YOKOGAWA

Co-innovating tomorrow™

Test&Measurement

MC300

Pressure Controller

Bulletin MC300-01EN

The MC300 Pressure Controller combines unmatched accuracy, superior quality, and versatile functionality to enhance pneumatic control performance for process management and production automation.

Enhancing Pneu
Pressure Control

Unmatched Accuracy and Long-Term Stability

Output relative accuracy: ±0.04%
Accuracy guarantee period: 12 months

Fast Response, Superior Quality

≤5 s response time with low overshoot

Versatile Functionality

Pressure monitoring
Micro negative pressure output
Sweep, auto step, divider output

Accuracy – Advanced sensing and control technologies enable precise and stable pressure control, improving reliability in the development and testing of pressure-related devices.

Quality – High-precision pressure control with low overshoot and low noise reduces waiting time for pressure stabilization, achieving shorter takt times and improved productivity.

Functionality – Supporting features such as status monitoring, external outputs, and negative-pressure output are included.

matic Testing with Superior and Unparalleled Precision

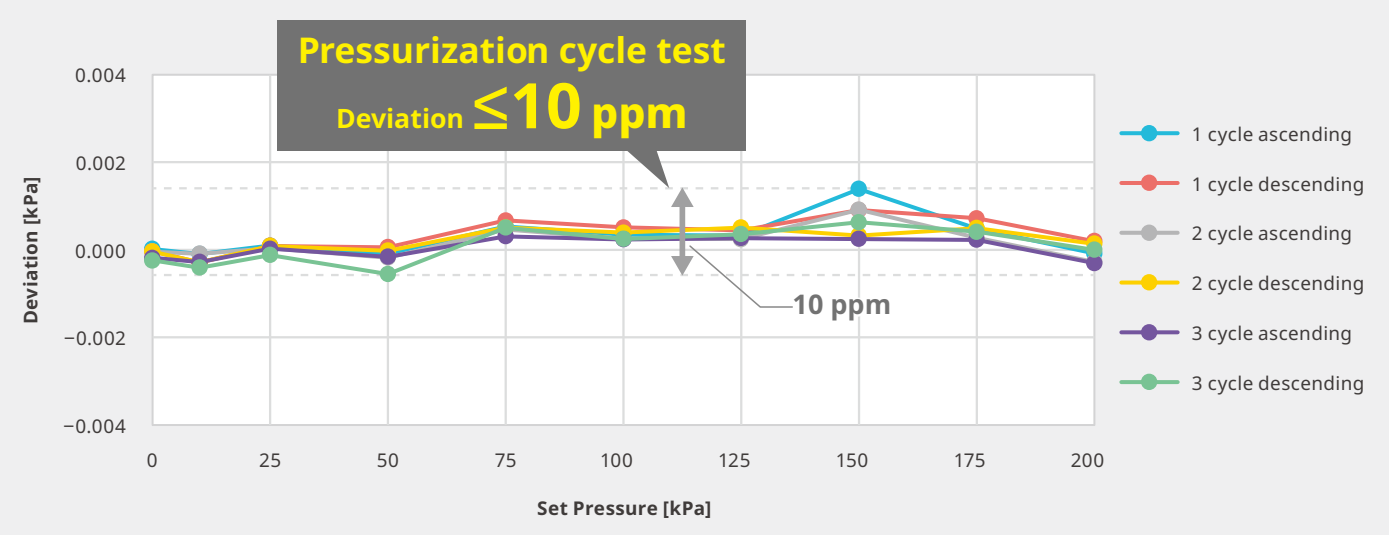
Two Optimized Models for Different Pressure Ranges

Gauge pressure 10 kPa range model
Gauge pressure 200 kPa range model

High-Precision, High-Quality Pressure Control

Excellent Linearity and Repeatability

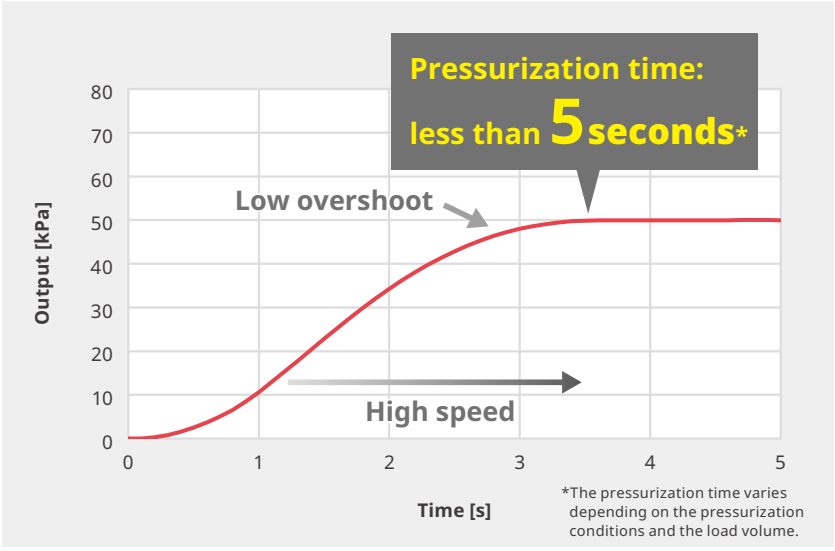
Powered by Yokogawa's proprietary sensing technology — combining a silicon resonant sensor with precision needle-valve flow control — the MC300 delivers an output relative accuracy of ±0.04% with one-year guaranteed long-term stability. Extremely low hysteresis, excellent linearity, and high repeatability ensure stable, reliable pressure control over extended operating periods.



Sample data for 3-cycle test (200 kPa Range Model)

High-Speed, Smooth Pressurization

The MC300 mitigates the risk of overpressure at the device under test caused by rapid pressurization through smooth flow regulation using precision needle-valve control. Even as the setpoint is approached, it maintains fine pressure control to minimize overshoot and achieves a response time of less than 5 seconds.

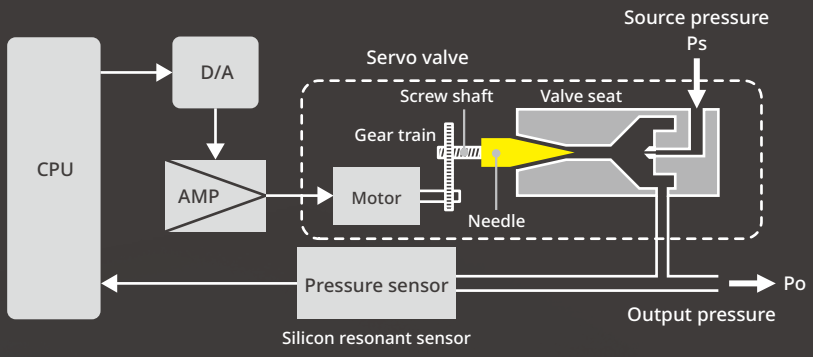


Pressurization Test from 0 to 50 kPa, Load Volume: 20 cc (200 kPa Range Model)

Core Technologies Behind Precise Pressure Control

Precise Needle Valve Control

The MC300 uses a needle valve servo mechanism in its pressure control section, adjusting airflow through the needle position to regulate output pressure. Unlike solenoid valve systems that rely on rapid open/close operations, the needle valve enables continuous, smooth movement. This design delivers stable pressurization and depressurization with minimal wear, ensuring long-term reliable operation



Silicon Resonant Sensor

Stable pressure control depends on a high-precision pressure sensor to monitor output pressure for feedback.
The silicon resonant sensor integrated into the MC300 delivers exceptional performance to meet stringent requirements for accurate measurement, offering superior stability, repeatability, sensitivity, and temperature characteristics.

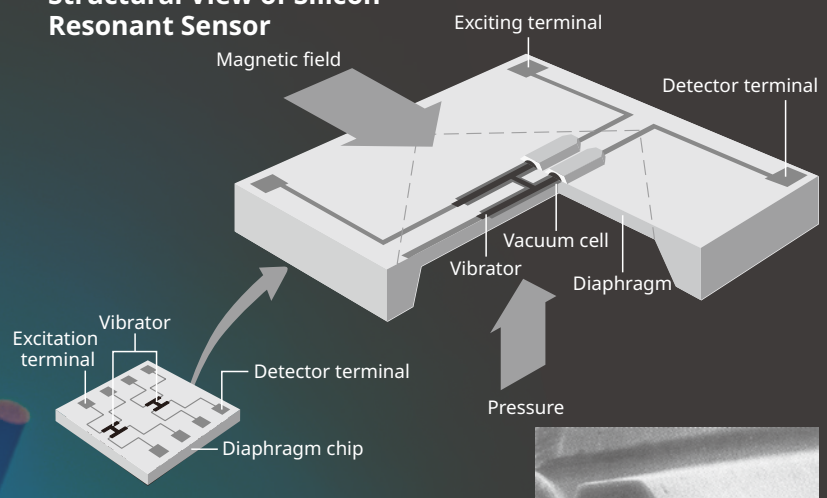
High sensitivity, high resolution, and superior long-term stability

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.

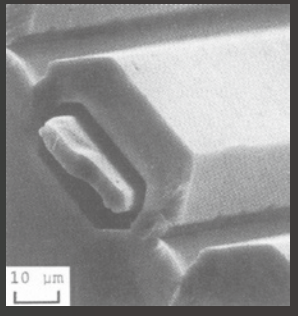
Extremely low temperature dependency

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.

Structural View of Silicon Resonant Sensor



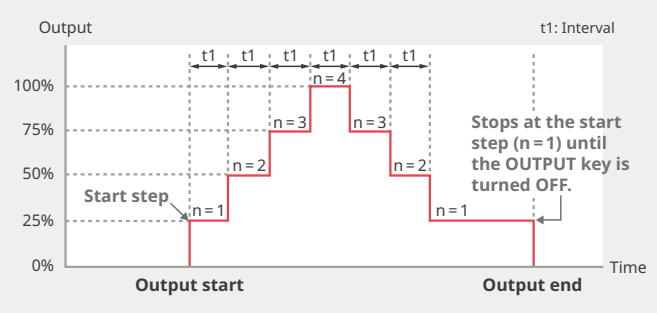
Each vibrator, fabricated using semiconductor process technology on a silicon wafer, is driven by a permanent magnet. When pressure is applied to the silicon diaphragm, the vibrator deforms, causing its resonant frequency to change.



Versatile Functionality

Output Division and Auto-Step Output

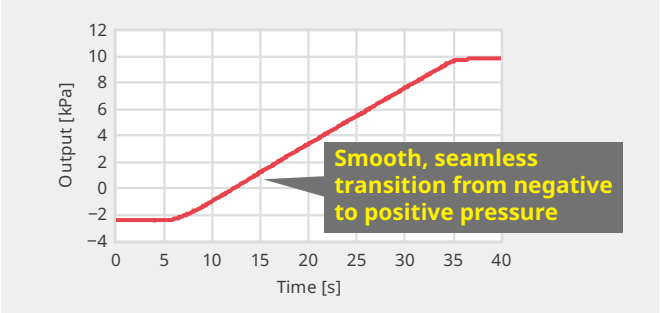
The MC300 allows the set pressure to be divided into a desired number of output steps (n/m). By setting the target pressure to the full scale of the device under test and specifying the number of steps, users can perform smooth step-up and step-down operations at the touch of a button. The auto-step function automatically executes each step at preset intervals, enabling efficient and repeatable testing.



Example of auto step when start step n = 1, number of division m = 4

Negative Pressure Output without Vacuum Pump

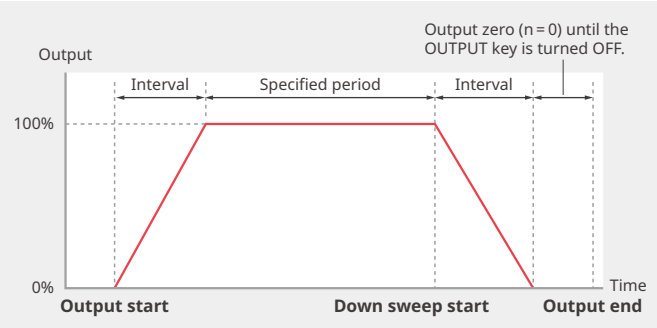
The MC300 generates negative pressure down to −1.2% of its full range without requiring an external negative pressure source such as a vacuum pump. This capability (unavailable in many conventional pressure controllers) simplifies system setup and makes the MC300 ideal for applications such as precise zero-point adjustment and compliance testing under slight negative pressure conditions.



Sweep Output from −2.4 kPa to 10 kPa (200 kPa Range Model)

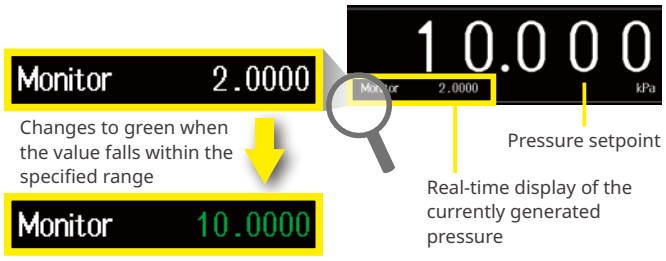
Sweep Output and Repeat Function

The MC300 delivers smooth, continuous linear pressure output from zero to full scale through precise needle-valve control. The sweep output function automates this process, making it ideal for applications such as pressure switch actuation verification, meter testing, and clog detection. When combined with the repeat function, the sweep or auto-step output can be executed continuously, providing greater flexibility and efficiency in automated testing.



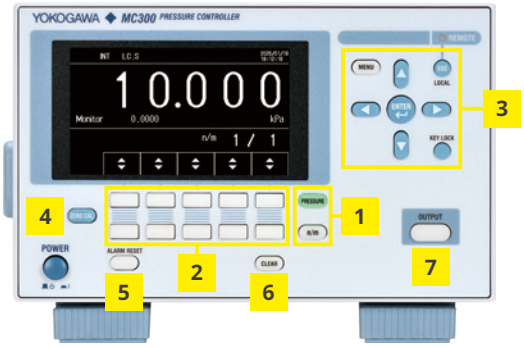
Pressure Output Status Monitoring

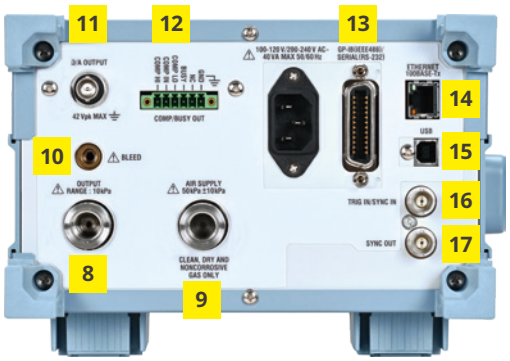
Pressure values measured by the built-in sensor are displayed on the screen and available via analog output, allowing both pressure transitions during control and setpoint stability to be easily monitored. Comparator output and on-screen indicators provide additional confirmation, with the display changing from white to green when the pressure reaches the specified range for instant visual verification.



User Interface

Front panel/Rear panel

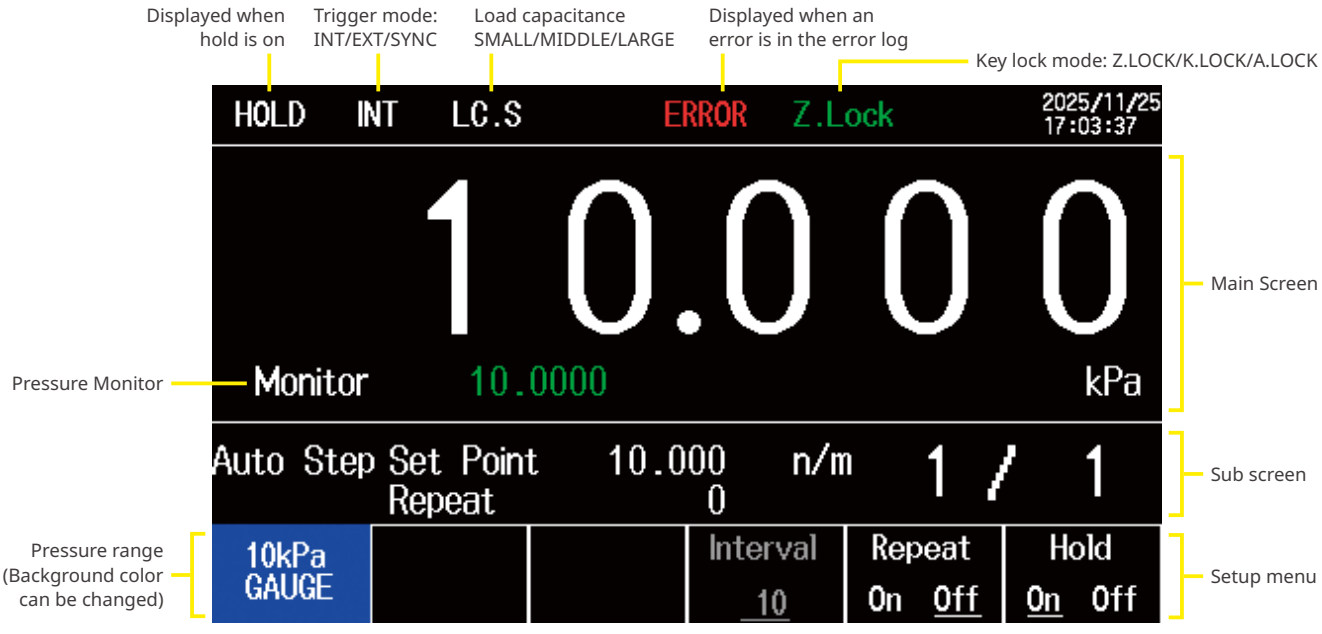




1	Pressure/Divider Ratio keys	7	Output	13	GP-IB/RS-232 port (Selectable)
2	Panel keys (for functions)	8	Output connector	14	Ethernet port
3	Menu	9	Supply pressure connector	15	USB port (Type-B)
4	Zero cal	10	Bleed outlet	16	External trigger/sync signal input terminal
5	Alarm reset	11	Monitor D/A output terminal	17	Sync signal output terminal
6	Clear key	12	Comparator output terminal		

Color Display for Comprehensive Information

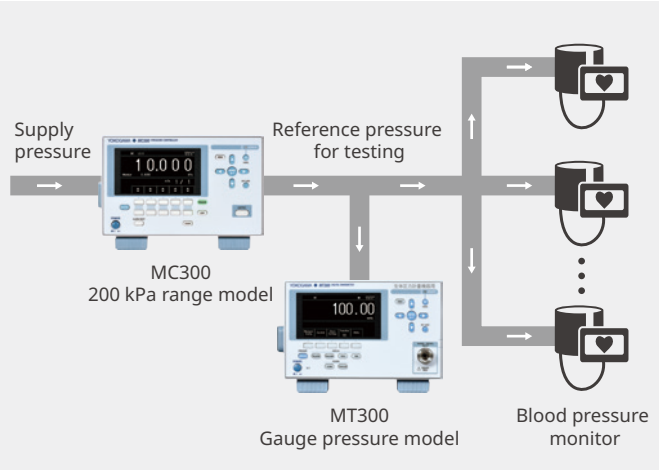
A color dot-matrix LCD delivers superior readability and rich, detailed information.



Application

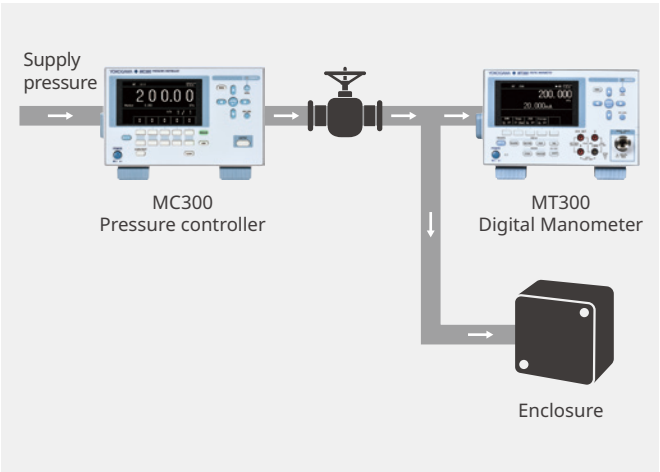
Blood Pressure Monitor Testing

Blood pressure monitors require accurate pressure measurement and control up to 40 kPa (300 mmHg) to ensure compliance with medical standards. With a pressure range up to 200 kPa, the MC300 provides ample margin while delivering the accuracy and resolution required to support both development and production testing of blood pressure monitors and medical devices with integrated blood pressure measurement functions. The MC300 is also capable of generating negative pressure without the use of a vacuum pump, allowing functional testing under negative pressure conditions specified by applicable standards using a single instrument. For applications requiring enhanced measurement confidence, the MT300 Digital Manometer (Gauge Pressure model) can be used alongside the MC300 to monitor pressure directly at the device under test.



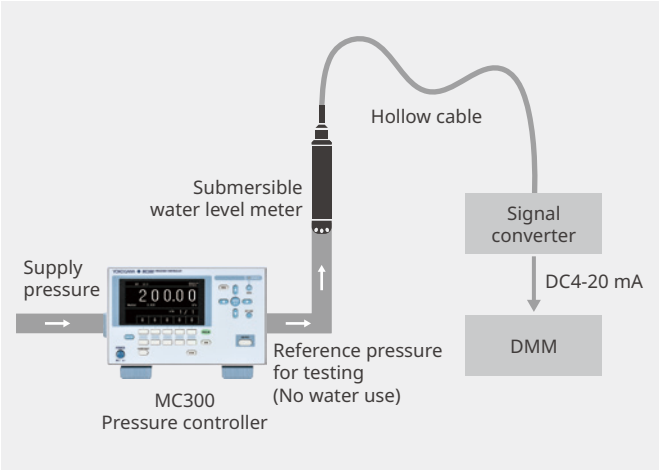
Leak/Airtightness Testing of Enclosures

Leak (airtightness) testing is commonly used to evaluate the waterproof and dustproof performance of enclosures using the pressure change method. In this approach, the test object is pressurized to a specified starting pressure and, after a defined stabilization period, the pressure change is measured to confirm compliance with allowable leakage limits.
Accurate leak measurement depends on maintaining a stable and repeatable starting pressure. The MC300 delivers smooth, highly repeatable pressurization to the target pressure, reducing measurement variation and ensuring consistent, reliable test results. This makes it well suited for both development testing and high-throughput inspections, including mass production and shipping verification. MT300 Digital Manometer monitoring also available for additional confidence.



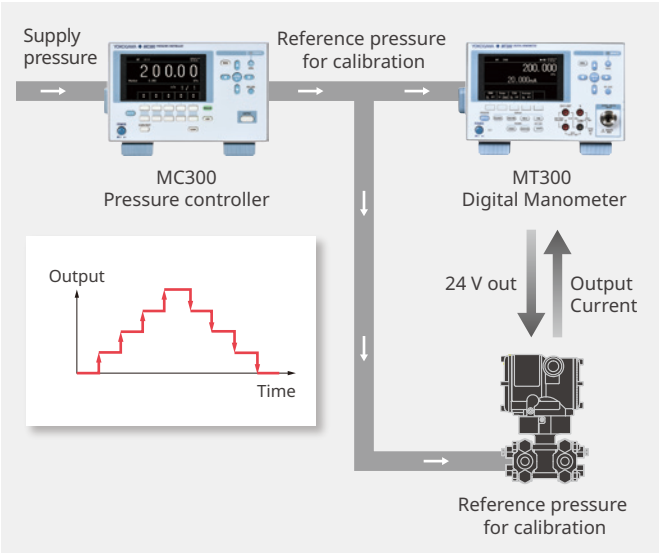
Submersible Water Level Meter Testing

During development and testing of water level meters creating actual water levels, for example, of 20 meters is challenging. Instead, a pressure controller applies equivalent air pressure to simulate an underwater environment.
The MC300 provides rapid pressurization to target pressure with minimal overshoot and extremely low hysteresis, delivering stable, high-quality pressure control for submersible water level meter development and verification. It also ensures precise control during both pressurization and depressurization, helping to prevent overpressure and hysteresis effects.



Pressure Transmitter Calibration

Pressure transmitters used in industrial plants require regular calibration to maintain measurement accuracy and process integrity.
The MC300 Pressure Controller provides precise, stable pressure generation required for accurate transmitter calibration. Its auto-step function enables automated multi-point pressure increase and decrease testing with minimal hysteresis and high accuracy, improving repeatability and reducing operator workload.
When used together with the MT300 Digital Manometer, the MC300 enables highly accurate comparison calibration with full automation. In addition, the MT300 can be equipped with a 24 V power supply and voltage/current measurement functions, eliminating the need for external power supplies or multimeters and enabling a more compact, efficient calibration setup.



Specifications

Output Specifications

Pressure range suffix code		-G01	-G03
Pressure type		Gauge pressure	Gauge pressure
Pressure range		10 kPa	200 kPa
Guaranteed accuracy range		0 kPa to 10 kPa	0 kPa to 200 kPa
Output setting range		−0.12 kPa to +12 kPa	−2.4 kPa to +240 kPa
Accuracy[*1]	Accuracy	±0.05% of full scale	
	Relative accuracy[*2]	±0.04% of full scale	
Output noise		±0.005 kPa	±0.04 kPa
Setting resolution		0.001 kPa	0.01 kPa
Influence of positional setup (at zero point)	At 90° forward or backward inclination	±0.25 kPa	±0.26 kPa
	Stand unfolded	±0.003 kPa	±0.004 kPa
Influence of temperature		±(0.002% of setting +0.0003 kPa)/°C	±(0.002% of setting +0.006 kPa)/°C
Supply pressure		50 kPa ±10 kPa	280 kPa ±20 kPa
Allowable supply pressure		100 kPa (gauge)	500 kPa (gauge)
Air consumption[*3]		30 L/min or less	
Output response time[*4]		5 s for the value to settle within ±0.1% of the full scale after the start of change	
Output setting display digits		4.5 (at kPa unit)[*5]	
Output method	Divider output	Outputs n/m pressure at the set value. n = 0 to m, m = 1 to 25, n/m ≤ 100%	
	Auto-step output	Automatically generates divider output for each step. Interval time: 10 s to 600 s (resolution: 5 s) Repetitions: 1 or infinite (can be paused)	
	Sweep output[*6]	Linearly outputs between the lower and upper limits at interval time. Increase/decrease direction switchable. Interval time: 15 s to 600 s (resolution: 5 s) Repetitions: 1 or infinite (can be paused)	

*1: Accuracy guaranteed for 1 year after calibration, 23˚C ±3˚C, after zero calibration under atmospheric pressure
*2: A value relative to the YOKOGAWA working standard
*3: Within the specified supply pressure range
*4: At any 20% or 25% division output in 1 step without load
*5: Depends on the unit selected
*6: Load capacity 10 cc or less. If the load capacity is large, the output may not be able to keep up.

Common Specifications

Supply pressure source	Dry air, 5°C to 40°C, with minimal temperature change. Use a pressure reducing valve with a filter to input a stable supply pressure.
Pressure control principle	Needle-type servo valve
Pressure sensor	Silicon resonant sensor
Display unit (-U2)	Pa, hPa, kPa, MPa, mbar, bar, atm, mmHg, inHg, gf/cm^2, kgf/cm^2, Torr, psi, mmH_2O*, ftH_2O*, inH_2O*
Input/output connection	Rc 1/4 female-threaded, 1/4 NPT female-threaded
Correction function (Zero correction)	Zero calibration
Error display	ALARM LED lights up when supply pressure is abnormal

*4°C or 20°C for all cases

Output Monitor Function

Display range		Up to 12 kPa (-G01) / 240 kPa (-G03)
Display resolution		0.0001 kPa (-G01) / 0.001 kPa (-G03)
Display update interval[*1]		250 ms
D/A output	Output range	2 VDC, 5 VDC
	Output setting range	Approx. ±120% of range
	Output resolution	16 bit
	Output update interval	Approx. 2 ms
	Response time[*2]	Conforms to the integration time[*3] of the output monitor
	Output resistance	0.1 Ω or less
	Load resistance	10 kΩ or more
	Load capacity	0.1 μF or less
	Output terminal[*4]	BNC terminal
	D/A output scaling	Any pressure output range can be output at full scale of D/A output range. (Set in 2-point mode or direct input mode)
Output stability monitor function	Display method	The display color of output monitor indicates output stability state. Stable: green, otherwise: white[*5]
	Judgment cycle/period	At each trigger. Output monitor integration time.
	Judgment value settinig	Range: 0.01% to 10% of full scale, Resolution: 0.01%
Comparator output[*6]	Output signal	HI/IN/LO, BUSY
	Output range	−0.3 to +5.5 V
	Output level	HIGH: 3.5 V or more, LOW: 0.45 V or less
	Output terminal[*7]	Detachable terminal block

*1: The data output cycle via communication is the same as the display update cycle.
*2: Measurement conditions for D/A output response time: Time required for the value to settle within ±1% of the convergence value after the start of change.
*3: The integration time can be set to 250 ms, 1500 ms, 2500 ms, or 4000 ms.
*4: Rated grounding voltage between analog output terminal and earth: 42 Vpeak
*5: Stability judgment condition: −(judgment value) ≤ (deviation between output setting value and output monitor value) ≤ +(judgment value)
*6: The judgment criteria are the same as the judgment values used by the output stability monitor function.
*7: Ground the comparator output GND terminal.

Output monitor trigger			
	Trigger mode		Internal trigger, external trigger, sync trigger
	Trigger source	Internal trigger	Display update (update interval: 250 ms)
		External trigger	External input (TRIG IN/SYNC IN), communication commands
		Sync trigger	External input (TRIG IN/SYNC IN)
	Trigger input/output range		−0.3 to +5.5 V
	Trigger input level		HIGH: 2.5 V or more, LOW: 0.8 V or less
	Effective trigger input edge		Falling
	Trigger output level		HIGH: 3.5 V or more, LOW: 0.45 V or less
	Input/output terminal		Input (TRIG IN/SYNC IN): BNC terminal, output (SYNC OUT): BNC terminal
Output monitor sync			
	Number of instrument synced		Up to four MC300s via daisy chain connection
	Sync accuracy		The trigger delay of the subordinate unit (sub) relative to the trigger of the reference unit (main) is within 2.5 ms.
	Sync signal input/output		Same as the trigger input/output

Communication Interface

USB PC	Connector type	USB type B (receptacle)
	Electrical and mechanical	USB Rev. 2.0 compliant
	Supported transfer modes	HS (High Speed) mode (480 Mbps) FS (Full Speed) mode (12 Mbps)
	Supported protocols	USB-FUNCTION interface USBTMC-USB488 (USB Test and Measurement Class Ver.1.0) Virtual COM port CDC (Communication Device Class)
Ethernet	Connector type	RJ-45 connector
	Electrical and mechanical	IEEE 802.3 compliant
	Transmission system	100 BASE-TX/10 BASE-T
	Transfer rate	100 Mbps max.
	Protocol	TCP/IP
	Supported services	DHCP/VXI-11
GP-IB*1	Electrical and mechanical	IEEE St'd 488-1978 compliant
	Functional specifications	SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, and C0
	Protocol	IEEE St'd 488.2-1992 compliant
	Address	0 to 30
Serial*2 (RS-232)		
	Connector type	D-sub 9 pin
	Electricals	EIA RS232 compliant
	Connection method	Point to point
	Communication method	Full duplex
	Synchronization method	Asynchronous (start-stop)
	Baud rate	1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 115200 bps

*1: Standard on -C1
*2: Standard on -C2

General Specifications

Display	Display device	4.3-inch TFT color LCD (480 × 272 dots)*1
	Output setting display digits	4.5 digits*2 (excluding minus sign)
	Output monitor display digits	5.5 digits*2 (excluding minus sign)
Warm-up time		Approx. 5 min
Operating temperature and humidity		5°C to 40°C, 20% RH to 80% RH, no condensation
Operating altitude range		2000 m or less
Storage temperature range		−20°C to +60°C, no condensation
AC power supply rating		
	Rated supply voltage	100 VAC to 120 VAC/200 VAC to 240 VAC
	Permitted supply voltage range	90 VAC to 132 VAC/180 VAC to 264 VAC
	Rated supply frequency	50/60 Hz
	Permitted supply frequency range	47 Hz to 63 Hz
Power consumption		30 VA max. (100 VAC system), 40 VA max. (200 VAC system)
Insulation resistance		100 MΩ or more at 500 VDC (between the AC power supply and case)
Withstand voltage		1500 VAC, at 50 Hz/60 Hz for 1 minute (between the AC power supply and case) 350 VAC, at 50 Hz/60 Hz for 1 minute (between the monitor output terminal and case)
Overvoltage category		Overvoltage Category II (EN 61010-1) AC power input
Dimensions		Approx. 213 mm (W) × 132 mm (H) × 400 mm (D), excluding protrusions
Weight		Approx. 7.5 kg

*1: The LCD may include a few defective pixels. There may be some pixels on the LCD that never light or are always lit (total number defective pixels 5 or less). These pixels are not defects.
*2: The display digits may vary depending on the selected unit.

Model and Suffix Code

Model	Suffix Code	Description
MC300		Pressure Controller
Pressure type and range	-G01	Gauge pressure 10 kPa
	-G03	Gauge pressure 200 kPa
Pressure unit	-U2	Pa, hPa, kPa, MPa, mbar, bar, atm, mmHg, inHg gf/cm², kgf/cm², Torr, psi, mmH₂O@4°C, mmH₂O@20°C, ftH₂O@4°C, ftH₂O@20°C, inH₂O@4°C, inH₂O@20°C
Input/output connection	-P1	Rc 1/4" female-thread
	-P2	1/4" NPT female-thread
Communication interface	-C01	GP-IB Interface
	-C02	RS-232 Interface
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

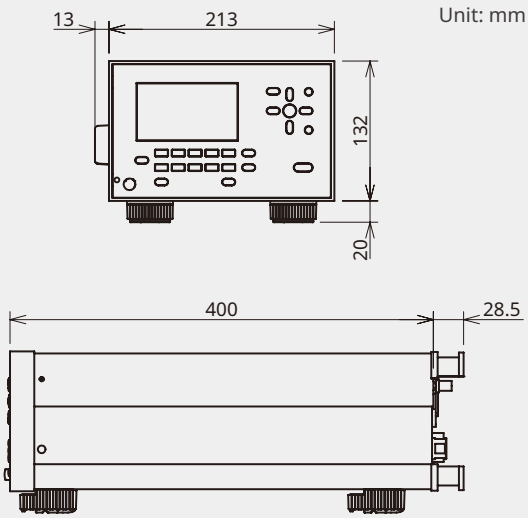
Standard accessories: Power cord (1), Rubber stoppers (1 set), Terminal plug (1), Connector assembly kit (1), User's manual (1 set)

Accessories

Model	Name	Description	
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)	
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)	

Dimensions

Unit: mm



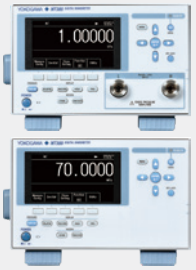
Related Products

Digital Manometer MT300

- Relative accuracy ±0.01% of reading
- 3 models, 13 ranges

Gauge pressure model	10 kPa, 200 kPa, 1000 kPa, 3500 kPa, 16 MPa, 70 MPa
Absolute pressure model	130 kPa, 700 kPa, 3500 kPa
Differential pressure model	1 kPa, 10 kPa, 130 kPa, 700 kPa

- Both gases and liquids measurable
- D/A conversion output, D/A scaling function (Option)
- High-speed measurement (Option)
- Leak test, scaling, statistical processing function
- GP-IB, USB and Ethernet communication interface as standard
- Data store function using internal memory
- Tilt alarm and tilt correction (Absolute model)
- 24 VDC output, DCV/DCA measurement (Option)
- Li-ion battery operation (Option)



Pressure Calibrator CA700

- 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

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.

YOKOGAWA

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YMI-E03

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