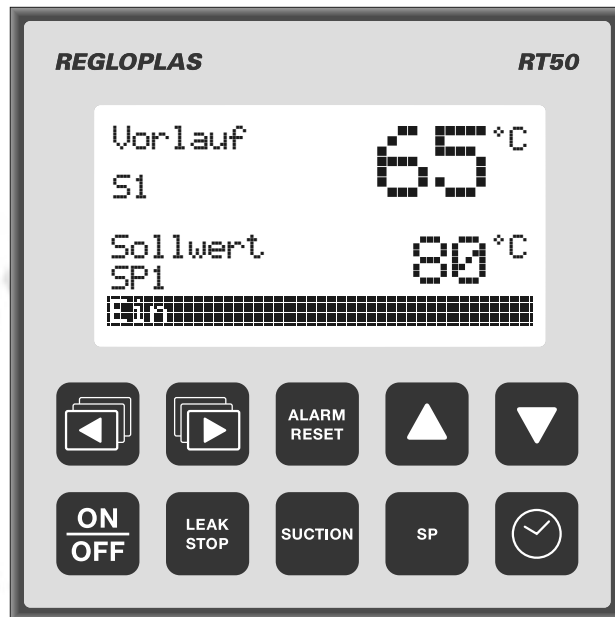


Betriebsanleitung Instructions de service Operating Instructions



Operating instructions control system RT50

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1. General comments

The Regloplas RT50 microprocessor control system consists of a control component with operating and display elements, as well as a performance component with several inserts for accessories such as interfaces etc.

2. Range of application

The RT50 control system was developed for use in temperature control unit (hereafter referred to as "units"). It enables dialog between one or more units and the production facility computer as well as operation independent of the computer.

3. Control and indicating elements (Fig. 1)

- 1 LCD display.
- 2 Keys for programming and selection of displayed value.
- 3 Alarm reset key.
- 4 On/off key.
- 5 Key for leak-stop mode.
- 6 Key for drainage and blowing out modes.
- 7 Key for switching between SP1 and SP2.
- 8 Key for operation with timer.
- 9 Keys for setting the set-point value and programming.
- 10 Status line.

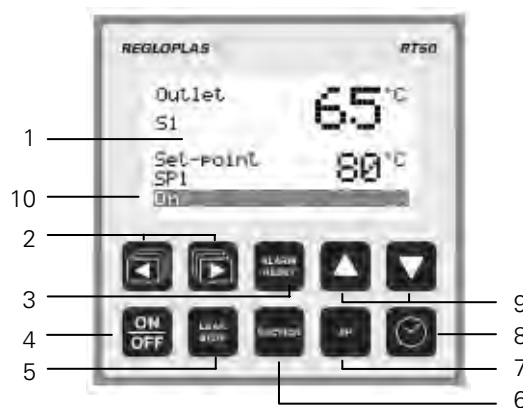


Fig. 1: Operating elements and displays

Set-point and actual value display

When the unit is turned on via the ON/OFF key, the set temperature SP1 or SP2 (SP= set-point value) appears in the lower part of the display while the upper part of the display indicates the outlet temperature (actual value) S1 of the sensor in the heat transfer fluid or S2 of the external sensor in the consumer (S=sensor).

Key for setting the set-point value and programming

Increase and decrease the set-point value and change programmed values.

Timer key

Activates the timer, when present. The timer turns the controller on and off.

Leak-stop key

Pressing this key will switch the unit over to leak-stop mode. Leak-stop mode is possible only when:

- If water is the heat transfer fluid, the set-point value should lie in the runout temperature range (Section 7.2, P 4.3) of 0 to 80 °C max.
 - If oil is the heat transfer fluid, the set-point value should be in the range of 0 to 250 °C.
- With leak-stop mode and oil, the max. heating capacity is 60 %, to keep the oil's thermal load due to reduced pump capacity low.

Leak-stop mode can be interrupted by pressing the ON/OFF key. Pressing the ON/OFF key again (after waiting for OFF to appear on the display) will return the unit to its normal mode.

Suction key

Pressing this key initiates the evacuation program. The consumer connected to the unit is evacuated either by the pump via suction or by blowing out with compressed air.

Evacuation is only possible when the temperature of the heat transfer fluid is below the programmed runout temperature (Section 7.2, P 4.3). If this is not the case, the unit will cool the heat transfer fluid to this level.

The pump is switched off. Once the pump's run-down time (Section 4.9) has elapsed, the pump is switched on again in the opposite direction of rotation. It then empties the consumer during the programmed value for evacuation time (Section 7.2, P 4.6).

The blow-out program using compressed air is activated once the pump's run-down time has elapsed.

After the programmed evacuation time, the unit will switch itself off automatically. The suction and blow-out programs can be interrupted by pressing the ON/OFF key.

Pressing the ON/Off key again (after waiting for OFF to appear on the display) will return the unit to its normal mode.

Note: In pressurised water units, the pressure relief valve closes 5 °C above the value runout temperature, i.e. at max. 85 °C, and opens at the programmed runout temperature during the cooling process.

Alarm reset key

Functions:

- Manual resetting of the alarm relay (e.g. horn switched off). As soon as the malfunction has been corrected, the alarm display can be switched off by pressing this key once more.
- Manual acknowledgment of the automatic switch-over from consumer temperature control or cascade control to outlet temperature for defective or missing sensor S2.

SP key

Switch-over from set-point value 1 (SP1) to set-point value 2 (SP2) and vice versa.

The set-point values can also be activated by an external digital signal.

A switch-over can only take place if no alarm is active.

Operation with code

To prevent the set or programmed values from being changed inadvertently, we strongly recommend the use of a code.

There are four possibilities:

- Code input value
- Code set-point value
- Code user setting 1
- Code user setting 2

They can be programmed as described in Section 7.2, P 15.

The input value code for the RT50 is set to 50 at the factory.

Save/Reset for factory and user settings

The RT 50 control system offers the possibility to change the factory setting simply and at any time.

In the same way, two different customer-specific settings can be reloaded (user settings 1 and 2).

Programming is described in Section 7.2, P 14.

4. Switching on

Once the main switch has been turned on, **OFF** will appear on the display. The RT50 is now ready for operation.

Switch the unit on by pressing the ON/OFF key.

Depending on the programming, the set-point and actual values as well as information on the operating condition of the control system and unit.

See also Section 6.

If the unit is equipped with the suction equipment and the phase sequence is wrong, two phases are switched automatically, so that the pump operates in positive pressure mode.

5. Switching off

The switching off procedure is initiated by pressing the ON/OFF key or by the timer.

The switching off program runs automatically as follows, depending on the temperature of the heat transfer fluid:

- Pump and control system are switched off. The RT50 is still powered (stand-by mode).
The display shows **OFF**.
- The pump continues to run. The unit cools until the temperature of the heat transfer fluid reaches the programmed run temperature (Section 7.2, P 4.3). The pump and controller are then switched off. The RT50 stays in stand-by mode.
The display indicates **OFF**.

6. Displays

The following **boxed text** can appear on the display:

6.1 Operating displays

Outlet (upper value) as actual value: **S1**, internal sensor. **S2**, external sensor. Inlet sensor **S3**.

Set-point value: **SP1**, **SP2** or **Extern**.

External control via external set-point value entry.

External set-point Cascade control with external sensor S2.

Suction The unit will cool to the programmed runout temperature and then switch itself off automatically.

Service due This message indicates that the unit is due for maintenance. However, the unit can still be operated normally.
Programming: Section 7.2, P 3.8.

6.2 Status displays

Unit **On**, **Off**.

1 hour Timer operation.

Leak-stop

Leak-stop clock

Suction

Ser_A3 Interface and unit address (e.g. 3).

6.3 Alarm displays

The alarm display blinks every second. Malfunctions must always be corrected by qualified personnel.

For control **Outlet sensor**, **Inlet** or **External**.

If a sensor becomes defective, the will switch automatically to cooling.

During **cascade control**, a defective external sensor (S2, consumer) will cause the unit to control to the internal sensor S1.

The actual value of the internal sensor temperature at the time of sensor malfunction will be used as the new set-point value. The alarm must be acknowledged.

Level too low

Wrong phase sequence

The pump will switch off a few seconds after it is switched on. Pump and control system remain switched off.

Motor current exceeded

Malfunction of motor contactor One or more phases is missing or no response was received from the motor contactor via the auxiliary contact.

Safety therm. triggered The unit cools automatically.

Heater thermostat triggered (Model P140S). The unit cools automatically.

Maximum set-point exceeded The unit cools automatically.

Flow monitor triggered The heat switches off automatically.

Flow rate too low The heat switches off automatically.

Dev. set-point/Actual, Set-point/External actual, Set-point/Inlet have been exceeded or fallen short of. Unit and control system continue to run normally.

Heating contact malfunction Cause: Despite command, the contact did not pick up.

Set-point or actual value is too high for leak-stop mode

External set-point signal interrupted or not present The unit cools automatically.

Analog/Digital transformer defective Unit and control system are switched off.

Program memory defective Unit and control system are switched off.

Microprocessor malfunction Unit and control system are switched off.

Calibrated values changed or wrong Unit and control system run normally.

Unit data in memory wrong or lost Unit and control system are switched off.

Press the alarm reset key twice: The initialisation data are imported anew.

If the initialisation data can be imported successfully, the normal display appears. If not, the alarm appears again.

Timer battery defective or dead Unit and control system continue to run normally.

Unit mains voltage too low Unit and control system are switched off.

Two flow monitors are connected at the same time

The message goes away as soon as only one flow monitor is connected.

No data available The factory or user settings contain no data.

Memory not present or defective e.g. memory not inserted.

6.4 Additional messages

In addition to the messages listed under 6.1. through 6.3, one of eight possible additional messages may be overlaid. See Section 7.2, item 16.

7. Programming

7.1 Programming keys

See also Fig. 1.

Functions

- ▲ { - Change the set-point value.
- ▼ { - Change the line within the corresponding programming level.
- Change the value of the corresponding input line.
- { - Switch from the operating level to the program overview.
- Switch from one programming level to another.
- ◀ { - Back to the operating level.
- Back to the program overview.

7.2 Programming process

- The sheet, "Menu RT50" in the Appendix is critical to understanding the following:
- Numbering refers to the sheet, "Menu RT50".
- The following text contains a "P" before the section number to differentiate the programming section from the rest of the sections.
- Display depends on special equipment.
- Programming can be done with the control system switched on or off.

P 1 Show actual value

On this level, the following actual values are shown:

P 1.1 Outlet

Outlet temperature. Temperature S1 of the heat transfer fluid (Sensor Sn1).

P 1.2 External

Consumer temperature. External sensor Sn2 in consumer.

P 1.3 Inlet

Inlet temperature S3 at unit entrance.

P 1.4 Heating/cooling cap.

Shows the current power as a percentage of the nominal power.

Example: Nominal power of the unit 9 kW. Value shown 33 %, i.e. the currently required power for the control system is 3 kW.

A negative number indicates cooling.

P 1.5 Flow rate

Flow rate in l/min or GPM.

P 1.6 Pump current L1

Current, phase 1 of the pump motor in A.

P 1.7 Pump current L2

Current, phase 2 of the pump motor in A.

P 1.8 Pump current L3

Current, phase 3 of the pump motor in A.

P 1.9 Operating hours

Number of the unit's operating hours.

P 1.10 Service after

Hours remaining until next maintenance service.

P 1.11 Software version

Software version being used.

P 1.12 Interface

Built-in interface (hardware), e.g. RS 485.

P 1.13 Protocol

Protocol installed (software), e.g. Profibus.

P 1.14 Address

Unit address when operating with an interface.

P 1.15 Day/time

Programmed day of the week and time

P 2 Select language

P 2.1 Sprache Deutsch

P 2.2 Language English

P 2.3 Langue Française

P 3 **User configuration**

For P 3.1 and 3.2 see also Section 11, Abb. 2.

P 3.1 **Deviation Set/Actual**

Values for deviation above (↑) or below (↓), with respect to

Set-point/outlet

Set-point/external

Set-point/inlet

Entry xx °C

Setting range 0 to 99 °C

P 3.2 **Outlet limit**

Limitation of the maximum and minimum outlet temperatures, i.e.

Outlet limit, max

Outlet limit, min

Entry xx °C

Setting range 0 to 99 °C

P 3.3 **Minimum flow rate**

Entry xx l/min

Setting range 2 to 50 l/min

P 3.4 **Interface**

Address

Protocol

Number entry as described in Section 10.

P 3.5 **Temperature display**

Display in °C

Display in °F

P 3.6 **Flow rate display**

Display in l/min

Display in GPM

P 3.7 **Set-point at start**

Last active set-point

When switched on, the unit will control to the last active set-point.

Always SP1 will control to the last set-point 1 (SP1) entered.

Always SP2

When switched on, the unit will control to set-point 2 (SP2).

P 3.8 **Next service**

P 3.9 The number of elapsed operating hours shows on the display.

Enter the number of operating hours until the next service procedure.

The value entered must be higher than the number of Operating hours shown.

Setting range: 0 to 9999 (value in hours).

P 4 **Unit configuration**

P 4.1 **Heat transfer fluid**

The type of heat transfer fluid is entered at the factory, depending on the type of unit.

Heat transfer fluid Water

Oil

P 4.2 **External sensor type**

Type of external sensor Sn 2.

Resist. Therm. Pt 100

Thermocoup. K NiCr-Ni

Thermocoup. J Fe-CuNi

Thermocoup. T Cu-CuNi

P 4.3 **Run-out temperature**

See also Section 11, Fig. 2.

Before the unit is switched off by the OFF key or when suction is activated, the unit will first cool to the temperature set in the next step.

Units with direct cooling: Value must be 0. This initiates automatic pressure release for 30 seconds after the unit is switched off by the OFF key.

First cool to

Entry xx °C

(then autom. off)

Setting range 0 to 80 °C. 0 = Function off. Leak-stop and suction modes not possible.

P 4.4 **Maximum set-point**

See also Section 11, Fig. 2.

The maximum set-point value can be set in this position. The value will vary with the type of unit. The value set must not exceed the value T_{max} on the rating plate.

Max. setting

Set-point

Entry xxx °C

See rating plate

on unit

Setting range 0 to 420 °C.

P 4.5 **Evacuation options**

Evacuation with pump

Evac. w/comp. air

P 4.6 **Evacuation time**

The suction or blow out time will vary with the type of heat transfer fluid used.

Evacuation time

Entry xxx s

Setting range 0 to 500 s. Only displayed when accessory present.

P 4.7 **Pump current**

Pump current on

Rating plate x.x A

Entered at the factory in accordance with the information provided on the rating plate.

Can be changed by ± 10 % as needed.

P 4.8 Pump dir. of rotation

The pump's direction of rotation will be corrected automatically upon incorrect phase sequence.
(Possible only when the Suction option is present).

Dir.of rot. will be
corrected yes
no

P 4.9 Pump run-out time

Maximum possible run-out time of the pump in s before the change in direction of rotation for evacuation by means of suction or leak-stop mode.

Pump run-out time
before change in dir. of rot. xx s
Setting range: 3 to 30 s.

P 4.10 Power failure behav.

Last state
After a power outage, the unit will operate as it did before the power outage.
Stays off
After a power outage, the unit remains switched off.

P 4.11 Heating 2

Heating 2 inactive
Heating 2 active
Only possible in units with 2 heating levels.

P 4.12 Heating cycle time

Heating cycle time
Entry xx s
Setting range 1 to 30 s

P 4.13 Cooling cycle time

Cooling cycle time
Entry xx s
Setting range 1 to 30 s

P 4.14 Suppress heating

Suppression of the heating command. The heating command will be suppressed during the period of time set.

Heating command
Suppress xxx ms
Setting range 0 to 200 ms

P 4.15 Suppress cooling

Suppression of the cooling command. The cooling command will be suppressed during the period of time set.

Cooling command
Suppress xxx ms
Setting range 0 to 200 ms

P 4.16 Pump. cooling medium

Activation of the extra pump in the cooling circuit (cooling system "SK").

Extra pump no
Extra pump yes

P 4.17 **Func. of ext. contact**

Switch on/off via external contact:

Ext. contact Code 0

When the external contact is closed, the unit is switched off and the ON/OFF key blocked.

Ext. contact Code 1

When the external contact is opened, the unit is switched off and the ON/OFF switch blocked.

Ext. contact Code 2

The unit can be switched on and off via the external contact as follows:

Closing the external contact: Unit switches off.

Opening the external contact: Unit switches on.

Ext. contact Code 3

The unit can be switched on and off via the external contact as follows:

Closing the external contact: Unit switches on.

Opening the external contact: Unit switches off.

For codes 2 and 3: Switching on and off via the ON/OFF key is always possible.

P 4.18 **Level alarm**

Pump run-out time

Entry xx s

After the level monitor has been triggered due to insufficient level of heat transfer fluid, the pump will continue to run after its set run-out time to prevent the unit from being switched off suddenly.

Setting range 3 to 60 s

Refill time window

Entry xx s

The refill time window is the maximum time the refill valve can be open. If the level is still insufficient after this time has elapsed, the alarm message **Level too low** remains.

Setting range 3 to 60 s

No. of insufficient

Levels before

Alarm

Entry xx

The number of level insufficiencies before the alarm is triggered. It is set to 1 for approximately 30 minutes after the last level insufficiency. Valid only for units using water as the heat transfer fluid (Section 4.1).

0 = Alarm counter off

Setting range 1 to 40

Alarm suppression

time after switch on

Entry xx min

Once the power has been switched on (main switch) the heat transfer fluid can be refilled as often as desired during the time period set.

0 = Function off.

Setting range 0 to 15 min

P 4.19 **Pressure relief valve**

Time delay

Valve xx s

Time delay until the pressurised water unit's pressure relief valve Y 8 opens.

0 = No delay. The set value may not be 0 for P 140S units.

Valid only when using water as the heat transfer fluid (Section 4.1).

Setting range 1 to 9 s

P 4.20 Viscosity

When flow measurement available, enter the kinematic viscosity in mm²/s at 20 °C.

When water is used as the heat transfer fluid (Section 4.1) the value 1.0 is entered automatically.

Kinematic

viscosity of medium

at 20 °C / 68 °F

Entry xx.x mm²/s

P 5 Control

P 5.1 Type of control

Select the desired type of control:

PID Outlet

With sensor in outlet

PID External

With sensor in consumer

PID Inlet

With sensor in inlet

Casc. External/outlet

With sensor in consumer and in outlet

Casc. Inlet/outlet

With sensor in inlet and in outlet

Casc. Cavity control

With sensor in outlet and in mould cavity

At this level the operator selects the sensor(s) to be used. The control system can, for example, be set to PID outlet, even if a sensor is in the consumer.

P 5.2 Control par. PID selection

Control par. PID fix

Control par. PID man.

The operator can choose between PID fix and PID man. For the fixed parameter sets, the operator can choose between set 1 (strong reaction to control deviations) and set 10 (weak reaction to control deviations).

The units are set to set 5 when they leave the factory.

P 5.3 Control par. PID fix

Par. set heating fix

Parameter set heating

Entry xx

Setting range 1 to 10

Par.set cooling fix

Parameter set cooling

Entry xx

Setting range 1 to 10

P 5.4 Control par. PID man.

P heating in % Tmax

Entry x.x %

Proportional band in %

xx °C

The proportional band in °C appears on the display, with reference to T_{max}.

Setting range 0 to 50.0 %

I heating

Entry xxxx s

Run-out time (integral) in seconds.

Setting range 0 to 9999 s

D heating

Entry xxx s

Setting range 0 to 999 s

Rate time (differential) in seconds.

Capacity lim. heating

Entry xxx %

Setting range 10 to 100 %

No heating command below the set value.

P cooling in % T_{max}

Entry xx.x %

xx °C

Proportional band in %

The proportional band in °C appears on the display, with reference to T_{max}.

Setting range 0 to 50.0 %

I cooling

Entry xxxx s

Setting range 0 to 9999 s

Run-out time (integral) in seconds.

D cooling

Entry xxx s

Setting range 0 to 999 s

Rate time (differential) in seconds.

Capacity lim. cooling

Entry xxx %

Setting range 10 to 100 %

No cooling command below the set value.

Cooling dead zone

Entry x.x °C

The cooling dead zone is the zone over the set-point in which cooling commands are suppressed.

Setting range 0 to 9.9 °C

P 5.5 Control par. casc. sel

Control par. casc. fix

Control par. casc. man

P 5.6 Control par. casc. fix

Control par. casc. fix

Control par. casc. man

Fix cascade par. set

Entry xx

Setting range 1 to 10

P 5.7 Control par. casc. man

Cascade amp.

Setting range 0 to 99.9

Cascade integral

Setting range 0 to 9999 s

Cascade differential

Setting range 0 to 999 s

M.Diff.heat Int/Ext

Max. acceptable temperature difference between internal and external sensor during heating.

Setting range 0 to 420 °C. Enter a value not higher than T_{max}.

M.Diff cool Int/Ext

Max. acceptable temperature difference between internal and external sensor during cooling.

Setting range 0 to 420 °C. Enter a value not higher than T_{max} .

P heat aux controller

Setting range 0 to 50 %

I heat aux controller

Setting range 0 to 9999 s

D heat aux controller

Setting range 0 to 999 s

P cool aux controller

Setting range 0 to 50 %

I cool aux controller

Setting range 0 to 9999 s

D cool aux controller

Setting range 0 to 999 s

Dead zone aux contr

Setting range 0 to 9.9 °C

These parameters should be entered by a control specialist.

P 6 **Offset**

Offset can be used to compensate for errors caused by instrument leads, measurement errors from sensors, etc.

P 6.1 **Offset outlet sensor**

Entry 0.0 °C

Setting range ± 20 °C

P 6.2 **Offset ext. sensor**

Entry 0.0 °C

Setting range ± 20 °C

P 6.3 **Offset inlet sensor**

Entry 0.0 °C

Setting range ± 20 °C

P 6.4 **Offset analog input**

Entry 0.0 °C

Setting range ± 20 °C

P 6.5 **Offset analog out. 1**

Entry 0.0 °C

Setting range ± 20 °C

P 6.6 **Offset analog out. 2**

Entry 0.0 °C

Setting range ± 20 °C

P 7 **Analog output 1**

On this level the measuring method is first chosen for analog output 1 and then the corresponding upper and lower values are entered.

P 7.1 **Output 1 Outlet 4-20mA**



Entry **P 7.2** to **P 7.1B** as P 7.1.

P 8 **Analog output 2**

On this level (P 8.1 to P 8.21), analog output 2 is placed. It is programmed in the same way as analog output 1 was, as described in Section 7.1. The exception is that no upper and lower values can be entered for the outputs Actual TE-FE and Actual TE-Cu.

P 9 **Analog input**

The analog input is programmed in the same way as the analog output as described in Section 7.1

P 9.1 **Analog input inactive**

P 9.2 **Analog input 4-20 mA**

P 9.3 **Analog input 0-20 mA**

P 9.4 **Analog input 0-10 V**

P 10 **Common alarm**

On this level, the alarm relays (common alarm), when present, can be activated at the next malfunction.

P 10.1 **Alarm repeat time**

Entry 0 s

Once this time has elapsed and the alarm has been acknowledged, the alarm (horn, lamp) is reactivated.
Setting range 0 to 600 s

P 10.2 **Alarm heating 1**

Alarm H1 inactive

Alarm H1 active

P 10.3 **Alarm heating 2**

Alarm H2 inactive

Alarm H2 active

P 10.4 **Alarm flow rate**

Alarm flow inactive

Alarm flow active

P 10.5 **Alarm flow monitor**

Alarm flow ind. inact

Alarm flow ind. act

P 10.6 Alarm level

Alarm level inactive

Alarm level active

P 10.7 Alarm pump current

Alarm P.curr. inact

Alarm P.curr. active

The following alarms always trigger the common alarm relay:

Sensor outlet defect

Sensor extern defect.

Contr. w/outlet sens

Phase seq wrong

Malf. motor contactor

Safetytherm.triggered

Cooling on

Max setpoint exceeded

Cooling on

Dev. sp/outl exceeded

Dev sp/outl exceeded

Dev sp/ext act excd.

Dev sp/ext act exdc.

Dev sp/inlet exceeded

Dev sp/inlet exceeded

Ext sp signal interrupted or not present

Analog-dig transf def

Memory chip defect

Malf. microprocessor

Calibration values changed or wrong

Unit mains voltage too low

No data present

P 11 **Relay configuration**

P 11.1 **Relay K1 function**

Relay K1 pick up

Relay K1 release

P 11.2 **Relay K1 selection**

The following selection is available:

K1 Common alarm

K1 Heat 1

K1 Heat 2

K1 Flow rate

K1 Flow indicator

K1 Level 1

K1 Level 2

K1 Pump current

K1 Dev set/outlet ↑

K1 Dev set/outlet ↓

K1 Dev set/extern ↑

K1 Dev set/extern ↓

K1 Dev set/inlet ↑

K1 Dev set/inlet ↓

K1 Temp. breakover

Actual value of the active sensor, through which the relay picks up or releases.

K1 Temp. breakover

Entry xxx °C

Setting range 0 to T_{max}.

K1 Band deviation

Band deviation, with respect to the active set point. For example, an entered value of 20 corresponds to a band of 20°C above and below the set point.

K1 Band deviation

Entry xx °C

Setting range 0 to 99 °C

K1 Control on

K1 Timer active

K1 Pump runs

K1 Level 1 reached

K1 Level 2 reached

K1 Heat 1 on

K1 Heat 2 on

K1 Cooling on

P 11.3 **Relay K2**

Programmed as described under Relay K1.

P 11.4 **Relay K3**

Programmed as described under Relay K1.

P 11.5 **Relay K4**

Programmed as described under Relay K1.

P 12 **Programming the timer**

10 steps are available for programming the timer. A weekday or group of days of the week, a time, and the type of time (On/Off time) must be programmed for each step. This means that to turn the unit on and off again requires 2 steps.

The unused steps are set to inactive. On the second sublevel, it can be seen at a glance which steps are active (On/Off) and which are inactive.

P 12.1 **01 Day of the week**

01 Monday

01 Tuesday

01 Wednesday

01 Thursday

01 Friday

01 Saturday

01 Sunday

01 Mo-Th

01 Mo-Fr

01 Mo-Sa

01 Mo-Su

P 12.2 **Hour/minute**

01 Time

Entry xx:xx

P 12.3 **Inactive/On/Off**

01: Inactive

01: On

01: Off

The remaining steps are programmed as needed.

To ensure that the On and Off times are correct, the timer must be synchronised.

P 13 **Synchronising the timer**

P 13.1 **Enter day**

Day Monday etc.

P 13.2 **Enter hour/minute**

Enter hour/minute

Entry 00:00

P 14 **Reset/Factory/User**

For saving and loading set values.

P 14.1 **Save as fact. setting**

This can be programmed only at the factory.

P 14.2 **Reset to fact. set**

When this level is left, the factory settings will be reloaded.

P 14.3 **Save user set 1**

When this level is left, all currently programmed values will be saved as User settings 1.

P 14.4 **Reset to user set 1**

When this level is left, User settings 1 will be loaded.

P 14.5 **Save as user set 2**

When this level is left, all currently programmed values will be saved as User settings 2.

P 14.6 **Reset to user set 2**

By entering the correct code and leaving this level, User settings 2 will be loaded.

P 15 **Change code**

P 15.1 **Code <Entry value>**

Code

Entry xxxx

The code must first be entered here.

Code <Entry value>

Change entry xxxx

The new code can be entered here. When this level is left, the new code is activated.

P 15.2 **Code <Set-point>**

Entry as 15.1

P 15.3 **Code <Fact setting>**

Entry as 15.1

P 15.4 **Code <User setting 1>**

Entry as 15.1

P 15.5 **Code <User setting 2>**

Entry as 15.1

P 16 **Additional display**

Select the additional display. It will appear after this level is left, in the operating level as the second to last line.

P 16.1 **No additional display**

P 16.2 **Outlet**

P 16.3 **External**

P 16.4 **Inlet**

P 16.5 **Heat/cool cap.**

P 16.6 **Flow rate**

P 16.7 **Operating hours**

P 16.8 **Service after**

P 16.9 **Day/time**

8. Programming example

The sheet entitled "Programming example" shows the entry of an individual code and the programming of the deviation between set-point value and actual value. See also sheets entitled "Menu RT50" and "Temperature limit values" in the Appendix.

Entering the value 5 °C means that when the actual value exceeds the set-point value entered, the alarm Deviation Set-point/Actual will appear on the controller display.

9. Types of control

The RT 50 control system works with the following computer programs (control algorithms):

- PID control to outlet, inlet or external sensor. For this type of control, there are 10 fixed parameter sets for each of heating and cooling as well as a manual set.

Cascade control with external and outlet sensors or outlet and inlet sensors. This type of control also has 10 fixed parameter sets as well as a manual set.

9.1 Fixed parameter sets

To save the operator the time-intensive determination of the P, I und D control parameters for heating and cooling, the fixed parameter set which best matches the application can be loaded.

In most cases, the operator can determine the best fixed parameter set for his application, by following these simple rules:

1. Basic setting: Parameter set 5
2. If the set-point value entered is not attained after a reasonable amount of time, the next lower parameter set should be selected (Example parameter set 4 instead of 5).
3. If the actual value exceeds the set-point value, or the set-point oscillates, the next higher fixed parameter set is chosen. If none of these parameter sets results in the desired control, because the controlled system deviates from the standard, an individual set can be entered.

Note: The set-point is reached most quickly when the actual value exceeds the set-point a bit. If an overshoot is not acceptable, the operator must expect a somewhat longer heat-up time.

9.2 Fixed cascade set

Notes and procedure as described in Section 9.1.

10. Operation with data interface (optional equipment)

Control of the unit from the process control computer by connecting the "unit/process control computer".

For selection of the protocol and address, see Section 3.4 of the Programming section.

Available protocols:

1	Arburg	4800 Bd	20 mA-CL
2	Engel	4800 Bd	20 mA-CL
3	Bühler Datacess	4800 Bd	RS 422 spec.
4	Firsttech	4800 Bd	20 mA-CL
5	Stork	1200 Bd	20 mA-CL
6	Ferromatik Milakron	4800 Bd	20 mA-CL
7	Klöckner Desma	4800 Bd	20 mA-CL
8	Demag Ergotech	4800 Bd	20 mA-CL
9	Krauss Maffei	4800 Bd	20 mA-CL
10	Dr. Boy	4800 Bd	RS 232
11	Euromap 17	9600 Bd	RS 485
12	Euromap 17	4800 Bd	RS 485
13	Euromap 17	2400 Bd	RS 485
14	Euromap 17	1200 Bd	RS 485
15	Sächsische Kunststofftechnik	4800 Bd	RS 485
16	CAN Demag Ergotech	615 kBit/s	Can RS 485
17	Müller-Weingarten	4800 Bd	RS 422 spec.
18	Engel	4800 Bd	RS 232
19	SPI	19200 Bd	RS 485
20	SPI	9600 Bd	RS 485
21	SPI	4800 Bd	RS 485
22	SPI	2400 Bd	RS 485
23	SPI	1200 Bd	RS 485
24	Bühler Dataspeed	4800 Bd	RS 485
25	Frech Datacontrol	9600 Bd	RS 485
26	Frech Datacontrol	4800 Bd	RS 485
27	Frech Datacontrol	2400 Bd	RS 485
28	Frech Datacontrol	1200 Bd	RS 485
29	CAN Demag Ergotech	500 kBit/s	CAN RS 485

30	CAN Demag Ergotech	250 kBit/s	CAN RS 485
31	CAN Demag Ergotech	125 kBit/s	CAN RS 485
32	Euromap 17 Bilon	9600 Bd	RS 485
33	Profibus DP	12 MBit/s	RS 485
34	Ferromatik Milakron	4800 Bd	RS 485

11. Appendix

Terminal markings

Temperature limit values

Technical data

Menu RT50

Programming example

Construction

Terminal labels

No.	Label	Function	No.	Label	Function
1	Output L	Protection pumping	76		Not used
2	Output L	Reserve 1	77		Not used
3	Output L	Reserve 2	78		Not used
4	Output L	Motor cooling SK	79		Not used
5	Output PE	Motor cooling SK	80		Not used
6	Output N	Motor cooling SK	81	Input	External heating signal
7	Output L	Flush valve	82	Input	External cooling signal
8	Output PE	Flush valve	83	Input	External heating/cooling active
9	Output N	Flush valve	84	Input	External on/off signal
10	Output L	Cooling valve	85	Input	External set-point 2(SP2)
11	Output PE	Cooling valve	86	Input	Acknowledgement monitor flow
12	Output N	Cooling valve			
13	Output L	Refill valve	87	Input	Acknowledgement level 2
14	Output PE	Refill valve	88	Output	Common for inputs 81–87 and 89–90
15	Output N	Refill valve			
16	Output L	Valve pressure release	89	Output	Flow measurement F150
17	Output PE	Valve pressure release	90	Input	Flow measurement F150
18	Output N	Valve pressure release	91	Input	External heating signal
19	Output L	Blow out valve/air inlet	92	Input	External cooling signal
20	Output PE	Blow out valve/air inlet	93	Input	External heating/cooling active
21	Output N	Blow out valve/air inlet	94	Input	External on/off signal
22	Output L	Contacteur heater 1	95	Input	Ext. set-point signal 2(SP2)
23	Input L NC	T-Max switch	96	Input	Acknowledgement flow monitor
24	Output L	T-Max switch common			
25	Input L NO	T-Max switch	97	Input	Acknowledgement level 2
26	Input	Heater 1 acknowledgement	98	Output	Common for inputs 91–97 and 99–100
27	Output L	Heater 1 acknowledgement			
28	Input L1	Motor current measurement	99	Output	Flow measurement F350
29	Output L1	Motor current measurement	100	Input	Flow measurement F350
30	Input L2	Motor current measurement	101	Output	Analog 1(+)
31	Output L2	Motor current measurement	102	Output	Analog 2(+)
32	Input L3	Motor current measurement	103	Output	Thermoelement TC (+)
33	Output L3	Motor current measurement	104	Input	Analog set-point (+)
34	Connection PE	Pump	105	Gemeinsam	Analog for 101–104 (–)
35	Input PE	Mains connection	106	Input	External heating signal
36	Input N	Mains connection	107	Input	External cooling signal
37	Input L	Mains connection	108	Input	External heating/cooling active
38	Output L	Acknowledgement reserve	109	Output	Common for inputs 106–108
39	Input	Acknowledgement reserve			
40	Output L	Acknowledgement reserve	111	20 mA-CL	Interface TxD+ RxD+
41	Input	Acknowledgement reserve	112	20 mA-CL	Interface TxD– RxD–
42	Output L	Acknowledgement flow	113	RS 485–	Interface
43	Input	Acknowledgement flow	114	RS 485–	Interface
44	Input	Sensor Sn2+ connection	115	RS 485–	Interface, TxD+ RxD+/A/DATA
45	Input	Sensor Sn2– connection			
46	Input	Sensor Sn1+ connection	116	RS 485–	Interface, TxD– RxD–/B/DATA*
47	Input	Sensor Sn1– connection			
48	Input	Digital input reserve 3	117	RS 485–	Interface, ground
49	Input	Digital input reserve 2	118	Output PE	
50	Input	Comm. digital input reserve 2 + 3	121	RxD	RS422 Bühler/Müller-Weing.
51	Input	Digital input reserve 1	122	CTS	RS422 Bühler/Müller-Weing.
52	Input	Digital input reserve 1	123	TxD	RS422 Bühler/Müller-Weing.
53	Input	Digital input level	124	+5V	RS422 Bühler/Müller-Weing.
54	Input	Digital input level	125	GND	RS422 Bühler/Müller-Weing.
55	Output	Digital output 1, 24V DC	131	CAN-L	CAN ISO High speed
56	Ground	Ground to digital output 1	132	CAN-H	CAN ISO High speed
57	Output	Digital output 2, 24V DC	133	V+	
58	Ground	Ground to digital output 2	134	Rt	
59		Not used	135	Bus-L	
60		Not used	136	Bus-H	
61		Not used	137	Ground	
62		Not used	138	Shield	
63		Not used	149	Output	Flow measurement 4-20 mA
64		Not used	150	Input	Flow measurement 4-20 mA
65		Not used			
66		Not used			
67		Not used			
68		Not used			
69		Not used			
70		Not used			
71	Input	Sensor Sn3 (Print for options)			
72	Input	Sensor Sn3 (Print for options)			
73	Output	Sensor Sn3 (Print for options)			
74		Not used			
75		Not used			

Temperature limit values

H	Heating area.
K	Cooling area.
SP	Set-point value.
T_N	Pump run-out temperature, measured with sensor S2 (absolute value). Section, 7.2, P 4.3.
↓	Lower limit value of medium temperature, with respect to the set-point value, measured with sensor S1. Section 7.2, P 3.1.
↑	Upper limit value of fluid temperature, with respect to the set-point value, measured with sensor S1.
↓*	Lower limit value of consumer temperature, with respect to the set-point value, measured with S2. Section 3.1.
↑*	Upper limit value of consumer temperature, with respect to the set-point value, measured with sensor S2. Section 3.1.
T_{SP}	Maximum adjustable set-point value (absolute value). Section 7.2, P 4.4.
T_{max}	Trigger temperature of the electromechanical safety thermometer in unit (absolute value). Set at the factory.

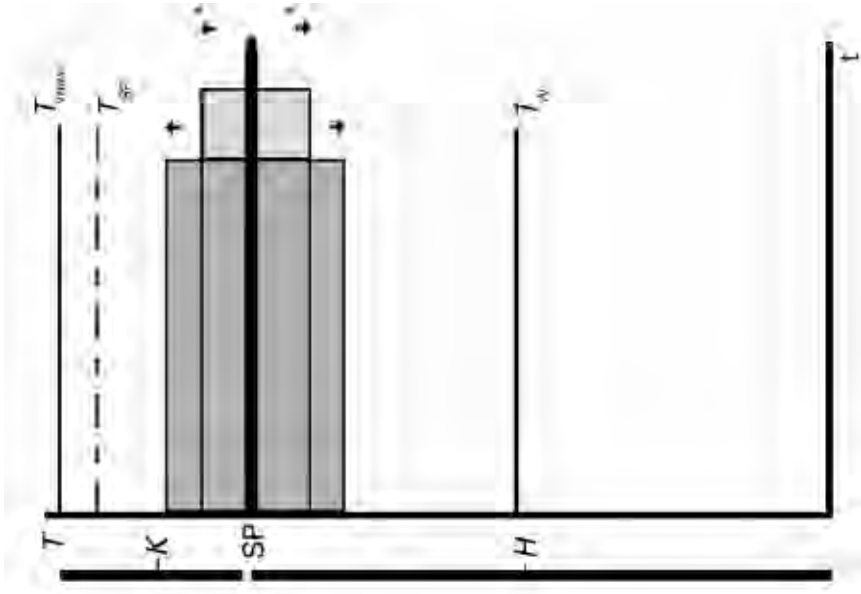


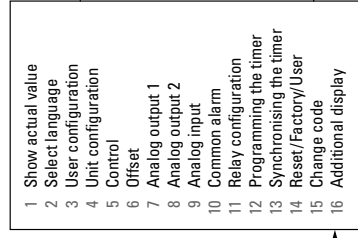
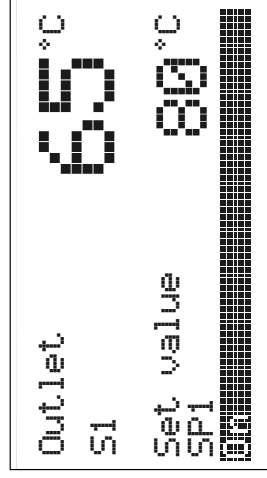
Abb. 2 Temperature limit values

Technical Data

Temperature range	0 to 420 °C
Control method	<u>Outlet control</u> : PID, with 1 of 10 pre-programmed PID-parameter sets or with a manually adjustable PID set. Separate parameter sets for heating and cooling. <u>Consumer control</u> : Cascade PI/PID, with 1 of 10 pre-programmed PID-parameter sets or with a manually adjustable cascade set PI/PID.
Control parameter input	Via keyboard and LCD display.
Data storage	Memory chip with min. 10 years of data preservation. Clock switch with lithium battery and about 10 years of data preservation.
Limit values	Adjustable maximum set-point limit value. Programmable minimum and maximum deviation of the medium and consumer temperatures from the set-point value.
Monitoring systems	Control and power systems have permanent self-monitoring. Sensor breakage and short-circuit (only for Pt 100). Limit values for temperature, pump flow (all 3 phases), level, function of the heating and pump contactors, as well as flow rate*. Data plausibility monitoring in memory, monitoring of the service interval, flow monitor, calibrated values of the pump motor phase sequence in normal and leak-stop mode*, as well as external set-point value signal*.
Inputs	
Temperature sensor	
Outlet	Pt 100.
External (consumer)*	Choose Pt 100, J (Fe-CuNi), K (NiCr-Ni), or T (Cu-CuNi).
Inlet*	Pt 100.
External Set-point value input	Normalised and scaleable analogue interface with 0/4 to 20 mA or 0 to 10 V DC.
Heating/cooling commands, external*	Via potential-free contacts.
Set-point value changeover	Via keyboard (key SP) or via potential-free external contacts.
Serial interface*	See "Data interfaces".
Outputs	
Heating/Cooling	Triac outputs for contactors or valves or solid-state relays. Individually adjustable cycle times for heating and cooling.
Relay functions*	Up to 4 optional relays as either common alarm or with individual functions such as temperature switching point, deviation, etc.
Analog outlets1 and 2*	Galvanically separate analogue outputs with scaleable signal 0/4 to 20 mA or 0 to 10 V DC. Each output can be assigned an actual or set-point value. In addition, the thermal e.m.f. of a J, K or T thermocouple output at analog output 2.
Data interfaces*	
Data transmission to master computer (Hardware)	CL-20 mA; RS232; Bühler Datacess; Bühler Dataspeed; RS485; CAN; SPI; Profibus-DP.
Data transfer to other Regloplas units	RS 422 (max. 32 units); CL-20 mA (2 to 4 units); RS485 (max. 32 units); CAN (max. 5 units); Bühler Dataspeed (max. 16 units); Profibus DP (max. 32 units).
Transmission protocol	See section 10 "Data interfaces".

Display	Modern, white backlit DOT matrix LCD display with black writing. Simultaneous display of actual and set-point values, and an extra line for an important display value as well as a status line are shown on the display.
Disturbances	Shown on the display
Precision Class precision/Linearization Deviation of display	Pt 100: 0.3 %. Thermocouple: 0.3% Pt 100: ± 1 digit. Thermocouple: ± 2 digits
Operation	Operation via short-stroke keys with pressure points on the membrane keyboard. Simple menu system in multiple languages via scroll keys. Set-point value and parameter setting protected by programmable codes.
Mains voltage	Switched mode power supply unit; 85 to 265 V AC
Degree of protection	Display unit with membrane keyboard: IP54
Service	Insertable memory chip, attached to the temperature control unit, allows the operator to switch the electronics quickly and simply without losing any data. The user data are read automatically into the new electronic component. Integrated operating hours counter and service interval display.
Front dimensions	96 x 96 mm.
Notes	* Optional equipment.

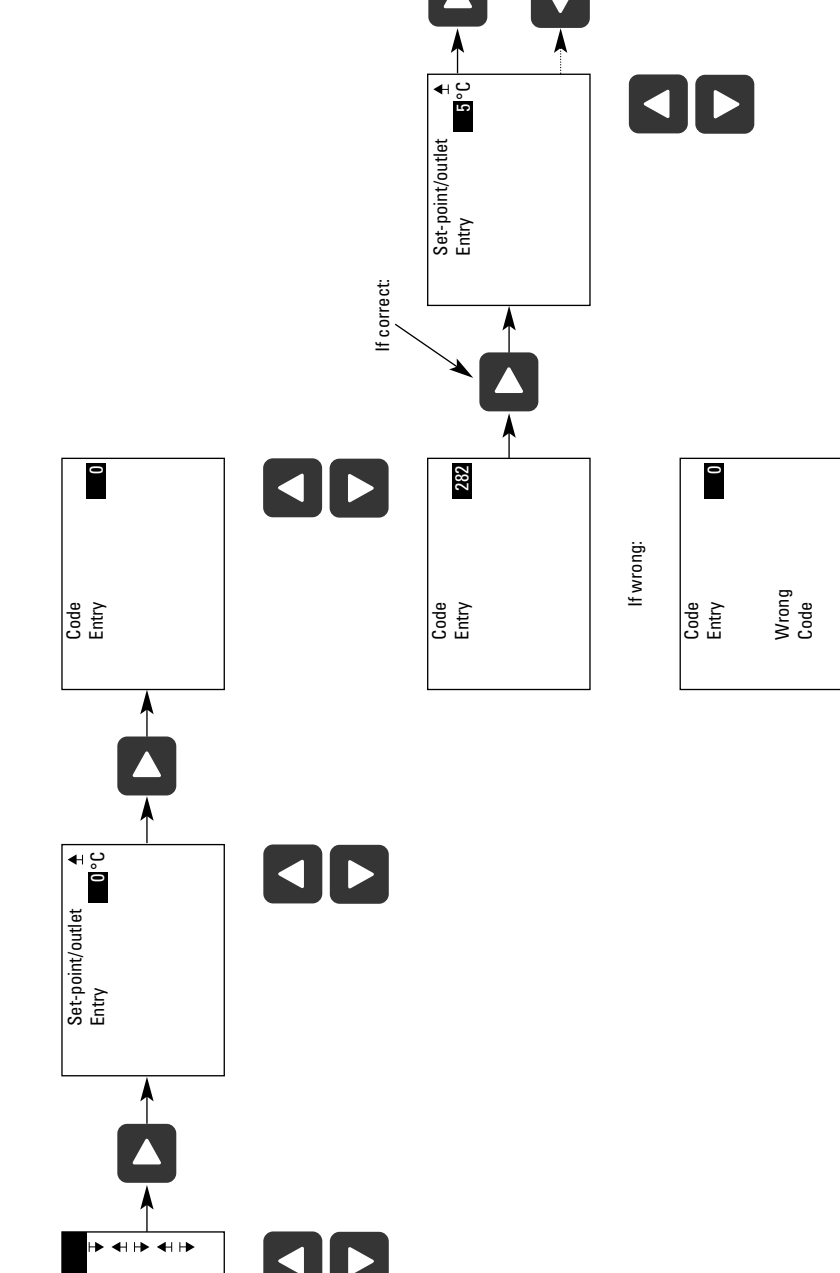
Menu RT50

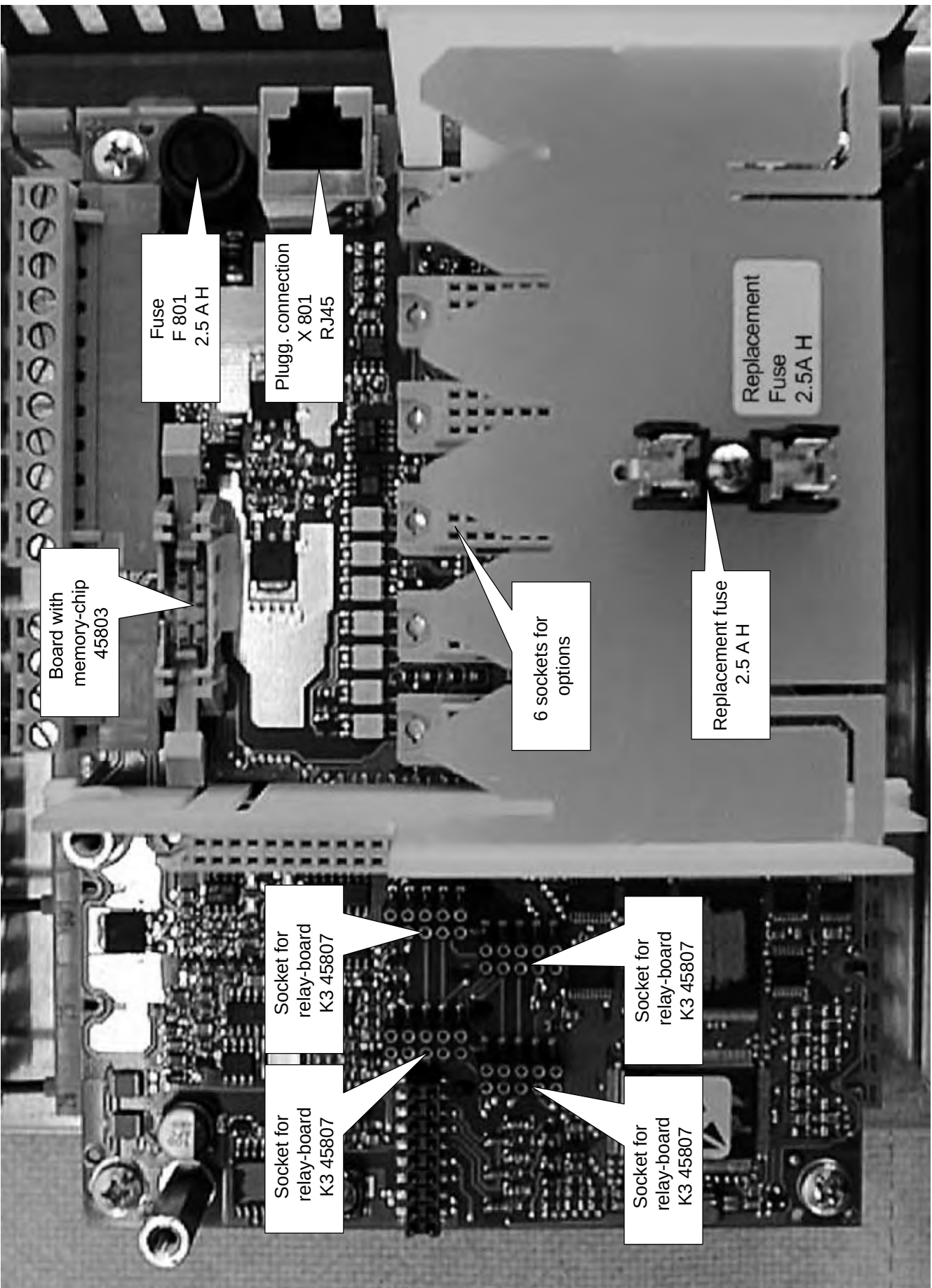


1 Show actual value	2 Select language	3 User configuration	4 Unit configuration	5 Control	6 Offset	7 Analog output 1	8 Analog output 2
1.1 Outlet 112 °C 1.2 External 110 °C 1.3 Inlet 1.4 Heating/cooling cap. 1.5 Flow rate 1.6 Pump current L1 1.2 A 1.7 Pump current L2 1.2 A 1.8 Pump current L3 1.3 A 1.9 Operating hours 14725 1.10 Service after 275 h 1.11 Software version 5005 1.12 Interface RS485 1.13 Protocol PROFIBUS 1.14 Address 3 1.15 Day/time Do 07:16	2.1 Sprache Deutsch 2.2 Language English 2.3 Langue Français	3.1 Deviation set/actual 3.2 Outlet limit 3.3 Minimum flow rate 3.4 Interface 3.5 Temperature display 3.6 Flow rate display 3.7 Set-point at start 3.8 Next service 14725 3.9 Operating hours	4.1 Heat transfer fluid 4.2 External sensor type 4.3 Runout temperature 4.4 Maximum set-point 4.5 Evacuation options 4.6 Evacuation time 4.7 Pump current 4.8 Pump dir. of rotation 4.9 Pump run-out time 4.10 Power failure behav. 4.11 Heating 2 4.12 Heating cycle time 4.13 Cooling cycle time 4.14 Suppress heating 4.15 Suppress cooling 4.16 Pump. cooling medium 4.17 Func. of ext. contact 4.18 Level alarm 4.19 Pressure relief valve 4.20 Viscosity	5.1 Type of control 5.2 Control par. PID selection 5.3 Control par. PID fix 5.4 Control par. PID man. 5.5 Control par. casc. sel 5.6 Control par. casc. fix 5.7 Control par. casc. man	6.1 Offset outlet sensor 6.2 Offset ext. sensor 6.3 Offset inlet sensor 6.4 Offset analog input 6.5 Offset analog out. 1 6.6 Offset analog out. 2	7.1 Output 1 Outlet 4–20 mA 7.2 Output 1 Outlet 0–20 mA 7.3 Output 1 Outlet 0–10 V 7.4 Output 1 Ext. 4–20 mA 7.5 Output 1 Ext. 0–20 mA 7.6 Output 1 Ext. 0–10 V 7.7 Output 1 Inlet 4–20 mA 7.8 Output 1 Inlet 0–20 mA 7.9 Output 1 Inlet 0–10 V 7.10 Output 1 Set1 4–20 mA 7.11 Output 1 Set1 0–20 mA 7.12 Output 1 Set1 0–10 V 7.13 Output 1 Set2 4–20 mA 7.14 Output 1 Set2 0–20 mA 7.15 Output 1 Set2 0–10 V 7.16 Output 1 Flow 4–20 mA 7.17 Output 1 Flow 0–20 mA 7.18 Output 1 Flow 0–10 V	8.1 Output 2 Outlet 4–20 mA 8.2 Output 2 Outlet 0–20 mA 8.3 Output 2 Outlet 0–10 V 8.4 Output 2 Actual TE–FE 8.5 Output 2 Actual TE–CA 8.6 Output 2 Actual TE–Cu 8.7 Output 2 Extern 4–20 mA 8.8 Output 2 Extern 0–20 mA 8.9 Output 2 Extern 0–10 V 8.10 Output 2 Inlet 4–20 mA 8.11 Output 2 Inlet 0–20 mA 8.12 Output 2 Inlet 0–10 mA 8.13 Output 2 Set1 4–20 mA 8.14 Output 2 Set1 0–20 mA 8.15 Output 2 Set2 4–20 mA 8.16 Output 2 Set2 0–20 mA 8.17 Output 2 Set2 0–10 V 8.18 Output 2 Set2 0–10 V 8.19 Output 2 Flow 4–20 mA 8.20 Output 2 Flow 0–20 mA 8.21 Output 2 Flow 0–10 V
9 Analog input	10 Common alarm	11 Relay configuration	12 Programming the timer	13 Synchronising the timer	14 Reset/Factory/User	15 Change code	16 Additional display
9.1 Analog input inactive 9.2 Analog input 4–20 mA 9.3 Analog input 0–20 mA 9.4 Analog input 0–10 V	10.1 Alarm repeat time 10.2 Alarm heating 1 10.3 Alarm heating 2 10.4 Alarm flow rate 10.5 Alarm flow monitor 10.6 Alarm level 10.7 Alarm pump current	10.8 Relay K1 function 10.9 Relay K1 selection 10.10 Relay K2 function 10.11 Relay K2 selection 10.12 Relay K3 function 10.13 Relay K3 selection 10.14 Relay K4 function 10.15 Relay K4 selection	12.1 Inactive 12.2 01: Inactive 12.3 02: Inactive 12.4 03: Inactive 12.5 04: Inactive 12.6 05: Inactive 12.7 06: Inactive 12.8 07: Inactive 12.9 08: Inactive 12.10 09: Inactive 12.11 10: Inactive	13.1 Enter day 13.2 Enter hour/minute	14.1 Save as fact. setting 14.2 Reset to fact set 14.3 Save as user set 1 14.4 Reset to user set 1 14.5 Save as user set 2 14.6 Reset to user set 2	15.1 Code <Entry value> 15.2 Code <Set-point> 15.3 Code <Fact setting> 15.4 Code <User setting 1> 15.5 Code <User setting 2>	16.1 No additional display 16.2 Outlet 5 °C 16.3 External 24 °C 16.4 Inlet 23 °C 16.5 Heat/Cool cap. –100 % 16.6 Flow rate 16.7 Operation hours 14725 16.8 Service after 275 h 16.9 Day/time Do 07:16

* Beispiele

Die Zahlen vor den Textzeilen beziehen sich auf die Betriebsanleitung.





Fuse
F 801
2.5 A H

Plugg. connection
X 801
RJ45

Board with
memory-chip
45803

6 sockets for
options

Replacement fuse
2.5 A H

Replacement
Fuse
2.5A H

Socket for
relay-board
K3 45807

Socket for
relay-board
K3 45807

Socket for
relay-board
K3 45807

Socket for
relay-board
K3 45807



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