RTM-30 TEMPERATURE REGULATOR

MANUAL INSTRUCTION

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ZAMEL

DESCRIPTION

The temperature regulator operation is based on heating/regulation curve which we obtain by means of choosing points including both the expected temperature and the reference temperature, by choosing a ready made curve or by changing options for room regulation. The regulator preserves the temperature suitable for the reference point (e.g outer or inner temperature), chosen during configuration phase. Regulation algorithm causes the heating costs lower and the same gives full comfort of room and weather regulation. The regulator uses two sensors for proper operation. There is also a possibility of extending its existing connection cable up to 50 m with a cable section of 0,2÷2,5 mm². The reference temperature sensor can be replaced with a standard resistor, which causes one sensor operation as in the standard temperature regulation.

The regulator is a perfect solution in every situation we want to be sure there was a full factor ciculation e.g.: cooling systems or heating systems, but also in situations where suitable temperature difference is necessary for preserving best conditions with maximum low costs e.g.: hot water circulation. Replacing one temperature sensor with a standard resistor has the effect of constant regulation around one point in accordance with the adjusted curve, close to the chosen points.

Replacing one temperature sensor with a potentiometer with similar functions has the effect of changing a universal regulator into a standard temperature regulator with difference regulation possibility by means of curve and hysterisis. It allows to control, e.g., the heating source in such a way its temperature is higher than the adjusted one including difference corresponding e.g. the ambient temperature loss through windows, etc.
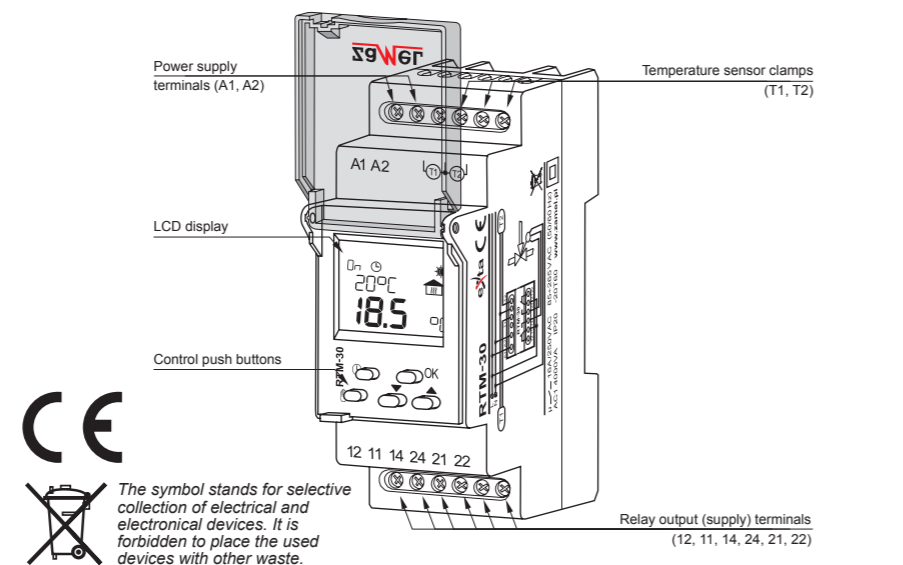
CECHY

- Temperature level regulation in the range of 5 ÷ 95 °C,
- two external temperature sensors,
- LCD display and keypad,
- output receiver's temperature regulation in accordance with the reference temperature,
- output receiver's temperature regulation in accordance with temperature differences,
- heating sources economical regulation gives enormous savings during heating period,
- simultaneous regulation possibilities of cooling and heating sources,
- temperature regulation possibility by means of blending valves,
- replacing possibility of a reference temperature regulator with a standard resistor,
- double-modular casing with a shield,
- TH-35 DIN rail installation,
- two output relays of max 16A capacity.

TECHNICAL DATA

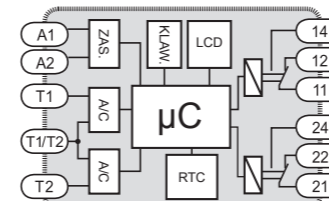| RTM-30	
Power supply terminals:	A1, A2
Input rated voltage:	85 ÷ 265 V AC
Nominal frequency:	50 / 60 Hz
Rated power consumption:	< 1,5 W
Temperature sensor terminals:	T1 (t reference), T2 (t expected)
Temperature sensor type:	KTY 81-210
Temperature regulation adjustment range:	5 ÷ 95 °C
Hysteresis:	+/- 0,5 °C
Relay output (supply) terminals:	11, 12, 14, 21, 22, 24
Receiver switch on indicator:	LCD
LCD display backlight:	amber
Output relay parameters:	2NO/NC 16A / 250V AC1 4000VA
Number of terminal clamps:	12
Section of connecting cables:	0,2 ÷ 2,50 mm²
Regulator ambient temperature range:	-20 ÷ 60 °C
Sensor ambient temperature range:	-20 ÷ 90 °C
Operating mode:	freely
Mounting:	rail TH35 (acc to PN-EN 60715)
Protection degree:	IP20 (PN-EN 60529)
Protection level:	II
Overvoltage category:	II
Pollution degree:	2
Dimensions:	double-modular (35 mm) 90x35x66 mm
Weight:	0,160 kg
Reference standards:	PN-EN 60730-1; PN-EN 60730-2-7 PN-EN 61000-4-2,3,4,5,6,11

APPEARANCE

Power supply terminals (A1, A2)

Temperature sensor clamps (T1, T2)

LCD display

Control push buttons

Relay output (supply) terminals (12, 11, 14, 24, 21, 22)

MOUNTING

1. Disconnect power supply by the phase fuse, the circuit-breaker or the switch- disconnector combined to the proper circuit.
2. Check if there is no voltage on connection cables by means of a special measure equipment.
3. Install the RTM-30 on the TH-35 DIN rail in the switchboard.
4. Connect the cables with the terminals in accordance with the installing diagram.
5. Switch on the power supply from the mains.

INNER DIAGRAM

DIMENSIONS
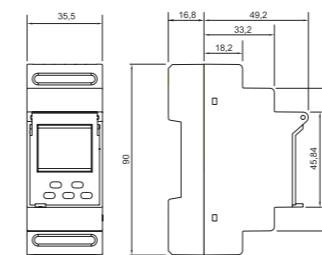
FAMILY PRODUCT

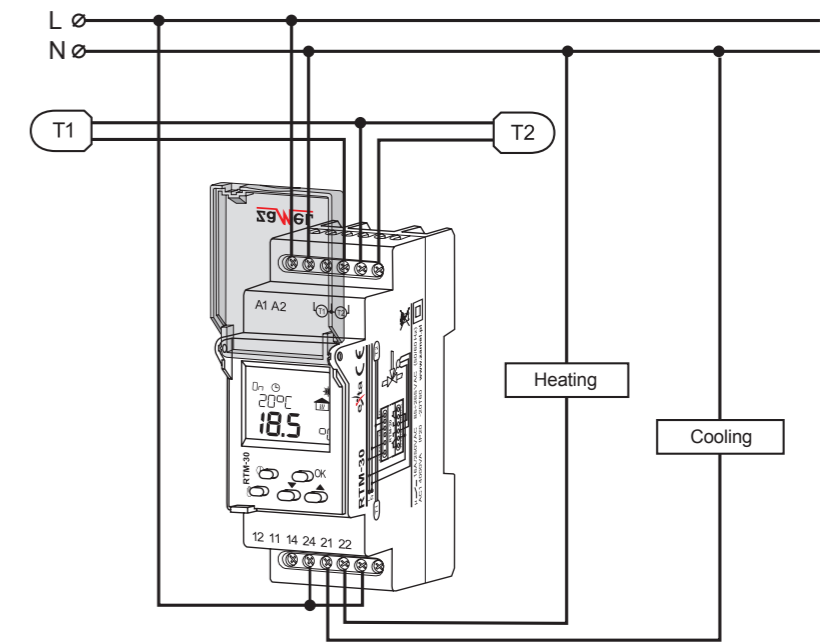RTM-30 temperature regulator belongs to RTM family product.

RTM - xx

Device type:
01 - basic
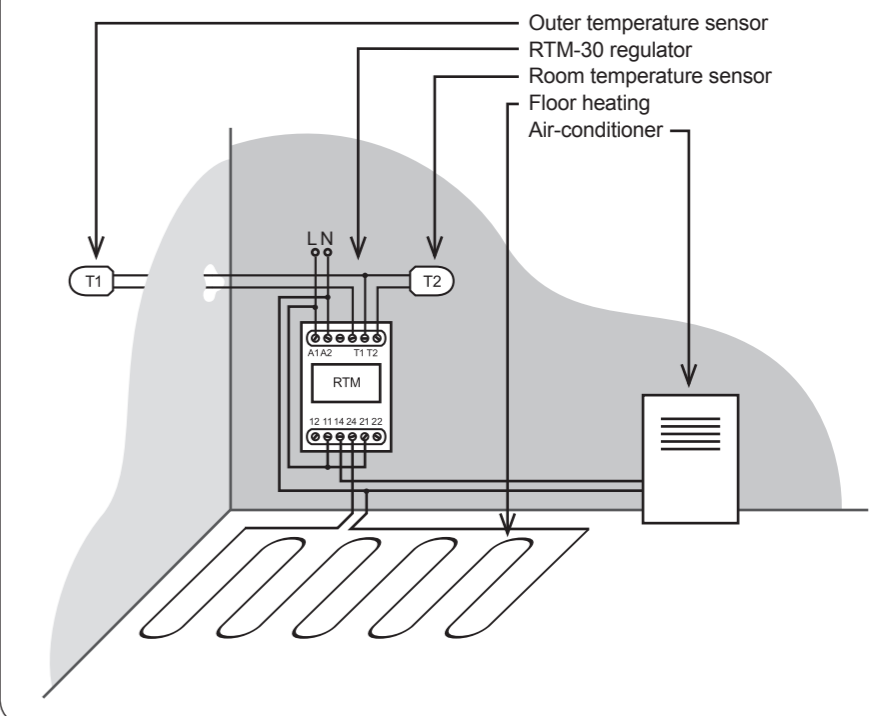02 - LCD display
03 - weather with LCD display

Device symbol

CONNECTION

Heating

Cooling

APPLICATION

Outer temperature sensor
RTM-30 regulator
Room temperature sensor
Floor heating
Air-conditioner

WARRANTY CARD

DESCRIPTION

Displayed elements and messages description
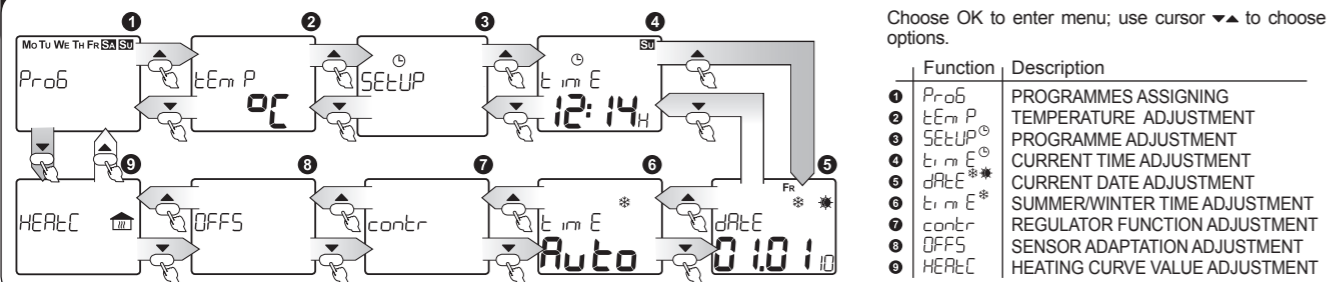
Use cursor ▲ to change from main window ❶ to current time and date window ❷ or use cursor ▼ to choose calculated and expected temperature window ❸.
After 15 sec there is an automatic return.

Window ❸
21ºC - adjusted temperature
16.5ºC - reference temperature (T1)

Different windows:
dAY - day, YEAR - year
Auto - automatic, USEr - user
On OFF - on/off
Error Error
t1 or t2 - T1 or T2 sensor error

Window ❷
Mo Tu WE TH FR SA SU - days of the week
🕑 - automatic mode
☝ - manual mode
❄ - winter time
8-03- - current date
12:14ss - current time

Window ❶
🕑 - automatic mode, ☝ - manual mode
◀ - reference temperature
❄ - anti frozen temperature
☀ - comfort temperature
☾ - economical temperature
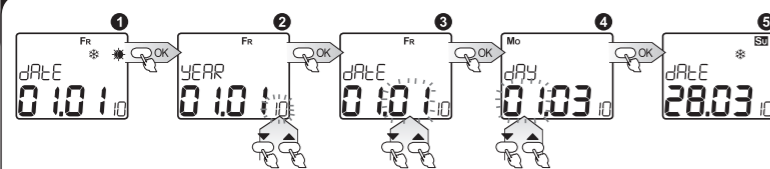20ºC - calculated temperature
18.0ºC - expected temperature (T2)

Push buttons description

🕑 • main window - automatic mode entry;
  • different windows - one level higher entry without saving the inserted data;
☝ • main window - manual mode entry;
  • different windows - one level higher entry without saving the inserted data;
OK • main window - main menu entry;
  • different windows - submenu entry or adjusted data saving;
▼▲ • toggle between menu windows or increase/decrease options of the adjusted value.

▲🏠 Arrow up blinks: opening - enter signal to open the valve.
▲🏠 Arrow up is on: switch on the heater or open the central heating circulation valve.
▼🏠 Arrow down blinks: closing - enter signal to close the valve.
▼🏠 Arrow down is on: switch on the cooling device or open the ice water valve.

MAIN MENU

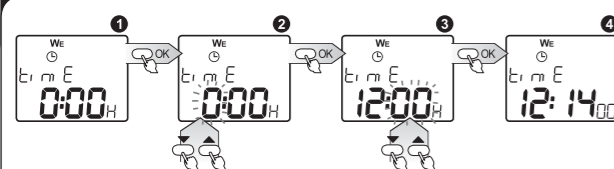Choose OK to enter menu; use cursor ▼▲ to choose options.

Function	Description
❶ Pro6	PROGRAMMES ASSIGNING
❷ tEmP	TEMPERATURE ADJUSTMENT
❸ SEtUP🕑	PROGRAMME ADJUSTMENT
❹ timE🕑	CURRENT TIME ADJUSTMENT
❺ dAtE❄☀	CURRENT DATE ADJUSTMENT
❻ timE❄☀	SUMMER/WINTER TIME ADJUSTMENT
❼ contr	REGULATOR FUNCTION ADJUSTMENT
❽ OFFS	SENSOR ADAPTATION ADJUSTMENT
❾ HEAtC	HEATING CURVE VALUE ADJUSTMENT

DATE ADJUSTMENT

❶ dAtE❄☀ - current date adjustment; press OK to enter;
❷ YEAR - use cursor ▼▲ to choose the required year, press OK to confirm, adjustment range from 2000 to 2099;
❸ MONTH - use cursor ▼▲ to choose the required month, press OK to confirm;
❹ DAY - use cursor ▼▲ to choose the required day of the month, press OK to confirm; the system is equipped with protection against wrong insertion of days for a particular month (it includes leap years), and it automatically counts the day of the week on the basis of the adjusted date;
❺ Confirming the command allows to enter date adjustment window and current summer/winter time adjustment window if the option Auto is activated.

There is an escape possibility from every submenu window one level higher in every moment of programming by pressing 🕑 or ☝ without saving the adjusments.

TIME ADJUSTMENT

❶ timE🕑 - current time adjustment; press OK to enter;
❷ HOUR - use cursor ▼▲ use cursor to choose the required hour, you can adjust in format 1-24 H or 1-12 A (AM) and 1-12 P (PM), press OK to confirm;
❸ MINUTES - use cursor ▼▲ to choose the required minutes value, press OK to confirm;
❹ Confirming the minutes value causes seconds reset and time adjustment window entry.

There is an escape possibility from every submenu window one level higher in every moment of programming by pressing 🕑 or ☝ without saving the adjusments.

SUMMER/WINTER TIME ADJUSTMENT
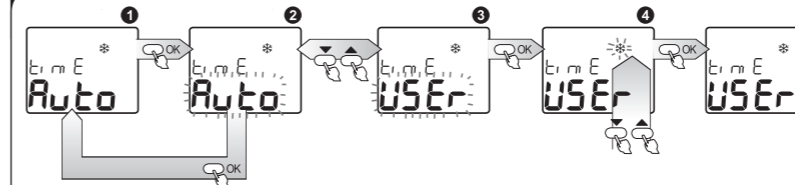
❶ timE❄☀ - choosing one out of two modes by means of which the summer/winter time switching follows: Auto - the switching follows automatically the last Sunday of March at 2:00 AM from winter time to summer time, and last Sunday of October at 3:00 AM from summer time to winter time, USEr - the user chooses between winter/summer time; press OK to enter;
❷❸ MODE ADJUSTMENT - use cursor ▼▲ to choose the required mode Auto or USEr and press OK to confirm; after choosing Auto mode, the clock automatically adjusts to summer or winter time in reference to the adjusted date; choosing USEr mode allows to enter the next window;
❹ Use cursors ▼▲ o choose summer/winter time where ❄ stands for winter time and ☀ stands for summer time, if there was a cursor change the system changes current time by adding or distracting 1 hour, press OK to confirm;
❺ Confirming the choice the system enters summer/winter time change window.

There is an escape possibility from every submenu window one level higher in every moment of programming by pressing 🕑 or ☝ without saving the adjusments.

REGULATOR FUNCTION ADJUSTMENT

❶ contr - regulator function adjustment. Choose onOFF to control devices on the basis of on/off (heater, air conditoner, boiler, temperature control by means of two-way valve), and choose uALuE to control temperature by means of three-way or four-way blending valve, press OK to review and to edit;
❷❸ Use cursors ▼▲ to choose functions onOFF or uALuE, press OK to confirm; choose onOFF function to return to contr menu; next choose uALuE to adjust function parameters:
❹ kP - regulator intensification (dynamics); press OK to enter;
❺ use cursors ▼▲ to adjust the value in the range of 1 to 10; press OK to confirm.
❻ tv - full valve opening time; press OK to enter; ❼ use cursors ▼▲ to adjust the value in the range of 15 to 1200 seconds; press OK to confirm.
❽ ti - time between following measurements (so called integrator time); press OK to enter; ❾ use cursors ▼▲ to adjust the value in the range of 5 to 600 seconds; Auto it means time equals 1/5 tv; press OK to confirm.
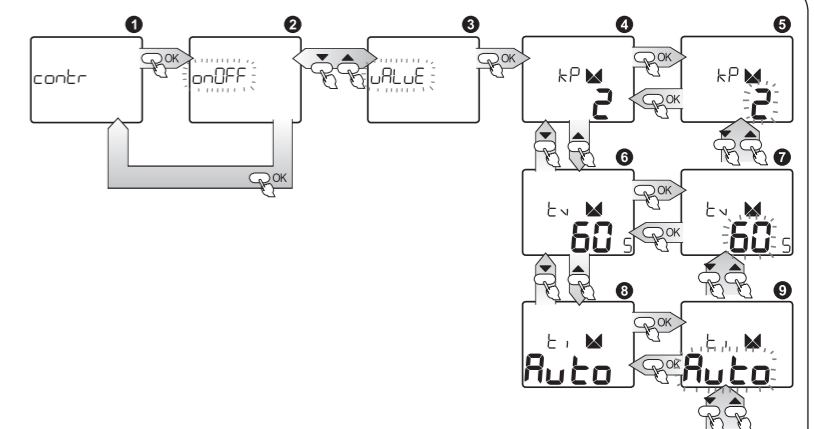
There is an escape possibility from every submenu window one level higher in every moment of programming by pressing 🕑 or ☝ without saving the adjusments.

OPERATING MODE CHANGE (AUTOMATIC, MANUAL)

MANUAL MODE CHANGE - if the system is in the main window and in automatic mode 🕑 pressing the button ☝ causes the system switches into manual mode, with a possibility of direct device switch on/switch off or valve control.

Regulator in onOFF function:
Jf the regulator is in manual mode ❶ pressing (holding) ▲ cursor causes the heating relay switches on (the relay short circuits contacts 11-14) - symbols ▲ and 🏠 light ❷, when the cursor is released the relay is switched off and ▲ and 🏠 symbols fade ❸. Another pressing (holding) ▲ cursor lights both ▲ and 🏠, and switches on the relay - the relay is switched on only when pressing the cursor ▲.

If the regulator is in manual mode ❶ pressing (holding) ▼ cursor causes the cooling relay is switched on (the relay short circuits contacts 11-12) - symbols ▼ and 🏠 light ❷, when the cursor is released the relay is switched off and ▼ and 🏠 symbols fade ❸. Another pressing (holding) ▼ cursor lights ▼ and 🏠, and switches on the relay - the relay is switched on only when pressing the cursor ▼.
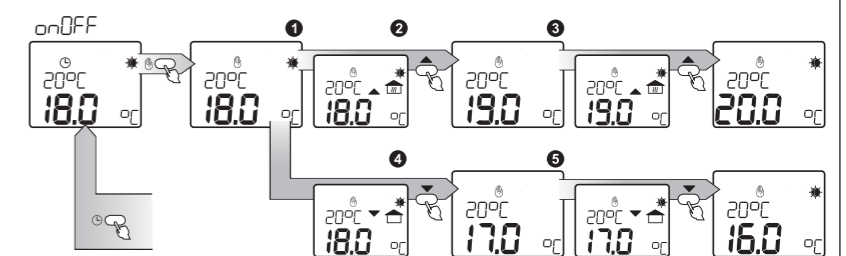

Regulator in uALuE function:
If the regulator is in manual mode ❶ pressing (holding) ▲ cursor causes the opening valve relay switches on (the relay short circuits contacts 11-14) - ▲ arrow lights; when the cursor ▲ is released the relay is switched off and 🏠 ights, it symbolizes the previous meter status ❷. Another pressing (holding) ▲ cursor lights the arrow ▲ and switches on the relay - when the cursor is released, the arrow ▲ fades and the relay switches off - the relay is switched on only when pressing the cursor ▲.

If the regulator is in manual mode ❶ pressing ▼ cursor causes the closing valve relay switches on (the relay short circuits contacts 21-24) - ▼ arrow lights; when the cursor ▼ is released the relay is switched off; 🏠 it symbolizes the previous meter status ❸. Another pressing (holding) ▼ cursor lights the arrow ▼ and switches on the relay - when the cursor is released, the arrow ▼ fades and the relay switches off - the relay is switched on only when pressing the cursor ▼.
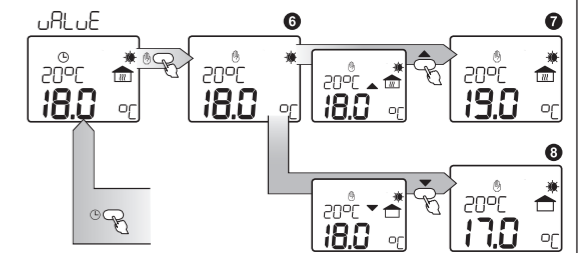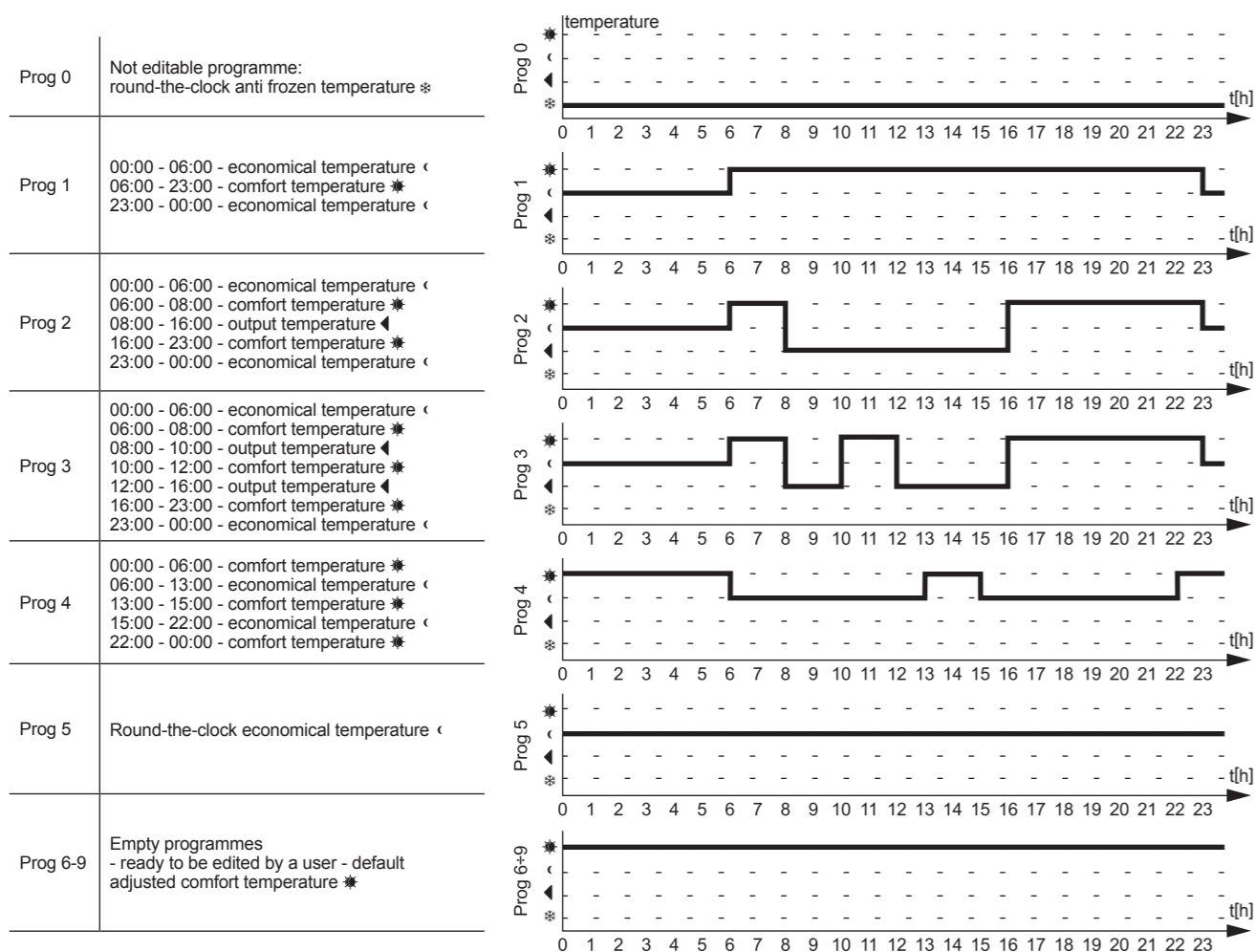

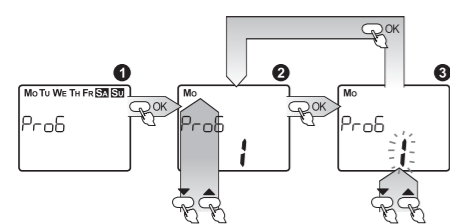If the system is in one of the two mentioned manual modes ☝, press the cursor 🕑 to return to automatic mode 🕑.

PROGRAMME ADJUSTMENT
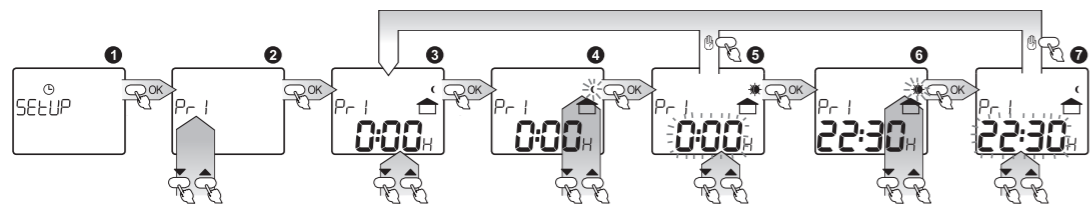
❶ SEtUP🕐 - programmes review and adjustment, press OK to enter;
❷ Use cursors ▾▴ to choose the required programme number to edit, press OK to confirm;
❸ When the programme number is chosen review its contents by means of cursors ▾▴ the system presents data with 15 minutes difference. Press OK to edit the programme;
❹ Use cursors ▾▴ to choose mode (temperature) that starts at 0:00, press OK to confirm;
❺ When the mode is chosen press cursors ▾▴ to adjust the proper time of temperature operation, press OK to confirm; if the chosen mode (temperature) must operate till the end of the whole programme press the 🖐, push button. It fills the whole programme memory with the previously chosen programme;
❻ If time is confirmed by OK command, use cursors ▾▴ to choose the next mode to operate before the time previously adjusted (in certain point ❺); press OK to confirm;
❼ Use cursors ▾▴ to choose time for the adjusted temperature to operate - press the 🖐 push button to save the adjustments and to go to programme review.

Prog 0	Not editable programme: round-the-clock anti frozen temperature ❄	
Prog 1	00:00 - 06:00 - economical temperature ◖ 06:00 - 23:00 - comfort temperature ❋ 23:00 - 00:00 - economical temperature ◖	
Prog 2	00:00 - 06:00 - economical temperature ◖ 06:00 - 08:00 - comfort temperature ❋ 08:00 - 16:00 - output temperature ◀ 16:00 - 23:00 - comfort temperature ❋ 23:00 - 00:00 - economical temperature ◖	
Prog 3	00:00 - 06:00 - economical temperature ◖ 06:00 - 08:00 - comfort temperature ❋ 08:00 - 10:00 - output temperature ◀ 10:00 - 12:00 - comfort temperature ❋ 12:00 - 16:00 - output temperature ◀ 16:00 - 23:00 - comfort temperature ❋ 23:00 - 00:00 - economical temperature ◖	
Prog 4	00:00 - 06:00 - comfort temperature ❋ 06:00 - 13:00 - economical temperature ◖ 13:00 - 15:00 - comfort temperature ❋ 15:00 - 22:00 - economical temperature ◖ 22:00 - 00:00 - comfort temperature ❋	
Prog 5	Round-the-clock economical temperature ◖	
Prog 6÷9	Empty programmes - ready to be edited by a user - default adjusted comfort temperature ❋	

PROGRAMMES ASSIGNING

❶ ProG - assigning programme number to the particular day of the week, press OK to enter;
❷ Use cursors ▾▴ to choose the day of the week to edit, and press OK to confirm;
❸ Use cursors ▾▴ to choose the programme number to be assigned to a particular day of the week; press OK to enter days of the week window ❷.

TEMPERATURE ADJUSTMENT

❶ tEm P - temperature adjustment; press OK to review and to edit; use cursors ▾▴ to choose temperature:
Window ❷: Antifreeze temperature - can not be changed by a user;
Window ❸: Comfort temperature (day) - press OK to change the adjusted parameters; use cursors ▾▴ to choose the required temperature ❼; press OK to confirm.
Window ❹: Economical temperature (night) - press OK to change the adjusted parameters; use cursors ▾▴ to choose the required temperature ❽; press OK to confirm.
Window ❺: Output temperature - press OK to change the adjusted parameters; use cursors ▾▴ to choose the required temperature ❾; press OK to confirm.
Window ❻: Safety temperature - press OK to change the adjusted parameters; use cursors ▾▴ to choose the required temperature; OFF - adjustment - stands for 95 °C value ❿; press OK to confirm.
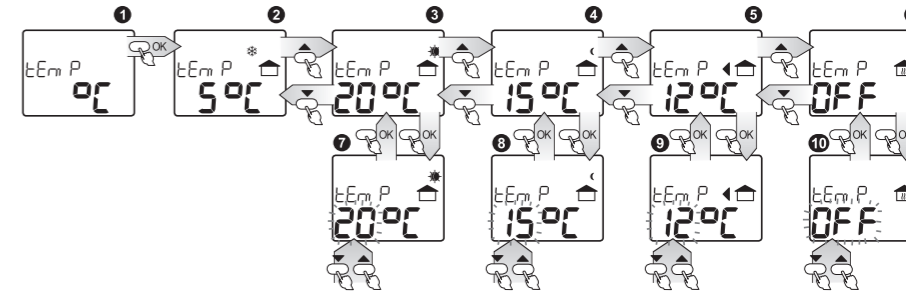
CAUTION: If the regulator is in the weather mode, the adjusted temperature values constitute a point of curve shift. The basic heating curve is based on 20 °C comfort temperature. If the comfort temperature is adjusted to 25 °C the curve shifts to 5 °C up, however it goes 5 °C down if the comfort temperature is adjusted to 15 °C. The antifreeze temperature switches off the regulator and switches on protection mode against freezing.

SENSOR ADAPTATION ADJUSTMENT

❶ OFFS - sensor adaptation adjustment - when the user notices that the temperature measured by sensors is different from the real one, measure temperature correction can be done; press OK to edit;
❷ OFFS1 - press OK to change the adjusted value; ❹ use cursors ▾▴ to choose the required temperature correction from the range of - 4,5 °C ÷ +4,5 °C; press OK to confirm.
❸ OFFS2 - press OK to change the adjusted value; ❺ use cursors ▾▴ to choose the required temperature correction from the range of - 4,5 °C ÷ +4,5 °C; press OK to confirm.

There is an escape possibility from every submenu window one level higher in every moment of programming by pressing 🕐 or 🖐 without saving the adjusments.
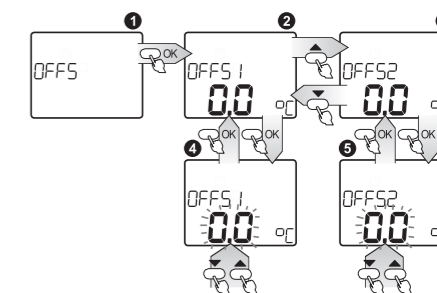
HEATING CURVE VALUES ADJUSTMENT

❶ HEAtC (heating curve) - operation adjustment as a room temperature regulator or temperature regulator with reference to outer temperature (weather regulator), in accordance with pre-set heating curve values or individual curve points adjustments; press OK to enter;
❷ Hom E - room regulator operation adjustment;
❸ CuruE - weather regulator operation adjustment in accordance with pre-set heating curve types;
❹ Po int - weather regulator operation adjustment in accordance with individual values adjustments of heating curve points;
Window ❸: press OK to change heating curve type; use cursors ▾▴ to adjust type - adjustment range: from 0,2 to 1,8 ❺; press OK to confirm;
Window ❹: press OK to adjust individually temperature values for four heating curve points; ❻ use cursors ▾▴ to adjust the first value of the first point of the heating curve HP11 which describes the reference temperature (e.g. outside a building in case of weather operation mode); press OK to edit the second value of the first point of the heating curve HP12; ❼ use cursors ▾▴ to adjust the expected temperature values (e.g. central heating boiler temperature) which is obtained in case the reference temperature occurs HP11; press OK to edit the first value (reference temperature) of the second point of the heating curve HP21; ❽ use cursors ▾▴ to adjust the temperature for the second point; press OK to edit the expected temperature of the second point of the curve HP22; repeat the same steps as for the first point; following OK commands confirm adjustments for the rest 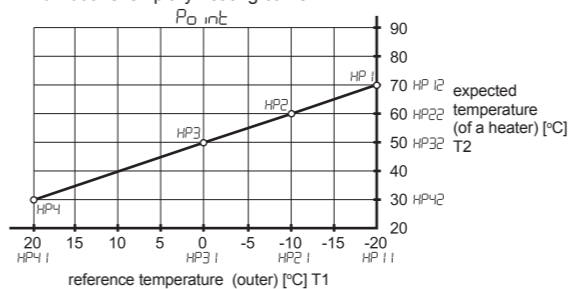curve points till the second value of the fourth point HP42; ❾ use cursors ▾▴ to choose the required value and press OK to save adjustments and to go to a higher level.
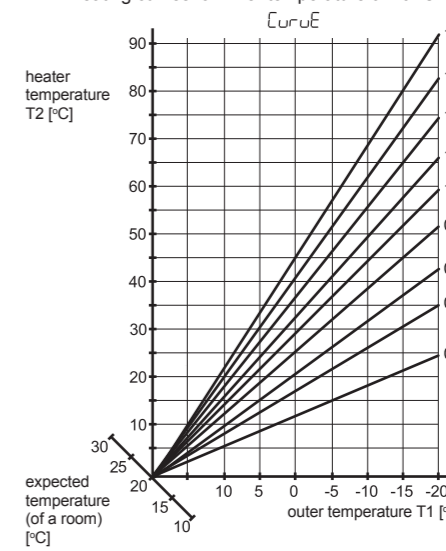Window ❷: press OK to adjust the regulator as a typical room regulator.
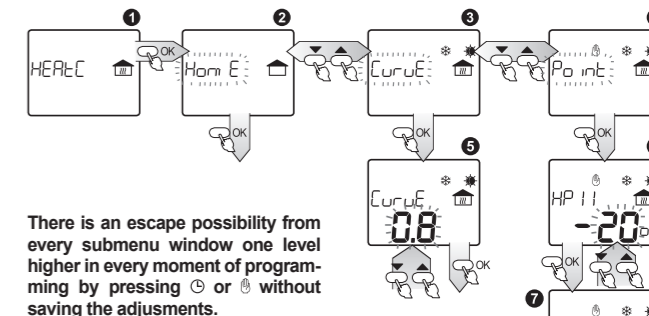
There is an escape possibility from every submenu window one level higher in every moment of programming by pressing 🕐 or 🖐 without saving the adjusments.

Heating curves for inner temperature of 20 °C

Individual exemplary heating curve

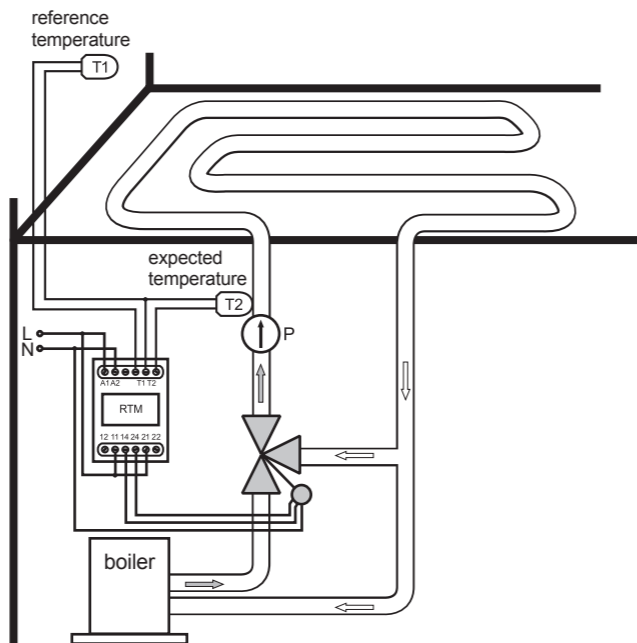**Room regulator switch on/off (electric heaters, gas/oil boilers, air-conditioners)**
❶ Press OK in the main menu to choose contr option.
❷ Use cursors ▼▲ to choose onOFF; in submenu; press OK to confirm; go to main menu.
❸ In main menu use cursors ▼▲ to choose HEAtC option and press OK to confirm.
❹ In submenu HEAtC use cursors ▼▲ to choose Hom E and press OK to confirm.
The regulator operates in the same way as the room regulator. The room expected temperature is chosen in temperature adjustment phase.
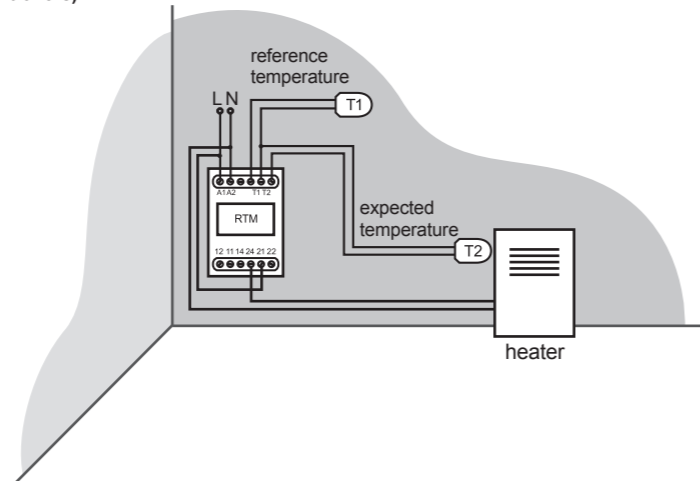
Room regulator with blending valve
❶ Press OK in the main menu to choose contr option.
❷ In submenu contr use cursors ▼▲ to choose vALuE; press OK to confirm.
❸ In submenu vALuE use cursors ▼▲ to choose time of full valve opening from 15 sec to 1200 sec; this time range should be given in a valve manual by the producer as it is unavoidable to operate properly. In case the time range is not given by the producer, it can be measured by means of a stopwatch: measuring starts with „opening" signal and finishes with full valve opening. In case relay time do not precisely correspond with valve opening time, then the nearest time once increased should be given; press OK to confirm; go to main menu.
❹ In main menu use cursors ▼▲ to choose HEAtC; option and press OK to confirm.
❺ In submenu HEAtC use cursors ▼▲ to choose Hom E and press OK to confirm.

Coal-fired boiler pump control
The first sensor is mounted (reference temperature) where hot water escapes or at the top of a central heating boiler.
❶ Press OK in the main menu to choose contr option.
❷ Use cursors ▼▲ to choose onOFF; in submenu; press OK to confirm; go to main menu.
❸ In main menu use cursors ▼▲ to choose HEAtC option and press OK to confirm.
❹ In submenu HEAtC use cursors ▼▲ to choose Po int and press OK to confirm.
❺ In Po int option use cursors ▼▲ to choose the curve value points till the last one, confirm every choice by OK command.
Exemplary points of heating curve:

	HP 1	HP2	HP3	HP4
Boiler's temperature	HP 1 l: **39**	HP2 l: **40**	HP3 l: **60**	HP4 l: **100**
Central heating return temperature	HP l2: **0**	HP22: **28**	HP32: **48**	HP42: **100**

CAUTION: In case the regulator operates as a central heating circulation pump relay, the comfort and economical temperatures should be adjusted to 20 °C, programmes should not be adjusted or economical temperature should be switched on for all days and periods. When the temperature falls beneath 39 °C there is a complete switch off.
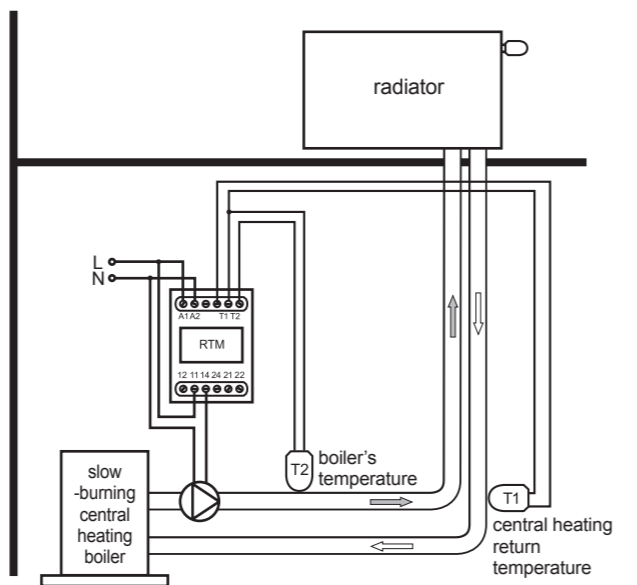
Weather regulator switch on/off (electric heaters, gas/oil boilers, air-conditioners)
❶ Press OK in the main menu to choose contr option.
❷ In submenu use cursors ▼▲ to choose onOFF; press OK to confirm; go to main menu.
❸ In main menu use cursors ▼▲ to choose HEAtC option and press OK to confirm.
❹ In submenu HEAtC use cursors ▼▲ to choose CurvE and press OK to confirm to enter option adjustment.
❺ In submenu CurvE use cursors ▼▲ to choose curve's type from the range from 0,2 to 1,8; press OK to confirm.

0,8 is enough for well insulated homes, however the typical curve for poor insulated homes is 1,0 to 1,2 and 1,6 for badly insulated homes. For homes with floor heating 0,2 or 0,6 is enough. Press OK to confirm.

It is recommended to adjust own heating curve points because of air-conditioning. The expected temperature sensor should be mounted in a way to measure the devices' temperature (heater and air-conditioner) or room's temperature with its individual heating curve adjustment.
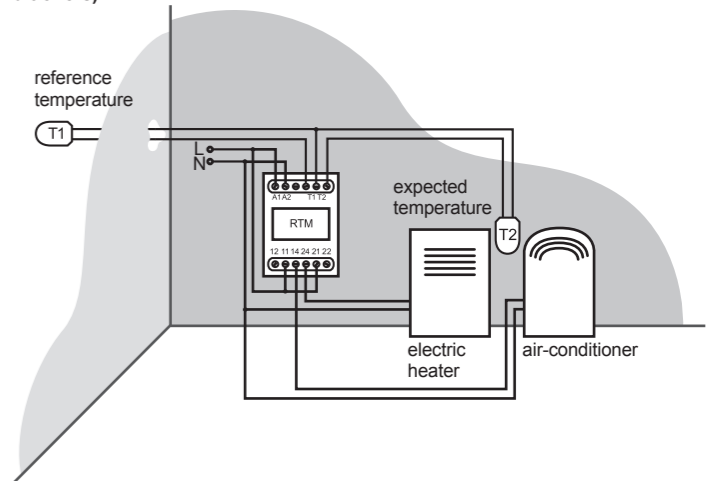
Weather regulator with mixing valve
❶ Press OK in the main menu to choose contr option.
❷ In submenu contr use cursors ▼▲ to choose vALuE; press OK to confirm.
❸ In submenu vALuE use cursors ▼▲ to choose time of full valve opening from 15 sec to 1200 sec; this time range should be given in a valve manual by the producer as it is unavoidable to operate properly. In case the time range is not given by the producer, it can be measured by means of a stopwatch: measuring starts with „opening" signal and finishes with full valve opening. In case relay time do not precisely correspond with valve opening time, then the nearest time once increased should be given; press OK to confirm; go to main menu.
❹ In main menu use cursors ▼▲ to choose HEAtC; option and press OK to confirm.
❺ In submenu HEAtC use cursors ▼▲ to choose CurvE and press OK to confirm to enter option adjustment.
❻ In submenu CurvE use cursors ▼▲ to choose curve's type from the range from 0,2 to 1,8.

0,8 is enough for well insulated homes, however the typical curve for poor insulated homes is 1,0 to 1,2 and 1,6 for badly insulated homes. For homes with floor heating 0,2 or 0,6 is enough. Press OK to confirm. It is possible to adjust own heating curve in Po int option.
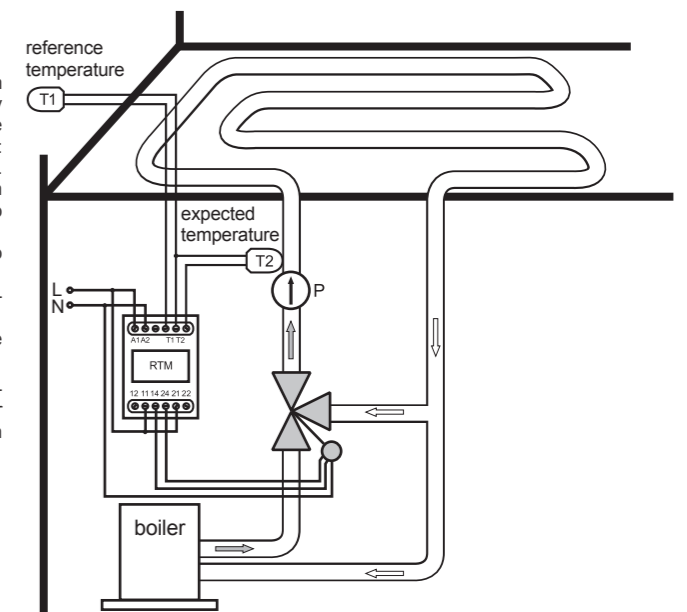
Circulation pump relay
The reference temperature sensor should be mounted where hot water escapes or at the top of a container (boiler) so it has the best contact with the temperature of hot water for use. The expected temperature sensor should be mounted just behind the last point of water drawing so it has the best contact with hot water for use that returns to the container.
❶ Press OK in the main menu to choose contr option.
❷ In submenu use cursors ▼▲ to choose onOFF; press OK to confirm; go to main menu.
❸ In main menu use cursors ▼▲ to choose HEAtC option and press OK to confirm.
❹ In submenu vALuE use cursors ▼▲ to choose Po int and press OK to confirm.
❺ In Po int option use cursors ▼▲ to choose values for curve's points according to the below presented example; press OK to confirm.
When the container reaches up to 40 ˚C the circulation pump should be switched on manually for about 2 to 5 minutes; temperature should be measured in the point where the expected temperature sensor is built - just behind the last water drawing (economically recommended) or in the point just before returning to the container. The container's temperature should be increased by 10 ˚C and the whole experiment should start from the beginning. All the points should be written down in a table. An exemplary table is presented below.

	HP 1	HP2	HP3	HP4
Container's temp.	HP 1 l: **40**	HP2 l: **45**	HP3 l: **50**	HP4 l: **55**
Circulation pipe temp.	HP l2: **35**	HP22: **37**	HP32: **40**	HP42: **43**

CAUTION: If the regulator operates as a circulation pump relay for hot water, the comfort and economical temperature should be adjusted to 20 °C, and time programme must be adjusted without economical temperature, complete pump switch off is when there is an antifreeze temperature cycle in the programme. An antifreeze temperature option can preserve the distant parts of pipes from freezing.