

SINGLE-CHANNEL PROCESS INDICATOR series 4002-D

- Analog Inputs - all inputs available in one unit
 - Pt100 RTD type DIN 43 760 or GOST 6651-78 (range from 0 to +600°C)
 - TC type:
 - J - range from 0 to +600 C
 - K - range from 0 to +1200 C
 - S - range from 0 to +1600 C
 - Current input 0-20mA or 4-20mA DC
 - Voltage input 0-10V DC
- Built-in cold junction temperature compensation
- Built-in programmable digital filtration of the measured value
- Four programmable SPDT relay outputs - High / Low alarm level or ON/OFF control
- Optional: galvanic isolated internal 24V DC / 50mA loop power supply
- Optional: RS485 communication interface
- Optional: galvanic isolated 4÷20 mA current output, passive



GENERAL INFORMATION

The process indicator 4002-D is purposed for measurement and control of various industrial process parameters. The current process value is visualized on the 4-digit LED display, which is programmed to show the process variable in physical units.

Each of the output relays could be programmed either for alarm action (High or Low limit), or for ON/OFF control with user-adjustable values of control level and hysteresis. When the output relay is configured as High limit level, it is triggered when the actual process value exceeds the set limit level, and resets when the process value falls below the limit minus hysteresis. If the input is configured as Low limit level, it is triggered when the process value is below the set limit level, and resets when the limit plus hysteresis is exceeded. There is a possibility to set some reaction delay for every limit relay (up to 999 sec).

When the relay output is configured for ON/OFF control action, it is triggered when the actual process value falls below the control level setpoint minus hysteresis magnitude, and resets when the process value exceeds the setpoint. The relay status LEDs L1 (Relay 1), L2 (Relay 2), L3 (Relay 3) and L4 (Relay 4) are illuminated when the corresponding relay is energized.

When in normal operating mode, on the digital display is visualized the measured process variable. If its value is less than the lower range limit, a message "LO" is displayed; if it exceeds the upper range limit, on the display appears "HI".

By an input RTD or a TC, in case of failure of the input circuits (sensor burnout, break or short circuit of the connecting wire), a message "Err" is shown on the display. In the above-mentioned situation, the output relays are switched off.

By an input type current or voltage the process indicator does not detect and indicate on the display an eventual error in the input circuit (break or short circuit of the connecting wire). In case of such error the output relays will remain in their last actual state.

In case of detected additive error by measurements, there is a menu option for additive error correction in the form of adjustable signed value, which will be added to the measured one.

There is an option of a 2-wire galvanic isolated 4÷20 mA DC current output - passive and proportional to the measured physical quantity within the adjusted measurement range.

Alternatively there can be integrated a RS485 serial interface (baudrate up to 9600). The communication is accomplished according to the protocol Modbus RTU (Modbus ASCII on request).

On request there can be integrated also a galvanic isolated 24 VDC power supply for an external transmitter.

The following measuring ranges could be set via the keypad:

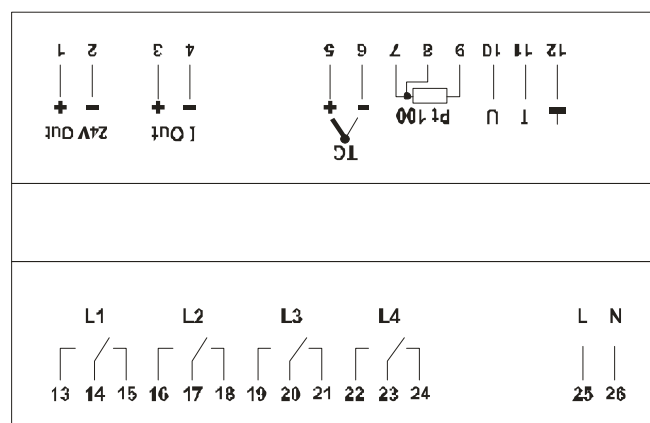
- for current input 0-20mA or 4-20mA (other on request)
- for voltage input 0-10V (other on request)
- for RTD input Pt100 (other RTDs on request)*
- for TC type "J", "S" or "K" (other TC types on request)*

* - the measuring ranges for those measuring inputs should be set within the ranges listed in the basic specifications in the table bellow. The producer guarantees the accuracy of the measurement only within the measuring ranges listed bellow.

TECHNICAL SPECIFICATIONS

Power supply	230V AC (130-250V), < 6 VA
Measuring input types and ranges	RTD: 3-wire connection: - Pt100 (DIN 43760 or GOST 6651-78) - range from 0 to +600 °C; TC: 2-wire connection: <ul style="list-style-type: none"> • Type J - range from 0 to +600 °C • Type K - range from 0 to +1200 °C • Type S - range from 0 to +1600 °C Current input 0-20 mA or 4-20 mA DC Voltage input 0-10V DC
Accuracy	< 0.25 % FS ± 1 digit - for current, voltage and RTD input < 0.5% FS ± 1 digit – for TC
Ambient temperature	0 . . . 23°C . . . 55 °C
Resolution	Depends on the set range: 0.1 or 1°C
Digital display	- 4-digit main LED display - 2-digit LED display for symbols - 4 additional LEDs for operating mode indication
Optional: auxiliary power supply for transmitter	24V DC ± 2V, 50mA, galvanic isolated
Output relays	4 SPDT 5A/250VAC
Optional: current output or serial communication interface	4 – 20 mA , galvanic isolated, passive RS 485 over Modbus RTU protocol (ASCII on request)
Mounting	on a 35mm DIN rail
Dimensions	105 x 90 x 60mm
Weight	< 0.3 kg
Protection degree	IP 30

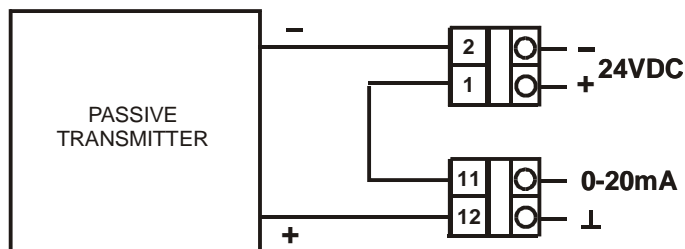
CONNECTION SCHEME



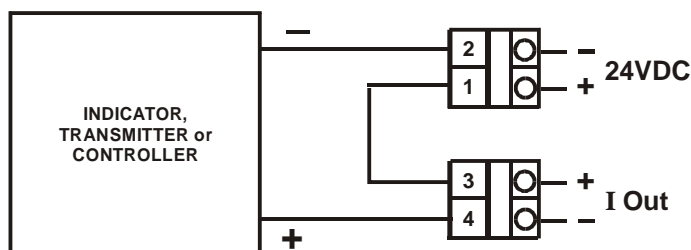
Important: All relays are displayed in coil de-energizing condition.

Sparking suppression RC groups are provided for the NO contacts only, assuming that the power switch is usually connected to the relay NO contact. Should any need arise to use any of the NC contacts, an additional external RC group (R = 100 and C = 15nF) has to be fitted in parallel, in order to prevent possible spark formation.

Example of using the built-in power supply for passive transmitter connection



Example of using the built-in power supply for the passive current output



PROCESS INDICATOR CONFIGURATION

1. CONFIGURING THE INPUT SIGNAL TYPE

Press simultaneously "MODE" and "ENT" buttons and the instrument normal operation will be cancelled. "P000" will appear on the display. Using "◀" and "▲" buttons type security code "P112". Press "ENT" and after the password is identified, a message "PASS" will appear. Press "MODE" and begin the instrument configuration.

"InPt" will appear on the display. Press "ENT".

On the display will be shown the currently selected input signal type. The "▲" button toggles between the available options:

'0-20' - Current input 0-20mA;

'4-20' - Current input 4-20mA;

'0-10' - Voltage input 0-10V;

'P100' - Pt100 RTD input type;

'tc 1' - TC type J;

'tc 2' - TC type K;

'tc 3' - TC type S;

Press "ENT".

The "▲" button toggles between the options (if Pt100 input type is chosen):

'GOST' - Pt100 RTD input type *GOST 6651-78*;

'din' - Pt100 RTD input type *DIN 43 760*;

Press "ENT".

2. SETTING THE DECIMAL POINT POSITION AND THE MEASURING RANGE FOR THE CURRENTLY SELECTED INPUT TYPE

Press simultaneously "MODE" and "ENT" buttons and the instrument normal operation will be cancelled. "P000" will appear on the display. Using "◀" and "▲" buttons type security code "P111". Press "ENT" and after the password is identified, a message "PASS" will appear. Press "MODE" and begin the instrument configuration.

Prompt 'dP' will appear on the display. Press "ENT".

On the display will be shown the currently selected decimal point position. The "▲" button toggles between the available options:

' 0'

' 0.0'

' 0.00' – for current or voltage input only

'0.000' – for current or voltage input only. (no negative values for the measuring range could be set in this case)

Press "ENT".

SETTING THE MEASUREMENT RANGE IN PHYSICAL UNITS

Setting the beginning of the measurement range

Prompt "rbEG" will appear on the display. Press "ENT".

On the display will be shown the currently set value for the beginning of the range:

'xxxx'

Using "◀" and "▲" buttons change the displayed value to the desired one.

Press "ENT".

Setting the end of the measurement range

Prompt "rEnd" will appear on the display. Press "ENT".

On the display will be shown the currently set value for the end of the range:

'xxxx'

Using "◀" and "▲" buttons change the displayed value to the desired one.

Press "ENT".

Note: The measuring range limits for TC and RTD inputs should be set within the listed in **Table 1** (Technical specifications) measuring ranges.

3. CONFIGURING THE RELAY OUTPUTS

Press simultaneously "MODE" and "ENT" buttons and the instrument normal operation will be cancelled. "P000" will appear on the display. Using "◀" and "▲" buttons type security code "P113". Press "ENT" and after the password is identified, a message "PASS" will appear. Press "MODE" and begin the Relay 1 output configuration.

Prompt "rEL1" (Relay output 1) will appear on the display. Press "ENT".

The currently selected configuration of the relay will be displayed. The "▲" button toggles between the available options:

'ALAr' - Alarm level control action

'0n0F' - ON/OFF control action

'n0' - deactivated

Press "ENT".

On the display will appear the currently set limit level type. The "▲" button toggles between the available options:

'HL' - High limit level

'LL' - Low limit level

Press "ENT".

Prompt "**L1**" appears on the display. Press "**ENT**". On the display will appear the currently set limit level.

'**xxxx**' - currently set limit level value in real units

Using "**◀**" and "**▲**" buttons change the displayed value to the desired one.

Press "**ENT**".

On the display will appear '**H1**'. Press "**ENT**" and you can see the set hysteresis value for the limit level in real units.

Using "**◀**" and "**▲**" buttons change the displayed value to the desired one.

Press "**ENT**".

If the Relay output 1 is configured as a limit level for alarm action, on the display will appear '**txxx**' - time delay from 0 to 999 seconds (After the alarm level is exceeded, the timer starts measuring the delay and resets every time when the measured value goes out of the alarm zone. The relay will be activated at the end of the set delay.)

Using "**◀**" and "**▲**" buttons change the displayed value of the time delay to the desired one.

Press "**ENT**".

Prompt "**rEL2**" (Relay output 2) will appear on the display. Press "**ENT**".

The currently selected configuration of the relay will be displayed. The "**▲**" button toggles between the available options:

'**ALAr**' - Alarm level control action

'**0n0F**' - ON/OFF control action

'**n0**' - deactivated

Press "**ENT**".

On the display will appear the currently set limit level type. The "**▲**" button toggles between the available options:

'**HL**' - High limit level

'**LL**' - Low limit level

Press "**ENT**".

Prompt "**L2**" appears on the display. Press "**ENT**". On the display will appear the currently set limit level.

'**xxxx**' - currently set limit level value in real units

Using "**◀**" and "**▲**" buttons change the displayed value to the desired one.

Press "**ENT**".

On the display will appear '**H2**'. Press "**ENT**" and you can see the set hysteresis value for the limit level in real units.

Using "**◀**" and "**▲**" buttons change the displayed value to the desired one.

Press "**ENT**".

If the Relay output 2 is configured as a limit level for alarm action, on the display will appear '**txxx**' - time delay from 0 to 999 seconds (After the alarm level is exceeded, the timer starts measuring the delay and resets every time when the measured value goes out of the alarm zone. The relay will be activated at the end of the set delay.)

Using "**◀**" and "**▲**" buttons change the displayed value of the time delay to the desired one.

Press "**ENT**".

Prompt "**rEL3**" (Relay output 3) will appear on the display. Press "**ENT**".

The currently selected configuration of the relay will be displayed. The "**▲**" button toggles between the available options:

'**ALAr**' - Alarm level control action

'**0n0F**' - ON/OFF control action

'**n0**' - deactivated

Press "**ENT**".

On the display will appear the currently set limit level type. The "**▲**" button toggles between the available options:

'**HL**' - High limit level

'**LL**' - Low limit level

Press "**ENT**".

Prompt "**L3**" appears on the display. Press "**ENT**". On the display will appear the currently set limit level.

'**xxxx**' - currently set limit level value in real units

Using "**◀**" and "**▲**" buttons change the displayed value to the desired one.

Press "**ENT**".

On the display will appear '**H3**'. Press "**ENT**" and you can see the set hysteresis value for the limit level in real units.

Using "**◀**" and "**▲**" buttons change the displayed value to the desired one.

Press "**ENT**".

If the Relay output 3 is configured as a limit level for alarm action, on the display will appear '**txxx**' - time delay from 0 to 999 seconds (After the alarm level is exceeded, the timer starts measuring the delay and resets every time when the measured value goes out of the alarm zone. The relay will be activated at the end of the set delay.)

Using "**◀**" and "**▲**" buttons change the displayed value of the time delay to the desired one.

Press "**ENT**".

Prompt "**rEL4**" (Relay output 4) will appear on the display. Press "**ENT**".

The currently selected configuration of the relay will be displayed. The "**▲**" button toggles between the available options:

'**ALAr**' - Alarm level control action

'**On0F**' - ON/OFF control action

'**n0**' - deactivated

Press "**ENT**".

On the display will appear the currently set limit level type. The "**▲**" button toggles between the available options:

'**HL**' - High limit level

'**LL**' - Low limit level

Press "**ENT**".

Prompt "**L4**" appears on the display. Press "**ENT**". On the display will appear the currently set limit level.

'**xxxx**' - currently set limit level value in real units

Using "**◀**" and "**▲**" buttons change the displayed value to the desired one.

Press "**ENT**".

On the display will appear '**H4**'. Press "**ENT**" and you can see the set hysteresis value for the limit level in real units.

Using "**◀**" and "**▲**" buttons change the displayed value to the desired one.

Press "**ENT**".

If the Relay output 4 is configured as a limit level for alarm action, on the display will appear '**txxx**' - time delay from 0 to 999 seconds (After the alarm level is exceeded, the timer starts measuring the delay and resets every time when the measured value goes out of the alarm zone. The relay will be activated at the end of the set delay.)

Using "**◀**" and "**▲**" buttons change the displayed value of the time delay to the desired one.

Press "**ENT**".

4. CONFIGURING THE BUILT-IN DIGITAL FILTER

Press simultaneously "MODE" and "ENT" buttons and the instrument normal operation will be cancelled. "P000" will appear on the display. Using "◀" and "▲" buttons type security code "P114". Press "ENT" and after the password is identified, a message "PASS" will appear. Press "MODE" and begin the digital filter adjustment.

Prompt 'FILT' appears on the display. Press "ENT". Using "◀" and "▲" buttons type the value of the digital filter coefficient (00.00 to 99.99). The filtration is proportional to the coefficient's value. If the difference between two consequent measurements is bigger than 5% of the range the filter coefficient is automatically set to zero. When the difference is less than 5% the filter works with the currently set coefficient.

5. SETTING THE ADDITIVE ERROR CORRECTION

Press simultaneously "MODE" and "ENT" buttons and the instrument normal operation will be cancelled. "P000" will appear on the display. Using "◀" and "▲" buttons type security code "P115". Press "ENT" and after the password is identified, a message "PASS" will appear. Press "MODE" and begin the correction adjustment.

'AdCr' appears on the display. Press 'ENT'. Using "◀" and "▲" buttons type the necessary signed value of the additive error correction in real units. The correction can be negative. The '-' sign appears on the most significant position after the digit 9.

6. CONFIGURING THE SYMBOLS ON THE 2-DIGIT DISPLAY

Press simultaneously "MODE" and "ENT" buttons and the instrument normal operation will be cancelled. "P000" will appear on the display. Using "◀" and "▲" buttons type security code "P118". Press "ENT" and after the password is identified, a message "PASS" will appear. Press "MODE" and begin the configuration.

A prompt 'SdSP' appears on the display. Press 'ENT'. The left digit of the 2-digit display starts blinking. Using "◀" and "▲" buttons traverse through the available indication symbols. Press 'ENT' to save the selected symbol and continue to the next digit. Using "◀" and "▲" buttons traverse through the available indication symbols. Press 'ENT' to save the selected symbol. The display should stop blinking. Press 'ENT' once again to return to normal operation mode. By pressing 'MODE' instead of 'ENT' the operator can skip a digit without saving it.

7. OPTIONAL: CONFIGURING THE SERIAL COMMUNICATION

Press simultaneously "MODE" and "ENT" buttons and the instrument normal operation will be cancelled. "P000" will appear on the display. Using "◀" and "▲" buttons type security code "P116". Press "ENT" and after the password is identified, a message "PASS" will appear. Press "MODE" and begin the serial interface configuration.

On the display will be shown the currently selected communication speed. The "▲" button toggles between the available options:
'9600' - 9600 baud (recommended value);
'4800' - 4800 baud;
Press "ENT".

On the display will appear the currently selected parity. The "▲" button toggles between the available options:
'n0nE' – no parity
'EuEn' – even parity
Press "ENT".

Configuring the **MODBUS** device address. On the display will appear:

'**dxxx**' - MODBUS device address from 0 to 255

Each device on a serial line must have its own unique address in range from 1 to 247 as is described in MODBUS application protocol standard.

Using "**◀**" and "**▲**" buttons change address to the desired one.

Press "**ENT**".

Configuring the **SLAVE** response delay. On the display will appear:

'**txxx**' - amount of time to delay the reply after receiving a MASTER request - from 0 to 63 milliseconds (a value from 20 to 40 ms is recommended)

Using "**◀**" and "**▲**" buttons change the displayed value of the delay to the desired one.

Press "**ENT**".

8. OPTIONAL: CONFIGURING THE RANGE OF THE CURRENT OUTPUT

Press simultaneously "**MODE**" and "**ENT**" buttons and the instrument normal operation will be cancelled. "**P000**" will appear on the display. Using "**◀**" and "**▲**" buttons type security code "**P117**". Press "**ENT**" and after the password is identified, a message "**PASS**" will appear. Press "**MODE**" and begin the configuration.

A prompt '**Out**' appears on the display. Press '**ENT**'. A prompt '**rA 1**' appears on the display. Press '**ENT**' to begin setting the lower range limit. Using "**◀**" and "**▲**" buttons change the displayed current lower range value to the desired one. Press '**ENT**' to save it. A prompt '**rA 2**' appears on the display. Press '**ENT**' to begin setting the higher range limit. Using "**◀**" and "**▲**" buttons change the displayed current higher range value to the desired one. Press '**ENT**' to save it. By pressing '**MODE**' instead of '**ENT**' the operator can skip a range limit without saving it.