Industrial Microprocessor Control

INDU-40

Application

Fluid batchers, fluid mixers.

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Contents

Destination of the control, operating principle ____ *3*
Specification ____ *4*
Start of batching process ____ *4*
Changing of set value ____ *4*
Holding up and stopping of batching process ____ *5*
Info ____ *5*
Service functions accessible for user ____ *5*
Alarms ____ *8*
Hypothetical application ____ *9*

Destination of the control, operating principle

The control is destined for batching of arbitrary volumes of arbitrary medium at set temperature. Particular emphasis has been put to ensure proper operation in most harsh environmental conditions.
The control is equipped with relay outputs controlling operation of solenoid valves.

- REL1 controlling of water outlet at temperature beyond set range
- REL2 controlling of water outlet at set temperature
- REL3 increase of cold water portion (left turn) – temperature decrease
- REL4 increase of hot water portion (right turn) – temperature increase

One relay output switched on in case of alarm occurrence or after batching completion – REL5.

Two digital inputs:
- pulse input
- potential free control input

Analogue input:
- measurement with PT-100 (PT-500, PT-1000)

Selection of measuring input type in the control Setup (cell 32)

Specification

Display	LED ½ '' x 2 digits LED ½ '' x 4 digits LED ½ '' x 3 digits
Supply	230 (option: 110, 24) VAC ± 10%
Keypad	6 keys (micro switch)
Dimensions of enclosure	134x134x65 mm
Installation opening	90x90 mm
Inputs	digital, potential-free Control input: short-circuited to the system common Pulse input: short-circuited to the system common (up to 50 kHz) Maximum resistance of closed contact 100 Ω Minimum resistance of open contact 10000 Ω
Outputs	5 relay outputs, short circuiting contact (250 VAC/8A)
Degree of protection	IP65 (on front)
Power consumption	3W
Programming	100 programs enabling edition of set value

Start of batching process

In order to batch appropriate volume of medium, push the START key. Select adequate program (0…99) using PLUS/MINUS keys. Pushing the START key again will initiate mixing of medium. Once temperature of set range is reached, batching will start automatically. During mixing (establishing of set temperature), the liquid is carried away by means of REL1. Batching of medium at temperature within tolerance limits proceeds by means of REL2.

Changing of set value

If necessity to correct set values exists, it is possible to accomplish it by use of EDIT key. In order to introduce set values changes, access code for edition should be entered. A program for edition should be selected in turn, and confirmed with OK key, next set values can be changed by means of PLUS/MINUS keys. Exit from EDIT mode after pushing EDIT key once again. The first parameter is program number (upper display), the second (central display) is volume of medium to be batched, and the third parameter is set temperature.

Holding up and stopping of batching process

Batching can be held up in any moment: Pause mode (single pushing of STOP/PAUSE key), or permanent stopping of batching: STOP mode (pushing the STOP/PAUSE key second time). When the control is in Pause mode (blinking LED next to STOP/PAUSE key), restarting of batching is accomplished by START key.

Info

It is possible to obtain information about ongoing batching. If batching goes on (START or PAUSE mode), pushing of MINUS key will bring "IF" message on the display, together with information that depends on values entered into F5 and F10 cells of Setup. Info mode exit proceeds after OK key is pressed, or automatically after 5 seconds

Service functions accessible for user

Cell Number	Description
UF0	Real-time clock setting Pushing of OK key transfers to the next parameter
UF1	Change of access code to user functions Range 0..999 For 0 value – access code checking is disabled
UF2	Information about current software version
UF3	Switching ON/OFF the keypad click OFF – switching off ON – switching on

In order to enter user mode, it is necessary to push and hold MINUS key, push and hold PLUS key. The above-mentioned functions are accessible after entering of access code. In order to disable access code checking, its value should be set to 0. Access code to user functions is disabled as a standard.

Setup

SETUP menu can be accessed by pushing and holding of MINUS key, next EDIT key should be pressed. Corrections of the control parameters can be made after entering of access code.

N°	Default value	Range	Description
0	1	0..128	Address in MODBUS network
1	0	0..4	Transmission rate 0 – 9600 1 – 19200 2 – 38400 3 – 57600 4 – 115200
2	1	0..3	Decimal point position: 0 - none 1 - decimal 2 - hundredth 3 - thousandth
3	-	-	-
4	0	0..9999	How many pulses prior to reaching of set value, batching should be stopped
5	0	0..1	Counting of batched medium: 0 – up to set value 1 – from set value down to 0
6	10	0..9999	Number of units after which leaky valve alarm is raised: 0 – alarm disabled
7	0	0..4	Handling of control input 2 0 - alarm disabled 1 - alarm when inputs 7-8 are closed 2 - alarm when 7-8 inputs are open 3 – keypad locking when 7-8 inputs are closed 4 – keypad locking when 7-8 inputs are open
8	0	0..9999	Edit mode access code (change of programs' settings)
9	0	0..9999	Setup access code
10	0	0..1	Type of information displayed in START or PAUSE mode 0 –depending on F5 cell contents for F5=0 how many units left to batching end for F5=1 how many units have been already batched 1 – set values
11	0.250		Volume of medium corresponding to 1 pulse. This value must correspond to factory data of liquid flowmeter. Example: if manufacturer provides 4 pulses per one litre, then the value of 1 litre / 4 pulses = 0.250 should be entered into F11 cell. Input sequence is as follows: integer value should be entered first (in above example: 0), hit OK key, enter fractional part (in above example: 250) and confirm with OK key. Increasing and decreasing of entered values by means of PLUS/MINUS keys.
12	0	-20..20	Correction of temperature indications
13	°C	°C / F	Temperature unit

N°	Default value	Range	Description
14	1 [min]	0..99 [min]	Duration of acoustic signal Caution! If 0 value is entered, cancelling of the signal with OK key!
15	1	0..1	Operating mode of alarm output 0 – intermittent signal 1 – continuous signal
16	150°C	-99.. 990°C	Maximum allowable temperature (alarm level)
17	-1°C	-99.. 990°C	Minimum allowable temperature (alarm level)
18	Off	On / Off	Activation of temperature sensor failure alarm
19	Off	On / Off	Activation of maximum temperature exceeding alarm
20	Off	On / Off	Activation of minimum temperature exceeding alarm
21	Off	On / Off	Activation of leaky batching valve alarm
22	60	0..999 sec	Delay time of alarm signalling when sensors are damaged
23	60	0..999 sec	Delay time of alarm signalling when allowable temperatures are exceeded
24	60	0..999 sec	Delay time of alarm signalling, when alarm on control inputs
25	1	0..1	Reaction to alarm: measuring sensors damaged: 1 – process stop, 0 – signalling
26	1	0..1	Reaction to alarm: set values exceeded 1 – process stop, 0 – signalling
27	1	0..1	Reaction to alarm from control input: 1 – process stop, 0 – signalling
28	1	0..1	Recording * 0 – continuous recording 1 – recording only in START mode * recording module is installed in R version only
29	1	1..360 min	Frequency of measurements recording
30	1	1..360 min	Frequency of alarms recording
31	35	1..9999	Time-constant of the valve, in seconds
32	1	0..2	Type of temperature measuring input 0 – PT-500 1 – PT-100 2 – PT1000
33	1°C	0..50°C	Lower hysteresis, from which batching starts
34	1°C	0..50°C	Upper hysteresis from which batching starts
35	50	1..999	Gain of proportional unit
36	5	0..250 sec	Stabilization time after mixer location change

Alarms

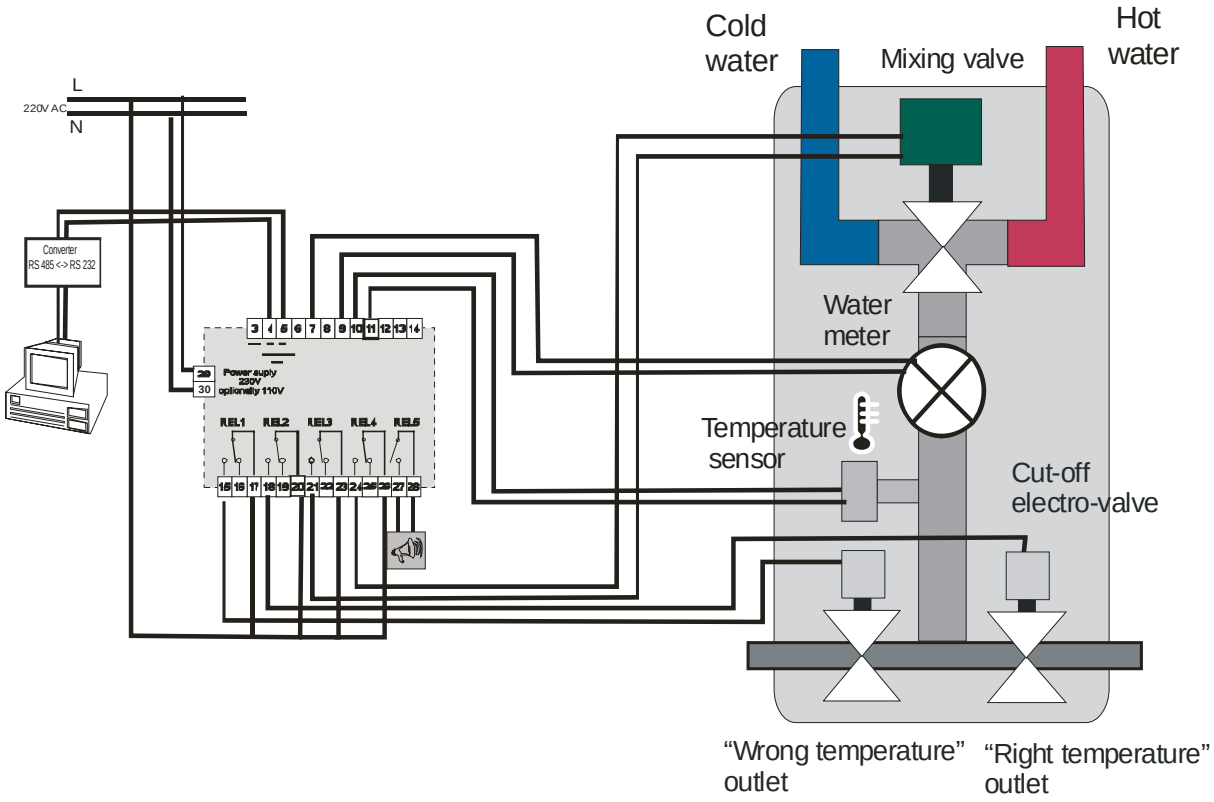
INDU 40 control signals the following alarm conditions:

- Err 1 Failure or missing temperature measuring element
- Err 4 Maximum allowable temperature exceeded
- Err 7 Minimum allowable temperature exceeded
- Err 11 Control input 2 is open
- Err 16 Batching valve untightness

In order to enable alarms, the time of alarm activation should be selected first [seconds] in Setup (cells 22 … 24), and then selected alarms should be enabled in Setup (cells 18 … 21).

Occurrence of alarm should be acknowledged with OK key. If cause of alarm activation was not rectified, then control, after expiration of given alarm delay time, will signal the alarm again.

Hypothetical application*



*- *recording module installed only in R version*

* *Example of application should be treated as pictorial, and cannot be in whole or in part treated as control system design*

Notes

Notes

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