MIKSTER®

Guarantee card

INDUSTRIAL MICROPROCESSOR CONTROLLER
INDU-50

serial no:

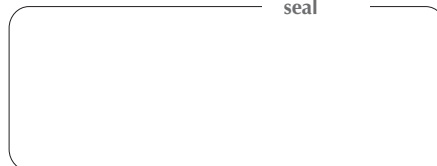sale date: ....

The hereby given guarantee confirms the good quality and operation of the product.
The guarantee is furnished for 12 month period from the sale date.
The guarantee imposes an obligation of removing, free of charge, defects of the sold
product - in 14 days from the date of delivering the product for repairs – on the producer.

GUARANTEE CONDITIONS

→ **Exploitation of the device should be done according to the Service Instruction and according to its destination.**
→ **The guarantee loses its validity in the following cases:**
» **rupture of laden seal,**
» **mechanical damages,**
» **damages caused by misapplication,**
» **corrections in the guarantee certificate – unless they are introduced by the producer himself.**

→ **Guarantee Certificate is valid together with the sale receipt.**
→ **Servicing of the Mikster Sp. z o.o. products is realized by the MIKSTER SERVICE S.C. Company.**

seal

CE

Logginet

User's Manual

Industrial Microprocessor Controller INDU-50

v. 1.4

CE

MIKSTER®
INDUSTRIAL TECHNOLOGY
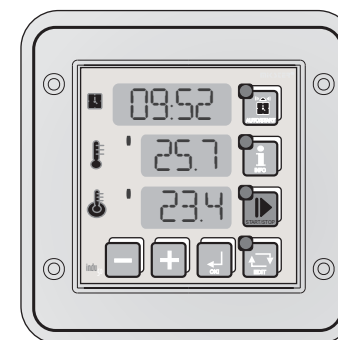
MIKSTER

List of contents

Introduction

We would like to congratulate You the selection of 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 cooperaters 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.pl

Components   *Assembly*

The INDU-50 consists of the following elements:

1	2	3	4

134mm

134mm

65mm

80mm

90mm

5	6	7

90 mm

90 mm

rack mount opening

Power supply
230 V
(option 24 V)
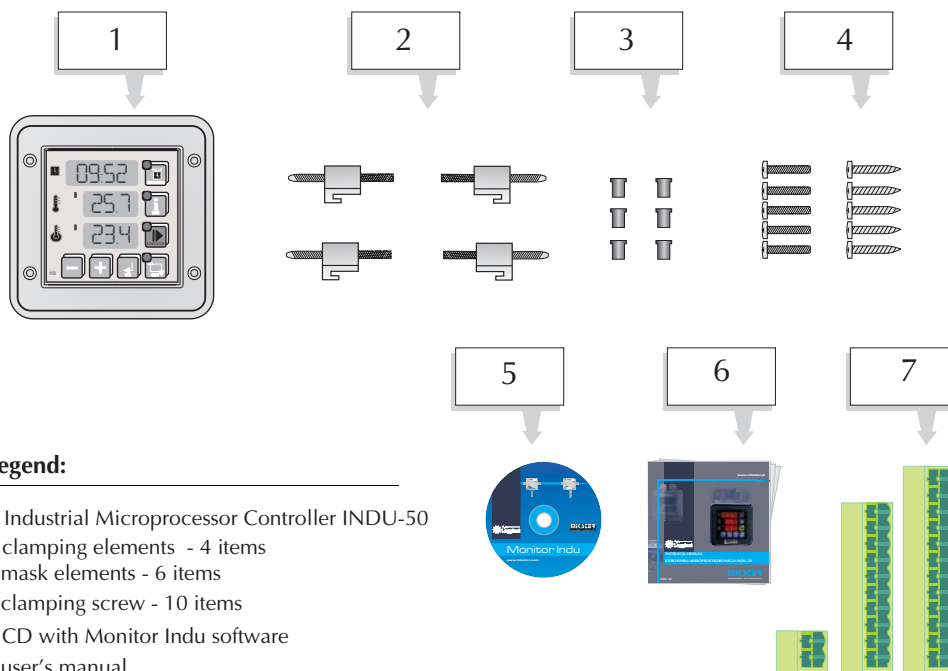
Legend:

1. Industrial Microprocessor Controller INDU-50
2. clamping elements - 4 items
3. mask elements - 6 items
4. clamping screw - 10 items
5. CD with Monitor Indu software
6. user's manual
7. plug AKZ950x14 - 1 item, plug AKZ950x12 - 1 item, plug AKZ950x2 - 1 item
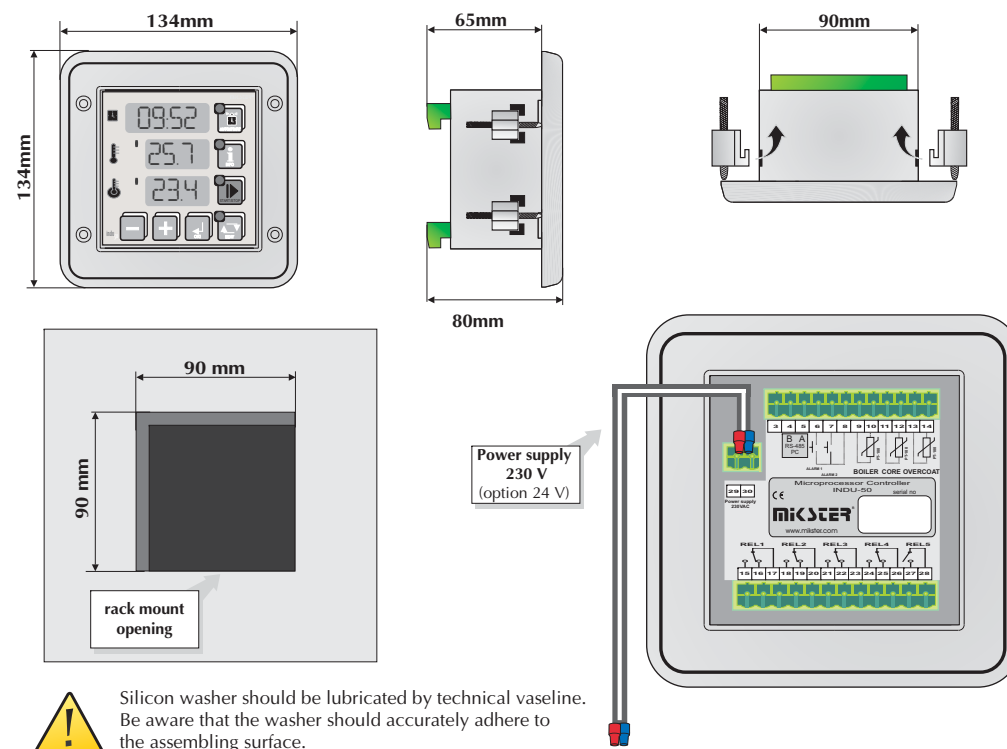
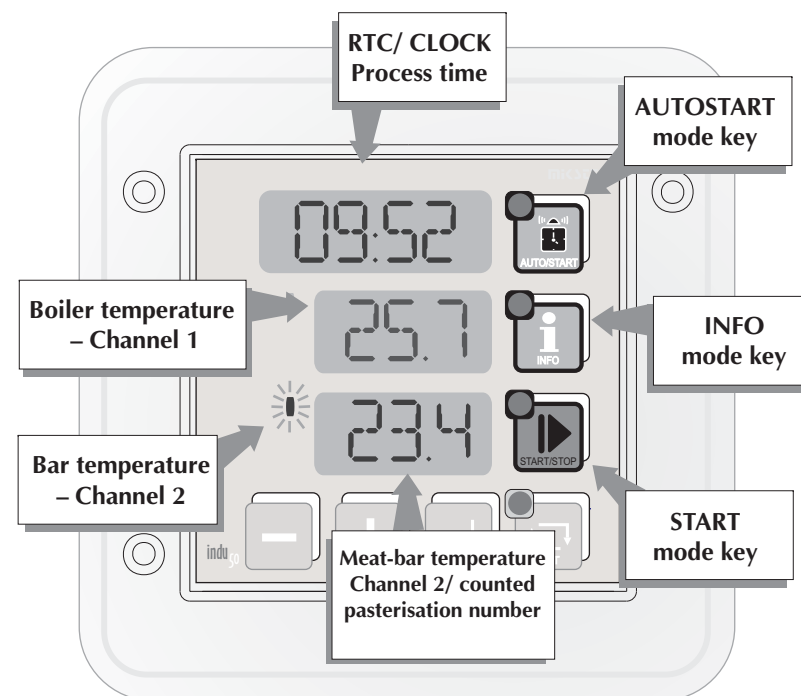⚠ Silicon washer should be lubricated by technical vaseline. Be aware that the washer should accurately adhere to the assembling surface.

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 STOP 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).

**RTC/ CLOCK
Process time**

**AUTOSTART
mode key**

**INFO
mode key**

**Boiler temperature
– Channel 1**

**Bar temperature
– Channel 2**

**START
mode key**

**Meat-bar temperature
Channel 2/ counted
pasterisation number**

Operation description

Operation description

TRYB EDIT - zmiana wartości zadanych

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 chanel 1
→ controller temperature setpoint based on chanel 2

⚠ **NOTE:**
Channel 3 temperature setpoint can be entered in the SETUP menu (item 38).

INFO MODE

Press the   key to recall 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 – when the pasterisation number is being counted
→ channel 1 and channel 2 temperature setpoints
→ current date
→ current time

To get the next (previous) information, press

AUTOSTART MODE

Press the   key to edit parameters for this mode.
The 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 couses begining 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.

START MODE

To start and end the START mode, press
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.

Operation description

Operation description

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 pasterisation number

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

SERVICE FUNCTIONS ACCESSIBLE FOR THE USER

cell no	Description
UF 0	real time clock setting press _____ for next parameter
UF 1	Access code changing to the user's function Range 0..999 Value 0 – access code off
UF 2	information on software version
UF 3	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.

ALARMS

The INDU 50 Controller recognises 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.

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 aritmetric 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; Setup cell SF80) for the process temperature Tr 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.
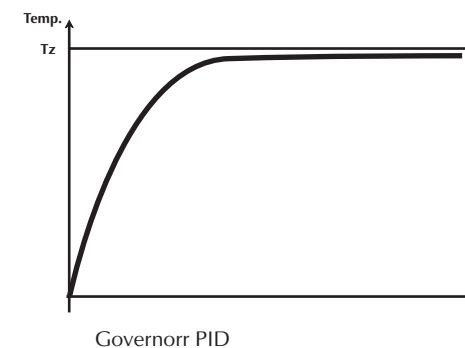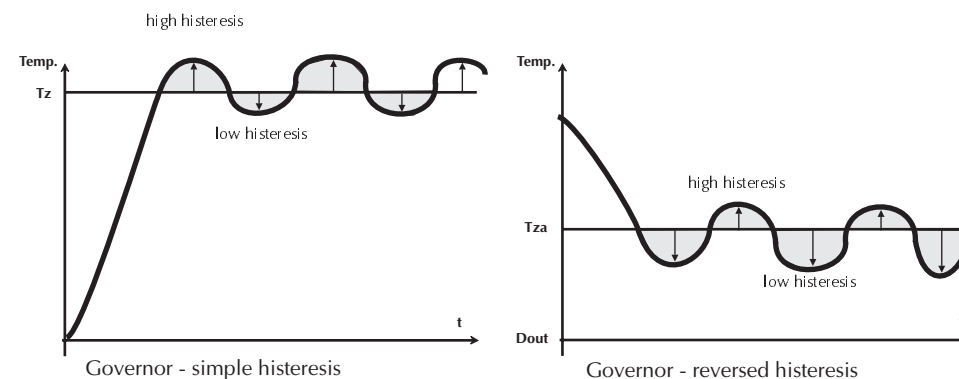
GOVERNORS OPERATION

Description of parameters

Tza – temperature of governor activation; Output is controlled up to this temperature (warming). When this temperature is reached the algorithm of regulation begins.
Dout – state on digital output (high state means that heaters are switched on).
t- time

Governor - simple histeresis

Governor - reversed histeresis

Governorr PID

Governor of temperature approaching

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 realised. In the third zone the temperature in between the lower and upper histeresis is kept.
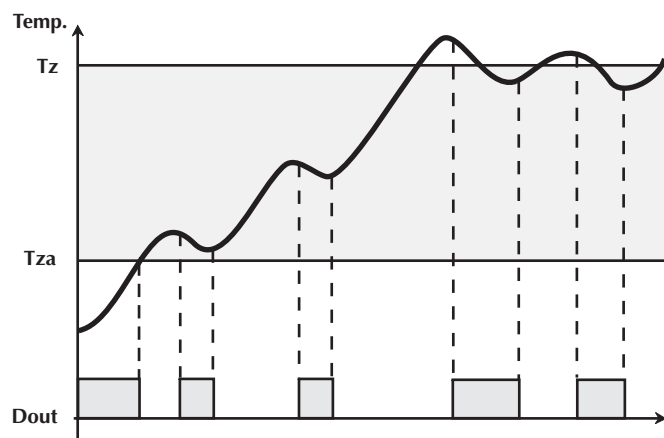
Governor of temperature approaching

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 [i INFO]

Information concerning the given parameter and the governor number will appear on the upper display.
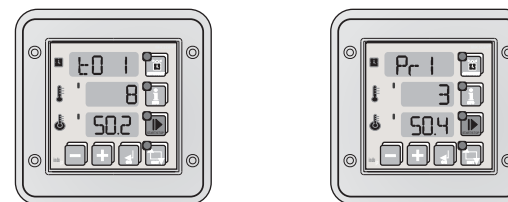
Edition of the selected parameter is done on the middle display (pulsating value).
Increase of parameter Value by the key [+] , decrease by the key [–]

Shift to the next parameter and confirmation of changes by the key [← OK]
Exit from edition mode by pressing the key [EDIT]

Regulation is being done on the basis of:
To – sampling period
Pr – strengthening of a proportional element
Ti - integration constant (doubling time)
Td – difentiation constant (advancing time)
Ts - set temperature

CONTROLLER SETUP

To get into the SETUP menu, press and hold down the [–] key and then press the [EDIT] key. After entering the access code you can change the controller parameters.

No.	Default value	Range	Description
SF0	1	0..128	MODBUS network address
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 0 – PT-500, 1 – PT-100, 2 – PT1000, 3 – 0..20 mA*, 4 – 4..20 mA* 5 – thermocouple s**, 6 – thermocouple b**, 7 – thermocouple r**, 8 – thermocouple t** 9 – thermocouple j**, 10 – thermocouple e**, 11 – thermocouple k**, 12 – thermocouple n** * current input version, ** thermocouple operation version
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
SF16	200°C	-99,0 .. 999°C	Value corresponding to 20 mA for channel 3 4..20 mA input

No.	Default value	Range	Description
SF17	0,0°C	-20,0 .. 20,0°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 ON- only in the START mode
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 0 – normal hysteresis 1 – reversed hysteresis 2 – normal hysteresis, "setpoint ramping" algorithm 3 –PID regulator
SF30	0	0..3	Regulator type for channel 2
SF31	0	0..3	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
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

Controller setup

No.	Default value	Range	Description
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..20	START mode end conditions see "CYCLE END CONDITIONS"
SF46	1	0..1	Recording 1 – recording in the START mode only 0 – continuous recording
SF47	HMd	HMd / HM	AUTOSTART mode parameter format HMD – hour, minute and daily delay for START HM – hours 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 interval
SF50	1	1..360 min	Alarm recording interval
SF51	C	C / F	Temperature 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 0 – interrupted signal 1 – continuous signal
SF54	150℃	-99.. 999℃	Maximum allowable (alarm) temperature for channel 1
SF55	150℃	-99.. 999℃	Maximum allowable (alarm) temperature for channel 2
SF56	150℃	-99.. 999℃	Maximum allowable (alarm) temperature for channel 3
SF57	-99℃	-99.. 999℃	Minimum allowable (alarm) temperature for channel 1
SF58	-99℃	-99.. 999℃	Minimum allowable (alarm) temperature for channel 2
SF59	-99℃	-99.. 999℃	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
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

Controller setup

| No.	Default value	Range	Description
SF69	0	0..4	Alarm activation on control input 1 0-alarm disabled 1-alarm when inputs 6-8 are open 2-alarm when inputs 6-8 are close 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 0-alarm disabled 1-alarm when inputs 7-8 are close 2-alarm when inputs 7-8 are close 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 0 - HOUR:MIN 1 - MIN:SEC
SF76	66,4	0,1..999,1 min	Set pasterisation number
SF77	72℃	0..100 ℃	Pasterisation temperature (Process temperature Tr)
SF78	0	0..2	The channel on which the temperature inside the box is measured. 0 - channel 1 1- channel 2 2- channel 3
SF79	15	0..600 sek	Setting the reading rate of the pasterisation number (seconds)
SF80	0	0..5	Selection of sterilisation coefficients table for: 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℃	0..100℃	Temperature, from which the governor starts counting the pasterisation number

No.	Default value	Range	Description
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
			0 - measuring channel 1
			1 - measuring channel 2
			2 - measuring channel 3
SF85	0	-50,0..100 °C	Shifting of the set temperature for governor 1
SF86	0	-50,0..100 °C	Shifting of the set temperature for governor 2
SF87	0	-50,0..100 °C	Shifting of the set temperature for governor 3

Relays

REL1 Relay output of governor 1

REL2 Relay output of governor 2

REL3 Relay output of governor 3

REL4 Switched on in START mode

REL5 Alarm

Pic1. this example is given for informative purpose only and should not be considered in part or in whole as a system design.
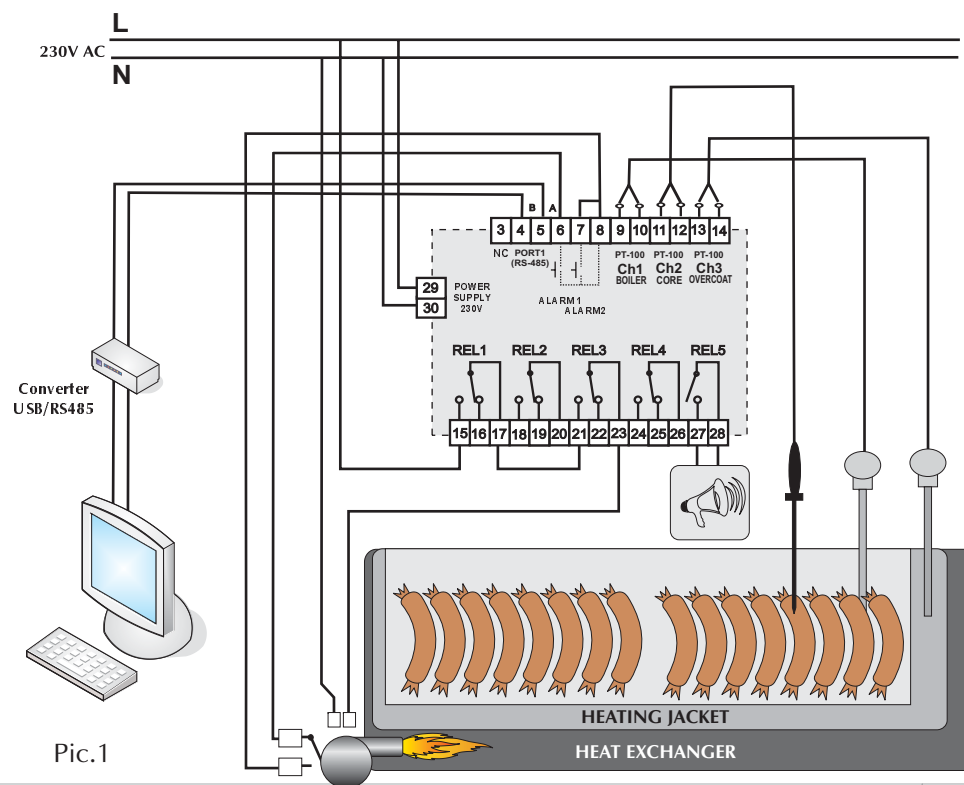
Pic.1

No	Cycle end condition (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 pasterisation number is reached.
SF45=20	End of a cycle, when either the pasterisation number or the set time is reached.

➔ **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 aften 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 ommit 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.**

➔ **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.**

Declaration of Conformity

The person undersigned, representing the below mentioned Producer

Producent	Mikster Sp. z o.o.

Address	41-250 Czeladź ul .Wojkowicka 21

Assuming full responsibility, we declare that our product:

identification:

Industrial Microprocessor Controller INDU-50

Conforms with the provisions of the following EC directive (directives).
(including all amendments and supplementing)

No directive (document)	title
89/336/EWG with changes **91/263/EWG** **92/31/EWG** **93/68/EWG**	Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Members States relating to electromagnetic comatibility

City: Czeladź   date: 16.11.2004

WICEPREZES ZARZĄDU

Zbigniew Ponitka

....
seal

(the surname and function of the person undersigning who is authorized to represent the Producer or duly empowered representative)

more information you can find on website
www.mikster.com

Technical Data

- **3 analog inputs: PT-100 (PT-500, PT-1000)**

channel 1:boiler temperature
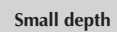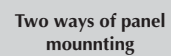channel 2: bar temperature
channel 3: jacket temperature

- **temperature measuring range**: -30.. +400 °C
- accuracy 0.1 °C
- 5 relay outputs
- 1 x RS-485
- 2 control inputs (for indicating alarms)
- power supply: 230 V AC ±10%
- power input: 3W
- protection: IP65 (front side)
- operating temperature: -10 °C .. +55 °C
- storage temperature: -15 °C.. +60 °C
- enclosure size: 134x134x65 mm
- rack mount opening: 90x90 mm

AUTOSTART: according to RTC; it is possible to program the controller run in 10 day advance.
Regulator type: 2 types of dual-setpoint regulators and PID.
Conditional process termination programmed in the SETUP menu. Recording up to approx. 100000 setpoints and measurements*.

* recording module (version R)

Features

Notes

Dual silicon gasket

Two ways of panel mounnting

Small depth

50
65

Water proof *

Chemical proff **

Alcohol proff **

* from the front IP 65
** from the front - the resistance to strong cleaning agents used in the food industry