PTU300 Combined Pressure, Humidity, and Temperature Transmitter

For Demanding Applications

Vaisala Combined Pressure, Humidity and Temperature Transmitter PTU300 is a unique instrument measuring three parameters simultaneously.

**Features**
- Barometric pressure, humidity, and temperature measurement in one transmitter
- RS-232C serial interface with NMEA protocol for GPS use
- Graphical display and keypad for convenient operation
- Analog outputs, RS-232/485, LAN
- Modbus protocol support (RTU/TCP)
- Traceable to international standards

**Options**
- Available with up to two barometric pressure sensors for added reliability
- Optional universal power supply module
- HMT330MIK installation kit for outdoor use

You can choose from the following probe options: PTU301 for wall mounting for example in laboratories or engine rooms, PTU303 for general use, PTU307 warmed probe for outdoor and demanding meteorology applications, and PTU30T for pressure and temperature measurement only.

**Proven Vaisala Sensor Technology**
PTU300 incorporates sensors known for their high accuracy and excellent long-term stability: Vaisala BAROCAP® for pressure measurement and Vaisala HUMICAP® for humidity measurement. The temperature sensor is a platinum RTD sensor.

**Graphical Display of Measurement Data and Trends for Convenient Operation**
PTU300 features a large numerical and graphical display with a multilingual menu and keypad. It allows users to easily monitor operational data, measurement trends, and access measurement history for the past 12 months.

The optional data logger, with real-time clock, makes it possible to generate over four years of measurement history and zoom in on any desired time or time frame.

The display alarm allows any measured parameter to be tracked, with freely configurable low and high limits.

**Versatile Outputs and Data Collection**
PTU300 comes with a standard RS-232 serial interface. The output format is compatible with major GPS receivers and NMEA-coded messages. An isolated RS-485 interface is available as an option.

PTU300 is also capable of applying the Modbus communication protocol and, together with an appropriate connection option, provides either Modbus RTU (RS-485) or Modbus TCP/IP (Ethernet) communication.

The data logger records data that can be viewed on the local display or transferred to a PC with Microsoft® Windows® software. The transmitter can also be connected to a network with an optional LAN interface, which enables an Ethernet connection. A USB service cable makes it easy to connect PTU300 to a PC via the service port.

**Outdoor Installation Kit**
Outdoor installation is possible using the optional HMT330MIK installation kit, for applications requiring reliable measurements for meteorological purposes.

**Flexible Calibration**
Quick, one-point field calibration for humidity is easy using Vaisala Hand-Held Humidity Meter HM70.
With Vaisala Barometric Pressure Transfer Standard PTB330TS, including optional humidity and temperature probe, field check and calibration can be performed for all three parameters.

**Applications**

- Environmental monitoring in calibration laboratories
- Industrial applications in semiconductor industry, engine testing and maritime sector
- GPS meteorology: estimating precipitable water vapor in the atmosphere, weather stations

The display also shows the WMO pressure trend ΔP 3h and tendency of 0 … 8.

**Model Dimensions in mm**

PTU301 for wall mounting

<table>
<thead>
<tr>
<th>Model</th>
<th>Dimensions in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>120 (4.72)</td>
</tr>
<tr>
<td></td>
<td>12 (0.47)</td>
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<tr>
<td></td>
<td>169 (6.65)</td>
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<td>Ø 7 (0.28)</td>
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<tr>
<td></td>
<td>183 (7.20)</td>
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<td></td>
<td>116 (4.57)</td>
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<td></td>
<td>96 (3.78)</td>
</tr>
<tr>
<td></td>
<td>195</td>
</tr>
</tbody>
</table>
**Model**

PTU303 probe for outdoor use

PTU307 warmed probe for demanding meteorological installations

PTU30T for pressure and temperature only measurement

**Dimensions in mm**

HMT330MIK Meteorological Installation Kit enables PTU307 to be installed outdoors to obtain reliable measurements for meteorological purposes.
Technical Data

Measurement Performance

### Barometric Pressure
- **Pressure range:** 500 ... 1100 hPa, 50 ... 1100 hPa
- **Accuracy:** 500 ... 1100 hPa
  - Class A: ±0.05 hPa
  - Class B: ±0.10 hPa
- **Linearity:** ±0.03 hPa
- **Hysteresis:** ±0.03 hPa
- **Repeatability:** ±0.03 hPa
- **Calibration uncertainty:** ±0.03 hPa
- **Accuracy at +20 °C / +68 °F:** ±0.10 hPa
- **Temperature dependence:** ±0.1 hPa
- **Total accuracy (-40 ... +60 °C / -40 ... +140 °F):** ±0.15 hPa
- **Response Time (100 % Response):**
  - One sensor: 2 s
  - 1 s
- **Pressure units:** hPa, mbar, kPa, Pa, inHg, mmH2O, mmHg, torr, psia

### Relative Humidity
- **Measurement range:** 0 ... 100 %RH
- **Accuracy (Including Non-linearity, Hysteresis, and Repeatability):**
  - At +15 ... +25 °C / +59 ... +77 °F: ±1 %RH (0 ... 90 %RH)
  - ±1.7 %RH (90 ... 100 %RH)
  - At -20 ... +40 °C / -4 ... +104 °F: ±(1.0 + 0.008 x reading) %RH
  - ±(1.5 + 0.015 x reading) %RH
- **Sensor for typical applications:** Vaisala HUMICAP 180 or 180R
- **Sensor for applications with chemical purge/warmed probe:** Vaisala HUMICAP 180C or 180RC
- **Response Time (90 %) at +20 °C (+68 °F) in Still Air:**
  - With grid filter: 8 s / 17 s
  - With grid + steel netting filter: 20 s / 50 s
  - With sintered filter: 40 s / 60 s

### Temperature
- **Measurement range, housing (barometric pressure measurement limit):**
  - -40 ... 60 °C (0 ... 140 °F)

### Temperature Performance
- **Accuracy over Temperature Range:**
  - ±0.7 °C at +40 °C
  - ±0.6 °C at +50 °C
  - ±0.5 °C at +60 °C
  - ±0.4 °C at +70 °C
  - ±0.3 °C at +80 °C
  - ±0.2 °C at +90 °C
  - ±0.1 °C at +100 °C

### Operating Environment
- **Operating temperature:** -40 ... +60 °C (-40 ... +140 °F)
- **Humidity range:** Non-condensing
- **EMC compliance:** EN61326-1, Industrial Environment
- **Note:** Transmitter with display test impedance of 40 Ω is used in IEC61000-4-5 (Surge immunity)

### Mechanical Specifications
- **Cable bushing:** M20 x 1.5 for cable diameter 8 ... 11 mm / 0.31 ... 0.43"
- **Conduit fitting:** 1/2" NPT
- **User cable connector (optional):**
  - M12 series 8-pin (male)
  - Female plug with 5 m (16.4 ft) black cable
  - Female plug with screw terminals
- **Cable diameter, PTU303:** 6.0 mm
- **Cable diameter, other probes:** 5.5 mm
- **Standard probe cable lengths:**
  - 2 m, 5 m or 10 m
  - 1)
- **Housing material:** G-AlSi 10 Mg (DIN 1725)
- **Weight (depending on selected probe):** 10 - 3.0 kg / 2.2 - 6.6 lb
  - 1) Additional cable lengths available, please see order form for details.

### Optional Data Logger with Real-time Clock
- **Logged parameters:** Max. four with trend/min/max values
- **Logging interval:** 10 s (fixed)
- **Maximum logging period with maximum temporal resolution:** 4 years 5 months
- **Logged points:** 13.7 million points per parameter
- **Battery lifetime:** Min. 5 years

### Display
- **Material:** LCD with backlight, graphical trend display of any parameter
- **Menu languages:** English, Chinese, Finnish, French, German, Japanese, Russian, Spanish, Swedish
**Inputs and Outputs**

Operating voltage
With optional power supply module
10 ... 35 VDC, 24 VAC ±20 %
100 ... 240 VAC, 50/60 Hz

Settling time at power-up (one sensor)
Class A: 4 s
Class B: 3 s

Recommended wire size
0.5 mm² (AWG 20) stranded wires

Digital outputs
RS-232, RS-485 (optional)

Protocols
ASCII commands, Modbus RTU

Service connection
RS-232, USB

Relay outputs (optional)
0.5 A, 250 VAC

Power Consumption at +20 °C (+68 °F) (Uin, 24 VDC)
RS-232
Max. 28 mA

Uout 3 x 0 ... 1 V / 0 ... 5 V / 0 ... 10 V
Max. 33 mA

Iout 3 x 0 ... 20 mA
Max. 63 mA

Display and backlight
+20 mA

During chemical purge
Max. +110 mA

During probe heating
+120 mA

**External Loads**

Current outputs
Ri < 500 Ω

0 ... 1 V output
Ri > 2 kΩ

0 ... 5 V and 0 ... 10 V outputs
Ri > 10 kΩ

**Ethernet Interface (Optional)**

Supported standards
10BASE-T, 100BASE-TX

Connector
8P8C (RJ45)

IPv4 address assignment
DHCP (automatic), static

Protocols
Telnet, Modbus TCP/IP

**Analog Outputs (Optional)**

Current output
0 ... 20 mA, 4 ... 20 mA

Voltage output
0 ... 1 V, ... 5 V, 0 ... 10 V

Humidity and Temperature:

Accuracy of analog outputs at +20 °C (+68 °F)
±0.05 %/full scale

Temperature dependence of analog outputs
±0.005 %/°C (0.003 %/°F) full scale

Pressure:

Accuracy of analog outputs at +20 °C (+68 °F)
±0.30 hPa (500 ... 1100 hPa)
±0.40 hPa (50 ... 1100 hPa)

Accuracy of analog outputs at -40 ... +60 °C / -40 ... +140 °F
±0.60 hPa (500 ... 1100 hPa)
±0.75 hPa (50 ... 1100 hPa)

**Spare Parts and Accessories**

PC software and cable
215005

USB-RJ45 Serial Connection Cable
219685

Connection cable for HM70
211339

Wall mounting plate (plastic)
214829

Pole installation kit with rain shield
215109

DIN rail installation set
211477

Duct installation kit, PTU303/307
210697

Cable gland and AGRO, PTU303/307
HMP247CG

Solar radiation shield, PTU303/307/30T
DTR502B

Meteorological installation kit
HMT330MIK

Duct installation kit (T probe)
215003

Dimensions in mm (inches)
VAISALA

PTB330 Digital Barometer
For Professional Meteorology, Aviation, and Industrial Users

Vaisala BAROCAP® Digital Barometer PTB330 is a new-generation barometer, designed for a wide range of high-end atmospheric pressure measurement. The pressure measurement of PTB330 is based on the Vaisala silicon capacitive, absolute pressure sensor - the Vaisala BAROCAP sensor. It provides high measurement accuracy and excellent long-term stability.

Features

• Vaisala BAROCAP® sensor
• Accurate measurement
• Excellent long-term stability
• Added reliability through redundancy
• Graphical trend display with 1-year history data
• Height and altitude corrected pressure (QFE, QNH)
• For professional meteorology and aviation, laboratories, demanding industrial applications

Highly Accurate

The PTB330 series is highly accurate. The Class A barometers for the most demanding applications are fine-tuned and calibrated against a high-precision pressure calibrator. Class B barometers are adjusted and calibrated using electronic working standard. All PTB330 barometers come with a traceable factory calibration certificate.

Reliability through Redundancy

According to your choice, PTB330 can incorporate one, two, or three BAROCAP sensors. When two or three sensors are used, the barometer continuously compares the readings of the pressure sensors against one another and reports if they are within the set internal difference criteria. This unique feature provides redundancy in pressure measurement.

Users also get a stable and reliable pressure reading at all times as well as a pre-indication of when to service or recalibrate the barometer.

QNH and QFE

PTB330 can be set to compensate for QNH and QFE pressure used especially in aviation. The QNH represents the pressure reduced to sea level, based on the altitude and temperature of the observation site. The QFE represents the height-corrected pressure of small differences in altitude, for example, the air pressure at the airfield elevation.

Applications

PTB330 can be used successfully for aviation, professional meteorology, and for demanding industrial pressure measurement applications such as accurate laser interferometric measurement and exhaust gas analysis in engine test benches.

Graphical Display

PTB330 features a multilingual, graphical display allowing users to monitor measurement trends. PTB330 updates the graph automatically during measurement and it provides a one-year measurement history. In addition to instant pressure, PTB330 provides the WMO pressure trend and tendency codes.
Technical Data

Measurement Performance

<table>
<thead>
<tr>
<th>Barometric Pressure Range 500 ... 1100 HPA</th>
<th>Class A</th>
<th>Class B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearity ¹</td>
<td>±0.05 hPa</td>
<td>±0.10 hPa</td>
</tr>
<tr>
<td>Hysteresis ²</td>
<td>±0.03 hPa</td>
<td>±0.03 hPa</td>
</tr>
<tr>
<td>Repeatability ³</td>
<td>±0.03 hPa</td>
<td>±0.03 hPa</td>
</tr>
<tr>
<td>Calibration uncertainty ²</td>
<td>±0.07 hPa</td>
<td>±0.15 hPa</td>
</tr>
<tr>
<td>Accuracy at +20 °C (+68 °F) ³</td>
<td>±0.10 hPa</td>
<td>±0.20 hPa</td>
</tr>
</tbody>
</table>

Barometric Pressure Range 50 ... 1100 HPA

<table>
<thead>
<tr>
<th>Class B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linearity ³</td>
</tr>
<tr>
<td>Hysteresis ³</td>
</tr>
<tr>
<td>Repeatability ³</td>
</tr>
<tr>
<td>Calibration uncertainty ²</td>
</tr>
<tr>
<td>Accuracy at +20 °C ³</td>
</tr>
</tbody>
</table>

Temperature Dependence ⁴

| 500 ... 1100 hPa | ±0.1 hPa |
| 50 ... 1100 hPa | ±0.3 hPa |

Total Accuracy ~40 ... +60 °C (~40 ... +140 °F)

<table>
<thead>
<tr>
<th>Class A</th>
<th>Class B</th>
</tr>
</thead>
<tbody>
<tr>
<td>500 ... 1100 hPa</td>
<td>±0.15 hPa</td>
</tr>
<tr>
<td>50 ... 1100 hPa</td>
<td>±0.45 hPa</td>
</tr>
</tbody>
</table>

Long-term Stability

| 500 ... 1100 hPa | ±0.1 hPa/year |
| 50 ... 1100 hPa | ±0.1 hPa/year |

1) Defined as ±2 standard deviation limits of endpoint non-linearity, hysteresis, or repeatability error.
2) Defined as ±2 standard deviation limits of inaccuracy of the working standard including traceability to international standards.
3) Defined as the root sum of the squares (RSS) of endpoint non-linearity, hysteresis error, repeatability error, and calibration uncertainty at room temperature.
4) Defined as ±2 standard deviation limits of temperature dependence over the operating temperature range.

<table>
<thead>
<tr>
<th>Operating Environment</th>
</tr>
</thead>
</table>

Pressure range 500 ... 1100 hPa, 50 ... 1100 hPa
Operating temperature ~40 ... +60 °C (~40 ... +140 °F)
Operating temperature with local display 0 ... +60 °C (+32 ... +140 °F)

Data Transfer Software

MI70 Link Interface software requirements
Microsoft® Windows OS Microsoft® Excel

<table>
<thead>
<tr>
<th>Mechanical Specifications</th>
</tr>
</thead>
</table>

Housing material G AISI10 Mg (DIN 1725)
Housing classification IP66 IP65 (NEMA4) with local display
Weight 1.5 kg (2.2 - 3.3 lbs)

Inputs and Outputs

Supply voltage 10 ... 35 VDC
Supply voltage sensitivity Negligible
Typical power consumption at +20 °C (Uin, 24 VDC, one pressure sensor)
RS-232 25 mA
RS-485 40 mA
Uout 25 mA
Iout 40 mA
Display and backlight +20 mA
Serial I/O RS-232C, RS-485, RS-422
Pressure units hPa, mbar, kPa, Pa inHg, mmH2O, mmHg, torr, psia

<table>
<thead>
<tr>
<th>Analog Output (Optional)</th>
</tr>
</thead>
</table>

Current output 0 ... 20 mA, 4 ... 20 mA
Voltage output 0 ... 1 V, 0 ... 5 V, 0 ... 10 V
Accuracy at pressure range 500 ... 1100 hPa, 50 ... 1100 hPa
At +20 °C (68 °F) ±0.30 hPa ±0.40 hPa
At ~40 ... +60 °C (~40 ... 140 °F) ±0.60 hPa ±0.75 hPa

Accessories

Serial interface cable 19446ZZ
USB-RJ45 serial connection cable 29685
Software interface kit 215005
Wall mounting kit 217499
Outdoor installation kit (weather shield) 215109
Installation kit for pole or pipeline 215108
Power supply module POWER-1
Temperature compensated analog output module AOUT-1T
Isolated RS-485 module RS485-1
DIN Rail Kit 215094

1) Defined as ±2 standard deviation limits of non-linearity, hysteresis, or repeatability error.
2) Defined as ±2 standard deviation limits of inaccuracy of the working standard including traceability to international standards.
3) Defined as the root sum of the squares (RSS) of endpoint non-linearity, hysteresis error, repeatability error, and calibration uncertainty at room temperature.
4) Defined as ±2 standard deviation limits of temperature dependence over the operating temperature range.

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Barometric Pressure Transfer Standard PTB330TS combines a PTB330 digital barometer with a handheld MI70 indicator into a portable unit that can be used as a transfer standard.

Barometer for Portable Use
PTB330TS uses a PTB330 series digital barometer that is housed in a tabletop casing. PTB330TS is designed to be operated using the handheld MI70 indicator. The MI70 indicator also provides the operation power for the barometer. Optional HMP155 probe is available for accurate humidity and temperature measurement.

For Measurements in Industrial and Meteorological Areas
PTB330TS is suitable for reference measurements in industrial and meteorological areas. PTB330TS is housed in a durable and weatherproof transport case that can be easily carried and shipped. The components of the PTB330TS are placed in a foam interior with accessories and User Guide in the lid organizer. The case includes a shoulder strap.

Features
- PTB330 digital barometer for accurate pressure measurement
- Handheld MI70 indicator with a user-friendly, multilingual display
- Service port for MI70 Link software or computer
- Vaisala HUMICAP® humidity and temperature probe HMP155
- Weatherproof transport case

Available Options
- ISO/IEC 17025 Accredited calibration for PTB330
- HMP155 options: additional temperature probe, manually controlled chemical purge feature
- MI70 Link software and USB or RS-232 cable for downloading measurement data to a computer
- USB service cable for connecting to PTB330 service port
Technical Data

These specifications apply when MI70, PTB330, and HMP155 are used together in PTB330TS. For PTB330 and HMP155 specifications, see the product documentation.

General

Operating temperature -10 ... +40 °C (+14 ... +104 °F)
Operating humidity Non-condensing
Maximum pressure limit 5000 hPa abs.
Power supply Rechargeable NiMH battery pack with AC-adapter or 4xAA-size alkalines, type IEC LR6
Menu languages English, Chinese, French, Spanish, German, Russian, Japanese, Swedish, Finnish
Display LCD with backlight, graphic trend display of any parameter, character height up to 16 mm
Data logging capacity 2700 points
Alarm Audible alarm function
Compliance • EMC Directive (2004/108/EC) Complies with the EMC product family standard EN61326-1
  • Electrical equipment for measurement control and laboratory use
  • Basic immunity test requirements.
  • Low Voltage Directive (2006/95/EC)
  • ROHS Directive (2002/95/EC)
Operation Time (Using Rechargeable Battery Pack)
Continuous use with PTB330 11 h typical at +20 °C (+68 °F)
Datalogging use Up to 30 days

Measurement Performance

Barometric Pressure (PTB330)
Measurement range 500 ... 1100 hPa
Linearity(1) ±0.05 hPa
Hysteresis(1) ±0.03 hPa
Repeatability(1) ±0.03 hPa
Calibration uncertainty(2) ±0.07 hPa
Accuracy at +20 °C (+68 °F) (3) ±0.10 hPa
Temperature dependence(3) ±0.1 hPa
Total accuracy -40 ... +60 °C (-40 ... +140 °F) ±0.15 hPa
Long-term stability ±0.1 hPa/year
Settling time at startup (one sensor) 4 s
Response time (one sensor) 2 s
Acceleration sensitivity Negligible
Relative Humidity (HMP155)
Measurement range 0 ... 100 %RH
Accuracy (incl. non-linearity, hysteresis and repeatability) at +15 ... +25 °C (+59 ... +77 °F) ±1 %RH (O ... 90 %RH)
  ±1.7 %RH (9 ... 100 %RH)
at -10 ... +40 °C (-4 ... 104 °F) ±(1.0 + 0.008 reading) %RH
Factory calibration uncertainty at +20 °C (+68 °F) (5) ±0.6 %RH (O ... 40 %RH)
Humidity sensor HUMICAP180
HumidCAP180RC
Response time at +20 °C in still air with a sintered PTFE filter 63% < 20 s
  90% < 60 s
Temperature (HMP155)
Measurement range -10 ... +40 °C (+14 ... +104 °F)
Accuracy -10 ... +20 °C ±(0.176 - 0.0028 x temperature) °C
+20 ... +40 °C ±(0.07 + 0.0025 x temperature) °C
Temperature sensor Pt100 RTD Class F0.1 IEC 60751
Response time with additional temperature probe in 3 m/s air flow 63% < 20 s
  90% < 35 s

Available Parameters

Pressure parameters P, P3h, HCP, QFE, QNH
Humidity and temperature parameters RH, T, Tdf, Td, x, Tw
**Inputs and Outputs**

- **MI70 probe ports**: 2
- **MI70 data interface**: RS-232 (accessible only with MI70 Link software)
- **PTB330 supply voltage**: 10 ... 35 VDC (if not powered by MI70)
- **PTB330 data interface**: RS-232C
- **PTB330 serial I/O connectors**: RJ45 (service port) Male 6-pin M12 (user port)
- **HMP155 data interface**: RS-485
- **HMP155 serial I/O connector**: Male 8-pin M12

**Mechanical Specifications**

**PTB330**
- **Housing material**: G-AlSi 10 Mg (DIN 1725)
- **IP rating**: IP65
- **Pressure connector**: M5 (10-32) internal thread
- **Pressure fitting**: Barbed fitting for 1/8 inch I.D. tubing or quick connector with shutoff valve for 1/8 inch hose

**HMP155**
- **Housing material**: PC
- **IP rating**: IP66
- **Additional T-probe cable length**: 2 m
- **Cable material**: PUR
- **Sensor protection**: Sintered PTFE

**MI70 Measurement Indicator**
- **IP rating**: IP54
- **Housing material**: ABS/PC blend

**Transport Case**
- **IP rating (when closed)**: IP67
- **Plastic parts**: TTX01, PP+SEBS, POM
- **Metal parts**: Stainless steel AISI 303
- **Interior foam material**: Polyethylene and polymer
- **Weight with all instruments and typical accessories**: 5.9 kg (13 lbs)
- **Exterior dimensions (L × W × H)**: 405 × 330 × 165 mm (15.94 × 12.99 × 6.50 in)

**Spare Parts and Accessories**

**PTB330**
- **MI70 – PTB330 spiral cable**: 223235SP
- **USB-RJ45 serial connection cable**: 219685
- **Serial connection cable**: 19446ZZ
- **Barbed fitting 1/8 in**: 19498SP
- **Quick connector 1/8 in**: 220186
- **Transport case with interior foams and tabletop casing for PTB330**: 224068SP

**MI70**
- **USB cable for MI70, includes MI70 Link software**: 219687
- **MI70 Link software**: MI70LINK
- **MI70 connection cable to HMT330, MMT330, DMT340, HMT100, PTB330**: 211339
- **MI70 battery pack variety of AC adapters available**: 26755

**HMP155**
- **HMP155 - MI70 connection cable**: 221801
- **Protection set for HMP155 calibration buttons: protective cover, 2 O-rings and protective plug**: 22131B
- **USB cable for HMP155**: 2201040
- **Sintered teflon filter + O-ring**: 219452SP
- **Humidity sensor**: HUMICAP180R
- **Humidity calibrator**: HMK15

[Image of a transport case with interior foams and a tabletop casing for PTB330]
Vaisala BAROCAP® Digital Barometer PTB210 is a reliable outdoor barometer for harsh conditions.

**For Harsh Environments**
PTB210 is ideal for outdoor installations and harsh environments. PTB210 is designed to operate in a wide temperature range, and the electronics housing provides IP65 (NEMA 4) standardized protection against sprayed water.

PTB210 is ideal for use in applications such as weather stations, data buoys and ships, airports, and agrology. They are also an excellent solution for monitoring barometric pressure in industrial equipment such as laser interferometers and engine test benches.

**Several Pressure Ranges**
PTB210 is designed for various pressure ranges. They are available in two basic configurations:

- Serial output for 500 ... 1100 hPa
- Serial output for 50 ... 1100 hPa
- Analog output with different scalings between 500 ... 1100 hPa

**Accurate and Stable Measurement**
PTB210 is digitally adjusted and calibrated by using electronic working standards. A higher accuracy barometer, that is fine-tuned and calibrated against a high-precision pressure calibrator, is available for the 500 ... 1100 hPa pressure range.

In addition, PTB210 integrates directly with Vaisala Static Pressure Head Series SPH10/20. This pairing offers accurate measurement in all wind conditions.

**Vaisala BAROCAP Technology**
PTB210 uses the Vaisala BAROCAP sensor, a silicon capacitive absolute pressure sensor developed by Vaisala for barometric pressure applications. The Vaisala BAROCAP sensor provides excellent hysteresis and repeatability characteristics and outstanding temperature and long-term stability. PTB210 is delivered with a traceable factory calibration certificate.
## Technical Data

### Measurement Performance

#### Pressure Range

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serial output</td>
<td>500 ... 1100 hPa</td>
</tr>
<tr>
<td></td>
<td>50 ... 1100 hPa</td>
</tr>
<tr>
<td>Analog output</td>
<td>500 ... 1100 hPa</td>
</tr>
<tr>
<td></td>
<td>600 ... 1060 hPa</td>
</tr>
<tr>
<td></td>
<td>800 ... 1060 hPa</td>
</tr>
<tr>
<td></td>
<td>900 ... 1100 hPa</td>
</tr>
</tbody>
</table>

#### Serial Output (Units in hPa), Accuracy

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
<th>Class A</th>
<th>Class B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure range</td>
<td>500 ... 1100 hPa</td>
<td>± 0.10</td>
<td>± 0.15</td>
</tr>
<tr>
<td></td>
<td>50 ... 1100 hPa</td>
<td>± 0.20</td>
<td>± 0.20</td>
</tr>
<tr>
<td>Non-linearity</td>
<td>± 0.05 ± 0.05 ± 0.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>± 0.07 ± 0.15 ± 0.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>± 0.05 ± 0.05 ± 0.10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calibration uncertainty</td>
<td>± 0.15 ± 0.20 ± 0.35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accuracy at +20 °C (+68 °F)</td>
<td>± 0.20 ± 0.20 ± 0.40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Temperature dependence

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
<th>± 0.25</th>
<th>± 0.30</th>
<th>± 0.50</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40 ... +60 °C</td>
<td>-40 ... +140 °F</td>
<td>± 0.20</td>
<td>± 0.20</td>
<td>± 0.40</td>
</tr>
</tbody>
</table>

#### Total accuracy

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
<th>± 0.30</th>
<th>± 0.60</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40 ... +60 °C</td>
<td>-40 ... +140 °F</td>
<td>± 0.50</td>
<td>± 0.50</td>
</tr>
</tbody>
</table>

#### Long term stability (hPa/year)

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
<th>± 0.10</th>
<th>± 0.10</th>
<th>± 0.20</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>± 0.10</td>
<td>± 0.10</td>
<td>± 0.20</td>
</tr>
</tbody>
</table>

### Inputs and Outputs

#### Serial Output

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shutdown</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>Settling time at startup</td>
<td>2 s</td>
</tr>
<tr>
<td>Serial I/O</td>
<td>RS-232C</td>
</tr>
<tr>
<td></td>
<td>RS-232C, TTL (optional)</td>
</tr>
<tr>
<td></td>
<td>RS-485, non isolated (optional)</td>
</tr>
<tr>
<td>Parity</td>
<td>None, even, odd</td>
</tr>
<tr>
<td>Data bits</td>
<td>7, 8</td>
</tr>
<tr>
<td>Stop bits</td>
<td>1, 2</td>
</tr>
<tr>
<td>Baud rate</td>
<td>1200, 2400, 4800, 9600, 19200</td>
</tr>
<tr>
<td>Response time</td>
<td>1 s</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.01 hPa (1 measurement/s)</td>
</tr>
<tr>
<td></td>
<td>0.03 hPa (10 measurements/s)</td>
</tr>
<tr>
<td>Current consumption, normal mode</td>
<td>&lt; 15 mA (factory setting)</td>
</tr>
<tr>
<td>Current consumption, power down mode</td>
<td>&lt; 0.8 mA</td>
</tr>
<tr>
<td>Current consumption, shutdown mode</td>
<td>0.2 mA</td>
</tr>
</tbody>
</table>

#### Analog Output

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outputs</td>
<td>0 ... 5 VDC, 0 ... 2.5 VDC (order specified)</td>
</tr>
<tr>
<td>Shutdown</td>
<td>ON/OFF</td>
</tr>
<tr>
<td>Response time</td>
<td>500 ms</td>
</tr>
<tr>
<td>Resolution</td>
<td>300 µV</td>
</tr>
<tr>
<td>Measurement rate</td>
<td>3 measurements/s</td>
</tr>
<tr>
<td>Current consumption, normal mode</td>
<td>&lt; 8 mA</td>
</tr>
<tr>
<td>Current consumption, shutdown mode</td>
<td>0.2 mA</td>
</tr>
</tbody>
</table>

### Operating Environment

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating temperature</td>
<td>-40 ... +60 °C (-40 ... +140 °F)</td>
</tr>
<tr>
<td>Operating humidity</td>
<td>Non-condensing</td>
</tr>
<tr>
<td>EMC compliance</td>
<td>EN61326-1, Generic Environment</td>
</tr>
</tbody>
</table>

### Mechanical Specifications

<table>
<thead>
<tr>
<th>Type</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing material</td>
<td>PC Plastic</td>
</tr>
<tr>
<td>IP rating, electronics</td>
<td>IP65 (NEMA 4)</td>
</tr>
<tr>
<td>IP rating, sensor</td>
<td>IP53</td>
</tr>
<tr>
<td>Instrument weight</td>
<td>110 g (3.9 oz)</td>
</tr>
<tr>
<td>Cable weight</td>
<td>28 g/m (1.0 oz)</td>
</tr>
</tbody>
</table>
Vaisala BAROCAP® Barometer PTB110 is designed both for accurate barometric pressure measurements at room temperature and for general environmental pressure monitoring over a wide temperature range.

**Vaisala BAROCAP Technology**
PTB110 uses the Vaisala BAROCAP sensor, a silicon capacitive absolute pressure sensor developed by Vaisala for barometric pressure measurement applications. The sensor combines the outstanding elasticity characteristics and mechanical stability of single-crystal silicon with the proven capacitive detection principle.

**Applications**
PTB110 is suitable for a variety of applications, such as environmental pressure monitoring, data buoys, laser interferometers, and agriculture and hydrology. The compact PTB110 is ideal for data logger applications as it has low power consumption. The external On/Off control is practical when electricity supply is limited.

**Accuracy and Stability**
The excellent long-term stability of the barometer minimizes or even removes the need for field adjustment in many applications.

### Features
- Vaisala BAROCAP® sensor
- Several pressure ranges
- Accuracy ±0.3 hPa at +20 °C
- Long-term stability
- On/Off control with external trigger
- Output voltage 0 ... 2.5 or 0 ... 5 VDC
- Current consumption less than 4 mA
- Mountable on 35 mm wide DIN rail
- Traceable calibration (certificate included)
## Technical Data

### Measurement Performance

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pressure range (1 hPa = 1 mbar)</td>
<td>500 ... 1100 hPa</td>
</tr>
<tr>
<td></td>
<td>600 ... 1100 hPa</td>
</tr>
<tr>
<td></td>
<td>800 ... 1100 hPa</td>
</tr>
<tr>
<td></td>
<td>800 ... 1060 hPa</td>
</tr>
<tr>
<td></td>
<td>600 ... 1060 hPa</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1 hPa</td>
</tr>
<tr>
<td>Load resistance</td>
<td>10 000 Ω minimum</td>
</tr>
<tr>
<td>Load capacitance</td>
<td>47 nF maximum</td>
</tr>
<tr>
<td>Settling time to full accuracy after startup</td>
<td>1 s</td>
</tr>
<tr>
<td>Response time to full accuracy after a pressure step</td>
<td>500 ms</td>
</tr>
<tr>
<td>Acceleration sensitivity</td>
<td>Negligible</td>
</tr>
</tbody>
</table>

### Accuracy

- **Linearity**: ±0.25 hPa
- **Hysteresis**: ±0.03 hPa
- **Repeatability**: ±0.03 hPa
- **Pressure calibration uncertainty**: ±0.15 hPa
- **Voltage calibration uncertainty**: ±0.7 mV
- **Frequency calibration uncertainty**: ±0.3 Hz
- **Accuracy at +20 °C (+68 °F)**: ±0.3 hPa

### Total Accuracy at

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>+15 °C (+59 °F)</td>
<td>±0.3 hPa</td>
</tr>
<tr>
<td>0 °C (+32 °F)</td>
<td>±0.6 hPa</td>
</tr>
<tr>
<td>−20 °C (+4 °F)</td>
<td>±1.0 hPa</td>
</tr>
<tr>
<td>−40 °C (+40 °F)</td>
<td>±1.5 hPa</td>
</tr>
</tbody>
</table>

### Long-term stability

±0.1 hPa / year

1) Defined as ±2 standard deviation limits of end-point non-linearity, hysteresis error, or repeatability error.
2) Defined as ±2 standard deviation limits of inaccuracy of the working standard including traceability to international standards.
3) Defined as the root sum of the squares (RSS) of end-point non-linearity, hysteresis error, repeatability error, and calibration uncertainty at room temperature.

### Operating Environment

- **Operating temperature**: −40 ... +60 °C (−40 ... +140 °F)
- **Storage temperature**: −40 ... +60 °C (−40 ... +140 °F)
- **Operating humidity**: Non-condensing
- **EMC compliance**: EN/IEC 61326-1, Electrical equipment for measurement, control and laboratory use - industrial environment

### Mechanical Specifications

- **IP rating**: IP32
- **Dimensions (H × W × D)**: 97.3 × 68.4 × 28.1 mm (3.83 × 2.69 × 1.10 in)
- **Weight**: 90 g (3.2 oz)
- **Materials**
  - Housing cover: Plastic ABS/PC blend
  - Mounting plate: Aluminum

### Inputs and Outputs

- **Supply voltage**: 10 ... 30 VDC
- **Supply voltage control**: With TTL-level (Transistor-Transistor Logic) trigger
- **Supply voltage sensitivity**: Negligible
- **Average power consumption**: 0.10 W at 12 V
- **Output voltage**: 0 ... 2.5 VDC
- **Output frequency**: 500 ... 1100 Hz
- **Pressure connector**: M5 (10 ... 32) internal thread
- **Pressure fitting**: Barbed fitting for ⅛ in
- **Minimum pressure limit**: 0 hPa abs
- **Maximum pressure limit**: 2000 hPa abs
- **Electrical connector**: A removable connector for 5 wires (AWG 28 ... 16)
- **Terminals**
  - Pin 1: External triggering
  - Pin 2: Signal ground
  - Pin 3: Supply ground
  - Pin 4: Supply voltage
  - Pin 5: Voltage/Frequency output

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**VAISALA**

www.vaisala.com

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SPH10/20 Static Pressure Heads minimize the effects of wind on barometric pressure readings.

Wind induced effects are one of the main sources of error when measuring barometric pressure. Variations due to strong and gusty wind can be overcome by using a static pressure head to reduce the effect of dynamic pressure. Vaisala Static Pressure Head Series SPH10/20 are designed to minimize the errors caused by wind. Their wind tunnel tested structure is both horizontally and vertically symmetrical. This design ensures reliable barometric pressure measurements in all weather.

Ideal for Outdoor Installations

Vaisala static pressure heads are available in two models: Vaisala Static Pressure Head SPH10 is a basic version, and Vaisala Static Pressure Head SPH20 is a heated version for reliable operation in snowy and icy conditions. The heated SPH20 contains a thermostat that switches on the warming power at temperatures where the risk of icing may occur.

Composed of ultraviolet stabilized PC plastics and offshore aluminum, SPH10/20 static pressure heads are durable and weather resistant.

SPH10/20 protects against rain and condensed water. This prevents capillary condensation of a water column in the pressure channel resulting in a pressure error. The drain holes in the lower plate allow rain and water to flow out. The static pressure heads have internal netting that prevents insects and debris from blocking the pressure channel.

Carefree Maintenance

SPH10/20 static pressure heads are easy to install and disassemble, service, and clean – even at the installation site. Vaisala BAROCAP® Digital Barometer PTB210 can be installed directly on top of SPH10/20 static pressure heads. Other barometers can be connected to the heads with pressure tubing. SPH10 and SPH20 are a perfect pair for all Vaisala barometers. They ensure an accurate and reliable measurement in all weather conditions.

Features

- Minimizes wind induced error
- Reliable barometric pressure measurement in all weather
- Wind tunnel tested structure
- Easy to clean
- Easy to install

SPH10/20 is easy to install and connect. In the picture, SPH10 is connected to PTB210.
Technical Data

Operating Environment
Operating temperature -60 ... +80 °C (-76... +176 °F)

Mechanical Specifications
Weight
- SPH10: 800 g (1.76 lb)
- SPH20: 1360 g (3.0 lb)
Materials
- PC plastic, offshore aluminium
Mounting
- With 2 bolts (M6 × 20 mm min.)
Hose connection
- Barbed fitting for 4 mm i.D. hose or Rp1/4 thread (parallel)

Dimensions in mm (inches)

SPH20 Inputs and Outputs

Electrical connections M12 connector
Power supply
- Factory setting: 12 V
- Changed connection: 24 V
Power consumption during heating 70 W

Thermostat Switching Temperature
On
- +4 °C (±3 °C)
- +39.2 °F (±4.4 °F)
Off
- +13 °C (±3 °C)
- +55.4 °F (±4.4 °F)