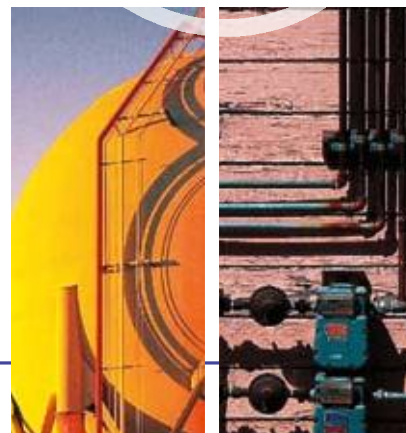




Pressure



- HD 2124.1, HD 2124.2, HD 2304.0, HD 2114.0, HD 2114.2, HD 2134.0, HD 2134.2, HD 2164.0, HD 2164.2, HD 2114B.0, HD 2114B.2 Portable manometers, barometers, thermometers	pag. 94
- DO 9704 Portable pressure and temperature meter, datalogger	pag. 101
- HD 3604T..., HD 36V4T... Absolute or relative pressures transmitters, with DIN 43650 connectors, stainless steel membrane	pag. 105
- HD 2004T..., HD 20V4T... Absolute or relative pressures transmitters, DIN 43650 connectors, alumina membrane	pag. 107
- HD 408T, HD 4V8T Relative or differential pressures transmitters	pag. 109
- HD 404T Very low relative or differential pressures transmitters	pag. 111
- HD 9408T BARO, HD 9408TR BARO, HD 9908T BARO Barometric (pressure) transmitters	pag. 114
- HD 9408PS 50 Static port for barometric measures	pag. 116
•SIT Centre 124 accredited laboratory for Pressure	pag. 118



HD2124.1 AND HD2124.2 MANOMETER-THERMOMETER

HD2124.1 and **HD2124.2** are **two inputs** portable instruments with a large LCD display. They perform measure of absolute, relative, differential pressure and temperature. In order to measure the pressure you use the electronic module PP471 that works as an interface between the instrument and Delta Ohm probes series TP704 and TP705. Temperature is measured by means of Pt100 with SICRAM module or direct 4 wires Pt100 probes for immersion, penetration, contact or air. Temperature probes are equipped with SICRAM module and factory calibration data are stored inside so that when the instrument is on it soon recognizes them. The HD2124.2 is a data logger. It stores up to 32.000 samples which can be transferred into a PC connected to the instrument through a multi-standard RS232C serial port and a USB 2.0. It is possible to configure the storage interval, the printing and the baud rate by the menu. The models HD2124.1 and HD2124.2 are equipped with RS232C serial port and they can transfer the acquired measures, in real time, into a PC or a portable printer. Functions Max, Min and Avg calculate maximum, minimum and average values. Further functions are: REL relative measure, HOLD and automatic switching-off system, excludable.
Instruments have IP67 protection degree.

INSTRUMENT TECHNICAL CHARACTERISTICS

Instrument

Dimensions (Length x Width x Height)	185x90x40mm
Weight	470g (complete with batteries)
Materials	ABS, rubber
Display	2x4½ characters plus symbols Visible area: 52x42mm

Operating conditions

Operating temperature	-5...50°C
Storage temperature	-25...65°C
Working relative humidity	0...90%RH without condensation
Protection degree	IP67

Power supply

Batteries	4 1.5V type AA batteries
Autonomy	200 hours with 1800mAh alkaline batteries

Current absorbed with instrument off Mains	20µA Output mains adapter 12Vdc / 1000mA
Measuring unit	°C - °F - Pa - hPa - mbar - bar - atm mmHg - mmH ₂ O - kgf/cm ² - PSI - inchHg
Security of data stored	Unlimited, independently of battery charge conditions
Time	
Date and time	Schedule in real time
Precision	1min/month max departure
Measured values storage - model HD2124.2	
Type	2000 pages of 16 samples each
Quantity	32,000 pairs of samples
Storage interval	1s...3600s (1hour)
Serial interface RS232C	
Type	RS232C electrically isolated
Baud rate	Can be set from 1200 to 38400 baud
Data bit	8
Parity	None
Stop bit	1
Flow Control	Xon/Xoff
Serial cable length	Max 15m
Immediate print interval	1s...3600s (1hour)
USB interface - model HD2124.2	
Type	1.1 - 2.0 electrically isolated
Connections	
Input module for the probes	2 8-pole male DIN45326 connectors
Serial interface	8-pole MiniDin connector
USB interface - model HD2124.2	8-pole MiniDin connector
Mains adapter	2-pole connector (positive at centre)
Measurement of temperature by Instrument	
Pt100 measurement range	-200...+650°C
Resolution	0.1°C
Instrument accuracy	±0.1°C
Drift after 1 year	0.1°C/year

TECHNICAL DATA FOR INSTRUMENT EQUIPPED WITH PROBES AND MODULES

Measurement of pressure by module PP471

All TP704 and TP705 series Delta Ohm probes can be connected to the PP471 module. For the technical characteristics of the single probes, see the table below.

Technical characteristics

Accuracy	±0.05% of bottom scale
Peak duration	≥ 5ms
Peak accuracy	±0.5% of bottom scale
Peak dead band	≤ 2% of bottom scale

Pt100 sensor temperature probes with SICRAM module

Model	Type	Application field	Accuracy
TP472I	Immersion	-196°C...+500°C	±0.25°C (-196°C...+350°C) ±0.4°C (+350°C...+500°C)
TP472I.0	Immersion	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP473P	Penetration	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP473P.0	Penetration	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP474C	Contact	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP474C.0	Contact	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP475A.0	Air	-50°C...+250°C	±0.3°C (-50°C...+250°C)
TP472I.5	Immersion	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP472I.10	Immersion	-50°C...+400°C	±0.30°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP49A	Immersion	-70°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP49AC	Contact	-70°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP49AP	Penetration	-70°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP875	Globe-thermometer Ø150mm	-30°C...+120°C	±0.25°C
TP876	Globe-thermometer Ø 50mm	-30°C...+120°C	±0.25°C
TP87	Immersion	-50°C...+200°C	±0.25°C
TP878 TP878.1	Solar panel	+5°C...+80°C	±0.25°C
TP879	For compost	-20°C...+120°C	±0.25°C

Common specifications

Temperature drift @20°C	0.003%/°C
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4 wires Pt100 and 2 wires Pt1000 Probes

Model	Type	Application field	Accuracy
TP47.100	4 wires Pt100	-50...+400°C	Class A
TP47.1000	2 wires Pt1000	-50...+400°C	Class A

Common specifications

Temperature drift @20°C

Pt100	0.003%/°C
Pt1000	0.005%/°C

ORDER CODES

HD2124.1: The kit consists of instrument HD2124.1, 4 per 1.5V alkaline batteries, instruction manual, case and DeltaLog9 software. **Probes, PP471 module and cables have to be ordered separately.**

HD2124.2: The kit consists of instrument HD2124.2 data logger, 4 per 1.5V alkaline batteries, instruction manual, case and DeltaLog9 software. **Probes, PP471 module and cables have to be ordered separately.**

HD2110CSNM: 8-pole connection cable MiniDin - Sub D 9-pole female for RS232C.

C.206: Cable for instruments of the series HD21...1 and .2 to connect directly to USB input of PC.

HD2101/USB: Connection cable USB 2.0 connector type A - 8-pole MiniDin.

DeltaLog9: Software for download and management of the data on a PC using Windows 98 to XP and Vista operating systems.

SWD10: Stabilized power supply at 230Vac/12Vdc-300mA-1000mA mains voltage.

HD40.1: Upon request, portable, serial input, 24 column thermal printer, 58mm paper width.

PROBES FOR MASURING PRESSURE

Probes equipped with SICRAM module

PP471: Interfacing SICRAM module between instrument and Delta Ohm probes of the series TP704 and TP705. Cable 2 meters long.

The list of pressure probes is outlined in the technical data table.

PROBES FOR MEASURING TEMPERATURE

Probes equipped with SICRAM module

TP472I: Immersion probe, Pt100sensor. Stem Ø 3 mm, length 300 mm. Cable 2 meters long.

TP472I.0: Immersion probe, Pt100sensor. Stem Ø 3 mm, length 230 mm. Cable 2 meters long.

TP473P: Penetration probe, Pt100sensor. Stem Ø 4mm, length 150 mm. Cable 2 meters long.

TP473P.0: Penetration probe, Pt100sensor. Stem Ø 4mm, length 150 mm. Cable 2 meters long.

TP474C: Contact probe, Pt100sensor. Stem Ø 4mm, length 230mm, contact surface Ø 5mm. Cable 2 meters long.

TP474C.0: Contact probe, Pt100sensor. Stem Ø 4mm, length 230mm, contact surface Ø 5mm. Cable 2 meters long.

TP475A.0: Air probe, Pt100sensor. Stem Ø 4mm, length 230mm. Cable 2 meters long.

TP472I.5: Immersion probe, Pt100sensor. Stem Ø 6mm, length 500 mm. Cable 2 meters long.

TP472I.10: Immersion probe, Pt100sensor. Stem Ø 6mm, length 1,000mm. Cable 2 meters long.

TP49A: Immersion probe, Pt100sensor. Stem Ø 2.7mm, length 150mm. Cable 2 meters long. Aluminium handle.

TP49AC: Contact probe, Pt100sensor. Stem Ø 4 mm, length 150mm. Cable 2 meters long. Aluminium handle.

TP49AP: Penetration probe, Pt100sensor. Stem Ø 2.7mm, length 150mm. Cable 2 meters long. Aluminium handle.

TP875: Globe thermometer Ø 150 mm with handle. Cable 2 meters long.

TP876: Globe thermometer Ø 50 mm with handle. Cable 2 meters long.

TP87: Immersion probe, Pt100sensor. Stem Ø 3 mm, length 70 mm. Cable 2 meters long.

TP878: Contact probe for solar panels. Cable 2 meters long.

TP878.1: Contact probe for solar panels. Cable 5 meters long

TP879: Penetration probe for compost. Stem Ø 8 mm, length 1 meter. Cable 2 meters long.

Temperature probes without SICRAM

TP47.100: Direct 4 wires Pt100 sensor immersion probe. Stem Ø 3 mm, length 230mm. 4 wires connection cable with connector, 2 meters long.

TP47.1000: Pt1000 sensor immersion probe. Stem Ø 3 mm, length 230mm. 2 wires connection cable with connector, 2 meters long.

TP47: Only connector for probe connection: direct 3 and 4 wires Pt100, 2 wires Pt1000.



HD2124.2



HD2101/USB

Pressure

PRESSURE PROBE TABLE

Bottom scale pressure	Maximum overpressure	Resolution	ORDER CODES			Accuracy From 20 to 25°C	Working temperature	Connection
			Differential pressure	Relative pressure (compared to atmosphere)	Absolute pressure			
			NON insulated membrane	Insulated membrane	Insulated membrane			
10.0 mbar	20.0 mbar	0.01 mbar	• TP705-10MBD			0.5 % FSO	0..60 °C	Tube Ø 5 mm
20.0 mbar	40.0 mbar	0.01 mbar	• TP705-20MBD			0.5 % FSO	0..60 °C	Tube Ø 5 mm
50.0 mbar	100 mbar	0.01 mbar	TP705-50MBD			0.5 % FSO	0..60 °C	Tube Ø 5 mm
100 mbar	200 mbar	0.1 mbar	TP705-100MBD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
				TP704-100MBGI		0.25 % FSO	-10..+80 °C	¼ BSP
200 mbar	400 mbar	0.1 mbar	TP705-200MBD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
				TP704-200MBGI		0.25 % FSO	-10..+80 °C	¼ BSP
400 mbar	1000 mbar	0.1 mbar		TP704-400MBGI		0.25 % FSO	-10..+80 °C	¼ BSP
500 mbar	1000 mbar	0.1 mbar	TP705-500MBD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
600 mbar	1000 mbar	0.1 mbar		TP704-600MBGI		0.25 % FSO	-40..125 °C	¼ BSP
			TP705-1BD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
1.00 bar	2.00 bar	1 mbar			TP705BARO	0.25 % FSO	0..60 °C	Tube Ø 5 mm
						0.25 % FSO	-40..125 °C	¼ BSP
					TP704-1BA	0.25 % FSO	-40..120 °C	¼ BSP
			TP705-2BD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
2.00 bar	4.00 bar	1 mbar		TP704-2BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-2BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
5.00 bar	10.00 bar	1 mbar		TP704-5BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-5BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
10.00 bar	20.0 bar	0.01 bar		TP704-10BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-10BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
20.0 bar	40.0 bar	0.01 bar		TP704-20BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-20BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
50.0 bar	100.0 bar	0.01 bar		TP704-50BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-50BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
100 bar	200 bar	0.1 mbar		TP704-100BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-100BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
200 bar	400 bar	0.1 mbar		TP704-200BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-200BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
500 bar	1000 bar	0.1 mbar		TP704-500BGI		0.25 % FSO	-40..+125 °C	¼ BSP
	700 bar	0.1 mbar			TP704-500BAI *	0.25 % FSO	-25..+85 °C	¼ BSP

* Ceramic diaphragm

• Only report of calibration, no SIT certificate



HD2304.0 MANOMETER - THERMOMETER

The **HD2304.0** is a portable instrument with a large LCD display. It performs measurements of absolute, relative and differential pressure, and temperature. The PP471 electronic module is used to measure the pressure. The PP471 electronic module works as an interface between the instrument and the TP704 and TP705 series Delta Ohm probes. The temperature is detected with immersion, penetration, contact or air Pt100 probes with SICRAM module or 4 wire direct Pt100 probes. The temperature probes are fitted with SICRAM module and the factory calibration settings are already memorized inside. Upon turning on the instrument automatically detects them. The Max, Min and Avg function calculate the maximum, minimum or average values. Other functions include: the relative measurement REL, the HOLD function, and the automatic turning off that can also be excluded. **The instrument has IP67 protection degree.**

INSTRUMENT TECHNICAL SPECIFICATIONS

Instrument

Dimensions (Length x Width x Height)	140x88x38mm
Weight	160g (complete with batteries)
Materials	ABS
Display	2x4½ characters plus symbols Visible area: 52x42mm



HD2304.0



PP471

Operating conditions

Operating temperature	-5...50°C
Storage temperature	-25...65°C
Working relative humidity	0...90%RH without condensation
Protection degree	IP67

Power

Batteries	3 1.5V type AA batteries
Autonomy	200 hours with 1800mAh alkaline batteries
Power absorbed with instrument off	< 20µA

Measuring unit

°C - °F - Pa - hPa - kPa - mbar - bar - atm mmHg
- mmH₂O - kgf/cm² - PSI - inchHg

Connections

Input module for the probes	8-pole male DIN45326 connector
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Measurement of temperature by Instrument

Pt100 measurement range	-200...+650°C
Resolution	0.1°C
Instrument accuracy	±0.1°C
Drift after 1 year	0.1°C/year

TECHNICAL SPECIFICATIONS OF PROBES AND MODULES IN LINE WITH THE INSTRUMENTS

Measurement of pressure by module PP471

All TP704 and TP705 series Delta Ohm probes can be connected to the PP471 module. For the technical specifications of each probe see the table below.

Technical specifications

Accuracy	±0.05% of full scale
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Pt100 sensor temperature probes equipped with SICRAM module

Model	Type	Application field	Accuracy
TP472I	Immersion	-196°C...+500°C	±0.25°C (-196°C...+350°C) ±0.4°C (+350°C...+500°C)
TP472I.0	Immersion	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP473P	Penetration	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP473P.0	Penetration	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP474C	Contact	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP474C.0	Contact	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP475A.0	Air	-50°C...+250°C	±0.3°C (-50°C...+250°C)
TP472I.5	Immersion	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP472I.10	Immersion	-50°C...+400°C	±0.30°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP49A	Immersion	-70°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP49AC	Contact	-70°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP49AP	Penetration	-70°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP875	Globe-thermometer Ø150mm	-30°C...+120°C	±0.25°C
TP876	Globe-thermometer Ø 50mm	-30°C...+120°C	±0.25°C
TP87	Immersion	-50°C...+200°C	±0.25°C
TP878 TP878.1	Solar panel	+5°C...+80°C	±0.25°C
TP879	For compost	-20°C...+120°C	±0.25°C

Common characteristics

Temperature drift @20°C	0.003%/°C
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TP704...

TP705...

4 wire Pt100 and 2 wire Pt1000 probes without SICRAM module

Model	Type	Application range	Accuracy
TP47.100	Pt100 4 wires	-50...+400°C	Class A
TP47.1000	Pt1000 2 wires	-50...+400°C	Class A

Common specifications

Temperature drift @20°C

Pt100	0.003%/°C
Pt1000	0.005%/°C

ORDER CODES

HD2304.0: The kit consists of the instrument HD2304.0, 1 **SICRAM interface module PP471**, 3 1.5V alkaline batteries, operating manual, case. **Probes have to be ordered separately.**

PRESSURE MEASUREMENT PROBES

Probes equipped with SICRAM module

PP471: Interfacing SICRAM module between instrument and Delta Ohm probes of the series TP704 and TP705. Cable 2 meters long.

The list of pressure probes is outlined in the technical data table.

TEMPERATURE MEASUREMENT PROBES

Probes equipped with SICRAM module

TP472I: Immersion probe, Pt100sensor. Stem Ø 3 mm, length 300 mm. Cable 2 meters long.

TP472I.0: Immersion probe, Pt100sensor. Stem Ø 3 mm, length 230 mm. Cable 2 meters long.

TP473P: Penetration probe, Pt100sensor. Stem Ø 4mm, length 150 mm. Cable 2 meters long.

TP473P.0: Penetration probe, Pt100sensor. Stem Ø 4mm, length 150 mm. Cable 2 meters long.

TP474C: Contact probe, Pt100sensor. Stem Ø 4mm, length 230mm, contact surface Ø 5mm. Cable 2 meters long.

TP474C.0: Contact probe, Pt100sensor. Stem Ø 4mm, length 230mm, contact surface Ø 5mm. Cable 2 meters long.

TP475A.0: Air probe, Pt100sensor. Stem Ø 4mm, length 230mm. Cable 2 meters long.

TP4721.5: Immersion probe, Pt100sensor. Stem Ø 6mm, length 500 mm. Cable 2 meters long.

TP4721.10: Immersion probe, Pt100sensor. Stem Ø 6mm, length 1,000mm. Cable 2 meters long.

TP49A: Immersion probe, Pt100sensor. Stem Ø 2.7mm, length 150mm. Cable 2 meters long. Aluminium handle.

TP49AC: Contact probe, Pt100sensor. Stem Ø 4 mm, length 150mm. Cable 2 meters long. Aluminium handle.

TP49AP: Penetration probe, Pt100sensor. Stem Ø 2.7mm, length 150mm. Cable 2 meters long. Aluminium handle.

TP875: Globe thermometer Ø 150 mm with handle. Cable 2 meters long.

TP876: Globe thermometer Ø 50 mm with handle. Cable 2 meters long.

TP87: Immersion probe, Pt100sensor. Stem Ø 3 mm, length 70 mm. Cable 2 meters long.

TP878: Contact probe for solar panels. Cable 2 meters long

TP878.1: Contact probe for solar panels. Cable 5 meters long

TP879: Penetration probe for compost. Stem Ø 8 mm, length 1 meter. Cable 2 meters long.

Temperature probes without SICRAM

TP47.100: Direct 4 wires Pt100 sensor immersion probe. Stem Ø 3 mm, length 230mm. 4 wires connection cable with connector, 2 meters long.

TP47.1000: Pt1000 sensor immersion probe. Stem Ø 3 mm, length 230mm. 2 wires connection cable with connector, 2 meters long.

TP47: Only connector for probe connection: direct 3 and 4 wires Pt100, 2 wires Pt1000.



Pressure

PRESSURE PROBE TABLE

Bottom scale pressure	Maximum overpressure	Resolution	ORDER CODES			Accuracy From 20 to 25°C	Working temperature	Connection
			Differential pressure	Relative pressure (compared to atmosphere)	Absolute pressure			
			NON insulated membrane	Insulated membrane	Insulated membrane			
10.0 mbar	20.0 mbar	0.01 mbar	• TP705-10MBD			0.5 % FSO	0..60 °C	Tube Ø 5 mm
20.0 mbar	40.0 mbar	0.01 mbar	• TP705-20MBD			0.5 % FSO	0..60 °C	Tube Ø 5 mm
50.0 mbar	100 mbar	0.01 mbar	TP705-50MBD			0.5 % FSO	0..60 °C	Tube Ø 5 mm
100 mbar	200 mbar	0.1 mbar	TP705-100MBD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
				TP704-100MBGI		0.25 % FSO	-10..+80 °C	¼ BSP
200 mbar	400 mbar	0.1 mbar	TP705-200MBD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
				TP704-200MBGI		0.25 % FSO	-10..+80 °C	¼ BSP
400 mbar	1000 mbar	0.1 mbar		TP704-400MBGI		0.25 % FSO	-10..+80 °C	¼ BSP
500 mbar	1000 mbar	0.1 mbar	TP705-500MBD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
600 mbar	1000 mbar	0.1 mbar		TP704-600MBGI		0.25 % FSO	-40..125 °C	¼ BSP
			TP705-1BD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
1.00 bar	2.00 bar	1 mbar			TP705BARO	0.25 % FSO	0..60 °C	Tube Ø 5 mm
						0.25 % FSO	-40..125 °C	¼ BSP
					TP704-1BA	0.25 % FSO	-40..120 °C	¼ BSP
			TP705-2BD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
2.00 bar	4.00 bar	1 mbar		TP704-2BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-2BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
5.00 bar	10.00 bar	1 mbar		TP704-5BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-5BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
10.00 bar	20.0 bar	0.01 bar		TP704-10BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-10BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
20.0 bar	40.0 bar	0.01 bar		TP704-20BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-20BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
50.0 bar	100.0 bar	0.01 bar		TP704-50BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-50BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
100 bar	200 bar	0.1 mbar		TP704-100BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-100BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
200 bar	400 bar	0.1 mbar		TP704-200BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-200BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
500 bar	1000 bar	0.1 mbar		TP704-500BGI		0.25 % FSO	-40..+125 °C	¼ BSP
	700 bar	0.1 mbar			TP704-500BAI *	0.25 % FSO	-25..+85 °C	¼ BSP

* Ceramic diaphragm

• Only report of calibration, no SIT certificate



HD2114.0
 HD2114.2
 HD2134.0
 HD2134.2
 HD2164.0
 HD2164.2
 HD2114B.0
 HD2114B.2



**HD2114.0, HD2114.2, HD2134.0, HD2134.2, HD2164.0
 HD2164.2 MANOMETER - THERMOMETER
 HD2114B.0, HD2114B.2 BAROMETRIC - THERMOMETER**

These are portable instruments with a large LCD display. They measure absolute, relative and differential pressure, as well as temperature.

Pressure is measured using an internal module which is differential with respect to the atmosphere with fixed full scale. With the PP471 module acting as an interface, the instrument can use all the TP704 and TP705 series Delta Ohm probes to perform the measurements. **The HD2114B.0 and HD2114B.2 internal module measures the barometric pressure.**

The temperature is detected using immersion, penetration, contact or air probes, with SICRAM module or direct 4 wire probes. The sensor can be a Pt100 or Pt1000. Temperature probes are equipped with SICRAM module and factory calibration data are stored inside so that when the instrument is on it soon recognizes them.

The HD2114.2, HD2134.2, HD2164.2 and HD2114B.2 instruments are **dataloggers**. They store up to 36,000 samples which can be transferred in to a PC via the multi-standard RS232C serial port and USB 2.0. The storing interval, printing, and baud rate can be configured using the menu. They are also fitted with an RS232C serial port and can transfer the acquired measurements to a PC or to a portable printer in real time.

The **Max, Min** and **Avg** function calculates the maximum, minimum or average values. **The Peak function can be activated with external probes connected to the module PP471** and detects the presence of pressure peaks. Other functions include: the relative measurement REL, the HOLD function, and the automatic turning off which can also be excluded.

The instruments have IP67 protection degree.

INSTRUMENT TECHNICAL CHARACTERISTICS

Instrument

Dimensions (Length x Width x Height) 185x90x40mm
 Weight 470g (complete with batteries)
 Materials ABS, rubber
 Display 2x4½ digits plus symbols
 Visible area: 52x42mm

Operating conditions

Working temperature -5...50°C
 Storage temperature -25...65°C
 Working relative humidity 0...90%RH without condensation
Protection degree IP67

Power supply

Batteries 4 1.5V type AA batteries
 Autonomy 200 hours with 1800mAh alkaline batteries
 Power absorbed with instrument off 20µA
 Mains - models **HD21...4.2** Output mains adapter 9Vdc / 250mA

Measuring unit

°C - °F - Pa - hPa - kPa - mbar - bar atm - mmHg - mmH₂O - kgf/cm² - PSI inchHg

Security of logged data

Unlimited, independent of battery charge conditions

Time

Date and time Schedule in real time
 Accuracy 1min/month max departure

Measured values storage - models HD21...4.2

Type 2000 pages containing 18 samples each
 Quantity 36000 samples (pressure - temperature)
 Storage interval 1s...3600s (1hour)

Serial interface RS232C - models HD21...4.2

Type RS232C electrically isolated
 Baud rate Can be set from 1200 to 38400 baud
 Data bit 8
 Parity None
 Stop bit 1
 Flow Control Xon/Xoff
 Serial cable length Max 15m
 Immediate print interval 1s...3600s (1hour)

USB interface - models HD21...4.2

Type 1.1 - 2.0 electrically isolated

Connections

Input modules for the probes 2 quick couplings Ø 5mm
 Serial and USB interface models **HD21...4.2** 8-pole MiniDin connector
 Mains adapter - models **HD21...4.2** 2-pole connector (positive at centre)



HD2114.2



PP471

	HD2114.0	HD2134.0	HD2164.0	HD2114B.0	HD2114.2	HD2134.2	HD2164.2	HD2114B.2
Full scale	±20mbar	±200mbar	±2000mbar	600..1100mbar	±20mbar	±200mbar	±2000mbar	600..1100 mbar
Barometer	-	-	-	SI	-	-	-	SI
Datalogger	-	-	-	-	SI	SI	SI	SI
RS232C-USB	-	-	-	-	SI	SI	SI	SI
External power supply	-	-	-	-	SI	SI	SI	SI

Measurement of pressure using the internal sensor

	HD2114.0 HD2114.2	HD2134.0 HD2134.2	HD2164.0 HD2164.2	HD2114B.0 HD2114B.2
Full scale	±20mbar	±200mbar	±2000mbar	600...1100mbar
Maximum overpressure	±300mbar	±1bar	±6bar	3bar
Resolution	0.001mbar	0.01mbar	0.1mbar	0.1mbar
Accuracy @23°C	±0.3%f.s.	±(0.1%f.s.+0.1% measurement)		±0.3mbar
Working temperature	0...60°C			
Connection	quick couplings Ø5mm			
Compensation temperature	0...60°C			
Drift on zero	±1%f.s.	±0.5%f.s.	±0.5%f.s.	±0.3%f.s.
Drift on span	±1%f.s.	±0.5%f.s.	±0.5%f.s.	±0.3%f.s.
Fluid contacting the membrane	non corrosive air and gas			

Measurement of temperature by Instrument

Pt100 measurement range	-200...+650°C
Pt1000 measurement range	-200...+650°C
Resolution	0.1°C
Instrument accuracy	±0.1°C
Drift after 1 year	0.1°C/year



TECHNICAL SPECIFICATIONS OF PROBES AND MODULES IN LINE WITH THE INSTRUMENT

Pressure measurement by module PP471

All TP704 and TP705 series Delta Ohm probes can be connected to the PP471 module. See the table below for the technical specifications of the individual probes.

Technical specifications of the PP471 module

Accuracy	±0.05% of full scale
Peak duration	≥ 5ms
Peak accuracy	±0.5% of full scale
Peak dead band	≤ 2% of full scale

Pt100 sensor temperature probes using SICRAM module

Modell	Type	Application range	Accuracy
TP472I	Immersion	-196°C...+500°C	±0.25°C (-196°C...+350°C) ±0.4°C (+350°C...+500°C)
TP472I.0	Immersion	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP473P	Penetration	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP473P.0	Penetration	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP474C	Contact	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP474C.0	Contact	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP475A.0	Air	-50°C...+250°C	±0.3°C (-50°C...+250°C)
TP472I.5	Immersion	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP472I.10	Immersion	-50°C...+400°C	±0.30°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP49A	Immersion	-70°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP49AC	Contact	-70°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP49AP	Penetration	-70°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP875	Globothermometer Ø 150mm	-30°C...+120°C	±0.25°C
TP876	Globothermometer Ø 50mm	-30°C...+120°C	±0.25°C
TP87	Immersion	-50°C...+200°C	±0.25°C
TP878 TP878.1	Solar pannels	+5°C...+80°C	±0.25°C
TP879	Per compost	-20°C...+120°C	±0.25°C

Common characteristics

Temperature drift @20°C	0.003%/°C
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4 wire Pt100 and 2 wire Pt1000 probes without SICRAM module

Model	Type	Application range	Accuracy
TP47.100	Pt100 4 wires	-50...+400°C	Class A
TP47.1000	Pt1000 2 wires	-50...+400°C	Class A

Common characteristics

Temperature drift @20°C	
Pt100	0.003%/°C
Pt1000	0.005%/°C

ORDER CODES

HD2114.0: The kit consists of the HD2114.0 with built-in 20mbar full scale probe, 4 1.5V alkaline batteries, operating manual, case. **Other probes and cables have to be ordered separately.**

HD2114.2: The kit consists of the HD2114.2 datalogger with built-in 20mbar full scale probe, 4 1.5V alkaline batteries, operating manual, case and DeltaLog9 software. **Other probes and cables have to be ordered separately.**

HD2134.0: The kit consists of the HD2134.0 with built-in 200mbar full scale probe, 4 1.5V alkaline batteries, operating manual, case. **Other probes and cables have to be ordered separately.**

HD2134.2: The kit consists of the HD2134.2 datalogger with built-in 200mbar full scale probe, 4 1.5V alkaline batteries, operating manual, case and DeltaLog9 software. **Other probes and cables have to be ordered separately.**

HD2164.0: The kit consists of the HD2164.0 with built-in 2000mbar full scale probe, 4 1.5V alkaline batteries, operating manual, case. **Other probes and cables have to be ordered separately.**

HD2164.2: The kit consists of the HD2164.2 datalogger with built-in 2000mbar full scale probe, 4 1.5V alkaline batteries, operating manual, case and DeltaLog9 software. **Other probes and cables have to be ordered separately.**

HD2114B.0: The kit consists of the HD2114B.0 with 600...1100mbar range barometric sensor, 4 1.5V alkaline batteries, operating manual, case. **Other probes and cables have to be ordered separately.**

HD2114B.2: The kit consists of the HD2114B.2 datalogger with 600...1100mbar range barometric sensor, 4 1.5V alkaline batteries, operating manual, case and DeltaLog9 software. **Other probes and cables have to be ordered separately.**

HD2110CSNM: 8-pole connection cable MiniDin - Sub D 9-pole female for RS232C.

C.206: Cable for instruments of the series HD21...1 and .2 to connect directly to USB input of PC.

HD2101/USB: Connection cable USB 2.0 connector type A - 8-pole MiniDin.

DeltaLog9: Software for download and manage of the data on PC by using Windows 98 to Vista operating systems.

SWD10: Stabilized power supply at 230Vac/12Vdc-1000mA mains voltage.

HD40.1: Upon request, portable, serial input, 24 column thermal printer, 58mm paper width.

PRESSURE MEASUREMENT PROBES

PP471: SICRAM interface module between instrument and TP704 and TP705 series Delta Ohm probes. Cable length 2 metres. **The list of pressure probes is outlined in the PP471 module technical data table.**

TEMPERATURE PROBES EQUIPPED WITH SICRAM MODULE

TP472I: Immersion probe, Pt100sensor. Stem Ø 3 mm, length 300 mm. Cable 2 meters long.

TP472I.0: Immersion probe, Pt100sensor. Stem Ø 3 mm, length 230 mm. Cable 2 meters long.

TP473P: Penetration probe, Pt100sensor. Stem Ø 4mm, length 150 mm. Cable 2 meters long.

TP473P.0: Penetration probe, Pt100sensor. Stem Ø 4mm, length 150 mm. Cable 2 meters long.

TP474C: Contact probe, Pt100sensor. Stem Ø 4mm, length 230mm, contact surface Ø 5mm. Cable 2 meters long.

TP474C.0: Contact probe, Pt100sensor. Stem Ø 4mm, length 230mm, contact surface Ø 5mm. Cable 2 meters long.

TP475A.0: Air probe, Pt100sensor. Stem Ø 4mm, length 230mm. Cable 2 meters long.

TP472I.5: Immersion probe, Pt100sensor. Stem Ø 6mm, length 500 mm. Cable 2 meters long.

TP472I.10: Immersion probe, Pt100sensor. Stem Ø 6mm, length 1,000mm. Cable 2 meters long.

TP49A: Immersion probe, Pt100sensor. Stem Ø 2.7mm, length 150mm. Cable 2 meters long. Aluminium handle.

TP49AC: Contact probe, Pt100sensor. Stem Ø 4 mm, length 150mm. Cable 2 meters long. Aluminium handle.

TP49AP: Penetration probe, Pt100sensor. Stem Ø 2.7mm, length 150mm. Cable 2 meters long. Aluminium handle.

TP875: Globe thermometer Ø 150 mm with handle. Cable 2 meters long.

TP876: Globe thermometer Ø 50 mm with handle. Cable 2 meters long.

TP87: Immersion probe, Pt100sensor. Stem Ø 3 mm, length 70 mm. Cable 2 meters long.

TP878: Contact probe for solar panels. Cable 2 meters long.

TP878.1: Contact probe for solar panels. Cable 5 meters long

TP879: Penetration probe for compost. Stem Ø 8 mm, length 1 meter. Cable 2 meters long.

TEMPERATURE PROBES WITHOUT SICRAM MODULE

TP47.100: Direct 4 wire Pt100 sensor immersion probe. Probe's stem Ø 3mm, length 230mm. 4 wire connection cable with connector, length 2 metres.

TP47.1000: Pt1000 sensor immersion probe. Probe's stem Ø 3mm, length 230mm. 2 wire connection cable with connector, length 2 metres.

TP47: Only connector for probe connection: direct 3, 4 wire Pt100, 2 wire Pt1000 .



HD40.1



HD2110CSNM

PRESSURE PROBE TABLE

Bottom scale pressure	Maximum overpressure	Resolution	ORDER CODES			Accuracy From 20 to 25°C	Working temperature	Connection
			Differential pressure	Relative pressure (compared to atmosphere)	Absolute pressure			
			NON insulated membrane	Insulated membrane	Insulated membrane			
10.0 mbar	20.0 mbar	0.01 mbar	• TP705-10MBD			0.5 % FSO	0..60 °C	Tube Ø 5 mm
20.0 mbar	40.0 mbar	0.01 mbar	• TP705-20MBD			0.5 % FSO	0..60 °C	Tube Ø 5 mm
50.0 mbar	100 mbar	0.01 mbar	TP705-50MBD			0.5 % FSO	0..60 °C	Tube Ø 5 mm
100 mbar	200 mbar	0.1 mbar	TP705-100MBD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
				TP704-100MBGI		0.25 % FSO	-10..+80 °C	¼ BSP
200 mbar	400 mbar	0.1 mbar	TP705-200MBD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
				TP704-200MBGI		0.25 % FSO	-10..+80 °C	¼ BSP
400 mbar	1000 mbar	0.1 mbar		TP704-400MBGI		0.25 % FSO	-10..+80 °C	¼ BSP
500 mbar	1000 mbar	0.1 mbar	TP705-500MBD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
600 mbar	1000 mbar	0.1 mbar		TP704-600MBGI		0.25 % FSO	-40..125 °C	¼ BSP
			TP705-1BD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
1.00 bar	2.00 bar	1 mbar			TP705BARO	0.25 % FSO	0..60 °C	Tube Ø 5 mm
						0.25 % FSO	-40..125 °C	¼ BSP
					TP704-1BA	0.25 % FSO	-40..120 °C	¼ BSP
			TP705-2BD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
2.00 bar	4.00 bar	1 mbar		TP704-2BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-2BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
5.00 bar	10.00 bar	1 mbar		TP704-5BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-5BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
10.00 bar	20.0 bar	0.01 bar		TP704-10BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-10BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
20.0 bar	40.0 bar	0.01 bar		TP704-20BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-20BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
50.0 bar	100.0 bar	0.01 bar		TP704-50BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-50BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
100 bar	200 bar	0.1 mbar		TP704-100BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-100BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
200 bar	400 bar	0.1 mbar		TP704-200BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-200BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
500 bar	1000 bar	0.1 mbar		TP704-500BGI		0.25 % FSO	-40..+125 °C	¼ BSP
	700 bar	0.1 mbar			TP704-500BAI *	0.25 % FSO	-25..+85 °C	¼ BSP

* Ceramic diaphragm

• Only report of calibration, no SIT certificate



DO 9704 PRESSURE AND TEMPERATURE DATALOGGER

The Delta Ohm **DO 9704** pressure gauge and data logger has been designed for detecting pressure, flow rate and temperature, physical values which are very important in industrial and chemical processes.

The instrument has two inputs and automatically recognises the probes connected, whether they be pressure or temperature probes or turbines for measuring flow rate.

As the probes are interchangeable, it is possible to choose the most suitable combination for all applications without having to recalibrate the instrument. The operating principle of the pressure sensor is based on the deflection of a membrane in a sealed chamber in contact with the stream you want to measure the pressure. The flow may be liquid or gas. The flow rate measurement is based on the number of impulses or the frequency of a small fan. The DO 9704 is able to measure the following:

Pressure:

- differential or relative pressure from 10 mbar to 2 bar for air or non corrosive gases;
- absolute and relative pressure from 0.2 bar to 1000 bar for measurements in contact with liquids or gases.
- The measurement units are: bar, kPa, atm, mmHg, mmH₂O and psi.
- The instrument is able to detect peaks of around 5 milliseconds.

Temperature:

interchangeable probes are available with amplified Pt100 elements of the TP 870 series; the measurement can be in °C or °F.

Flow rate:

Flow rate can be measured with a turbine in the range from 2 to 2000 litres per minute in the measurement units LPM (litres per minute) or IPGM (Imperial Gallons per Minute).

MAIN CHARACTERISTICS AND APPLICATIONS

- RECORD function with display of the peak, minimum and mean value.
- Input A-B measurement function for pseudo differential measurements, pressure drops or flow rate with calibrated flanges.
- Relative measurement function with respect to a given instant.
- Zero correction function, especially useful for low pressures.
- Stores up to 30,000 measurements with date and time of measurement and programmable interval from 1 sec. to 12 hours.
- Double display for simultaneous viewing of the two inputs.
- RS 232C serial output for a printer or for unloading data onto a PC.

Typical applications for this instrument are in the following sectors:

- Hydraulics - Fluidodynamics - Chemical plants and process controls - Compressors
- Pumping plants - Flow rate measurements - Chimney draught - Moulding and presses for plastics and thermosetting materials - Level measurements

INSTRUMENT TECHNICAL DATA

Inputs/type of measurement	2 / pressure, flow rate or temperature
Connector	DIN 45326 8-pole
No. conversions per second	2
Working temperature	-5...+50°C
Working relative humidity	0...90% R.H. no condensation
Serial output	RS 232C, 300...19200 baud (galvanically insulated)
Display	Double LCD 12.5 mm
Functions	Auto Power Off, Autorange, Hold, Record, Peak (5ms), Minimum, Mean, Relative, A-B (differential)
Memory	512kB (FLASH) corr. To 30000 measurements
Power supply	9V dc alkaline battery
Autonomy	Approx. 50 hours (continuous duty)
Weight/dimensions	20 gr. / 215x73x38 mm

INSTRUMENT ACCURACY			
	Amb. T. 18 to 25°C	Amb. T. -5...18 or 25...50°C	measures
Pressure measurements	0.1% FS + 0.1% RDG	0.1% FS + 0.1% RDG + 100ppm/°C	RDG = measured value
Flow rate measurements	0.2% FS + 0.5% RDG	0.2% FS + 0.5% RDG + 100ppm/°C	
Temperatre measurements	0.4°C	0.4°C + 0.01°C/°C	-200...-50°C
	0.2°C	0.2°C + 0.01°C/°C	-50...+200°C
	3°C	3°C + 0.01°C/°C	+200...+800°C

CLASSIFICATION OF PRESSURE MEASUREMENTS

Pressure measurements are always relative to a reference pressure; there are four distinguish types that allow you to immediately define the reference pressure.

- **Absolute pressure (A=absolute)** - Pressure with respect to absolute zero, ideal vacuum reference; the measured pressure is always higher than the reference pressure.
- **Overpressure (G=gauge)** - Pressure measured with respect to the atmospheric pressure, environment pressure reference; the measured pressure is always higher than the reference pressure.
- **Depression (V=vacuum)** - Pressure with respect to the atmospheric pressure, environment pressure reference; the measured pressure is always lower than the reference pressure.
- **Differential pressure (D=differential)** - Pressure measured with respect to any reference pressure; the measured pressure may be higher or lower than the reference pressure.



Pressure

ORDER CODES

D09704: Pressure gauge, thermometer, data logger. The kit consists of instrument D09407, carrying case, 9V batteries, DeltaLog1 software and user's manual. CPA cable, 9CPRS232 cable for download data, pressure probes, temperature probes, **fittings and gaskets have to be ordered separately.**

ACCESSORIES

9CPRS232: Sub D 9-pole extension cable female/female for RS232 (null modem).

CPA: Connection cable L=1,5m, to connect the pressure probes to the instruments.

DeltaLog-1: DeltaLog1 software for PC data download and PC data manager.

KIT 2104: Set of 1/4 BSPP fittings and gaskets for TP704 series of probes.

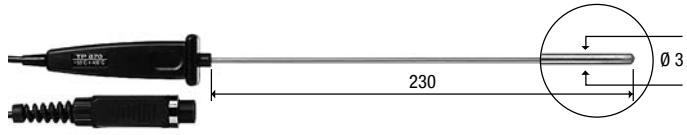

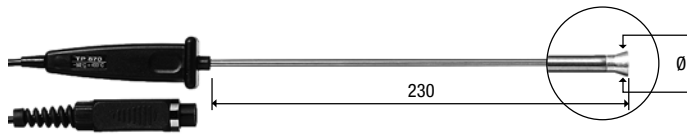
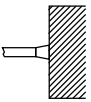
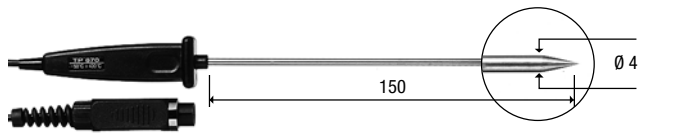
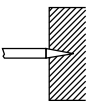
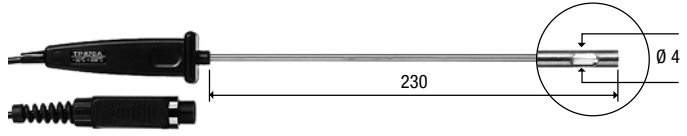

TP 870: Immersion temperature probe, Pt100 sensor, diam. 3x230 mm measuring range -50...+400°C.

TP 870/C: Contact temperature probe, Pt100 sensor, diam. 4x230 mm, measuring range -50...+400°C.

TP 870/P: Penetration temperature probe, Pt100 sensor, diam. 4x150 mm, range -50...+400°C.

TP 870/A: Air temperature probe, Pt100 sensor, diam. 4x230 mm, measuring range -50...+250°C.

TEMPERATURE PROBES

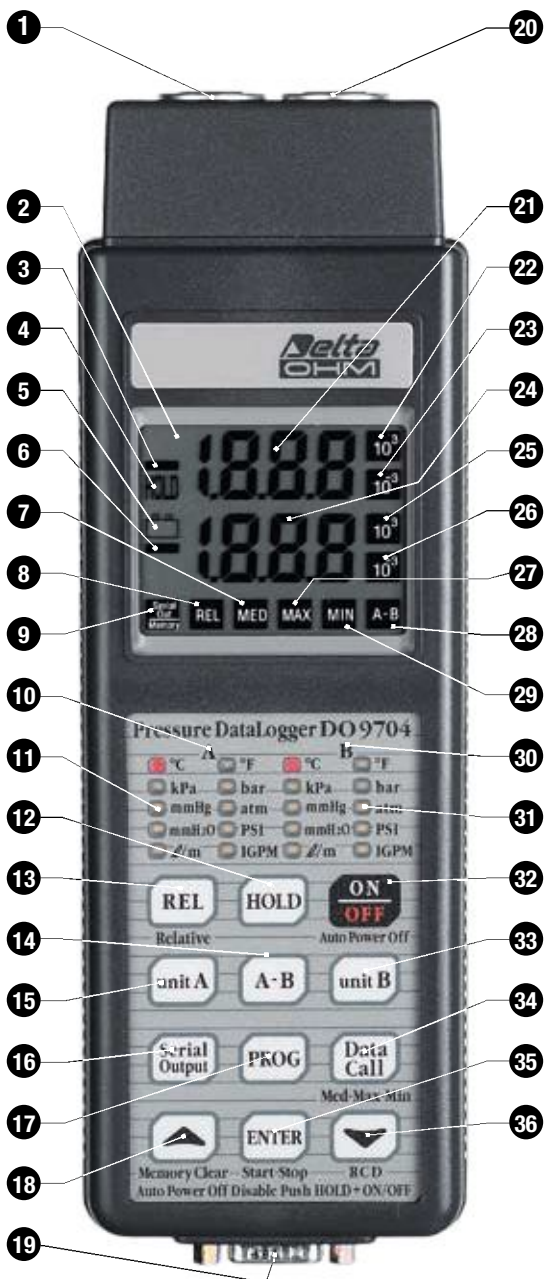
CODE	°C max	τ s	DIMENSIONS	USE
TP 870	-50 +400	3s		
TP 870 C	-50 +400	5s		
TP 870 P	-50 +400	5s		
TP 870 A	-50 +250	12s		

PRESSURE PROBES

Bottom scale pressure	Maximum overpressure	Resolution	ORDER CODES			Accuracy From 20 to 25°C	Working temperature	Connection
			Differential pressure	Relative pressure (compared to atmosphere)	Absolute pressure			
			NON insulated membrane	Insulated membrane	Insulated membrane			
10.0 mbar	20.0 mbar	0.01 mbar	• TP705-10MBD			0.5 % FSO	0..60 °C	Tube Ø 5 mm
20.0 mbar	40.0 mbar	0.01 mbar	• TP705-20MBD			0.5 % FSO	0..60 °C	Tube Ø 5 mm
50.0 mbar	100 mbar	0.01 mbar	TP705-50MBD			0.5 % FSO	0..60 °C	Tube Ø 5 mm
100 mbar	200 mbar	0.1 mbar	TP705-100MBD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
				TP704-100MBGI		0.25 % FSO	-10..+80 °C	¼ BSP
200 mbar	400 mbar	0.1 mbar	TP705-200MBD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
				TP704-200MBGI		0.25 % FSO	-10..+80 °C	¼ BSP
400 mbar	1000 mbar	0.1 mbar		TP704-400MBGI		0.25 % FSO	-10..+80 °C	¼ BSP
500 mbar	1000 mbar	0.1 mbar	TP705-500MBD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
600 mbar	1000 mbar	0.1 mbar		TP704-600MBGI		0.25 % FSO	-40..125 °C	¼ BSP
1.00 bar	2.00 bar	1 mbar	TP705-1BD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
					TP705BARO	0.25 % FSO	0..60 °C	Tube Ø 5 mm
						0.25 % FSO	-40..125 °C	¼ BSP
					TP704-1BA	0.25 % FSO	-40..120 °C	¼ BSP
2.00 bar	4.00 bar	1 mbar	TP705-2BD			0.25 % FSO	0..60 °C	Tube Ø 5 mm
				TP704-2BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-2BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
5.00 bar	10.00 bar	1 mbar		TP704-5BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-5BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
10.00 bar	20.0 bar	0.01 bar		TP704-10BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-10BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
20.0 bar	40.0 bar	0.01 bar		TP704-20BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-20BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
50.0 bar	100.0 bar	0.01 bar		TP704-50BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-50BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
100 bar	200 bar	0.1 mbar		TP704-100BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-100BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
200 bar	400 bar	0.1 mbar		TP704-200BGI		0.25 % FSO	-40..+125 °C	¼ BSP
					TP704-200BAI *	0.25 % FSO	-25..+85 °C	¼ BSP
500 bar	1000 bar	0.1 mbar		TP704-500BGI		0.25 % FSO	-40..+125 °C	¼ BSP
	700 bar	0.1 mbar			TP704-500BAI *	0.25 % FSO	-25..+85 °C	¼ BSP

* Ceramic diaphragm
 • Only report of calibration, no SIT certificate

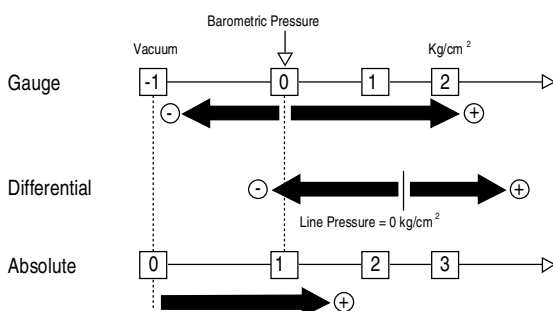




- 1 Input A, DIN 8-pole connector for pressure, flow rate or temperature.
- 2 Display.
- 3 Negative symbol input A.
- 4 HOLD symbol.
- 5 H symbol, flashes during RECORD function, permanently lit if the battery is running low.
- 6 Negative symbol input B.
- 7 The display shows the mean values.
- 8 REL symbol, indicates that the instrument is making a relative measurement.
- 9 Memory / Serial Out. Fixed symbol: the instrument is storing. Flashing symbol: serial output is enabled.
- 10 Measurement units that may be selected at input A.
- 11 Measurement unit selected at input A.
- 12 HOLD key for blocking the reading.
- 13 REL key, the value shown is relative with respect to the moment in which the REL key was pressed.
- 14 A-B key. The instrument displays the difference between the inputs.
- 15 Unit A. Key for selecting the measurement unit for input A.
- 16 Serial Out: enables unloading of data at the RS 232C serial output.
- 17 Prog: this key is pressed to enter the routine for programming the various functions of the instrument.
- 18 ▲ key. When enabled, this key increases the displayed parameter.
- 19 Output for RS 232C (SUB D male 9-pole).
- 20 Input B, DIN 8-pole connector for pressure, flow rate or temperature.
- 21 Input A indication.
- 22 Multiplication channel for channel A 103.
- 23 Multiplication channel for channel A 10-3.
- 24 Input B indication.
- 25 Multiplication channel for channel B 103.
- 26 Multiplication channel for channel B 10-3.
- 27 The display shows the Maximum values.
- 28 The display shows the difference in value between inputs A or B.
- 29 The display shows the Minimum values.
- 30 Measurement units that may be selected at input B.
- 31 Measurement unit selected at input B.
- 32 Key for switching the instrument on and off.
- 33 Unit B. Key for selecting the measurement unit for input B.
- 34 When pressed in sequence, the display indicates the Maximum peak value, the Minimum value and the Mean value.
- 35 The key has various functions: it starts and stops storage, conforms the set parameters.
- 36 ▼ key. When enabled, this key decreases the displayed values, starts and stops the RECORD function.



PRESSURE REFERENCES





HD3604T..., HD36V4T... RELATIVE PRESSURE TRANSMITTERS

HD3604T... and HD36V4T... are pressure transmitters with microprocessor and current (4...20mA) or voltage (0...5V, 1...5V or 0...10V) output, respectively. The sensor, piezoresistive, is insulated and allows gas and liquid pressure measurement over a wide range of temperatures.

The measured pressure is relative to atmosphere. The different models cover the scales from 100mbar to 600bar.

The case is in stainless steel 20mm diam. and encloses sensor and electronics: in order to connect it to a pressurized system, it is supplied with a 1/4" BSP threaded connection with a 22mm hex fastening ring.

For electrical connections, three different solutions are provided:

- A male connector DIN 43650A,
- A male connector DIN 43650C,
- A circular male connector DIN 41524.

The connectors are fitted with a three or four pole free female socket with fairlead (according to the models).

All transmitters are factory calibrated at three points. The use of a microprocessor circuit allows memorizing the sensor response curve and correcting any possible non linearity. No calibration is requested to the user.

Technical characteristics		Notes
Output signal	4 ...20mA	HD3604TxBG models
	0 ...5V	HD36V4TxBG1 models
	1 ...5V	HD36V4TxBG2 models
	0 ...10V	HD36V4TxBG3 models
Bottom scale pressure range	100, 200, 400, 600 mbar 1, 2,5 bar 4, 6, 10, 16, 25, 40, 60, 100, 160, 250, 400 and 600 bar relative	
Overpressure limit	Twice the nominal value	
Sensor	Piezoresistive	
Surface in contact with fluid	Steel 17-4PH	
Fluid in contact with membrane	Gas or liquid	
Operating temperature	-40 ... +125°C	
Power supply voltage	10...30Vdc	
	15...30Vdc	HD36V4TxBG3 models with 0...10Vdc output
Absorption	< 4mA	In the models with voltage output
Accuracy	≤ ±0.25%F.S.	
Temperature effects	±1% span ±1% offset	For a variation of 100°C
Mechanical stability	< 0.1%F.S.	After 10 ⁶ cycles 0...f.s.
Response time	<5ms	
Connection to the system under pressure	1/4" BSP male	
Electric connection	Male connector 3 or 4 poles DIN 43650A + female connector DIN 46350A	HD3604TxBG and HD- 36V4TxBG models
	Male connector 3 or 4 poles DIN 43650C + female connector DIN 46350C	HD3604TAxBG and HD- 36V4TAxBG models
	Male connector 3 or 4 poles DIN 41524 + female connector DIN 41524	HD3604TBxBG and HD- 36V4TBxBG models
Case material	Stainless steel AISI 304	
Dimensions	Ø 20x95mm	Connector included
Weight	80g	
Load resistance	$R_{Lmax} = 636\Omega$ a 24Vdc $R_{Lmax} = \frac{(Vdc - 10)}{22mA}$	For the models with current output 4...20mA HD3604T... (see fig.1)
	$R_L \geq 10K\Omega$	For the models with volt- age output HD36V4T ...
Protection degree	IP65	With connector correctly engaged.

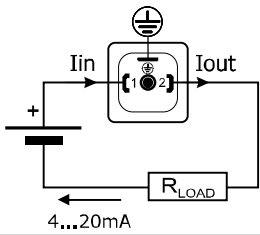
Installation and connections

The HD3604T... and HD36V4T... transmitters can be installed in any position.

Make the electrical connection to the free female connector as indicated in the diagrams of the following table.

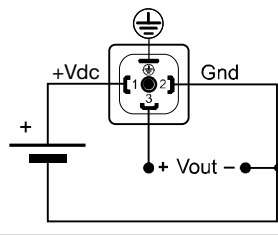
Transmitter model	Connection diagram of the transmitter pin (front view)	Notes
HD3604TxBG HD3604TAxBG		If the connection cable is shielded, connect the shield to pin
HD36V4TxBG... HD36V4TAxBG...		Use a shielded connection cable and connect the shield to the pin

In the models with a 4...20mA current output, use the following connections:



HD3604TxBG e HD3604TAxBG

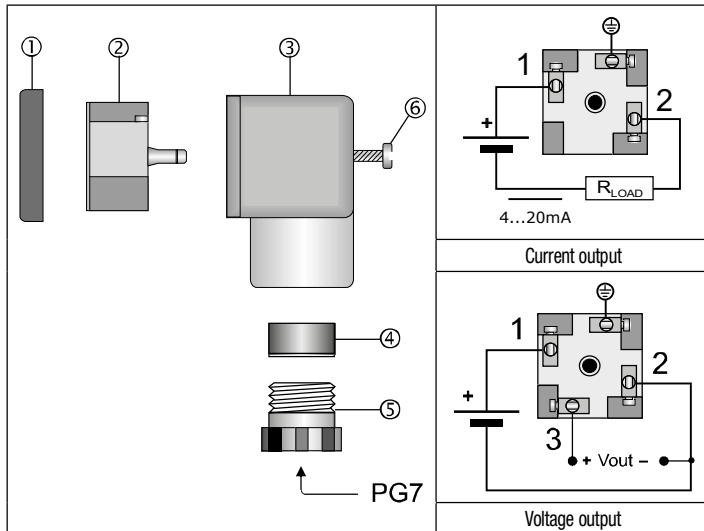
In the models with a voltage output, use the following connection:



HD36V4TxBG... e HD36V4TAxBG...

DIN 43650A and DIN 43650C connectors

To make the electrical connections you need to open the female connector.



Remove the gasket ①. Unscrew the fairlead ⑤ and take off the gasket ④. Use a screwdriver to pry and take off the connecting terminal ②. Make the connections as shown in the figure: if present, the shielded cable braid must be connected to the earth terminal. Once the connections are made, close the connector.

Transmitter calibration

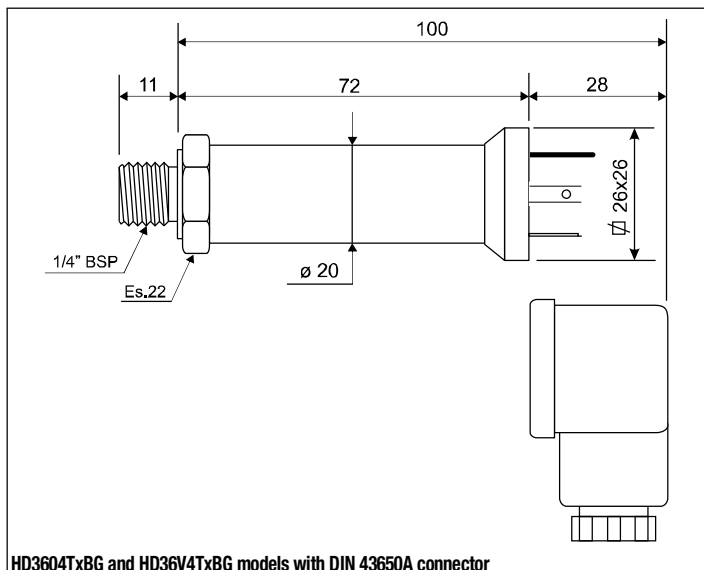
The transmitters are calibrated at three points; no calibration is requested to the user.

Warnings

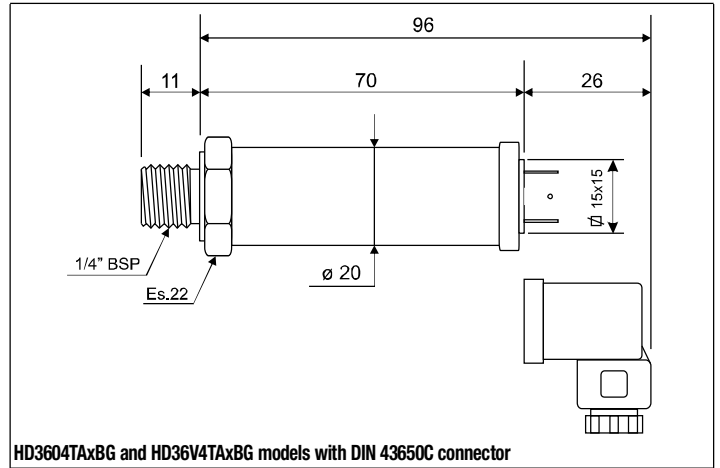
The pressure transmitter has a male threaded 1/4" BSP. During installation, take special care to the pressure resistance of the junction. Use any appropriate seals.

Great attention must be placed in the installation of transmitters in the pressure vessel or piping. Attention must be paid to the choice of full scale flow rate for an error, in addition to permanently damage the transmitter, can cause personal injuries and property also severe. Always insert, before the first transmitter, a key stop and make sure that the plant will not occur abnormal and unexpected peaks or surges of fluid under pressure.

Mechanical Dimensions

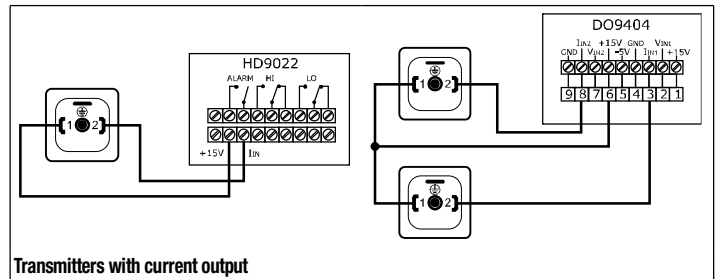


HD3604TxBG and HD36V4TxBG models with DIN 43650A connector

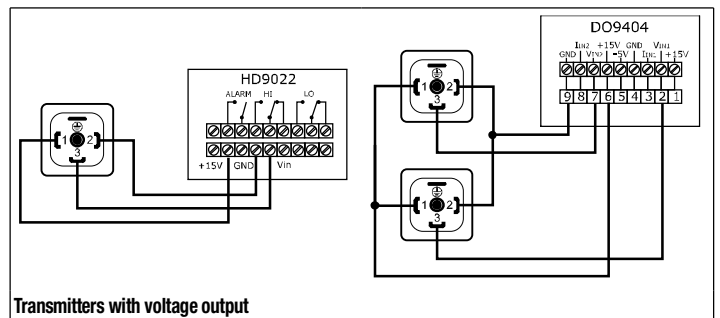


HD3604TAxBG and HD36V4TAxBG models with DIN 43650C connector

Examples of connections with the HD9022 and D09404 indicators/regulators



Transmitters with current output



Transmitters with voltage output

Order codes:

HD 36 X 4T X X BG X

- 1 = Voltage analog output 0...5Vdc
- 2 = Voltage analog output 1...5Vdc
- 3 = Voltage analog output 0...10Vdc

- MB = mbar
- B = Bar
- G = Gauge (relative pressure)

Electrical Connection

- No sign = Male connector DIN 43650A
- A = Male connector DIN 43650C

Nominal bottom scale (bar)

- 100 - 200 - 400 - 600 mbar - 1 - 2,5 relative bar
- 4 - 6 - 10 - 16 - 25 - 40 - 60 - 100 - 160 - 200 - 250
- 400 - 600 - relative bar

- O = Analog output 4...20mA
- V = Voltage analog output



**HD 2004T..., HD 20V4T...
PASSIVE PRESSURE TRANSMITTERS WITH DIN 43650
CONNECTOR**

HD 2004T and **HD 20V4T** are microprocessor pressure transmitters, with current output (4÷20 mA) the first and voltage output (0÷5V, 1÷5V or 0÷10V). The sensitive element consists of a jumper of piezoresistive resistors deposited on a ceramic membrane. At the variation of pressure, the bending of this membrane causes a linear and proportional variation of the bridge resistances. The stainless steel case (30 mm diam.) includes both the sensor and the electronics. For the connection to the pressure there will be a part threaded 1/4 "BSP and a tax on container for a key 27 mm. For the electrical connection is present on the side, a male connector pin Faston three or four (depending on model) with the corresponding female socket and PG7 cable gland to DIN 43650.

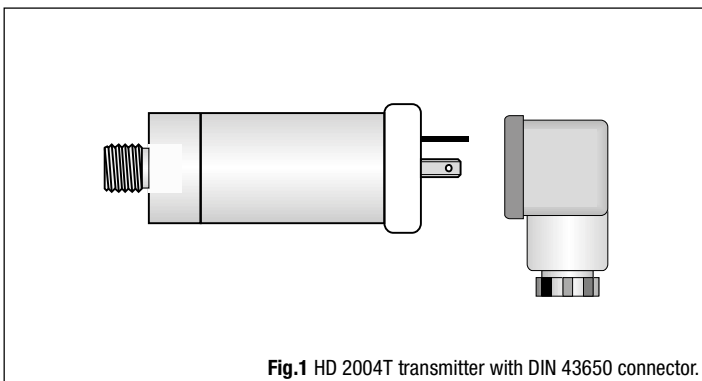


Fig.1 HD 2004T transmitter with DIN 43650 connector.

Technical Specifications

Output Signal	Current	4...20 mA (HD 2004T...)
	Voltage	0...5V (HD 20V4T... 1), 1...5V (HD 20V4T... 2), 0...10V (HD 20V4T... 3)
Pressure range		200, 400, 600 relative mbars 1, 2.5, 4, 6, 10, 16, 25, 40, 60, 100, 160, 250, 400 and 600 absolute bars 1, 2.5, 4, 6, 10, 16, 25, 40, 60 relative bars
Overpressure limit	Up to 250 bars	Twice the rated value
	400 nominal bars	750 bars
	600 nominal bars	750 bars
Sensor		Piezoresistive
Material in contact with the measuring fluid		Alumina
Fluid in contact with the diaphragm		Gas or liquids
Operating temperature		-30...+80°C
Power supply voltage		10...30Vdc (15...30Vdc for models having 0...10Vdc output)
Accuracy (linearity, hysteresis and repeatability)		≤ ±0.25%F.S.
Gain sensitivity to temperature changes (@ 25°C)		≤ ±0.008%F.S. between 0 and 70°C ≤ ±0.012%F.S. between -30°C and 0°C and between 70°C and 80°C
Zero sensitivity to temperature changes (@ 25°C)		≤ ±0.04%F.S.
Connection to plant under pressure		1/4" BSP male
Electrical connection		3/4 -pole faston male connector + DIN 43650 female connector (outlet)
Housing		AISI 304 stainless steel
Size		Ø 30x90 mm (included DIN 43650 connector)
Weight		190 g
Load resistance for HD 2004T models... (see Fig.2)		$R_{Lmax} = 636 \Omega$ a 24 Vdc $R_{Lmax} = \frac{(Vdc - 10)}{22mA}$
Load resistance for HD 20V4T models...		$R_L \geq 10K$
Response time		1 sec. (Time required to achieve the 63% of the final variation)
Protection class		IP54

Installation and connections

HD 2004T... and HD 20V4T... transmitters can be installed in any position. Open the female connector to make the electrical connections (see fig.3).

Transmitter Calibration

The transmitter output is factory-calibrated, thus no user's operation is generally requested. Current output transmitters supply 4 mA on the upper scale and 20 mA at full scale;

0...5V, 1...5V and 0...10V voltage output transmitters generate 0V or 1V at upper scale pressure and 5V or 10V at full scale pressure.

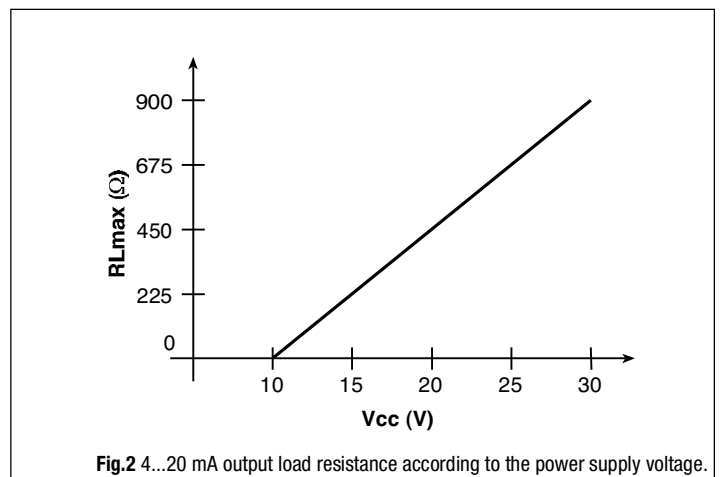


Fig.2 4...20 mA output load resistance according to the power supply voltage.

HD 2004T... and HD 20V4T... series pressure transmitters can be connected to Delta Ohm HD 9022 single input configurable indicators / regulators or with DO 9404 double input ones.

Warnings

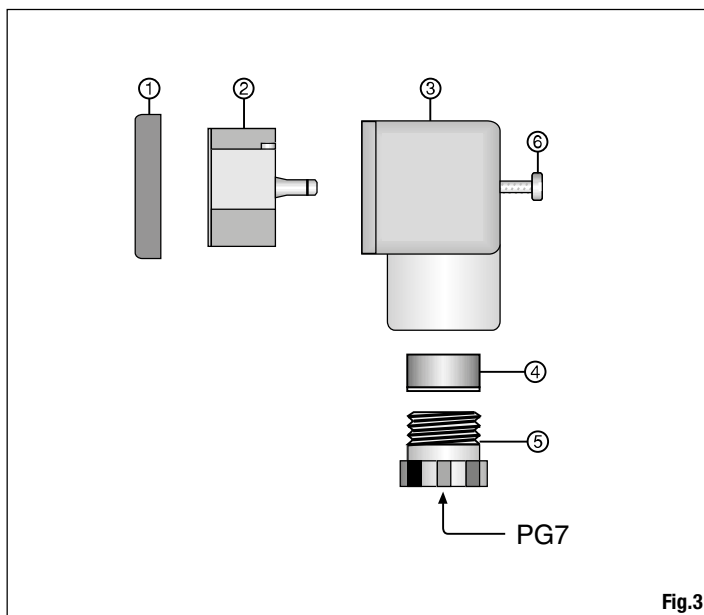
The pressure transmitter has a male threaded 1/4" BSP. During installation, take special care to the pressure resistance of the junction. Use any appropriate seals.

Great attention must be placed in the installation of transmitters in the pressure vessel or piping. Attention must be paid to the choice of full scale flow rate for an error, in addition to permanently damage the transmitter, can cause personal injuries and property also severe. Always insert, before the first transmitter, a key stop and make sure that the plant will not occur abnormal and unexpected peaks or surges of fluid under pressure.

ORDER CODES

HD 2004T - 1BG1

Output: 1 = 0...5V 2 = 1...5V 3 = 0...10V none = 4...20 mA
A = Absolute pressure G = Relative pressure
B = bar MB = mbar
Nominal full scale (bar) 200-400-600 relative mbar 1-2.5-4-6-10-16-25-40-60 relative or absolute bar 100-160-250-400-600 absolute bar
Type of output 0 = Current V = Voltage



Remove the gasket 1. Unscrew the cable gland 5 and take the gasket 4 away. Using a screwdriver, lever and remove the terminal carrier 2. Follow the indications shown on figure 4 to make the connections: the ground terminal has to be connected with the braid of the screened cable. After carrying out the connections, close again the connector. Mount the HD 2004T... or the HD 20V4T... : the transmitters have a 1/4" BSP male threaded connection. By mounting, take care that the fitting is properly pressure-sealed and, if necessary, use adequate seals. Apply the connector to the transmitter and fix it with the provided 6 screw.

FULL SCALE	RELATIVE Ref.: atmospheric pressure	ABSOLUTE Ref.: vacuum	ABSOLUTE Ref.: 1 bar s.g.
1 bar	HD 20...4T- 1 BG...	HD 20...4T- 1 BA...	
2.5 bar	HD 20...4T- 2 B5G...	HD 20...4T- 2 B5A...	
4 bar	HD 20...4T- 4 BG...	HD 20...4T- 4 BA...	
6 bar	HD 20...4T- 6 BG...	HD 20...4T- 6 BA...	
10 bar	HD 20...4T- 10 BG...	HD 20...4T- 10 BA...	
16 bar	HD 20...4T- 16 BG...	HD 20...4T- 16 BA...	
25 bar	HD 20...4T- 25 BG...	HD 20...4T- 25 BA...	
40 bar	HD 20...4T- 40 BG...	HD 20...4T- 40 BA...	
60 bar	HD 20...4T- 60 BG...	HD 20...4T- 60 BA...	
100 bar			HD 20...4T- 100 BA...
160 bar			HD 20...4T- 160 BA...
250 bar			HD 20...4T- 250 BA...
400 bar			HD 20...4T- 400 BA...
600 bar			HD 20...4T- 600 BA...

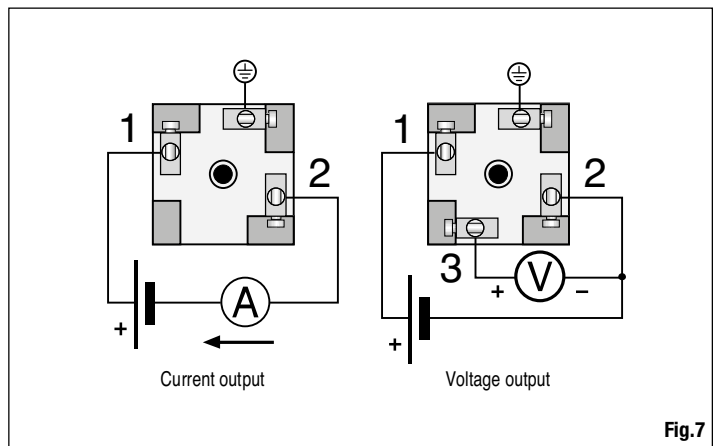
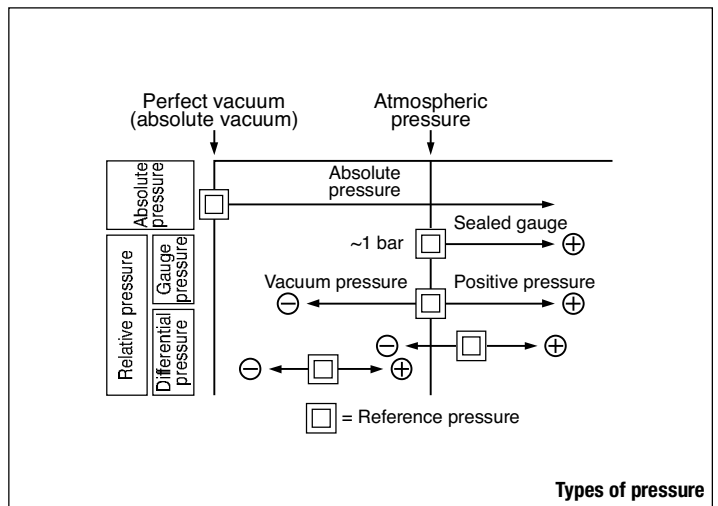


Fig.7



Types of pressure

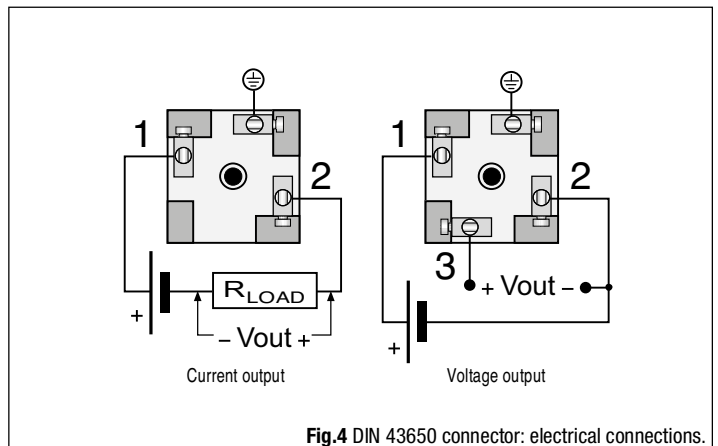


Fig.4 DIN 43650 connector: electrical connections.

TECHNICAL INFORMATION @ 20°C AND 24Vdc

	HD408T	HD4V8T
Sensor	Piezoresistive	
Measurement range	10, 20, 50, 100, 200, 500, 1000, 2000 mbar ±10, ±20, ±50, ±100, ±200, ±500, ±1000, ±2000 mbar	
Output signal	4 ... 20 mA	0 ... 10 Vdc standard; 0 ... 5 Vdc, 1 ... 5 Vdc on request
Precision	±0.5 % F.S. @ 20°C	
Resolution	Infinite	
Temperature effects	< 1% F.S., zero; < 1% F.S., span from -20°C to +60°C (from -4° to 140°F)	
Time stability	< 1 % F.S. over 6 months at 20°C	
Startup time	1 sec. at 99% of bottom scale reading	
Response time	< 10 m sec. until it reaches the stated precision by applying a pressure level	
Power	8 ... 30 Vdc	16 ... 40 Vdc or 24 Vac with output 0 ... 10 Vdc 10 ... 40 Vdc or 24 Vac with outputs 0 ... 5 Vdc, 1 ... 5 Vdc
Absorption	< 4 mA	20 mA @ 20°C, 24 Vdc
Load resistance	$R_{Lmax} = 727 \Omega$ a 24Vcc $R_{Lmax} = \frac{Vdc-8}{22 \text{ mA}}$	Minimum input resistance 10kΩ
Operating temperature	-20 ... +60°C	
Storage temperature	-20 ... +80°C	
Compatible elements	air and dry gases only	
Overpressure limit	350mbar for the models 10, 20, 50, 100 mbar 3X F.S. for all the other models	
Pressure connection	With Ø 5mm flexible tube	
Electric connection	Screw terminal box	
Case	MACROLON	
Case size	64x58x34	
Protection degree	IP67	

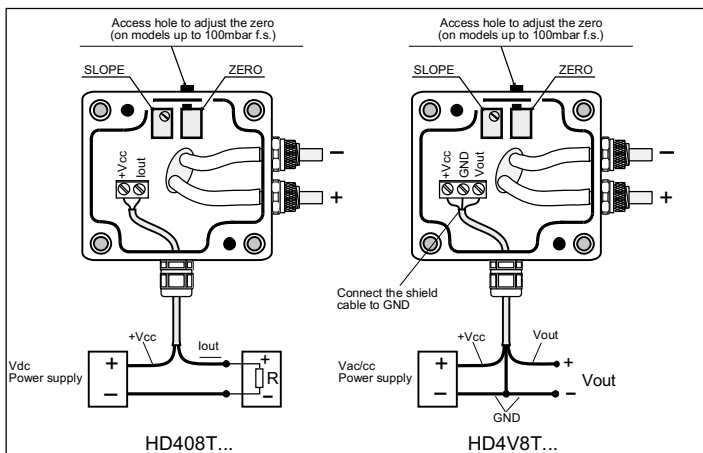


HD 408T..., HD 4V8T... RELATIVE OR DIFFERENTIAL ATMOSPHERIC PRESSURE TRANSMITTERS

The HD408T, HD4V8T are analog output relative or differential atmospheric pressure transmitters; they are used in all those applications where non corrosive air or gas need to be monitored, with pressure fields from 10 mbar to 2000 mbar. The piezoresistive sensor gives extremely precise and stable measurements of the applied differential pressure, with excellent repeatability, low hysteresis, and very good temperature stability.

The output signal of the sensor is conditioned to provide a voltage or a current output (model HD408T) or a voltage output (model HD4V8T) linearly proportional to the applied differential pressure.

The transmitters are ready to use as they have been calibrated at the factory. They are used to monitor clean room barometric pressure, to control filters, to measure flows (employment with the Pitot tube), for packing and packaging machines, and to control ventilation.

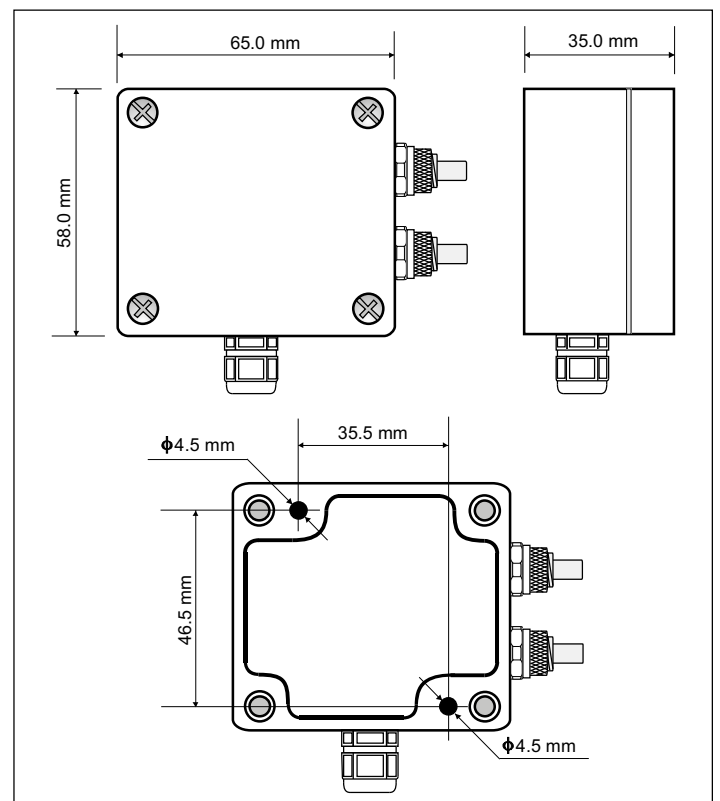


INSTALLATION

In all models the sensor and electronic parts are housed in a robust case in MACROLON with IP67 degree of protection. Opening the cover, the holes that allow to secure the transmitter's base directly to a panel or a wall, become available. HD408T, HD4V8T can be mounted in any position, the deviation of the zero due to the mounting position is in the worst case (10 mbar range) less than 1% F.S. and can be corrected with an appropriate regulating potentiometer, that can be accessed from outside, for pressures up to 100mbar.

Pressure

MECHANICAL DIMENSIONS



ORDER CODES

HD408T-1BG

Output:
 1 = 0...5Vdc
 2 = 1...5Vdc
 3 = 0...10Vdc
 not indicated = 4...20mA

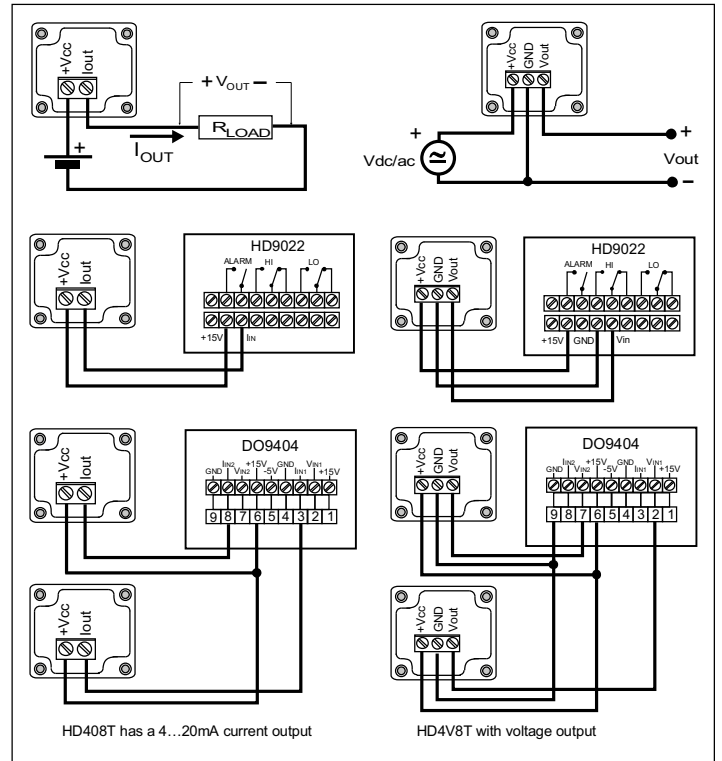
D = Differential pressure -f.s ... +f.s
 with regard to the atmosphere
G = Relative pressure 0... +f.s
 with regard to the atmosphere

B = bar
MB = mbar

Nominale full scale
 10 - 20 - 50 - 100 - 200 - 500 mbar (MB)
 1 - 2bar (B)

Output Type: **0** = Current
V = Voltage

Examples of connections with the HD9022 and DO9404 indicators/regulators



	RANGE	OUTPUT 4...20mA	OUTPUT 0...10Vdc	OUTPUT 0...5Vdc	OUTPUT 1...5Vdc
RELATIVE	0...10mbar	HD408T-10MBG	HD4V8T-10MBG3	HD4V8T-10MBG1	HD4V8T-10MBG2
	0...20mbar	HD408T-20MBG	HD4V8T-20MBG3	HD4V8T-20MBG1	HD4V8T-20MBG2
	0...50mbar	HD408T-50MBG	HD4V8T-50MBG3	HD4V8T-50MBG1	HD4V8T-50MBG2
	0...100mbar	HD408T-100MBG	HD4V8T-100MBG3	HD4V8T-100MBG1	HD4V8T-100MBG2
	0...200mbar	HD408T-200MBG	HD4V8T-200MBG3	HD4V8T-200MBG1	HD4V8T-200MBG2
	0...500mbar	HD408T-500MBG	HD4V8T-500MBG3	HD4V8T-500MBG1	HD4V8T-500MBG2
	0...1000mbar	HD408T-1BG	HD4V8T-1BG3	HD4V8T-1BG1	HD4V8T-1BG2
	0...2000mbar	HD408T-2BG	HD4V8T-2BG3	HD4V8T-2BG1	HD4V8T-2BG2

DIFFERENTIAL	-10...10mbar	HD408T-10MBD	HD4V8T-10MBD3	HD4V8T-10MBD1	HD4V8T-10MBD2
	-20...20mbar	HD408T-20MBD	HD4V8T-20MBD3	HD4V8T-20MBD1	HD4V8T-20MBD2
	-50...50mbar	HD408T-50MBD	HD4V8T-50MBD3	HD4V8T-50MBD1	HD4V8T-50MBD2
	-100...100mbar	HD408T-100MBD	HD4V8T-100MBD3	HD4V8T-100MBD1	HD4V8T-100MBD2
	-200...200mbar	HD408T-200MBD	HD4V8T-200MBD3	HD4V8T-200MBD1	HD4V8T-200MBD2
	-500...500mbar	HD408T-500MBD	HD4V8T-500MBD3	HD4V8T-500MBD1	HD4V8T-500MBD2
	-1000...1000mbar	HD408T-1BD	HD4V8T-1BD3	HD4V8T-1BD1	HD4V8T-1BD2
	-2000... 2000mbar	HD408T-2BD	HD4V8T-2BD3	HD4V8T-2BD1	HD4V8T-2BD2



deviation of the zero of the sensor to temperature changes: virtually eliminates maintenance. It's available the **(L)** "display" option, in which the pressure is visualized on a display with 4 digits in the selected measurement unit. The **(SR)** "square root" is especially useful if the transmitter is connected to a pitot tube, as the output is directly proportional to the speed of airflow. The transmitters are ready to use and are supplied calibrated at 3 points by the manufacturer. Typical applications for HD404T series are clean room monitoring, filters' control, flow measures (matched with the Pitot tube), the air conditioning control and the ventilation one.



TECHNICAL COMMON FEATURES @ 20°C and 24Vdc

Sensor	Piezoresistive
Measurement range	from 0...50 Pa (0...0,2" H ₂ O) to 0...1000 Pa (0...4" H ₂ O) relative and differential (look at the table downwards)
Signal output	0 ... 10 Vdc, R _L > 10kΩ and 4...20 mA, R _L < 500Ω
Precision	It depends on the model (look at the table)
Response time	1sec. (slow) or 4sec. (fast) selectable through wire bridge
Overpressure limit	25 kPa
Compatible means	Only air and no aggressive gas
Power Supply	24 Vac ±10% or 16...40Vdc
Absorption	< 1W
Fit on pressure	With Ø 5mm flexible cable
Electrical connections	Terminal board with screw, max 1,5mm ² , PG9 conduit with input cable
Working conditions	-10 ... +60°C (-5...+50°C for models with auto-zero AZ), 0...95% RH
Storage temperature	-20 ... +70°C
Case sizes	80x84x44
Degree of electronic protection	IP67

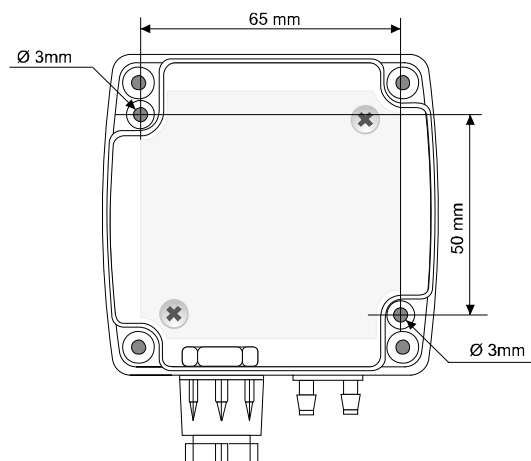
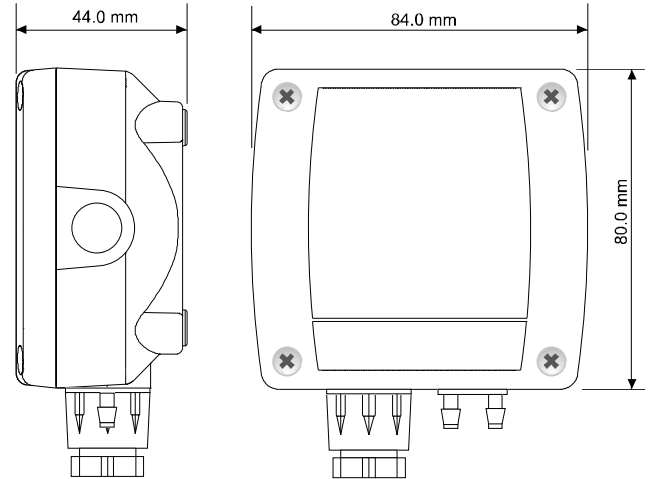
INSTALLATION

In all the models, the sensor and the electronic are contained in a sturdy plastic case with an IP67 protection degree. Opening the lid are available 3 mm diameter holes that let you set the base of the transmitter directly to a panel or a wall.

HD 404T VERY LOW PRESSURE TRANSMITTER

The series of HD404T transmitters is able to measure relative pressures with reference to the atmosphere or differential in their range from 50 to 1000 Pa (0.2" H₂O to 5" H₂O). HD404T transmitters use a silicon "micro-machined" type sensor compensated in temperature that has an excellent linearity, repeatability and stability over time. The output signal from the sensor is amplified and converted into a standard analogical output in current (4-20mA) and in one in voltage (0-10V), which, then, can be transmitted over long distances with a high immunity to noise.

In each model it's possible to choose, via a dip switch, between two measurement ranges in order to select the optimum scale optimal for each application. Usually the low pressure transmitters are susceptible to the guidance by which they are mounted. In HD404T series there is available a special auto-zero circuit, which periodically equalize the differential pressure at the input sensor and corrects the offset; the transmitters, provided with this circuit, are insensitive to the mounting position. In addition, The circuit compensates autozero aging and the

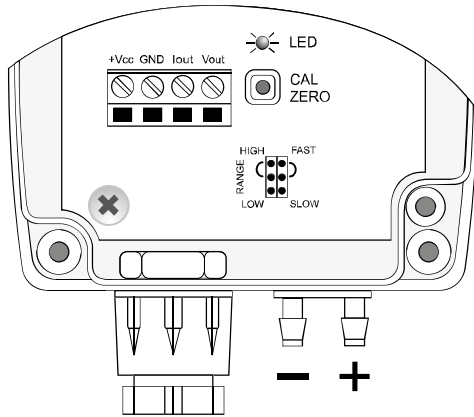


Pressure

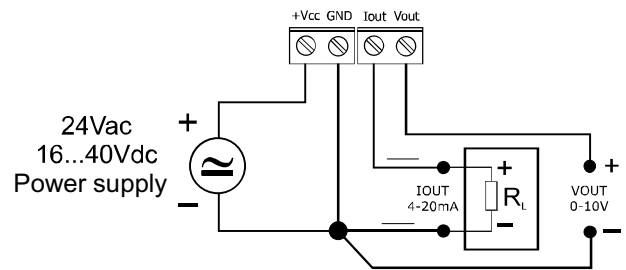
HD404T can be mounted in any position, but typically on a vertical wall with the pressure facing downwards. The gap from zero due to the mounting position can be compensated by using CAL ZERO button. The procedure to follow for manual calibration of zero is the following one:

- Make sure that the transmitter is powered by at least 1 hour;
- Disconnect both tubes taken from the + and – pressure;
- Press CAL ZERO button until the red LED starts to flash;
- When the red led turns off, the reset procedure is completed and you can reconnect the tubes to pressure fits.

We suggest you to perform the auto-zero procedure at least once a year under normal working conditions. In models with auto-zero circuit (AZ option), this procedure is regularly performed every 15 minutes without disconnecting the hoses from pressure taps. During the reset, which takes about 4 seconds, the analogical outputs and the display will remain frozen at the measured value. Models with auto-zero have virtually no need for maintenance.



CAL ZERO button and configuration bridge wires



Electrical connections

CONFIGURATION

Setting the output range: jumper named RANGE allows you to choose one of this output ranges: with LOW you choose the low range, with HIGH the extended range.

Response time setting: the FAST SLOW small jumper let you choose the response time of the transmitter: in FAST position the measurement is integrated over 1 sec., while SLOW position is integrated over 4 sec. SLOW position is recommended if there are conditions of turbulence or disruption of air flow.

DISPLAY

Models with L suffix are provided with a LCD display with 4 digits.

Visualization resolution:

- 50, 100, 250, 500 Pa → 0.5 Pa
- 1000 Pa → 1 Pa
- 5, 10, 25, 50 mmH₂O → 0.05 mmH₂O
- 100 mmH₂O → 0.1 mmH₂O
- 0.2, 0.4, 1, 2, 4 inchH₂O → 0.002 inchH₂O

Default reporting:

- Undr → it appears if the measured value is smaller than the minimum value that you can measure
- OVEr → it appears if the measured value surpasses the maximum value that you can measure
- CAL Error → it appears when the zero calibration is finished if the maximum offset value is surpassed that you can correct

SUMMARY TABLE OF MODELS AND PRECISION

MODEL	RANGE		PRECISION %FS RANGE2 (0...+50°C)	LONG TERM STABILITY (1 YEAR)	
	LOW	HIGH		-AZ	NO AZ
	Pa				
HD404T1PG-AZ(-L-SR)	0...50 Pa	0...100 Pa	±3%	≤±1Pa	
HD404T2PG-AZ(-L-SR)	0...100 Pa	0...250 Pa	±1,5%	≤±1Pa	
HD404T3PG(-AZ-L-SR)	0...250 Pa	0...500 Pa	±1%	≤±1Pa	≤±8Pa
HD404T4PG(-AZ-L-SR)	0...500 Pa	0...1000 Pa	±1%	≤±1Pa	≤±8Pa
HD404T1PD-AZ(-L)	-50...+50 Pa	-100...+100 Pa	±1,5%	≤±1Pa	
HD404T2PD-AZ(-L)	-100...+100 Pa	-250...+250 Pa	±1%	≤±1Pa	
HD404T3PD(-AZ-L)	-250...+250 Pa	-500...+500 Pa	±1%	≤±1Pa	≤±8Pa
HD404T4PD(-AZ-L)	-500...+500 Pa	-1000...+1000 Pa	±1%	≤±1Pa	≤±8Pa
	mmH ₂ O				
HD404T1MG-AZ(-L-SR)	0...5 mmH ₂ O	0...10 mmH ₂ O	±3%	≤±0,1 mmH ₂ O	
HD404T2MG-AZ(-L-SR)	0...10 mmH ₂ O	0...25 mmH ₂ O	±1,5%	≤±0,1 mmH ₂ O	
HD404T3MG(-AZ-L-SR)	0...25 mmH ₂ O	0...50 mmH ₂ O	±1%	≤±0,1 mmH ₂ O	≤±0,8 inchH ₂ O
HD404T4MG(-AZ-L-SR)	0...50 mmH ₂ O	0...100 mmH ₂ O	±1%	≤±0,1 mmH ₂ O	≤±0,8 inchH ₂ O
HD404T1MD-AZ(-L)	-5...+5 mmH ₂ O	-10...+10 mmH ₂ O	±1%	≤±0,1 mmH ₂ O	
HD404T2MD-AZ(-L)	-10...+10 mmH ₂ O	-25...+25 mmH ₂ O	±1%	≤±0,1 mmH ₂ O	
HD404T3MD(-AZ-L)	-25...+25 mmH ₂ O	-50...+50 mmH ₂ O	±1%	≤±0,1 mmH ₂ O	≤±0,8 inchH ₂ O
HD404T4MD(-AZ-L)	-50...+50 mmH ₂ O	-100...+100 mmH ₂ O	±1%	≤±0,1 mmH ₂ O	≤±0,8 inchH ₂ O
	inchH ₂ O				
HD404T1IG-AZ(-L-SR)	0...0.2 inchH ₂ O	0...0.4 inchH ₂ O	±3%	≤±0,04 inchH ₂ O	
HD404T2IG-AZ(-L-SR)	0...0.4 inchH ₂ O	0...0.8 inchH ₂ O	±1,5%	≤±0,04 inchH ₂ O	
HD404T3IG(-AZ-L-SR)	0...1 inchH ₂ O	0...2 inchH ₂ O	±1,5%	≤±0,04 inchH ₂ O	≤±0,04 inchH ₂ O
HD404T4IG(-AZ-L-SR)	0...2 inchH ₂ O	0...4 inchH ₂ O	±1,5%	≤±0,04 inchH ₂ O	≤±0,04 inchH ₂ O
HD404T1ID-AZ(-L)	-0.2...0.2 inchH ₂ O	-0.4...0.4 inchH ₂ O	±3%	≤±0,04 inchH ₂ O	
HD404T2ID-AZ(-L)	-0.4...0.4 inchH ₂ O	-1...+1 inchH ₂ O	±3%	≤±0,04 inchH ₂ O	
HD404T3ID(-AZ-L)	-1...+1 inchH ₂ O	-2...+2 inchH ₂ O	±3%	≤±0,04 inchH ₂ O	≤±0,04 inchH ₂ O
HD404T4ID(-AZ-L)	-2...+2 inchH ₂ O	-4...+4 inchH ₂ O	±3%	≤±0,04 inchH ₂ O	≤±0,04 inchH ₂ O

CODES FOR PURCHASE ORDER

HD404T 1P - G - AZ - L - SR

SR = with square root output
(not available for type D versions)

L = with LCD display

AZ = with auto-zero circuit

D = differential pressure -f.s...+f.s.

G = relative pressure with reference to the atmosphere 0...+f.s.

Nominal scale bottom (f.s.):

1P = 100Pa, 2P = 250Pa, 3P = 500Pa, 4P = 1000Pa

1M = 10mmH₂O, 2M = 25mmH₂O, 3M = 50mmH₂O, 4M = 100mmH₂O

1I = 0.4inchH₂O, 2I = 0.8inchH₂O, 3I = 2inchH₂O, 4I = 4inchH₂O

MODEL	RANGE	
	LOW	HIGH
	Pa	
HD404T1PG-AZ(-L-SR)	0...50 Pa	0...100 Pa
HD404T2PG-AZ(-L-SR)	0...100 Pa	0...250 Pa
HD404T3PG(-AZ-L-SR)	0...250 Pa	0...500 Pa
HD404T4PG(-AZ-L-SR)	0...500 Pa	0...1000 Pa
HD404T1PD-AZ(-L)	-50...+50 Pa	-100...+100 Pa
HD404T2PD-AZ(-L)	-100...+100 Pa	-250...+250 Pa
HD404T3PD(-AZ-L)	-250...+250 Pa	-500...+500 Pa
HD404T4PD(-AZ-L)	-500...+500 Pa	-1000...+1000 Pa
	mmH ₂ O	
HD404T1MG-AZ(-L-SR)	0...5 mmH ₂ O	0...10 mmH ₂ O
HD404T2MG-AZ(-L-SR)	0...10 mmH ₂ O	0...25 mmH ₂ O
HD404T3MG(-AZ-L-SR)	0...25 mmH ₂ O	0...50 mmH ₂ O
HD404T4MG(-AZ-L-SR)	0...50 mmH ₂ O	0...100 mmH ₂ O
HD404T1MD-AZ(-L)	-5...+5 mmH ₂ O	-10...+10 mmH ₂ O
HD404T2MD-AZ(-L)	-10...+10 mmH ₂ O	-25...+25 mmH ₂ O
HD404T3MD(-AZ-L)	-25...+25 mmH ₂ O	-50...+50 mmH ₂ O
HD404T4MD(-AZ-L)	-50...+50 mmH ₂ O	-100...+100 mmH ₂ O
	inchH ₂ O	
HD404T1IG-AZ(-L-SR)	0...0.2 inchH ₂ O	0...0.4 inchH ₂ O
HD404T2IG-AZ(-L-SR)	0...0.4 inchH ₂ O	0...0.8 inchH ₂ O
HD404T3IG(-AZ-L-SR)	0...1 inchH ₂ O	0...2 inchH ₂ O
HD404T4IG(-AZ-L-SR)	0...2 inchH ₂ O	0...4 inchH ₂ O
HD404T1ID-AZ(-L)	-0.2...0.2 inchH ₂ O	-0.4...0.4 inchH ₂ O
HD404T2ID-AZ(-L)	-0.4...0.4 inchH ₂ O	-1...+1 inchH ₂ O
HD404T3ID(-AZ-L)	-1...+1 inchH ₂ O	-2...+2 inchH ₂ O
HD404T4ID(-AZ-L)	-2...+2 inchH ₂ O	-4...+4 inchH ₂ O

ACCESSORIES

Supplied:

- N°1 piece of Ø3.2/Ø6.4 silicone tube 2m long
- N°2 HD434T.5 plastic fittings.

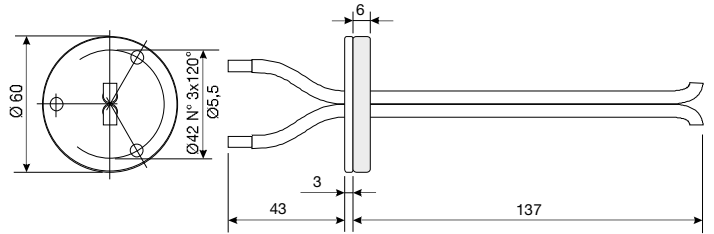
Under request:

AP3719: Flow offtake for square or cylindrical channel. Two pieces of Ø3.2/Ø6.4 tube 1m long.

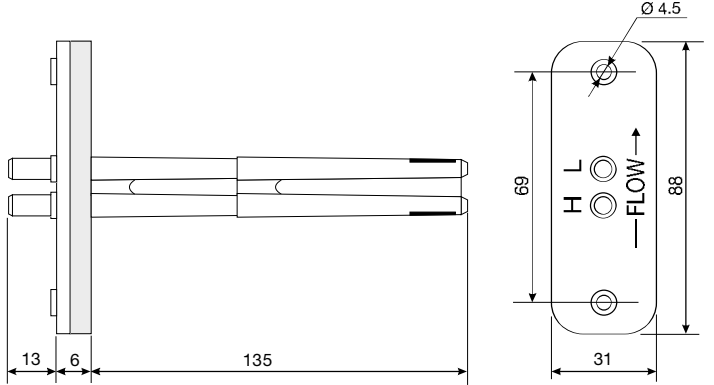
AP3721: Flow offtake for plastic material cylindrical channel. Two pieces of Ø3.2/Ø6.4 tube 1m long.

Pitot Tube: see list and dimensions on pag. 130

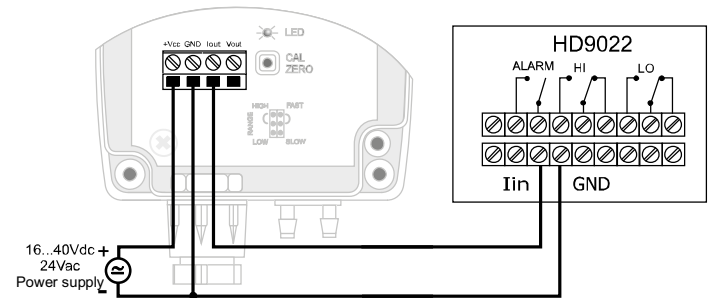
AP3719 channel probe



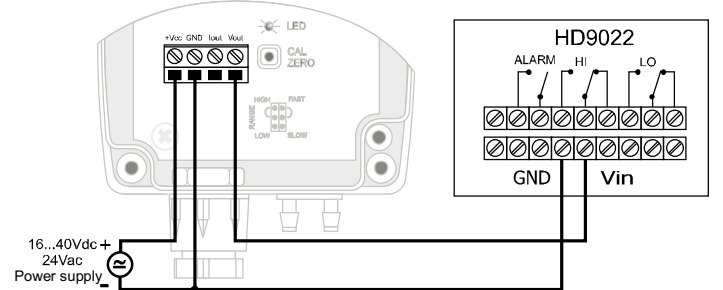
AP3721 channel probe



Examples of connection with HD9022 indicator regulator



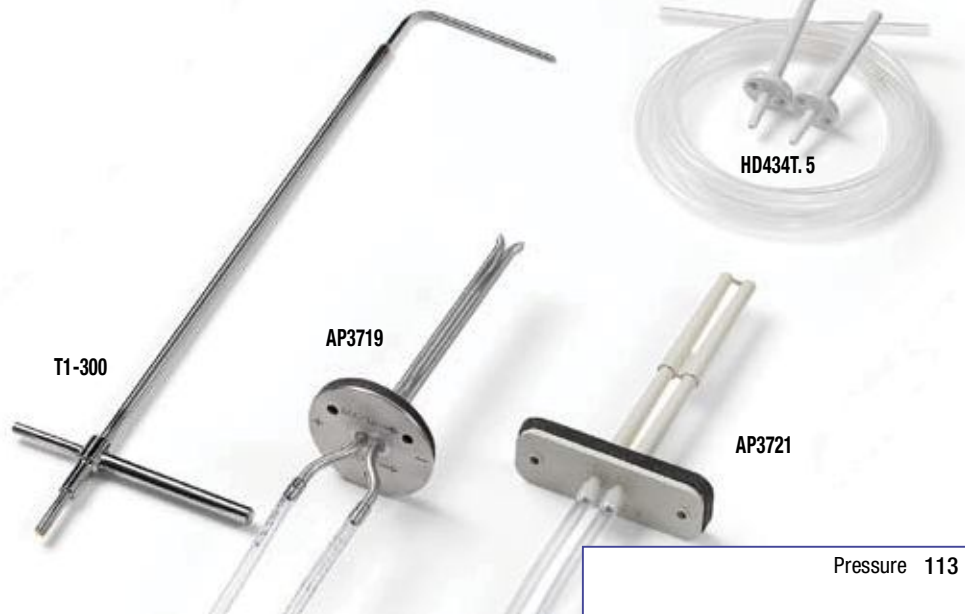
Current output 4...20mA



Voltage output 0...10Vdc



HD404T3PD



T1-300

AP3719

HD434T.5

AP3721



HD 9408T BARO HD 9408TR BARO HD 9908T BARO



HD 9408T BARO, HD 9408TR BARO, HD 9908T BARO BAROMETRIC TRANSMITTERS

HD 9408T BARO, HD 9408TR BARO and **HD 9908T BARO** are analog output electronic barometers. They use a piezoresistive sensor element which gives extremely accurate and stable measurement of the atmospheric pressure and assures excellent repeatability, low hysteresis and very good temperature stability. The output signal of the sensor is conditioned to provide a voltage or a current output linearly proportional to the barometric pressure. The transmitters are ready as they have been calibrated at the factory. A zero adjustment potentiometer is available for offset to station elevation.

HD9408T BARO requires a continuous dc power supply, its low power consumption (< 4 mA) makes it ideal for portable and remote battery or solar powered applications. It is available in different kinds of analog output: 0-1 Vdc, 0-5 Vdc (1-5 Vdc, 1-6 Vdc on request) or 4-20 mA (two wires).

HD 9408TR BARO offers superior temperature performance: the internal circuitry allows the sensor to work at constant temperature so that it achieves accurate

temperature compensation over the whole range from -40°C to +60°C.

HD 9408TR BARO requires a continuous dc power supply and a differential cabling connection to achieve best results. It is available in different output versions: 0÷1 Vdc, 0÷5 Vdc (1÷5 Vdc, 1÷6 Vdc on request).

HD 9908T BARO, unlike the other models, is equipped with a display showing the pressure measurements, an analog output 0÷20 mA, 4÷20 mA, 0÷1 V and 0÷5 V (0÷10 V on request) configurable by the customer and with an ON/OFF relay output with programmable alarm threshold.

HD 9908T BARO requires a 24 Vac (or 220 Vac on request) power supply.

HD 9408T BARO, HD 9408TR BARO and **HD 9908T BARO** are low cost and excellent performance solutions for meteorological applications, environmental monitoring systems, metrological and environmental data logging, altitude applications, barometric pressure compensation in the performance of internal combustion engine, cleanroom barometric pressure compensation, testing of vehicle emissions.

HOUSING AND INSTALLATION

In all models the sensor electronics are housed in a sturdy MACROLON with IP67 protection. Opening the lid holes are available that allow you to secure the base of the transmitter directly to a panel or a wall. The measurement accuracy is independent of the position of the transmitter. However, it is advisable to mount the transmitter so that the sensor is facing down to reduce dust and dirt on the filter. If the installation is in an open environment is recommended to use a special static port to minimize errors caused by the wind flow on the input pressure.

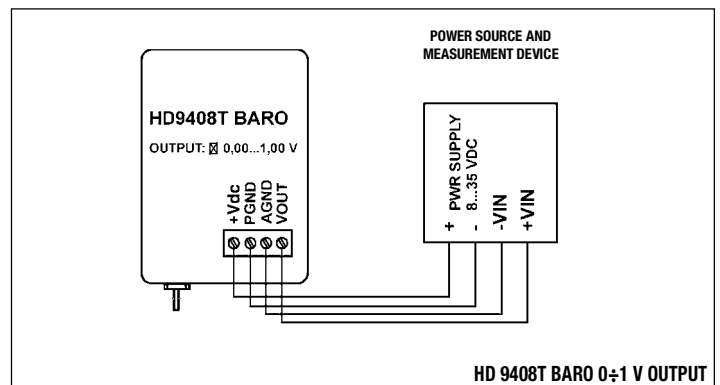
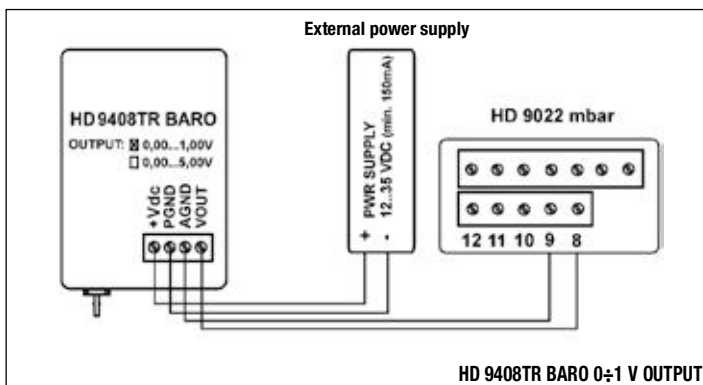
CONNECTION DIAGRAM AND OPERATION

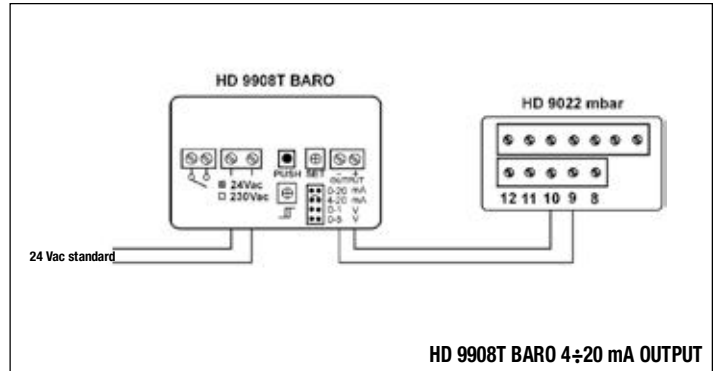
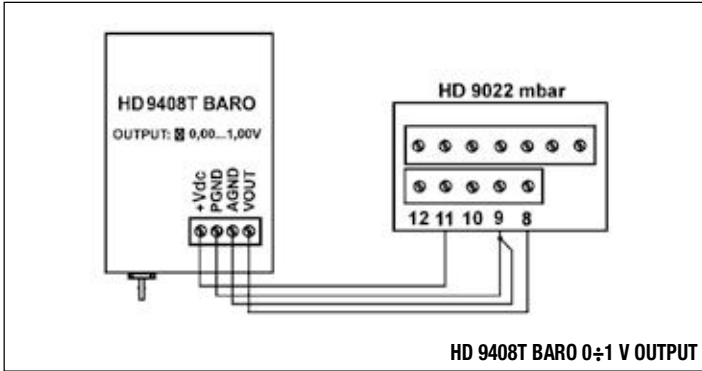
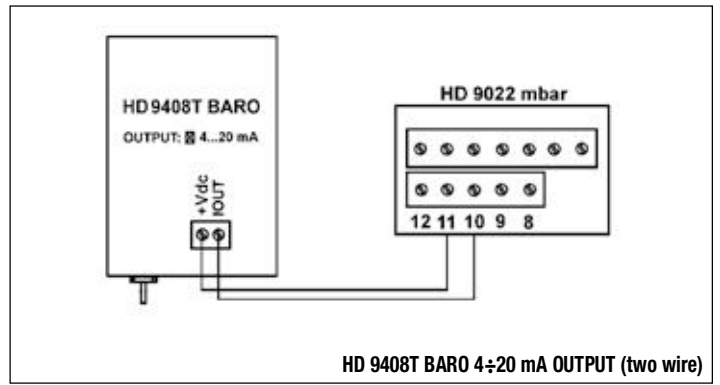
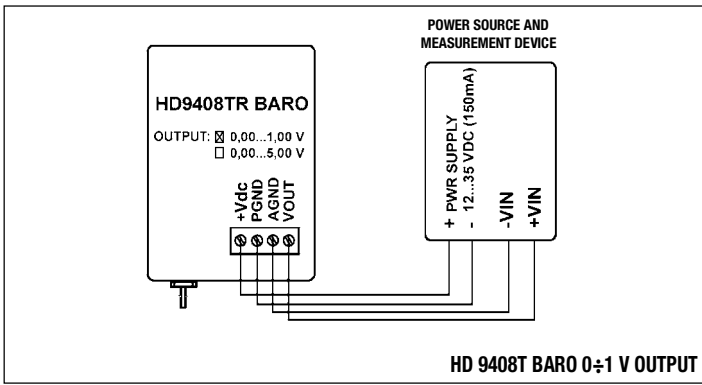
- Make the power connections for the HD 9908T BARO.
- Make the connections for the relay output, the relay contact is free.
- Select the analog output 0÷20 mA, 4÷20 mA, 0÷1 V, 0÷5 V by means of the jumper.
- Switch on the instrument, press the PUSH button and turn the SET trimmer to set the desired threshold value between 800 and 1100 mbar; the set value is shown on the LCD display.
- Using the trimmer i □, set the desired HYS (=hysteresis) value between 5 and 50 mbar.
- The instrument will now indicate the barometric pressure; HI led, LO led or ALARM led and ALARM relay will switch on if one the following cases occurs (see table 1).

NOTE: the ALARM led comes on to indicate that the relay is energized and the contact is closed.

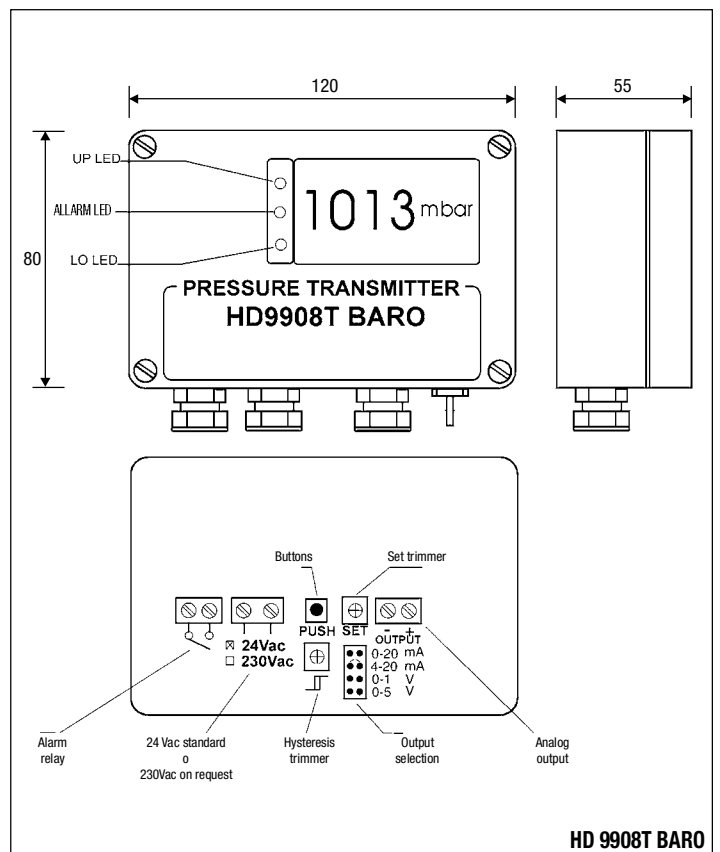
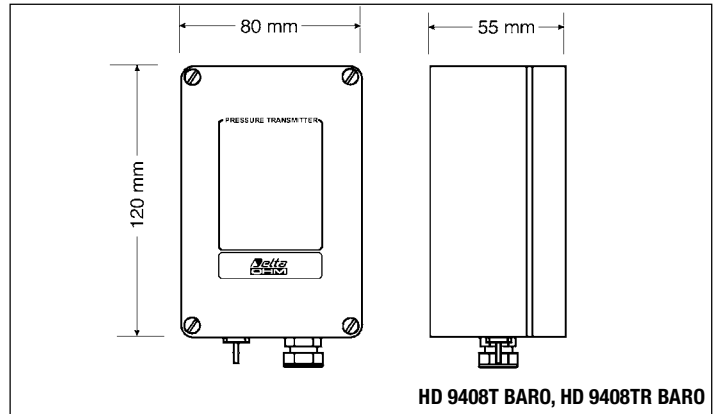
- **Once installation is completed, check that the cover is tightly closed; the same applies to the grommets.**

TABLE 1	HI	LO	ALARME LED
MISURA > SET, MISURA < SET + HYS	ON	OFF	OFF
MISURA > SET, MISURA > SET + HYS	ON	OFF	ON
MISURA < SET, MISURA > SET - HYS	OFF	ON	OFF
MISURA < SET, MISURA < SET - HYS	OFF	ON	ON





	HD9408T BARO	HD9408TR BARO	HD9908T BARO
Sensor type	Piezoresistive diaphragm		
Measuring range	800 ÷ 1100 mbar / 600 ÷ 1100 mbar on request		
Analog output	0 ÷ 1 Vdc standard; 0 ÷ 5 Vdc, 1 ÷ 5 Vdc, 1 ÷ 6 Vdc and 4 ÷ 20 mA (two wires) on request	0 ÷ 1 Vdc standard; 0 ÷ 5 Vdc, 1 ÷ 5 Vdc and 1 ÷ 6 Vdc on request	0 ÷ 20 mA, 4 ÷ 20 mA, 0 ÷ 1V and 0 ÷ 5V (0 ÷ 10V on request), configurable by means of a jumper.
Accuracy	± 0.5 mbar, @ 20°C	± 0.5 mbar, @ 20°C	Display: ± 1 mbar, @20°C Analog output: ± 0.8 mbar, @ 20°C
Resolution	Infinite	Infinite	Display: Analog output: 1 mbar Infinite
Thermal effects	< 1% F.S., zero; <1% F.S., span over -20°C to +60°C (-4° to 140°F)	± 0.8 mbar over -40°C to +60°C (-40° to 40°F)	< 1% F.S. zero, <1% F.S. span over -20°C to +60°C (-4° to 140°F)
Long term stability	< 0.25 % F.S. over 6 months at 20°C	< 0.2 % F.S. over 6 months at 20°C	< 0.25 % F.S. over 6 months at 20°C
Turn on time	1 sec. to 99% of full scale reading	5 min @ 24 Vdc supply to 99% of full scale reading	5 sec. to 99% of full scale reading
Response time	< 200 msec. to reach full accuracy after a pressure step		
Relay contact output	Absent	Absent	3A/220 Vac resistive load
Set point	Absent	Absent	Configurable from 800 to 1100 mbar
Supply Voltage	8 ÷ 35 Vdc	12 ÷ 35 Vdc	24 Vac ±10% (230 Vac on request)
Supply current	< 4 mA	25 mA @ 20°C, 24 Vdc (warm-up 120 mA)	1VA
Operating Temperature	-30 ÷ +60°C	-40 ÷ +60°C	-20 ÷ +60°C
Media ompatibility	Air and dry gases only		
Overload pressure	30 psi		



ORDERING CODE

HD9408T BARO 800÷1100mbar barometric transmitter output 0÷1Vdc. Upon request output: 0÷5Vdc, 1÷5Vdc, 1÷6Vdc, 4÷20mA. Working temperature range -30°C ÷ +60°C.

HD9408TR BARO 800÷1100mbar barometric transmitter output 0÷1Vdc. Upon request output 0÷5Vdc, 1÷5Vdc. Temperature working range -40°C ÷ +60°C, heaters sensor

HD9908T BARO 800÷1100mbar digital barometric transmitter with LCD indication. Outputs: 0÷20mA, 4÷20mA, 0÷1Vdc, 0÷5Vdc. Working temperature range -20°C ÷ +60°C.



HD9408PS 50 STATIC PORT FOR BAROMETRIC MEASUREMENTS

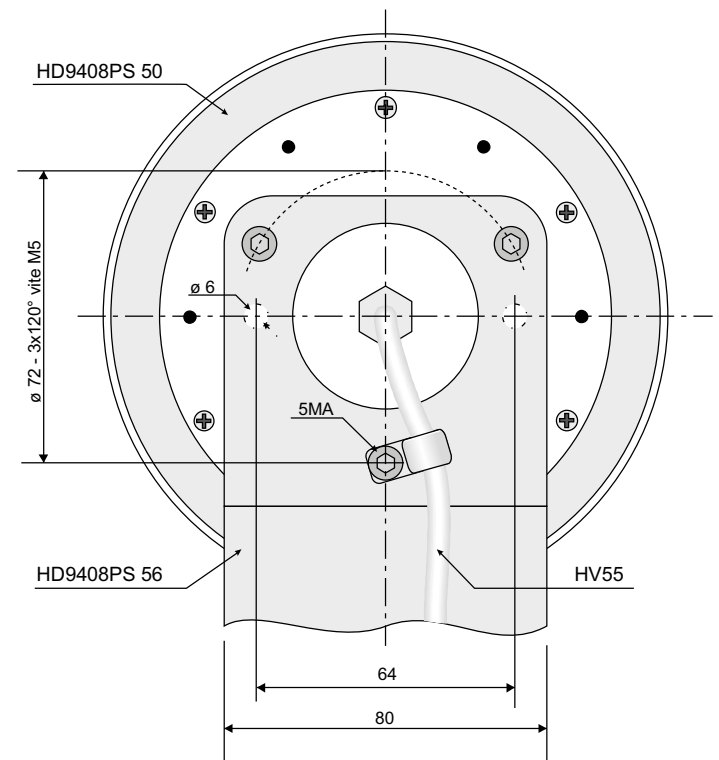
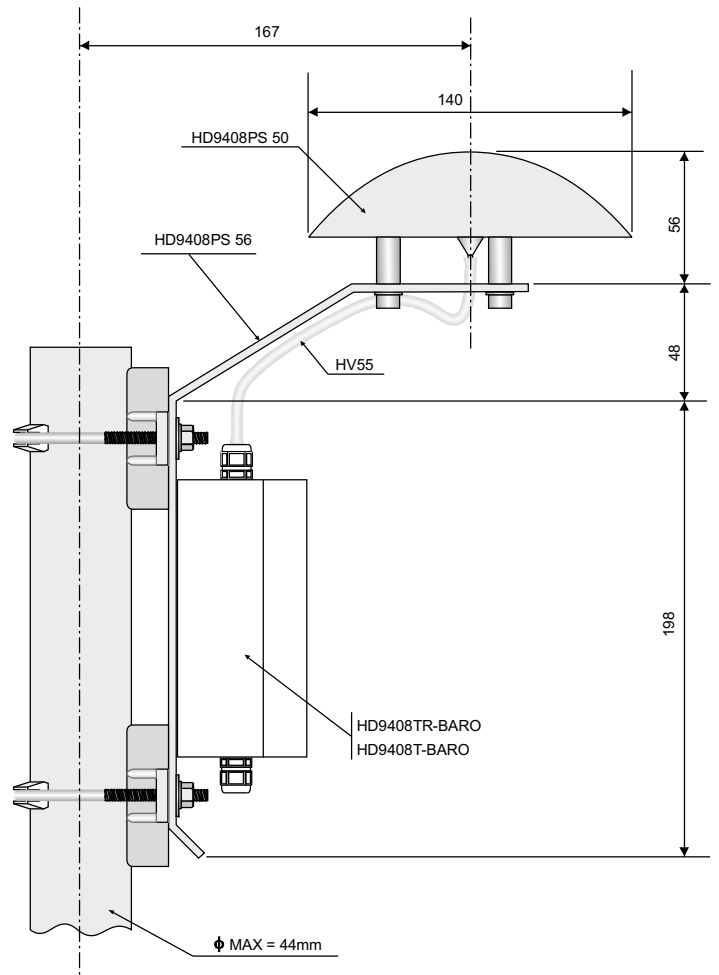
The measurement of the barometric pressure in free field can give incorrect values of hundred pascal fluctuation and wind direction. With the static port for barometric measurements, HD9408PS 50 can minimize these errors because, in addition to act as a filter (brake) against the dynamic pressure of the wind, the barometer can operate correctly even in the presence of snow or ice and comply with the recommendations of the WMO (World Meteorological Organization). The materials used for the construction of the static are UV resistant and can operate in temperatures between -40°C and +80°C.

INSTALLATION AND CONNECTION

Installation is simple: it must be installed away from buildings, trees or any other source which can disrupt the flow of wind. To install the bracket is available HD9408PS 56 and three stainless steel screws M5x16 Acc. The connection of the static to the barometer, for example, HD9408T or HD9408TR, is made with a special tube HV55 (internal diameter of 3mm, 6mm outer diameter) and UV resistant to climate changes. Maintenance or cleaning is minimal. The plastic parts are manufactured by BASF LURAN S777K. Clean using non aggressive detergents compatible with the material.

TECHNICAL SPECIFICATIONS

According to recommendations of the WMO, the deviation allowed measurement of wind speed 20meters/second is equal to 0.3mbar, corresponding to 300 Pascal. The HD9408PS 50 static port for barometric measurements falls within that value. The following tables show the values obtained from the tests performed in the wind tunnel.



Error due to the dynamic pressure	Lower than 0.3mbar @20°C
Working temperature	-40°C... +80°C
Connection pipe (for a tube with inside ϕ : 3mm, outside ϕ : 6mm)	ϕ 3.4 mm
Weight of the static port. - Weight of the static port equipped with the bracket	200 gr, 570 gr
Total weight and static port and bracket	570 gr

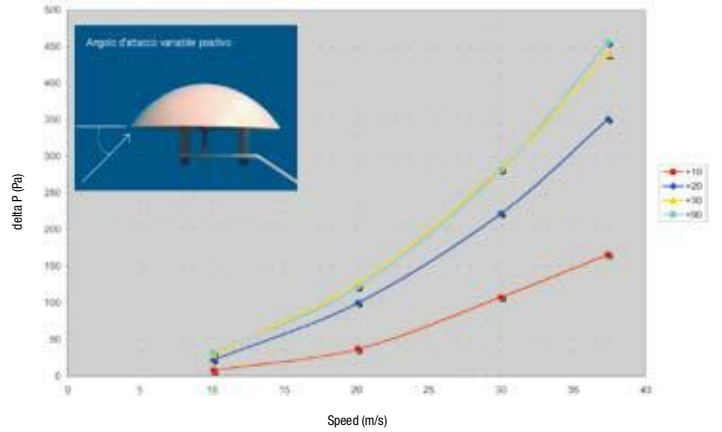
ORDERING CODE

- HD9408PS 50K** Kit consists of static port, pole mounting bracket and HV55 tube
- HD9408PS 50** Static port for barometric measurements equipped with the HV55 tube
- HD9408PS 56** Mounting bracket for static port, barometer fastening, pole anchor
- HV55** HV55 UV- and temperature-resistant silicone tube, inside \varnothing : 3mm, outside \varnothing : 6mm, L=400mm

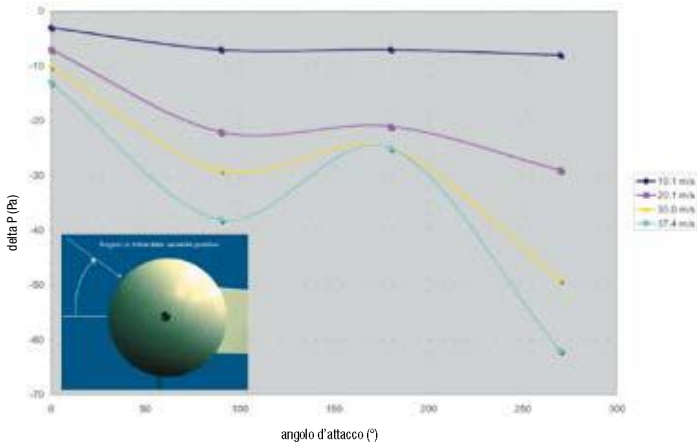
TESTS MADE IN THE WIND TUNNEL



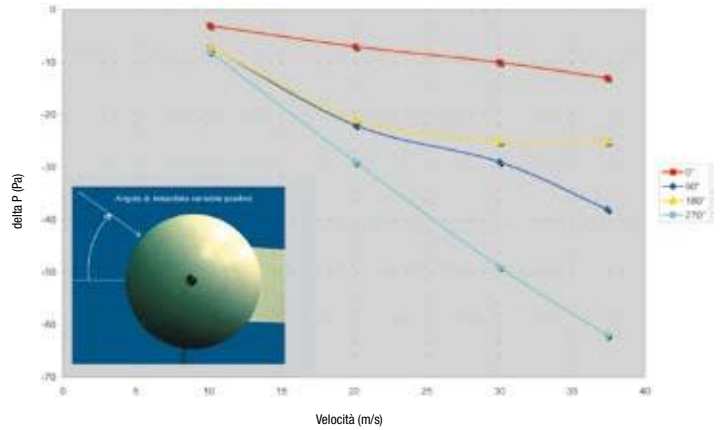
Static port put in front of the wind tunnel



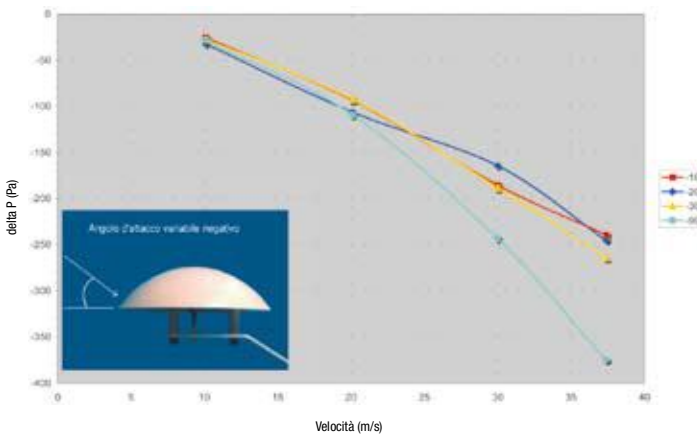
ΔP according to the yaw angle β (join angle $\alpha = 0^\circ$)



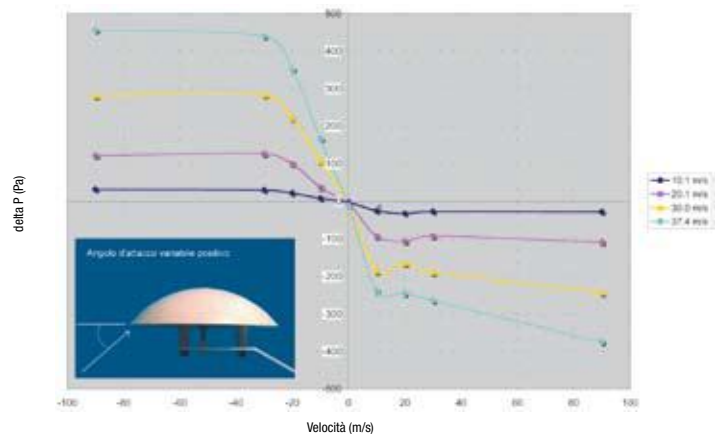
ΔP according to the join angle α (yaw angle $\beta = 0^\circ$)



ΔP according to the α join angle (yaw angle $\beta = 0^\circ$)



ΔP according to the β yaw angle



ΔP according to the α join angle

Pressure



SIT N° 124 Laboratory - pressure measurements





Italian calibration service

SIT centre n° 124:
DELTA OHM s.r.l.
Via G. Marconi, 5
35030 CASELLE DI SELVAZZANO (PD) - ITALIA
Telefono: +39 049 89 77 150
Telefax: +39 049 63 55 96
E-mail: deltaohm@tin.it
URL <http://www.deltaohm.com>

Permanent Laboratory

SIT ACCREDITATION TABLE

Magnitude	Instrument under calibration	Measuring range	Uncertainty (*)	Note
Pressure	Secondary pressure transducer:			
	- in liquid medium relative condition	from 0,075 MPa to 100 MPa	0,01 %	
	- in gas medium relative condition	from 1, 4 kPa to 12 MPa	0,01 %	
	- in gas medium absolute condition	1,4 KPa to 6,9 MPa	0,01 %	

(*) Measuring uncertainty is expressed at the 95% of confidence level.

