Барометрические датчики давления DELTA OHM HD9408.3B

Технические характеристики

HD 9408.3B

◉ [GB] Characteristics

- High accuracy temperature-compensated sensor with excellent stability
- Wide temperature operating range
- Various output options available (depending on model): analogue as current or voltage signal, digital as RS232, RS422, RS485, SDI-12
- Standard protocols: MODBUS-RTU, NMEA, SDI-12
- Watertight housing IP 67

Applications

- Weather stations (AWOS – Automated Weather Observing Systems)
- Environmental monitoring
- Measurement labs
- Vehicle emission test locations
- Clean room monitoring
- Determination of combustion engines performance

Description

HD9408.3B is a barometric transmitter that uses a piezoresistive high accuracy and temperature-compensated sensor. It allows to measure the atmospheric pressure in the range from 500...1200 hPa, providing extreme accuracy and time stability, with excellent repeatability, low hysteresis, and excellent temperature behavior.
The superior performance are obtained thanks to the employment of a piezoresistive Silicon sensor that integrates both a pressure sensitive as well as a temperature sensitive element. The measurement of pressure and temperature are processed by a microprocessor to obtain an output signal that is compensated over the transmitter's whole, wide temperature operating range of -40...+85°C.

The sensor is factory calibrated at several points and at different temperatures in the range of use.
The transmitter is available in three versions which differ in the output type:
- **HD9408.3B.1**: configurable 0…5 V or 1…5 V analogue voltage output and digital RS232, RS422 or RS485 output. Standard MODBUS-RTU and NMEA 0183 protocols.
- **HD9408.3B.2**: active configurable 0…20 mA or 4…20 mA current output and digital RS232, RS422 or RS485 output. Standard MODBUS-RTU and NMEA 0183 protocols.
- **HD9408.3B.3**: Digital SDI-12 output, compatible with version 1.3 of the protocol.
The digital output enables the transmission of the measurements over long distances and connects the transmitter to sensor networks.
The pressure measured and transmitted with MODBUS RTU and SDI-12 protocols can be expressed in different user-selectable measuring units.
The watertight housing with **IP 67** protection degree allows the use of the instrument even in harsh environments.
The instrument is particularly suitable for meteorological applications (AWOS - Automated Weather Observing Systems), environmental monitoring systems, meteorological and environmental data logging, measurement laboratories, atmospheric pressure compensation in the performance of internal combustion engines, barometric pressure compensation in clean rooms, vehicle emission test.
Its low power consumption makes it ideal for remote acquisition systems such as automatic weather stations powered by solar cells.
DC power supply 10…30 Vdc.

Technical specifications

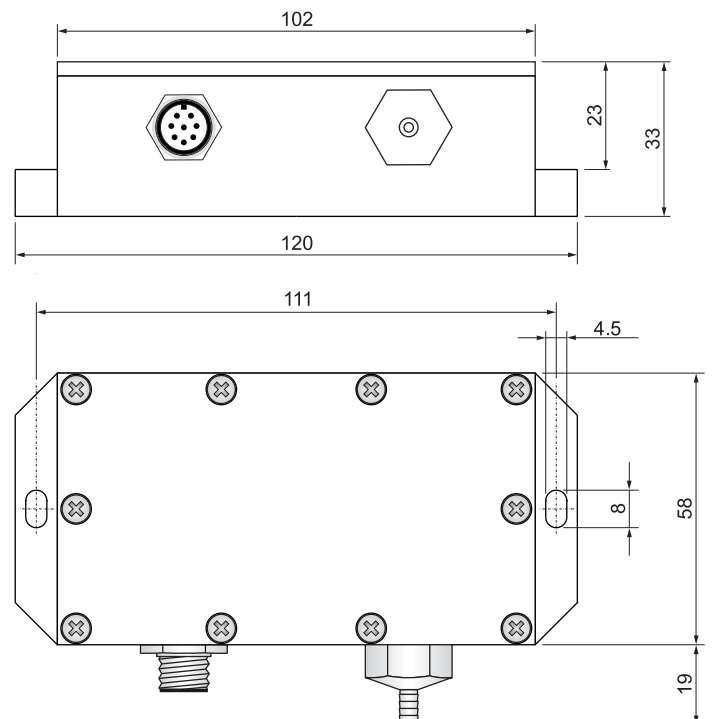| Sensor	High accuracy piezoresistive
Measuring range	500...1200 hPa (analog output) / 0...1350 hPa (digital outputs)
Resolution	0.01 hPa
Accuracy	±0.1 hPa (500...1200 hPa)/±0.2 hPa (remain. range) @ 23 °C ±0.3 hPa (500...1200 hPa)/±0.4 hPa (rem. range)@T=full range
Measuring units available with Modbus and SDI-12	Pa, hPa, kPa, mbar, bar, atm, psi, mmHg, inHg, mmH_2O, ftH_2O, kg/cm^2, Torr.
Long term stability@ 25 °C	0.25 hPa/year
Output signal	• **RS485 digital output** with standard MODBUS-RTU and NMEA protocols and Delta OHM proprietary protocol (only HD9408.3B.1 and HD9408.3B.2) • **RS422 digital output** with standard MODBUS-RTU and NMEA protocols and Delta OHM proprietary protocols (only HD9408.3B.1 and HD9408.3B.2) • **RS232** digital output with standard NMEA protocol and Delta OHM proprietary protocol (only HD9408.3B.1 and HD9408.3B.2) • **SDI-12** digital output (only HD9408.3B.3) • **Analog voltage** output 0…5 /1…5 V (only HD9408.3B.1) • **Analog active current** output 0…20/4…20 mA (only HD9408.3B.2)
Warm-up time	2 s approx. from powering
Measuring period	16 ms for HD9408.3B.1 and HD9408.3B.2 (in the HD9408.3B.3, the measurement is made upon user request)
Overpressure limit	3 x f.s.
Compatible media	Only dry air and non corrosive gases
Power supply	10…30 Vdc
Absorption	< 10 mA @ 12 Vdc for HD9408.3B.1 and HD9408.3B.2 < 200 µA @ 12 Vdc for HD9408.3B.3 (average consumption between two subsequent measurements)
Pressure connection	Ø 5 mm flexible tube
Electrical connections	M12
Operating conditions	-40...+85 °C / 0…100% RH
Storage temperature	-40...+85 °C
Dimensions	120 x 77 x 33 mm
Housing material	Anticorodal
Protection degree	IP67

Fig. 1: dimensions (mm)

Installation

The sensor and electronics are housed in a sturdy metal housing with IP 67 degree of protection. The transmitter can be mounted in any position, but typically is attached to a vertical wall with the outlet pressure facing downward. The two holes on the housing's sides allow you to secure the base of the transmitter directly to a panel or a wall. See Figure 1 for the dimensions of the mounting holes.

Electrical connections of the models HD9408.3B.1 and HD9408.3B.2

The transmitters HD9408.3B.1 and HD9408.3B.2 have an 8-pole M12 male connector. **On request, CP18… with flying 8-pole M12 female M12 connector and 2 or 5 m standard length are available (other lengths on request).**

Fig. 2: cable CP18…

Male M12 connector of the transmitter

Cable CP18...

Numbering on the cable wires
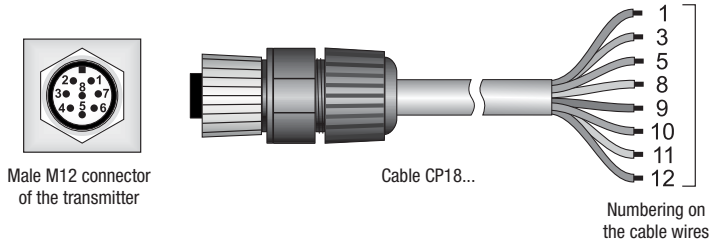
TAB. 1: connections of HD9408.3B.1 and HD9408.3B.2

Connector numbering	Function		12-pole cable numbering
	Symbol	Description	
1	PWR-	Power Negative / serial grounding	12
2	PWR+	Power Positive	1
3	RX-	Rx- for RS422	3
4	TX-	Tx per RS232/ Tx- per RS422 / DATA- for RS485	9
5	TX+	Tx+ per RS422 / DATA+ for RS485	5
6	RX+	Rx per RS232/ Rx+ per RS422	8
7	AGND	Analog output Negative	10
8	AOUT	Analog output Positive	11

RS485 connection

The RS485 connection of the transmitter is made over a screened twisted-pair cable for the signals and a third grounding wire. At the beginning and at the end of each segment you should apply the line terminator. To polarize the line during periods of non-transmission, use resistors connected between the signal lines and the power supply. The maximum number of devices that can be connected to the (Bus) line 485 depends on the load characteristics of the devices to be connected. The RS485 standard requires that the total load does not exceed 32 unit loads. The load of a transmitter is equal to 1 unit load. If the total load is greater than 32 unit loads, divide the network into segments and then put a signal repeater between a segment and the next. At the beginning and end of each segment of the line, terminations should be applied. The RS485 output of the transmitter is not isolated.
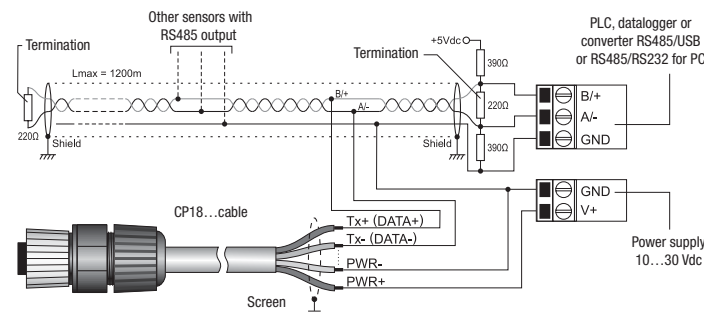

Fig. 3: RS485 output connection

RS422 connection

The RS422 standard is used for the point-to-point connection over long distances. The instrument is connected to the PC by means of a screened cable with two twisted-pair cables for the signals and an additional wire for grounding. It is necessary to provide for line terminations at the ends of the connections.
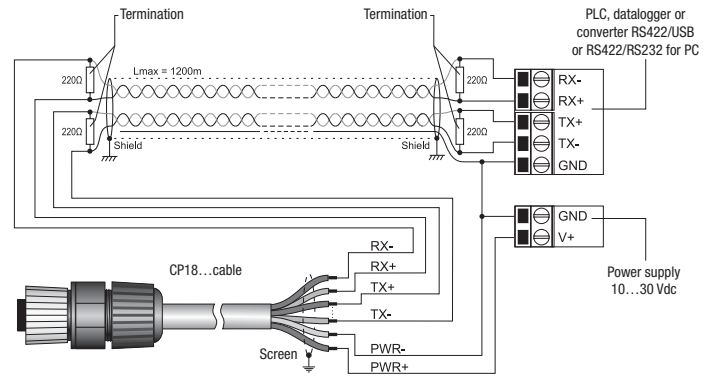

Fig. 4: RS422 connection

RS232 connection

The length of RS232 cables should not exceed 15 m. If the PC is not fitted with RS232 serial ports, it is possible to interpose the RS52 (optional) adapter cable with integrated USB/RS232 converter between instrument and PC.
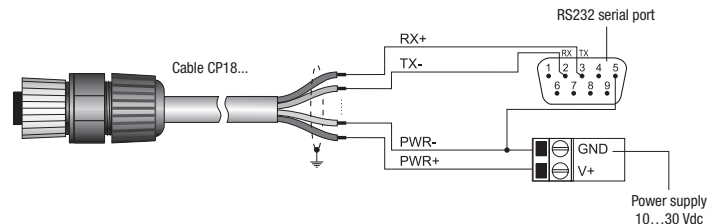

Fig. 5: connection of RS232 output

Connection of the analog output
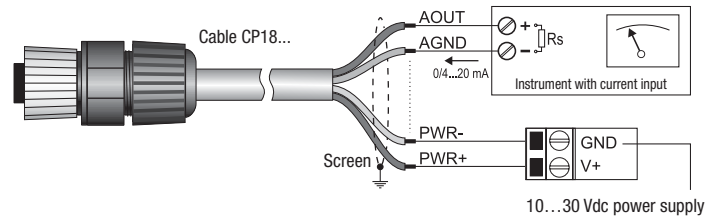
Fig. 6: connection of the active 0…20/4…20 mA analog output

In case of analog current output, the maximum shunt resistance Rs of the receiver depends on the power supply: Rs ≤ 100 Ω @ 12V,   Rs ≤ 700 Ω @ 24V.
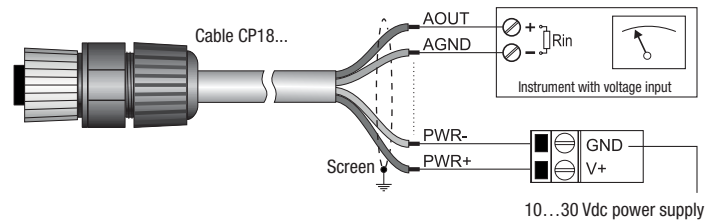
Fig. 7: connection of analog 0…5/1…5 V voltage output

In case of analog voltage output, the input resistance Rin of the receiver should be at least 100 kΩ.

Electrical connections of the model HD9408.3B.3

The transmitter HD9408.3B.3 has a 4-pole M12 male connector. **On request**, **CPM12AA4… cables with flying 4-pole M12 connector with 2 or 5 m standard length are available (other lengths on request)**.

M12 male connector of the transmitter

Cable CP12AA4...

Blue (1)
Red (2)
Black (3)
White (4)
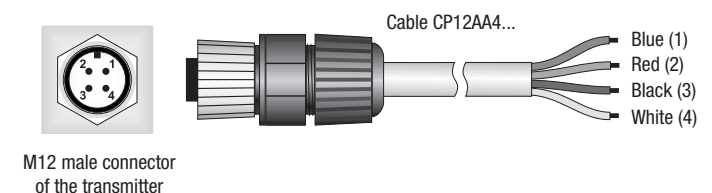
Fig. 8: CPM12AA4… cable

TAB. 2: connections of HD9408.3B.3

Connector numbering	Function		Color
	Symbol	Description	
1	PWR-	Power Negative / serial grounding	Blue
2	PWR+	Power Positive	Red
3		Screen	Black
4	SDI	SDI-12 data line	White

SDI-12 Connection

The standard SDI-12 foresees three connection wires: +12V power supply, data line, and grounding. It is possible to connect up to 10 sensors in parallel. The connection cable should not exceed 60m length.

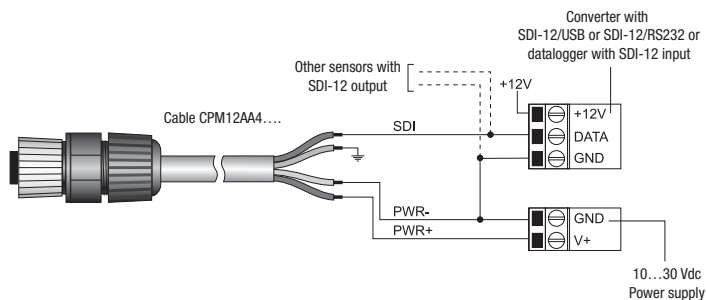Converter with SDI-12/USB or SDI-12/RS232 or datalogger with SDI-12 input

Other sensors with SDI-12 output

Cable CPM12AA4….

+12V

SDI

+12V
DATA
GND

PWR-
PWR+

GND
V+

10…30 Vdc Power supply

Fig. 9: SDI-12 connection

Selection of the physical interface and protocol

The models HD9408.3B.1 and HD9408.3B.2 allow to select the type of digital output (RS232, RS422 or RS485) on hardware level, by means of a dip switch on the electronic board, or at software level, by means of an appropriate serial command. The choice of the protocol is always done through a serial command. The selected protocol must be compatible with the selected physical interface, as reported in table 3.

TAB. 3: compatibility of physical interface /protocols in models HD9408.3B.1 and HD9408.3B.2

		Physical Interface		
		RS232	RS422	RS485
Protocol	Delta OHM Proprietary	✓	✓	✓
	MODBUS-RTU		✓	✓
	NMEA 0183	✓	✓	✓

Selectable measuring units

The pressure measured and transmitted via the digital output with MODBUS RTU and SDI-12 standard protocols can be expressed in a user selectable measuring unit between: Pa, hPa, kPa, mbar, bar, atm, psi, mmHg, inHg, mmH2O, ftH2O, kg/cm2, Torr. The default unit is hPa. The unit setting is done with a serial command. Table 4 shows the resolution of the measurement as a function of the selected unit.

TAB. 4: Measuring unit and resolution

Measuring unit	Resolution
Pa	1 Pa
hPa	0.01 hPa
kPa	0.001 kPa
mbar	0.01 mbar
bar	0.00001 bar
atm	0.00001 atm
psi	0.0001 psi
mmHg	0.001 mmHg
inHg	0.0001 inHg
mmH_2O	$0.1\ mmH_2O$
ftH_2O	$0.0001\ ftH_2O$
kg/cm^2	$0.00001\ kg/cm^2$
Torr	0.001 Torr

With the NMEA 0183 standard protocol, the pressure value is transmitted in two fixed units: **Pa** and **bar**.
With the Delta OHM proprietary protocol, the pressure is transmitted in the two fixed units **mbar** and **psi.**

Configurable analog output

The factory pre-set of the analog output of models HD9408.3B.1 and HD9408.3B.2 is such as to correspond to the measurement range of 500 ... 1200 hPa. It is possible to configure the analog output so as to correspond to a different measuring range. It is also possible to reverse the operation of the analog output, to obtain an output signal that decreases with increasing of the measured pressure, and add or remove an offset to the minimum value of the output signal to pass from the range 0...5 V or 0... 20mA to the range 1...5 V or 4...20 mA. The configuration of the analog output is done via serial commands.

ORDERING CODES

HD9408.3B.1: Precision barometric transmitter. Measuring range 500…1200 hPa. Accuracy ± 0.1 hPa @ 23 °C in the range 500...1200 hPa.
Configurable voltage output signal 0…5 V or 1…5 V. Digital RS232, RS422 or RS485 output. Standard MODBUS-RTU and NMEA protocols. Power supply 10…30 Vdc. IP 67 housing. Provided with flying 8-pole M12 connector. **The cable CP18… with flying female 8-pole M12 connector has to be ordered separately.**

HD9408.3B.2: Precision barometric transmitter. Measuring range 500…1200 hPa. Accuracy ± 0.1 hPa @ 23 °C in the range 500...1200 hPa. Configurable active current 0…20 mA or 4…20 mA output. Digital RS232, RS422 or RS485 output. Standard MODBUS-RTU and NMEA protocols. Power supply 10…30 Vdc. IP 67 housing. Provided with flying 8-pole M12 connector. **The cable CP18… with flying female 8-pole M12 connector has to be ordered separately.**

HD9408.3B.3: Precision barometric transmitter. Measuring range 500…1200 hPa. Accuracy ± 0.1 hPa @ 23 °C in the range 500...1200 hPa. SDI-12 digital output. IP 67 housing. Provided with flying 4-pole M12 connector.
The cable CPM12AA4... with flying female 4-pole M12 connector has to be ordered separately.

Accessories

CP18.2: 12-pole cable. Length 2m. 8-pole M12 connector on one end, open wires on the other side. For HD9408.3B.1 and HD9408.3B.2 transmitters

CP18.5: 12-pole cable. Length 5m. 8-pole M12 connector on one end, open wires on the other side. For HD9408.3B.1 and HD9408.3B.2 transmitters

CPM12AA4.2: 4-pole cable. Length 2m. 4-pole M12 connector on one end, open wires on the other side. For HD9408.3B.3 transmitter.

CPM12AA4.5: 4-pole cable. Length 5m. 4-pole M12 connector on one end, open wires on the other side. For HD9408.3B.3 transmitter.

RS48: Cable for RS485 connection with built-in USB/RS485 converter. The cable has USB connector for PC and 3 separate wires for the instruments. The cable is used to configure HD9408.3B.1 and HD9408.3B.2 transmitters before the installation. Length 2m.

RS52: Serial connection cable with built-in USB/RS232 converter. USB connector for the PC and screw terminals on the instrument side. The cable is used to configure HD9408.3B.1 and HD9408.3B.2 transmitters before the installation. Length 1.5m.

Архангельск (8182)63-90-72
Астана (7172)727-132
Астрахань (8512)99-46-04
Барнаул (3852)73-04-60
Белгород (4722)40-23-64
Брянск (4832)59-03-52
Владивосток (423)249-28-31
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Вологда (8172)26-41-59
Воронеж (473)204-51-73
Екатеринбург (343)384-55-89
Иваново (4932)77-34-06

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Набережные Челны (8552)20-53-41
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Орел (4862)44-53-42
Оренбург (3532)37-68-04
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Симферополь (3652)67-13-56
Смоленск (4812)29-41-54
Сочи (862)225-72-31
Ставрополь (8652)20-65-13
Таджикистан (992)427-82-92-69

Сургут (3462)77-98-35
Тверь (4822)63-31-35
Томск (3822)98-41-53
Тула (4872)74-02-29
Тюмень (3452)66-21-18
Ульяновск (8422)24-23-59
Уфа (347)229-48-12
Хабаровск (4212)92-98-04
Челябинск (351)202-03-61
Череповец (8202)49-02-64
Ярославль (4852)69-52-93

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