

INDU-50

CONTROLLER USER'S MANUAL
v1.95(86)EN



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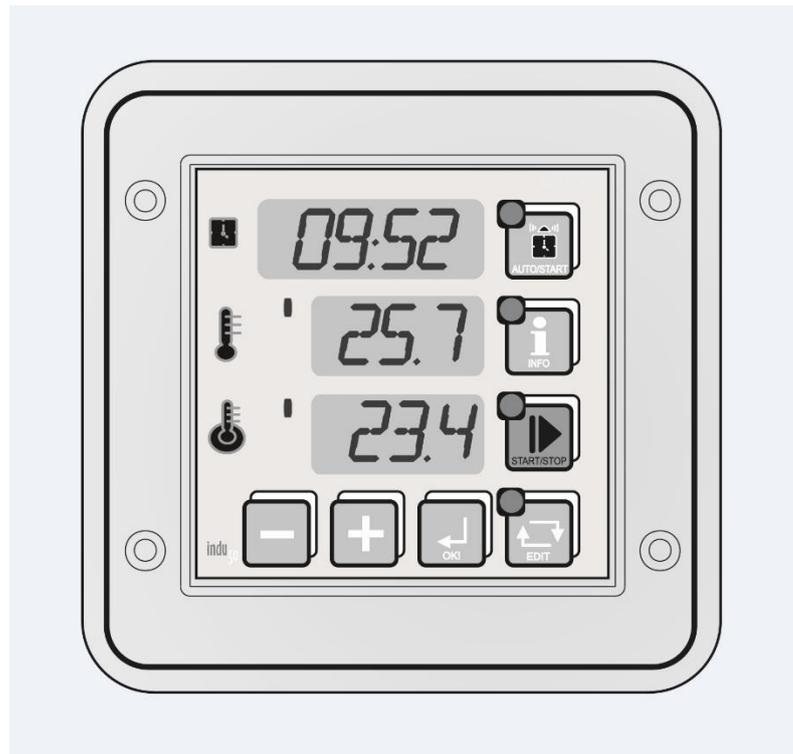
1. Introduction

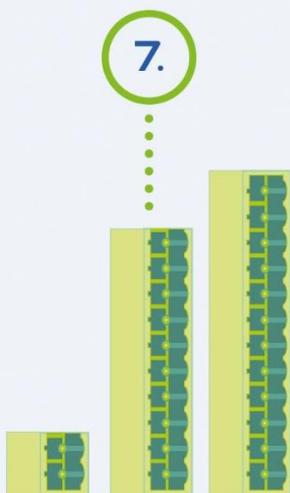
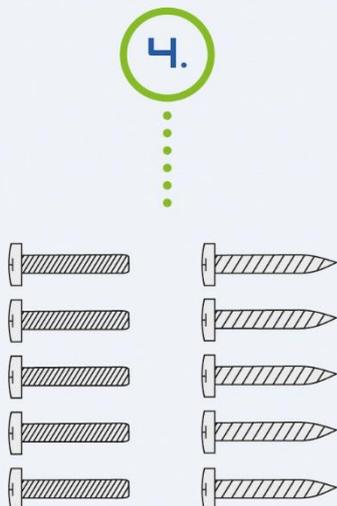
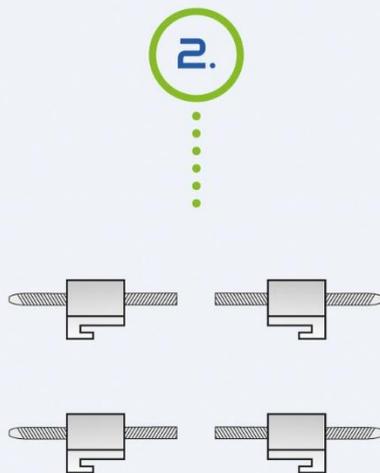
Thank you for choosing and purchasing the Industrial Microprocessor Controller INDU-50. We hope that You will find our product to be reliable and easily operated. Please read carefully the User's manual. This will enable You to obtain the best effects in using the system and to prolong the service life of devices.

Microprocessor controller INDU-50 is intended for servicing heat boilers, smoke houses, cooking ovens.

INDU controllers constitute series of industrial microprocessor devices, in which the special emphasis has been laid on the proper operation at difficult environment conditions. INDU series comprises such devices as governors, digital recorders, indicators.

Microprocessor controller INDU-50 cooperates with computer software, with INDU monitor and Loggisoft from version 2.12 (or higher). Versions of software are available, free of charge, on www.mikster.eu



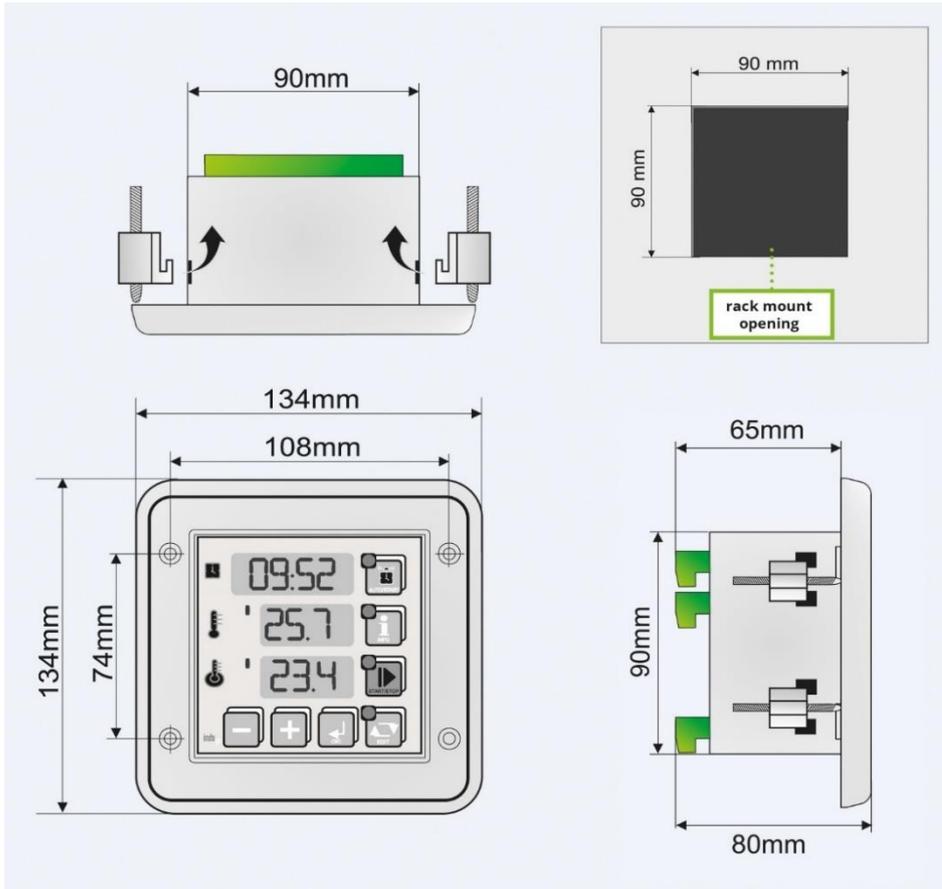


2. Elements

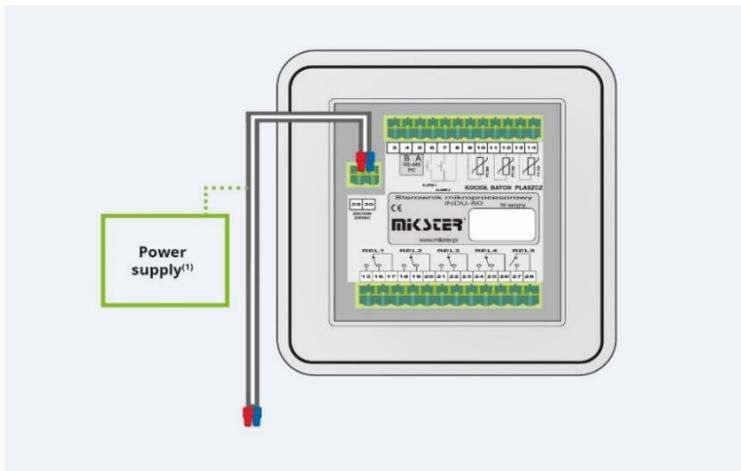
The UND-50 consists of the following elements:

1. Industrial Microprocessor Controller INDU-50 – 1 item,
2. Clamping elements – 4 item,
3. Mask elements – 6 item,
4. Clamping screw – 10 item,
5. CD with Loggisoft LT software,
6. User's manual,
7. Plug AKZ950x14 – 1 item,
8. Plug AKZ950x12 – 1 item,
9. Plug AKZ950x2 – 1 item,

3. Assembly



	<p>ATTENTION!</p>
	<p>Silicon washer should be lubricated by technical vaseline. Be aware that the washer should accurately adhere to the assembling surface.</p>



	<p>ATTENTION!</p>
	<p>(1) Before connecting, verify the supply voltage on the device label. Depending on the version: 230V AC, 110-230V AC, 24V AC, 24V AC/DC</p>

4. Start up

After connecting the temperature sensors (standard: PT-100) and power supply, the controller is switched on automatically. After displaying a “welcome” text the current hour, minute, channel 1 and channel 2 measurements are displayed consecutively.

When the display shows “---”, the controller indicates that a measuring element is missing or damaged.

Diodes located at keys indicate current status of the device (e.g. edit or auto start mode). Horizontal lines on the left side of displayed measured value indicate regulator status: diode on signals that an output is programmed. Key LEDs indicates the current operating mode. The following modes can be indicated: AUTOSTART, START, INFO and EDIT.

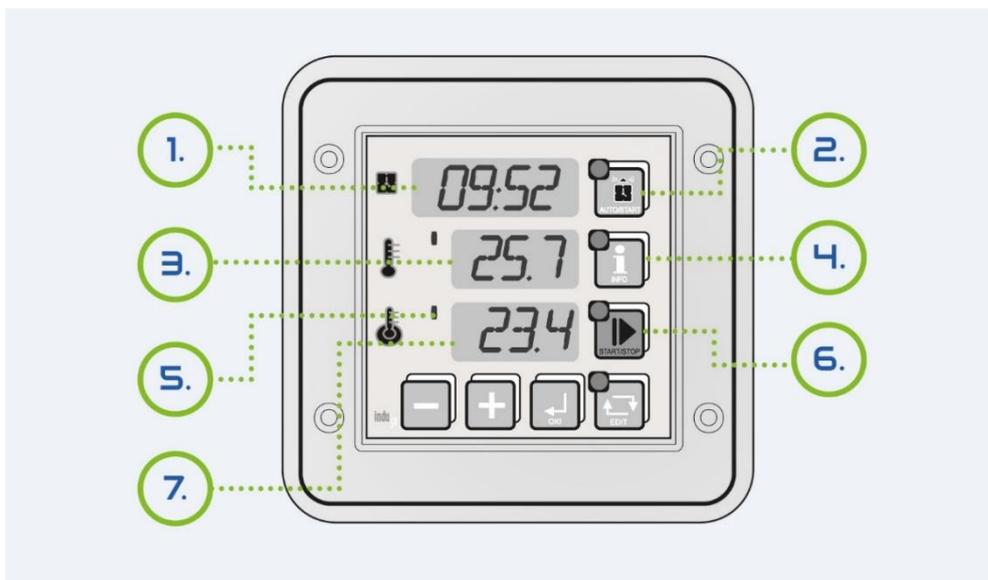
In the STOP mode, after the START mode is completed, the display shows instead of hour and minute.



	ATTENTION!
	In case of power failure the controller saves in memory its current operating mode and when power is back, it returns to the same mode (unless time set in cell 48 — Setup has passed).

5. Operator panel

1. Clock RTC/Process time
2. AUTOSTART mode key
3. Boiler temperature - Channel 1
4. INFO mode key
5. Bar temperature
6. START mode key
7. Meat-bar temperature Channel 2/ counted pasterisation number



6. Operation description

6.1. EDIT mode – setpoint changing

To get into the setpoint edit mode press the **EDIT** key. 

When the edit mode is activated, the **EDIT** key flashes .

You can change parameters on the display by using the keyboard  .

To confirm or move to the next field, press  to exit press .

Setpoint sequence:

- **START** mode duration (hours: minutes)
- controller temperature setpoint based on channel 1
- controller temperature setpoint based on channel 2

	ATTENTION!
	Channel 3 temperature setpoint can be entered in the SETUP menu (item SF38).

6.2. INFO mode

Press the key  to recal information depending on the current controller operating mode.

For the AUTOSTART mode

According to the setting in the Setup menu, item SF47:

- For HMD — hour, minute and daily delay when the START mode is to be activated
- For HM — hours and minutes to the START mode

Other information is identical for each mode:

- channel 3 measurement (Ad-3), Measurement on channel 2*; the calculated jacket temperature setpoint**
- channel 1 and channel 2 temperature setpoints
- current date
- current time

To get the next (previous) information, press  

* when governor type 4 is set for channel 3

**when the pasterisation number is being counted

6.3. AUTOSTART mode

Press the key  to edit parameters for this mode.

AUTOSTART mode can be activated in two ways:

1. At specified time (hour and minute) and daily delay, if any (F47 SETUP – HMD).
2. After counting down a specified time (hours and minutes) (F47 SETUP - HM)

Pressing **START** button during edit mode causes beginning of waiting mode for **START (AUTOSTART)**. To quit the **AUTOSTART** mode, press the key  once again. You can switch immediately from the **AUTOSTART** mode into the **START** mode by pressing the **START** key.

6.4. START mode

To start and end the **START** mode, press key . For typical controller settings after switching into the **START** mode all regulators are activated and the process time counting down is started. The time in hours and minutes to the process end is shown on the display.

Depending on the SETUP configuration the following process end conditions may occur.

- after process time elapsing (process timeout)
- after the required bar temperature is reached
- obtaining the required pasteurisation number

The process end is indicated with an internal audible signal and by closing the **REL5** Output To switch audible signal off, press. .

6.5. Service functions accessible for the user

Cell no	Description
UF0	Real time clock setting press  for the next parameter
UF1	Access code changing to the user's function Range 0..999 Value 0 – access code off
UF2	Information on software version
UF3	Keyboard click ON/OFF

To get into the user's setting press and hold down the key  and then press and hold down the key .

The functions mentioned above are available after the access code is entered. To disable the access code verification function, set access code at 0000 for the user's function. By default, the access code for service functions available to the user is disabled.

6.6. Alarms

The INDU 50 Controller recognizes 11 alarm events:

Err 1	Measuring element missing or damaged in channel 1
Err 2	Measuring element missing or damaged in channel 2
Err 3	Measuring element missing or damaged in channel 3
Err 4	MAX temperature exceeded in channel 1
Err 5	MAX temperature exceeded in channel 2
Err 6	MAX temperature exceeded in channel 3
Err 7	Temperature below MIN in channel 1
Err 8	Temperature below MIN in channel 2
Err 9	Temperature below MIN in channel 3
Err 10	Control input 1 alarm (depends on SF69 settings)
Err 11	Control input 2 alarm (depends on SF70 settings)

To activate alarms it is necessary first to set alarm activation time [seconds] in SETUP (items 71..73), and then enable the selected alarms in SETUP (items SF60..SF70). Any alarm shall be acknowledged by pressing . If the cause of alarm has not been cleared, then the controller activates the alarm once again after activation delay time.

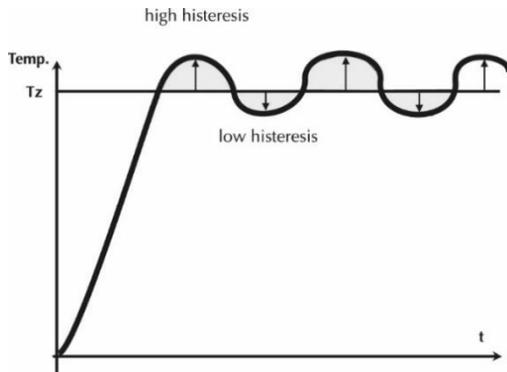
7. Pasterisation

Due to frequent application of INDU50 controller as a unit controlling the process of thermal food processing, its properties were widened by the possibility of counting the pasterisation number according to the arithmetic variant of the general method.

The following sterilisation coefficients were applied: ($z = 4.8K$; $z = 7.78K$; $z = 10K$; $z = 15K$; $z = 25K$; $z = 33,34K$ — set in Setup; cell SF80) for the process temperature T_r also set in Setup SF77. There is a possibility of performing the process either on the bases of the set value of the pasterisation number only (Setup SF76), or on the bases of the set value of pasterisation number and the process time. In the second case the parametrisation of maximum process time can constitute additional protection of the production process correctness. Setting of the adequate integration time, which means the time between consecutive moments of counting pasterisation number (setup cell SF79), was also taken into account in INDU50 controller. The possibility of determining the temperature, from which the controller should start counting the pasterisation number (Setup SF81) was also added. In order to utilise INDU50 controller for counting the pasterisation number the Setup cell SF45 – condition of ending START mode - should be set on 19 or 20. The pasterisation number is determined in Setup SF76.

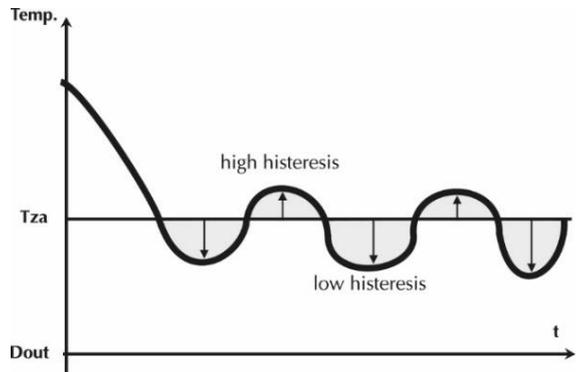
8. Governor diagrams

Governor – simple hysteresis – **heating**
Type 0*



Tz – temperature setpoint
t – time

Governor – reversed hysteresis – **refrigeration**
Type 1*

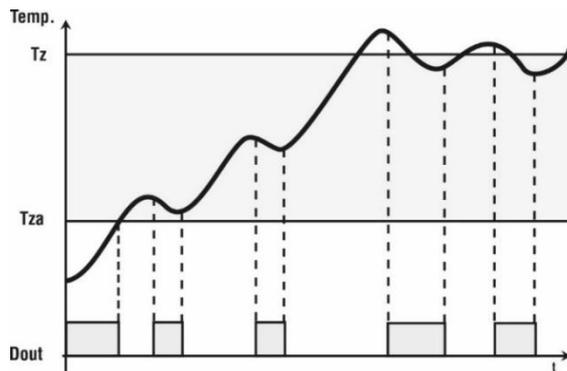


Tz – temperature setpoint
t – time

Governor – simple hysteresis – **algorithm of temperature approaching**
Type 2*

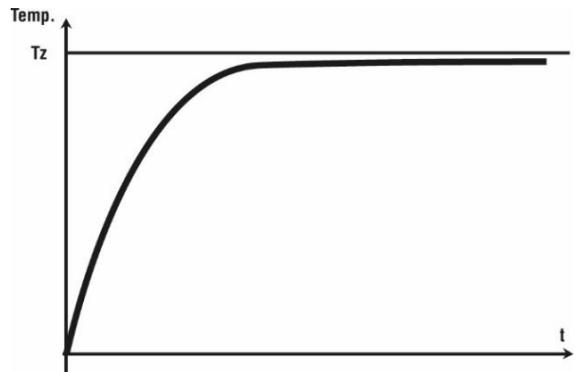
Temperature control can be divided into three zones. In the first zone the output Dout is controlled until Tza temperature is reached. Above the Tza temperature, in the second zone, the algorithm of temperature approaching the set value is realized. In the third zone the temperature in between the lower and upper hysteresis is kept.

Governor of temperature approaching



Tz – temperature setpoint
t – time
Tza – threshold temperature for triggering the „approach” algorithm (for temp. below Tza-Dout output is permanently on)
Dout – state at binary output (high state corresponds with the activation of heaters)

Governor PID
Type 3*



Tz – temperature setpoint
t – time

* governors types set for individual channels in SETUP cells SF29, 30, 31

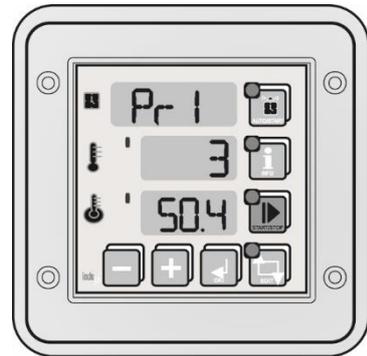
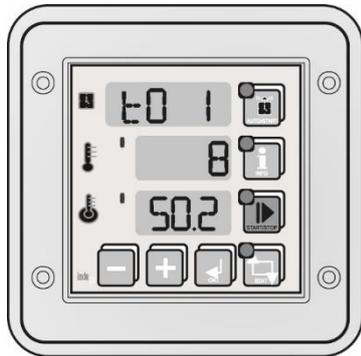
**Governor relative
Type 4**

Governor dedicated for jacket temperature control in parboilers.
Jacket temperature control is carried out on the basis of the relationship between the preset and the read-out water temperature.

	ATTENTION!
	<p>This type of governor is only available on channel 3 (cell setting SF31); controller configuration parameters: SF87,103, SF104, SF105.</p>

9. Selection of governor setup PID

To obtain an access to governor setup PID coupled with the given measuring channel the key  should be pressed and hold and then the key . Information concerning the given parameter and the governor number will appear on the upper display.



Edition of the selected parameter is done on the middle display (pulsating value). Increase of parameter Value by the key , decrease by the key . Shift to the next parameter and confirmation of changes by the key . Exit from edition mode by pressing the key .

Regulation is being done on the basis of:

- To – sampling period
- Pr – strengthening of a proportional element
- Ti – integration constant (doubling time)
- Td – differentiation constant (advancing time)
- Ts – set temperature

10. Controller setup



To get into the SETUP menu, press and hold down the  key and then press the  key. After entering the access code (if included in Setup cell SF 74) you can change the controller parameters.

No.	Default value	Range	Description	User settings
SF0	1	0..128	MODBUS network adress	
SF1	0	0..4	Baud rate 0-9600, 1-19200, 2-38400, 3-57600, 4-115200	
SF2	1	0..12	Channel 1 measuring input type Standard version: <ul style="list-style-type: none"> • 0 – PT-500 • 1 – PT-100 • 2 – PT1000 FULL CALIBRATION version (special order) <ul style="list-style-type: none"> • 3 – 0..20mA • 4 – 4..20mA • 5 – thermocouple s • 6 – thermocouple b • 7 – thermocouple r • 8 – thermocouple t • 9 – thermocouple j • 10 – thermocouple e • 11 – thermocouple k • 12 – thermocouple n 	
SF3	1	0..12	Measuring input type for channel 2	
SF4	1	0..12	Measuring input type for channel 3	
SF5	0°C	-99,0..999°C	Value corresponding to 0 mA for channel 1 0..20 mA input	
SF6	200°C	-99,0..999°C	Value corresponding to 20 mA for channel 1 0..20 mA input	
SF7	0°C	-99,0..999°C	Value corresponding to 0 mA for channel 2 0..20 mA input	
SF8	200°C	-99,0..999°C	Value corresponding to 20 mA for channel 2 0..20 mA input	
SF9	0°C	-99,0..999°C	Value corresponding to 0 mA for channel 3_0..20 mA input	
SF10	200°C	-99,0..999°C	Value corresponding to 20 mA for channel 3_0..20 mA input	
SF11	0°C	-99,0..999°C	Value corresponding to 4 mA for channel 1 4..20 mA input	
SF12	200°C	-99,0..999°C	Value corresponding to 20 mA for channel 1 4..20 mA input	
SF13	0°C	-99,0..999°C	Value corresponding to 4 mA for channel 2 4..20 mA input	
SF14	200°C	-99,0..999°C	Value corresponding to 20 mA for channel 2 4..20 mA input	
SF15	0°C	-99,0..999°C	Value corresponding to 4 mA for channel 3 4..20 mA input	

No.	Default value	Range	Description	User settings
SF16	200°C	-99,0..999°C	Value corresponding to 20 mA for channel 3 4..20 mA input	
SF17	0,0°C	-20,0..20°C	Temperature readout adjustment for channel 1	
SF18	0,0°C	-20,0..20,0°C	Temperature readout adjustment for channel 2	
SF19	0,0°C	-20,0..20,0°C	Temperature readout adjustment for channel 3	
SF20	On	On / Off	Regulator operation in channel 1	
			Off –always	
SF21	On	On / Off	as above for channel 2	
SF22	On	On / Off	as above for channel 3	
SF23	-99°C	-99..400°C	Minimum allowable setpoint for channel 1	
SF24	150°C	-99..400°C	Maximum allowable setpoint for channel 1	
SF25	-99°C	-99..400°C	Minimum allowable setpoint for channel 2	
SF26	150°C	400°C	Maximum allowable setpoint for channel 2	
SF27	-	-	-	
SF28	-	-	-	
SF29	0	0..3	Regulator type for channel 1 <ul style="list-style-type: none"> • 0 – normal hysteresis • 1 – reversed hysteresis • 2 – normal hysteresis, 'setpoint ramping" algorithm • 3 – PID regulator • 4* – relative regulator (only available for channel 3) 	
SF30	0	0..3	Regulator type for channel 2	
SF31	0	0..4*	Regulator type for channel 3	
SF32	1,0°C	0,0..5,0°C	Low hysteresis for channel 1	
SF33	1,0°C	0,0..5,0°C	Low hysteresis for channel 2	
SF34	1,0°C	0,0..5,0°C	Low hysteresis for channel 3	
SF35	1,0°C	0,0..5,0°C	High hysteresis for channel 1	
SF36	1,0°C	0,0..5,0°C	High hysteresis for channel 2	
SF37	1,0°C	0,0..5,0°C	High hysteresis for channel 3	
SF38	120°C	-99..999°C	Channel 3 temperature setpoint	

No.	Default value	Range	Description	User settings
SF39	20°C	0..200°C	Regulator activation temperature (Tza) for channel 1 For "setpoint ramping" algorithm	
SF40	20°C	0..200°C	Regulator activation temperature (Tza) for channel 2 For "setpoint ramping" algorithm	
SF41	20°C	0..200°C	Regulator activation temperature (Tza) for channel 3 For "setpoint ramping" algorithm	
SF42	1	0..100 sek	Regulator activation delay [seconds] for channel 1	
SF43	1	0..100 sek	Regulator activation delay [seconds] for channel 2	
SF44	1	0..100 sek	Regulator activation delay [seconds] for channel 3	
SF45	5	0..21	START mode end conditions see "CYCLE END CONDITIONS"	
SF46	1	0..1	Recording <ul style="list-style-type: none"> 0 – continuous recording 1 – recording in the START mode only 	
SF47	HMd	HMd/HM	AUTOSTART mode parameter format <ul style="list-style-type: none"> HMD – hour, minute and daily delay for START HM – ours and minutes to START 	
SF48	5	0..10 godz.	Maximum time period after which the controller returns to the START mode (after power failure)	
SF49	1	1..360 min	Measurement recording frequency (unit defined in SF89: min, sec)	
SF50	1	1..360 min	Alarm recording frequency	
SF51	C	C / F	Temperatur unit	
SF52	1 [min]	0..99 [min]	Audible signal duration Note! If 0 is selected, then the signal is cancelled with the OK key!	
SF53	1	0 .. 1	Alarm output operating mode <ul style="list-style-type: none"> 0 –interrupted signal 1 –continuous signal 	
SF54	150°C	-99..999°C	Maximum allowable (alarm) temperature for channel 1	
SF55	150°C	-99..999°C	Maximum allowable (alarm) temperature for channel 2	
SF56	150°C	-99..999°C	Maximum allowable (alarm) temperature for channel 3	
SF57	-99°C	-99..999°C	Minimum allowable (alarm) temperature for channel 1	
SF58	-99°C	-99..999°C	Minimum allowable (alarm) temperature for channel 2	
SF59	-99°C	-99..999°C	Minimum allowable (alarm) temperature for channel 3	
SF60	Off	On / Off	Sensor fault alarm activation for channel 1	
SF61	Off	On / Off	Sensor fault alarm activation for channel 2	
SF62	Off	On / Off	Sensor fault alarm activation for channel 3	

No.	Default value	Range	Description	User settings
SF63	Off	On / Off	Maximum temperature exceeded alarm activation for channel 1	
SF64	Off	On / Off	Maximum temperature exceeded alarm activation for channel 2	
SF65	Off	On / Off	Maximum temperature exceeded alarm activation for channel 3	
SF66	Off	On / Off	Maximum allowable (alarm) temperature for channel 1	
SF67	Off	On / Off	Maximum allowable (alarm) temperature for channel 2	
SF68	Off	On / Off	Maximum allowable (alarm) temperature for channel 3	
SF69	0	0..4	Alarm activation on control input 1 <ul style="list-style-type: none"> • 0 – alarm disabled • 1 – alarm when inputs 6-8 are close • 2 – alarm when inputs 6-8 are open • 3 – keyboard blocking when inputs 6-8 shorted • 4 - keyboard blocking when inputs 6-8 not shorted 	
SF70	0	0..4	Alarm activation on control input 2 <ul style="list-style-type: none"> • 0 – alarm disabled • 1 – alarm when inputs 7-8 are close • 2 – alarm when inputs 7-8 are open • 3 – keyboard blocking when inputs 7-8 shorted • 4 – keyboard blocking when inputs 7-8 not shorted 	
SF71	60	0..999 sek	Sensor fault alarm indication delay	
SF72	60	0..999 sek	Temperature exceeded alarm indication delay.	
SF73	60	0..999 sek	Control input alarm indication delay	
SF74	0	0..999	SETUP access code change Value 0 - code check OFF	
SF75	0	0..1	Time base for START mode <ul style="list-style-type: none"> • 0 – hour:min • 1 – min:sec 	
SF76	66,4	0,1..999, 1 min	Set pasteurisation number	
SF77	72°C	0..100°C	Pasteurisation temperature (Process temperature Tr)	
SF78	0	0..2	The channel on which the temperature inside the box is measured. <ul style="list-style-type: none"> • 0 – channel 1 • 1 – channel 2 • 2 – channel 3 	
SF79	15	0..600 sek	Setting the reading rate of the pasteurisation number (seconds)	

SF80	0	0..5	Selection of sterilisation coefficients table for: <ul style="list-style-type: none"> • 0 – coefficient z=4,8 K • 1 – coefficient z=7,78 K • 2 – coefficient z=10 K • 3 – coefficient z=15 K • 4 – coefficient z=25 K • 5 – coefficient z=33,34 K 	
SF81	52°C	0..100°C	Temperature, from which the governor starts counting the pasteurisation number	
SF82	0	0..2	Number of the measuring channel versus which the regulation is carried on governor 1	
SF83	1	0..2	Number of the measuring channel versus which the regulation is carried on governor 2	
SF84	2	0..2	Number of the measuring channel versus which the regulation is carried on governor 3 <ul style="list-style-type: none"> • 0 – measuring channel 1 • 1 – measuring channel 2 • 2 – measuring channel 3 	
SF85	0	-50..100°C	Shifting of the set temperature for governor 1	
SF86	0	-50..100°C	Shifting of the set temperature for governor 2	
SF87	0	-50..100°C	Shifting of the set temperature for governor 3	
SF88	0	0..4	Process triggering method <ul style="list-style-type: none"> • 0 – START key • 1 – Input 1 • 2 – Input 2 • 3 – Input 1 or 2 • 4 – Input 1 or 2 	
SF89	0	0..1	Measurement recording frequency unit (applies to SF49): <ul style="list-style-type: none"> • 0 – min • 1 – sec 	
SF90	0	0..1	Time display method <ul style="list-style-type: none"> • 0 – countdown • 1 – forward countdown 	
SF91	10 s	10..1000 s	Cycle time of digital output - Governor PID1	
SF92	10 s	10..1000 s	Cycle time of digital output – Governor PID2	
SF93	10 s	10..1000 s	Cycle time of digital output – Governor PID3	
SF94	0 s	0..120 s	Minimum heating time – Governor PID1	
SF95	0 s	0..120 s	Minimum heating time - Governor PID2	
SF96	0 s	0..120 s	Minimum heating time - Governor PID3	
SF97	0 s	0..120 s	Minimum period interval time – Governor PID1	
SF98	0 s	0..120 s	Minimum period interval time – Governor PID2	
SF99	0 s	0..120 s	Minimum period interval time – Governor PID3	
SF100	0 s	0..120 s	Purge time – Governor PID1	
SF101	0 s	0..120 s	Purge time – Governor PID2	
SF102	0 s	0..120 s	Purge time – Governor PID3	
SF103	5,2	0..99,9	Relative governor gain	
SF104	30 s	0..120 s	Minimum burner start-up time for the relative governor	
SF105	30 s	0..120 s	Minimum burner switch-off time for the relative governor	

11. Relays

REL 1	Relay output of governor 1
REL 2	Relay output of governor 2
REL 3	Relay output of governor 3
REL 4	Switched on in START mode
REL 5	Alarm

12. Example of application

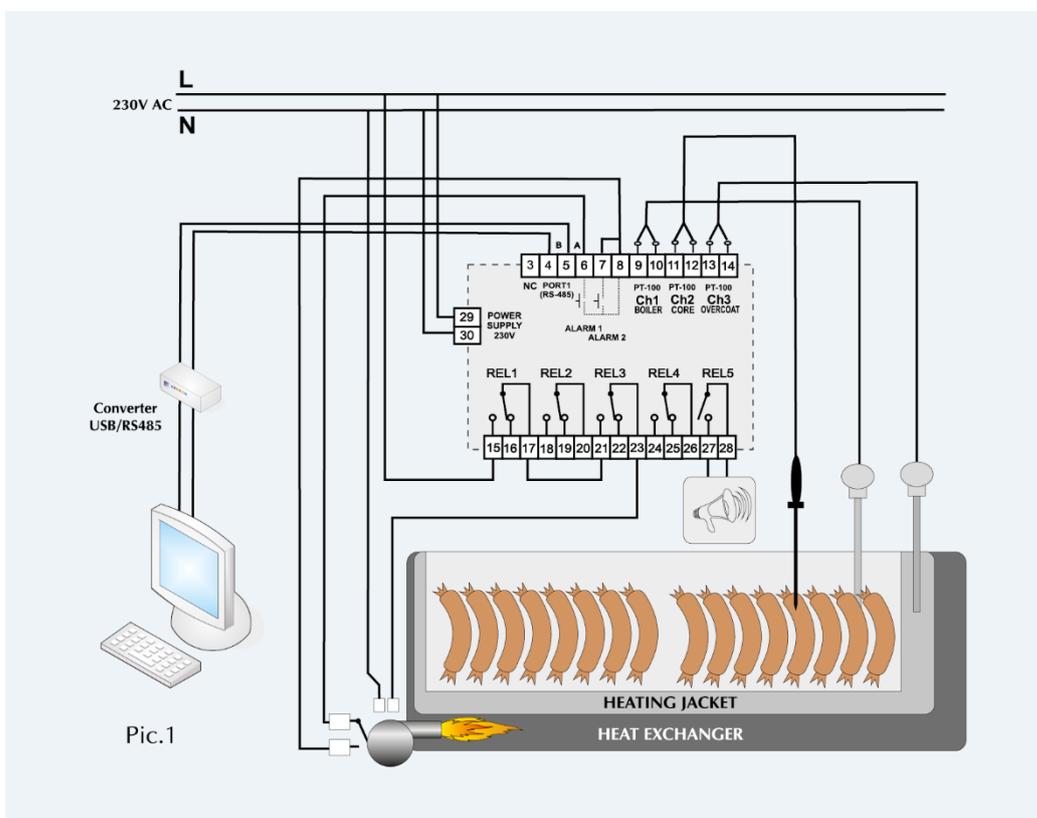


Figure 1

Pic. 1. this example is given for informative purpose only and should not be considered in part or in whole as a system design

13. Cycle end conditions

Nr	Cycle end conditions (cell Setup 45)
SF45=0	Timeout (time elapsed)
SF45=1	Cycle ends when temperature setpoint is exceeded in channel 1 (boiler)
SF45=2	Cycle ends when temperature setpoint is exceeded in channel 2 (bar)
SF45=3	Cycle ends when temperature setpoint is exceeded in channel 3 (shell)
SF45=4	Cycle ends after the preset time is elapsed or temperature setpoint is exceeded (boiler)
SF45=5	Cycle ends after the preset time is elapsed or temperature setpoint is exceeded (bar)
SF45=6	Cycle ends after the preset time is elapsed or temperature setpoint is exceeded (shell)
SF45=7	Cycle ends after the preset time is elapsed and temperature setpoint is exceeded (boiler)
SF45=8	Cycle ends after the preset time is elapsed and temperature setpoint is exceeded (bar)
SF45=9	Cycle ends after the preset time is elapsed and temperature setpoint is exceeded (shell)
SF45=10	Cycle ends when the boiler temperature drops below the setpoint
SF45=11	Cycle ends when the bar temperature drops below the setpoint
SF45=12	Cycle ends when the shell temperature drops below the setpoint
SF45=13	Cycle ends after the preset time is elapsed or the boiler temperature drops below the setpoint
SF45=14	Cycle ends after the preset time is elapsed or the bar temperature drops below the setpoint
SF45=15	Cycle ends after the preset time is elapsed or the shell temperature drops below the setpoint
SF45=16	Cycle ends after the preset time is elapsed and the boiler temperature drops below the setpoint
SF45=17	Cycle ends after the preset time is elapsed and the bar temperature drops below the setpoint
SF45=18	Cycle ends after the preset time is elapsed and the shell temperature drops below the setpoint
SF45=19	End of a cycle, when the pasteurisation number is reached.
SF45=20	End of a cycle, when either the pasteurisation number or the set time is reached.
SF45=21	End of cycle when, after reaching the bar temperature, the set time is counted down.

14. The most frequently asked questions (FAQ)

1. What to do when the governor does not switch on?

- Check the power supply of the governor.

2. The governor does not record the data after the end of the process.

- Check the setting of the SF46 cell. If continuous recording is required, which means recording regardless of the operation mode, write 0.

3. Is it possible to omit the access code to service functions accessible for the user?

- Write 0 (zero) as the access code of the governor.

4. Transmission in RS485 network does not operate.

- Check addresses in RS485 network. Attention! Each device must have an individual address.
- The problem may also be: - incorrectly set baud rate in the governor, swapped A and B signals, damaged transmission line, and many others.

5. Temperature sensor PT-100, PT-500 or PT-1000 does not operate.

- Check the setting correctness for the temperature sensor, e.g. for the first sensor, PT-100, value 1 should be set in cell SF2.

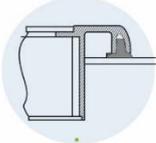
15. Technical data



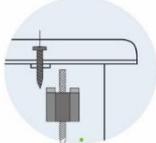
Power supply:	24V AC/DC I _{max} .140mA 110/230VAC I _{max} .30mA
Display:	3x LED 0,5" Red
Keyboard:	micro switch buttons
Connectors:	plug-in terminal blocks
Temperature measuring range:	- 99°C ÷ 600°C
Temperature measurement resolution:	0,1°C od - 9,9°C to 99,9°C 1°C in other ranges
Temperature measurement error:	≤ ±0,5°C (applies to the measuring circuit of the controller)
Inputs:	3 measuring analogue configurable (PT100/PT500/PT1000) <ul style="list-style-type: none"> • PT100/PT500/PT1000 - standard version • 0..20mA, 4..20mA, thermocouple: s, b, r, t, j, e, k, n - FULL CALIBRATION version (special order) 2 potential free digital (control)
Outputs:	4 switch relay digital (max load 250VAC/2A per channel) 1 NO relay digital (max load 250VAC/2A)
Communication:	1xRS485
Registration:	100 000 records
Software:	LoggisoftLT (PC) , MPC4 (PC)

Dimensions:	external 134x134x65mm (W x H x D) mounting 90x90mm (W x H)
Fixing:	screwed 4 mounting holes (front) or 4 mounting clips (rear)
Weight:	500 g (net)
IP rating:	65 (front) 20 (rear)
Operating conditions:	Temperature: 0°C ÷ 55°C Humidity: 5%RH ÷ 85%RH
EC compliance:	2014/30/UE ROHS 2011/65/UE 2014/35/UE PN-EN IEC 61000-6-2:2019 PN-EN 61000-4-4:2013-05 PN-EN 61000-4-2:2011 PN-EN 61000-4-11:2007 PN-EN 61131-2:2008

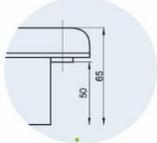
16. Features



Dual silicon gasket



Two ways of panel mounting



Small depth



Water proof*



Chemical proff **



Alcohol proff **

*from the front IP 65

**the front - the resistance to strong cleaning agents used in the food industry

17. Transmission parameters

Transmission characteristics

- Interface: RS-485
- Transmission protocol: MODBUS RTU
- Transmission parameters: 1 start bit, 8 data bits, 2 stop bits, without parity check
- Transmission speed: 9600 bit/sec

Measurement results readout

Address	Function	Sub-function	Length H	Length L	Data	CRC L	CRC H
8 bits	8 bits	8 bits	8 bits	8 bits	8 bits	8 bits	8 bits

Designations

- ADDRESS – address of the SLAVE device
- FUNCTION – function number
- SUB-FUNCTION – sub-function number
- LENGTH (H, L) – total frame length
- DATA – N-bytes of data
- CRC (H, L) – low byte and high byte CRC 16

Sub-functions for the measurement readout function: 46 HEX (70 DEC)

Measurement results readout

Sub-functions number	Feedback	Interpretation	Length	Byte number in the frame (*)
0 HEX (0 DEC)	Measurement results readout	Channel 1 *10 (entry in the complementary code to 2)	2 bytes	5 6
		Channel 2 *10 (entry in the complementary code to 2)	2 bytes	7 8
		Channel 3 *10 (entry in the complementary code to 2)	2 bytes	9 10

	Attention!
	<p>⁽¹⁾ Value 0xF448 on any of the channels means no measurement (defective sensor or no sensor). Example of a query (values in HEX): 01 46 00 00 07 4D 4A.</p>

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