

Operating Manual MU1001K

updated: 2018-11-12 / sm
from Firmware: 0-04

- Measuring-Transducer



Table of contents

1	Application and short description	3
2	Overview of functions	3
3	Connecting diagram	3
4	Important Information	4
5	Installation	4
6	Commissioning	5
6.1	Overview of commissioning	5
6.2	Overview of the predefined standard ranges.....	5
6.3	Setting a predefined range.....	6
6.4	Diagram for setting a predefined range.....	7
6.5	Overview of scaling an arbitrary range.....	8
6.6	Scaling of range.....	8
6.7	Diagram for scaling of range.....	9
6.8	Factory setting	10
6.9	Query of firmware-version.....	10
6.9.1	Revision Firmware	10
7	Maintenance and repair	10
8	Error search	10
9	Technical data	11
10	Housing Type K	12

1 Application and short description

Universal Measuring-Transducers MU1001K can measure DC-signals up to 300 V.

Pre-set measuring-ranges can be selected by the user.

More measuring-ranges (zero and full scale) can be easily scaled.

The output-signals DC 0/2-10 V and 0/4-20 mA are insulated from measuring-input and supply-voltage.

With its universal power-supply AC/DC 24-240 V the measuring-transducer can be connected to all common supply-voltages.

2 Overview of functions

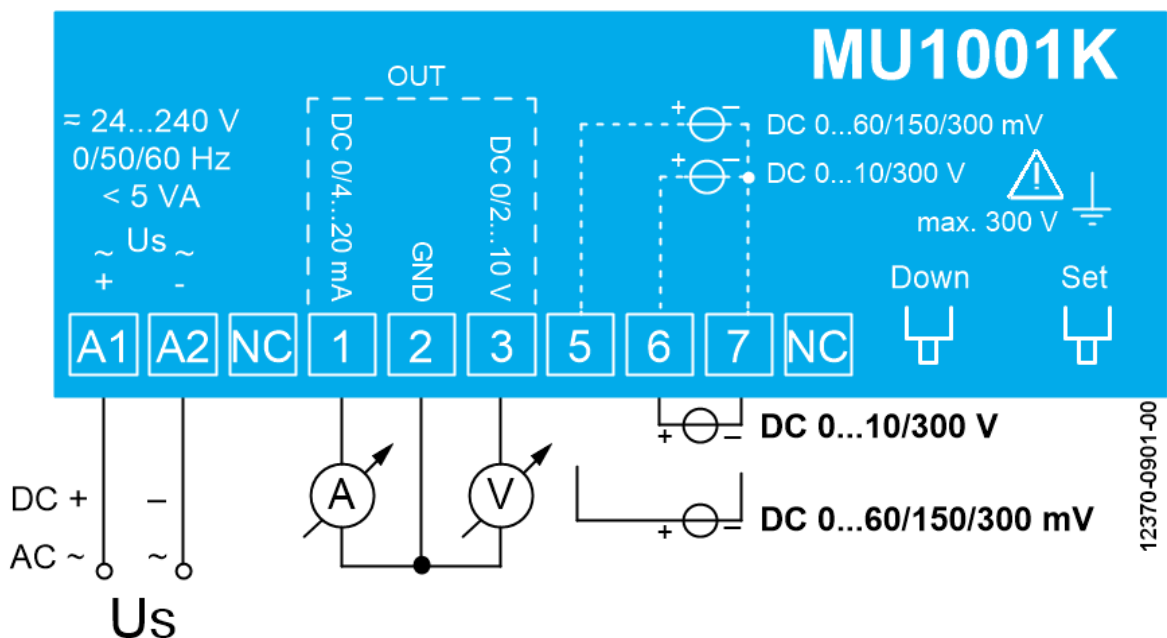
- Output signal 0-20mA and 0-10V or 4-20mA and 2-10V
- Rated Supply Voltage AC/DC 24-240V
- Insulation between inputs, outputs and supply voltage
- Standard ranges adjustable, universally scalable input ranges

Inputs:

- DC -300 ... 300 mV
(preset values: 0...60 / 0...150 / 0...300 / -60...60 / -150...150 / -300...300 mV)
- DC -10 ... 10 V
(preset values: 0...10 / 2...10 / -10...10 V)
- DC 0 ... 300 V
(preset values: 0...20 / 0...50 / 0...100 / 0...200 / 0...300 V)

Zeros and Full Scales for more measuring-ranges can be freely selected by the user.

3 Connecting diagram



4 Important Information



DANGER!

Hazardous voltage!

Will cause death or serious injury. Turn off and lock out all power supplying this device before working on this device.



The measuring input fulfils reinforced insulation according to DIN EN 61010-1 for overvoltage category II, measuring category II and pollution degree 2. Connected voltages may not exceed 300 V AC/DC to earth.

To use the equipment flawless and safe, transport and store properly, install and start professionally and operate as directed.

Only let persons work with the equipment who are familiar with installation, start and use and who have appropriate qualification corresponding to their function. They must observe the contents of the instructions manual, the information which are written on the equipment and the relevant security instructions for the setting up and the use of electrical units.

The equipment is built according to DIN / EN and checked and leave the plant according to security in perfect condition. If, in any case the information in the instructions manual is not sufficient, please contact our company or the responsible representative.

To maintain this condition, you must observe the safety instructions in this instruction manual titled "Important Information". Failure to follow the safety instructions may result in death, personal injury, or property damage to the equipment itself and other equipment and facilities.

Instead of the industrial norms and regulations written in this instruction manual valid for Europe, you must observe out of their geographical scope the valid and relevant regulations of the corresponding country.



Attention!

Only one of the two measuring inputs terminals 5+7 or terminals 6+7 may be used.

5 Installation

The unit can be installed as follows:

- Installation in switchgear cabinet on 35 mm mounting rail according to EN 60715 for protection against fire, external environmental conditions and mechanical effects.
- With screws M4 for installation on walls or panel. (additional latch is not included in delivery)
- Connection according to connection plan or type plate.

Failure to comply with the information in this instruction manual will not guarantee the function of the device.



A circuit-breaker or switch must be situated within easy reach of the unit and fused. Installation excess current protection should be ≤ 10 A.



Attention! Universal power supply

The device have a universal power supply, that is suitable for DC- and AC-voltages. Before connecting the device to supply-voltage make sure that the connected voltage corresponds with the voltage on the lateral type on the device

Observe the maximum temperature permissible when installing in switching cabinet. Make sure sufficient space to other equipment or heat sources. If the cooling becomes more difficult e.g. through close proximity of apparatus with elevated surface temperature or hindrance of the cooling air, the tolerable environmental temperature is diminishing.



Attention!

All wires connected to the device must have insulation rated at least 300 Vac.

6 Commissioning

6.1 Overview of commissioning

The MU1001K can be commissioned to predefined standard ranges or scaled to an arbitrary range.

There are two different ways to do the settings:

Point 6.2 – 6.4: MU1001K setting a predefined range

Point 6.5 – 6.7: MU1001K scaling an arbitrary range

6.2 Overview of the predefined standard ranges

Following standard ranges can be set without adjustment to the unit:

Input (300 V)	
Zero point	Full scale
0 V ...	20 V
0 V ...	50 V
0 V ...	100 V
0 V ...	200 V
0 V ...	300 V

Input (10 V)	
Zero point	Full scale
0 V ...	10 V
2 V ...	10 V
-10 V ...	10 V

Output (mV)	
Zero point	Full scale
0 mV ...	60 mV
0 mV ...	150 mV
0 mV ...	300 mV
-60 mV ...	60 mV
-150 mV ...	150 mV
-300 mV ...	300 mV

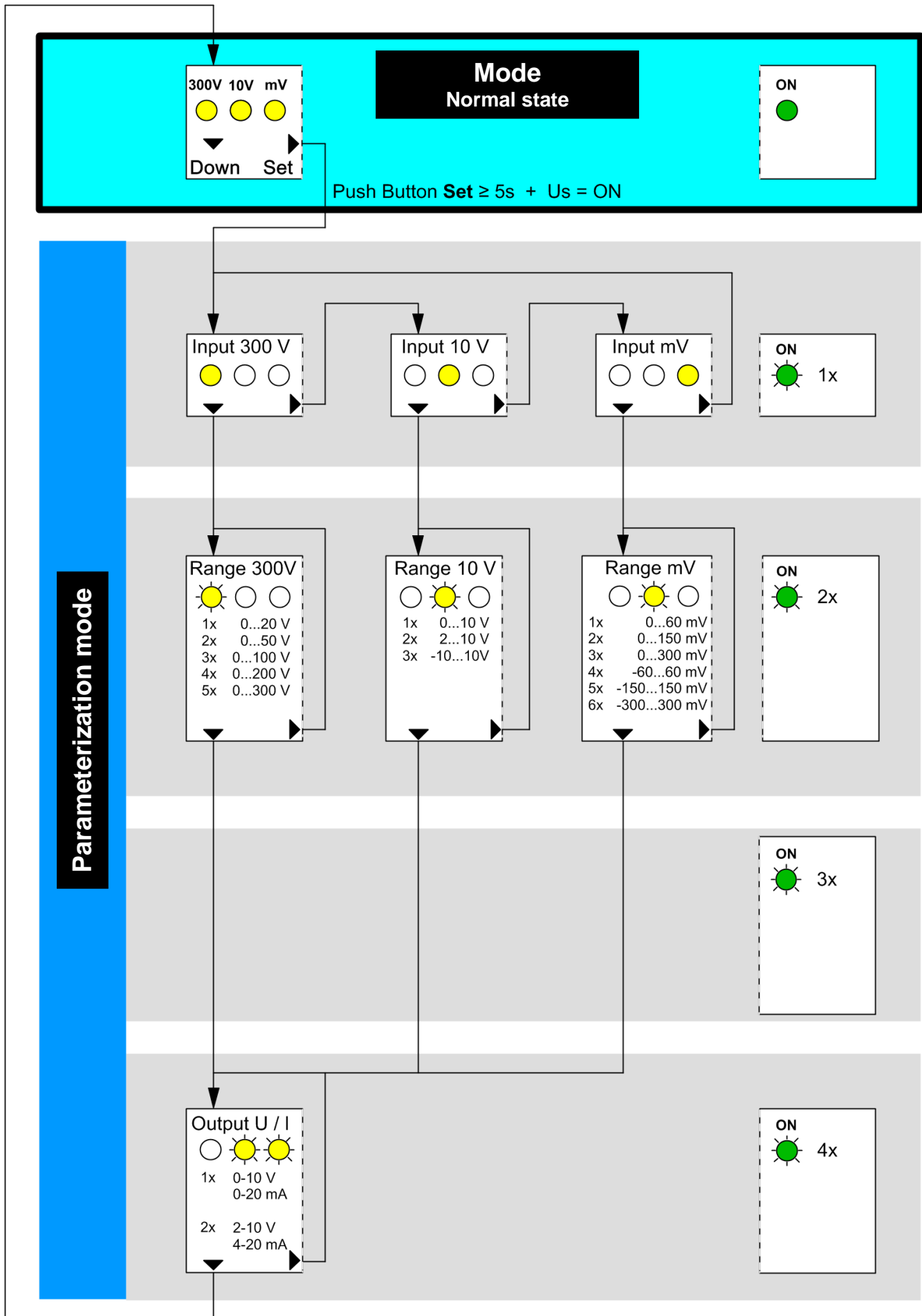
6.3 Setting a predefined range

<ul style="list-style-type: none"> Power off the device 				
<ul style="list-style-type: none"> Press Button [Set] and keep pressed 				
<ul style="list-style-type: none"> Power on the device, and keep pressed the button [Set] 				
⇒ After 5s flashes the green LED, release button [Set]				
⇒ Parameterization „input type“ >> LED ON flashes 1x				
<ul style="list-style-type: none"> Select with button [Set] the input type (displayed by LEDs 300 V / 10 V / mV) 				
<ul style="list-style-type: none"> Press button [Down] 				
⇒ Parameterization „range“ >> LED ON flashes 2x				
<ul style="list-style-type: none"> Select with button [Set] the range of the input 	Number of flashes	300 V	LED 10 V	mV
	1 x	0 - 20 V	0 - 10 V	0 - 60 mV
	2 x	0 - 50 V	2 - 10 V	0 - 150 mV
	3 x	0 - 100 V	-10...10 V	0 ... 300 mV
	4 x	0 - 200 V		-60...60 mV
	5 x	0 - 300 V		-150...150 mV
<ul style="list-style-type: none"> Press button [Down] 				
⇒ Parameterization „output“ >> LED Power flashes 4x				
<ul style="list-style-type: none"> Select with button [Set] the output range 	Number of flashes	LED 10 V + mV		
	1 x	0 - 10V / 0 - 20mA		
	2 x	2 - 10V / 4 - 20mA		
<ul style="list-style-type: none"> Press button [Down] 				
⇒ End of parameterization, LED ON lights permanently				

Attention:

- When no button is pressed during scaling for 120 s, the process is cancelled automatically. Entered values will be discarded.
- When scaling is started, all parameters are reset to default. Parameters cannot be checked after scaling has been finished.
- In normal operating mode the selected input is displayed with LED.

6.4 Diagram for setting a predefined range



6.5 Overview of scaling an arbitrary range

Other ranges may be set by scaling of the input signal:

Input	range		Output
	Zero point	Full scale	
300 V	0 ... 300 V	0 ... 300 V	0 - 10 V / 0 - 20 mA oder 2 - 10 V / 4 - 20 mA
10 V	-10 ... 10 V	-10 ... 10 V	
mV (300 mV)	-300 ... 300 mV	-300 ... 300 mV	

6.6 Scaling of range

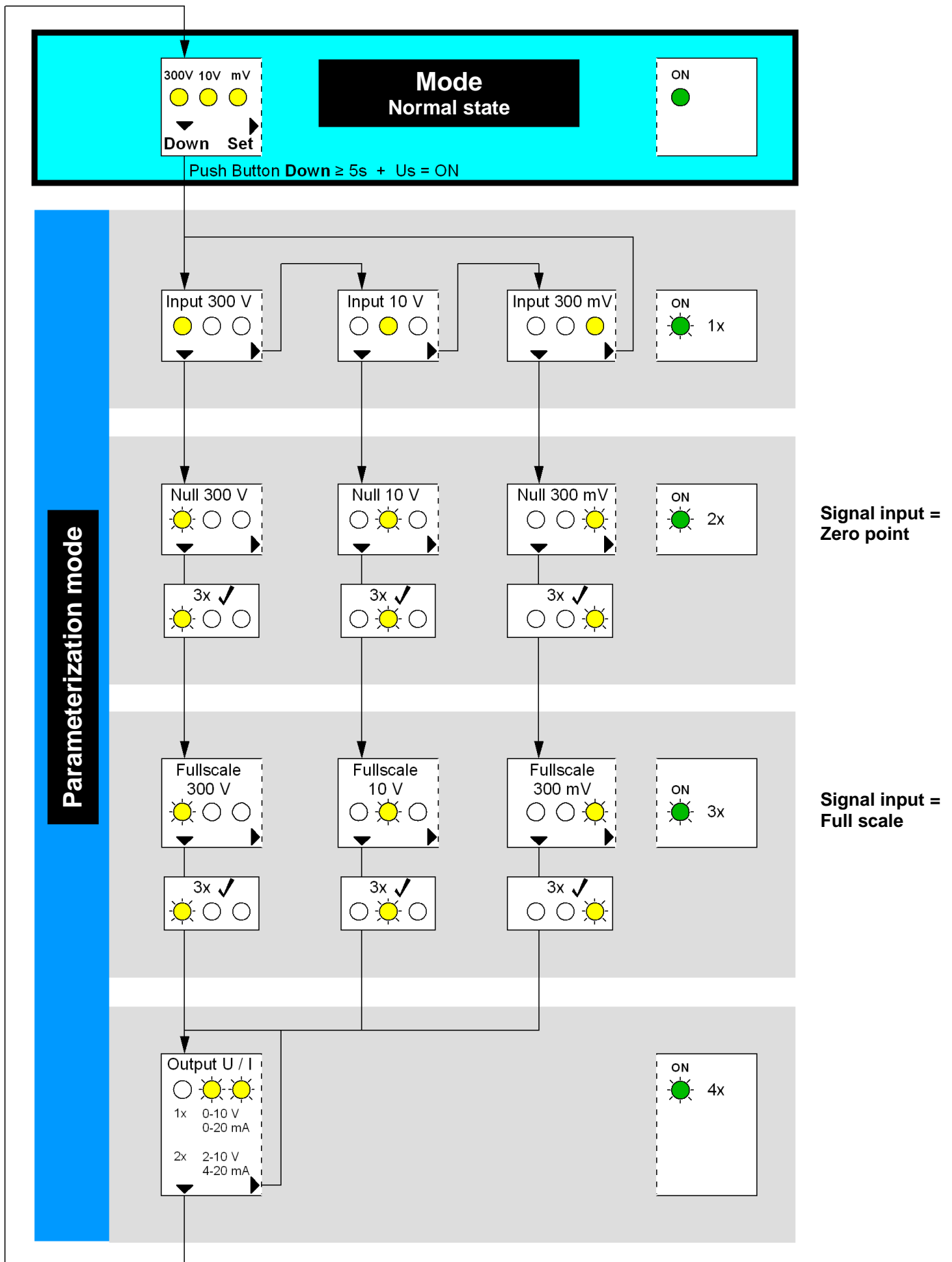
Parameterization:

• Power off the device		
• Press Button [Down] and keep pressed		
• Power on the device, and keep pressed the button [Down]		
⇒ After 5s flashes the green LED, release button [Down]		
⇒ Parameterization „input type“ >> LED Power flashes 1x		
• Select with button [Set] the input type (displayed by LEDs 300 V / 10 V / mV)		
• Press button [Down]		
⇒ Parameterization „input zero point“ >> LED Power flashes 2x		
⇒ Connect a signal at the input corresponding to the zero point		
• Press button [Down] (store of value, green LED flashes 3 times quickly)		
⇒ Parameterization „input full scale“ >> LED Power flashes 3x		
⇒ Connect a signal at the input corresponding to the full scale		
• Press button [Down] (store of value, green LED flashes 3 times quickly)		
⇒ Parameterization „output“ >> LED Power flashes 4x		
• Select with button [Set] the output range	Number of flashes	LED 10 V / mV
	1 x	0 - 10V / 0 - 20mA
	2 x	2 - 10V / 4 - 20mA
• Press button [Down]		
⇒ End of parameterization, Power LED lights permanently		

Attention:

- When no button is pressed during scaling for 120 s, the process is cancelled automatically. Entered values will be discarded.
- When scaling is started, all parameters are reset to default. Parameters cannot be checked after scaling has been finished.
- In normal operating mode the selected input is displayed with LED.

6.7 Diagram for scaling of range



6.8 Factory setting

Default settings:

Input: [10 V] -> DC 0 – 10 V

Output: 0 – 10V, 0 – 20 mA

6.9 Query of firmware-version

from firmware 0-04:

- Keep [Set] button pressed ($\geq 5s$)
⇒ LEDs indicate the firmware version by fast blinking
(binary coded, LED 300V = bit0 ... LED ON = bit3)

LED	300 V	10 V	mV	ON
Bit No. (value)	0 (1)	1 (2)	2 (4)	3 (8)
example (LED)	off	off	flash	off

➔ Version 0-04

6.9.1 Revision Firmware

Version 0-04:

- additional predefined standard ranges (-10...10V, -60...60mV, -150...150mV, -300...300mV)

7 Maintenance and repair


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8 Error search

Wrong output signal (current/voltage) OUT (terminal 1 – 2 – 3)	
Cause	The device is not configured correctly
Remedy	Check commissioning

For selected output range 4-20 mA (2-10V) the current is < 3,8 mA (the voltage is <1,9V)	
Cause	Sensor short-circuit or sensor interruption
Remedy	Check sensor/wire at terminal 5-6-7

9 Technical data

Rated supply voltage U_s	AC/DC 24 – 240 V	0/50/60Hz	
Tolerance	DC 20,4 - 297 V	AC 20 - 264 V	
Power consumption	< 3 W	< 8 VA	
Input	Input-resistance	Maximum Input signal	Error of full scale
DC 300 V	500 k Ω	DC \pm 300 V	0,1 %
DC 10 V	500 k Ω	DC \pm 300 V	0,1 %
DC 60mV	10 M Ω	DC \pm 2 V	0,1 %
DC 150mV	10 M Ω	DC \pm 2 V	0,1 %
DC 300mV	10 M Ω	DC \pm 2 V	0,1 %
 max. 300 V			
Resolution	14 Bit		
Measuring time	< 20 ms		
Output	2 outputs with common ground		
Response-time T09	< 40 ms		
Voltage output	DC 0/2 – 10 V		
Tolerance	0,3 % of full scale (from 0,1 V)		
Temperature factor	< 0,01 % / K		
Resolution	11,6 Bit	< 3,1 mV	
Load	\geq 1 k Ω		
Current output	DC 0/4 – 20 mA		
Tolerance	0,3 % of full scale (from 0,1 mA)		
Temperature factor	< 0,015 % / K		
Resolution	11,6 Bit	< 6,1 μ A	
Load	\leq 500 Ω		
Error from load	(250 Ω – resistance) / 250 Ω * 0,3 % of final value		
Galvanic insulation	Us – input - output		
Test voltage	Us – output	DC 3540V	
	Us – input	DC 3540V	
	Input – output	DC 3540V	
Test conditions	EN 61010-1		
Rated supply voltage U_s (terminals A1,A2)			
Pollution degree	2		
Overvoltage category	III reinforced insulation		
Rated insulation voltage U_i	300 V		
Input (terminals 5,6,7)			
Pollution degree	2		
Overvoltage category	II reinforced insulation		
Rated insulation voltage U_i	300 V		
EMC-tests	EN 61326-1		
	Equipment intended for use in industrial locations		
Emission	EN 61326-1, CISPR 11 class B		
Immunity	EN 61326-1 industrial environment		

Electrical fast transient (Burst)

EN 61000-4-4 $\pm 4,5$ kV

Surge immunity test

Pulse 5/50 ns, f = 5 kHz, t = 15 ms, T = 300 ms

IEC 61000-4-5 ± 2 kV

Environmental conditions

Permissible ambient temperature	-20 °C ... +65 °C
Permissible storage temperature	-20 °C ... +70 °C
Permissible wiring temperature	-5 °C ... +70 °C
Climatic conditions	5 – 85 % rel. humidity, no condensation
Installation height	< 2000 m
Vibration resistance EN 60068-2-6	2...25 Hz $\pm 1,6$ mm 25 ... 150 Hz 5 g

Housing

Type K

Dimension (H x W x D)	75 x 22,5 x 115 mm
Width	1 TE
Line connection solid wire	each 1 x 0,5...2,5 mm ²
Stranded wire with insulated ferrules	each 1 x 0,14...1,5 mm ²
Torque	0.5 Nm (3,6 lb.in)
Protection class housing / terminals	IP 40 / IP 20
Mounting	Snap mounting on 35 mm standard rail EN 60 715 or M4 screws
Weight	app. 100 g

Subject to technical changes

10 Housing Type K

Dimensions in mm

