

Measuring process unit type MPU-**



USER'S MANUAL

December 2025





CONTENTS

1. TECHNICAL DESCRIPTION	- 5 -
2. MEASURING QUANTITIES AND PRINCIPLE	- 6 -
3. DEVICE AND SENSOR HEAD MARKING DESCRIPTION	- 7 -
3.1. DEVICE MARKING	- 7 -
3.2. HEAD MARKING	- 7 -
4. TECHNICAL DATA	- 8 -
4.1. MPU-01/* /SBH	- 8 -
4.2. MPU-02/* /SBH	- 9 -
4.3. MPU-03/* /SBH	- 10 -
4.4. MPU-04/* /SBH	- 10 -
4.5. MPU-05/* /SBH	- 12 -
4.6. MPU-06/* /SBH	- 13 -
4.7. MPU-07/* /SBH	- 14 -
4.8. MPU-08/* /SBH	- 15 -
4.9. MPU-09/* /SBH	- 16 -
4.10. MPU-10/* /SBH	- 17 -
4.11. MPU-11/* /SBH	- 18 -
4.12. MPU-12/* /SBH	- 19 -
5.13. MPU-13 (IRTD)/* /SBH	- 20 -
4.14. MPU-14 (I2WCT)/* /SBH	- 21 -
5. INPUT/OUTPUT I.S. PARAMETERS	- 22 -
6. INSTALLATION AND CONNECTION	- 22 -
6.1. CONNECTION WITH CONNECTOR	- 22 -
6.1.1. POWER SUPPLY	- 24 -
6.1.2. ANALOG OUTPUT	- 24 -
6.1.3. RELAYS OUTPUT	- 24 -
6.1.4. RS485/CAN COMMUNICATION – OPTIONAL	- 24 -
6.2. CONNECTION THROUGH CABLE GLAND	- 24 -
6.2.1. TERMINALS CONNECTION CAPACITY	- 25 -
6.3. DISLOCATED MEASURING HEAD CONNECTION	- 25 -
7. EXTERNAL DIMENSIONS	- 26 -
7.1. MPU-01/* /SBH – MPU-07/* /SBH	- 26 -
7.2. MPU-08/* /SBH	- 27 -
7.3. MPU-09/* /SBH	- 28 -



7.4. MPU-10/* /SBH – MPU-11/* /SBH	- 29 -
7.5. MPU-12/* /SBH	- 30 -
7.6. MPU-13/* /SBH – MPU-14/* /SBH	- 31 -
8. SAFETY INFORMATION.....	- 33 -
9. OPERATION DESCRIPTION	- 34 -
9.1. START-UP	- 34 -
9.2. DETECTING AND MEASURING	- 35 -
9.2.1. IDLE MODE	- 35 -
9.2.2. ALARM MODE	- 35 -
9.2.3. WARNING	- 36 -
9.2.4. ERROR.....	- 36 -
10. DEVICE MANAGEMENT	- 37 -
10.1. USER AUTHENTICATION	- 37 -
10.2. MENU AND SUB-MENU MANAGEMENT	- 37 -
10.3. CALIBRATION	- 38 -
10.3.1. MEASURING HEAD.....	- 38 -
10.3.1.1. Calibration process	- 39 -
10.3.2. ALARM BORDER.....	- 39 -
10.3.2.1. Calibration process	- 40 -
10.3.2.2. Auto-reset function.....	- 40 -
10.3.3. RELAYS TRIGGERING	- 40 -
10.3.3.1. Calibration process	- 41 -
10.4. TEST DEVICE	- 41 -
10.4.1. TEST ANALOG OUTPUT	- 41 -
10.4.1.1. Test process	- 42 -
10.4.2. TEST DIGITAL OUTPUT	- 42 -
10.4.2.1. Test process	- 42 -
10.4.3. TEST RELAYS OUTPUT	- 42 -
10.4.3.1. Test process	- 42 -
10.5. SETTINGS	- 43 -
10.5.1. DISPLAY & LANGUAGE	- 43 -
10.5.1.1. Brightness.....	- 43 -
10.5.1.2. Contrast	- 43 -
10.5.1.3. Dimming time	- 44 -
10.5.1.4. Language	- 44 -
10.5.2. TEMPERATURE & PRESSURE	- 44 -
10.5.2.1. Show Temperature	- 45 -
10.5.2.2. Show Pressure	- 45 -
10.5.2.3. Toggle Temperature and Pressure.....	- 45 -
10.5.3. CHANGE PIN CODE.....	- 46 -
10.6. MENU STRUCTURE	- 47 -
11. TROUBLESHOOTING.....	- 48 -



12. MANUFACTURER.....	- 48 -
A. QUICK GUIDE – MEASURING HEAD CALIBRATION PROCESS	- 49 -
A.1. DEVICE FRONT PANEL.....	- 49 -
A.2. USER AUTHENTICATION.....	- 49 -
A.3. CALIBRATION MENU SELECT	- 49 -
A.4. CALIBRATION PROCESS.....	- 49 -
A.5. SAVE CALIBRATION	- 50 -
A.6. EXIT MENUS.....	- 51 -
B. MOUNTING DISLOCATED TEMPERATURE MEASURING HEAD EXAMPLE	- 52 -
C. INTERFACE IRTD/I2WCT.....	- 52 -
C.1. INTERFACE CONNECTION WITH MPU-** DEVICE	- 52 -
C.2. SENSOR CONNECTION TO IRTD/I2WCT INTERFACE	- 53 -
C.2.1. RTD sensor connection to iRTD-13/**.1 interface	- 53 -
C.2.1.1. Intrinsically safe parameters of iRTD-13/**.1 interface	- 54 -
C.2.2. 4-20mA current loop transmitter sensor connection to interface i2WCT/**.1	- 54 -
C.2.2.1. Intrinsically safe parameters of iRTD-14/**.1 interface	- 54 -






1. TECHNICAL DESCRIPTION

Measuring process unit type MPU-XX is stationary device for continuous measurement and detection the explosive gases, toxic gases, oxygen, temperature, humidity, air flow, pressure, etc. in a mining application. It is used to ensure safety, prevent explosion, and to measure and monitor the other important parameters in a mining application. The robust, light weight and compact constructed measuring device is designed in intrinsic safety **Ex-ia** protection according to the following standards:




- EN 60079-0:2018
- EN 60079-11:2012
- EN 60079-28:2015 (with SBH)
- EN 50303:2000

Explosion marking (MPU-**):

 I M1 Ex ia I Ma	(all types except MPU-01/B.C.D, MPU-02/B.C.D, MPU-03/B.C.D)
 I M1 Ex ia da I Ma	(only for type MPU-01/B.C.D)
 I M1 Ex ia db I Ma	(for types MPU-02/B.C.D and MPU-03/B.C.D)

On the device can be optionally added a certified intrinsically safe *Signal Flash Light with Horn SBH-ia/MPS*, certificate **FTZU 11 ATEX 0186 (I M1 Ex ia op is I Ma)**.

Explosion marking (MPU-** + SBH-ia/MPS):

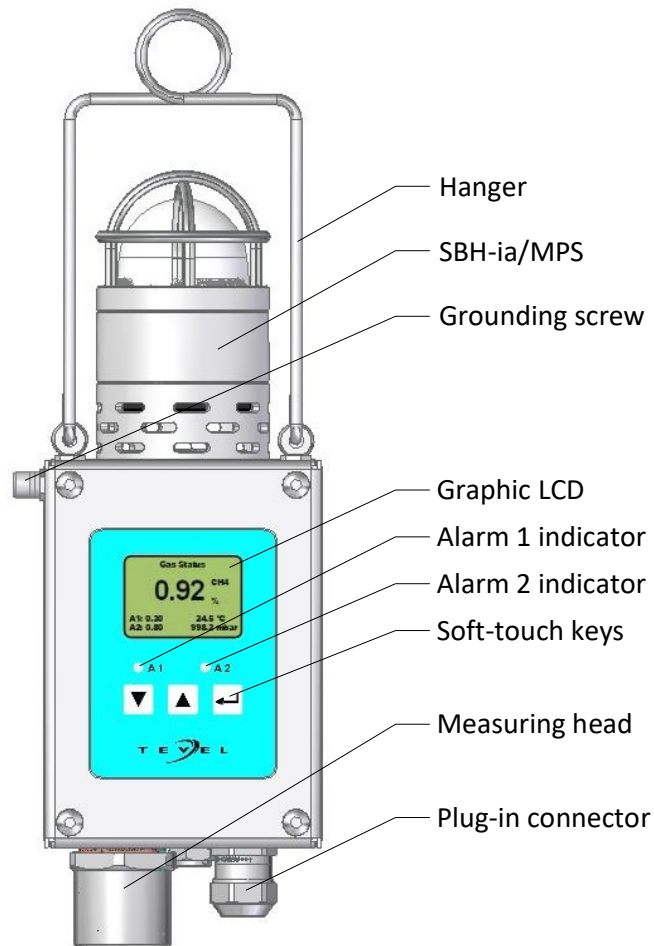
 I M1 Ex ia op is I Ma	(all types except MPU-01/B.C.D, MPU-02/B.C.D, MPU-03/B.C.D)
 I M1 Ex ia da op is I Ma	(only for type MPU-01/B.C.D)
 I M1 Ex ia db op is I Ma	(for types MPU-02/B.C.D and MPU-03/B.C.D)

The device is intended for underground mining application as well as surface mining application where may be a potential risk of fire and/or combustible dust is present.

The device enclosure is made from 2,0 mm thick of stainless steel. The housing cover is sealed with flat rubber washer which assure high ingress protection. The connection of the device can be made by 16-pole plug-in female connector for fast and easy device connection or disconnection.

Inside enclosure is electronic part of device with graphic LCD screen, two LED indicators and three capacitive touch keys. The LED indicators warn to warnings, errors or for corresponding level of alarm triggering. The screen is intended to displays actual measurement value and other important parameters and also in combination with capacitive touch keys to maintain and calibrate device. The device is protected with 4-digit PIN code against unauthorized maintaining the device.

According to the measured value and predefined alarm limit points, the device warns to potential risks. Depending on the settings and configuration, the device triggers relay outputs and scales the value on analog output. The device version with CAN or Profibus (RS-485) communication is also available to full integration the device in large systems.



2. MEASURING QUANTITIES AND PRINCIPLE

Depending on the measuring principle, type of measuring gas and other parameters, 14 versions of device is available:

Gasses:

- Explosive gas methane (CH_4) – pellistor
- Explosive gas methane (CH_4) – IR
- Suffocating gas carbon dioxide (CO_2) – IR
- Toxic gas carbon monoxide (CO) – electrochemical
- Oxygen (O_2) – electrochemical
- Toxic gas hydrogen sulfide (H_2S) – electrochemical
- Explosive gas hydrogen (H_2) – electrochemical

In most cases it is recommended to place the device vertically (the measuring head should be facing down) due to the principle of sensor operation.

Other mining parameters:

- Pressure (p) – piezoresistive
- Differential pressure (Δp) – piezoresistive
- Temperature (T) – silicone band gap
- Relative humidity (Rh) – capacitive
- Air flow rate (v) – thermal



3. DEVICE AND SENSOR HEAD MARKING DESCRIPTION

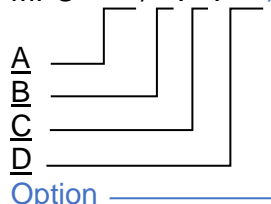
Measuring process unit:

Measuring head:

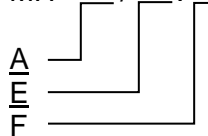
Interface module:

Interface module:

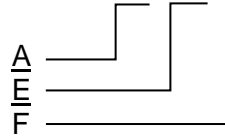
MPU - **/ * . * . ** /SBH



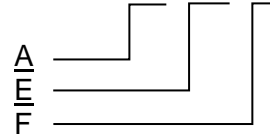
MH - **/ * . * . **



iRTD - 13/ * . * . 1



i2WCT - 14/ * . * . 1



3.1. DEVICE MARKING

<u>A</u> (measuring quantity)	<u>B</u> (output signal)	<u>C</u> (output signal - indicator limit values)	<u>D</u> (MH connection type + MPU connection type)
01/ Methane (CH ₄ -PEL)	1/ Analog output 0,2 - 1mA	0/ Without relay outputs	01/ directly + connector
02/ Methane (CH ₄ -IR)	2/ Analog output 4 - 20mA	1/ Two relay outputs	02/ directly + cable gland
03/ Carbon dioxide (CO ₂ -IR)	3/ Analog output 5 - 15Hz		11/ connector + connector*
04/ Carbon monoxide (CO)	4/ Analog output 1- 5V		12/ connector + cable gland*
05/ Oxygen (O ₂)	5/ Digital output RS485		
06/ Hydrogen sulfide (H ₂ S)	6/ Digital output CAN		
07/ Hydrogen (H ₂)			
08/ Air pressure (p)			
09/ Differential pressure (Δp)			
10/ Temperature (T)			* MPU-13/14 are available only in version type 11 or 12
11/ Relative humidity (Rh)			
12/ Air flow rate (v)			
13/ iRTD (T)			
14/ i2WCT			

3.2. HEAD MARKING

<u>E</u> (sensor type)			<u>F</u> (MH mounting)
MH-01	MH-04	MH-10	0- Directly to MPU enclosure
01- 0-5%	01- 0-2000ppm (Alphas.)	01- -40÷125°C	1- Connector version *
MH-02	02- 0-5000ppm (Alphas.)	MH-11	
01- SV 0-5%	03- 0-1000ppm (CityTech)	01- 0-100%Rh	
02- SV 0-100%	MH-05	MH-12	
03- SV 0-5%+0-100%	01- 0-25% (Alphas.)	01- 0-100m/s	
04- LPV 0-5%	02- 0-25% (CityTech)	iRTD-13	
05- LPV 0-100%	MH-06	Various types of 2,3 or 4 wire passive temperature sensors (compatible with MPU-13 i.s. parameters)	
06- LPV 0-5%+0-100%	01- 0-2000ppm (Alphas.)		
MH-03	02- 0-200ppm (CityTech)		
01- SV 0-1%	MH-07		
02- SV 0-2%	01- 0-5000ppm (Alphas.)	i2WCT-14	
03- SV 0-5%	02- 0-1000ppm (CityTech)	Various types of 2-wire current transmitter (compatible with MPU-14 i.s. parameters)	
04- SV 0-10%	MH-08 (sensor is mounted to CPU)		
05- SV 0-20%	01- 260-1260mbar		
06- SV 0-50%	MH-09 (sensor is mounted to CPU)		
07- SV 0-100%	01- ±60mbar		
08- LPV 0-1%	02- ±100mbar		
09- LPV 0-2%	03- ±160mbar		
10- LPV 0-5%	04- ±250mbar		
11- LPV 0-10%	05- ±400mbar		
12- LPV 0-20%	06- ±600mbar		
13- LPV 0-50%	07- ±1bar		
14- LPV 0-100%	08- ±1,6bar		* only version for iRTD and i2WCT



4. TECHNICAL DATA

4.1. MPU-01/**/SBH

Certificate	FTZU 20 ATEX 0079
<ul style="list-style-type: none"> Ex mark - MPU-01/* Ex mark - MPU-01/**/SBH 	I M1 Ex ia da I Ma I M1 Ex ia da op is I Ma
Measuring principle	Catalytic
<ul style="list-style-type: none"> Gas intake 	Diffusion
Measuring range	0 – 5% CH ₄
<ul style="list-style-type: none"> Accuracy (at 20°C, 1 bar) 	± 5%
<ul style="list-style-type: none"> Resolution 	0.01%
<ul style="list-style-type: none"> Response time t_{50}¹ Response time t_{90}¹ 	< 10s < 30s
<ul style="list-style-type: none"> Display response time 	0.5s
<ul style="list-style-type: none"> Heating time 	60s
Power supply voltage	9 – 15V DC (I.S. Power Supply)
Current consumption	
<ul style="list-style-type: none"> MPU-01/* 	≤ 100mA (@12V)
<ul style="list-style-type: none"> MPU-01/**/SBH 	≤ 130mA (@12V)
Analog output (4 option)	
<ul style="list-style-type: none"> Current output 	0.2 – 1mA
<ul style="list-style-type: none"> Current output 	4 – 20mA
<ul style="list-style-type: none"> Frequency output 	5 – 15Hz
<ul style="list-style-type: none"> Voltage output 	1 – 5V
Digital output (2 option)	
<ul style="list-style-type: none"> RS485 bus 	Modbus RTU
<ul style="list-style-type: none"> CAN bus 	
2x Relay output (alarm 1 and alarm 2)	
<ul style="list-style-type: none"> Range 	0.1 – 4.9%
<ul style="list-style-type: none"> Connection Parameters 	30V, 2A, 30W
Operating temperature range	-20°C to +50°C
Relative humidity (non-condensing)	15 – 95% Rh (short time 0 – 98% Rh)
Dimension	See section 7.1
Weight	~ 1.6kg / ~ 2.3kg with SBH
Enclosure material	Stainless steel
Ingress protection	IP66
Impact strength	20J

¹ Response times are measured by gas flow of 0.75 l/min and without any filters on measuring head. Gas flow rates under this value or with additional filters on measuring head may increase response times.



Measuring process unit MPU - **/ * . * . ** /SBH

4.2. MPU-02/**/SBH

Certificate	FTZU 20 ATEX 0079
<ul style="list-style-type: none"> Ex mark - MPU-02/* Ex mark - MPU-02/**/SBH 	I M1 Ex ia db I Ma I M1 Ex ia db op is I Ma
Measuring principle	Infrared (IR)
<ul style="list-style-type: none"> Gas intake 	Diffusion
Measuring range	0 – 5% CH ₄ 0 – 100% CH ₄
<ul style="list-style-type: none"> Accuracy (at 20°C, 1 bar) 	± 2%
<ul style="list-style-type: none"> Resolution 	0.01% for readings up to 5% CH ₄ 0.1% for readings from 5% up to 100% CH ₄
<ul style="list-style-type: none"> Response time t_{50}^1 Response time t_{90}^1 	< 10s < 30s
<ul style="list-style-type: none"> Display response time 	0.5s
<ul style="list-style-type: none"> Heating time 	60s
Power supply voltage	9 – 15V DC (I.S. Power Supply)
Current consumption	
<ul style="list-style-type: none"> MPU-02/* 	≤ 100mA (@12V)
<ul style="list-style-type: none"> MPU-02/**/SBH 	≤ 130mA (@12V)
Analog output (4 option)	
<ul style="list-style-type: none"> Current output 	0.2 – 1mA
<ul style="list-style-type: none"> Current output 	4 – 20mA
<ul style="list-style-type: none"> Frequency output 	5 – 15Hz
<ul style="list-style-type: none"> Voltage output 	1 – 5V
Digital output (2 option)	
<ul style="list-style-type: none"> RS485 bus 	Modbus RTU
<ul style="list-style-type: none"> CAN bus 	
2x Relay output (alarm 1 and alarm 2)	
<ul style="list-style-type: none"> Range 	0.1 – 99.9%
<ul style="list-style-type: none"> Connection Parameters 	30V, 2A, 30W
Operating temperature range	-20°C to +50°C
Relative humidity (non-condensing)	15 – 95% Rh (short time 0 – 98% Rh)
Dimension	See section 7.1
Weight	~ 1.6kg / ~ 2.3kg with SBH
Enclosure material	Stainless steel
Ingress protection	IP66
Impact strength	20J

¹ Response times are measured by gas flow of 0.75 l/min and without any filters on measuring head. Gas flow rates under this value or with additional filters on measuring head may increase response times.



Measuring process unit MPU - **/ * . * . ** /SBH

4.3. MPU-03/**/SBH

Certificate	FTZU 20 ATEX 0079
<ul style="list-style-type: none"> Ex mark - MPU-03/* Ex mark - MPU-03/**/SBH 	I M1 Ex ia db I Ma I M1 Ex ia db op is I Ma
Measuring principle	Infrared (IR)
<ul style="list-style-type: none"> Gas intake 	Diffusion
Measuring range	0 – 1% CO ₂ , 0 – 2% CO ₂ , 0 – 5% CO ₂ , 0 – 10% CO ₂ , 0 – 20% CO ₂ , 0 – 50% CO ₂ 0 – 100% CO ₂
<ul style="list-style-type: none"> Accuracy (at 20°C, 1 bar) 	± 2%
<ul style="list-style-type: none"> Resolution 	0.01% for volume readings 10ppm for parts per million readings.
<ul style="list-style-type: none"> Response time t_{50}^1 Response time t_{90}^1 	< 15s < 30s
<ul style="list-style-type: none"> Display response time 	0.5s
<ul style="list-style-type: none"> Heating time 	60s
Power supply voltage	9 – 15V DC (I.S. Power Supply)
Current consumption	
<ul style="list-style-type: none"> MPU-03/* 	≤ 100mA (@12V)
<ul style="list-style-type: none"> MPU-03/**/SBH 	≤ 130mA (@12V)
Analog output (4 option)	
<ul style="list-style-type: none"> Current output 	0.2 – 1mA
<ul style="list-style-type: none"> Current output 	4 – 20mA
<ul style="list-style-type: none"> Frequency output 	5 – 15Hz
<ul style="list-style-type: none"> Voltage output 	1 – 5V
Digital output (2 option)	
<ul style="list-style-type: none"> RS485 bus 	Modbus RTU
<ul style="list-style-type: none"> CAN bus 	
2x Relay output (alarm 1 and alarm 2)	
<ul style="list-style-type: none"> Range 	0.1 – 99.9%
<ul style="list-style-type: none"> Connection Parameters 	30V, 2A, 30W
Operating temperature range	-20°C to +50°C
Relative humidity (non-condensing)	15 – 95% Rh (short time 0 – 98% Rh)
Dimension	See section 7.1
Weight	~ 1.6kg / ~ 2.3kg with SBH
Enclosure material	Stainless steel
Ingress protection	IP66
Impact strength	20J

¹ Response times are measured by gas flow of 0.75 l/min and without any filters on measuring head. Gas flow rates under this value or with additional filters on measuring head may increase response times.



Measuring process unit MPU - **/ * . * . ** /SBH

4.4. MPU-04/**/SBH

Certificate	FTZU 20 ATEX 0079
<ul style="list-style-type: none"> Ex mark - MPU-04/* Ex mark - MPU-04/**/SBH 	I M1 Ex ia I Ma I M1 Ex ia op is I Ma
Measuring principle	Electrochemical (CO)
<ul style="list-style-type: none"> Gas intake 	Diffusion
Measuring range	0 – 1000ppm CO 0 – 2000ppm CO 0 – 5000ppm CO
<ul style="list-style-type: none"> Accuracy (at 20°C, 1 bar) 	± 5% of reading
<ul style="list-style-type: none"> Resolution 	1ppm
<ul style="list-style-type: none"> Response time t_{50}^1 Response time t_{90}^1 	< 10s < 30s
<ul style="list-style-type: none"> Display response time 	0.5s
<ul style="list-style-type: none"> Heating time 	60s
Power supply voltage	9 – 15V DC (I.S. Power Supply)
Current consumption	
<ul style="list-style-type: none"> MPU-04/* 	≤ 70mA (@12V)
<ul style="list-style-type: none"> MPU-04/**/SBH 	≤ 100mA (@12V)
Analog output (4 option)	
<ul style="list-style-type: none"> Current output 	0.2 – 1mA
<ul style="list-style-type: none"> Current output 	4 – 20mA
<ul style="list-style-type: none"> Frequency output 	5 – 15Hz
<ul style="list-style-type: none"> Voltage output 	1 – 5V
Digital output (2 option)	
<ul style="list-style-type: none"> RS485 bus 	Modbus RTU
<ul style="list-style-type: none"> CAN bus 	
2x Relay output (alarm 1 and alarm 2)	
<ul style="list-style-type: none"> Range 	0.5 – 999.5ppm
<ul style="list-style-type: none"> Connection Parameters 	30V, 2A, 30W
Operating temperature range	-20°C to +50°C
Relative humidity (non-condensing)	15 – 95% Rh
Dimension	See section 7.1
Weight	~ 1.6kg / ~ 2.3kg with SBH
Enclosure material	Stainless steel
Ingress protection	IP66
Impact strength	20J

¹ Response times are measured by gas flow of 0.75 l/min and without any filters on measuring head. Gas flow rates under this value or with additional filters on measuring head may increase response times.



4.5. MPU-05/**/SBH

Certificate	FTZU 20 ATEX 0079
• Ex mark - MPU-05/*	I M1 Ex ia I Ma
• Ex mark - MPU-05/**/SBH	I M1 Ex ia op is I Ma
Measuring principle	Electrochemical (O ₂)
• Gas intake	Diffusion
Measuring range	0 – 25% O ₂
• Accuracy (at 20°C, 1 bar)	± 5% of reading
• Resolution	0.1%
• Response time t ₅₀ ¹	< 10s
• Response time t ₉₀ ¹	< 15s
• Display response time	0.5s
• Heating time	60s
Power supply voltage	9 – 15V DC (I.S. Power Supply)
Current consumption	
• MPU-05/*	≤ 70mA (@12V)
• MPU-05/**/SBH	≤ 100mA (@12V)
Analog output (4 option)	
• Current output	0.2 – 1mA
• Current output	4 – 20mA
• Frequency output	5 – 15Hz
• Voltage output	1 – 5V
Digital output (2 option)	
• RS485 bus	Modbus RTU
• CAN bus	
2x Relay output (alarm 1 and alarm 2)	
• Range	0.1 – 24.9%
• Connection Parameters	30V, 2A, 30W
Operating temperature range	-20°C to +50°C
Relative humidity (non-condensing)	15 – 95% Rh
Dimension	See section 7.1
Weight	~ 1.6kg / ~ 2.3kg with SBH
Enclosure material	Stainless steel
Ingress protection	IP66
Impact strength	20J

¹ Response times are measured by gas flow of 0.75 l/min and without any filters on measuring head. Gas flow rates under this value or with additional filters on measuring head may increase response times.



4.6. MPU-06/**/SBH

Certificate	FTZU 20 ATEX 0079
• Ex mark - MPU-06/*	I M1 Ex ia I Ma
• Ex mark - MPU-06/**/SBH	I M1 Ex ia op is I Ma
Measuring principle	Electrochemical (H ₂ S)
• Gas intake	Diffusion
Measuring range	0 – 200ppm H ₂ S
	0 – 2000ppm H ₂ S
• Accuracy (at 20°C, 1 bar)	± 5% of reading
• Resolution	1ppm
• Response time t ₉₀ ¹	< 30s
• Display response time	0.5s
• Heating time	60s
Power supply voltage	9 – 15V DC (I.S. Power Supply)
Current consumption	
• MPU-06/*	≤ 70mA (@12V)
• MPU-06/**/SBH	≤ 100mA (@12V)
Analog output (4 option)	
• Current output	0.2 – 1mA
• Current output	4 – 20mA
• Frequency output	5 – 15Hz
• Voltage output	1 – 5V
Digital output (2 option)	
• RS485 bus	Modbus RTU
• CAN bus	
2x Relay output (alarm 1 and alarm 2)	
• Range	1 – 1999ppm
• Connection Parameters	30V, 2A, 30W
Operating temperature range	-20°C to +50°C
Relative humidity (non-condensing)	15 – 95% Rh
Dimension	See section 7.1
Weight	~ 1.6kg / ~ 2.3kg with SBH
Enclosure material	Stainless steel
Ingress protection	IP66
Impact strength	20J

¹ Response times are measured by gas flow of 0.75 l/min and without any filters on measuring head. Gas flow rates under this value or with additional filters on measuring head may increase response times.



4.7. MPU-07/**/SBH

Certificate	FTZU 20 ATEX 0079
• Ex mark - MPU-07/*	I M1 Ex ia I Ma
• Ex mark - MPU-07/**/SBH	I M1 Ex ia op is I Ma
Measuring principle	Electrochemical (H ₂)
• Gas intake	Diffusion
Measuring range	0 – 1000ppm H ₂ 0 – 5000ppm H ₂
• Accuracy (at 20°C, 1 bar)	± 5% of reading
• Resolution	2ppm
• Response time t ₉₀ ¹	< 30s
• Display response time	0.5s
• Heating time	60s
Power supply voltage	9 – 15V DC (I.S. Power Supply)
Current consumption	
• MPU-07/*	≤ 70mA (@12V)
• MPU-07/**/SBH	≤ 100mA (@12V)
Analog output (4 option)	
• Current output	0.2 – 1mA
• Current output	4 – 20mA
• Frequency output	5 – 15Hz
• Voltage output	1 – 5V
Digital output (2 option)	
• RS485 bus	Modbus RTU
• CAN bus	
2x Relay output (alarm 1 and alarm 2)	
• Range	2 – 4998ppm
• Connection Parameters	30V, 2A, 30W
Operating temperature range	-20°C to +50°C
Relative humidity (non-condensing)	15 – 95% Rh
Dimension	See section 7.1
Weight	~ 1.6kg / ~ 2.3kg with SBH
Enclosure material	Stainless steel
Ingress protection	IP66
Impact strength	20J

¹ Response times are measured by gas flow of 0.75 l/min and without any filters on measuring head. Gas flow rates under this value or with additional filters on measuring head may increase response times.



4.8. MPU-08/**/SBH

Certificate	FTZU 20 ATEX 0079
• Ex mark - MPU-08/*	I M1 Ex ia I Ma
• Ex mark - MPU-08/**/SBH	I M1 Ex ia op is I Ma
Measuring principle	Piezoresistive (p)
• Gas intake	Diffusion
Measuring range	260 – 1260 mbar
• Accuracy (at 20°C, 1 bar)	± 1 mbar
• Resolution	± 1 mbar
• Response time t_{50}	< 10s
• Response time t_{90}	< 30s
• Display response time	0.5s
• Heating time	60s
Power supply voltage	9 – 15V DC (I.S. Power Supply)
Current consumption	
• MPU-08/*	≤ 70mA (@12V)
• MPU-08/**/SBH	≤ 100mA (@12V)
Analog output (4 option)	
• Current output	0.2 – 1mA
• Current output	4 – 20mA
• Frequency output	5 – 15Hz
• Voltage output	1 – 5V
Digital output (2 option)	
• RS485 bus	Modbus RTU
• CAN bus	
2x Relay output (alarm 1 and alarm 2)	
• Range	261 – 1259 mbar
• Connection Parameters	30V, 2A, 30W
Operating temperature range	-20°C to +50°C
Relative humidity (non-condensing)	15 – 95% Rh
Dimension	See section 7.2
Weight	~ 1.6kg / ~ 2.3kg with SBH
Enclosure material	Stainless steel
Ingress protection	IP66
Impact strength	20J



4.9. MPU-09/**/SBH

Certificate	FTZU 20 ATEX 0079
<ul style="list-style-type: none"> Ex mark - MPU-09/* Ex mark - MPU-09/**/SBH 	I M1 Ex ia I Ma I M1 Ex ia op is I Ma
Measuring principle	Piezoresistive (p)
<ul style="list-style-type: none"> Gas intake 	Diffusion
Measuring range	±60mbar, ±100mbar, ±160mbar, ±250mbar, ±400mbar, ±600mbar, ±1000mbar, ±1600mbar
<ul style="list-style-type: none"> Accuracy (at 20°C, 1 bar) 	± 1.5% of reading
<ul style="list-style-type: none"> Resolution 	±1mbar
<ul style="list-style-type: none"> Response time t_{50} 	< 1s
<ul style="list-style-type: none"> Response time t_{90} 	< 10s
<ul style="list-style-type: none"> Display response time 	0.5s
<ul style="list-style-type: none"> Heating time 	60s
Power supply voltage	9 – 15V DC (I.S. Power Supply)
Current consumption	
<ul style="list-style-type: none"> MPU-09/* 	≤ 70mA (@12V)
<ul style="list-style-type: none"> MPU-09/**/SBH 	≤ 100mA (@12V)
Analog output (4 option)	
<ul style="list-style-type: none"> Current output 	0.2 – 1mA
<ul style="list-style-type: none"> Current output 	4 – 20mA
<ul style="list-style-type: none"> Frequency output 	5 – 15Hz
<ul style="list-style-type: none"> Voltage output 	1 – 5V
Digital output (2 option)	
<ul style="list-style-type: none"> RS485 bus 	Modbus RTU
<ul style="list-style-type: none"> CAN bus 	
2x Relay output (alarm 1 and alarm 2)	
<ul style="list-style-type: none"> Range 	-1599 to +1559mbar
<ul style="list-style-type: none"> Connection Parameters 	30V, 2A, 30W
Operating temperature range	-20°C to +50°C
Relative humidity (non-condensing)	15 – 95% Rh
Dimension	See section 7.3
Weight	~ 1.6kg / ~ 2.3kg with SBH
Enclosure material	Stainless steel
Ingress protection	IP66
Impact strength	20J



4.10. MPU-10*/SBH

Certificate	FTZU 20 ATEX 0079
• Ex mark - MPU-10/*	I M1 Ex ia I Ma
• Ex mark - MPU-10*/SBH	I M1 Ex ia op is I Ma
Measuring principle	Silicone band gap (T)
• Gas intake	Diffusion
Measuring range*	- 20 to +50°C (MH mounted to MPU enclosure) - 40 to +120°C (MH is connected to MPU via connector*)
• Accuracy (at 20°C, 1 bar)	± 0.3°C
• Resolution	0.1°C
• Response time t_{90}	< 30s
• Display response time	0.5s
• Heating time	60s
Power supply voltage	9 – 15V DC (I.S. Power Supply)
Current consumption	
• MPU-10/*	≤ 70mA (@12V)
• MPU-10*/SBH	≤ 100mA (@12V)
Analog output (4 option)	
• Current output	0.2 – 1mA
• Current output	4 – 20mA
• Frequency output	5 – 15Hz
• Voltage output	1 – 5V
Digital output (2 option)	
• RS485 bus	Modbus RTU
• CAN bus	
2x Relay output (alarm 1 and alarm 2)	
• Range	-19.9 to +49.9°C
• Connection Parameters	30V, 2A, 30W
Operating temperature range	-20°C to +50°C
Relative humidity (non-condensing)	0 – 100% Rh
Dimension	See section 7.4
Weight	~ 1.6kg / ~ 2.3kg with SBH
Enclosure material	Stainless steel
Ingress protection	IP66
Impact strength	20J



Measuring process unit MPU - **/ * . * . ** /SBH

* The operating range of MPU device is from -20°C to +50°C. For dislocated mounted measuring head, the measuring temperature range can be extended from -40°C to +120°C. In this case, you must ensure that the MPU device unit is exposed to temperatures in the range from -20°C to +50°C. Please consider the maximum allowed temperature +80°C for connecting cable. For details, see annex B (page [47](#)).

4.11. MPU-11/* /SBH

Certificate	FTZU 20 ATEX 0079
• Ex mark - MPU-11/*	I M1 Ex ia I Ma
• Ex mark - MPU-11/* /SBH	I M1 Ex ia op is I Ma
Measuring principle	Capacitive (Rh)
• Gas intake	Diffusion
Measuring range	0 ÷ 100% Rh
• Accuracy (at 20°C, 1 bar)	± 3% Rh
• Resolution	1% Rh
• Response time t_{90}	< 10s
• Display response time	0.5s
• Heating time	60s
Power supply voltage	9 – 15V DC (I.S. Power Supply)
Current consumption	
• MPU-11/*	≤ 70mA (@12V)
• MPU-11/* /SBH	≤ 100mA (@12V)
Analog output (4 option)	
• Current output	0.2 – 1mA
• Current output	4 – 20mA
• Frequency output	5 – 15Hz
• Voltage output	1 – 5V
Digital output (2 option)	
• RS485 bus	Modbus RTU
• CAN bus	
2x Relay output (alarm 1 and alarm 2)	
• Range	1 – 99% Rh
• Connection Parameters	30V, 2A, 30W
Operating temperature range	-20°C to +50°C
Relative humidity (non-condensing)	0 – 100% Rh
Dimension	See section 7.4
Weight	~ 1.6kg / ~ 2.3kg with SBH
Enclosure material	Stainless steel
Ingress protection	IP66
Impact strength	20J



4.12. MPU-12/**/SBH

Certificate	FTZU 20 ATEX 0079
• Ex mark - MPU-12/*	I M1 Ex ia I Ma
• Ex mark - MPU-12/**/SBH	I M1 Ex ia op is I Ma
Measuring principle	Thermal (v)
• Gas intake	Free air
Measuring range	0 ÷ 20m/s
• Accuracy (at 20°C, 1 bar)	< 10% of measured value or 0.5m/s, which is larger
• Resolution	0.01m/s
• Response time t_{90}	< 30s
• Display response time	0.5s
• Heating time	60s
Power supply voltage	9 – 15V DC (I.S. Power Supply)
Current consumption	
• MPU-12/*	≤ 70mA (@12V)
• MPU-12/**/SBH	≤ 100mA (@12V)
Analog output (4 option)	
• Current output	0.2 – 1mA
• Current output	4 – 20mA
• Frequency output	5 – 15Hz
• Voltage output	1 – 5V
Digital output (2 option)	
• RS485 bus	Modbus RTU
• CAN bus	
2x Relay output (alarm 1 and alarm 2)	
• Range	0.01 – 19.99 m/s
• Connection Parameters	30V, 2A, 30W
Operating temperature range	-20°C to +50°C
Relative humidity (non-condensing)	0 – 100% Rh
Dimension	See section 7.5
Weight	~ 1.6kg / ~ 2.3kg with SBH
Enclosure material	Stainless steel
Ingress protection	IP66
Impact strength	20J



5.13. MPU-13 (iRTD)*/SBH

Certificate	FTZU 20 ATEX 0079
<ul style="list-style-type: none"> Ex mark - MPU-13/* Ex mark - MPU-13*/SBH 	I M1 Ex ia I Ma I M1 Ex ia op is I Ma
Measuring principle	2-wire, 3-wire or 4-wire Resistance Temperature Detector (RTD)
<ul style="list-style-type: none"> RTD Thermocouples 	Thermocouples (TC)
Measuring range	-50 to +400°C (at the measuring sensor) * **
<ul style="list-style-type: none"> Accuracy (at 20°C, 1 bar) Resolution Display response time Heating time 	Depending on the type of measuring sensor 1.0°C 0.5s 60s
Power supply voltage	9 – 15V DC (I.S. Power Supply)
Current consumption	
<ul style="list-style-type: none"> MPU-13/* MPU-13*/SBH 	≤ 70mA (@12V) ≤ 100mA (@12V)
Analog output (4 option)	
<ul style="list-style-type: none"> Current output Current output Frequency output Voltage output 	0.2 – 1mA 4 – 20mA 5 – 15Hz 1 – 5V
Digital output (2 option)	
<ul style="list-style-type: none"> RS485 bus CAN bus 	Modbus RTU
2x Relay output (alarm 1 and alarm 2)	
<ul style="list-style-type: none"> Range Connection Parameters 	-40°C to +500°C 30V, 2A, 30W
Operating temperature range	-20°C to +50°C
Relative humidity (non-condensing)	0 – 100% Rh
Dimension	See section 7.
Weight	~ 1.6kg / ~ 2.3kg with SBH + interface ~ 0.5kg
Enclosure material	Stainless steel
Ingress protection	IP66
Impact strength	20J

* Measuring range is depending of the sensor probe. The most common sensor probes have range from 0 to



Measuring process unit MPU - **/ * . * . ** /SBH

+400°C or from -50°C to +180°C.

** The sensor probe may be exposed to this temperature. Please note that the operating range of MPU device is from -20°C to +50°C.

4.14. MPU-14 (i2WCT)*/SBH

Certificate <ul style="list-style-type: none"> Ex mark - MPU-14/* Ex mark - MPU-14/*/SBH 	FTZU 20 ATEX 0079 I M1 Ex ia I Ma I M1 Ex ia op is I Ma
Measuring principle <ul style="list-style-type: none"> Current loop 	2 wires current loop (4-20mA)
Measuring range <ul style="list-style-type: none"> Accuracy (at 20°C, 1 bar) Resolution Display response time Heating time 	Depending on the type of 2-wire current transmitter sensor. 0.5s 60s
Power supply voltage	9 – 15V DC (I.S. Power Supply)
Current consumption <ul style="list-style-type: none"> MPU-14/* MPU-14/*/SBH 	≤ 70mA (@12V) ≤ 100mA (@12V)
Analog output (4 option) <ul style="list-style-type: none"> Current output Current output Frequency output Voltage output 	0.2 – 1mA 4 – 20mA 5 – 15Hz 1 – 5V
Digital output (2 option) <ul style="list-style-type: none"> RS485 bus CAN bus 	Modbus RTU
2x Relay output (alarm 1 and alarm 2) <ul style="list-style-type: none"> Range Connection Parameters 	Depending on the type of 2 wires current transmitters 30V, 2A, 30W
Operating temperature range	-20°C to +50°C
Relative humidity (non-condensing)	0 – 100% Rh
Dimension	See section 7.
Weight	~ 1.6kg / ~ 2.3kg with SBH + interface ~ 0.5kg
Enclosure material	Stainless steel
Ingress protection	IP66



Impact strength	20J
-----------------	-----

5. INPUT/OUTPUT I.S. PARAMETERS

Power supply	U _i = 15 V, I _i = 3.3 A, C _i = 0, L _i = 0
Analog signal output	
• Current signal output	U _o = 9.56 V, I _o = 78.7 mA, P _o = 188.3 mW, C _o = 5 uF, L _o = 60 mH
• Voltage output	U _o = 9.56 V, I _o = 7.0 mA, P _o = 1.7 mW, C _o = 5 uF, L _o = 1 H
• Frequency output	U _o = 9.56 V, I _o = 9.6 mA, P _o = 23 mW, C _o = 5 uF, L _o = 1 H
• Frequency input	U _i = 70 V, I _i = 50 mA, P _i = 150 mW, C _i = 0, L _i = 0
Serial communication output	
• RS485 bus	U _o = 5.88 V, I _o = 131.6 mA, P _o = 193.5 mW, C _o = 10 uF, L _o = 20 mH
• CAN bus	U _i = 5.88 V, C _i = 0, L _i = 0
Relay outputs (alarm 1 and alarm 2)	U _i = 30 V, I _i = 2 A, P _i = 30 W

Conformance with 6.3.13 (EN 60079-11:2012).

6. INSTALLATION AND CONNECTION

Two different types of connection are possible.

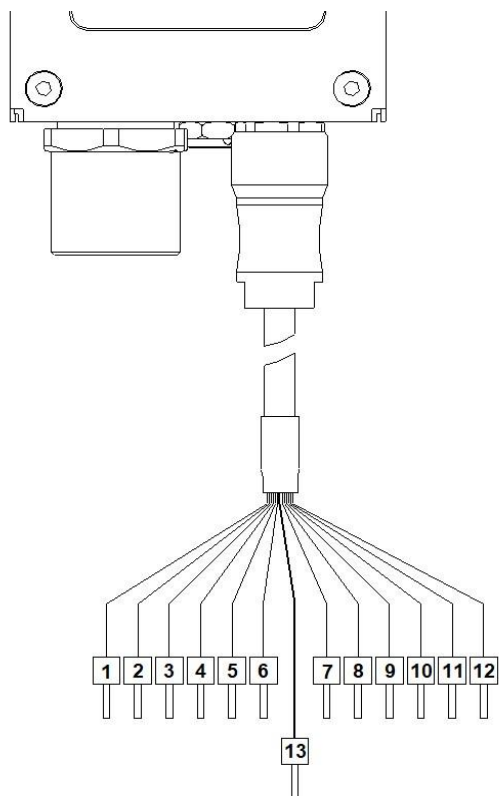
6.1. CONNETION WITH CONNECTOR

Mount the connection cable to the device. Connect the wires at the other side of cable according to the table below.

WIRE NO.	DESIGNATION
1	Power supply – plus
2	Power supply – minus
3	Analog Output – plus
4	Analog Output – minus
5	Alarm 1 – plus
6	Alarm 1 – minus
7	Alarm 2 – plus
8	Alarm 2 – minus
9	Isolation 5V (optional)
10	Isolation GND (optional)

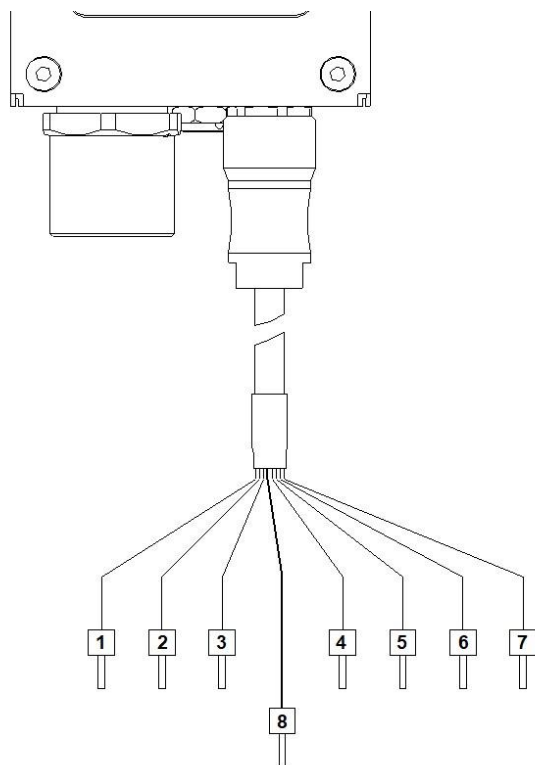


Measuring process unit MPU - **/ * . * . ** /SBH



12-wires cable connection type

11	RS-485 A / CAN A
12	RS-485 B / CAN B
13	Shield



7-wires cable connection type

WIRE NO.	DESIGNATION
1	Power supply – plus
2	Power supply – minus
3	Analog Output – plus
4	Alarm 1 – plus
5	Alarm 1 – minus
6	Alarm 2 – plus
7	Alarm 2 – minus
8	Shield

**WARNING!**

Read this instruction carefully before installation or maintain operation of this product!

**WARNING!**

Device must be powered from certified intrinsically safe power supply (ia)!

**WARNING!**

Installation, operation and maintenance work should be done only by trained technical personnel!

**WARNING!**

Installation, connection and device operation should be performed according to IEC/EN 60079-17!

6.1.1. POWER SUPPLY

Intrinsic safe power supply type “ia” within range 9 -15V(DC) is connected to wires No. 1 (Vs) and No. 2 (GND).

**WARNING!**

Make sure the power supply polarity is correct!

6.1.2. ANALOG OUTPUT

Three different types of analog output signal are possible – current loop, voltage output or frequency output. Analog output signal is connected to wires No. 3 (S+) and No. 4 (S-) for 12-wires cable connection type. For 7-wires cable connection type it is connected to wires No. 3 (S+) and it is measured against GND.

6.1.3. RELAYS OUTPUT

Device has built-in two relays. Relay RE1 is connected to wires No. 5 and No. 6 for 12-wires cable connection type or to wires No. 4 and No. 5 for 7-wires cable connection type. Relay RE2 is connected to wires No. 7 and No. 8 for 12-wires cable connection type or to wires No. 6 and No. 7 for 7-wires cable connection type. Both relays can be toggled to normally open mode (NO) or normally close mode (NC) by the software.

6.1.4. RS485/CAN COMMUNICATION – OPTIONAL

Two types of communication RS485 or CAN are possible. Communication pins are galvanically isolated and are connected to wire No. 11 (RS-485 A/CAN A) and wire No. 12 (RS-485 B/CAN B) for only a 12-wires cable connection type.








6.2. CONNECTION THROUGH CABLE GLAND

On the top side unscrew four screws and remove enclosure cover. Mount cable through cable gland with a torque **5.5 Nm**. Connect wires to terminals according to the table below with a torque within **0.5 – 0.6 Nm**. After that place the enclosure cover and screw the screws back with a torque within **4 – 6 Nm**.

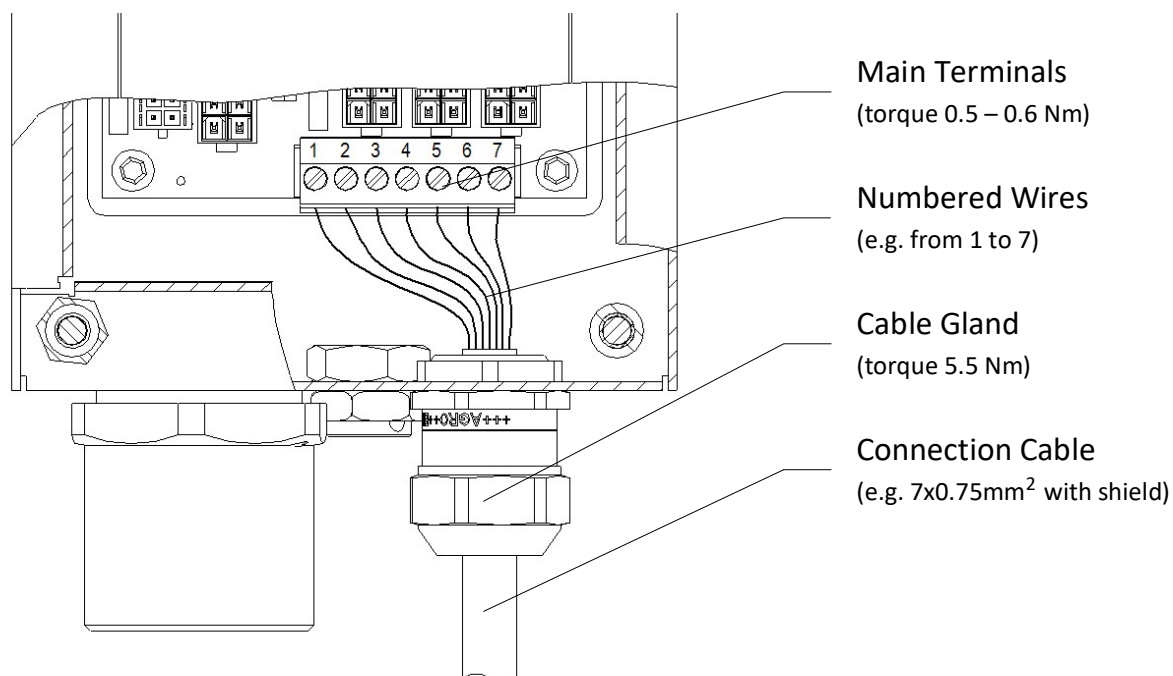
WIRE NO.	DESIGNATION
1	Power supply – plus
2	Power supply – minus



Measuring process unit MPU - **/ * . * . ** /SBH

1	2	3	4	5	6	7
						

3	Analog Output – plus
4	Alarm 1 – plus
5	Alarm 1 – minus
6	Alarm 2 – plus
7	Alarm 2 – minus



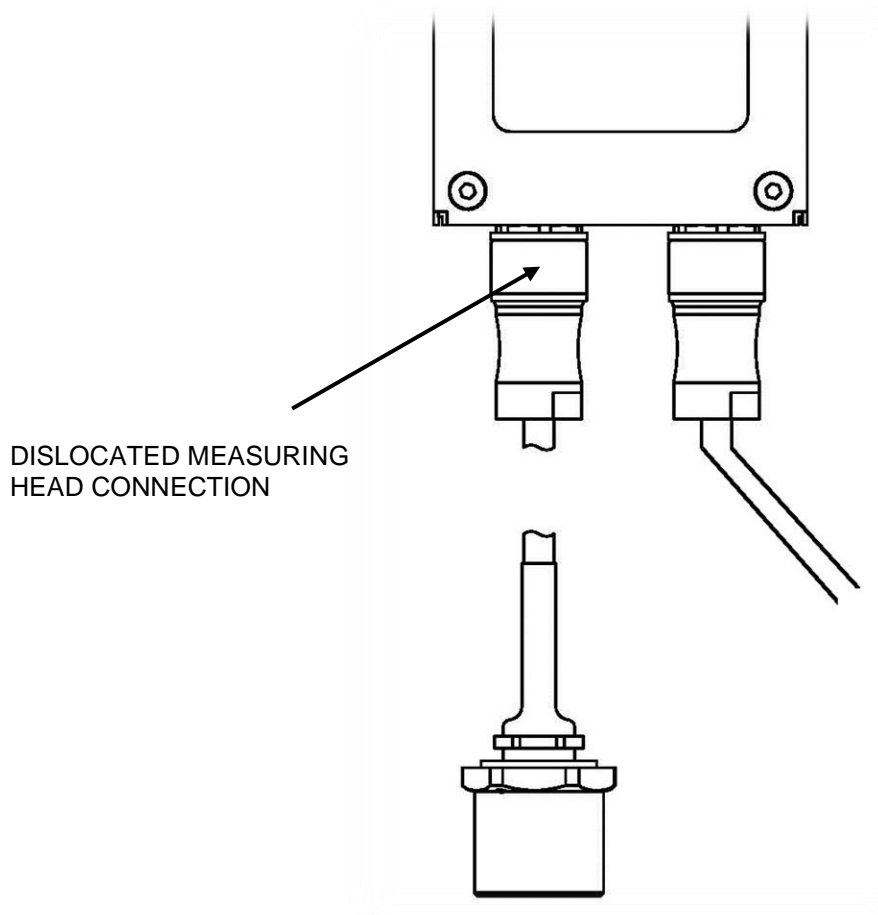
6.2.1. TERMINALS CONNECTION CAPACITY

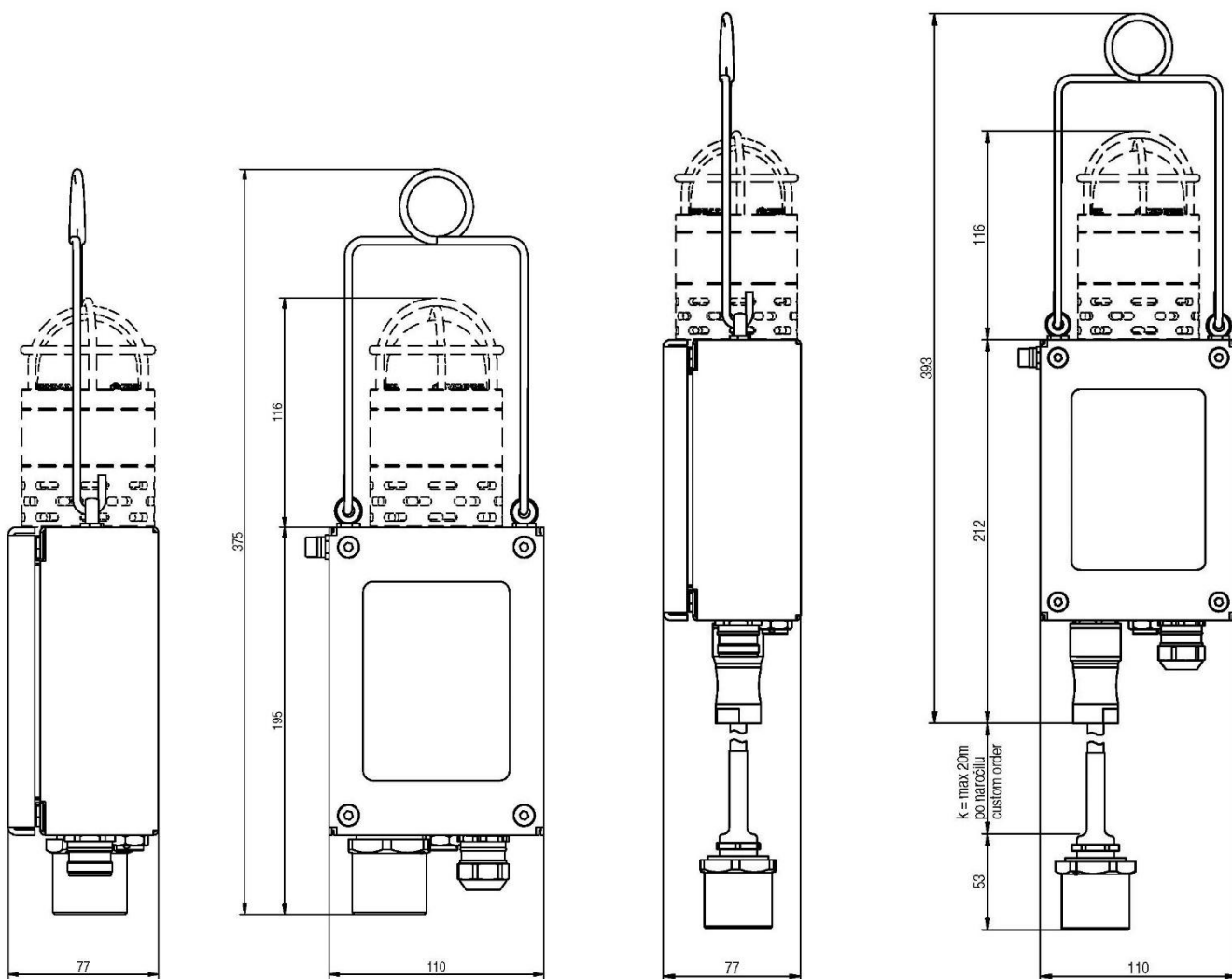
Connection method	Screw connection with tension sleeve
pluggable	Yes
Conductor cross section solid	0.2 mm ² ... 2.5 mm ²
Conductor cross section flexible	0.2 mm ² ... 2.5 mm ²
Conductor cross section AWG / kcmil	24 ... 12
Conductor cross section flexible, with ferrule without plastic sleeve	0.25 mm ² ... 2.5 mm ²
Conductor cross section, flexible, with ferrule, with plastic sleeve	0.25 mm ² ... 2.5 mm ²
2 conductors with same cross section, solid	0.2 mm ² ... 1 mm ²
2 conductors with same cross section, flexible	0.2 mm ² ... 1.5 mm ²
2 conductors with same cross section, flexible, with ferrule without plastic sleeve	0.25 mm ² ... 1 mm ²
2 conductors with the same cross section, flexible, with TWIN ferrule with plastic sleeve	0.5 mm ² ... 1.5 mm ²
Stripping length	7 mm
Torque	0.5 Nm ... 0.6 Nm

6.3. DISLOCATED MEASURING HEAD CONNECTION

**Measuring process unit MPU - **/ * . * . ** /SBH**

Dislocated measuring head connection is performed through the dedicated connector. Mount the measuring head connector to the dedicated measuring head connector on the MPU-** device. The standard cable length is 5m and can be extended up to 20m.

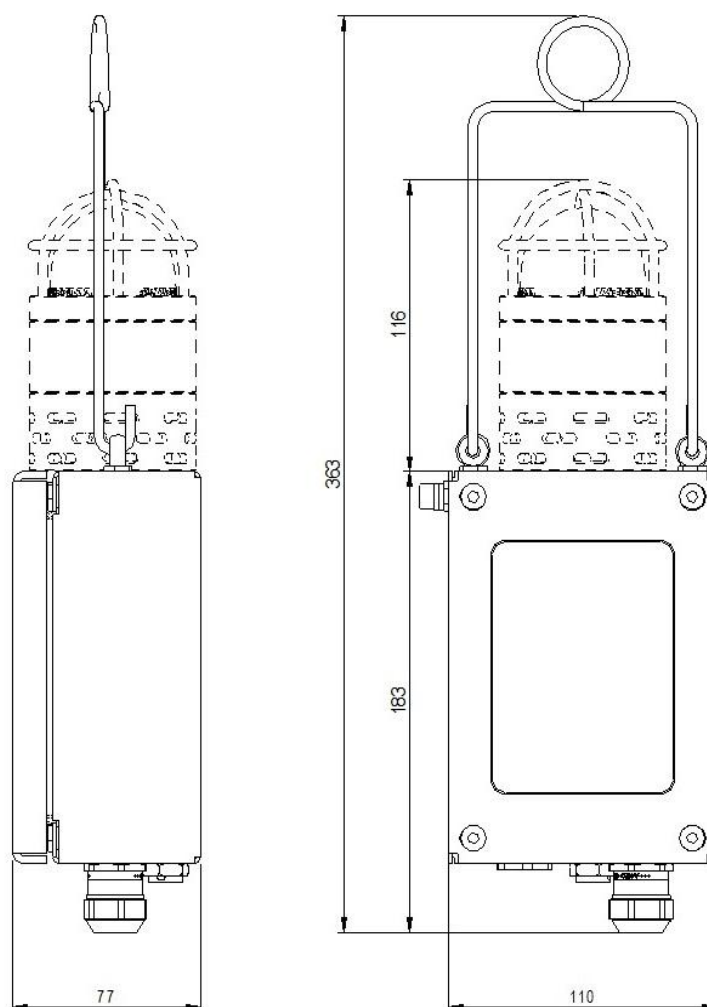
**7. EXTERNAL DIMENSIONS****7.1. MPU-01/**/SBH – MPU-07/**/SBH**



MPU-01/*.*.0x/SBH
 MPU-02/*.*.0x/SBH
 MPU-03/*.*.0x/SBH
 MPU-04/*.*.0x/SBH
 MPU-05/*.*.0x/SBH
 MPU-06/*.*.0x/SBH
 MPU-07/*.*.0x/SBH

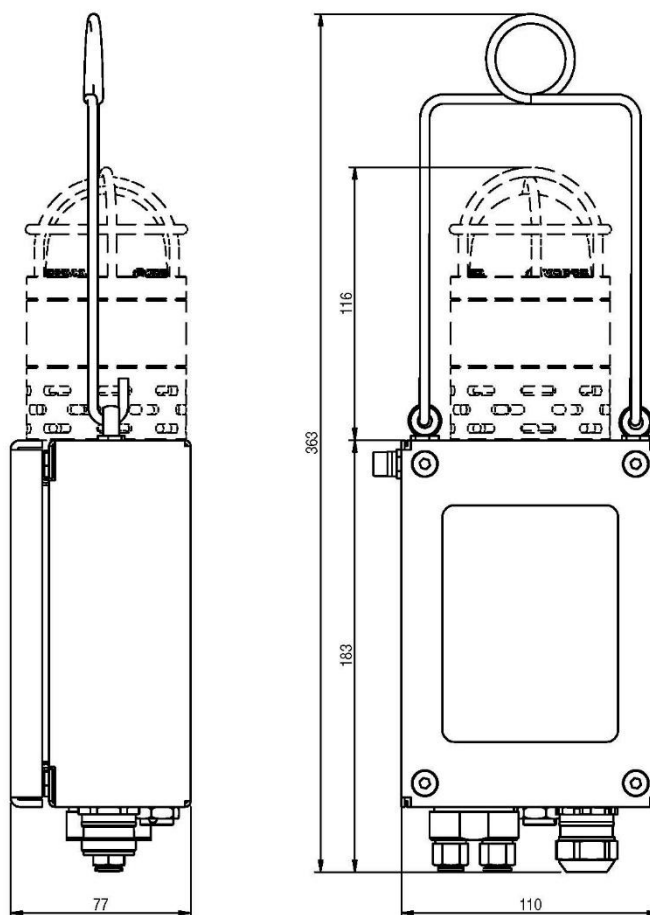
MPU-01/*.*.1x/SBH
 MPU-02/*.*.1x/SBH
 MPU-03/*.*.1x/SBH
 MPU-04/*.*.1x/SBH
 MPU-05/*.*.1x/SBH
 MPU-06/*.*.1x/SBH
 MPU-07/*.*.1x/SBH

7.2. MPU-08/*/SBH



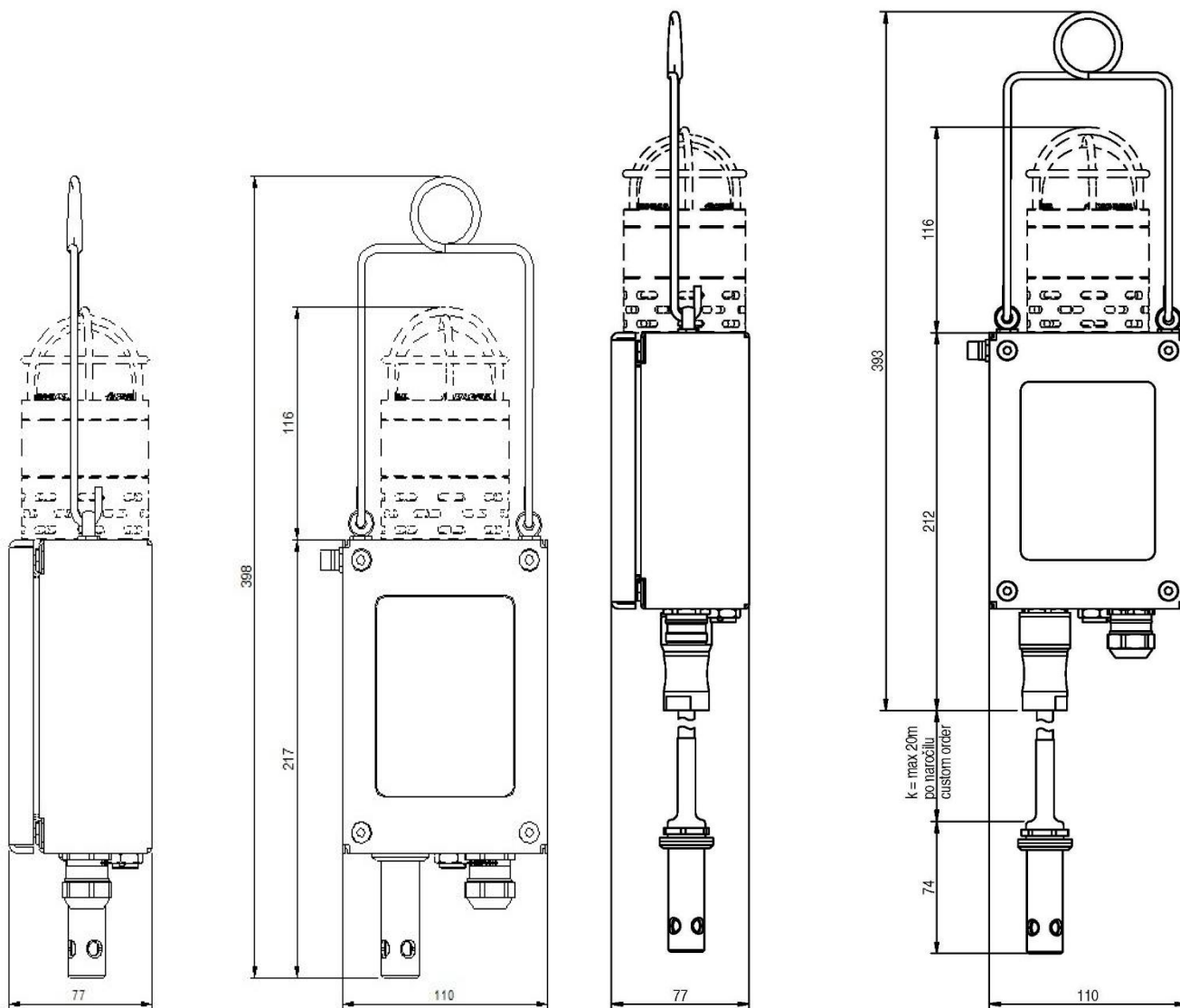
MPU-08/*.*.0x/SBH

7.3. MPU-09/* /SBH



MPU-09/*.*.0x/SBH

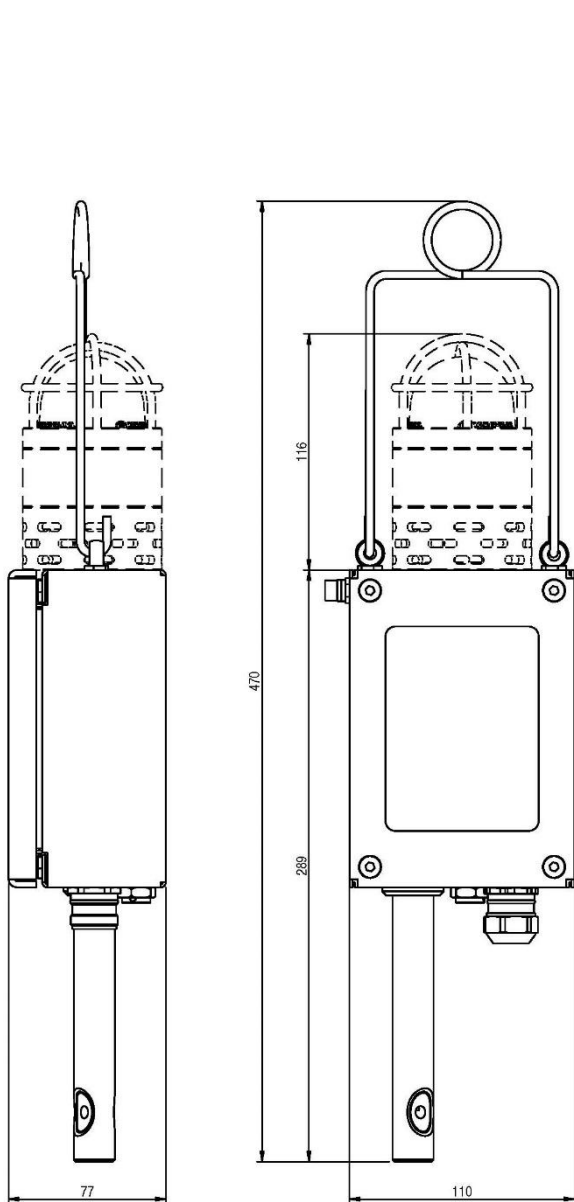
7.4. MPU-10/* /SBH – MPU-11/* /SBH



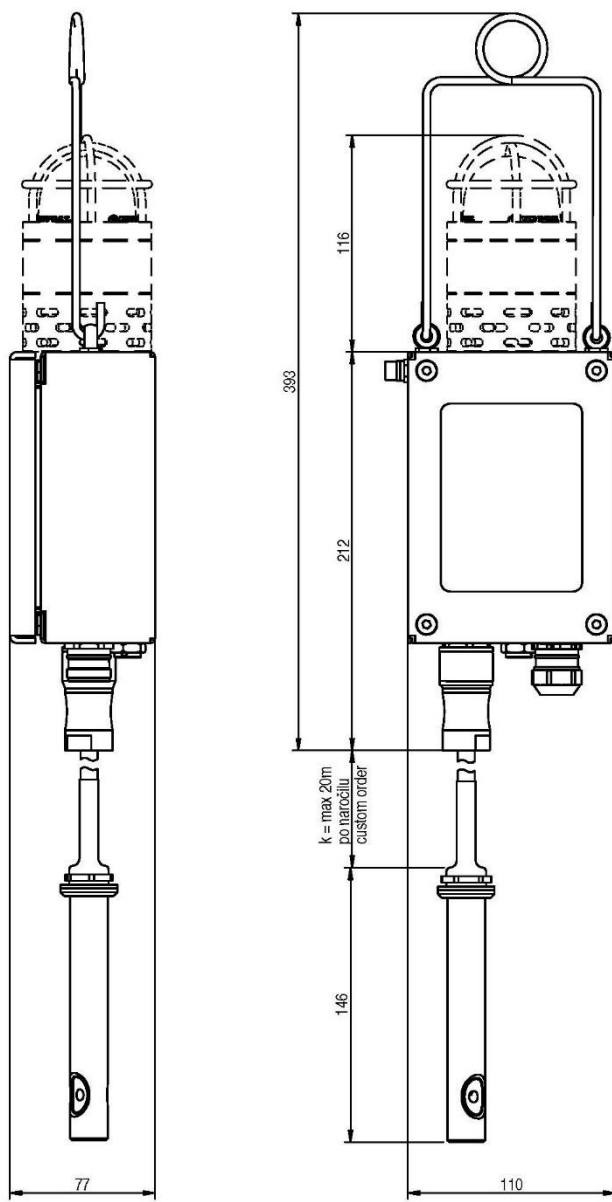
MPU-10/**.0x/SBH
MPU-11/**.0x/SBH

MPU-10/**.1x/SBH
MPU-11/**.1x/SBH

7.5. MPU-12/**/SBH



MPU-12/**.0x/SBH

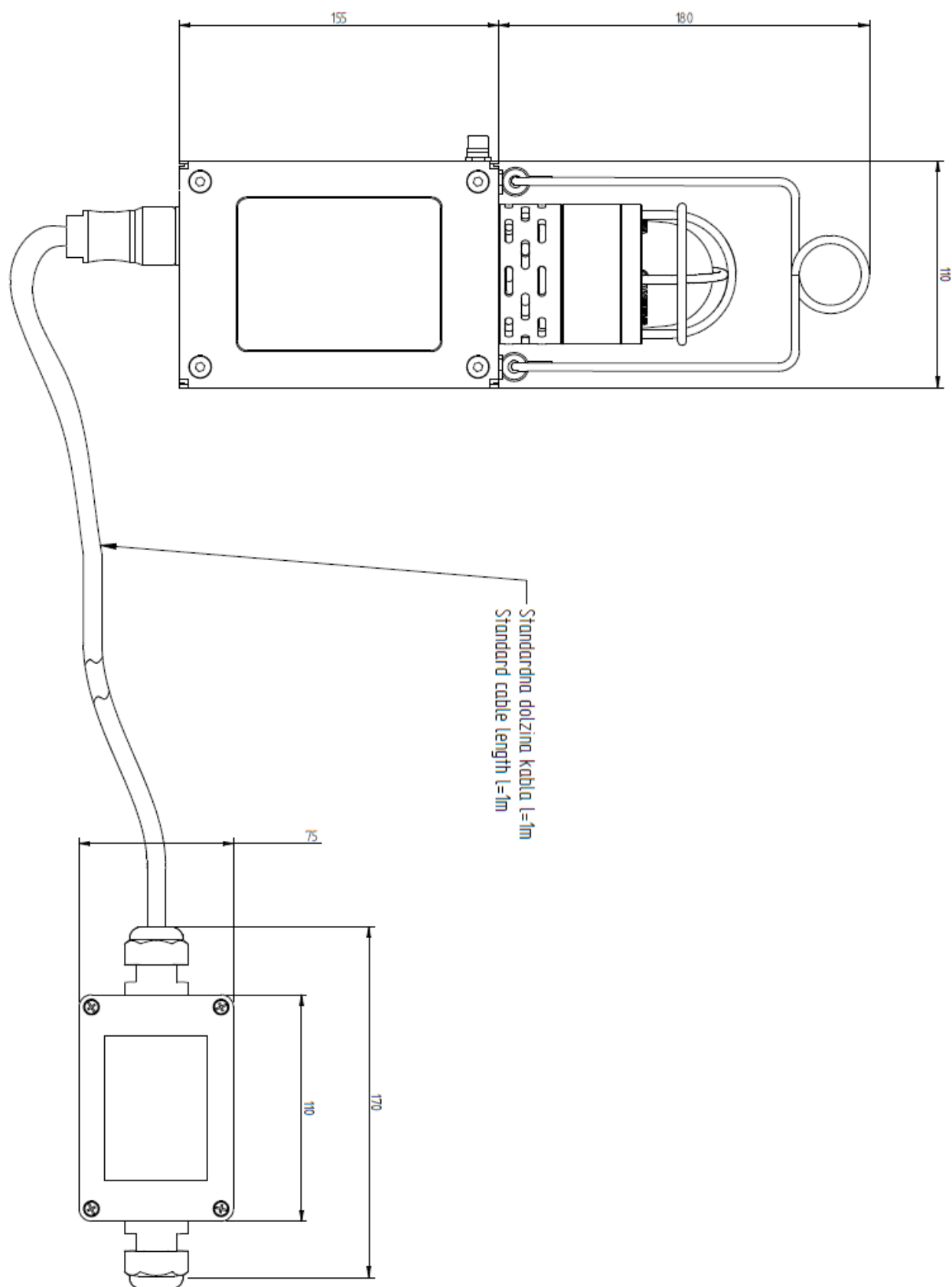


MPU-12/**.1x/SBH

7.6. MPU-13/**/SBH – MPU-14/**/SBH



Measuring process unit MPU - **/ * . * . ** /SBH



MPU-13/*.*.1x/SBH
MPU-14/*.*.1x/SBH



8. SAFETY INFORMATION

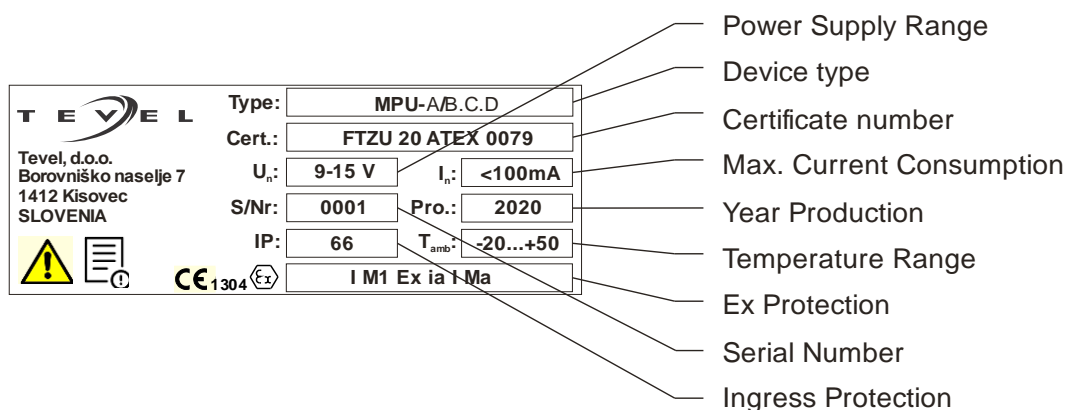
- Read this instruction carefully before installation or maintain operation of this product!
- Before device installation and connection, it is necessary to checked if device version corresponds to the value of the voltage supply and intrinsically safe parameters!
- This product should be stored in the original packing material, in a dry location and within the operational temperature range!
- Modifications or change of design are not permitted!
- The manufacturer is under no circumstances responsible for personal injuries, death or any other damage caused by modifications of the device, unsuitable handling or poor maintenance!
- For replacement and repairs only original spare parts from manufacturer may be used!
- Repairs effecting the explosion protection of device, may only be carried out by manufacturer or workshop authorized by the manufacturer!
- Installation, connection and operation of device should be performed according to IEC/EN 60079-17.
- The operator of the electrical equipment in hazardous area has to operate, supervise and maintain the equipment in good condition!
- Installation, operation and maintenance work should be done only by trained technical personnel!
- The device must be installed vertically (sensor head placed downwards)!
- The device must be powered from certified intrinsically safe power supply (ia)!



WARNING!

Powered only by intrinsic safe power supply (ia)!

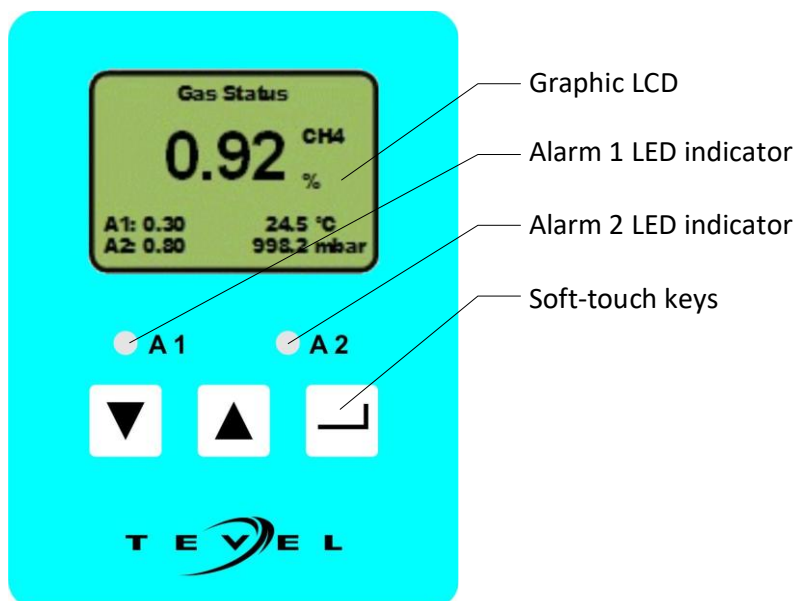
- Before the device installation it is necessarily to check the accordance of marking plate parameters with application requirements. It is also important to check all technical data and eventual warnings in certificate FTZU XX ATEX 0079. Additional technical information is provided in manufacturer's mining equipment catalog or at manufacturer's web page.





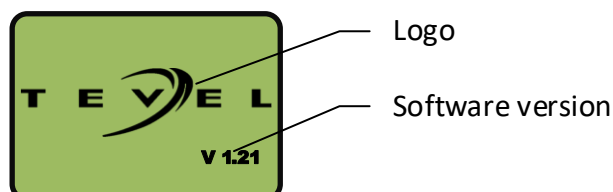
9. OPERATION DESCRIPTION

The front panel of the device contains graphic LCD display, LED indicator for alarm 1, LED indicator for alarm 2 and three soft-touch keys.

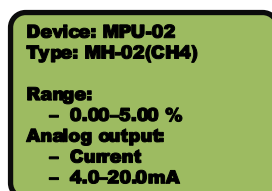


9.1. START-UP

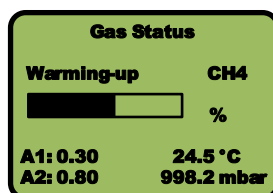
When starting the device, the manufacturer logo appears on the screen and the version of installed software at the bottom-right. During this time, the preset configuration of the device is loaded. In case of the first run of the device, the factory defaults will be loaded.



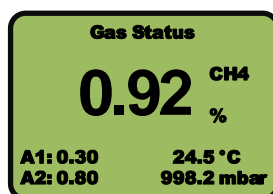
After that, the basic information about hardware settings of the device are displayed on the screen. This is the device type, measuring head type, measuring range, the type of analog output signal and its range.



During the process of warming-up the sensor will be warmed-up and stabilized. The progress bar displays current status of the warming-up process, and the warming-up time depends on the type of installed sensor. During this process both preset levels of alarm A1 and alarm A2 are visible, optionally device temperature and atmospheric pressure too (depending on user's settings). Yellow LED indicator blinks during the warming-up.



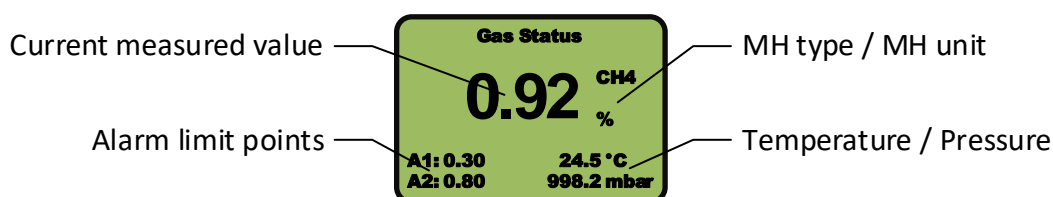
When the device is warmed-up, it goes to normal operation mode. The current actual measuring value is being constantly displayed on the screen. Both preset levels of alarm A1 and alarm A2 are visible, optionally current device temperature and current atmospheric pressure too (depending on user's settings).



9.2. DETECTING AND MEASURING

In normal operation mode, the device constantly measures and displays current measuring value on the screen. Other important parameters and settings are also shown, such as measuring head type and unit, alarm limit points and optionally temperature and pressure value too. Any warnings or errors are displayed in the top line on screen if it is occurred.

If the analog output is enabled in hardware settings, the current measured value is scaled to analog output according to the corresponding measuring range and type of analog output.



Measuring value is constantly compared with two predefined levels of alarm A1 and alarm A2. When measuring value is below of both predefined levels of alarm A1 and alarm A2, the device operates in idle mode.

9.2.1. IDLE MODE

- LED indicators are turned off,
- relay RE1 and relay RE2 are in normal predefined position (**only if relay outputs triggering is enabled**),
- digital outputs DO1 and DO2 are on normal predefined value (**only if digital outputs triggering is enabled**).

If measuring value exceeds any of predefined alarm limit point, the device switches to alarm mode.

9.2.2. ALARM MODE

Alarm status is activated if measured value exceeds one or both predefined limit points A1 and A2. In this case two stage alarm conditions are possible.

ALARM 1 – First alarm limit point (A1) has been exceeded

ALARM 2 – Second alarm limit point (A2) has been exceeded




If **ALARM 1** is activated:

- Alarm limit point A1 starts to blink on the screen
- Yellow LED indicator is turned on
- Relay RE1 is activated (**only if relay outputs triggering is enabled**)

When ALARM 1 condition is no longer present (the measuring value reduces below alarm limit point):

- If AUTO RESET function is ENABLED (the device automatically goes to IDLE MODE):
 - Alarm limit point A1 stops to blink on the screen
 - Yellow LED indicator is turned off
 - Relay RE1 is activated (**only if relay outputs triggering is enabled**)
- If AUTO RESET function is DISABLED (the device stays in ALARM MODE):
 - Alarm limit point A1 stays in blink mode on the screen
 - Yellow LED indicator stays turned on
 - Relay RE1 stays activated


When AUTO RESET function is DISABLED, it is necessary to press ENTER key  to reset alarm and to put the device to IDLE MODE.

If **ALARM 2** is activated:

- Alarm limit point A2 starts to blink on the screen
- Red LED indicator is turned on
- Relay RE2 is activated (**only if relay outputs triggering is enabled**)

When ALARM 2 condition is no longer present (the measuring value reduces below alarm limit point):

- If AUTO RESET function is ENABLED (the device automatically goes to IDLE MODE):
 - Alarm limit point A2 stops to blink on the screen
 - Red LED indicator is turned off
 - Relay RE2 is activated (**only if relay outputs triggering is enabled**)
- If AUTO RESET function is DISABLED (the device stays in ALARM MODE):
 - Alarm limit point A2 stays in blink mode on the screen
 - Red LED indicator stays turned on
 - Relay RE2 stays activated

When AUTO RESET function is DISABLED, it is necessary to press ENTER key  to reset alarm and to put the device to IDLE MODE.

9.2.3. WARNING

If warning condition appears, a notification is displayed in the top line on the screen. In this case also yellow LED indicator blink.

9.2.4. ERROR

If error condition appears, a current measured value disappears from the screen and error code is displayed on the screen. Analog output also switches in error mode.

ERROR CODE	FAULT	POSSIBLE CAUSE	POSSIBLE ACTION
80	Calibration error	<ul style="list-style-type: none"> ▪ The device is not calibrated. ▪ All calibrated points are zero. 	<ul style="list-style-type: none"> ▪ Calibrate the device.
81	Measuring head de-calibration	<ul style="list-style-type: none"> ▪ The device is de-calibrated. ▪ The sensor's cell is bad. 	<ul style="list-style-type: none"> ▪ Calibrate the device. ▪ Replace the sensor's cell.
100	Main board communication	<ul style="list-style-type: none"> ▪ Communication problem with main board ▪ Broken main board. 	<ul style="list-style-type: none"> ▪ Reset the device.
105	Temperature/Pressure sensor error	<ul style="list-style-type: none"> ▪ Communication problem with temperature/pressure sensor ▪ Broken temperature/pressure sensor 	<ul style="list-style-type: none"> ▪ Reset the device.






Measuring process unit MPU - **/ * . * . ** /SBH

106	Differential pressure sensor error	<ul style="list-style-type: none"> Communication problem with temperature/pressure sensor Broken temperature/pressure sensor 	<ul style="list-style-type: none"> Reset the device.
109	Display board communication	<ul style="list-style-type: none"> Communication problem with display board. Broken display board. 	<ul style="list-style-type: none"> Reset the device.
110	Measuring head error	<ul style="list-style-type: none"> Problems with the measuring head communication. Weak connection. Broke measuring head. 	<ul style="list-style-type: none"> Check measuring head. Check measuring head connection. Reset device.
111	Wrong measuring head	<ul style="list-style-type: none"> The measuring head is not compatible with device. Wrong type of measuring head. 	<ul style="list-style-type: none"> Check measuring head type. Replace measuring head with compatible type of head.
113	Replaced measuring head	<ul style="list-style-type: none"> The measuring head has been replaced. 	<ul style="list-style-type: none"> Re-calibrate the device.





10. DEVICE MANAGEMENT

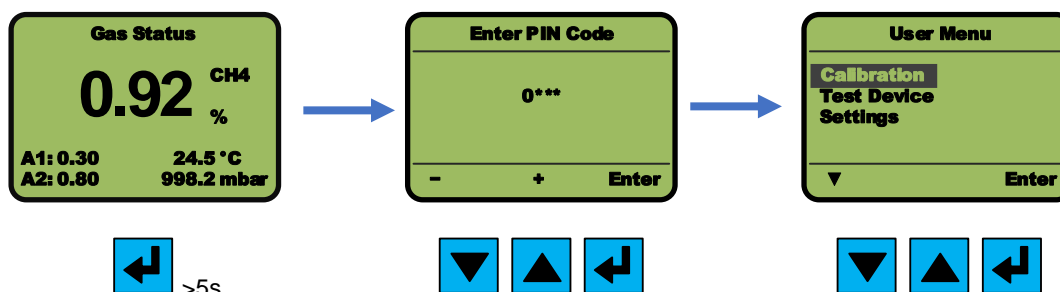
The device settings can be managed in **user mode menu**. It can be accessible with prior authentication which prevents the abuse of unauthorized persons. The device is managed with using a three soft-touch keys located on the front panel (figure XX).

Enter key: **"ENTER / QUIT"**  (LONG and SHORT press key function – depending on menu's function)




Shift keys: **"DOWN", "UP"**   (SHORT press function – slow shift/count, LONG press function – quick shift/count)

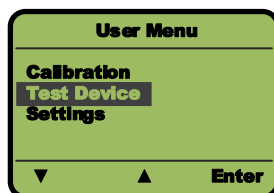
10.1. USER AUTHENTICATION



Hold 5 seconds ENTER KEY  for authentication. The device requires 4-digit PIN code. The currently selected digit is displayed and it blinks. Other digits are hidden ("**"). Use SHIFT KEYS   for change number and then ENTER KEY  to apply selected number. Default PIN code is "0000".

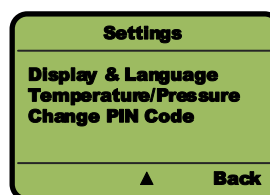
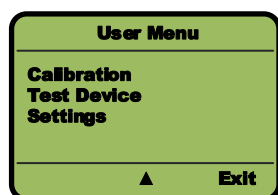


10.2. MENU AND SUB-MENU MANAGEMENT




After success entering the correct PIN code, the user menu is displayed on the screen. Use the shift keys   to select the desired setting in the menu and confirm it with enter key  to switch to sub-menu.

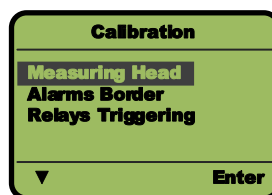
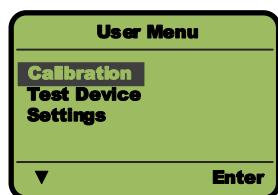


To exit the menu or return from the sub-menu, scroll to the end of bottom position with shift key . At the right bottom side on the screen appears “Exit” or “Back” (depending of the menu or sub-menu) and then press enter key  to confirm.









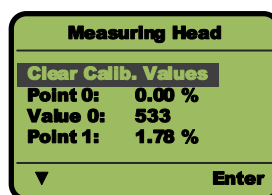
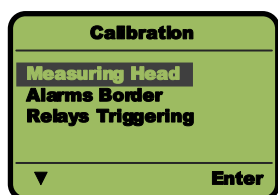
10.3. CALIBRATION

The device must be correct calibrated for proper operation. To switch to *Calibration* menu select the **Calibration** in user menu with shift keys   and confirm it with enter key .



10.3.1. MEASURING HEAD

To calibrate measuring head sensor select the **Measuring Head** in *Calibration* menu with shift keys   and confirm it with enter key . Then select desired settings with switch keys   and confirm it with enter key .





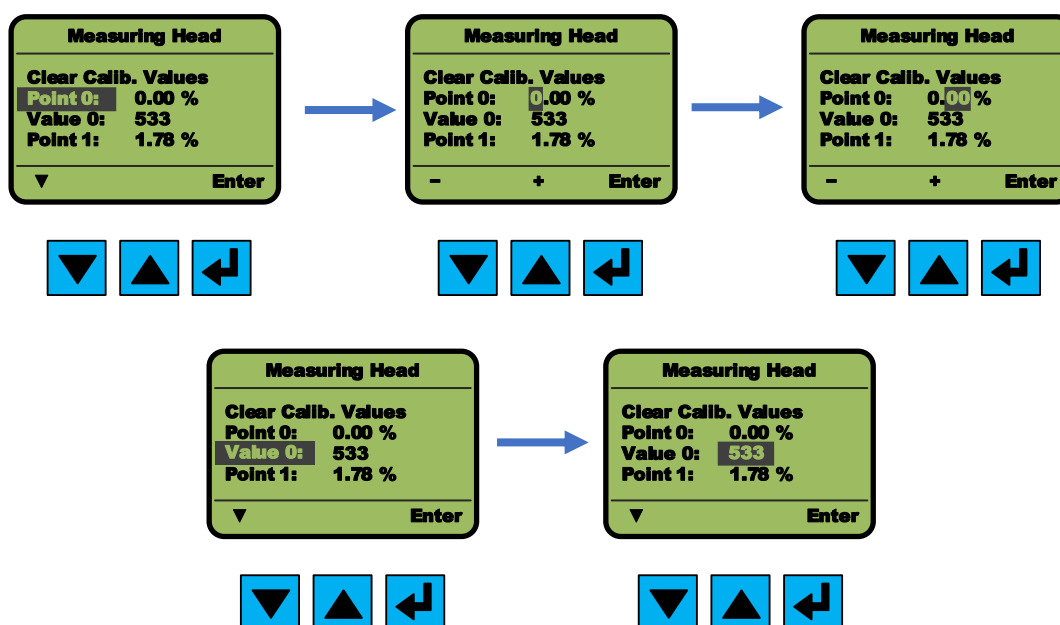
10.3.1.1. Calibration process

Select the setting with switch keys and confirm it with enter key .

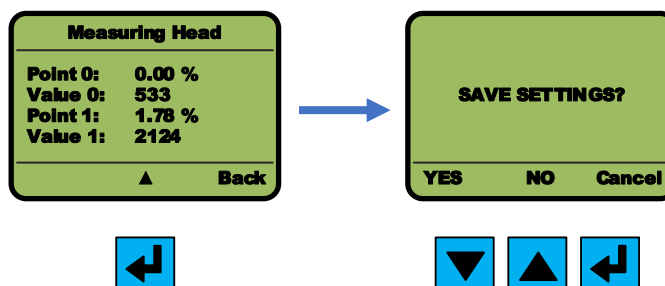
To clear all values, select **Clear Calib. Values** and press . All calibration points and values will be cleared and set to zero.

To calibrate point 0 select **Point 0** with switch keys and press enter key . Set gas concentration for point 0 with switch keys and confirm it with enter key . The AD value must also be set for point 0. Select **Value 0** and press enter key . To measuring head applies gas concentration which correspond set point 0. When the AD value stabilizes, confirm it with enter key . Standard stabilization time is >2min.

The same is for the point 1. Select **Point 1** in menu and set the gas concentration. Then select **Value 1**, apply the gas concentration which correspond point 1, and when value stabilizes, confirm it with enter key.

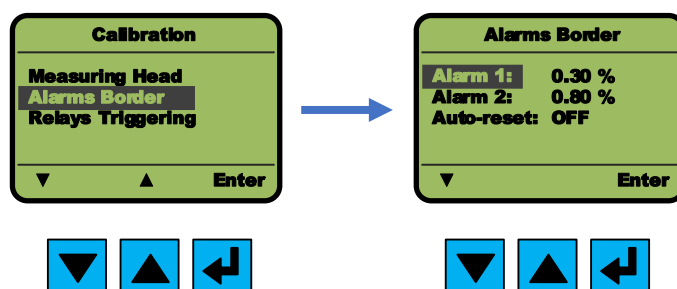


When all points are set, scroll to the bottom-end position to exit and return to previous menu. In the bottom-right on the screen will appear **"Back"**. Confirm it with enter key . Device will ask you, if you want to save settings. Press switch key to SAVE the settings, or switch key to DISCARD the settings or enter key to CANCEL and return into edit the settings.



10.3.2. ALARM BORDER

To calibrate alarms border select the **Alarms Border** in *Calibration* menu with shift keys and confirm it with enter key . Then select desired settings with switch keys and confirm it with enter key .



10.3.2.1. Calibration process

Select the setting with switch keys and confirm it with enter key .

To calibrate alarm 1 limit point, select **Alarm 1** in menu and press . With switch keys set the value and confirm it with enter key .

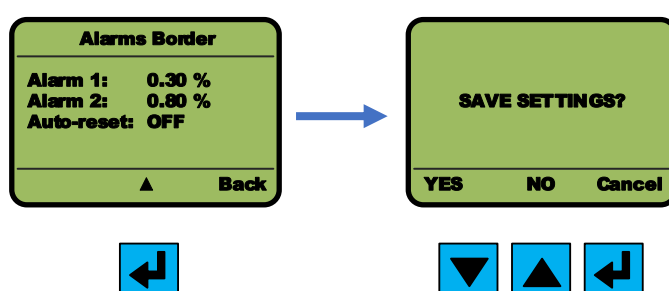
The same is for the alarm 2 limit point. Select **Alarm 2** in menu and set the value and confirm it with enter key.

10.3.2.2. Auto-reset function

If auto-reset function is enabled, the alarms are automatically controlled by device. If measuring value exceeds alarm limit point, corresponding alarm will be set. If measuring value returns below the alarm limit point, corresponding alarm will be cleared.

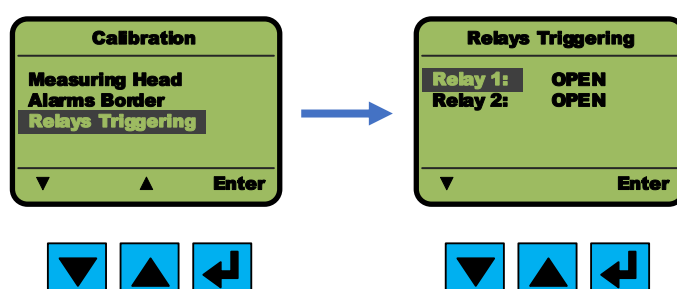
If auto-reset function is disabled, the alarms must be cleared manually. If measuring value exceeds alarm limit point, corresponding alarm will be set. If measuring value returns below the alarm limit point, corresponding alarm will remain set. User must manually clear the alarms by pressing the enter key .

When all settings are set, scroll to the bottom-end position to return to previous menu. In the bottom-right on the screen will appear "**Back**". Confirm it with enter key . Device will ask you, if you want to save settings. Press switch key to SAVE the settings, or switch key to DISCARD the settings or enter key to CANCEL and return into edit the settings.



10.3.3. RELAYS TRIGGERING

To set relays triggering select the **Relays Triggering** in **Calibration** menu with shift keys and confirm it with enter key . Then select desired settings with switch keys and confirm it with enter key .



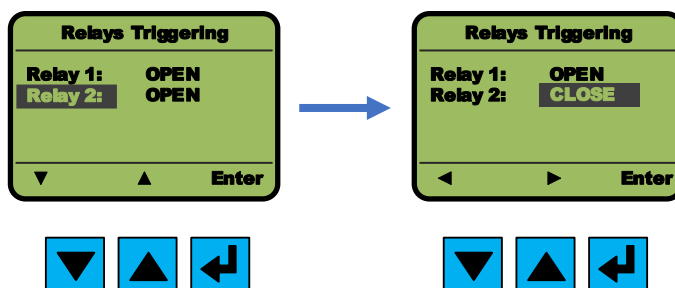


10.3.3.1. Calibration process

Select the setting with switch keys and confirm it with enter key .

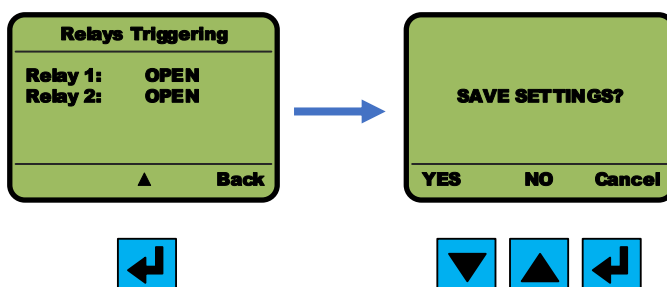
To set relay RE1, select **Relay 1** in menu and press . Set the relay 1 triggering with switch keys and confirm it with enter key .

The same is for the relay 2. Select **Relay 2** in menu, set the triggering and confirm it with enter key.



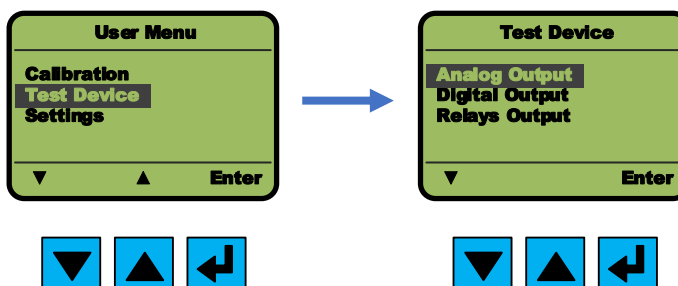
Set relay output triggering to **OPEN** for a normally open mode (NO) or to **CLOSE** for normally closed mode (NC). If relay output is not in function, set it to **OFF**.

When all settings are set, scroll to the bottom-end position to return to previous menu. In the bottom-right on the screen will appear **Back**. Confirm it with enter key . Device will ask you, if you want to save settings. Press switch key to SAVE the settings, or switch key to DISCARD the settings or enter key to CANCEL and return into edit the settings.



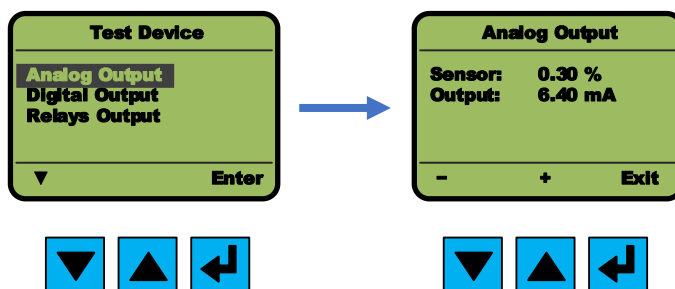
10.4. TEST DEVICE

Some testing features are built-into the device to check settings, also to periodic testing the device. For testing select **Test Device** in user menu with shift keys and confirm it with enter key .



10.4.1. TEST ANALOG OUTPUT

To test analog output select the **Analog Output** in **Test Device** menu with shift keys and confirm it with enter key .

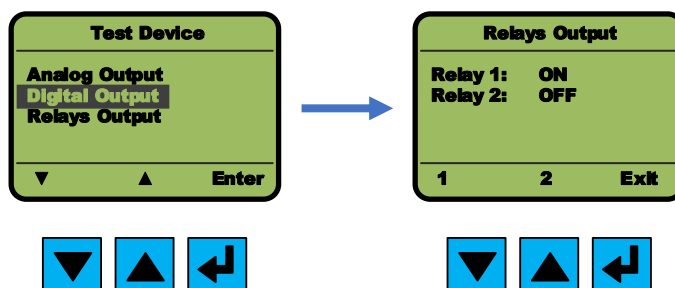


10.4.1.1. Test process

Use switch keys to increase or decrease values. Check the analog output suitability and the dependence on the sensor value. To exit press .

10.4.2. TEST DIGITAL OUTPUT

To test digital output select **Digital Output** in *Test Device* menu with shift keys and confirm it with enter key .

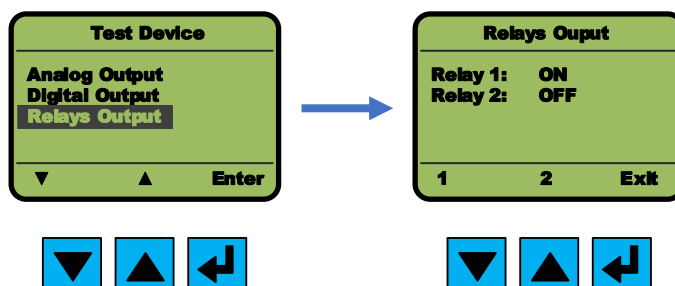


10.4.2.1. Test process

Digital output is originally intended to control SBH device. Use switch keys to trigger digital output A or B. Status line will display the SBH operation mode, which must actually correspond to the SBH operation. To exit press .

10.4.3. TEST RELAYS OUTPUT

To test relays output select **Relays Output** in *Test Device* menu with shift keys and confirm it with enter key .



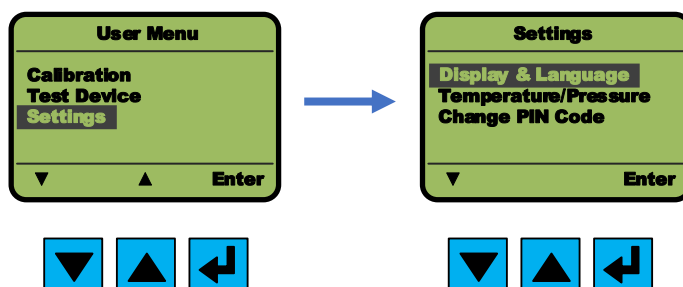
10.4.3.1. Test process

Use switch key to trigger the relay RE1 and switch key to trigger the relay RE2. To exit press .



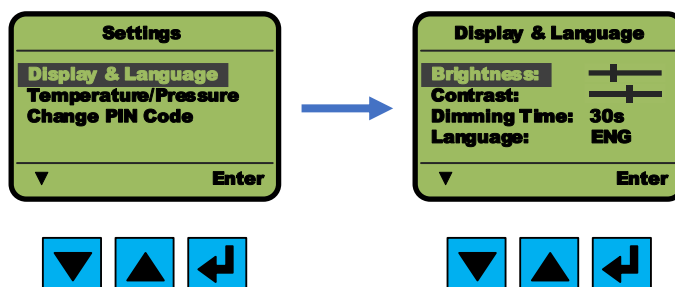
10.5. SETTINGS

In *User Menu* select **Settings** with shift keys and confirm it with enter key to switch to *Settings* menu.



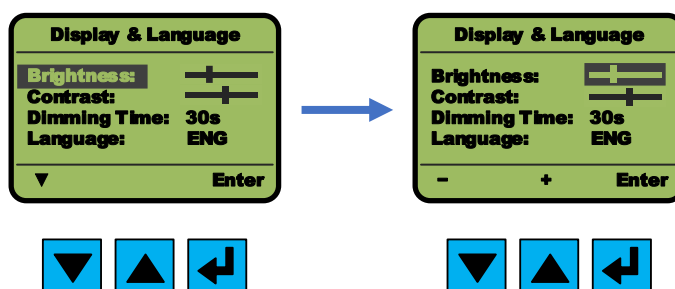
10.5.1. DISPLAY & LANGUAGE

In *Settings* menu select **Display & Language** with shift keys to adjust display and language settings and confirm it with enter key .



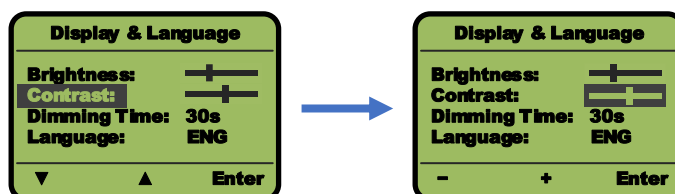
10.5.1.1. Brightness

To adjust a screen brightness select **Brightness** with switch keys and press enter key . Use switch keys to change the screen brightness and confirm it with enter key .



10.5.1.2. Contrast

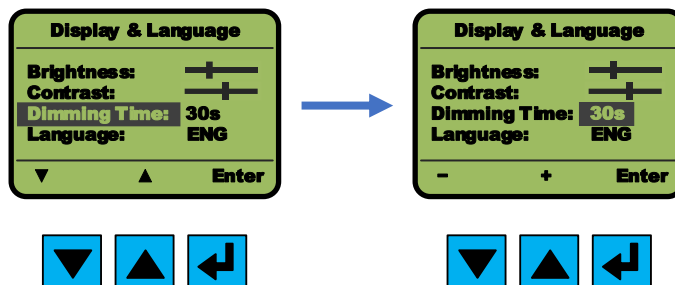
To adjust a screen contrast select **Contrast** with switch keys and press enter key . Use switch keys to change the screen contrast and confirm it with enter key .





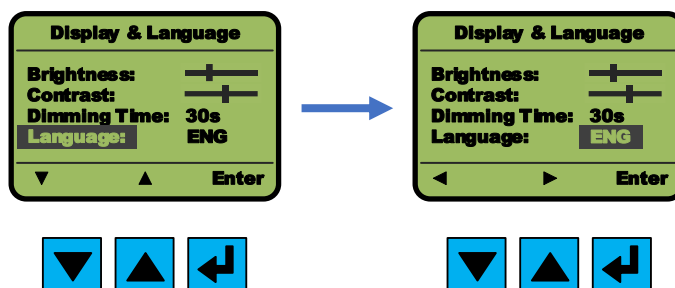
10.5.1.3. Dimming time

To adjust a screen dimming time select **Dimming Time** with switch keys and press enter key . Use switch keys to change the screen dimming time and confirm it with enter key .

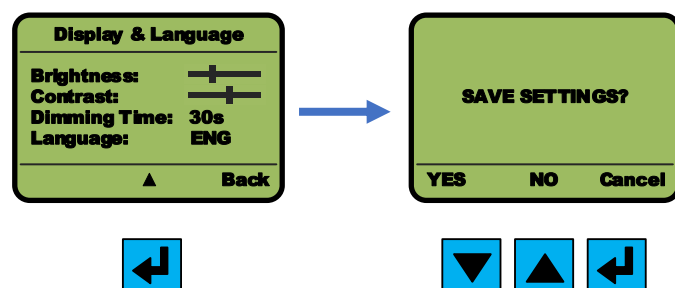


10.5.1.4. Language

To change the language select **Language** with switch keys and press enter key . Use switch keys to change the language and confirm it with enter key .

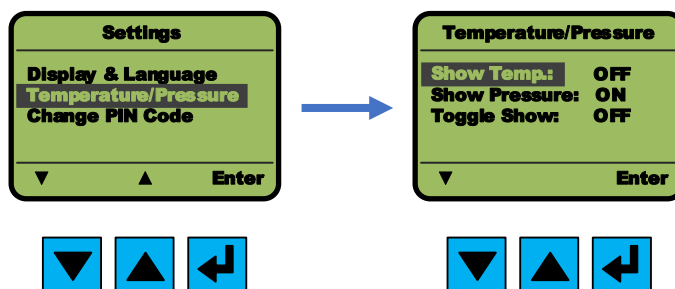


When all settings are set, scroll to the bottom-end position to return to previous menu. In the bottom-right on the screen will appear "**Back**". Press enter key . Device will ask you, if you want to save settings. Press switch key to SAVE the settings, or switch key to DISCARD the settings or enter key to CANCEL and return into edit the settings.



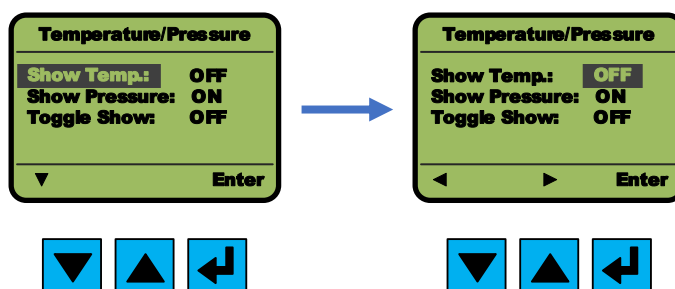
10.5.2. TEMPERATURE & PRESSURE

In **Settings** menu select **Temperature/Pressure** with shift keys to show/hide temperature or pressure and confirm it with enter key .



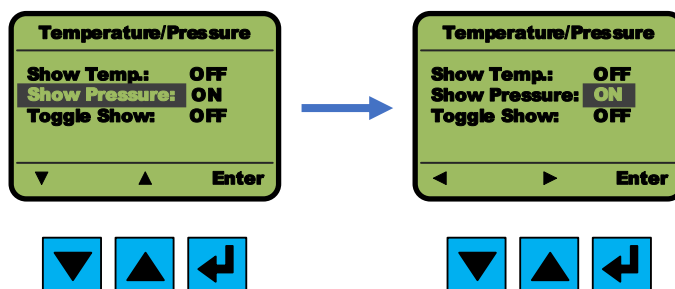
10.5.2.1. Show Temperature

To show/hide device temperature on the screen select **Show Temp.** with switch keys ▼ ▲ and press enter key ↵. Use switch keys ▼ ▲ to change setting and confirm it with enter key ↵.



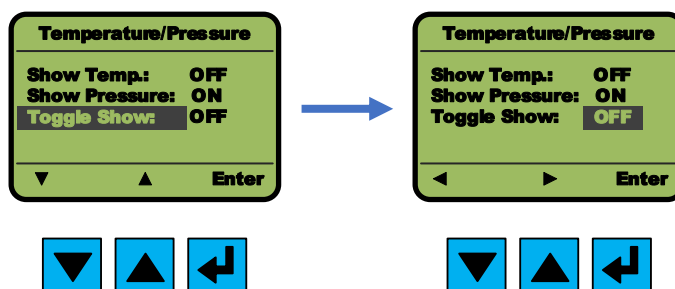
10.5.2.2. Show Pressure

To show/hide atmospheric pressure on the screen select **Show Pressure** with switch keys ▼ ▲ and press enter key ↵. Use switch keys ▼ ▲ to change setting and confirm it with enter key ↵.







10.5.2.3. Toggle Temperature and Pressure

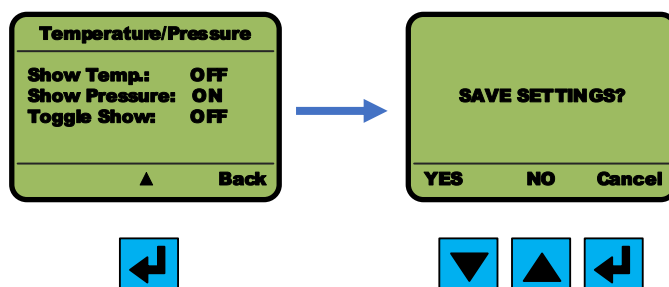
To toggle temperature and atmospheric pressure position on the screen select **Toggle Show** with switch keys ▼ ▲ and press enter key ↵. Use switch keys ▼ ▲ to change setting and confirm it with enter key ↵.














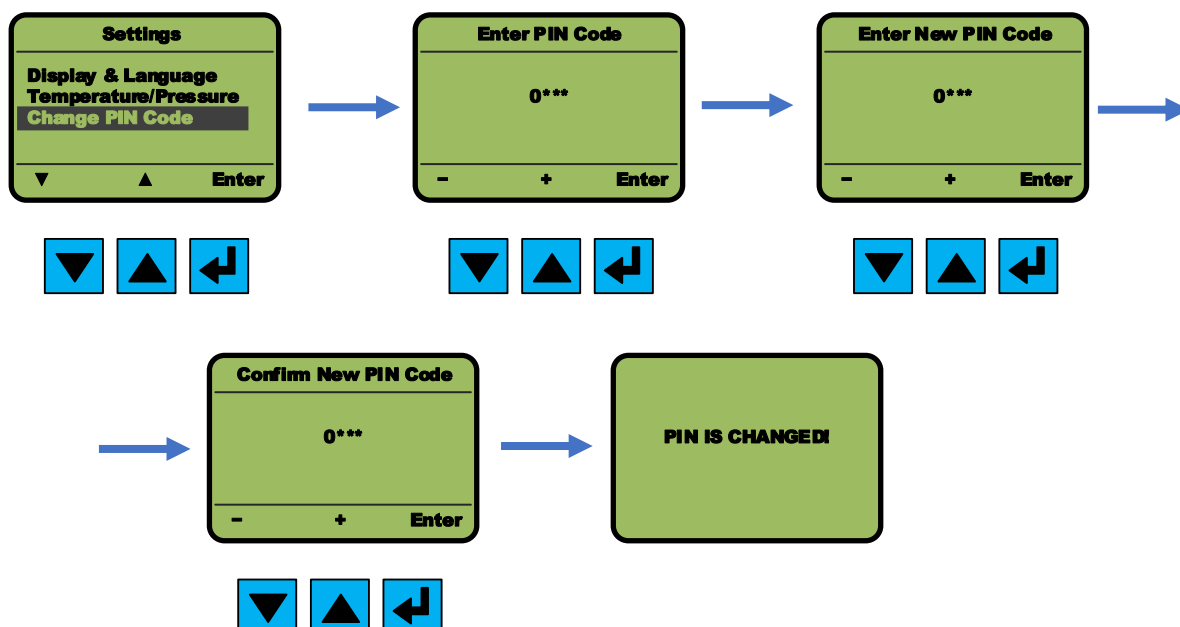
Measuring process unit MPU - **/ * . * . ** /SBH

When all settings are set, scroll to the bottom-end position to return to previous menu. In the bottom-right on the screen will appear “**Back**”. Press enter key . Device will ask you, if you want to save settings. Press switch key  to SAVE the settings, or switch key  to DISCARD the settings or enter key  to CANCEL and return into edit the settings.



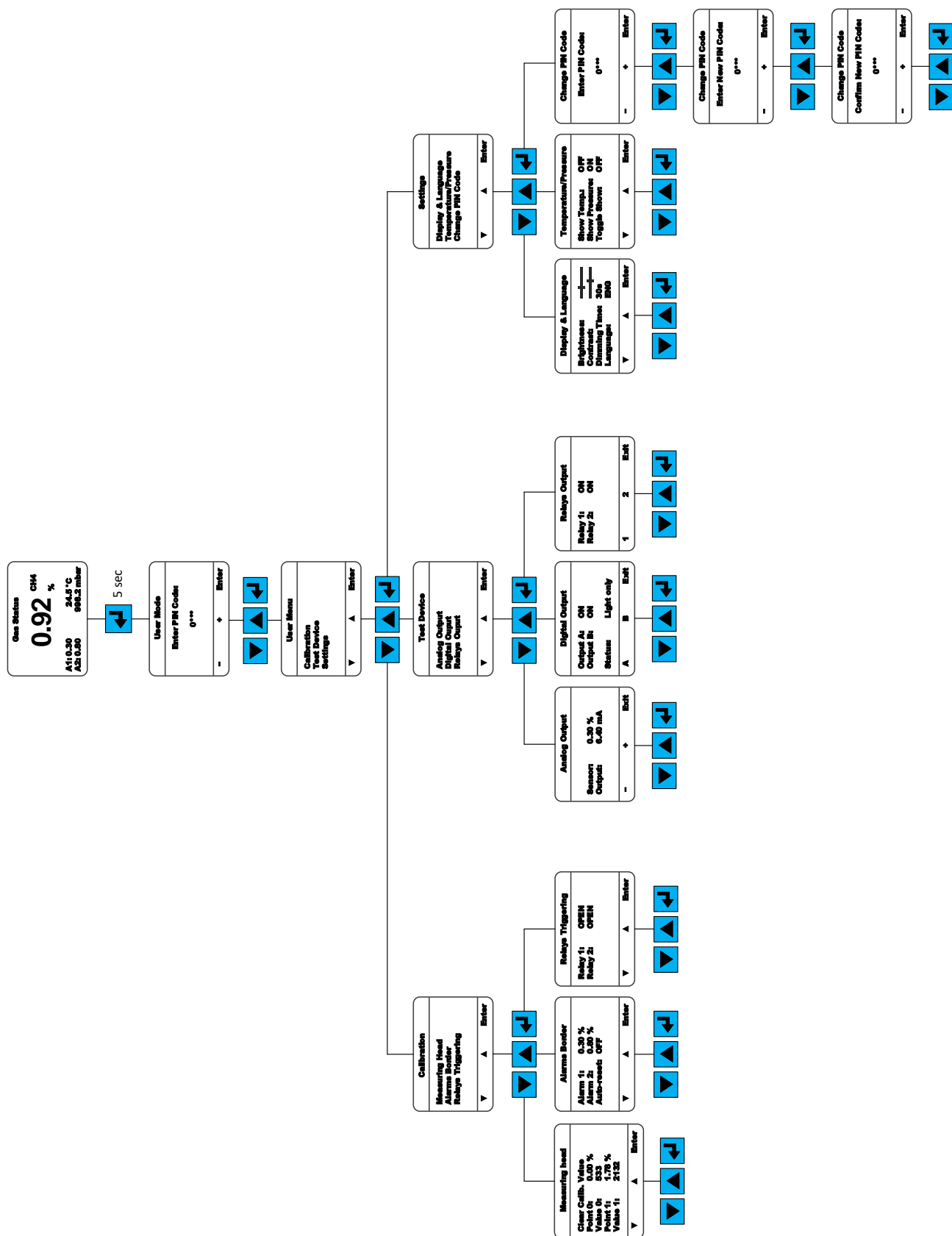
10.5.3. CHANGE PIN CODE

In *Settings* menu select the **Change PIN Code** with shift keys   to change PIN code and confirm it with enter key . The device requires current PIN code. The currently selected digit is displayed and it blinks. Other digits are hidden (“**”). Use shift keys   to change current digit value and confirm it with enter key . If the entered PIN code is correct, a new PIN code can be entered. User must re-enter the new PIN code after change. Use shift and enter keys   .





10.6. MENU STRUCTURE





11. TROUBLESHOOTING

PROBLEM	POSSIBLE REASON	POSSIBLE SOLUTION
The device not turn-on.	<ul style="list-style-type: none"> ▪ The device is not connected. ▪ The device has no power supply. ▪ The connection cable is broken. ▪ The wire connection is wrong. 	<ul style="list-style-type: none"> ▪ Make sure the device is connected. ▪ Make sure the power supply is live. ▪ Make sure the connection cable is in good condition. ▪ Make sure the wires are properly connected. Refer to <i>Installation and Connection</i> (chapter 8).
The analog output does not work or does not work properly.	<ul style="list-style-type: none"> ▪ The connection cable is broken. ▪ The wire connection is wrong. ▪ The cable for current loop is too long. ▪ The terminating resistor is too large. 	<ul style="list-style-type: none"> ▪ Make sure the connection cable is in good condition. ▪ Make sure the wires are properly connected. Refer to <i>Installation and Connection</i> (chapter 8). ▪ Make sure the length of cable for current loop is within specifications. ▪ Make sure the terminating resistor in connected device is appropriate. ▪ Turn off the device for 5 second and then turn it back on.
The relay output does not work or does not work properly.	<ul style="list-style-type: none"> ▪ The connection cable is broken. ▪ The wire connection is wrong. ▪ The relay output is disabled. ▪ The alarm limit point value is not set. 	<ul style="list-style-type: none"> ▪ Make sure the connection cable is in good condition. ▪ Make sure the wires are properly connected. Refer to <i>Installation and Connection</i> (chapter 8). ▪ Make sure the relay output is enabled. Refer to <i>Device Management</i> (chapter 10). ▪ Make sure the alarm limit point value is set. Refer to <i>Device Management</i> (chapter 10). ▪ Turn off the device for 5 second and then turn it back on.
The display does not work properly.	<ul style="list-style-type: none"> ▪ The error in communication with display is occurred. 	<ul style="list-style-type: none"> ▪ Turn off the device for 5 second and then turn it back on.
The soft-touch keys not work or does not work properly.	<ul style="list-style-type: none"> ▪ Several keys are pressed at the same time. ▪ The key error is occurred. 	<ul style="list-style-type: none"> ▪ Only one key can be pressed at the same time. ▪ Turn off the device for 5 second and then turn it back on.
The measuring head does not work or does not work properly.	<ul style="list-style-type: none"> ▪ Problems with the measuring head communication. ▪ Weak connection. ▪ Broke measuring head. ▪ The measuring head is not compatible with device. ▪ Wrong type of measuring head. 	<ul style="list-style-type: none"> ▪ Make sure the connection cable is in good condition. ▪ Make sure the measuring head is compatible with device type. ▪ Refer to <i>Operation Description</i> (chapter 9), find error description in the error table and try the suggested possible action. ▪ Turn off the device for 5 second and then turn it back on.

12. MANUFACTURER

TEVEL d.o.o.

Borovniko naselje 7

SI-1412 Kisovec

Tel.: +386 3 56 72 050

Fax: +386 3 56 71 119

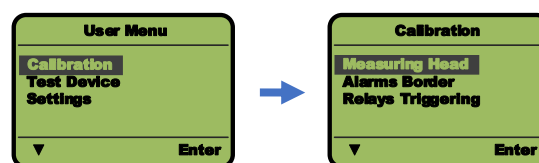
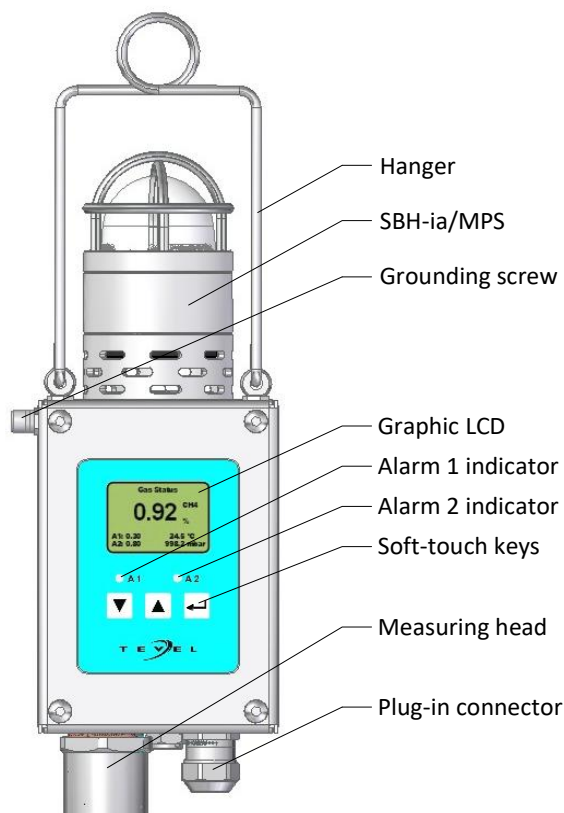
E-mail: info@tevel.si

www.tevel.si

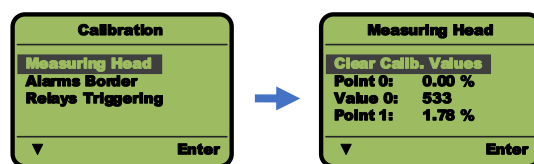


A. QUICK GUIDE – MEASURING HEAD CALIBRATION PROCESS

A.1. DEVICE FRONT PANEL

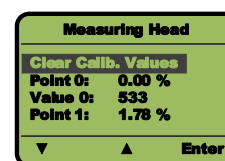


- b) Select with switch keys *Measuring Head* and confirm it with enter key .

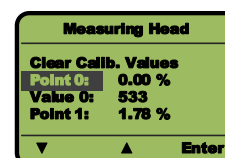


A.4. CALIBRATION PROCESS

- a) Select the setting with switch keys and confirm it with enter key .
- b) To clear all values, select **Clear Calib. Values** and press . All calibration points and values will be cleared and set to zero. If you do not want to clear the previous values, skip this point.



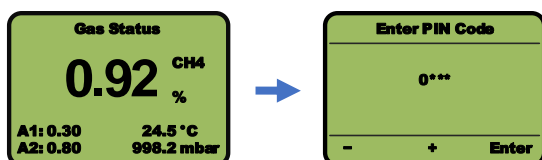
- c) To calibrate point 0, select **Point 0** with switch keys and confirm it with enter key .



- d) Set gas concentration for point 0 with switch keys and confirm it with enter key . The

A.2. USER AUTHENTICATION

- a) Hold for 5 seconds ENTER KEY .
- b) Enter with switch keys and enter key a 4-digit PIN code.
- c) Default PIN code is "0000".



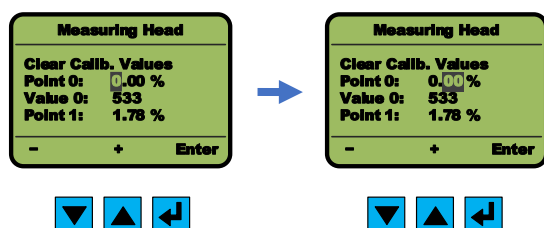
A.3. CALIBRATION MENU SELECT

- a) Select with switch keys *Calibration* and confirm it with enter key .

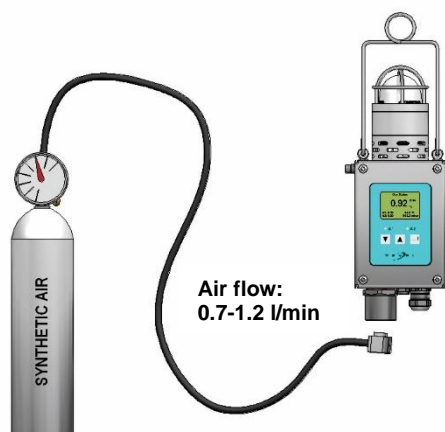
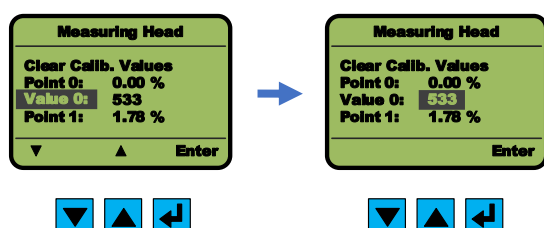


Measuring process unit MPU - **/ * . * . ** /SBH

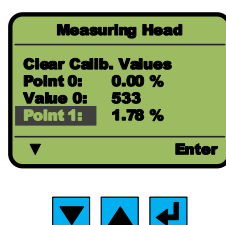
point 0 is usually intended to apply synthetic air to measuring head and it should be set to zero.



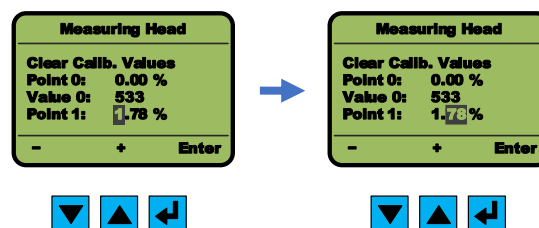
- e) Select **Value 0** and press enter key to calibrate point 0. Apply synthetic air to measuring head. When the value is stabilized, confirm it with enter key . The point 0 is calibrated.



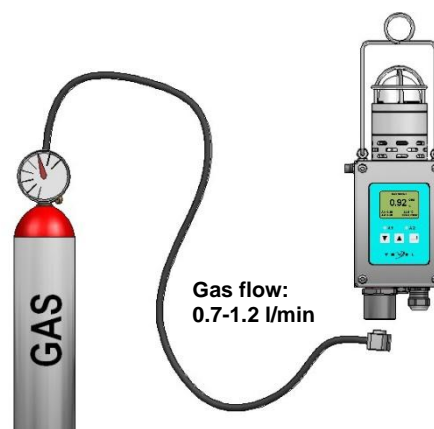
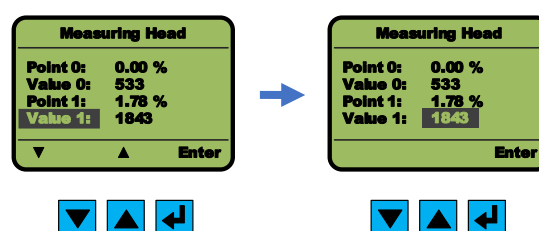
- f) To calibrate point 1 select **Point 1** with switch keys and confirm it with enter key .



- g) Set gas concentration for point 1 with switch keys and confirm it with enter key . The point 1 is usually intended to apply a gas (or other measured quantity) to the measuring head. The value is the same as the gas concentration (or other measured quantity).

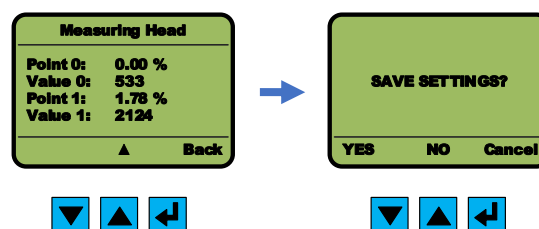


- h) Select **Value 1** and press enter key to calibrate point 1. Apply the gas (or other measured quantity) to measuring head. When the value is stabilized, confirm it with enter key . The point 1 is calibrated.





A.5. SAVE CALIBRATION

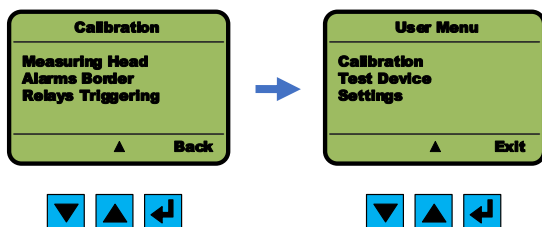
Scroll to the bottom-end position with switch key . In the bottom-right on the screen will appear "Back". Confirm it with enter key . Device will ask you, if you want to save settings. Press switch key to SAVE the settings, or switch key to DISCARD the settings or enter key to CANCEL and return into edit the settings.





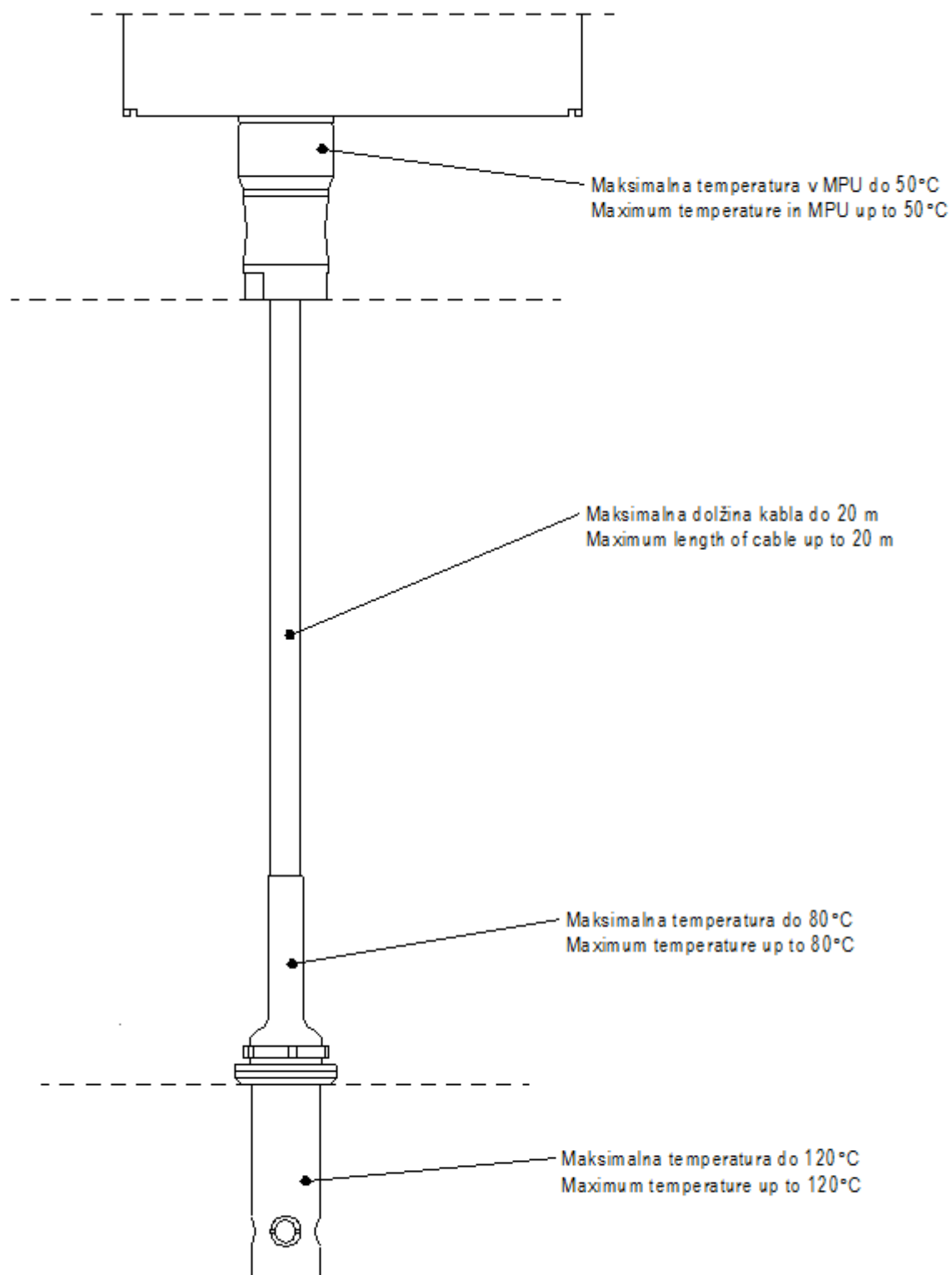
A.6. EXIT MENU

Scroll to the bottom-end position with switch key  .
In the bottom-right on the screen will appear “**Back**”
in sub-menus or “**Exit**” in main menu. Confirm it with
enter key  .





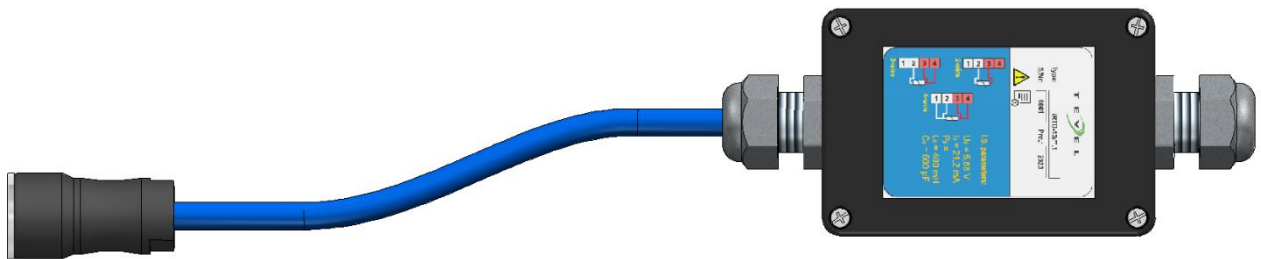
B. MOUNTING DISLOCATED TEMPERATURE MEASURING HEAD EXAMPLE





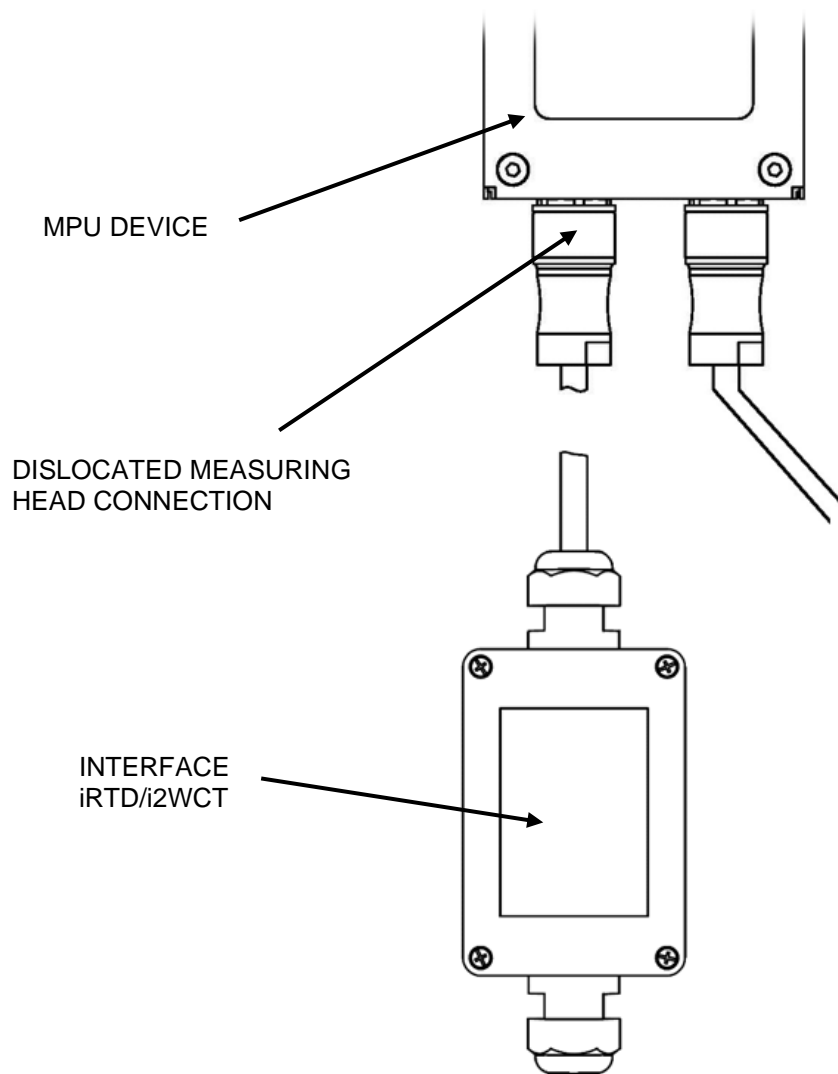
C. INTERFACE iRTD/i2WCT

Interface iRTD/i2WCT is an extension unit for MPU-** device for connecting ATEX-certified RTD sensors and ATEX-certified sensors based on a 4-20mA current loop transmitter to MPU-** device. Interface is dislocated unit (dislocated measuring head) with dedicated cable connector, which is connected to MPU-** device.



C.1. INTERFACE CONNECTION WITH MPU-** DEVICE

To connect the interface to the MPU-** device mount the connection cable to the device.





C.2. SENSOR CONNECTION TO iRTD/i2WCT INTERFACE

On the top side of interface unscrew four screws and remove enclosure cover. Mount cable through dedicated cable gland with a torque **5.5 Nm**. Connect wires to terminals according to the table below with a torque within **0.5 – 0.6 Nm**. After that place the enclosure cover and screw the screws back with a torque within **4 – 6 Nm**.

Be aware that to the iRTD/i2WCT interface should be connected only ATEX-certified sensors with appropriate intrinsically safe ia parameters. Before the sensor to the iRTD/i2WCT interface is connected, the user must check if the intrinsically safe parameters of the sensor are compatible with the intrinsically safe parameters of the iRTD/i2WCT interface.



WARNING!

Only ATEX-certified sensors can be connected to the interface iRTD/i2WCT!



WARNING!

Check the sensor's intrinsically safe parameters compatibility with interface iRTD/i2WCT!

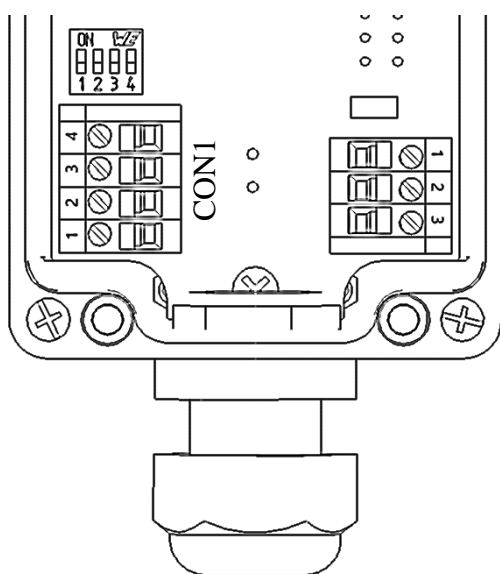


WARNING!

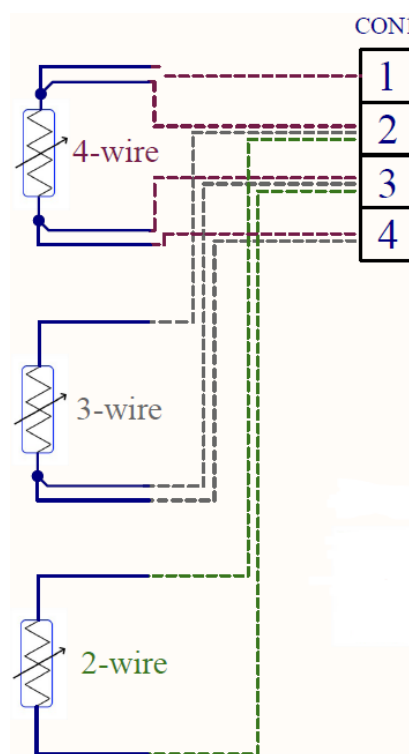
Installation, operation and maintenance work should be done only by trained technical personnel!

C.2.1. RTD sensor connection to iRTD-13/**.1 interface

The extension iRTD-13/**.1 interface allows connecting ATEX-certified 2-wire, 3-wire, and 4-wire RTD sensors to MPU-** device. Connect the RTD sensor according to the diagram and picture below. The DIP switch shall be also set correctly.



DIP switch settings





Measuring process unit MPU - **/ * . * . ** /SBH



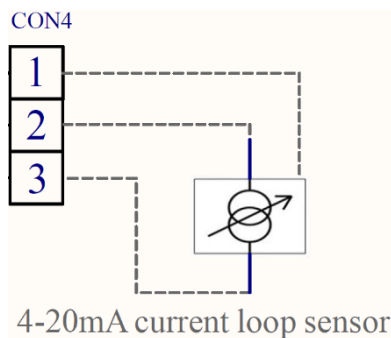
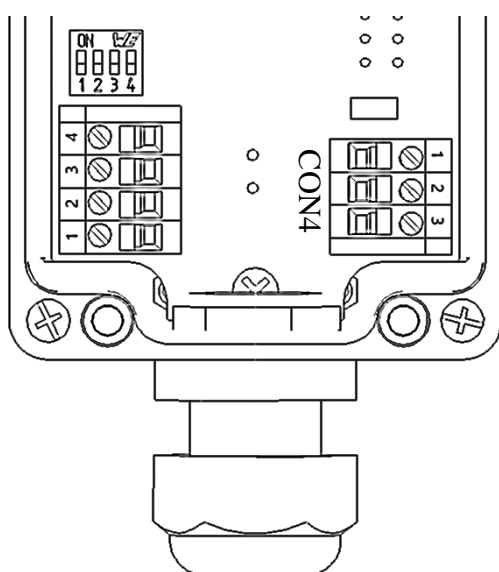
C.2.1.1. Intrinsically safe parameters of iRTD-13/**.1 interface

The intrinsically safe parameters of the sensor must be compatible with the intrinsically safe parameters of iRTD-13/**.1 interface. The parameters for the interface are specified below:

$$U_0 = 5.88 \text{ V}, \quad I_0 = 21.2 \text{ mA}, \quad P_0 = 125 \text{ mW}, \quad C_0 = 500 \text{ }\mu\text{F}, \quad L_0 = 400 \text{ mH}$$

C.2.2. 4-20mA current loop transmitter sensor connection to interface i2WCT/**.1

The extension i2WCT/**.1 interface allows connecting certified sensors based on a 4-20mA current loop transmitter to MPU-** device. Connect the 4-20mA current loop transmitter sensor according to the table and picture below.



C.2.2.1. Intrinsically safe parameters of iRTD-14/**.1 interface

The intrinsically safe parameters of the sensor must be compatible with the intrinsically safe parameters of iRTD-14/**.1 interface. The parameters for the interface are specified below:

$$U_0 = 21.4 \text{ V}, \quad I_0 = 90.2 \text{ mA}, \quad P_0 = 1.93 \text{ W}, \quad C_0 = 3.3 \text{ }\mu\text{F}, \quad L_0 = 45 \text{ mH}$$