

- 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	320 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% RGD + 100ppm/°C	RDG = measured value
Flow rate measurements	0.2% FS + 0.5% RDG	0.2% FS + 0.5% RGD + 100ppm/°C	
Temperature 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.

**ORDER CODES**

**DO9704:** Pressure gauge, thermometer, data logger. The kit consists of instrument DO9704, 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**.

**TEMPERATURE 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.

**PRESSURE PROBES**

Pressure probes: sensor surface in contact with fluid under pressure alumina or AISI316 steel. Body in steel AISI 304, O-Ring in VITON, male thread 1/4" BSP, 8-pin DIN 45326 connector.

The codes and pressure probes list are shown in table below.

**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 ¼ BSP fittings and gaskets for TP704 series of probes.
- C.205:** Serial connection cable with USB connector for PC and Sub-D 9-pole connector for the instrument. The cable has a built-in USB/RS232 converter and connects the instrument DO 9704 directly to the USB port of the PC.

## 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, mmH<sub>2</sub>O 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.



**TEMPERATURE PROBES OF THE SERIES TP870**

Code	Description	Drawing	$\tau$ Sec.	Temp/°C
TP 870.0	Immersion probe $\varnothing$ 3 x 230 mm		3"A	-50/+250
TP 870P.0	Penetration probe $\varnothing$ 4 x 150 mm		3"A	-50/+250
TP 870C.0	Contact probe $\varnothing$ 4 x 230 mm		12"C	-50/+250
TP 870A.0	Air probe $\varnothing$ 4 x 230 mm		3"B	-50/+250

A) Time constant in water at 100 °C / B) Time constant detected in contact with metal surface at 200 °C / C) Time constant in air at 100 °C.  
**Notes:** Time constant to respond to the 63% of the temperature variation.

**PRESSURE PROBE TABLE**

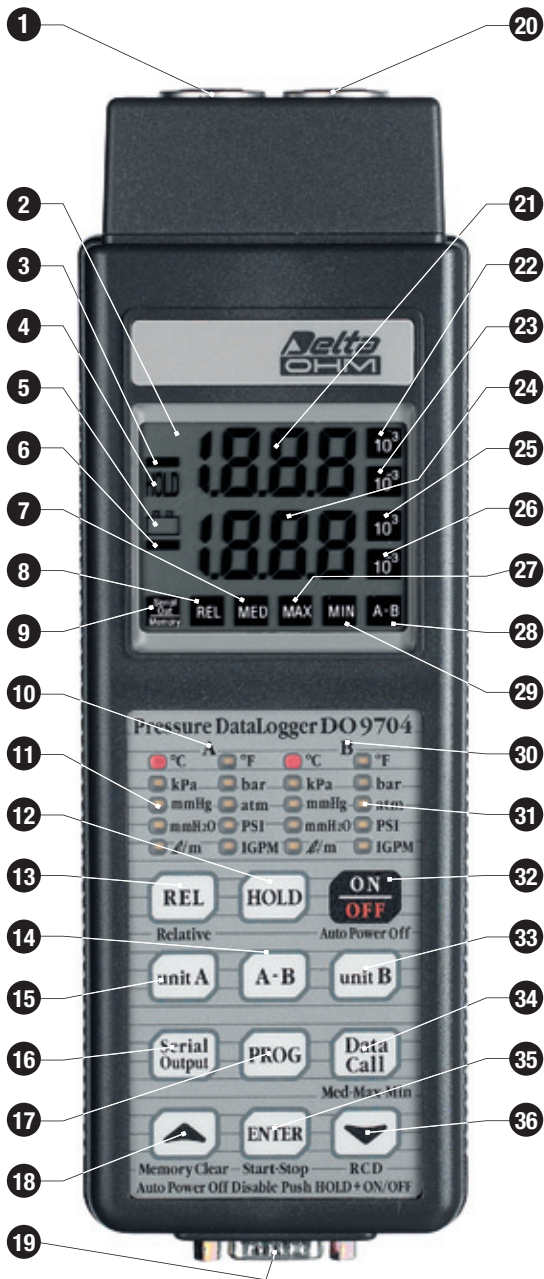
Full scale pressure	Maximum overpressure	Resolution	ORDERING CODES			Accuracy From 20 to 25°C	Working temperature	Connection
			Differential pressure	Relative pressure (compared to atmosphere)	Absolute pressure			
			NON insulated membrane	Insulated membrane	Insulated membrane			
10.0 mbar	20.0 mbar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

\* Ceramic diaphragm

• Only report of calibration, no Accredia certificate



Pressure



- 1 Input A, DIN 8-pole connector for pressure, flow rate or temperature.
- 2 Display.
- 3 Negative symbol input A.
- 4 HOLD symbol.
- 5 BATT 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 factor for channel A  $10^3$ .
- 23 Multiplication factor for channel A  $10^{-3}$ .
- 24 Input B indication.
- 25 Multiplication factor for channel B  $10^3$ .
- 26 Multiplication factor 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, confirms the set parameters.
- 36 ▼ key. When enabled, this key decreases the displayed values, starts and stops the RECORD function.



### PRESSURE REFERENCES

