

Contents

1. DESIGNATION, FIELD OF APPLICATION.....3

2.SPECIFICATION.....3

2.1. Inputs (Figure4.).....3

2.2. Outputs (Figure 4.)3

2.3. Displays.....4

2.4. Type selection4

2.5. Accessories shipped with the equipment.....4

2.6. Ambient factors affecting the operation of the device.....4

2.6.1. Reference conditions4

2.6.2. Operating conditions.....5

2.7. Informative data5

2.8. Error of the measured values.....5

3. TECHNICAL DESCRIPTION5

3.1. Display unit.....5

3.2. Operating the pushbuttons (Figure 1.)6

3.3. Displays and programming the device.....6

3.3.1. Definition of data in data group Measure.....6

3.3.2. Definition of data in data group Program.....6

3.4. Batch control7

4. MECHANICAL CONSTRUCTION8

5. SETUP.....8

5.1. Unpacking the device.....8

5.2. Installing the device.....8

6. MAINTENANCE8

7. REPAIR8

8. PROGRAMMING DATA.....13

List of Figures

Figure 1 Keypad, display.....9

Figure 2. Functions of the display.....9

Figure 3. Mechanical dimensions, panel cutout10

Figure 4. Block diagram, I/O connections10

Figure 5. Rear panel arrangements11

Figure 6. Connecting turbine meter sensor.....12

Figure 7. Setting of input selector (on rear panel).....12

1. DESIGNATION, FIELD OF APPLICATION

TQI-021/1 can be connected to any meter having pulse output. This pulse output can be directly an inductive transducer of a turbine meter, or a pulse output with higher signal level from a preamplifier.

TQI-021/1 has been built from up-to-date circuits that ensure high reliability. The instrument can be mounted in instrument rooms or field racks ensuring similar ambient conditions. In case the connected meter is operated in explosive area, it must be connected to the input through proper insulating unit (Zener-barrier).

The TQI-021/1 calculates the rate of the ing fluid based on the signals of the pulse signals of the meter, and summarizes the volume ing through during the time of measurement. These

values are displayed digitally in technical units. The measured values and the programmed constants necessary for the calculations are kept by the instrument even in power-off state.

The TQI-021/1 signal processing unit is equipped with batch controlling function, pulse output for remote counter, and current output for control and recording, furthermore limit contacts for control or alarm.

2. SPECIFICATION

2.1. Inputs (Figure4.)

INP 1 Low-level pulse input (turbine transducer coil):
Inductive transducer (connected by Figures 6/A and 6/C)
Input signal level: 10 mVrms . 3 Vrms
Input frequency range: 0- 1500 Hz

INP 2 High-level pulse input:

Optocoupler LED: max. 30 mA
NAMUR (two-wire current-pulse) input
LA6 preamplifier (connected by 6/B and 6/D Figures):

Current in "0" state of pulse: max. 4mA
Current in "1" state of pulse: min. 7mA, max. 20mA
Input frequency range: 0-1500 Hz
INP 3 Batch control remote start input
Type of input make contact at start of batch
Input current max. 20 mA
Voltage at the input max. 5VDC

2.2. Outputs (Figure 4.)

OUT 1 Remote counter operating output
Type of output: 24VDC control pulse.
Load: 100 mA
Duration of pulse: presettable (dT)
Volume unit per pulse: presettable (Vo)
OUT 2 Batch control output
Type of output: make contact during batching
Load: max.12W, max.42VDC, max.1A

TQI-021/1

OUT 3 Alarm for power failure or exceeding limits:

Type of output: brake contact at signaling

Switchable power: max.12W, max.42VDC, max.1A

The contact is normally closed. In case the actual is less, than the preset low limit

(QL), or the actual is higher, than the preset high limit (QH), the contact brakes.

OUT 4 Programmable current output proportional to rate

Current range:

rate rang:

Load:

0.20 mA (Io...Im)

the measuring range (QIo, QIm)

0.500 .

2.3. Displays

The display of the signal processing unit is displaying the following measured and calculated values:

Integrated volume (not resettable),

Integrated volume (resettable),

In case of batch control the batch volume and volume left,

rate (numeric and analogue bar-graph display),

More information of other programming data and displays see paragraph 3.

2.4. Type selection

The TQI-021/1 signal processing unit is manufactured in two versions according to powering.

3 4 1 7 - 0 - 3 0 0 - A

Power

0 115...230 VAC

1 24 VDC

2.5. Accessories shipped with the equipment

1 pc. Manual

1 pc. Quality Certificate

1 pc. Set of accessories for panel mounting

2.6. Ambient factors affecting the operation of the device

2.6.1. Reference conditions

- Ambient temperature: 20 °C ±2 °C

- Line voltage: 230Vrms ± 2% (optionally 24VDC ±2%)

- Line frequency: 50 Hz ± 1%

- Relative humidity: 10÷75 % at 20 °C

- Magnetic field: not allowed

- Mechanical shock: not allowed

- Pressure: normal atmospheric pressure (86-106 kPa)

4

2.6.2. Operating conditions

- Ambient temperature: +5 .. +40 °C
- Line voltage: 100.264 VAC (optionally 24VDC±3 V)
- Line frequency: 50 Hz ± 2%
- Relative humidity: 5-80 % without condensation
- Magnetic field: max. 400 A/m
- Mechanical shock: frequency: 10-55 Hz, amplitude: max. 0.15 mm

2.7. Informative data

- Power consumption: about 10 VA
- Fuse: 500mA-T
- Protection: IP 20

Outline dimensions:

- Panel cutout dimensions: 138x68 mm
- Outline dimension of cover: 144 x 72 x 209 mm
- Construction: Nz-1 (MSZ 8881/3-70) normal indoor.
- Mass: 0,8 kg

Storage temperature range: -25 ÷ +70 °C

Relative humidity: 5 ÷ 80 % (without condensation)

2.8. Error of the measured values

- Calculation error of rate: ± 0,02 %
- Volume integrating error: ± 0,02 %
- Error of output current: ± 0,25 %

3. TECHNICAL DESCRIPTION

The block diagram of TQI-021/1 can be seen on Figure 4.:

3.1. Display unit

The construction of the display of TQI-021/1 can be seen on Figure 2. The display functionally consists

of three parts:

Data display:

Displays data set, measured or calculated by the device. The displayed data can consist of max. 8 digits, 10,5 mm high, including decimal point, too.

Information display:

The three by four character display on the left side of the display gives the following information:

Upper row: DESIGNATION of the displayed data.

Middle row. TECHNICAL UNIT of the displayed data.

Lower row: first character: BATCH: during batch control flashing D appears.

second character: ALARM: at rate less than the low limit of rate a flashing L appears, at folwrate higher than the high limit of rate a flashing H appears.

third character: Empty

fourth character: DATA GROUP: signaling the kind of displayed data.

M . measured or calculated data

P . programmable data

Analogue display:

The lowest row of the display is an analogue display which shows a 3,5 mm thick line the length of which is proportional to the actual rate (Q). The full length of the line corresponds to the maximal rate of the meter (Qm). The analogue display shows the lines signing the low and high limits

TQI-021/1

(QL, QH) too, in the place proportional to their values. In case of limit error these marker lines are flashing.

3.2. Operating the pushbuttons (Figure 1.)

The four pushbuttons below the display serves for controlling the display, the batching and entering data:

^ By the arrow the displayed data can be selected.

ENT Pushbutton for initializing data change (rewriting) and for acknowledging the changed

value. It is effective only in data group P (see details in chapter 3.1.)

D Pushbutton for batch control. (see details in chapter 0.)

ESC Escape ("NOT VALID") pushbutton.

Right from the display a standard numeric keypad can be found for entering the constants for the

device. In this group the CL (Clear) pushbutton can be found, which serves for clearing the mistaken

entered digit, and for clearing the resettable counter (chapter 3.3.1. .V'). The pushbutton 0 has

double function. At data entry it serves for entering number 0 , at normal case it serves for selecting

DATA GROUP (M/P) (details in chapter 3.3.).

3.3. Displays and programming the device

The displayable data are sorted in two groups. The first group contains the Measured data displayed

during normal operation; the other contains the Programmed data of the device and the attached

meter. At power-on the DATA GROUP is always M.

Only the data in group P can be rewritten. The way of it is the following:

- Switch the data group to P using the pushbutton M/P.
- Select the data to be changed by the pushbutton ^.
- Press pushbutton ENT . This time the contrast of the data display becomes inverted signing that data-entering keypad is active.

• Enter new value. During entering the mistaken number can be cleared by pushbutton CL or we

can leave enter mode with pushbutton ESC to the state that was before pressing pushbutton ENT.

- The entered data is acknowledged and stored by pressing pushbutton ENT again.

3.3.1. Definition of data in data group Measure

.V Not resettable ("all time") volume counter, showing total volume n through since the factory setup.

.V' Resettable volume counter, that shows volume n through since the last reset. By pressing

pushbutton CL this data becomes displayed and is changed to inverse, signing the state ready

for reset. By pressing CL again the counter is reset.

NOTE! The value before reset cannot be called back by pressing ESC.

D' During batch control the volume left from the batch.

Q Actual value of rate.

q Actual relative value of rate ($q = Q/Q_m \cdot 100\%$).

3.3.2. Definition of data in data group Program

D Set value of batch.

Io Minimal value of output current.

Im Maximal value of output current.

QIo rate corresponding to minimal output current.

QIm rate corresponding to maximal output current.

K Calibration factor of the meter.

TQI-021/1

Qm Nominal maximal rate for the meter.
QH High alarm limit for the rate.
QL Low alarm limit for the rate.
Vo Volume corresponding to one pulse of the remote counter.
dT Pulse width of the remote counter output.
E Identifier (serial number) of the device.
S Identifier (serial number) of the meter connected to the device.

CNo Electronic .seal. that is the check number of the measuring system. The program of TQI-021/1 generates this number automatically; there is no other way of setting it. In case any of the data in data group P is changed even temporarily, the check number will change. As there is no other way for changing the check number, registering and checking the value of this number can sense the unauthorized manipulation.

fIn Selector code for input signal.
1 the device receives pulse signal from the high level inputs (6,7,8)
0 the device receives pulse signal from the low level inputs (4,5)

ISk Output current full scale. Attention! The changing of it by the user is not recommended.
I00 Output current zero correction. Attention! The changing of it by the user is not recommended.

3.4. Batch control Setting the batch

At pressing pushbutton D at once the value of batch (D) appears at the display in inverse contrast signaling that the keys of the numeric keypad became active, enabling the entering of the new value of batch. After entering the new value of batch it is acknowledged by pressing pushbutton ENT. By pressing ENT the batching is not started, only the new value for batching is entered in memory D.

Start batching by the pushbutton on front panel

After entering the new batch value (or leaving the old value unchanged) by pressing pushbutton D repeatedly batching starts at once, the BATCHING information character gives a flashing D signal, the display is changed to displaying the batch volume left (D').

Suspending or stop batching by front panel pushbuttons

Batching automatically stops if the volume left (D') reaches zero. In case You press pushbutton D during batching started from the front panel the batching is suspended, the display changes to D' , the value of it is seen this time in inverted contrast, signing that the batching is only suspended, but is not terminated. The character BATCH keeps giving the flashing

D signal. In this stage batching can be continued by pressing pushbutton D again, the display of D' turns to normal contrast. The suspended batching can be terminated by pressing pushbutton ESC.

Start batching by remote contact

Batching starts at once in case we apply short circuit at the batch input terminals for at least 100 ms time. After starting batch by remote close contact the pushbutton D becomes inactive until the end of batching.

Suspending or stop batching by remote contact

Batching started by remote contact can be suspended by a new closing of the contact and it can be restarted by a new closing.

Batching suspended by a remote contact can also be terminated by the pushbutton ESC.

4. MECHANICAL CONSTRUCTION

TQI-021/1 is encapsulated in a standard size plastic enclosure that is to be built in by Figure 3. The front panel consists of a foil keypad and a graphic LCD display. The rear panel contains the terminals for connecting input and output cables. The cables must be fixed near their end by cable fixing assemblies for freeing the terminals of stress.

5. SETUP

5.1. Unpacking the device

The device and its accessories are packed according to the demands of safe transport. Unpacking is carried out by the usual way, no special measures are needed.

5.2. Installing the device

Before you want to use TQI-021/1 signal processing unit for measurement, the following are recommended:

- Study the Manual.
- Prepare the necessary cutout on the instrument panel (Figure 3.)
- Install the device to the final position.
- Connect the input and output terminals of the device according to the desired task by figures 4. and 6.
- Check the settings of the code switches on the rear panel (Figure 7.)
- Connect the power cord of the device.
- Switch the device under power
- Check the programmed data in the memory of the device (chapter 3.3.2.). In Chapter 8.

You find the list of Programmed Data with the factory-preset values. Perform the necessary changes and record them in the table.

6. MAINTENANCE

The device needs no other maintenance except the performing of checks described in the Manual.

7. REPAIR

In case of malfunction the device can be repaired by the usual and accepted way of repairing electronic devices, keeping the prescriptions of safety of life and goods. During repair the ambient conditions fixed in the specification must be agreed.

Attention! After the factory setup of the device the operating software stores the necessary hardware setup values. These values might change after a part replace during a repair, therefore a new setup measurement might be necessary. Therefore it is recommended to have the repair made by the manufacturer.

RIGHT FOR TECHNICAL CHANGES IS RESERVED!

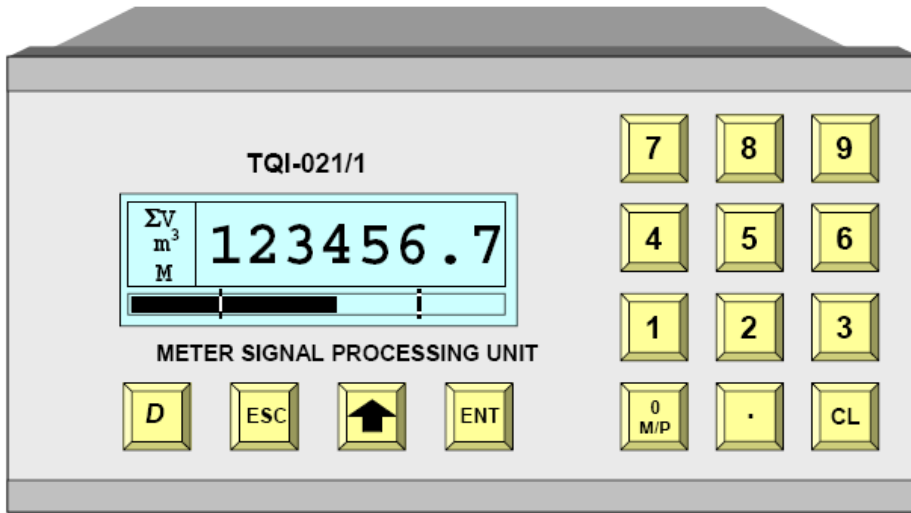


Figure 1 Keypad, display

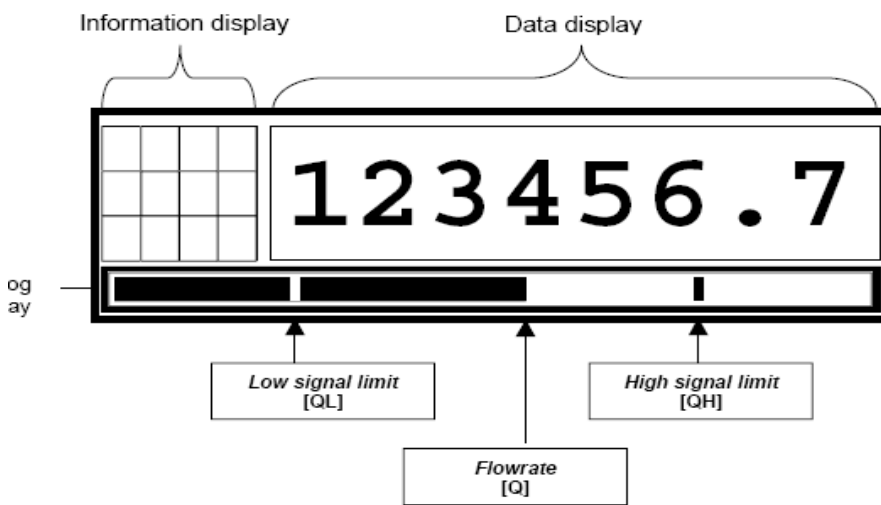


Figure 2. Functions of the display

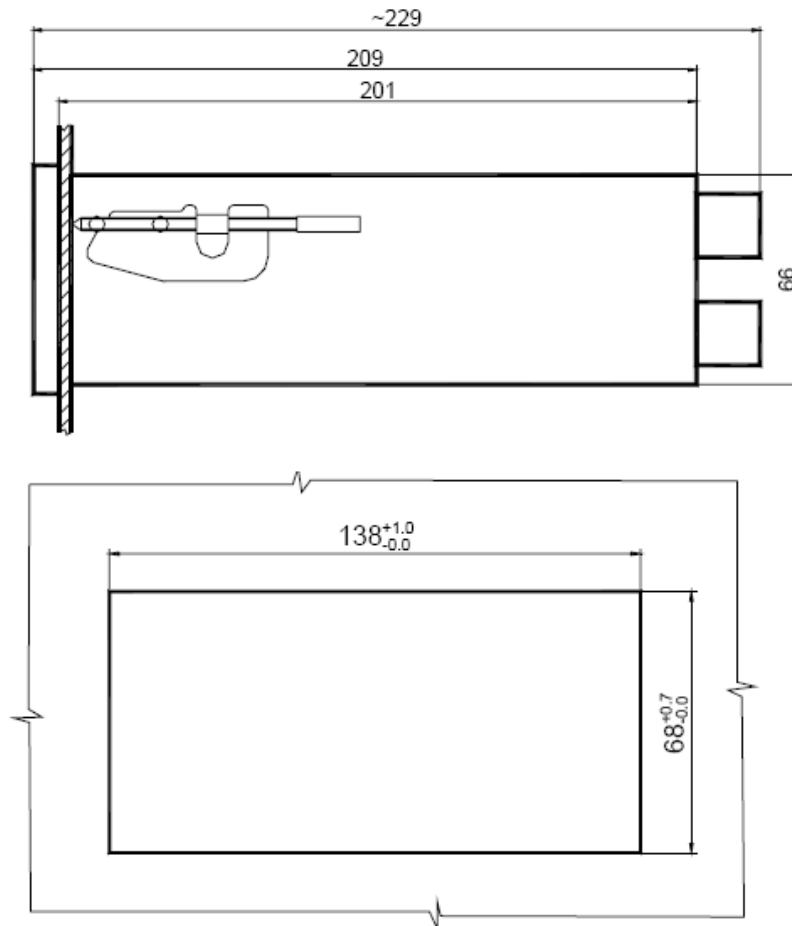


Figure 3. Mechanical dimensions, panel cutout

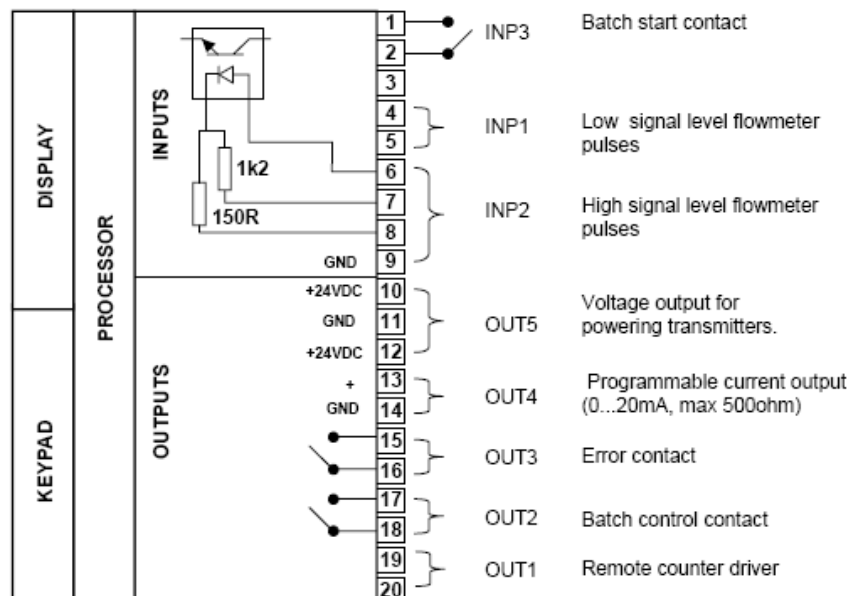
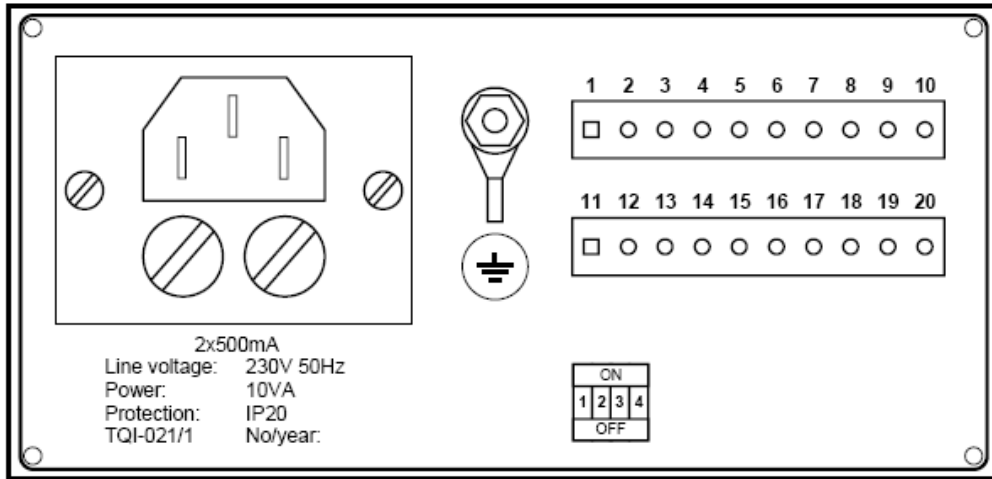
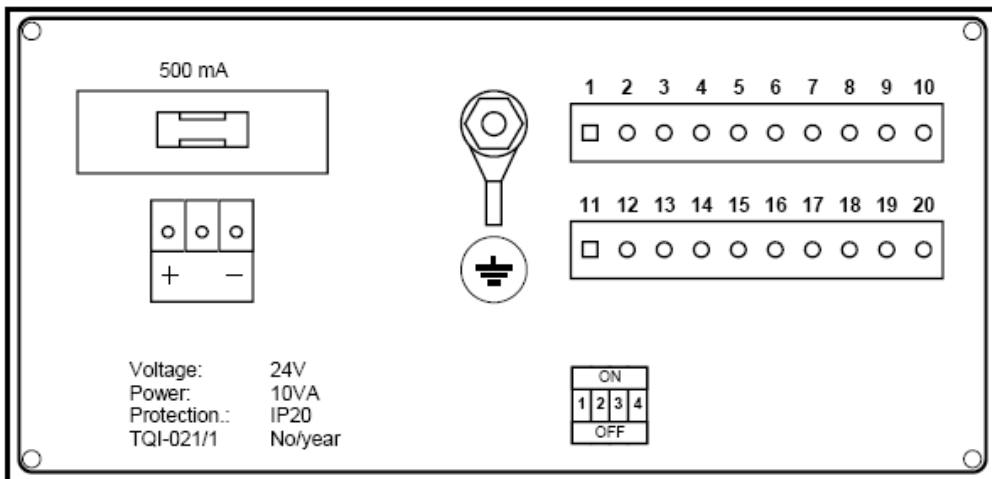


Figure 4. Block diagram, I/O connections



Line powering



24V DC powering

Figure 5. Rear panel arrangements

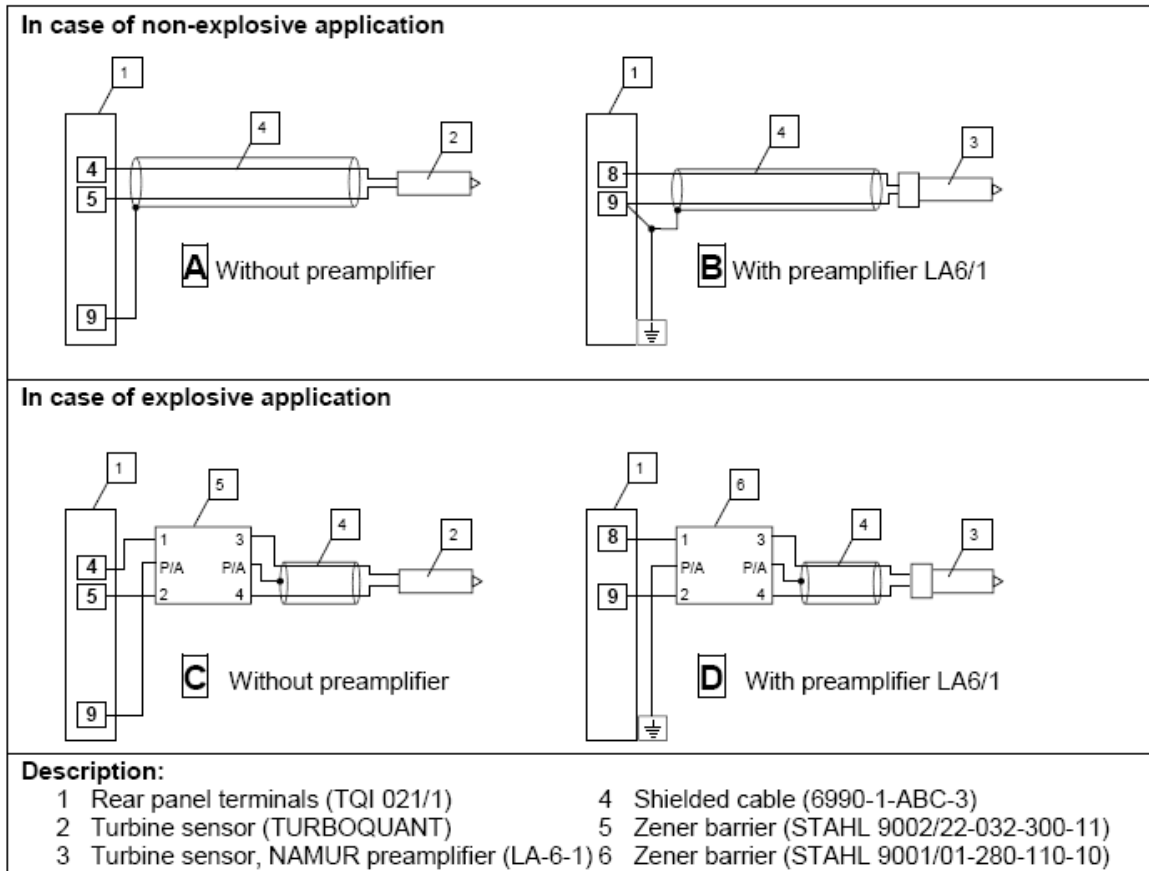


Figure 6. Connecting turbine meter sensor

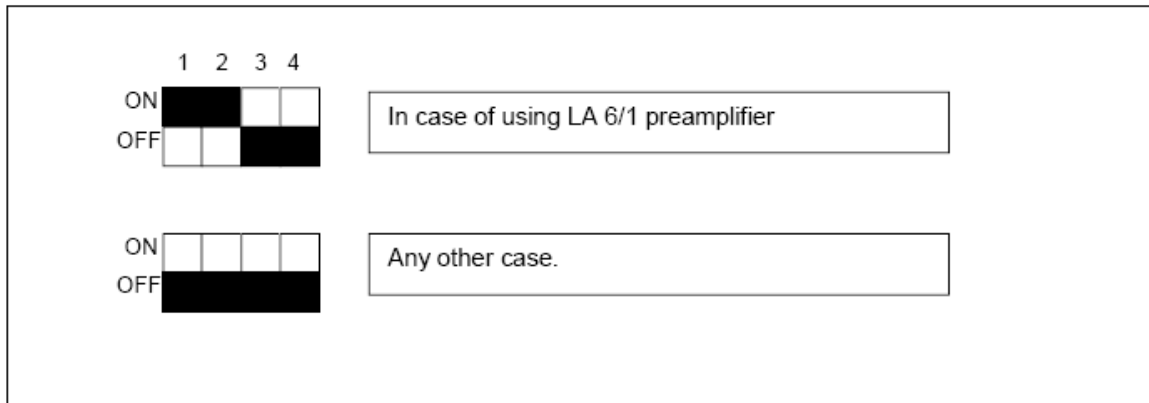


Figure 7. Setting of input selector (on rear panel)

8. PROGRAMMING DATA

Sign	Description	Unit	Factory setting	Change 1	Change 2	Change 3
D	Set batch volume.	m ³	1,000			
I_o	Minimal value of output current.	mA	4,0			
I_m	Maximal value of output current.	mA	20,0			
Q_{io}	Flowrate corresponding to minimal current output.	m ³ /h	0,00			
Q_{im}	Flowrate corresponding to maximal current output.	m ³ /h	16,00			
K	Calibration factor of flow sensor.	pulse/m ³	247540,4			
Q_m	Nominal maximal flowrate of the flowmeter.	m ³ /h	16,00			
QH	High alarm limit of flowrate.	m ³ /h	14,40			
QL	Low alarm limit of flowrate.	m ³ /h	3,20			
V_o	Volume corresponding to one pulse of the remote counter.	m ³	1,0000			
dT	Pulse width of the remote counter.	ms	25			
E	Identifier of the device (serial number).	-	127,2002			
S	Identifier of the flow sensor (serial number).	-	273,2002			
CN_o	Electronic "seal"	-	530528,9			
fIn	Input signal selector code	-	0			
ISk	Output current full scale	mA	25,313	*	*	*
I00	Output current zero correction	mA	-0,238	*	*	*

* Factory preset values are allowed to be changed only based on check measurements performed at authorized workshop.