to start the temperature control unit again.

##### 5.1.1.2 Ending the temperature control process

#### NOTE

**When the temperature control unit is switched off, the heat transfer fluid temperature is higher/lower than room temperature**

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

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

The temperature control can be ended at any time, the pump continues to run for approx. 30 seconds. The compressor is switched off after the stepper motor valve has reached a defined position to control the cold output.

### PROCEDURE

- Go to the "Home" screen.
- Tap on the "Stop" touchbutton.
- Confirm the stop of temperature control by tapping on "OK".  
The correct selection will be displayed graphically and temperature control will stop immediately and the pump with overrun for about 30 seconds. Wait until the pump stops. If tapping on "OK" is not correct, this is displayed graphically for 2 seconds. After this, the display will return to the "Home" screen again. Try to stop the temperature control unit again.

#### INFORMATION

The compressor is not switched off until the stepper motor valve has reached a defined position. The status line [Field 10] displays the relevant information.

## 5.1.2 Temperature control via a created temperature control program

### 5.1.2.1 Starting the temperature control program

A temperature control program can be started after filling and complete venting.

## PROCEDURE

- Go to the "Categories Menu".
- Tap on the category "Programmer/Ramp".
- Tap on the category "Start/stop Program".
- Tap on the dialog entry of the temperature control program to be started.
- Confirm your choice by tapping on "OK".
- Read the message and confirm it. Your temperature control unit will start the temperature control program and the temperature control programmed in it will start.
- Read the Note and confirm by tapping on "OK".

### 5.1.2.2 Ending/cancelling the temperature control program

#### NOTE

**When the temperature control unit is switched off, the heat transfer fluid temperature is higher/lower than room temperature**

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

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

You can either end the temperature control automatically using the parameters predefined in the temperature control program or end/interrupt the temperature control at any time manually. The temperature control is switched off immediately after, the pump continues to run for approx. 30 seconds. The compressor is switched off after the stepper motor valve has reached a defined position to control the cold output.

#### Manual ending/cancelling

## PROCEDURE

- Go to the "Home" screen.
- Tap on the "Stop" touchbutton.
- Confirm the stop of temperature control by tapping on "OK".  
The correct selection will be displayed graphically and temperature control will stop immediately and the pump with overrun for about 30 seconds. Wait until the pump stops. If tapping on "OK" is not correct, this is displayed graphically for 2 seconds. After this, the display will return to the "Home" screen again. Try to stop the temperature control unit again.

#### INFORMATION

The compressor is not switched off until the stepper motor valve has reached a defined position. The status line [Field 10] displays the relevant information.

## 6 Interfaces and software update

### NOTE

**Connection with the interfaces while the temperature control unit is switched on.**

#### DAMAGE TO THE INTERFACES

- Connecting a component while the temperature control unit is switched on can destroy the interface.
- Switch off the temperature control unit and the component to be connected before connecting them.

### NOTE

**Failure to observe the specifications of the interface used**

#### MATERIAL DAMAGE

- Only connect components that meet the interface requirements.

### NOTE

**The "Pilot ONE®" controller is not operated behind a firewall**

#### MATERIAL DAMAGE

- The "Pilot ONE®" controller must be operated behind a firewall if it is connected with a high-risk network.
- The best available technology is to be applied in order to create sufficient security for the LAN!

### INFORMATION

Please note the specifications of the generally applicable standards when using the interfaces. For the exact position of the interfaces, please refer to the wiring diagram.

### INFORMATION

Settings of the interfaces: Settings in the "Interfaces" category can be made in the "Pilot ONE®".

### INFORMATION

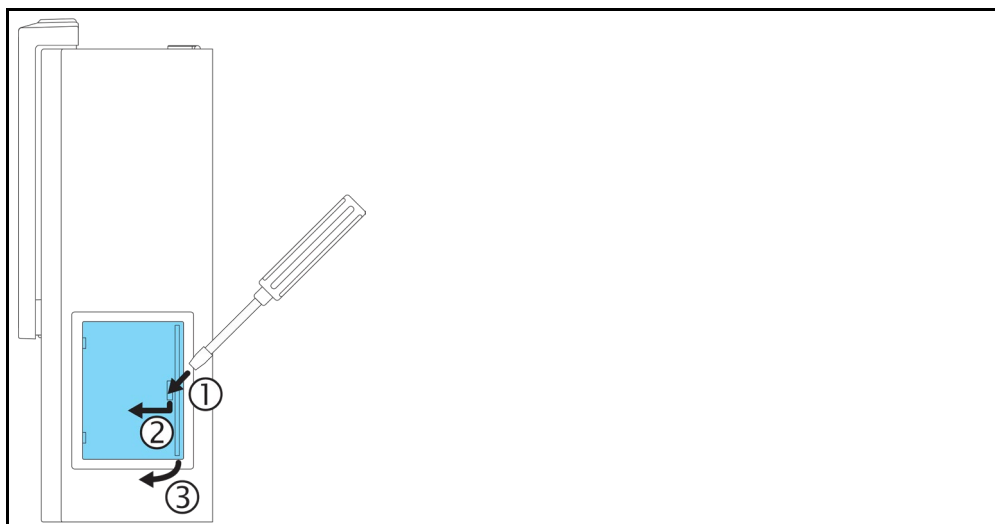
The use of PB commands is described in our manual "Data communication". You can download this manual at [www.huber-online.com](http://www.huber-online.com).

### INFORMATION

Information on the interfaces can be found in our manual "Interfaces". You can download this manual at [www.huber-online.com](http://www.huber-online.com).

### 6.1 Removing the interface cover at the "Unistat® Control ONE"

Removing the cover

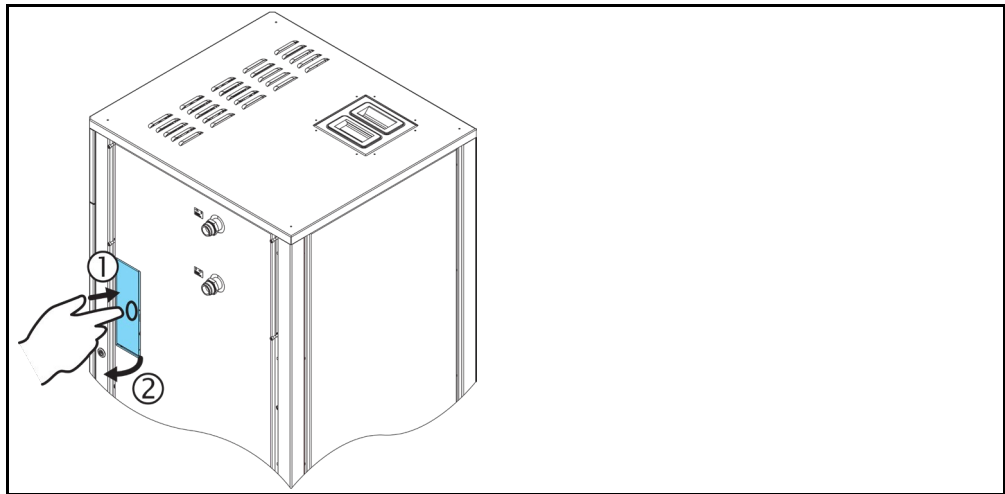


## PROCEDURE

- Insert a screwdriver into the opening.
- Using the screwdriver, prise off the cover to the left and away from you.

## 6.2 Swinging open the interface box [133]

Swinging open the  
>Interface box< [133]  
(exemplary illustration)



### PROCEDURE

- Press on the >Interface box< [133]. This causes the >Interface box< [133] to spring open a little.
- Swing open the >Interface box< [133].

## 6.3 Installing the Com.G@te® [46]

Only valid if an optional Com.G@te is to be installed on the temperature control unit.

### INFORMATION

The >Com.G@te< [46] is available in two versions (external and internal). For the external >Com.G@te< [46], you can obtain the required connection cable, a wall mounting bracket or a bracket for direct mounting on the housing from our accessory program. The connection cable for the internal >Com.G@te< [46] is marked in the wiring diagram and numbered. This numbering is directly affixed to the connection cable that is pre-assembled in the control cabinet.

The >Com.G@te< [46] must only be connected/replaced when the temperature control unit is switched off.

### PROCEDURE

- Switch off the temperature control unit.
- **External>Com.G@te< [46]:**
  - Place the >Com.G@te< [46] into the optional bracket.
  - Connect the >Com.G@te< [46] via the connection cable with the >Service interface< [50] on the temperature control unit.
- **Internal>Com.G@te< [46]:**
  - Open the control cabinet.
  - Remove the lid of the temperature control unit from the assembly opening.
  - Install the >Com.G@te< [46] into the temperature control unit
  - Connect the >Com.G@te< [46] with the connection cable in the control cabinet.
  - Close the control cabinet.
- Switch on the temperature control unit. The >Com.G@te< [46] is automatically recognized and is ready for operation.

## 6.4 Firmware update

The "Pilot ONE Flasher" software to update the firmware is available under [www.huber-online.com](http://www.huber-online.com). The installation package contains instructions for the firmware update.

## 7 Maintenance

### 7.1 Messages from the temperature control unit

Messages output by the temperature control unit can be divided into various classes.

Follow the instructions displayed on the >Touchscreen< [88]. Once a message has been acknowledged, a symbol is output on the >Touchscreen< [88]. Tapping the symbol takes you to an overview of all messages in chronological order.

Displayed symbol: 

### 7.2 Replacing the “Pilot ONE®” or “Unistat® Control ONE”



#### Replacing the electronics on the running temperature control unit

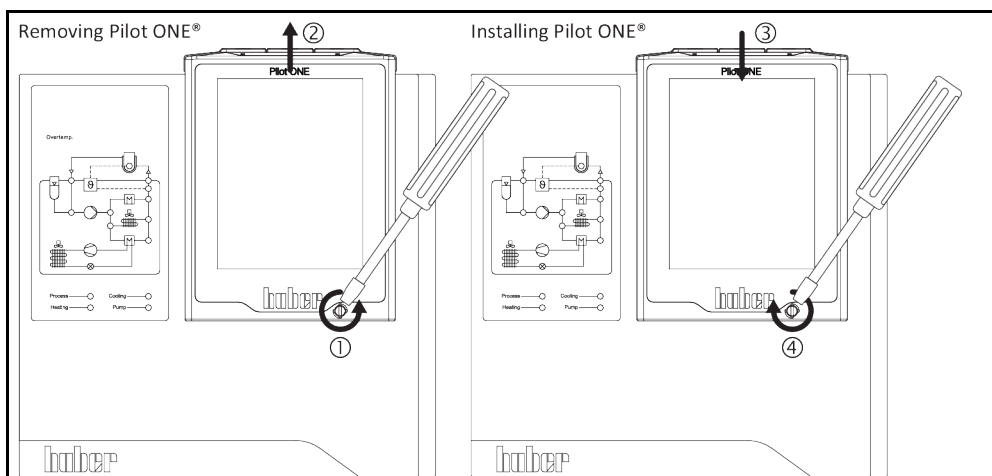
##### MORTAL DANGER FROM FIRE

- Stop an ongoing temperature control process.
- Switch off the temperature control unit.
- Disconnect the temperature control unit from the power supply.

In case of a malfunction, you can replace the “Pilot ONE” or the “Unistat Control ONE” (depending on the model) yourself. If you have questions or difficulties, please contact your dealer, your local office or our Customer Support.

#### 7.2.1 Replacing the “Pilot ONE®”

Replacing the “Pilot ONE”. Exemplary representation with Unistat Control ONE (depending on the model)



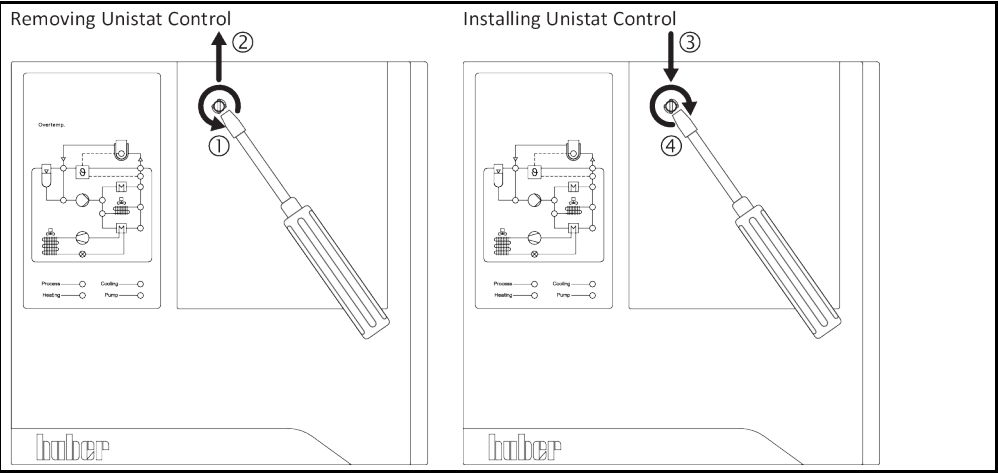
### PROCEDURE

- Turn off the temperature control unit.
- Disconnect the temperature control unit from the power supply.
- Release the >Fixing screw for Pilot ONE< [89] at the front of the housing.
- Carefully pull the “Pilot ONE” away upwards.
- Carefully insert the replacement “Pilot ONE”.
- Close the >Fixing screw for Pilot ONE< [89] at the front of the housing.
- Connect the temperature control unit to the power supply.
- Turn on the temperature control unit.

7.2.2 Replacing the “Unistat® Control ONE”

Only valid for temperature control units with Unistat Control ONE.

Replacing the “Unistat Control ONE”



PROCEDURE

- Switch off the temperature control unit.
- Disconnect the temperature control unit from the power supply.
- Remove the “Pilot ONE”. → Page 82, section »Replacing the “Pilot ONE”«.
- Undo the fastening screw on the “Unistat Control ONE”.
- Also pull the “Unistat Control ONE” away upwards.
- Carefully insert the replacement “Unistat Control ONE”.
- Fasten the replacement “Unistat Control ONE” with the fastening screw.
- Install the “Pilot ONE”. → Page 82, section »Replacing the “Pilot ONE”«.
- Connect the temperature control unit to the power supply.
- Switch on the temperature control unit.

7.3 Maintenance

 **DANGER**

**Maintenance work on the running temperature control unit**  
**DANGER TO LIFE FROM ELECTRIC SHOCK**

- Stop an ongoing temperature control process.
- Switch off the temperature control unit.
- Disconnect the temperature control unit from the power supply.

**NOTE**

**Maintenance work that is not described is carried out**  
**MATERIAL DAMAGE**

- For maintenance work that is not described, please contact the Huber company.
- Maintenance work that is not described is reserved for qualified specialists trained by the Huber company.
- Safety-relevant components may only be replaced by equivalent components. 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 85, Section »Replacing temperature control or coolant hoses«. | Operating company and / or operators |

| Cooling* | Description                                                         | Maintenance interval                                                | Comment                                                                                                                                                                      | Person responsible                   |
|----------|---------------------------------------------------------------------|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| A/W      | Inspection in accordance with the F-Gas Directive                   | In accordance with the F-Gas Directive                              | → Page 18, Section » <b>Fluorinated greenhouse gases as refrigerants</b> «.                                                                                                  | Operating company                    |
| A/W      | Check the power 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 (certified) electrician    |
| A        | Clean the perforated sheet                                          | As required                                                         | Clean the perforated sheet of the temperature control unit with a damp cloth                                                                                                 | Operating company                    |
| A/W      | Heat transfer fluid inspection                                      | As required                                                         | –                                                                                                                                                                            | Operating company and / or operators |
| U        | Empty drip tray <sup>1</sup>                                        | Monthly                                                             | → Page 88, Section » <b>Empty the drip tray</b> «.                                                                                                                           | Operating company and / or operators |
| A/W      | Check mechanical seals (drip tray) <sup>1</sup>                     | Monthly                                                             | → Page 91, Section » <b>Inspect the mechanical seal</b> «.                                                                                                                   | Operating company and / or operators |
| A        | Check the liquefier fins                                            | As required, at the latest after 3 months                           | → Page 85, Section » <b>Cleaning the liquefier fins</b> «.                                                                                                                   | Operating company and / or operators |
| W        | Check the hat-type strainer / dirt trap                             | As required, at the latest after 3 months                           | → Page 86, Section » <b>Cleaning the hat-type strainer/dirt trap</b> «.                                                                                                      | Operating company and / or operators |
| A/W      | Overtemperature protection (OT) - functional check                  | Every month or after changing the heat transfer fluid.              | → Page 56, Section » <b>Testing overtemperature protection for functionality</b> «.                                                                                          | Operating company and / or operators |
| A/W      | Testing the emergency stop switch for proper function               | Every 6 months or after relocation                                  | → Page 88, Section » <b>Function test of the emergency stop switch</b> «.                                                                                                    | Operating company and / or operators |
| A/W      | Safety circuit pressure: Function test of safety relay <sup>2</sup> | Every 12 months                                                     | Have the maintenance only carried out by certified personnel (such as Huber service engineers). Please contact Customer Support. → Page 97, section » <b>Contact data</b> «. | Operating company                    |
| A/W      | Check the temperature control unit for damage and stability         | Every 12 months or after relocation                                 | –                                                                                                                                                                            | Operating company and / or operators |
| W        | Check the cooling water quality                                     | Every 12 months                                                     | Descale the cooling water circuit as required. Documentation on water quality is available at: <a href="http://www.huber-online.com">www.huber-online.com</a>                | Operating company and / or operators |
| A/W      | Free-standing models: Check air filter mats                         | Determine according to ambient conditions.                          | Check all air filter mats of the temperature control unit. Clean the air filter mats as needed or replace. → Page 19, section » <b>Proper disposal</b> «.                    | Operating company and / or operators |

<sup>1</sup> Not valid for magnetically coupled circulation pumps (entry "MC pump" in technical Bulletin). Magnetically coupled circulation pumps are maintenance-free.

<sup>2</sup> Only valid for the models "Unistat 625w" and "Unistat 620w Zeta Edition from XII".

| Cooling*                                                              | Description                                                        | Maintenance interval | Comment                                                                                                                                                          | Person responsible |
|-----------------------------------------------------------------------|--------------------------------------------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|
| 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 97, section »Contact data«. | Operating company  |
| *A = Air cooling; W = Water cooling; U = Applicable only for Unistats |                                                                    |                      |                                                                                                                                                                  |                    |

### 7.3.2 Replacing temperature control or coolant hoses

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

#### 7.3.2.1 Replacing temperature control hoses

### PROCEDURE

- Drain the temperature control unit. → Page 72, section »Draining externally closed applications« or → Page 76, section »Draining externally open applications«.
- Replace defective temperature control hoses. Follow the instructions for the proper disposal. → Page 19, section »Proper disposal«.
- Reconnect your external application. → Page 37, section »Connecting an externally closed/open application«.
- Fill the temperature control unit with heat transfer fluid. → Page 68, section »Filling and venting externally closed application« or → Page 74, section »Filling and venting externally open application«.
- Vent the temperature control unit. → Page 68, section »Filling and venting externally closed application«. An externally open application does not need to be vented.
- Start the function „Degassing“. → Page 70, section »Degassing externally closed applications«. An externally open application does not need to be de-gassed.
- Restart the temperature control unit in normal mode.

#### 7.3.2.2 Replacing coolant hoses

### PROCEDURE

- Drain the cooling water. → Page 94, section »Draining the cooling water«.
- Replace the defective coolant hoses. Follow the instructions for the proper disposal. → Page 19, section »Proper disposal«.
- Reconnect the temperature control unit to the building's cooling water supply. → Page 31, section »Temperature control units with water cooling«.
- Restart the temperature control unit in normal mode.

### 7.3.3 Cleaning the liquefier fins

Valid for air-cooled temperature control units only

#### CAUTION

##### Manual cleaning

##### RISK OF BEING CUT ON THE LIQUEFIER FINS

- Wear suitable cut-resistant gloves for cleaning work.
- Depending on the ambient conditions, use cleaning equipment such as vacuum cleaners and/or a hand brush/brush. Follow the local regulations when cleaning. Do not clean the liquefier fins in a clean room with items like a brush and do not use a vacuum cleaner without an extra-fine particle filter.

#### NOTE

##### Cleaning using pointed or sharp-edged tools

##### DAMAGE TO THE LIQUEFIER FINS

- Clean the liquefier fins using suitable cleaning appliances.

#### INFORMATION

Make sure there is adequate ventilation (removal of waste heat, fresh air supply) for the temperature control unit, in case of **air cooling, maintain wall clearance**. → Page 22, Section »Consequence of inadequate energy dissipation« and → Page 27, Section »Ambient conditions«. The liquefier fins must be cleaned (dust) from time to time as only then will the temperature control unit perform at its maximum cooling capacity.

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

## PROCEDURE

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

- Turn off the temperature control unit.
- Disconnect the temperature control unit from the power supply.
- Remove the ventilation grille to create unhindered access to the liquefier fins.
- Clean the liquefier fins using suitable cleaning appliances. Observe the local regulations and ambient conditions when selecting cleaning appliances.
- Make sure the liquefier fins are not damaged or deformed as this will impair the air flow.
- Re-mount the ventilation grille after cleaning work.
- Connect the temperature control unit to the power supply.
- Turn on the temperature control unit.

## PROCEDURE

### Ventilation grille on the underside (table-top units)

#### NOTE

**Cleaning of liquefier fins at the underside when the temperature control unit is filled**  
**DAMAGE CAUSED BY HEAT TRANSFER FLUID PENETRATING THE TEMPERATURE CONTROL UNIT**  
 ➤ Empty the temperature control unit before cleaning the liquefier fins at the underside of the temperature control unit.

- Switch off the temperature control unit.
- Disconnect the temperature control unit from the power supply.
- Drain the heat transfer fluid from the temperature control unit. → Page 72, section »**Draining externally closed applications**« or → Page 76, section »**Draining externally open applications**«.
- Tilt the temperature control unit to remove the grille (if available) in front of the liquefier fins.
- Clean the liquefier fins using suitable cleaning appliances. Observe the local regulations and ambient conditions when selecting cleaning appliances.
- Make sure the liquefier fins are not damaged or deformed as this will impair the air flow.
- Re-mount the ventilation grille after cleaning work.
- Connect the temperature control unit to the power supply.
- Refill the temperature control unit with heat transfer fluid. → Page 68, section »**Filling and venting externally closed application**« or → Page 74, section »**Filling and venting externally open application**«.

### 7.3.4 Cleaning the hat-type strainer/dirt trap

Valid for water-cooled temperature control units only

#### NOTE

**Building's isolating valves are not closed**  
**DAMAGE BY FLOODING OF ROOMS**  
 ➤ Close the building-side isolating valves of the cooling water supply and return line.

#### INFORMATION

Depending on the water quality, regular checking and cleaning of the strainer at the **>Cooling water inlet< [13]** is necessary.  
 Carry out the steps "Draining the cooling water circuit", "Dismantling the cooling water inlet", "Cleaning the hat-type strainer/dirt trap" and "Installing the cooling water inlet" in succession.

#### INFORMATION

We would be pleased to also offer you training for the Service. Contact our Customer Support → page 97, section »**Contact data**«.

#### 7.3.4.1 Draining the cooling circuit

## PROCEDURE

Only valid for temperature control units without the function "Drain":.

- Switch off the temperature control unit.
- Disconnect the temperature control unit from the power supply.

- Close the building-side isolating valves of the cooling water supply and return line.
- Place a collecting container below the cooling water supply [13], [14] and [15] (if present)
- Open the >Cooling water drain< [15] (if present). If the temperature control unit is not equipped with a >Cooling water drain< [15]: Open the >Cooling water inlet< [13]. The cooling water will begin to drain out. Allow the cooling water to fully drain.
- Open the >Cooling water outlet< [14]. The cooling water will begin to drain out. Allow the cooling water to fully drain.
- Remove the collecting containers below the cooling water supply [13], [14] and [15] (if present) after draining. Properly dispose of the contents of the collecting containers. → Page 19, section »Proper disposal«.

## PROCEDURE

**Only valid for temperature control units with the function "Drain" or Drain „Cooling water“**  
**To fully drain the cooling water circuit, you must activate the function „Drain“ or „Drain cooling water“ to open the control valve in the cooling water circuit. This causes the cooling water from the temperature control unit to be removed as well.**

- Close the building-side isolating valves of the cooling water supply and return line.
- Place a collecting container below the cooling water supply [13], [14] and [15] (if present)
- Open the >Cooling water drain< [15] (if present). If the temperature control unit is not equipped with a >Cooling water drain< [15]: Open the >Cooling water inlet< [13]. The cooling water will begin to drain out. Allow the cooling water to fully drain.
- Open the >Cooling water outlet< [14]. The cooling water will begin to drain out. Allow the cooling water to fully drain.
- Tap on "Category menu", "Temperature control", "Start/stop" in sequence.
- Tap on the dialog entry "Drain" and then "Drain cooling water".
- Touch "OK" to confirm your selection.
- Read the message and confirm by tapping on "OK".
- Wait until the remaining heat transfer fluid has flown from the temperature control unit.
- Read the message and confirm by tapping on "OK".
- Remove the collecting containers below the cooling water supply [13], [14] and [15] (if present) after draining. Properly dispose of the contents of the collecting containers. → Page 19, section »Proper disposal«.
- Switch off the temperature control unit.
- Disconnect the temperature control unit from the power supply.

### 7.3.4.2 Dismantling the cooling water supply

## PROCEDURE

- Disconnect the >Cooling water inlet< [13] from the building's cooling water supply.
- Disconnect the >Cooling water outlet< [14] from the building's cooling water return line.
- Close the >Cooling water drain< [15] (if present).

### 7.3.4.3 Cleaning the hat-type strainer/dirt trap

## PROCEDURE

- **Table-top models:** Remove the hat-type strainer from the >Cooling water inlet< [13].
- **Free-standing models:** Remove the paneling around the cooling water supply [13], [14] and [15] (if present). Located immediately behind the >Cooling water inlet< [13] is the dirt trap.
  - Carefully detach the cover (hexagonal).
  - Remove the metal strainer located below.
- Clean the hat-type strainer/metal strainer under running water.
- Re-insert the hat-type strainer/metal strainer after cleaning work.
- **Free-standing models:** Carefully fasten the cover (hexagonal) and mount the paneling around the cooling water supply [13], [14] and [15] (if present).

### 7.3.4.4 Installing the cooling water supply

## PROCEDURE

- Connect the >Cooling water inlet< [13] to the building's cooling water supply.
- Connect the >Cooling water outlet< [14] to the building's cooling water return line.
- Check the connections for leaks.
- Open the building-side shut-off valves of the cooling water supply and return line.

### 7.3.5 Empty the drip tray

Only valid for circulation pumps with mechanical seal.

#### CAUTION

**Non-compliance with the safety data sheet for the heat transfer fluid to be used**

##### INJURIES

- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the heat transfer 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 heat transfer fluid and aids. → Page 19, section »Proper disposal«.

#### INFORMATION

This is not an actual leak but residues that are necessary for the lubrication of the mechanical seal.

The exiting quantity of heat transfer fluid is dependent on the heat transfer fluid itself and the working temperature of the temperature control unit. The drops in the drip tray usually evaporate in case of heat transfer fluids with a high vapor pressure. The drops usually do not evaporate in case of heat transfer fluids with a low vapor pressure (e.g. silicone oils). Therefore, these residues must be drained from time to time.

## PROCEDURE

- Hold a suitable container, e.g. beaker, below the >Drain drip tray< [7]. The drips can be cleanly collected in the beaker and properly discarded. Follow the instructions for the proper disposal when cleaning filling accessories. → Page 19, section »Proper disposal«.
- Open the >Drain drip tray< [7].
- Collect the drips.
- Close the >Drain drip tray< [7].

### 7.3.6 Function test of the emergency stop switch

Only valid for temperature control units with emergency stop switch.

#### INFORMATION

**Important:** Perform the function test only when the temperature control unit is **not** controlling the temperature. All poles of the temperature control unit are switched off **immediately** during a function test!

Immediately take the temperature control unit out of use if the function test doesn't turn off the temperature control unit. Please contact Customer Support, if this is the case. → Page 97, section »Contact data«.

## PROCEDURE

- Press the >Emergency stop switch< [70].  
All poles of the temperature control unit are disconnected **immediately**.
- Restart the temperature control unit in normal mode after a successful function test. → Page 53, section »Turning on the temperature control unit«.

## 7.4 Heat transfer fluid inspection, replacement and circuit cleaning

Observe the wiring diagram. → From page 98, section »Annex«.

#### CAUTION

**Extremely hot or cold surfaces, connections and heat transfer fluids**

##### BURNS OR FREEZING OF LIMBS

- Surfaces, connections and the tempered heat transfer fluid can be extremely hot or cold depending on the operating mode.
- Avoid direct contact!
- Wear personnel protective equipment. For example heat-resistant protective gloves and safety goggles.

**NOTE**

During an active circulation, the heat transfer 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 heat transfer fluid circuit during an active circulation by means of shut-off valves.
- Warm the heat transfer fluid to room temperature before stopping the circulation.

## 7.4.1 Heat transfer fluid inspection

**CAUTION**

Heat transfer fluid is not inspected on a regular basis  
**BURNS DUE TO REDUCED BOILING POINT**

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

**NOTE**

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

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

**INFORMATION**

**Oxidation**  
 Oxidation ages the heat transfer fluid and changes its characteristics (e.g. reduces its boiling point). When controlling high temperatures, a reduced boiling point may cause very hot heat transfer fluid to overflow at the >Expansion vessel< [18]. This may cause serious burns of the limbs.

**Hygroscopy**  
 When continuously controlling the temperature to below room temperature, hygroscopy causes water to accumulate in the heat transfer fluid in the course of time. Such a liquid mixture causes the evaporator to burst when the temperature is controlled in the minus range. This is caused by the water in the liquid mixture, which forms ice crystals on the evaporator. When controlling the temperature in the high range with such a liquid mixture, the boiling point is reduced. When controlling high temperatures, a reduced boiling point may cause very hot heat transfer fluid to overflow at the >Expansion vessel< [18]. This may cause serious burns of the limbs.

## 7.4.2 Heat transfer fluid replacement

**NOTE**

**Mixing different heat transfer fluids in a heat transfer fluid circuit**  
**PROPERTY DAMAGE**

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

Please note when changing the heat transfer fluid: → Page 68, section »Filling, venting, degassing and draining«.

## 7.4.3 Rinsing the heat transfer fluid circuit

**DANGER**

**Setpoint and overtemperature protection are not adjusted to the heat transfer fluid**  
**MORTAL DANGER FROM FIRE**

- The cut-out value of the overtemperature protection **must** be adapted to the heat transfer fluid. Set the cut-out value of the overtemperature protection 25 K below the fire point of the heat transfer fluid.
- The setpoint set during rinsing **must** be adjusted to the heat transfer fluid used.

**CAUTION**

**Non-compliance with the safety data sheet for the heat transfer fluid to be used**  
**INJURIES**

- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the heat transfer 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 heat transfer fluid and aids. → Page 19, section »Proper disposal«.

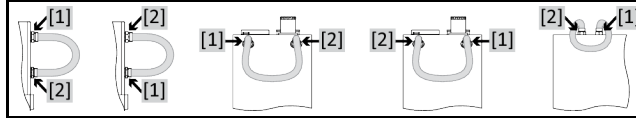
## NOTE

### Mixing different heat transfer fluids in a heat transfer fluid circuit

#### PROPERTY DAMAGE

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

Example: Connecting a short circuit hose



The inner components of the temperature control unit must be dried out. Need to avoid boiling retardation during future uses (e.g. use of a silicone oil at temperatures above about 100 °C).

## INFORMATION

Not all temperature control units are equipped with the same combination of connections/drains. Skip the step in the procedure if the connection / drain is not available on your temperature control unit.

## PROCEDURE

- Drain the temperature control unit. → Page 72, section »**Draining externally closed applications**« or → Page 76, section »**Draining externally open applications**«.

## INFORMATION

Residual heat transfer fluid can remain in the pump chamber and the internal lines after draining. Leave the temperature control unit with open valves for a while.

- Leave the drain hose mounted to the >Drain< [8].
- Leave the drain hose mounted to the >Expansion vessel drain< [9].
- Check the fill level in the collecting container at the other end of the drain hose. Follow the instructions for the proper disposal of heat transfer fluid. → Page 19, Section »**Proper disposal**«.

## INFORMATION

If the application used is also dirty, leave the application connected to the temperature control unit. This rinses the temperature control unit and the application at the same time. If the used application is not dirty, replace the application with a bypass hose. Thus, only the temperature control unit is rinsed.

- Connect the >Circulation flow< [1] with the >Circulation return< [2] at the temperature control unit using a bypass hose.
- Close all the valves. → Page 73, section »**Closing the valves**«
- **Fill** the system (minimum fill level) with the heat transfer fluid you wish to use. → Page 68, section »**Filling and venting externally closed application**« or → Page 74, section »**Filling and venting externally open application**«.
- **Vent** the system. → Page 68, section »**Filling and venting externally closed application**«. An externally open application does not need to be vented.
- Adjust the **setpoint** and the cut-out value of the **overtemperature protection** and the **setpoint limits** to the heat transfer fluid used. → Page 67, section »**Setting the setpoint**«, → Page 54, section »**Setting the overtemperature protection**« and → Page 67, section »**Setting the setpoint thresholds**«.
- Go to the "Categories menu".
- Tap on the category "Temperature control".
- Tap on the category "Start/Stop".
- Tap on the dialog entry "Start temperature control".
- Tap on "OK" to confirm your selection. The length of rinsing depends on the level of soiling.
- Tap on the category "Start/Stop".
- Tap on the dialog entry "Stop temperature control".
- Tap on "OK" to confirm your selection. The temperature control process is stopped.
- **Drain** the temperature control unit. → Page 72, section »**Draining externally closed applications**« or → Page 76, section »**Draining externally open applications**«.

- Connect the **>Circulation flow< [1]** with the **>Circulation return< [2]** at the temperature control unit using a bypass hose.
- Repeat the steps "Filling", "Venting", "Start/Stop temperature control" and "Draining" until the drained heat transfer fluid remains clear.
- Remove the bypass hose after completely draining the temperature control unit.

**INFORMATION**

Leave an application connected, if you have simultaneously rinsed a used application (externally closed).

- Leave the drains and the drain valves open for a while to allow the heat transfer fluid remaining in the temperature control unit to evaporate.
- Close all valves and remove the drain hoses. → Page 73, section »Closing the valves«.
- Re-connect your application. (Only if you have rinsed the heat transfer fluid circuit using a bypass hose.)
- Fill the temperature control unit with heat transfer fluid. → Page 68, section »Filling and venting externally closed application« or → Page 74, section »Filling and venting externally open application«.
- Vent the temperature control unit. → Page 68, section »Filling and venting externally closed application«. An externally open application does not need to be vented.
- Start the function „Degassing“. → Page 70, section »Degassing externally closed applications«. An externally open application does not need to be de-gassed.
- Restart the temperature control unit in normal mode.

## 7.5 Cleaning the surfaces

**CAUTION****Extremely hot or cold surfaces, connections and heat transfer fluids****BURNS OR FREEZING OF LIMBS**

- Surfaces, connections and the tempered heat transfer fluid can be extremely hot or cold depending on the operating mode.
- Avoid direct contact!
- Wear personnel protective equipment. For example heat-resistant protective gloves and safety goggles.

**NOTE****Open plug contacts****DAMAGE CAUSED BY FLUID INGRESS**

- Protect plug contacts that are not required 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 cleaning agents and aids. → Page 19, section »Proper disposal«.

## 7.6 Inspect the mechanical seal

Only valid for circulation pumps with mechanical seal.

**NOTE****No visual inspection of the drip tray****MATERIAL DAMAGE IN THE TEMPERATURE CONTROL UNIT BY OVERFLOW OF THE DRIP TRAY**

- Check the drip tray on a monthly basis and empty it when necessary.

Expect drop formation at the mechanical seal when operating with heat transfer fluids that evaporate only very slowly, as mechanical seals are never absolutely tight. These drops must be collected in a controlled fashion. The drip tray **must** be regularly checked and emptied if necessary. → Page 83, section »Function check and visual inspection«. Follow the instructions for the proper disposal of heat transfer fluid. → Page 19, section »Proper disposal«.

## 7.7 Plug contacts

### NOTE

#### Open plug contacts

#### DAMAGE CAUSED BY FLUID INGRESS

- Protect plug contacts that are not required with the protective caps supplied.
- Clean surfaces only with a damp cloth.

All plug contacts are provided with protective caps. Plug contacts that are not required must be protected with the protective caps.

## 7.8 Decontamination before shipping

### CAUTION

#### Shipping temperature control units or accessories that are not decontaminated

#### PERSONAL INJURIES AND DAMAGE DUE TO RESIDUES OF HAZARDOUS SUBSTANCES

- Carry out suitable decontamination.
- The scope of decontamination depends on the type and amount of the substances used.
- The corresponding safety data sheet must be observed.
- You will find a prepared return receipt at [www.huber-online.com](http://www.huber-online.com).

The operating company is responsible for carrying out a decontamination. Decontamination must be carried out **before** the temperature control unit or accessory is shipped. For example for repair or inspection. It must be ensured that third-party personnel do **not** come into contact with a contaminated temperature control unit or accessory. A written note pointing out that decontamination has been carried out must be attached clearly visible on the temperature control unit or accessory.

To simplify the process, we have prepared a form for you. This is available for download at [www.huber-online.com](http://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 a qualified (certified) 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 a qualified (certified) electrician.
- Always connect the temperature control unit to a power socket with protective earth (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 cable/power cable connection replaced and inspected by a qualified (certified) electrician.

#### 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 heat transfer fluid to be used

##### **INJURIES**

- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the heat transfer 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 heat transfer fluid and aids. → Page 19, section »Proper disposal«.

#### CAUTION

Hot or very cold heat transfer fluid

##### **SEVERE BURNS/FROSTBITE OF LIMBS**

- Before draining, ensure that the heat transfer fluid has room temperature (20 °C).
- If, at this temperature, the heat transfer fluid is too viscous to be drained: Control the temperature of the heat transfer fluid for a few minutes until the viscosity will allow drainage. Never control the temperature of the heat transfer fluid when the drain is open.
- Danger of burns when draining heat transfer 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 heat transfer fluid and its temperature.

#### **INFORMATION**

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

### 8.2 Switch-off

#### PROCEDURE

Our temperature control units are equipped with varying functions. Depending on the function, the switch-off procedure on shutting down differs.

Without "Draining" function: Steps d.) and e.)

With "Draining" function: Steps a.), b.), d.) and e.)

With the functions Draining "Heat transfer fluid" and "Cooling water": Steps a.), c.), d.) and e.).

- a.) Drain the heat transfer fluid circuit with the function Draining "Heat transfer fluid". → From page 68, section »Filling, venting, degassing and draining«

- **b.)** Do **not** confirm the last message by tapping on "OK". Thus, the control valve in the cooling water circuit remains open. This is the prerequisite to be able to completely drain the cooling water circuit.
- **c.)** Drain the cooling water circuit with the function Draining "Cooling water". → From page 94, section »**Draining the cooling water**«
- **d.)** Switch off the temperature control unit.
- **e.)** Disconnect the temperature control unit from the power supply connection.

### 8.3 Draining the temperature control unit

#### PROCEDURE

- Drain the temperature control unit. → From page 68, section »**Filling, venting, degassing and draining**«.

### 8.4 Draining the cooling water

#### CAUTION

**Pressurized cooling water connections**

**RISK OF INJURY**

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

#### NOTE

**Building's isolating valves are not closed**

**DAMAGE BY FLOODING OF ROOMS**

- Close the building-side isolating valves of the cooling water supply and return line.

#### NOTE

**Cooling water is not drained before the unit is taken out of service or transported**

**PROPERTY DAMAGE OR ENVIRONMENT DAMAGE**

- If the cooling water is not drained, the internal piping may be damaged by the elements. This can damage both the cooling water circuit and the coolant circuit. If the coolant circuit is damaged, the coolant it contains will be released.
- Be sure to drain the cooling water circuit before taking the unit out of service or transporting it.

#### INFORMATION

This section must be observed when using water-cooled temperature control units.

#### 8.4.1 Draining process

#### PROCEDURE

- Proceed as described to drain the cooling water circuit.
  - From page 86, section »**Draining the cooling circuit**«.
  - From page 87, section »**Dismantling the cooling water supply**«.

### 8.5 Uninstalling an external application

#### PROCEDURE

- Disconnect the external application from the temperature control unit.

### 8.6 Opening/closing valves

#### PROCEDURE

- Close the valves. → From page 33, Section »**Opening/closing valves**«.

## 8.7 Disassemble the exhaust air [105]

Only valid for temperature control units with >Exhaust air< [105]

### PROCEDURE

- Disconnect the connection >Exhaust air< [105] from the building's exhaust air system.
- If necessary, dismantle the model-dependent adapter.
- Re-install the cover at the >Exhaust air< [105] connection.

## 8.8 Deactivating the leveling feet

Only valid for temperature control units with extendible leveling feet.

Ensure that the leveling feet are screwed in/deactivated before you pack the temperature control unit.

### PROCEDURE

- Ensure that the locking brakes of the casters (if present) are activated.
- Loosen the lock screws on the leveling feet.
- Screw in the leveling feet.
- Ensure that the locking brakes of the casters (if installed) are deactivated.

## 8.9 Mounting the knurled screws

### PROCEDURE

- Check whether the knurled screws on the drains have been mounted and hand-tightened.

## 8.10 Transportation lock

#### NOTE

**Not checking the position of the transportation locks prior to transport**

**DAMAGE TO THE TEMPERATURE CONTROL UNIT**

- Prior to packaging and transport of the temperature control unit, bring the transportation locks of the compressor into the transport position.

When tightening the transportation locks, please observe: → Page 25, section »Transportation lock«.

## 8.11 Packing

Always use the original packaging! → Page 27, section »Unpacking«.

## 8.12 Shipping

#### NOTE

**Temperature control unit transported in a horizontal position**

**DAMAGE TO THE COMPRESSOR**

- Only transport the temperature control unit in an upright position.

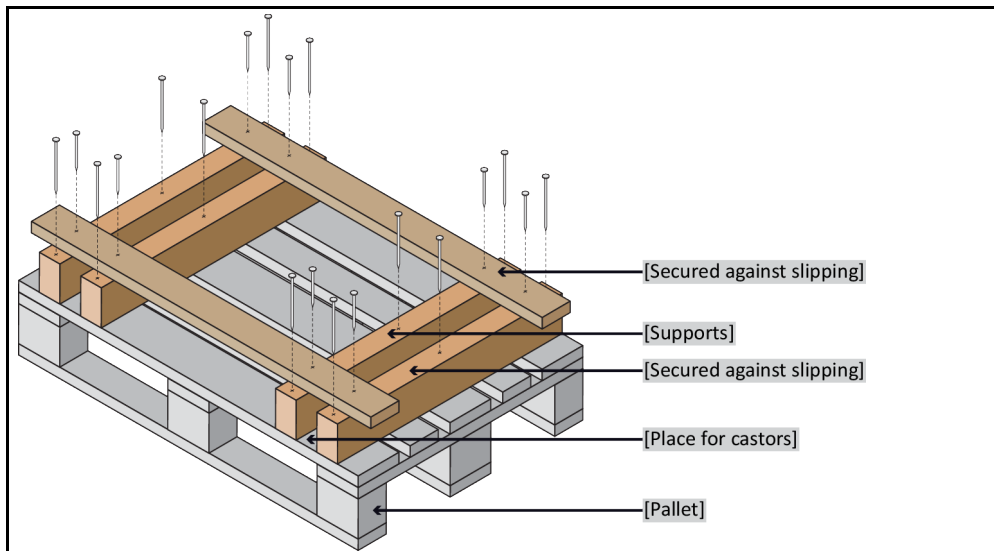
#### NOTE

**Temperature control unit transported incorrectly**

**PROPERTY DAMAGE**

- Do not transport by truck on the castors or feet.
- Comply all requirements in this section to avoid damage to the temperature control unit.

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.

- Check whether the coolant circuit must be emptied for transportation. → Page 18, section »Transportation«. Only commission approved specialized companies in the field of cooling and air-conditioning to carry out the disposal.
- 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.

For temperature control units with transportation lock, strictly observe: → Page 25, section »Transportation lock«.

## 8.13 Disposal

The operating company must comply with national and local regulations for the disposal.

### CAUTION

**The coolant circuit is opened incorrectly**

#### RISK OF INJURY AND ENVIRONMENTAL DAMAGE

- Only commission approved specialized companies in the field of cooling and air-conditioning to carry out the disposal.
- Please strictly observe: → Page 17, section »Temperature control units with refrigerants«.

### NOTE

#### Improper disposal

#### ENVIRONMENTAL DAMAGE

- Immediately dispose of spilled or leaked heat transfer fluid in a professional manner.  
→ Page 19, section »Proper disposal«.
- Environmental damage must be avoided.
- Only commission approved specialized companies in the field of cooling and air-conditioning to carry out the disposal.
- Please strictly observe: → Page 17, section »Temperature control units with refrigerants«.

Huber temperature control units and Huber accessories are manufactured from 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. With proper recycling you actively contribute to the reduction of the CO<sub>2</sub> emissions during the manufacture of these materials.

## 8.14 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](http://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.

### 8.14.1 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](http://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

### 8.14.2 Telephone number: Sales

Telephone: +49-781-9603-123

### 8.14.3 Email address: Customer Support

Email: [support@huber-online.com](mailto:support@huber-online.com)

## 8.15 Clearance certificate

This certificate must be enclosed with the temperature control unit. → Page 92, section »**Decontamination before shipping**«.

## 9 Annex



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