

CC[®] Immersion Circulator

V1.3.0

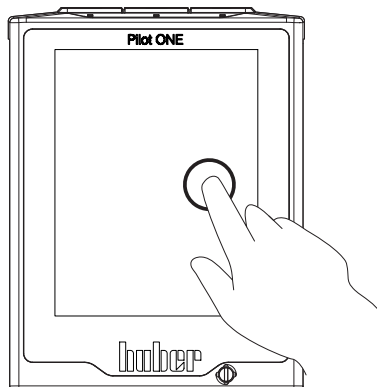
Operation Manual

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

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



OPERATION MANUAL



CC[®]
Immersion
Circulator

V1.3.0

CC[®] Immersion circulator

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

VALID FOR:

CC[®]-E (xd)

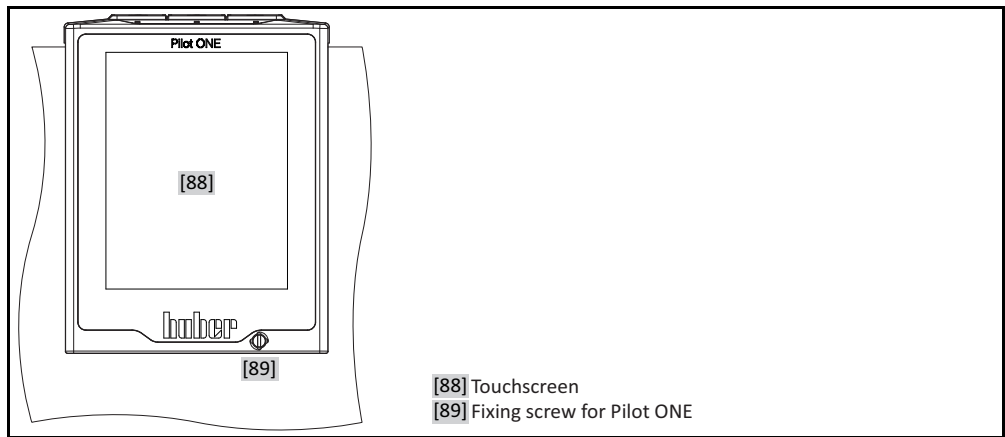
CC[®]-1xxA

CC[®]-130A Visco x

CC[®]-2xx(C/B/BX)

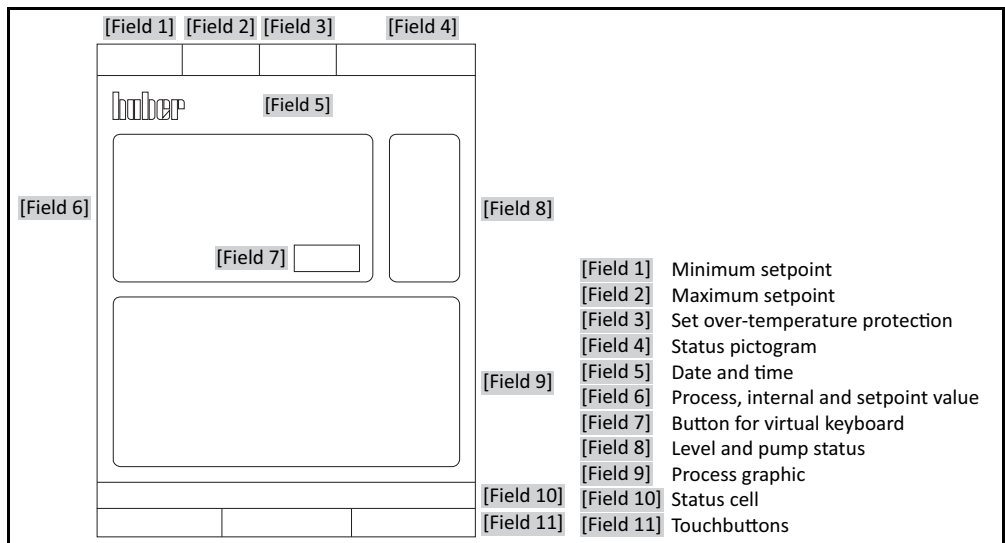
CC[®]-3xx(B/BX)

„Pilot ONE“



- [88] Touchscreen
- [89] Fixing screw for Pilot ONE

Layout of the “Home” screen



- [Field 1] Minimum setpoint
- [Field 2] Maximum setpoint
- [Field 3] Set over-temperature protection
- [Field 4] Status pictogram
- [Field 5] Date and time
- [Field 6] Process, internal and setpoint value
- [Field 7] Button for virtual keyboard
- [Field 8] Level and pump status
- [Field 9] Process graphic
- [Field 10] Status cell
- [Field 11] Touchbuttons

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Foreword

Dear customer,

You have opted for a temperature control unit from Peter Huber Kältemaschinenbau GmbH. You have made a good choice. Thank you for your confidence in our products.

Read through this operation manual carefully prior to start-up. Strictly follow all notes and safety instructions.

Proceed with transport, start-up, operation, maintenance, repairs, storage and disposal in accordance with this operation manual.

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

1 Introduction

1.1 Details on the declaration of conformity

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

- Machinery Directive 2006/42/EC
- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC

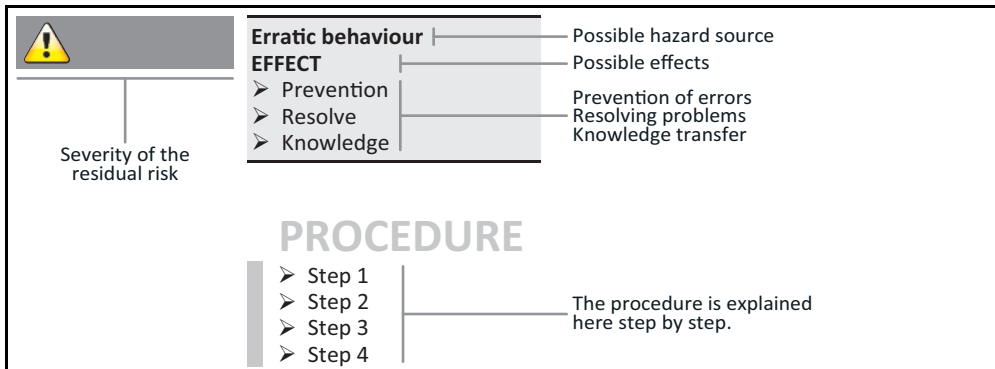
1.2 Safety

1.2.1 Symbols used for Safety Instructions

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

	HAZARD	Denotes an immediate hazardous situation that will result in death or serious injuries.
	WARNING	Denotes a general hazardous situation that may result in death or serious injuries.
	CAUTION	Denotes a hazardous situation that can result in injury.
NOTE		Denotes a situation that can result in property material damage.
INFORMATION		Denotes important notes and usable hints.
		Notes in conjunction with Ex p cabinets.

Safety information and procedure



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

1.2.2 Proper operation

HAZARD

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 operator's safety rules to protect life and limb and to limit damages!

NOTE

Modifications to the temperature control unit by third-parties

DAMAGE TO THE TEMPERATURE CONTROL UNIT

- Do not allow third parties to make technical modifications to the temperature control unit.
- In case of any modification of the temperature control unit not approved by the manufacturer, the CE declaration of conformity becomes invalid.
- Only specialists trained by the manufacturer may carry out modifications, repairs or maintenance work.
- **The following must be observed without fail:**
- Only use the temperature control unit in a fault-free condition!
- Have start-up and repairs carried out only by specialists!
- Do not ignore, bypass, dismantle or disconnect any safety devices!

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

The temperature control unit is manufactured for industrial use. The temperature control unit maintains the temperature of certain applications, including glass or metal reactors or other expedient items in laboratories and industry. Flow-through coolers and calibration baths must be used only in combination with Huber temperature control units. Thermal fluids suitable for the overall system are used. The chilling and heating capacity is provisioned at the pump connections or - where present - in the tempering bath. The technical specification of the temperature control unit is given in the data sheet (from page 69 in section »Annex«). The temperature control unit must be installed, configured and operated according to the handling instructions in this operating manual. Failure to comply with the operation manual is deemed improper use. The temperature control unit conforms to state-of-the-art technology and the recognized safety regulations. Safety devices are built into your temperature control unit.

1.2.3 Reasonably foreseeable misuse



Without an Ex p cabinet, the temperature control unit is **NOT** protected against explosion and must **NOT** be installed or put into operation within an ATEX Zone. When operating the temperature control unit in conjunction with an Ex p cabinet, the information in the annex (section ATEX operation) must be observed and followed. This annex is only provided for temperature control units delivered with an Ex p cabinet. If this annex is missing, please immediately contact the Customer Support of Peter Huber GmbH Kältemaschinenbau GmbH (the telephone number is provided on page 68 section »Phone number and company address«).

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

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

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

1.3 User and operators – Obligations and requirements

1.3.1 Obligations of the user

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.

1.3.2 Requirements for operators

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

1.3.3 Obligations of the operators

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

1.4 General information

1.4.1 Description of workstation

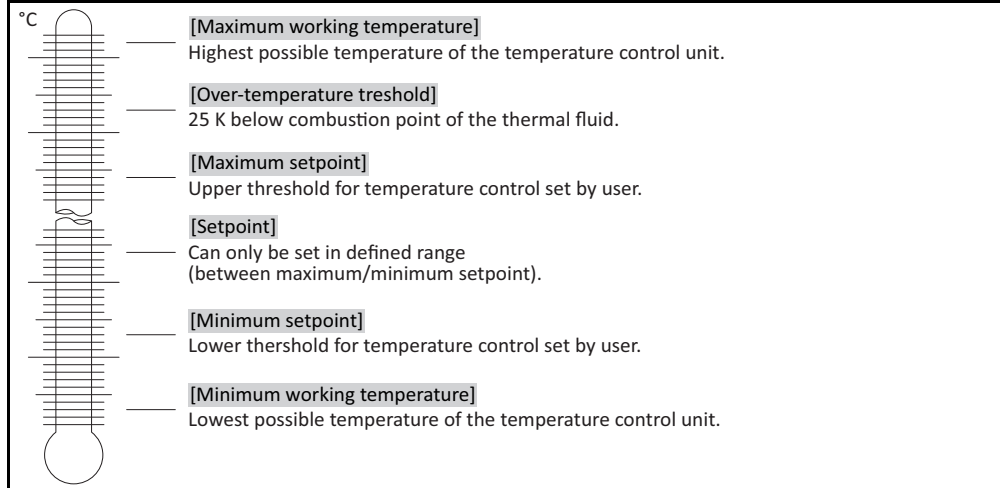
The workstation is located at the control panel in front of the temperature control unit. The workstation is determined by the customer's connected peripheries. Accordingly, it must be designed safe by the user. The workstation design also depends on the applicable requirements of the German occupational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

1.4.2 Safety devices to DIN 12876

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

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

Overview of the temperature thresholds



Combined electronic low level and overtemperature protection

Some temperature control units (device dependent) feature an electronic overtemperature and low-level protection. Instead of a mechanical float device, temperature sensors are employed on the surface of the heating coils. These sensors monitor overtemperature at this potential ignition source, thus ensuring that the controller regulates the heating coil temperatures regulates below the critical temperature (combustion point of the thermal fluid). This does not apply to Chillers where the level is capacitively determined). An appropriate message is output via the >Touchscreen< [88] (see figure »Pilot ONE« on page 6).

There is no longer a need for mechanical tools to set the trigger values of the overtemperature protection. It is replaced by a software engineering tool. The threshold value for the overtemperature protection can be set only if a code, randomly generated by "Pilot ONE", is entered correctly. As with the mechanical tool, accidental settings are thus prevented.

1.4.3 Further protective devices

INFORMATION

Emergency strategy – isolate the power supply!
Disconnect the temperature control unit from the power supply!

1.4.3.1 Power interruption

Following a power outage (or when switching on the temperature control unit), this function can be used to determine how the temperature control unit is supposed to respond. This response can be determined via "Pilot ONE".

OFF/Standby (Default setting)

After turning the temperature control unit on, thermoregulation is started only after manual input.

ON / Temperature control active

After turning on the temperature control unit, thermoregulation is always started. An INFO appears for a few seconds. This makes it possible to suppress the automatic start.

Power Failure Auto

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

1.4.3.2 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).

1.4.3.3 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.

2 Commissioning

2.1 In-plant transport

- Do not transport the temperature control unit alone and without aids.
- Protect the temperature control unit from transport damage.

2.2 Unpacking


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

- Do not operate a damaged temperature control unit.
- Please contact the Customer Support. The telephone number can be found on page 68, section »Phone number and company address«.

PROCEDURE

- Check for damage to the packaging. Damage can indicate property damage to the temperature control unit.
- Check for any transport damage when unpacking the temperature control unit.
- Always contact your forwarding agent regarding the settlement of claims.

2.3 Ambient conditions


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

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

INFORMATION

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

Free-standing model

For the connection data, see the data sheet (from page 69 in section »Annex«).

Use of the temperature control unit is permitted only under normal ambient conditions in accordance with DIN EN 61010-1:2001:

- Use only indoors.
- Installation elevation up to 2000 meters above sea level .
- Maintain wall and ceiling clearance for adequate air exchange (dissipation of waste heat, supply of fresh air for the temperature control unit and work area). Ensure adequate floor clearance for air-cooled temperature control units. Do not operate this temperature control unit from within the box or with an inadequately dimensioned bath. This inhibits the 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 prevent access to the isolator (to the power supply).
- Magnitude of the power supply fluctuations: see data sheet from page 69 in section »Annex«.
- Transient surges, as would normally occur in the power supply system
- Applicable degree of soiling: 2.
- Surge category II.

Wall clearance to temperature control unit

Clearance to the temperature control unit in cm	
Side of the temperature control unit	
[A2] Top	Can be located under a bench
[B] Left	min. 10
[C] Right	min. 10
[D] Front	min. 10
[E] Rear	min. 10
Clearance to the temperature control unit in cm (for operation in a bath)	
Side of the temperature control unit	
[A2] Top	Can be located under a bench
[B] Left	min. 20
[C] Right	min. 20
[D] Front	min. 20
[E] Rear	min. 20

2.4 Installation conditions



WARNING

**Temperature control unit is connected to the power supply line
DEATH FROM ELECTRICAL SHOCK BY DAMAGE TO THE POWER CABLE.**
➤ Do not put temperature control unit on power cable.

- 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!
- Transport upright.
- Install upright, stable and without tilt.
- Use a non-combustible, sealed subsurface.
- Keep environment clean: Prevent slip and trip hazards.
- If wheels are present, they must be locked after the installation!
- Drip catcher below the temperature control unit for condensation/thermal fluid.
- Spilled/leaked thermal fluid must be discarded immediately and correctly.
- The operator must check whether national regulations require the mandatory installation of a drain tray for the installation area of the temperature control unit/the entire system.
- Observe the floor load bearing capacity for large units.
- Observe the ambient conditions.

2.5 Recommended temperature control and cooling water hoses

CAUTION

Use of unsuitable/defective hoses and/or hose connections

INJURIES

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

CAUTION

Hot or cold thermal fluid and surfaces

BURNS TO LIMBS

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

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

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

2.6 Wrench sizes and torques

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

Overview wrench sizes and torques

Pump connection	Sleeve nut wrench size	Connector wrench size	Recommended torques in Nm	Maximum torques in Nm
M16x1	19 AF	17 AF	20	24
M24x1.5	27 AF	27 AF	47	56
M30x1.5	36 AF	32 AF	79	93
	36 AF	36 AF	79	93
M38x1.5	46 AF	46 AF	130	153

2.7 Temperature control units with cooler

Valid for CC heating circulators with >cooling coil< [29]

CAUTION

Steam or hot water escapes at the >cooling coil< [29]

SEVERE BURNS

- Do not use the >cooling coil< [29] at bath temperatures > 95 °C.
- Provide a greater flow rate through the >cooling coil< [29] at bath temperatures > 60 °C.

NOTE

No protection against corrosion

DAMAGE TO THE TEMPERATURE CONTROL UNIT

- The addition of anti-corrosion agents is mandatory if salts (chlorides, bromide) have been added to the water circuit.
- Ensure that the materials used in the cooling water circuit are resistant with respect to the cooling water. See the data sheet from page 69 in section »Annex« for information on the materials used.
- Take suitable measures to maintain the warranty conditions.
- For information about water quality, see www.huber-online.com.

INFORMATION

>Cooling coil< [29] scales at cooling water temperatures > 60 °C according to the water quality. Descale regularly and on time. Observe all legal and other requirements specified by your water supplier when connecting to the public water system.

To reach temperatures close to the ambient temperature a >cooling coil< [29] is required. In some types of temperature control units the >cooling coil < [29] is pre-assembled and for other types it is available as an accessory (see the wiring diagram on page 69 in section »Annex«).

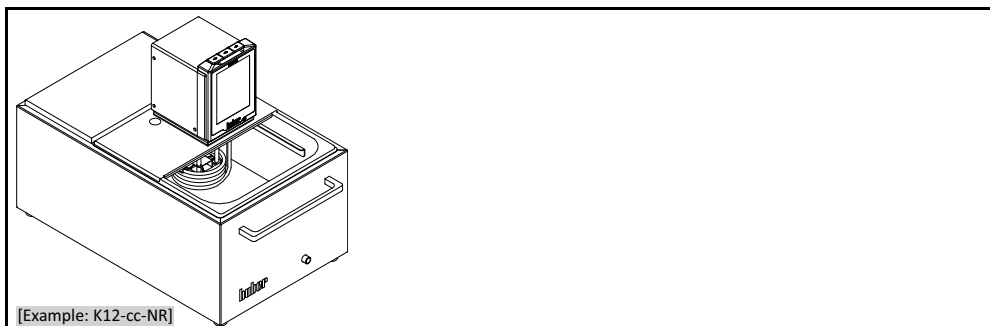
PROCEDURE

- Connect one of the connectors to your cooling water inlet and the other to your cooling water return flow (no preferred direction).
- Only use the >cooling coil< [29] at bath temperatures at less than 95 °C.
- Provide sufficient flow at high bath temperatures (between 60 °C and 95 °C) to prevent excessive scaling of the >cooling coil< [29] and the return line.
- Shut off the cooling water supply during heating. You will save energy and achieve shorter heating times.

2.8 Temperature control unit with batch

2.8.1 Operation as bath thermostat

Figure bath thermostat



Note the volume displacement caused by a sample (e.g. Erlenmeyer flask). Place your sample into the empty bath. Only then fill in a sufficient amount of temperature control medium. Also note that the level of the temperature control medium drops when you remove the sample. This may cause a safety shutdown (low level protection) during an enabled thermoregulation. Therefore, switch off the temperature control unit beforehand.

2.9 Preparations for operation

2.9.1 Externally closed and externally open applications

Using a pre-assembled pump adapter that is also available as an accessory, you can also control the temperature of an external application (e.g. reactor or open bath vessel). Externally open applications can run without interference only in conjunction with a DS level stabilizer (accessory). The DS level stabilizer compensates the differences in the pump (pressure capacity and throughput). If not already attached, please install the pump adapter. In an externally open application, please also install the DS level stabilizer on the externally open bath and observe on page 52 the section »Filling and venting the bath thermostat and the externally closed application« as well as the operation manual of the DS level stabilizer.

2.9.2 Opening/closing valves

Opening and closing valves



INFORMATION

Opening valves:

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

Close 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 Connecting externally closed application

The illustration "Wiring diagram" can be found on page 69 in section »Annex«.

2.10.1 Connecting an externally closed application

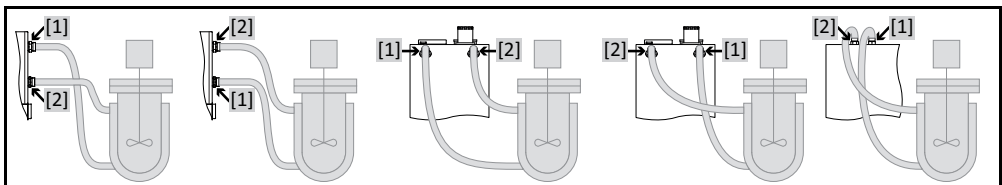
NOTE

Pressure > 0.5 bar (g) with glass apparatus

MATERIAL DAMAGE CAUSED BY CRACK FORMATION AT THE GLASS APPARATUS.

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

Example: Connecting an externally closed application



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

PROCEDURE

- Remove the screw plugs from the >Circulation flow< [1] and >Circulation return< [2] connections.
- Then connect your application to the temperature control unit using suitable thermal fluid hoses. The corresponding wrench sizes can be found in the table on page 20 in section »Wrench sizes and torques«.
- Check the connections for leaks.

2.11 Connecting to the power supply

INFORMATION

Based on local circumstances, it may be that you need to use an alternative power cable instead of the supplied original power cable. Do not use a power cable that is longer than **3 m** to be able to disconnect the temperature control unit at any time from the mains. Have the mains cable only replaced by a qualified electrician.

2.11.1 Connection using socket with protective earth (PE)

HAZARD

Connecting to a power socket without protective earth (PE)

MORTAL DANGER FROM ELECTRIC SHOCK

- Always connect the temperature control unit to safety sockets (PE).

HAZARD

Damaged power cable/power cable connection

MORTAL DANGER FROM ELECTRIC SHOCK

- Do not start up the temperature control unit.
- Isolate the temperature control unit from the power supply.
- Have the power supply cable/power supply connection replaced and inspected by an electrician.
- Do not use a power cable that is longer than **3 m**.

NOTE

Incorrect power supply connection

DAMAGE TO THE TEMPERATURE CONTROL UNIT

- Your building's existing power supply voltage and frequency must match the data provided on the rating plate of the temperature control unit.

INFORMATION

In case of uncertainties about an existing protective earth (PE), have the connection inspected by an electrician.

2.11.2 Connection via direct wiring

HAZARD

Connection/adjustment to the power supply not carried out by an electrician

MORTAL DANGER FROM ELECTRIC SHOCK

- Have the connection/adjustment to the power supply carried out by an electrician.

HAZARD

Damaged power cable/power cable connection

MORTAL DANGER FROM ELECTRIC SHOCK

- Do not start up the temperature control unit.
- Isolate the temperature control unit from the power supply.
- Have the power supply cable/power supply connection replaced and inspected by an electrician.
- Do not use a power cable that is longer than **3 m**.

NOTE

Incorrect power supply connection

DAMAGE TO THE TEMPERATURE CONTROL UNIT

- Your building's existing power supply voltage and frequency must match the data provided on the rating plate of the temperature control unit.

3 Function description

3.1 Function description of the temperature control unit

3.1.1 General functions

The **CC heating circulators** are **temperature control units** ideally suited for the thermoregulation of baths. This **controller generation** is characterized by the fact that there is only a **single hardware**. For a license fee you will receive an **activation key**, which allows you to quickly expand the functionality of e.g. a simple temperature control unit (basic version) to its **maximum functionality** (professional version) at any time.

Due to the powerful **heat technology**, **short heating times** can be achieved.

3.1.2 Other functions

Due to the **speed-controlled pressure and suction pump**, the mixing of the thermal fluid can be optimally adapted to a given task.

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

Depending on the configuration level both analog and digital interfaces, programmer and a Pt100 connection are available.

Your temperature control unit can be easily integrated into many laboratory automation systems. This is provided for by the existing **standard interfaces Ethernet, USB device and USB host at the "Pilot ONE"**. The optional Com.G@te allows you to expand your temperature control unit by **digital interfaces (RS232 and RS485), an analogue current loop interface (0/4 - 20 mA or 0 - 10 V) and various digital control options (In/Out)**.

The **removable operating panel ("Pilot ONE")** can also be used as a **remote control**. If you require a cable extension, please contact your dealer or the Sales Department at Peter Huber Kältemaschinenbau GmbH. The telephone number for Huber Sales can be found on page 68 in section »**Phone number and company address**«.

A **Pt100 connection** enables you to accomplish **external temperature control tasks** with ease (requires E-grade Exclusiv or Professional).

The temperature control unit can be retrofitted with an **integrated temperature ramp function** and an **internal temperature programmer** via an "E-grade" upgrade. The "E-grade" upgrade "**Exclusiv**" enables you to set and call 3 temperature control programs with 5 program steps each by using the integrated programmer. The "E-grade" upgrade "**Professional**" enables you to set and call 10 temperature control programs with a total of 100 program steps by using the integrated programmer.

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

3.2 Information on the thermal fluids

CAUTION

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

INJURIES

- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the thermal fluid to be used must be read prior to use and its contents respected.
- Observe the local regulations/work instructions.
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear).
- Danger of slipping through contamination of floor and work area.

NOTE

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

PROPERTY DAMAGE

- Water with a temperature below 0 °C and without an anti-freeze must not be used as a thermal fluid (risk of freezing and potential destruction of the evaporator).
- Observe the rating of your temperature control unit in accordance with DIN 12876.
- Ensure the following materials are resistant with respect to the thermofluid: Stainless steel 1.4301/ 1.4401 (V2A), copper, nickel, FKM, red bronze/brass, silver solder and plastic.
- The maximum viscosity of the thermal fluid must not exceed 50 mm²/s at the lowest working temperature!
- The maximum density of the thermal fluid may not exceed 1 kg/dm³!

INFORMATION

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

Thermal fluid product name/product key

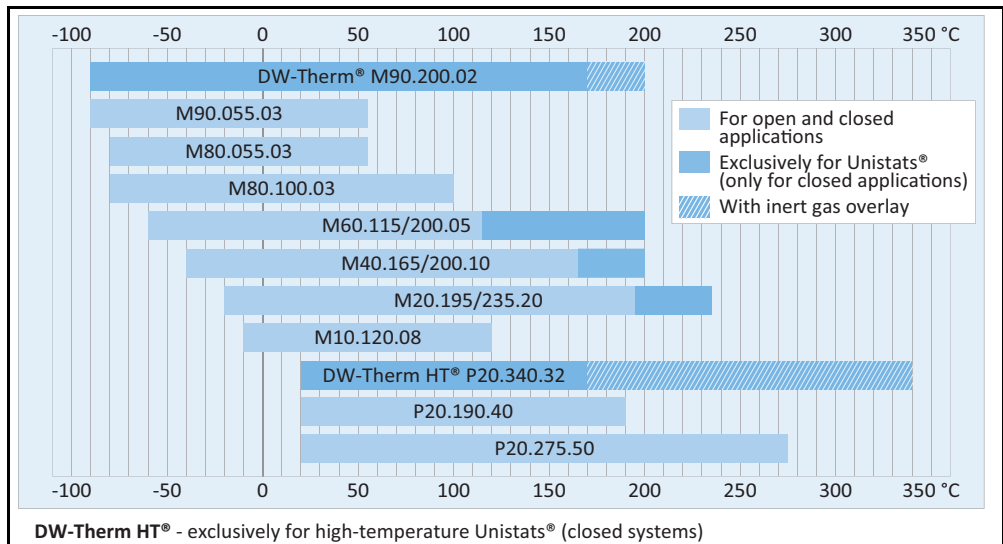
Thermal fluid product designation/key:

- P = plus/M = minus
- Lowest temperature threshold of the working range
- Uppermost temperature threshold of the working range
- Viscosity at 25 °C

P 20.340.32 = temperature range: +20 ... +340 °C, viscosity at 25 °C: 32 mm²/s

M80.100.03 = temperature range: -80 ... +100 °C, viscosity at 25 °C: 3 mm²/s

Overview: Working temperature ranges of Huber thermal fluids



3.3 To be noted when planning the test

INFORMATION

Also observe page 14 in section »Proper operation«.

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

- Make sure that the electrical connection is adequately dimensioned.
- The installation location of the temperature control unit should be selected so as to ensure adequate fresh air, even with water-cooled chillers.
- The thermal fluid used by you must be chosen in such a way that it not only allows the minimum and maximum working temperature but is also suitable as regards the combustion point, boiling point and viscosity. In addition, the thermal fluid must be compatible with all the materials in your system.
- Basically, you should only use the thermal fluids recommended by the manufacturer and only within the usable temperature and pressure range.
- With temperature control close to the boiling temperature of the thermal fluid, the application should be roughly at the same height or below the temperature control unit.
- Fill the temperature control unit slowly, carefully and evenly. Wear the necessary personal protective equipment, such as goggles, heat-proof and chemicals-resistant gloves, etc.

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 69 onward in the Section »Annex«.

3.4 “Pilot ONE®” controller

Figure »“Pilot ONE”« is shown on page 6.

The basic version of the “Pilot ONE” (Basic) can be upgraded in two stages (from Basic to Exklusiv and from Exklusiv to Professional or from Exklusiv to Professional with DV-E-grade).

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 Basic	E-grade Exclusive	E-grade Professional
Brewing thermostats	✘	●	○
Unistat temperature control units	✘	✘	●
UniCAL	✘	✘	●
Other temperature control units	●	○	○
● = Standard equipment, ○ = Optional, ✘ = Not possible			

Overview of E-grade functions

	Function	E-grade Basic	E-grade Exclusive	E-grade Professional
Temperature control	Controller parameterization	predefined ¹	TAC (True Adaptive Control)	TAC (True Adaptive Control)
	Sensor calibration for control sensor (internal Pt100, external Pt100 and return flow sensor)	2-point	5-point	5-point
	Monitoring (low level, overtemperature ²)	●	●	●
	Adjustable alarm thresholds	●	●	●
	VPC (Variable Pressure Control) ³	●	●	●
	Ventilation program	●	●	●
	Automated compressor	●	●	●
	Setpoint limiting	●	●	●
	Programmer	×	3 programs à 5 steps (up to 15 steps)	10 programs à 10 steps (up to 100 steps)
	Ramp function	×	linear	linear, non-linear
	Temperature control mode (internal, process)	×	●	●
	Maximum heating/cooling capacity adjustable	×	●	●
Display & operation	Temperature display	5.7" Touchscreen	5.7" Touchscreen	5.7" Touchscreen
	Display mode	graphical, numerical	graphical, numerical	graphical, numerical
	Display resolution	0.1 °C	0.1 °C / 0.01 °C	0.1 °C / 0.01 °C
	Graphic display for temperature curves	Window, full screen, scalable	Window, full screen, scalable	Window, full screen, scalable
	Calendar, date, time	●	●	●
	Language: de, en, fr, it, es, pt, cs, pl, ru, zh, ja	●	●	●
	Temperature format switchable (°C/ °F/K)	●	●	●
	Display mode (screen) can be switched by swiping	●	●	●
	Favourites menu	●	●	●
	User menu (Administrator Level)	×	×	●
	2. Setpoint	×	×	●

¹ TAC function available as a 30 day evaluation version.

² For temperature control units with integrated overtemperature protection.

³ For units with variable-speed pump or external bypass.

Function		E-grade Basic	E-grade Exclusive	E-grade Professional
Connections	Digital interface RS232	●	●	●
	USB interfaces (Host and Device)	●	●	●
	Ethernet RJ45 interface	●	●	●
	Pt100 external sensor connection	●	●	●
	External control signal / ECS STANDBY ¹	●	●	●
	Programmable floating contact / ALARM ²	●	●	●
	AIF (Analog Interface) 0/4-20 mA or 0-10 V ³	●	●	●
	Digital interface RS485 ⁴	●	●	●
Comfort & other	Visual / audible alarm signal	●	●	●
	Autostart (Power Failure Auto)	●	●	●
	Plug & Play technology	●	●	●
	Technology glossary	●	●	●
	Remote control / data visualization via Spy software	●	●	●
	E-grade evaluation versions available (valid for 30 days)	●	●	●
	Storage/loading temperature control programs onto USB stick	●	●	●
	Service data recorders (flight recorder)	●	●	●
	Process data recording directly to a USB stick: - Setpoint, actual value internally, actual value process - heating capacity %, cooling capacity %, pump pressure, pump speed, VPC pressure	× × ×	● ● ×	● ● ●
	Calendar start	×	×	●

3.5 Clock/event function

3.5.1 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, contact Customer Support. The telephone number can be found on page 68 in section »**Phone number and company address**«.

¹ Standard on Unistats, otherwise via optional Com.G@te or POKO/ECS interface.

² Standard on Unistats, otherwise via optional Com.G@te or POKO/ECS interface.

³ Via optional Com.G@te.

⁴ Via optional Com.G@te.

3.5.2 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:

3.5.2.1 Event function “Alarm clock event”

Several acoustic signals are used.

3.5.2.2 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.

3.6 Operation via the touch screen

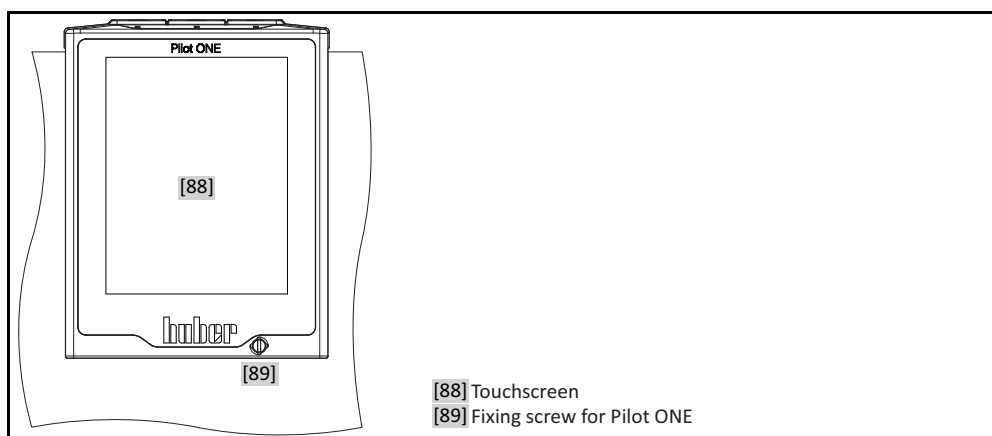
The entire operation is via the >Touchscreen< [88]. These functions can be activated by tapping the displayed text boxes/icons once. This also changes the display.

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.

3.7 Display instruments

Display instruments



The following meters are available:

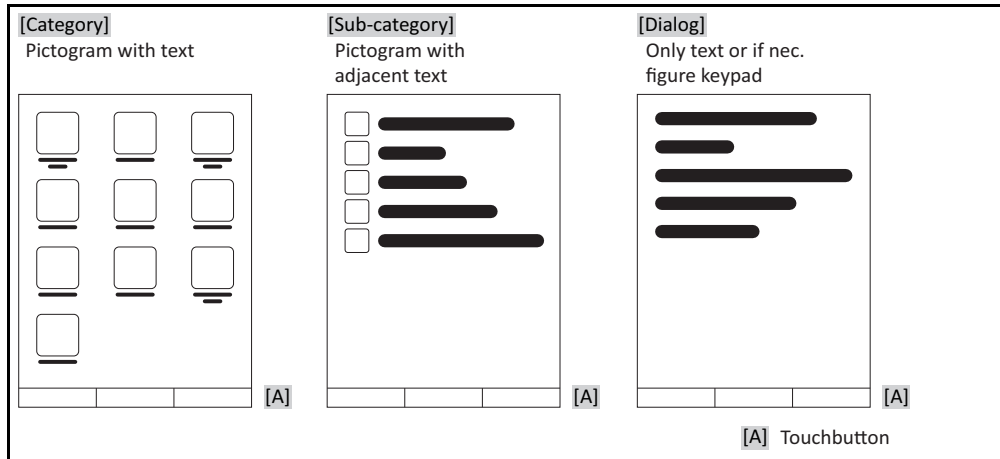
- >Touchscreen< [88]

3.7.1 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 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.

3.8.1 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.

3.8.2 The categories

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

3.8.3 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.

3.8.4 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.

3.9 Function examples

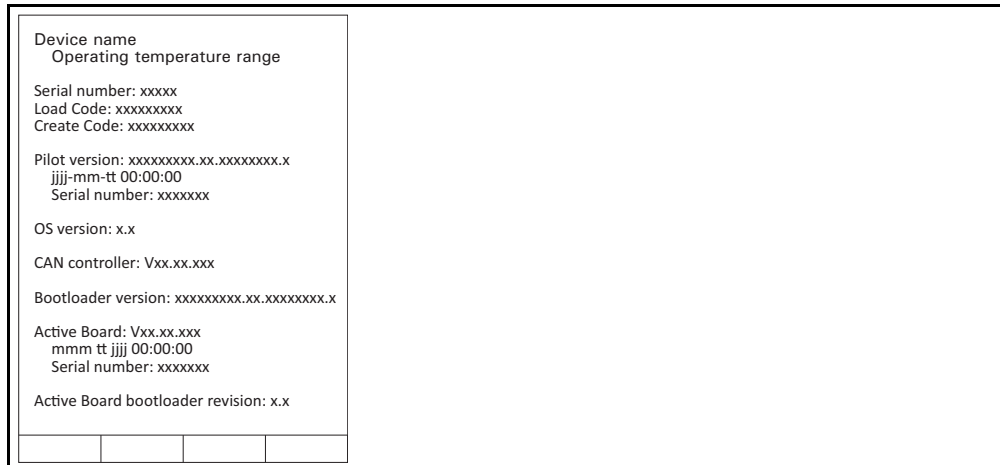
3.9.1 Display of software version

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



- 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.

3.9.2 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.

3.9.3 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, thermal fluid used, cut-out value etc.) again.

● = value is reset ○ = value is not reset

Description	Standard value	All together	Unit Control Data without OT	Unit Control Data	Programmer	Menu	Control parameter	Com.G@te	Your setting
Acoustics	On	●	●	●	○	○	○	○	
Display functions									
- Warnings	Manual acknowledge	●	●	●	○	○	○	○	
- Messages	Manual acknowledge	●	●	●	○	○	○	○	
- Inactive menu options	Show	●	●	●	○	○	○	○	
- Resolution Temperature	0.01 K (with CC "Basic": 0.1 K)	●	●	●	○	○	○	○	
Display modes	Unistat: Graphics; CC: Normal	●	●	●	○	○	○	○	
AutoStart response	Off/Standby	●	●	●	○	○	○	○	
Limits									
- Delta T limit	100 K	●	●	●	○	○	○	○	
- Max. heating variable	100 %	●	●	●	○	○	○	○	
- Max. cooling variable	100 %	●	●	●	○	○	○	○	
- Max. permissible power draw (230 V machines)	Not defined (is queried at the start of Pilot ONE)	●	●	●	○	○	○	○	
Com.G@te (only if Com.G@te is connected)									
- Analogue interface									
Config. input									
- Meaning AIF input	Input off	●	●	●	○	○	○	●	
- Response on cable break	Trigger alarm	●	●	●	○	○	○	●	
- Setting measurement range	-40 °C ... 100 °C	●	●	●	○	○	○	●	
- Calibration	No calibration	○	○	○	○	○	○	●	
- On error, analogue	Cut-out	●	●	●	○	○	○	●	
- Current/voltage switchover	Current	●	●	●	○	○	○	●	
- Filter constants	2	●	●	●	○	○	○	●	
Config. output									
- AIF output variable	No output	●	●	●	○	○	○	●	

Description	Standard value	All together	Unit Control Data without OT	Unit Control Data	Programmer	Menu	Control parameter	Com.G@te	Your setting
- Setting output range	-40 °C ... 100 °C	●	●	●	○	○	○	●	
- Calibration	No calibration	○	○	○	○	○	○	●	
- RS232/RS485									
Hardware RS	RS232	●	●	●	○	○	○	○	
Baud rate	9,600 Baud	●	●	●	○	○	○	○	
Device address	1	●	●	●	○	○	○	○	
- ECS Standby	No impact	●	●	●	○	○	○	○	
- POKO alarm	Off	●	●	●	○	○	○	○	
Attributes (other)									
- Change thermal fluid									
Thermal fluid	No data	●	●	●	○	○	○	○	
No. of liters	0	●	●	●	○	○	○	○	
Use of bypass	No	●	●	●	○	○	○	○	
- Chilling bath/cooling (CC-E only)	None	●	●	●	○	○	○	○	
Sensor calibration									
Automated compressor									
Automated compressor	Permanently on	●	●	●	○	○	○	○	
Enter program									
Enter program	No program present	●	●	○	●	○	○	○	
Pump settings									
- Setpoint pump speed									
- Setpoint pump speed	Unistat: max. speed 3,500 l/min. CC: 2,500 l/min.	●	●	●	○	○	○	○	
- Setpoint pump pressure	500 mbar	●	●	●	○	○	○	○	
- Control mode	Speed control	●	●	●	○	○	○	○	
Controller parameterization									
- Select auto/manual									
- Select auto/manual	Automatic control parameters	○	○	○	○	○	●	○	
- Configuration auto									
Control dynamics	Fast, small overshoot	○	○	○	○	○	●	○	
Controller parameter	Dependent on Sim-File, no general values	○	○	○	○	○	●	○	
Fluid attributes									
- Thermal fluid									
- Thermal fluid	No data	●	●	●	○	○	○	○	
- No. of liters	0	●	●	●	○	○	○	○	
- Use of bypass	No	○	○	○	○	○	●	○	
- Configuration manual parameters									
Change control parameters									
- Internal KP	200	○	○	○	○	○	●	○	

Description	Standard value	All together	Unit Control Data without OT	Unit Control Data	Programmer	Menu	Control parameter	Com.G@te	Your setting
- Internal TN	100	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
- Internal TV	0	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
- Cascade jacket control KP	200	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
- Cascade process control KP	4.31	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
- Cascade process control TN	231.7	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
- Cascade process control TV	-13.46	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
(Service function for switching from RidR to standard structure)	Off	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	
Safety function									
- Upper alarm threshold, internal	Max. working temperature + 20 K	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
- Lower alarm limit, internal	Min. working temperature – 20 K	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
- Upper alarm threshold, process	Max. working temperature + 20 K	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
- Lower alarm threshold, process	Min. working temperature – 20 K	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
- Hydrostatic correction	1,000 mbar	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
- Warning time limit (CC-E only)	30 min	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
- Min. level (for devices with analogue level sensor)	0 %	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
- Max. level (for devices with analogue level sensor)	100 %	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
- Freeze protection	Off	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Setpoint	20 °C	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Setpoint limiting									
- Minimum Setpoint	5 °C	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
- Max. setpoint	35 °C	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Language	Undefined	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Temperature format	°C	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Temperature control mode	Internal	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Favourites menu	No user menus available	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Pilot ONE Ethernet									
- IP address	0.0.0.0	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
- Subnet mask	255.255.255.0	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
- Remote Access	Deactivated	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
Time format	Minutes	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	
2. Setpoint	5 °C	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	

3.9.3.1 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”.
- Choose between the dialog entries “Unit Control Data without OT”, “Menu”, “Programmer” and “Com.G@te”. These entries do **not** restore 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. The message “Restart system!” appears on the >Touchscreen< [88].
- Switch the temperature control unit off. The selected control data have been reset.

3.9.3.2 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 thermal fluid used. To reset the cut-out values of the overtemperature protection to the factory setting from within the controller of Pilot ONE, enter for “Heater” 35 °C and for the expansion vessel 45 °C. “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)”.
- Confirm your choice by tapping on “OK”.
- 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 format set by you in the controller (green text).
- Enter the displayed red safety code using the numeric keypad that appears.
- Enter the value 35 °C for the “Heating OT value” using the numeric keypad that appears.
- Confirm your entry by tapping on “OK”.
- Read the message and confirm by tapping on “OK”.
- Read the safety warning and confirm by tapping on “OK”.
- Tap on the temperature format set by you in the controller (green text).
- Enter the displayed red safety code using the numeric keypad that appears.
- Enter the value 45 °C for the “Exp. vessel OT value” using the numeric keypad that appears.
- Confirm your entry by tapping on “OK”. 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 THERMAL FLUID

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

4.1.1 Turning on the temperature control unit

PROCEDURE

- Switch on the temperature control unit using the **>mains switch<** [37]. First, a system test is conducted to test the full functionality of the temperature control unit. All sensors, the all pole breaking power disconnect relay for the power supply 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 contact Customer Support (the phone number can be found on page 68 in section **»Phone number and company address«**).

INFORMATION

The following data entry is required only for:

- a) initial startup
- b) resetting the temperature control unit to the factory settings (see page 32, section **»Restore factory settings«**).

- After switching on the temperature control unit, tap on the required system language.
- Confirm your choice by tapping on "OK".
- Tap on the thermal fluid used.
- Confirm your choice by tapping on "OK".
- Read the message and confirm by tapping on "OK".
- Enter the volume using the number keypad that appears.
- Confirm your entry by tapping on "OK".
- Tap on the cooling bath used. This selection list is displayed only when the Pilot ONE was connected to a cooling bath.
- Confirm your choice by tapping on "OK".

INFORMATION

If your temperature control unit is not integrated into a network, confirm the preset IP address (0.0.0.0) by tapping on "OK". This skips the network settings.

- Enter the required IP address using the number keypad that appears.
- Confirm your entry by tapping on "OK".
- Enter the required Subnet Mask using the number keypad that appears.
- Confirm your entry by tapping on "OK".
- Tap on the required remote control mode.
- Confirm your choice by tapping on "OK".

4.1.2 Setting the overtemperature protection



The overtemperature protection is not correctly set to the thermal fluid used

MORTAL DANGER FROM FIRE

- The overtemperature protection must be correctly set to the thermal fluid you are using.
- Always observe the safety data sheet for the thermal fluid.
- Different working temperature ranges may apply for open and closed systems.
- **For Huber thermal fluids:**
- For Huber thermal 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 thermal fluid.
- **For thermal fluids of other manufacturers:**
- Set the cut-out value of the overtemperature protection at least 25 K **below the combustion point** of the thermal fluid.

INFORMATION

The maximum settable cut-out value of the OT corresponds, for HUBER thermal fluids, to the specified upper working temperature of the thermal fluid. The usable working temperature range may be less, if the overtemperature protection is correctly set. When controlling the temperature at the upper working temperature limit, the OT may be triggered due to tolerances.

4.1.2.1 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 thermal 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. If the temperature of the just filled thermal fluid is higher than the set cut-out value of the overtemperature protection, an alarm is triggered by the temperature control unit shortly after turning on the power. Set the overtemperature protection to the thermal fluid you are using.

When setting a new cut-out value for the overtemperature protection, you will be prompted to enter a randomly generated and displayed code via the numeric keypad displayed. Only after successful entry will you be able to change the cut-out value.

4.1.2.2 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".
- Confirm your choice by tapping on "OK".
- Tap on the temperature format set by you in the controller (green text).
- Enter the displayed red safety code using the numeric keypad that appears.
- Enter the value for the "Heating OT value" using the numeric keypad that appears. This value must be 25 K below the combustion point of the thermal fluid you are using.
- Confirm your entry by tapping on "OK".

4.1.2.3 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 heater 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 make sure that the automated compressor is set to **Permanently ON** ([System Settings] > [Power/ECO Settings] > [Compressor ON/OFF/AUTO] > [Permanently 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".
- Confirm your choice by tapping on "OK".

4.1.2.4 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.

4.1.3 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 thermal 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 thermal 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.

4.1.4 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) occurs 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 setpoint. However, damage could result if the temperature difference limits are exceeded (bursting of the application e.g.glass apparatus). This difference in temperature may have to be restricted depending on the application (glass apparatus).

4.1.4.1 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

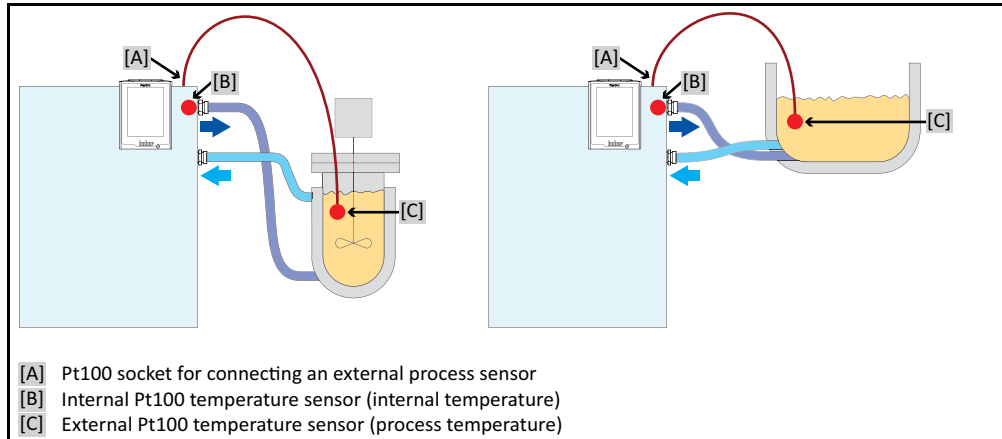
Every temperature control unit with a Pilot ONE control panel has its own PID controller for internal and process temperature control. For many temperature control tasks it is sufficient to use the factory-set control parameter. Our years of experience and current developments in control technology are 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. For more information, see the pages from 57, 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

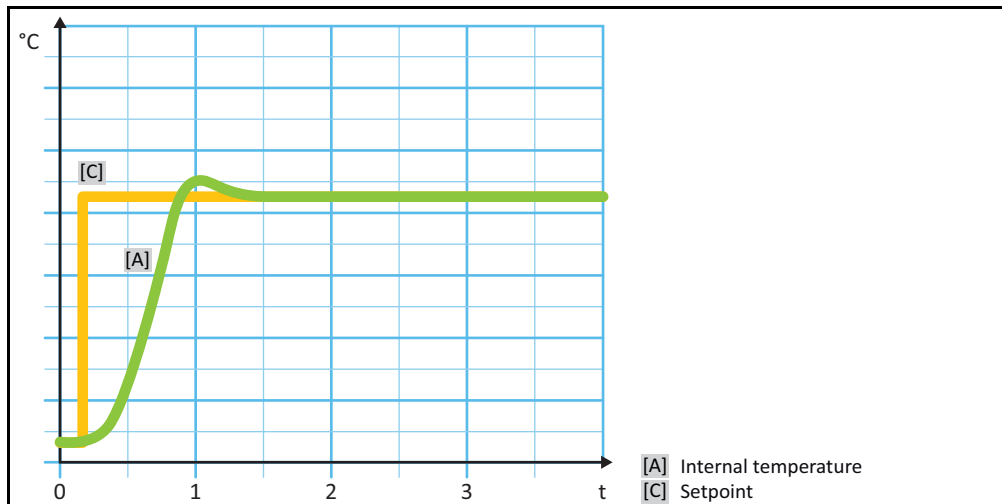
PROCEDURE

- 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 thermal 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.

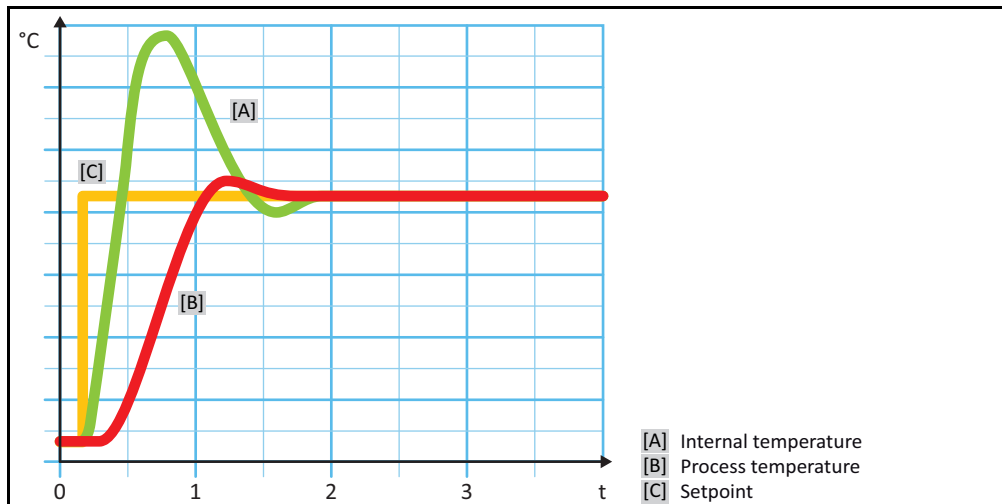
NOTE

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 Exklusiv)
- With Preliminary Test (Unistat from E-Grade Exklusiv)

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"

In relation to the little effort, the "Fast Identification" of the control process provides you with very quick and reliable adapted control parameters. These control parameters achieve a fast and very accurate tuning performance. Only in very rare cases require Unistats the more complex but also more precise identification "With Preliminary Test".

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 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 thermal 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: "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. Here, you can modify an existing control parameter set by entering the thermal fluid used and the quantity of thermal fluid. This version is available with bath thermostats without connected external application.

INFORMATION

All the necessary technical data for the thermal fluids listed for Pilot ONE are stored in the controller. If the thermal fluid that you use is not shown in the list, choose the most similar thermal fluid with regard to temperature range and viscosity. Further information about this is provided on page 25 in the Section »**Information on the thermal 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 thermal 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.

4.2.8.1.3 Dialog entry: "With Preliminary Test" (only with Unistat)

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. Further information on this is provided on page 25 in the 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 thermal 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".

4.2.8.2 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".

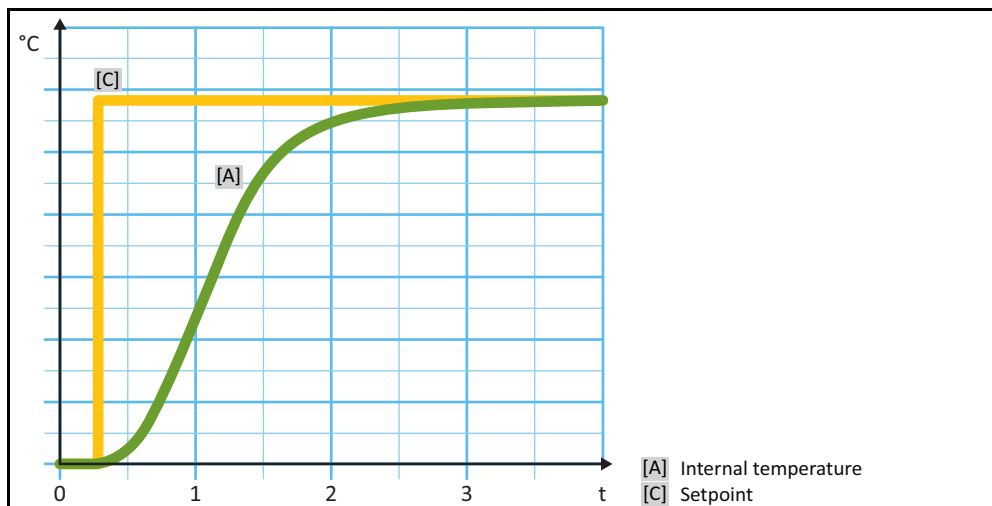
The overshoot always refers to the leading temperature. Example: The process temperature, if activated, is the leading temperature. In contrast, the bath or flow temperature must always be leading the process temperature. In order to achieve the best possible energy transfer, the greatest possible temperature difference between the bath or flow temperature and the process temperature is necessary (see figure "»Representation of an optimum process temperature control«" from page 41 in section »Temperature control to process temperature«). This always requires the maximum possible thermal fluid flow rate. In the setting "Faster, small overshoot", the combination of high thermal fluid flow rate and the superbly designed control electronics hardly ever results in an overshoot of the process temperature, while reaching the setpoint as quickly as possible. The opposite to the mode "Faster, small overshoot" is available in the setting "Without overshoot". The target temperature is approached more cautiously and thus aperiodic. It takes longer to adjust to the selected setpoint. The statement "without overshooting" is only valid with little external distur-

balance influence. Please note the specifications on page 25 in section »To be noted when planning the test«.

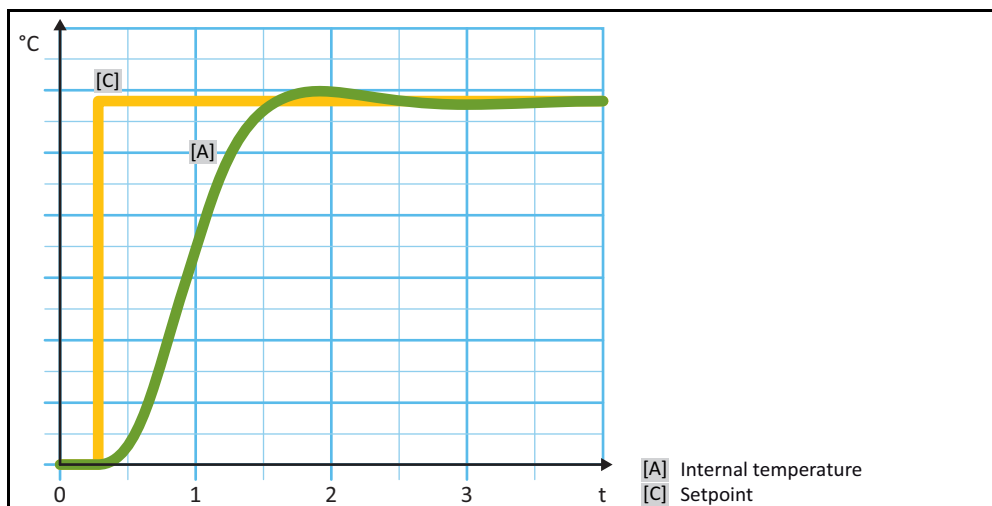
INFORMATION

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 thermal 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 thermal 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 thermal 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: "VPC/Bypass"

Under this entry, you can specify whether you use a bypass or not.

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 "VPC/Bypass".
- Choose between the dialog entries "Bypass used" and "Bypass not used".
- Confirm your choice by tapping on "OK".

4.2.8.3.4 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 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 used by the service engineers of Peter Huber Kältemaschinenbau GmbH exclusively 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 Freeze protection for temperature control unit

NOTE

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

PROPERTY DAMAGE

- Water with a temperature below 0 °C and without an anti-freeze must not be used as a thermal fluid (risk of freezing and potential destruction of the evaporator).
- Observe the rating of your temperature control unit in accordance with DIN 12876.
- Ensure the following materials are resistant with respect to the thermofluid: Stainless steel 1.4301/ 1.4401 (V2A), copper, nickel, FKM, red bronze/brass, silver solder and plastic.
- The maximum viscosity of the thermal fluid must not exceed 50 mm²/s at the lowest working temperature!
- The maximum density of the thermal fluid may not exceed 1 kg/dm³!

NOTE

Operation without freeze protection activated

COMPLETE DESTRUCTION OF THE TEMPERATURE CONTROL UNIT

- When using water as a thermal fluid, freeze protection must be activated in the category “protective devices”.

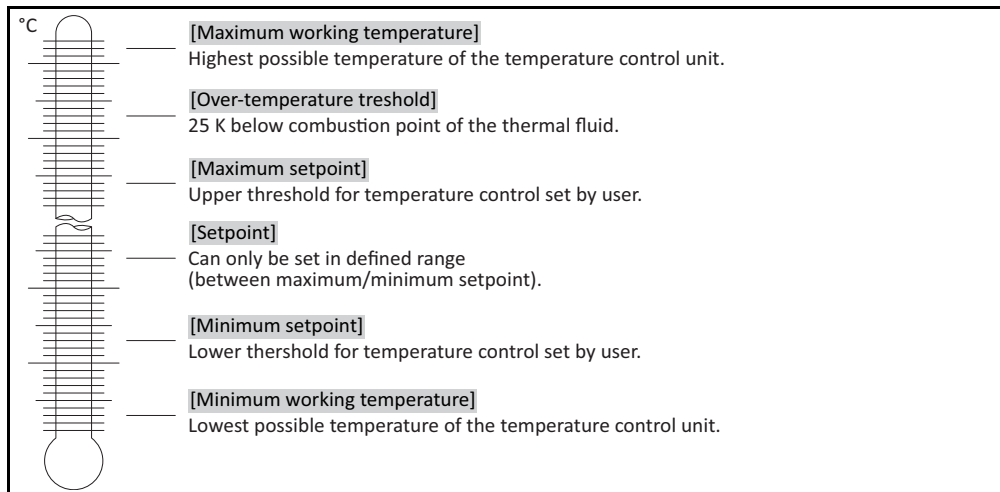
Temperature control units with freeze protection option can use water as the only thermal fluid. Possible danger: Freezing of the heat exchanger at < 5 °C. An ice crystal (green flashing) indicates the activation of the freeze protection on the touch display. To find out whether your temperature control unit is equipped with a freeze protection, refer to the datasheet from page 69 in section »Annex«.

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 setpoints serve for the safety of your system. They should be set for the application field of the thermal fluid before starting the first temperature control and when changing the thermal fluid. The maximum setpoint limit limits the setpoint setting for the bath or flow temperature. The minimum setpoint limit protects against high viscosity or freezing at low temperatures. Setpoint settings are only available in the temperature range between the minimum and maximum setpoint limit.

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 thermal fluid.

4.2.14 Setting the setpoint

PROCEDURE

- Go to the “Home” screen.
- Tap on the keypad symbol next to “T_{Setpoint}”.
- 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.
- 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 setpoint will be changed 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 changing the setpoint again.

4.3 Filling, venting, degassing and draining

The illustration “Wiring diagram” can be found on page 69 in section »Annex«.

4.3.1 Filling, venting, degassing and draining the bath thermostat

CAUTION

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

- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the thermal fluid to be used must be read prior to use and its contents respected.
- Observe the local regulations/work instructions.
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear).
- Danger of slipping through contamination of floor and work area.

4.3.1.1 Filling and venting the bath thermostat and the externally closed application

PROCEDURE

- Lift the >bath cover< [93] from the temperature control unit.
- Carefully pour suitable thermal fluid (see page 25 in section »Information on the thermal fluids«) using the filling accessories (funnel and/or beaker). During the fill process, ensure any necessary measures, such as earthing the tanks, funnels and other aids, have been taken. The thermal fluid can flow via the hose connection to the external application.
- Switch on the temperature control unit using the >mains switch< [37].
- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "Start/Stop".
- Tap on the Dialog entry "Start air-purge".
- Confirm your choice by tapping on "OK".
- Using the numeric keypad that appears, enter the time interval for venting. The default is 0.5 minutes.
- Confirm your entry by tapping on "OK" to start the filling process. The filling process is complete when the bath vessel is filled sufficiently. For temperature control units with heater, each heating coil of the heater must be below the thermal fluid level. This corresponds to the minimum level in the bath/minimal filling. There must be no air bubbles left in the external application (e.g. double jacket). The control electronics monitors the fill quantity and displays the level on the graphic display.
- Run the "venting program" for a few minutes. This ensures that trapped air bubbles can escape. These bubbles would result in a safety shutdown during an actual thermoregulation.
- Stop venting. To do this, go to the category "Temperature Control".
- Tap on the category "Start/Stop".
- Tap on the dialog entry "Stop air-purge".
- Confirm your choice by tapping on "OK". Venting is stopped and the pump continues to run for approx. 30 seconds. Wait until the pump stops.
- Put the >bath cover< [93] back onto the bath opening.

INFORMATION

The volume expansion of the thermal fluid depends on the working temperature range you wish to work in. Do not go below the minimum bath level/minimal level when working at the "lowest" working temperature and there should be no overflow from the expansion vessel/temperature control unit when working at the "highest" working temperature. In case of overfilling, drain the excess amount of thermal fluid (see page 54, section »Draining the bath thermostat«).

- In case of overfilling, drain thermal fluid via the >Drain< [8] into a suitable container (see page 54, section »Draining the bath thermostat«).

INFORMATION

Venting and degassing must be performed especially during commissioning and after changing the thermal fluid. This is the only way to ensure trouble-free operation. After venting is completed, follow the steps on page 53 in section »Degassing of bath thermostat«

4.3.1.2 Degassing of bath thermostat

 CAUTION**Hot or cold thermal fluid and surfaces****BURNS TO LIMBS**

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

INFORMATION

When changing from low-boiling thermal fluid (low-boiling components) to higher boiling thermal 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 bath opening and can escape.

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

Thermal fluids are more or less hygroscopic (water-attracting). This effect increases, the lower the working temperature. The de-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 the temperature control unit in accordance with the instructions on page 52 in section »Filling and venting the bath thermostat and the externally closed application« and/or cleaned it as per page 62 in section »Cleaning the thermal fluid circuit«.
- Go to the "Home" screen.
- Tap on the keypad symbol next to " T_{Setpoint} ".
- Enter a setpoint using the number keypad that appears. This setpoint must be below the lower boiling thermal fluid. This setpoint will be increased in 10 K steps during the degassing process up to the maximum working temperature.
- 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 setpoint will be changed immediately. If tapping on "OK" is not correct, this is displayed graphically for 2 seconds. Then the display will return to the "Home" screen again. 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, this is displayed graphically for 2 seconds. Then the display will return to the "Home" screen again. Try starting the thermoregulation 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 the increasing of the setpoint by 10 K until the maximum working temperature of the thermal fluid used has been reached.
- Tap on the "Stop" touch button as soon as no more gas bubbles rise up at the thermal fluid's maximum working temperature.
- Confirm the stop of thermoregulation by tapping on "OK".
The correct selection will be displayed graphically. Thermoregulation 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, this is displayed graphically for 2 seconds. Then the display will return to the "Home" screen again. Try stopping the thermoregulation again. The de-gassing process is complete.

4.3.1.3 Draining the bath thermostat

CAUTION

Hot or very cold thermal fluid

SERIOUS BURNS/FREEZING OF LIMBS

- Before draining, ensure that the thermal fluid has room temperature (20 °C).
- If, at this temperature, the thermal fluid is too viscous to be drained: Control the temperature of the thermal fluid for a few minutes until the viscosity will allow drainage. Never control the temperature of the thermal fluid when the **>Drain valve<** [4] is open.
- **>Drain valve<** [4] is closed by turning it clockwise (turn 90° right as far as it will go).
- Danger of burns when draining thermal fluids at temperatures above 20 °C.
- Wear your personal protective equipment when carrying out the drainage operation.
- Only drain with a suitable draining hose and container (these must be resistant to the thermal fluid and temperature).

PROCEDURE

Baths with **>Drain valve<** [4]

- Remove the knurled screw at the **>Drain<** [8].
- Connect a suitable drain hose to the **>Drain<** [8].
- Place the other end of the hose in a suitable container.
- Open the **>Drain valve<** [4] by turning it counterclockwise (turn 90° left as far as it will go).
- The thermal fluid will flow from the external application via the bath vessel and the draining hose into the container.
- Wait until the external application and the bath are empty.
- Open the connection **>Circulation flow<** [1].
- Open the connection **>Circulation return<** [2].
- Leave the temperature control unit open for a while for to allow it to dry out and the residue to drain. Without screw caps with **>Drain valve<** [4] open.
- Close the **>Drain valve<** [4] by turning it clockwise (turn 90° right as far as it will go).
- Close the connection **>Circulation flow<** [1].
- Close the connection **>Circulation return<** [2].
- After drying out, remove the drain hose and re-fit the knurled screw to the **>Drain<** [8].
- The bath is now drained.

Baths without **>Drain valve<** [4]

- Have a suitable container ready to catch the thermal fluid.
- Open the knurled screw at the **>Drain<** [8]. As soon as you have opened the knurled screw, the thermal fluid will flow from the external application over the bath and into the container.
- Wait until the external application and the bath are empty.
- Open the connection **>Circulation flow<** [1].
- Open the connection **>Circulation return<** [2].
- Leave the temperature control unit open for a while for to allow it to dry out and the residue to drain (without screw caps).
- Close the connection **>Circulation flow<** [1].
- Close the connection **>Circulation return<** [2].
- Re-fit the knurled screw to the **>Drain<** [8].
- The bath is now drained.

5 Normal operation

5.1 Automatic operation

CAUTION

Hot or cold thermal fluid and surfaces

BURNS TO LIMBS

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

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 thermal fluid temperature is higher/lower than room temperature

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

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

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. You 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 thermal fluid temperature is higher/lower than room temperature

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

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

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

INFORMATION

The use of PB commands is described in our “Data communications PB” manual. This manual can be downloaded from www.huber-online.com.

6.1 Interfaces at the “Pilot ONE®” controller

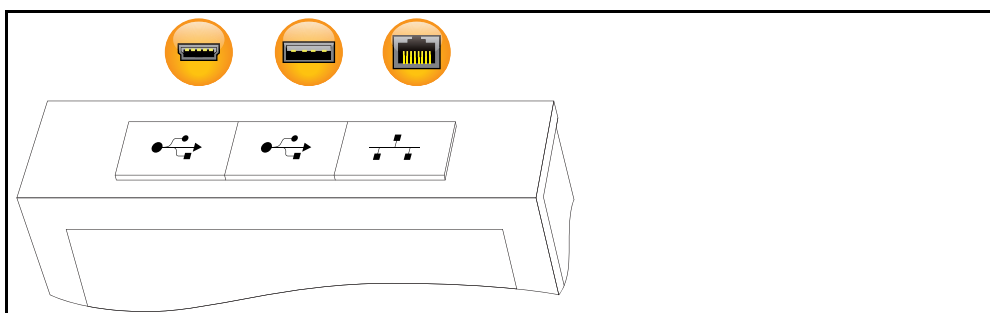
NOTE

The Pilot ONE controller is not operated behind a firewall

PROPERTY DAMAGE

- Operate the controller Pilot ONE exclusively behind a firewall, if the local subnet is connected to the Internet or another risk-prone network.
- The best available technology is to be applied in order to provide sufficient security for the LAN!

Standard interfaces at the “Pilot ONE” top side



6.1.1 10/100 Mbps Ethernet for RJ45 network sockets



This is a fast and flexible interface. Standard 10/100 Mbps interface (Fast Ethernet), can be connected to any existing Ethernet network. Because this interface can also be connected to very large networks, the IT “Best Practices” (firewall) must be observed.

Usage:

Also - to be able to communicate with the “Pilot ONE” controller - the communication enable must be issued. This is an additional safety feature that prevents persons - possibly unintentionally - connecting to the wrong machine and implementing incorrect temperature control specifications. The following restrictions are possible:

- Deactivated
- Always on (PLC)
- 12h Inactivity Timer
- 10min Inactivity Timer

If, for example, “10min Inactivity Timer” is selected, the connection must be made within 10 minutes after confirmation at the control. If this does not happen, the connection is refused.

INFORMATION

Communication with the Pilot ONE is via TCP (Transmission Control Protocol), Port 8101.

6.1.2 USB-2.0 interface

6.1.2.1 USB-2.0 interface, host



USB-2.0 connection (for connector A), e.g. for data memories.

6.1.2.2 USB-2.0 interface, device

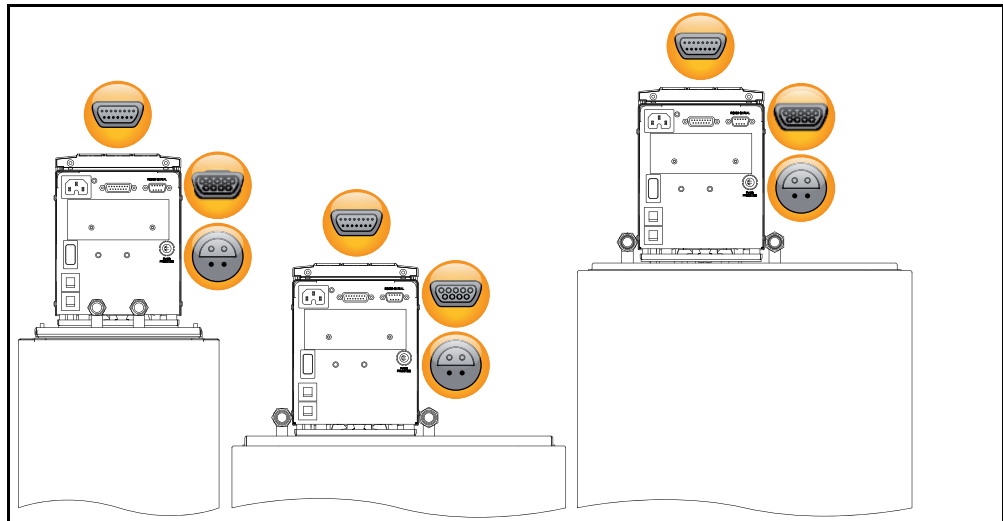


USB-2.0 connection (for Mini-B connector) for communicating with a computer.

6.2 Interfaces on the temperature control unit

6.2.1 Interfaces at the back

Interfaces at the back of the hanger thermostat



6.2.1.1 Service interface



This interface is used by the service engineers of Peter Huber Kältemaschinenbau GmbH exclusively for service purposes. An adapter cable connects this interface to a RS232 serial jack.

6.2.1.2 Female RS232 serial



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

Pin assignment

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

6.2.1.3 Connection jack for Pt100 process controller sensor



A temperature sensor located in the connected application (Pt100, 4-wire technology, Lemosa connector) is connected to the Pt100 connection jack. The external actual temperature is then recorded and the operating temperature of the temperature control unit is permanently calculated and adjusted.

INFORMATION

Depending on the operating temperature, isolation losses and exothermic heat, the operating temperature (flow temperature) at the application can be significantly less than the setpoint for the application. In this context, safety-critical thresholds for the temperature control fluid must be strictly observed.

The control results contained in the data sheet can only be achieved with **shielded** sensor leads. We recommend the external Pt100 sensors from the Huber accessories.

Pin assignment	Pin	Signal	
	1	I+	
	2	U+	
	3	U-	
	4	I-	

6.3 Firmware update


An instruction for running a firmware update can be found at www.huber-online.com.

7 Service/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 Electrical fuse

The thermal overcurrent circuit breakers for all pole breaking (L and N) are located at the back of the hanger thermostat. In case of a fault (no function and no display on the hanger thermostat) please first check if the overcurrent circuit breaker has tripped. If the overcurrent circuit breaker triggers again immediately after reversing, please unplug the power cord and contact Customer Support immediately (see phone number can be found on page 68 in section »Phone number and company address«).

7.3 Replacing the “Pilot ONE®”



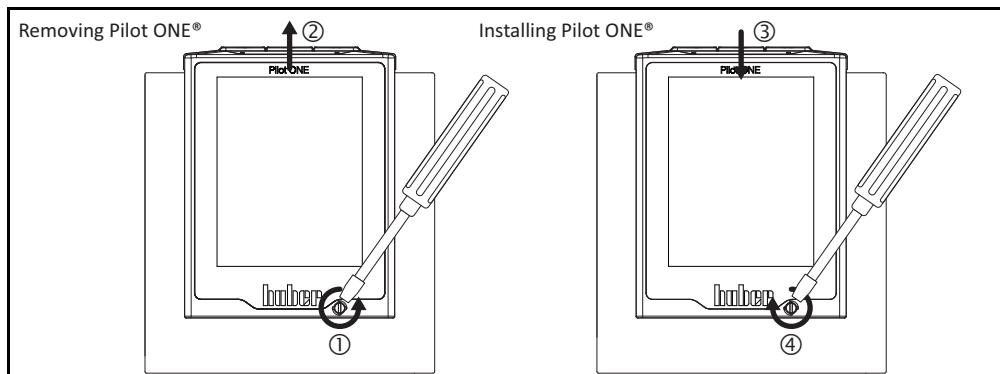
Replacing the electronics while the temperature control unit is operating

MORTAL DANGER FROM FIRE

- Stop an ongoing temperature control process.
- Disconnect the temperature control unit from the power supply by turning the >mains switch< [37] on the temperature control unit to “0”.
- Also disconnect the temperature control unit from the current supply.

In case of fault, you can replace the “Pilot ONE” yourself. If you have questions or difficulties, please contact your dealer, your local office or our Customer Support.

Replacing the
“Pilot ONE”



PROCEDURE

- Switch off the temperature control unit. Do this by turning the >Mains switch< [37] to the “0” position!
- Disconnect the temperature control unit from the current 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”.
- Connect the >Fixing screw for Pilot ONE< [89] to the front of the housing.
- Connect the temperature control unit to the power supply.
- Switch the temperature control unit on.

7.4 Maintenance



Cleaning/maintenance while the temperature control unit is operating

MORTAL DANGER FROM ELECTRIC SHOCK

- Stop an ongoing temperature control process.
- Disconnect the temperature control unit from the power supply by turning the **>Mains switch<** [37] on the temperature control unit to "0".
- Also disconnect the temperature control unit from the current supply.



Carrying out maintenance work not described in this operation manual

DAMAGE TO THE TEMPERATURE CONTROL UNIT

- For maintenance work not described in the operation manual, contact Peter Huber Kälte- maschinenbau GmbH.
- Maintenance work not described in this operation manual is reserved for qualified specialists trained by Huber.
- Only perform the following maintenance work on the temperature control unit yourself.

7.4.1 Function check and visual inspection

Monitoring interval

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.	User and/or operators
A/W	Inspect power supply cable	Prior to switching on the temperature control unit or on relocation	Do not start-up the temperature control unit if the power cable is damaged.	Qualified electrician (BGV A3)
A/W	Thermal fluid inspection	As required		User and/or operators
A/W	Overtemperature protection (OT) - functional check	Every 3 months or after changing the thermal fluid	See page 39, section »Testing over-temperature protection for functionality«	User and/or operators
A/W	Inspect temperature control unit for damage and stability	Every 12 months or after a change of location		User and/or operators
W	Inspect water quality	Every 12 months	Descale the cooling water circuit as required. Documentation on water quality available at: www.huber-online.com	User and/or operators

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

7.5 Thermal fluid inspection, replacement and circuit cleaning

The illustration "Wiring diagram" can be found on page 69 in section **»Annex«**.

7.5.1 Thermal fluid inspection



Thermal fluid is not inspected on a regular basis

BURNS DUE TO REDUCED BOILING POINT

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

NOTE

Thermal fluid is not inspected on a regular basis

DAMAGE TO THE HEAT EXCHANGER AND/OR ELECTROMECHANICAL PARTS.

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

INFORMATION

Oxidation

Oxidation ages the thermal fluid and change its characteristics (e.g. a reduced boiling point). When controlling high temperatures, a reduced boiling point may cause overflow of very hot thermal fluids. It may cause serious burns of the limbs.

Hygroscopy

When continuously thermoregulating below room temperature, hygroscopy causes the thermal fluid to accumulate water in the course of time. Such a liquid mixture causes the evaporator to burst when thermoregulating in the minus range. This is caused by the water in the liquid mixture, which forms ice crystals on the evaporator. When thermoregulating high temperatures with such a liquid mixture, the boiling point is reduced. When controlling high temperatures, a reduced boiling point may cause overflow of very hot thermal fluids. It may cause serious burns of the limbs. Hygroscopy can change the mixing ratio of a water-ethylene-glycol mixture.

7.5.2 Cleaning the thermal fluid circuit

CAUTION

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

INJURIES

- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the thermal fluid to be used must be read prior to use and its contents respected.
- Observe the local regulations/work instructions.
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear).
- Danger of slipping through contamination of floor and work area.

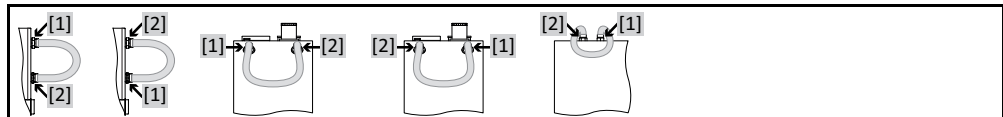
NOTE

Using acetone as an agent to clean the thermal fluid circuit

DAMAGE CAUSED BY LEAKS IN THE INTERNAL THERMAL FLUID CIRCUIT

- Use only suitable detergents.

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).

PROCEDURE

- Drain the temperature control unit as described on page 54 in section »Draining the bath thermostat«.

INFORMATION

After draining, residual thermal fluid can remain in the pump chamber and the internal lines. Leave the temperature control unit with open valves for a while.

- Leave the drain hose mounted to the >Drain< [8].
- Check the fill level in the collecting container at the end of the drain hose.
- Close the drain valves on the temperature control unit by turning them clockwise (turn 90° right as far as it will go).
- Connect the >Circulation flow< [1] with the >Circulation return< [2] to the temperature control using a bypass hose.

INFORMATION

If the application used by you (externally closed) is also dirty, perform the following steps without attaching a short circuit hose. In this case, you leave your external closed application connected to the temperature control unit. Thus clean the temperature control unit and your application the same time.

When using **Huber thermal fluids** to clean the thermal fluid circuit, use **ethanol**.

PROCEDURE

- **Fill** the system (minimum fill level) with the cleaning agent. The description can be found on page 52 in section »**Filling and venting the bath thermostat and the externally closed application**«.
- **Vent** the system as described on page 52 in section »**Filling and venting the bath thermostat and the externally closed application**«.
- Go to the "Categories Menu".
- Tap on the category "Temperature Control".
- Tap on the category "Start/Stop".
- Tap on the dialog entry "Start circulation".
- Confirm your choice by tapping on "OK". The length of circulation depends on the level of soiling.
- Tap on the category "Start/Stop".
- Tap on the dialog entry "Stop circulation".
- Confirm your choice by tapping on "OK". The circulation is stopped.
- Open the **>Drain< [8]** and drain the detergent through the draining hose into a suitable container (such as the original canister, which is compatible with the cleaning agent).
- Repeat the steps "Filling", "Venting", "Start/Stop circulation" and "Draining" until the drained ethanol remains clear.
- Remove the bypass hose.

INFORMATION

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

- Leave the **>Drain< [8]** open for a while to allow the cleaning agent to evaporate in the temperature control unit.
- Close the **>Drain< [8]** once the residual cleaning agent has evaporated.
- Dismount the drain hose.
- Remove the collecting tank.
- Discard the collecting container, including its contents, properly.
- Re-connect your application. (Only if you have cleaned the thermal fluid circuit using a bypass hose.)
- Fill the temperature control unit with thermal fluid, as described on page 52 in section »**Filling and venting the bath thermostat and the externally closed application**«.
- Drain the temperature control unit as described on page 52 in section »**Filling and venting the bath thermostat and the externally closed application**«. An externally open application does not need to be vented.
- Start the "degassing" function as described on page 53 in section »**Degassing of bath thermostat**«. An externally open application does not need to be off-gassed.
- Restart the temperature control unit in normal mode.

7.6 Cleaning the surfaces**NOTE****Exposed plug contacts****DAMAGE CAUSED BY FLUID INGRESS**

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

A standard stainless steel cleaning agent is suitable for cleaning the stainless steel surfaces. Carefully clean paint surfaces (damp) using the suds of a mild detergent.

7.7 Plug contacts

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

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

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

7.8 Decontamination/repairs

CAUTION**Returning a not decontaminated temperature control unit for repair****PHYSICAL INJURY AND PROPERTY DAMAGE CAUSED BY HAZARDOUS MATERIALS IN OR ON THE TEMPERATURE CONTROL UNIT**

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

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

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

8 Shutting down

8.1 Safety instructions and basic principles

HAZARD

Connection/adjustment to the power supply not carried out by an electrician and/or connection to a power socket without protective earth (PE)

MORTAL DANGER FROM ELECTRIC SHOCK

- Have the connection/adjustment to the power supply carried out by an electrician.
- Always connect the temperature control unit to safety sockets (PE).

HAZARD

Damaged power cable/power cable connection

MORTAL DANGER FROM ELECTRIC SHOCK

- Do not start up the temperature control unit.
- Isolate the temperature control unit from the power supply.
- Have the power supply cable/power supply connection replaced and inspected by an electrician.
- Do not use a power cable that is longer than **3 m**.

WARNING

Risk of tipping due to unstable temperature control unit

SERIOUS INJURY AND PROPERTY DAMAGE

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

CAUTION

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

INJURIES

- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the thermal fluid to be used must be read prior to use and its contents respected.
- Observe the local regulations/work instructions.
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear).
- Danger of slipping through contamination of floor and work area.

CAUTION

Hot or very cold thermal fluid

SERIOUS BURNS/FREEZING OF LIMBS

- Before draining, ensure that the thermal fluid has room temperature (20 °C).
- If, at this temperature, the thermal fluid is too viscous to be drained: Control the temperature of the thermal fluid for a few minutes until the viscosity will allow drainage. Never control the temperature of the thermal fluid when the **>Drain valve< [4]** is open.
- **>Drain valve< [4]** is closed by turning it clockwise (turn 90° right as far as it will go).
- Danger of burns when draining thermal fluids at temperatures above 20 °C.
- Wear your personal protective equipment when carrying out the drainage operation.
- Only drain with a suitable draining hose and container (these must be resistant to the thermal fluid and temperature).

INFORMATION

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

8.2 Switch-off

PROCEDURE

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

8.3 Draining-off the cooling water

INFORMATION

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

8.3.1 Draining process

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 side isolating valves are not closed

DAMAGE BY ROOM FLOODING

- Close the building's isolating valves in the cooling water supply and return lines.

PROCEDURE

- Close the building's isolating valve in the cooling water supply and return lines.
- Place the collecting container below the input and output of the >Cooling coil< [29].
- Unscrew the connection at the >Cooling coil< [29]. The cooling water will begin to drain from the lines.
- Remove the cooling water from the >Cooling coil< [29]. Allow the cooling water to fully drain to prevent the risk of freezing during transport and storage!

8.4 Packing

Use the original packaging wherever possible! Further information can be found on page 18 in section »Unpacking«.

8.5 Shipping

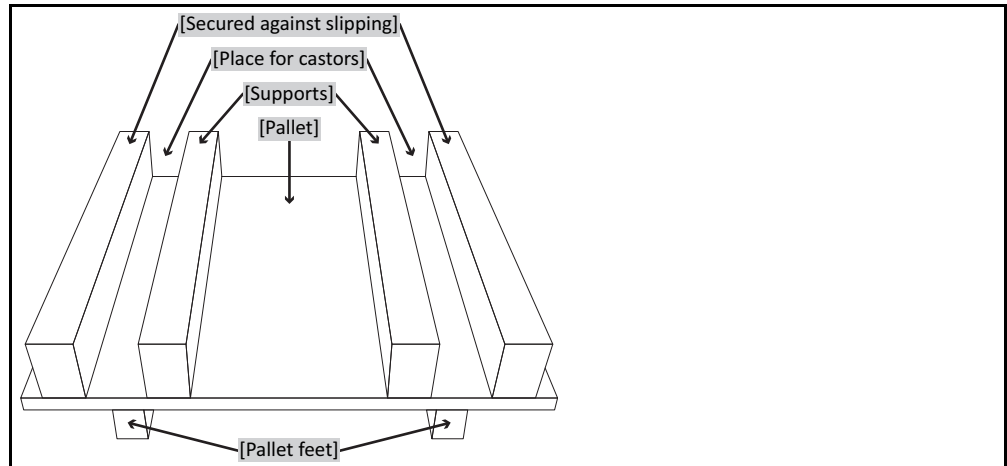
NOTE

Temperature control unit transported incorrectly

PROPERTY DAMAGE

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

Pallet with squared timber for free-standing units



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

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

8.6 Disposal

NOTE

Improper disposal

ENVIRONMENTAL DAMAGE

- Spilled/leaked thermal fluid must be discarded immediately and correctly.
- To avoid environmental damage, have "disused" temperature control units disposed of exclusively by approved waste management companies (e.g. refrigeration and air conditioning companies).

8.7 Phone number and company address

INFORMATION

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

8.7.1 Telephone number: Customer Support

Telephone: +49-781-9603-244

8.7.2 Telephone number: Sales

Telephone: +49-781-9603-123

8.7.3 Email address: Customer Support

Email: support@huber-online.com

8.7.4 Service/return address

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

8.8 Certificate of Compliance

Please read page 64, section »Decontamination/repairs«.

9 Annex



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