

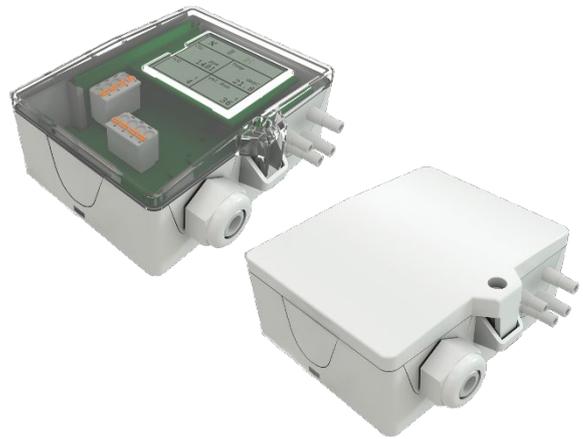
# DPA+ Dual | DPA+ LCD Dual RS485 Modbus

Differential Pressure Transmitter

**thermokon**<sup>®</sup>  
HOME OF SENSOR TECHNOLOGY

## Datasheet

Subject to technical alteration  
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The following illustrations show the version with LCD

### » APPLICATION

Differential pressure and volume flow transducer for monitoring differential pressure and volume flow of air and other non-flammable and non-aggressive gases. LCD models with RGB background light have a transparent cover. Display configuration, k-values for flow calculation (default 1500) and threshold values for color changes can be parameterized via Thermokon USEapp. The option with input for a potential-free contact or an NTC10k allow a variety of applications. The mounting base (included in delivery) allows mounting on a level surface or mounting on DIN rail TS35 (35x7,5 mm) according to EN 60715.

### » TYPES AVAILABLE

#### Differential pressure and volume flow transducer optional with display – RS485 Modbus

- DPAX+ Dual RS485 Modbus MultiRange <AZ>
- DPAX+ LCD Dual RS485 Modbus MultiRange <AZ>

#### Differential pressure and volume flow transducer optional with display and 2 digital inputs – RS485 Modbus

- DPAX+ Dual RS485 Modbus MultiRange <AZ> 2IN
- DPAX+ LCD Dual RS485 Modbus MultiRange <AZ> 2IN

x: 250 | 2500 | 7000

MultiRange: Measuring ranges adjustable at the transducer

<AZ>: automatic zero-point adjustment (optional)

### » PRODUCT TESTING AND CERTIFICATION



#### Declaration of conformity

The declaration of conformity of the products are available on our website  
<https://www.thermokon.de/direct/en-gb/categories/dpaplus>

### » NOTES ON DISPOSAL



The crossed-out wheeled bin symbol indicates that the product or removable batteries must not be disposed of with household or commercial waste. Within the EU, you are legally obliged to dispose of the product separately and appropriately in accordance with the national laws of your country. Alternatively, please contact your supplier or Thermokon Sensortechnik GmbH. Further information can be found at: [www.thermokon.com](http://www.thermokon.com)

## » SECURITY ADVICE – CAUTION



The installation and assembly of electrical equipment should only be performed by authorized personnel.

The product should only be used for the intended application. Unauthorised modifications are prohibited! The product must not be used in relation with any equipment that in case of a failure may threaten, directly or indirectly, human health or life or result in danger to human beings, animals or assets. Ensure all power is disconnected before installing. Do not connect to live/operating equipment.

Please comply with

- Local laws, health & safety regulations, technical standards and regulations
- Condition of the device at the time of installation, to ensure safe installation
- This data sheet and installation manual

Before installation, commissioning and operation, make sure that the correct pressure gauge has been selected with regard to measuring range, design and, based on the specific measuring conditions, the suitable medium in contact with the medium. Pressure gauges may only be installed and serviced by trained specialist personnel authorized by the plant operator. Failure to observe the relevant regulations may result in serious physical injury and/or damage to property.

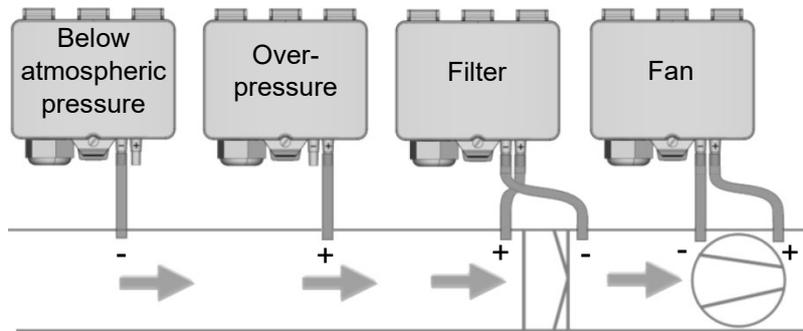
## » TECHNICAL DATA

Measuring values	differential pressure, volume flow		
Medium	air or other non-flammable/non-aggressive gases		
Output voltage	0..10 V or 0..5 V, min. load 10 kΩ (live-zero configuration via Thermokon USEapp)		
Network technology	RS485 Modbus, RTU, half-duplex, baud rate 9.600, 19.200, 38.400 or 57600, parity: none (2 stopbits), even or odd (1 stopbit), <b>Fail-safe Biasing required</b>		
Power supply	15..35 V = or 19..29 V ~ SELV		
Power consumption	max. 2,3 W (24 V =)   max. 4,3 VA (24 V ~)		
Measuring range velocity	0... 750.000 m³/h (default), optionally configured via Thermokon USEapp		
Measuring range pressure <i>*selectable at the device</i>	<b>type 250</b> 0..+1   0..+0.4   0..+0.2   0..+0.1   -0.1..+0.1   -0.2..+0.2   -0.4..+0.4   -0.6..+0.6 inchWC	<b>type 2500</b> 0..+10   0..+8   0..+6   0..+4   -0..+2   0..+1   0..+0.4   -0.4..+0.4 inchWC	<b>type 7000</b> 0..+28   0..+20   0..+16   0..+12   0..+10   0..+8   0..+6   0..+4 inchWC
Accuracy pressure <i>*deviation from calibration reference device (calibrator)</i>	at range <1 inchWC: typ. ±0.004 inchWC	at range ≤2 inchWC: ±0.02 inchWC, >2 inchWC: ±0.04 inchWC	at range ≤8 inchWC: ±0.04 inchWC, >8 inchWC: ±0.10 inchWC
Zero-point adjustment <i>(manual)</i>	3 month	at range: ≤2 inchWC: 6 month >2 inchWC: 12 month	12 month
Zero-point adjustment <i>(automatic)</i>	automatic zero-point adjustment (optional)		
Max. working overpressure	160 inchWC		
Sensor	MEMS membrane measuring element		
Inputs <i>(optional)</i>	<b>2IN</b> 2x input for NTC10k or floating contact		
Display <i>(optional)</i>	LCD 1.14x1.38 in. with RGB backlight, units, pressure: Pa, inchWC, volume flow: m3/h, cfm (configurable)		
Enclosure <i>(type-dependent)</i>	<b>without LCD</b> enclosure USE-L, PC, pure white, with removable cable entry	<b>with LCD</b> enclosure USE-L, PC, pure white, cover PC, transparent, with removable cable entry	
Protection	IP65 according to EN 60529		
Cable entry	M25, for wire max. Ø=7 mm, seal insert for fourfold cable entry		
Connection electrical	<b>Mainboard</b> removable plug-in terminal, max. 14AWG	<b>Plug-in card</b> removable plug-in terminal, max. 16AWG	
Connection mechanical	pressure connection male Ø=0.2 in / Ø=0.25 in., connection tube: PVC, soft		
Ambient condition	+14..+122 °F, max. 85% rH short term condensation		
Mounting	screw mounted onto flat surface, prepared for mounting on DIN rail TS35 (35x7,5 mm) according to EN 60715		

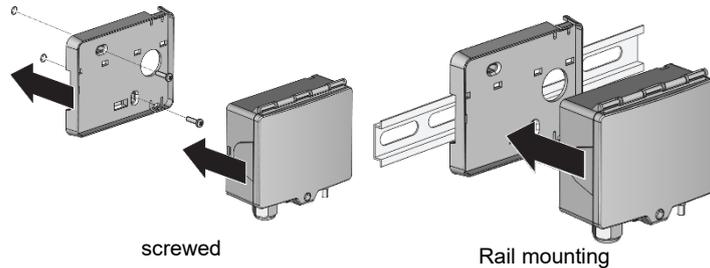
» **MOUNTING ADVICES**

Before installing the device, please check the leak tightness of the pressure lines. A prerequisite for the operation is a proper installation of all electrical supply, control and sensing leads as well as the pressurized connection line.

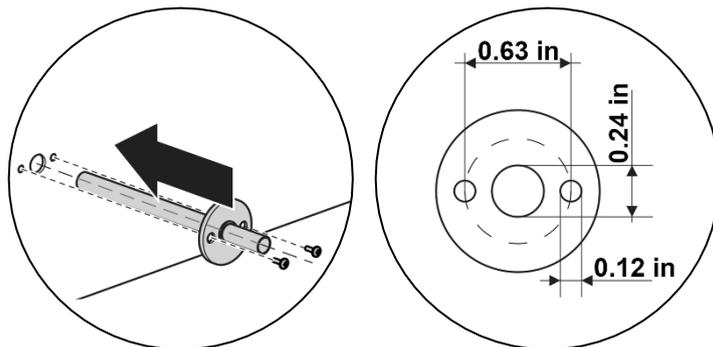
- In order to connect the device, the process lines must be unpressurized
- Consider the suitability of the device for the medium to be measured
- Consider maximum pressures



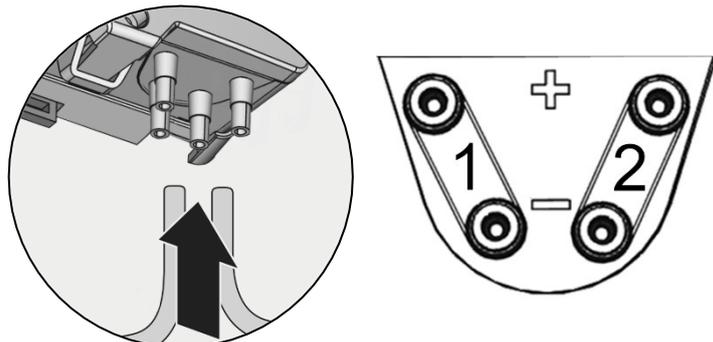
- 1.** Mount the DPA+ mounting base in a suitable location and attach the DPA+. **Note alignment!**



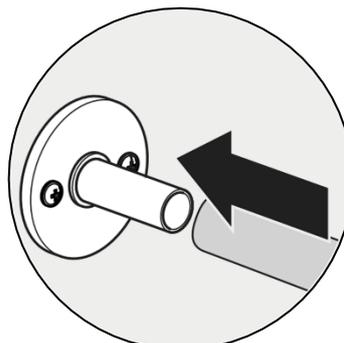
- 2.** Prepare the duct for mounting and mount the duct connection piece. **Attention! Observe dimensions!**



- 3.** Connect pressure tubes to the device. **Attention! Observe labeling!**



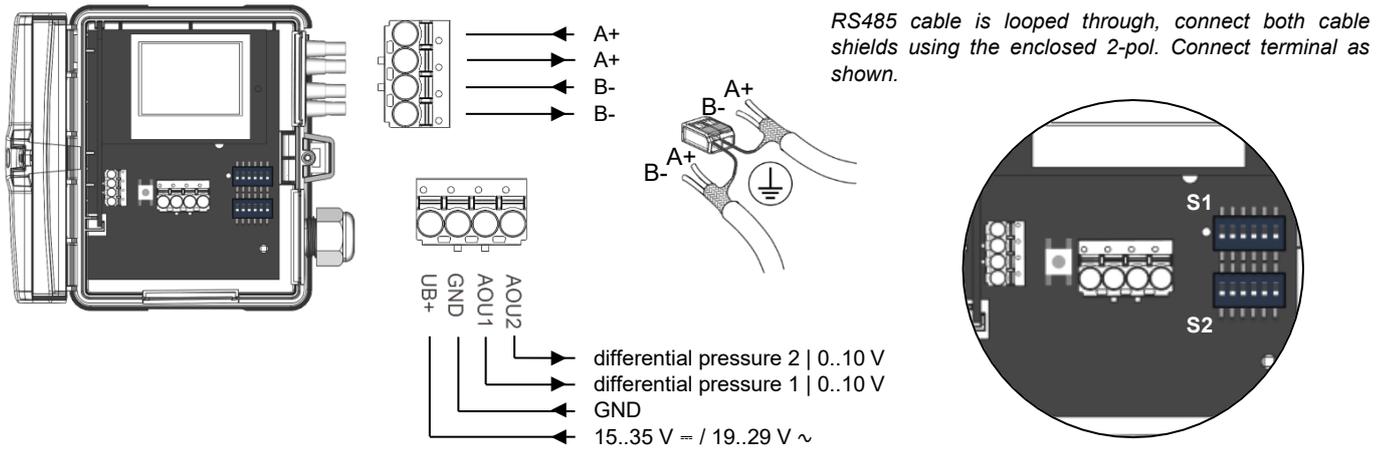
- 4.** Connect pressure tubes to the duct connection pieces



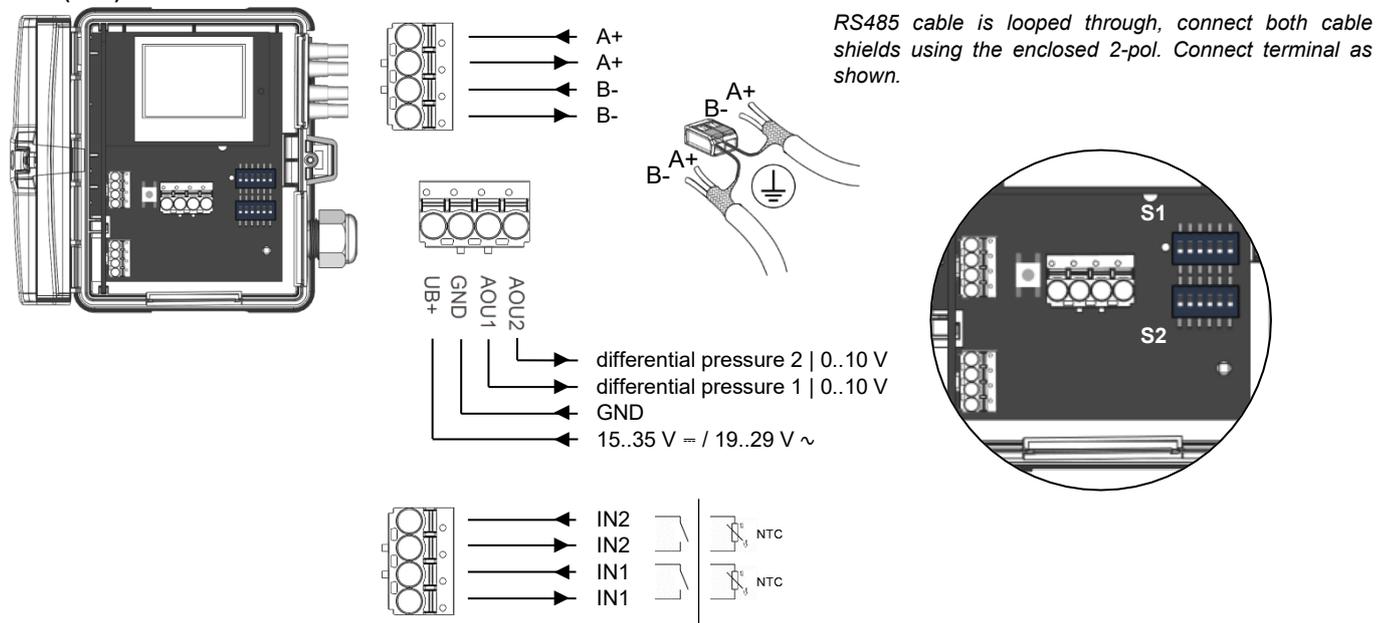
» **CONNECTION PLAN**

RS485 cable is looped through, connect both cable shields using the enclosed 2-pol. connect terminal as shown.

**DPA+ (LCD) Dual RS485 Modbus MultiRange**



**DPA+ (LCD) RS485 Modbus 2IN**



» **DIP SWITCHES, MAINBOARD (S1+S2)**

S1 – Dip-switch 1 (pressure sensor 1)  
S2 – Dip-switch 2 (pressure sensor 2)

Measuring range adjustment – Typ 250 | 2500 | 7000

0..+250	0..+100	0..+50	0..+25	-25..+25	-50..+50	-100..+100	-150..+150	Pa
0..+2500	0..+2000	0..+1500	0..+1000	0..+500	0..+250	0..+100	-100..+100	Pa
0..+7000	0..+5000	0..+4000	0..+3000	0..+2500	0..+2000	0..+1500	0..+1000	Pa
0..+1	0..+0.4	0..+0.2	0..+0.1	-0.1..+0.1	-0.2..+0.2	-0.4..+0.4	-0.6..+0.6	inchWC
0..+10	0..+8	0..+6	0..+4	0..+2	0..+1	0..+0.4	-0.4..+0.4	inchWC
0..+28	0..+20	0..+16	0..+12	0..+10	0..+8	0..+6	0..+4	inchWC

default

Response time		Output voltage		Unit	
0,8 sec	4,0 sec	0..10 V	0..5 V	Pa	inchWC
default		default		default	

» **DIP SWITCHES, PLUG-IN CARD**

The modbus address of the device is set in the range of 1 ... 31 (binary encoded) using a 5-pole DIP switch. With address 0 via DIP, an extended address range (32..247) is available via USEapp.

\* factory default settings

<b>Termination 120 Ω</b> Not active* active	<b>Modbus address</b> ON=2 <sup>0</sup> (1)* ON=2 <sup>1</sup> (2) ON=2 <sup>2</sup> (4) ON=2 <sup>3</sup> (8) ON=2 <sup>4</sup> (16)
<b>Baud</b> 9600* 19200 38400 57600	<b>Parity</b> none* (2-stopbits) even (1-stopbit) odd (1-stopbit) none (1-stopbit)

Sample address: 26

» **CONFIGURATION**



The Thermokon bluetooth dongle with micro-USB (Item No.: 668262) is required for communication between USEapp and USE-M / USE L products. Commercial bluetooth dongles are not compatible.



Application-specific reconfiguration of the devices can be carried out using the Thermokon USEapp. The configuration is carried out in the voltage-supplied state.



The configuration-app and the app description can be found in the Google Play Store or in the Apple App Store.

» **APPLICATION NOTICE**



The Bluetooth dongle snaps into the socket easily. When removing, please fix the plug-in card (option PCB) so that it is not unintentionally pulled out.

## » MODBUS KONFIGURATION



### Modbus addresses:

USE-RS485 Modbus Interface

A detailed description of the Modbus addresses can be found under the following link: → [Download](#)

Adress	Access	Description	Register 400 = 1 (Unit SI)			Register 400 = 2 (Unit Imperial)		
			Resolution / Unit			Resolution / Unit		
8	R / s16	<b>Differential pressure 1</b>	SI	1.0	Pa	Imperial	0.001	inWC
9	R / u16	<b>Volumetric flow 1 (16 Bit)</b> (if register address 404 is set to the value 2, the value scales the unit m <sup>3</sup> /s)	SI	100.0	m <sup>3</sup> /h m <sup>3</sup> /s	Imperial	10.0	cfm
10	R / s16	<b>Differential pressure 2</b>	SI	1.0	Pa	Imperial	0.001	inWC
11	R / u16	<b>Volumetric flow 2 (16 Bit)</b> (if register address 404 is set to the value 2, the value scales the unit m <sup>3</sup> /s)	SI	100.0	m <sup>3</sup> /h m <sup>3</sup> /s	Imperial	10.0	cfm
50 Low	R / u32	<b>Volumetric flow 1 (32 Bit)</b> (if register address 404 is set to the value 2, the value scales the unit m <sup>3</sup> /s)	SI	1.0	m <sup>3</sup> /h m <sup>3</sup> /s	Imperial	1.0	Cfm
51 High		<i>This register is available since firmware V1.6 (see register 505)</i>						
52 Low	R / u32	<b>Volumetric flow 2 (32 Bit)</b> (if register address 404 is set to the value 2, the value scales the unit m <sup>3</sup> /s)	SI	1.0	m <sup>3</sup> /h m <sup>3</sup> /s	Imperial	1.0	Cfm
53 High		<i>This register is available since firmware V1.6 (see register 505)</i>						

### Optional (IN1 | IN2)

NTC10k temperature sensors or floating contacts can be connected to the inputs (IN1 & IN2)

Adress	Access	Description	Values	
92	R / s16	Input 1 – Binary signal	0	Contact open
93	R / s16	Input 2 – Binary signal	1	Contact closed

Adress	Access	Description	Register 400 = 1 (Unit SI)			Register 400 = 2 (Unit Imperial)		
			Resolution / Unit			Resolution / Unit		
90	R / s16	Input 1 - Temperature NTC10k (beta value configurable, register address 490, default: 3864)	SI	0.1	°C	Imperial	0.1	°F
91	R / s16	Input 2 - Temperature NTC10k (beta value configurable, register address 491, default: 3864)	SI	0.1	°C	Imperial	0.1	°F

## » FLOW CALCULATION: (DEFAULT PARAMETERS)

$q = k * \sqrt{2 * \frac{\Delta p}{\rho}}$  with k=1500, fan manufacturer Rosenberg, Comefri, Nicotra Gebhardt, default measuring range 0..750.000 m<sup>3</sup>/h. **Further calculation formulas, fan manufacturers and k-values can be selected via the USEapp.**

Rosenberg · Comefri · Gebhardt · Nicotra	Ziehl-Abegg · EBM-Papst	Fläkt Woods
$q = k * \sqrt{2 * \frac{\Delta p}{\rho}}$	$q = k * \sqrt{\Delta p}$	$q = \frac{1}{k} * \sqrt{\Delta p}$

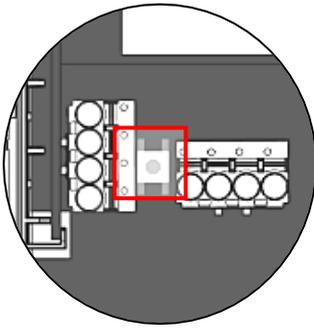
## » AUTOMATIC ZERO-POINT ADJUSTMENT - (OPTIONAL)



**Transmitters equipped with the auto-zero adjustment are maintenance free.**

The auto-zero adjustment electronically adjusts the transmitter to zero every 10 minutes. The function eliminates all output signal drift due to thermal, electronic or mechanical effects. The auto-zero adjustment takes approx. 4 seconds after which the device returns to its normal measuring mode. During the 4 second correction period, the output and display values will freeze to the latest measured value.

## » MANUAL ZERO-POINT ADJUSTMENT (FOR DEVICES WITHOUT AUTO-ZERO FUNCTION)



In normal operation zero point adjustment should be executed depending on the device and the measuring range.

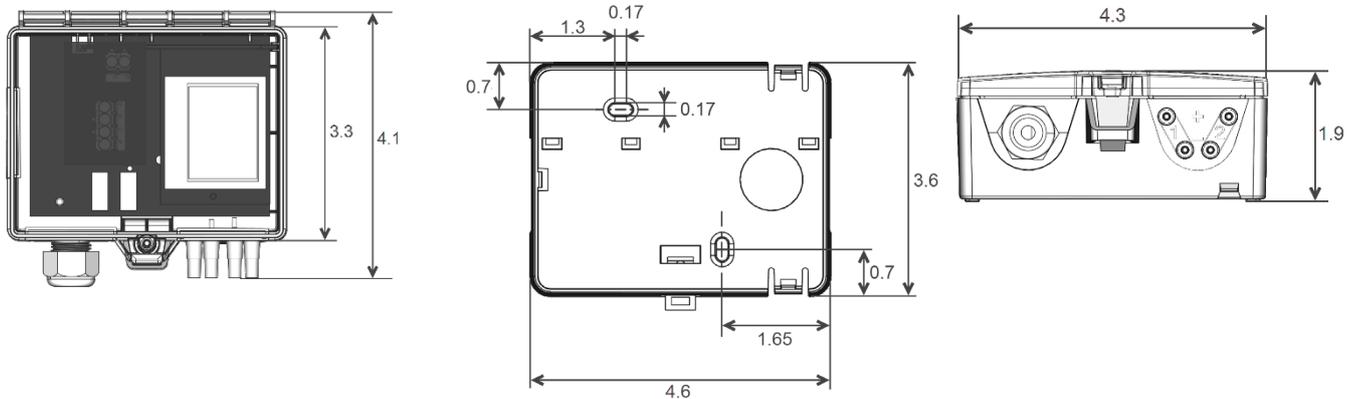
**Attention! For executing zero point adjustment the power supply must be connected one hour before.**

- Release both connection tubes from the pressure terminals + and -
- Press the button until the LED lights permanently
- Wait until the LED flashes again and reinstall the connection tubes to the pressure ports (note + and -)

## » USE ENCLOSURE WITH UV AND WEATHER RESISTANCE

After some time, outdoor mounted plastics can lose their color and quality. Therefore, all USE housings are made of special white polycarbonate (PC). The light-stable colorants and additives are used to achieve optimum protection of the polymer while maintaining color stability. The titanium dioxide used is specially developed for polycarbonate and offers excellent UV protection through the reflection of the entire light spectrum including the UV component by 340 nm. This effectively counteracts the otherwise occurring photochemical polymer degradation. The colors stay full for a long time without fading. The material is also resistant to cold and frost.

## » DIMENSIONS (IN.)



## » ACCESSORIES (INCLUDED IN DELIVERY)

Mounting base enclosure USE-L  
2x 2 m PVC connection tube  
2x KKS40 kit  
• 2 plastic duct flanges • 4 mounting screws 4x20

Item No. 668361  
Item No. 484268  
Item No. 430135

Mounting kit universal  
• Cover screw + screw cover • 2 Rawlplugs • 2 Screws (countersunk head) • 2 Screws (rounded head)

Item No. 698511

## » ACCESSORIES (OPTIONAL)

Bluetooth dongle USE for USEapp  
Converter RS485 Modbus-USB incl. driver CD  
USB RS485 Modbus RTU Logger  
RS485 Biasing Adapter

Item No. 668262  
Item No. 668293  
Item No. 809917  
Item No. 811378

T-hose connector for pressure hoses  $\varnothing=0.16$  in. (10 pcs)  
Adapter 90° angle for pressure hoses  $\varnothing=0.16$  in.  
Metal duct connectors 1.6 in.

Item No. 668323  
Item No. 668330  
Item No. 265138