



# PRESSURE AND TEMPERATURE - DATALOGGER DO 9704

## DO 9704 DATA LOGGER FOR MEASURING PRESSURE, FLOW RATE AND TEMPERATURE

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 bending of a membrane in a watertight chamber in contact with the flow of which 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 may be in °C or °F.

### Flow rate:

Flow rate may 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

## CLASSIFICATION OF PRESSURE MEASUREMENTS

Pressure measurements always relate to a reference pressure; there are four distinct types by means of which the reference pressure may be immediately defined.

- **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

**DO 9704 K:** Pressure gauge - thermometer - data logger kit composed of a diplomatic carrying case, instrument DO 9704, series of fittings, 1 CPA 8-pole DIN 45326 connecting cable between instrument and probe, 1 cable CP RS 232C.

**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, measuring range -50...+400°C.

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

**Pressure probes: contact surface with Alumina pressurised fluid, stainless steel body AISI 304, male threaded coupling 1/4" BSP, 8-pole DIN 45326 male connector.**

**TP 704-200MBGI:** Pressure probe, full scale 200 mbar relative.

**TP 704-500MBGI:** Pressure probe, full scale 500 mbar relative.

**TP 704-1BGI:** Pressure probe, full scale 1 bar relative.

**TP 704-2BGI:** Pressure probe, full scale 2 bar relative.

**TP 704-5BGI:** Pressure probe, full scale 5 bar relative.

**TP 704-10BGI:** Pressure probe, full scale 10 bar relative.

**TP 704-20BGI:** Pressure probe, full scale 20 bar relative.

**TP 704-50BGI:** Pressure probe, full scale 50 bar relative.

**TP 704-2BAI:** Pressure probe, full scale 2 bar absolute.

**TP 704-5BAI:** Pressure probe, full scale 5 bar absolute.

**TP 704-10BAI:** Pressure probe, full scale 10 bar absolute.

**TP 704-20BAI:** Pressure probe, full scale 20 bar absolute.

**TP 704-50BAI:** Pressure probe, full scale 50 bar absolute.

**TP 704-100BAI:** Pressure probe, full scale 100 bar absolute.

**TP 704-200BAI:** Pressure probe, full scale 200 bar absolute.

**TP 704-500BAI:** Pressure probe, full scale 500 bar absolute.



The probes in the series TP 705 are suitable for measuring the low pressure of not-corrosive gases and dry air, fitting diam. 5 mm.

**TP 705-10MBD:** Pressure probe, full scale 10 mbar relative.

**TP 705-20MBD:** Pressure probe, full scale 20 mbar relative.

**TP 705-50MBD:** Pressure probe, full scale 50 mbar relative.

**TP 705-100MBD:** Pressure probe, full scale 100 mbar relative.

**TP 705-200MBD:** Pressure probe, full scale 200 mbar relative.

**TP 705-500MBD:** Pressure probe, full scale 500 mbar relative.

**TP 705-1 BD:** Pressure probe, full scale 1 bar relative.













**TP 705-2 BD:** Pressure probe, full scale 2 bar relative.

**TP 705-BARO:** Pressure probe absolute barometric.

**CPA:** Connection cable L=1,5m, to connect the probe to the instrument.

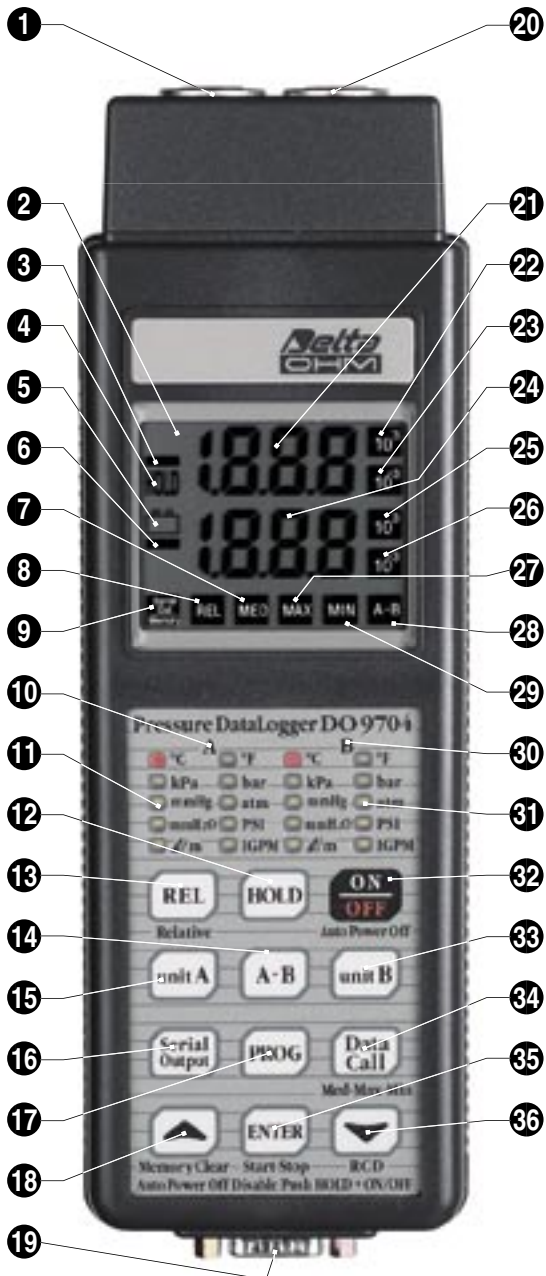
**Deltalog-1:** Software Deltalog-1 for data download and management.

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	
Temperature measurements	0.4°C 0.2°C 3°C	0.4°C + 0.01°C/°C 0.2°C + 0.01°C/°C 3°C + 0.01°C/°C	-200...-50°C -50...+200°C +200...+800°C

TEMPERATURE PROBES						
CODE	Description	Drawing			τ Sec..	Temp/°C
TP 870	Immersion probe Ø 3 x 230 mm				3°A	-50/+400
TP 870/P	Penetration probe Ø 4 x 150 mm				3°A	-50/+400
TP 870/C	Surface probe Ø 4 x 230 mm				12°C	-50/+400
TP 870/A	Air probe Ø 4 x 230 mm				3°B	-50/+250

A) Time constant in water at 100°C / B) Time constant observed with metal surface at 200°C / C) Time constant in air at 100°C  
**Note:** The time constant is the time needed to respond to 63% of the temperature changes.

PRESSURE PROBE TABLE								
Full scale pressure	Maximum overpressure	Resolution	ORDER CODES			Accuracy From 20 to 25°C	Functioning temperature	Connection
			Differential pressure	Relative pressure (compared to atmosphere)	Absolute pressure			
			NON insulated membrane	Insulated membrane	Insulated membrane			
10.0 mbar	20.0 mbar	0.001mbar	TP705-10MBD			0.50 % FSO	0...60°C	Tube Ø 5mm
20.0 mbar	40.0 mbar	0.001mbar	TP705-20MBD			0.50 % FSO	0...60°C	Tube Ø 5mm
50.0 mbar	100 mbar	0.001mbar	TP705-50MBD			0.50 % FSO	0...60°C	Tube Ø 5mm
100 mbar	200 mbar	0.01mbar	TP705-100MBD			0.25 % FSO	0...60°C	Tube Ø 5mm
			TP705-200MBD	TP704-200MBGI		0.25 % FSO	0...80°C	¼ BSP
200 mbar	400 mbar	0.01mbar	TP705-500MBD			0.25 % FSO	0...60°C	Tube Ø 5mm
			TP704-500MBGI			0.25 % FSO	0...80°C	¼ BSP
1.00 bar	2.00 bar	0.1mbar	TP705-1BD	TP705BARO		0.25 % FSO	0...60°C	Tube Ø 5mm
			TP705-2BD	TP705-1BGI		0.25 % FSO	0...80°C	¼ BSP
2.00 bar	4.00 bar	0.1mbar	TP705-2BD			0.25 % FSO	0...60°C	Tube Ø 5mm
			TP704-2BGI	TP704-2BAI		0.40 % FSO	0...80°C	¼ BSP
5.00 bar	10.00 bar	0.1mbar		TP704-5BGI	TP704-5BAI	0.40 % FSO	0...80°C	¼ BSP
10.0 bar	20.0 bar	0.001bar		TP704-10BGI	TP704-10BAI	0.40 % FSO	0...80°C	¼ BSP
20.0 bar	40.0 bar	0.001bar		TP704-20BGI	TP704-20BAI	0.40 % FSO	0...80°C	¼ BSP
50.0 bar	100.0 bar	0.001bar		TP704-50BGI	TP704-50BAI	0.40 % FSO	0...80°C	¼ BSP
100 bar	200 bar	0.01bar			TP704-100BAI	0.40 % FSO	0...80°C	¼ BSP
200 bar	400 bar	0.01bar			TP704-200BAI	0.40 % FSO	0...80°C	¼ BSP
500 bar	750 bar	0.01bar			TP704-500BAI	0.40 % FSO	0...80°C	¼ BSP



- 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.

