



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 | |
| 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 |

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

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 ¼ BSPP fittings and gaskets for TP704 series of probes.



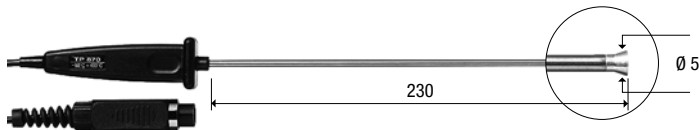

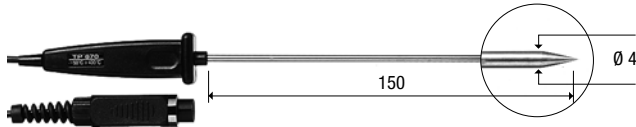

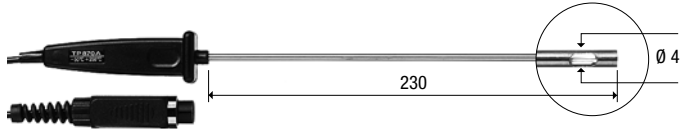

TP 870: Immersion temperature probe, Pt100 sensor, diam. 3x230 mm measuring range -50...+400°C.

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 |  |  |

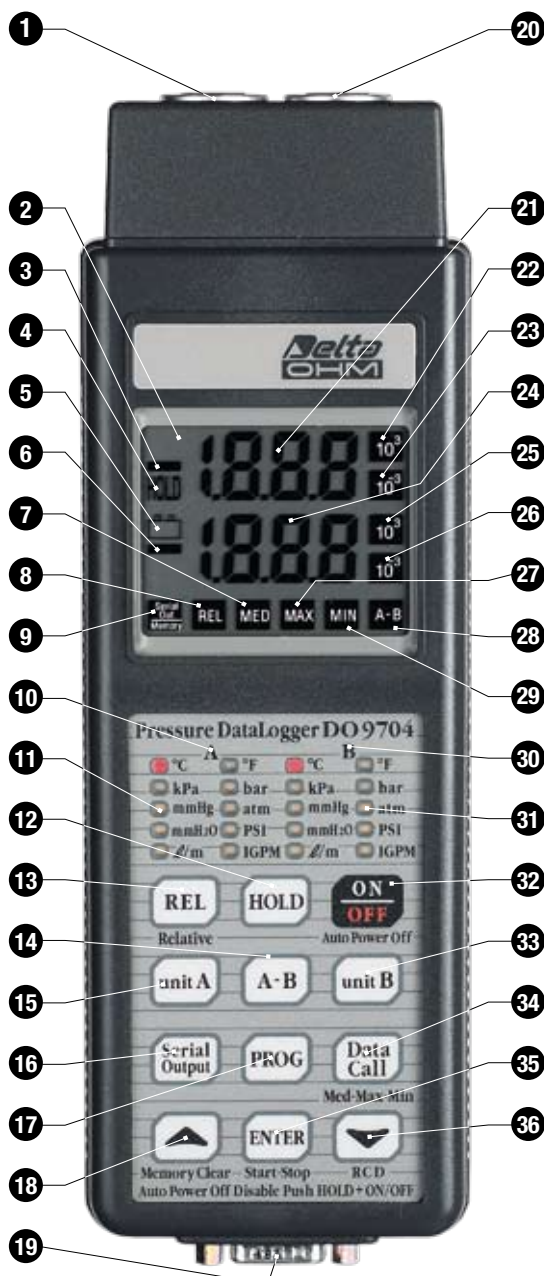
PRESSURE PROBES

| 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 |
| | | | | TP704-1BGI | | 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

