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USER GUIDE

DPT-Priima-MOD-AZ-D

Produal

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PRODUAL

PART OF BEMSIQ GROUP

DPT-Priima-MOD Modbus differential pressure transmitter

USER GUIDE

Made in Finland

5 years warranty

MANAGEMENT SYSTEM CERTIFICATION DNV ISO 9001 · ISO 14001 Finland

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1 Introduction

The DPT-Priima-MOD differential pressure transmitter is designed for cleanrooms and other high-accuracy applications. It measures static and differential pressure, airflow volume and air velocity. It has two functions for airflow measurement. You can either monitor airflow across a centrifugal fan, or connect an airflow volume probe to the transmitter to monitor airflow volume in a ventilation duct.

The DPT-Priima-MOD transmitter has an extremely accurate sensor and automatic zeroing. Automatic zeroing keeps the transmitter zero point accurate by automatically eliminating zero point drifting.

You can select the pressure measurement range from five options. The transmitter supports the Modbus RTU communication protocol. The BMS system reads the measurement data directly from the Modbus registers of the transmitter using Modbus RTU communication over the RS-485 interface. This transmitter does not have analogue outputs.

The backlit display shows the measured values for pressure and flow at the same time as default. You can also set the display to show only pressure or flow.

You can use this transmitter with the FloXact airflow volume probe and other airflow probes, pitot tube, or air dampers.

Commissioning this device is simple. You can configure the settings using the device menu or via Modbus communication.

1.1 About this user guide

This user guide contains important information about the installation, wiring, configuration and use of the product. Read this guide carefully before you install the product, connect the wires, or operate the product. Make sure that you fully understand all instructions before you start work. If you are not sure what the instructions mean, contact the seller or the manufacturer.

Follow all instructions in this user guide carefully. Always obey the applicable local rules and regulations.

The original instructions were written in English. If there are differences between the English instructions and the translations, refer to the English instructions.

If you find a mistake in the English instructions or in the translations, please send the details to the manufacturer.

1.2 Intended use

The DPT-Priima-MOD differential pressure transmitters are intended to be used for measuring static and differential pressure, airflow volume, and air velocity in commercial environments.

This device is compatible with dry air. It is intended to be connected to a building automation system in the HVAC/R industry.

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2 Safety precautions

The product is developed, manufactured and tested according to high quality standards. However, instructions for safe use must be followed when installing, using or disposing the product or parts of product.

Read this user guide carefully before you commission, use or service this device. To avoid any kind of damage to people or property, follow the instructions carefully. Produal is not liable for any hazards, injury to people, or damage to property caused by incorrect installation or misuse of the device.

To avoid electrical shock or damage to equipment, disconnect power before you install or service the product. Use only proper wiring that is rated for the full operating voltage and maximum current in the system. The wiring must also withstand fault conditions.

To avoid fire and/or explosion, do not use the product in potentially flammable or explosive atmosphere.

Make sure that the product is not damaged before installation. Do not drop the product or use excessive force during installation. Do not use the product if you can see any damages.

After installation, the product will be part of a system whose specifications and performance characteristics are not designed or controlled by Produal. Refer to national and local authorities to ensure that the installation is functional and safe.

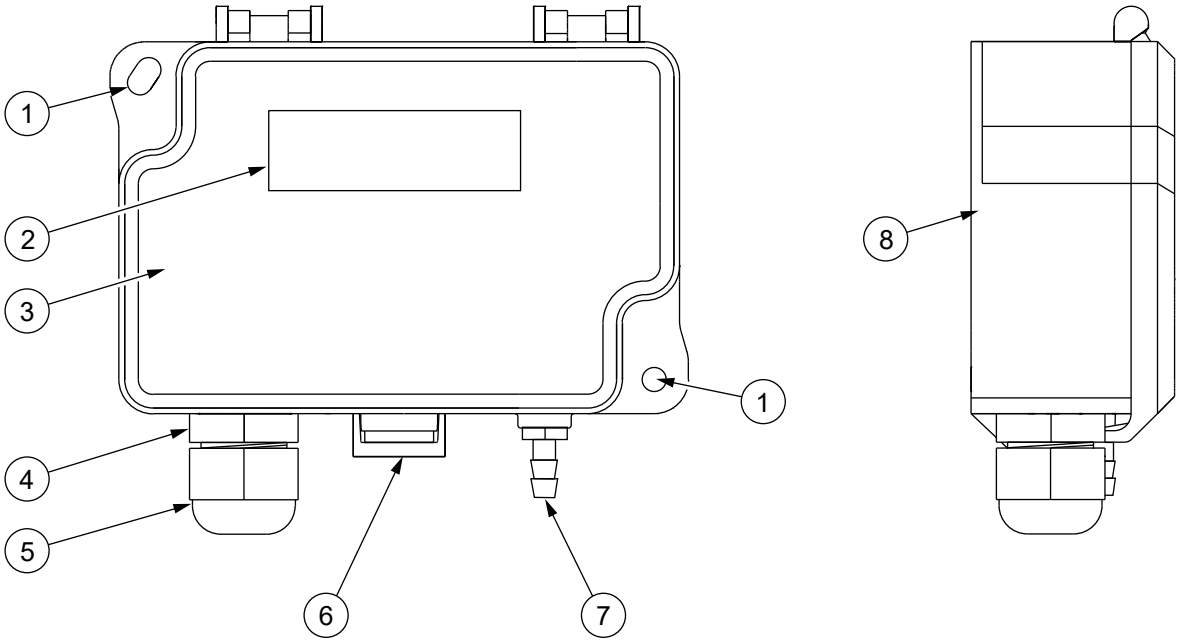
The product should only be used in professionally designed applications. Unauthorised modifications are not allowed. The product must not be used in relation with any equipment that in case of a failure may threaten, directly or indirectly, human health or life or result in danger to human beings, animals or property.

In this document, there are different warnings and notes. The warning and note types are defined in the following table.

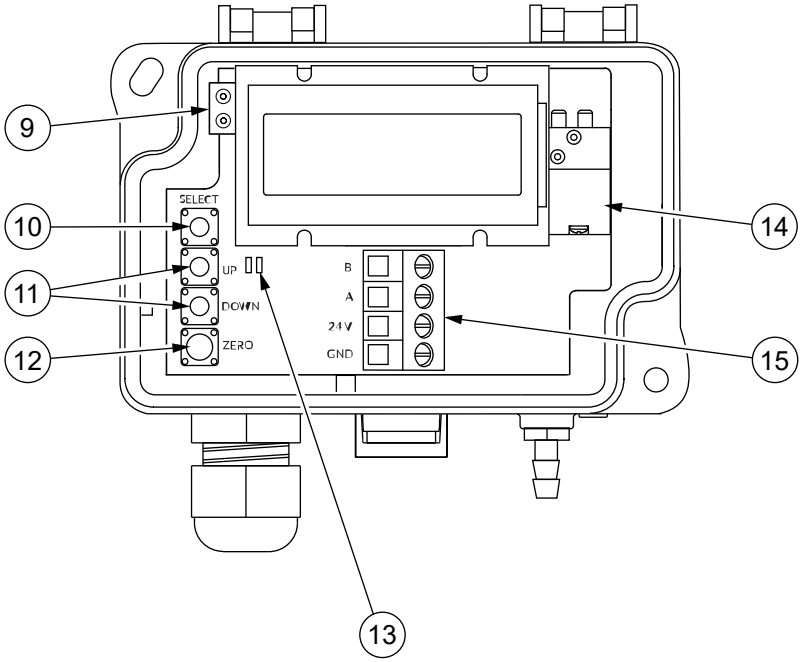
Sign	Description
WARNING:	The warning symbol indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
CAUTION:	The caution symbol indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.
Important:	The important symbol indicates a potentially hazardous situation which, if not avoided, could result in damage to the device or property.
Note:	The note symbol indicates a useful tip or a recommended way to complete a task. These notes also provide information that is useful but not critical to the user.

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3 Main components



1	Mounting point	2	Display
3	Cover	4	Cable gland
5	Strain relief	6	Cover latch
7	Pressure connection (+ high pressure / - low pressure)	8	Housing



9	Pressure sensor	10	Menu button (*SELECT*)
11	Menu navigation buttons	12	Zeroing button
13	Zeroing indicator light	14	Automatic zeroing module
15	Terminal block		

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4 Commissioning

4.1 Mounting

WARNING: Handle the product with care. Dropping the product can damage it internally and cause unwanted functions in the connected system.

CAUTION: Place the device outside the reach of children and animals.

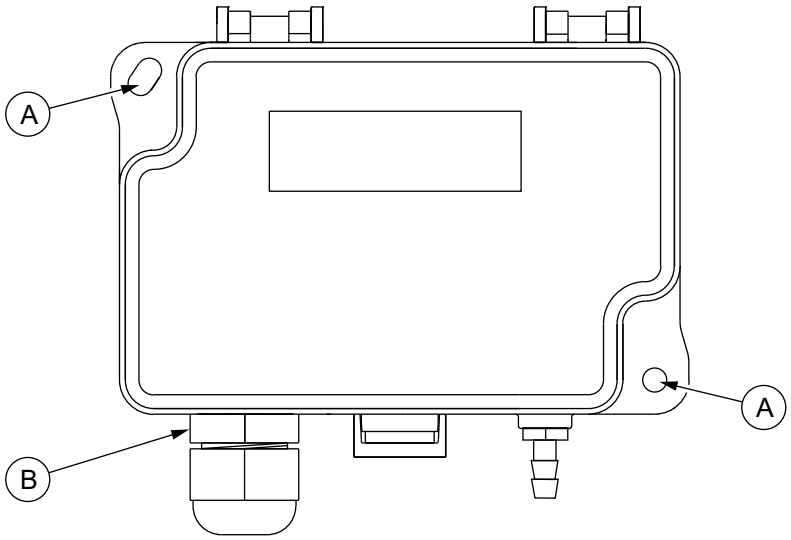
Important: Only install this device in a location where the ambient conditions meet the operating condition requirements.

Note: When the temperature drops below 0 °C, the display fades slightly and the response time increases.

Operating conditions

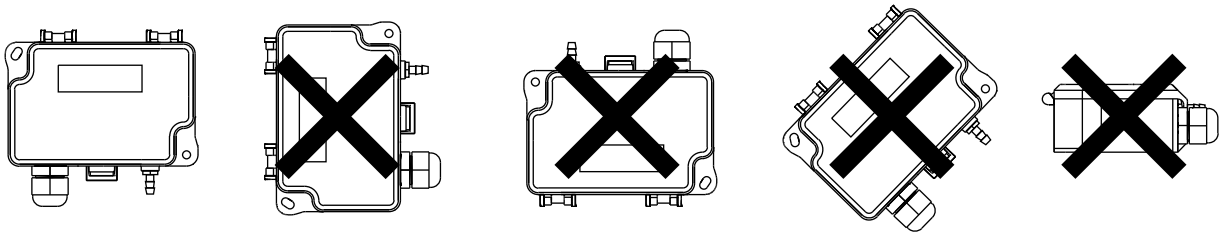
Ambient temperature	-5...50 °C
Ambient humidity	0...95 %rH (non-condensing)

1. Check that the product is not damaged during transportation.
2. Select the mounting position on a wall or other flat and vertically upright surface.
3. Use the device as a template and mark the screw holes on the mounting surface.
4. Select the mounting screws according to the mounting surface.
   The maximum screw diameter is 4.3 mm.
5. Make sure that the cable gland points down.



A. Mounting point
B. Cable gland

6. Mount the device with the screws using the mounting points.
   See the figure below for the correct mounting orientation.



7. Make sure that the device is horizontally and vertically level.
8. Tighten the screws.

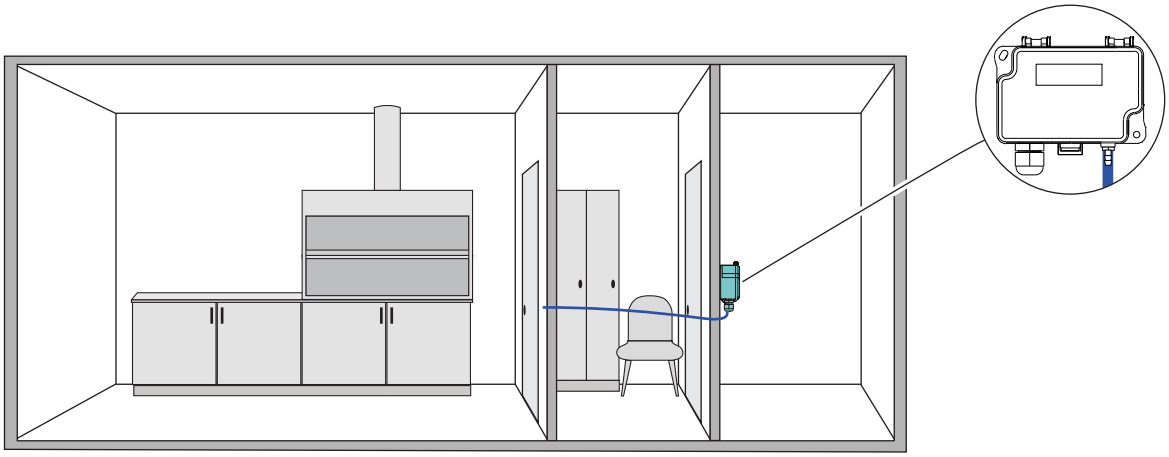
4.2 Connecting the pressure measurement hoses

Note: Make sure that the pressure measurement points are on the same vertical level to improve the accuracy of the measurement. Height difference between the pressure measurement points has an effect on the measurement accuracy (approximately 12 Pa/m).

Note: The hose length does not have an effect on the measurement accuracy. However, long hoses cause delay to the measurement.

Connect the pressure measurement hoses to the pressure connections of the device according to your application. See the examples below.

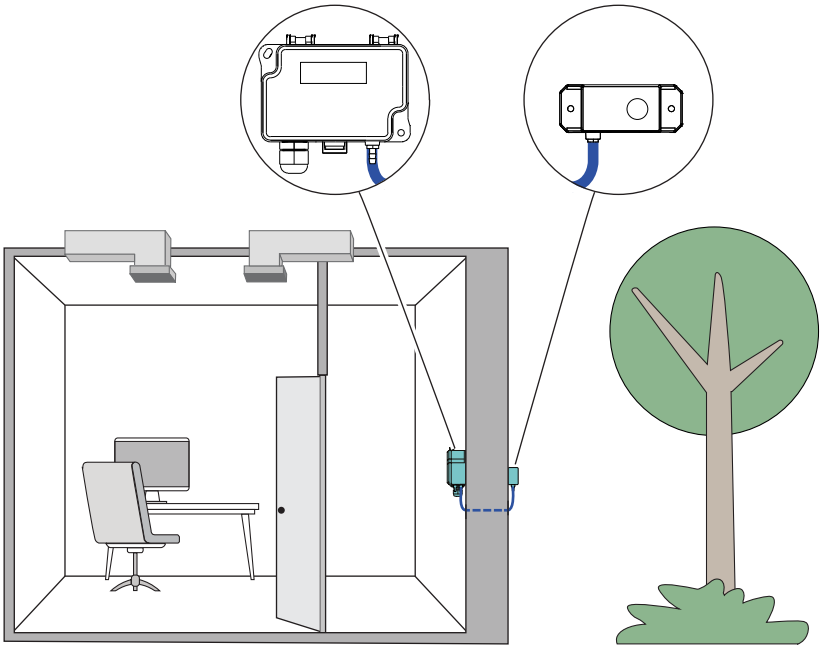
Pressure monitoring in cleanrooms



- Install the DPT-Priima-MOD transmitter to the wall in the corridor.
- Connect the pressure measurement hose to the "–" connection on the DPT-Priima-MOD transmitter.
- Route the other end of the pressure measurement hose to the cleanroom.

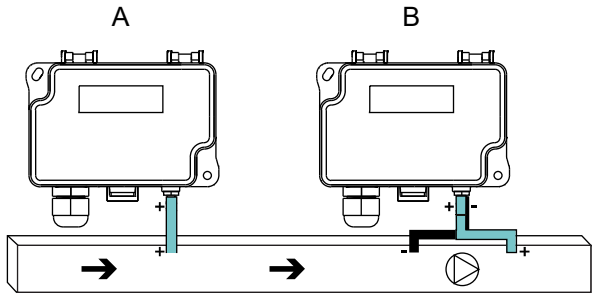
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Pressure difference monitoring across the building envelope



- Install the DPT-Priima-MOD transmitter inside the building.
- Install a SPP static pressure port to the outer wall of the building.
- Connect a pressure measurement hose to the "+" connection on the SPP static pressure port.
- Connect the other end of the pressure measurement hose to the "–" connection on the DPT-Priima-MOD transmitter.

Static pressure and pressure difference monitoring in ventilation ducts



A. Static pressure
B. Fan/blower monitoring

- If the pressure is static, connect the pressure measurement hose to the "+" connection only.
- Fan or blower monitoring:
  1. Connect a pressure measurement hose to the duct on the low pressure side before the fan/blower and another pressure measurement hose on the high pressure side after the fan/blower.
  2. Connect the high pressure measurement hose to the "+" connection.
  3. Connect the low pressure measurement hose to the "–" connection.

Airflow volume monitoring in ventilation ducts

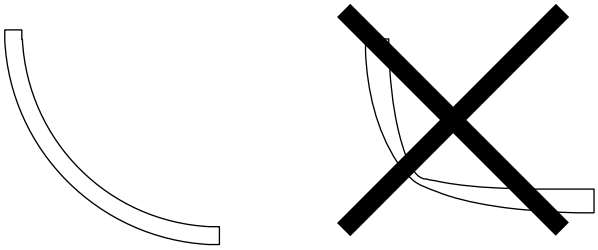
- To monitor airflow volume in a ventilation duct, connect the pressure measurement hoses to a FloXact airflow volume probe or other flow measurement probe according to probe manufacturer's installation instructions.

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- To monitor airflow volume across a centrifugal fan, connect the pressure measurement hoses to the measurement ports specified by the fan manufacturer.

Installing pressure measurement hoses

- Install the measuring hoses carefully and make sure that the hoses do not bend too tightly. Too tight curves can prevent the airflow to the sensor.



4.3 Wiring

WARNING: Only connect wires and commission the device if you are qualified for electrical work and familiar with building automation products. Risk of electric shock and damage to the device.

WARNING: Always commission the device in a de-energised electricity network. Risk of electric shock.

WARNING: Connect this device to SELV (separated extra low voltage) electricity network only. This device is appliance class III product according to IEC 60664-1.

CAUTION: Use single-stranded wires if possible. If you use multi-stranded wires, always install wire end sleeves to the wires to prevent short circuits and ensure secure attachment.

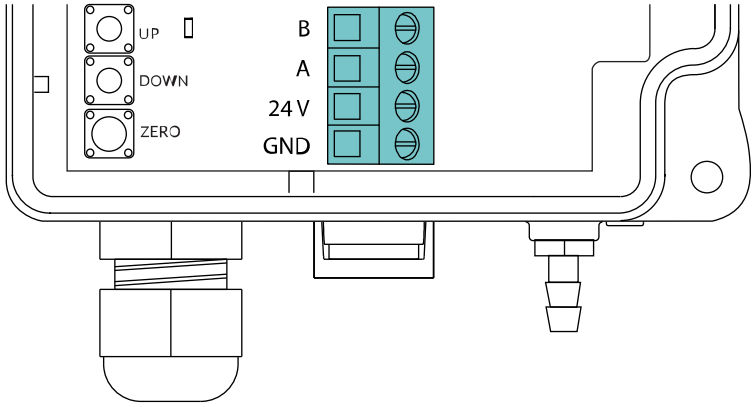
Important: For CE and UKCA compliance, use correctly grounded, shielded cable.

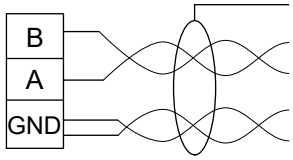
Note: Use a shielded twisted-pair cable for Modbus cabling. Connect the shield to earth at one point only to prevent ground loops and noise. The shield is usually connected to earth at the end of the main cable.

1. Open the cover.
2. Unscrew the strain relief on the cable gland.
3. Route the cable through the strain relief and the cable gland.

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4. Connect the wires to the terminal block according to the table below.



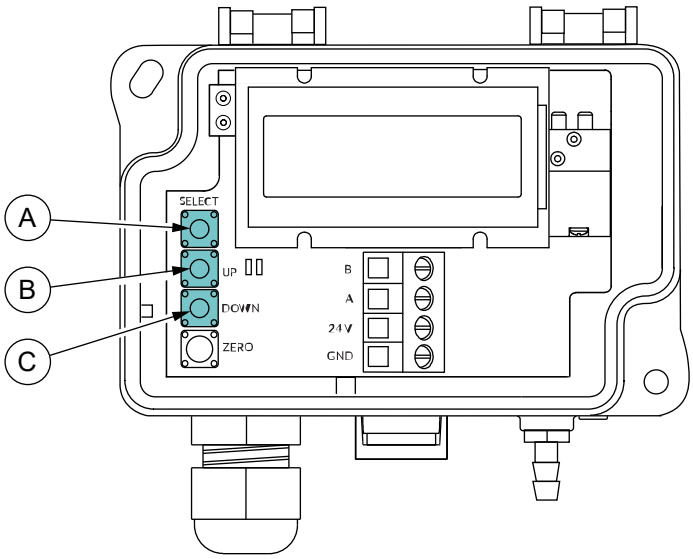
B- *A+*		Modbus RTU, RS-485
24 V		24 Vac/dc power supply
GND		0 V

The nominal tightening torque for wiring terminal screws is 0.4 Nm.

Important: Do not use excessive force when you tighten the wiring terminal screws.

5. Tighten the strain relief.
6. Close the cover.

4.4 Configuring settings using the device menu



A. *SELECT* button
B. *UP* button
C. *DOWN* button

1. Open the cover.

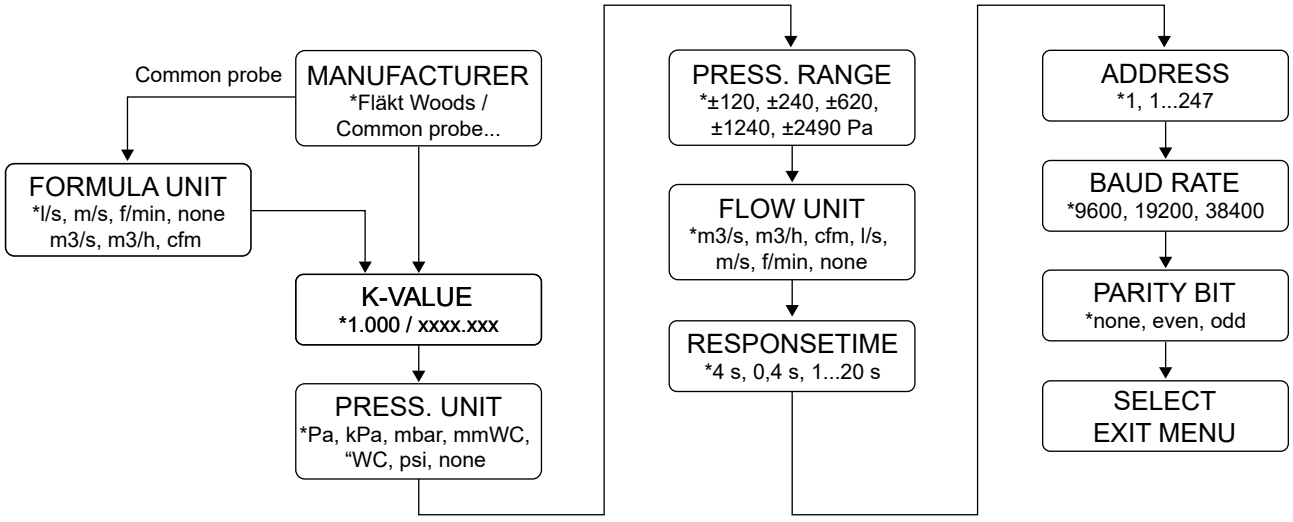
   CAUTION: Be very careful if you touch the device when the power supply is connected and the cover is removed.

2. Press the *SELECT* button for two seconds to activate the device menu.
3. Use the *UP* and *DOWN* buttons to navigate the menu.
4. Press the *SELECT* button to change the value of a menu item.
5. Press the *UP* or *DOWN* button to select a value.
6. Press the *SELECT* button to accept the new value and to return to menu navigation.
7. Navigate to the *EXIT MENU* view and press the *SELECT* button to save the settings and exit the menu.

   Note: If you do not press any buttons for 50 seconds, the device returns to normal operation. In this case, the settings are not saved.

4.4.1 Device menu structure

See the figure below for the full menu structure. The default values are marked with an asterisk (*).



4.4.2 The Manufacturer menu

Select the manufacturer in the *MANUFACTURER* menu if you connect DPT-Priima-MOD to a fan with pressure measurement points. Select *Common probe* if you use DPT-Priima-MOD with FloXact airflow volume probe or other common measurement probe.

If you select *Common probe*, select the measurement unit used in the formula from the *FORMULA UNIT* menu.

Menu selection	Calculation equation	Description
Fläkt Woods	$q = \frac{1}{k}\sqrt{\Delta P}$	Select the fan manufacturer if you connect the device to a fan with pressure measurement points.
Rosenberg	$q = k\sqrt{\frac{2\Delta P}{\rho}}$	
Nicotra-Gebh	$q = k\sqrt{\frac{2\Delta P}{\rho}}$	
Comefri	$q = k\sqrt{\frac{2\Delta P}{\rho}}$	
Ziehl	$q = k\sqrt{\Delta P}$	
Ebm-Papst	$q = k\sqrt{\Delta P}$	
Gebhardt	$q = k\sqrt{\frac{2\Delta P}{\rho}}$	
Nicotra	$q = k\sqrt{\Delta P}$	
Common probe	$q = k\sqrt{\Delta P}$	Select *Common probe* if you connect the device to a common measurement probe (for example, FloXact).

4.4.3 The Formula unit menu

The *FORMULA UNIT* menu is available if you selected *Common probe* in the *MANUFACTURER* menu. The measurement unit you select in this menu is used in the calculation formula.

The correct formula unit depends on the probe you use. For example, if you use the FloXact airflow probe, the correct formula unit is *l/s*.

Name	Values	Default	Description
Formula unit	*m3/s, m3/h, cfm, l/s, m/s, f/min, none*	*l/s*	Formula unit used in calculation formula. Airflow volume units: *m3/s, m3/h, cfm, l/s*. Air velocity units: *m/s, f/min*. If you select *none*, the transmitter operates only as a pressure transmitter and flow measurement values are not shown on the display.

4.4.4 The K-Value menu

Each fan and measuring probe has a specific K-value. You can select the K-value in the *K-VALUE* menu. See the manufacturer specification for the correct value. The available value range is 0.001...9999.999.

See the following table for the equations used in the flow calculations and the typical K-values according to the fan manufacturer.

Manufacturer menu selection	Equation	Equation unit	Typical K-value range
Fläkt Woods	$q = \frac{1}{k}\sqrt{\Delta P}$	m^3/s	0.3...99

Manufacturer menu selection	Equation	Equation unit	Typical K-value range
Rosenberg	$q = k\sqrt{\frac{2\Delta P}{\rho}}$	m^3/h	37...800
Nicotra-Gebh	$q = k\sqrt{\frac{2\Delta P}{\rho}}$	m^3/h	50...4700
Comefri	$q = k\sqrt{\frac{2\Delta P}{\rho}}$	m^3/h	10...2000
Ziehl	$q = k\sqrt{\Delta P}$	m^3/h	10...1500
Ebm-Papst	$q = k\sqrt{\Delta P}$	m^3/h	10...1500
Gebhardt	$q = k\sqrt{\frac{2\Delta P}{\rho}}$	m^3/h	50...4700
Nicotra	$q = k\sqrt{\Delta P}$	m^3/h	50...5300
Common probe	$q = k\sqrt{\Delta P}$	Selectable, m^3/h as the default	0.001...9999.999

q airflow

k K-value

ΔP differential pressure

ρ air density

4.4.5 The Press. unit menu

You can select the pressure unit for the display in this menu. You can also hide pressure measurement from the display.

Note: Pascal (Pa) is the base unit for measurement. You can select some other unit to show on the display. The values for these other units are converted from pascals.

Name	Values	Default	Description
Press. unit	*Pa / kPa / none / psi / mbar / "WC / mmWC*	*Pa*	Measurement unit shown on the display. If you select *none*, pressure is not shown on the display.

4.4.6 The Press. range menu

You can select the pressure measurement range in this menu.

Name	Values	Default	Description
Press. range	*±120 / ±240 / ±620 / ±1240 / ±2490 Pa*	*±120 Pa*	Pressure measurement range. For best measurement accuracy, select the smallest measurement range you can use in your application.

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4.4.7 The Flow unit menu

You can select the airflow unit for the display in this menu. You can also hide the airflow measurement from the display.

Name	Values	Default	Description
Flow unit	*m3/s, m3/h, cfm, l/s, m/s, f/min, none*	*m3/s*	Measurement unit shown on the display. If you select *none*, airflow is not shown on the display. Airflow volume units: *m3/s, m3/h, cfm, l/s* Air velocity units: *m/s, ft/min*.

If you selected *Common probe* in the *MANUFACTURER* menu, the flow unit shown in this menu by default is the same unit you selected in the *FORMULA UNIT* menu.

4.4.8 The Response time menu

You can select the measurement response time in the *Response time* menu. Response time is the time it takes for the output signal to reach 63 % of the final value after a change in differential pressure. This time period is also known as T_{63}.

Name	Values	Default	Description
Response time	0.4 s, 1...20 s	*4 s*	Measurement response time in seconds.

4.4.9 The Address menu

You can select the Modbus address in the *Address* menu.

Name	Values	Default	Description
Address	1...247	1	Modbus address for the device.

4.4.10 The Baud rate menu

You can select the Modbus speed in the *Baud rate* menu.

Name	Values	Default	Description
Baud rate	*9600 / 19200 / 38400*	*9600*	Modbus speed (bits/s).

4.4.11 The Parity bit menu

You can select the Modbus parity in the *Parity bit* menu.

Name	Values	Default	Description
Parity bit	*none / odd / even*	*none*	Bus parity.

4.4.12 The Exit menu view

Navigate to the *EXIT MENU* view and press the *SELECT* button to save the settings and exit the menu.

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5 Maintenance

5.1 Automatic zeroing

These transmitters have an automatic zeroing function, which adjusts the transmitter zero point every 10 minutes. Automatic zeroing removes output signal drift that can occur due to thermal, electronic or mechanical effects. As a result, it is not necessary to calibrate the transmitter zero point manually.

The zeroing process takes approximately 5 seconds. During the zeroing process, the output and display values are locked to the latest measured value to avoid conflict with the building management system. A red indicator light comes on when zeroing starts. When the zeroing process is completed, the device returns to its normal measuring mode.

5.2 Manual zeroing

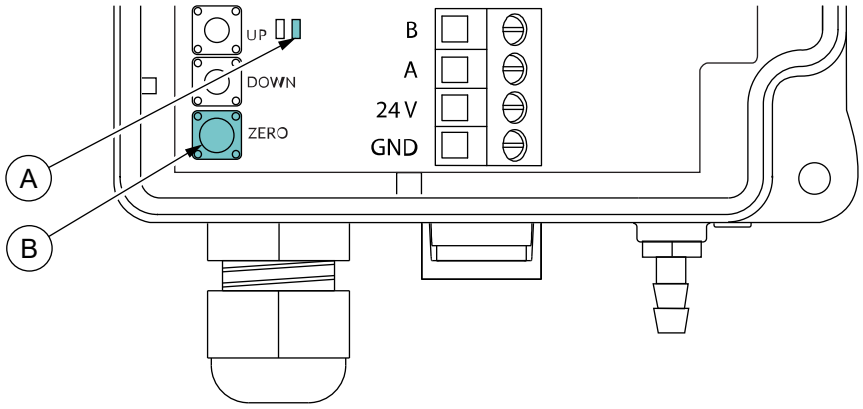
You can reset the zero point manually by using the *ZERO* button on the circuit board. You can also reset the zero point via Modbus communication. If you reset the zero point via Modbus communication, make sure that there is no pressure in the pressure measurement hoses during zeroing.

Note: Supply power must be on for one hour before zeroing.

1. Disconnect both pressure measurement hoses from the device.
2. Open the cover.

   CAUTION: Be very careful if you touch the device when the power supply is connected and the cover is removed.
3. Push the zeroing button until the red indicator light comes on.

   Text *Zeroing...* appears on the display.



A. Indicator light
B. Zeroing button

4. Wait until the red indicator light goes off.
5. Connect the pressure measurement hoses to the device (+ high pressure, – low pressure). See section Connecting the pressure measurement hoses on page 7 for instructions.

6 Modbus

This device has an RS-485 connection for Modbus RTU communication.

Note: Modbus communication settings must be configured in the device menu before you can access the Modbus registers via the Modbus network.

6.1 Modbus properties

Protocol	RS-485 Modbus RTU
Bus speed	*9600/19200/38400 bit/s
Data bits	8
Parity	*none/odd/even
Stop bits	1
Modbus ID	*1
Unit load	1/8 UL
	* factory setting

Important: This device writes the Modbus register values to non-volatile memory unless otherwise specified in this document. The non-volatile memory durability is 100000 write cycles.

6.2 Modbus function codes

This device supports the following Modbus function codes.

Decimal	Hexadec-imal	Function
1	0x01	Read Coils
3	0x03	Read Holding Registers
4	0x04	Read Input Registers
5	0x05	Write Single Coil
6	0x06	Write Single Register
16	0x10	Write Multiple Registers

6.3 Modbus registers

Note: If you try to write a parameter value that is beyond the parameter value range, the value will be replaced by the nearest acceptable value.

6.3.1 Coils

Register	Parameter description	Data type	Values	Range	Default
0	Measurement zeroing	Bit	*0 - 1*	0. Off 1. On	0

6.3.2 Input registers

Register	Parameter description	Data type	Values	Range
0	Program version	S16	*0...9900*	0.00...99.00
1	Pressure measurement value (Pa)	S16	*-24900...24900**	±2490.0 Pa
2	Pressure measurement value (kPa)	S16	*-24900...24900**	±2.4900 kPa
3	Pressure measurement value (mbar)	S16	*-24900...24900**	±24.900 mbar
4	Pressure measurement value (mmWC)	S16	*-24900...24900**	±253.91 mmWC
5	Pressure measurement value ("WC)	S16	*-10000...10000**	±10.000 "WC
6	Pressure measurement value (psi)	S16	*-3610...3610**	±0.3611 psi
7	Airflow volume measurement value (m^3/s)	S16	*0...10000*	0...100 m^3/s
8	Airflow volume measurement value (m^3/h)	S16	*0...30000*	0...30000 m^3/h
9	Airflow volume measurement value (cfm)	S16	*0...30000*	0...30000 cfm
10	Airflow volume measurement value (l/s)	S16	*0...3000*	0...3000 l/s
11	Air velocity measurement value (m/s)	S16	*0...1000*	0...100 m/s
12	Air velocity measurement value (f/min)	S16	*0...5000*	0...5000 f/min

* Measurement values depend on the selected pressure measurement range. These values apply to the ±2490 Pa range.

6.3.3 Holding registers

Register	Parameter description	Data type	Values	Range	Default
0	Fan manufacturer	S16	*0 - 1 - 2 ... - 8*	0. Fläkt Woods 1. Rosenberg 2. Nicotra-Gebhardt 3. Comefri 4. Ziehl 5. Ebm-Papst 6. Gebhardt 7. Nicotra 8. Common probe	*8*
1	Formula unit	S16	*0 - 1 - 2 ... - 5*	0. m^3/s 1. m^3/h 2. cfm 3. l/s 4. m/s 5. f/min Value *none* is only available through the device menu.	*0*
2	K-value, integer part	S16	*0...9999*	0...9999	*1*
3	K-value, decimal part	S16	*0...999*	0...999	*0*

Register	Parameter description	Data type	Values	Range	Default
4	Response time	S16	*0 - 1 - 2 … - 20*	0. 0.4 s 1. 1 s 2. 2 s 3. 3 s 4. 4 s 5...20 s	*4*
5	Pressure measurement range	S16	*0...4*	0. ±120 Pa 1. ±240 Pa 2. ±620 Pa 3. ±1240 Pa 4. ±2490 Pa	*0*

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7 Disposal

This device is considered as electrical and electronic equipment for disposal in terms of the applicable European Directive. At the end of life, the product must enter the recycling system at an appropriate collection point.

- The device must be disposed through channels provided for this purpose.
- The disposal must be completed according to the local and currently applicable laws and regulations.

Generally all metals can be recycled as material. Plastics and cardboard packaging material can be used in energy recovery. Printed circuit boards need selective treatment according to IEC 62635 guidelines. To aid recycling, plastic parts are marked with an appropriate identification code. Contact your local Produal distributor for further information on environmental aspects and recycling instructions for professional recyclers.



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