INTRODUCTION

Thank you for choosing an HK Instruments DPT-IO-MOD series differential pressure transmitter. The DPT-IO-MOD differential pressure transmitter for air conforms to Modbus over serial line protocol, using RTU transmission mode and RS485 interface. The digital output signal is sent over Modbus enabling the DPT-IO-MOD to connect directly to a field communications network.

DPT-IO-MOD requires less wiring than traditional 3-wire transmitters, since multiple devices can be connected on serial line.

The DPT-IO-MOD includes an Input terminal that enables reading of multiple other signals such as temperature or control relays over Modbus. The Input terminal has two input channels designed to accept 0–10 V, NTC10k, Pt1000, Ni1000/(-LG), and BIN IN (potential free contact) signals. For example, DPT-IO-MOD can read values from one differential pressure measurement point and two temperature measurement points.

APPLICATIONS

DPT-IO-MOD series devices are commonly used in HVAC/R systems for:
- fan, blower and filter monitoring
- pressure and flow monitoring
- valve and damper control
- pressure monitoring in cleanrooms

⚠ WARNING

- READ THESE INSTRUCTIONS CAREFULLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THIS DEVICE.
- Failure to observe safety information and comply with instructions can result in PERSONAL INJURY, DEATH AND/OR PROPERTY DAMAGE.
- To avoid electrical shock or damage to equipment, disconnect power before installing or servicing and use only wiring with insulation rated for full device operating voltage.
- To avoid potential fire and/or explosion do not use in potentially flammable or explosive atmospheres.
- Retain these instructions for future reference.
- This product, when installed, will be part of an engineered system whose specifications and performance characteristics are not designed or controlled by HK Instruments. Review applications and national and local codes to assure that the installation will be functional and safe. Use only experienced and knowledgeable technicians to install this device.

SPECIFICATIONS

Performance
Accuracy (from applied pressure):
Model 2500:
  Pressure < 125 Pa = 1 % + ±2 Pa
  Pressure > 125 Pa = 1 % + ±1 Pa
Model 7000:
  Pressure < 125 Pa = 1.5 % + ±2 Pa
  Pressure > 125 Pa = 1.5 % + ±1 Pa
(Including: general accuracy, linearity, hysteresis, long term stability and repetition error)
Input accuracy:
<0,5%
Response time:
1...20 s selectable via menu
Overpressure:
Proof pressure: 25 kPa
Burst pressure: 30 kPa

Communication
Protocol: MODBUS over Serial Line
Transmission Mode: RTU
Interface: RS485
Byte format (11 bits) in RTU mode:
    Coding System: 8-bit binary
    Bits per Byte:
        1 start bit
        8 data bits, least significant bit sent first
        1 bit for parity
        1 stop bit
Baud rate: selectable in configuration
Modbus address: 1–247 addresses selectable in configuration menu

Zero point calibration options:
- Manual pushbutton autozero
- Via Modbus write coil

Technical Specifications
Media compatibility:
Dry air or non-aggressive gases
Measuring units:
Selectable via menu (Pa, mbar, inchWC, mmWC, psi)
Measuring element:
MEMS, no flow-through
Environment:
Operating temperature: -20...+50 °C
Temperature compensated range 0...+50 °C
Storage temperature: -40...+70 °C
Humidity: 0 to 95 % rH

Physical
Dimensions:
Case: 102.0 x 71.5 x 36.0 mm
Weight:
150 g, with accessories 290 g
Mounting:
2 each 4.3 mm screw holes, one slotted
Materials:
Case: ABS
Lid: PC
Pressure inlets: Brass
Duct connectors: ABS
Tubing: PVC
Protection standard:
IP54
Display:
2-line display (12 characters/line)
Line 1: active measurement
Line 2: units

Electrical Connections:
4+3 spring load terminals, max 1.5 mm²
Cable Entry: M20
Pressure fittings:
Male ø 5,0 mm and 6,3 mm

Electrical
Supply voltage:
24 VAC or VDC ± 10 %
Power consumption:
< 1.3 W
Output signal:
via Modbus
Input signals:
2 x input (0...10v, NTC10k, Pt1000, NI1000/(-LG), or BIN IN)

Conformance
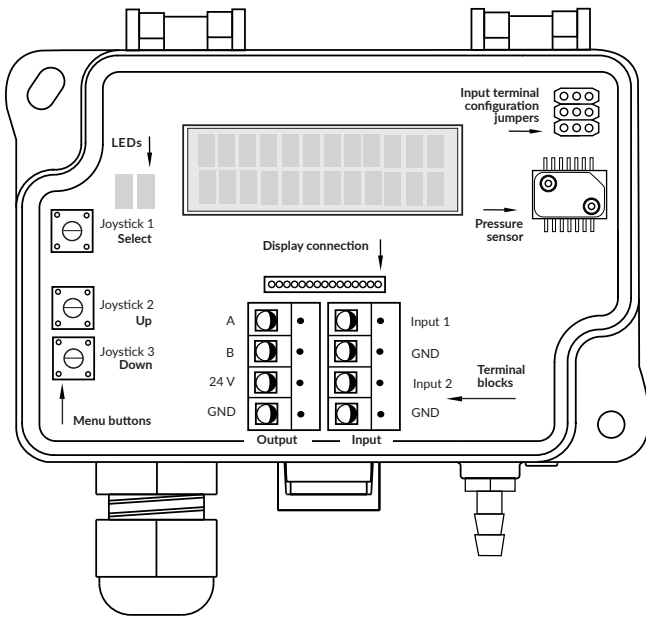Meets requirements for CE marking:
EMC directive 2014/30/EU
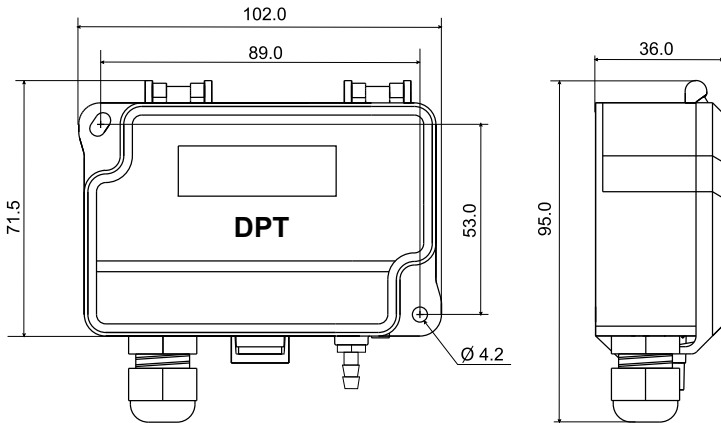RoHS Directive 2011/65/EU
WEEE Directive 2012/19/EU

COMPANY WITH MANAGEMENT SYSTEM CERTIFIED BY DNV GL = ISO 9001 = ISO 14001 =

CE

RoHS 2
2011/65/EU

SCHEMATICS

LEDs

Joystick 1 **Select**

Joystick 2 **Up**

Joystick 3 **Down**

Menu buttons

Input terminal configuration jumpers

Pressure sensor

Display connection

A
B
24 V
GND

Output

Input 1
GND
Input 2
GND

Input

Terminal blocks

DIMENSIONAL DRAWINGS

102.0
89.0
71.5
53.0
DPT
Ø 4.2

36.0
95.0

INSTALLATION

1) Mount the device in the desired location (see step 1).
2) Open the lid and route the cable through the strain relief and connect the wires to the terminal block(s) (see step 2).
3) The device is now ready for configuration.

⚠ WARNING! Apply power only after the device is properly wired.

STEP 1: MOUNTING THE DEVICE

1) Select the mounting location (duct, wall, panel).
2) Use the device as a template and mark the screw holes.
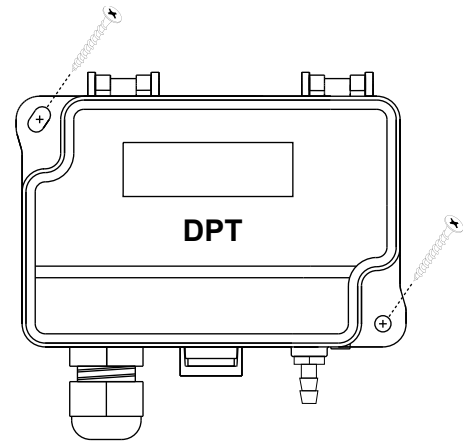3) Mount with appropriate screws.

Figure 1a - Surface mounting
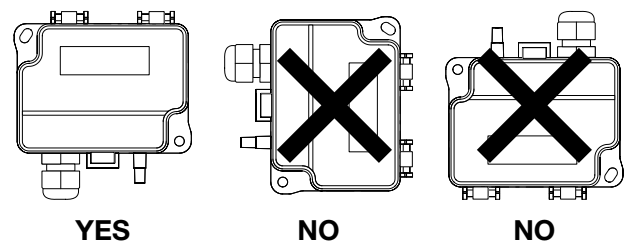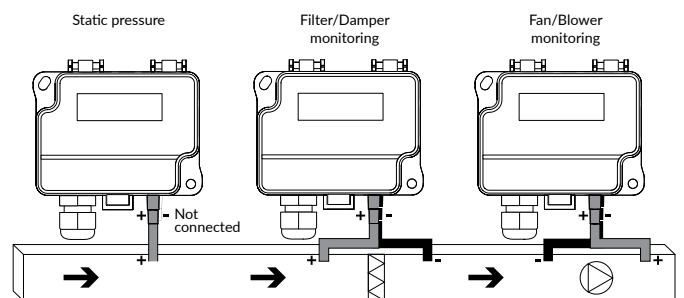
DPT

Figure 1b - Mounting orientation

YES   NO   NO

Figure 1c - Application connections

Static pressure

Filter/Damper monitoring

Fan/Blower monitoring
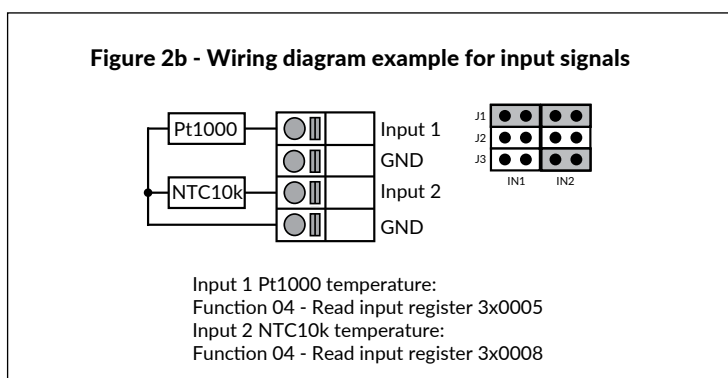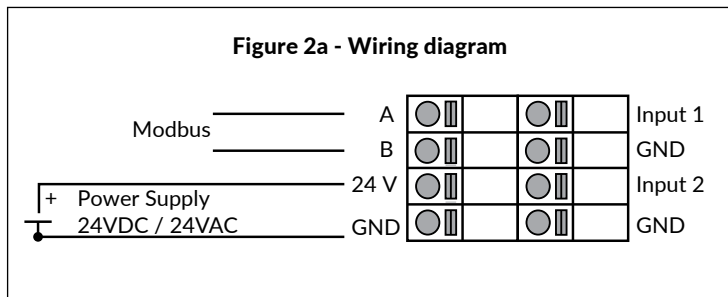
Not connected

STEP 2: WIRING DIAGRAMS

For CE compliance, a properly grounded shielding cable is required.
1) Unscrew the strain relief and route the cable(s).
2) Connect the wires as shown in figure 2a and 2b.
3) Tighten the strain relief.

Figure 2a - Wiring diagram

Modbus	A	Input 1
	B	GND
+ Power Supply	24 V	Input 2
24VDC / 24VAC	GND	GND

Figure 2b - Wiring diagram example for input signals

Pt1000 — Input 1
GND
NTC10k — Input 2
GND

J1 J2 J3 IN1 IN2

Input 1 Pt1000 temperature:
Function 04 - Read input register 3x0005
Input 2 NTC10k temperature:
Function 04 - Read input register 3x0008

STEP 3: CONFIGURATION

1) Activate the device Menu by pushing the the select button for 2 seconds.
2) Select the address for Modbus: 1...247

```
ADDRESS
   99
```
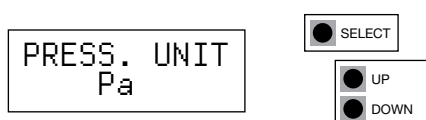● SELECT
● UP
● DOWN
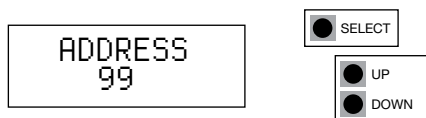
3) Select the baud rate: 9600/19200/38400.

```
BAUD RATE
  9600
```
● SELECT
● UP
● DOWN
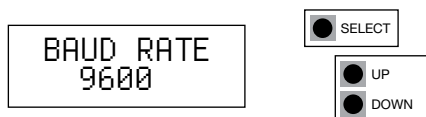
4) Select the parity bit: None/Even/Odd

```
PARITY BIT
  NONE
```
● SELECT
● UP
● DOWN

5) Select the pressure unit for display: Pa/inchWC/mmWC/psi/mbar

```
PRESS. UNIT
    Pa
```
● SELECT
● UP
● DOWN

CONFIGURATION CONTINUED

6) Select the response time: 1...20 s

```
RESPONSETIME
    20 s
```
● SELECT
● UP
● DOWN
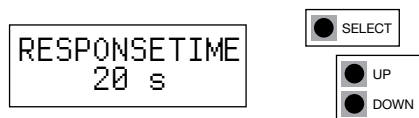
7) Push the select button to exit menu.

```
  SELECT
 EXIT MENU
```
● SELECT

STEP 4: ZERO POINT ADJUSTMENT

NOTE! Always zero the device before use.

Supply voltage must be connected one hour before the zero point adjustment is carried out. Access via Modbus or by push button.

1) Loose both tubes from the pressure inlets + and -.
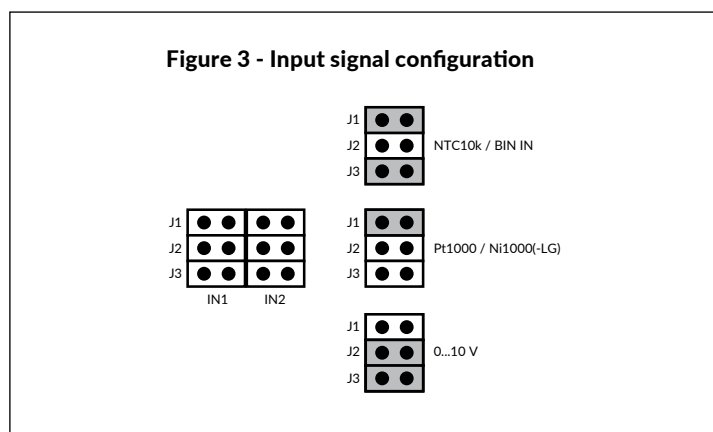2) Press the select button briefly. ● SELECT

3) Wait until the LED turns off and then install tubes again for the pressure inlets.

STEP 5: INPUT SIGNAL CONFIGURATION

Input signals can be read over Modbus via DPT MOD RS485 interface.

Signals	Accuracy for measurement	Resolution
0...10 V	< 0,5 %	0,1 %
NTC10k	< 0,5 %	0,1 %
Pt1000	< 0,5 %	0,1 %
Ni1000/(-LG)	< 0,5 %	0,1 %
BIN IN (potential free contact)		

The jumpers should be set according to the instructions below and the value should be read from the right register. Both inputs can be configured independently.

Figure 3 - Input signal configuration

J1 J2 J3 — NTC10k / BIN IN

J1 J2 J3 IN1 IN2 | J1 J2 J3 — Pt1000 / Ni1000(-LG)

J1 J2 J3 — 0...10 V

STEP 6: MODBUS REGISTERS

Function 04 - Read input register

Register	Parameter description	Data Type	Value	Range
3x0001	Program version	16 bit	0...1000	0,00...99,00
3x0002	Pressure reading	16 bit	-250...2500/7000	-250...2500/7000 (Pa)
3x0004	Input 1: 0...10 V	16 bit	0...1000	0...100 %
3x0005	Input 1: Pt1000	16 bit	-500...500	-50...+50 °C
3x0006	Input 1: Ni1000	16 bit	-500...500	-50...+50 °C
3x0007	Input 1: Ni1000-LG	16 bit	-500...500	-50...+50 °C
3x0008	Input 1: NTC10k	16 bit	-500...500	-50...+50 °C
3x0009	Input 2: 0...10 V	16 bit	0...1000	0...100 %
3x0010	Input 2: Pt1000	16 bit	-500...500	-50...+50 °C
3x0011	Input 2: Ni1000	16 bit	-500...500	-50...+50 °C
3x0012	Input 2: Ni1000-LG	16 bit	-500...500	-50...+50 °C
3x0013	Input 2: NTC10k	16 bit	-500...500	-50...+50 °C

Function code 02 - Read input status

Register	Parameter description	Data Type	Value	Range
1x0001	Input 1: BIN IN	Bit 0	0...1	On - Off
1x0002	Input 2: BIN IN	Bit 0	0...1	On - Off

Function 05 - Write single coil

Register	Parameter description	Data Type	Value	Range
0x0001	Zeroing function	Bit 0	0...1	On - Off

Function code 06 - Write single register

Register	Parameter description	Data Type	Value	Range
4x0001	Beta value of NTC thermistor	16 bit	0...30000	1...30000 (Default: 4220)

RECYCLING/DISPOSAL

The parts left over from installation should be recycled according to your local instructions. Decommissioned devices should be taken to a recycling site that specializes in electronic waste.

WARRANTY POLICY

The seller is obligated to provide a warranty of five years for the delivered goods regarding material and manufacturing. The warranty period is considered to start on the delivery date of the product. If a defect in raw materials or a production flaw is found, the seller is obligated, when the product is sent to the seller without delay or before expiration of the warranty, to amend the mistake at his/her discretion either by repairing the defective product or by delivering free of charge to the buyer a new flawless product and sending it to the buyer. Delivery costs for the repair under warranty will be paid by the buyer and the return costs by the seller. The warranty does not comprise damages caused by accident, lightning, flood or other natural phenomenon, normal wear and tear, improper or careless handling, abnormal use, overloading, improper storage, incorrect care or reconstruction, or changes and installation work not done by the seller or his/her authorized representative. The selection of materials for devices prone to corrosion is the buyer's responsibility, unless otherwise is legally agreed upon. Should the manufacturer alter the structure of the device, the seller is not obligated to make comparable changes to devices already purchased. Appealing for warranty requires that the buyer has correctly fulfilled his/her duties arisen from the delivery and stated in the contract. The seller will give a new warranty for goods that have been replaced or repaired within the warranty, however only to the expiration of the original product's warranty time. The warranty includes the repair of a defective part or device, or if needed, a new part or device, but not installation or exchange costs. Under no circumstance is the seller liable for damages compensation for indirect damage.