VAISALA

OPERATING MANUAL

PTB100 SERIES

Analogue barometers

Edition U157en-1.2

Date February 1997

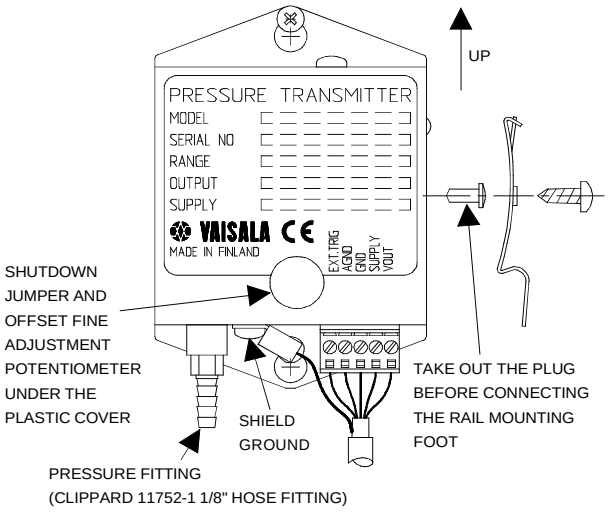
1 PRODUCT DESCRIPTION

The PTB100 series analogue barometers feature the BAROCAP silicon capacitive absolute pressure sensor developed by Vaisala. The BAROCAP sensor has been especially designed for accurate and stable measurement of barometric pressure. The PTB100 series barometers have 0...5 VDC output and they can be used in either three or four wire connection. Shutdown mode is jumper selectable. With the shutdown mode enabled the barometers can be turned on/off by using an external TTL level trigger.

2 INSTALLATION

The PTB100 series barometers are designed to be installed indoors or inside equipment only. The barometers can also be mounted on a 35 mm wide standard DIN mounting rail by using a mounting foot and screw supplied with the barometers.

The barometers should be installed vertically with the connectors downwards to prevent any ingress of condensated water. Horizontal installation can be used under conditions where no condensation can take place.



2.1 Operating modes

The PTB100 series barometers have two operating modes: normal and shutdown. In the normal operating mode the barometer measures continuously when powered-up. In the shutdown operating mode the barometer is turned on/off using an external TTL level trigger. When needed, the shutdown operating mode is enabled by removing the jumper which is under the plastic cover on the front panel. The normal operating mode is reselected by reinstalling the jumper. The barometers are supplied from factory in the normal operating mode with the shutdown mode disabled with a jumper.

2.2 Electrical connections

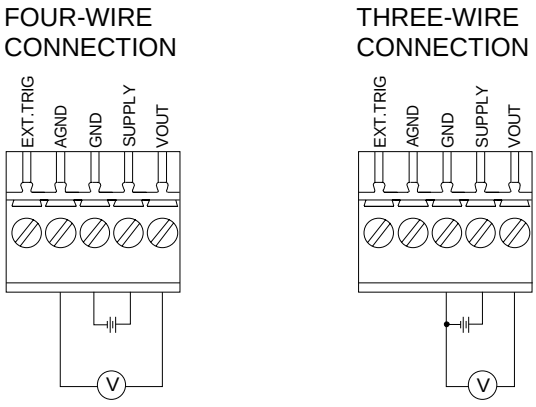
The PTB100 series barometers have five electrical terminals:

EXT.TRIG	supply voltage control	
	0 VDC	shutdown state
	5 VDC	operating state
AGND	signal ground	
GND	supply ground	
SUPPLY	supply voltage	
VOUT	output voltage	

Both grounds (AGND and GND) are in the same electrical potential in the barometer. Both three-wire and four-wire connections can be used; the four-wire connection must be used when the voltage drop in the supply ground line affects the pressure measurement accuracy.

In normal operating mode no connection to the EXT.TRIG terminal is recommended.

The barometers are protected against reverse operating voltage.



2.3 Shield grounding

The PTB100 series barometers meet CE requirements for EMC only when a braided cable and proper grounding technique are used. The braid should be grounded at the barometer using the crimp connector supplied with the barometer.

3 VOLTAGE TO PRESSURE CONVERSION

The barometric pressure (P) can be calculated from the measured output voltage (U) using a simple equation.

$$\text{PTB100A: } P = 800\ \text{hPa} + \frac{260\ \text{hPa}}{5\ \text{V}} \times U\ [\text{V}]$$

$$\text{PTB100B: } P = 600\ \text{hPa} + \frac{460\ \text{hPa}}{5\ \text{V}} \times U\ [\text{V}]$$

Note that the output voltage of the PTB100 barometers saturates at about 50 mV.

4 ADJUSTMENT AND CALIBRATION

For offset fine adjustment a trimmer potentiometer is available under the plastic cover on the front panel. This trimmer potentiometer can be used at any pressure level to make a maximum ±1 hPa (mbar) offset adjustment to the barometer output.

Please consult the factory for further instructions if a larger offset or offset/gain adjustment is needed for some reason.

A calibration interval of one year is recommended.

The PTB100 series barometers are NIST traceable and supplied with NIST traceability certificate.

5 TECHNICAL DATA

Operating range (1 hPa = 1 mbar)

Pressure range	
PTB100A	800...1060 hPa
PTB100B	600...1060 hPa
Temperature range	-40...+60 °C
Humidity range	non-condensing

Accuracy

PTB100A	
Linearity *	±0.25 hPa
Hysteresis *	±0.03 hPa
Repeatability *	±0.03 hPa
Calibration uncertainty **	±0.15 hPa
Accuracy at +20 °C ***	±0.3 hPa
PTB100B	
Linearity *	±0.45 hPa
Hysteresis *	±0.05 hPa
Repeatability *	±0.05 hPa
Calibration uncertainty **	±0.15 hPa
Accuracy at +20 °C ***	±0.5 hPa

* Defined as ±2 standard deviation limits of end-point non-linearity, hysteresis error or repeatability error

** Defined as ±2 standard deviation limits of inaccuracy of the working standard including traceability to NIST

*** Defined as the root sum of the squares (RSS) of end-point non-linearity, hysteresis error, repeatability error and calibration uncertainty at room temperature

Total accuracy	PTB100A	PTB100B
+20 °C	±0.3 hPa	±0.5 hPa
0...+40 °C	±1 hPa	±1.5 hPa
-20...+45 °C	±1.5 hPa	±2 hPa
-40...+60 °C	±2.5 hPa	±3 hPa

Long-term stability	±0.1 hPa/year
Effect of thermal or mechanical shocks	less than ±0.2 hPa

General

Supply voltage	10...30 VDC
Supply voltage control	with TTL level trigger •
Supply voltage sensitivity	less than 0.1 hPa
Current consumption	less than 4 mA less than 1 µA in shut-down mode
Output voltage	0...5 VDC
Resolution	0.1 hPa
Load resistance	10 kohm minimum
Load capacitance	47 nF maximum
Settling time	1 s to reach full accuracy after power-up
Response time	300 ms to reach full accuracy after a pressure step
Warm-up shift	less than 0.1 hPa
Acceleration sensitivity	less than ±0.05 hPa/g
Pressure connector	M5 (10-32) internal thread
Pressure fitting	barbed fitting for 1/8" I.D. tubing

Minimum pressure limit	0 hPa abs.
Maximum pressure limit	2000 hPa abs.
Electrical connector	a removable connector for five wires (AWG 28...16)
Terminals	external triggering signal ground •• supply ground supply voltage output voltage
Housing material	aluminium
Weight	85 g

- • When enabled with an internal jumper, the barometer can be triggered on/off using external TTL level trigger.
- •• The signal ground and supply ground are in the same electrical potential in the barometer. A separate wire for signal ground must be used when the voltage drop in the supply ground line affects the pressure measurement accuracy.

Dimensions in mm (inches)