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Operating Manual MU2000K

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from Firmware: 0-00

For more information and help about this product please scan the QR-Code or choose the following link: MU2000K

Operating manual, Quick guide, Datasheet, Connection diagram, CAD Data
Firmwareupdates, FAQ, Videos about installation and settings, Certificates

- Universal Measuring Transducer for Voltage and Current (AC and DC)

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1 General Notes

Compliance with the following instructions is mandatory to ensure the functionality and safety of the product. If the following instructions given especially but not limited for general safety, transport, storage, mounting, operating conditions, commissioning and disposal / recycling are not observed, the product may not operate safely and may cause a hazard to the life and limb of users and third parties.

Deviations from the following requirements may therefore lead both to the loss of the statutory material defect liability rights and to the liability of the buyer for the product that has become unsafe due to the deviation from the specifications.

2 Display and controls

- Set

Button to navigate in menu

- Down

Button to change Parameters

- LED Power

Device active

- LED I

Current input active

- LED U

Voltage input active

- LED AC
  Alternate Current / Voltage measuring active

3 Condition at delivery

Default settings:

- Input: AC 5 A (AC 0 – 5 A)
- Output: DC 0 – 10 V, 0 – 20 mA
- Measuring time: 160 ms (8 measurements, x 20 ms measurement time)

Deviating settings for special devices: range see type label

4 Application and short description

Measuring transducers MU2000K can measure DC- an AC-voltages up to 600 V and
DC- and AC-currents 0-1/5 A.
Preset measuring ranges can be selected. 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 supply voltage AC/DC 24-240 V the measuring transducer can be connected to all common supply voltages.
The MU2000K e.g. is suitable for measuring DC voltages and charging currents at batteries or for measuring AC voltages and currents in plants for own generation of energy.

5 Overview of functions

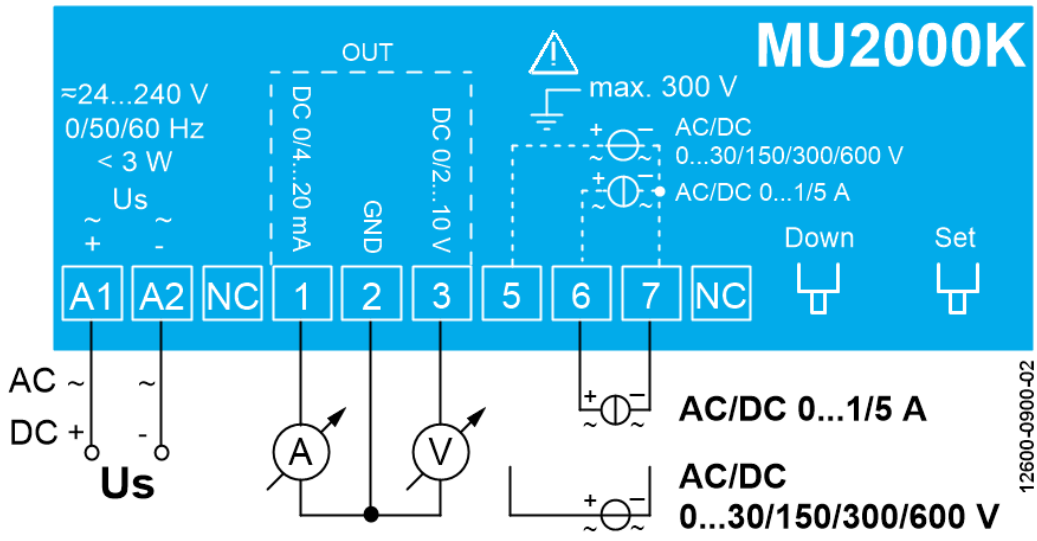
- Output signal 0-20mA and 0-10V or 4-20mA and 2-10V
- Rated Supply Voltage AC/DC 24-240V
- Insulation between inputs, outputs and supply voltage

Inputs:

- AC/DC 0 … 600 V
  (Preset values: 0…30 V / 80…120 V / 0…150 V / 0…300 V / 0…600 V)
- AC/DC 0 … 5 A
  (Preset values: 0…1 A / 0…5 A)
- In measuring ranges for AC also DC-signals can be measured. Negative signals will be measured as positive signals.

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

6 Connecting diagram



7 Important Information

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.

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

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.
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.

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!
Use only measuring current transformers with Instrument security factor max. secondary current 5A and FS5.
Protective current transformers are not allowed!

8 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.

Attention! Universal power supply
The device has 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.

Attention!

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

Warning! Installation of current transformers

DVE 3.2.1, DVE 3.2.2

Always open or disconnect circuit from power distribution system (or service) of building before installing or servicing current transformers.
The current transformers may not be installed in equipment where they exceed 75% of the wiring space of any cross-sectional area within the equipment.
Restrict installation of current transformers in an area where it would block ventilation openings.
Restrict installation of current transformers in an area of breaker arc venting.
Not suitable for Class 2 wiring methods und not intended for connection to class 2 equipment.
secure current transformer and rout conductors so that they do not directly contact live terminals or bus.
For use with Listed Energy-Monitoring Current Transformers.
Associated leads of the current transformers shall be maintained within the same overall enclosure.
The current transformers are intended for installation within the same enclosure as the equipment. These may not be installed within switchgears and panel boards.

9 Commissioning

9.1 Overview of commissioning

The MU2000K can be commissioned to predefined standard ranges or scaled to an arbitrary range.

There are two different ways to do the settings:

- MU2000K **setting** a predefined range
- MU2000K **scaling** an arbitrary range

9.2 Overview of the predefined standard ranges

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

Input voltage (AC / DC)	
Zero point	Full scale
0 V …	30 V
80 V …	120 V
0 V …	150 V
0 V …	300 V
0 V …	600 V

Input current (AC / DC)	
Zero point	Full scale
0 A …	1 A
0 A …	5 A

Output
0 - 10 V / 0 - 20 mA
or
2 - 10 V / 4 - 20 mA

9.3 Setting a predefined range

- Power off the device
- Press Button [Set] and keep pressed
- 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
- Select with button [Set] the input type → displayed by LED U (DC voltage), LED AC + U (AC voltage), LED I (DC current), LED AC + I (AC current)
- Press button [Down]

  ⇒ Parameterization „range“ >> LED ON flashes 2x
- Select with button [Set] the range of the input

Number of flashes	LED			
	U	AC + U	I	AC + I
1 x	DC 0…30 V	AC 0…30 V	DC 0...1 A	AC 0...1 A
2 x	DC 80…120 V	AC80…120 V	DC 0...5 A	AC 0...5 A
3 x	DC 0…150 V	AC 0…150 V	*1	*1
4 x	DC 0…300 V	AC 0…300 V		
5 x	DC 0…600 V	AC 0…600 V		
6 x	*1	*1		

- Press button [Down]

  ⇒ Parameterization „output“ → LED Power flashes 4x
- Select with button [Set] the output range

Number Of flashes	LED U + I
1 x	0 - 10 V / 0 - 20 mA
2 x	2 - 10 V / 4 - 20 mA

- Press button [Down]

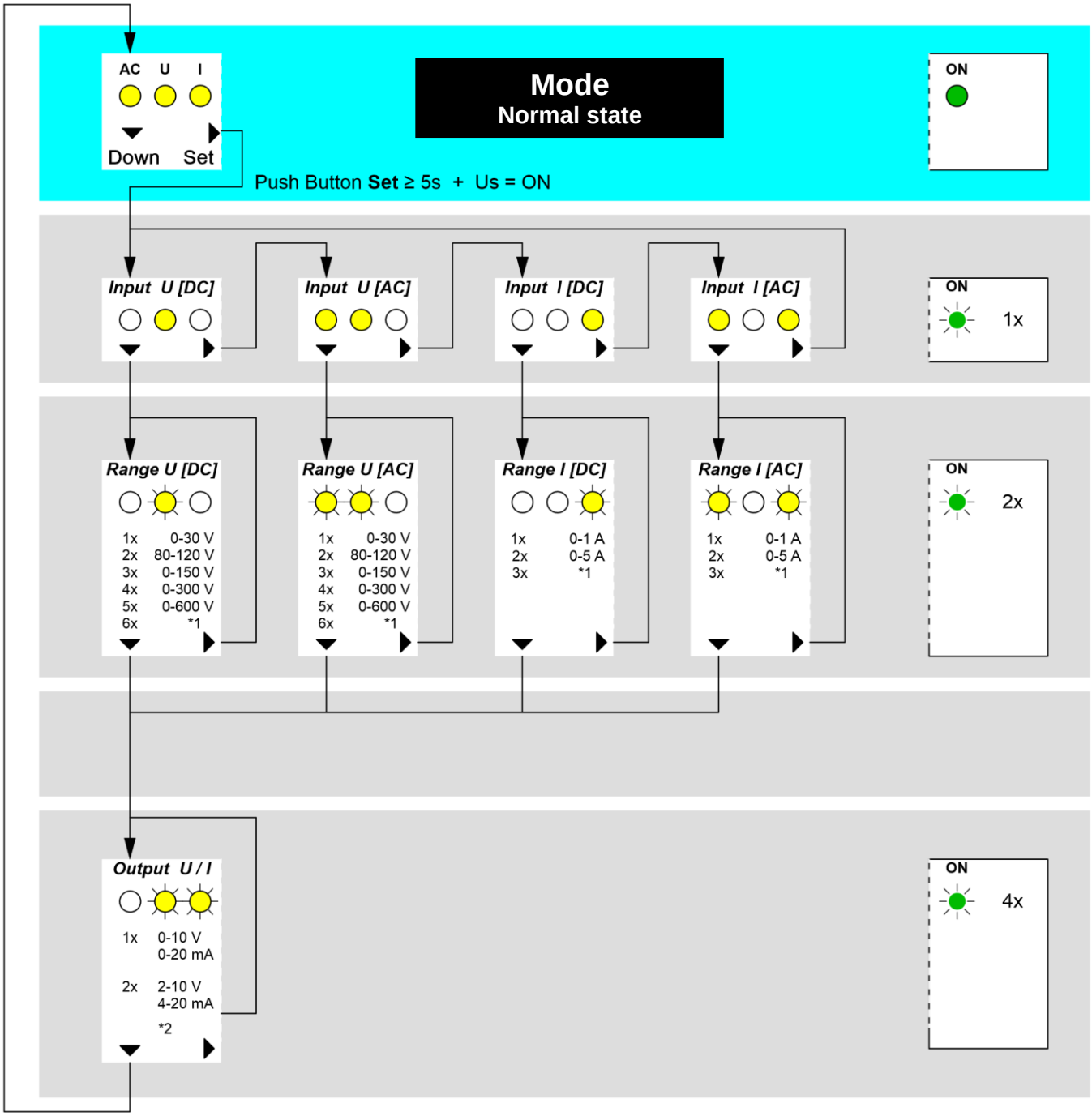
  ⇒ End of parameterization, LED ON lights permanently

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.
- In normal operating mode the selected input is displayed with LED.

*1) only active at special devices (range see type label)

9.4 Diagram for setting a predefined range



*1) only active at special devices (range see type label)
*2) menu point invisible at select special devices (after *1)

9.5 Overview of scaling an arbitrary range

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

Input	Range	
	Zero point	Full scale
U (AC / DC)	0 … 600 V	0 … 600 V
I (AC / DC)	0 … 5 A	0 … 5 A

Output
0 - 10 V / 0 - 20 mA or 2 - 10 V / 4 - 20 mA

9.6 Scaling of range

- 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 ON flashes 1x
- Select with button [Set] the input type → displayed by LED U (DC voltage), LED AC + U (AC voltage), LED I (DC current), LED AC + I (AC current)
- Press button [Down]

  ⇒ Parameterization „input zero point“ → LED ON 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 ON 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)

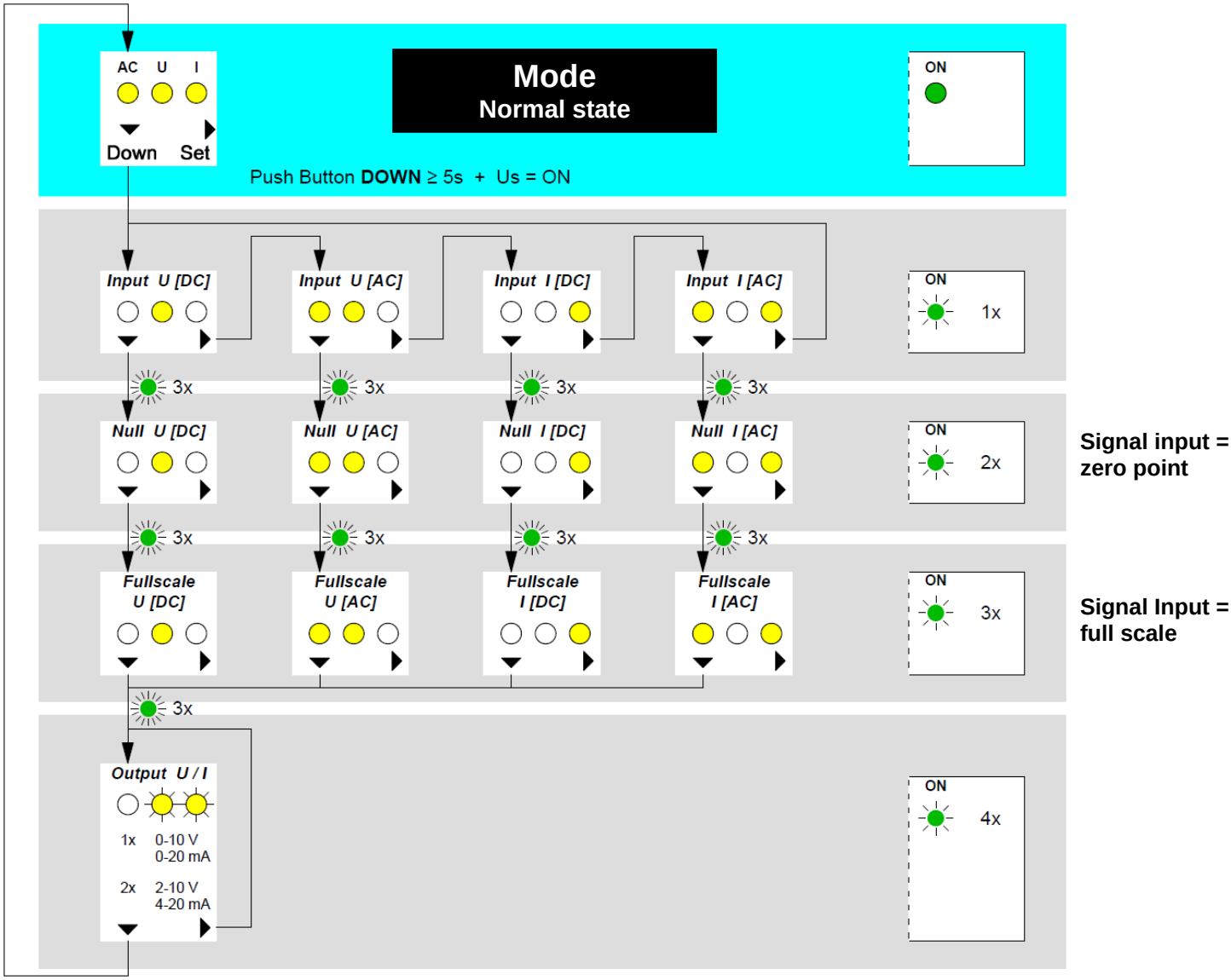
  ⇒ Parameterization „output“ → LED ON flashes 4x
- Select with button [Set] the output range
  - LEDs (U + I) 1 x flash -> output 0 - 10 V / 0 - 20 mA
  - LEDs (U + I) 2 x flash -> output 2 - 10 V / 4 - 20 mA
- Press button [Down]

  ⇒ 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.
- In normal operating mode the selected input is displayed with LED.

9.7 Diagram for scaling of range



9.8 System measurement time

Measuring time for one measurement is 20 ms (at AC 60 Hz app. 17 ms).
System measuring time is calculated by measuring time multiplied with number of measurements.
Generation of measured value:

→	new measurement	measurement	measurement	measurement	. . .	~~oldest measurement~~
	Measured value = average of measurements					Is deleted

Measuring ranges AC: when measuring DC measuring time prolonged to 25 ms

9.9 Setting the System measurement time

- Power off the device
- Keep pressed buttons [Set] and [Down] simultaneously
- Switch on power supply while buttons are pressed

  ⇒ Release buttons after app. 5s when green LED starts blinking

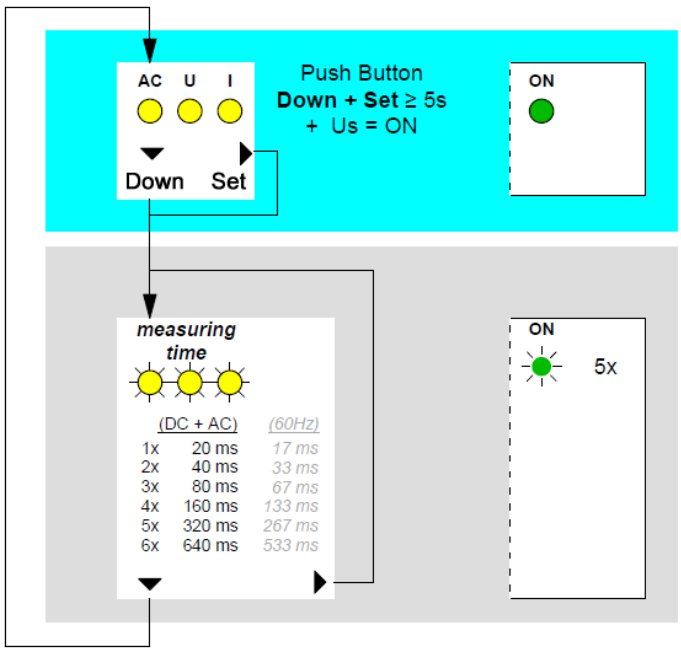
  ⇒ Parameterization „System measurement time“ → LED ON flashes 5x

- Select with button [Set] the System measurement time

Number of flashes	LEDs AC + U + I
1 x	20 ms (60Hz = 17 ms)
2 x	40 ms (60Hz = 33 ms)
3 x	80 ms (60Hz = 67 ms)
4 x	160 ms (60Hz = 133 ms)
5 x	320 ms (60Hz = 267 ms)
6 x	640 ms (60Hz = 533 ms)

- Press button [Down]

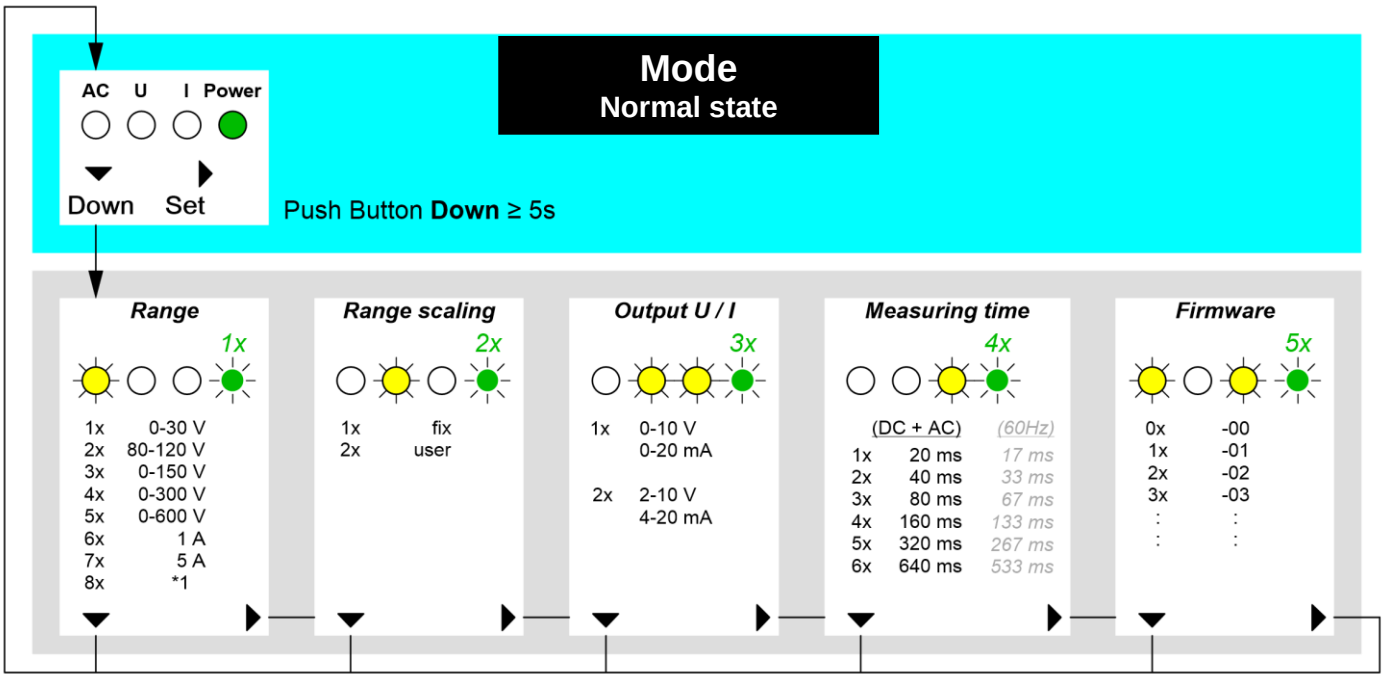
  ⇒ End of parameterization, LED ON lights permanently



9.10 Checking of parameters

During operation, several parameters can be checked.

- Keep button [Down] pressed (5s) until green LED Power starts blinking (1x)
  ⇒ Exit with pressing button [Down] again,
  Automatic exit 30s after last actuation of a button
- Display of selected parameter with blinking yellow LEDs.
- Shift with button [Set] to next parameters (green LED Power blinks accordingly)



*1) only active at special devices (range see type label)

10 Error search

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

22mA at output 0/4…20 mA, 11V at output 0/2…10 V (LED Power flashes quickly)	
Cause	Internal error of device
Remedy	Reset by interrupting supply voltage. If the error cannot be patched by a Reset send back to factory for repair.

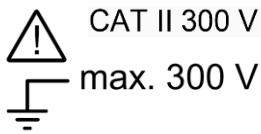
11 Technical data

Rated supply voltage Us	AC/DC 24 – 240 V	0/50…400 Hz	< 3 W < 8 VA
Tolerance	DC 20,4 - 297 V	AC 20 - 264 V	

Inputs / Ranges	Input-resistance	Maximum Input signal	Error of full scale
DC 30 V, 150 V, 300 V, 600 V	> 500 kΩ	600 V	0,2 %
AC 30 V, 150 V, 300 V, 600 V			0,5 %
DC 1 A, 5 A	30 mΩ	7,5 A / 4s, 25 A / 1s	0,1 %
AC 1 A, 5 A			0,5 %

AC- and DC measuring possible without switching over (AC ranges only, see item 8.8)

Frequency at AC- measurements	45 … 420 Hz
measurement deviation at > 100 Hz	1% of full scale
measurement deviation at > 300 Hz	2% of full scale
Temperature factor	< 0,02 % / K
Resolution	14 Bit



Output	2 outputs with common ground
Voltage output	DC 0 – 10 V (0 – 10,25 V, 11 V at device error)
	DC 2 – 10 V (1,9 – 10,25 V, 11 V at device error)
Tolerance / Temperature factor	0,3 % of full scale (from 0,1 V) / < 0,01 % / K
Resolution	11,6 Bit < 3,1 mV
Load	≥ 1 k Ω
Current output	DC 0 – 20 mA (0 – 20,5 mA, 22 mA at device error)
	DC 4 – 20 mA (3,8 – 20,5 mA, 22 at device error)
Tolerance / Temperature factor	0,3 % of full scale (from 0,1 mA) / < 0,015 % / K
Resolution	11,6 Bit < 6,1 µA
Load	≤ 500 Ω
Error from load	(250 Ω – Load) / 250 Ω * 0,3 % of current
Measuring principle	RMS (AC), mean (DC)
Measuring time	20 ms (17 ms at 60 Hz)
Averaging	adjustable 1, 2, 4, 8, 16, 32 measurements
System measurement time	Measuring time * Averaging
Reaction time of the outputs	< 45ms + System measurement time
Test conditions	EN 61010-1
Rated supply voltage Us (terminals A1, A2)	
Pollution degree	2
Overvoltage category	III reinforced insulation
Rated insulation voltage Ui	300V
Input (terminals 4,5,6,7)	
Pollution degree	2
Overvoltage category	II reinforced insulation
Rated insulation voltage Ui	300 V
Galvanic insulation / Test-voltage	
Input – output	DC 3540 V
Us – output	DC 3540 V
Us – input	DC 3540 V

EMC immunity	EN 61326-1 Industrial electromagnetic environment
EMC emission	EN 61000-6-3

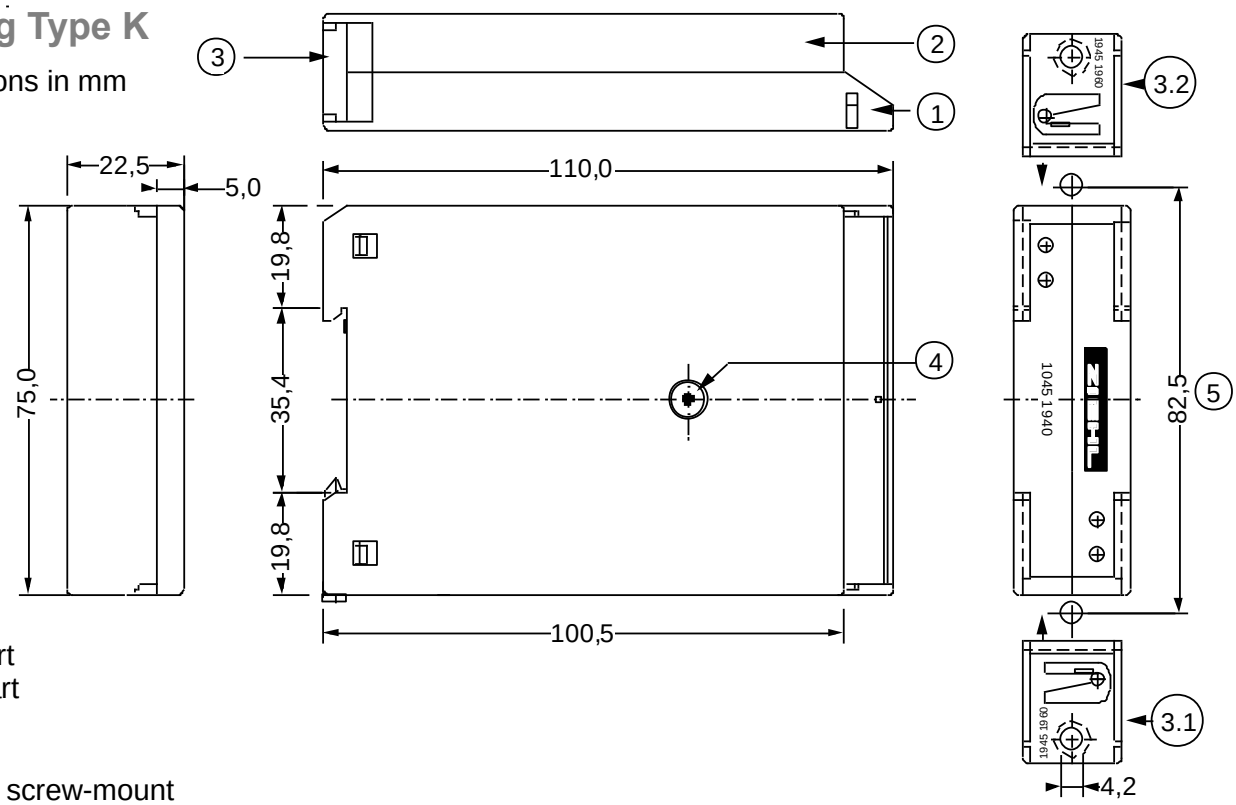
Environmental conditions	
rated ambient temperature range	-20 °C ... +50 °C
storage temperature	-20 °C ... +70 °C
Admissible temperature for wiring	-5 °C ... +70 °C
Altitude	< 2000 m above sea level (MSL)
Climatic conditions	5 - 85% rel. humidity, no condensation
Vibration resistance EN 60068-2-6	2…13,2 Hz ±1 mm 13,2 ... 100 Hz 1 g

Housing	Type K
Dimension (H x W x D)	75 x 22,5 x 110 mm
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	IP 40
Protection class terminals	IP 20
Mounting	Snap mounting on 35 mm standard rail EN 60 715 or M4 screws
Weight	app. 100 g

Subject to technical changes

12 Housing Type K

Dimensions in mm



1 lower part
2 upper part
3 bar
4 screw
5 holes for screw-mount

13 Disposal

Disposal should be carried out properly and in an environmentally friendly manner in accordance with legal provisions.
ZIEHL is registered with the EAR Foundation under WEEE no.: DE 49 698 543.