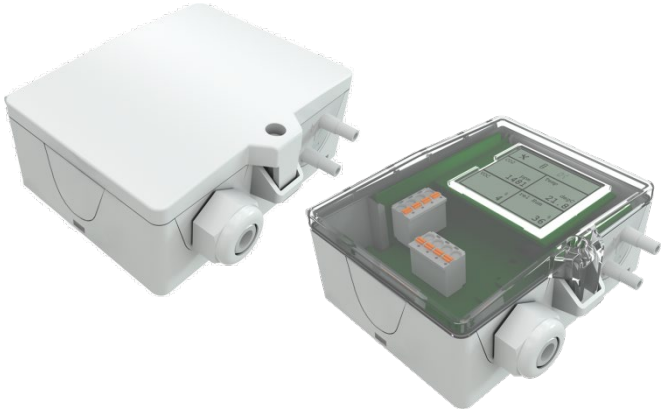
DPA+ (LCD) RS485 Modbus

Differential Pressure Transmitter

thermokon®
HOME OF SENSOR TECHNOLOGY

Datasheet

Subject to technical alteration
Issue date: 20.02.2023 • A123



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. Three types with eight different measuring ranges are available for different applications. In addition to differential pressure all variants provide the calculated volume flow as second analog output signal. 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 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 with display – RS485 Modbus

- DPA250+ (LCD) RS485 Modbus MultiRange <AZ>
- DPA2500+ (LCD) RS485 Modbus MultiRange <AZ>
- DPA7000+ (LCD) RS485 Modbus MultiRange <AZ>

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

- DPA250+ (LCD) RS485 Modbus MultiRange <AZ> 2IN
- DPA2500+ (LCD) RS485 Modbus MultiRange <AZ> 2IN
- DPA7000+ (LCD) RS485 Modbus MultiRange <AZ> 2IN

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/ .

»NOTES ON DISPOSAL

As a component of a large-scale fixed installation, Thermokon products are intended to be used permanently as part of a building or a structure at a pre-defined and dedicated location, hence the Waste Electrical and Electronic Act (WEEE) is not applicable. However, most of the products may contain valuable materials that should be recycled and not disposed of as domestic waste. Please note the relevant regulations for local disposal.

» 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.

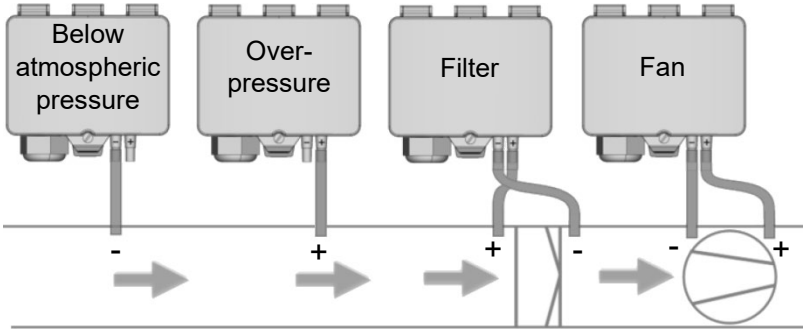
» TECHNICAL DATA

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), **Fail-safe Biasing required**		
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 **selectable at the device*	**type 250** 0..+25 | 0..+50 | 0..+100 | 0..+250 | -25..+25 | -50..+50 | -100..+100 | -150..+150 Pa	**type 2500** -100..+100 | 0..+100 | 0..+250 | 0..+500 | 0..+1000 | 0..+1500 | 0..+2000 | 0..+2500 Pa	**type 7000** 0..+1000 | 0..+1500 | 0..+2000 | 0..+2500 | 0..+3000 | 0..+4000 | 0..+5000 | 0..+7000 Pa
Accuracy pressure **deviation from calibration reference device (calibrator)*	at range <250 Pa: ±1 Pa	at range <500 Pa: ±5 Pa, at range >500 Pa: ±10 Pa	at range <2000 Pa: ±10 Pa, at range >2000 Pa: ±25 Pa
Zero-point adjustment *(manually)*	3 month	at range <500 Pa: 6 month at range >500 Pa: 12 month	12 month
Zero-point adjustment *(automatic)*	automatic zero-point adjustment (optional)		
Max. working overpressure	40 kPa		
Inputs *(optional)*	**2IN** 2x input for NTC10k or floating contact		
Sensor	piezo measuring element		
Display *(optional)*	LCD 29x35 mm with RGB backlight units, pressure: Pa, inchWC, volume flow: m3/h, cfm (configurable)		
Enclosure	enclosure USE-L, PC, pure white, with removable cable entry, with LCD: cover PC, transparent, UV resistant		
Protection	IP65 according to EN 60529		
Cable entry	M25, for wire max. Ø=7 mm, seal insert for fourfold cable entry		
Connection electrical	**Mainboard** removable plug-in terminal, max. 2,5 mm²	**Plug-in card** removable plug-in terminal, max. 1,5 mm²	
Connection mechanical	pressure connection male Ø=5,0 mm / Ø=6,3 mm, connection tube: PVC, soft		
Ambient condition	-10..+50 °C, 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		

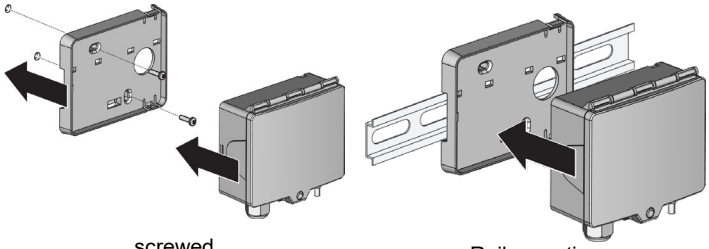
» MOUNTING ADVICES

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

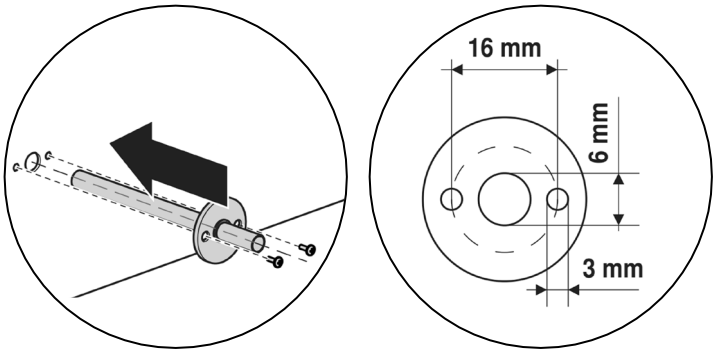


1. Mount the DPA+ mounting base in a suitable location and attach the DPA+. ***Note alignment!***

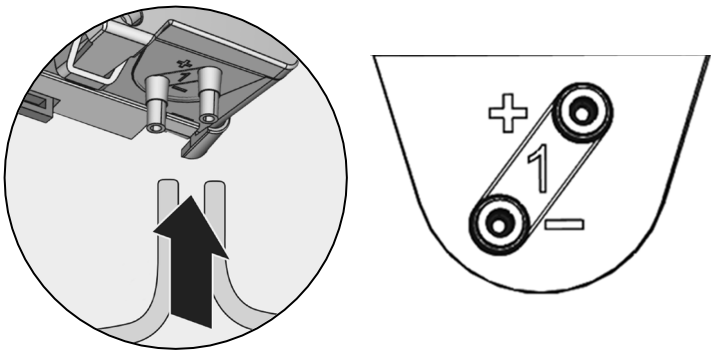


screwed Rail mounting

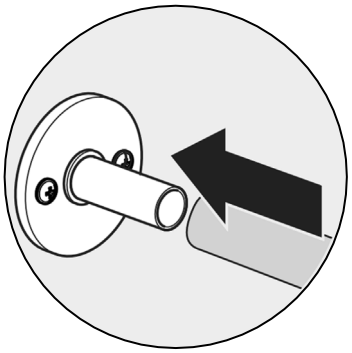
2. Prepare the duct for mounting and mount the duct connection piece. ***Attention! Observe dimensions!***



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

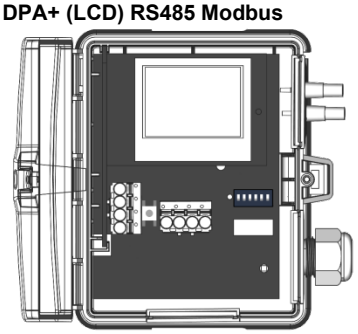


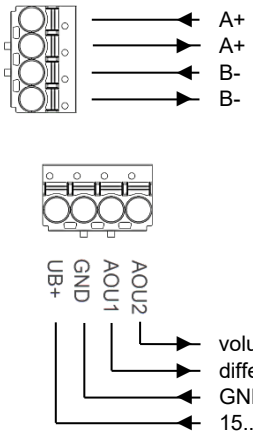
4. Connect pressure tubes to the duct connection pieces



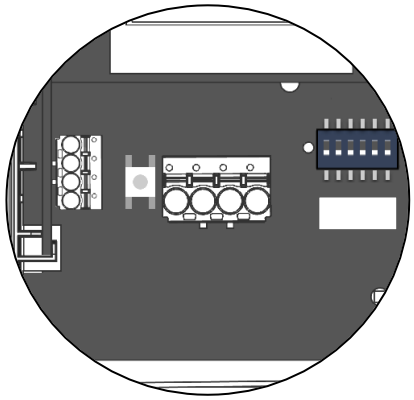
»CONNECTION PLAN

DPA+ (LCD) RS485 Modbus

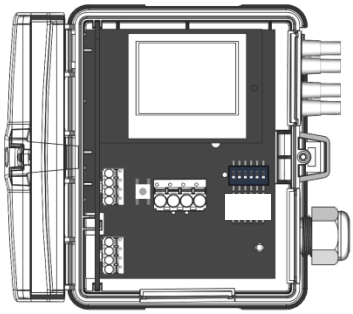


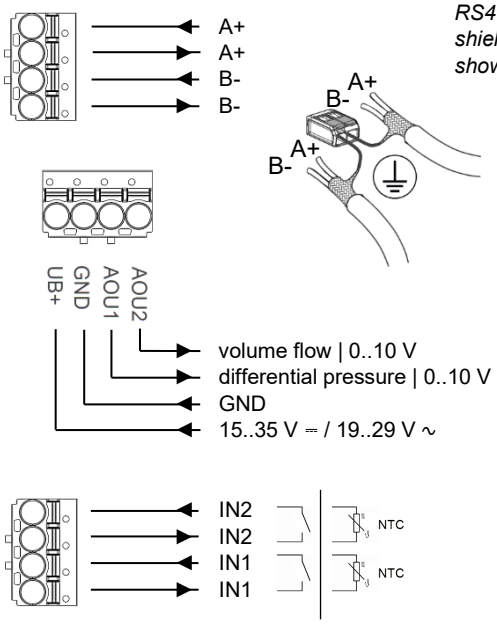


RS485 cable is looped through, connect both cable shields using the enclosed 2-pol. Connect terminal as shown.

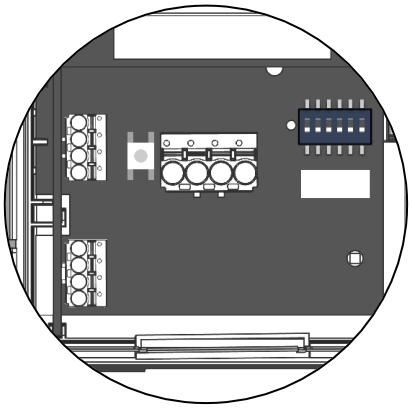


DPA+ (LCD) RS485 Modbus 2IN





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



»DIP SWITCHES, MAIN BOARD

Measuring range adjustment – Typ 250 | 2500 | 7000

ON 1 2 3	ON 1 2 3	ON 1 2 3	ON 1 2 3	ON 1 2 3	ON 1 2 3	ON 1 2 3	ON 1 2 3	= ON = OFF
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

ON 4	ON 4
0,8 sec	4,0 sec

default

Output voltage

ON 5	ON 5
0..10 V	0..5 V

default

Unit

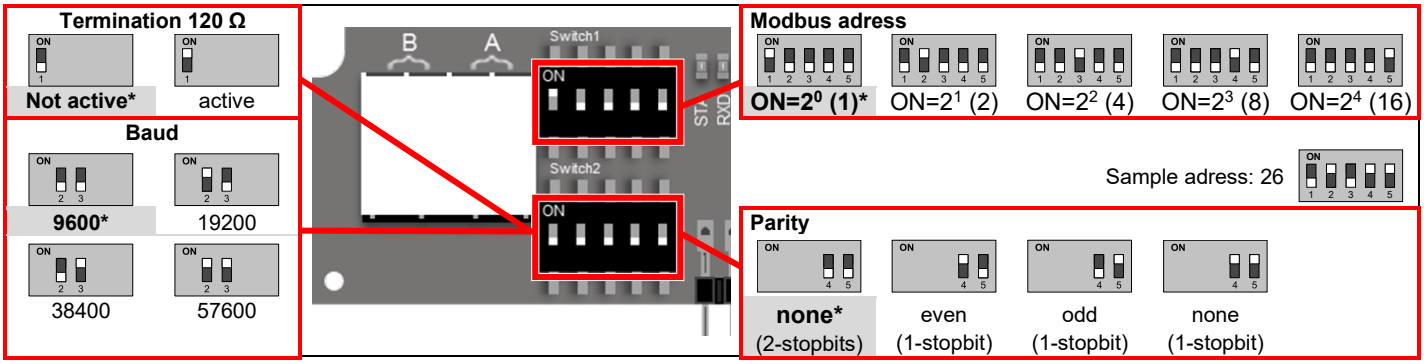
ON 6	ON 6
Pa	inchWC

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**



» MODBUS KONFIGURATION

Modbus addresses:
USE-RS485 Modbus Interface
A detailed description of the Modbus addresses can be found under the following link: → **Download**

			Register 400 = 1 (Unit SI)			Register 400 = 2 (Unit Imperial)		
Adress	**Access**	**Description**	**Resolution / Unit**			**Resolution / Unit**		
8	R / s16	**Differential pressure 1**	SI	1.0	Pa	Imperial	0.001	inWC
9	R / u16	**Volumetric flow 1 (16 Bit)** (if register address 404 is set to the value 2, the value scales the unit m³/s)	SI	100.0	m³/h m³/s	Imperial	10.0	cfm
50 Low 51 High	R / u32	**Volumetric flow 1 (32 Bit)** (if register address 404 is set to the value 2, the value scales the unit m³/s) *This register is available since firmware V1.6 (see register 505)*	SI	1.0	m³/h m³/s	Imperial	1.0	cfm

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

			Register 400 = 1 (Unit SI)			Register 400 = 2 (Unit Imperial)		
Adress	**Access**	**Description**	**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 m³/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
$q = k * \sqrt{2 * \frac{\Delta p}{\rho}}$	$q = k * \sqrt{\Delta p}$	$q = \frac{1}{k} * \sqrt{\Delta p}$

»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.

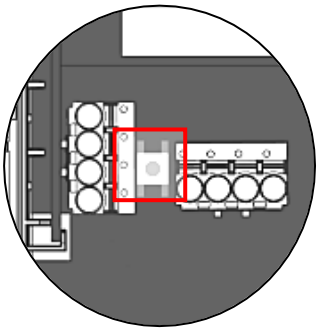
»APPLICATION NOTICE

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.

»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)

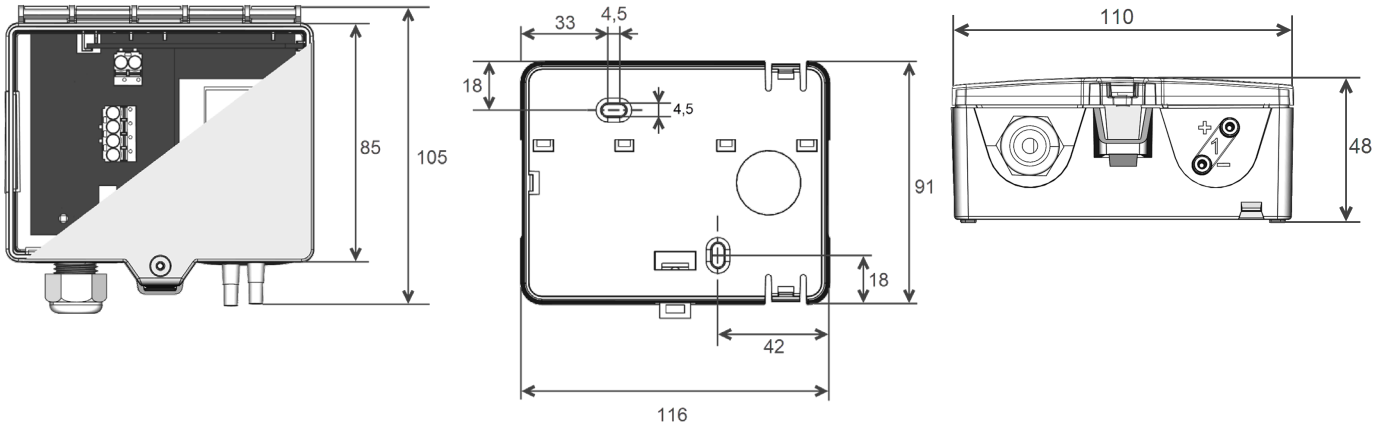


In normal operation zero point adjustment should be executed depending on the device and the measuring range.

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 -)

»DIMENSIONS (MM)



»ACCESSORIES (INCLUDED IN DELIVERY)

Mounting base enclosure USE-L	Item No. 668361
2 m PVC connection tube	Item No. 484268
KKS40 kit • 2 plastic duct flanges • 4 mounting screws 4x20	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	Item No. 668262
Converter RS485 Modbus-USB incl. driver CD	Item No. 668293
USB RS485 Modbus RTU Logger	Item No. 809917
RS485 Biasing Adapter	Item No. 811378
T-hose connector for pressure hoses Ø=4 mm (10 pcs)	Item No. 668323
Adapter 90° angle for pressure hoses Ø=4 mm	Item No. 668330
Metal duct connectors 40 mm	Item No. 265138
Metal duct connectors 100 mm	Item No. 302531