OPERATING INSTRUCTIONS

Nuevo

25 April 2007

Valid for:

Unistat 645w, 680w
Unistat 950w

Contents

Foreword

Dear Customer,

The Huber team would like to thank you for ordering this product. You have made a good choice. We thank you for your trust!

Please read and understand the instruction manual thoroughly before operating the unit. All instructions and safety information must be complied with.

Please read this manual before transporting, commissioning, operating, maintaining, repairing, storing or disposing of this unit.

Failure to comply with the instructions within this manual may invalidate any warrenty for this unit.

Chapter 1: Safety

In this chapter is to be found the following sections:

- Correct use and general safety information
- Description
- Obligations of the responsible person
- Requirements for the operating personnel
- Responsibilities of the operating personnel
- Working area
- Safety systems according to DIN 12876
- further protective systems
- Environmental conditions
- Experiment planing
- setting up
- Thermofluids

Description of Safety and Information symbols

Safety information is shown with a pictogram and keyword. The keyword indicates the level of the corresponding danger.

Danger! — **Immediate** risk to the life and health of personnel (Serious injury or death).

Warning! — **Possible** risk to the life and health of personnel (Serious injury or death).

Caution! — **Possible** dangerous situation (possible injury to personnel or damage to property).

Information! — User-tips and other useful information.

Requirement! — Requirement to carry out a specific method, or action, for safe machine operation.

Intended Use and General Safety Instructions

The machine is NOT suitable for use in "ATEX" areas!
The device is NOT approved for use as a medical product!

No third persons are authorised to make any changes to the machine. No explanations will be entertained for any changes that have not been done by us.
Only expert persons trained by us are authorised to make any changes, repairs or maintenance jobs on the machine.

 **Danger!**
Non-intended use can result in considerable personal injuries and material damage.

The tempering device is manufactured for commercial use and may **only be used for temperature control of closed systems**, e.g. of reactors or other professionally expedient objects in laboratories and industry. Suitable thermal fluids for closed systems are used throughout the complete system. The refrigerating or heating capacity is provided at the pump connections. The technical specifications of the tempering device are determined in data sheet. Preparation and operation must be carried out according to the operating instructions. Any non-observance of the operating instructions is considered as non-intended use.
The tempering device corresponds to the state-of-the-art and the recognised safety-related regulations. Safety devices are built into your tempering device.

The following must be observed:
Always use the machine in a perfect working condition!
Only expert personnel may initially start-up and repair the device!
Do not bypass, bridge-over, dismantle or switch off the safety mechanisms!

 The manufacturer is not liable for damages caused by technical changes to the tempering device, inappropriate handling and/or use of the tempering device without regard to the operating instructions.

Predictable misuse:

Activate the brakes for machines with rollers or roller support.

Use of improper hoses or hose joints can cause heat-related damages to persons or the environment. Tempering hoses and their cross-overs must be insulated and/or protected against human contact/ mechanical load.
A bad circulation results when using tempering hoses with too small cross section and/or too long corrugated hoses or other fittings, which cause high pressure loss. These and other losses lead to reduction in refrigerating or heating output on the object to be tempered. Therefore when designing/installing the system make sure, that pressure losses are as low as possible. Please take the inner diameter of the pump connections as a guiding value. In case of doubt, please do not hesitate to contact us.

Incorrect thermal fluids can result in damages.
Only use thermal fluids, that we have recommended and only in the indicated temperature range.
While filling, the thermal fluid should be filled in slowly and evenly at room temperature. At the same time ensure that no liquid overflows (back pressure); personal protection equipment e.g. eye protection, thermally and chemically resistant protective gloves etc., must be worn.

After filling and adjusting all necessary parameters, the tempering device equipment must be vented and degassed if necessary (see also the section Exchanging Thermal Fluid). This procedure can possibly take several hours, is however a precondition for perfect operation of the tempering device and therefore for its use.

In the case of pressure sensitive applications, e.g. glass reactors, observe the maximum flow pressure of the tempering device during cross section reduction or shut-off (see data sheet). Take appropriate precautions.

In order to prevent the hazard of over pressure in the system, the thermal fluid must always be adapted to the ambient temperature before switching off and possibly available shut-off valves must remain open (pressure compensation).

The temperature and the dynamics in the interior of the reactor are determined by the flow temperature. A temperature differential (Delta T) between flow temperature and temperature within the reactor forms. This temperature differential must be limited if necessary, depending upon application, since the temperature differential can exceed permissible limit values. Adjust the Delta T value to your application; the instructions can be inferred from the section main and submenu items.

An inert gas superposition of the expansion container may not exceed 0.1 bar.

The Unistat Control (Controller) is located in the control cabinet and is operated by a control line from the Unitstat Pilot. The length of the control line may not be arbitrary changed. The Unistat Pilot may only be used indoors.

The equipment contains pressure devices in terms of the Pressure Equipment Directive 97/23/EEC. Only competent or appropriately trained personnel may carry out maintenance and service tasks.

Description

This Unistat is an **extremely dynamic tempering device,** which **is only** designed for **externally closed applications**. In comparison to conventional bath and hydraulically sealed thermostats, is tempering device is not equipped with an internal bath.

The **low inherent volume**, combined with **high performance refrigerating and heating technology** achieves, in comparison to conventional bath and hydraulically sealed thermostats, appropriately **short refrigerating and heating rates.**
In place of a tempering bath, which takes up the expansion of the thermal fluids in conventional bath and hydraulically sealed thermostats in dependence on the temperature, the device is equipped here **with a passively temperature-controlled expansion tank.**

With the help of the **self-optimising optimising cascade controller,** you can achieve **optimal control results** during activation behaviour/deactivation behaviour both **in the case of set value changes** as well as **during exothermic reactions**. You can alternatively control the temperature either aperiodically or with a slight overshoot (faster).

The **large graphic display (with touchscreen)** allows you to comfortably read information and temperature patterns as well as to accomplish inputs.

A **convenient menu navigation** facilitates use of the tempering device.

The **standard equipment, e.g. digital interfaces RS232 and RS485, the analogue 4…20mA current interface and various digital input/output control options (all according to NAMUR)**, permit integration of the tempering devices into many automatic laboratory systems.

The **removable control unit (Unistat Pilot)** can also be used as a **remote control**.

A **Pt100 connection (according to NAMUR**) enables you to accomplish **external temperature control tasks** without problems.

The **integrated temperature ramp function** as well as the **internal temperature programmer** underlines the high degree of control convenience. The integrated programmer offers the option of creating and calling 10 different tempering programmes each with max. 99 steps.

The tempering devices are equipped with **an overtemperature protection, which is independent from the control system according to DIN EN 61010-2-010**.

Duties of responsible person

 **Warning!**

Thoroughly read and understand the instruction manual before operating the unit. Please pay special attention to the safety instructions and precautions. Wear appropriate Personal Protective Equipment as required e.g., safety glasses, gloves, and safety boots.

Operator requirements

The instruction manual should be kept close to the temperature control unit.
Only authorised, qualified personnel should operate this unit. Personnel should be properly trained before operating the unit. Make sure that the operators have read and understood the instruction manual.

The minimum age for operators is 18 years. Personnel under 18 years should only operate the unit under the direct supervision of qualified personnel.

Machine operator duties

Only authorised, qualified personnel should operate this unit. Personnel should be properly trained before operating the unit. Make sure that the operators have read and understood the instruction manual.
The minimum age for operators is 18 years.
The operator is solely responsible for operating the unit.
The operator must be suitably qualifield.

Work area

It is the customer's responsibility to ensure a clear, safe working area around the temperature control unit. The arrangement of the work area should be made after considering access to, and risk assessment of, the area and application.

Safety systems according to DIN12876

- Low level protection.
- Adjustable over temperature protection.

Tabel 2 - Classification of Laboratory Thermostats and Baths

Classification	Thermal Fluid	Technical requirement	Designation [d]
I	Non-Flammable [a]	Overtemperature cut-off [c]	NFL
II	Flammable [b]	Adjustable overtemperature cut-off	FL
III		Adjustable over temperature cut-off and extra low-level switch	

[a] Normally water; other fluids only when they are non-flammable in the event of a single failure

[b] The thermal fluid must have a flame point ≥ 65°C, this means that ethanol can only be used under constant supervision

[c] The over temperature protection can for example be provided by a fluid sensor or a suitable over temperature switch.

[d] Determined by the manufacturer.

Your thermostat has the type classification III/FL

Electronic over temperature protection.

This thermostat is fitted with an electronic over temperature protection. A temperature sensor is fitted for the fluid outlet temperature as well as for the temperature of the expansion vessel. For each sensor there is a comfortable input possibilty for the trip temperature.

It is no longer required to use a tool to adjust the tripping value for the over temperature protection. Instead of thise, now a software tool is used A change to the over temperature trip temperature can only take place after a random number code has been successfully confirmed. Like when using the mechanical tool, an accidental change of the values cannot take place.

Also new is the operating function "**Process safety**". The background to this mode is the wish for an extended protection of the operator and the system. In the classical protection systems, when the over temperature trip value is reached, the system shuts

down. As the over temperature protection trip value lies generally above the control set point, activation means that possibly more heat energy has been brought into the system (e.g. exothermic reaction) than the machine can cool down. By switching off the thermostat under these conditions, the only possibility of removing the heat has been eliminated. The temperature can thus rise further in an uncontrolled manner, and cause possible damage to the system components due to high temperatures, or cause bursting of the material used, or due to a phase change from fluid to gas give danger of explosion with its subsequent effects.
With the operating mode "**Process safety**", the controller recognises that the temperature has reached the trip value, but then instead of stopping, it turns on the cooling. A pre-condition of this operating mode is that **Compressor automatic** is turned to ON (compressor always on). Even when the temperature climbs higher, the refrigeration system will use its maximum power to try to keep the heating as small as possible.

Additional Protection Devices

Autostart function
Alarm function
Warning messages
General unit messages

 **Danger!**
Emergency Procedure: Disconnect Electrical Power!
The Mains Isolator switch is on the rear of the machine.
Turn the Mains isolator to "0" – OFF.

Dangerous liquid/vapours from temperature control unit or connected hoses (very hot, very cold, dangerous chemicals).
Evacuate the area, following local regulations and procedures to prevent injury or loss of life.
Refer to the MSDS Safety information for the thermal fluid concerned.

Ambient Conditions


Use of the tempering device is only permissible under normal ambient conditions according to EN 61010-1:200:

- Installation up to an altitude of 2000 a.S.;
- Underground firm, level and anti-slip, do not install on a combustible underground;

- Wall and ceiling distance for sufficient air exchange (heat dissipation, fresh air supply for the tempering device and work area), min. 1 m;
- Ambient temperature minimally 5°C to maximally 40°C; Compliance with the ambient conditions is absolutely necessary for failure-free operation;
- Maximum relative air humidity 80% for temperatures up to 40°C;
- Short distance to supply connections;
- The tempering device may not be installed in such a way, that access to the separation unit (to mains) is more difficult or hampered;
- Mains voltage fluctuations not more than ± 10% of the rated voltage;
- Transient overvoltages as they usually occur in the supply mains;
- Applicable degree of pollution: 2;
- Overvoltage category II;

Operating conditions


Please make sure that the application and system performance is dependent upon the temperature range, viscosity, and flow rate of the thermal fluid.

Please note that water, or an antifreeze/water solution should not be used as a thermal fluid.
Please make sure to select a thermal fluid that is not only suitable for the maximum and minimum operating temperatures, but has appropriate viscosity, flash point, and freezing point. The fluid should be compatible with all materials in the fluid loop and application.
Pay attention to the pressure drop in the hoses at the lowest operating temperature. The unit should be located in a ventilated area, with sufficient flow of fresh air. The hose connections should be suitable for the thermal fluid and operating temperatures being used.
The pressure drop in the hoses is determined by the hose length, diameter, and the fluid viscosity at the lowest temperature. The bore and size of hose connections, valves, etc can also cause significant flow resistance.
Please make sure the electrical connection is of the correct size.

For water-cooled units please pay special attention to the maximum operating temperature and differential pressure requirements for the cooling water, which are given in the specification sheet.


Danger!
If the cooling water contains high levels of minerals, e.g. chloride, bromide then suitable water treatment chemicals should be used. Use only recommended materials to maintain the unit warranty. Further information on corrosion, (appearance and avoidance) can be found on our website, www.huber-online.com .

Please refer to the sections on operating requirements and general safety precautions.

Location

Caution!

Transport the unit upright.
The unit should be mounted in an upright and secure position, on a solid, stable surface.
Keep the area around the unit clean, to avoid slip and trip hazards.
Set the brakes on the castors once the unit is in position.
Place suitable absorbent material under the unit to catch any condensate and thermal fluid spills.
Any spillage of thermal fluid should be immediately be cleaned up.
For large units, check the weight/load capacity for the flooring.

Thermofluids

We recommend the thermal fluids shown in our catalogue. The name of a thermal fluid is derived from the working temperature range and the viscosity at 25°C.

Examples of thermal fluids in our catalogue:

M40.165.10:

- Lower working limit -40°C
- Upper working limit 165 °C
- Viscosity at 25 °C: 10 mm^2/s

P20.275.50:

- Lower working limit +20 °C
- Upper working limit 275 °C
- Viscosity at 25 °C: 50 mm^2/s

The data sheet for the thermal fluid used is of utmost importance, and must be read before use and the data followed.

- Please note the classification of your machine according to DIN 12876
- The chosen thermal fluid must be compatible with stainless steel 1.4301 (V2A) and Viton !

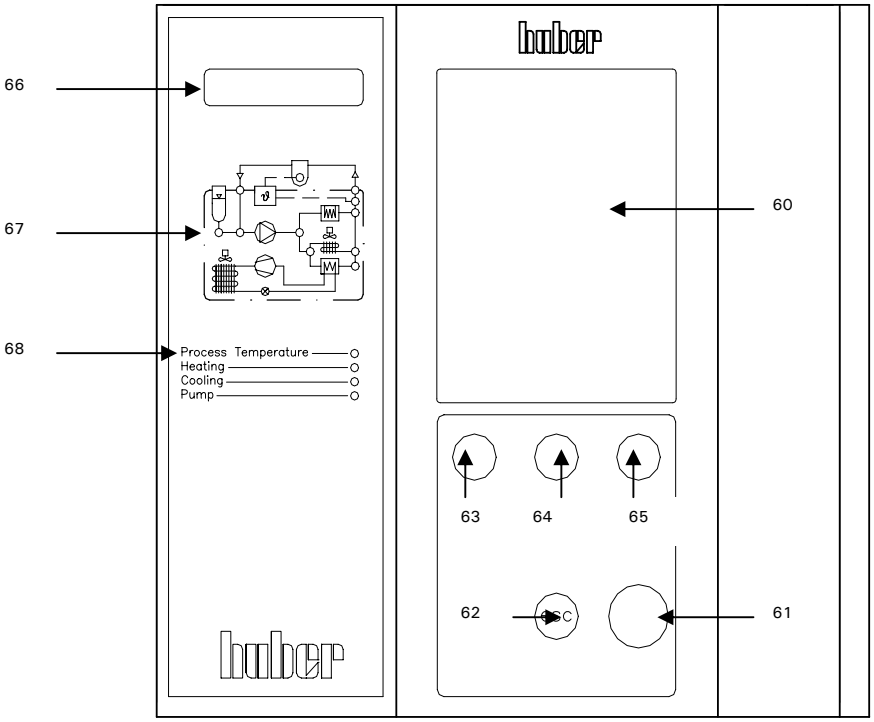
- The maximum viscosity of the thermal fluid may not exceed 50 mm^2/s at the lowest temperature reached!
- The maximum density of the thermal fluid may not exceed 1kg/dm^3
- We recommend inert gas overlay! For this we offer in our Huber catalogue a sealing set (Order number 6523)

Chapter 2: Electronics and operation

The following sections are to be found in this chapter:

- Unistat Control and Unistat Pilot
- Display instruments
- Real time clock
- Operation
- Operation via keys or rotary selector.
- Operation via the number field.
- Main menu points.
- Main menu and sub menu points.
- Function numbers and meanings.
- Working with the programmer.
- User menu configuration.
- Choosing the user menu.
- Factory reset.

Unistat control and Unistat Pilot



60) Touch screen and graphic display
61) Key and rotary knob
62) ESC key
63) Key 1 (Soft-key 1)
64) Key 2 (Soft-key 2)
65) Key 3 (Soft-key 3)
66) LED temperature display
67) LED flow diagram
68) LED status display

Information Displays

The following information displays are available:

1. Graphical display (60)
2. LED temperature display (66)
3. Schematic diagram (67)
4. LED status display (68)

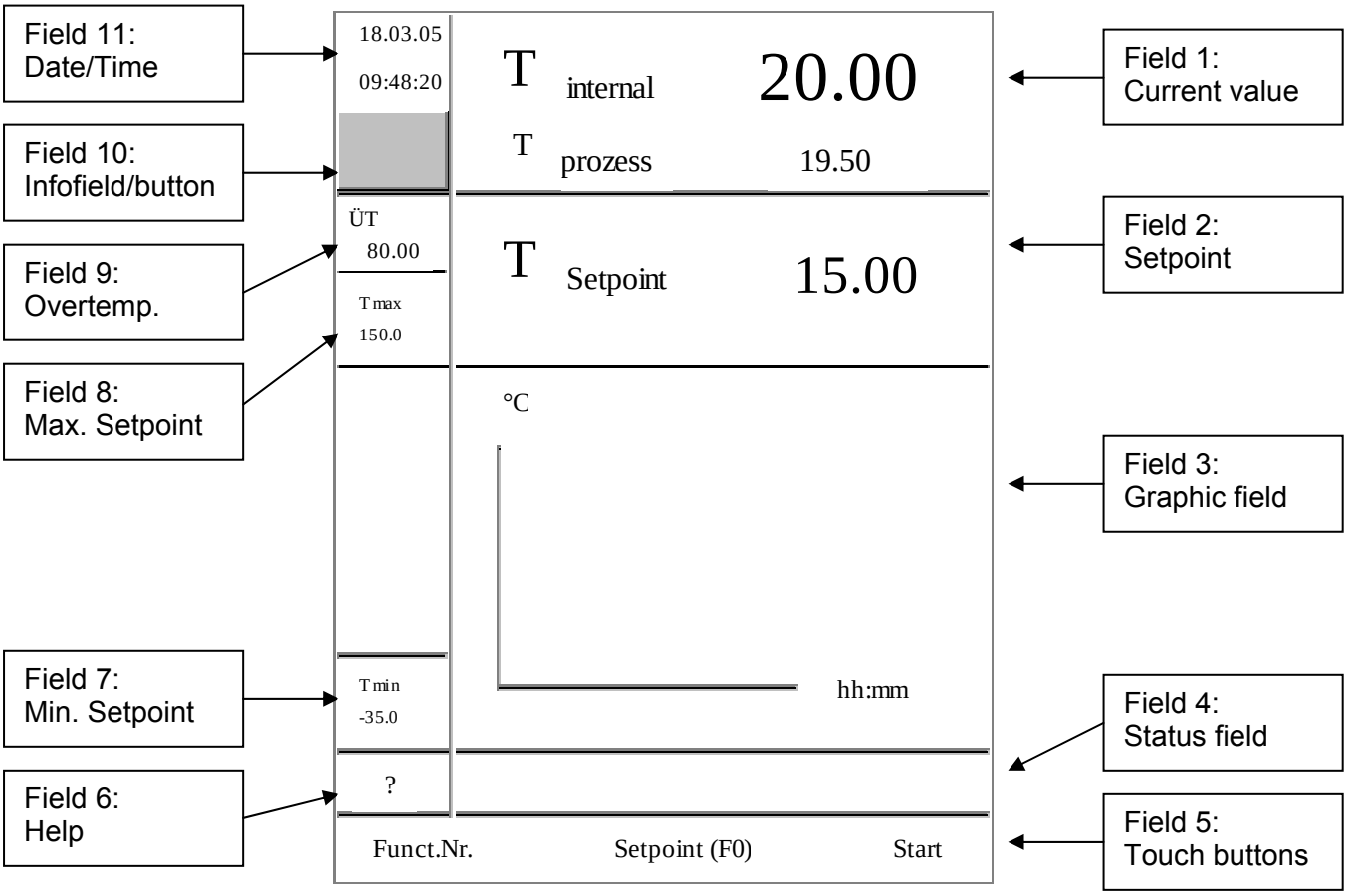
1. Graphical display (60)
The most important display, giving details of standard parameters (setpoint, current temperature, setpoint limits), as well as menu options and error messages.

2. LED temperature display (66)
The red LED display shows the current overtemperature limit. Please note that if the temperature of the Unistat reaches this value, the unit will perform a safety cut-off.
The green LED display shows the current temperature, being controlled. Please note that in internal control mode the internal temperature will be shown, and in process (external) control mode the process temperature will be shown.

3. Schematic diagram (67)
The current status of the Unistat (circulation, cooling, heating, control mode) is indicated by the position of the lit LEDs.

4. LED status display (68)
These LEDs summarise the status information shown in the schematic diagram, 3 above.

Screen display (this display is reached by selecting Main Menu/ Display Mode/ Graphic)



Information display fields: Field 1, Field 3, Field 4, Field 9

Input / Output fields: Field 2, Field 5, Field 6, Field 8, Field 10, Field 11

Please refer to the "Operation" chapter for operating information and details.

Description of individual Fields:

Field 1: Displays Current value
This field shows the current internal temperature of the unit and, if an external sensor is connected, the current process temperature.

Field 2: Enter/display Setpoint
This field displays the current setpoint. Lightly touch this field on the touchscreen to enter a new setpoint.

Field 3: Graphic temperature display
This field shows the internal and process temperatures in graphical format. The span of the temperature axis is between the minimum and maximum setpoint limits. (See fields 7 and 8).

Field 4: Status Field
This field shows useful information such as the current temperature control mode (internal or process), unit operations (degassing, air-purging) and active control loops.

Field 5: Touch buttons
This field enables various functions. The Function Number menu can be displayed by lightly touching the "Funct.Nr" area of the screen. Please refer to the "Function Numbers and Definitions" chapter for more details.

Pressing the "Tset F(0)" area of the screen will bring up the option to enter a new setpoint, exactly the same as touching Field 2.

Pressing the "Start" area (5) of the screen will bring up the "Start and Stop" menu. This menu allows the temperature control, air-purging, circulation and degassing to be started as required. After an operation, the menu will return to the standard screen. By pressing the "Start" area again, any operations previously started may be stopped.

Please note that the operations above can be performed by pressing the Softkeys (53, 54, 55) located directly under the relevant touchscreen buttons.

Field 6: Help
Help and trouble-shooting information will be displayed by lightly pressing the "?" in this field.

Field 7: Enter /display Minimum setpoint
This field displays the current minimum setpoint limit. Lightly touch this field on the touchscreen to enter a new minimum setpoint limit, in the same way as Function F 1 in the Funct Nr menu. The minimum setpoint also serves as the lower temperature limit for the graphic temperature display, in Field 3.

Field 8: Enter /display Maximum setpoint
This field displays the current maximum setpoint limit. Lightly touching this field on the touchscreen to enter a new maximum setpoint limit, in the same way as Function F 2 in the Funct Nr menu. The minimum setpoint also serves as the upper temperature limit for the graphic temperature display, in Field 3.

Field 9: Overtemperature display
This field displays the current setting of the overtemperature cut-off. Please note that this value can only be changed through the main menu. Please refer to the "setting overtemperature" chapter.

Field 10: Alarm and Warning message display
This field displays information on any alarm or warning conditions that are present. Alarm and warning messages are also immediately displayed as text in the graphic display. Once the text message is acknowledged a symbol will be shown in Field 10. A "Stop" sign indicates the presence of an alarm message, a "warning" triange (black exclamation mark on a yellow triangle) indicates the presence of a warning message. By lightly touching the symbol on the touchscreen, a list of the stored messages will appear in place of the graphic display. The messages are stored and displayed in time/date order.

Field 11: Enter/display Date and Time
This field displays the current date and time, stored in the unit. Lightly touch this field on the touchscreen to change the date and time.

Real-time Clock

The Unistat Pilot is equipped with an internal, battery-powered clock that runs even when the unit is turned off. When the unit is powered up, the actual date and time are uploaded to the unit. The capacity of the battery means allows the clock to continue to run for a number of months. If a unit has been powered-down for an extended time, it should be powered-up and left for an hour or so before running it again. If the time and date have been lost, they can be re-entered during this period.

Event Function
The clock has a programmable event function. Using this function an operation can be set to run every day (until the function is reset in the operator menu). There are two available operations:

Audible tone
The unit will generate an audible tone for about 15 seconds

Program Start
When configuring the calendar to start a program, the user will be asked for the number of the program to be started. The program will then be started at the set time and date, even if (manual) temperature control had not been previously started.

Operation

Please note, there are multiple possibilities to operate the machine.
Complete operation of the machine is possible even without the touch screen (60)

1. **Operation via touchscreen (60)**
2. **Operation via function keys T1 bis T3 (63, 64, 65)**, together with information given in the lowest line of the graphic display (60).
3. **Operation via the rotary selector (61),** together with the information given via the graphic display (60).

Note that the operational possibilities given give above can be used in virtually any combination.

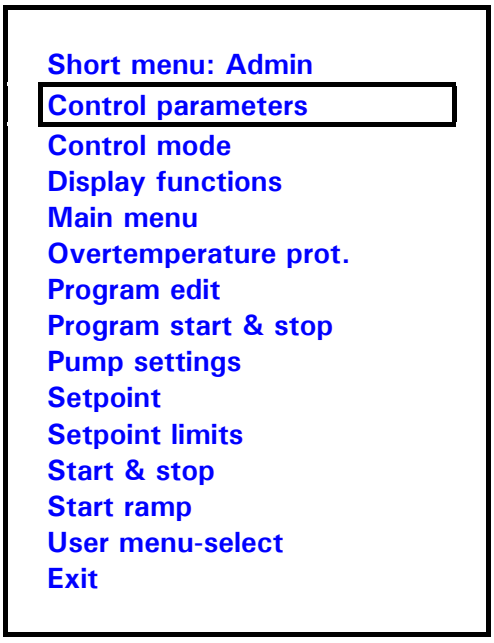
To 1. Operation using the Touch screen (60)
One can activate the function with a light finger pressure on the blue displayed text fields, e.g. T setpoint. A display change is also connected to this. By turning the rotary selector (61) one can change the setpoint. Note the OK field in the touch screen. A light finger pressure on the OK field confirms the input. One then returns to the output display.

To 2. Operation using the function keys T1 to T3 (63, 64, 65), together with information given in the lowest line of the graphic display (60).
Pay attention to the information displayed above the function keys T1 to T33 (63, 64, 65). Activating the notice takes place by pressing the associated key.

To 3. Operation using the rotary selector (61) together with information displayed via the graphic display (60).
By pressing the rotary selector (61) one enters the main menu. Choose the function required by turning the rotary selector (61). Confirm the input by pressing the rotary selector (61).

Please note that the procedure presently being chosen can be broken off by using the ESC-key (62), and one then returns to the display which was selected under "Display functions" from the main menu.

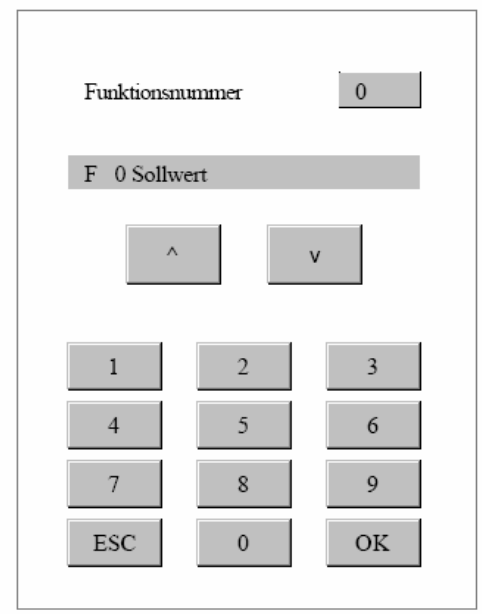
Operation using the rotary knob (61)



Once the rotary knob (61) has been pressed, the short menu appears on the display screen. This menu lists the most commonly used options in alphabetical order. Turn the knob to highlight the required function and then press the knob to activate that function. An overview of these menu options is given in the “main menu” chapter.

Please note that selecting “main menu” will bring up the full list of available functions. Selecting the “short menu” from the main menu will bring up the reduced menu again.

Operation using the simulated Number Pad



Pressing the “Funct.Nr” area at the bottom of the graphic display (60) will bring up the “Number pad” display. Press the corresponding number keys, and press the OK button to bring up the required function menu. Once a valid function number is entered, the function number and description will appear in the graphic display, for example “F0 Setpoint”. The “up” and “down” arrow keys can be used to step through the function list. Press the OK button to accept the function, and close the number pad.

Please note that the required function number can also be selected by rotating and then pressing the rotary knob (61). Press the rotary knob again to accept the function, and close the number pad.

Main Menu and Short Menu Options

The main menu is reached by pressing the rotary knob (61). To highlight and select the required option, turn and then press the rotary knob (61).
Please note that as well as the main menu, there is a short menu that shows only the more frequently used options.

COMF. MAIN MENU: Admin

Analog interface
Audible alarm
AutoStart
Compressor control
Control parameters
Control mode
Digital interface
Display functions
External signal
Factory default
Language
Limits
Overtemperature prot.
Pot. free contact
Program edit
Program start & stop
Protection functions
Pump settings
Sensor adjustment
Service
Setpoint
Setpoint limits
Short main menu
Start & stop
Start ramp
Software version
User menu - config
User menu - select
Temperature scale
Time scale
2nd Setpoint
Exit

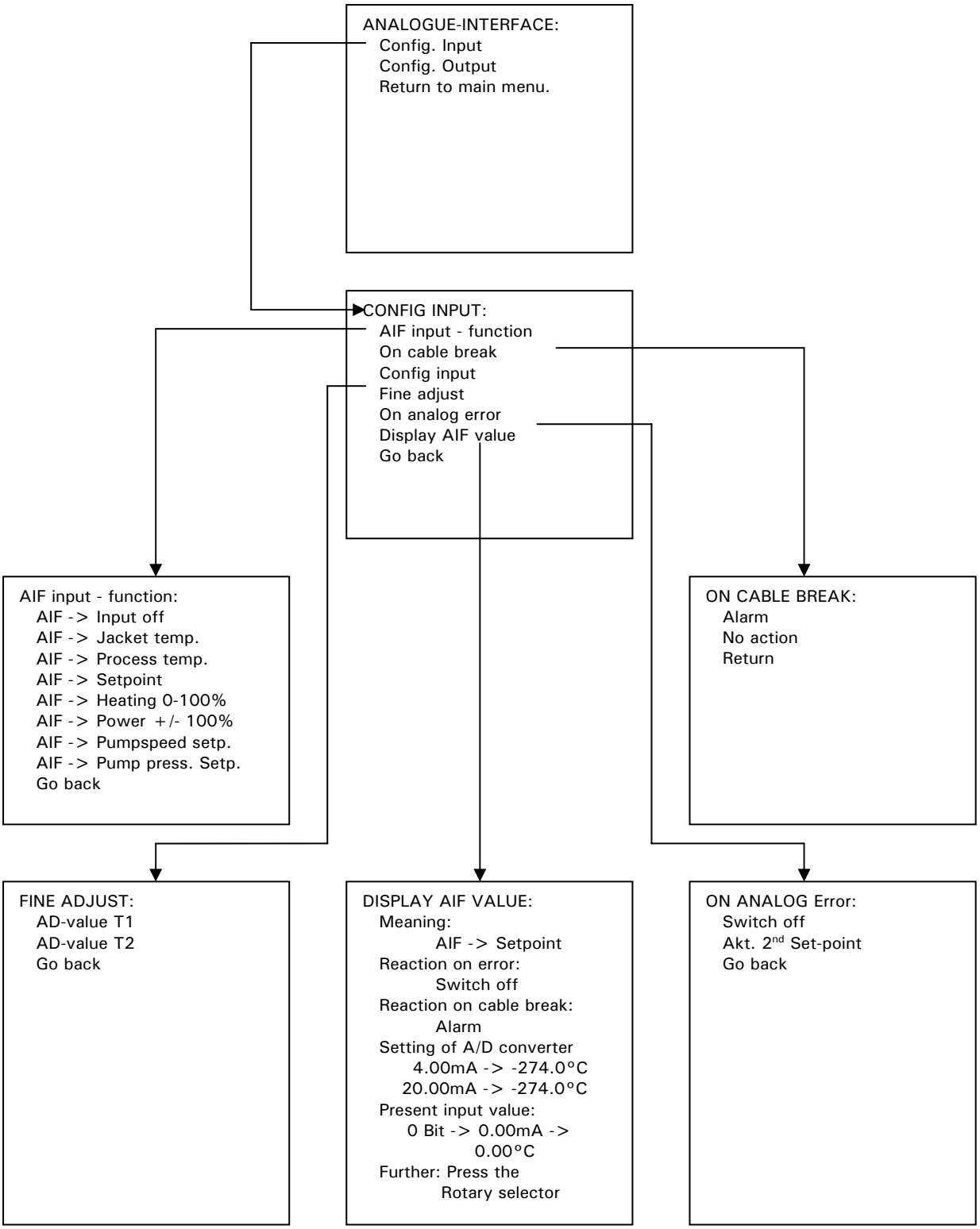
SHORT MAIN MENU: Admin

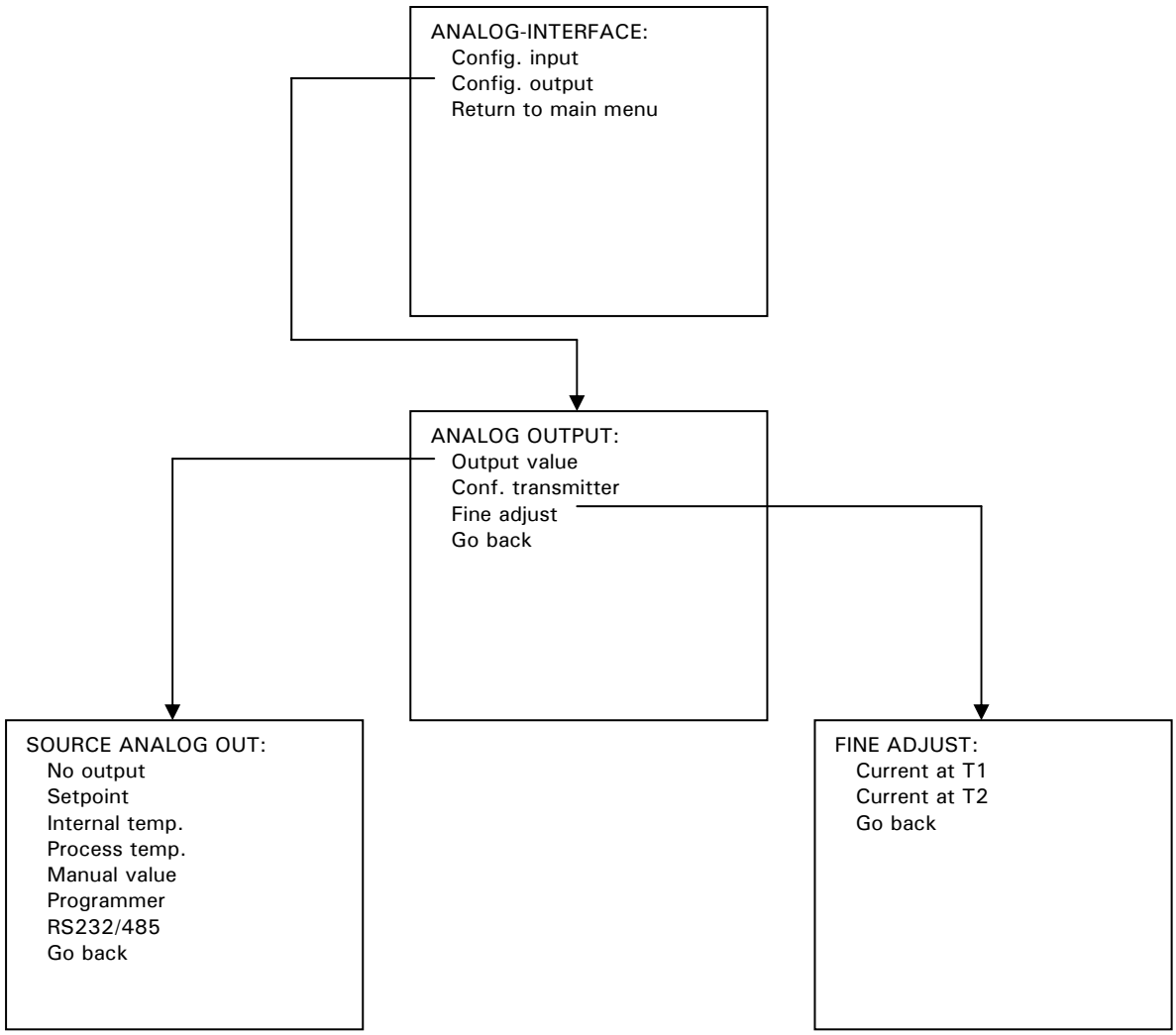
Control parameters
Control mode
Display functions
Main menu
Overtemperature prot.
Program edit
Program start & stop
Pump settings
Setpoint
Setpoint limits
Start & stop
Start ramp
User menu - select
Exit

The individual functions of the comf. main menu are described in the following pages:

Main menu and sub menu points.

Analogue – Interface





Using the **analogue interface**, the unit can be controlled via an analogue (4...20mA) signal. An analogue (4...20mA) output signal is also available. The schematic above describes the structure of the analogue input and output.
Below is an example using the analogue input to provide a setpoint, and the analogue output relays the process temperature. The current/temperature configuration is also shown.

E.g. Required operating temperature range is 0°C to 100°C. 0°C should correspond to 4mA. 100°C to 20mA. The 4...20mA (I/O) is available on the analogue interface connector. An alarm should given when the cable breaks. The unit should be switched off if there is an analogue error.

Settings:

1. Current/Temperature
   Select Analog interface/config. input/conf. transmitter
   Enter the temperature range to correspond to **4...20mA (T1 = 0°C, T2 = 100°C)**

2. Select input signal
   Select Analog interface/config. input/Means AIF-input
   AIF-> Setpoint

3. Select output signal
   Select Analog interface/config. output/Output value
   Process temp.

4. Select action if cable breaks
   Select Analog interface/config. input/On cable break
   Alarm & Stop

5. Select action upon analogue error
   Select Analog interface/config. input/On error analog
   Switch off

6. The settings can be reviewed by selecting
   Select Analog interface/config. input

Please Note that the fine signal adjustment functions the same for the analogue output as it does for the input.

Setting information for fine adjustment.

It is possible at any time to adjust the precision of the input channel. This could be required if the set point input current does not coincide with the expected temperature value.
If as shown in point 1 above, an input of 4.000mA does not give exactly 0°C, but maybe 1°C. A fine adjustment then can then be made. Change to menu point *Analogue-interface/config input/fine adjust/A-D value at T1*. Feed 4.000mA into the interface. Confirm the value. Choose then *Analogue-interface/config input/fine adjust/A-D value at T2.* Feed then 20.000mA into the interface. Confirm the value. At the end, a current input of exactly 4.000mA should give a setpoint of 0°C and a current input of 20.000mA should give a set point of 100°C.

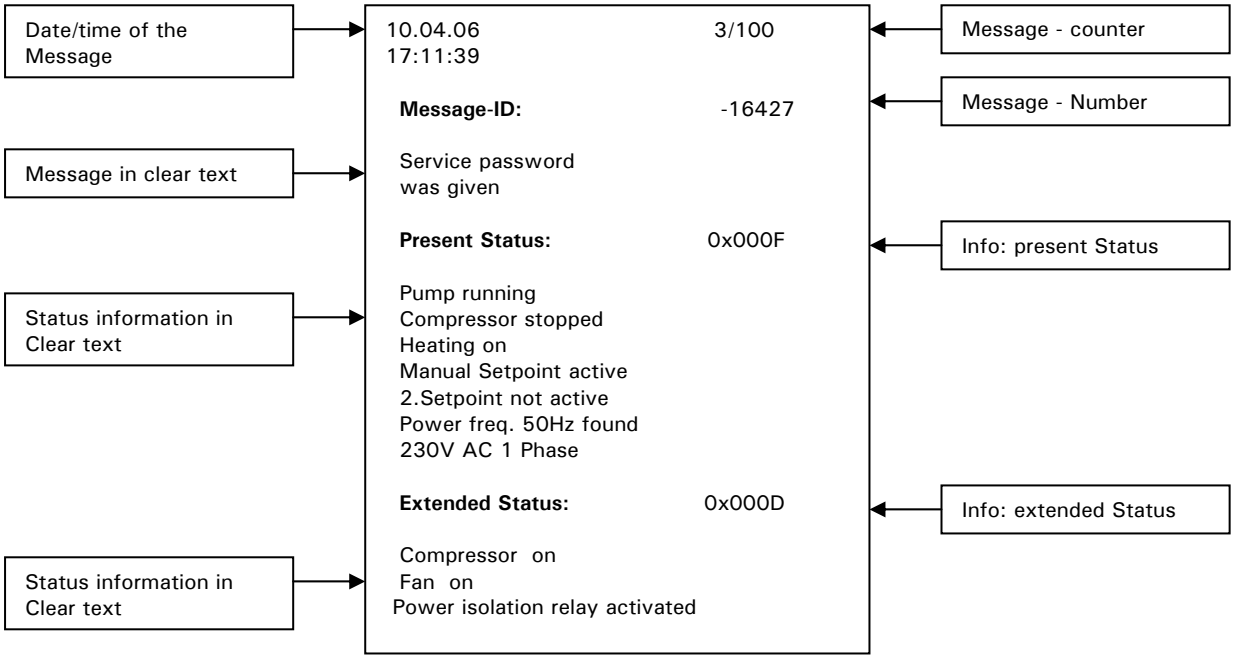
The fine adjustment of the output channel is done in a similar manner. A sensor value of 0°C and 100°C should give an output current value of 4.000mA and 20.000mA.

Display functions

The brightness of overtemp. and temperature seven-segment displays can be adjusted here.

Display mode is used to select the required display: Normal or Graphic. The standard setting is Graphic. The message memory can also be read using ***Display machine info.*** to display the machine condition

Display on choosing "Display machine info" .



By turning the key / rotary selector (61) one can display the individual messages, Take note of the message counter for reference.

AutoStart Behaviour **(Automatic Start)**

This corresponds to Function F5 in the Funct.Nr. menu. This allows the start-up condition, after mains failure to be defined.

Es gilt:

AutoStart = ***ON***/Temp. control active.
Temperature control will be restarted on power-up.

AutoStart = ***OFF*** / Standby
Temperature control will not be restarted when power restored (Default setting)

 **Caution!**

The end-user should assess the risk and consequences of this setting for their application. The default setting is OFF.

Limits

Is equivalent to function Nr. F18 in Function menu.

You can here set the maximum allowable difference (***Delta.T limits)*** between the internal temperature and the process temperature when using process control. If the chosen temperature difference is reached, then the Unistat power is reduced so that this temperature difference is held. This function can protect the application (e.g. glass reactor) against thermal stress caused by too high a Delta-T.

One can also limit the heating and cooling powers.

Digital Interface

Corresponds to F84 (RS485 slave address), F85 (Baudrate), and F86 (Select ***RS232/RS485)*** in the Funct.Nr. menu.

The required interface protocol and baudrate can be selected. Selecting the ***slave address*** is only necessary when using RS 485 (RS Hardware).

Please alsonote the chapter on the ComBox

Real time Clock

Corresponds to F30 (Set date) F31 (Set time) and F32 (Display time and date) in the Funct.Nr. menu.

Sets the unit *time and date*. A number of functions can be chosen, e.g. a calendar/ reminder function and timed start can also be configured.

External control signal

Corresponds to Function F28 in the Funct.Nr. menu

This is a active-high input. Application of an external 24Vdc signal to this input, activates a selected function in the temperature control unit. Please also refer to the ComBox section of this manual.

One can choose one of the following alternatives.

No action

The input signal 24Vdc or 0Vdc has no effect.

Switch to ***Act. 2nd setp. const.***

Changing the input signal from 0Vdc to 24Vdc causes the unit to use the value of the second setpoint. Changing the signal back to 0Vdc has no effect.

Switch to ***Act. 2nd setp. tempor.***

An input signal of 0Vdc means the unit uses its internal setpoint. An input signal of 24Vdc causes the unit to use the value of the second setpoint. Setting the input to 0Vdc causes the unit to use its original internal setpoint.

Switch between ***internal*** and ***process*** control

Applying a 24Vdc signal causes the unit to immediately switch between internal and external control mode. Applying a 0Vdc signal causes the unit to switch to its original control mode.

On /***Off*** temperature control

Switching the input signal from 0Vdc to 24Vdc starts temperature control. Switching from 24Vdc to 0Vdc stops temperature control.

Sensor Adjustments

there exists a possjibility to carry out an adjustment of the internal sensor, the process sensor and the return sensor.

Short main menu

Here one can switch to the limited possibilites of the short menu.
Please note the menu point ***Main menu***.

Compressor Control

Corresponds to Function F35 in the Funct.Nr. menu. This is used to select the operating mode of the compressor. The default setting is AUTO (Automatic).

Note when the menu point Over Temp behaviour and Emergency cooling is selected, then the compressor is set to ALWAYS ON and cannot be changed.

Automatic

The compressor control is set to switch on and off as required by the unit.
Benefit: Energy saving
Disadvantage: Longer response times to sudden increase in cooling demand.

Compr. always on

The compressor is always running, so the refrigeration system is always immediately available.

Compr. always off

The compressor is always off. Cooling is only available using the HT cooler (where fitted) or by natural radiation..

Pot. free Contact (POKO)

Corresponds to Functions F6, F7, and F8. This function allows a relay contact, in the Combox (9) to be controlled and activated. Please also review the ComBox section of the manual.

 The following functions are available

Not used

The POKO displays the OK status when the unit is ready to operate. This condition is after the internal controller check, ca 30sec after the switch on. The OK status will be ended by switching off the mains or a fault.

Check temp.

The relay switches when the current internal temperature is outside the range set between the POKO minimum and maximum internal temperatures (F6 and F7). The values in functions F6 and F7 are relative to the current setpoint. If the range is exceeded the potential free contact is switched (from the OK status), and the unit will continue to operate. If the actual value is in the range, the contact will be reset to the OK status.

External alarm

The POKO relay is only activated if the unit is in 'fault status' when it is switched on. This is so that the alarm is not raised when the unit gets switched off.

If you wish the alarm function together with the work flow principle, please use the POKO function 'OFF'.

Unipump/PLC

UNIPUMP: This POKO function is used to connect the signal calling for the circulation pump to start with an external booster pump. This has to be done so that the external pump runs in synchronisation with the circulation pump in the unit, this means that the POKO activates (to the OK status) as soon as the circulation pump starts.

PLC: PLS stands for „Prozess Leitsystem" (English-Process Control System), this mode is often used when the unistat is integrated in a "PLC".

An example of this would be when the unistat would be controlled by a "PLS" via the external control signal (Funktion F28), the POKO can be used to communicate the status of the unistat to the PLS.

Condition POKO ON means temperature control is activated.

Condition POKO OFF means temperature control is not activated.

Controlled by RS232

The relay is controlled via an RS232 command.

Check process temp.

The relay switches when the current external, process temperature is outside the range set between the POKO minimum and maximum external temperatures.

When the unit is set to process control and the "POKO check internal temperature check" is selected the relay operates in exactly the same method as the internal control.

When the unit is set to internal control, and the "POKO check process temperature" is selected, the temperature of the external sensor is monitored – this sensor can be independent of the internal temperature and the temperature control process. The limits set by F6 and F7 still apply.

Unipump with echo
This function is used to monitor if the "UNIPUMP" being controlled by the POKO is operating in synchronisation with the Unistat's own pump. The operating status of the "UNIPUMP" can be signalled to the Unistat by connecting to "level". If the unipump does not operate with the Unistat, a fault signal will be generated.

Contr. by programmer
The relay is controlled by a command from a segment within a temperature profile running on the programmer.

Internal temp. limits
The relay switches when the current internal temperature is outside the specific band determined by the maximum and minimum temperature limits set using functions F108 and F109 respectively.

Process temp. limits
The relay switches when the current external temperature is outside the specific band determined by the maximum and minimum temperatures set using functions F106 and F107 respectively.

Also see the chapter on the ComBox.

Program Edit
This corresponds to Function F20 (Tempering program "edit" or "enter") and F21 (Tempering program – Parameters) in the Funct.Nr. menu.
Here it is possible to write new programs, or programs already written can be edited and changed or erased. (***Add segments, Insert segments, erase segments or edit segments)*** or erase whole programs
Also one can set a particular behaviour at the end of the program through ***Stop temp. control, continue*** (Temperature is continued at the last set point) ***or Repeat*** (The Temperature program is restarted. One can also display the program elements as text or graphic.

Program start & stop
Corresponds to Function F22 in the Funct.Nr. menu.
This enables a tempering program to be paused in order to:

a) pause at the current set point and restart
b) to skip a segment
c) Stop the program

Pump settings
There is the possibility to choose via the chosen menu point either a speed control (with spped regulated at the given speed) or pressure control, with output pressure regulated at the given value. The pressure sensor is to be found shortly before the fluid outlet connection (1).

Start ramp

Corresponds to Function F19 in the Funct.Nr. menu.
This ramps the temperature setpoint up or down as required, instead of a sudden temperature jump. It can be used in both internal and process control modes, to ramp the temperature at the internal or external temperature sensor (see function F3).

Control parameters

One can choose here the optimum control parameters for the application in use.
It is essential to see the chapter on Control parameters.

Protection functions

 This corresponds to the old Functions F106, F107, F108 and F109.
Here one can choose the following protection functions.

Upper alarm limit - int: (Upper alarm limit - internal sensor
Corresponds to the Function nr. F108 in the function menu.

The temperature monitoring is first activated when the internal (or process) temperature is below the maximum temperature limit. The temperature must also "dip" into the limit "band" by 3K, before an alarm will be generated. If the temperature limits are below room temperature, the unit temperature must first reach the temperature band before the monitoring is activated.
This method allows the monitoring temperature to be easily checked and changed.
An alarm is displayed if the temperature value set here is exceeded for more than 3 seconds.
NOTE: The default setting is 265°C, i.e. a value which the internal sensor cannot reach.

Lower alarm limit - int: (Lower alarm limit - internal sensor)
Corresponds to the Function nr. F109 in the function menu.
An alarm is given when the measured temperature is lower than the set limit values for more than 3 seconds.
NOTE: The default setting is -60°C, i.e. a value which the internal sensor cannot reach even if not connected.

Upper alarm limit Proc..: (Upper alarm limit - process sensor)
Corresponds to the Function nr. F106 in the function menu.
An alarm is displayed if the temperature value set here is exceeded for more than 3 seconds.
NOTE: The default setting is 265°C, i.e. a value which the internal sensor cannot reach.

Lower alarm limit Proc.: (Lower alarm limit - process sensor)
Corresponds to the Function nr. F106 in the function menu.
An alarm is given when the measured temperature is lower than the set limit values for more than 3 seconds.
NOTE: The default setting is -60°C, i.e. a value which the internal sensor cannot reach, even if not connected.

Service
This menu is only available in service mode, and may only be accessed after contacting and obtaining a password from Huber.
It allows the unit's internal sensors and other data to be directly read, for service purposes.
There is also the possibilitiy via Reset Unistat Pilot and Reset Unistat Contrtol to load the newest software.

Audible alarm
This option allows the unit's audible key tones and alarm to be enabled or disabled.

Software version
Corresponds to function F98 in the function menu.
The installed software version of the Unistat Control and Unistat Pilot are displayed.

Set point
This corresponds to Function F0 in the Funct.Nr. menu. The setpoint is limited to the band between the upper and lower setpoint limits.

Minimum setpoint ≤ Setpoint ≤Maximum setpoint

Setpoint limits
This corresponds to Function F1 and F2 in the Funct.Nr. menu. It allows the operating setpoint range to be set between user-determined minimum and maximum temperatures.

Language
This corresponds to Function F90 in the Funct.Nr. menu, and allows the unit's operating language to be selected. The language options displayed are available.

Start & stop
Please see the "Start temperature", "Stop temperature", "Air-purging" and "Degassing an external, closed application" sections of this manual.

Temperature format
It is possible to to choose between °C, °F and K

Temperature modes
Corresponds to the function nr. F3 in the function number menu.
One can choose between internal (jacket) and process (reactor temperature) control.

Overtemperature protection
Cut-off limits can be set for both the temperature of the internal fluid circuit (heating chamber) and the expansion tank.
IMPORTANT NOTE: It is essential to read the chapter concerning setting the Overtemperature protection

User menu - select

Under this point, one can choose which user menu (previously configured via ***User menu-config***) should be used, Only this menu, with its approved points then will be seen.

User menu - config.

The User menus can here be configured, in that one can choose which menu points should be allowed or blocked.

Factory default

Corresponds to function Nr. F52 in the Function Nr. menu.
It is possible here to reset the machine parameters to factory default settings.

Time scale

The time display can be displayed in various formats . (hh, min, sec).

2nd. Setpoint

Corresponds to the function Nr. F4 in the Function Nr. menu.
The input of a 2nd or alternative setpoint is done in the same way as the normal setpoint under the menu point setpoint. This second setpoint is activated with an external control signal (Function F28) or through a watchdog event.

Function Numbers and their meaning

The structure of these functions is based upon the programming and operation of the previous generation of Unistats.

Please note that the pushbuttons and control knob (61) can also be used to select the required options and operations.

F0 Setpoint
Once selected, the "Setpoint" menu will be shown on the display (60). By using the control buttons and knob, or touch-screen, the new setpoint can be entered and then confirmed by pressing the OK button. The setpoint range is limited between the values entered for the minimum and maximum setpoint, i.e.

Minimum setpoint ≤ Setpoint ≤Maximum setpoint

If an attempt is made to enter a setpoint outside these limits, then a warning message will be shown on the display (60) and the setpoint will not be accepted.

F1 Minimum setpoint
Once selected, the minimum setpoint menu will be shown on the display (60). By using the control buttons and knob, or touch-screen, the setpoint limit can be entered, and then confirmed by pressing the OK button. The maximum temperature limit should be decided after considering the properties of the temperature control unit, heat transfer fluid and application.

F2 Maximum setpoint
Once selected, the maximum setpoint menu will be shown on the display (60). By using the control buttons and knob, or touch-screen, the setpoint limit can be entered, and then confirmed by pressing the OK button. The minimum temperature limit should be decided after considering the properties of the temperature control unit, heat transfer fluid and application.

F3 Control mode
Once selected, the temperature control mode menu will be shown on the display (60). By using the control buttons and knob, or touch-screen, the temperature control mode can be set, and confirmed by pressing the OK button.

Internal temperature control: The temperature at the unit's internal temperature sensor is controlled.
Process temperature control: The temperature at the connected, process temperature sensor is controlled.

F4 2nd setpoint
Once selected, the 2nd setpoint menu will be shown on the display (60). By using the control buttons and knob, or touch-screen, the required 2nd setpoint can be entered, and then confirmed using the OK button. Please also note the setting of function F28 (External control signal).

F5 AutoStart

Once selected, the AutoStart menu will be shown the display (60). By using the control buttons and knob, or touch-screen, the required operating mode can be set.

AutoStart = On/Temp. control active.
After power loss – Temperature control will be restarted on return of power.
AutoStart = Off/Standby
After power loss – Temperature control will not be started on return of power.

 **Caution!**

The end-user should assess the risk and consequences of this setting for their application. The default setting is OFF.

F6 PoKo minimum limit

Used in conjuction with function F8. This function sets the lower limit for the internal temperature, relative to the setpoint. A value of 1.5 means that the contact remains energised as long as the temperature remains less than 1.5K below the setpoint.

F7 PoCo maximum limit

Used in conjuction with function F8. This function sets the upper limit for the internal temperature, relative to the setpoint. A value of 1.5 means that the contact remains energised as long as the temperature remains less than 1.5K above the setpoint.

F8 PoKo - programming

The options for the potential free contact are given and described in the earlier Potential Free Contact section of this manual.

F12 Adjust int. sensor

The current measured temperature from the internal Pt100 sensor can be offset by up to ±5K. The offset can be confirmed by pressing the OK button.

F13 Adj. process sensor

The current measured temperature from the external Pt100 sensor can be offset by up to ±5K. The offset can be confirmed by pressing the OK button.

F18 Delta-T limit

Once selected the "Delta-T limit" menu will be shown on the display (60). Using the control buttons and knob, or touch-screen, the maximum allowable temperature difference between the internal and process temperatures can be set. The setting can be confirmed by pressing the OK button.

Once the maximum temperature difference has been reached, the unit will automatically reduce its cooling (or heating) capacity as required.

F19 Ramp function

Once selected the "Ramp function" menu will be shown on the display (60). Using the control buttons and knob, or touch-screen, the required parameters for the setpoint ramp can be entered, and then confirmed by pressing the OK button.

The temperature setpoint will be ramped from the current point to a second point over the time specified. The measured temperature, internal or process as selected (function F3), should follow the ramp.

F20 Program edit

Once selected the "Program edit" menu will be shown on the display (60). Using the control buttons and knob, or touch-screen, the number of the program to be edited can be entered, and then confirmed by pressing the OK button.

F22 Program control

Please note that F22 is only active when a temperature program is running.

Once selected the "Program control" menu will be shown on the display (60). Using the control buttons and knob, or touch-screen, the required function can be selected, and then confirmed by pressing the OK button.

F23 Program start&stop

Once selected the "Program start&stop" menu will be shown on the display (60). Using the control buttons and knob, or touch-screen, the required program can be selected, and then confirmed by pressing the OK button.

F27 Time scale

Once selected the "Time scale" menu will be shown on the display (60). Using the control buttons and knob, or touch-screen, the required time base (hours or minutes) can be selected, and then confirmed by pressing the OK button.

F28 Ext. control signal

Once selected the "Ext. control signal" menu will be shown on the display (60). Using the control buttons and knob, or touch-screen, the required function can be selected, and then confirmed by pressing the OK button.
The external control signal can be used to control one of a number of available unit functions.

F30 Set date

Once selected the input menus for the day, month and year will be shown in turn on the display (50). Using the control buttons and knob, or touch-screen, the required setting can be entered and then confirmed by pressing the OK button.

F31 Set time

Once selected the input menus for the hours, day and seconds will be shown in turn on the display (50). Using the control buttons and knob, or touch-screen, the required setting can be entered and then confirmed by pressing the OK button.

F35 Compressor control

Once selected the compressor control menu will be shown on the display (60). Using the control buttons and knob, or touch-screen, the required compressor operation can be selected and then confirmed by pressing the OK button.
This is used to select the operation of the compressor: always off; always on; or auto. Default setting is AUTO (automatic).

Note when the menu point Over Temp behaviour and Emergency cooling is selected, then the compressor is set to ALWAYS ON and cannot be changed.

Automatic

The compressor control is set to switch on and off as required by the unit.
Benefit: Energy saving
Disadvantage: Longer response times to sudden increase in cooling demand.

Compr. always on

The compressor is always running, so the refrigeration system is always immediately available.

Compr. always off

The compressor is always off. Cooling is only available using the HT cooler (where fitted) or by natural radiation..

F46 Define analogue input

Once selected the "Define analogue input" menu will be shown on the display (50). Using the control buttons and knob, or touch-screen, the function of the 4...20mA analogue input can be selected, and then confirmed by pressing the OK button.

F47 On cable break

This function determines the unit's response to a break in the cable, eg turn off temperature control, or control to a second setpoint.

F49 Unit name

This function displays the unit model number.

F50 Input password

Used only for Service. Contact Huber for further information.

F52 Factory default

Once selected the "Factory default" menu will be shown on the display (50). Using the control buttons and knob, or touch-screen, the function(s) to be reset can be selected, and then confirmed by pressing the OK button.

F55 Degassing mode

Once selected the "Degassing mode" can be started. Please see the section on degassing closed, external applications.

F70 Service increments

Used only for Service. Contact Huber for further information.

F71 Service functions
Used only for Service. Contact Huber for further information.

F72 Service temperature
Used only for Service. Contact Huber for further information.

F75 Cooling power man.
One can here set a constant cooling power. An automatic cooling power adjustment does not take place.

F84 Slave address
Once selected the "Slave address" menu will be shown on the display (50). Using the control buttons and knob, or touch-screen, the unit's Bus-Address can be entered, and then confirmed by pressing the OK button.

F85 Baudrate
Once selected, the "Baudrate" menu will be shown on the display (50). Using the control buttons and knob, or touch-screen, the required communications baud rate can be selected, and then confirmed by pressing the OK button.

F86 Select RS232/485
Once selected, the "Select RS232/485" menu will be shown on the display (50). Using the control buttons and knob, or touch-screen, the required communications baud rate can be selected, and then confirmed by pressing the OK button.

F90 Language / Sprache
Once selected, the "Language / Sprache" menu will be shown on the display (50). Using the control buttons and knob, or touch-screen, the operating and display language can be selected, and then confirmed by pressing the OK button.

F98 Software version
Once selected, information the about the Unistat Control and Pilot Software Version will be shown on the display (50)

F103 Setpoints cooling
Used only for Service. Contact Huber for further information

F106 Proc. high limit al
A description of this function is given in the "Safety Functions" section of this manual.

F107 Proc. low limit al.
A description of this function is given in the "Safety Functions" section of this manual.

F108 Int. high limit al.
A description of this function is given in the "Safety Functions" section of this manual.

F109 Int. low limit al.
A description of this function is given in the "Safety Functions" section of this manual.

F111 Air-purge

Once selected, the "Air-purge" menu will be shown on the display (60). Using the control buttons and knob, or touch-screen, air-purging can be started and stopped, and then confirmed by pressing the OK button.

F135 Adj. analogue input

Using this function the current of 4…20mA analogue input signal can be calibrated.
NOTE: see also the chapter on the ComBox.

F136 Adj. analogue outp.

Using this function the current of the unit's 4…20mA analogue output signal can be calibrated. Adjust difference output via AIF. See also function F138.
NOTE: Also see the chapter ComBox.

F137 Set an. Input I-T

Using this function the relationship between the input current and temperature values can be defined

F138 Def. analogue outp.

Once selected, the "Def. analogue outp." menu will be shown on the display (50). Using the control buttons and knob, or touch-screen, the definition of the output signal can be selected, and then confirmed by pressing the OK button.

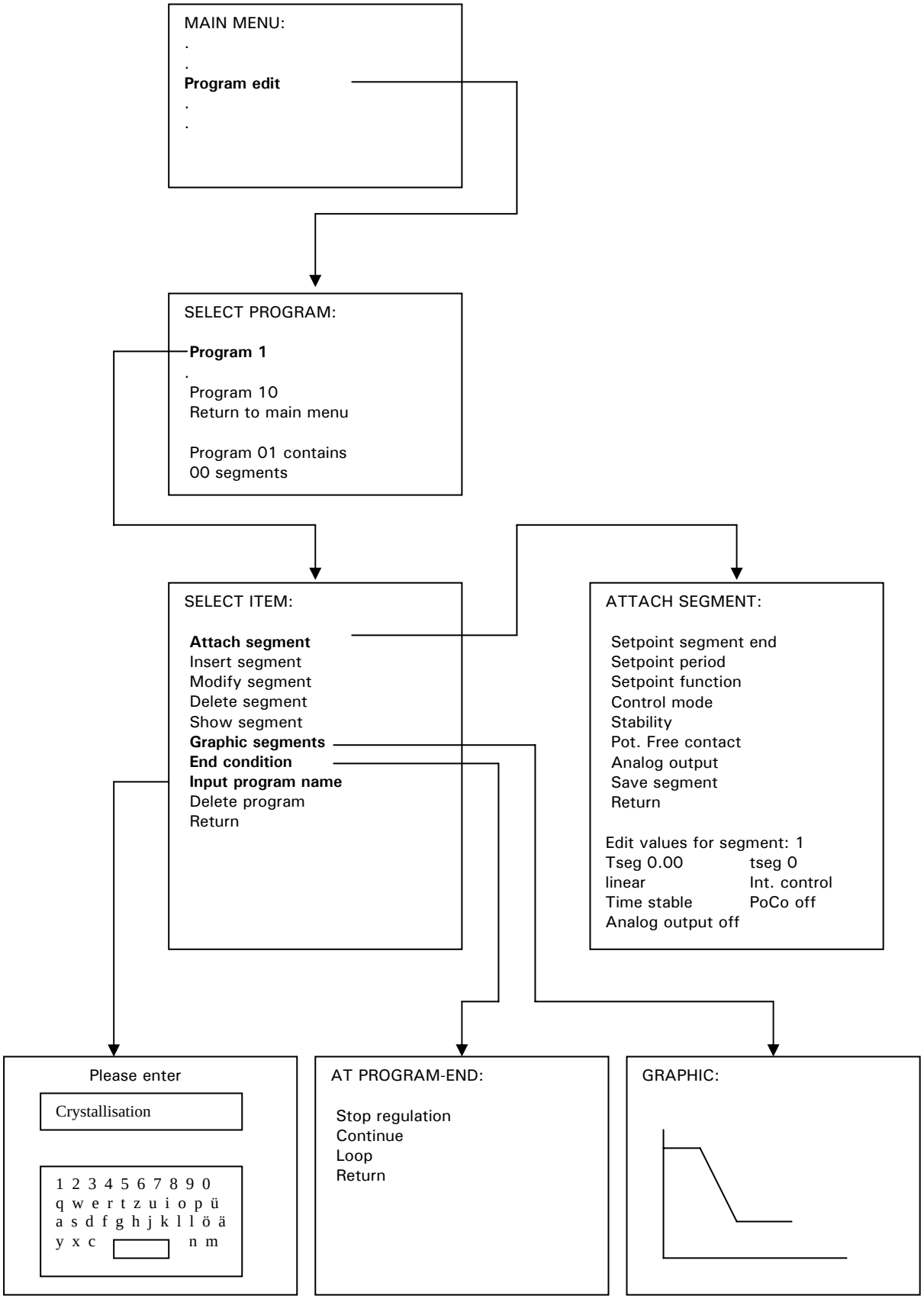
F180 Heat. power limit

This function allows the maximum heating capacity of the unit to be set between 0 and 100%.

F181 Cool. power limit

This function allows the maximum cooling capacity of the unit to be set between 0 and 100%.

Program creator



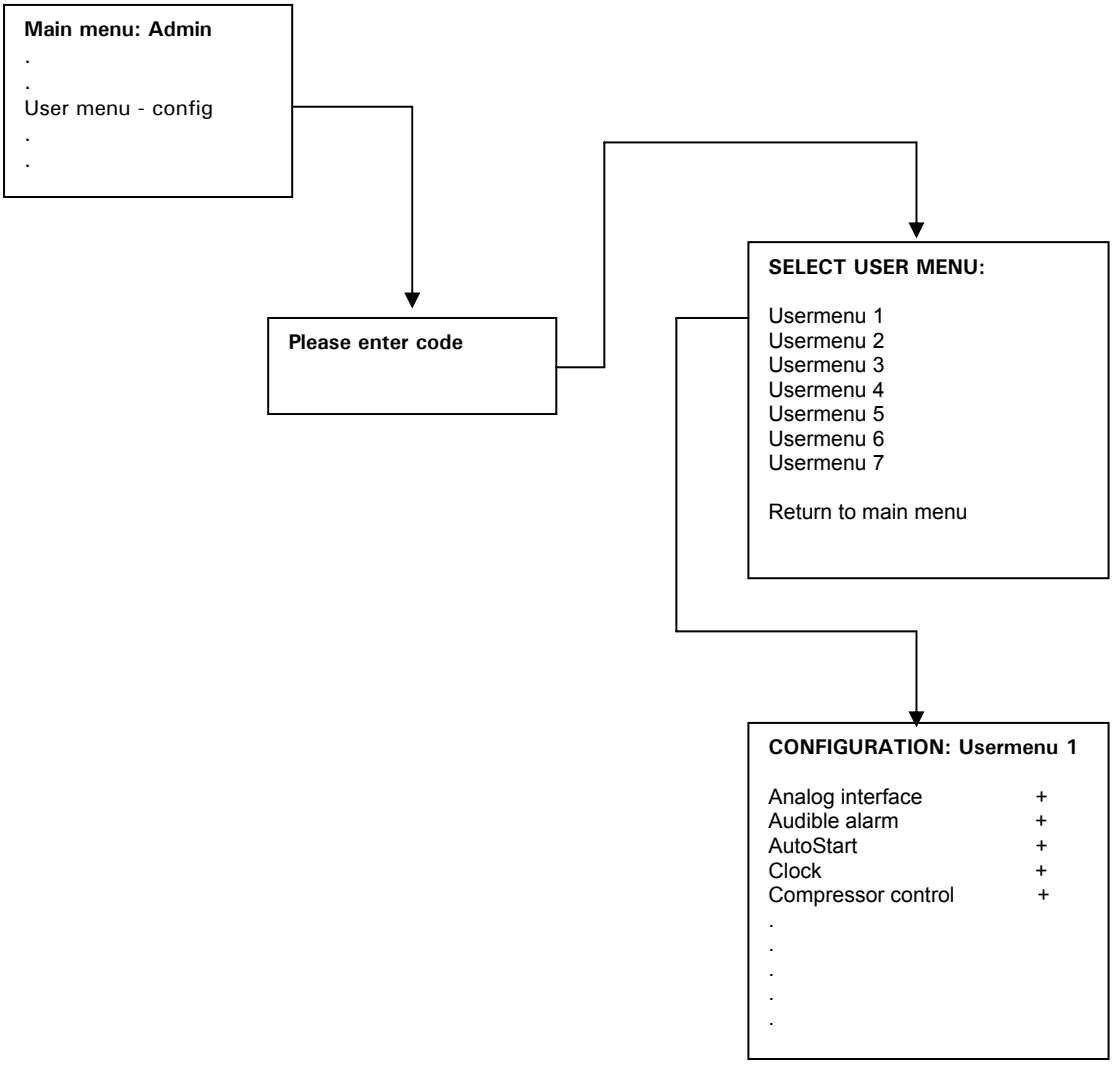
To create a new program:

1. Select the "**Enter Program**" option from the main/short menu.
2. Select the program number to be used. Information about the program, segments, etc is shown in the lower part of the display screen (60).
3. After selecting the **Input program name** option, enter a program name using the keyboard that appears on the touchscreen (60).
4. After selecting the program, more functions are displayed. Begin by selecting the attach segment option. After that further options are given, **Setpoint segment end, Segment period**, **Setpoint function**, and so on.
   Please note that under the **setpoint function** there are two options: **linear** and **exponential**.
   Under the **Control mode** it is possible to switch between **internal** and **process control modes**.
   The **Stability** option switches the unit between **temperature stable** and **time stable.**
   The **Analog** and **Pot. free contact** can also be controlled.
   Extra information about the segment is displayed in the lower part of the graphic display (60).
5. After saving the segment, it becomes active, and the Return option now appears in the Select Operation menu.
6. As well as creating segments as above, there are more options such as **End condition**. This displays the available options that can be carried out at the end of the program, e.g. **Stop temperature control**, or **Continue temperature control**.
7. After writing the program the individual program segments can be displayed using the **Graphic segments**. Turning the control knob (61) can move backwards and forwards in the program.
8. To delete a program use the **Delete program** option and confirm the program to be deleted.
9. After entering a program, the **Start & Stop Program** option can be used to call up, run and stop it.

Configure User menus

Using the configure menu function up to seven different operation modes can be set up. This is comparable to the Short menu option in the main menu. However here the user menu can be stopped and edited. There is also the ability for an administrator to create and save menu lists for individual users. Reducing the number of options in a list can give a clearer display and overview of the operation, as well increase security by locking out other functions.

Please note that the Configure user menu is password (number) protected.



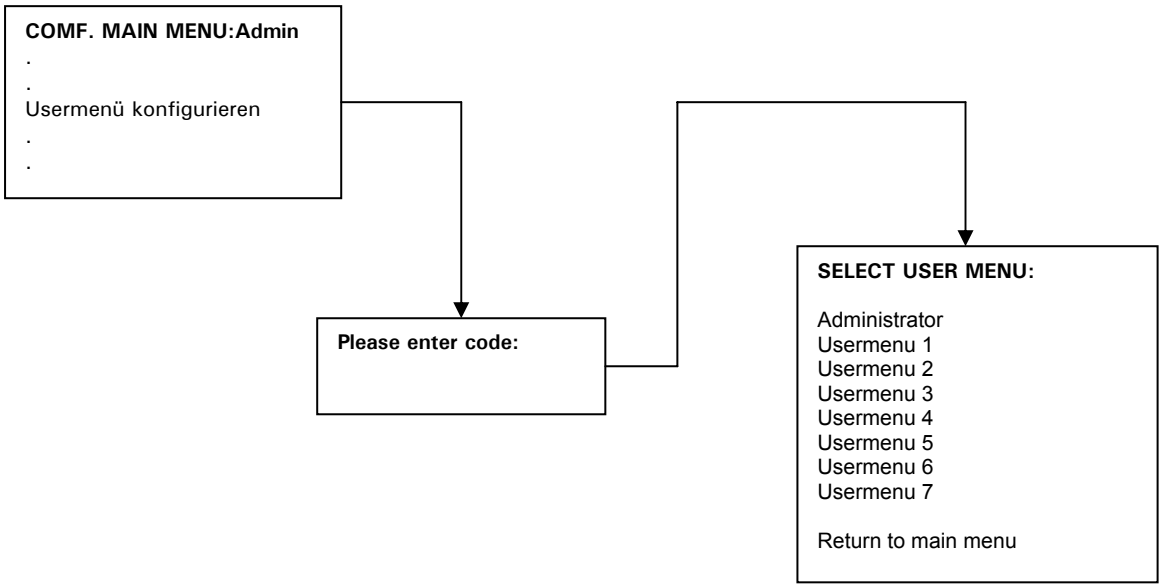
After entering the password, select one of the available user menus to enter the configuration program. A list of available short menus will be displayed. At the end of each of line there will be a "+" if that function is active. This can be changed to a "-" using the control button/knob to deactivate it.

Select User menu

This option can be used to configure a user menu to be operate like a new main menu. A user menu must be created before it can be selected for use.

Please note that the User menu configuration is password protected.

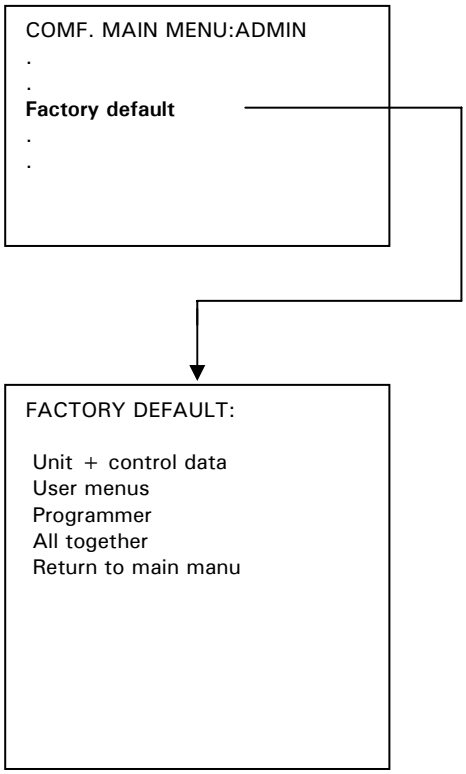
The path to select a user menu is given below:



After entering the correct password, one of the availables user menus can be selected. To return to using the full function, main menu, select the Administrator option from the User menu list.

Factory default

This section allows the different areas of the temperature control unit to be reset to the factory default. This can be a relatively quick way of changing the unit settings.



Unit + control data:
Resets the setpoints, setpoint limits, temperature control mode to the factory-set default values.

User menus:
Resets the complete user menus to their default settings. Settings in the unit memory and programs created using the programmer remain unchanged.

Programmer:
Resets complete programs to default settings. Settings in the unit memory and user menus remain unchanged.

All together:
Resets the unit data, user menu, program, and controller parameters to default values.

Chapter 3: Connecting and filling the tempering device and preparing for the tempering task

In this chapter you will find the following sections:

- Transport protection
- Start-up
- Connecting externally closed consumers (Reactor)
- Turning the tempering device on
- Setting the overtemperature protection (OT)
- Setting the set value limits
- Setting the set value
- Starting tempering
- Concluding tempering
- Filling and degassing externally closed applications
- Controller parameterisation
- Draining externally closed applications
- Replacing thermal fluid / Internal cleaning

Transportprotection

The compressor of the LT stage (Low-temperature stage) is equipped with a transport protection. This lock must be released prior to the system's commissioning and re-fastened for the system's transport to a different installation site.

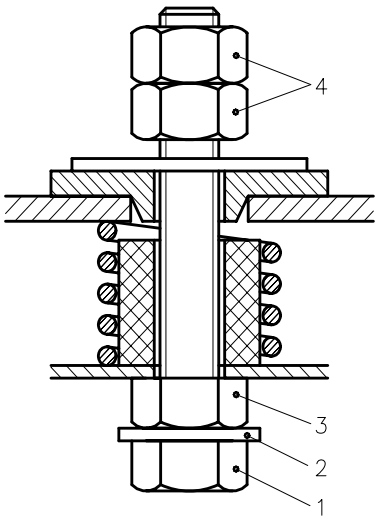
Danger!
The four transport protections of the compressor must be brought into the operating position before initial start-up of the tempering device.

- *Releasing the transportation locks (operating position)*
Turn upward the hexagon head screw (1) on the lower side of the housing using the socket wrench SW17 and tighten it against the weld nut (3).

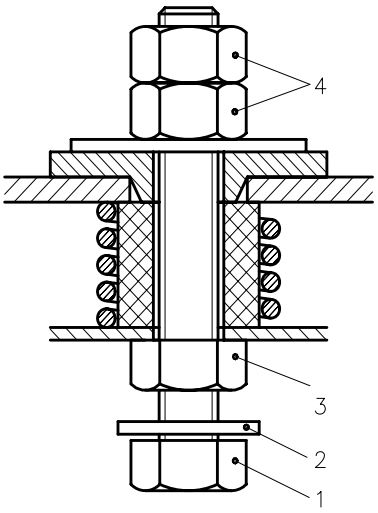
- *Fastening the transportation locks (transport position)*
Turn downward the hexagon head screw (1) on the lower side of the housing using the socket wrench SW17 and tighten it against both the lock nuts.

You can distinguish between both these positions by feeling whether the supporting washer (2) is loosened (transport position) or is tight (operating position).

Operating position



Transport position



Start-Up

Install the tempering device at the intended location and align it evenly by adjusting the equipment legs. Observe that all models must be moved and installed vertically. Provide for a stable installation and make sure that the thermostat cannot tilt. When selecting the location ensure that there sufficient fresh air is available for the circulation pump and for the compressors. The warm exhaust air must be able to escape unhindered upwards. You must observe at least 1 m wall distance around the equipment despite water cooling for service and maintenance work on the device. Select suitable hose material in accordance with the planned temperature range.
The hose material must resist the thermal fluid.
Please observe correct connection of all accessories.
When assembling the hose connections, tighten the union nut with a flat spanner (SW 46). Tension thereby with a second flat spanner (SW 46).
Use hose clips to secure the hose connections against slipping.
The pump connections and the cross-overs to the customer system have to the respectively isolated to avoid danger spots, which may arise at a later point of time (contact during tempering).

Caution!
Check all hose connections for impermeability.
Regularly check the hose connections and the hose quality.
Porous hoses are hazardous and must be replaced.
To meet increased safety requirements, also reinforced hoses may be used.

Caution!
Danger of freezing at ambient temperatures of less than 0°C with not completely drained cooling water circuit and switched off device.

Preparation of devices with water cooling:

Remove the protective caps from the cooling water connections.

Connect the cooling water connections on the device to the available on-site connections with sufficiently dimensioned liquid-proof hoses or piping (according to data sheet). The connection must accommodate a water pressure of min. 6 bar.

Please infer the position and dimension of the cooling water connections (device) as well as the minimum/maximum pressure differential in the cooling water system and the recommended cooling water inlet temperature from the data sheet.

Additionally keep the cooling water drain valve (16) closed or close it with protective caps.

Opening water supply and drain.

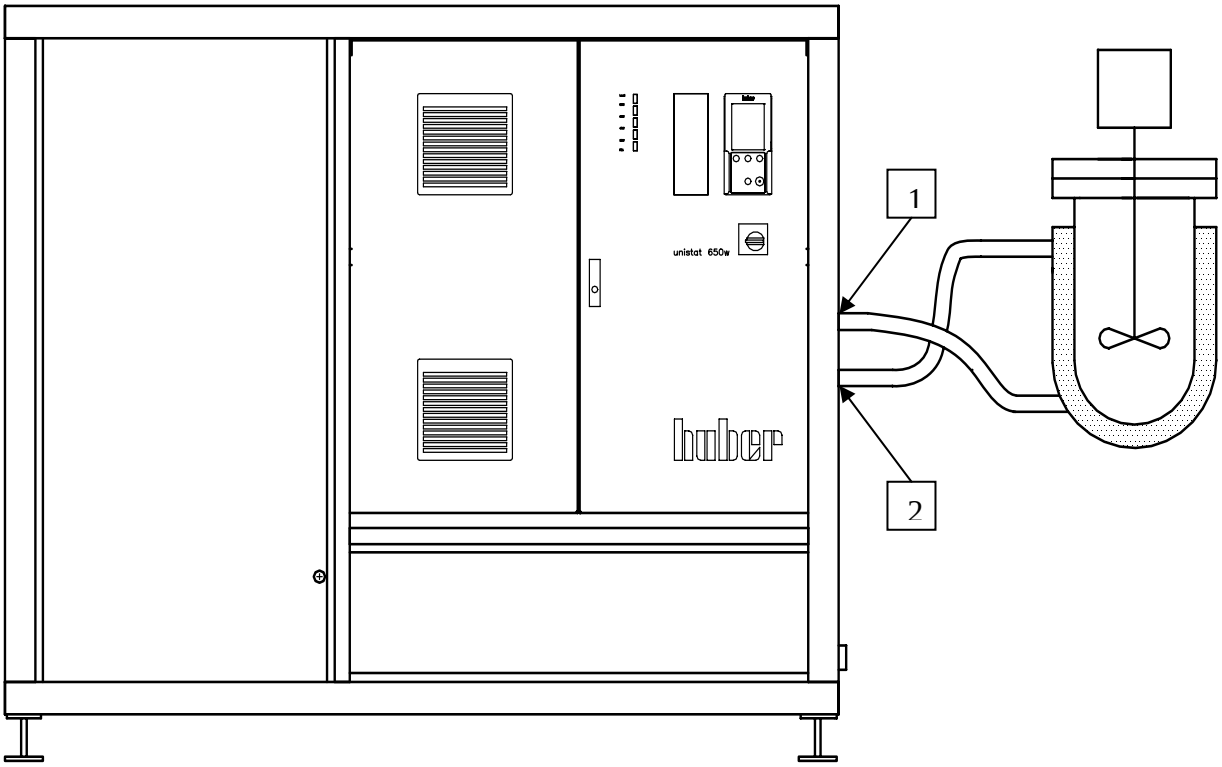
A cooling water controller (KWR) is used in Huber tempering devices, in order to minimise the cooling water consumption. This only lets cooling water flow as required by the current load situation of the tempering device.

Only little cooling water is used, if the required refrigerated capacity is low.

No cooling water flows, when the device is turned off.

Connecting externally closed consumers (Reactor)

Remove the protective caps (Thread M38x1.5) of the output circulation (1) and input circulation (2) connections. Then connect your application by means of suitable hoses to the Unistats. To enable your application to be operated correctly and to prevent air bubbles remaining in the system, you must ensure that the circulation connection outlet (1) of the tempering device is connected to the lower positioned connection of the application and the circulation connection inlet (2) of the tempering device is connected to the higher located connection of the application.



Switching on the temperature control unit

Once the power cable has been correctly connected, the temperature control unit (Unistat) can be switched on using the mains switch (36). The unit performs initialisation tests, to check the full functionality of the Unistat. The control electronics first check the heaters, the sensors and then relays. If an error, or warning condition, arises, a message will be shown on the display (60) giving details of the problem. More details of these messages, their causes, and solution, can be found in the "Message" appendix. For further information and assistance please contact Huber.

Setting the Overtemperature switch

General Information
The overtemperature switch is an independent function of the temperature control unit. The software and hardware is configured so that essential functions and operations are tested during the self-test when the unit is first powered on. During these tests the sensor are tested for short- and open- circuits. If a problem arises then the unit is automatically prevented from operating until the problem is rectified.

The constant monitoring of the internal oil temperature provides safety for the connected application.


Warning!
The overtemperature switch should be tested at least monthly, and after changing the thermal fluid. The overtemperature setting should be reduced to a safe temperature, just above ambient, and the unit should be given a setpoint of no more than 5K over the overtemperature setting.
The overtemperature switch should be set at least 25K below the flame point of the thermal fluid.

When using DW Therm, in a closed system, please contact Huber for advice on the appropriate temperature range.

Select the overtemperature switch option from the main menu.

When received, the cut-off will be set to 35°C. If the temperature of the thermal fluid is higher then this when filled an alarm will given after a short time. When this occurs follow the instructions below:

OVERTEMPERATURE PROT:
OT setpoint circ. (ht.)
OT setpoint exp. v.
OT control
Display all OT values
Return to main menu

After selecting an option then the display (60) will show the following message: Enter code for overtemperature xx

xx is a number between 0 and 65000 that changes for each entry. The number is displayed for about 3 seconds. Please note this number to continue.
To adjust the overtemperature switch, enter the number when requested. This procedure is to prevent the accidental adjustment of the overtemperature switch.
After selecting “Display all” the following information appears on the display (60):

Overtemperature protection

Current value Hz1	32.2°C (Main heating)
Current value Hz2	34.0°C (Fine heating)
Current value Exp	30.3°C (Expansion tank)
OT Setting Hz1	35.00°C
OT Setting Hz2	35.00°C
OT Setting Exp	35.00°C

Continue: Press the control knob

Cancel overtemperature

The temperature control unit and application should be constantly monitoring while carrying out the following procedures!

Option 1:
The overtemperature cut-off is below the flamepoint of the fluid, by 25K for open bath systems, and the temperature advised by Huber for a closed application using DW Therm.
Adjust the overtemperature setpoint higher so that the unit can be started. Enter a fluid setpoint that is 30K below the flamepoint of the fluid. Start the temperature control. When the setpoint has been reached, adjust the overtemperature cut-off to 25K below the flamepoint. When using DW Therm with a closed system, contact Huber for advice.

Option 2:
The overtemperature cut-off is at least 25K below the flamepoint of the thermal fluid, for DW Therm in a closed system this is 200°C.
Set the overtemperature cut-off to 25K below the flamepoint of the fluid. Contact Huber for advice when using DW Therm in a closed system.

Warning!
Do not forget to reset the overtemperature cut-off temperature!

Please note the overtemperature response function. There are two options available:

Stop according to DIN 12876:
When the cut-off temperature is reached, heating, cooling and pump are all turned off. (Default setting)

Process security:
When the cut-off temperature is reached the heating is turned off, but the cooling and pump remain on. The full cooling capacity of the unit remains available for emergency cooling.

Setting the Setpoint Limits

The minimum and maximum setpoint limits provide safety for the equipment. These limits should be set before starting temperature control, and checked if the heat transfer fluid is changed. The setpoint limits should be determined after reviewing the flame and freezing points of the heat transfer fluid being used, and any temperature restrictions for the application itself.
The maximum setpoint limits the maximum set point input for the outlet temperature of the machine, and also the maximum temperature which can be reached. The minimum setpoint limits the lowest temperature that can be input and reached, and protects against the effects of too low a temperature such as high viscosity or freezing of the thermal fluid.
The set point input is only possible in the band between maximum and minimum setpoint.

To set the minimum setpoint limit, select the “Setpoint” limits option from the main menu, and the minimum setpoint limit from the sub menu. Enter the required value using the rotary knob (61), and then confirm it by pressing the rotary knob.

To set the maximum setpoint limit, select the “Setpoint” limits option from the main menu, and the maximum setpoint limit from the sub menu. Enter the required value using the rotary knob (61), and then confirm it by pressing the rotary knob.

Check the value of the minimum and maximum setpoint for every system change, in particular if the thermal fluid is changed.

The maximum and minimum setpoint limits are shown on the standard display screen. Lightly touching a setpoint limit value will bring up the corresponding setpoint limit entry screen.

Entering a setpoint

Select the “Setpoint” option from the main menu. The new setpoint can be chosen, and confirmed using the rotary knob (61). The value of the setpoint is limited by the current minimum and maximum set-point limits,
i.e. Minimum setpoint limit ≤ setpoint ≤ maximum setpoint limit.
If an attempt is made to enter a setpoint outside these limits is made, a message will be shown on the graphical display (60) and the input will be ignored.

Lightly touching the current setpoint shown on the standard screen will bring up the new setpoint entry screen.
Also, pressing the “Setpoint F0” area on the standard display or the button (64) below it will bring the new setpoint entry screen.

Start temperature control

Temperature control can be started after the filling and air-purging of the application. Select the “Start & stop” option from the main menu, and then “Temperature control” from the submenu. Use the rotary knob to select and confirm the “starts temperature control” option.

The “Start & stop” menu can also be reached by pressing the “Start” button in the lower right corner of the standard touch-screen display, or the button (65) directly below it.

Concluding tempering

Tempering can be concluded at any time by pressing the Stop Key (see lowest line on the touchscreen (60)) or by pressing the function key T3 (65) positioned below. Tempering and circulation are switched off immediately afterwards. The compressor is turned off after the stepping motor valve for regulating the refrigerated capacity has been driven to a defined position. You can alternatively select the „Start & Stop“ menu item in the main menu and then activate the Conclude Tempering menu item.
The tempering device may be turned off with the main switch (36) after the controller has turned the compressor off.

Before concluding tempering aim for ambient temperature. Shut-off valves and other valves may not be closed.

External closed application - filling and venting

Caution!

- Only fill from the least possible height
- Observe local regulations / Working instructions
- During filling, it may be necessary to take some additional steps such as earthing of the tank, the funnel and other aids.
- Wear personal protective equipment according to the material safety sheet and local regulations.
- Observe the temperature of the thermal fluid. Before draining the thermal fluid, allow it to adapt to the ambient temperature level.

Warning!

Overflowing thermal fluid forms a lubricating film on surfaces and must therefore be immediately collected and disposed after the event in accordance with the material safety sheet. The device must be immediately turned off and checked by personnel trained by Huber, if thermal fluid has penetrated into the device.

If this procedure is not observed, it must be assumed that the tempering device does not comply with all safety requirements according to DIN EN 61010-2-010.

- Loosen the screw plug from the filler opening of the expansion tank(17).
- Fill a suitable thermal fluid with help of suitable filling accessories, such as a funnel and/or beaker, carefully into the expansion tank (18). The thermal fluid flows from the expansion tank (18) into the tempering device and over the hose connections to the external application. Fill to 20% of the level indicator/level.

Select the menu item **„Vent“** in the "Start & Stop“ menu of the main menu. Activate venting by means of the pushbutton/rotary sensor (61). You can alternatively press on the „Start & Stop“ test on the lower right side of the display edge or on the function key 3 located below (65) and then proceed with venting.

Bleeding

The programme item "Vent" deactivates monitoring of the pressure rise in the fluid circuit for some seconds. This means that the pump can be operated in this period with a thermal fluid-air mixture. Please always ensure that thermal fluid is always filled in, because the pump will otherwise be damaged.

- Following switch-on, assure the pump sockets' or hose connections' tightness.
- Continue filling the temperature control liquid until the level remains constant for a long time.

- Then allow the "Venting programme" to run for some minutes. This ensures that possibly still enclosed bubbles, which later would result in a safety shutdown during tempering, can escape.
  Air bubbles will also lower the heat transfer and in turn the maximum output of the evaporator; poor transportation by the pump will only intensify this effect.
  The application is considered vented, if the liquid level of the level indicator stays constant both when the pump is running or shut down during externally closed applications (Reactors).

- Consider the volumetric expansion of the thermal fluid in dependence on the operating temperature range in which you would like to work. The level indicator may not be underrun by more than 20% at the "lowest" operating temperature and the expansion tank may not overflow at the "highest" operating temperature. If the device is too full, drain thermal fluid over the drain valve of the expansion tank (5) into a suitable container.

Degassing an external, closed application

Danger!

If heating too fast, it is possible by having varying boiling point liquids in the thermal fluid, that sudden boiling can occur in the lowest boiling point fluid.. An exit of hot fluid through the expansion tank is the result. Also, the hot remnants of low boiling point fluids will accumulate in the expansion vessel. Depending on the type and quantity of the low boiling point fluids, it is possible that the expansion vessel reaches a temperature >70°C. Under the menu point "Overtemperature Prot." the tripping temperature of the over temperature sensing can be extended to 100°C in "De-gassing" mode. (In normal mode the maximum temperature is limited to 70°C). Be careful of the hot surface of the expansion vessel under this condition.
Suitable precautionary measures should be made.

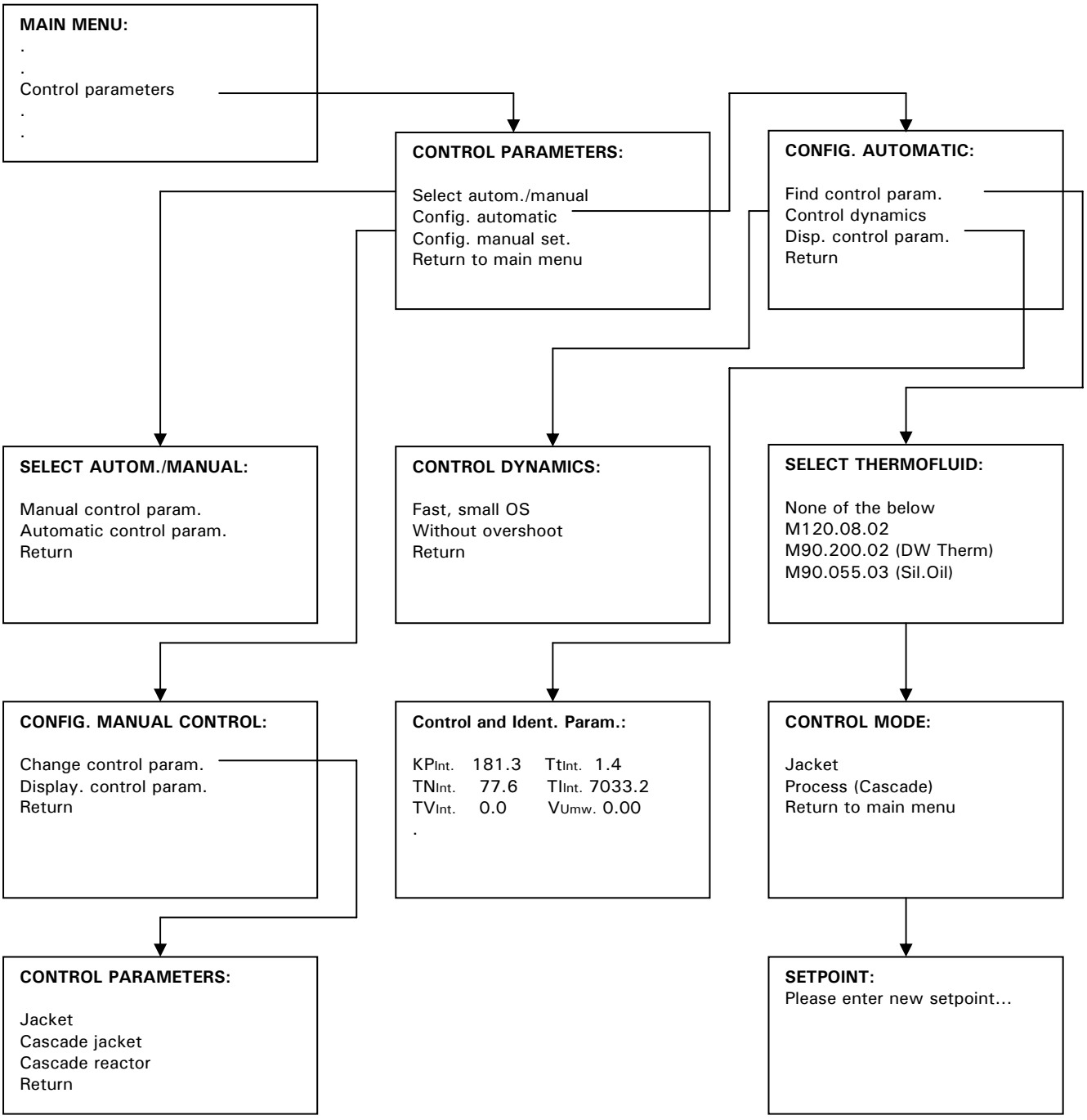
Water should never be used as thermal fluid, not even with "anti-freeze" solutions. Please note that some thermal fluids can be hygroscopic (absorb moisture). The effects of this can be seen as the working temperature of the fluid drops. Carrying out the degassing procedure above can remove this water from the thermal fluid. Typical boiling points are: water e.g. 100°C, and ethanol 68°C.
Hygroscopic problems can also be avoided by using an inert gas blanket in the expansion tank. An accessory sealing kit can be obtained from Huber (Abdichtset #6523) .

- **NOTE!**
  f the heat transfer fluid is changed from one with a lower boiling point to one with a higher boiling point, then residues from the first fluid will boil off causing vapours in the fluid circuit. The vapours can form bubbles in the fluid line causing a drop in fluid pressure. This can cause a safety cut off of the machine. When degassing the bubbles collect in the pump housing, pass into the expansion tank (14) and then escape through the hole in the threaded plug at the top of the tank (17) as vapour.
- **Do not leave machines unattended during de-gassing!**
- After cleaning, filling, and air-purging the unit and application as described in earlier chapters, select the "degassing" option from the main menu.
- Start temperature control, and the degassing program.
- Increase the setpoint in steps (say 10K each step) up to the maximum operating temperature. After each step, wait until the temperature in the expansion tank has approximately stabilised. This should avoid fluid over-flowing the expansion tank, due to large vapour bubbles escaping quickly from the system.
- Once the expansion tank has cooled back down to ambient temperature, the degassing process is complete and the degassing program can be turned off..

Control parameters

The temperature control unit uses the most modern controls to optimise temperature control.

The control parameter menu is laid out below:



After selecting ***Control Parameters*** from the main menu, the following functions are available:

Select autom./manual
The control can be changed between being automatically configured, and having control parameters manually entered, using the ***Config.manual*** set. sub-menu.

Config. automatic
This lists the **find control param.**, **control dynamics**, **display.control param** menu options. These options are described below:

Config. manual set.
Here the parameters for the control modes can be manually entered: ***Jacket, Cascade jacket,*** and ***Cascade reactor***.

Config. Automatic

After selecting the Config.Automatic option, the following options are available:

Find control parameters

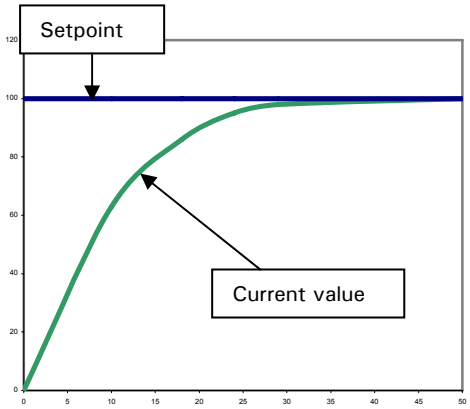
This should be done before controlling process temperatures. The unit should be controlling to a suitable setpoint for a few minutes.

After activating the function a list of thermal fluids will be displayed. Please selected the thermal fluid being used in your application. If your thermal fluid is not listed then select the “none of the below” option. If your fluid is not listed then the control will default to overshoot-free (slower), pre-determined parameters.
After selecting the thermal fluid, the user must select the configuration and use of ***Jacket*** or ***Process*** (Cascade). The user is then asked for a new setpoint. Please note that the configuration only operates when the new setpoint is a minimum of 10K from the current setpoint. Corresponding information will be given in the status field of the graphic display (60).

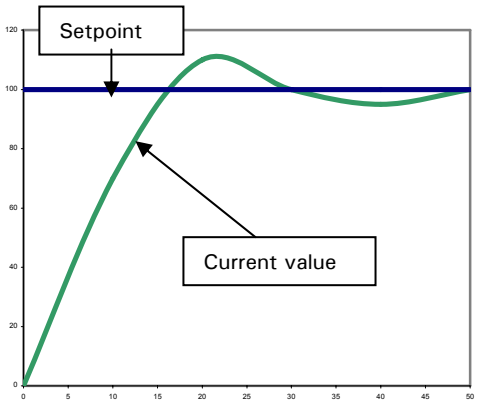
Please note that the thermofluids in the table are identified and listed under the corresponding Huber fluid codes. These fluids can be found in the current Huber catalogue. Please contact Huber if you have any questions, for example when using another thermal fluid.

Control Dynamics
One can select between a control response with small overshoot (**Fast, small OS** option) and a slower response with no overshoot (**Without overshoot** option). The default option is no overshoot.

Control without overshoot



Control with overshoot



The above diagrams show the control response to a step-change in setpoint.

Please note that it is not necessary to activate the Parameter Configuration option every time before starting temperature control.

Display. control param.
The automatically configured control parameters are displayed here.

Config. manual set.

The following options are available after selected the Config.manual set. sub-menu:

Control parameters
Here the Jacket, Cascade Jacket, and Cascade reactor parameters can be changed.

Display. control param.
The entered control parameters are displayed here.

We recommend entering the largest possible change in setpoint as well as the highest possible pump speed (only if pump speed is controlled), so that the best possible results.

Draining externally closed applications

- Before commencing with draining, ensure that the thermal fluid has an ambient temperature (approx. 20°C). If necessary, allow to adapt to ambient temperature (approx. 20°C) for some minutes before draining.
- Then connect a suitable drainage hose (observe the compatibility of the drainage hose with the thermal fluid) to the drain valve of the thermal fluid (3). Position the other end of the hose in a suitable container (e.g. original can, also observe compatibility with the thermal fluid here.
- Then open the drain valve for the thermal fluid (3). Lever in flow direction means open, lever crosswise means closed.
- The thermal fluid flows from the external application over the pump chamber and draining hose into the container.
- Then open the screw connection of the output circulation (1). If necessary you can remove further remainders of the thermal fluid out of the tempering device by means of the draining hose by carefully introducing e.g. compressed air into the flow hose.
- Then open the screw connection of the input circulation (2).
- Allow the temporary device some time to dry with the circulation input (2) and circulation output (1) connection fittings open as well as with open thermal fluid drain valve (3).
- Further observe the Chapter „Exchanging Thermal Fluid / Internal Cleaning“

Replacing thermal fluid / Internal Cleaning

- Please consider that after drainage according to Chapter „Draining externally closed applications“, according to the used thermal fluid, remainders of the thermal fluid can still be in the pump, in the heat exchanger, in the heating and in the internal lines.
- Connect e.g. a short-circuit pipe between circulation input (2) and circulation output (1).
- You can clean the components (pump, lines....) by rinsing with a suitable fat solvent (e.g. Mucasol). Depending upon degree of contamination, we recommend draining the tempering device several times and filling with suitable fat solvent.
- Note that acetone may not be used as a fat solvent. Using acetone would result in leakages of the tempering circuit.
- Note that fat solvents on water basis leave water arrears in the components. In order to avoid bumping during future use (e.g. application of silicone oil at temperatures above approx. 120°C), the interior components of the tempering device must be dried. For this purpose remove the short-circuit hose and carefully introduce compressed air, alternatively to the circulation input (2) and circulation output (1) into the temporary device.
- Then allow the tempering device to stand with opened circulation input (2) and circulation output (1) screw connections as well as opened thermal fluid drain valve for as long as necessary.
- Note, that you must always activate the "Degassing" menu option after refilling with e.g. silicone oil at approx. 110-120°C. Only this ensures that there are then no water remainders in the tempering circuit, which could result in bumping. Please also read the section „Degassing externally connected applications“.

Chapter 4: Interface and software update

The following chapters are to be found in this section:

- ComBox
- Digital interface with additional NAMUR commands.

ComBox

The ComBox is included with the unit. Details of how to connect to the Combox are below. The temperature control unit must first be switched off. Insert the Combox into the slot in the rear of the unit (refer to the control elements section). Switch the temperature control unit on again. The Unistat Control will recognize the new component, and the Combox is ready for operation. The Combox should only be removed when the unit is switched off. The Combox can be mounted remote from the Unistat by using an extension cable (#16160).

Caution!
If a voltage higher than 60Vac is connected the Combox there is a risk of electric shock and/or damage to the Combox. To avoid this, only voltages of less than 60Vac should be connected to the unit.

The connections are configured to NAMUR recommendations and are not changeable.
The Combox has the following functions:

Level: Allows for the connection of an external level switch (#6152)

POKO Alarm: Potential Free Contact – Normally open and closed contacts.

AIF-Reg-E_Prog : One analogue input and three analogue outputs.

ECS Standby: External Control Signal (potential free contact) can be used to control the unit.

RS232/RS485: Digital Interface, using NAMUR-recommended commands (RS232/RS485).

RS232/RS485 Serial Connector
This connector can be used to connect a PC to the Controller Electronics to enable remote control, or connection to a RS485 Bus. Before connecting a cable, please check the digital interface menu.

RS232 Pin-out
Pin 2 RxD Receive Data
Pin 3 TxD Transmit Data
Pin 5 GND Signal Ground

RS485 Pin-out
Pin 6 A Terminate with 120Ω Resistor
Pin 7 B
Pin 8 B

ECS Input (Standby)

Pin	Signal
1, 3	E2
2	E1

ECS is activated when E1 and E2 are connected, by an external potential-free contact.

The available options for the Remote signal are defined in the "External signal".

Analogue Interface
The function of the analogue interface should be programmed using the "Analogue Interface" / Function F46 menu.
The Combox has three analogue outputs:
Output 1: Value of the current set-point
Output 2: Value of the current process temperature
Output 3: Value defined using the Analogue Interface menu.

Analogue interface pin-out AIF/REG + E + PROG

Pin	Description	Signal
1	Current output 2	0…20mA
2	Current output 1	0…20mA
3	GND for analogue output	GND
4	Analogue input	0…20mA
5	Current output 3	0…20mA
6	GND for analogue Input	GND

POKO (as alarm to an external system)
This connection is a switching, potential-free contact.
Pins 2 and 3 are closed when an alarm condition is present.
Pins 1 and 3 are open when an alarm condition is present.

The contacts are rated for 1Amp, 24VC. A screened/shielded cable should be used.

The potential-free contact (POKO) can be used to indicate the status of the unit. When the working contacts are closed, the unit is available. If an alarm condition occurs then the contacts open.

Please refer to the “Pot. free contact” menu for more details of the other POKO functions.

Level
This feature allows an external level switch (Huber #6173) to be mounted in the sight-glass, to monitor the fluid level when using an external closed-circuit application

Pin	Description
1	Level Test (Link to pin 2 -> “Present”)
2	Level – (GND)
3	Level + (Closer)

Digital Interface with additional NAMUR-Commands

RS232, Command Syntax, Namur-Commands

The signal interface is carried out over an RS232 Interface. Individual commands have been formatted in accordance with NAMUR recommendations (NE28). To use these commands the following communications protocol should be used:

1 Start bit
8 Data bits
1 Stop bit
No parity.

The data transmission rate is set in the main menu.
Data flow control: The commands are not buffered. A new command may be sent as soon as the reply to the previous command has been received. If no reply is expected, then there should be a pause of 500ms.

Access method:
Master (Computer/PLC), Slave (Unistat) control, the Slave can only be activated by a signal from the master. Required response time: less than 500ms.

Further information on Command Syntax
Commands and parameters should be separated by a space.

- Parameters may be entered as floating point or integer numbers
- The decimal point (code 46) is used in the floating point numbers
- After the comma, two places are permitted (OUT-command)
- A any character after the physical unit (°C, K,°F) will be ignored
- Parameters in an exponential format are not allowed.

Namur Commands

IN_PV_00	Request Internal (jacket) temperature
IN_PV_02	Request External (process/reactor contents) temperature
IN_SP_00	Request Temperature Set-point
IN_SP_05	Request current Analogue Set-point
OUT_SP_00	Send Set-point xxx.xx
START	Start temperature control
STOP	Stop temperature control
STATUS	Request Unit Status

STATUS Single digit

-1	Alarm / Warning
0	OK/standby/manual stop
1	OK Temperature control / air-purging
2	Temperature control stopped remotely
3	Temperature control started remotely

Example Command

Please note that the notation \r\n means that the CR LF (linefeed) is used for the final characters of the command. The data to be transmitted is in "".

Master	**Slave**	**Comment**
"START\r\n"		Start temperature control
"OUT_SP_00 21.2\r\n"		Change set-point to 21.2°C
"IN_PV_00\r\n"		Request internal temperature
	"20.5\r\n"	Slave transmits temperature
"IN_PV_02\r\n"		Request process temperature
	"20.5\r\n"	Slave transmits temperature
"STOP\r\n"		Stop temperature control

If a reply from the ComBox is not expected, then a pause of 500ms should be used.

Chapter 5: First aid for a fault condition

The following sections can be found in this chapter:

- Messages
- Fault displays
- Exchanging the electronics
- Service
- Decontamination / repair
- Cleaning the outside surfaces.
- Checking the pump seal
- Plug contacts

Messages

Messages which occur can be split into Warnings and Alarm messages.

Please note that alarms generally lead to the machine stopping temperature control. An alarm message is immediately displayed as text on the graphic display (60).
After the reason for the alarm has been repaired, the machine must be switched off using the main switch (36), and then switched on again in order to reset the alarm.

Warnings do not normally cause the machine to stop temperature control, however they give information concerning critical conditions within the machine or environment. If the conditions leading to the warning message are not improved, then there is a danger that the machine will stop with an alarm, as generally alarm limits are then exceeded.

After the alarm or warning message has been acknowledged, then the graphic display (60) shows in the left upper corner a symbol (A stop sign for alarm messages, a triangle with an exclamation mark for warnings). These symbols are similar to road signs and are internationally known. A light finger pressure on the symbol gives a further information window, in which the alarm or warning messages are chronologically shown. Turning the knob/key (61) allows specific messages to be chosen, and by pressing the knob/key (61) displayed in plain text.

Display Error Messages

 If an error occurs, the unit will display an alarm or warning message in clear text on the graphic display (60). Each error is allocated an error code.

Errors are separated into three categories:

Hard alarms (error codes -1 to -1023)

When a hard alarm occurs, temperature control is immediately stopped. The unit must be turned off, using the main switch (36) and the error condition corrected. The unit can then be turned on again. If an alarm occurs during the unit start up and self-test, please contact Huber for advice.

Soft alarms (error codes -1024 to -2047)
These alarms also cause the temperature control to be immediately stopped. After clearing the error condition temperature control can be restarted without cycling power to the unit.

Warnings (error codes -2048 to -4095)
These warnings do not stop temperature control, and give important information about the condition of the unit, its environment, or the application. If steps are not made to correct the cause of the warning, there is the risk that an alarm condition may arise, for example if a condition causes the unit to exceed an alarm limit, or temperature.

Once an alarm or warning is acknowledged a symbol will be shown in the upper left corner of the graphic display. A “Stop” sign indicates the presence of an alarm message, a “warning” triangle (black exclamation mark on a yellow triangle) indicates the presence of a warning message. By lightly touching the symbol on the touch-screen, a list of the stored messages will appear in place of the graphic display. The messages are stored and displayed in time/date order. The control knob (51) and buttons can be used to step through the messages in order, and display their corresponding text messages.

System Messages
These messages give the user more general information, such as the attempted entry of an invalid input, or setpoint. These messages do not generate an alarm. Each message should be acknowledged when it occurs, so as not to cover up the normal display screen.

Alarm and Warning codes

Hard Alarms

-1 Overtemperature cut-off temperature reached
-40 Uneven structure size detected during data transmission
-41 Problem with Unistat RS232 communication
-42 Problem with the return fluid temperature sensor
-43 Problem with the evaporator end temperature sensor
-44 Problem with Reserve sensor / Reserved for sensor problem
-45 Problem with main power relay (Tr1)
-46 Problem with main power relay (Tr1)
-47 Problem with temperature measurement (internal/general??)
-48 Evaporator temperature below minimum value
-49 Evaporator pressure/temperature above maximum value
-50 Refrigeration superheat is too low.
-51 Discrepancy detected when reading EEPROM data.
-52 Problem found during stepper-motor test
-53 24-Bit A/D converter reference voltage out of range
-54 Unistat Pump (incoming) and Unipump (POKO) signals not synchronised.
-55 Unistat level signal detected without level switch being connected.
-56 Pump rotating without signal
-57 Setpoint tracing function has been selected, but no sensor is connected
-58 Standby current is too high.
-59 Pump running current is too high.
-60 An out of range signal has been connected to the A-D converter (OVR bit set)
-61 Problem with the first reference sensor measurement
-62 Problem with the second reference sensor measurement.
-63 Pump pressure has dropped below the minimum value during temperature control.
-64 Transmission between 24bit A-D converter and processor has failed.
-66 Problem with signal from stepper-motor module.
-67 No pump pressure seen for excessive time period during degassing
-68 Internal temperature sensor reading -151°C (Pt100 open circuit temp. reading)
-69 External temperature sensor reading -151°C (Pt100 open circuit temp reading)
-70 EEPROM cannot be read, despite multiple attempts (PILOT)
-71 EEPROM cannot be read, despite multiple attempts (CONTROL)
-72 Mains power frequency cannot be confirmed
-73 Measured A-D signal not correct (high oscillation/not steady)
-74 The temperature difference between the Internal, Overtemp 1, and Overtemp 2 sensors has exceeded 30K while fluid has been circulating.
-75 Level sensor detects that fluid level is too low.
-76 Overpressure switch has tripped.
-77 Expansion tank temperature too high – overtemperature cut-off-
-78 Mains power relay still closed – test current too high.
-79 Heater current not detected
-80 Mains voltage cannot be confirmed.
-81 Combox not recognised when connected.
-82 Current test not completed due to overtemperature cut-off
-83 Controller and Pilot software not compatible.
-84 RS communications Watchdog alarm
-85 Temperature difference between internal and external temperature sensors too high.
-86 Mains relay defect? Heater current too high when relay should be open.

-87 Heater SSR defect? Heater current too high when SSR should be open.
-88 Heater 1 defect? No current seen when Heater 1 switched on.
-89 Heater 2 defect? No current seen when Heater 2 switched on.
-90 Heater 1 current too high – has not dropped to allow Heater 2 test to start.
-91 Machine type not recognised by unit software.
-92 The controller software is not compatible with the unit.
-93 The software does not recognise the controller hardware.
-94 Controller hardware is not compatible with the unit.
-95 Controller and Pilot software versions are not compatible.
-96 Controller not calibrated.
-97 Correct Configuration file not available
-98 Correct Controller file not available.
-99 Mains power relay is sticking.
-100 Mains power frequency not recognised after timeout.
-110 Out of range voltage applied to A-D converter channel 0. (OVR bit set).
-111 Out of range voltage applied to A-D converter channel 1. (OVR bit set).
-112 Out of range voltage applied to A-D converter channel 2. (OVR bit set).
-113 Out of range voltage applied to A-D converter channel 3. (OVR bit set).
-114 Out of range voltage applied to A-D converter channel 4. (OVR bit set).
-115 Out of range voltage applied to A-D converter channel 5. (OVR bit set).
-116 Out of range voltage applied to A-D converter channel 6. (OVR bit set).
-117 Out of range voltage applied to A-D converter channel 7. (OVR bit set).
-118 No Overtemperature protection switch detected.
-119 AD 7738 could not be initialised.
-120 Overtemperature protection switch EEPROM is blank.
-121 Error occurred when writing to overtemperature switch EPROM.
-122 Error occurred when reading from the overtemperature switch EEPROM.
-123 Error with 2 out of 3 comparisons from Overtemperature switch EEPROM.
-124 Overtemperature switch reset by Processor Watchdog
-125 Overtemperature switch reset by EEPROM Watchdog.
-126 Overtemperature at overtemperature sensor 1 – Heater 1
-127 Overtemperature sensor 1 short-circuit.
-128 Overtemperature sensor 1 open-circuit
-129 Overtemperature at overtemperature sensor 2 – Heater 2
-130 Overtemperature sensor 2 short-circuit.
-131 Overtemperature sensor 2 open-circuit
-132 Overtemperature at overtemperature sensor 3 – Expansion tank
-133 Overtemperature sensor 3 short-circuit.
-134 Overtemperature sensor 3 open-circuit
-135 Overtemperature at overtemperature reference sensor
-136 Overtemperature reference sensor short-circuit.
-137 Overtemperature reference sensor open-circuit
-138 Setpoint for Overtemperature sensor 1 fluctuating
-139 Setpoint for Overtemperature sensor 2 fluctuating
-140 Setpoint for Overtemperature sensor 3 fluctuating
-141 No CAN communication with Overtemperature switch
-142 Overtemperature signal present, but overtemperature switch not responding.
-512 Pilot RAM-Test aborted.
-513 Graphic chip not recognised.
-514 S1D13705 register not changed.
-1000 Configuration error (Simfile?)
-1016 NMI released in Unistat Control

-1017 Stack overflow in Unistat Control
-1018 Stack underflow in Unistat Control
-1019 Stack overflow in Unistat Control
-1020 Undefined OpCode in Unistat Control
-1022 Protection fault in Unistat Control
-1023 Illegal Word Operand in Unistat Control.

Soft Alarms

-1024 No pressure increase when pump runs. Is pump dry/sufficient fluid in circulation?
-1025 Unistat Control doesn't recognise Unistat Pilot
-1026 Unistat Pilot doesn't recognise Unistat Control.
-1027 Is Pump Dry, fluid in circuit?
-1028 Control and Pilot Software versions are not compatible.

Warnings

-2063 Main loop duration too long
-2064 Fluid/pump standstill pressure too high.
-2065 Data set corrected while reading EEPROM file.
-2066 Maximum number of messages
-2067 No significant external volume detected - set to lowest possible.
-2068 Heating turned off - Temperature difference between Jacket and overtemperature sensor too high.
-2069 Seven-segment display not functioning.
-2070 Graphic display not functioning
-2071 The pump-speed setpoint has been reduced. The pump could not reach the set speed eg because of high fluid viscosity.
-2072 The expansion tank temperature is within 5K of the overtemperature cut-off setting.
-2073 Maximum number of messages reached.
-2074 The compressor has been turned off because the internal temperature is more than 5K below the minimum setpoint.
-2075 Internal temperature exceeds the setpoint limits. Response: The maximum heating/cooling capacity has been reduced.
-2076 Problem with the 24 Bit A-D SPI Interface.
-2077 The temperature control has switched to the second setpoint because the RS Watchdog flagged an error.
-2078 The maximum number of messages in the AD7738 Interrupt Routine has been reached.
-2079 The required evaporation pressure cannot be reached. Refrigeration leak/problem?
-2080 Strong noise seen on the value of AD7738 channel 0.
-2081 Strong noise seen on the value of AD7738 channel 1.
-2082 Strong noise seen on the value of AD7738 channel 2.
-2083 Strong noise seen on the value of AD7738 channel 3.
-2084 Strong noise seen on the value of AD7738 channel 4.
-2085 Strong noise seen on the value of AD7738 channel 5.
-2086 Strong noise seen on the value of AD7738 channel 6.
-2087 Strong noise seen on the value of AD7738 channel 7.
-3000 Clock battery drained.
-3001 Graphics library - initialisation error.

-3003 Graphics library – Coordinates outside of normal range.
-3006 Graphics library – out of memory.
-3007 Graphics library – device not available.
-3008 Graphics library – Error in enclosed system.
-3020 Graphics library – Error when processing list.
-3030 Graphics library – Error when processing button list

Removing the electronics

Turn the unit off by switching the isolator switch (36) "0" – OFF position.
Remove the cover and screw from the top of Unistat Pilot, and pull the Pilot upwards and outwards.
Remove the screw revealed in the Unistat Control, and pull the Control module upwards.

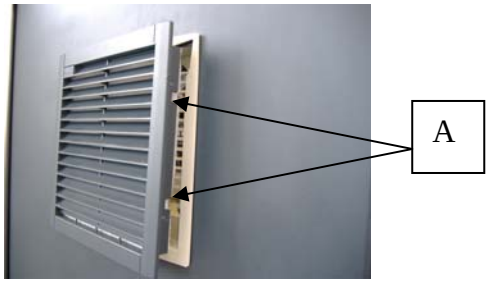
Maintenance

The equipment contains pressure devices in terms of the Pressure Equipment Directive 97/23/EEC. Only competent or appropriately trained personnel may carry out maintenance and service tasks.

The device initially requires little maintenance within the housing. Only expert personnel trained by Huber are permitted to carry out maintenance work, which exceeds the following tasks.

Cleaning the dirt traps
The strainer in the dirt trap at the cooling water input must be regularly checked and cleaned by trained expert personnel, dependent on the water quality. For this purpose disconnect the tempering device from the power supply. Close the inlet valve of the cooling water supply. Remove the cover on the side of the cooling water connection (13+14). The dirt trap is located immediately behind the cooling water supply connection (13). To clean it, first loosen its lid using a suitable tool. You can now remove and clean the metal sieve located below the cover. Check the dirt collector for leaks after you have screwed back the sieve and the lid.

Cleaning the air filters
The filters in the control cabinet door must be regularly checked, cleaned or replaced, depending on the degree of air pollution.



Two cut-outs (position A) are located in the ventilation screen. Apply a suitable tool (e.g. slotted screwdriver) here and release the catch with light pressure. The ventilation screen can then be removed to the front.

We can also offer you service training courses. Please contact our Customer Support.

Decontamination / Repair

The user is responsible for making sure that there are no hazardous materials either in or on the unit. The level of decontamination should be appropriate to the amount and type of contaminants on the unit. The user should refer to the appropriate MSDS information for advice.

The decontamination should be done ***before*** outside personnel come into contact with the machine, and before the unit is sent out for repair or testing. The unit should be clearly labelled that it has been decontaminated before it is sent.
We have prepared a document to simplify this process. This is available in the appendix, and at our website www.huber-online.com.

Cleaning the surfaces

A normal steel cleaning spray is suitable for cleaning the stainless steel surfaces.
Painted areas should be carefully cleaned with a gentle detergent.

Chapter 6: Taking the machine out of service

The following sections can be found in this chapter

- Taking the machine out of service
- Transport
- Disposal

Shutdown

Safety instructions and basic principles

 **Caution!**
Injuries and material damages possible.
Slip hazard if floors and work places are not clean.
Risk of tilting if the device does not stand firmly.
Electric shock hazard if power connection is faulty.
Risk of scalding and burns if temperatures are extreme.
Cauterisation hazard for eyes, skin, respiratory channel if hazardous vapours are emitted (by the respective thermal fluid).
Collect escaping residual liquid in collecting tank, immediately remove device and floor contamination.


All safety instructions are important and must be considered during work according to our operating instructions!

Switch-off
Set the main switch (36) to „0“.
Disconnect the tempering device from the mains.

Draining process cooling water circuit:
Close the stop valves provided by the customer to stop the cooling water flow. Position the collector underneath the cooling water connectors, input/output. Carefully loosen the connecting screw-fittings, the cooling water starts to drain from the cooling water connectors.

Drainage of the water cooled condenser:
After draining the cooling water circuit, open the rear cover on the left-hand side. Remove the screw caps of the marked drain valves (16). Fasten a suitable drain hose (threaded connection 3/4"). Lead the other end of the hose into a suitable container. Then open the cooling water drain valves (16). Lever in flow direction means open, lever crosswise means closed. Close the drain valve after draining.

You must allow the cooling water to drain completely! (Implement preventive measures against freezing damage during transport and storage!)


The drained cooling water can be disposed via standard waste-water disposal lines. The draining of the cooling water can be accelerated by compressed-air pistols directed into the cooling water connectors.

Transport

The unit is now decommissioned and ready for transportation. The original packing material should be used as far as possible, and the unit must always be transported in the upright position.

Items such as the controller and sight glass should be protected from transport damage. The unit should not be transported on its rollers, or mounting feet. Supports of rectangular wooden beams appropriate for the weight should be used even when transported on a palette. When shipping the unit on a palette, it should be braced on four sides using wood or other suitable materials. Extra bracing and banding should be made according to the weight of the unit. Extra materials such as plastic wrap/sheeting, cardboard, and banding should be used as necessary.

Disposal

Thermal Fluid which has spilled or leaked but be correctly disposed of.
To minimise environmental pollution, please dispose of old temperature control machines only via suitably licenced and experienced disposal or re-cycling companies.