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 government 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 |
|---|---|---|
| 4 ranges | 1 range | 4 ranges |
| 10 kPa<br>200 kPa<br>1000 kPa<br>3500 kPa | 130 kPa | 1 kPa<br>10 kPa<br>130 kPa<br>700 kPa |

# High accuracy and long term stability

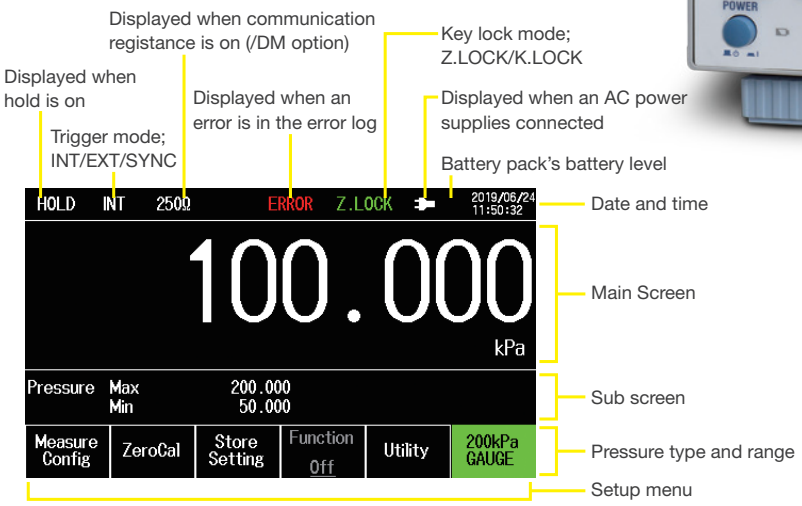
## Absolute accuracy of pressure measurement: 0.01%

## Accuracy guarantee period: 12 months

Yokogawa's proprietary silicon based resonant sensor technology achieves a high measurement accuracy of 0.01% as absolute 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

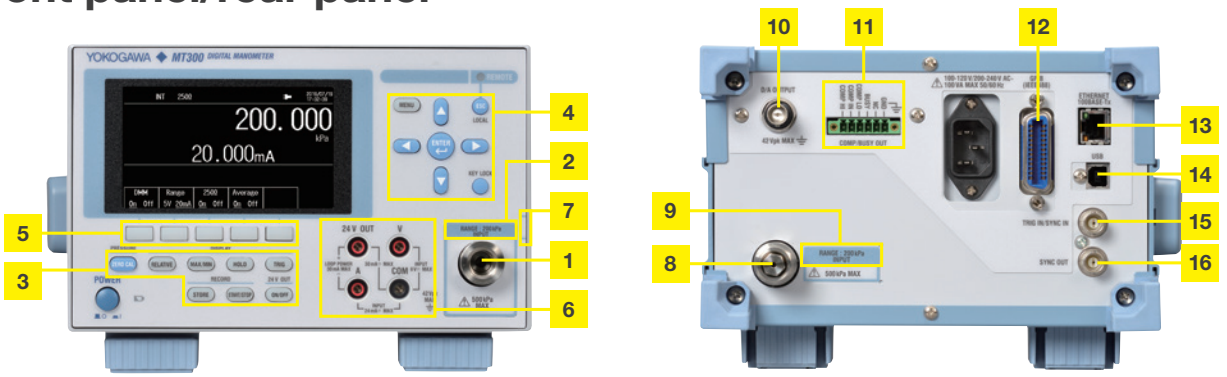
The use of a color dot matrix LCD, allows measurement data and analysis to be displayed with high resolution and high visibility.





Differential pressure model

# Front panel/rear panel




1 Pressure input connector*1

2 Shown a pressure range

3 Direct keys

4 Menu keys

5 Soft keys

6 24 VDC output and DCV/DCA measurement terminals
(when /DM is selected)

7 Reference point of the pressure receiving section

8 Pressure input connector*1

9 Shown a pressure range

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

11 Comparator output terminals
(when /DA is selected)

12 GP-IB connector

13 Ethernet port

14 USB port

15 External trigger/synchronized signal input terminal

16 Synchronized signal output terminal

*1 Located on both front and rear panels; however, simultaneous input to connections on both sides is prohibited.
There are two input ports on both sides when differential models are selected.

# 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.)

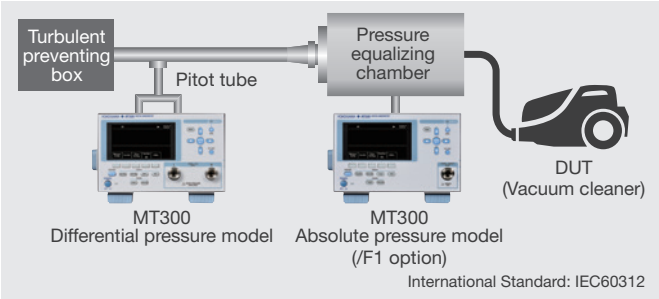
Rapid pressure changes and transient responses requires high speed and reliable measurements. Depending on the application, you can choose your measurement speeds from three different modes, normal, medium or high speed.

### 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: Deffence of pressure value per minute

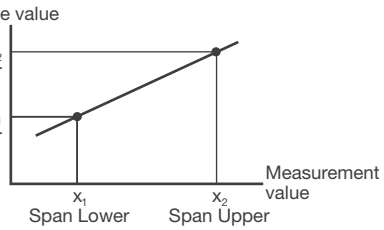
$$\text{Leak rate} = \frac{\text{(Started value) – (stopped value)}}{\text{Leak test period (minute)}}$$

### 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.

$y = Ax + B$

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




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

### Statistical processing

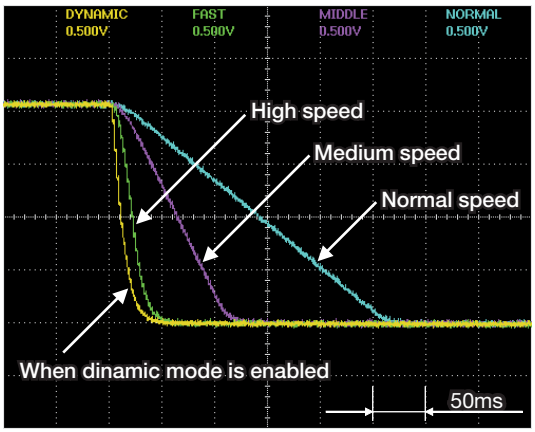
You can apply statistical processing to the data acquired. Find and display the maximum value, minimum value, average value, and standard deviation for the measured data. When error data is detected, the number of error data within the measurement range can be recorded and displayed.


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

### Comparator output

Using external I/O terminals, you can output control signals, based on set upper and lower limits and judgement criteria's on measured values. These features allow automation of production and/or inspection lines for pressure-related products.

### Interfaces

Communication Interfaces such as GPIB, USB (type-B), and ETHERNET are available as standard features.
Communication commands are compatible[*1] with existing models[*2], making it easy to expand or update your existing measurement system.

*1: Some command can not be used

*2: MT210/MT210F/MT220

## Support for field device calibration and maintenance works

Calibration involves inputting the same pressure level to both a calibrator and a transmitter and comparing the transmitter output with a value measured by the calibrator. The MT300 come with the functions you need for such calibration or maintenance work in the field.

- 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.


Example of "MT300-G03/DM/EB"

# 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 and resolution and superior long-term stability

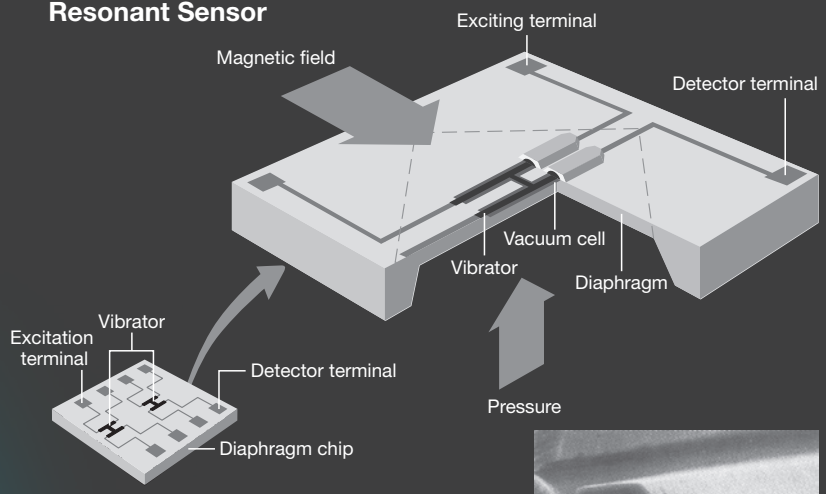
The vibrators are in a vacuum. This reduces the dispersion of vibration energy. Combined with the superior flexibility of silicon single crystal, this makes it possible to obtain a high Quality factor.

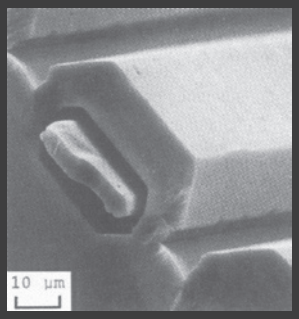
### Extremely low temperature dependency

Two vibrators are used, and pressure is derived from the difference between the two unique oscillation counts. With this operating structure, it is possible to cancel out external environment influences such as ambient temperature. In addition, the oscillators are in a vacuum, so they are not affected by humidity.

*Silicon Resonant Sensor*

**Structural View of Silicon Resonant Sensor**



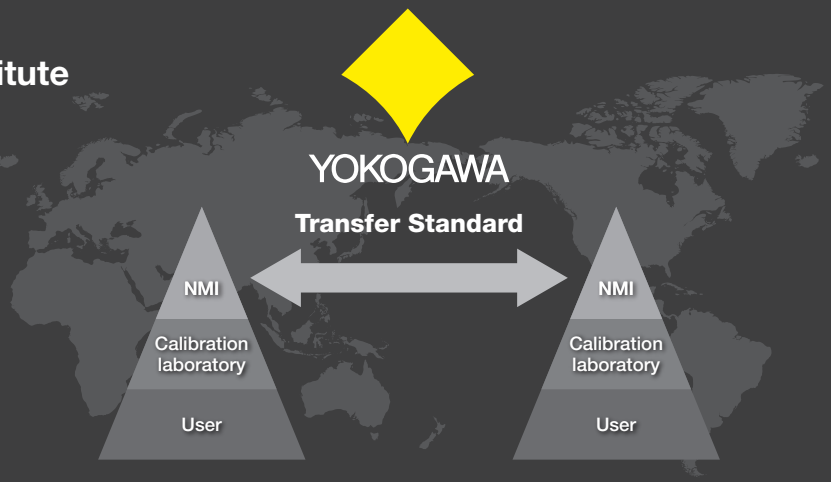

A vibrator, formed using semiconductor process technology on a silicon wafer, is driven by a permanent magnet. When pressure is applied to the silicon diaphragm, the vibrator is distorted, causing the resonant frequency to change.

### Efforts 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 comparison 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.

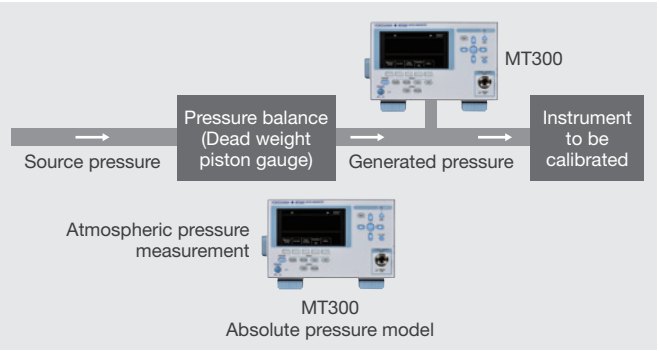


# Applications

## High precision and resolution providing stable measurements

### Pressure calibration using Pressure Balance

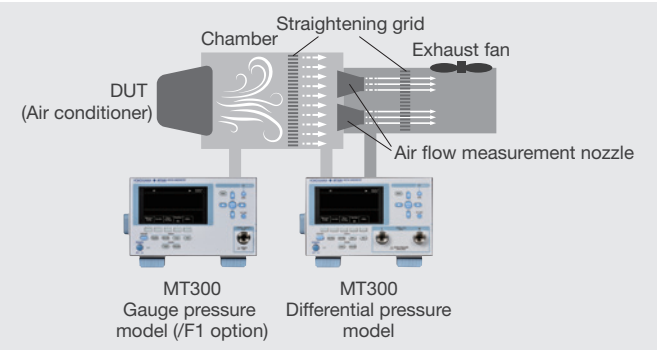
When pressure balance is used in calibration, connecting a manometer is necessary to confirm that the calibration values are generated correctly. Also, measurement of atmospheric pressure is necessary to confirm the effects of atmospheric pressure to the calibration results. The MT300 is best suited 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

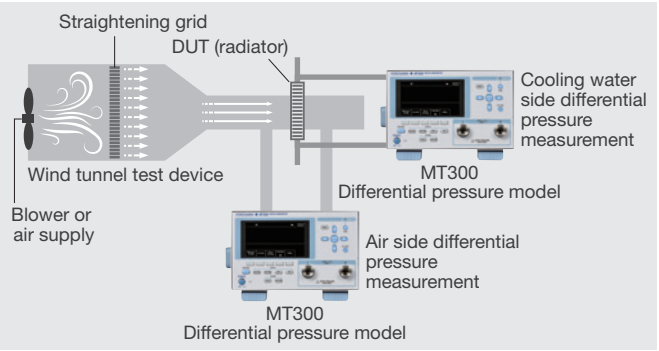
The cooling and heating performance of air conditioners is calculated by testing the differential pressure before and after an air flow measurement nozzle and the air temperature/humidity. The test has to be performed in an equilibrium state and it is necessary to measure the internal and external pressures.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




## Measuring pressure loss with one unit

### Radiation Performance Test for Vehicle Radiator

Radiation testing for vehicle radiators involves measuring the pressure loss on air side and the pressure loss on cooling water side in front and behind the radiator.
The MT300 multiple differential pressure models features optimal range and resolution, enabling high accuracy measurements for a variety of applications with one unit.

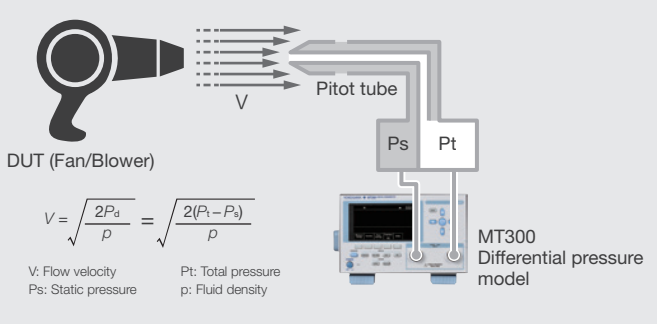



For applications using multiple manometers as described above, by using the synchronous measurement function, you can perform more accurate pressure measurement.

## Measuring small differential pressure

### Evaluation of Fans and Blowers

A Pitot tube is one of the pressure measurement instruments used to measure fluid flow velocity. It has two pressure measuring ports and the air speed is calculated by measuring the differential pressure value between these ports.
The MT300 allows measuring small differential pressure with high accuracy, and is ideal for measuring air speed using “Pitot tube”.



# Specifications

## Pressure-measurement Specifications

### Gauge-pressure models

| Model Code | | | | | -G01 | -G03 | -G05 | -G06 |
|---|---|---|---|---|---|---|---|---|
| Range | | | | | 10 kPa | 200 kPa | 1000 kPa | 3500 kPa |
| Guaranteed Accuracy Range | | Positive presssure | | | 0 kPa to 10 kPa | 0 kPa to 200 kPa | 0 kPa to 1000 kPa | 0 kPa to 3500 kPa |
| | | Negative pressure | | | –10 kPa to 0 kPa | –80 kPa to 0 kPa | –80 kPa to 0 kPa | –80 kPa to 0 kPa |
| Readout range | | | | | –12 to 12 kPa | to 240 kPa | to 1200 kPa | to 4200 kPa |
| Display resolution | | | | | 0.0001 kPa | 0.001 kPa | 0.01 kPa | 0.01 kPa |
| | | When /R1 is selected | | | 0.00001 kPa | 0.0001 kPa | 0.001 kPa | 0.001 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 |
| Accuracy<br>12 months after calibration Tested at 23±3°C, after zero calibration | Measurement mode | Normal-speed[*6, *7] | Positive pressure | Relative accuracy[*1] | ±0.01% of full scale | 25 to 200 kPa: ±(0.008% of reading + 0.002 kPa)<br>0 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 |
| | | | | Absolute accuracy | ±(0.015% of reading + 0.0015 kPa) | 25 to 200 kPa: ±(0.02% of reading)<br>0 to 25 kPa: ±0.005 kPa | 100 to 1000 kPa: ±(0.02% of reading + 0.03 kPa)<br>0 to 100 kPa: ±0.05 kPa | ±(0.02% of reading + 0.10 kPa) |
| | | | Negative pressure | Relative accuracy[*1] | ±(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[*2] (Add each value to the accuracy in normal-speed measurement mode) | | | ±0.0020 kPa | ±0.026 kPa | ±0.14 kPa | ±0.60 kPa |
| | | High-speed[*2] (Add each value to the accuracy in normal-speed measurement mode) | | | ±0.0060 kPa | ±0.065 kPa | ±0.35 kPa | ±1.50 kPa |
| Readout update interval[*4] | Measurement mode | Normal-speed | | | 250 ms | | | |
| | | Medium-speed[*3] (Add each value to the accuracy in normal-speed measurement mode) | | | 100 ms | | | |
| | | High-speed[*3] (Add each value to the accuracy in normal-speed measurement mode) | | | 100 ms | | | |
| Response time[*5] | Measurement mode | Normal-speed | | | 2.5 s or less | | | |
| | | Medium-speed[*3] (Add each value to the accuracy in normal-speed measurement mode) | | | 200 ms or less | | | |
| | | High-speed[*3] (Add each value to the accuracy in normal-speed measurement mode) | | | 100 ms or less | 50 ms or less | 70 ms or less | 150 ms or less |
| Temperature effect | | 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 |
| | | 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 |
| Effect of positional setup (Zero point drift) | | 90° tilt, forward or backward | | | ±0.01 kPa | ±0.013 kPa | ±0.07 kPa | ±0.3 kPa |
| | | 30° tilt, right or left | | | ±0.25 kPa | ±0.26 kPa | ±0.35 kPa | ±0.3 kPa |
| Weight (main unit) | | | | | Approx. 7.0 kg | Approx. 6.2 kg | Approx. 6.2 kg | Approx. 6.2 kg |
| Internal volume | | | | | Approx. 12 $cm^3$ | | | |

### Absolute-pressure Model

| Model code | | | | -A03 |
|---|---|---|---|---|
| Range | | | | 130 kPa |
| Guaranteed Accuracy Range | | | | 0 kPa to 130 kPa |
| Readout range | | | | to 156 kPa |
| Display resolutions | | | | 0.001 kPa |
| | When /R1 is selected | | | 0.0001 kPa |
| Allowable input | | | | 1 Pa abs to 500 kPa abs |
| Accuracy[*2]<br>12 months after calibration Tested at 23±3°C, after zero calibration | Measurement mode | Normal-speed[*6, *7] | Relative accuracy[*1] | The smaller of ±(0.01% of reading + 0.005 kPa) or ±0.01% of full scale |
| | | | Absolute accuracy | ±(0.03% of reading + 0.006 kPa) |
| | | Medium-speed[*2] (Add each value to the accuracy in normal-speed measurement mode) | | ±0.026 kPa |
| | | High-speed[*2] (Add each value to the accuracy in normal-speed measurement mode) | | ±0.065 kPa |
| Readout update interval[*3] | Measurement mode | Normal-speed | | 250 ms |
| | | Medium-speed[*2] (Add each value to the accuracy in normal-speed measurement mode) | | 100 ms |
| | | High-speed[*2] (Add each value to the accuracy in normal-speed measurement mode) | | 100 ms |
| Response time[*4] | Measurement mode | Normal-speed | | 2.5 s or less |
| | | Medium-speed[*2] (Add each value to the accuracy in normal-speed measurement mode) | | 200 ms or less |
| | | High-speed[*2] (Add each value to the accuracy in normal-speed measurement mode) | | 50 ms or less |
| Temperature effect | | | | ±(0.001% of reading + 0.0013 kPa)/°C |
| Effect of positional setup (Zero point drift) | | 90° tilt, forward or backward | | ±0.65 kPa |
| | | 30° tilt, right or left | | ±0.26 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 resolutions | | 0.00001 kPa | 0.0001 kPa | 0.001 kPa | 0.001 kPa |
| | When /R1 is selected | | 0.00001 kPa | 0.0001 kPa | 0.0001 kPa |
| Allowable input | | ±(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 |
| Accuracy<br>12 months after calibration<br>Tested at 23±3°C, after zero calibration | Relative accuracy*1 | ±(0.01% of reading + 0.00025 kPa) | ±0.01% of full scale | The smaller of ±(0.01% of reading + 0.005 kPa) or ±0.01% of full scale | The smaller of ±(0.01% of reading + 0.03 kPa) or ±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: ±(0.02% of reading + 0.013 kPa)<br>0 to 25 kPa: ±0.018 kPa | 100 to 700 kPa: ±(0.02% of reading + 0.10 kPa)<br>0 to 100 kPa: ±0.12 kPa |
| Readout update interval*4 | | 250 ms | | | |
| Response time*5 | | 5 s or less | 2.5 s or less | 2.5 s or less | 2.5 s or less |
| Temperature effect | | ±(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 |
| Effect 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*8 | ±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 | | | |

## Common specifications (Gauge-pressure model, Absolute-pressure model and Differential-pressure model)

| | |
|---|---|
| Material of measurement section | Diaphragm: Hastelloy 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 |
| 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 |
| Reaout unit | Pa, hPa, kPa, Mpa, mbar, bar, atm only, or add psi, inHg, in$H_2O$, kgf/$cm^2$, mmHg and mm$H_2O$ |
| Input connection | Rc1/4, NPT1/4 female-threaded or VCO*9 1/4 male-threaded*4 (specify when ordering), located on both front and rear panels; however, simultaneous input to connections on both sides is prohibited) |

*1: Relative value for the measure toward the working standard of YOKOGAWA.

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

*3: When /F1 is selected, the measurement mode can be selected from normal speed, medium speed and high speed.

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

*5: 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 absolute-pressure models, the manometer under test is made open to the atmospheric pressure at a scale value of 0.
- 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.)

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

*7: 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
-G03: ±0.006 kPa
-G05: ±0.04 kPa
-G06: ±0.06 kPa
-A03: ±0.006 kPa
-D00: ±0.00070 kPa
-D01: ±0.0007 kPa
-D03: ±0.006 kPa
-D05: ±0.04 kPa

*8: 5° tilt, right or left when -D00 is selected.

*9: VCO is a registered trademark of Swagelok Company. The equivalent connection is attaced when -P3 is selected.

## Other specifications

| **Comparator Output** | |
|---|---|
| Display area | In the main LCD display |
| Output signal | HI/IN/LO |
| Target value | Pressure measurement value |
| Jadgement interval | Every triggerd |

| **External Trigger** | |
|---|---|
| Trigger mode | Internal trigger, external trigger and syncronous 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>Syncronous trigger: External input (TRIG IN/ SYNC OUT) |
| 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 | The 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 |

| **Syncronous measuremet** | |
|---|---|
| Unit for syncronization | 4 units maximum with daisy chain |
| Precision of syncronization | Trigger deray bitween master unit and slave units: 2.5 ms maxmum |

| **Data memory** | |
|---|---|
| Data store mode | Auto store or manual store |
| Auto store interval | Midium-speed or High-speed mea surement 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 mea surement 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 parameters |
| 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 |

**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, mimimum value, average and standard deviation

| **General Specifications** | |
|---|---|
| Display | Display unit<br>4.3 inch TFT color liquid crystal display (480 x 272 dots) |
| | 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 |
| Insulation Resistance | More than 100 MΩ at 500 VDC (between AC power line and case) |
| Withstanding Voltage | 1500 VAC for one minute at 50/60 Hz (between AC power line and case)<br>350 VAC for one minute at 50/60 Hz (between each DMM input terminal and 24 VDC output terminal and case) |
| Overvoltage category | CAT II (EN61010-1) |
| Safety standards | Compliant standards EN61010-1, EN61010-2-030<br>Pollution degree 2<br>Measurement Category: O (Other) |
| EMC* | Emission<br>Compliant standards<br>EN61326-1 Class A, EN55011 ClassA, Group1, EN61000-3-2, EN61000-3-3<br>EMC Regulatory Arrangement in Australia and New Zealand<br>EN55011 Class A, Group 1<br>Korea Electromagnetic Conformity Standard |
| | Immunity<br>Compliant standards<br>EN61326-1 Table 2 (for use in industrial locations)<br>Influence in the immunity test environment: Within ±20% of the range setting |
| Environmental standard | Compliant standards<br>EN50581 Monitoring and control instruments including industrial monitoring and control instruments. |
| PED (Pressure Equipemt Directive) | SEP (Sound Engineering Practice) |

**Interfaces**

| | | |
|---|---|---|
| USB-PC Connection Terminal | | |
| | Connector | USB type B connector × 1 |
| | Electromechanical specifications | USB 2.0 compliant |
| | Supported transfer standards | High Speed (480 Mbbs), Full Speed (12 Mbps) |
| | Supported class | USB-FUNCTION interface<br>USBTMC-USB488 (USB Test and Measurement Class Ver. 1.0) |
| | | Vertual serial com port<br>CDC (Communication Device Class) |
| | | Strage<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 communicatin resister OFF<br>24 V±6 VDC, 20 mA when communicatin 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.

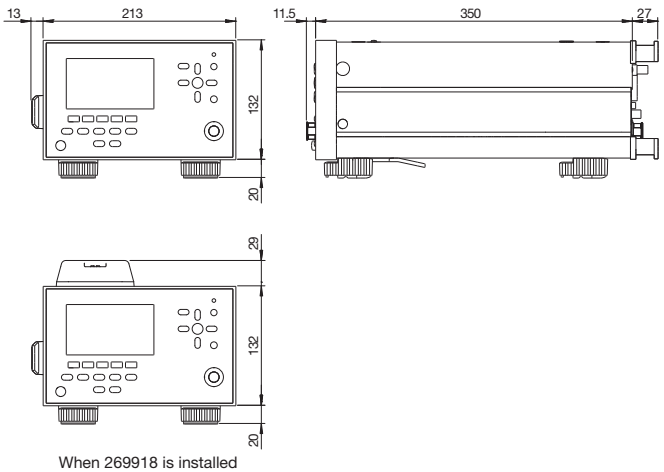
**/DA (option)**

| | | |
|---|---|---|
| D/A conversion | | |
| | Output voltage | DC 2 V range, DC 5 V range switchable |
| | 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 | |
| | Readout update interval | When dinamic mode OFF,<br>Add ±0.05% of full scale to accuracy in the Pressuremeasurement specifications section. |
| | | When dinamic mode ON,*1<br>±0.5% of full scale<br>±0.7% of full scale when -G01 is selected |
| | | When dinamic mode OFF,<br>Approx. 0.25 ms when middle-speed mode or high-speed mode is selected.<br>Approx. 2 ms when standard-speed mode is selected |
| | | When dinamic mode ON,*1<br>Approx. 0.25 ms |
| | Response time*2 | When dinamic mode OFF,<br>Same as the response time specified in the Pressure-measurement Specifications section. |
| | | When dinamic 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 | 1 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 accessoriy 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




When 269918 is installed

## Model and Suffix code

| Model | Suffix code | Descriptions |
|---|---|---|
| MT300 | | Digital Manometer |
| Pressure type and range | -G01 | 10 kPa range Gauge pressure model |
| | -G03 | 200 kPa range Gauge pressure model |
| | -G05 | 1000 kPa range Gauge pressure model |
| | -G06 | 3500 kPa range Gauge pressure model |
| | -A03 | 130 kPa range Absolute pressure model |
| | -D00 | 1 kPa range Differential pressure model |
| | -D01 | 10 kPa range Differential pressure model |
| | -D03 | 130 kPa range Differential pressure model |
| | -D05 | 700 kPa range Differential pressure model |
| Pressure unit | -U1 | Pa, hPa, kPa, MPa, mbar, bar, atm |
| | -U2 | Pa, hPa, kPa, MPa, mbar, bar, atm, mmHg, inHg, gf/cm², kgf/cm², mmH₂O, ftH₂O, inH₂O, Torr, psi |
| Input connection | -P1 | Rc 1/4 female-threaded |
| | -P2 | 1/4 NPT female-threaded |
| | -P3 | VCO 1/4 male-threaded*3 |
| Power code | -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*1 | Measurement mode switching function (Normal, Midium or High) |
| | /DM*1 | DCV/DCA measurement, 24 VDC Output |
| | /DA | DA conversion output |
| | /R1*2 | One additional display resolution digit |
| | /EB | Battery pack + battery pack cover |

*1: It can not be selected when diffential model is selected. *2: It can not be selected when -D00 is selected. *3: VCO is a registered trademark of Swagelok Company.

## 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 | R 1/4" NPT male thread to 1/8" NPT female thread (for -P2) |  |
| 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 | Carring case | Soft carring case |  |

*1: Included in the /EB option.
*2: Operation of the battery pack (739883) requires the battery pack cover (2669918).

## Related product

### MC100 Pneumatic Pressure Standard

- Basic accuracy: 0.05% of full scale
- Output ranges: 0 to 200 kPa/0 to 25 kPa
- Divider output, auto-step output, and sweep output.
- Supply pressure
  0 to 200 kPa range model: 280 kPa ±20 kPa
  0 to 25 kPa range model: 50 kPa ±10 kPa

### CA700 Pressure Calibrator

- Basic accuracy: 0.01% reading
- Widest range: 200 kPa gauge/1000 kPa gauge/ 3500 kPa gauge
- Both gases and liquids measurable.
- DC mA signals can be measured by supplying power to the transmitter from a 24 V DC power supply.

### PM100 External Pressure Sensor for CA700

- Basic accuracy: 0.01% of reading
- The highest resolution in class 0.0001 MPa
- Multi range:
  16 MPa model: Three ranges of 7 MPa/10 MPa/ 16 MPa are built into one unit.
  70 MPa model: Three ranges of 25 MPa/50 MPa/ 70 MPa are built into one unit.

### Hand Pump Series

**91051** Low Pressure Hand Pump
Generation range: –83 to 700 kPa

**91056** Pneumatic Hand Pump
Generation range: –83 to 4000 kPa

**91061** Hydraulic Hand Pump
Generation range: 0 to 70 MPa

Model 91051 Model 91056 Model 91061

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



**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.

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.