Test&Measurement

YOKOGAWA

# High Accuracy and Long Term Stability

## MT300
Digital Manometer

**Precision Making**

Bulletin MT300-01EN

**Yokogawa has been designing and providing precision measuring instruments with the highest quality for over 100 years.**
**While continuing to meet the needs of a broad customer base, we have accumulated and improved our measurement technologies over time. For over 40 years, we have pioneered the techniques of pressure measurements, that are even today, used by many governments and standards organizations as the de-facto standard. The new MT300 delivers high quality and reliable pressure measurements for today's advanced pressure measurement needs.**

**The MT300 provides:**

**Technology** – Proprietary, silicon based resonant sensor technology, delivers high measurement accuracy of 0.01% and long term stability of accuracy up to 12 months.

**Operability** – With high speed, high resolution, and synchronous measurements, the MT300 meets the needs of a wide range of industries, other than just pressure measurements.

**Confidence** – Yokogawa's high standards of quality and performance, gives engineers a high level of confidence in their measurements.

# Rich lineup

Choose from a variety of model based on your application needs.

| Gauge pressure model | Absolute pressure model | Differential pressure model |
|---|---|---|
| 6 ranges | 3 ranges | 4 ranges |
| 10 kPa<br>200 kPa<br>1000 kPa<br>3500 kPa<br>16 MPa<br>70 MPa*1 | 130 kPa<br>700 kPa<br>3500 kPa | 1 kPa<br>10 kPa<br>130 kPa<br>700 kPa |

*1 Shield gauge pressure model

# High accuracy and long term stability

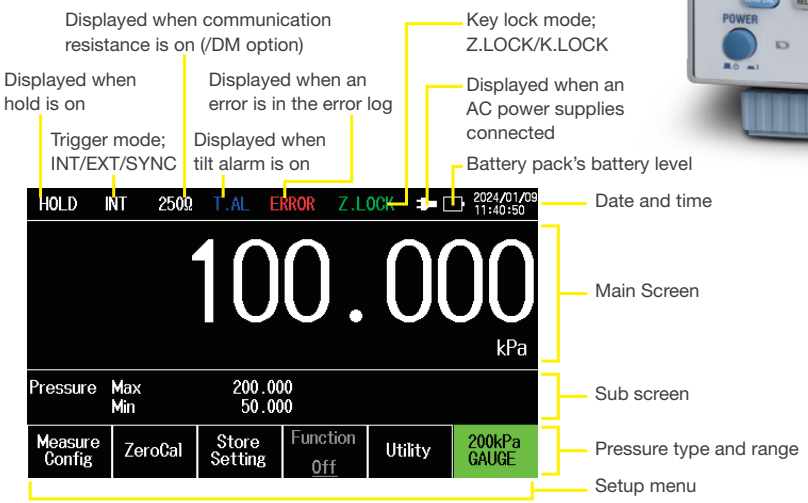
## Relative accuracy of pressure measurement: 0.01%

## Accuracy guarantee period: 12 months

Yokogawa's proprietary silicon based resonant sensor technology achieves a high measurement accuracy of 0.01% as relative accuracy. In addition, with long term stability performance backed by measurement data accumulated over many years, we guarantee the measurement accuracy of 12 months.

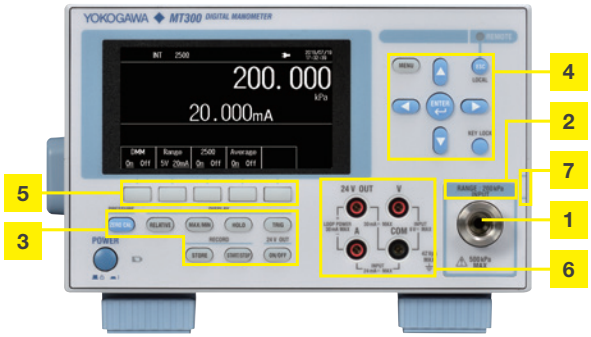
# An informative color display

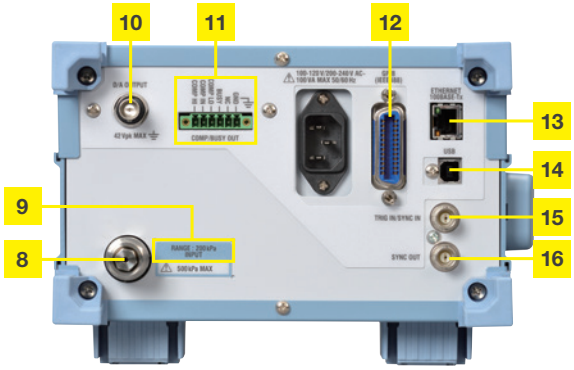
The use of a color dot matrix LCD, allows measurement data and analysis to be displayed with high resolution and high visibility.



Differential pressure model

# Front panel/rear panel




1 Pressure input port*1

2 Pressure range label

3 Panel keys (for functions)

4 Panel keys (for menu navigations)

5 Soft keys

6 24 VDC output and Voltage/Current input terminals (when /DM is selected)

7 Reference point of the pressure receiving section

8 Pressure input port*1

9 Pressure range label

10 D/A output terminal (when /DA is selected)

11 Comparator output terminal (when /DA is selected)

12 GP-IB port

13 Ethernet port

14 USB port

15 External trigger/sync signal input terminal

16 Sync signal output terminal

*1 Located on both front and rear panels; however, simultaneous input to connections on both sides are prohibited.
There are two input ports on both sides when differential models are selected. In the case of -G08 (70 MPa range) , input connector is located only on the rear panel.

# With various functions, we can meet the needs of a wide range of industries

## High precision measurements

### High resolution display (When /R1 is selected.)

By using a high resolution display, pressure measurements can be more accurately displayed and visualized. In addition, the increased resolution, especially in calibration environments, reduces the uncertainty of the entire calibration process.

Example of “MT300-G01”

### High speed measurement (When /F1 is selected.)

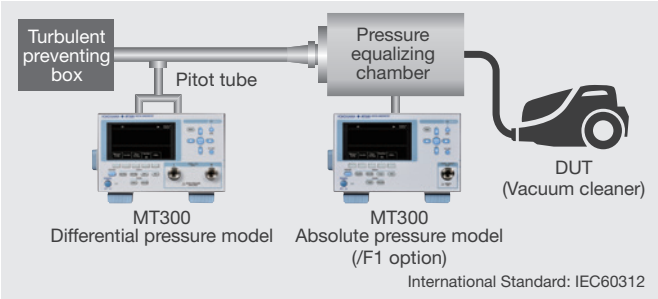
Rapid pressure changes and transient responses requires high speed and reliable measurements. Depending on the application, you can choose your measurement speeds from three different modes, normal, medium or high speed.

### Synchronous measurement

Using the synchronization features, you can collect data and display measurements from multiple units. Measurements can be captured and correlated at high speed with high accuracy and confidence.

**Application:**

In the performance testing of vacuum cleaners, the suction-force is calculated from the amount of suction-air in the pressure equalizing container and the degree of vacuum. The amount of intake-air can be obtained by measuring the differential pressure via a pitot tube, and the degree of vacuum can be obtained by measuring the absolute pressure. With the /F1 option, the dynamic characteristics can be captured at high speed, with accurate results, by synchronously measuring these two values from two MT300s.




Suction Power Test of Vacuum Cleaner

## Support for efficient works

### Leak test

The Leak-test feature can be used to measure pressure change or leak rate within the measurement period. It can be used to check the tightness or integrity of a pressure measurement system.

Start: Pressure value and time when started
Stop: Pressure value and time when stopped
Time: Measurement time
Delta: Difference of pressure value between started and stopped
Rate: Difference of pressure value per minute

$$\text{Leak rate} = \frac{\text{(Started value)} - \text{(stopped value)}}{\text{Leak test period (minute)}}$$

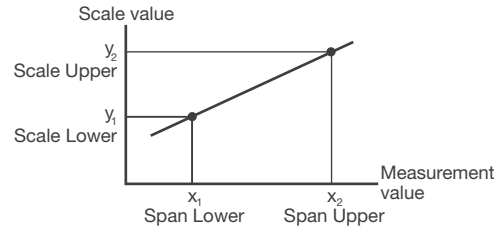
### Scaling

The scaling function can be used to assign customer specific coefficients to the measured values. Depending on the application, you can display your own conversion value. Scaling coefficient A and offset B are determined according to the following equation. Set the scale values for the upper and lower span limits.

$y = Ax + B$

$$A = \frac{y_2 - y_1}{x_2 - x_1},$$

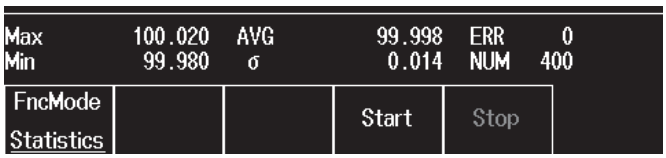
$$B = \frac{x_2 y_1 - x_1 y_2}{x_2 - x_1}$$




*If you change the unit, set scaling coefficient A and offset B again.

### Statistical processing

You can apply statistical processing to the data acquired. Find and display the maximum value, minimum value, average value, and standard deviation for the measured data. When error data is detected, the number of error data within the measurement range can be recorded and displayed.

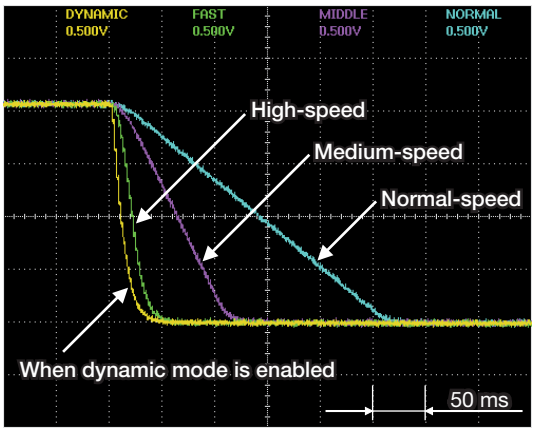



Max: Maximum value
Min: Minimum value
AVG: Average value
σ: Standard deviation
ERR: Number of error data

## Support for linkage with external devices

### D/A output (When /DA is selected)

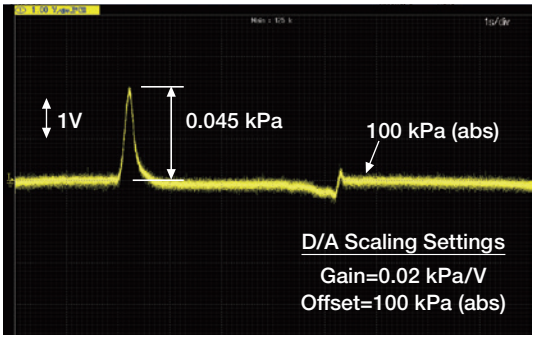
The Digital-to-Analog (D/A) option, makes it easy to output measured pressure values to an external terminal going to a measurement system or a recorder. The output update interval can be set to 250 μs in combination with the /F1 option (in medium-speed/high-speed modes).




Example of the waveform differences in measurement modes

### D/A Scaling (When /DA is selected)

Any range within the pressure measurement ranges is output in full scale of the D/A output range.
Minute changes in pressure can be captured with high resolution.




Measurement of minute changes in atmospheric pressure

## Support for field device calibration and maintenance works

- Outputting 24 VDC for the supply of transmitter
- Measuring transmitter output (1 to 5 V or 4 to 20 mA selective)
- Built-in communication resistance enables ON/OFF switching.

Above functions can be available when /DM is selected.

- It is possible to bring it out without AC power by Li-ion battery operation.

  Running time: Approx. 6 hours with all functions turned on
  Charge time: Approx. 6 hours

Above function can be available when /EB is selected or add them as accessory after ordered.

## Tilt alarm and Tilt Correction (Absolute pressure model)

### Tilt alarm

This function detects the orientation state of the absolute pressure model body and displays a warning.

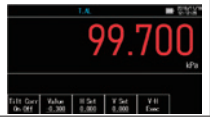
### Tilt correction (Enabled when the tilt alarm is on.)

Stores the vertical orientation offset and compensates measurement values during vertical use.*1

*1 Displays a warning if this function is set to ON in the horizontal orientation.

### Indication

Blue value: Tilt correction is working properly in the vertical orientation.
Red value: The combination of the installation orientation and the tilt correction on/off state is inappropriate.

| | | Vertical Orientation | Horizontal Orientation |
|---|---|---|---|
| Tilt Alarm ON | Tilt Corr ON | | |
| | Tilt Corr OFF |   | |

Example of tilt alarm and tilt correction

# High performance and reliability

**Yokogawa's proprietary and self-developed silicon based resonant sensor enables high accuracy, high resolution, and high stability pressure measurement system.**

Yokogawa's proprietary silicon resonant sensor has excellent characteristics that satisfy the conditions required for "accuracy measurement", such as stability, reproducibility, sensitivity, and temperature characteristics.

## High sensitivity, high resolution, and superior long-term stability

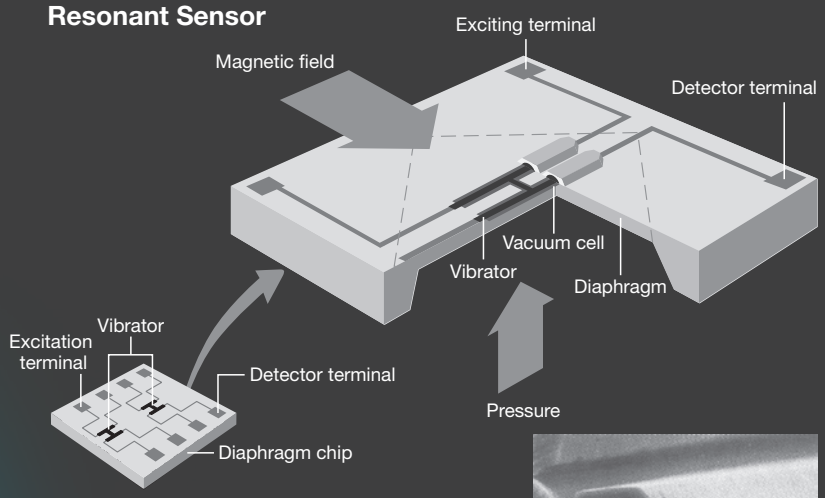
The vibrators are housed in a vacuum, reducing the dispersion of vibration energy. Combined with the high flexibility of silicon single crystal, this design achieves high quality factor.

## Extremely low temperature dependency

Two vibrators are used, and pressure is derived from the difference between their unique oscillation counts.
This structure to cancels out external influences such as ambient temperature.
In addition, the vacuum environment prevents humidity effects.

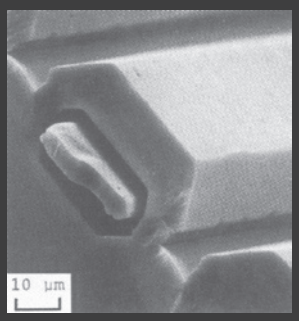
*Silicon Resonant Sensor*

### Structural View of Silicon Resonant Sensor




Each vibrator, fabricated using semiconductor process technology on a silicon wafer, is driven by a permanent magnet.

When pressure is applied to the silicon diaphragm, the vibrator deforms, causing its resonant frequency to change.

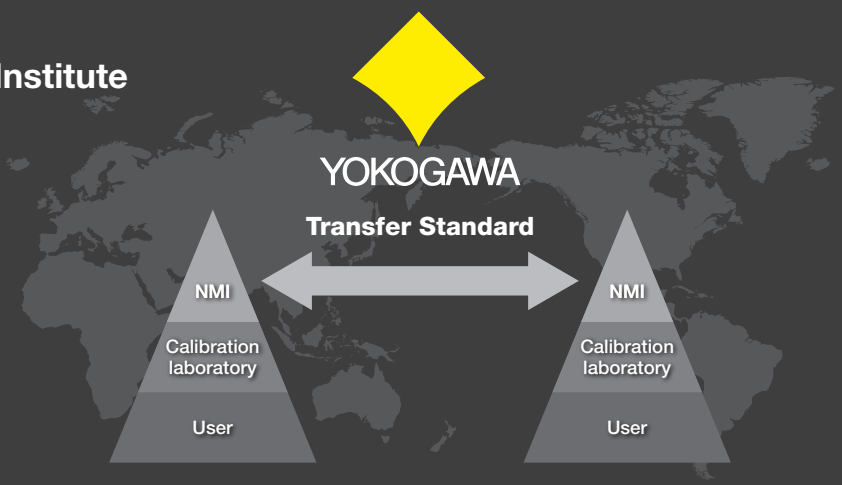



## Initiatives for National Metrology Institute

**International Comparison**

The Yokogawa's pressure sensor and the MT series are adopted as a Transfer Standard for many CC-level and the regional-level (for example APMP) international comparisons of pressure standards based on the enhanced performance of digital pressure gauges and the evaluation result of long term stability.

*Transfer Standard:
A standard used as a transfer equipment to compare standards.

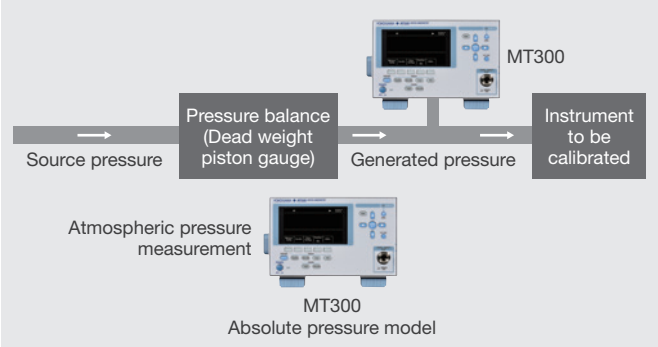


# Applications

## High precision and resolution providing stable measurements

### Pressure calibration using Pressure Balance

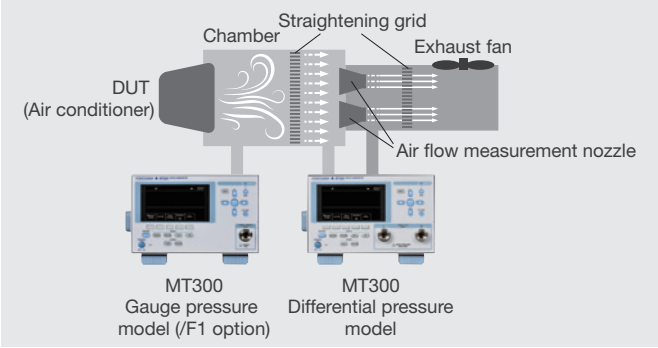
When pressure balance is used in calibration, connecting a manometer is necessary to confirm that the calibration values are generated correctly. Also, measurement of atmospheric pressure is necessary to confirm the effects of atmospheric pressure to the calibration results. The MT300 is best suited for this type of application, where high accuracy, long stability and high resolution is needed.




## High speed measurements for rapidly changing pressures

### Evaluation of Air Conditioner

The cooling and heating performance of air conditioners is calculated by testing the differential pressure before and after an air flow measurement nozzle and the air temperature/humidity. The test has to be performed in an equilibrium state and it is necessary to measure the internal and external pressures. The MT300 with /F1 option allows measurement of rapidly changing pressures.



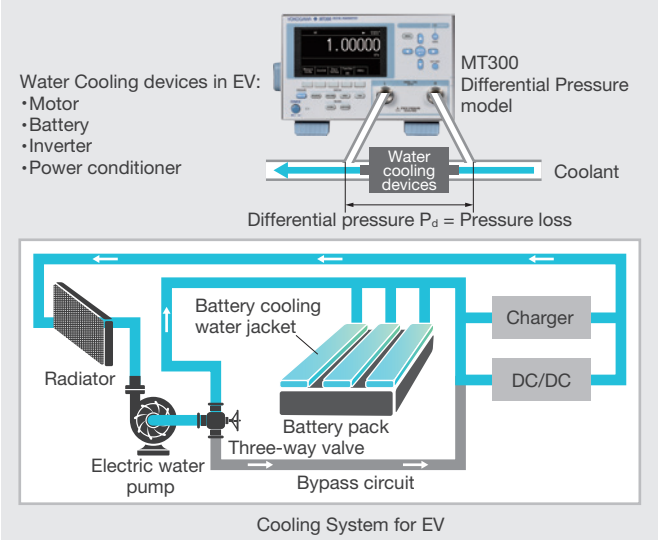

## Measuring pressure loss with one unit

### Measurement of Coolant Flow Pressure Loss in Water Cooling Systems for EV

There are many devices require temperature control in Electric Vehicles (EVs) such as motors, batteries, and power control units. Since each of these devices generates different amounts of heat and has a different optimum temperature, a single vehicle is usually equipped with multiple cooling systems. As EV performance improves, the importance of cooling systems also increase.

In the design and development of water cooling systems, it is essential to measure the pressure loss in the flow path where coolant flows.

The MT300 multiple differential pressure models features optimal range and resolution, enabling high accuracy measurements for a variety of applications with one unit.




Cooling System for EV

For more examples of applications, visit our website.

# Specifications

## Pressure-measurement Specifications

### Gauge-pressure models

| Model Code | | | | | -G01 | -G03 | -G05 | -G06 | -G07 | -G08[*1] |
|---|---|---|---|---|---|---|---|---|---|---|
| Range | | | | | 10 kPa | 200 kPa | 1000 kPa | 3500 kPa | 16MPa | 70MPa |
| Guaranteed Accuracy Range | | Positive pressure | | | 0 ka to 10 kPa | 0 kPa to 200 kPa | 0 kPa to 1000 kPa | 0 kPa to 3500 kPa | 0 kPa to 16000 kPa | 0 kPa to 70000 kPa |
| | | Negative pressure[*2] | | | –10 kPa to 0 kPa | –90 kPa to 0 kPa | –90 kPa to 0 kPa | –90 kPa to 0 kPa | — | — |
| Readout range | | | | | –12 kPa to 12 kPa | to 240 kPa | to 1200 kPa | to 4200 kPa | to 19200 kPa | to 77000 kPa |
| Display resolution | | | | | 0.0001 kPa | 0.001 kPa | 0.01 kPa | 0.01 kPa | 0.1 kPa | 0.1 kPa |
| | | When /R1 is selected | | | 0.00001 kPa | 0.0001 kPa | 0.001 kPa | 0.001 kPa | 0.01 kPa | — |
| Allowable input | | | | | 2.7 kPa (abs) to 50 kPa (gauge) | 2.7 kPa (abs) to 500 kPa (gauge) | 2.7 kPa (abs) to 3000 kPa (gauge) | 2.7 kPa (abs) to 4500 kPa (gauge) | 2.7 kPa (abs) to 21 MPa (gauge) | 2.7 kPa (abs) to 98 MPa (gauge) |
| Accuracy<br>12 months after calibration Tested at 23±3°C, after zero calibration | Measurement mode | Normal-speed[*3, *4] | Positive pressure | Relative accuracy[*5] | ±0.01% of full scale | 25 kPa to 200 kPa: ±(0.008% of reading + 0.002 kPa)<br>0 kPa to 25 kPa: ±0.004 kPa | The smaller of ±(0.01% of reading + 0.03 kPa) or ±0.01% of full scale | The smaller of ±(0.01% of reading + 0.09 kPa) or ±0.01% of full scale | The smaller of ±(0.008% of reading + 1.4 kPa) or ±0.01% of full scale | The smaller of ±(0.008% of reading + 5.0 kPa) or ±0.01% of full scale[*6] |
| | | | | Absolute accuracy | ±(0.015% of reading + 0.0015 kPa) | 25 kPa to 200 kPa: ±(0.02% of reading)<br>0 kPa to 25 kPa: ±0.005 kPa | 100 kPa to 1000 kPa: ±(0.02% of reading + 0.03 kPa)<br>0 kPa to 100 kPa: ±0.05 kPa | ±(0.02% of reading + 0.10 kPa) | ±(0.02% of reading + 1.5 kPa) | ±(0.02% of reading + 6.0 kPa)[*6] |
| | | | Negative pressure | Relative accuracy[*5] | ±(0.1% of reading + 0.0050 kPa) | ±(0.2% of reading + 0.040 kPa) | ±(0.2% of reading + 0.04 kPa) | ±(0.2% of reading + 0.04 kPa) | — | |
| | | | | Absolute accuracy | ±(0.2% of reading + 0.0100 kPa) | ±(0.2% of reading + 0.080 kPa) | ±(0.2% of reading + 0.08 kPa) | ±(0.2% of reading + 0.08 kPa) | — | |
| | | Medium-speed[*7] | | | ±0.0020 kPa | ±0.026 kPa | ±0.14 kPa | ±0.60 kPa | — | |
| | | High-speed[*7] | | | ±0.0060 kPa | ±0.065 kPa | ±0.35 kPa | ±1.50 kPa | — | |
| Readout update interval[*8] | Measurement mode | Normal-speed | | | 250 ms | | | | | |
| | | Medium-speed[*7] | | | 100 ms | | | | — | |
| | | High-speed[*7] | | | 100 ms | | | | — | |
| Response time[*9] | Measurement mode | Normal-speed | | | 2.5 s or less | | | | | |
| | | Medium-speed[*7] | | | 200 ms or less | | | | — | |
| | | High-speed[*7] | | | 100 ms or less | 50 ms or less | 70 ms or less | 150 ms or less | — | |
| Influence of temperature | | Positive pressure | | | ±(0.001% of reading + 0.00015 kPa)/°C | ±(0.001% of reading + 0.0013 kPa)/°C | ±(0.001% of reading + 0.007 kPa)/°C | ±(0.001% of reading + 0.03 kPa)/°C | ±(0.001% of reading + 0.16 kPa)/°C | ±(0.001% of reading + 0.7 kPa)/°C |
| | | Negative pressure | | | ±(0.001% of reading + 0.00015 kPa)/°C | ±(0.001% of reading + 0.0008 kPa)/°C | ±(0.001% of reading + 0.0008 kPa)/°C | ±(0.001% of reading + 0.0008 kPa)/°C | — | — |
| Influence of positional setup (Zero point drift) | | 90° tilt, forward or backward | | | ±0.01 kPa | ±0.013 kPa | ±0.07 kPa | ±0.3 kPa | ±1 kPa or less | ±1 kPa or less |
| | | 30° tilt, right or left | | | ±0.25 kPa | ±0.26 kPa | ±0.35 kPa | ±0.3 kPa | ±1 kPa or less | ±1 kPa or less |
| Weight (main unit) | | | | | Approx. 7.0 kg | Approx. 6.2 kg | Approx. 6.2 kg | Approx. 6.2 kg | Approx. 6.2 kg | Approx. 5.0 kg |
| Internal volume | | | | | Approx. 12 $cm^3$ | | | | | Approx. 6 $cm^3$ |

### Absolute-pressure Model

| Model code | | | | -A03 | -A05 | -A06 |
|---|---|---|---|---|---|---|
| Range | | | | 130 kPa (abs) | 700 kPa (abs) | 3500 kPa (abs) |
| Guaranteed Accuracy Range | | | | 0 kPa (abs) to 130 kPa (abs) | 0 kPa (abs) to 700 kPa (abs) | 0 kPa (abs) to 3500 kPa (abs) |
| Readout range | | | | to 156 kPa | to 840 kPa | to 4200 kPa |
| Display resolution | | | | 0.001 kPa | 0.01 kPa | 0.01 kPa |
| | When /R1 is selected | | | 0.0001 kPa | 0.001 kPa | 0.001 kPa |
| Allowable input | | | | 1 Pa (abs) to 500 kPa (abs) | 1 Pa (abs) to 3000 kPa (abs) | 1 Pa (abs) to 4500 kPa (abs) |
| Accuracy[*10]<br>12 months after calibration Tested at 23±3°C, after zero calibration | Measurement mode | Normal-speed[*3, *4] | Relative accuracy[*5] | The smaller of ±(0.01% of reading + 0.005 kPa) or ±0.01% of full scale | The smaller of ±(0.008% of reading + 0.04 kPa) or ±0.01% of full scale | The smaller of ±(0.01% of reading + 0.14 kPa) or ±0.01% of full scale |
| | | | Absolute accuracy | ±(0.03% of reading + 0.006 kPa) | ±(0.03% of reading + 0.07 kPa) | ±(0.03% of reading + 0.35 kPa) |
| | | Medium-speed[*7] | | ±0.026 kPa | ±0.14 kPa | ±0.70 kPa |
| | | High-speed[*7] | | ±0.065 kPa | ±0.35 kPa | ±1.75 kPa |
| Readout update interval[*8] | Measurement mode | Normal-speed | | 250 ms | | |
| | | Medium-speed[*7] | | 100 ms | | |
| | | High-speed[*7] | | 100 ms | | |
| Response time[*9] | Measurement mode | Normal-speed | | 2.5 s or less | | |
| | | Medium-speed[*7] | | 200 ms or less | | |
| | | High-speed[*7] | | 50 ms or less | 70 ms or less | 150 ms or less |
| Influence of temperature | | | | ±(0.001% of reading + 0.0013 kPa)/°C | ±(0.001% of reading + 0.007 kPa)/°C | ±(0.001% of reading + 0.03 kPa)/°C |
| Influence of positional setup (Zero point drift) | | 90° tilt, forward or backward | | ±0.65 kPa | | |
| | | 30° tilt, right or left | | ±0.26 kPa | | |
| | | When using the stand | | ±0.10 kPa | | |
| Weight (main unit) | | | | Approx. 6.0 kg | | |
| Internal volume | | | | Approx. 12 $cm^3$ | | |

## Differential-pressure models

| Model code | | -D00 | -D01 | -D03 | -D05 |
|---|---|---|---|---|---|
| Range | | 1 kPa | 10 kPa | 130 kPa | 700 kPa |
| Guaranteed Accuracy Range (High pressure ≥ Low pressure) | | 0 kPa to 1 kPa | 0 kPa to 10 kPa | 0 kPa to 130 kPa | 0 kPa to 700 kPa |
| Readout range | | –1.2 kPa to 1.2 kPa | –12 kPa to 12 kPa | –156 kPa to 156 kPa | –156 kPa to 840 kPa |
| Display resolution | | 0.00001 kPa | 0.0001 kPa | 0.001 kPa | 0.01 kPa |
| | When /R1 is selected | — | 0.00001 kPa | 0.0001 kPa | 0.001 kPa |
| Allowable input | | 1 Pa (abs) to 50 kPa (gauge) | 2.7 kPa (abs) to 50 kPa (gauge) | 2.7 kPa (abs) to 500 kPa (gauge) | 2.7 kPa (abs) to 1000 kPa (gauge) |
| Accuracy*3, *4<br>12 months after calibration<br>Tested at 23±3°C, after zero calibration | Relative accuracy*5 | ±(0.01% of reading + 0.00025 kPa) | ±0.01% of full scale | The smaller of<br>±(0.01% of reading + 0.005 kPa) or<br>±0.01% of full scale | The smaller of<br>±(0.01% of reading + 0.03 kPa) or<br>±0.01% of full scale |
| | Absolute accuracy | ±(0.02% of reading + 0.00030 kPa) | ±(0.015% of reading + 0.0025 kPa) | 25 to 130 kPa:<br>±(0.02% of reading + 0.013 kPa)<br>0 to 25 kPa: ±0.018 kPa | 100 to 700 kPa:<br>±(0.02% of reading + 0.10 kPa)<br>0 to 100 kPa: ±0.12 kPa |
| Readout update interval*8 | | 250 ms | | | |
| Response time*9 | | 5 s or less | 2.5 s or less | 2.5 s or less | 2.5 s or less |
| Influence of static pressure (zero point drift) | | ±0.00015 kPa / 50 kPa (gauge) | ±0.0005 kPa / 50 kPa (gauge) | ±0.008 kPa / 500 kPa (gauge) | ±0.04 kPa / 1000 kPa (gauge) |
| Influence of temperature | | ±(0.001% of reading + 0.00005 kPa)/°C | ±(0.001% of reading + 0.00015 kPa)/°C | ±(0.001% of reading + 0.0013 kPa)/°C | ±(0.001% of reading + 0.007 kPa)/°C |
| Influence of positional setup (Zero point drift) | 90° tilt, forward or backward | ±0.005 kPa | ±0.010 kPa | ±0.013 kPa | ±0.07 kPa |
| | 30° tilt, right or left*11 | ±0.05 kPa | ±0.25 kPa | ±0.26 kPa | ±0.35 kPa |
| Weight (main unit) | | Approx. 7.2 kg | Approx. 7.2 kg | Approx. 7.2 kg | Approx. 7.2 kg |
| Internal volume | | Approx. 12 $cm^3$ for both H and L sides | | | |

## For all models

| | |
|---|---|
| Material of measurement section | Diaphragm: Hastelloy*12 C276; flange of measurement chamber: stainless steel (JIS SUS316), Internal piping: stainless steel (JIS SUS316); input connector: stainless steel (JIS SUS316); O-ring: fluororubber or neoprene rubber, metal gasket: stainless steel (JIS SUS316L)*13 |
| Leak rate | $10^{-6}$ Pa•$m^3$/s or less |
| Applicable fluids | Gases and liquid (non-flammable, non-explosive, non-toxic and non-corrosive fluids)<br>Substances and mixtures defined in Directive 2014/68/EC Article 13(1)a are excluded. |
| Fluid temperature | 5 to 50°C (10 to 35°C when -D00 is selected) |
| Liquid viscosity | $5\times10^{-6}$ $m^2$/s or less |
| Pressure sensor | Silicon resonant sensor |
| Pressure sensing element | Diaphragm |
| Readout unit | Pa, hPa, kPa, MPa, mbar, bar, atm only, or add mmHg, inHg, gf/$cm^2$, kgf/$cm^2$, Torr, psi, mm$H_2O$@4°C, mm$H_2O$@20°C, ft$H_2O$@4°C, ft$H_2O$@20°C, in$H_2O$@4°C, in$H_2O$@20°C |
| Input connection | Rc1/4" female-thread, 1/4"NPT female-thread, VCO*14 1/4" male-thread or 1/2" NPT female-thread (specify when ordering), located on both front and rear panels; however, simultaneous input to connections on both sides is prohibited).*15 |

*1: -G08 is shield gauge pressure model.

*2: Negative pressure inspection point for -G03, -G05, and -G06 is -80 kPa only.

*3: Measurement integration time is 1500 ms or more. (The time is 4000 ms when -D00 is selected.)

*4: Add the following value to each measurement accuracy when the measurement integration time is 250 ms. (2500 ms or less when -D00 is selected)

| | | |
|---|---|---|
| -G01: ±0.0007 kPa | -D00: ±0.00070 kPa | -A03: ±0.006 kPa |
| -G03: ±0.006 kPa | -D01: ±0.0007 kPa | -A05: ±0.04 kPa |
| -G05: ±0.04 kPa | -D03: ±0.006 kPa | -A06: ±0.06 kPa |
| -G06: ±0.06 kPa | -D05: ±0.04 kPa | |
| -G07: ±0.6 kPa | | |
| -G08: ±3.0 kPa | | |

*5: A relative value to the YOKOGAWA working standard.

*6: Stability of zero point is excluded.

*7: When /F1 is selected, the measurement mode can be selected from normal-speed, medium-speed and highspeed.
Add each value to the accuracy in normal-speed measurement mode.

*8: The interval of outputting data via communication is the same as the readout update interval.

*9: Conditions of response time measurement

- The response time is defined as the interval from the start of change to the time the readout settles to within ±1% of its final value.
- The manometer under test is made open to the atmospheric pressure when it is at its full scale value, where the input section is under no load.

  In the case of -A03, the manometer under test is made open to the atmospheric pressure at a scale value of 0.

  In the case of -G07 and -G08, the manometer under test is made open to the atmospheric pressure at a scale value of 3500 kPa.
- Measurement is performed using the D/A conversion output.
- Measurement integration time is 1500 ms or more. (The time is 4000 ms when -D00 is selected.)

*10: Long term stability of zero point is excluded.

*11: 5° tilt, right or left when -D00 is selected.

*12: Hastelloy: Registered trademark of Haynes International Inc.

*13: It is used only -G07.

*14: The equivalent connection is attached when -P3 is selected.

*15: In the case of -G08, input connector is located on only rear panel.

# Other Specifications

| | |
|---|---|
| **Comparator Output** | |
| Display area | In the main LCD display |
| Output signal | HI/IN/LO |
| Target value | Pressure measurement value |
| Judgement interval | Every triggered |
| **External Trigger** | |
| Trigger mode | Internal trigger, external trigger and synchronous trigger |
| Trigger source | Internal trigger: Readout update interval (interval:100 ms or 250 ms)<br>External trigger: Trigger key, external input (TRIG IN/SYNC IN), or communication commands<br>Synchronous trigger: External input (TRIG IN/ SYNC IN) |
| Trigger I/O range | –0.3 V to 5.5 V |
| Trigger input level | High; 2.5 V or more, LOW 0.8 V or less |
| Trigger edge | Trailing edge |
| Trigger output level | High; 3.5 V or more, LOW 0.45 V or less |
| Terminals | Input (TRIG IN/ SYNC IN): BNC<br>Output (SYNC OUT): BNC |
| **Synchronous measurement** | |
| Unit for Synchronization | 4 units maximum with daisy chain |
| Precision of Synchronization | Trigger delay between master unit and slave units: 2.5 ms maximum |
| **Data memory** | |
| Data store mode | Auto store or manual store |
| Auto store interval | Medium-speed or High-speed measurement mode:<br>0.1 s/0.5 s/1 s/2 s/5 s/10 s/30 s/60 s/2 min/5 min |
| | Normal-speed measurement mode:<br>0.25 s/0.5 s/1 s/2 s/5 s/10 s/30 s/60 s/2 min/5 min |
| Store data | Store date, pressure measurement value, DMM measurement value (when /DM is selected) and each parameter |
| Maximum number of data entries per file | 10000 data |
| Total number of data entries | 30000 data |
| Maximum number of files | 200 files |
| **Offset function** | |
| Zero offset for Gauge and differential range model | Zero calibration |
| Zero offset for Absolute range model | Absolute zero calibration and absolute zero calibration including data offset |
| **Tilt correction function (Absolute-pressure model)** | |
| Tilt alarm | Judges the orientation state of the instrument and sends alarm notifications |
| Tilt correction | Corrects the offset of measured pressure values (correction and reference value settings) |
| **Relative value display** | |
| The criterion by measurement value, the criterion by setting value | |
| **Arithmetic function** | |
| %ERROR, scaling and leak test | |
| **Statistical processing function** | |
| Maximum value, minimum value, average and standard deviation | |
| **General Specifications** | |
| Display | Display unit<br>4.3 inch TFT color liquid crystal display (480 × 272 dots)<br>* There may be some pixels on the LCD that never light or are always lit (total number defective pixels 5 or less). |
| | Digits of pressure value<br>6 digits max. (7digits max. when /R1 is selected) |
| | Digits of DMM value<br>5 digits (when /DM is selected) |
| Warm up time | More than 5 minutes |
| Operating temperature/humidity ranges | 5 to 40°C, 20 to 80% RH (no condensation allowed)<br>10 to 35°C, 20 to 80% RH (no condensation allowed) when -D00 is selected |
| Altitude of operation | 2000 m or less |
| Storage temperature | –20°C to 60°C (no condensation) |
| Power Supply | AC or Li-ion battery (739883) with battery pack cover (269918) |
| AC power rating | AC power rating<br>100 to 120 VAC/200 to 240 VAC, at 50/60 Hz |
| | Allowable supply voltage range<br>90 to 132 VAC/180 to 264 VAC |
| | Allowable supply frequency range<br>47 to 63 Hz |
| Battery pack (739883) | Battery type: Li-ion |
| | Driving time: Approx. 6 hours with all functions turned on |
| | Recharge time: Approx. 6 hours |
| | Mounting: Battery pack and battery pack cover mounted on top of the instrument |
| Power consumption | When in pressure measurement mode: 25 VA maximum for 100 V power line; 40 VA maximum for 200 V power line<br>When in recharge mode: 80 VA maximum for 100 V power line; 100 VA maximum for 200 V power line |
| External Dimensions (not including the protrusions) | Main unit: Approx. 213 mm (W) × 132 mm (H) × 350 mm (D)<br>Battery pack + battery pack cover:<br>Approx. 87 mm (W) × 31 mm (H) × 304 mm (D) |
| Weight | Main unit:<br>Refer to “Weight (main unit)” in the pressure measurement sections<br>Battery pack + battery pack cover:<br>Approx. 720 g |

| Communication interfaces | | |
|---|---|---|
| USB-PC Connection Terminal | | |
| | Connector | USB type B connector × 1 |
| | Electromechanical specifications | USB 2.0 compliant |
| | Supported transfer standards | High Speed (480 Mbps), Full Speed (12 Mbps) |
| | Supported class | USB-FUNCTION interface<br>USBTMC-USB488 (USB Test and Measurement Class Ver. 1.0) |
| | | Virtual serial com port<br>CDC (Communication Device Class) |
| | | Storage<br>USB Mass Storage Class Ver. 1.1 |
| Ethernet | Connector | RJ-45 connector × 1 |
| | Electromechanical specifications | IEEE 802.3 compliant |
| | Transmission methods | Ethernet (100BASE-TX/10BASE-T) |
| | Transmission speed | 100 Mbps max. |
| | Protocol | TCP/IP |
| | Supported services | DHCP/VXI-11 |
| GP-IB | Electromechanical specifications | Conforms to IEEE std. 488-1978 (JIS C 1901-1987) |
| | Functional specifications | SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0 |
| | Protocol | Conforms to IEEE std. 488.2-1992 |
| | Address | 0 to 30 |

| /DM (option) | | |
|---|---|---|
| DCV/DCA measurement | | |
| | Measurement range | DCV: DC 5 V<br>DCA: DC 20 mA |
| | Guaranteed Accuracy Range | DCV: 0 to ±5.25 V<br>DCA: 0 to ±21 mA |
| | Readout range | DCV: 0 to ±6 V<br>DCA: 0 to ±24 mA |
| | Display resolution | DCV: 0.0001 V<br>DCA: 0.001 mA |
| | Accuracy 12 months after calibration Tested at 23±3°C | DCV: ±(0.015% reading + 0.5 mV)<br>DCA: ±(0.015% reading + 3 μA) |
| | Measurement interval | Approx. 300 ms when average OFF |
| | Response time | Approx. 500 ms when average OFF |
| | Maximum allowable input | DCV: ±30 V<br>DCA: ±100 mA |
| | Input impedance | DCV: Approx. 1 MΩ<br>DCA: Approx. 10 Ω |
| | Temperature effect | ±(0.01% of reading + 2 digits)/10°C |
| | CMRR | 100 dB or more (50/60 Hz, Rs=1 kΩ) |
| | NMRR | 60 dB or more (50/60 Hz) |
| | Terminals | Plug-in terminal [4 mm diameter banana jack (female type)] |
| 24 V DC output | | |
| | Output voltage, output current | 24 V±1 VDC, 24 mA when communication resister OFF<br>24 V±6 VDC, 20 mA when communication resister ON |
| | Maximum output current | 30 mA (current limit approx. 40 mA) |
| | Load capacitance | 0.1 μF or less |
| | Communication resistance | 250 Ω ON/OFF |
| | Terminals | Plug-in terminal [4 mm diameter banana jack (female type)] |

The maximum allowable potential difference between any measuring terminal and the grounding terminal is 42 Vpeak.

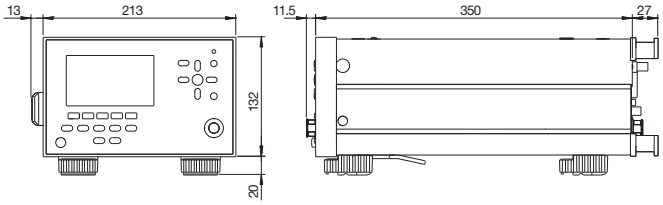
| /DA (option) | | |
|---|---|---|
| D/A conversion | | |
| | Output voltage | DC 2 V range, DC 5 V range switchable |
| | D/A scaling | Outputs any range within the measurement ranges in full scale of the output range (set in the 2-point mode or direct input mode) |
| | Guaranteed Accuracy Range | DC 2 V range: 0 to ±2 V<br>DC 5 V range: 0 to ±5 V |
| | Output resolution | 16 bits |
| | Output range | Approx. ±120% of the range |
| | Output accuracy 12 months after calibration Tested at 23±3°C | When dynamic mode OFF,<br>Add ±0.05% of full scale to the pressure accuracy |
| | | When dynamic mode ON,*1<br>When D/A scaling OFF,<br>±0.5% of full scale<br>±0.7% of full scale(when -G01 is selected)<br>When D/A scaling ON,<br>Add ±0.5% of full scale to the pressure accuracy<br>Add ±0.7% of full scale to the pressure accuracy (when -G01 is selected) |
| | Readout update interval | When dynamic mode OFF,<br>Approx. 0.25 ms when medium-speed mode or high-speed mode is selected.<br>Approx. 2 ms when normal-speed mode is selected |
| | | When dynamic mode ON,*1<br>Approx. 0.25 ms |
| | Response time*2 | When dynamic mode OFF,<br>Same as the response time specified in the pressure measurement specifications section. |
| | | When dynamic mode ON,*1<br>Same as the response time specified for the high-speed measurement mode. |
| | Output resistance | 0.1 Ω or less |
| | Temperature effect | ±(0.005% of full scale)/°C |
| | Load resistance | 10 kΩ or more |
| | Load capacitance | 0.1 μF or less |
| | Terminal | BNC |
| Comparator Output | | |
| | Output signal | HI/IN/LO, BUSY |
| | Output range | –0.3 V to 5.5 V |
| | Output level | HIGH: 3.5 V or more, LOW: 0.45 V or less |
| | Terminal | Removable terminal plug (standard Accessory on model with the /DA option) |

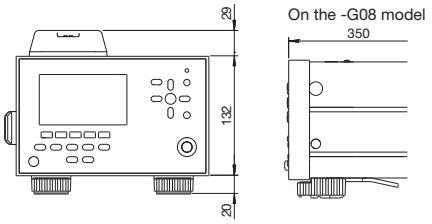
*1: When /F1 is selected, the measurement mode can be selected from normal-speed, medium-speed and high-speed.
*2: The response time is defined as the interval from the start of change to the time the readout settles to within ±1% of its final value.
The maximum allowable potential difference between D/A conversion terminals and the grounding terminal is 42 Vpeak.
The GND of comparator output is earth ground.

# Dimensions

Unit: mm

On the models other than -G08




On the -G08 model

When the battery pack is mounted

## Model and Suffix code

| Model | Suffix code | Descriptions | |
|---|---|---|---|
| MT300 | | Digital Manometer | |
| Pressure type and range | -G01 | Gauge pressure | 10 kPa |
| | -G03 | Gauge pressure | 200 kPa |
| | -G05 | Gauge pressure | 1000 kPa |
| | -G06 | Gauge pressure | 3500 kPa |
| | -G07 | Gauge pressure | 16 MPa |
| | -G08*1 | Gauge pressure | 70 MPa |
| | -A03 | Absolute pressure | 130 kPa |
| | -A05 | Absolute pressure | 700 kPa |
| | -A06 | Absolute pressure | 3500 kPa |
| | -D00 | Differential pressure | 1 kPa |
| | -D01 | Differential pressure | 10 kPa |
| | -D03 | Differential pressure | 130 kPa |
| | -D05 | Differential pressure | 700 kPa |
| Pressure unit | -U2 | Pa, hPa, kPa, MPa, mbar, bar, atm, mmHg, inHg, gf/cm$^2$, kgf/cm$^2$, Torr, psi, mmH$_2$O@4°C, mmH$_2$O@20°C, ftH$_2$O@4°C, ftH$_2$O@20°C, inH$_2$O@4°C, inH$_2$O@20°C | |
| Input connection | -P1 | Rc 1/4" female-thread | |
| | -P2 | 1/4" NPT female-thread | |
| | -P3 | VCO 1/4" male-thread | |
| | -P4*2 | 1/2" NPT female-thread | |
| Power cord | -D | UL/CSA Standard and PSE compliant | |
| | -F | VDE/Korean Standard | |
| | -Q | British Standard | |
| | -R | Australian Standard | |
| | -H | Chinese Standard | |
| | -N | Brazilian Standard | |
| | -T | Taiwanese Standard | |
| | -B | Indian Standard | |
| | -U | IEC Plug Type B | |
| Option | /F1*3 | Measurement mode switching function (Normal, Medium or High) | |
| | /DM*4 | DCV/DCA measurement, 24 VDC Output | |
| | /DA | DA conversion output | |
| | /R1*5 | One additional display resolution digit | |
| | /EB | Battery pack + battery pack cover | |

**Standard accessories**
Power cord (1), Rubber stoppers (1 set), Measurement target designation label (1), VCO body (when -P3 is selected, 1 set), Conversion connector (when -P4 is selected, 1 set), Cap for the pressure input port (when -G08 is selected, 1), Measurement lead (when /DM is selected, 1), Terminal plug (when /DA is selected, 1), Battery pack and battery pack cover (each 1, when /EB is selected), User's manual (1)

*1: -G08 is shield gauge pressure model.
*2: When -G08 is selected, only -P4 can be selected for -G08.
*3: Not selectable for -G07, -G08, or the differential pressure model.
*4: Selectable on the gauge pressure model and absolute pressure model.
*5: Not selectable for -G08 or -D00.

NOTICE
- Before operating the product, read the user's manual thoroughly for proper and safe operation.

■ Any company's names and product names mentioned in this document are trade names, trademarks or registered trademarks of their respective companies.

### Yokogawa's approach to preserving the global environment
- Yokogawa's electrical products are developed and produced in facilities that have received ISO14001 approval.
- In order to protect the global environment, Yokogawa's electrical products are designed in accordance with Yokogawa's Environmentally Friendly Product Design Guidelines and Product Design Assessment Criteria.

## Accessories

| Model | Name | Description | |
|---|---|---|---|
| 269918 | Battery pack cover*1 | Battery cover for MT300 | |
| 739883 | Battery pack*1, *2 | Li-ion battery | |
| 99045 | Conversion adapter | Binding Post (Red Black with one sheet plate) | |
| 99046 | Conversion adapter | Binding Post (Red, Red with one sheet plate) | |
| 366921 | Conversion adapter | BNC (Plug) - Binding Post (Red Black) | |
| 91080 | Adapting connector | R 1/4" male thread to 1/8" NPT female thread (for -P1) | |
| 91081 | Adapting connector | R 1/4" male thread to 1/4" NPT female thread (for -P1) | |
| 91082 | Adapting connector | 1/4" NPT male thread to 1/8" NPT female thread (for -P2) | |
| 91083 | Adapting connector | 1/2" NPT male thread to 1/8" NPT female thread (for -P4) | |
| 91086 | Adapting connector | 1/2" NPT male thread to 1/4" NPT female thread (for -P4) | |
| 91087 | Adapting connector | 1/2" NPT male thread to Rc 1/4" female thread (for -P4) | |
| B9984BW | Connector assembly kit | For use with 4 mm diameter × 6 mm diameter PVC tubing (for -P2) | |
| B9984BY | Connector assembly kit | For use with 4 mm diameter × 6 mm diameter PVC tubing (for -P1) | |
| 701963 | Carrying case | Soft Carrying case | |

*1: Included in the /EB option.
*2: Operation of the battery pack (739883) requires the battery pack cover (269918).

## Related Products

### MC300 Pressure Controller

- Output relative accuracy: 0.04% of full scale
- Output ranges: -2.4 kPa to 200 kPa / -0.12 kPa to 12 kPa
- Response time less than 5 seconds, low overshoot
- Pressure monitoring, divider / auto-step / sweep output

### CA700 Pressure Calibrator

- Optimized functionality and operability for field instrument calibration
- High-accuracy pressure measurement
  Basic accuracy: 0.01% of reading
  Range: 200 kPa/1000 kPa/3500 kPa*
  *Up to 70 MPa with the external sensor PM100
- 24 VDC supply, DC mA measurement, and other voltage/current source/measure functions
- Battery-powered operation

This is a Class A instrument based on Emission standards EN61326-1 and EN55011, and is designed for an industrial environment.
Operation of this equipment in a residential area may cause radio interference, in which case users will be responsible for any interference which they cause.

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YMI-N-MI-M-E03

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