

Instruction Manual

# Electronic Intelligent Heating Regulator

Type:  
IR 07  
IR 09 KTP



Version: 4.1  
11.11.2009  
Applicable for software:

DP18X  
v1DP20, v1DP22

EN  
Version 1.1

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## 1. Caution, Safety, Warranty:

**Caution: Keep the Manual for later use and consultation.  
Carefully read and understand the manual before use!**

The Regulus intelligent regulators are designed in compliance with latest technologic trends and recognized safety-technical rules.

Correct operation of the regulator is based on adhering to the Instruction Manual and its usage in compliance with its intended use. The regulator is intended to control of heating system, heating of domestic hot water (DHW), heating of pool, heat accumulation, control of boilers and other heat sources, pumps, mixing valves and regulating elements acc. to signals from sensors and regulator control. The manufacturer (supplier) is not liable for damages resulting from other than intended use of the product. In case of faults due to non-professional installation, non-adhering to regulation, standards, the Instruction Manual and exceeding of limit values of the heating system components the manufacturer is not liable for the faults and the warranty is not applicable to them. The intended use of the product covers also adhering to the Instruction / Installation Manual, as well as inspection / maintenance specifications. The manufacturer provides the warranty applicable for the device in period and under conditions specified in the Warranty Certificate. The Warranty Certificate forms integral part of the device supply and its applicability is conditioned by complete filling of all data.

**Installation and setting of the system shall be executed only in compliance with applicable standards (acc. to Decree No. 50/1978 Coll. on qualification in electro-technical sector as subsequently amended) and in compliance with allowed operating parameters of the system components!**

**The regulator is intended only to indoor use, to assembly onto DIN rack into the switchboard acc. to applicable standards (see above)!**

## 2. Technical Specifications:

### Space temperature control types:

- PID control acc. to spatial temperature
- Equitherm control with possible influence by spatial temperature
- Control to constant water temperature set in the program

### Adjustable parameters:

**Note:** *the settings are described in particular sections. The are applicable for IR09KTP regulator, the IR07 regulator is limited by number of inputs.*

- Operation with 9 zones (4 zones acc. to temperature in space)
- 6 adjustable day programmes for selected zones
- 6 temperature changes daily for each program
- 6 adjustable temperatures switched by program
- Equitherm curve for selected zone adjustable in min. 2 and max. 6 points
- 6 particular dates in year (bank holidays), in which the zone is heated acc. to other program
- Exception for each zone, in which temperature may be changed in defined time period (holiday program)

### Regulator outputs:

**Note:** *Electric parameters of outputs are given in Table 1.a.*

- 4 outputs for mixing circuits
- 2 outputs for mixing valves of boiler circuits (to constant temperature)
- 16 outputs for system – switching of pumps, HDW circuits, solar circuits etc.
- 9V DC output

### Regulator inputs:

**Note:** *Electric parameters of inputs are given in Table 1.b.*

- 4 optically separable inputs (e.g. for flue-gas thermostat, HDO etc.).
- 1 RS232 line for connection of PC (by means of adaptor)
- 1 RS 485 line for communication with other additional models (such as terminal keyboard)
- 1 line for connection of temperature sensors (addressable data)

Table. 1.a

Outputs	Positions of Terminals	Switch	Max. values		Unit	Note
			U	I		
Output for mixing servo-valves	d6-d9 e1-e8	Solid state relay (SSR)	U	230	V ac	Three-point control
			I	1	A	
Other outputs	a2-a9 c2-c9	relay	U	230	V ac/dc	Acc. to inputs – see Table 1.b.
			I	5	A	
DC output	b7	---	U		9	V dc

Table. 1.b

Inputs	Positions of Terminals	Values		Unit	Note
		U	I		
Power supply	Power supply connector	U	230	V	
		P	8	W	
Power supply of outputs	a1; c1; d1; e9	U	230	V ac/dc	Maximum total current for each output 12 A
		I max	12	A	
Voltage-less outputs	d4,d5		---		Neutral conductor (N) supplied to inputs
			---		
Power supply for voltage-free inputs	d1	Umax	230	V	
HDO Input	d2-d3	Umax	230	V	
RS485 Communication	b8; b9		---		Communication with auxiliary modules
			---		
Data input for sensors	b1-b3: sensors b4-b6:GND		---		For data addressable sensors
			---		
RS232 Communication	Communication connector		---		Connection of terminal or solar module
			---		

The other parameters of the regulator are given in Table 2.a, the parameters of sensors in Table 2.b.

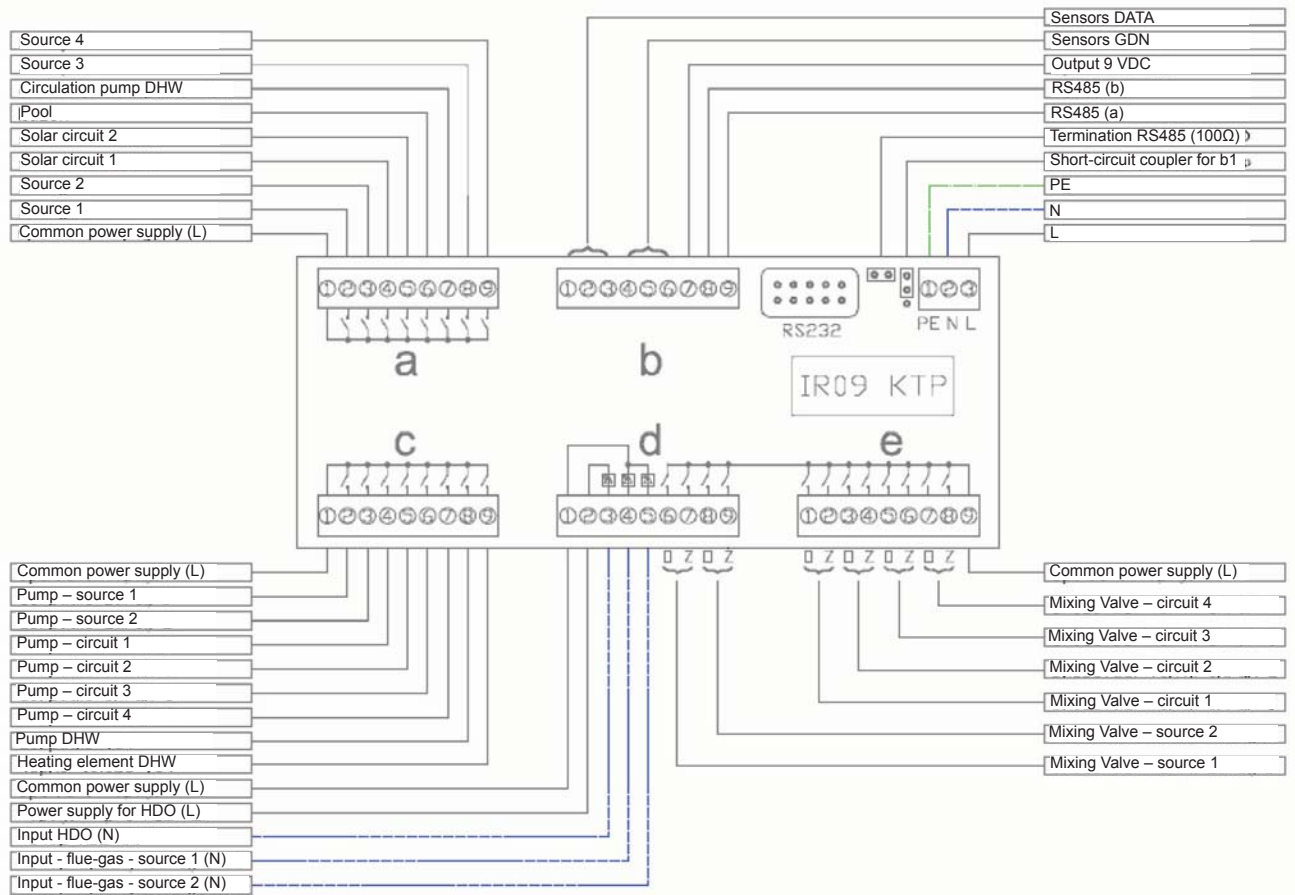
Table 2.a

Parameter	Range		Unit	Note
	min.	max.		
Operation temperature	0	40	°C	
Storage temperature	0	40	°C	
Fuse	250		mA	Slow (T)
Insulation protection	IP 20		---	
Electrical equipment of protection class I.				

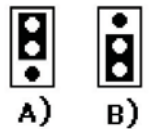
Table 2.b

Parameter	Range		Unit	Note
	min.	max.		
Temperature range	-55	125	°C	
Max. conductor length	---	600	m	
Sensor type	Data addressable sensor			

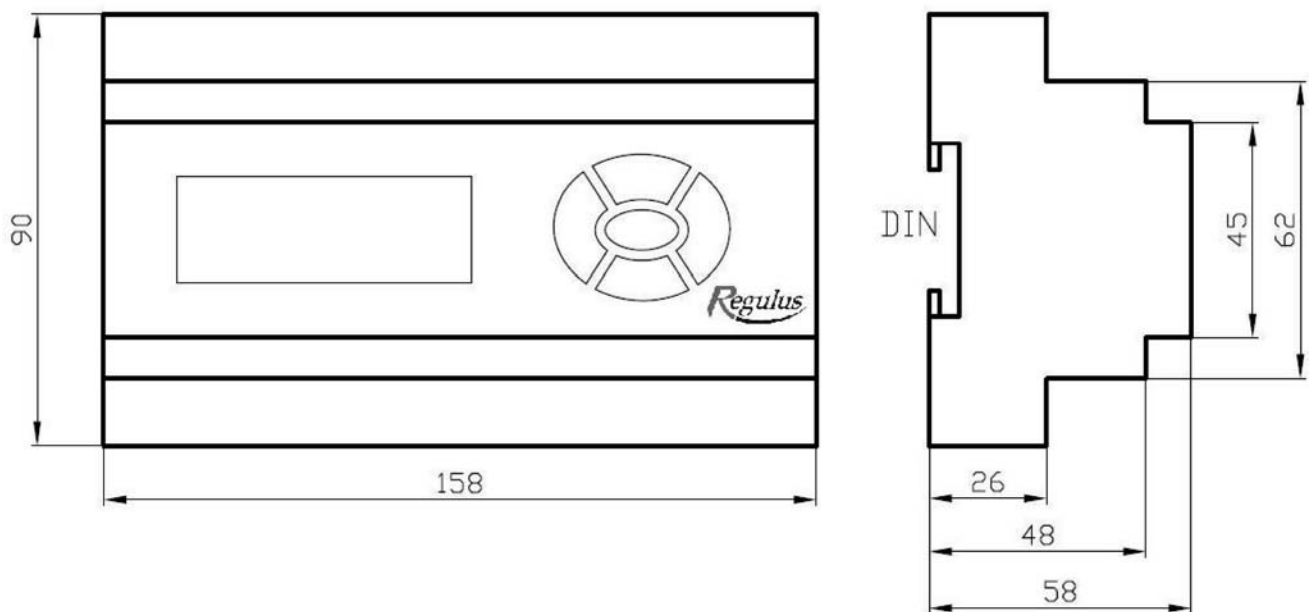
I/O connection of IR09KTP regulator:



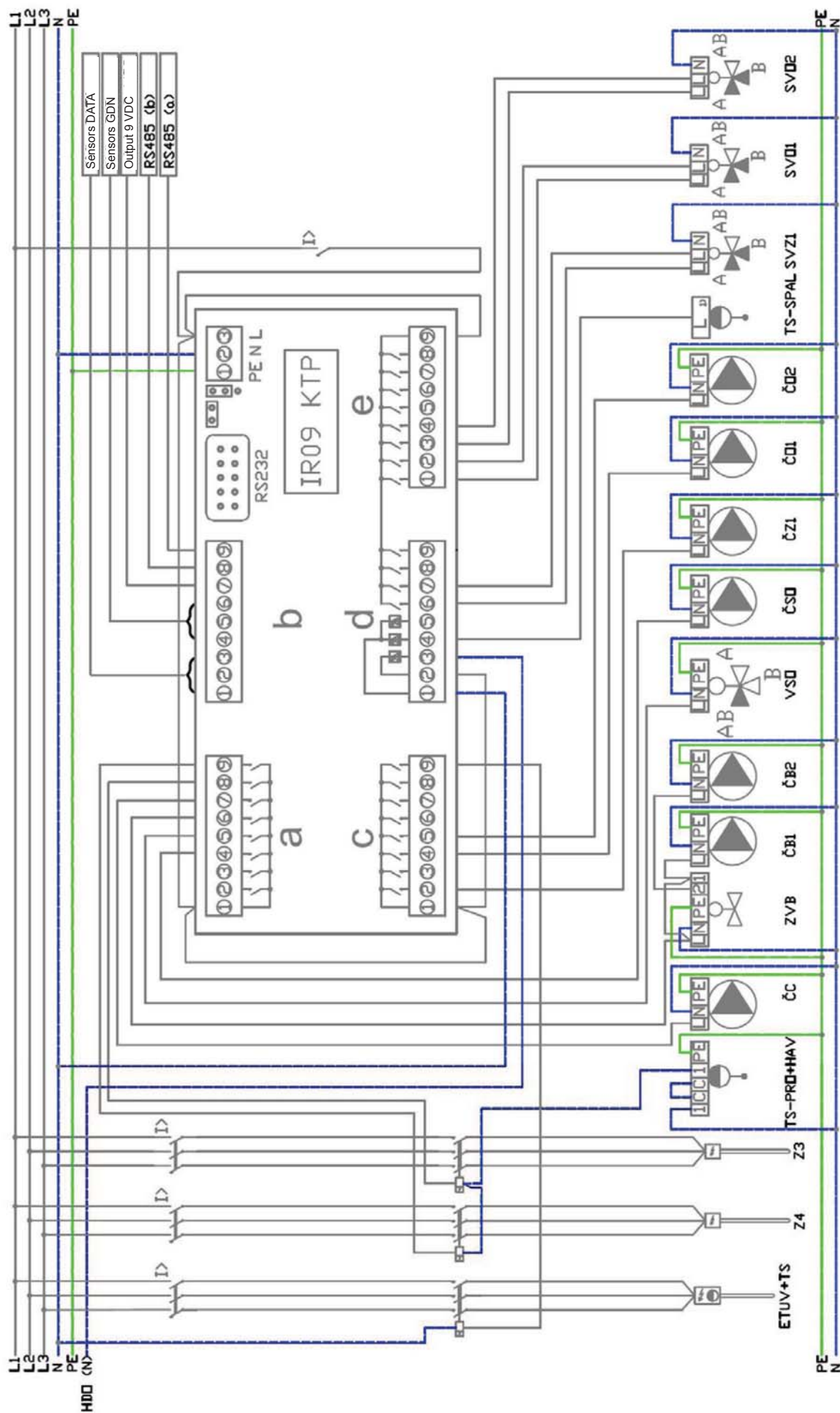
**Note:** In case of connection of pin 2 and 3 with short-circuit coupler (situation **b** – see sketch), the terminal **b1** will be used as the **zone 1** input against the GND sensor. In case of connection of pin 1 and 2 (situation **a**) the **b1** serves as input for sensors..



Basic dimensions:



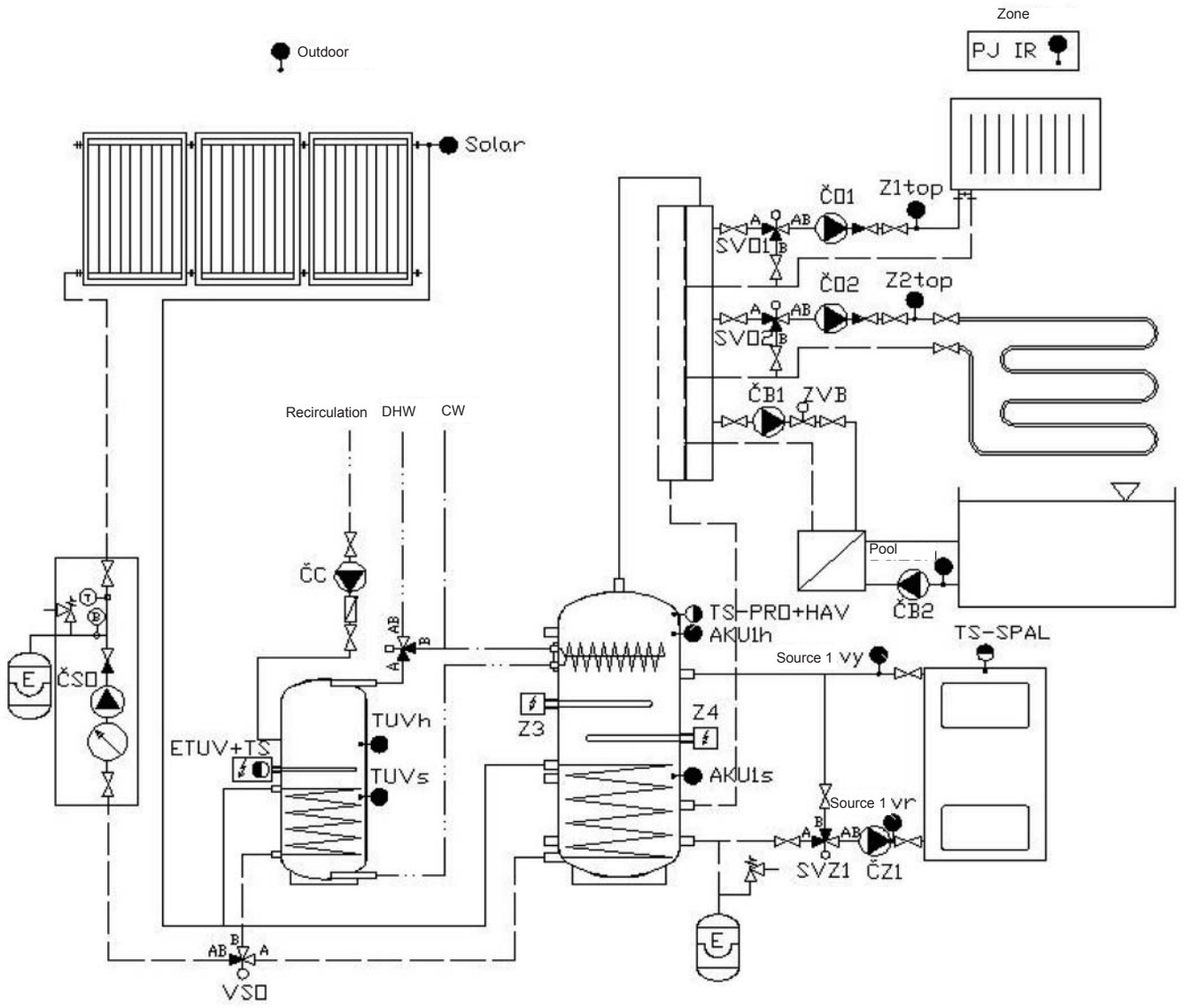
Example of electric connection of regulator to heating system on page 7::



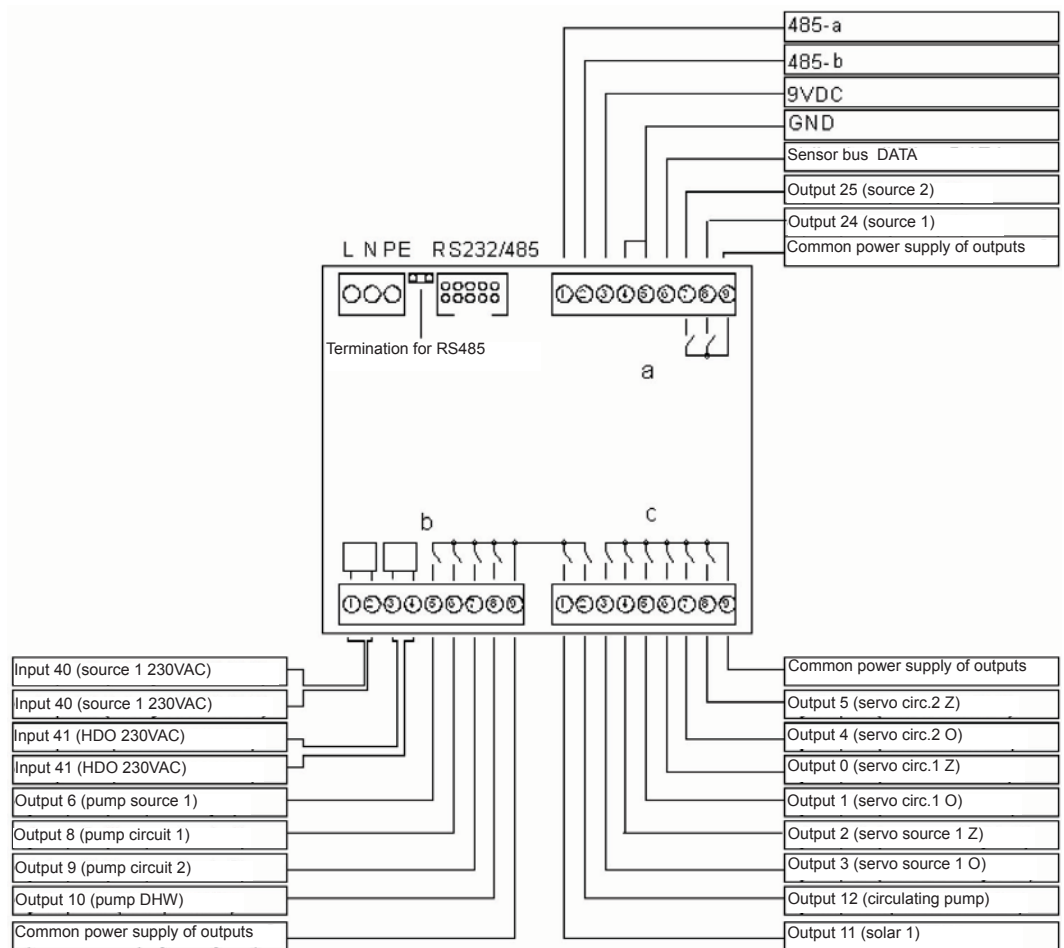
<sup>p</sup> E.g. the Atmos boilers since manufacturing year 2003  
 the flue-gas thermostat has been at terminal 6.



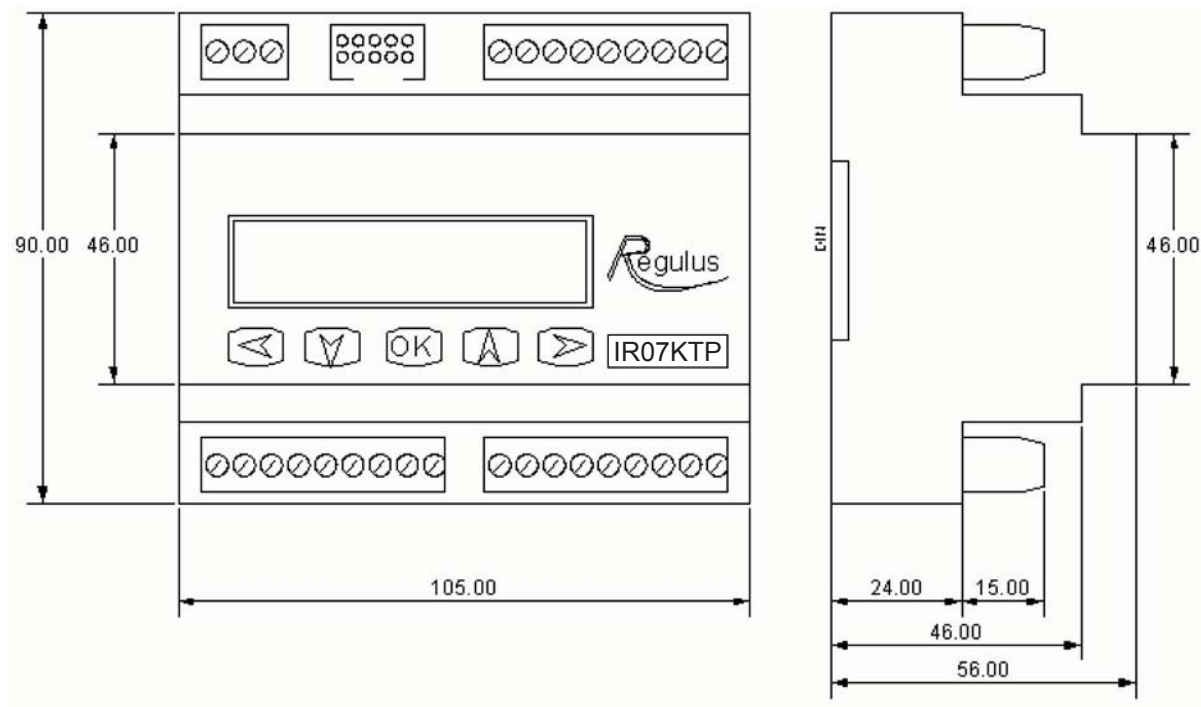
Example of hydraulic connection of heating system with IR09KTP regulator:



Connectin of inputs/outputs for IR07KTP regulator:



Basic dimensions:





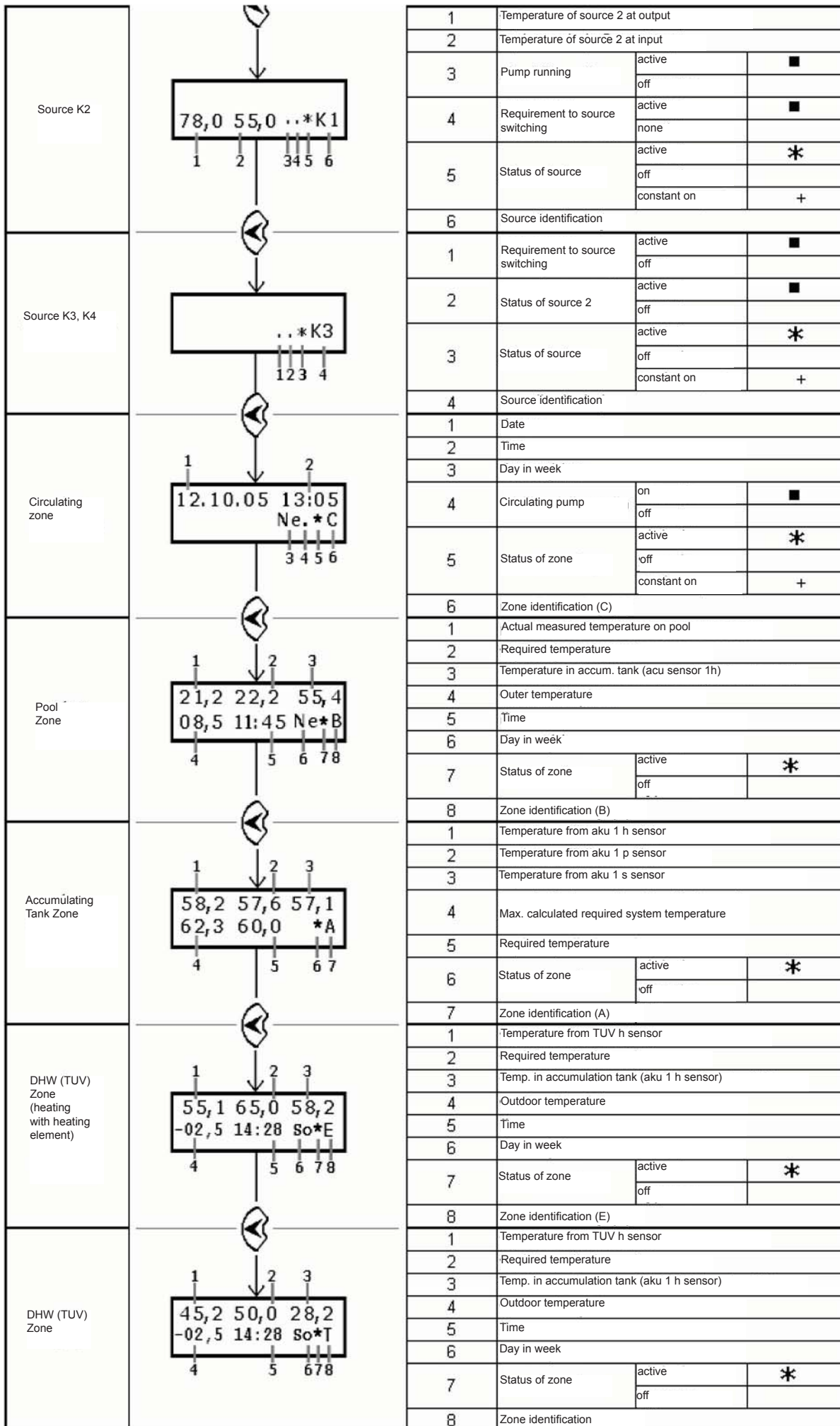
### 3. Operation of IR07 / IR09KTP Regulators:

The regulator is controlled by means of five buttons on case panel of the IR07/IR09 regulator. Pressing of ◀ (button (left arrow) in display menu switches over between displaying of individual zones. Arrangement of zones and description of displayed data is on diagram 1.

**Note:** Diagram 1 displays all zones and sources. If the zones and/or sources are not used (switched OFF in the Service Menu), they are not displayed and following used zone, resp. source is displayed instead. However, used zones and sources switched OFF by the user are displayed.

Diagram 1:

		Number:	Description:	Symbol	
Zone 1-4		1	Actual measured temperature in the zone		
		2	Required temperature in the zone		
		3	Temperature of heating water		
		4	Outside temperature		
		5	Time		
		6	Day in week		
		7	Status of zone:	active	*
		8	Zone No. (z1 - z4)	off	
Zone solar 1		1	Temperature of appliance no. 1		
		2	Switching temperature to appliance no. 2		
		3	Temperature of solar field 1		
		4	No. of heated appliance		
		5	Pump speed		
		6	Pump running	active	■
		7	Status of zone:	off	*
		8	Zone identification	constant on	+
Zone solar 2		1	Temperature of appliance no. 2		
		2	Switching temperature to appliance no. 3		
		3	Temperature of solar field 2		
		4	No. of heated appliance		
		5	Pump speed		
		6	Pump running	active	■
		7	Status of zone:	off	*
		8	Zone identification	constant on	+
Source K1		1	Temperature of source 1 at output		
		2	Temperature of source 1 at input		
		3	Pump running	active	■
		4	Requirement to source switching	off	■
		5	Status of zone:	active	*
		6	Source identification	constant on	+



When empty position is shown on the display:

--,--	70,0	32,2
.30,0	50,0	.*S

then no sensor is loaded or connected in this position.

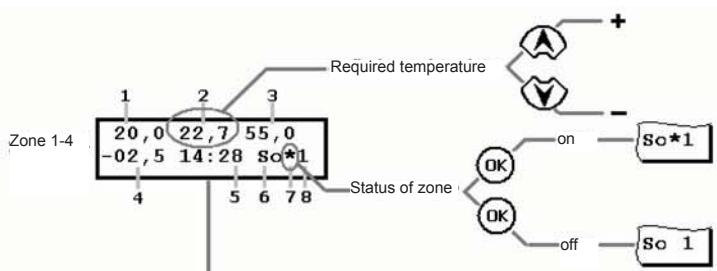
Setting of required temperatures in displayed zone may be manually changed by means of ▲ and ▼ buttons, maximum possible change is  $\pm 10$  °C from the value set by program. Such modified value then applies only to another time change within the program.

The OK button serves for switching the zone ON / OFF (at user level), resp. activate the constant run mode, if such function is available for particular zone. Function of antifreeze protection is active, even if the zone is switched OFF (if not switched OFF at service level).

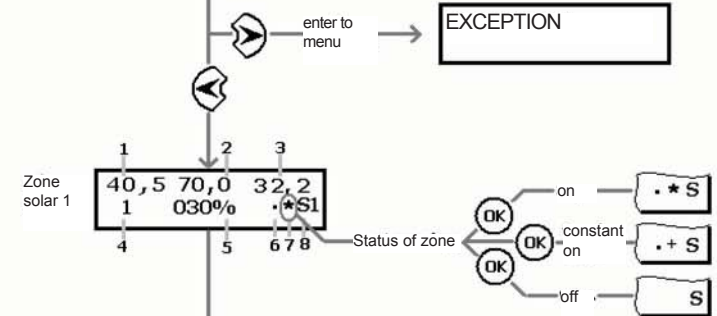
The ► button moves from particular zone display to regulator menu (see section 4), where this particular zone is automatically selected in all menu items.

Movement, temperature setting and zone control .

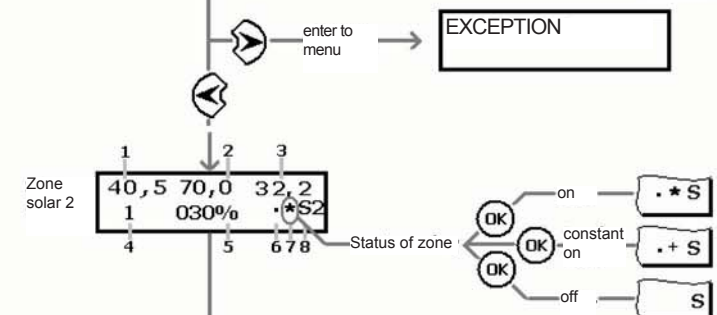
1	Actual temperature in zone
2	Required temperature in zone
3	Temp. of heating water in zone
4	Outer temperature
5	Time
6	Day in week
7	Status of zone
8	Zone identification (Z1-Z4)



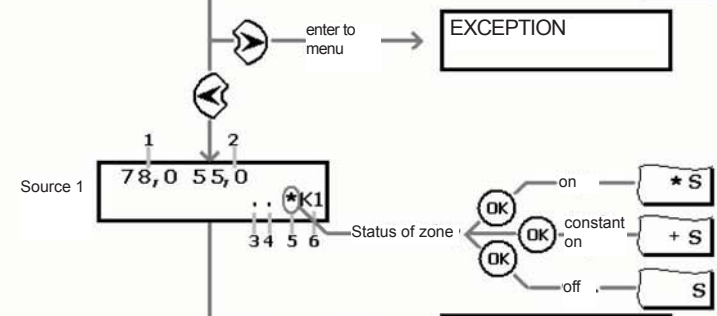
1	Temperature of appliance no. 1
2	Switching temp. to appliance no. 2
3	Temperature of solar panel 1
4	Actually heated appliance
5	Pump speed
6	Status of pump
7	Status of zone
8	Zone identification (S1)



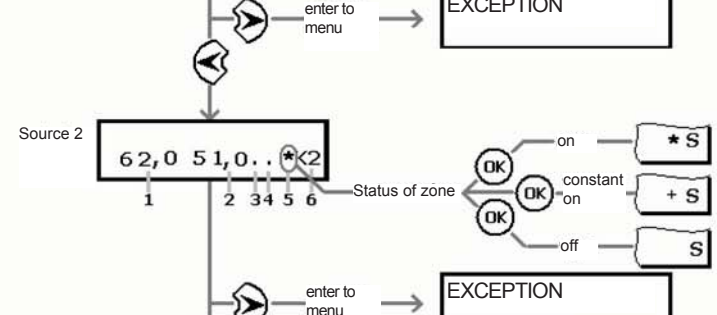
1	Temperature of appliance no. 2
2	Switching temp. to appliance no. 3
3	Temperature of solar panel 2
4	Actually heated appliance
5	Pump speed
6	Status of pump
7	Status of zone
8	Zone identification (S2)



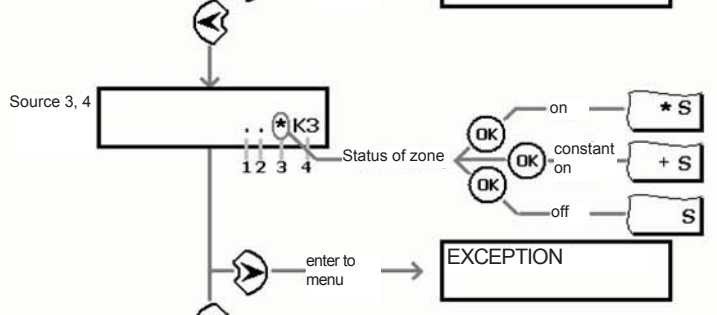
1	Temperature of source 1 – output
2	Temperature of source 1 – input
3	Status of pump
4	Activation of source
5	Status of source
6	Source identification (K1)



1	Temperature of source 2 – output
2	Temperature of source 2 – input
3	Status of pump
4	Activation of source
5	Status of source
6	Source identification (K2)



1	Activation of source
2	Activation of source No. 2
3	Status of source
4	Source identification (K3, K4)



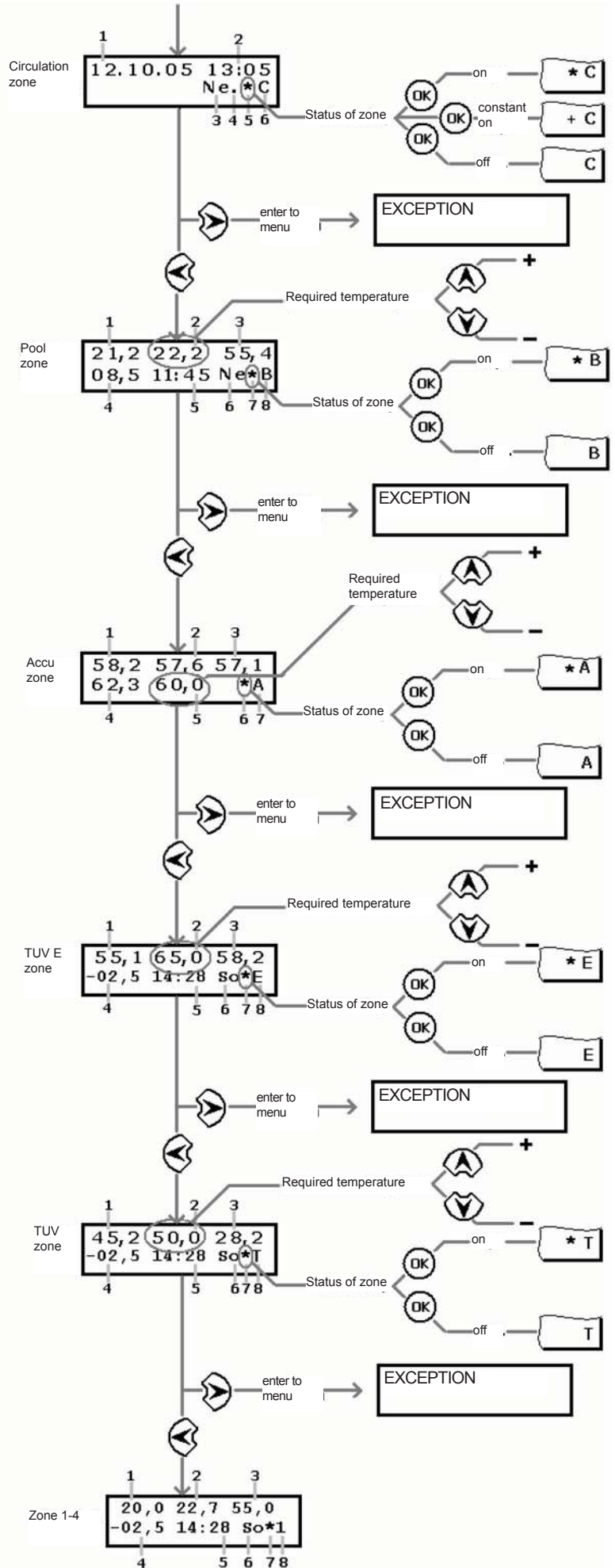
1	Date
2	Time
3	Day in week
4	Status of pump
5	Status of zone
6	Zone identification (C)

1	Temperature of water in pool
2	Required temperature
3	Temp. in accum. tank (Aku1h sensor)
4	Outer temperature
5	Time
6	Day in week
7	Status of zone
8	Zone identification (B)

1	Temperature from Aku1h sensor
2	Temperature from Aku1p sensor
3	Temperature from Aku1s sensor
4	Max. required system temperature
5	Required temp. in accumulating tank
6	Status of zone
7	Zone identification (A)

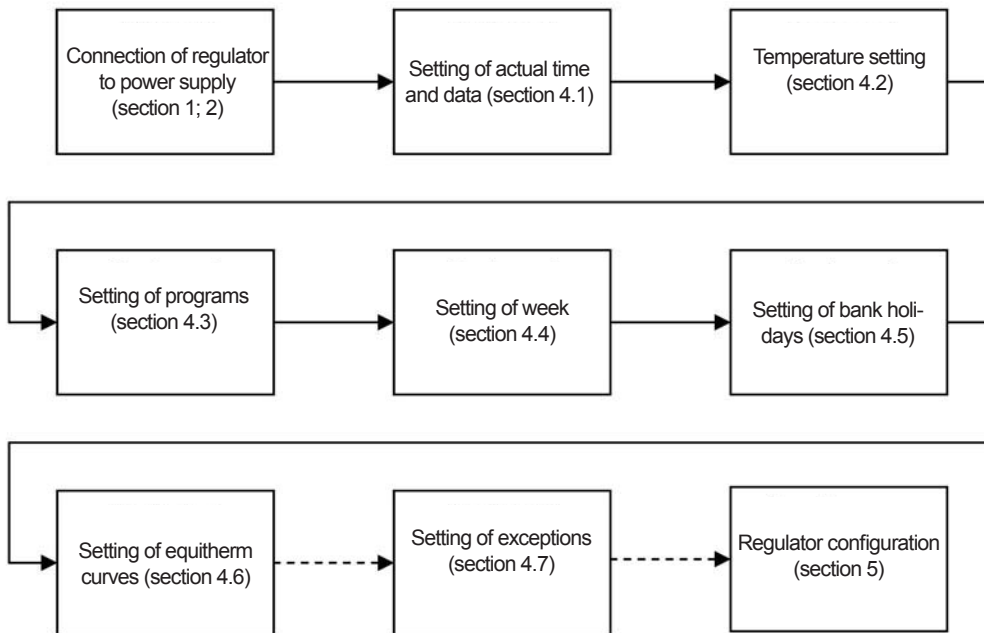
1	Temperature from TUVh sensor
2	Required temperature
3	Temp. in accum. tank (Aku1h sensor)
4	Outer temperature
5	Time
6	Day in week
7	Status of zone
8	Zone identification (E)

1	Temperature from TUVs sensor
2	Required temperature
3	Temp. in accum. tank (Aku1h sensor)
4	Outer temperature
5	Time
6	Day in week
7	Status of zone
8	Zone identification (T)



## 4. Regulator Setting:

Diagram of regulator setting process:



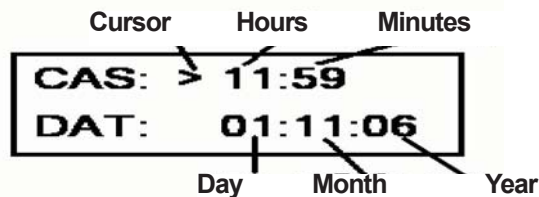
**Note:** Within setting, the regulator uses operation memory as well as permanent memory. On change of value and pressing OK button the changes are immediately applied and loaded to operation memory, which may be however erased on interruption of power supply. The loading into permanent memory, where the values are stored even after the power supply interruption, is executed by return from setting menu back to the display menu.

#### 4.1 Setting of Actual Date and Time:

**Note:** Actual time and date must be set in regulator, as programmed regulations is controlled by the time and date.

##### Setting:

- Pressing of ► button enters the basic menu (first EXCEPTION tab is displayed); move to DATE AND TIME tab by ▲ and ▼ button.
- - Press ►. Following is displayed:



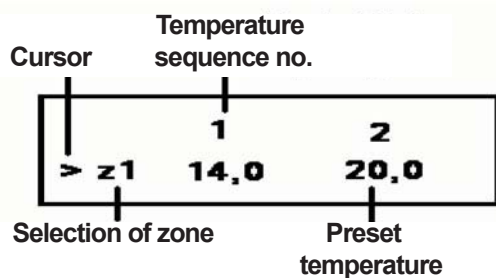
- Select individual items of time and date by means of ► and ◀, set the value by means of ▲ and ▼.
- On completion, enter OK and press ◀ to exit the menu.

#### 4.2 Temperature Setting:

**Note:** Temperatures used in the regulator day program may be selected only from pre-selected list of temperatures, in which up to six temperatures may be chosen for each zone (z1, z2, z3, z4, TU, AK).

##### Setting:

- Temperatures are factory preset in the regulator (see table 8.1).
- Pressing of ► button enters basic menu (first EXCEPTION tab is displayed); move to TEMPERATURES tab by ▲ and ▼ button.
- Press ►. Following is displayed:



- Select zone by means of ▲ and ▼.
- Navigate through individual temperatures with seq. no. 1 to 6 by means of ► and ◀ buttons. Values of temperatures are modified by ▲ and ▼ buttons.
- If you wish to modify temperature in other zone, move cursor to zone identification by ► and ◀ and select other zone by means of ▲ and ▼ buttons.
- On completion, enter OK and press ◀ to exit the menu. Zone, which was last selected at the setting, is displayed on the screen.



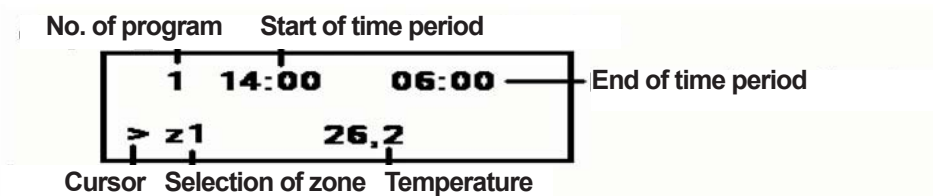
### 4.3 Setting of Programs:

**Note:** The program determines change of required temperature (from preset values – see section 4.2) in selected time period.

**Caution:** The regulator starts to regulate to set temperature is specified time; the temperature will be achieved with delay based on size and nature of the space.

#### Setting:

- Pressing of ► button enters basic menu (first EXCEPTION tab is displayed); move to PROGRAMS tab by ▲ and ▼ button.
- - Press ►. Following is displayed:



- Select the zone by means of ▲ and ▼ buttons.
- Move to number of program by ► button and by ▲ and ▼ buttons navigate through start of time period, temperature is specific time period and end of time period. Select the value of time and temperature with ► and ◀ buttons. End of one time period is also start of following time period, see figure 1.
- Note:** In CIR zone, the switching the pump ON and OFF is selected within the time period instead of the temperature.
- If you wish to select another program (resp. programs in another zone), move cursor by means of ► and ◀ buttons to the number of program (resp. zone) and repeat the same process.
- On completion, enter OK and press ◀ to exit the menu. Zone, which was last selected at the setting, is displayed on the screen.

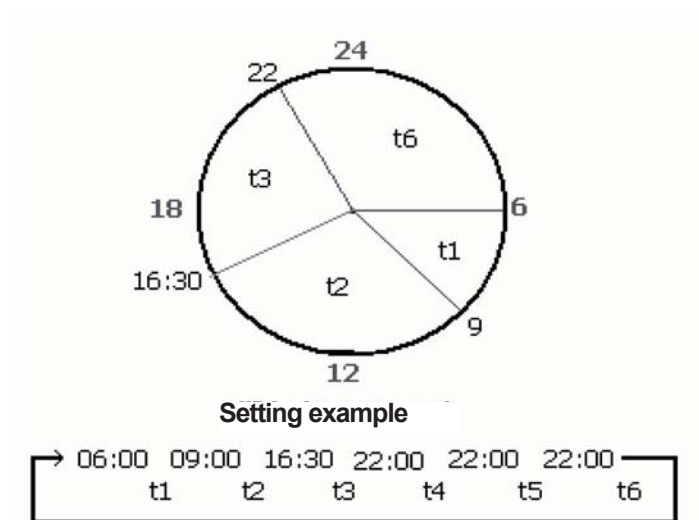


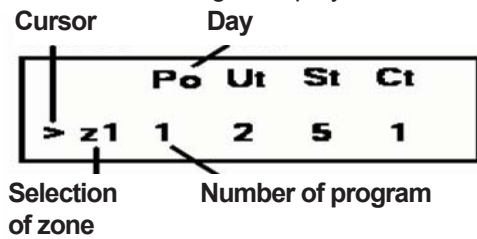
Fig. 1

#### 4.4 Setting of Week:

**Note:** This item selects one of six programs for each day in week within defined zone.

##### Setting:

- Pressing of ► button enters basic menu (first EXCEPTION tab is displayed); move to WEEK tab by ▲ and ▼ button.
- Press ►. Following is displayed:



- Select a zone by means of ▲ and ▼ buttons.
- Select individual days in week by ► and ◀ buttons; assign one of the programs 1 – 6 or combination of programs 1+, 3+, 5+ (see note) to selected day by ▲ and ▼ buttons.
- If you wish to select another zone, move cursor by means of ► and ◀ buttons to required zone and repeat the same process.
- On completion, enter OK and press ◀ to exit the menu. Zone, which was last selected at the setting, is displayed on the screen.

**Note:** In WEEK submenu you can select also combinations of programs 1-6. Program 1+ means combination of 1st and 2nd program, 3+ means combination of 3rd and 4th program, and 5+ means combination of 5th and 6th program. The regulator functions firstly acc. to first program, and then it moves to second program, instead of stopping of the day cycle.

**Caution:** On selection of the program combination the second of the combination must be time linked to the first program.

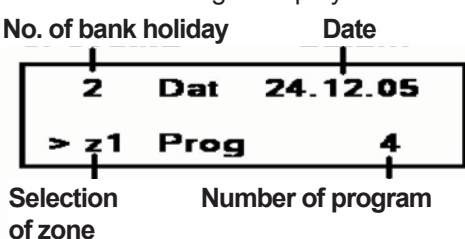
**Recommendation:** Combination of programs is used with advantage in CIR zone, where we can switch the circulation pump for short period (min. 1 min) up to 12 times per day.

#### 4.5 Setting of Bank Holidays:

**Note:** Up six particular dates in year (bank holidays), in which the regulator executes the set program regardless its setting for the day in week, may be entered into the regulator.

##### Setting:

- Pressing of ► button enters basic menu (first EXCEPTION tab is displayed); move to BANK HOLIDAYS tab by ▲ and ▼ button.
- Press ►. Following is displayed:



- Select a zone by means of ▲ and ▼ buttons.
- Press ► button (cursor will point to no. of bank holiday) and select number of bank holiday.
- Navigate through day, month and year in date and number of program by means of the ► and ◀ buttons. The ▲ and ▼ buttons select day, month, year, and number of program for selected zone, which the regulator will execute in specific day.
- If you wish to select another bank holiday (resp. zone), move cursor by means of ► and ◀ buttons to number of bank holiday (resp. zone), select required number of bank holiday (resp. zone) by ▲ and ▼ button and repeat the same process.
- On completion, enter OK and press ◀ to exit the menu. Zone, which was last selected at the setting, is displayed on the screen.

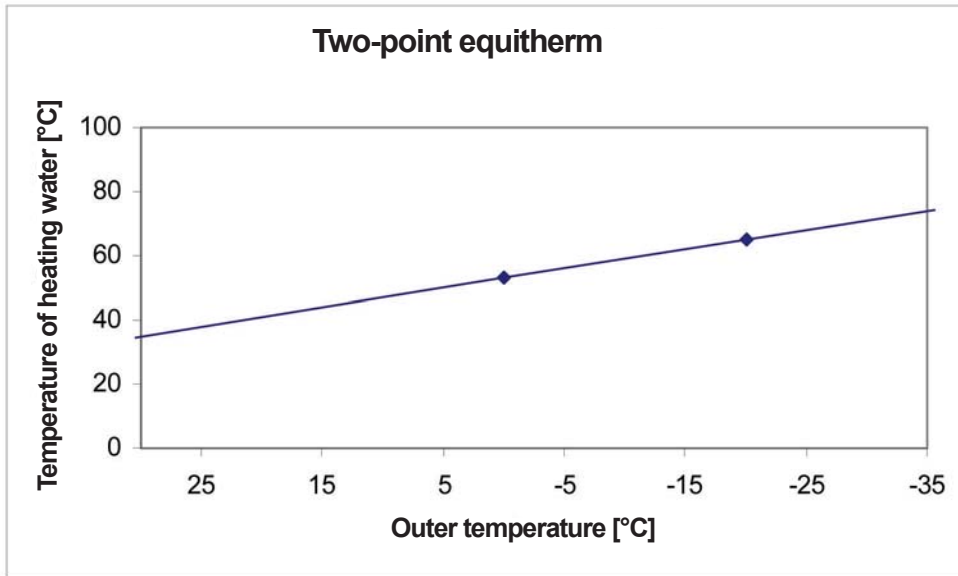
#### 4.6 Setting of Equitherm Curves:

The equitherm curves (equitherms) serve for entering of relation of heating water to outer temperature. The relation requires at least 2 points entered to create equitherm curves of line shape (see Example 1). By means of two points, we are able to set steepness and shift of the line.

If you wish use different course than the line one, the equitherm curve may be shaped by means of additional four points into required shape (see Example 2).

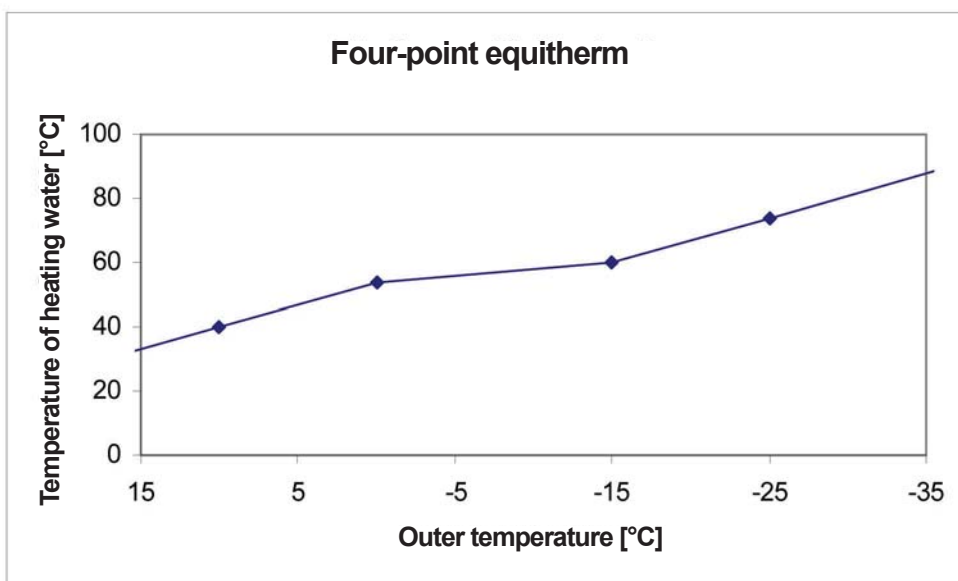
##### Example 1:

E	-20 °C	2 °C	0 °C	0 °C	0 °C	0 °C
I	65 °C	53 °C	0 °C	0 °C	0 °C	0 °C



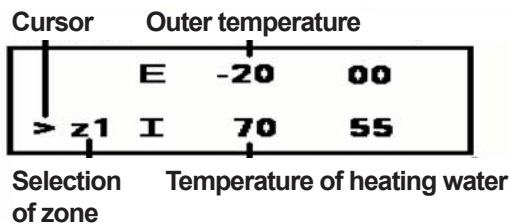
##### Example 2:

E	-25 °C	-15 °C	0 °C	10 °C	0 °C	0 °C
I	74 °C	60 °C	54 °C	40 °C	0 °C	0 °C



**Setting:**

- Pressing of ► button enters basic menu (first EXCEPTION tab is displayed); move to EQUITHERMS tab by ▲ and ▼ button.
- Press ►. Following is displayed:



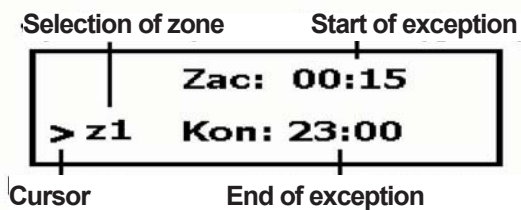
- Select a zone by means of ▲ and ▼ buttons.
- Navigate between individual points (a point is formed by couple E = outer temperature and I = temperature of heating water) by ► and ◀ buttons and set the equitherm point temperatures within range E = -40 to +40 °C; I = 0 to 99 °C by means of ▲ and ▼ buttons. The equitherm curve will be reshaped also in areas of lower, resp. higher outer temperatures, see graph of Example 1, Example 2.  
*Note: Proper function of the regulator requires entering of min. one point of equitherm curve at negative outer temperature and one point at positive outer temperature!*
- If you wish to select another zone, move cursor by means of ► and ◀ buttons to the zone and select required zone by ▲ and ▼ button; then repeat the same process.
- On completion, enter OK and press ◀ to exit the menu. Zone, which was last selected at the setting, is displayed on the screen.

**4.7 Setting of Exceptions:**

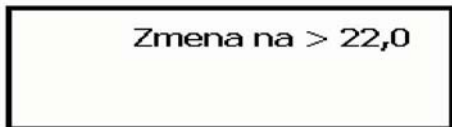
*Note: The exceptions may be used, if we need to set different temperature from preset temperatures in specific time period in specific zone (see 4.2) regardless to the program.*

**Setting:**

- Pressing of ► button enters basic menu, then first EXCEPTION tab is displayed. Press ►. Following is displayed:



- Select a zone by means of ▲ and ▼ buttons.
- Navigate between the items of time and data for start of exception by ► and ◀ button, set the values by ▲ and ▼ buttons.
- On displaying:



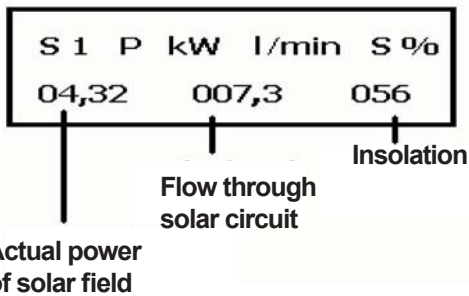
- set the temperature from preset temperatures by ▲ and ▼ buttons.
- Further navigate the items of time and data for end of exception by ► button, return back to the items of time and data for start of exception with ◀ button. Change the value by means of ▲ and ▼ buttons.
- On completion, enter OK and press ◀. to exit the menu. Zone, which was last selected at the setting, is displayed on the screen.

If you wish to cancel or terminate the exception, repeat the exception setting procedure and set the end for exception to actual time and date. Then the regulator starts to regulate acc. to set program.

#### 4.8 Solar Circuit Data Display:

##### Display procedure:

- Enter the basic menu by means of ► button, first EXCEPTION item is selected.
- Select MEASURED VALUES by means of ▲ and ▼ button and press ►.
- Select the displaying of solar field 1 data (S1) or solar field 2 data (S2) by means of ▲ and ▼. The display will show data on selected solar field, actual power of the field (kW), flow through selected solar circuit (l/min) and solar intensity (%):

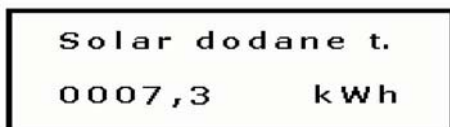


#### 4.9 Solar System Heat Display:

*Note: Regulator records amount of heat supplied by the solar system to appliances. Counter of supplied heat is reset from SOLAR service menu; additionally, the counter is reset upon interruption of regulator power supply.*

##### Display procedure:

- Enter the basic menu by means of ► button, first EXCEPTION item is selected.
- Select MEASURED VALUES by means of ▲ and ▼ button and press ►.
- Select display of supplied heat by ▲ and ▼ buttons. Display shows data on supplied heat.



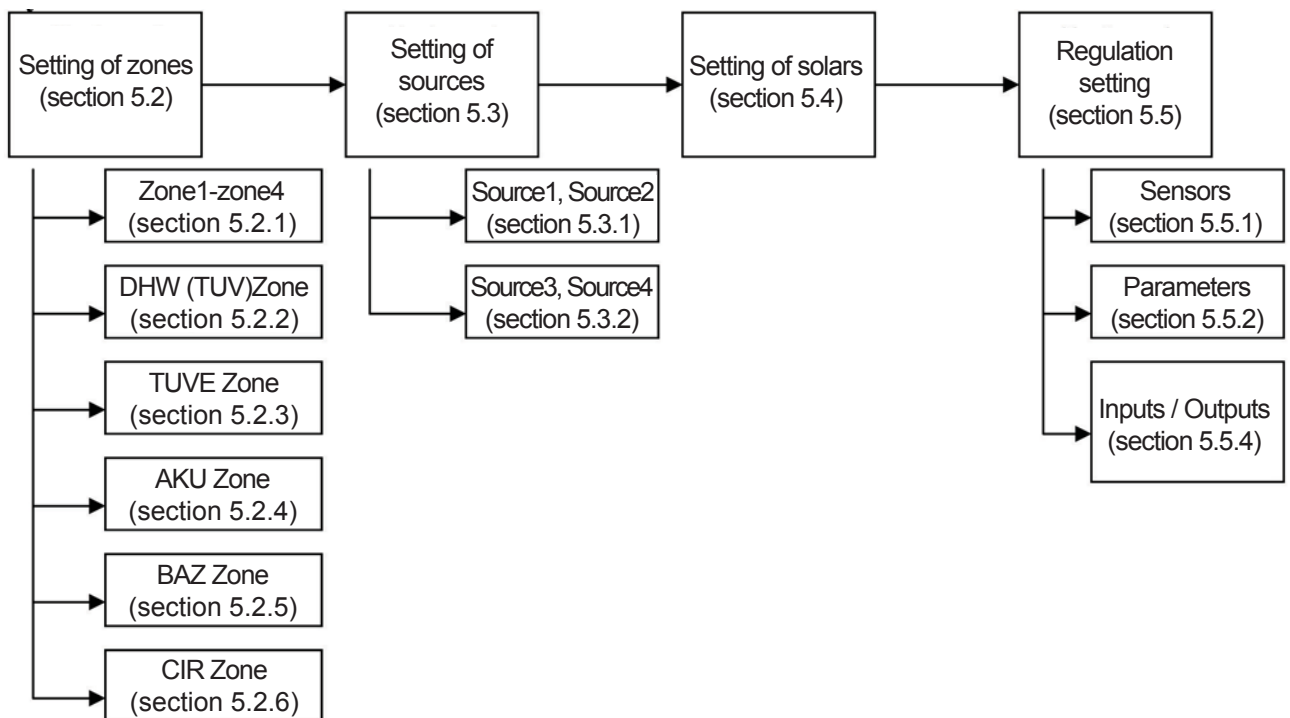
## 5. Regulator Configuration Settings – Service Settings:

The Configuration submenu serves to setting of zones, sources, regulation and loading of sensors. CONFIGURATION item is available only in the service mode. This setting may be made only by trained qualified person (service technician).

### 5.1 Entry to Service Mode:

- Pressing of ► button enters basic menu (first EXCEPTION tab is displayed); move to BANK HOLIDAYS tab by ▲ and ▼ button.
- In the BANK HOLIDAY menu select bank holiday no. 5, press ► button and then OK.
- Select the CONFIGURATION item by means of ▲ and ▼ buttons.
- Enter the CONFIGURATION item by ► button.
- Within the CONFIGURATION item, navigate through the ZONES, SOURCES, SOLAR, REGULATION by means of ▲ and ▼ buttons.

Scheme of regulator configuration setting procedure:



## 5.2 Setting of Zones:

**Note:** Individual zones differ by number, as well as type of set parameters.

### Setting:

- In the configuration menu, select the ZONE item by means of ▲ and ▼ button, then press ► button.
- Select required zone from the zone listing (see table 5.1) by means of ▲ and ▼ button and then press ► button.

Table. 5.1

Zone	Description
ZONA1	Zone 1
ZONA2	Zone 2
ZONA3	Zone 3
ZONA4	Zone 4
ZONA TUV	Zone of domestic hot water (DHW) – heating by heating water
ZONA TUVE	Zone of domestic hot water (DHW) – heating by electric heating element
ZONA AKU	Zone of accumulation tank
ZONA BAZ	Pool zone
ZONA CIR	DHW (TUV) circulation zone

- Navigate through the set parameters within a zone by means of ▲ and ▼ button, press ► to enter the selected parameter (cursor points to the type or value of the parameter).
- Set the type or value of the parameter by means of ▲ and ▼ button, confirm by OK.
- Select another parameter by means of ▲ and ▼ button, repeat the procedure.
- Upon completion of all required parameter settings return back to upper menu by ◀ button (1x pressing to enter the ZONES menu, 2x pressing to CONFIGURATION menu etc.).

### 5.2.1 Description of individual parameters for UONE1 to ZONE 4 zones :

**Regulation type:** Zone OFF - Switches the zone OFF and does not work with it  
**Typ regulace:** PID acc. to space t - PID control of heating water in relation to room temperature (at sensor zone 1-4)  
 Equitherm - Regulation acc. to equitherm curve set for specific zone.  
 Constant t. of water - Regulation to constant water temperature. **For this type of regulation, set the temperatures of heating water (not space temperatures) for particular zone in the TEMPERATURES menu.**

**Max. t to zone (°C):**  
**Max. t do zony (°C):** - Setting of maximum temperature to zone. On achieving of this temperature, the regulator starts closing the mixing valve independently on the program..

**Min. t to zone (°C):**  
**Min. t do zony (°C):** - Setting of minimum temperature to zone. If the requirement to heating water temperature calculated by regulator is lower than temperature set in the program, the circulating pump into the zone switches OFF (and the valve starts closing). Also, the circulating pump to the zone is switched, if the temperature on AKU1h sensor is lower than temperature set in the program.

**Block zone below (°C):**  
**Blok zonu pod (°C):** - If the temperature on sensor selected in parameter "SOURCES MENU-SOURCE X Selection of sensor block" is lower than the set temperature and the X source is active, the zone circulating pump is switched OFF and mixing valve of the zone starts closing (see Quick heating, section 7).



### Effect of spatial t (%) (Vli prostor.t):

Parameter entered only in equitherm regulation type.

- Setting of proportional parameter G affecting change of heating water temperature in relation to difference between actual and required temperatures within a zone acc. to following equation:

$$\Delta t = (w - y) \cdot 0,8 \cdot G$$

(w - required temperature; y – actual temperature).

(see example in section 7.2).

Such calculated required change of heating water temperature is limited to maximum value set by parameters: Max. pos. pretop and Max. pos. nedotop (see below and figure 2).

### Max.pos.pretop (°C):

Parameter entered only in equitherm regulation type.

- Limiting of maximum change of temperature calculated by proportional component (see above and figure 2).

### Max.pos.nedotop (°C):

Parameter entered only in equitherm regulation type.

- Limiting of maximum change of temperature calculated by proportional component (see above and figure 2).

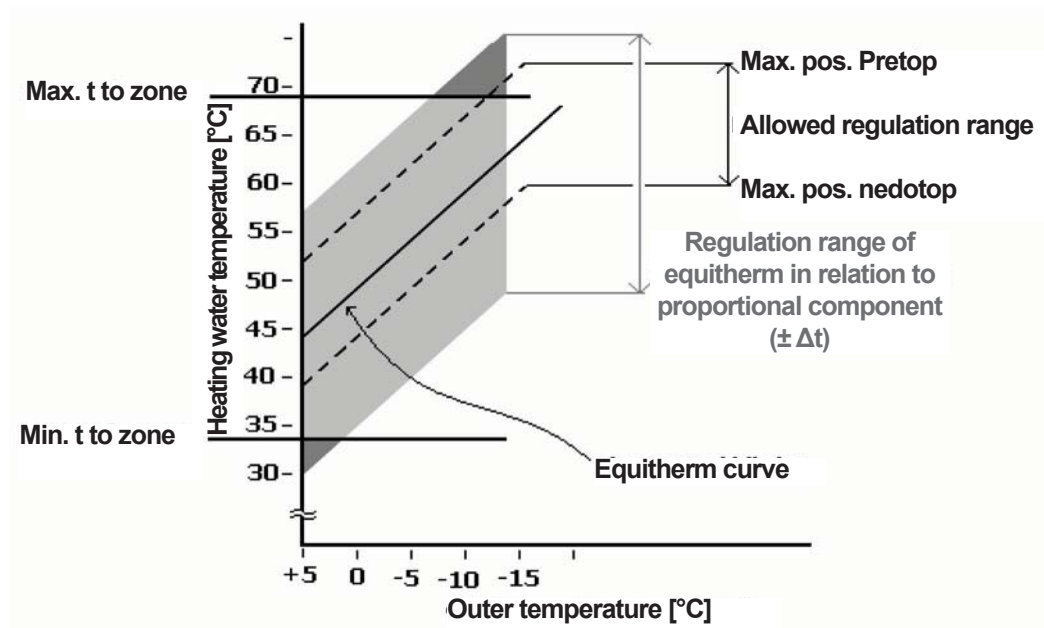


Fig. 2

**Prostor.t P.k (%) (Spatial t Pc):**

Parameter entered only in PID regulation type (no effect for control to constant water temperature).  
- Setting of PID regulation proportional constant.

**Prostor.t I.k (%) (Spatial t Ic):**

Parameter entered only in PID regulation type (no effect for control to constant water temperature).  
- Setting of PID regulation integral constant.

**Prostor.t D.k (%) (Spatial t Dc):**

Parameter entered only in PID regulation type (no effect for control to constant water temperature).  
- Setting of PID regulation derivation constant.

**Ventil P konst. (%) (Valve P const.):**

- Setting of proportional component P of servomotor control (see example in section 7.1).

**Ventil max.krok (%) (Valve max. step):**

Note: Parameter serves for setting of regulation speed.

- Limitation of regulation intervention calculated by regulator acc. to following equation:

$$R_{skut.} = R_{vyp.} \cdot \frac{Ventilmax.krok}{100}$$

Additionally, the parameter sets maximum size of valve step at request to maximum deviation (i.e. limitation at Rvyp. =10 sec), see figure 3.

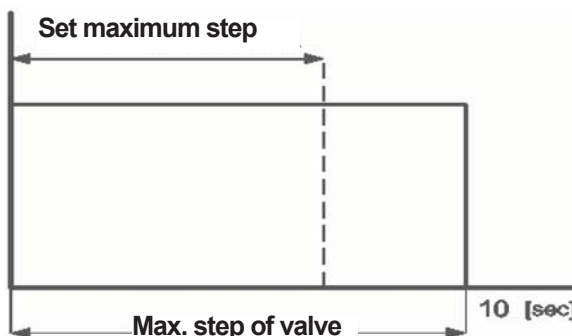


Fig. 3

**Vent. omez. d sl (Valve limit der. comp.):**

Limited

- Limits D-component of valve regulation intervention in such manner the the regulation intervention does not apply, if there is opposite sign (see section 7.1).

Unlimited

- D-component of regulation intervention is not limited.

**Ventil D konst. (%) (Valce D-const):**

- Setting of derivation component D of mixing valve regulation (see example in section 7.1).

**Ventil min. step (Valve min. step) (%):**

- setting of minimum step of servomotor of mixing valve.  
Minimum time of servo-motor operation:

$$t_{min} = 10 \cdot \text{Valve min step [s]}$$

If required times for switching of servo-motor are lower than calculated time of the servo-motor operation, the times of requirements are summed up and at exceeding of calculated time the servo-motor switches ON (see figure 4).

**Note:** It is setting of the valve dead range limiting cycling of valve at small deviations.

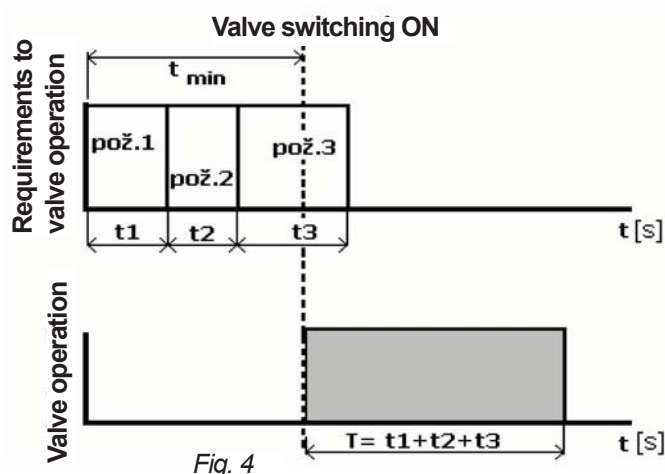


Fig. 4

**Dobeh cepadla (Pump rundown)(min):**

- Setting of rundown time for zone circulating pump.

**Regul. t pomoci (regula. time by):**

- |          |       |  |
|----------|-------|--|
| cerpadla | pump  | - Circulating pump of direct heating circuit is switched ON in relation to requirement to heating water temperature.   |
| ventilu  | valve | - Requirement to heating water temperature into the circuit has no effect to the pump operation. The heating water temperature is controlled by means of mixing valve.<br><b>Note:</b> If the mixing valve is not fitted, this function may control the heating water temperature into the zone. The heating water sensor (Zx top) is located to return branch from the system. If the sensor achieves temperature required by the regulator, the circulating pumps switches OFF for 60 s, then it is switched ON for min. 60 s, until required temperature is achieved. |

### 5.2.2 Description of individual parameters for DHW (TUV) zone:

**Note:** TUVs sensor is used for control of parameters. This sensor must be loaded to regulator (see section 5.5.1). Common sensor may be loaded for position TUVh and TUVs.

**Typ regulace (type of regulation):**

- |              |                  |   |
|--------------|------------------|---|
| zona vypnuta | Zone off         | - Regulator does not work with the zone.    |
| konst.t.vody | water constant t | - Regulation to constant water temperature. |

**Min. prev. AKU>TUV (°C):**

- Setting of minimum difference of accumulation tank temperature above the DWH water temperature for switching the DHW circulating pump ON.

**Zdroje TUV (DHW sources):**

- |          |                  |  |
|----------|------------------|--|
| Nespinat | Do not switch ON | - Upon requirement from DHW zone the active zones will not be switched ON (SOURCE1-SOURCE4). |
| Spinat   | Switch ON        | - Active sources (SOURCE1-SOURCE4) will be switched ON upon requirement from DHW zone.       |

**Max.t do zony (°C) (Max t to zone):**

- Setting of maximum temperature to DHW zone. When the set temperature is exceeded, the DHW zone circulating pump is switched OFF

**Min.t do zony (°C) (Min. t to zone):**

- Setting of minimum temperature to zone. With requirement to lower temperature, the zone circulating pump is switched OFF

**Blok zonu pod (°C) (Zone block below):**

- If the temperature on sensor selected in parameter "SOURCES MENU-SOURCE X Selection of sensor block" is lower than the set temperature and the X source is active, the zone circulating pump is switched OFF (see Quick heating, section 7).

### 5.2.3 Description of individual parameters for DHWE zone:

**Note:** Domestic hot water (DHW) is heated in the tank by electric heating element. The heating element is switched ON upon decrease of temperature at sensor TUHv below required temperature in zone, the element is switched OFF upon increasing of zone required temperature by fix set difference 3K.

**Note:** TUVh sensor is used for control of parameters. This sensor must be loaded to regulator (see section 5.5.1). Common sensor may be loaded for position TUVh and TUVs.

#### Typ regulace (type of regulation):

- |              |                  |  |
|--------------|------------------|--|
| zona vypnuta | Zone off         | - Regulator does not work with the zone.   |
| konst.t.vody | water constant t | - Regulation to constant water temperature |

#### Max.t do zony (°C) (Max t to zone):

- Setting of maximum DHW temperature.

#### Min.t do zony (°C) (Min t to zone):

- Limit of minimum DHW temperature.  
**Note:** DHWE heating will be blocked, if user enters lower temperature than set one in this parameter).

#### Podmíneno HDO (Conditioned HDO):

- |     |     |   |
|-----|-----|---|
| ne  | No  | - Heating element is switched independently on HDO signal.    |
| ano | Yes | - Heating element is switched ON only with actual HDO signal. |

### 5.2.4 Description of individual parameters for AKU zones :

**Note:** Zone of heating water accumulation tank.

#### Typ regulace (type of regulation):

- |              |                  |   |
|--------------|------------------|---|
| zona vypnuta | Zone off         | - Regulator does not work with the zone.    |
| konst.t.vody | water constant t | - Regulation to constant water temperature. |

#### Max.t do zony (°C) (Max t to zone):

- Setting of maximum temperature in accumulation tank. When exceeded, the regulator switches OFF the automatic sources.

#### Min.t do zony (°C) (Min t to zone):

- Limit of minimum water temperature in accumulation tank.  
**Note:** If regulator calculates required temperature in accumulation tank below the set temperature of this parameter, it switches OFF the automatic sources ).

### 5.2.5 Description of individual parameters for BAZ zone:

#### Typ regulace (type of regulation):

- |              |                  |   |
|--------------|------------------|---|
| zona vypnuta | Zone off         | - Regulator does not work with the zone.    |
| konst.t.vody | water constant t | - Regulation to constant water temperature. |

#### Zdroj pro bazén (source for pool):

- |         |                  |   |
|---------|------------------|---|
| nepinat | Do not switch ON | - Requirement to heating water for pool does not switch ON the automatic sources. |
| spinat  | Switch ON        | - Requirement to heating water for pool switches ON the automatic sources.        |

#### Min.prev. AKU>BAZ (°C):

- Setting of minimum difference of water temperature in accumulation tank above the pool water temperature for switching the pool circulating pump ON.

#### Max.t do zony (°C) (Max t to zone):

- Setting of maximum pool temperature. When exceeded, the circulating pump switches OFF.

**Min.t do zony (°C) (Min t to zone) (°C):**

- Setting of minimum temperature to zone.
- Note:** If user sets the BAZ zone temperature below the temperature set in parameter Min t to zone, the circulating pump switches OFF.

**Blok zonu pod (°C) (Zone block below):**

- If the temperature on sensor selected in parameter "SOURCES MENU-SOURCE X Selection of sensor block" is lower than the set temperature and the X source is active, the zone circulating pump is switched OFF (see Quick heating, section 7).

**5.2.6 Description of individual parameters for CIR zones:****Typ regulace (type of regulation):**

- |              |                  |   |
|--------------|------------------|---|
| zona vypnuta | Zone off         | - Regulator does not work with the zone.    |
| konst.t.vody | water constant t | - Regulation to constant water temperature. |

**5.3 Source Settings:**

**Note:** Individual sources varies by number. as well as type of set parameters.

**Settings:**

- In configuration menu, select SOURCE item by means of ▲ and ▼ buttons, then press ►.
- Select required source from list of sources (see table 5.3) by means of ▲ and ▼ buttons and press ►.

Table 5.3

Source	Note
Source 1	Mode: AUTO, MANUAL, COMBINED
Source 2	Mode: AUTO, MANUAL, COMBINED
Source 3	Mode: AUTO (Automatic mode only)
Source 4	Mode: AUTO (Automatic mode only)
Emergency z ACU	Mode: AUTO (Automatic mode only)
Max. number of sources	Max. number of simultaneously switched ON sources

- Navigate through the set parameters within a zone by means of ▲ and ▼ button, press ► to enter the selected parameter (cursor points to the type or value of the parameter).
- Set the type or value of the parameter by means of ▲ and ▼ button, confirm by OK.
- Select another parameter by means of ▲ and ▼ button, repeat the procedure.
- Upon completion of all required parameter settings return back to upper menu by ◀ button (1x pressing to enter the SOURCES menu, 2x pressing to CONFIGURATION menu etc.).

**5.3.1 Description of individual parameters for sources SOURCE1 and SOURCE2:****Typ zdroje (Source type):**

- |             |              |  |
|-------------|--------------|--|
| auto        | Auto         | - Source is switched ON automatically by regulator acc. to set temperature difference.   |
| vypnut      | Switched OFF | - Source is switched OFF.  |
| kombinovany | Combined     | - Upon activation of input from flue-gas thermostat the regulator controls the source (boiler) as in the "Manual" mode, upon opening of the input the regulator moves to the "Auto" mode.<br><b>Note:</b> Such type of regulation is used in combined boilers for solid fuels with pellet burner or electric coil. |
| manual      | Manual       | - Upon activation of input from flue-gas thermostat the source (boiler) circulating pump is switched ON and the servo-motor of mixing valve of reverse running is controlled to required temperature.  |

### Cas blokace 2 (min.) (Block time):

**Note:** The parameter is set for SOURCE2 in mode "Auto" or "Combined".

- Setting of block time delay for switching the second source ON from request to switching the sources ON (source 1 switches ON automatically)

### Dif.pro zap (°C) (Dif for ON):

- Setting of temperature difference between required heating water temperature calculated by regulator and temperature from selected sensor (see parameter Selection of sensor ON) for switching the source ON in the "Auto" mode.

**Note:** Lower limit of the difference is limited by upper limit of parameter Dif for OFF. If you wish to modify the temperature below the value, at first the parameter Dif for OFF (see figure 5) must be modified.

### Dif. pro vyp (°C) (Dif for OFF):

- Setting of temperature difference between required heating water temperature calculated by regulator and temperature from selected sensor (see parameter Selection of sensor OFF) for switching the source OFF in the "Auto" mode.

**Note:** Upper limit of the difference is limited by lower limit of parameter Dif for ON. If you wish to modify the temperature above the value, at first the parameter Dif for ON (see figure 5) must be modified.

**The source is switched OFF, when the temperature from sensor selected in parameter Selection of sensor for ON is above the temperature required by parameter Dif. for ON for switching the sensor ON**

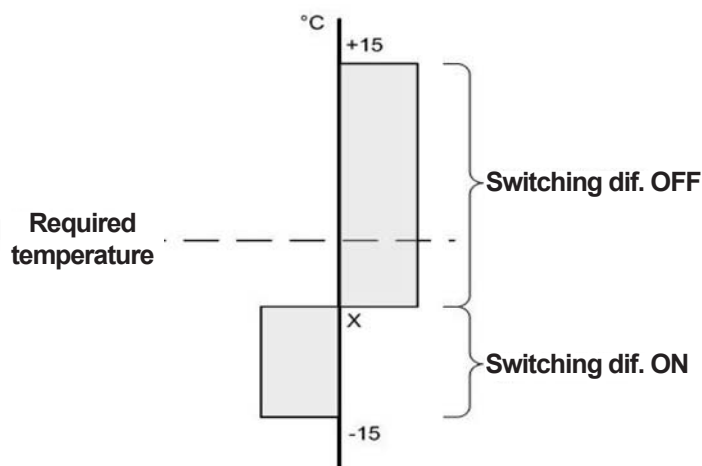


Fig. 5

### Volba čidla ZAP (Selection of sensor ON):

- Selection of sensor from the list of sensors (see table 5.4), acc. to which the regulator will switch the source ON in the "Auto" mode.

### Volba čidla VYP (Selection of sensor OFF):

- Selection of sensor from the list of sensors (see table 5.4), acc. to which the regulator will switch the source OFF in the "Auto" mode.

**Note:** sensors recommended for this parameter are **bold**.

Table 5.4

Sensor	Description
Outdoor	Outdoor sensor
Zone 1	Spatial sensor in zone 1
Zone 2	Spatial sensor in zone 2
Zone 3	Spatial sensor in zone 3
Zone 4	Spatial sensor in zone 4
<b>Z1 heat</b>	<b>Heating water temperature sensor in zone 1</b>
<b>Z2 heat</b>	<b>Heating water temperature sensor in zone 2</b>
<b>Z3 heat</b>	<b>Heating water temperature sensor in zone 3</b>
<b>Z4 heat</b>	<b>Heating water temperature sensor in zone 4</b>
<b>Zdr.1vy</b>	<b>Source 1 output sensor</b>
<b>Zdr.1vr</b>	<b>Source 1 return sensor</b>
<b>Zdr.2vy</b>	<b>Source 2 output sensor</b>
<b>Zdr.1vr</b>	<b>Source 2 return sensor</b>
TUV h	DHW tank sensor, upper part
TUV s	DHW tank sensor, lower part
<b>AKU1 h</b>	<b>Acc. tank 1 water temperature, upper part</b>
<b>AKU1 p</b>	<b>Acc. tank 1 water temperature, middle part</b>
<b>AKU1 s</b>	<b>Acc. tank 1 water temperature, lower part</b>
<b>AKU2 h</b>	<b>Acc. tank 2 water temperature, upper part</b>
<b>AKU2 p</b>	<b>Acc. tank 2 water temperature, middle part</b>
<b>AKU2 s</b>	<b>Acc. tank 2 water temperature, lower part</b>
<b>AKU3 h</b>	<b>Acc. tank 3 water temperature, upper part</b>
<b>AKU3 p</b>	<b>Acc. tank 3 water temperature, middle part</b>
<b>AKU3 s</b>	<b>Acc. tank 3 water temperature, lower part</b>
<b>AKU4 h</b>	<b>Acc. tank 4 water temperature, upper part</b>
<b>AKU4 p</b>	<b>Acc. tank 4 water temperature, middle part</b>
<b>AKU4 s</b>	<b>Acc. tank 4 water temperature, lower part</b>
<b>Zdr.3vy</b>	<b>Source 3 output sensor</b>
<b>Zdr.4vy</b>	<b>Source 4 output sensor</b>
Pool	Pool water temperature sensor
Solar 1	Solar field 1 temperature
Solar 2	Solar field 2 temperature
Sol. vr.	Solar field input temperature
Reserve2	Reserve – use optional
Reserve3	Reserve – use optional

**Blokovano zdroje (Source block):**

povoleno	Allowed	- Heating of zone from the source is blocked, if the sensor temperature (Sensor block selected) is below the temperature set in parameter <i>Zone block below</i> in particular zone.
zakazano	Prohibited	- Heating of zone from the source is not blocked.

**Volba cidla blok (sensor block selected) (sensor from list of sensors):**

- Selection of sensor controlling the function Source block.

**Blok zdr1 venk.t (°C) (Block sour1 outer t):**

- Setting of outer temperature, above which the source is not switched ON. Difference for switching the source ON and OFF is fixed to  $\pm 0,3$  K.



**Podmíněné HDO (Conditioned HBO):**

ano	Yes
ne	No

- Switching source ON is conditioned by HDO signal.
- Switching source ON does not depend on HDO signal.

**t. vratu (°C) (Return t):**

- Setting of source return water temperature.

**t. pretopu (°C) (Overheat t):**

- Setting of source overheat temperature. On achieving or exceeding of the set temperature, source circulating pump is switched ON and return mixing valve is opened  
**If the temperature exceeds by additional 5 °C, the source (boiler) start cooling in all zones (activated in service menu) with maintaining of their maximum temperatures.**

**Zap.cerp.nad t (°C) (Pump ON above temp):**

- Setting of minimum temperature at source output, above which the circulating pump is switched ON

**t.max. zdroje (Source max. t):**

vypnuto	OFF
0-120 °C	0-120 °C

- Parameter switched OFF.
- Setting of maximum temperature, at which the source is OFF.  
**Note: For this parameters, the Zdr1(2)vy sensor must be loaded, otherwise the source is automatically switched OFF.**

**Doběh čerpadla (min) (Pump rundown):**

- Setting of rundown time of source circulating pump.

**Ventil P konst. (%) (Valve P const.):**

- Setting of proportional component P for servo-motor control.

**Ventil max. krok (%) (Valve max. step):**

- Limitation of regulation intervention calculated by regulator acc. to following equation:

$$R_{skut.} = R_{vyp.} \cdot \frac{Ventilmax.krok}{100}$$

Additionally, this parameter sets maximum amount of step of valve on request to maximum deviation (i.e. limitation at  $R_{off} = 10$  sec), see fig. 6.

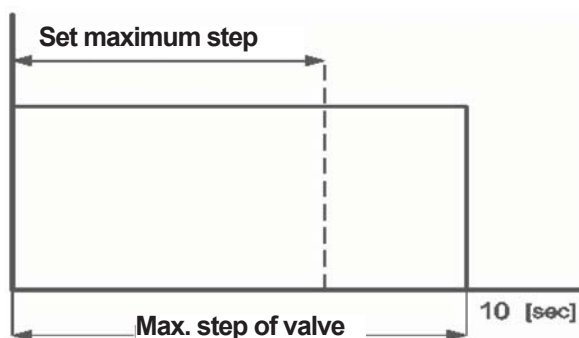


Fig. 6

**Vent.omez. d sl. (Valve der comp limit):**

Zapnuto ON

Vypnuto OFF

- Limits derivation component D of valve regulation intervention in such manner that regulation intervention is not applied in case of opposite sign (see section 7.1).
- Derivation component D of regulation intervention is not limited

**Ventil D konst. (%) (Valve D const.):**

- Setting of derivation component D of mixing valve control (see example in section 7.1).

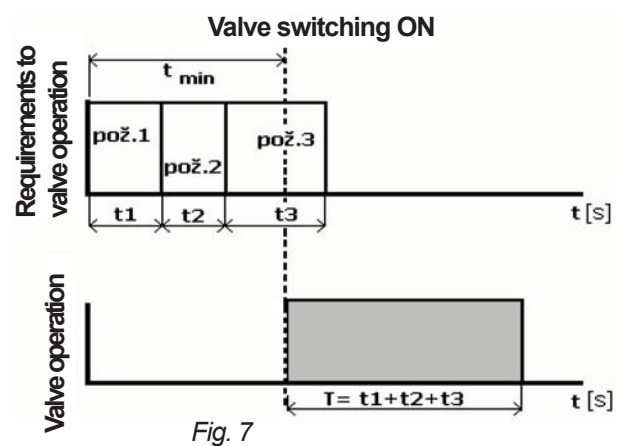
**Ventil min. krok (%) (Valve min. step):**

- Setting of minimum step of mixing valve servo-motor. Min. time of servo-motor operation:

$$t_{\min} = 10. \text{ Ventil min krok [s]}$$

If required times for switching of servo-motor are lower than calculated time of the servo-motor operation, the times of requirements are summed up and at exceeding of calculated time the servo-motor switches ON (see figure 7).

**Note:** It is setting of the valve dead range limiting cycling of valve at small deviations.



### 5.3.2 Description of individual parameters for SOURCE3 and SOURCE 4 sources:

#### Typ zdroje (source type):

auto	Auto	- Source is switched ON automatically by regulator acc. to set temperature difference.
vypnut	OFF	- Source is switched OFF.

#### Čas blokace 3(min.) (Block time):

#### Čas blokace 4(min.):

- Setting of block time of switching the 3<sup>rd</sup>, resp. 4<sup>th</sup> source ON from request to switching the sources ON.

#### Dif.pro zap (°C) (Diff for ON):

- Setting of temperature difference between required temperature of heating water calculated by regulator and temperature from Aku1h sensor for switching the sensor ON.  
**Note:** Lower limit of the difference is limited by upper limit of parameter Dif for OFF. If you wish to modify the temperature below the value, at first the parameter Dif for OFF (see figure 5) must be modified.

#### Dif.pro vyp (°C) (Dif for OFF):

- Setting of temperature difference between required temperature of heating water calculated by regulator and temperature from selected sensor (see parameter Sensor OFF sel) for switching the sensor OFF.  
**Note:** Upper limit of the difference is limited by lower limit of parameter Dif for ON. If you wish to modify the temperature above the value, at first the parameter Dif for ON (see figure 5) must be modified.

#### Volba čidla ZAP (Sensor ON selection):

- Setting of sensor from list of sensors (see Table 5.4) controlling switching the source ON/OFF.

#### Volba čidla VYP (Sensor OFF selection):

- Setting of sensor from list of sensors (see Table 5.4) controlling switching the source OFF.

#### Blokování zdroje (Source block):

povoleno	Allowed
zakazano	Prohibited

- Heating of the zone from source is blocked, if the temperature on sensor (Sensor block sel) below the temperature set in parameter Zone block below in particular zone.
- Heating of zone from source is not blocked.

#### Volba čidla blok (Sensor block sel):

- Selection of sensor controlling the Source block function.

#### Blok zdr3 venk.t (°C) (Block zdr3 out t):

#### Blok zdr4 venk.t (°C) (Block zdr3 out t):

- Setting of outer temperature, above which the source is not switched ON. Difference for switching the source ON and OFF is fixed to  $\pm 0,3$  K.

#### Podminene HDO (Conditioned HDO):

ANO	No
NE	Yes

- Heating element is switched independently on HDO signal.
- Heating element is switched ON only with actual HDO signal.

#### t.max. zdroje (°C) (Source max t):

vypnuto	OFF
0-120 °C	0-120 °C

- Parameter switched OFF.
- Setting of maximum temperature, at which the source is OFF.  
**Note:** For this parameters, the Zdr3(4)vy sensor must be loaded, otherwise the source is automatically switched OFF.

### 5.3.3 Other parameters of SOURCES menu:

#### Havarijní t. AKU (°C) (ACU emergency t):

vypnuto      OFF  
0-120 °C

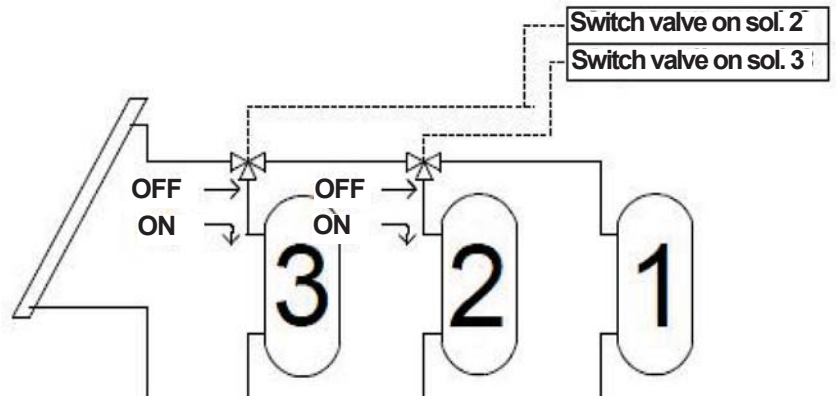
- Emergency cooling system switched OFF.
- Setting of maximum temperature of accumulation tanks (Sensed by sensor AKU1h-AKU4h); on exceeding the set temperature the emergency cooling of system is switched OFF. Maximum temperatures of individual zones remain unchanged.

#### Max. počet zdrojů (1-4) (Max no of sources):

- Setting of maximum number of simultaneously sources ON.

### 5.4 Setting of SOLAR Zone:

When multiply appliances are used in the solar system, they are switched by means of three-way valves. On request to heating of first appliance the regulator outputs of switch valve to sol. 2 and switch valve to sol. 3 are opened. Upon request to heating of the second appliance the output of switch valve to sol. 2 is closed; upon request to heating of the third appliance the output of switch valve to sol. 3 is closed. Proper function of solar system requires connection of appliances acc. to diagram:



#### Setting:

- In configuration menu, select the SOLAR item by means of ▲ and ▼ button and press ►.
- Navigate through the set parameters within a zone by means of ▲ and ▼ button, press ► to enter the selected parameter (cursor points to the type or value of the parameter).
- Set the type or value of the parameter by means of ▼ and ▲ button, confirm by OK.
- Select another parameter by means of ▲ and ▼ button, repeat the procedure.
- Upon completion of all required parameter settings return back to upper menu by ◀ button (1x pressing to CONFIGURATION menu etc.).

#### 5.4.1 Description of individual parameters for SOLAR zone:

##### Description of individual parameters for SOLAR zone:

vypnut	OFF	- Source is switched OFF.
jedno pole	One field	- Regulator operates one field of solar collectors. It switches ON/OFF the circulating pump of solar circuit no. 1 on basis of temperature differences.
dve pole	Two fields	- Regulator operates two solar fields (e.g. east-west). It switches ON/OFF the circulating pumps of solar circuit 1 and solar circuit 2 on basis of temperature difference between an appliance and individual fields.

#### Počet potřeb(1-3) (No. of appl):

- Setting of number of appliances for solar system.
- Note:** Higher heating priority is given to appliance no. 1, lower heating priority is given to appliance no. 2.

#### Volba cid okruh1 (Circuit1 sensor sel) (list of sensors):

- Selection of sensor from list of sensors (see table 5.4) for first solar circuit (appliance no. 1).
- Note:** If you wish to prefer heating of DHW, select DHWs sensor.

**Dif. t okruh1 ZAP(°C) (Dif t circuit 1 ON):**

- Setting of temperature difference for switching the first circuit solar heating ON.

**Dif. t okruh1 VYP (°C) (Dif t circuit 1 OFF):**

- Setting of temperature difference for switching the first circuit solar heating OFF.

**Max. t okr.1 (°C) (Max to circuit1):**

- Setting of maximum temperature of solar circuit 1. Its achieving or exceeding activates the cooling function.

**Volba čid okruh2 (Circuit2 sensor sel) (list of sensors):**

- Selection of sensor from list of sensors (see table 5.4) for second solar circuit (appliance no. 2).

**Dif. t okruh2 ZAP(°C) (Dif t circuit 2 ON):**

- Setting of temperature difference for switching the second circuit solar heating ON.

**Dif. t okruh2 VYP (°C) (Dif t circuit 2 OFF):**

+

- Setting of temperature difference for switching the second circuit solar heating OFF.

**Max. t okr.2 (°C) (Max to circuit2):**

- Setting of maximum temperature of solar circuit 2. Its achieving or exceeding activates the cooling function.

**Volba čid okruh3 (Circuit3 sensor sel) (list of sensors):**

- Selection of sensor from list of sensors (see table 5.4) for third solar circuit (appliance no. 2).

**Dif. t okruh3 ZAP(°C) (Dif t circuit 3 ON):**

- Setting of temperature difference for switching the third ; circuit solar heating ON.

**Dif. t okruh3 VYP (°C) (Dif t circuit 3 OFF):**

- Setting of temperature difference for switching the third circuit solar heating OFF.

**Max. t okr.3 (°C) (Max to circuit3):**

- Setting of maximum temperature of solar circuit 3. Its achieving or exceeding activates the cooling function.

**Ohrev (Heating):**

kaskadni Cascade

- Heating of appliances is realised by cascade manner, i.e. when appliance 1 is heated to temperature specified in parameter "t switch to cir2", solar heating is switched to 2nd appliance. After it is heated, then 3rd appliance starts to be heated.

stridavy Alternate

- The heating starts preferably by appliance 1. If appliance 1 cannot be heated, regulator finds out, whether it is possible to that the appliance 2, resp. 3, and starts eventual heating.

**Note:** Detailed description of alternate heating function is given in Annex.

**t prep.na okr. 2 (°C) (t switch to cir2):**

*Parameter entered only in cascade heating type.*

- Setting of temperature of 1st appliance, when the regulator starts heating of 2nd appliance.

**t prep.na okr. 3 (°C) (t switch to cir3):**

*Parameter entered only in cascade heating type.*

- Setting of temperature of 2nd appliance, when the regulator starts heating of 3rd appliance.

**Cas t1 (min.) (Time t1):**

Parameter entered only in alternate heating type.

- Setting of time delay for alternate heating, when the regulator detects the collector temperature increase.

**Note:** Detailed description of alternate heating function is given in Annex.

**Cas t okruhu2 (min.) (Time t circuit 2):**

Parameter entered only in alternate heating type.

- Setting of time, for which the regulator heats 2nd appliance during alternative heating, if regulator detects the appliance 1 cannot be heated

**Cas t okruhu3 (min.) (Time t circuit 3):**

Parameter entered only in alternate heating type.

- Setting of time, for which the regulator heats 3rd appliance during alternative heating, if regulator detects the appliance 1 and 2 cannot be heated.

**Rizeni cerp.dle (Pump control acc. to):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09.

slun.svitu      Insolation

- The pump is controlled acc. to insolation. The pump speed is controlled by nominal difference of temperatures of actually heated appliance and solar field.

rychl.ohrevu h      Heating rate h

- Pump control for quick heating of upper part of the accumulation tank. The pump speed is controlled to heat the upper part of the accumulation tank as soon as possible.

**Note:** Detailed description of alternate heating function is given in Annex.

**Min.ot cerp1 (%) (min speed pump1):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09.

- Setting of circulating pump minimum speed for 1<sup>st</sup> solar field. Setting is in percents of maximum speed.

**Min.ot cerp2 (%) (min speed pump2):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09.

- Setting of circulating pump minimum speed for 2<sup>nd</sup> solar field. Setting is in percents of maximum speed.

**Dif.t nom.okr1 (°C) (Dif t nom circ1):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09.

Parameter entered only for pump speed control type: acc. to insolation.

- Setting of temperature difference between solar circuit 1 (appliance 1) and solar field, when the pump speed is increased by one step (10%).

**Zvyseni t okr.1 (°C) (Increase t for circ1):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09.

Parameter entered only for pump speed control type: acc. to insolation.

- Setting of parameter of temperature increase parameter. If the temperature difference between solar circuit 1 (appliance 1) and solar field exceeds the value set in the parameter "Dif t nom circ1", the pump speed is increased by one step (10%). In case of further increase by value set in this parameter, the pump speed is increased by another step. If the temperature difference is decreased by value set in this parameter, the pump speed is decreased by one step.

**Dif.t nom.okr2 (°C) (Dif t nom circ2):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09.

Parameter entered only for pump speed control type: acc. to insolation.

- Setting of temperature difference between solar circuit 2 (appliance 2) and solar field, when the pump speed is increased by one step (10%).

**Zvyseni t okr.2 (°C) (Increase t for circ2):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09.

Parameter entered only for pump speed control type: acc. to insolation.

- Setting of parameter of temperature increase parameter. If the temperature difference between solar circuit 2 (appliance 2) and solar field exceeds the value set in the parameter "Dif t nom circ2", the pump speed is increased by one step (10%). In case of further increase by value set in this parameter, the pump speed is increased by another step. If the temperature difference is decreased by value set in this parameter, the pump speed is decreased by one step.

**Dif.t nom.okr3 (°C) (Dif t nom circ):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09.

Parameter entered only for pump speed control type: acc. to insolation.

- Setting of temperature difference between solar circuit 3 (appliance 3) and solar field, when the pump speed is increased by one step (10%).

**Zvyseni t okr.3 (°C) (Increase t for circ3):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09.

Parameter entered only for pump speed control type: acc. to insolation.

- Setting of parameter of temperature increase parameter. If the temperature difference between solar circuit 3 (appliance 3) and solar field exceeds the value set in the parameter "Dif t nom circ3", the pump speed is increased by one step (10%). In case of further increase by value set in this parameter, the pump speed is increased by another step. If the temperature difference is decreased by value set in this parameter, the pump speed is decreased by one step.

**t okr1 horni (°C):****t okr2 horni (°C):****t okr3 horni (°C):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09.

Parameter entered only for pump speed control type: acc. to quick heating of appliance upper part.

- Setting of temperature of the appliance upper part within pump speed control method to quick heating of appliance upper part (sensors TUV h, AKU1 h, AKU2 h, AKU3 h, AKU4 h).

**Note:** Detailed description of alternate heating function is given in Annex.

**Teplotni dif. (°C):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09.

Parameter entered only for pump speed control type: acc. to quick heating of appliance upper part.

- Setting of temperature difference between the solar field and upper part of actual appliance (sensors TUV h, AKU1 h, AKU2 h, AKU3 h, AKU4 h). If the difference exceeds the set one and upper part of the appliance achieved the temperature set in parameter "t circ1(2,3)", the pump speed is increased by one step (10%). When the temperature difference between the solar field and upper part of appliance decreases by this difference, the pump speed is decreased by one step.

**Note:** Detailed description of alternate heating function is given in Annex.



**Zpozdzeni (min) (Delay):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09.

Parameter entered only for pump speed control type: acc. to quick heating of upper part of appliance.

- Setting of delay, for which the regulator measures temperature difference between solar field and upper part of actual appliance.

**Spev.funkce VTK (spec function VTK):**

vypnuto	Off
zapnuto	On

- Special function of vacuum tube collector is switched OFF.
- Special function of vacuum tube collector is switched ON.

**Note:** Detailed description of special function of vacuum tube collector is given in Annex.

**Dodane teplo (Supplied heat):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09.

**Note:** This function requires location of return solar sensor to input pipe of solar collectors.

auto	Auto
manual	Manual
vypnuto	OFF
vynulovat	Reset

- Regulator calculates amount of supplied heat (kWh) on basis of data from flow-meter and temperatures from sensors at inputs and outputs of solar collectors.
- Regulator calculates amount of supplied heat (kWh) on basis of manually set flow for 100% pump speed and temperatures from sensors at inputs and outputs of solar collectors.
- This function is switched OFF..
- Reset of data on supplied heat to zero.

**Prutok l/min (l/min) (Flow):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09. Parameter entered only with switched ON measurement of supplied heat in mode: manual.

- Manual setting of flow through solar circuits at 100% pump speed. The data serves to measurement of delivered heat in manual mode.

**Typ kapaliny (voda, Tyfocor G-LS, propylen glykol) (Liquid type (water, Tyfocor G-LS, propylene-glycol):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09. Parameter entered only with switched ON measurement of supplied heat in mode: manual.

- Setting of solar circuit liquid type.

**Konc.nemrz.kap%(%) (Non-freezing liquid concentration):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09.

- Setting of concentration of non-freezing liquid for polypropylene-glycol option set in parameter "Liquid type".

**Kal.vodomeru (Watermeter cal):**

**Note:** Parameter applies only in use of solar module with regulator IR07, IR09. Parameter entered only with switched ON measurement of supplied heat in mode: auto.

- Calibration of water-meter. The parameter sets number of pulses of water-meter for 100l of liquid.

**Bypass:**

zapnuto	On
vypnuto	Off

- Bypass function of the solar circuit is switched ON.
- Bypass function of the solar circuit is switched OFF.

**Min.prevyseni (°C) (min exceeding):**

Parameter entered only if the bypass function is ON.

- Setting of minimum exceeding of input temperature to solar system against the actual appliance temperature.

**Zpozd.prestaveni (min.) (reset delay):**

Parameter entered only if the bypass function is ON.

- Setting of bypass reset delay. If minimum exceeding is achieved (see parameter "Minimum exceeding", the bypass will be closed after period set in this parameter.

**Krit.t kol (°C) (Crti coll):**

- Setting of collector critical temperature. On exceeding of the temperature the solar pump switches OFF to prevent damage of solar components.

**Protimraz.fc.kol (°C) (Coll antifreeze fun):**

vypnuto            Off  
-20 - 10 °C

- Collector anti-freeze protection function is OFF.
- If the collector temperature decreases below set temperature, solar pump switches ON. If the collector temperature increases by 1 °C, solar pump switches OFF in relation to set rundown time (parameter "Anti-freeze pump rundown").

**Dobeh protimr.c (min.) (Anti-freeze pump rundown):**

- Rundown of pump in collector anti-freeze protection-

**Dochlaz.spotreb:**

vypnuto            Off  
zapnuto            On

- Appliance cooling function is switched OFF.
- On achieving of solar circuit maximum temperature (setting see parameter Max t circ.1(2,3) the solar pump(s) is (are) switched ON to max. speed (100%). Solar circuit temperature may increase up to 95 °C, then the solar pump(s) is (are) switched OFF.

**Chlazení kol.1 (°C) (Coll 1 cooling):****Chlazení kol.2 (°C) (Coll 2 cooling):**

vypnuto            Off  
50 - 190 °C

- Function of solar collector cooling is switched OFF
- Setting of collector temperature, when the circulating solar pump is switched ON. The pump remains ON, until the collector temperature decreases by 5 °C below this value. If the solar circuit temperature increases above 95 °C, the function of collector cooling is blocked.

**Note:** *The Coll 1(2) cooling supersedes the Appliance cooling function! However the system maintains the 95 °C temperature, above which the collector cooling function is blocked also in this case.*

**5.5 REGULATION Settings:****Setting:**

- - In configuration menu, select the REGULATION item by means of ▲ and ▼ button and press ►.
- - Navigate through the set parameters within a zone by means of ▲ and ▼ button, press ► to enter the selected parameter (cursor points to the type or value of the parameter).
- - Set the type or value of the parameter by means of ▲ and ▼ button, confirm by OK.
- - Select another parameter by means of ▲ and ▼ button, repeat the procedure.
- - Upon completion of all required parameter settings return back to upper menu by ◀ button.

**5.5.1 Description of individual CID parameters, loading, clearing and correction of sensors:****CID:**

- Selection of individual sensors (see table 5.4) from the last of sensors and check of measures temperatures.

Table 5.4

Sensor	Description
Outdoor	Outer sensor
Zone 1	Spatial sensor in zone 1
Zone 2	Spatial sensor in zone 2
Zone 3	Spatial sensor in zone 3
Zone 4	Spatial sensor in zone 4
Z1 heat	Heating water temperature sensor in zone 1
Z2 heat	Heating water temperature sensor in zone 2
Z3 heat	Heating water temperature sensor in zone 3
Z4 heat	Heating water temperature sensor in zone 4
Source1out	Source 1 output sensor
Source1ret	Source 1 return sensor
Source2out	Source 2 output sensor
Source2ret	Source 2 return sensor
TUV h	DHW tank sensor, upper part
TUV s	DHW tank sensor, lower part
AKU1 h	Accumulation tank 1 water temperature, upper part
AKU1 p	Accumulation tank 1 water temperature, middle part
AKU1 s	Accumulation tank 1 water temperature, lower part
AKU2 h	Accumulation tank 2 water temperature, upper part
AKU2 p	Accumulation tank 2 water temperature, middle part
AKU2 s	Accumulation tank 2 water temperature, lower part
AKU3 h	Accumulation tank 3 water temperature, upper part
AKU3 p	Accumulation tank 3 water temperature, middle part
AKU3 s	Accumulation tank 3 water temperature, lower part
AKU4 h	Accumulation tank 4 water temperature, upper part
AKU4 p	Accumulation tank 4 water temperature, middle part
AKU4 s	Accumulation tank 4 water temperature, lower part
Source3out	Source 3 output sensor
Source4out	Source 4 output sensor
Pool	Pool water temperature sensor
Solar 1	Solar field 1 temperature
Solar 2	Solar field 2 temperature
Sol. ret	Solar field input temperature
Reserve 1	Reserve – use optionally
Reserve 2	Reserve – use optionally



### Clearing of sensors load into the regulator:

- Disconnect all sensors or only selected sensor from the regulator.
- Proceed similarly as during the sensor loading process; select sensor, which is to be cleared, and follow the procedure for its loading. As no sensor is connected, the sensor is assigned with address 0000000000000000 and thus the sensor is cleared.
- Press OK to clear the sensor.
- Follow the same procedure for clearing another sensor.

### Monitoring of communication between sensors:

If the sensor monitoring is allowed in MENU – REGULATION, the IR Terminál program (see section 10) enables monitoring of communication with individual sensors (detailed information see section 10).

## 5.5.2 Description of other parameters for REGULATION zone:

### t. protimaraz. och. (°C) (Antifreeze prot t. (°C)):

- nastavení teploty protimrazové ochrany.

**Note:** If the sensor temperature decreases below 0 °C, it is maintained in all sensors (assigned to active zone in service menu), except the Outdoors and Solar sensors.

### Cetnost zazn. t (min.) (Record frequency t):

- Setting of time interval, after which selected temperatures will be recorded into the regulator memory.

**Note:** The data may be reloaded to PC and use e.g. to assessment of the system behaviour.

### dif.1 cidlo 1 (seznam čidel) (Dif 1 sensor 1) (list of sensors):

- Selection of sensor 1 for universal differential thermostat.

### dif.1 cidlo 2 (seznam čidel) (Dif 2 sensor 1) (list of sensors):

- Selection of sensor 2 for universal differential thermostat.

### dif.1 sd on (°C):

- Setting of switching ON difference between sensor 1 and sensor 2 for universal differential thermostat.

### dif.1 sd off (°C):

- Setting of switching OFF difference between sensor 1 and sensor 2 for universal differential thermostat.

**Note:** Output of universal difference thermostat must be set acc. to table of functions and outputs in section 5.5.4.

### Zapis. udalosti (Record of events):

ano Yes

- Events and values of selected regulator temperatures are stored into memory

**Note:** eg. switching the sources ON/OFF etc.

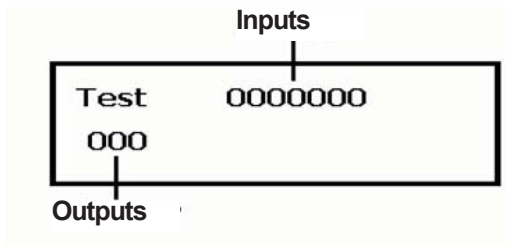
ne No

- Events are not recorded.

### 5.5.3 Testing of inputs and outputs:

#### Setting:

- In the REGULATION menu, select TEST item by means of ▲ and ▼ buttons. The display shows:



- The INPUTS field shows status of inputs at the moment of TEST item displaying (see table 5.5). During the displaying, the inputs are not updated, for actual status of inputs it is necessary to select another parameter by means of ▲ and ▼ buttons and then return back to TEST parameter.

Table 5.5

X	X	X	X	X	X	X
Input zone 1	HDO	Input source 1	Input source 2			

X =	0	Non-active
	1	Active

- Press ► to test the outputs, a cursor is displayed at no. of output (See table 5.6) and the output status (ON, OFF).
- Select required output by means of ▲ and ▼ buttons, select status (ON, OFF) of output by means of ►.
- Terminate the output test by OK.

### 5.5.4 Setting of inputs/outputs:

The regulator can adjust the function outputs to physical outputs of the regulator. The outputs are factory pre-set (see table with function list, page 43 and 44).

#### Setting:

- In REGULATION menu select INPUTS/OUTPUTS menu by means of ▲ and ▼ button. Press ► to enter settings. The display shows:



- Select no. of input/output by means of ▲ and ▼ buttons. At the same time the no. of function is displayed (see table of function list).
- To change assignment of input/output, select required input/output and press ►. Cursor appears at the number of function.
- Select required function by means of ▲ and ▼ buttons and press OK. This will assign the input/output to selected function.

Table 5.6

Table with numbers of regulator functions

Function No. (Test No.)	Output function
0	Circuit 3 mixing valve opens
1	Circuit 3 mixing valve closes
2	Circuit 4 mixing valve opens
3	Circuit 4 mixing valve closes
4	Circuit 2 mixing valve closes
5	Source 4
6	Source 1 pump
7	Solar circuit 2 pump
8	Circuit 1 mixing valve opens
9	Circuit 2 mixing valve opens
10	Circuit 1 mixing valve closes
11	Circuit 1 mixing valve opens
12	Circuit 1 mixing valve closes
13	Circuit 2 mixing valve opens
14	Circuit 2 mixing valve closes
15	Switch valve to solar 3
16	Source 2 pump
17	Heating circuit 1 pump
18	Heating circuit 2 pump
19	Heating circuit 3 pump
20	Heating circuit 4 pump
21	DHW pump
22	DHW heating element
23	Solar bypass
24	Source 1
25	Source 2
26	Solar circuit 1 pump
27	Switch valve to solar 2
28	Pool pump
29	DHW circulating pump
30	Source 3
31	Differential regulator
32-39	Reserve
Function No.	Input function
40	Heating circuit 1 block input
41	HDO input
42	Boiler input – flue-gas thermostat source 1
43	Boiler input – flue-gas thermostat source 2
49	HW off

Table 5.7

Table with no. of IR07 reg. outputs

IR 07	
Output No.	Terminal pos.
0	c6
1	c5
2	c4
3	c3
4	c7
5	c8
6	b5
--	--
8	b6
9	b7
10	b8
11	c1
12	c2
13	a8
14	a7
Input No.	Terminal pos.
40	b1 + b2
41	b3 + b4
49	HW off



Table 5.8

Table with no. of IR09 reg. outputs

IR 09	
Output No.	Term. pos.
0	e5
1	e6
2	e7
3	e8
4	e4
5	a9
6	c2
--	--
8	d6
9	e3
10	e2
11	e1
12	d7
13	d8
14	d9
--	--
16	c3
17	c4
18	c5
19	c6
20	c7
21	c8
22	c9
--	--
24	a2
25	a3
26	a4
27	a5
28	a6
29	a7
30	a8
Input No.	Term. pos.
40	b1
41	d2 + d3
42	d4
43	d5
49	HW off

Table 5.9

Table factory setting of IR 07

Factory settings of IR07 I/Os			
Term. pos.	Output No.	Function No.	Function
a7	14	25	Source 2
a8	13	24	Source 1
a9	--	--	Common supply (L)
b1 + b2	40 (input)	42	flue-gas therm. input source 1
b3 +b4	41 (input)	41	HDO input
b5	6	6	Source 1 pump
b6	8	17	Heat. circuit 1 pump
b7	9	18	Heat. circuit 2 pump
b8	10	21	DHW pump
b9	--	--	Common supply (L)
c1	11	26	Solar circuit pump
c2	12	29	DHW circulating pump
c3	3	8	Source 1 servo opens
c4	2	12	Source 1 servo closes
c5	1	11	Circuit 1 servo opens
c6	0	10	Circuit 1 servo closes
c7	4	9	Circuit 2 servo opens
c8	5	4	Circuit 2 servo closes
c9	--	--	Common supply (L)

Note: Inputs 42, 43, 44, 45, 46 and 47 shall be assigned no function, i.e. all unused functions shall be assigned input number 49 which means HW-off input.

Table 5.10

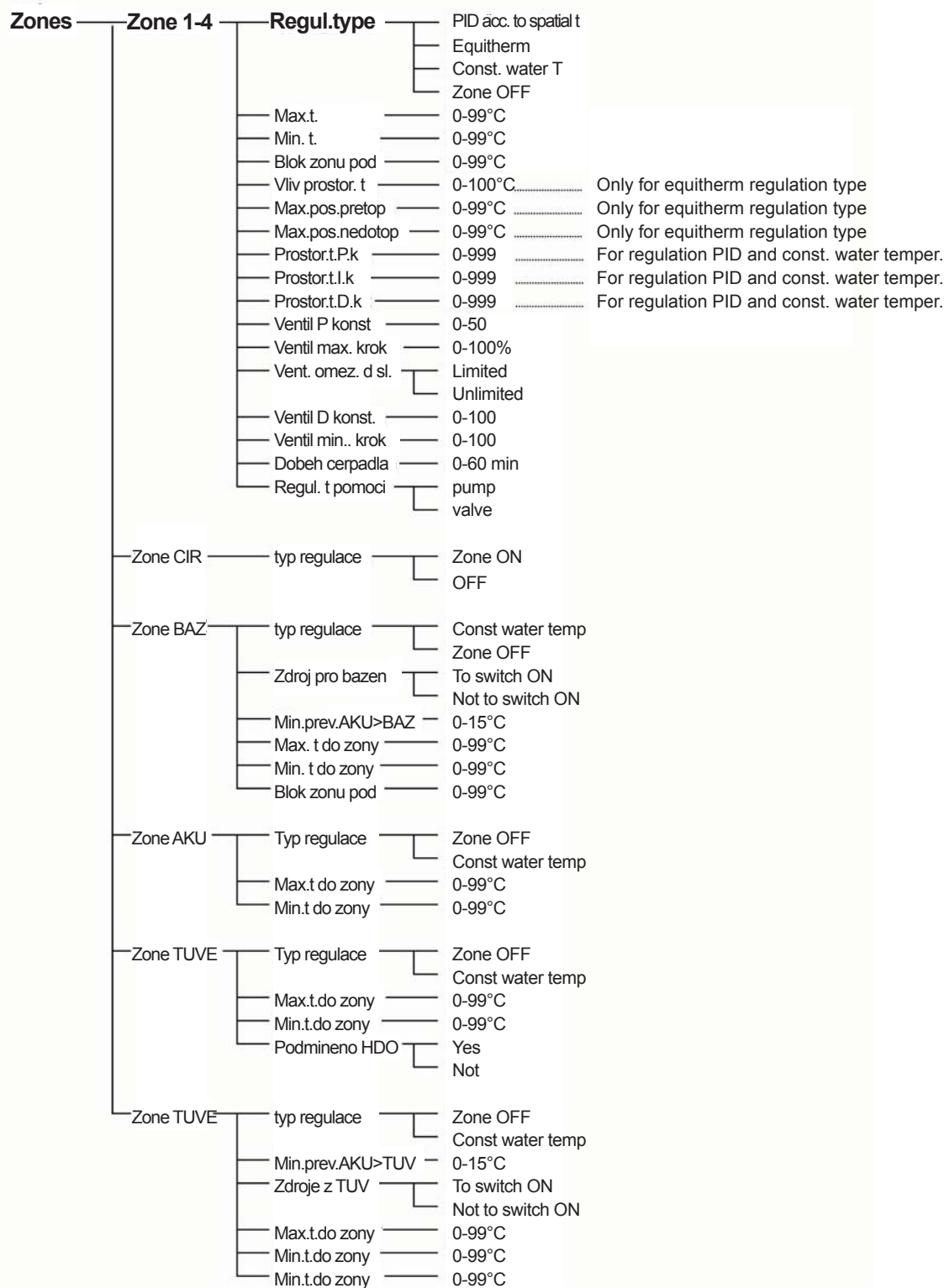
**Table of factory setting of IR09 regulator**

Factory settings of IR09 I/Os			
Terminal pos.	Output No.	Function No.	Function
a1	--	--	Common supply (L)
a2	24	24	Source 1
a3	25	25	Source 2
a4	26	26	Solar circuit 1 pump
a5	27	27	Switching to solar 2
a6	28	28	Pool pump
a7	29	29	DHW circulating pump
a8	30	30	Source 3
a9	5	5	Source 4
b1	40 (input)	40	Heating circuit 1 blocked
c1	--	--	Common supply (L)
c2	6	6	Source 1 pump
c3	16	16	Source 2 pump
c4	17	17	Heating circuit 1 pump
c5	18	18	Heating circuit 2 pump
c6	19	19	Heating circuit 3 pump
c7	20	20	Heating circuit 4 pump
c8	21	21	DHW heating pump
c9	22	22	DHW heating element
d1	--	--	Common supply (L)
d2 + d2	41 (input)	41	HDO
d4	42 (input)	42	Source 1 flue-gas thermostat input
d5	43 (input)	43	Source 2 flue-gas thermostat input
d6	8	8	Source 1 servo opens
d7	12	12	Source 1 servo closes
d8	13	13	Source 2 servo opens
d9	14	14	Source 2 servo closes
e1	11	11	Circuit 1 servo opens
e2	10	10	Circuit 1 servo closes
e3	9	9	Circuit 2 servo opens
e4	4	4	Circuit 2 servo closes
e5	0	0	Circuit 3 servo opens
e6	1	1	Circuit 3 servo closes
e7	2	2	Circuit 4 servo opens
e8	3	3	Circuit 4 servo closes
e9	--	--	Common supply (L)

Note: Inputs 44, 45, 46 and 47 shall be assigned no function, i.e. all unused functions shall be assigned input number 49 which means HW-off input.

## 6. Arrangement, configuration, range of parameters:

Annex: Arrangement, configuration, range of parameters

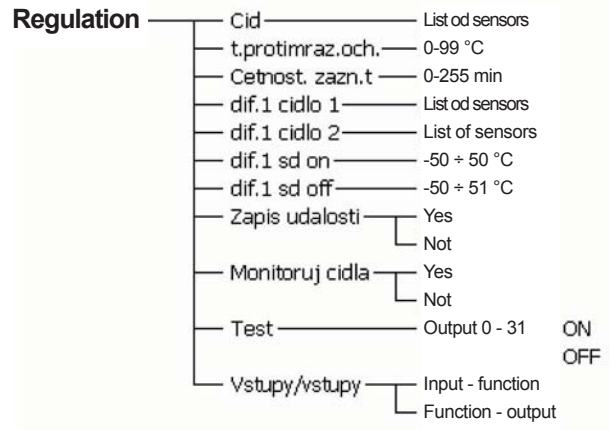


## Sources

Source 1	Typ zdroje	auto
		Manual
		Combined
		Off
	Dif.pro zap	-15 + X °C
	Dif.pro vyp	Y + 15 °C
	Volba cidla ZAP	List of sensor
	Volba cidla VYP	List of sensor
	Blokovani zdroje	Allowed
		Prohibited
	Volba cidla blok	List of sensor
	Blok.zdr1 venk.t	-50+50 °C
	Podmineno HDO	YES
		NOT
	t. vratu	0-99 °C
	t. pretopu	0-120 °C
	Zap.cerp.nad t	0-120 °C
	t.max zdroje	Off
		1-120 °C
	Dobeh cepadla	0-59 min
Ventil P konst	0-50	
Ventil max. krok	0-100	
Vent. omez.d.sl	limited	
	unlimited	
Ventil D konst.	0-100	
Ventil min. krok	0-100	
Source 2	Typ zdroje	auto
		Manual
		Combined
		Off
	Cas blokace 2	0-120 min
	Dif.pro zap	-15 + X °C
	Dif.pro vyp	Y + 15 °C
	Volba cidla ZAP	List of sensors
	Volba cidla VYP	List of sensors
	Blokovani zdroje	Allowed
		Prohibited
	Volba cidla blok	List of sensors
	Blok.zdr2 venk.t	-50+50 °C
	Podmineno HDO	YES
		NOT
	t. vratu	0-99 °C
	t. pretopu	0-120 °C
	Zap.cerp.nad t	0-120 °C
	t.max zdroje	Off
		1-120 °C
Dobeh cepadla	0-59 min	
Ventil P konst	0-50	
Ventil max. krok	0-100%	
Vent. omez.d.sl	limited	
	unlimited	
Ventil D konst	0-100	
Ventil min. krok	0-100	
Source 3	Typ zdroje	auto
		Off
	Cas blokace 3	0-120 min
	Dif pro zap	-15 + X °C
	Dif pro vyp	Y + 15 °C
	Volba cidla ZAP	List of sensors
	Volba cidla VYP	List of sensors
	Blokovani zdroje	limited
		unlimited
	Volba cidla blok	List of sensors
	Blok.zdr3 venk.t	-50+50 °C
Podmineno HDO	YES	
	NOT	
t.max zdroje	off	
	1-120 °C	
Source 4	Typ zdroje	auto
		Off
	Cas blokace 4	0-120 °C
	Dif pro zap	-15 + X °C
	Dif pro vyp	Y + 15 °C
	Volba cidla ZAP	List of sensors
	Volba cidla VYP	List of sensors
	Blokovani zdroje	Allowed
		Prohibited
	Volba cidla blok	List of sensors
	Blok.zdr4 venk.t	-50+50 °C
Podmineno HDO	YES	
	NOT	
t.max zdroje	off	
	1-120 °C	
Havarijni t AKU	off	
	1-120 °C	
Max. pocet zdroju	1-4	

Solar	Typ zdroje	Off	
		One field	
		Two fields	
	Pocet spotreb.	1-3	
Volba cid.okruh1	List of sensors		
Dif.t okruh1 ZAP	0-99 °C		
Dif.t okruh1 VYP	0-99 °C		
Max. t okr.1	0-120 °C		
Volba cid.okruh2	List of sensors		
Dif.t okruh2 ZAP	0-99 °C		
Dif.t okruh2 VYP	0-99 °C		
Max.t okr.2	0-120 °C		
Volba cid.okruh3	List of sensors		
Dif.t okruh3 ZAP	0-99 °C		
Dif.okruh3 VYP	0-99 °C		
Max.t okr.3	0-120 °C		
Ohrev	Cascade		
	Alternate		
t prep.na okr.2	0-120 °C		
t prep.na okr.3	0-120 °C		
Cas t1	0-10 min		
Cas t okruhu 2	0-60 min		
Cas t okruhu 3	0-60 min		
Rizeni cerp.dle	Insolation	*	
	Heating speed	*	
Min.ot.cerp1	30-100%	*	
Min.ot.cerp2	30-100%	*	
Dif.t nom.okr1	0-30 °C	*	
Zvyseni t okr.1	0-20 °C	*	
Dif.t nom.okr2	0-30 °C	*	
Zvyseni t okr.2	0-20 °C	*	
Dif.t nom.okr3	0-30 °C	*	
Zvyseni t okr.3	0-20 °C	*	
t okr1 horni	1-99 °C	*	
t okr2 horni	1-99 °C	*	
t okr3 horni	1-99 °C	*	
Teplotni dif.	0-10 °C	*	
Zpozdeni	1-20 min	*	
Spec.funkce VTK	Off		
	On		
Dodane teplo	Auto	*	
	Manual	*	
	Off	*	
	Reset	*	
Prutok l/min	0-100 l	*	
Typ kapaliny	Water	*	
	TyfoconG-LS	*	
	Propylene-glycol	*	
Konc.nemrz.kap%	20-70%	*	
Kal.vodomeru	0-999	*	
	Off	*	
Bypass	On	*	
	Off		
Min.prevyseni	0-15 °C		
Zpozd.prestaveni	0-10 min		
Krit.t kol	110-200 °C		
Protimraz.fc.kol	-20÷10 °C		
	Off		
Dobeh protimr.c	0-10 min		
Dochlaz.spotreb.	On		
	Off		
Chlazení kol.1	50-190 °C		
	Off		
Chlazení kol.2	50-190 °C		
	Off		

**Note:** Parameters marked with \* are functional only with solar module.



## 7. Examples of regulation and settings:

### 7.1 Regulation of Mixing Valves:

The regulator calculates a regulating intervention of  $R_{off}$  valve acc. to following equation:

$$R_{vyp.} = 10 \left[ \frac{t_{poz} - t_{skut}}{P} - \frac{V_{\Delta t}}{D} \right]$$

composed from proportional part:

$$\frac{t_{poz} - t_{skut}}{P}$$

and derivation part:  $\frac{V_{\Delta t}}{D}$

Where the meaning of parameters is as follows:

- $t_{poz}$ : Requested temperature of heating water to zone calculated by regulator [°C]
- $t_{skut}$ : Actual temperature of heating water after the valve (sensor Z/heat) [°C]
- $V_{\Delta t}$ : Change rate of heating water temperature [°C/10 sec]
- $P$ : Proportional component (0-50)
- $D$ : Derivation component (0-100)

P component (entered in regulator configuration by parameter "Ventil P const") affects amount of regulation intervention in relation to difference of required heating water temperature and actual heating water temperature.

D component (entered in regulator configuration by parameter "Ventil D const") affects amount of regulation intervention in relation to heating water temperature change rate, This parameter improves accuracy of valve control.

Regulation intervention of the valve is parameter determining time of valve opening within (0-100%), where 100% = 10 sec of interval – see figure 8. If the value is negative, the valve closes.

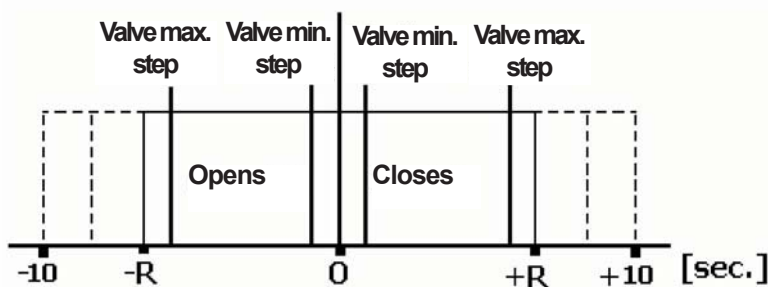


Fig. 8

**The valve regulating intervention is further limited by following parameters:**

Ventil max.krok (Valve max step): Limits valve opening/closing interval (see figure 8) acc. to following equation:

$$R_{skut.} = R_{vyp.} \cdot \frac{Ventilmax.krok}{100}$$

Vent.omez.d.sl (Valve der comp lim): Limitation of Roff regulating intervention derivation component. If this part is limited, it may be max. value of proportional part and thus the sign of calculated regulation intervention Roff does not change.

Ventil min.krok: Setting of minimum time for valve running by equation:

$$t_{min} = 10 \cdot \text{Ventil min.krok}$$

**Example:**

Setting: Ventil P konst. = 15; Ventil D konst. = 30, Ventil max.krok = 80

Values of heating system:  $t_{poz} = 54 \text{ }^\circ\text{C}$ ;  $t_{skut} = 42 \text{ }^\circ\text{C}$ .

Regulation procedure:

Step 1)

$$R = 10 \left[ \frac{54 - 52}{15} - \frac{0}{30} \right] \cdot \frac{80}{100} = 6,4 \text{ sec}$$

Step 2)

In next cycle the temperature  $t_{skut}$  increases to  $45 \text{ }^\circ\text{C}$ , this parameter  $\sqrt{\Delta t} = \frac{45 - 42}{8} = 0,375$

$$R = 10 \left[ \frac{54 - 45}{15} - \frac{0,375}{30} \right] = 10 [0,6 - 0,0125] = 5,875 \text{ sec}$$

In following tseps the procedure is similar.

**7.2 Affecting of Equitherm Curve by Spatial Temperature:**

*Note: This regulating intervention is applied only in equitherm regulation.*

Affecting of Equitherm Curve by Spatial Temperature is controlled by following equation:

$$\Delta t = (w - y) \cdot 80 \cdot g$$

Where the meaning of parameters is as follows:

- $\Delta t$ : Shifting of equitherm curve by spatial temperature [ $^\circ\text{C}$ ]
- $w$ : Required temperature in zone [ $^\circ\text{C}$ ]
- $y$ : Actual temperature in zone [ $^\circ\text{C}$ ]
- $G$ : Proportional component [---]

In regulator configuration, the proportional component is entered by parameter Proporc.slozka as follows:

$$G = \frac{proporc.slozka(\%)}{100} [-]$$

I.e. if the "Proporc.slozka" parameter = 15%, then  $G = 0.15$ .



Changes of heating water temperature given by equitherm curve are limited by parameters “Max.pos.pretop” and “Max.pos.nedotop”, and also by parameters “Max t do zony” and “Min t do zony” (see figure 8b).

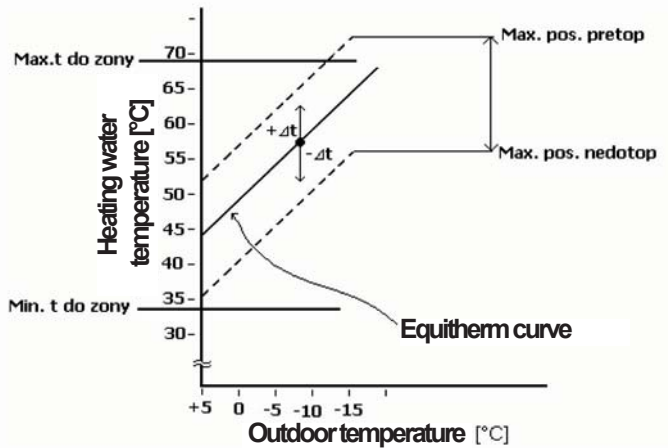


Fig. 8b

### Example 1:

#### Setting:

proporc.složka=12%; Max.pos.pretop=15 °C; Max.pos.nedotop=10 °C, Max.t do zony=85 °C; Min.t.do zony=15 °C.

#### Values of heating system:

Required temperature of heating water calculated from equitherm curve  $T=44$  °C;  $w = 21$  °C;  $y = 20,2$  °C.

Regulation procedure:  $\Delta t = (21 - 20,2) \cdot 80 \cdot 0,12 = 7,7$  °C

Required temperature to zone:  $Top = T + \Delta t = 44 + 7,7 = 51,7$  °C.

### Example 2:

#### Setting:

proporc.složka=35%; Max.pos.pretop=15 °C; Max.pos.nedotop=10 °C, Max.t do zony=85 °C; Min.t.do zony=15 °C.

#### Values of heating system:

Required temperature of heating water calculated from equitherm curve  $T=44$  °C;  $w = 21$  °C;  $y = 20,2$  °C.

Regulation procedure:  $\Delta t = (21 - 20,2) \cdot 80 \cdot 0,35 = 24,4$  °C

However this change is limited by parameter Max.pos.pretop, thus resulting  $\Delta t = 15$  °C.

Required temperature to zone:  $Top = T + \Delta t = 44 + 15 = 59$  °C.

## 7.3 Quick Heating Function:

Suitable location of sensor **AKU1h** and setting of parameter **Blok zonu pod** for individual zones enables so-called quick heating function. This function enables quick heating of selected zones and only then heating of accumulating tank and the other zones.

Parameter **Blok zonu pod** sets minimum temperature of heating water in accumulating tank, at which the zone opens. In case of quick heating the settings are as follows:

- 1) In zones, where we wish the quick heating, set parameter **Blok zonu pod** to 50 °C.
- 2) In zones, where the quick heating is not required, set parameter **Blok zonu pod** above, e.g. 55 °C.

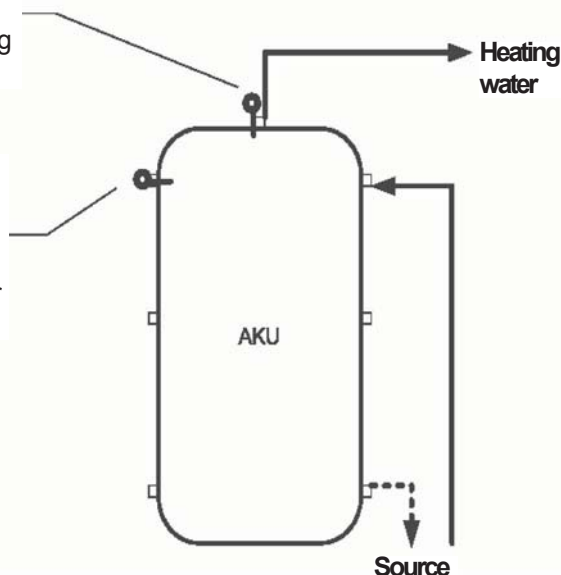
Location of sensor influences the amount of hot water accumulated in the accumulating tank, before the zone opens.

### Position 1)

Location of Aku1h sensor for quick heating function

### Position 2)

Standard location of Aku1h sensor, less suitable for quick heating.



For the quick heating function, the **Aku1h** sensor is located in position 1 (see diagram) to achieve the effect, when minimum amount of hot water in accumulating tank is used for heating of selected zones.

Standard location of the **Aku1h** sensor is not suitable for the quick heating function. Larger part of accumulating tank must be heated up to enable supply of hot water to the zone.

Fig. 9

Sensor location diagram.

## 8. Description of Selected Functions of IR09 Regulator and Solar Module:

### 8.1 Popis funkce Kaskádní ohřev:

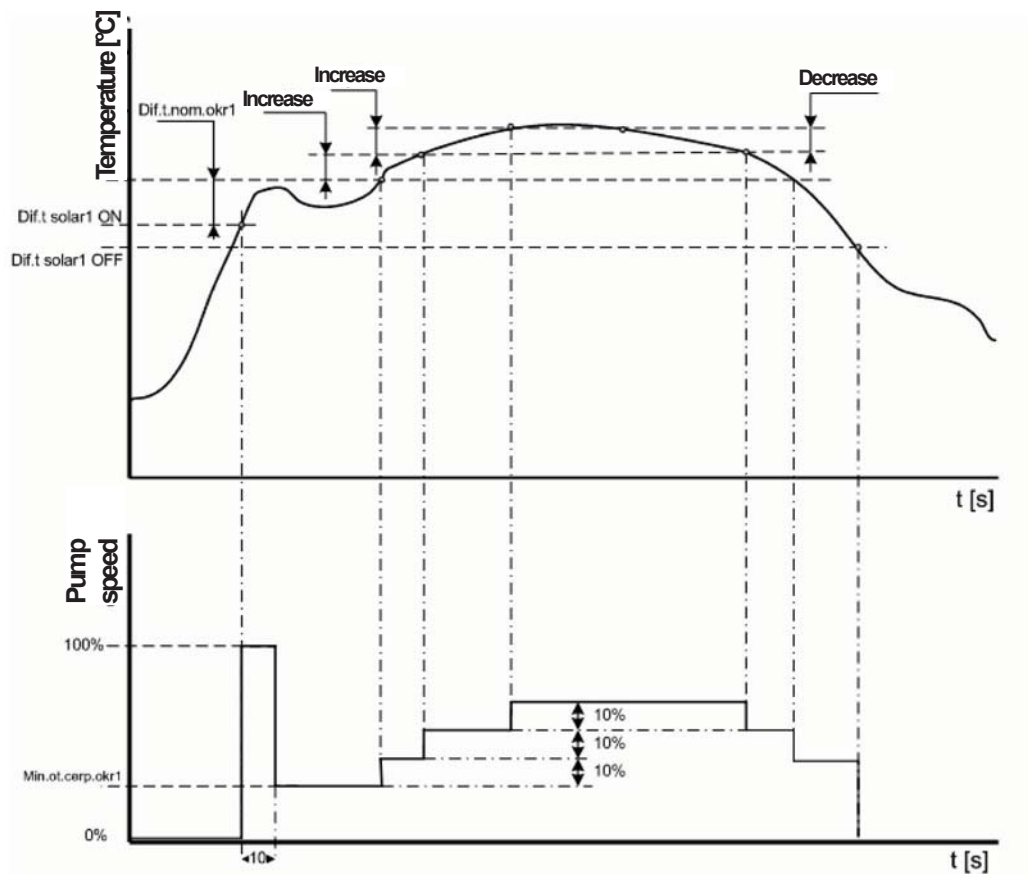
1<sup>st</sup> appliance (solar circuit 1) has highest priority and is heated by solar system as the first. If it is heated to temperature set I parameter **t prep na okr.2**, the heated is switched to second appliance (solar circuit 2). If the appliance achieves the temperature **t prep.na okr 3**, the regulator starts heating of 3<sup>rd</sup> appliance (solar circuit 3). If during heating of 2<sup>nd</sup> appliance (resp. 3<sup>rd</sup> appliance) the 1<sup>st</sup> appliance (resp. 2<sup>nd</sup> appliance) is cooled down by 5 K (5 °C), the regulator starts heating of 1<sup>st</sup> (resp. 2<sup>nd</sup>) appliance.

### 8.2 Description of Alternate Heating Function:

Regulator assesses temperatures of solar collector and individual appliances. If the 1<sup>st</sup> appliance (with highest priority) cannot be heated, the regulator checks, whether the 2<sup>nd</sup> appliance can be heated. If it can be heated, the 2<sup>nd</sup> appliance starts to be heated for period entered in parameter **Cas t okruhu 2**. After this time the heating stops and regulator waits for period set in parameter **Cas t1**, whether the solar collector temperature does not increase by **2K** (2 °C). If it is the case, regulator again waits. This is repeated, until the switching difference for heating of 1<sup>st</sup> appliance is fulfilled. If within period determined by parameter **Cas t1** the temperature does not increase by more than **2K** (2 °C), the regulator continues to heat up the 2<sup>nd</sup> appliance. If the 2<sup>nd</sup> appliance cannot be heated, the regulator heats up similarly the 3<sup>rd</sup> appliance.

### 8.3 Description of Solar Pump Speed Control acc. to Insolation:

If switching frequency between solar collector and particular appliance is achieved, the solar pump is switched ON for 10 sec to full speed – 100%. Then the speed decreases to value determined by difference between temperature of the appliance and solar collector acc. to setting in parameter “Zvyseni t okr.X (speed control acc. to insolation), resp. “Teplotni dif” (speed control acc. to quick heating of upper part of the appliance).



#### 8.4 Description of Solar Speed Control for Quick Heating in Upper Part of Appliance:

This function requires fitting of “upper sensors” to the appliance sensors, i.e. if the appliance 1 sensor is Aku1s and appliance 2 sensor is DHWs, also the Aku1h and DHWh sensors must be fitted.

If switching frequency between solar collector and appliance upper part is achieved, the solar pump is switched ON for 10 sec to full speed – 100%. Then the speed decreases to value determined by parameter **Min.ot.cerp1(2)** and the appliance is heated by this manner, until the appliance upper part temperature achieves value set in parameter **t okr1(2,3) horni**. When the temperature is achieved, the regulator compares the temperature of solar collector with temperature of upper part of the appliance. If the difference is higher than value set in parameter **Teplotni dif.**, the pump speed increases by one step (10%) and the regulator waits for time set in parameter **Zpozdenni**. Then it repeats the measurement and eventually again increases the pump speed. If measured temperature difference is below the value set in parameter **Teplotni dif.**, the pump speed decreases by one step.

If the difference for switching the solar circuit OFF is exceeded during this process (parameter **Dif.t okruh1(2,3) vpp**), the solar pump switches OFF.

Additionally, heating of particular appliance is switched OFF at quick cooling of the appliance, when the temperature decreases below fixed difference 5K (5 °C).

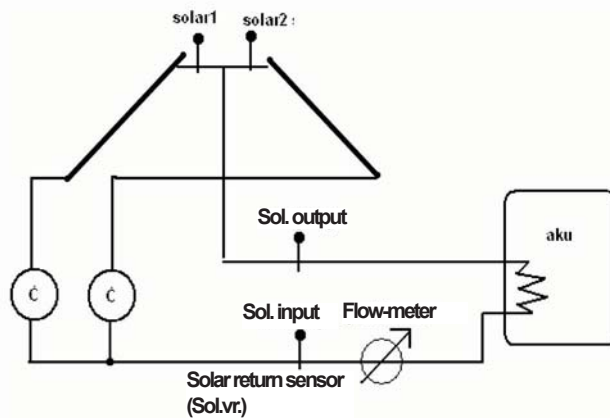
#### 8.5 Description of Special Function of Vacuum Tube Collector:

This function is used in applications with vacuum collectors. Upon switching the solar pump OFF the regulator stores the collector temperature as reference value. If the sensor temperature increases by 2 K above the reference value, it may be supposed that the temperature of water in collector is increased by higher value and the solar pump switches to 100% for 30 sec. This guarantees that the collector sensors achieves the actual temperature as the collector water. After stopping of the solar pump the temperature on collector sensor is stored and the new reference value. If switching difference of any appliance is exceeded during this process, the regulator goes to automatic operation mode.

If during switched OFF solar pump or during 30 sec interval of solar pump ON the temperature of solar collector sensors decreases by 2K (2 °C) below the reference value, this difference is subtracted.

### 8.6 Description of Supplied Heat Measurement:

The IR09 solar module is able to measure the heat supplied by solar collectors to appliance. In this case, the solar system must include besides the temperature sensors on solar collectors also the sensor at input to solar collectors and eventually the flow-meter (see diagram). Correct measurement of supplied heat requires proper setting of solar circuit medium type in parameter **Typ kapaliny**. If the medium is propylene-glycol, than set the concentration of anti-freeze liquid in parameter **Konc. nemrz.kap%**. If the system is not fitted with flow-meter, the function **Dodane teplo: manual** may be used, where the regulator calculates the actual flow from the pump speed on basis of full-speed flow (100%) entered in parameter **Průtok l/min**. Supplied heat is displayed in user menu.



### 9. Table Annexes:

**Note:** The values are to be fill-in with crayon to enable their overwriting if changed.

Table 9.1 - Preset values:

	Temperature					
	1	2	3	4	5	6
Zone 1						
Zone 2						
Zone 3						
Zone 4						
Zone TU						
Zone TE						
Zone Ak						
Zone Ba						

Table 9.2 - Equitherm curve points:

		Equitherm curve points					
		1	2	3	4	5	6
Zone 1	E						
	I						
Zone 2	E						
	I						
Zone 3	E						
	I						
Zone 4	E						
	I						

			program						
			from	to/ from	to/ from	to/ from	to/ from	to/ from	
Zone 1	program 1	time							
		temperature	■						
	program 2	time							
		temperature	■						
Zone 2	program 1	time							
		temperature	■						
	program 2	time							
		temperature	■						
Zone 3	program 1	time							
		temperature	■						
	program 2	time							
		temperature	■						
Zone 4	program 1	time							
		temperature	■						
	program 2	time							
		temperature	■						
Zone BAZ	program 1	time							
		temperature	■						
	program 2	time							
		temperature	■						
Zone Aku	program 1	time							
		temperature	■						
	program 2	time							
		temperature	■						
Zone TUVE	program 1	time							
		temperature	■						
	program 2	time							
		temperature	■						
Zone TUVE	program 1	time							
		temperature	■						
	program 2	time							
		temperature	■						

## 10. Software for IR07/IR09 Regulator Testing and Service - Program IR09 terminál:

Program IR09 terminál is intended to:

- Monitoring of inputs, outputs and activity of the regulator;
- Loading and storing of configuration to PC;
- Monitoring of event records and their loading to PC;
- Clearing and loading of new firmware;
- Clearing and loading of new firmware;

The regulator is connected to PC by means of communication cable IR09-PC Regulus (COM-RS232).

The program is executable without any installation. Upon start of IR09terminal.exe the program window is displayed, see fig. 10.

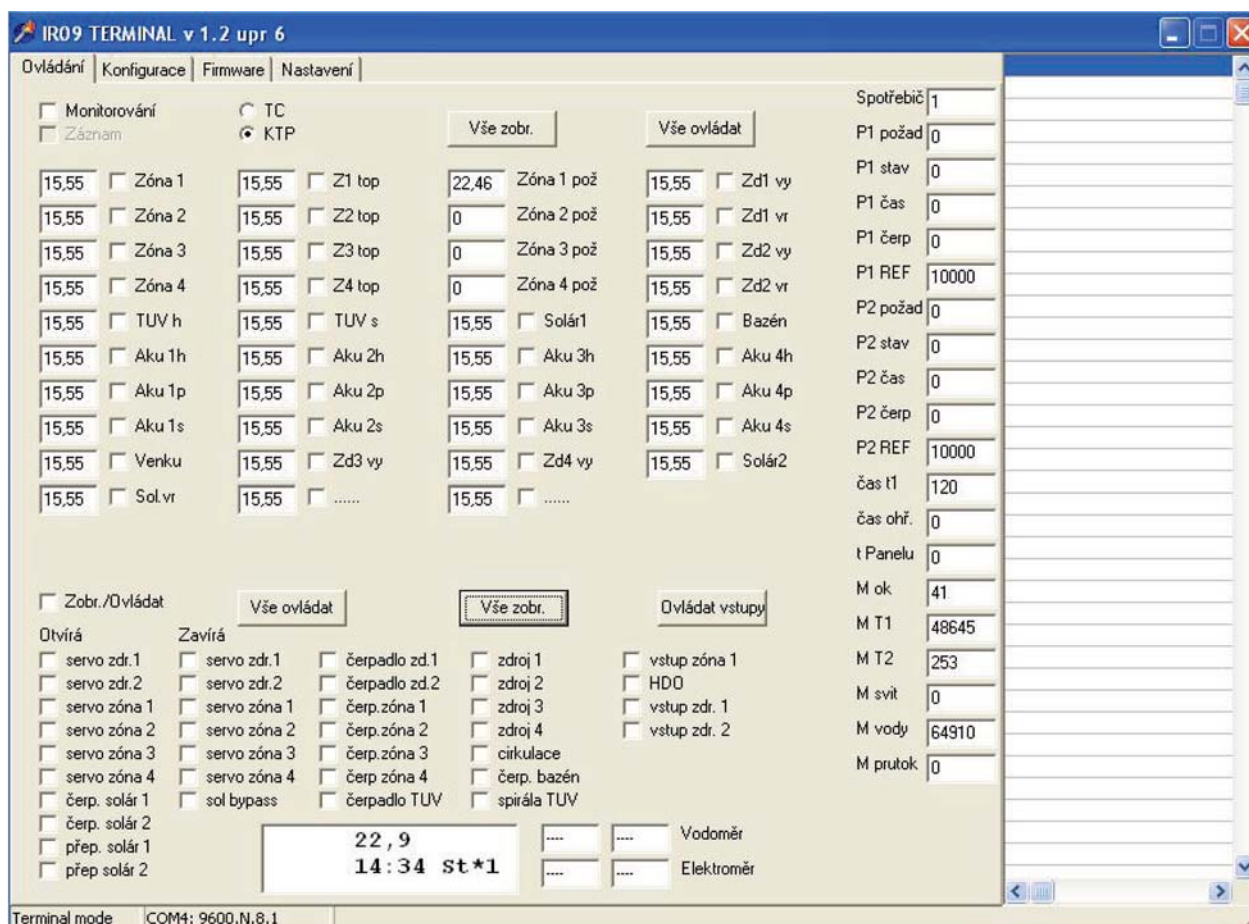


Fig. 10

In **Nastavení (Setting)** menu select the serial port for communication with PC and set the path to directory for saving of operating data, see fig. 11.

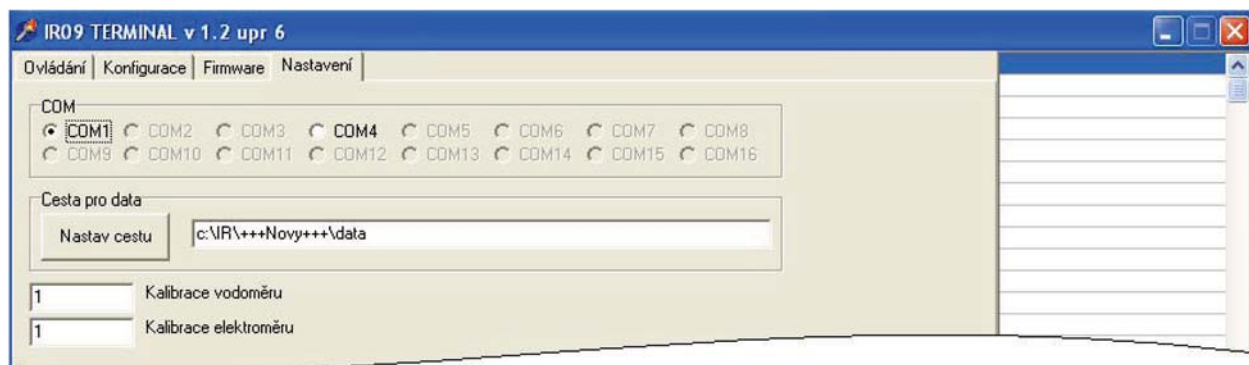


Fig. 11



Monitoring, control and testing of the regulator and check of saved data is done by **Ovládání (Control)** item and select regulator type (KTP). Select **Monitorování (Monitoring)** function for communication of regulator with PC (ensure that regulator is connected to PC). Then the program will display actual data (temperatures from relevant sensors and status of inputs and outputs of regulators). If not sensor is loaded in respective position, the displayed temperature will be replaced by constant data 15,55 (see fig. 12). Active inputs and/or outputs are coloured

Fields Zona 1 pož. – Zona 4 pož. displays heating water temperatures calculated by the regulator. The data serve for check of heating curves and behaviour of heating circuits

Click to **DISPLEJ (Display)**, field to navigate through regulator menu and set the parameters by means of PC keyboard (by means of arrows, ENTER and „\*“ key for switching the zones ON/OFF) similarly as on the regulator keypad. Numeric values may be entered by means of numeric keypad.

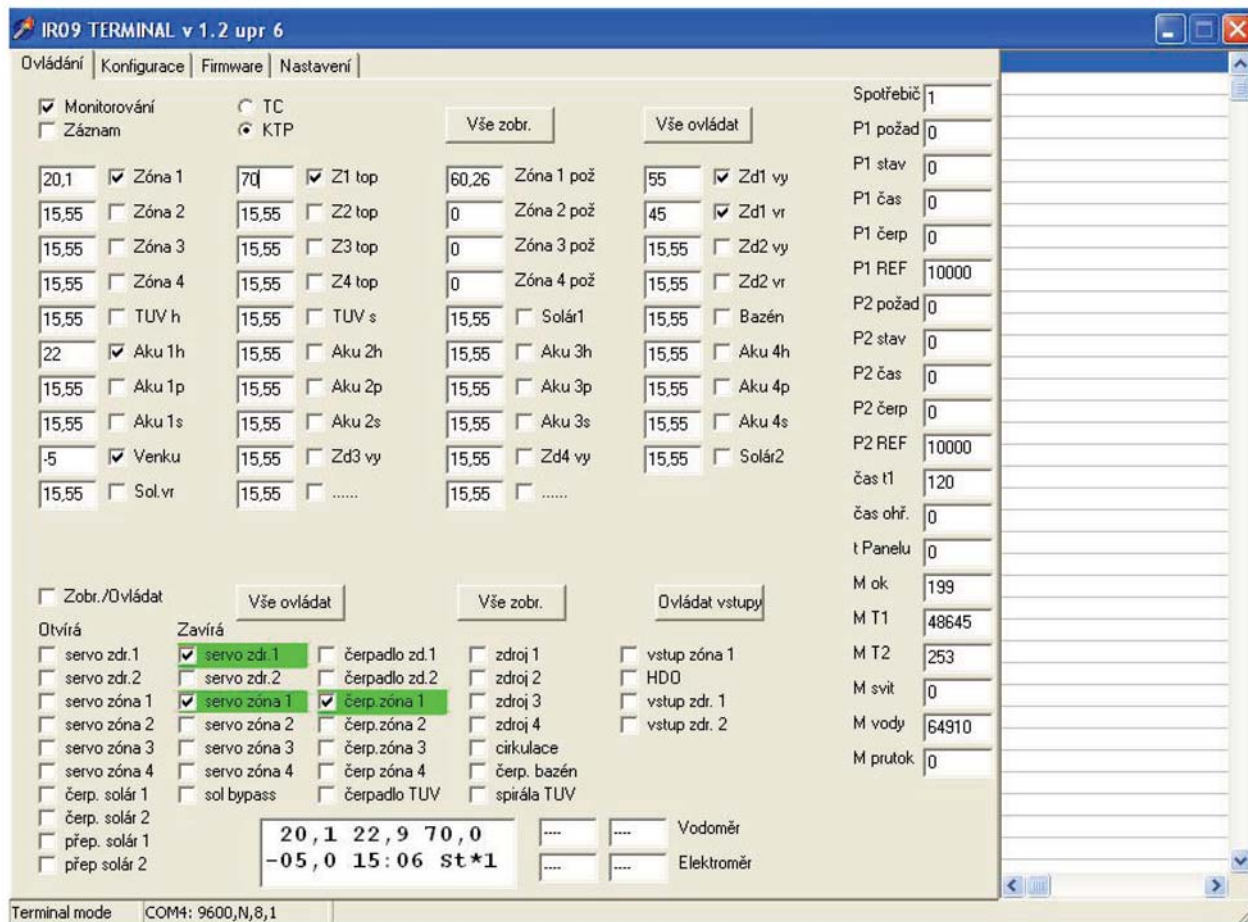


Fig. 12

Select **Záznam (Record)** function to record the data into selected file in PC. The right column displays status of sources, times of events and relevant description.

If you wish to simulated any value in the program, tick relevant position and rewrite the value. Then the regulator operates acc. to this temperature. Button **Vše ovládat (Control all)** selects all positions, button **Vše zobrazovat (Display all)** ticks them out.

Button **Ovládat vstupy (Control inputs)** controls the inputs. Particular input is activated by ticking. Then the regulator operates acc. to this option. Press button **Vše zobrazovat (Display all)** to tick out all inputs.

Press the button **Vše ovládat (Control all)** to control the inputs and outputs. Particular input / output is activated by ticking. If you wish to control the inputs/outputs simultaneously, select function **Zobrazovat/Ovládat (Display/Control)**. Press button **Vše zobrazovat (Display all)** to tick out all items.

**Note: During control of valve it is necessary to ensure that outputs for both rotation directions of servo-motor are not activated simultaneously! Do not exceed allowed parameters of the system (such as source overheating at manual start)!**



For saving of actual, loading new or back-up configuration, select in IR09terminal the Configuration item (window is displayed as shown on fig. 13).

**Note: Make sure that recording and monitoring is switched OFF, otherwise the communication between regulator and PC will not be successful during configuration change.**



Fig. 13

Press **Cti konfiguraci (Read configuration)** to load the configuration. The configuration is loaded upon entering of file name, in which the configuration is to be saved, and its path.

**Caution: the configuration changes may be made only by authorised person.**

**Note: back-up of long used fine tuned configuration is recommended.**

Select the **Firmware** item from IR09terminal to load new firmware. Window is displayed as shown on fig. 14.

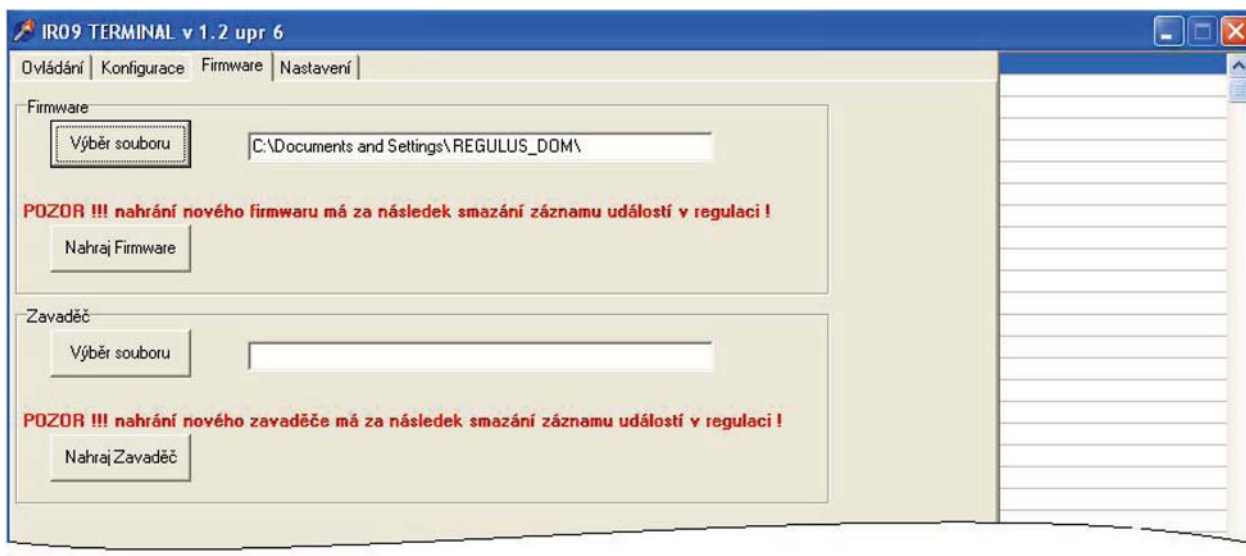


Fig. 14

During loading of new firmware the program verifies correct data transmission, clears all data in the regulator memory and load the new ones. Before loading of firmware it is necessary to switch off **MONITOROVANI (Monitoring)** in **Ovládání (Control)** menu. If the regulator works with solar module, this module must be disconnected before loading!

In case of problems with communication PC-regulator it is necessary at first download the drive.

**Caution: the firmware changes may be made only by authorised person.**

### Monitoring of sensors:

Program IR09 Terminál enables monitoring of communication with sensors in system. If the sensor monitoring is allowed in REGULATION menu, the right-hand terminal window lists continuously status of communication with sensors along the data line (fig. 15). After the time data there is sequence of characters, where character position corresponds to position of sensor in the table of sensors (table 5.4), i.e. first position is information on communication with outer sensor, then follow the sensors zone1, zone2 ... up to last sensor Reser3. Meaning of symbols at position is as follows:

- 0-9                    Communication level with sensor. 0=excellent communication level, 9=very pure communication level (proper function of regulation requires minimum communication level of all sensors below 7).
- x                     Load sensor does not communicate (bus fault or sensor disconnected).
- .



Information on communication with sensors

Fig. 15

### System information:

Right-hand terminal window includes information on solar field 1 and solar field 2. Meaning of individual parameters is given in table 10.1.

Table 10.1

Field	Description	Value	Meaning
Spotřebič	No. of actual appliance of solar heating	1	Appliance 1 heated
		2	Appliance 2 heated
		3	Appliance 3 heated
P1 požad	Assessment of requests for activity of solar fiel 1*)	1	Cool appliance 1
		2	Cool appliance 2
		4	Cool appliance 3
		8	Appliance 1 is not yet heated
		16	Appliance 2 is not yet heated
		32	Appliance 3 is not yet heated
P1 stav	Actual status of state automatics of solar circuit	0	Standstill
		1	first 10 sec - solar pump 100%
		2	normal operation – pump speed acc. to control type
		3	collector critical temperature - pump 100%
		4	antifreeze function - pump 100%
		5	appliance cooling - pump 100%
		6	collector cooling - pump 100%
		7	special function of tube collector - pump 100%
P1 čas	Time from last change of status automatics (sec)		
P1 čerp	Pump speed (0-100%)		
P1 REF	Reference temperature of collector for special function of vacuum coll. (1-100%)		
P2 požad	Assessment of requests for activity of solar fiel 2*)	1	Cool appliance 1
		2	Cool appliance 2
		4	Cool appliance 3
		8	Appliance 1 is not yet heated
		16	Appliance 2 is not yet heated
		32	Appliance 3 is not yet heated
P2 stav	Actual status of state automatics of solar circuit	0	Standstill
		1	first 10 sec - solar pump 100%
		2	normal operation – pump speed acc. to control type
		3	collector critical temperature - pump 100%
		4	antifreeze function - pump 100%
		5	appliance cooling - pump 100%
		6	collector cooling - pump 100%
		7	special function of tube collector - pump 100%
P2 čas	Time from last change of status automatics (sec)		
P2 čerp	Pump speed (0-100%)		
P2 REF	Reference temperature of collector for special function of vacuum coll. (1-100%)		
čas t1	Actual value of timer – cas t1 – alternate heating function (s)		
čas ohř.	Actual value of timer – cas t – alternate heating function (s)		
t Panelu	Register of panel temperature for detection of 2K increase within t1 - alternate heating function		
M ok	Communication level of IR regulator with solar module		
M T1	Temperature of sensor 1 (1-100 °C)		
M T2	Temperature of sensor 2 (1-100 °C)		
M svit	Value for insolation sensor		
M vody	Value of pulse counter from flow-meter		
M prtok	Flow from flow-meter		

\*) NOTE: Assessment of request to activity of solar fields – the field sums individual requests (e.g., appliance 1 must be cooled, i.e. value is 1, and appliance 2 is not yet heated, i.e. value is 16. Then the field contains value of 1+16, i.e. 17.

## **11. Revisions to IR07/IR09 Installation Manual – History**

### **Changes from version 3.0**

**(08.08.2008)**

**to version 3.1**

**(22.02.2009)**

1. Adding of history of revision and modifications (p. 59)
2. Modification of Table 5.6 Functions and outputs (p. 42)
3. Removal of separate test table (p. 42)
4. Modified description of parameter Min.t to zone (p. 22)
5. Modified display of regulator connection (p. 6)

### **Changes from version 3.1**

**(22.02.2009)**

**to version 4.0**

**(03.03.2009)**

6. Joining with instruction manual to regulator IR07
7. Modified diagram and description to switching of appliances (p. 33)
8. Extended table 5.6 by inputs and outputs of IR07 (p. 42)

### **Changes from version 4.0**

**(3.3. 2009)**

**to version 4.1**

**(11.11.2009)**

9. Corrected title of figure for inputs and outputs (p. 8)
10. Modified figure of IR07KTP regulator inputs and outputs (p. 8)
11. Division of table 5.6 to more detailed tables (p. 43, 44)





# WARRANTY CERTIFICATE

## *IR07, IR09KTP Intelligent Regulator*

Serial No.: .....

THE WARRANTY PERIOD COVERS 24 MONTHS FROM PUTTING INTO OPERATION,  
HOWEVER MAXIMUM 30 MONTHS FROM DATE OF SALE.

REGULUS SPOL. S R.O. (LIMITED) DECLARES THAT IT HAS ADOPTED SUCH MEASURES  
ENSURING COMPLIANCE OF ALL PRODUCTS PUT INTO MARKET WITH TECHNICAL DO-  
CUMENTATION.

## WARRANTY TERMS AND CONDITIONS

1. The operator must ensure electric supply acc. to the ČSN 33 2000 standard.
2. The regulator must be installed and put into operation by authorised company.
3. The warranty does not apply to faults resulting from over-voltage or under-voltage in electric supply grid.
4. No modifications may be made on the device by non-authorised person.

Date of sale:

### RECORD ON PUTTING INTO OPERATION

Company:

User:

Technician:

Signature:

Date:

01/2013



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