Installation and Operation Manual

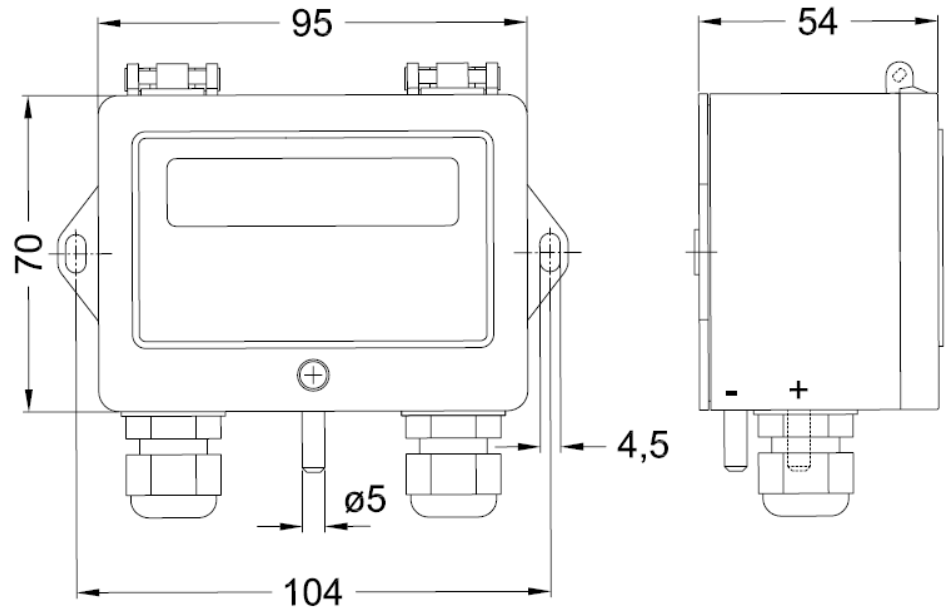
ebmpapst
The engineer's choice

Static pressure transducer with controller

- Differential static pressure transducer with analog output and optional PI control mode
- Large diaphragm element with differential transformer
- Transducer choice of five pressure ranges
- Simple setup and operation completely without external communication devices
- Clear text LCD-display, two push button switches, and one magnetically activated switch.
- Selectable parameters: Differential pressure or volume flow
- Metric or imperial units selectable
- Control mode with PI algorithm and measurement mode selectable
- Two adjustable set points
- Analog output 0...10 V dc
- Upper output voltage limit is adjustable
- Supply 10...30 V dc or 24 V ac (+/-15%)
- Compact plastic housing according to IP 54 and flammability rating UL 94 HB
- RoHS Directive 2011/65/EU compliant

ebm-papst Inc. part number
HX0C-000-00-001
HX0C-000-00-002
HX0C-000-00-003
HX0C-000-00-005
HX0C-000-00-004

Dimensions (mm)



Safety instructions

Attention! Study these instructions carefully, before you connect this item. Only qualified technicians familiar with installation, construction and operation of the equipment shall work around this item.

Applications

This *static pressure transducer with controller* measures low pressure differentials of dry air and inert gases and it provides optional control. Its output signal depends on the operating mode:

- For pressure measuring mode the device puts out 0-10 Vdc proportional to the applied pressure differential.
- For air volume measuring mode in combination with an instrumented fan inlet ring, the controller internally performs a square root calculation. Its 0 - 10 Vdc output is proportional to the calculated air volume flow according to

$$\dot{V} = k \times \sqrt{\Delta p_w}$$

- In closed-loop control mode the device puts out a PI control signal for a self-regulating air system.

This *static pressure transducer with controller* is primarily intended for air conditioning systems, room pressure control, and filter control with continuously variable speed fans.

Description

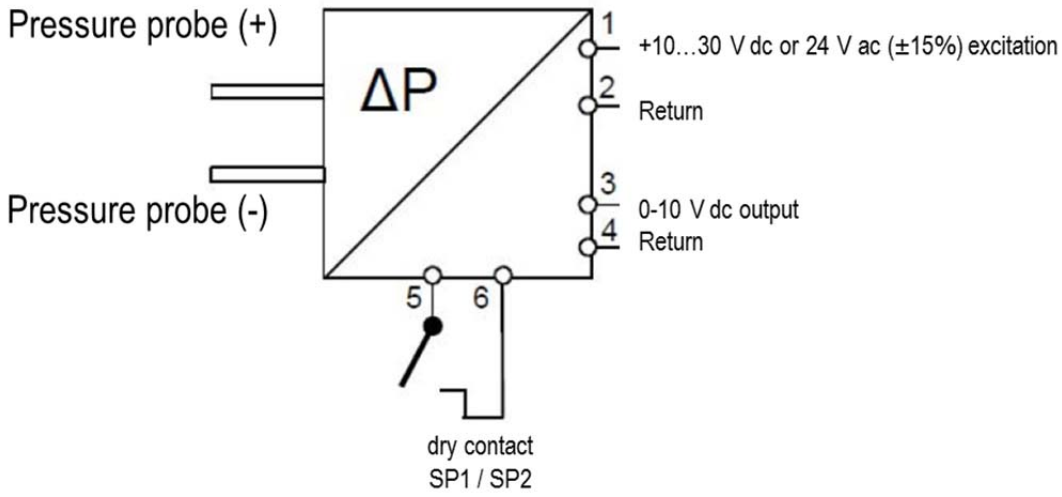
A differential pressure applied to the pressure ports (+) and ( ) displaces a silicone diaphragm against a measuring spring. A differential transformer and suitable electronics convert this displacement into a continuously variable output voltage signal. The large diaphragm mechanism keeps measurement value fluctuations to a minimum.

The *static pressure transducer with controller* combines several functions:

1. Measuring mode options:
    a. The LCD display indicates the differential pressure and physical unit (Pa or in. wg), and a proportional 0–10 V signal is available at terminal #3.
    b. The LCD display indicates the calculated volume flow and physical unit (m^3/h or cfm) and a proportional 0–10 V signal is available at terminal #3.
2. Control mode options:
    The integrated controller accepts two adjustable set points that can be switched with a potential free contact connected to terminals #5+#6. The function of the controller is to reach and maintain the activated set point.
    The controller continuously compares the measured differential pressure against the activated set point, performs a PI control calculation, and accordingly puts out a 0 – 10Vdc control signal. This signal is directly suitable to control a fan motor.
    The upper limit of the PI control signal output is adjustable.
    The adjustable proportional (P) gain and integral (I) gain permit tuning of the control loop.

Electrical connections

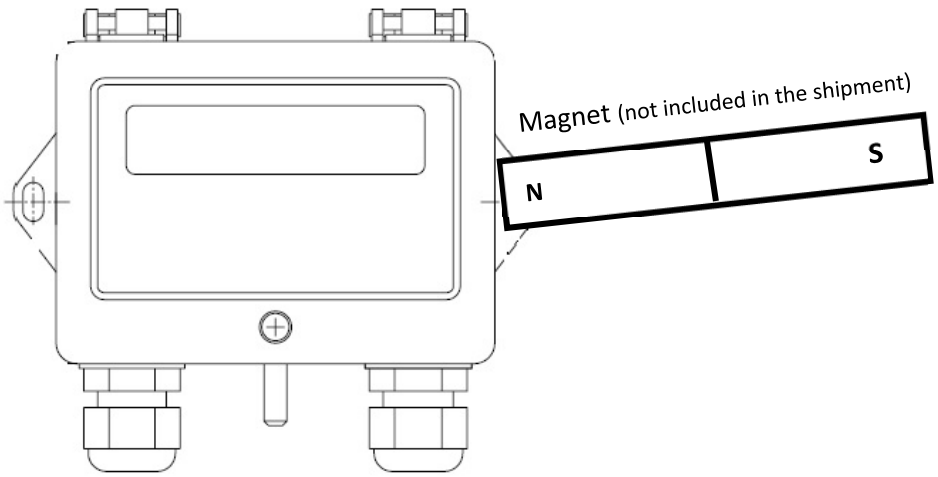
Six electrical screw terminals and two push button switches are located behind the front cover.



Offset:

Gravity affects the diaphragm and consequently the pressure measurement value.

A brief touch of the housing with a magnet-tipped screw driver at the marked location permits activation of a Reed switch in the control electronics from the outside. With the transducer in its final mounting orientation but no pressure probes connected this process adjusts the gravity effect to zero. The controller will display for a short time that the offset has been zeroed and saved.



Mounting

This *static pressure transducer with controller* is designed for wall mounting vertically.
Its mounting orientation affects the measurements.
The pressure ports accommodate plastic tubing with 5 mm and 6 mm inner diameter.

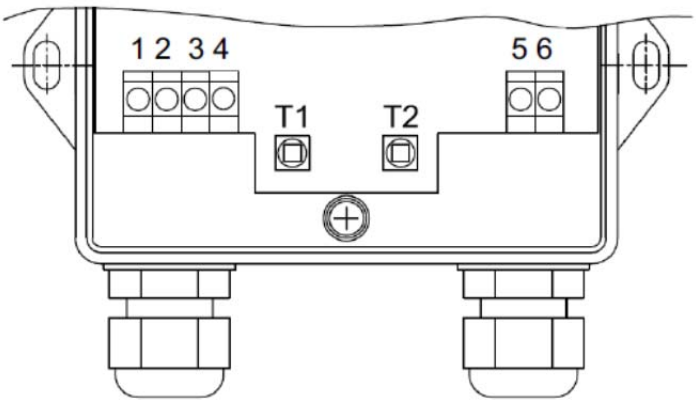
Operation

Start up:

Mount the device vertically.
Establish all electrical connections in accordance with this manual.
Use a regulated supply voltage.
Zero the offset.
Connect pressure tubing.

Factory default settings:

Operating mode:	measuring mode
Zero point:	adjusted to measuring range
End point:	adjusted to measuring range
Set point 1:	about 75% of the measuring range
Set point 2:	about 25% of the measuring range
Max. voltage:	10.0 Vdc output
P gain:	50
I gain:	3.15
K factor:	70
Control mode	positive / heating



T1 push button switch 1
T2 push button switch 2

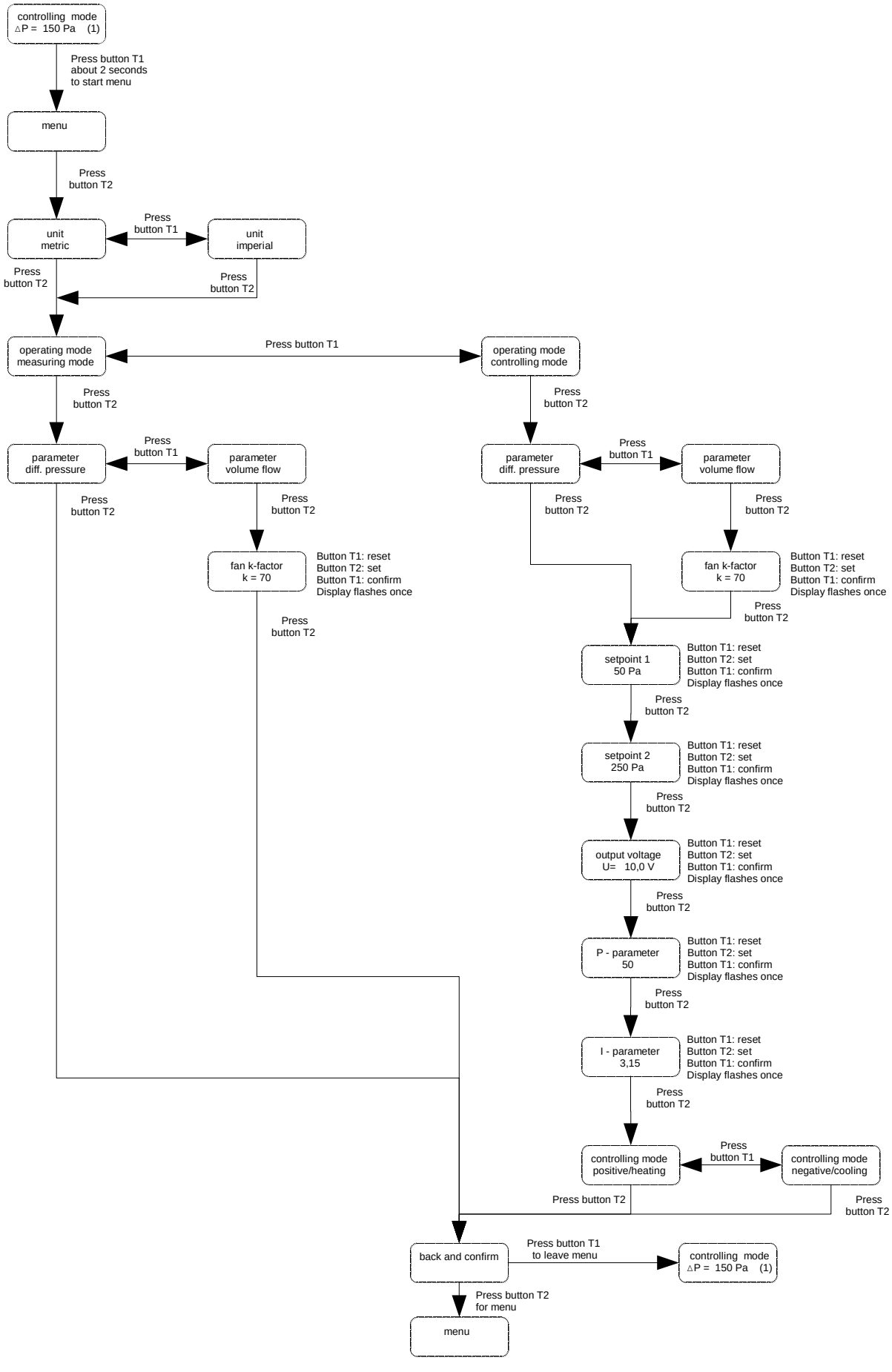
Commissioning:

Available units	Accept and display metric or IP units.
Operation mode selections	Control mode or measuring mode
Parameter selections	Either differential pressure (Pa or in. wg) or volume flow (m^3/h or cfm)
K factor	$\dot{V} = k \times \sqrt{\Delta p_w}$ $\dot{V} =$ calculated volume flow in m^3/h or cfm $k =$ adjustable constant according to venturi manufacturer data sheet $p_w =$ measured nozzle pressure
Set point selections	SP1 and SP2 (e.g. high/low, summer/winter, day/night)
Set point range	Adjustable pressure from 0% to 100% of the sensor range Adjustable volume flow from 5% to100% of corresponding range
Output voltage limit	Adjustable maximum from 0 to 10 Vdc
P gain range	0…1000
I gain range	0…100
Control mode selections	Positive/heating Control deviation equals set point minus actual value. The output increases when the set point is greater than the actual value. or Negative/cooling Control deviation equals actual value minus set point. The output increases when the actual value is greater than the set point.

Technical data

ebm-papst Inc. part number	static pressure span (sensor range) in. wg	static pressure span (sensor range) Pascal	maximum k factor
HX0C-000-00-002	0-0.2	0-50	1000
HX0C-000-00-001	0-2.0	0-500	1000
HX0C-000-00-003	0-4.0	0-1000	1000
HX0C-000-00-005	0-8.0	0-2000	700
HX0C-000-00-004	0-16	0-4000	500

Media	Air and non-aggressive gases
Measuring principle	Silicon diaphragm with spring and differential transformer
Overpressure protection	80 in. wg (0.2 bar)
Static pressure maximum	80 in. wg (0.2 bar)
Pressure ports	Suitable for 5 – 6 mm tubes
Materials	Polyamide case, ABS cover UL 94 HB
Supply voltage	10...30 Vdc or 24 Vac ± 15 %) Reverse polarity protected
Current consumption	~10 mA @ 10Vdc; ~12 mA @ 24 Vdc
Output	0...10 Vdc
Display	LCD, 2x16 characters
Modes	Measuring mode or controlling mode
Control	PI algorithm
Set points	2 set points, push button adjusted
Set point selection	Dry contact
Protection class	IP 54 according EN 60529
Ambient temperature	14 F ...122 F (-10...+50 °C)
Storage temperature	-13 F ...140 F (-25...+60 °C)
Weight	Approx. 0.5 LBS (250 g)
Mounting orientation	Vertical, position dependence by turning of 90°: approx. 25 Pa
Interference emission	CE compliant per EN 50081-2, EN 50082-2
Influences limits	
Zero error	± 0.75 %
Sum of linearity and hysteresis	± 0.5 % ... ± 1 % (depends on measuring range)
Temperature drift, zero point	± 0.17 % / 10 F (± 0,3 % / 10 K)
Temperature drift, span	± 0.11 % / 10 F (± 0,2 % / 10 K)


controlling mode
ΔP = 150 Pa (1)
Press button T1
about 2 seconds
to start menu
menu
Press
button T2
unit
metric
Press
button T1
unit
imperial
Press
button T2
Press
button T2
operating mode
measuring mode
Press button T1
operating mode
controlling mode
Press
button T2
Press
button T2
parameter
diff. pressure
Press
button T1
parameter
volume flow
parameter
diff. pressure
Press
button T1
parameter
volume flow
Press
button T2
Press
button T2
Press
button T2
Press
button T2
fan k-factor
k = 70
Button T1: reset
Button T2: set
Button T1: confirm
Display flashes once
fan k-factor
k = 70
Button T1: reset
Button T2: set
Button T1: confirm
Display flashes once
Press
button T2
Press
button T2
setpoint 1
50 Pa
Button T1: reset
Button T2: set
Button T1: confirm
Display flashes once
Press
button T2
setpoint 2
250 Pa
Button T1: reset
Button T2: set
Button T1: confirm
Display flashes once
Press
button T2
output voltage
U= 10,0 V
Button T1: reset
Button T2: set
Button T1: confirm
Display flashes once
Press
button T2
P - parameter
50
Button T1: reset
Button T2: set
Button T1: confirm
Display flashes once
Press
button T2
I - parameter
3,15
Button T1: reset
Button T2: set
Button T1: confirm
Display flashes once
Press
button T2
controlling mode
positive/heating
Press
button T1
controlling mode
negative/cooling
Press button T2
Press
button T2
back and confirm
Press button T1
to leave menu
controlling mode
ΔP = 150 Pa (1)
Press button T2
for menu
menu