## INTRODUCTION

Thank you for choosing an HK Instruments DPT-Dual-MOD-AHU series differential pressure transmitter. DPT-Dual-MOD-AHU is especially designed for air handling units, combining two differential pressure transmitters into one device. It offers a possibility to measure pressure from two different points. One of the measurements can be set to show the air flow rate. DPT-Dual-MOD-AHU has a Modbus interface and an Input terminal.

The Input terminal 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.

## APPLICATIONS

DPT-Dual-MOD-AHU series devices are commonly used in HVAC/R systems for:
• air flow monitoring across centrifugal fans and blowers
• in-duct air flow monitoring
• VAV applications
• 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):**
Sensor A (-700...7000 Pa):
    Pressure < 125 Pa = 1.5 % + ±2 Pa
    Pressure > 125 Pa = 1.5 % + ±1 Pa
Sensor B (-250...2500 Pa):
    Pressure < 125 Pa = 1 % + ±2 Pa
    Pressure > 125 Pa = 1 % + ±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
• Via Modbus write coil

### Technical Specifications
**Media compatibility:**
Dry air or non-aggressive gases
**Measuring units on display (Selectable via menu):**
Pressure: Pa, kPa, mbar, inchWC, mmWC, psi
Flow: $m^3/s$, $m^3/hr$, cfm, l/s, m/s, ft/min
**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, non-condensing

### Physical
**Dimensions:**
Case: 102.0 x 71.5 x 36.0 mm
**Weight:**
150 g
**Mounting:**
2 each 4.3 mm screw holes, one slotted
**Materials:**
Case: ABS
Lid: PC
Pressure inlets: Brass
Tubing: Silicone
**Protection standard:**
IP54
**Display:**
2-line display (12 characters/line)
Line 1: active measurement, inlet A
Line 2: active measurement, inlet B
If inputs are selected, the lines show also input information (for example temperature)

**Electrical Connections:**
4+4 spring load terminals, max 1.5 $mm^2$
Cable Entry: M20
**Pressure fittings:**
Male ⌀ 5.2 mm
+ High pressure
- Low pressure

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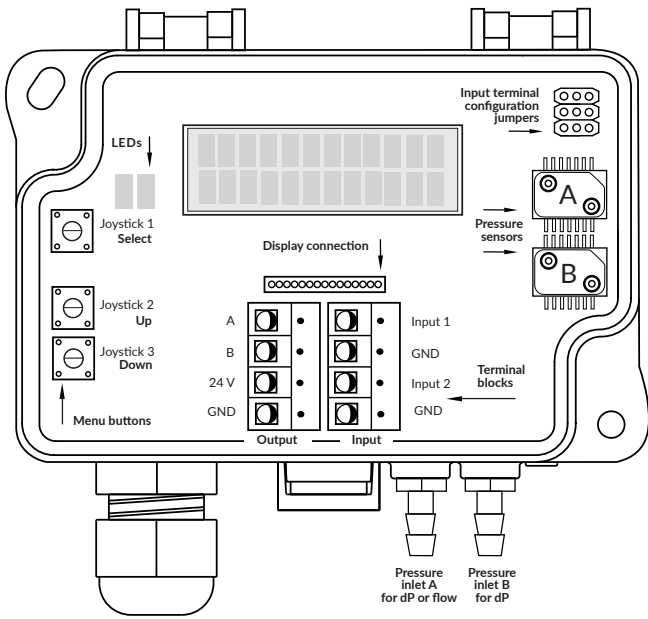2 x input (0...10 V, NTC10k, Pt1000, NI1000/(-LG), or BIN IN)

### Conformance
Meets requirements for:

|  | CE: | UKCA: |
|---|---|---|
| EMC: | 2014/30/EU | S.I. 2016/1091 |
| RoHS: | 2011/65/EU | S.I. 2012/3032 |
| WEEE: | 2012/19/EU | S.I. 2013/3113 |

COMPANY WITH MANAGEMENT SYSTEM CERTIFIED BY DNV
ISO 9001 · ISO 14001

UKCA  C€  RoHS COMPLIANT

# SCHEMATICS



- LEDs
- Joystick 1 **Select**
- Joystick 2 **Up**
- Joystick 3 **Down**
- Menu buttons
- Display connection
- Input terminal configuration jumpers
- Pressure sensors
- A
- B
- Terminal blocks
- Output: A, B, 24 V, GND
- Input: Input 1, GND, Input 2, GND
- Pressure inlet A for dP or flow
- Pressure inlet B for dP

# DIMENSIONAL DRAWINGS



102.0
89.0
36.0
71.5
53.0
95.0
DPT
Ø 4.2
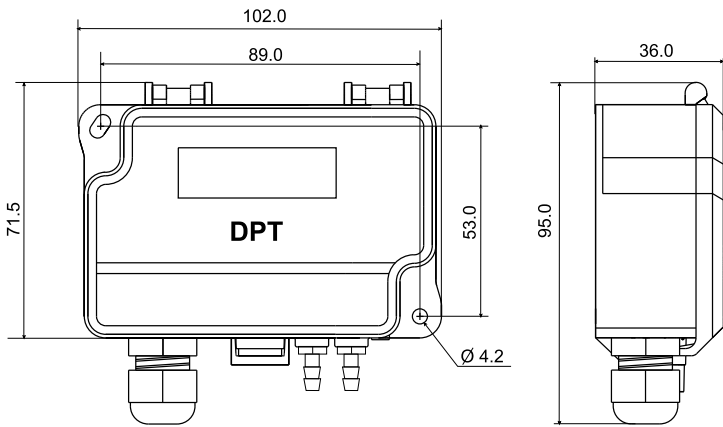
# INSTALLATION

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.

# MOUNTING THE DEVICE CONTINUED



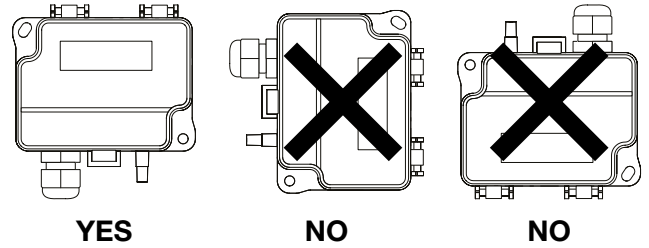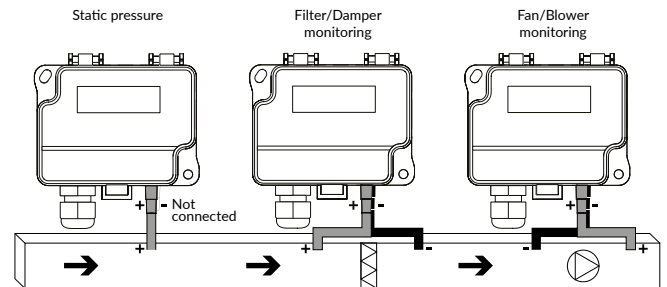**Figure 1a - Mounting orientation**

YES     NO     NO



**Figure 1b - Application connections**

**Pressure**

Static pressure     Filter/Damper monitoring     Fan/Blower monitoring

- Not connected

**Flow**

The pressure tubes are connected to a flow measurement probe (i.e. FloXact), or to the measurement ports specified by the fan manufacturer. Please see the FloXact installation guide or the fan manufacturer's technical specifications for more information.

**Air handling unit**

In a typical Air Handling Unit application, connect the pressure inlet A to measure air flow and pressure inlet B to measure the differential pressure across the filter.
Pressure inlet A can be used for pressure or flow measurement.
Pressure inlet B can be used only for pressure measurement.

# 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.
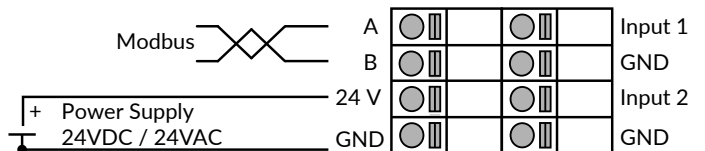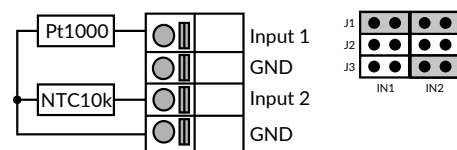3) Tighten the strain relief.



**Figure 2a - Wiring diagram**

Modbus — A, B
Power Supply 24VDC / 24VAC — 24 V, GND
Input 1, GND, Input 2, 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 3x0013
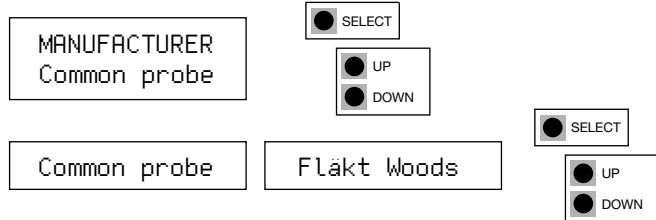
## STEP 3: CONFIGURATION

1) Activate the device Menu by pushing the the select button for 1 second.

2) Select the functioning mode of the device:
- Select *Manufacturer* when connecting DPT-Dual-MOD-AHU to a fan with pressure measurement points
- Select *Common probe* when using DPT-Dual-MOD-AHU with a common measurement probe that follows the formula:
$q = k \cdot \sqrt{\Delta P}$ (i.e. FloXact)

```
MANUFACTURER
Common probe
```
● SELECT
● UP
● DOWN

```
Common probe
```    ```
Fläkt Woods
```
● SELECT
● UP
● DOWN

3) If *common probe* is selected, select measurement unit used in the formula: m3/s, m3/h, cfm, l/s, m/s or f/min.

Note: When using the FloXact probe, select the formula unit l/s. For other probe models, check the manufacturer's datasheet for the correct unit.

```
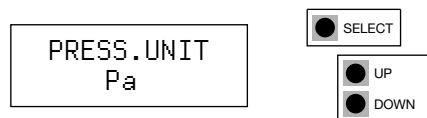FORMULA UNIT
l/s
```
● SELECT
● UP
● DOWN
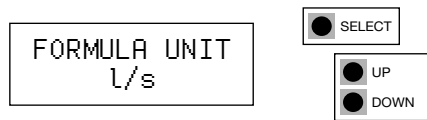
4) Select K-value
Each application has a specific K-value. Select the K-value from the manufacturer's specifications.
Available K-value range: 0.001...9999.000

```
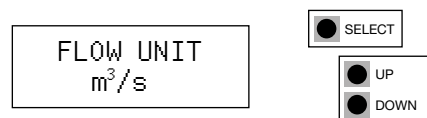K-VALUE
9000.000
```
● SELECT
● UP
● DOWN

5) Select pressure unit for display:
Pa, kPa, mbar, mmWC, inWC or psi

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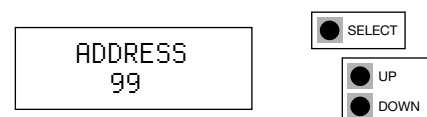PRESS.UNIT
Pa
```
● SELECT
● UP
● DOWN

6) Select flow unit for display:
Flow volume: $m^3/s$, $m^3/h$, cfm, l/s
Velocity: m/s, f/min (selectable only if a common probe is used with m/s or f/min unit)

```
FLOW UNIT
m³/s
```
● SELECT
● UP
● DOWN

7) Select the address for Modbus: 1*...247.

```
ADDRESS
99
```
● SELECT
● UP
● DOWN

## CONFIGURATION CONTINUED

8) Select the baud rate: 9600*/19200/38400.

```
BAUD RATE
9600
```
● SELECT
● UP
● DOWN

9) Select the parity bit: None*/Even/Odd.

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

10) Select the response time: 1...20 s (factory setup 4 s)

```
RESPONSETIME
20 s
```
● SELECT
● UP
● DOWN
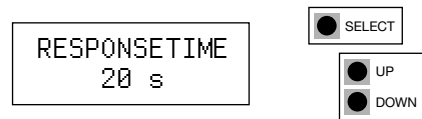
11) Select the the type of sensor for input 1:
NTC10k, Ni1000-LG, Ni1000, Pt1000, VINPUT (voltage 0–10 V), none

```
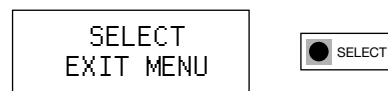SENSOR 1
NTC10K
```
● SELECT
● UP
● DOWN
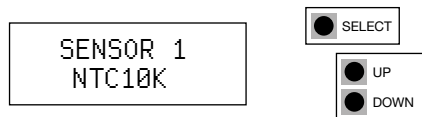
12) Select the the type of sensor for input 2:
NTC10k, Ni1000-LG, Ni1000, Pt1000, VINPUT (voltage 0–10 V), none

```
SENSOR 2
NONE
```
● SELECT
● UP
● DOWN
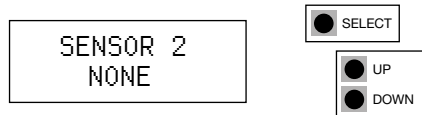
13) Push the select button to save settings and exit menu.

```
SELECT
EXIT MENU
```
● SELECT

* Factory setup

## 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 pushbutton.

1) Loose both tubes from the pressure inlets + and -.
2) Press the select button for 1 sec to enter the menu and select *zero sensors*.
● 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
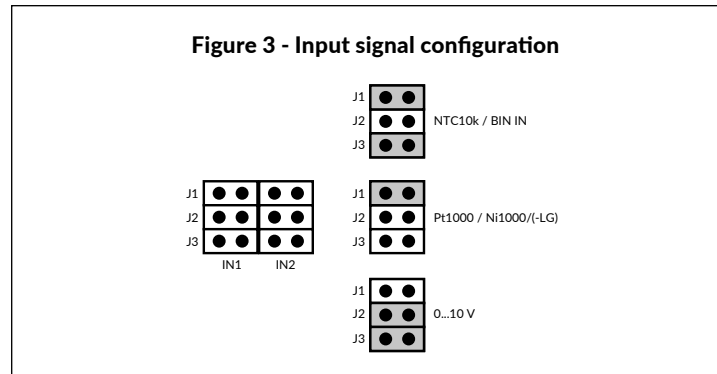
# STEP 6: MODBUS REGISTERS

Function code 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 A | 16 bit | -700...7000 | -700...7000 (Pa) |
| 3x0003 | Pressure reading B | 16 bit | -250...2500 | -250...2500 (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 |
| 3x0014 | Flow m3/s | 16 bit | 0...10000 | 0...100 m3/s |
| 3x0015 | Flow m3/h | 16 bit | 0...30000 | 0...30000 m3/h |
| 3x0016 | Flow cfm | 16 bit | 0...30000 | 0...30000 cfm |
| 3x0017 | Flow l/s | 16 bit | 0...3000 | 0...3000 l/s |
| 3x0018 | Velocity m/s | 16 bit | 0...1000 | 0... 100 m/s |
| 3x0019 | Velocity f/min | 16 bit | 0...5000 | 0...5000 f/min |

Function code 03 - Read input holding register

| Register | Parameter description | Data Type | Value | Range |
|---|---|---|---|---|
| 4x0001 | Manufacturer | 16 bit | 0...8 | 0=Fläkt Woods, 1=Rosenberg, 2=Nicotra-Gebhardt, 3=Comefri, 4=Ziehl, 5=ebm-papst 6=Gebhardt, 7=Nicotra, 8=Common probe |
| 4x0002 | Formula unit (Manufacturer=8) | 16 bit | 0...5 | 0=m3/s, 1=f/min, 2=m/s, 3=l/s, 4=cfm, 5=m3/h |
| 4x0003 | K-Factor Integer | 16 bit | 0...9999 | 0...9999 |
| 4x0004 | K-Factor Decimal | 16 bit | 0...999 | 0...999 |
| 4x0005 | Response Time | 16 bit | 0...20 | 0...20 s |

Function code 02 - Read input status

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

Function 05 - Write single coil

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

Function code 06 - Write single register

| Register | Parameter description | Data Type | Value | Range |
|---|---|---|---|---|
| 4x0001 | Manufacturer | 16 bit | 0...8 | 0=Fläkt Woods, 1=Rosenberg, 2=Nicotra-Gebhardt, 3=Comefri, 4=Ziehl, 5=ebm-papst 6=Gebhardt, 7=Nicotra, 8=Common probe |
| 4x0002 | Formula unit (Manufacturer=8) | 16 bit | 0...5 | 0=m3/s, 1=f/min, 2=m/s, 3=l/s, 4=cfm, 5=m3/h |
| 4x0003 | K-Factor Integer | 16 bit | 0...9999 | 0...9999 |
| 4x0004 | K-Factor Decimal | 16 bit | 0...999 | 0...999 |
| 4x0005 | Response Time | 16 bit | 0...20 | 0...20 s |

# 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.
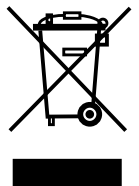
# WARRANTY POLICY

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. 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.