



THERMAL CARE

PiovanGroup



Temperature Controllers

OPERATION,
INSTALLATION AND
MAINTENANCE
MANUAL

Vactherm RVU

Where water
means business.



Instructions

Vactherm RVU

Serial number _____

Enclosed this instruction manual are separate instructions for Microprocessor for temperature control units.

Documentation Vactherm RVU

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FOREWORD

This owner's manual, prepared by the manufacturer, provides detailed instructions for the installation, operation, and maintenance of a Vactherm RVU unit. Prior to installation, it is strongly recommended to thoroughly read the entire owner's manual.

The temperature controller must be installed in a well-ventilated room and is not suitable for outdoor installation.

Only piping that has been approved for use with the temperature controller and are rated for the maximum temperature and pressure of the unit should be used. Additionally, the electrical installation must be carried out correctly and in accordance with relevant standards.

The manufacturer bears no responsibility for any issues related to piping and electrical installations outside of the temperature controller.

The back plate of the temperature controller displays important information such as the serial number, voltage, frequency (Hertz), and current consumption (Ampere).

If there are any questions, do not hesitate to contact Customer Service. When making an inquiry about the temperature control unit, please provide the model number and serial number of the unit in question.

Upon receipt of the temperature controller, it is important to inspect it for any damage that may have occurred during transport. Carefully check the housing for dents and the electric box for any loose components or wires.

If any damage is found, please contact Customer Service for further assistance.

SECTION 1 - USE

The Vactherm RVU temperature control unit is used to control the water temperature in connection with open systems.

When in operation, water of a controlled temperature is circulated through the process and then the water is sucked back to the tank of the temperature controller. When working with open systems the quantity of water in the process must be known and must remain constant.

The temperature range is between 50°F and 194°F (10°C and 90°C), however, the minimum temperature will always be above the available cooling water temperature.

Oil and inflammable liquids must not be used as the circulating medium in the unit.

SECTION 2 – STRUCTURE/FUNCTION

The Vactherm RVU has a stainless steel tank (13. see principle of operating) a pump (5) for internal circulation, heating element (11), plate heat exchanger (10), tubes, piping, and solenoid valve (12) for water filling of the process. At the right water level the injector (18) is automatically activated in order to suck the water back to the tank (6). After a short time the process pump (5) is activated, and tries to build up a pressure over the pressure gauge (9). When in operation the microprocessor controls the water temperature by activating the heaters (11) or the solenoid valve (14) for cooling.

The temperature range is between 10 and 90°C, however, the min. temperature will always be above the available cooling water temperature.

Oil and inflammable liquids must not be used as the circulating medium in the unit.

SECTION 3 - SAFETY INSTRUCTIONS

1. Do not block the cooling water outlet. If this is not possible, please contact Customer Service.
2. Do not block the flow of the cooling water with a non-return valve. If this is not possible, please contact Customer Service.
3. The unit should only be used for the work processes specified in Section 1.
4. Piping used in connection with the unit shall be approved for the maximum temperature and pressure of the unit.
5. Remember that piping ages and should therefore be inspected at regular intervals.
6. Piping connections shall be secured when it is a matter of a warm medium. Never use quick couplings directly on the unit or elsewhere in the process.
7. Before connecting the power supply, make sure that piping is properly installed and connected.

8. Piping should not be removed from the unit before the medium has cooled, the pressure in the tank has been released and the power supply to the unit has been cut off.
9. Cabinet components should not be removed before the power supply has been cut off. Always reinstall them before reconnecting the power supply.
10. When the power supply is connected, the electric box must be closed.
11. The device is supplied with miscellaneous air intakes which should not be covered.
12. Do not place the unit close to heat-generating machines or surfaces.
13. The unit is equipped with an automatic start/stop function, which is why it is important to ensure that all piping connections are intact while there is voltage in the device.

SECTION 4 – ELECTRICAL



Risk of Electric Shock!

Prior to opening, the temperature control unit should be disconnected from the electrical power source (unplug the main plug and, if available, deactivate the main switch on the temperature control unit).



Important - danger of injury in the event of escaping water or oil!

Remember to install piping properly before connecting to the power supply.

A cable is supplied with the unit.

Check whether the flow direction is the same as the flow direction specified on the pump engine at start-up. Dismantle the front plate to check this.

The flow direction can be changed by swapping the two-phase conductors.

The unit should not be included in a fixed installation. It should be possible to switch it off/disconnect it from the power supply by a socket outlet and plug.

The unit must have a ground connection.

The unit must be secured with a fault current relay (applies only for countries where this is mandatory).

Ensure that the connection cable to the unit does not come in contact with hot pipes or tubes.

The unit can be equipped with a socket for connecting an external temperature sensor. The socket is installed on the back plate of the device. For more information about the installation of an external sensor in the socket, please see the electric diagrams.

SECTION 5 – CONNECTION/START-UP

The connections marked “TO PROCESS” and “FROM PROCESS” should be connected to the process.

The water supply for cooling and automatic refilling should be connected to the “WATER IN” connecting piece.

Remember to install a filter for the water supply.

The cooling water is returned by “WATER OUT”.

All tubes, pipes and fittings that are to be used for the connection must be able to withstand the maximum temperature and pressure of the device.

Open the water supply to the device. Connect the voltage to the device.

SECTION 6 - OPERATION

When the hoses are connected you can turn on the unit with turning the emergency stop on. When the machine is on, press the green button and the device will start filling with water. The pump turns on after the tank has been filled. The filling process is automatic.

Stay with the unit until the pump starts and the filling is complete. Then you can inspect the piping connections and the process for leaks.

The unit refills the tank automatically during operation without interrupting the pump. In order to avoid large water spills in case of big leaks, the first-time filling after on is pressed will continue for up to 4 min. The duration of the refilling is up to 20 seconds, whereupon the pump stops and the solenoid valve closes. Do the following to restart the filling:

Turn off the unit using



Turn on the unit using



The tank and process temperatures are shown on the home screen during operation.

The unit regulates the temperature according to the selected settings using the cooling and heating function.

The thermostat uses a microprocessor. The heat output is automatic. Both the heating and cooling functions regulate the temperature by means of pulses so that display of too high or too low values is eliminated.

A clarification of the different display values can be found in Section 14 - Control Display

SECTION 7 – DISPOSAL AND DISASSEMBLY

Before disposal of the unit, it should be dismantled and the different materials shall be recycled out of environmental considerations.

When dismantling the unit, it is important to follow a certain procedure in order to avoid damages caused by water.

You must cool down the water in the machine before dismantling.

Turn off the unit.

Turn off the taps to and from the process and allow to cool.

Dismantle the electric connection.

Then remove the tubes from the machine.

Please note that if the return pipe is still pressurized, the device will be pressurized as well.

SECTION 8 – MAINTENANCE & CLEANING

MAINTENANCE

Regarding maintenance, the manufacturer recommends performing an inspection after approximately 2,500 operating hours. You can easily monitor the operating hours on the display, and you also have the option to configure this setting in the control system. Here's a step-by-step guide for the maintenance procedure:

- Turn off the machine.
- Open the electrical panel and visually inspect the electrical components. Pay special attention to the contactors, as they tend to wear out over time.
- Remove the side panels to check for any leaks or issues with the machine's integrity.
- We strongly recommend replacing the coil of the Q2 solenoid valve during each maintenance cycle after approximately 2500 operating hours.

CLEANING

The power supply to the device must be disconnected prior to cleaning. Do not rinse with water or pour water over the device during cleaning.

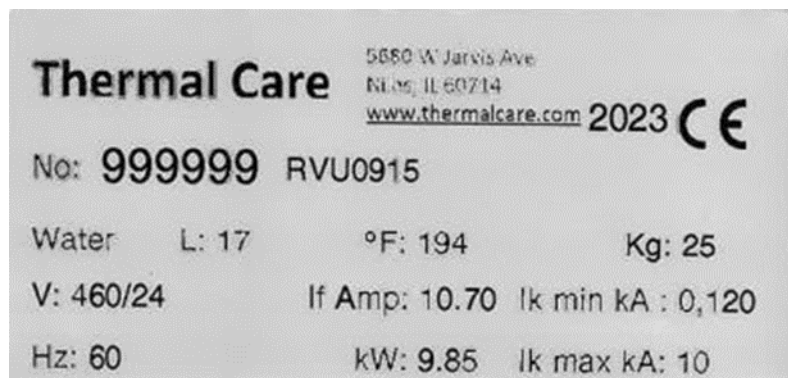
Wipe the cover plates, backplate and the instrument plate with all-purpose cleaner. Do not use products containing solvents. Remove calcium, lime and other accumulations from the level sensor at regular intervals.

The liability of the manufacturer is either limited or the manufacturer is not liable at all for component replacements/repairs that have not been recommended by manufacturer or that have not been performed according to the enclosed instructions (cf. Product Liability Directive 85/374/EEC).

SECTION 9 – SERIAL NUMBER TAG

Inside the electrical box and on the back of the RVU is the serial number tag with details regarding the unit.

Sample Serial Number Tag

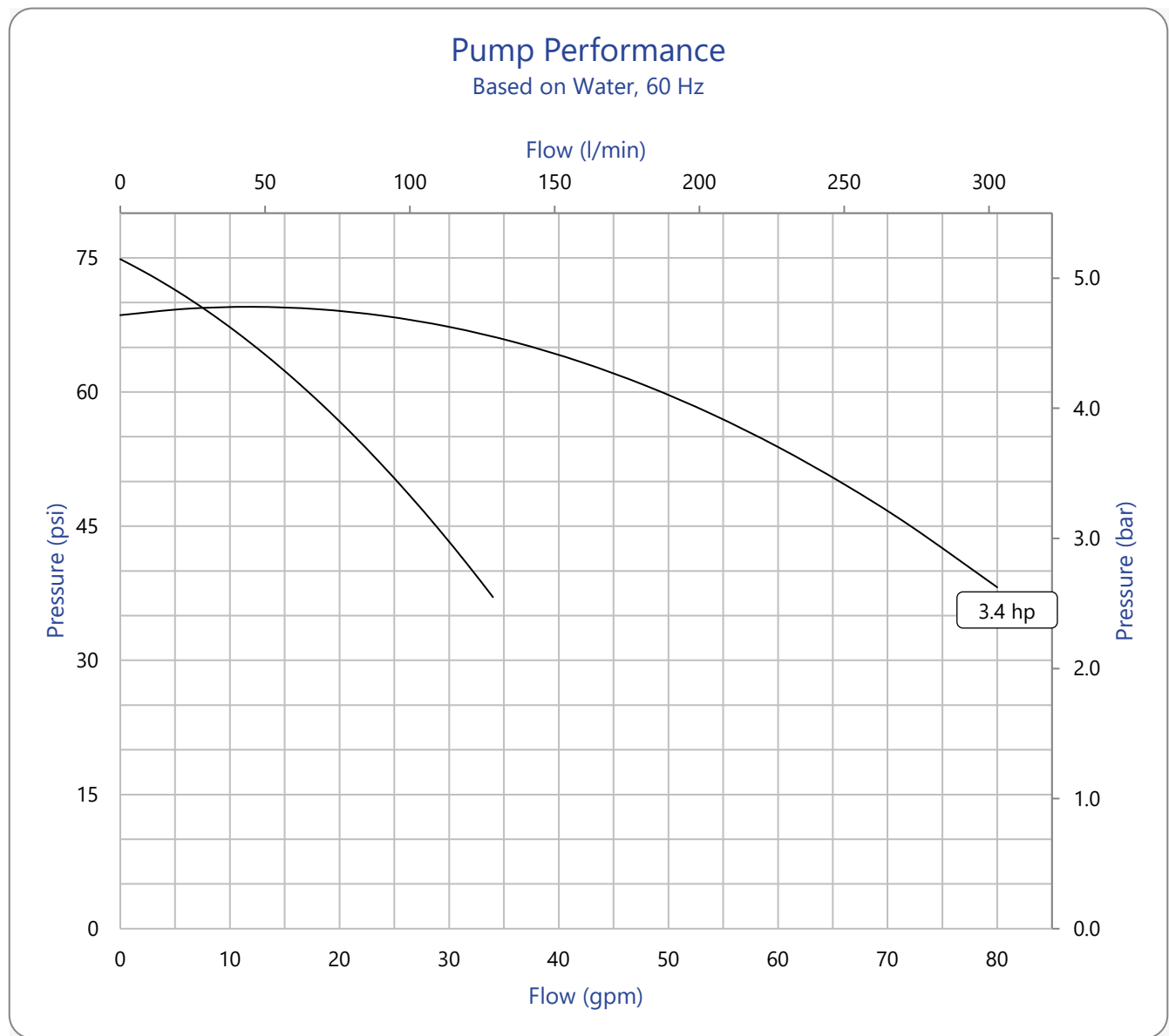


SECTION 10 – SPECIFICATIONS

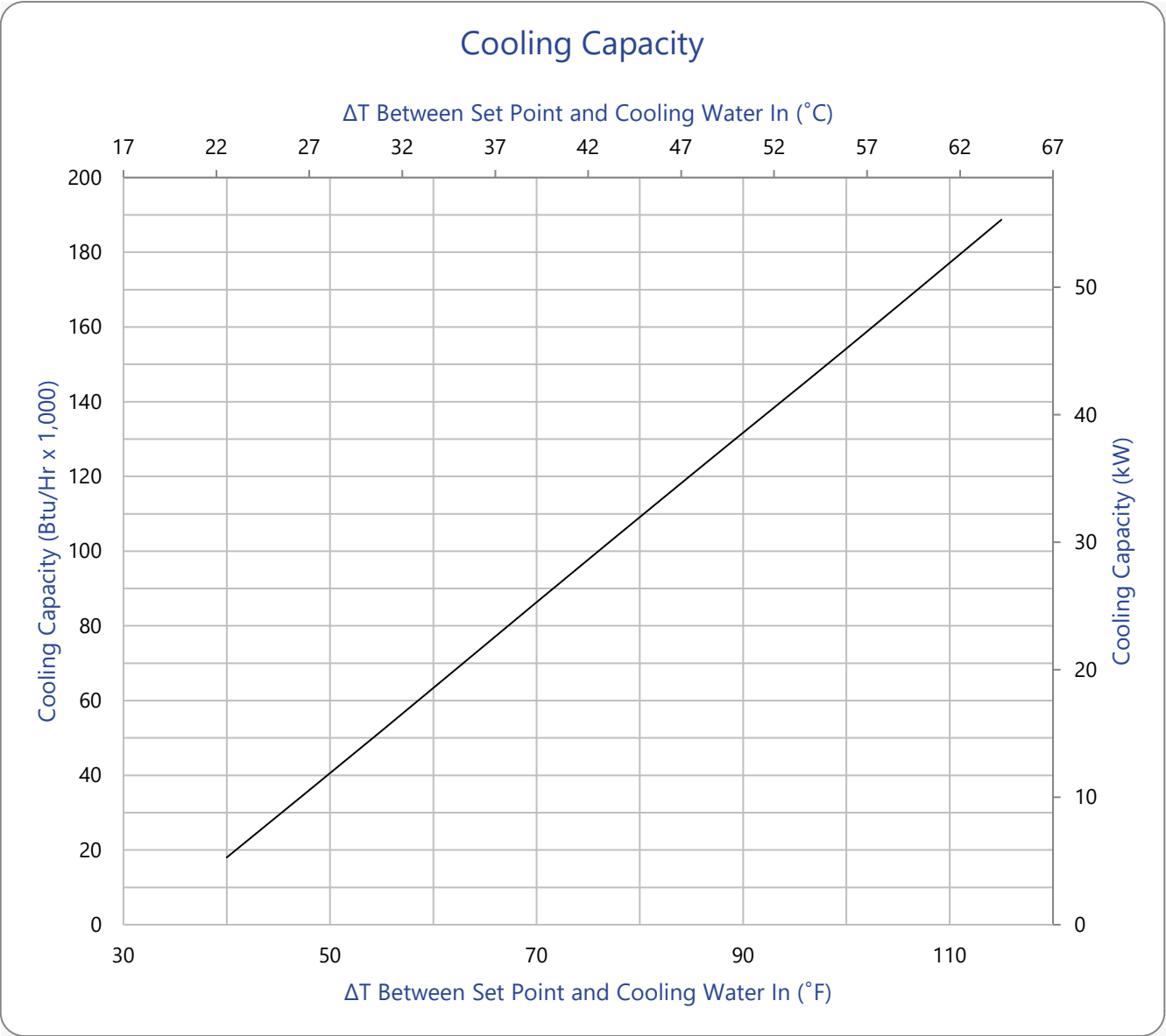
RVUXX35	
Temperature range	50°F to 194°F (10° to 90 °C)
Circulation medium	Water
Maximum pressure including pump	145 psi (10 bar)
Pump flow max.	12 M ³ /h (200 l/min)
Pump motor output (P2)	1.1 kW, 2.5 kW
Heat output	9 kW, 18 kW, 27 kW
Cooling capacity, Δt 140°F (60°C)	14 kW – 28 kW
Output power	9.8 kW, 18.8 kW, 27.8 kW
Power consumption 460/3/60	12A, 21A, 30A
Pipe connection Process	½" NPT
Pipe connection Cooling	½" NPT
Tank volume:	8 gal (30 L)
Dimensions	
Length	35 in (880 mm)
Width	13 in (335 mm)
Height	31 in (780 mm)
Weight	188 lbs (85 kg)

SECTION 11 – PUMP & COOLING CAPACITY CURVES

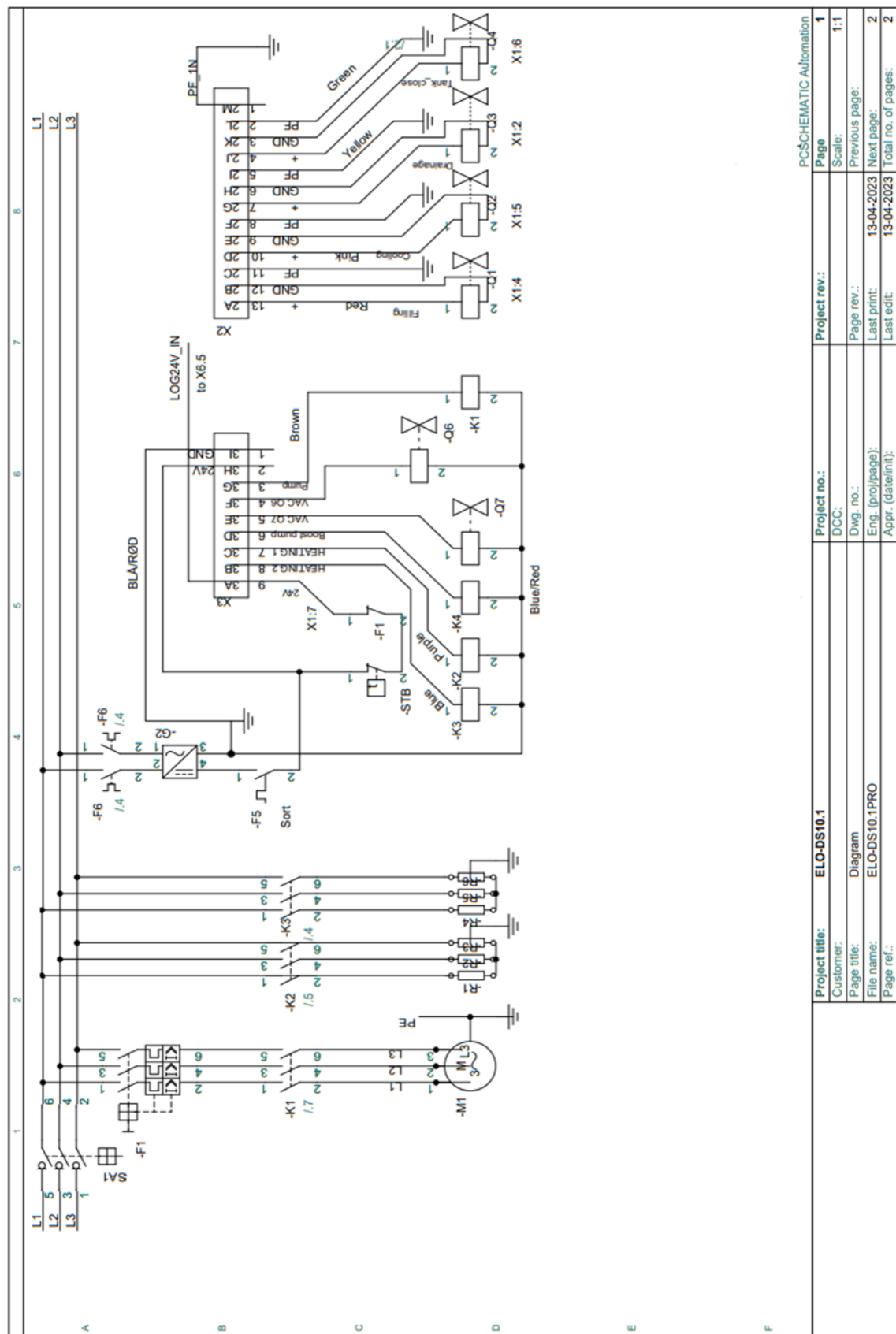
PUMP PERFORMANCE

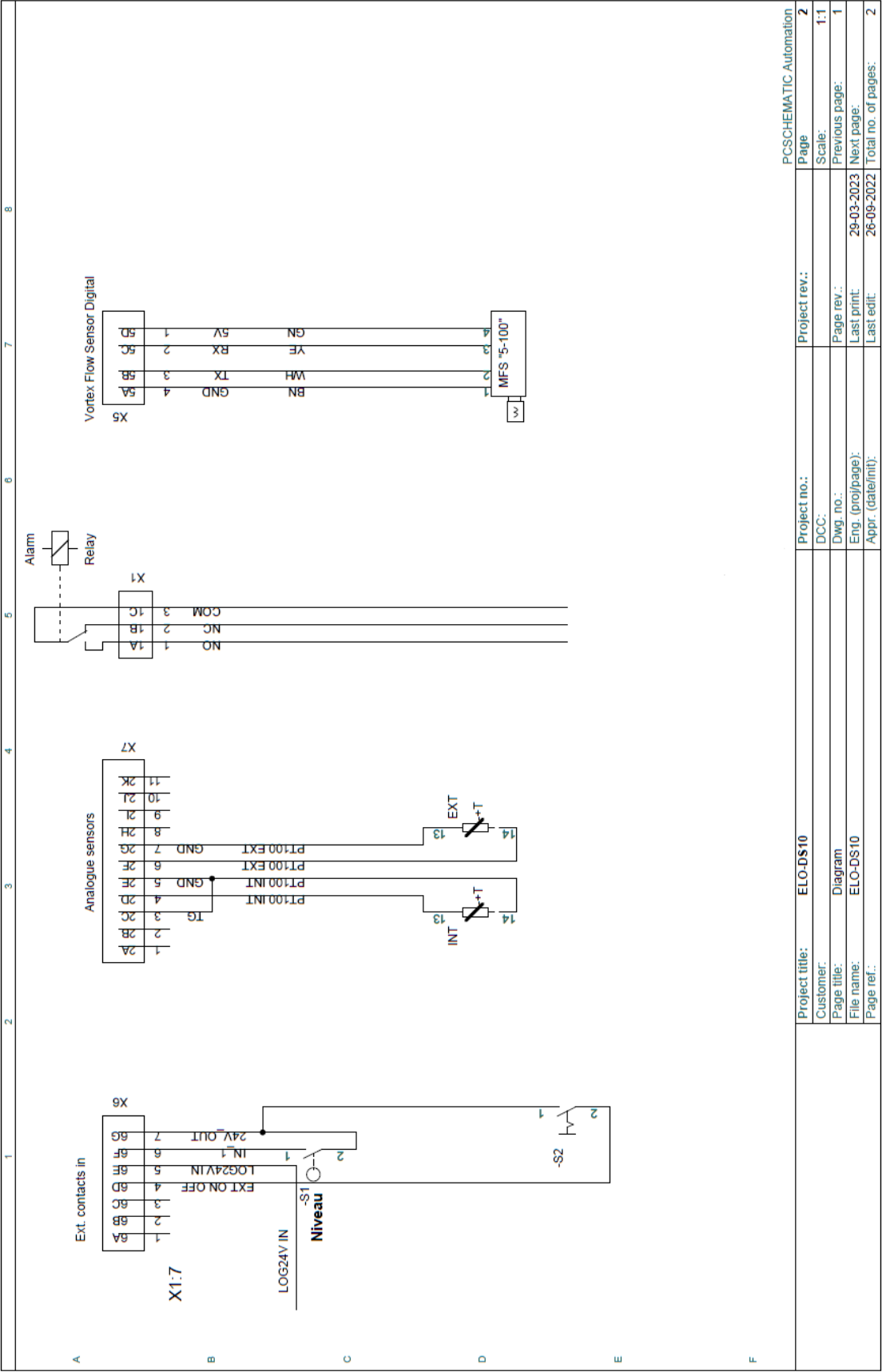


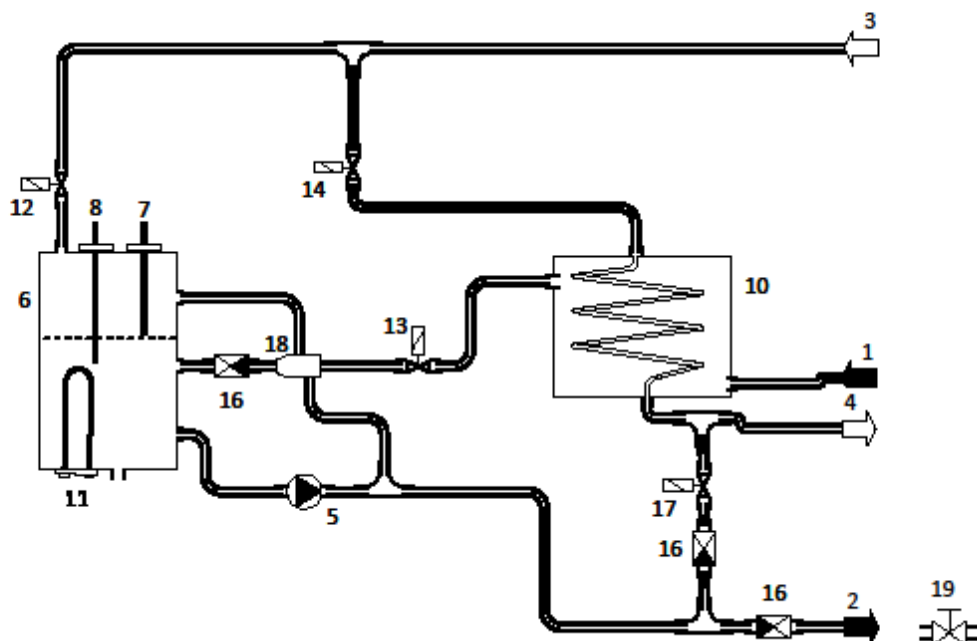
COOLING CAPACITY



SECTION 12 - ELECTRICAL DIAGRAM







Thermal Care list

	DK	GB	D
1	Fra form	From mould	Von form
2	Til form	To mould	Zu form
3	Kølevand ind	Inlet cooling water	Kühlwasserinlass
4	Kølevand ud	Outlet cooling water	Kühlwasserauslass
5	Pumpe	Pump	Pumpe
6	Tank	Tank	Tank
7	Niveauføler	Level sensor	Niveautaster
8	Temperaturføler	Temperature sensor	Temperaturtaster
10	Køler	Heat exchanger	Kühler
11	Varmeelement	Heating element	Heizelement
12	Magnetventil påfyldning Q2	Solenoid valve filling Q2	Magnetventil wasserfüllung Q2
13	Magnetventil procesvand Q5	Solenoid valve proces Q5	Magnetventil wasserfüllung Q5
14	Magnetventil Køling Q1	Solenoid valve cooling Q1	Magnetventil kühlung Q1
16	Kontraventil	Non-return valve	Rückschlag ventil
17	Magnetventil formtømning Q3	Solenoid valve draining Q3	Magnetventil formentleerung Q3
18	Injektor (vac)	Injector (Vac)	Injektor (vac)
19	Justeringsventil	Adjustment valve	Einstellventil

Thermal Care

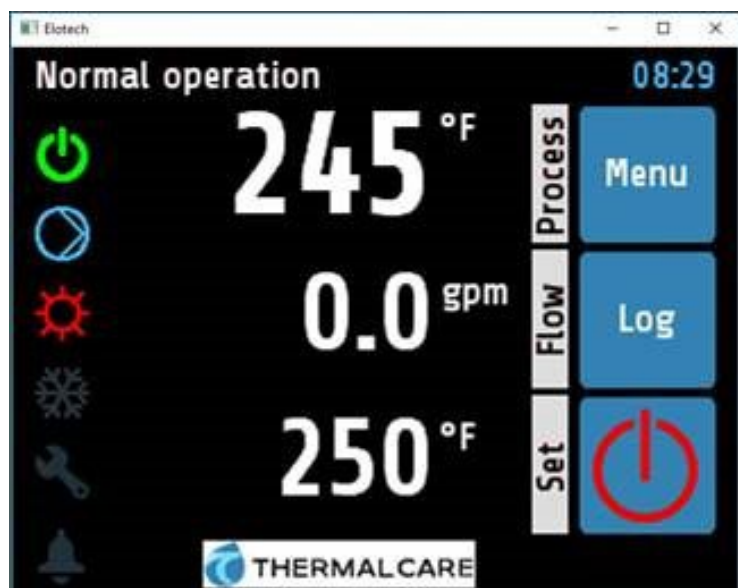
RVUXX35



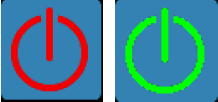



Dato: 2022.12.16

Name: RVUXX35 VAC

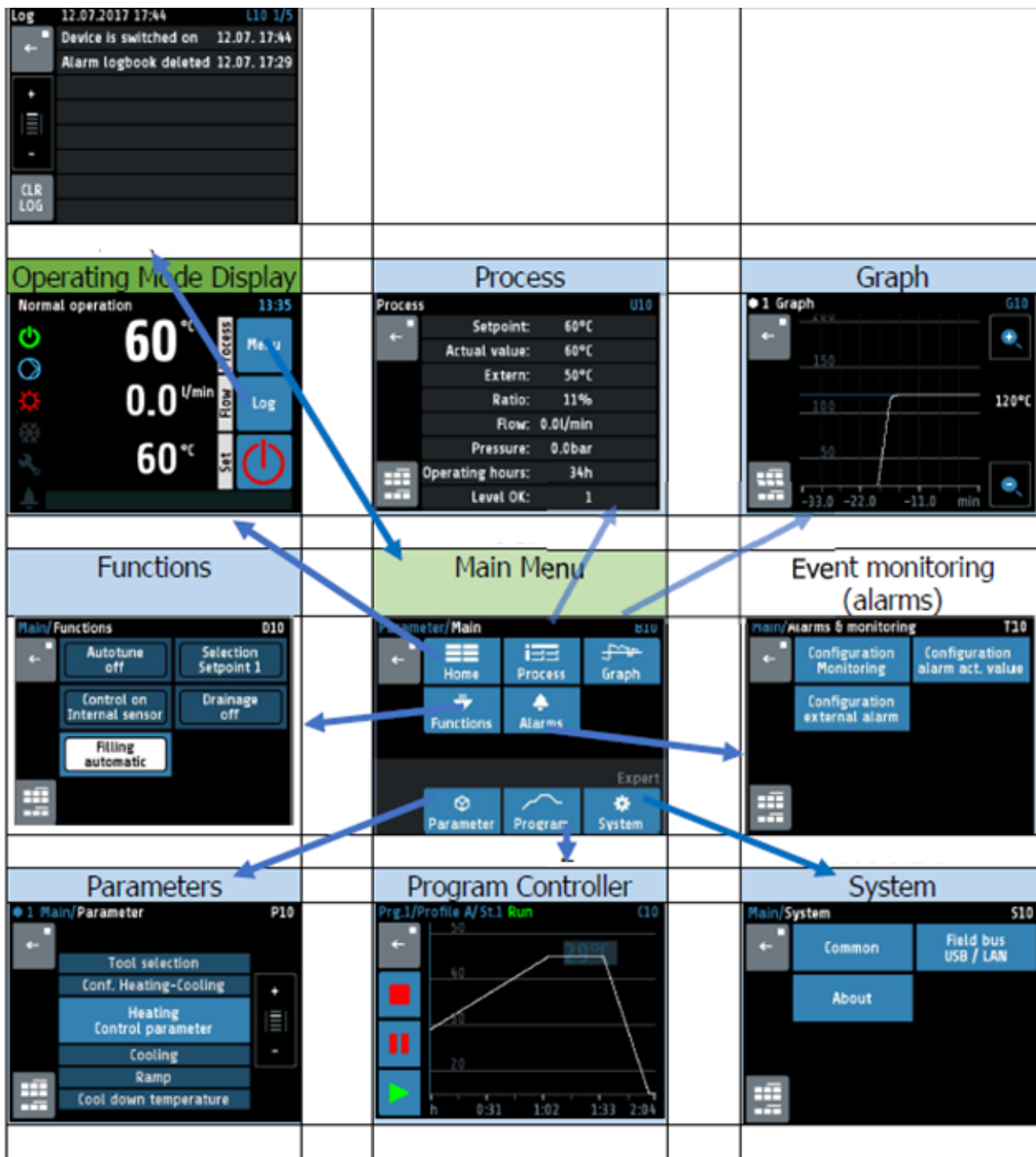
SECTION 14 – CONTROL DISPLAY

HOME / START DISPLAY

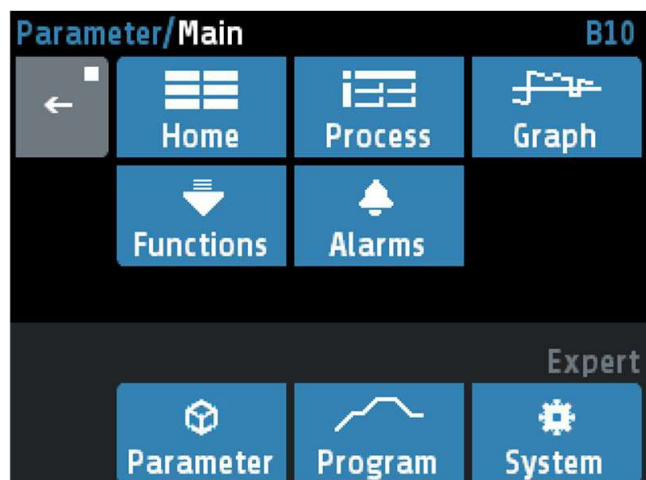


	Button “Menu”: Jump to Main Menu
	Button “Alarm Log”: Jump to the record of events including the temperature alarms
	Button “on / off”: By means of the button represented on the right hand side the unit will be switched on / switched off. The color indicates the actual result of pressing the button: Green: The unit will be switched on Red: The unit will be switched off .
	Actual temperature value Touch on this section: Jump to setpoint menu
	Setpoint Touch on this section: Jump to setpoint menu
	Example of status display <ul style="list-style-type: none"> · device on, controller running · pump is running · heating output is on

OVERVIEW OF THE CONTROLLER






MAIN MENU

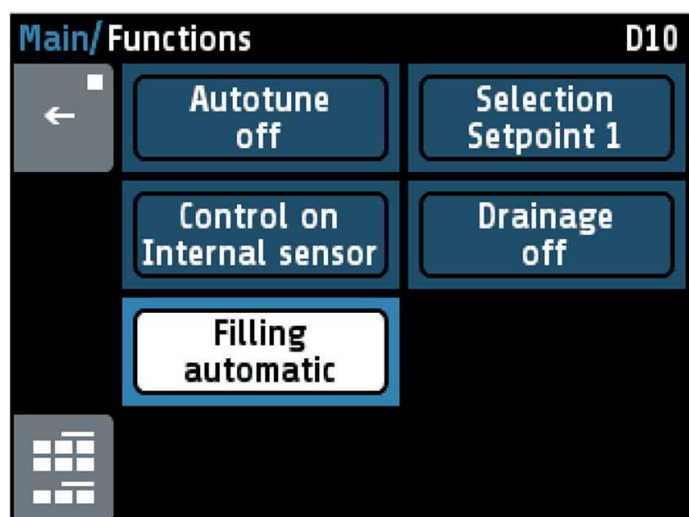





This menu provides access to the menus and displays

	<p>Jump to the Operating Mode display</p> <p>Shows actual temperature, setpoint, activity of heater and cooler outputs</p>
	<p>Jump to menu “Process”</p> <p>Listing of setpoint, actual values of forward circulation temperature and circulation return temperature, output ratio of heater (if leading sign is positive) respectively output ratio of cooler (if leading sign is positive).</p>
	<p>Jump to menu “Graph”</p> <p>Diagram of the actual temperature value of the controlled temperature</p>
	<p>Jump to menu “Functions”</p> <ul style="list-style-type: none"> · Activation of autotune · Activation of cooling down and switch off · Activation of tool (equipment) drainage · Selection of setpoint 1 or setpoint 2 · Selection of target of temperature control (supply or return) · Selection of filling mode (manual filling or automatic filling)
	<p>Jump to menu “Alarms” (Configuration of event monitoring)</p> <p>By means of this menu the automatic signaling of events (generally out-of-band signaling) can be determined.</p>
	<p>Jump to menu “Parameters”</p>

	<p>Jump to menu “Program”</p> <p>By means of this menu temperature-time-profiles, which are more complex than simple temperature ramps, can be set up.</p>
	<p>Jump to menu “System”</p> <p>System configurations: date, time, data rate, authorizations</p>
	<p>Touch < 2 seconds = jump to preceding display</p> <p>Touch > 2 seconds = jump to operating mode display</p>

MAIN MENU FUNCTIONS



	<p>Function “Autotune”</p>
	<p>Selection of setpoint 1 / setpoint 2:</p> <p>Dependent on the current selection the controlled temperature follows setpoint 1 or setpoint 2.</p> <p>If setpoint 2 is selected the operating mode display shows “SP2” at the headline.</p>
	<p>Function “Drainage” (of tool equipment). This function makes the pump run and opens the drainage valve.</p> <ol style="list-style-type: none"> 1. Cooling down to “cool down temperature” 2. Drainage: Wait delay “drainage time” 3. Switch off device <p>The stage “Cooling down” can be aborted by switching off the device. The stage “Drainage” cannot be aborted. The device shows error message.</p>

<div>Filling manually</div>	<p>Function “manual / automatic filling”:</p> <p>If the button “Filling” is toggled to “automatic”: The filling valve will be activated if the filling level drops below maximum level.</p> <p>If the fluid level is on maximum level (both contacts closed) the pump will be released.</p> <p>If the fluid level is in between maximum and minimum level the pump remains released.</p> <p>If the fluid level drops below minimal level (tank empty) the pump will be locked.</p> <p>When filling (tank is empty) was activated the pump will not be released until the fluid level exceeds maximum level.</p> <p>If the filling procedure lasts longer than “maximal filling time” the alarm output is activated.</p>
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AUTOTUNE

Autotune	off	Switches off autotune <Default>
<div>Autotune off</div>	on	Activates autotune

The tuning algorithm determines the characteristic values within the controlled process and calculates the valid feedback parameters (P, D, I) and the cycle time. ($= 0.3 \times D$) of a PD/Controller for a wide section of the range.

The autotune mode works during start-up shortly before the setpoint is reached. If activated after the setpoint has already been reached, the temperature will first drop by approx. 5% of the measuring range.

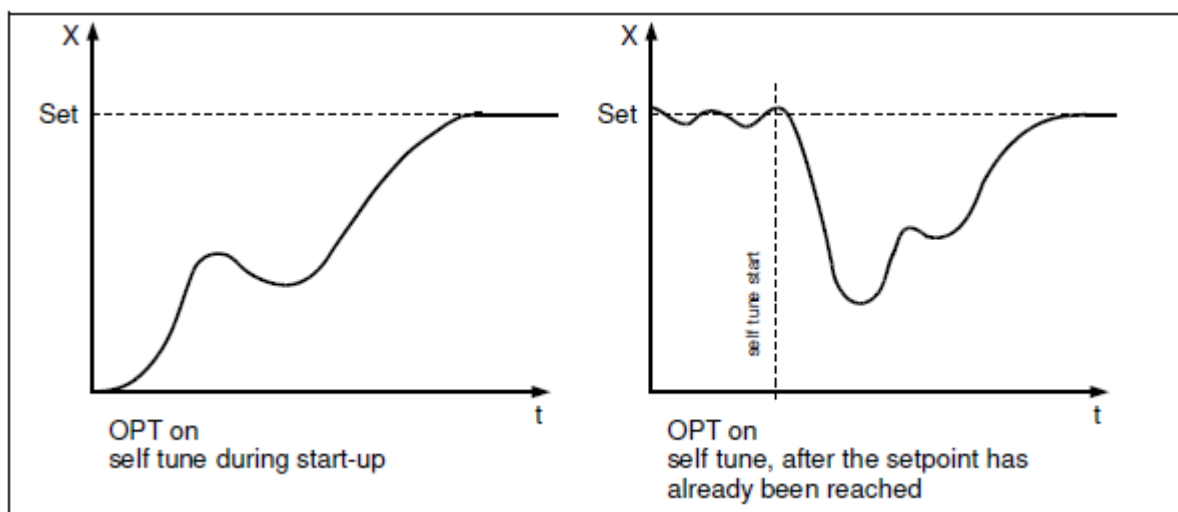
The tuning algorithm can be activated at any time by selecting the parameter **Autotune** = “on”. After having calculated the feedback parameters, the controller will lead the process value to the actual setpoint.

Selecting **Autotune** = “off” will stop the autotune function.

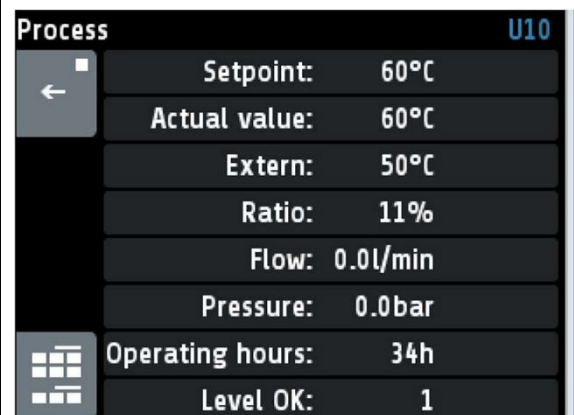
Autotune duration > 2 hours: autotune stops with an error message.

Conditions for starting the autotune algorithm:

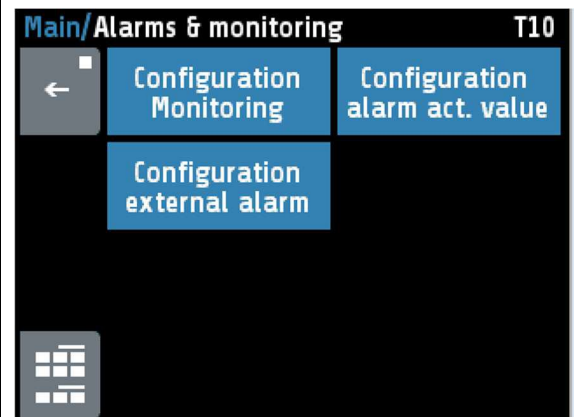
- The setpoint must amount to at least 5% of the measurement range
- The sensor must not have a failure.
- The soft start function must not be active



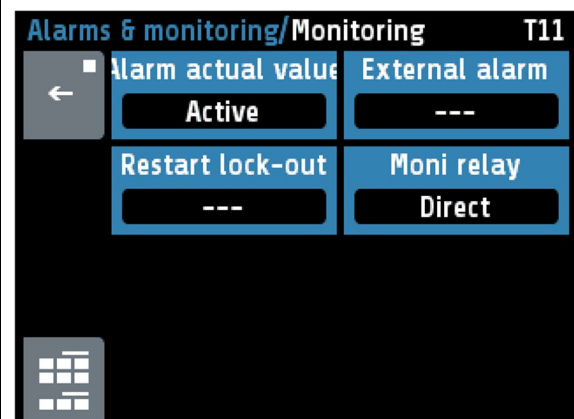
MENU PROCESS

 <p>Process U10</p> <ul style="list-style-type: none"> Setpoint: 60°C Actual value: 60°C Extern: 50°C Ratio: 11% Flow: 0.0l/min Pressure: 0.0bar Operating hours: 34h Level OK: 1 	<p>This display shows the fundamental current process values</p> <ul style="list-style-type: none"> · Setpoint of the controlled temperature · Actual value of the controlled temperature · Actual value of the external temperature (optional) · Actual output ratio · Actual flow value (optional) · Actual pressure value (optional) · Hours of operating · Max level 1=OK 0=Low
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MENU ALARMS

 <p>Main/Alarms & monitoring T10</p> <ul style="list-style-type: none"> Configuration Monitoring Configuration alarm act. value Configuration external alarm 	<p>Explanations to the submenus pictured on the left-hand side please find as follows Menu – “Configuration Monitoring”</p>
--	---

MENU “CONFIGURATION MONITORING”

 <p>Alarms & monitoring/Monitoring T11</p> <ul style="list-style-type: none"> Alarm actual value: Active External alarm: --- Restart lock-out: --- Moni relay: Direct 	<p>By means of this menu the events can be determined which shall generate signals and messages:</p> <ul style="list-style-type: none"> · out-of-band of the actual temperature · out-of-band of the ext. temperature · restart was locked after power-on <p>Furthermore the switching behavior of the event monitoring relay can be determined:</p> <ul style="list-style-type: none"> · “Direct”: the contacts are closed when event is active · “Inverse” the contacts are open when event is active
---	--

CONFIGURATION OF TEMPERATURE MONITORING

Alarms & monitoring/Actual value alarm T12

←	Alarm values OFF / OFF	Type Absolute
	Delay OFF	Start Suppression OFF

Grid icon

Alarms & monitoring/External alarm T14

←	Alarm values OFF / OFF	Type Absolute
	Delay OFF	Start Suppression OFF

Grid icon

The device provides the monitoring of the following temperature readings:

- actual temperature
- externally measured temperature optional

The monitoring of the readings listed above can be adjusted as follows:

- lower limit value
- upper limit value
- absolute limits: if "absolute" is activated the limits are not dependent on the set point

- relative limits: if "relative" is activated

the limits are dependent on the set point value. The complete limit values are then figured out, e.g.:

Upper limit = 176°F (80°C) Setpoint + 10 Kelvin

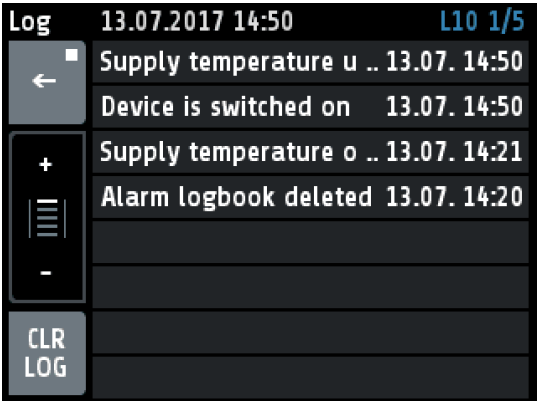




(upper limit value) = 194°F (90°C)

Lower limit = 176°F (80°C) Setpoint - 10 Kelvin

(limit value) = 158°F (70°C)

- the alarm signal is delayed about the entered time (1...8000 s)
- start-up suppression: If activated the ☐ - Alarm is not released until the temperature will have attained once the inner band sector.

MENU ALARM LOG

	<p>This listing saves significant events (Power On, temperature alarms, lock on restarts)</p> <p>The headline shows the current date, time and current page of log listing.</p> <p>If you push and hold a particular entry it will appear in full length.</p> <p>If you push the underpart of the listing the log is scrolled on.</p> <p>The log listing is able to save up to 40 event entries. The most recent entry is listed on page 1/5. If there are more than 40 entries the first input will be deleted.</p> <p>The log listing is stored if the unit has a failure.</p>
	<p>Jump from operating mode display to the log listing</p>
	<p>Page up / page down "+" preceding page; "-" next page</p>
	<p>Jump back to the operating mode display</p>
	<p>Clear log listing</p>

MENU GRAPH

This window shows the temperature curve. In the case of a technical incident the actual process value can still be examined afterwards.

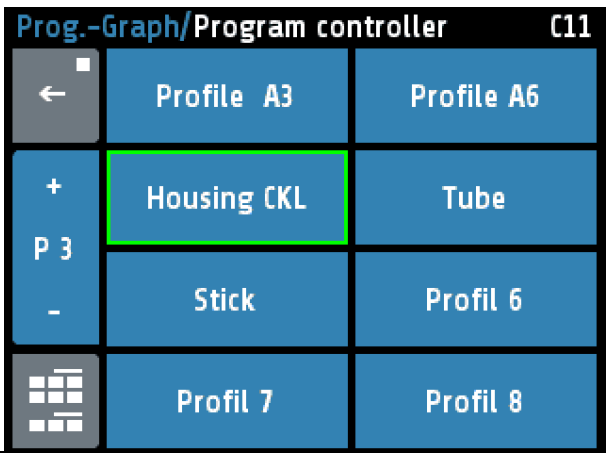
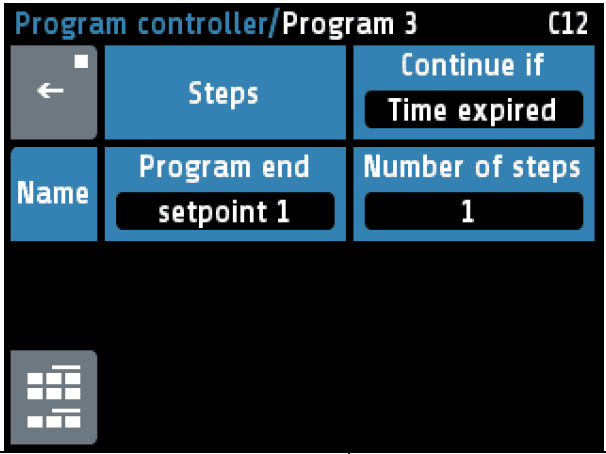
	<p>On the right the actual process value is shown, here 133°F (56°C).</p> <p>By pressing the zoom keys “+” and “–” the resolution of the temperature axis can be altered.</p> <p>The time axis can be determined by the parameter “Graph sampling time” in the window “System/Settings”.</p> <p>Turning off the device causes deletion of the values.</p>
	<p>Hold down < 2 sec. = Return to previous window</p> <p>Hold down > 2 sec. = Jump to window “Operating Mode Display”</p>
	<p>Jump to main menu</p>

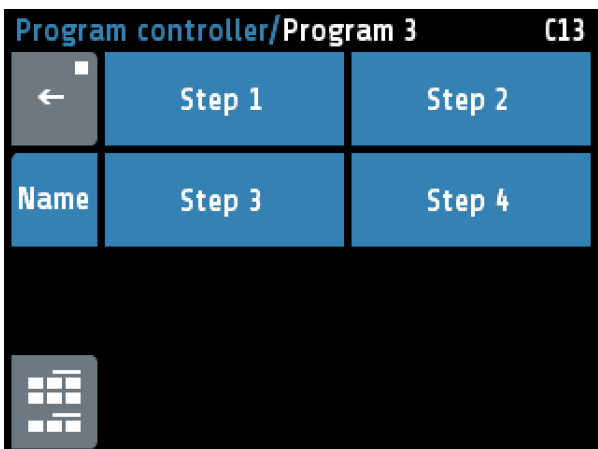
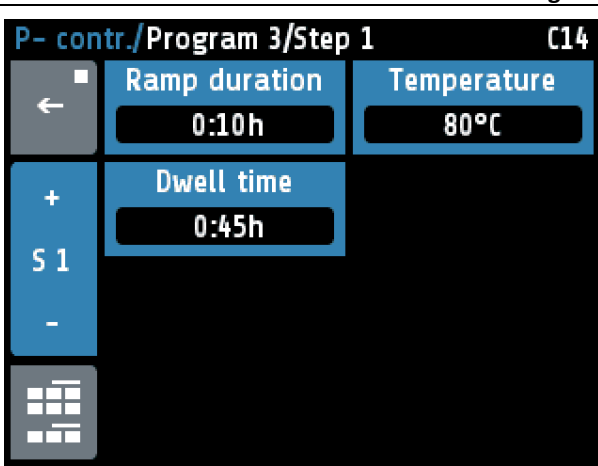
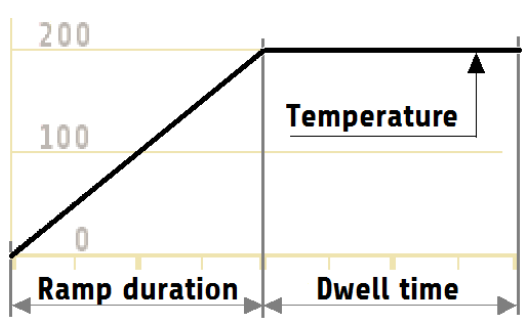


MENU PROGRAM

	<p>The header displays the current program, the current step and the status.</p> <p>Right above the graph is the indication of the current program setpoint.</p> <p>At the bottom (x-axis) the time is shown in hours.</p> <p>The elapsed time is displayed as a blue ribbon.</p> <p>The current time is indicated by the thin vertical blue line.</p>
	<p>By means of these keys the program is controlled:</p> <ul style="list-style-type: none"> • Start • Pause • Stop • Edit (only available in mode “Stop”)
	<p>Hold down < 2 sec. = Return to previous window</p> <p>Hold down > 2 sec. = Jump to window “Operating Mode Display”</p>

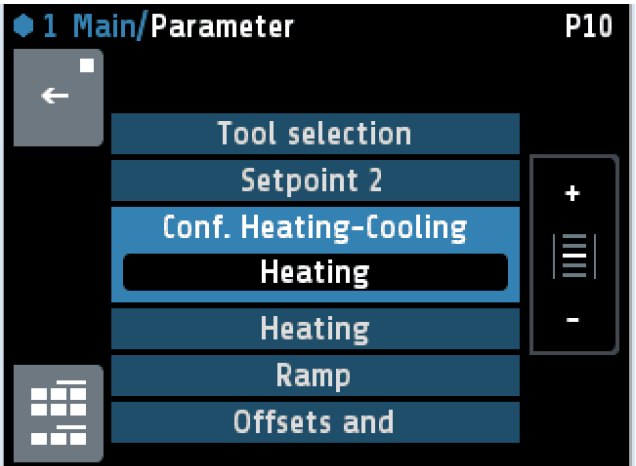


SETTING UP THE PROGRAM CONTROLLER

The button “Edit” opens the program set up menu:

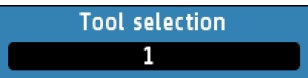
Select the program		
		<p>The green frame shows the selected program.</p> <p>Select another program by pressing + and – keys.</p> <p>Press the respective program button branches to the setup menu of the program.</p>
Setting program properties		
		
Continue if	Time expired	All steps are executed according to the time grid entered in the appropriate step menu.
	Temp. reached	After the time has elapsed, the controller switches to the next step. The step setpoint must be reached up to + - 2K.
Program end	Setpoint 1	After completion of the last step, the current setpoint is set active. Normally setpoint 1.
	Last setpoint	After the last step has been completed, the temperature of the last step is further regulated.
	Repeat	After the last step has been completed, step 1 is started again.
Number of steps	1...8	Number of program steps
Name		Name of the program.

Setting step properties		
		Here the set-up menu of the step can be activated.
Setting the step parameter		
		<p>In this figure, the ramp duration, the step temperature, and the dwell time can be set for the particular step.</p>  <p>The key S1 + selects the next step. The key S1 - selects the previous step.</p>
Ramp duration	0:00...99:59h	Time setting in which the setpoint shall move from the previous step temperature to the setpoint of the current step. In the first step, the actual value is set as the start setpoint. * If no ramp is desired, set this time to 0: 00h.
Temperature	-100...1600°C	Temperature (setpoint) of this step.
Dwell time	0:00...99:59h	Hold time of the current step temperature (step setpoint). The dwell time starts after the end of the ramp duration. If configuration is switched to "temp. reached", this time does not start until target temperature of the particular step is attained.
Program status in operating mode display (headline)		
		Program controller active, Step2 is running.
		Program paused or stopped


MENU PARAMETERS

	<p>By means of this menu the configuration of all controller-related parameters can be set up.</p>
	<p>Hold down < 2 sec. = Return to previous window Hold down > 2 sec. = Jump to window "Operating Mode Display"</p>
	<p>Jump to main menu</p>

TOOL SELECTION

	<p>It is possible to store and to select 8 different sets of particular controlling parameters. Affected are the parameters being part of the submenus "Heating", "Cooling" and "Configuration Heating / Cooling".</p> <p>If tool #4 is selected, e.g., the parameter set #4 is applied to the temperature controlling. This parameter set is then also accessible for adjusting.</p> <p>If tool #2 – #8 is selected in the headline of the Operating Mode Display the no. of the current tool parameter set is indicated: "W.4", e.g.</p> <p>If the standard parameter set (#1) is selected there is no tool identification displayed.</p>
---	---

SETPOINT 2

	<p>Setting the second setpoint. This value is used for control if the button selection in the "Functions" menu is set to setpoint 2.</p> <p>For example, setpoint 2 can be used to lower the regulated temperature during a break.</p>
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CONFIGURATION HEATING/COOLING

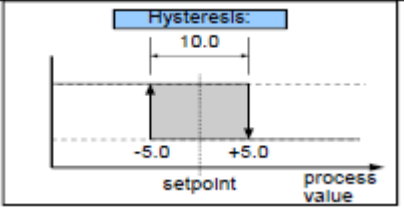
<div>Conf. Heating-Cooling</div> <div>Heating-Cooling</div>	Heating <Default>	Two-point controller: "Heating"
	Cooling	Two-point controller: "Cooling"
	Non-linear Cooling	Two-point controller: "Cooling", with non-linear characteristic curve for evaporation cooling
	Heating-Cooling	Three-point controller: "Heating-Off-Cooling"

CONTROL PARAMETERS

<p>By default the controller operates in PD/I control mode, i.e. controlling without deviation and with nearly no overshoot during start-up.</p> <p>The controlling behavior can be changed by adjusting the PID parameters listed in Heating Control Parameters and Cooling Control Parameters:</p>	
no feed back	Setting P = off (then D and I are switched off as well)
P-controller	Setting D and I = off
PD-controller	Setting I = off
PI-controller	Setting D = off
PD/I-controller	Modified PID-mode (set: P,D,I)

HEATING CONTROL PARAMETERS

<div>Heating Control parameter</div>		This menu is only available if configurations Heating or Heating-Cooling is selected. Depending on the configuration, particular parameters are not visible.
P (xp)	OFF, 0.1 ... 400.0K <Default=10,0>	Proportional range Unit: Kelvin
D (tv)	OFF, 1 ... 200s <Default=30s>	Derivative time
(tn)	OFF, 1 ... 1000s <Default=150>	Reset time
Cycle-time	0.5 ... 240.0s <Default=10,0s>	<p>The switching frequency of the actuator can be determined through the cycle time. In this time interval the controller switches on and off once.</p> <p>Voltage outputs for solid state relays (SSR): Cycle time: 0,5...10 s</p> <p>Preferred settings for rapid control processes: 0,8s</p> <p>Relay outputs: Cycle time: > 10 s</p> <p>The cycle time should be adjusted to a time as long as possible in order to minimize wear of the relay contacts.</p>
Max. Out-put ratio	0 .. 100% <Default=100%>	<p>The limitation of the output ratio is only necessary if the heating energy supply is grossly over dimensioned compared to the power required.</p> <p>Normally it should be switched off (Setting: 100%).</p>

		The limitation becomes effective when the controller's calculated output ratio is greater than the maximum permissible (limited) ratio. Warning! The output ratio limiting does not work during autotune.
Hysteresis	Only adjustable if "(xp)" = off (on-off action, without feedback)	
	OFF, 0.1 ... 80.0 <Default=0.1>	For measuring range without decimal point
	OFF, 0.01 ... 8.00 <Default=0.01>	For measuring range with decimal point
		

COOLING CONTROL PARAMETERS

<div>Cooling Control parameter</div>		This menu is only available if configurations Cooling or Heating-Cooling is selected. Depending on the configuration, particular parameters are not visible.
P (xp)	See Heating Control Parameters	
D (tv)		
I (tn)		
Cycle-time		
Max. Output ratio		
Hysteresis		
Deadband	Switching point distance "heating" and "cooling" This parameter is available for "heating and cooling" operations only. (Configuration Heating-Cooling = Heating-Cooling)	
	OFF, 0.1 ... 80.0 <Default=0.1>	For measuring range without decimal point
	OFF, 0.01 ... 8.00 <Default=0.01>	For measuring range with decimal point

RAMPS

<div>Ramp</div> <div>1.0K/min / 0.1K/min</div>		
<p>A programmed ramp is always activated when the setpoint is changed or when the mains supply is switched on. The ramp starts at the actual process value and ends at the preselected setpoint. The ramp can be activated for both setpoint 1 and setpoint 2. By programming the second setpoint a setpoint profile can be obtained, accordingly (see example with external contact In 1 (K1) below).</p>		
Ramp rising	OFF<Default>, 0.1 ... 99,9	°K/min for measurement range without decimal point
	OFF<Default>, 0.01 ... 9.99	°K/min for measurement range with decimal point
Ramp falling	OFF<Default>, 0.1 ... 99,9	°K/min for measurement range without decimal point
	OFF<Default>, 0.01 ... 9.99	°K/min for measurement range with decimal point

COOL DOWN TEMPERATURE

<div>Cool down temperature</div> <div>50°C</div>	Function will be shut off when this temperature is attained.
--	--

DRAINAGE TIME

<div>Drainage time</div> <div>20s</div>	This time is applied to the function.
---	---------------------------------------

TANK CLOSED

<div>Tank closed</div> <div>80°C</div>	Above this temperature the tank close valve will be closed, below it will be opened. If a boost pump is available, it will be active while filling if the actual value is above the tank closed temperature.
--	--

DEVIATION INT./EXT

<div>Deviation int./ext.</div> <div>5°C</div>	If the controller is controlling the external value, the heating will stop if the deviation between internal sensor and external sensor is more than the set value of this parameter.
---	---

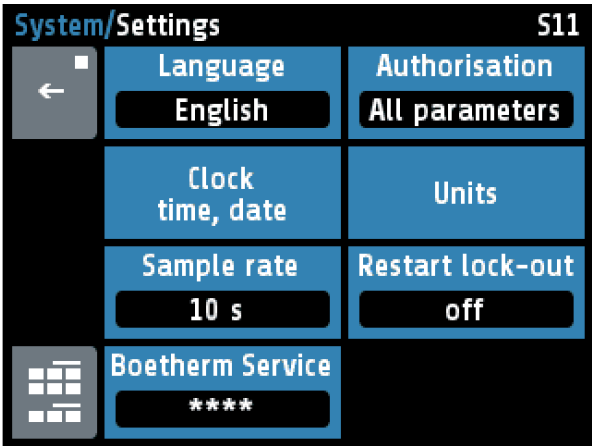
WATER EXCHANGE

<div>Water exchange</div>	<p>By means of this menu the following parameters are adjustable:</p> <ul style="list-style-type: none"> · Auto water exchange on/off · Duration time. (How long will the water exchange be active) · Interval time (every x min. the water exchange will be active)
---------------------------	---

OFFETS AND SETPOINT LIMITS

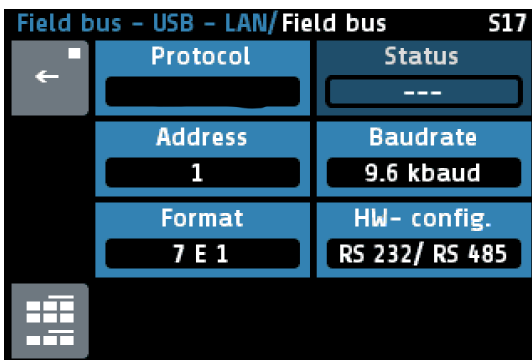
<div>Offsets and setpoint limits</div>	<p>By means of this menu the following parameters are adjustable:</p> <ul style="list-style-type: none"> · minimal setpoint supported by menu · maximum setpoint supported by menu · offset to be added to the actual value · offset to be added to externally measured temperature
--	---

MENU FOR COMMON SETTINGS(GENERAL SETTINGS)

		
Language	English (English)	English
Authorization (LOC)	All Parameters adjustable	All parameters adjustable <Default>
	Setp. and ramps adjustable	Setpoints, alarm values and ramps are adjustable. All other parameters are locked.
	Only setpoint 1 adjustable	All other parameters are locked
	All parameters locked	No parameter is adjustable
	Change Lock code	Here the code (start value = 0000) can be changed to a different value.
<p>The previous code is requested before setting the new code. The new Code has to be entered twice. The parameters that have been locked can be displayed but not changed. This parameter cannot be changed if the logic input In_2 is active, or the lock code is not known. The value of the factory setting is <Default = 0000></p>		
Clock, time, date		
Time	Hours	Number value 0...23
	Minutes	Number value 0...59
Day/Month	Day	Number value 1...31
	Month	Number value 1...12

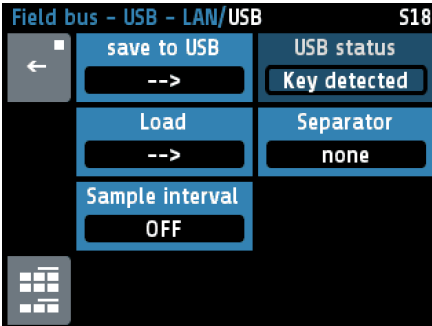
Year	2000...2150	Adjustment of calendar year
Units		
Unit	°C	
	°F	
Flow unit	l/min	
	gpm	
	m3/h	
Pressure unit	Bar	
	Psi	
Sample rate Scanning time for recorder function		Time interval between the current measurements of two successive samples. In brackets the complete time interval as shown on display: 2,5 s (Total time: 8,2 Min) 5 s (Total time: 16,5 Min) 10 s (Total time: 33 Min) <Default> 30 s (Total time: 99 Min) 1 Min. (Total time: 3,3 h) 5 Min. (Total time: 16,5 h) 10 Min.(Total time: 33 h) A maximum of 198 temperature points can be saved.
Restart lock-out	OFF	No function <Default>
	ON	After power-on the temperature controlling is switched off and a message is displayed. Switch on must be acknowledged. After acknowledgement the controlling will be started. In addition, the alarm "Restart lock-out" will be set and can be handled in the monitoring.

MENUS FIELDBUS /USB / LAN

Menu “Fieldbus” 		Depending to the installed fieldbus module parameters are displayed or hidden.
Protocol	Off	No protocol selected
	Arburg	<SERIAL> Protocol for temperature control systems
	Modbus	<SERIAL> Modbus-RTU-protocol
	Profinet	<SERIAL> Profinet
	Profibus DP	Profibus
Status Display only	---	<SERIAL> No data communication
	Data	<SERIAL> Data communication is active
	Exchange	<PROFIBUS> Data-Exchange-Mode
	Wait Param	<PROFIBUS> Controller waits for configuration / parametrisation
	No connection	<PROFIBUS> No master connected / Master not active
Baudrate <SERIAL>	1.2 kBaud	1.200 Bit/s
	2.4 kBaud	2.400 Bit/s
	4.8 kBaud <Default>	4.800 Bit/s
	9.6 kBaud	9.600 Bit/s
	19.2 kBaud	19.200 Bit/s
	38.4 kBaud	38.400 Bit/s
Address	1 ... 255	1 <Default>... 255 (xxx-Standard) 1 <Default>... 32 (Arburg-Protocols) 1 <Default>... 247 (Modbus-RTU-Protocol) At this address a master communicates with the controller. Each controller needs a unique address.
Format <SERIAL>	7 E 1	7 Data bits, 1 Stop bit, Parity Even
	7 0 1	7 Data bits, 1 Stop bit, Parity Odd
	7 E 2	7 Data bits, 2 Stop bits, Parity Even
	7 0 2	7 Data bits, 2 Stop bits, Parity Odd
	7 N 2	7 Data bits, 2 Stop bits, Parity None
	8 E 1 <Default>	8 Data bits, 1 Stop bit, Parity Even
	8 0 1	8 Data bits, 1 Stop bit, Parity Odd

	8 N 1	8 Data bits, 1 Stop bit, Parity None
	8 N 2	8 Data bits, 2 Stop bits, Parity None
The serial fieldbus module has three integrated interfaces.		
HW-conflg <SERIAL>	Select here the desired interface:	
	RS232/RS485	Signals see connection diagram
	TTY	Signals see connection diagram.
Remote <PROFIBUS>	ON	Profibus can read and write. Local operation is locked.
	OFF <Default>	Profibus can read only. Local operation is permitted.

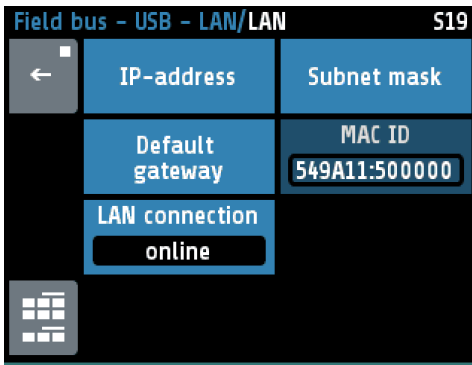
MENUS USB / LAN

Menu "USB"		<p>Save controller data on an USB-Stick. (USB-flash drive)</p> <p>The data is stored as a text file in an adjustable CSV-format.</p> <p>The USB-flash-drive must be formatted with FAT. (FAT16/ FAT32)</p> <p>The file name contains the last 5 digits "xxxxx" of the MAC-ID.</p>
		
Save to USB	All parameters	Save all parameters Generates the file -> LogParaxxxxx.txt and LogPara.bin
	Al. Logbook	Save the entries of the Alarm Logbook. Generates the file -> LogBookxxxxx.txt
	Graph	Save the readings of the graph Generates the file -> LogGraphxxxxx.txt
USB status	- - -	Display of the USB-status: no stick detected.
	Key detected	USB-stick detected: Files can be saved or loaded from the USB flash drive.
Load	Load all Parameters	Loading a previously saved parameter set. The file "LogPara.bin" must exist on the USB flash drive.
Separator	none <Default>	Delimiter symbol between single data sets: Spaces
	comma	,
	semicolon	;
	colon	:
	tabulator	<TAB>

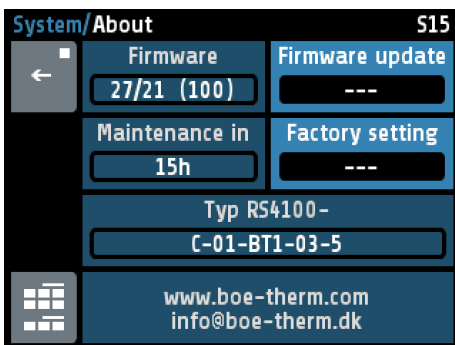
Sample- Interval	OFF; <Default> 5...720s	Cycle time for writing an output line with time stamp on the USB stick. The values setpoint, actual value, output ratio and current actual value are written out.
-------------------------	---	---

If the parameter "Log interval" is set to a numerical value, so a file named "LogR4000_XXXXX_YYYY_MM_DD.txt" is generated on the USB stick. "XXXXX" the last 5 digits of the MAC-ID. YYYY, MM and DD mean the year, month, day. After a change of date a new file is created.

With the included names MAC-ID "XXXXX", the files can be assigned to different R4000 controllers. Each "Log interval" time a new row is added. The line includes a timestamp, setpoint, the actual value, the output ratio and the actual current value.

Menu "Lan" 		Ethernet interface for connection to <ul style="list-style-type: none"> • Web browser • Configuration tool EloVision 3 • PLC via MODBUS-TCP Connect the device RS4100 to the LAN. The static IP address must be set to an address which is not allocated to another device being part of the same LAN. Please adjust the subnet mask as well and the default gateway according to the requirements of the LAN. In order to operate the device via web browser please enter the chosen static IP address into the address field of the web browser, for example: „192.168.100.100“
Static IP address		192 . 168 . 100 . 100 Part 1 <Default> 192 . 168 . 100 . 100 Part 2 <Default> 192 . 168 . 100 . 100 Part 3 <Default> 192 . 168 . 100 . 100 Part 4 <Default>
Subnet mask		
Subnet Mask 1		255 . 255 . 255 . 0 Part 1 <Default>
Subnet Mask 2		255 . 255 . 255 . 0 Part 2 <Default>
Subnet Mask 3		255 . 255 . 255 . 0 Part 3 <Default>
Subnet Mask 4		255 . 255 . 255 . 0 Part 4 <Default>
Default gateway		
def.-gateway 1		192 . 168 . 100 . 1 Part 1 <Default>
def.-gateway 2		192 . 168 . 100 . 1 Part 2 <Default>
def.-gateway 3		192 . 168 . 100 . 1 Part 3 <Default>
def.-gateway 4		192 . 168 . 100 . 1 Part 4 <Default>
MAC ID	549A11:5xxxxx	Display of the MAC-ID: 54:9A:11:5x:xx:xx
LAN connection	online / offline	For connection to other devices this parameter must be set to "online"

MENU ABOUT

			
Firmware			Displays the current firmware version and in brackets the language version.
Firmware up-date			<p>Start the firmware update by selecting the button "Start Update" and confirm with SAVE. A confirmation prompt opens. If this window is confirmed with YES, the unit turns into the loader mode.</p> <p>When the loader mode is accidentally turned on, you can switch back by a mains reset into the existing user program.</p> <p>If an update should be performed, a USB flash drive must be plugged in with the new firmware. After a short time, the firmware folder appears in the line "Folder". E.g. „BT4100.01_V20xx_xx.ELO“.</p> <p>Now you can start the loading process by touching the touch screen.</p> <p>The controller must not be disconnected from the power supply until the download is complete!</p> <p>After finished loading the new user program is started by a power interruption.</p>
Maintenance in	x h		The remaining hours to the next maintenance.
Factory setting			Reset to factory delivery status. With the help of this parameter, all settings are deleted and reset to the delivery status. Choose "Reset", then press "SAVE".
Type RS4100- C-01-BT1-03-5			Type key of the controller
www.thermalcare.com sales@thermalcare.com			Homepage and E-mail address of the manufacturer.

ERROR MESSAGES

Error message	Cause	Possible remedy
At actual process value maximum value flashes	Top range end has been exceeded, sensor defect	Check sensor and cable
At actual process value minimum value flashes	Bottom range end has been exceeded, sensor defect	Check sensor cable Check process value offset TC connected with inverted polarity
REMOTE: Parameter locked	Adjusting of parameters is not allowed. Unit is controlled by fieldbus	Profibus: The parameter "Remote" in the menu Field bus is set to "on". The configuration-tool Vision is active.
Field bus module unavailable		The controller is not fitted with the correct hardware for the selected protocol
DfErr	Text display error	Please contact the manufacturer.
ERR0	System error	Please contact the manufacturer.
ERR8	System error	Quit error message. Check the parameters. If the error is still there, contact the manufacturer.

TECHNICAL DATA

Input Pt100 / RTD -30...400°C	PT100-1 and PT100-2: 2- wire connection PT100-3 : 3- wire connection Built-in protection against sensor breakage and short circuit Sensor current: < 1 mA Calibration accuracy: ... < 0,2 % Linear error: < 0,2 % Influence of the ambient temperature: < 0,01 % / K	
Logic input	Internal resistance > 22k-Ohm Level 0 < 2V Level 1 > 9V; max 30V	
Logic outputs	Bist. voltage, 0/24 V DC, max. 500 mA, short-circuit proof	
Relay output	Relay changeover contact; max. 250V AC, max. 3A, resistive load	
Continuous outputs	0...20 mA maximal load 300 Ohm; 0...10V minimal Load 5kOhm. Automatic switching, depending on connected load.	
Hybrid Output	Optional plug-in module tri-phase contacts, two phases are operated by controller. max. 440V AC; max. 13A; max. 9kW total power Please note: These outputs must be protected by separate 16 Ampere fuses of type FF (very fast acting).	
Fieldbus	Optional plug-in module: - Serial: RS232, RS485, TTY (20mA) - Profibus DP, according to EN 50170 All variants are equipped with optical insulation.	
Ethernet	Modbus TCP	
USB	Host for USB-Stick; max. 100mA	
Supply voltage	24 V DC, +/-25 %	
Power consumption	appr. 6W + Power of logic outputs	
LCD-Display	8,8 cm (3,5") RGB-display with LED-backlight. 320 x 240 pixel with resistive Touch-Panel	
Data protection	EARAM, Semiconductor storage When using a Fieldbus interface please note: Permissible writing operations per parameter must not exceed 1 000 000.	
Real time clock	Backup battery: Lithium CR2032	
Housing RS4100-C	Type	Unsealed frame to be covered by a front film
	Format	Ca. 90 x 90 mm; Mounting depth: ca.60 mm
	Display cut-out	78 +0,5 mm x 70 +0,5 mm
	Material	Sheet steel and Makrolon UL 94-V1
	Protection class	IP 10 (DIN 40050), Front side: IP 00
Housing RS4100-M	Type	to be mounted on cap rail TS35/7,5

	Format	Width: Ca 130 mm Length: Ca. 90 mm Height: Ca 70 mm	
	Material:	PVC	
	Protection class	IP 10 (DIN 40050), Front side: IP 00	
Weight RS4100-C	Approximately 250 g, depending on actual model		
Weight RS4100-M	Approximately 250 g, depending on actual model		
Connectors	Service-Interface: Ethernet RJ45 USB-Interface: Type A Profibus: SUB-D 9 Others: Screw terminals, Protection mode IP 10 (DIN 40050) Insulation class C		
Permissible operating conditions	Operating temperature:	0...50°C / 32...122°F	
	Storage temperature:	-30...70°C / -22...158°F	
	Climate class:	KWF DIN 40040; equivalent to annual average. max. 75% rel. humidity, no condensation	
Harmonized standards	EN 61326-1:2013 / EN 61000-3-2:2006+A1:2009+A2:2009 EN 61000-3-3:1995+A1:2001+A2:2005 Electrical safety: EN 61010-1		

SUBJECT TO CHANGE WITHOUT NOTIFICATION.

TROUBLESHOOTING

Fault:	Possible cause:
The unit does not fill the tank and the level indicator is lit:	No water supply -Solenoid valve defect
The unit does not fill the tank and the level indicator is not lit:	The level indicator is soiled. - The thermostat is defective loose connection
The unit overfills the tank and the level indicator is lit:	The level indicator is soiled. -The thermostat is defective
The unit overfills the tank and the level indicator is not lit:	Dirt in the solenoid valve
The Reset diode is lit (the thermostat is reconnected directly to the thermal release in the electric cabinet):	Fault in the installation, possibly only 2 phases - Motor protecting switch /thermal release defective - Motor defective - Thermal protection tripped
The device does not circulate water, but the motor is running:	The motor has incorrect rotation direction - The cooling channel in the process is blocked.
The pump motor does not start after connection, water filling and pressing the start button.	Faulty motor - Reset pump triggered - Motor protecting switch /thermal release defective
The device does not heat:	Faulty contactor Thermostat defect Heating element defect Overheating thermostat defect
The device is not cooling	Insufficient cooling water Solenoid valve defect Thermostat defect
The device is constantly cooling:	Dirt in the solenoid valve Thermostat defect

VAC

Units with Vacuum Functioning and Mold Draining only

Vactherm RVU has an integral push-pull system which makes it possible to work with pressure as well as with vacuum in a leaky circuit.

Vacuum Functioning

If a leak occurs in the mold or in the process the built-in push-pull system permits stable temperature control without interrupting production.

Through the use of the vacuum adjusting valve (19) the push-pull system makes it possible to supply pressure to the leak and vacuum from the leak back to the unit. If a leak occurs, the flow through the circuit should be arranged so that the leak is at the end of the water circuit.

Adjusting the Vacuum

The vacuum adjusting valve (19) on top of the back panel must be fully closed so that the injector (18) makes a vacuum in the return line from the process (1). As the leak air is drawn into the circuit, the valve (19) should be opened slowly to allow water to flow to the mold and pressurize the supply line (2). The leak will reappear as the pressure increases. At this point, the adjusting valve must be closed until the leak is eliminated.

Pressure System

When the Vactherm RVU is to supply positive pressure only to the mold the vacuum adjustment valve (19) must be fully opened.

EU DECLARATION OF CONFORMITY

EC Declaration of Conformity		Date: 2023.05.26
No.: TempXS, TempS, TempM	Doc. No.: 132-GB	
<p>Manufacturer: Boe-Therm A/S Industrivaenget 1 DK-5610 Assens Tel.: +45 64712375 Denmark</p> <p>hereby declare that</p> <p>Machine: Name: Boe-Therm RVU Type: Temperature Controller Serial No.: 460000 - 479999</p> <p>Standard unit: X Special unit:</p> <p>Is in conformity with:</p> <p>Directive 2006/42/EC of the European Parliament and of the Council of 17. May 2006 on machinery, and amending Directive 95/16/EC(recast)</p> <p>Directive 2014/30/EU of The European Parliament and of the Council of 26. February 2014, on the harmonisation of the laws of the Member States relating to electromagnetic compatibility(recast)</p> <p>Directive 2014/35/EC of the European Parliament and of the Council of 26. February 2014 on the harmonisation of the laws of Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits(recast)</p> <p>Directive 2014/68/EU of the European Parliament and of the Council of 15 May 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of pressure equipment(recast)</p> <p>Applying Article 4 section 3</p> <p>Was manufactured and conforms with the following national standards that implement a harmonisation</p> <p>EN 12100:2010 :Safety of machinery - General principles for design-Risk assesment and risk reduction</p> <p>EN 61000-6-1:2007: Electromagnetic compatibility (EMC) -Part 6-1: Generic Standards - Immunity for residential, commercial and light-industrial environments</p> <p>EN 61000-6-3:2007/A1:2011/AC:2012 Electromagnetic compatibility (EMC) - Part 6-3. Generic Standards - Emission standard for residential, commercial and light-industrial environments</p> <p>EN 60204-1:2006/A1:2009 Safety of Machinery. Electrical requirements of machines. General requirements</p> <p>EN 10217-7:2014: Welded steel tubes for pressure purposes -Technical delivery conditions -Part 7: Stainless steel tubes</p> <p>EN ISO 15613:2004: Specification and qualification of welding procedures for metallic materials -Qualification based on pre-production welding test</p> <p>EN 10028-7:2016: Flat products made of steels for pressure purposes - Part 7: Stainless steels</p> <p>Position: Mechanical Engineer Name: Maik B. Wagenknecht Company: Boe-Therm A/S</p> <p>2023.05.26 date</p> <p><i>Maik BW</i> Signature</p>		



5680 W. Jarvis Ave. • Niles, IL 60714

847.966.2260

www.thermalcare.com

April 2024

New Equipment Sales

847.966.2260

sales@thermalcare.com

Customer Service

847.966.2636

service@thermalcare.com

Parts Department

847.966.8560

tcparts@thermalcare.com

RVU IOM 00