Water Cooler

Cat. No. BioAcc-cool

Version 1.1

diagenode

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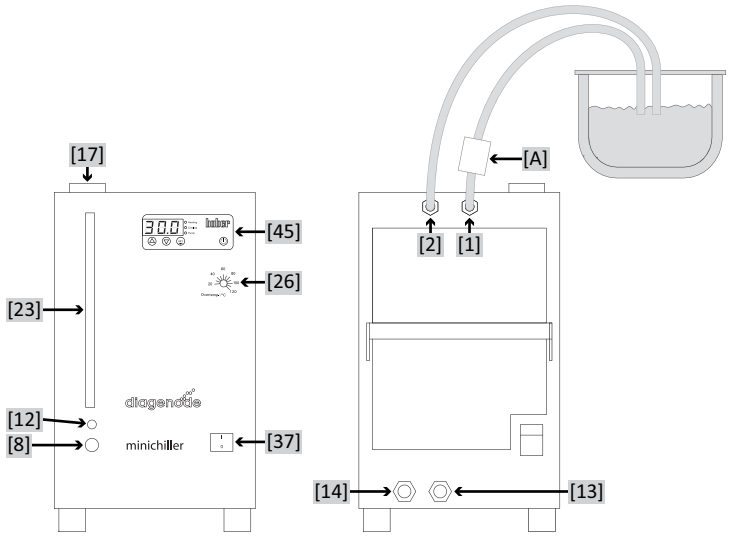
Water Cooler

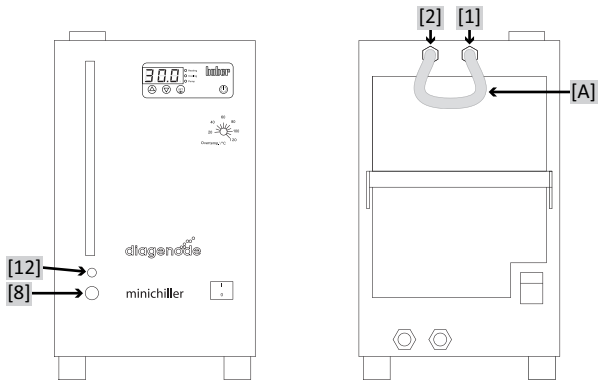
This operation manual is a translation of the original operation manual

Figure 1: Connecting/filling externally copen application



[1] Blue
[2] Red
[8] Drain
[12] Overflow
[13] Cooling water inlet (only w)
[14] Cooling water outlet (only w)
[17] Filling port
[23] Sight glass
[26] Overtemperature protection (only -H)
[37] Mains switch
[45] Controller
[A] Connector kit for Water Cooler

Figure 2: Thermal fluid change/check and internal clean



[1] Circulation flow
[2] Circulation return
[8] Drain
[12] Overflow
[A] Temperature control hose

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V1.1.0en/13.12.12

Foreword

Dear customer,

You have opted for a temperature control unit from Diagenode. 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

This chapter contains the following sections:

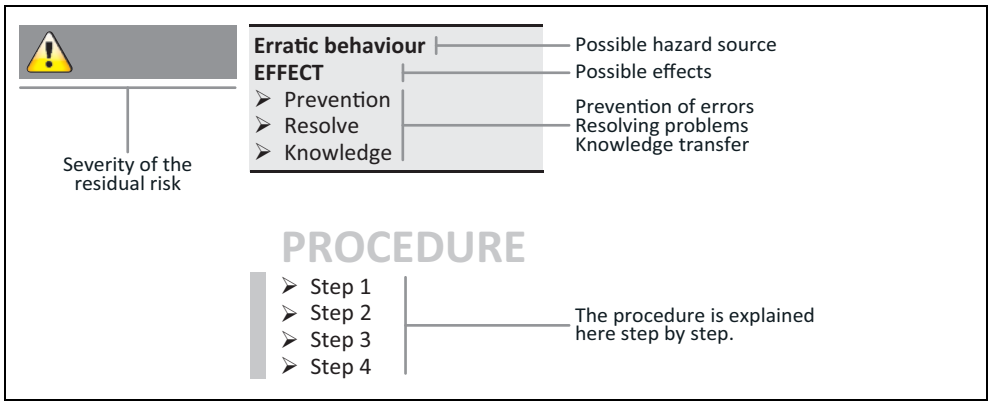
1.1 Safety

1.1.1 Depiction of safety instructions

Safety instructions are depicted by the following pictogram/signal words combinations. The signal word describes the classification of the residual risk if the operation manual is not observed.

HAZARD	**Denotes an imminent hazardous situation that will result in death or serious injury.** G
WARNING	**Denotes a generally hazardous situation that can result in death or serious injury.** W
CAUTION	**Denotes a hazardous situation that can result in injury.** V
NOTE	**Denotes a situation that can result in property material damage.** H
INFORMATION	Denotes important notes and usable hints. I

Explanation Safety instructions and procedure



The safety instructions in this operation are intended to protect you as the user, operator and the plant from damage. Safety instructions must always appear BEFORE the handling instruction and at the start of each chapter. You should be informed about the residual risks caused by misuse before starting the action concerned.

1.1.2 Proper operation

HAZARD	**Operating the temperature control unit in a potentially explosive area** **DEATH THROUGH EXPLOSION** ➢ Do NOT install or operate the temperature control unit within an ATEX zone. G01

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.
- Strictly heed the safety instructions of the operator in order to protect life and limb and limit property damage.

W01

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.
- Every modification not agreed with the manufacturer invalidates every CE Declaration of Conformity for the temperature control unit.
- 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!
- Never omit, bypass, remove or deactivate safety devices!

H01

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 55 in section **»Annex«**). The temperature control unit must be installed, configured and operated according to the handling instructions in this operating manual. Failure to comply with the operation manual is deemed improper use. The temperature control unit conforms to state-of-the-art technology and the recognized safety regulations. Safety devices are built into your temperature control unit.

1.1.3 Reasonably foreseeable misuse

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

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

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

1.2 User and operators – Obligations and requirements

1.2.1 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.

1.2.1.1 Temperature control unit with natural refrigerants (NR)

WARNING

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

- Observe the rating plate (amount of natural refrigerant contained) and the room size (maximum room concentration of natural refrigerant in case of leakage) when installing the temperature control unit.
- For temperature control units with more than 150 g natural refrigerant: A gas warning sensor must be fitted and functioning.
- The gas warning sensor must be calibrated and maintained at regular intervals (between 6 and 12 months).
- The temperature control unit is **not approved for operation in ATEX areas.**

W07

Huber products with natural refrigerants work with numerous proven, safe and highly-sustainable technologies. The relevant standards and regulations for temperature control units with natural refrigerants contain a number of stipulations, the importance of complying with which is set out below. Also observe on page 12 the section **»Proper operation«**.

Huber temperature control units are constructed to be permanently sealed and are carefully checked for leak tightness. Temperature control units with more than 150 g natural refrigerant are equipped with an additional gas warning sensor.

The fill quantity of your temperature control unit is stated on the data sheet (from page 55 in section **»Annex«**) or on the rating plate on the rear of the temperature control unit. Observe page 22, section **»Ambient conditions«** and page 24, section **»Installation conditions«**.

Classifying the application field

Class of the application field	Application field	Example of the installation location	Max. refrigerant quantity		Max. permissible quantity above ground level (GL)
A	General	Publicly accessible area in a public building	8 g/m³ room air	OR	1.5 kg
B	Monitored	Laboratories			2.5 kg
C	Access only for authorized persons	Production equipment			10.0 kg
Temperature control units with **more than 1 kg** refrigerant must **not be installed below ground level** (GL).					

Temperature control units with up to 150 g natural refrigerant

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

Temperature control units with more than 150 g natural refrigerant

- The temperature control unit has been constructed to the requirements of EU and EFTA countries.
- Use the table as guidance for classifying the application field. Respect the max. refrigerant quantity or the permissible highest quantity above ground level (GL) stated therein.
- Further notes on the pre-installed gas sensor:

a) The integrated gas warning sensor permits a **safety cut-out at 20 % of the lower explosion threshold via an isolation relay to be installed locally by the user**. The temperature control unit is therefore shut down safely and at an early stage in case of malfunction.

b) For the pre-installed gas warning sensor, you must hold ready an **external power supply of 24 V DC**. The gas warning sensor alarm is output using a 4 - 20 mA signal. For further technical details, please see the data sheet for the gas warning sensor.

Upon request, **a separate evaluation unit is available as an accessory** for controlling the isolation relay. The evaluation unit provides a floating switch contact, while also supplying the voltage and evaluating the gas warning sensor.

Dimensioning and installation by the user are required for both variants. The technical details required for installation can be found on the data sheet of the gas warning sensor. The gas warning system alarm can also be routed to a user's alarm control unit. The user is responsible for this and for any further measures.

c) The user is responsible for **calibrating the gas warning sensor** prior to initial start-up and for maintaining the calibration and maintenance intervals in accordance with the manufacturer's operating instructions. If no other information is available, we recommend calibration and maintenance intervals of between 6 and 12 months. Shorter intervals can also be specified to meet tougher safety requirements. Upon request, we would be happy to propose a specialist company to carry out the calibration and maintenance work.

1.2.1.2 Temperature control units with 3 to 30 kg fluorinated greenhouse gases/natural refrigerant

F-Gas Directive (EC) No. 842/2006 of the European Parliament and of the Council of 17 May 2006 on specific fluorinated greenhouse gases.

This directive concerns all systems that contain fluorinated refrigerants. The substances set out in Directive (EC) No. 1005/ 2009 of the European Parliament and of the Council of 16 September 2009 that deplete the ozone layer are excepted (CFC/HCFC).

The Directive regulates the reduction of emissions, the use, the recovery and the destruction of specific fluorinated greenhouse gases, as well as the identification and disposal of products and equipment containing these gases. Since 4 July 2007, users must check their stationary refrigeration systems for leaks on a regular basis and rectify any leaks within the shortest possible time.

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

Obligations of the user:

- Annual inspection, for instance, for leaks from stationary refrigeration systems by certified personnel (e.g. service technicians of Peter Huber Kaeltemaschinenbau GmbH) for a fill quantity of fluorinated greenhouses from **3 kg to 30 kg**.
- Obligation to keep records (maintenance and inspection) in the operation manual of the refrigeration system, specifying the type and quantity of used or recovered refrigerants, which the user must retain for at least 5 years after they are produced and present to the competent authority on demand.
- Responsibility of plant users to recover F-gases using certified personnel.
- Temperature control units with natural refrigerants (NR) are exempt from this Directive.
- The refrigerant quantity is stated on the data sheet or rating plate of your temperature control unit.

1.2.2 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.

1.2.3 Obligations of the operators

Carefully read the operation manual before handling the temperature control unit. Strictly observe the safety instructions. Wear personnel protective equipment when handling the temperature control unit (e.g. safety goggles, protective gloves, anti-slip footwear).

1.3 General information

1.3.1 Description of the workstations

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.

1.3.2 Safety devices to DIN 12876

- Adjustable over-temperature protection (applicable for temperature control units with heating function).
- Low level protection.

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

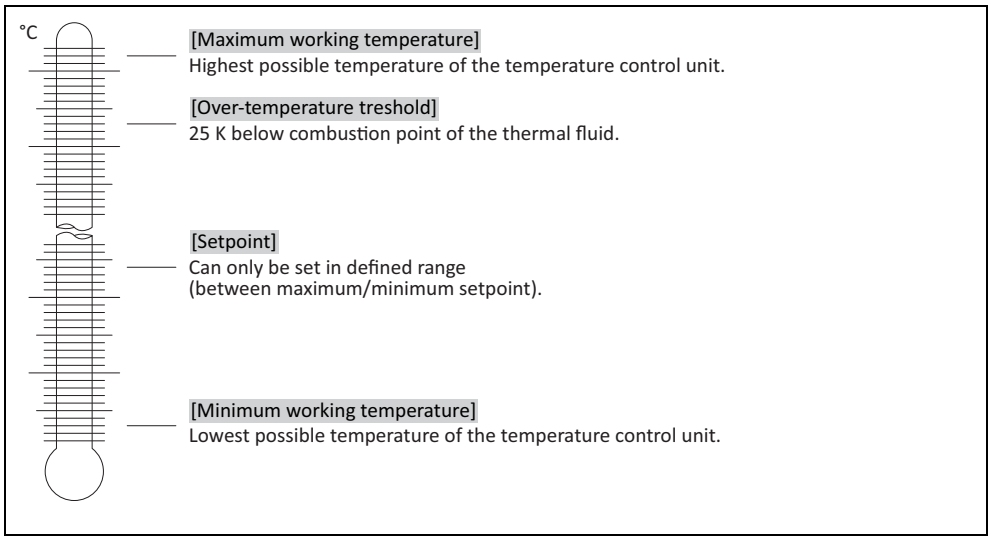
Rating of laboratory thermostats and laboratory baths

Rating	Temperature control fluid	Technical requirements	Code [c]
I	Distilled Water [a]	Overheat protection [b]	NFL

[a] Usually water; other fluids only if non-combustible even within the temperature range of an individual fault.
[b] The overheat protection can, for instance, be realized using a suitable fill level sensor or a suitable temperature limiter.
[c] Optional at the choice of the manufacturer.

- Temperature control units with heating (marked by an “-H” in the name) are designated as class III FL.
- Temperature control units without heating are designated as class I NFL.

Overview of the temperature thresholds



1.3.3 Additional safety devices

INFORMATION

Emergency strategy – isolate the power supply!
Do this by turning the **>Mains switch<** [37] to the “0” position!

1.3.3.1 Auto-Start function

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

Standard setting (OFF):

OFF Once the temperature control unit is switched on, the temperature control process is started only after manual input.

ON The temperature control unit is restored to the same status as it was before the power failure. For example, before the mains failure: temperature is off, according to this setting, after the power is restored temperature control is off.

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

Further information can be found on page 34 in section **»Setting the Auto-Start function (automatic mains failure)«**.

1.3.3.2 Alarm functions

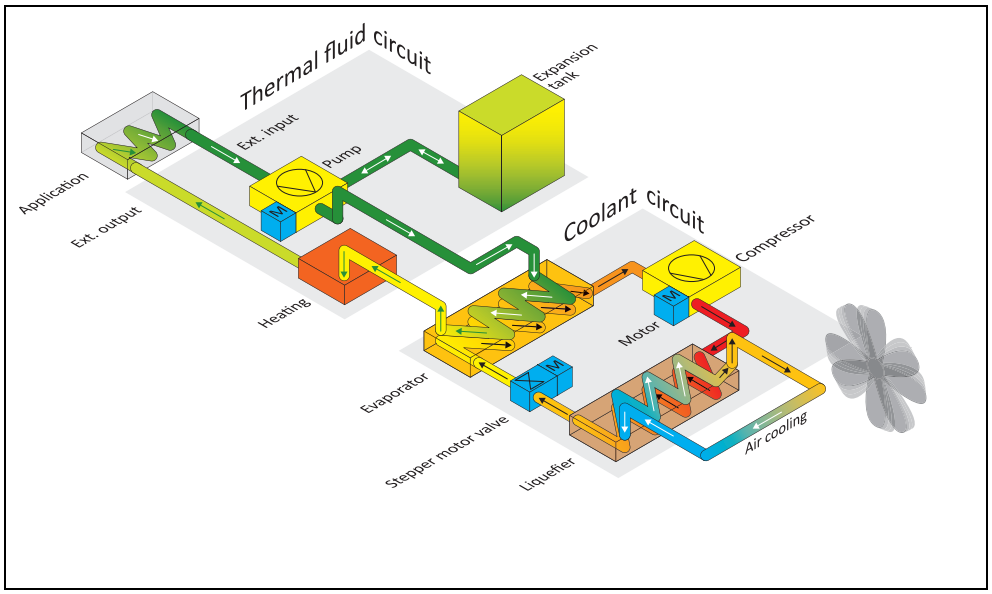
An alarm is a system state that signals unfavorable process conditions. The temperature control unit can be programmed so that the plant operator is warned when defined limit values are exceeded.

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).

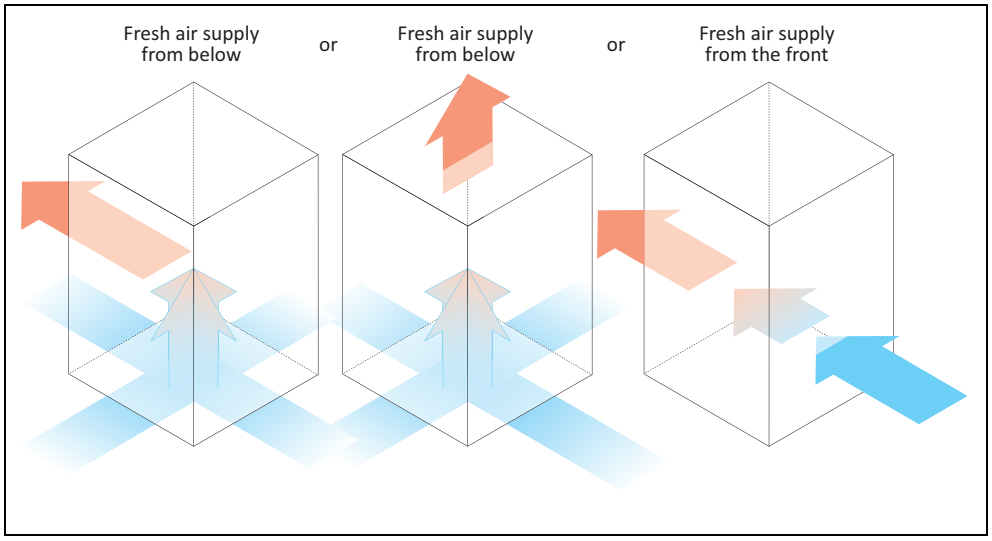
1.4 Schematic illustration of the cooling variants

1.4.1 Air cooling

Diagram: Air cooling

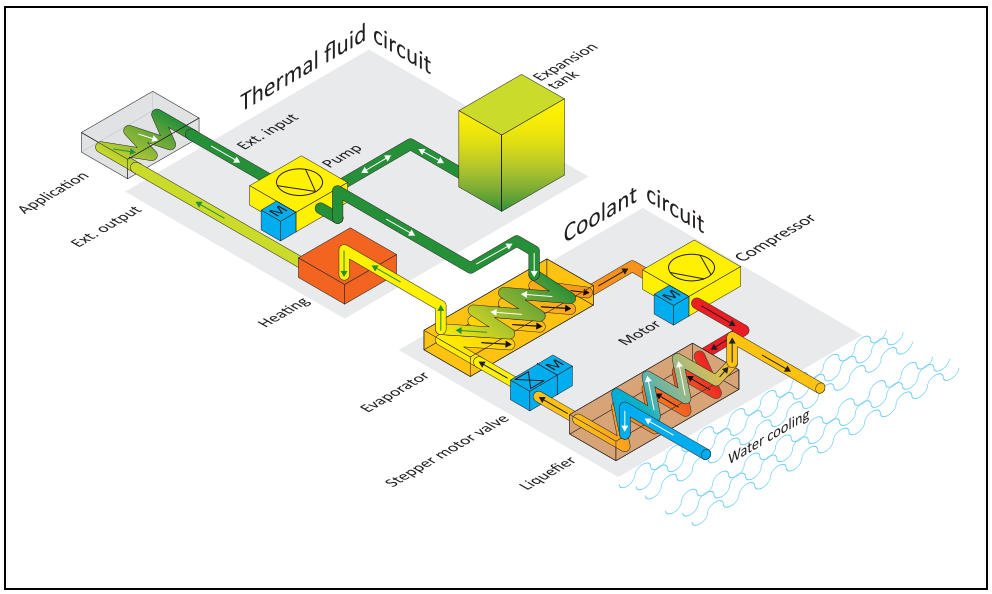


Air inlet

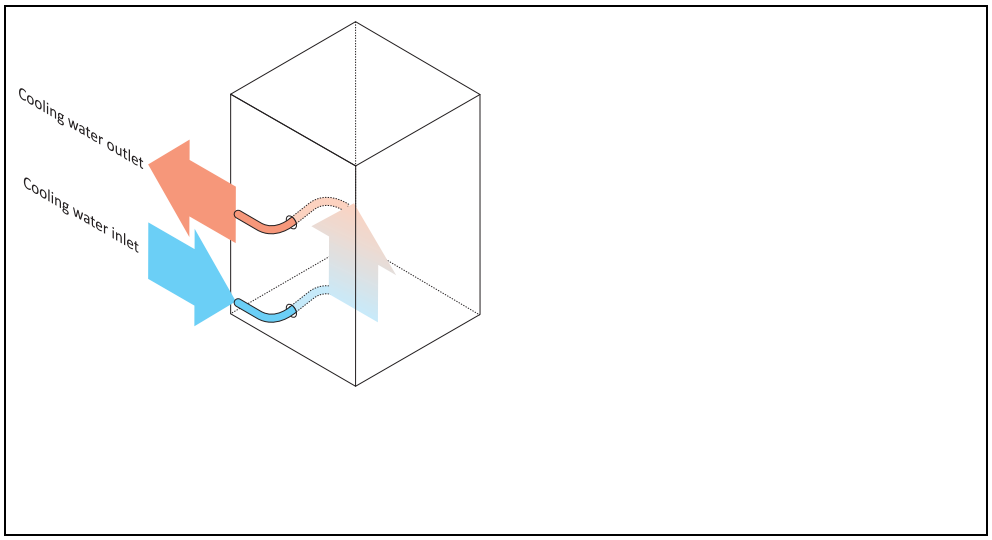


1.4.2 Water cooling

Diagram: Water cooling



Water connection



1.4.3 Consequence of inadequate energy dissipation

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

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

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

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

Temperature control unit
For optimal temperature control performance and maximum cooling power the unit should be used within the specified ambient temperature range. The temperature control unit switches off when the upper range is reached (maximum permissible ambient temperature).

2 Commissioning

This chapter contains the following sections:

2.1 In-plant transport

NOTE

Temperature control unit transported in a horizontal position
DAMAGE TO THE COMPRESSOR
➢ Only transport the temperature control unit in an upright position. H28

- 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.
- 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.
➢ Contact Customer Support. The telephone number can be found on page 54 in section **»Telephone numbers and company address«**. W02

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 CAUSED BY CRUSHING
➢ Observe the stipulations in section **»Ambient conditions«** and **»Installation conditions«**. V03

INFORMATION

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

Free-standing model
For the connection data, see the data sheet (from page 55 in section **»Annex«**).

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

- 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 unit. Do not operate this temperature control unit in the box or inadequately dimensioned bath. This inhibits the air exchange.

Side of the temperature control unit	Clearance to the temperature control unit in cm	
	Temperature control unit with air cooling	Temperature control unit with water cooling
Top	Air outlet on top of unit: free standing; otherwise can be located under a bench	Can be located under a bench
Front	min. 20	min. 10
Right	min. 20	min. 10
Left	min. 20	min. 10
Rear	min. 20	min. 20
	Clearance to the temperature control unit in cm (for operation in a bath)	
Top	Air outlet on top of unit: free standing; otherwise can be located under a bench	Can be located under a bench
Front	min. 20	min. 20
Right	min. 20	min. 20
Left	min. 20	min. 20
Rear	min. 20	min. 20

- Ambient temperature values are provided on the technical data sheet; to ensure trouble-free operation, compliance with the ambient conditions is mandatory.
- Maximum relative humidity 80% to 32 °C and to 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 55 in section **»Annex«**.
- Transient surges, as would normally occur in the power supply system
- Applicable degree of soiling: 2.
- Surge category II.

Observe page 18 of section **»Schematic illustration of the cooling variants«**.

2.4 Installation conditions

WARNING

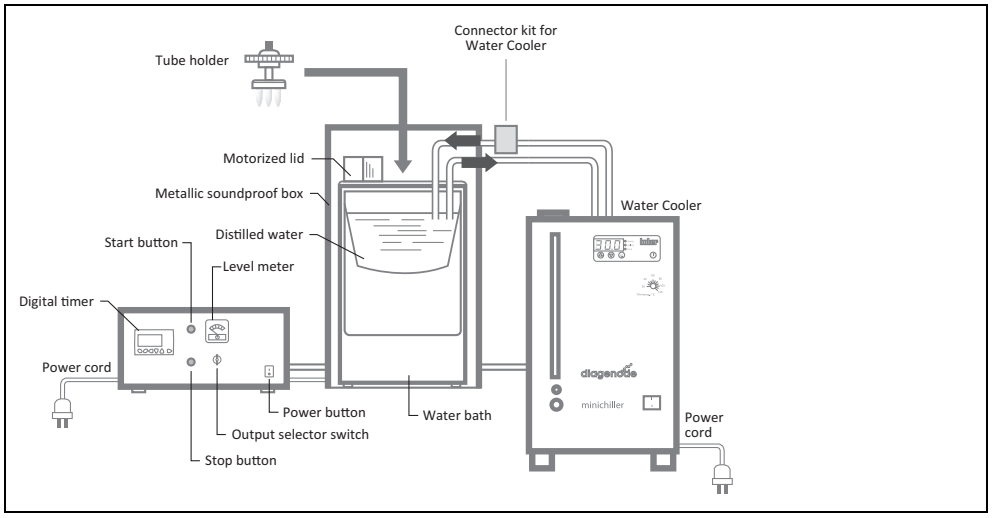
Temperature control unit is connected to the power supply line
DEATH THROUGH ELECTRIC SHOCK CAUSED BY DAMAGE TO THE POWER SUPPLY LINE
➢ Do not position the temperature control unit on the power supply line. W03

CAUTION

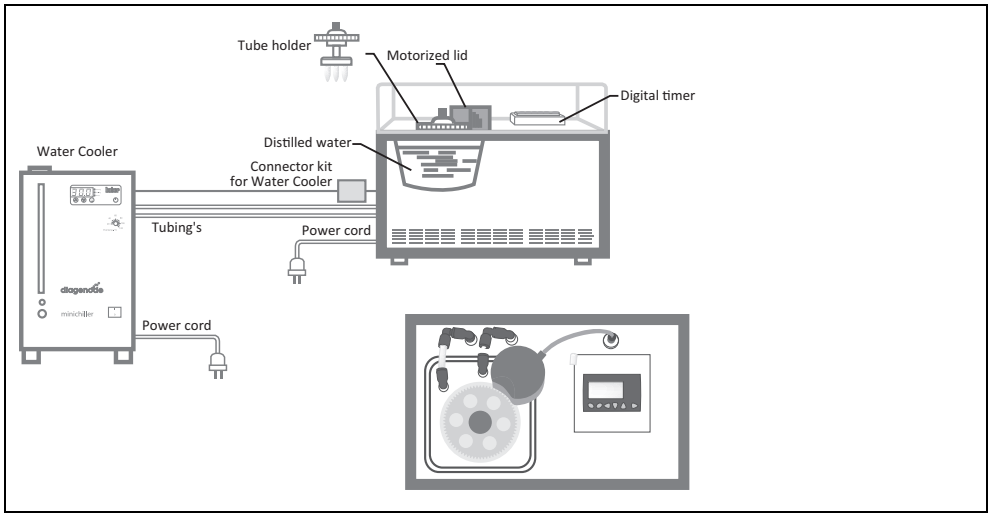
Operating the temperature control unit fitted with castors without brakes activated
CRUSHING OF LIMBS
➢ Activate brakes on the castors. V02

IMPORTANT: PLACE THE WATER COOLER BELOW THE WATER BATH.

Installation



Installation



- Transport upright.
- Install upright, stable and without tilt.
- Use a non-combustible, sealed subsurface.
- Keep the vicinity clean: Prevent slip and trip hazards.
- Lock existing wheels after installation!
- Drip catcher below the temperature control unit for condensation/thermal fluid.
- Spilled/leaked thermal fluid must be discarded immediately and correctly.
- 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.
- Close the cooling water supply to the temperature control unit even for short standstills (e.g. overnight).

V01

CAUTION

Hot or cold thermal fluid and surfaces
BURNS TO LIMBS
- Avoid direct contact with thermal fluid and surfaces.
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear).

V22

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

2.6 Wrench sizes and torques

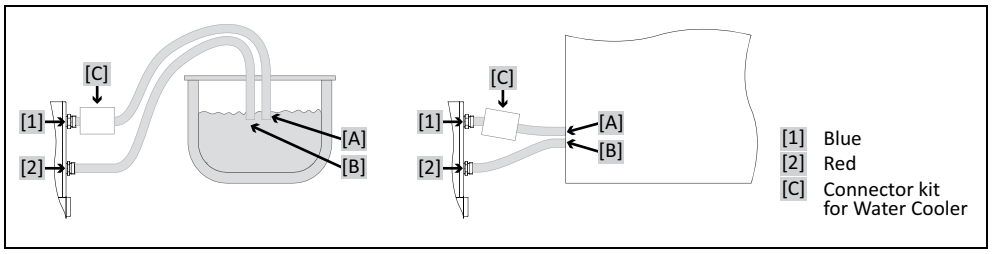
Observe the wrench sizes ensuing for the pump connection on the temperature control unit. The table below lists the pump connections and the ensuing wrench sizes and torque values. A leak test must then always be carried out and the connection re-tightened (to 10% higher torque) as required.

Overview Wrench size and torque values

Pump connection	Sleeve nut wrench size	Connector wrench size	Torque in Nm
M16x1	19 AF	17 AF	55
M24x1.5	27 AF	27 AF	55
	27 AF	17 AF	55
M30x1.5	36 AF	32 AF	70
	36 AF	36 AF	70
M38x1.5	46 AF	46 AF	150

2.7 Connecting an externally open application (bath)

Connection example



To enable your application to be operated correctly and eliminate air bubbles from the system, you must ensure that the **>Blue<** connection [1] from the temperature control unit is attached to the connection point [A] of the application and the **>Red<** connection [2] is attached to the connection point [B] of the application. Make sure that the connection points [A] and [B] of the application are higher than the connection **>Blue<** [1] and **>Red<** [2] of the temperature control unit.

PROCEDURE

- Remove the screw plugs from the **>Circulation flow<** [1] and **>Circulation return<** [2] connections.

INFORMATION

Install the connector kit. For more information, see the user manual **»Connector kit for Water Cooler«**.

- Then connect your application to the temperature control unit using suitable thermal fluid hoses. The corresponding wrench sizes can be found in the table on page 25 in section **»Wrench sizes and torques«**.
- Check the connections for leaks.

2.8 Connecting to the power supply

INFORMATION

Local circumstances may dictate that you have to use an alternative power supply cable to the original one supplied. Do not use a power supply cable over **3 m** long. This will ensure that the temperature control unit easily can be isolated from the power supply at any time. Have the power supply cable replaced by an electrician.

2.8.1 Connection using socket with protective earth (PE)

HAZARD

Connecting to a power socket without protective earth (PE)
MORTAL DANGER FROM ELECTRIC SHOCK
- Connect the temperature control unit only to power sockets with protective earth (PE). G09

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 supply cable over **3 m long**. G02

NOTE

Incorrect power supply connection
DAMAGE TO THE TEMPERATURE CONTROL UNIT
- Your existing building power supply voltage and frequency must match the temperature control unit values on the rating plate. H07

INFORMATION

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

2.8.2 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. G08

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 supply cable over **3 m long**. G02

NOTE

Incorrect power supply connection
DAMAGE TO THE TEMPERATURE CONTROL UNIT
- Your existing building power supply voltage and frequency must match the temperature control unit values on the rating plate. H07

3 Function description

This chapter contains the following sections:

3.1 Function description of the temperature control unit

3.1.1 General functions

Chillers are **temperature control units** that ideally are used for carrying away of process heat and as economic alternative for cooling water (drinking water).

Due to powerful **refrigeration technology** a **very short cooling time** can be achieved.

3.1.2 Other functions

A pump is responsible for a good circulation of the thermal fluid. Current temperature can be easily read via the LED-display screen. A new set point in entered via the easy to use keypad.

This temperature control unit can be equipped with a **digital interface (RS232)**.

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).
- Risk of slipping on dirt on the floor and around the workplace.

V07

NOTE

Non-compliance with the compatibility between the thermal fluid and your temperature control unit
PROPERTY DAMAGE
- Distilled water is recommended for use as thermal fluid. Information on the topic of water quality can be found at www.huber-online.com.
- Observe the rating of your temperature control unit in accordance with DIN 12876.
- The selected thermal fluid must be resistant to the following materials: Stainless steel 1.4301/ 1.4401 (V2A), copper, nickel, FKM and silver solder.
- The maximum viscosity of the thermal fluid must not exceed 50 mm^2/s at the lowest working temperature!
- The maximum density of the thermal fluid must not exceed 1 kg/dm^3!

H09

NOTE

Use of contaminated water
PROPERTY DAMAGE
- Use only distilled water
- Information on water quality can be found at www.huber-online.com.

3.3 Testing planning

INFORMATION

Also observe page 12 in section **»Proper operation**«.

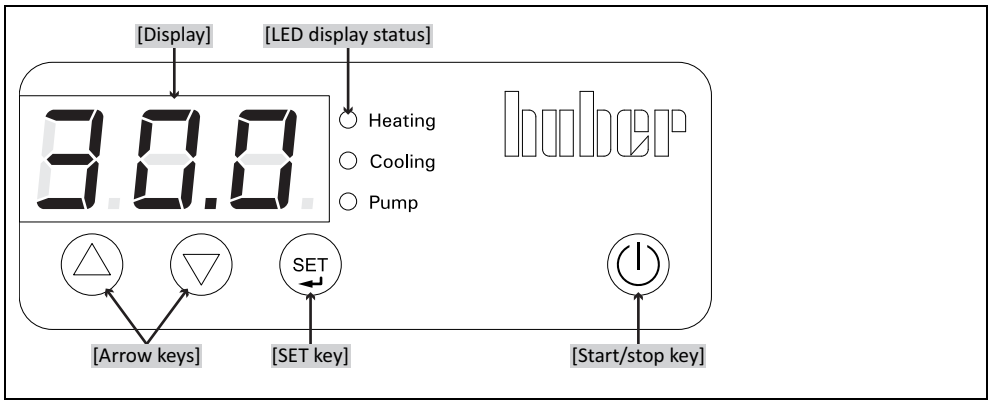
The focus is on your application. Remember that system performance depends on the temperature and viscosity of the thermal fluid and the flow speed:

- 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 selected hose connections must withstand the thermal fluid/working temperatures.
- You must choose a thermal fluid that not only permits the minimum and maximum working temperatures, but that is also suitable for the combustion point and/or viscosity. Furthermore, the thermal fluid must be compatible with all materials in your system.
- The hose lengths (as short as possible), the hose diameters (clearance of the pump connections is the reference value), and the viscosity of the thermal fluid (this is temperature-dependent) determine the pressure drop and influence the tempering result. Inadequate clearances for connections, corrugated hoses and values can cause considerable flow resistances. As a result, it takes longer to control the temperature in your application.
- Unsuitable thermal fluids can negatively impact temperature control, causing negative temperature control results and damage. Always use only the thermal fluids recommended by the manufacturer and only within the usable temperature and pressure range. With a temperature control near to the boiling point of the thermal fluid, the application should be at around the same height level or above the temperature control unit. During filling, the thermal fluid must be around room temperature level. Fill slowly, carefully and evenly. At the same time, make sure that no thermal fluid overflows (backup). Personal protective equipment, including safety goggles, temperature and chemical-resistant protective gloves, must be worn.
- After filling and setting all the requisite parameters, the temperature control circuit must be vented. This is required to ensure trouble-free operation of the temperature control unit and hence your application.
- With pressure-sensitive applications such as glass reactors, the maximum flow pressure of the temperature control unit for cross-section reduction or sealing must be observed (see data sheet from page 55 in section **»Annex«** and the data sheet for your glass apparatus). Take the necessary precautions (e.g. pressure limiter for temperature control units with pressure regulation and/or use of an external bypass for temperature control units without pressure limiter).
- Avoid bending the hoses.
- Check hoses for potential material fatigue at regular intervals (e.g. cracks).

For water-cooled temperature control units, please see page 55 in section **»Annex«** for the maximum cooling water temperature and the differential pressure required to ensure trouble-free operation.

3.4 Display and control instruments

The control panel: Display and buttons



3.4.1 Display

The internal temperature is displayed. This is the chiller supply temperature. Using different key combinations the set point or a menu point or setting is displayed.

3.4.2 LED display status

These LEDs provide information about the current operating status.

3.4.3 Arrow keys

Depending on requirements, these arrow keys, are used to select or change a menu point or the setpoint (△ (up) or ▽ (down)). These **>Arrow keys<** are required to enter the menu.

3.4.4 SET key

The **>SET key<** is used to change the setpoint temperature. Thus the current setpoint temperature can be displayed and changed. Also, using the **>SET key<** at various menu points, the entries are displayed.

3.4.5 Start/Stop key

This button starts or stops the temperature control.

3.5 Menu navigation

The temperature control unit is equipped with a menu function.

Overview of the menu items

Menu item	Display	Description
ADR		Without function
C40		Auto-Start Function
PA	 or 	Service menu Only for Huber service personnel.

In this menu you can adjust the settings for the **auto-start function**.

The temperature control unit is restored to the same state it was before the power failure. For example, before the mains failure: temperature control is off, after power has been restored: temperature control is turned off.

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

3.6 Function examples

3.6.1 Display of the Setpoint

PROCEDURE

- Press the **>SET key<** and hold it down. The setpoint is displayed.
- Let the **>SET key<** go. The internal temperature is displayed again.

3.6.2 Setting/change the setpoint

NOTE

Changing the preset temperature
PROPERTY DAMAGE
- Don't change the preset temperature.

PROCEDURE

- Press the **>SET key<** and hold it down. The setpoint is displayed.
- Set the desired setpoint using the **>Arrow keys<**.
  ⏶ (up), the temperature increases, ⏷ (down), the temperature decreases.
- Let the **>SET key<** go. The new setpoint is set.

3.6.3 Setting the Auto-Start function (automatic mains failure)

Settings in the menu point "C40" auto-start

Setting	Display	Description
0		The auto-start function is switched on
1		The auto-start function is switched off

PROCEDURE

- Simultaneously press the **>Arrow keys<** ⓐ and ⓥ for about 3 s. The display changes from the temperature display to show the first menu item.
- Press the **>Arrow key<** ⓥ to display the menu point “C40”.
- Press the **>SET key<** and hold it down.
- Press the **>SET key<** and the **>Arrow keys<** ⓐ and ⓥ simultaneously, the display toggles between “0” (auto-start function is switched on) to “I” (auto-start function is switched off). After the desired setting is displayed, release the **>SET key<**.
- Simultaneously press the **>Arrow keys<** ⓐ and ⓥ for about 1 second. Or wait after releasing the **>SET key<** for a few seconds. The selected function is saved and the menu is exited. The display returns to the temperature display.

4 Setup mode

This chapter contains the following sections:

4.1 Setup mode

CAUTION

Moving the temperature control unit during operation
SERIOUS BURNS/FREEZING OF THE HOUSING PARTS/ESCAPING THERMAL FLUID
- Never move temperature control units that are in operation. V08

4.1.1 Turning on the temperature control unit

PROCEDURE

- Turn on the temperature control unit at the **>Mains switch<** [37].
  The circulation and temperature are switched off.

4.1.2 Setting the setpoint

NOTE

Changing the preset temperature
PROPERTY DAMAGE
- Don't change the preset temperature.

PROCEDURE

- Turn on the temperature control unit at the **>Mains switch<** [37].
- Press the **>SET key<** and hold it down. The setpoint is displayed.
- Set with the desired setpoint using the **>Arrow keys<**.
  ⏶ (up), the temperature increases, ⏷ (down), the temperature decreases.
- Release the **>SET key<**. The new setpoint is set.

4.2 Filling, venting, off-gassing and draining

4.2.1 Externally open application

4.2.1.1 Filling and venting externally open application

CAUTION

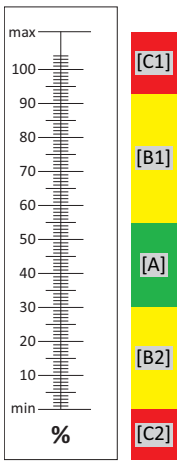
Non-compliance with the safety data sheet for the thermal fluid to be used
INJURIES
- Risk of injury to the eyes, skin, respiratory tract.
- The safety data sheet for the thermal fluid to be used must be read prior to use and its contents respected.
- Observe the local regulations/work instructions.
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear).
- Risk of slipping on dirt on the floor and around the workplace. V07

NOTE

Overflowing thermal fluid inside the temperature control unit
PROPERTY DAMAGE
- Shut down the temperature control unit immediately.
- Isolate the temperature control unit from the power supply.
- Have the temperature control unit inspected and cleaned only by personnel trained by Peter Huber Kaeltemaschinenbau GmbH.

H11

Fill levels in the **>Sight glass<** [23]



[C1] To much thermal fluid
[B1] Heated thermal fluid (> 20 °C) /
Fill level at first fill
Thermostat at upper working temperature
[A] Thermal fluid level at room temperature (20 °C)
[B2] Cooled thermal fluid (< 20 °C)
Thermostat at lower working temperature
[C2] Too little thermal fluid

The figure showing **»Connecting/filling externally open applications«** can be found on page 4.

- During the fill process, ensure any necessary measures, such as earthing the tanks, funnels and other aids, have been taken.
- Fill to the lowest possible height.

PROCEDURE

- Connect a suitable hose to the **>Overflow<** [12].
- Place the other end of the hose into a suitable container. If the unit is over-filled excess thermal fluid flows out here. Hose and container must be suitable for use with the thermal fluid and temperature.
- Add suitable thermal fluid to the bath. The thermal fluid flows over the return line into the temperature control unit and over the flow line to the bath. This forces the air inside the temperature control unit outside.
- The volume expansion of the thermal fluid changes to suit the working temperature range in which you wish to operate. At the “lowest” working temperature, a **“Min” mark** in the bath (top edge of the return flow + approx. 1 cm allowance) must not be underrun and at the “highest” working temperature a **“Max” mark** in the tank must not be exceeded. With table-top models, draw off any surplus thermal fluid, prior to starting the temperature control process, through the **>Drain<** [8] by additionally opening the **>Drain valve<** [4] (by turning anti-clockwise (by 90° to the right up to the stop)) or by decanting bath fluid from the bath into a suitable container. If the thermal fluid level is inadequate, the pump will aspirate air instead of thermal fluid. This “dry running” of the pump is detected by the sensors and the electronics and a safety cut-out occurs. You should therefore ensure an adequate level of thermal fluid.

4.2.1.2 Draining externally open applications

CAUTION

Hot or very cold thermal fluid
SERIOUS BURNS/FREEZING OF LIMBS

- Before starting the draining process, you must make sure that the thermal fluid has been brought to 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.
- Close **>Drain valve<** [4] by turning clockwise (by 90° to the right up to the stop).
- Wear your personal protective equipment when carrying out the drainage operation.
- Drain only using suitable drain hose and container (must be compatible with the thermal fluid and the temperature).

V14

PROCEDURE

Temperature control units 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 anti-clockwise (by 90° to the left up to the stop).
- The thermal fluid flows from the external application over the temperature control unit and the drain hose into the container.
- Wait until the external application and the temperature control unit 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 clockwise (by 90° to the right up to the stop).
- 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 temperature control unit is now drained.

PROCEDURE

Temperature control units 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 temperature control unit and into the container.
- Wait until the external application and the temperature control unit 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 temperature control unit is now drained.

5 Normal operation

This chapter contains the following sections:

5.1 Automatic operation

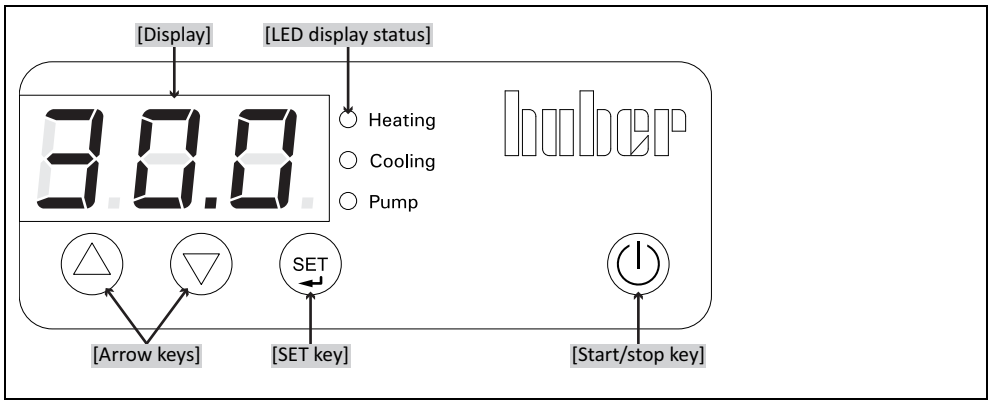
CAUTION

Hot or cold thermal fluid and surfaces
BURNS TO LIMBS
- Avoid direct contact with thermal fluid and surfaces.
- Wear your personnel protective equipment (e.g. temperature-resistant safety gloves, safety goggles, safety footwear).

V22

5.1.1 Temperature control

The control panel: Display and buttons



5.1.1.1 Starting the temperature control process

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

PROCEDURE

- Press the **>Start/stop key<** when the temperature control unit is switched and in standby mode. The temperature control process starts.

5.1.1.2 Ending the temperature control process

NOTE

When the temperature control unit is switched off, the thermal fluid temperature is higher/lower than room temperature
DAMAGE TO THE TEMPERATURE CONTROL UNIT AND THE GLASS APPARATUS/APPLICATION
- Bring the thermal fluid up to room temperature using the temperature control unit.
- Do not close shut-off valves in the thermal fluid circuit.

H13

The temperature control process can be ended at any time. Circulation is then switched off immediately.

PROCEDURE

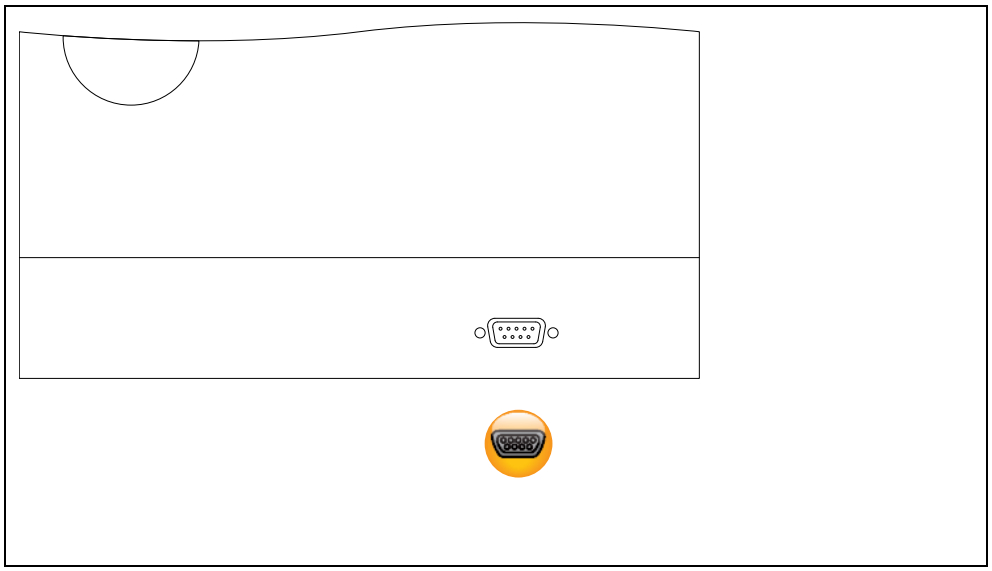
- Press the **>Start/stop key<** during circulation or temperature control modes. The temperature control process stops.

6 Interfaces

This chapter contains the following sections:

6.1 Interface at the temperature control unit (optional)

Interfaces at the Minichiller top side



6.1.1 Jack RS232

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

Pin assignment

Pin	Signal	Description
Wiring RS232		
2	RxD	Receive Data
3	TxD	Transmit Data
5	GND	Signal GND

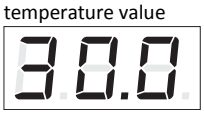
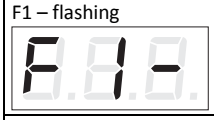
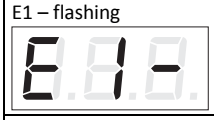
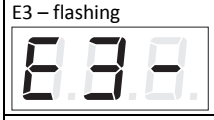
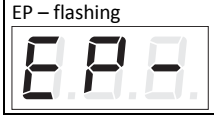
7 Service/maintenance

This chapter contains the following sections:

7.1 Display error messages

In case of malfunction alarms and warning messages are indicated through the display.

Overview of the menu items

Display	Cause	Effect, measurement
Flashing display of temperature value 	Warning: Over- or undertemperature.	**Thermoregulation continues.** Limit value from set point: Minichiller (Plus) – 5 K/+ 2 K Minichiller w (Plus) – 5 K/+ 2K Minichiller H (Plus) ± 5 K
F1 – flashing 	Malefunction sensor F1 Broken or short circuit	Thermoregulation is inactiv. (Pump off, compressor off, heating off) **Check the Sensor.**
E1 – flashing 	Inlet E1 indicates failure. No release-signal, level-alarm.	Thermoregulation is inactiv. (Pump off, compressor off, heating off) Check level. **Reset only possible if level ok.**
E2 – flashing 	Inlet E1 indicates failure. Pump is running and circulation is missing or pump is running and water pressure is missing.	Thermoregulation is inactiv. (Pump off, compressor off, heating off) **Reset only possible if disconnected from the power supply.**
E3 – flashing 	Even though thermoregulation is off, inlet E1 is indicating circulation.	Thermoregulation is inactiv. (Pump off, compressor off, heating off) **Failure is being reset if inlet E1 is open again in standby.**
EP – flashing 	Loss of data in parameter memory.	Thermoregulation is inactiv. (Pump off, compressor off, heating off)

INFORMATION

While the error message is displayed, the display changes constantly between the error message and the actual value.

7.2 Maintenance

HAZARD

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. G06

NOTE

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 Kaeltemaschinenbau GmbH.
- Maintenance work not described in this operation manual is reserved for qualified specialists trained by Huber.
- Carry out only the following maintenance activities on the temperature control unit. H16

7.2.1 Function check and visual inspection

Monitoring interval

Cooling*	Description	Maintenance interval	Comment	Person responsible
A	Visually inspect hoses and hose connections	Prior to switching on the temperature control unit	Replace leaking hoses and hose connections prior to switching on the temperature control unit.	User and/or operators
A	Inspection in accordance with the F-Gas Directive	In accordance with the F-Gas Directive	See page 15, section **»Temperature control units with 3 to 30 kg fluorinated greenhouse gases/natural refrigerant«**	User
A	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	Clean air inlet grille	As required	Clean air inlet grille with a damp cloth.	User
A	Thermal fluid inspection	As required		User and/or operators
A	Changing the thermal fluid	Weekly	See page 47, section **»Thermal fluid inspection«**	User and/or operators
A	Cleaning the thermal fluid circuit	Every 14 days	See page 47, section **»Cleaning the thermal fluid circuit«**	User and/or operators
A	Inspect mechanical seals (collecting container)	Monthly	See page 48, section **»Inspect the mechanical seal«**	User and/or operators
A	Check condenser fins	As required, after 3 months at the latest	See page 46, section **»Clean condenser fins (air-cooled temperature control unit)«**	User and/or operators
A	Inspect temperature control unit for damage and stability	Every 12 months or after relocation		User and/or operators
*A = Air cooling				

7.2.2 Clean condenser fins (air-cooled temperature control unit)

CAUTION

Manual cleaning
RISK OF BEING CUT ON THE CONDENSER FINS
- Wear suitable cut-resistant gloves for cleaning work.
- Use cleaning appliances such as vacuum cleaner and hand brush/brush.

V16

NOTE

Cleaning using pointed or sharp-edged tools
DAMAGE TO THE CONDENSER FINS
- Clean the condenser fins using suitable cleaning appliances.

H17

INFORMATION

Ensure an unhindered air supply (dissipation of waste heat, supply of fresh air) to the temperature control unit, for air-cooled units, maintain the wall clearance (see page 18, section **»Schematic illustration of the cooling variants«** and page 22, section **»Ambient conditions«**).
Dirt (dust) must be removed from the condenser fins time to time, only then can the circulator provide the maximum cooling performance.

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

PROCEDURE

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

- Switch off the temperature control unit. Do this by turning the **>Mains switch<** [37] to “0”!
- Disconnect the temperature control unit from the current supply.
- Remove the ventilation grille to create unhindered access to the condenser fins.
- Clean the condenser fins using suitable cleaning appliances.
- Make sure the condenser fins are not damaged or deformed, as this will impair the air flow.
- Re-mount the ventilation grille after cleaning work.
- Connect the temperature control unit to the power supply.
- Switch on the temperature control unit.

PROCEDURE

Ventilation grille on the underside (table-top units)

NOTE

Cleaning the underside of condenser units with the temperature control unit filled
DAMAGE CAUSED BY THERMAL FLUID PENETRATING THE TEMPERATURE CONTROL UNIT
- Before cleaning the condenser fins on the underside of the temperature control unit, drain the temperature control unit.

H18

- Switch off the temperature control unit. Do this by turning the **>Mains switch<** [37] to “0”!
- Disconnect the temperature control unit from the current supply.
- Drain the thermal fluid out of the temperature control unit. Further information can be found on page 38, section **»Draining externally open applications«**.
- Tilt the temperature control unit to remove the ventilation grille (if fitted) before the condenser fins.
- Clean the condenser fins using suitable cleaning appliances.
- Make sure the condenser fins are not damaged or deformed, as this will impair the air flow.
- Re-mount the ventilation grille after cleaning work.
- Connect the temperature control unit to the power supply.
- Refill the temperature control unit with thermal fluid. Further information can be found on page 36, section **»Filling and venting externally open application«**.

7.3 Thermal fluid inspection, replacement and circuit cleaning

The figure **»Thermal fluid replacement/inspection and internal cleaning«** can be found on page 5.

7.3.1 Thermal fluid inspection

7.3.1.1 Externally open application

To replace the thermal fluid, proceed as described on page 36 in section **»Externally open application«**. The draining and filling operations are described in this section.

7.3.2 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).
- Risk of slipping on dirt on the floor and around the workplace.

V07

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 cleaning agents.

H21

To avoid boiling delays with future usage (e.g. using a silicone oil at temperatures above approx. 100 °C), the internal components of the temperature control unit must be dried out.

PROCEDURE

- Drain the temperature control unit and the externally open application as described on page 38 in section **»Draining externally open applications«**.

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.

- Disconnect your externally open application from the **>Circulation flow<** [1] and the **>Circulation return<** [2].
- Connect the **>Circulation flow<** [1] with the **>Circulation return<** [2] to the temperature control using a bypass hose.
- **Fill** the system (minimum fill level) with the cleaning agent. The description can be found on page 36 in section **»Filling and venting externally open application«**.
- **Vent** the system as described on page 36 in section **»Filling and venting externally open application«**.
- **Start** the **circulation**. The time required will depend on the degree of contamination.
- **Stop** the **circulation**.
- Open the **>Drain<** [8] and draw off the cleaning agent through the drain hose into a suitable container (e.g. original canister that is compatible with the cleaning agent).
- Repeat the steps “fill”, “vent”, “start/stop circulation” and “drain” until the drained cleaning agent remains clear.
- Remove the bypass hose.

INFORMATION

Leave the **>Drain<** [8] open for a while to allow the cleaning agent to evaporate in the temperature control unit.

PROCEDURE

- After drying out, remove the drain hose and re-fit the knurled screw to the **>Drain<** [8].
- Remove the collection vessel and dispose of the contents in a proper manner.
- Clean your external open application.
- Re-connect your application.
- Fill the temperature control unit with thermal fluid, as described on page 36 in section **»Filling and venting externally open application«**.
- Vent the temperature control unit as described on page 36 in section **»Filling and venting externally open application«**. An externally open application does not need to be vented.
- Restart the temperature control unit in normal mode.

7.4 Cleaning the surfaces

NOTE

Exposed plug contacts
DAMAGE CAUSED BY FLUID INGRESS
- Protect unused plug contacts with the protective caps supplied.
- Clean surfaces damp.

H22

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.

7.5 Inspect the mechanical seal

NOTE

No visual inspection of the collecting container
DAMAGE INSIDE THE TEMPERATURE CONTROL UNIT CAUSED BY OVERFLOW FROM THE COLLECTING CONTAINER
- Inspect the collecting container on a monthly basis and drain as required.

H23

Because mechanical seals are never completely tight, drips can be expected to form on the mechanical seal when using thermal fluids that barely evaporate. These drips are collected under control. The collecting container must be regularly checked and drained as required (see page 45, section **»Function check and visual inspection«**).

7.6 Plug contacts

NOTE

Exposed plug contacts
DAMAGE CAUSED BY FLUID INGRESS
- Protect unused plug contacts with the protective caps supplied.
- Clean surfaces damp.

H22

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

7.7 Decontamination/repairs

CAUTION

Sending un-decontaminated temperature control units in 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.
- A pre-prepared return slip is available for download at www.huber-online.com.

V19

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

8 Shutting down

This chapter contains the following sections:

8.1 Safety instructions and basic principles

HAZARD

Connection/adjustment to the power supply not carried out by an electrician and/or connection to power socket without protective earth (PE)
MORTAL DANGER FROM ELECTRIC SHOCK
- Have the connection/adjustment to the power supply carried out by an electrician.
- Connect the temperature control unit only to power sockets with protective earth (PE). G07

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 supply cable over **3 m** long. G02

WARNING

Risk of tipping due to unstable temperature control unit
SERIOUS INJURY AND PROPERTY DAMAGE
- Avoid the risk of tipping due to unstable temperature control unit W05

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).
- Risk of slipping on dirt on the floor and around the workplace. V07

CAUTION

Hot or very cold thermal fluid
SERIOUS BURNS/FREEZING OF LIMBS
- Before starting the draining process, you must make sure that the thermal fluid has been brought to 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.
- Close **>Drain valve<** [4] by turning clockwise (by 90° to the right up to the stop).
- Caution: risk of combustion when draining thermal fluid at temperatures over 20 °C.
- Wear your personal protective equipment when carrying out the drainage operation.
- Drain only using suitable drain hose and container (must be compatible with the thermal fluid and the temperature). V14

INFORMATION

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

8.2 Switch-off

PROCEDURE

- **Turn >Mains switch<** [37] to “0”.
- Disconnect the temperature control unit from the power supply.

8.3 Packing

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

8.4 Shipping

NOTE

Temperature control unit transported in a horizontal position
DAMAGE TO THE COMPRESSOR
- Only transport the temperature control unit in an upright position. H28

NOTE

Temperature control unit transported incorrectly
PROPERTY DAMAGE
- Do not transport by truck on the castors or feet.
- Observe all specifications in this section to prevent damage to the temperature control unit. H31

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.

8.5 Disposal

⚠ CAUTION

Uncontrolled or incorrect opening of the refrigerant circuit
RISK OF INJURY AND ENVIRONMENTAL DAMAGE
- Work on the refrigerant circuit and disposal of the refrigerant must be carried out by approved refrigeration/air-conditioning system contractors.
- Also observe page 15, section **»Temperature control units with 3 to 30 kg fluorinated greenhouse gases/natural refrigerant«**. V23

NOTE

Improper disposal
ENVIRONMENTAL DAMAGE
- Spilled/leaked thermal fluid must be discarded immediately and correctly.
- To prevent damage to the environment, have disused temperature control units discarded only by approved disposal companies (e.g. refrigeration/air-conditioning system contractors).
- Also observe page 15, section **»Temperature control units with 3 to 30 kg fluorinated greenhouse gases/natural refrigerant«**. V25

8.6 Telephone numbers 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.

8.6.1 Telephone number: Customer Support

Belgium | Europe: +32 4 364 20 50
USA | North Ameriac: +1 862 209-4680

8.6.2 Telephone number: Sales

Belgium | Europe: +32 4 364 20 50
USA | North America: +1 862 209-4680

8.6.3 Email adress: Customer Support

Belgium | Europe: custsupport@diagenode.com
USA | North America: custsupport.na@diagenode.com

8.6.4 Email adress: Technical Support

Belgium | Europe: techsupport@diagenode.com
USA | North America: techsupport.na@diagenode.com

8.7 Certificate of Compliance

Please read page 49, section **»Decontamination/repairs«**.

9 Annex

Technical data sheet
Replacement part list
Connection diagram

Water Cooler

Chiller with air-cooled refrigerating unit and circulation pump. Evaporator (cooler), tank and housing of stainless steel. Pressure-suction pump made of industrial plastic material. Digital Temperature adjustment and digital temperature display. Level indicator with sight glass.

Special Case: Acetone and Polyglycol: The plastic pump is not resistant against acetone and polyglycols (depending on the manufacturer). It is recommended that water is mixed with either glysantine or ethylene glycol for freeze protection. A more resistant plastic is available on request at an additional cost.

MPC-Controller:
Modern and easy to use microprocessor controller with a large temperature display.
Limited to essential functions only:
* Large temperature display
* LED indicators for pump, cooling and heating
* Simple operation using only 3 keys

Technical data according to DIN 12876

Operating temperature range	-20...40 °C
Temperature adjustment	digital
Temperature indication	digital
Internal temperature sensor	Pt100
Resolution of display	0,1 K
Temperature stability at -10°C	0,2 K
Safety classification	Class I / NFL
Cooling power	
at 15°C	0,3 kW
at 0°C	0,2 kW
at -10°C	0,14 kW
at -20°C	0,07 kW
Refrigeration machine	air-cooled, natural refrigerant
Refrigerant	R290
Refrigerant quantity	0,04 kg
Circulation pump	Pressure- and suction pump
max. delivery	20 l/min
max. delivery pressure	0.2 bar
max. delivery (suction)	17 l/min
max. delivery pressure (suction)	0,18 bar
Pump connection	G 1/4" female thread
min. filling capacity	1,4 l
Volume of expansion	2,6 l
Overall dimensions WxDxH **	225x360x380 mm
Net weight	23 kg
Power supply requirement	230V 1~ 50/60Hz
max. current	2,8 A
Fuse (1 phase)	4 A
min. ambient temperature	5 °C
max. ambient temperature	40 °C

Order-No.: 3006.0054.99

from Serial-No.: 170661 **1.0/12**

Technical details and dimensions are subject to change. No liability is accepted for errors or omissions.

Accessories and periphery: Hose coupling nom. dia. 8*/12*, sleeve nuts thread M16x1*, cover expansion tank*, drain valve, connection tubes
* standard equipment

Output data valid for: Room temperature 20°C
in accordance with EN60034-1 the following voltage and frequency tolerances are valid:
Voltage + / - 5% with a simultaneous frequency tolerance of + / - 2%
Example -5% voltage and +2% frequency -> not allowed!
-5%voltage and -2% frequency -> allowed.

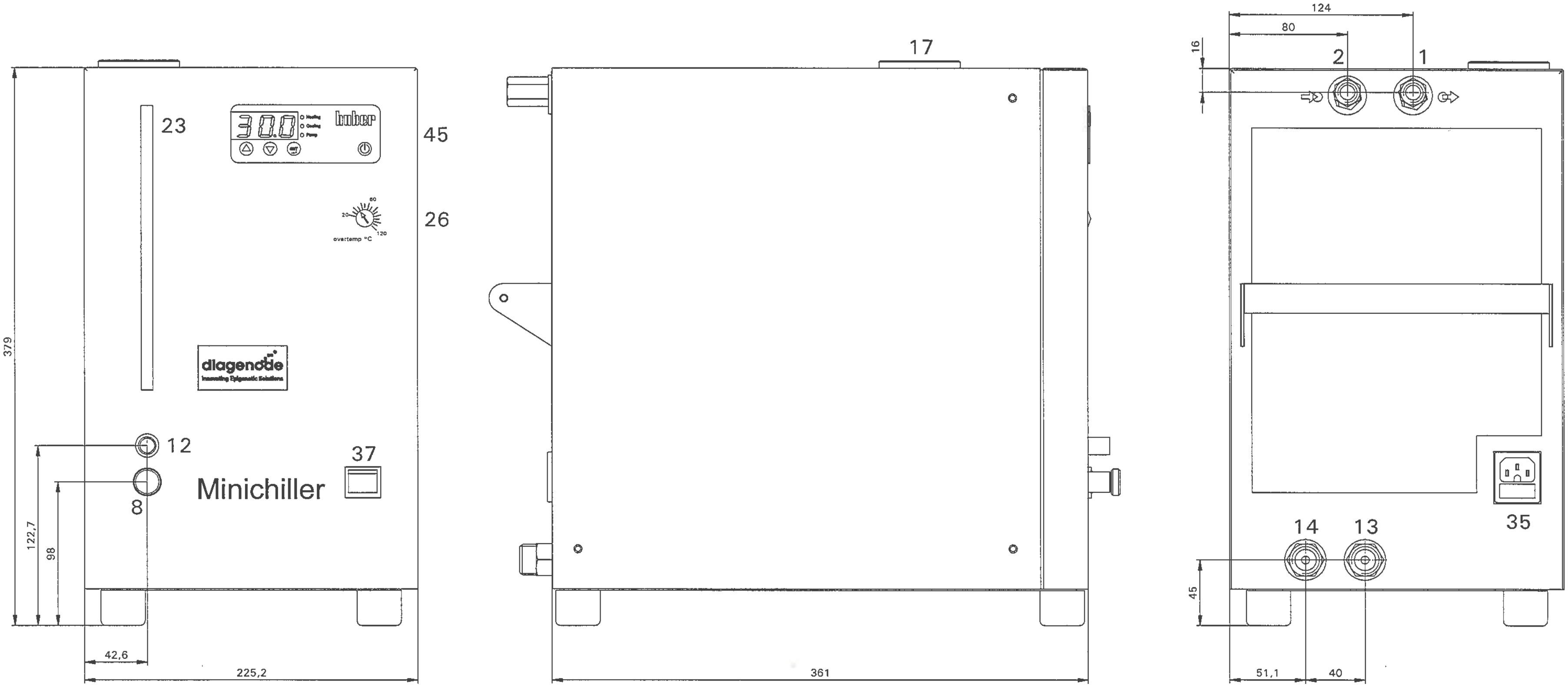
** Please respect space requirements. See operating conditions at **www.huber-online.com**

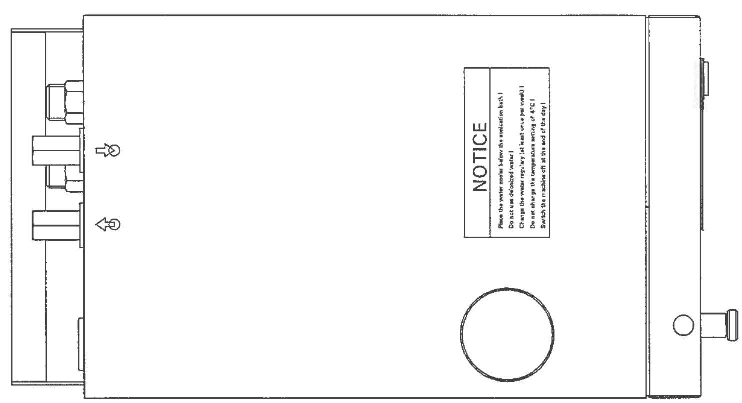
Parts list BAL complete GB Part number: 3006.0054.99

ETL GB

Equipment	BMK	Part number	Quantity	Designation	Function
	23	15634	1	Fluid level display	Fluid level display
	A122	36300	1	Temperature controller	Huber Temperature controller ST122
	AV2M3	0162	1	SCHRADER VALVE	service connection Suction side
	B4M3	25253	1	Dampfdom complete	Fluid seperator
	C0M3	0144	1	Capacitor	Starting condensor
	DO12M3	45704	1	injection capillary tube Minichiller	Capillary tube
	F5M3	35814	1	Pressure switch	Pressostat HD-limiter;HT-stage HD-limiter
	FT1M3	0727	1	Dryer	Filter-dryer
	H1	5887	1	ILLUMINATION F. Sight glass	Sight Glass Light
	KAM3	32322	1	Start up relay	Start up relay Compressor
	KM3	54569	1	power relay	Relay Compressor
	M1	50801	1	motor	Pump motor
	M3	32173	1	Compressor	Compressor;Compressor
	M10.1	1923	1	Fan	Fan Condenser;Fan Condenser
	RF1	5376	1	Sensor	Sensor Fluid outlet;sensor Internal Fluid outlet
	S1	1329	1	Rocker switch (black)	Machine switch
	W3M3	50252	1	Condenser	Condenser
	W7M3	15907	1	boiler minichiller	Evaporator
	XBU7	5598	1	built in test connector with Fuse	machine plug
	XBU7-F26	1589	1	Fuse	
	XY1M3	1766;1767;3205;3206	1;1;2;2	Socket case Mate-N-Lok;Pin cover Mate-N-Lok;Sockets;Pin	Plug Solonoid valve
	Y1M3	18844;13599	1;1	Magnet coil applicable;Solonoid valve	Solonoid valve Power adjustment;Solonoid valve Intermediate injection

+D/1	<<= Rückblatt	Heizleistung: ---	Peter Huber Kältemaschinenbau GmbH	minichiller Bioruptor Edition	Diese Zeichnung darf ohne Genehmigung der Geschäftsleitung weder kopiert noch Dritten zugänglich gemacht werden.	Folgeblatt =>>
Datum		Temperaturbereich: -20°C....+40°C		230V 1~ 50/60Hz		ab Sn Nr.: 170661/12
Bearb.	HJ	Seitenbennung:				bis Sn Nr.:
Gepr.	29.11.2012	ETL GB				Zeichnungs Nr.: 3006.52 Bl. 1
Norm						Index: 1 Bl.
Rev.				K:\Projekte\Huber\Minichiller\3006.0054 minichiller Bioruptor Edition\minichiller Bioruptor Edition_170661-.elk		





1 Umwälzung Ausgang
2 Umwälzung Eingang
8 Entleerung
12 Überlauf
13 Kühlwassereingang (nur w)
14 Kühlwasserausgang (nur w)
17 Einfüllöffnung
23 Schauglas
26 Übertemperaturschutz
35 Netzanschluss
37 Netzschalter
45 Regler

1 circullation flow
2 circulation return
8 drain
12 overflow
13 cooling water inlet (only w)
14 cooling water outlet (only w)
17 filling port
23 sight glass
26 overtemperature protection
35 power supply
37 mains switch
45 controller

Pos.	kommt vo	Anweisung	Änderung	Geändert
x	x		x	x

Genauig-keitsgrad	über 0,5 bis 3	über 3 bis 6	über 6 bis 30	über 30 bis 120	über 120 bis 400	über 400 bis 1000	Allg. Toleranzen DIN2768-fH
fein(f)	± 0,05	±0,05	±0,1	±0,15	±0,2	±0,3	Oberflächen
mittel(m)	± 0,1	±0,1	±0,2	±0,3	±0,5	±0,8	nach DIN1302

M 1:5 — Format A2

Werkstoff		Ersatz für	x	gez.	Zeichnungsnummer A3006.05
Zuschnitt	3006.0054.99	Ersatz durch	x	gepr. x	
Stück	170661	Stanzen Pr.	324733		Verwendung für Minichiller Bioruptor Edition
Ident.Nr		Kanten Pr.	0	Solid Edge	

Anschluss-Skizze
x

Geprüft TK ✓

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