MT300
Digital Manometer

Thank you for purchasing the MT300 digital manometer. This user's manual explains the features, operating procedures, and handling precautions of the instrument. To ensure correct use, please read this manual thoroughly before operation.

After reading this manual, keep it in a safe place. The manuals for this instrument are listed on the next page. Please read all manuals.

Contact information of Yokogawa offices worldwide is provided on the following sheet.

Document No.	Description
PIM 113-01Z2	List of worldwide contacts

Notes

- The contents of this manual are subject to change without prior notice as a result of improvements to the product's performance and functionality. Refer to our website to view our latest manuals.
- The figures given in this manual may differ from those that actually appear on your screen.
- Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest YOKOGAWA dealer.
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Revisions

- October 2019   1st Edition
- June 2020   2nd Edition
- April 2023   3rd Edition
- February 2024   4th Edition

Manuals

The following manuals, including this one, are provided as manuals for this instrument. Please read all manuals.

Manual Title	Manual No.	Description
MT300 Digital Manometer User's Manual	IM MT300-01EN	This document. Provided as PDF data. The manual explains all the instrument features.
MT300 Digital Manometer Getting Started Guide	IM MT300-02EN	Provided as a printed manual. This guide explains the handling precautions, basic operations, and specifications of the instrument.
MT300 Digital Manometer	IM MT300-92Z1	Document for China
Battery Pack Handling Precautions	IM 739883-01EN	This manual is included in models with the /EB option (battery pack + battery pack cover). It explains the handling precautions of the battery pack.
739883 Battery Pack	IM 739883-92Z1	Document for China This manual is included in models with the /EB option (battery pack + battery pack cover).
269918 Battery Pack Cover	IM 269918-92Z1	Document for China This manual is included in models with the /EB option (battery pack + battery pack cover).
Safety Instruction Manual	IM 00C01C01-01Z1	Safety manual (European languages)

The "EN" and "Z1" in the manual numbers are the language codes.

Conventions Used in This Manual

Notes
The notes and cautions in this manual are categorized using the following symbols.

⚠ Improper handling or use can lead to injury to the user or damage to the instrument. This symbol appears on the instrument to indicate that the user must refer to the user's manual for special instructions. The same symbol appears in the corresponding place in the user's manual to identify those instructions. In the manual, the symbol is used in conjunction with the word "WARNING" or "CAUTION."

WARNING Calls attention to actions or conditions that could cause serious or fatal injury to the user, and precautions that can be taken to prevent such occurrences.

CAUTION Calls attention to actions or conditions that could cause light injury to the user or damage to the instrument or user's data, and precautions that can be taken to prevent such occurrences.

French

AVERTISSEMENT Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures graves (voire mortelles), et sur les précautions de sécurité pouvant prévenir de tels accidents.

ATTENTION Attire l'attention sur des gestes ou des conditions susceptibles de provoquer des blessures légères ou d'endommager l'instrument ou les données de l'utilisateur, et sur les précautions de sécurité susceptibles de prévenir de tels accidents.

Note Calls attention to information that is important for the proper operation of the instrument.

Prefixes k and K
Prefixes k and K used before units are distinguished as follows:

k: Denotes 1000.   Example: 100 kPa (pressure value)
K: Denotes 1024.   Example: 720 KB (file size)

Notations Used in the Procedural Explanations
The contents of the procedural explanations are indicated using the following symbols.

Procedure Carry out the procedure according to the step numbers. All procedures are written under the assumption that you are starting operation at the beginning of the procedure, so you may not need to carry out all the steps in a procedure when you are changing the settings.

Explanation This section describes the setup items and the limitations regarding the procedures.

Characters and Terminology Used in Procedural Explanations
Panel Keys and Soft Keys
Bold characters used in the procedural explanations indicate panel keys or soft keys (setup menus).

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1

1.1   System Configuration

System Configuration

MT300 (UNIT2, UNIT3, UNIT4)

External trigger input

Sync signal output

Setting data, measured data

MT300

**Comparator output
(/DA option)**
Comparison result output

GP-IB

USB (USB TMC/USB CDC)

Ethernet (VXI-11)

PC

**Status
monitoring**

Communication interface

D/A output (/DA option)
Measured values are
transmitted as analog
voltages.

Command control

Waveform measuring instrument

**DC voltage/DC current
measurement, 24 VDC
output (/DM option)**

**Differential pressure or
pressure transmitter**

Pressure

Pressure device

1.2 Measurement Function

Pressure Measurement

This instrument can measure the pressure of liquids and gases.

Gauge Pressure, Absolute Pressure, and Differential Pressure Measurements

Pressure measurements can be categorized into three types: (1) gauge pressure measurement, which assumes atmospheric pressure to be zero, (2) absolute pressure measurement, which assumes vacuum to be zero, and (3) differential pressure measurement, which assumes a specific pressure to be zero.

The shield gauge pressure measurement is a kind of gauge pressure measurement, which assumes atmospheric pressure to be zero. The reference pressure chamber for the pressure sensor of the shield gauge pressure model is sealed. Therefore, the differences by fluctuations in atmospheric pressure are added to the measured pressure values.

Zero Calibration

Zero calibration (zero CAL) refers to the act of correcting the influence caused by changes in the temperature and installation environment in order to perform highly accurate pressure measurements.

Relative Value Display

The instrument displays the difference between the measured values and the specified reference value (measured value – reference value). You set the reference value to any value that you choose or the value that is displayed when you press RELATIVE.

Maximum and Minimum Display of Measured Values

You can display the maximum and minimum measured values.

Scaling

By assigning scale values to the upper and lower limits of the span, you can linearly scale measured values and display the scaled results. You can also directly input the scaling coefficients. If scaling is set to on, converted values can be displayed as you like.

Leak test

You can apply pressure to the device under measurement and measure pressure over a given period to examine the pressure change due to leakage.

The display shows the pressure at the start of measurement, the pressure at the end of measurement, the amount of pressure change, and the amount of pressure change per unit time (leak rate).

Statistical Processing

The instrument displays the maximum (Max), minimum (Min), average (AVG), and standard deviation (σ) of the pressure measurement results.

It also counts and displays the total number of obtained data (NUM), the number of error data (ERR), and the elapsed time (Time).

Percentage Display

By taking the lower limit of the specified span to be 0% and the upper limit to be 100%, the instrument displays the measured values as percentages along with the measured values themselves. If the DMM function (/DM) option is set to on, the percentage error is also displayed.

Tilt Correction (Absolute Pressure Model)

The tilt correction function corrects for the offset (amount of influence) of measured pressure values when the body of an absolute pressure model is used in a vertical orientation. In addition, it determines the tilt correction settings and the orientation state of the instrument and displays a tilt alarm warning.

Current and Voltage Measurement (/DM option)

DC current measurements can be performed at the 20 mA range and the DC voltage measurement at the 5 V range.
Like pressure measurement, the following features are also available.
*   Maximum and Minimum Display of Measured Values
*   Percentage display and percentage error display

Loop Current Measurement (/DM option)

The instrument can measure the current that flows when a 24 VDC constant voltage is output. This can be used in differential pressure and pressure transmitter loop tests.

1.3 Saving Data

Pressure measurement data and the instrument settings are saved in the internal storage device. On models with the /DM option, voltage and current measurement data are also saved.

Saving Measured Data and Settings

There are two methods to save data.

Manual Storage

Every time you press STORE or when the instrument receives a manual storage command, the measured data and the instrument settings at that point are saved.

Auto Storage

Measured data and the instrument settings are saved according to the specified interval and count.

Copying Data

Data saved in the instrument can be viewed or copied as CSV files on a PC.

Deleting Data

Data saved in the instrument can be deleted.

1.4 Communication Functions

You can connect to the instrument from a PC through the GP-IB connector, Ethernet port, or USB port. You can control the instrument remotely from a PC. By specifying a USB setting, the instrument can be controlled as a PC's USB storage device.

Remote Control

You can use dedicated communication commands to remotely control the instrument from a PC.
The following operations can be controlled remotely.
• MT300 configuration
• MT300 configuration retrieval
• Measured data retrieval

This instrument is compatible with the remote control commands of its predecessor model, the MT210/MT210F/MT220.

USB Storage Device

You can use the instrument as a PC's USB storage device.
Saved data can be viewed as CSV files.

1.5   Other Features

Screen Brightness

You can set the brightness to any of the five available levels. Change the brightness depending on the environment that you are using the instrument in.

Range Information

The pressure type and range can be displayed in the lower right of the screen. You can select the range information display color from eight colors.

By changing the colors, you will be able to distinguish pressure types and ranges by color.

Setting the Beep Sound

Beeps are used to indicate the operation status of the instrument. You can set it from the UTILITY menu.

You can turn the beep sound on or off for the following notifications. You cannot change the volume.

- When an error is detected during a self-test executed at power-on or executed manually (error codes:* 920 to 959)
- When you press a key

You cannot turn off the beep sound for notifying internal power supply errors (error code:* 904).

*   See the Getting Started Guide (IM MT300-02EN).

Error Message Language

You can set the error message language to English, Japanese, Chinese, or Korean.

Hold Function

The hold function holds the screen. While the screen is held, zero calibration cannot be executed.

Pressure measurements and voltage/current measurements continue even while the screen is held.

Key Lock Function

You can select whether to lock the ZERO CAL key or all keys except the KEY LOCK key.

Synchronous Measurement

Several MT300s can be connected, and the data acquisition timing and display updating can be synchronized by using the MT300 internal signal or a signal output by an external device. Up to four units can be synchronized.

2.1   Setting the Pressure Display Unit and the Number of Displayed Digits

Procedure

When connecting a connector to the pressure input port of the instrument, be sure to follow the instructions in the Getting Started Guide (IM MT300-02EN).

Setting the Pressure Display Unit

1. Press **MENU** to display the top menu.
2. Press the **Measure Config** soft key and then the **Next** soft key to display the following menu.
3. Press the **Unit** soft key to display the Unit menu.

| Unit kPa | Scaling | Tilt Corr Setting | | Next 2/3 | |

4. Press the soft key corresponding to the unit (**Unit**) you want to select. Press the **Next** soft key to select other units.

| ── Unit ── | | | | Next 1/2 | |
| Pa | hPa | kPa | MPa | | |

Setting the Number of Displayed Digits

In the pressure measurement display area, the least significant digit can be masked. This is useful when the least significant digit fluctuates making the value difficult to view.

1. Press **MENU** to display the top menu.
2. Press the **Measure Config** soft key to display the following menu.
3. Press the **Digit Mask** soft key to set the mask to On or Off.

   On: The least significant digit is masked.

   Off: Masking is cleared.

| Trigger INT | IntegTime 1500ms | Relative | Digit Mask On Off | Next 1/3 | |

Note

When you mask the least significant digit, the least significant digit of the percentage display and % ERROR display (/DM option) is also masked.

2.2 Setting the Trigger Mode and Trigger Delay

Procedure

Setting the Trigger Mode

1. Press **MENU** to display the top menu.

2. Press the **Measure Config** soft key to display the following menu.

3. Press the **Trigger** soft key to display the Trigger Mode menu.

Trigger	IntegTime	Relative	Digit Mask	Next	
INT	1500ms		On Off	1/3	

4. Press the soft key corresponding to the trigger mode (**Trigger Mode**) you want to use.

───── Trigger Mode ─────			Delay	LED	
Internal	External	Sync	0	On Off	

Setting the Trigger Delay

If you set the trigger mode to External, you can set the trigger delay.

5. Press the **Delay** soft key to display the following screen.

───── Trigger Mode ─────			Delay	LED	
Internal	External	Sync	0	On Off	

6. Use the arrow (▲, ▼, ◄, and ►) keys to enter the time, and press **ENTER**.

Trigger Delay	0ms	

Turning on/off the indicator of the TRIG key

5. Press the **LED** soft key to set the indicator of the TRIG key to On or Off.

   On: The LED of the TRIG key lights each time it is triggered.

   Off: The LED of the TRIG key is turned off.

───── Trigger Mode ─────			Delay	LED	
Internal	External	Sync	0	On Off	

Note

- The trigger delay setting is valid only when the trigger mode is set to External. The trigger delay is invalid when the trigger mode is set to Internal or Sync.
- If you want to measure by continuously generating triggers, generate the triggers at an interval greater than or equal to the minimum trigger input interval shown in the following table. Continuous trigger input that does not meet the conditions of the following table are discarded. If you want to generate triggers using communication commands, add at least 100 ms to the minimum trigger input intervals shown in the following table.

Trigger mode	Measurement mode	Measurement integration time[1]	Minimum trigger input interval
External trigger	Standard	250 ms	262 ms + the specified trigger delay
		1500 ms	1520 ms + the specified trigger delay
		2500 ms	2520 ms + the specified trigger delay
		4000 ms	4020 ms + the specified trigger delay
	Middle/Fast[2]	–	112 ms + the specified trigger delay
Sync trigger	Standard	250 ms	250 ms
		1500 ms	250 ms
		2500 ms	250 ms
		4000 ms	250 ms
	Middle/Fast[2]	–	100 ms

1 For details on the measurement integration time, see section 2.3.
2 This is available on models with the /F1 option.

2

Setting Measurement Conditions

Explanation

Trigger Mode (Trigger Mode)

Set the trigger source signal. The selected trigger mode is displayed in the upper left of the screen.

Internal Trigger (Internal)

Triggers are activated using the instrument's signals. The internal trigger interval is the same as the display update interval, which is 100 ms or 250 ms. When Internal is selected, "INT" is displayed in the upper left of the screen.

Display Updating Time Chart
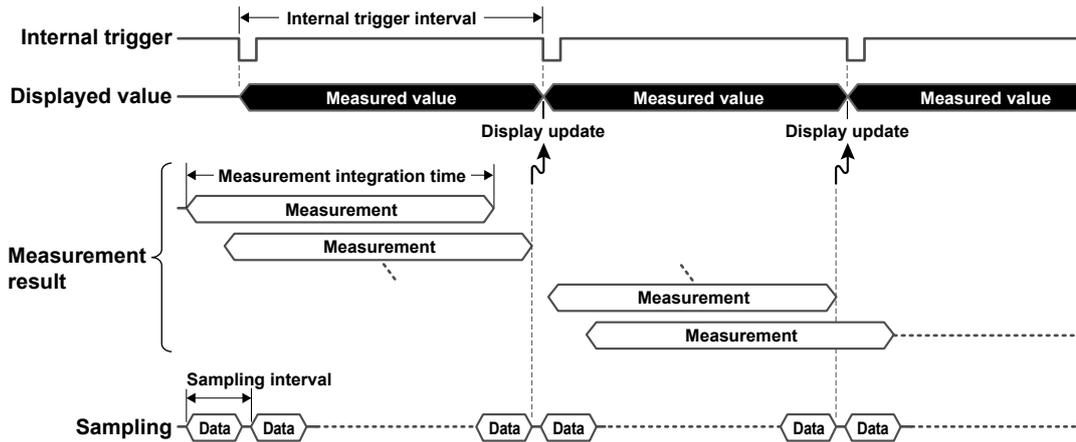
For the measurement integration time setting procedure, see section 2.3.

External Trigger (External)

Triggers are activated using external signals. You can set a trigger delay.

Triggers can be activated using the following methods. When External is selected, "EXT" is displayed in the upper left of the screen.

- External trigger signal input (TRIG IN/SYNC IN)
- Pressing of the TRIG key (manual trigger)
- Communication commands (normal command: *TRG, compatible command: E), or interface message GET (for GP-IB)

Trigger Delay (Delay)

The instrument normally displays the measured values at the trigger point. If you set a trigger delay, the measured values are displayed when a given period (delay time) elapses after an external trigger is activated.
Setting range: 0 to 10000 ms, resolution: 1 ms

Display Updating Time Chart

• **When the trigger delay time is 0 ms**
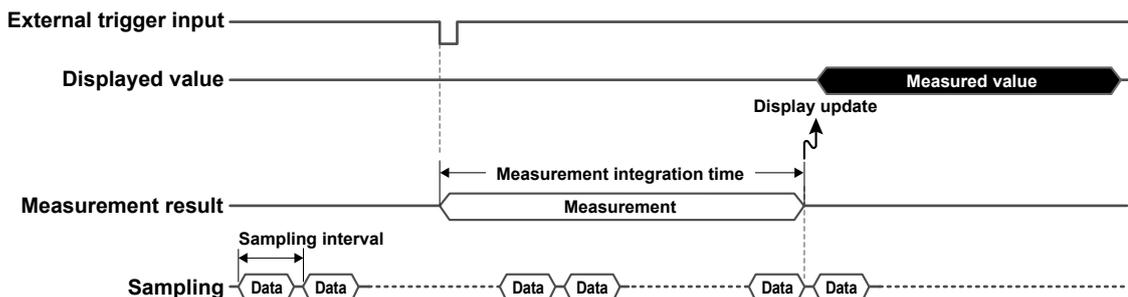
• When the trigger delay time is 1 ms or more
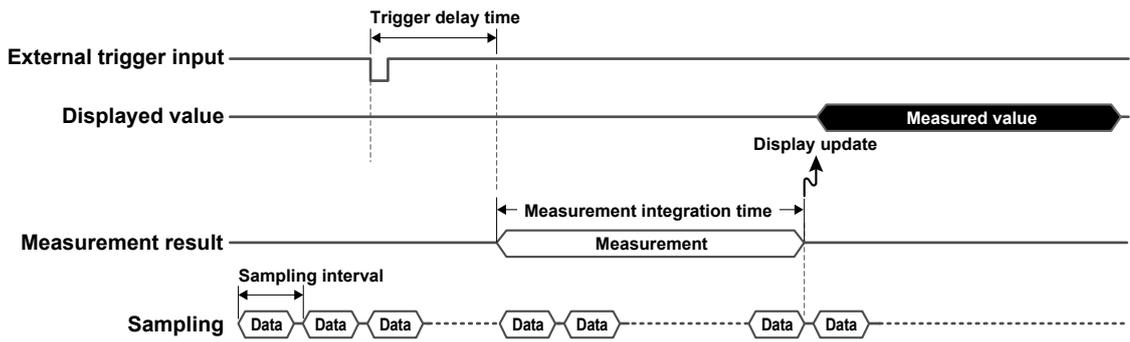
Sync Trigger (Sync)

Triggers activated using sync signals received through the external trigger signal input (TRIG IN/SYNC IN).

When Sync is selected, "SYNC" is displayed in the upper left of the screen.
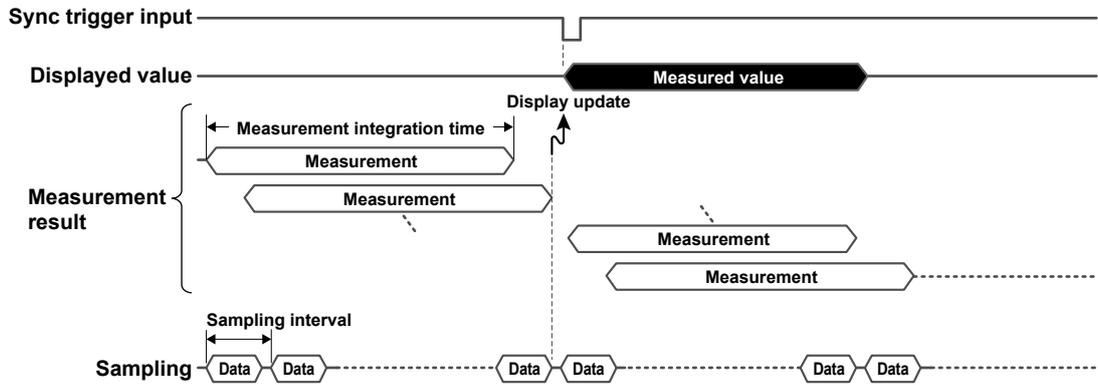
Display Updating Time Chart

2

Setting Measurement Conditions

2.3 Setting the Measurement Integration Time

Explanation

Measurement Integration Time (Integration Time)
Set the measurement integration time.

On Models with the Measurement Mode Switch Function (/F1 option)
You can select the measurement mode.
If you set the measurement mode to mid-speed or high-speed, the measurement integration time is fixed.
For details on the measurement mode, see section 4.1.

2.4 Performing Synchronous Measurement

This section explains the following settings for connecting several (up to four) MT300s and synchronizing the data storage and display update timings.
- Wiring method
- Instrument configuration

  If all the MT300s are to use the signal from an external device as the reference signal, to synchronize the display updating on the connected MT300s, the following parameters must be set to the same settings on all the connected MT300s.
  - Trigger delay
  - Measurement integration time
  - Measurement mode (models with the /F1 option)

  Further, to synchronize data storage, the storage mode must be set to Auto on all connected MT300s.

Wiring Method
Synchronous Measurement Using the MT300 Sync Signal (SYNC OUT signal)
- Connect the SYNC OUT terminal of UNIT1 to the TRIG IN/SYNC IN terminal of UNIT2.
- Connect the SYNC OUT terminal of UNIT2 to the TRIG IN/SYNC IN terminal of UNIT3.
- Connect the SYNC OUT terminal of UNIT3 to the TRIG IN/SYNC IN terminal of UNIT4.
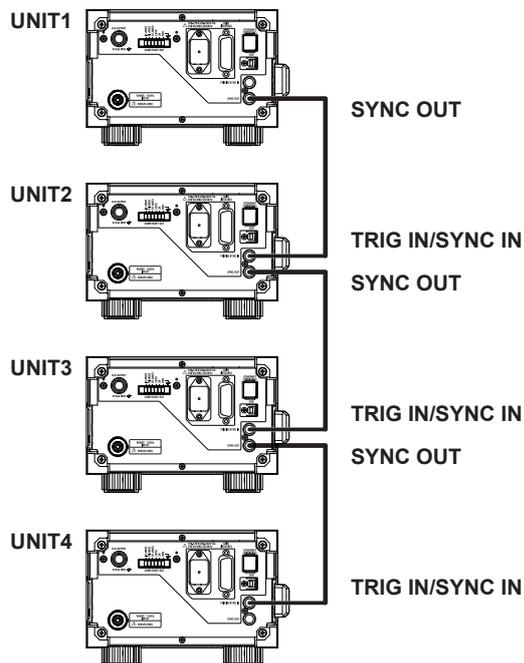
Synchronous Measurement Using Signals from an External Device

Using the External Signal Input to MT300 (UNIT1) as the Reference Signal

- Connect the output signal line of the external device to the TRIG IN/SYNC IN terminal of UNIT1.
- Connect the SYNC OUT terminal of UNIT1 to the TRIG IN/SYNC IN terminal of UNIT2.
- Connect the SYNC OUT terminal of UNIT2 to the TRIG IN/SYNC IN terminal of UNIT3.
- Connect the SYNC OUT terminal of UNIT3 to the TRIG IN/SYNC IN terminal of UNIT4.
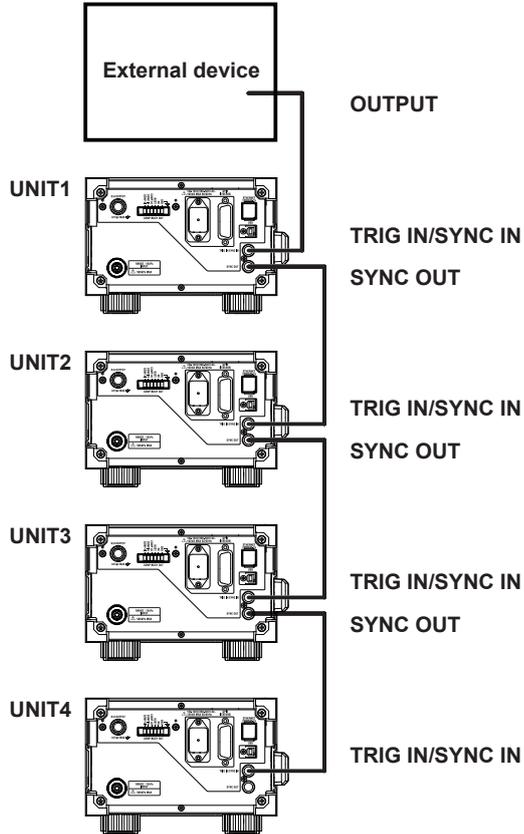
Using the Signal from an External Device As the Reference Signal On All MT300s

Connect the output signal line of the external device to the TRIG IN/SYNC IN terminals of UNIT1 to UNIT4.

Procedure

Configuring the Instrument

Set the trigger mode of each unit.

1. Press **MENU** to display the top menu.

2. Press the **Measure Config** soft key to display the following menu.

3. Press the **Trigger** soft key to display the Trigger Mode menu.

Trigger	IntegTime	Relative	Digit Mask	Next
INT	1500ms		On Off	1/3

4. Press the soft key corresponding to the trigger mode (**Trigger Mode**) appropriate for the wiring method.

─── Trigger Mode ───	Delay	LED	
Internal External Sync	0	On Off	

Wiring Method	UNIT1	UNIT2	UNIT3	UNIT4
Synchronous measurement using the MT300 sync signal (SYNC OUT signal)	Internal	Sync	Sync	Sync
Using the external signal input to MT300 (UNIT1) as the reference signal	External or Sync	Sync	Sync	Sync
Using the signal from an external device as the reference signal	External Sync	External Sync	External Sync	External Sync

Using the Signal from an External Device As the Reference Signal On All MT300s

5. Set the following parameters to the same settings on all connected MT300s. For the setting procedure, see the sections indicated in the following table.

Parameter	Refer To
Trigger delay	Section 2.2
Measurement integration time	Section 2.3
Measurement mode (models with the /F1 option)	Section 4.1

Synchronizing Data Storage on All MT300s

5. Set the storage mode to Auto on all connected MT300s. For details on setting the storage mode, see section 5.1.

Explanation

Several MT300s (up to four) can be connected, and the data acquisition and display update timings can be synchronized between the MT300s. Further, data storage can be synchronized.

External Trigger Signal and Sync Signal Input

CAUTION

Only apply signals that meet the specifications below. Excessive voltage or the like may damage the instrument.

French

ATTENTION

Les signaux ne correspondant pas aux spécifications risquent d'endommager cet instrument, à cause de facteurs tels qu'une tension excessive.
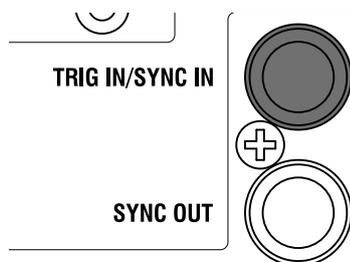
Input Section (TRIG IN/SYNC IN)

Input level: HIGH: 2.5 V or more, LOW: 0.8 V or less
Input range: –0.3 V to 5.5 V
Effective input edge: Falling
Trigger signal pulse width: 10 ms or more

Sync Signal Output

CAUTION

Do not short the SYNC OUT terminal or apply an external voltage to it. If you do, the instrument may malfunction.

2

Setting Measurement Conditions

French

ATTENTION

Ne pas mettre la borne SYNC OUT en court-circuit et ne pas y appliquer une tension externe.
Si vous le faites, l'instrument risque de ne pas fonctionner correctement.
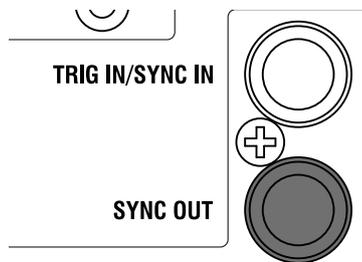
Output Section (SYNC OUT)

Output level: HIGH: 3.5 V or more, LOW: 0.45 V or less
Output range: –0.3 V to 5.5 V

3.1   Using the Relative Value Display (Relative)

Procedure

Setting the Reference Value for Relative Values

1. Press **MENU** to display the top menu.

2. Press the **Measure Config** soft key to display the following menu.

3. Press the **Relative** soft key to display the Relative Mode menu.

| Trigger INT | IntegTime 1500ms | Relative | Digit Mask On Off | Next 1/3 | |

Setting the Relative Value Mode

4. Press the **Mode** soft key to select the relative value mode.

   Meas: The reference value is set to a measured pressure.

   Set: The reference value is set manually.

| Mode Meas Set | Value 0.0000 | | | | |

Entering the Reference Value Manually

If you set the relative value mode to Set, enter the reference value.

5. Press the **Value** soft key to display the following screen.

| Mode Meas Set | Value 0.000 | | | | |

6. Use the arrow (▲, ▼, ◄, and ►) keys to enter the reference value, and press **ENTER**.

| Relative Value | 0. 0000 | |

Displaying Relative Values

Note

In the following situations, relative values cannot be displayed even when you press RELATIVE.
- When the displayed pressure measurement before switching to the relative value display is over-range
- When the MAX/MIN display is on (see section 3.2)
- When the leak test is on (see section 3.4)
- When the statistical processing function is on (see section 3.5)
- When the percentage display or percentage error display is on (see section 3.6)
- When storage is in progress (see section 5.1)

1. Press **RELATIVE**. The RELATIVE key lights, and the screen displays a relative value and reference value.

```
                70.000
                            kPa
   Pressure        100.000
   Reference        30.000
```
— Relative value
— Measured pressure
— Reference value
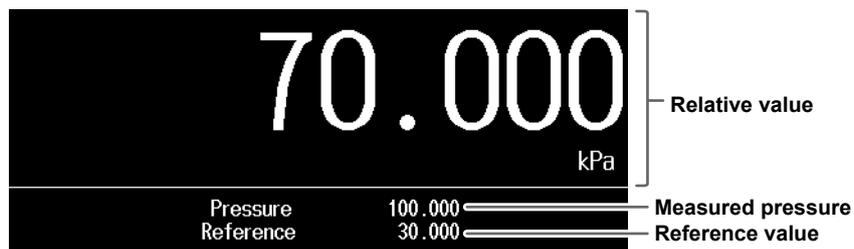
When the DMM function (/DM option) is on, the relative value is displayed above the DMM measurement value.
For instructions on how to turn on the DMM function, see section 4.4.

```
                70.000
                            kPa
           5.0000 v
   Pressure        100.000
   Reference        30.000
```
— Relative value
— DMM measurement value
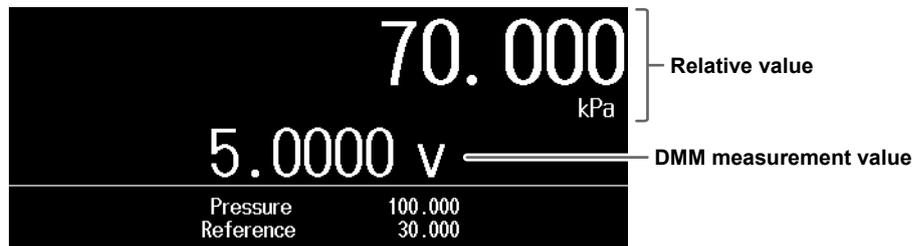
2. To clear the relative value display, press **RELATIVE** again. The RELATIVE key turns off, and the relative value and reference value are cleared from the screen.

Explanation

Relative pressure values can be displayed. Relative values can be determined from the following equation.

Relative value = measured pressure – reference value

Relative Value Mode (Mode)
The reference value is the measured pressure (displayed value) at the time when the RELATIVE key is pressed or a specified value.

Pressure Measurement Reference (Meas)
The reference value is the measured pressure (displayed value) at the time when the RELATIVE key is pressed.

Manually Set Reference (Set)
You can set the reference value to any value of your choice. The setting range and resolution vary depending on the pressure type, range, and unit. The setting range and resolution are the same as the measurement display range and display resolution. For details on the measurement display range and display resolution, see section 6.1 in the Getting Started Guide (IM MT300-02EN).

Relative Value Display
The following items are shown in the relative value display.
* Relative value: Relative value of the pressure.
* Pressure measurement (Pressure): Measured pressure.
* Reference value (Reference): The measured pressure (displayed value) at the time when the RELATIVE key is pressed or a manually specified value.

Note
* If the relative value exceeds the number of displayed digits, "+OverFlow" or "-OverFlow" is displayed.
* The zero calibration value is held regardless of whether the relative value display is on or off.
* When you change the unit (see section 2.1), the unit of the pressure measurement reference and manually set reference also change.

3.2 Displaying the Maximum and Minimum Measured Values

Procedure

Note

In the following situations, maximum and minimum values cannot be displayed even when you press MAX/MIN.

- When the relative value display is on (see section 3.1)
- When the leak test is on (see section 3.4)
- When the statistical processing function is on (see section 3.5)
- When the percentage display or percentage error display is on (see section 3.6)

To display the maximum and minimum voltage or current values, turn the DMM function (/DM option) on in advance. For the procedure, see section 4.4.

1. Press **MAX/MIN**. The MAX/MIN key lights, and the sub screen displays the maximum and minimum values.

On Models with the /DM Option

When the DMM function (/DM option) is on, the maximum and minimum DMM measurement values are displayed in the sub screen.
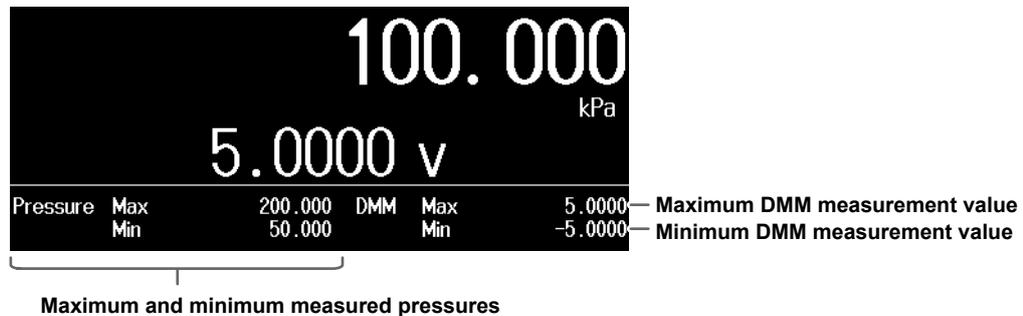
2. To clear the maximum and minimum values, press MAX/MIN again. The MAX/MIN key turns off, and the maximum and minimum values are cleared from the screen.

Explanation

You can display the maximum and minimum pressure measurement values (MAX/MIN display).

Maximum and Minimum Display

The maximum value (Pressure Max) and minimum value (Pressure MIN) of pressure measurement are displayed. When the scaling function is on, the scaled results are displayed.

• When you change the unit (see section 2.1), the unit of the maximum and minimum pressure measurement values also change.

• When the MAX/MIN display is turned off, the maximum and minimum pressure measurement values are initialized.

On Models with the /DM Option

When the DMM function is turned on, the maximum value (DMM max) and minimum value (DMM Min) of the DMM measurements are displayed.

In the following situations, the maximum and minimum DMM measurement values are initialized.

• The DMM function is turned off.

• The range of the DMM function (/DM option) is changed.

3

Pressure Measurement

3.3　Scaling Measured Values

1. Press **MENU** to display the top menu.

2. Press the **Measure Config** soft key and then the **Next** soft key. The following menu appears.

3. Press the **Scaling** soft key to display the Scaling menu.

| Unit kPa | Scaling | Tilt Corr Setting | | Next 2/3 | |

Selecting the Method to Set the Scaling Coefficient A and Offset B (Input)

4. Press the **Input** soft key to select Two or Dir.

   If you select Two, proceed to "Using the 2-Point Mode."
   If you select Dir, proceed to "Using the Direct Input Mode."

| Scaling On Off | Input Two Dir | Two Point Value | Direct Value | Next 1/2 | |

Using the 2-Point Mode (Two Point Value)

5. Press the **Two Point Value** soft key to display the following menu.

| Scaling On Off | Input Two Dir | Two Point Value | Direct Value | Next 1/2 | |

6. Press the **Span Upper** soft key to display the following screen.

| Span Upper | Span Lower | Scale Upper | Scale Lower | | |

7. Use the arrow (▲, ▼, ◀, and ▶) keys to enter the value, and press **ENTER**.

| Span Upper | 10. 0000 | |

8. Like Span Upper, press the **Span Lower**, **Scale Upper**, and **Scale Lower** soft keys, and enter values.

   Scaling coefficient A and offset B are determined from the entered values.

Using the Direct Input Mode (Direct Value)

5. Press the **Direct Value** soft key to display the following menu.

| Scaling On Off | Input Two Dir | Two Point Value | Direct Value | Next 1/2 | |

6. Press the **A Value** soft key to display the following screen.

| A Value | B Value | | | | |

7. Use the arrow (▲, ▼, ◄, and ►) keys to enter the value, and press **ENTER**.

A Value	10. 00000E+00	

8. Like A Value, enter **B Value**.

Setting the User Unit String (Unit String) and Decimal Display Method (Fixed Point)

9. Return to the Scaling menu, and press the **Next** soft key. The next menu appears.

Scaling On Off	Input Two Dir	Two Point Value	Direct Value	Next 1/2	

10. Press the **Unit String** soft key to display the following screen.

Unit String	FixedPoint On Off	FixedPoint Value		Next 2/2	

11. Use the arrow (▲, ▼, ◄, and ►) keys to enter the characters, and then press **ENTER**.
For details on the type of characters that can be entered, see section 3.2 in the Getting Started Guide (IM MT300-02EN).

Unit String		BS	

12. Press the **FixedPoint** soft key to set the decimal display method to On or Off.

On: A fixed decimal point is displayed.

Off: A floating decimal point is displayed.

Unit String	FixedPoint On Off	FixedPoint Value		Next 2/2	

13. Press the **FixedPoint Value** soft key to display the following screen.

Unit String	FixedPoint On Off	FixedPoint Value		Next 2/2	

14. Use the arrow (▲, ▼, ◄, and ►) keys to enter the value, and press **ENTER**.

FixedPoint Value	0	

Turning the Scaling Function On/Off (Scaling)

15. Return to the Scaling menu, and press the **Scaling** soft key to set the scaling function to On or Off.

On: Scaling is enabled.

Off: Scaling is disabled.

Scaling On Off	Input Two Dir	Two Point Value	Direct Value	Next 1/2	

Explanation

Pressure measurements are scaled according to the following equation.

y = Ax + B

x: Value before scaling
y: Value after scaling
A: Scaling coefficient A
B: Offset B

Note
If you change the unit (see section 2.1), set scaling coefficient A and offset B again.

Setting Method (Input)

Scaling coefficient A and offset B can be set using the 2-point mode (Two) or direct input mode (Dir).

2-Point Mode (Two Point 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

$$A = \frac{y_2 - y_1}{x_2 - x_1} \qquad B = \frac{x_2 y_1 - x_1 y_2}{x_2 - x_1}$$
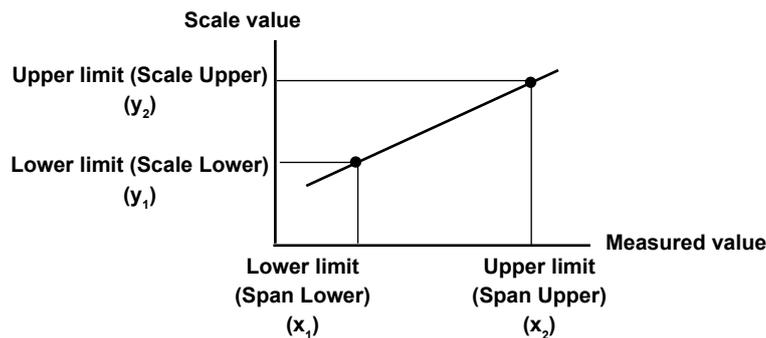
Upper and Lower Span Limits (Span Upper, Span Lower)

Set the upper limit and lower limit before scaling. The setting range and resolution vary depending on the pressure type, range, and unit. The setting range and resolution are the same as the measurement display range and display resolution. For details on the measurement display range and display resolution, see section 6.1 in the Getting Started Guide (IM MT300-02EN).

Upper and Lower Scale Limits (Scale Upper, Scale Lower)

Set the scale value for the upper span limit and that for the lower span limit. The setting range is –9.99999E±24 to +9.99999E±24.

Note
Make sure that the upper span and scale limits are greater than the lower span and scaled limits.

Direct Input Mode (Direct Value)

Enter scaling coefficient A and offset B.

A (A Value)

Set scaling coefficient A. The setting range is −9.99999E±24 to +9.99999E±24.

B (B Value)

Set offset B. The setting range is −9.99999E±24 to +9.99999E±24.

User Unit String (Unit String)

You can set the user unit string as you like. Set the string using 0 to 15 alphanumeric characters.

Decimal Display Method (Fixed Point)

Select whether to display the scaled results using our fixed decimal point or floating decimal point.

Fixed Exponent (Fixed Point Value)

Set the exponent when displaying values using a fixed decimal point. The setting range is −24 to +24.

3.4 Performing Leak Tests

Procedure

Note

In the following situations, the leak test cannot be turned on.
- When the relative value display is on (see section 3.1)
- When the MAX/MIN display is on (see section 3.2)

1. Press **MENU** to display the top menu.

2. Press the **Function** soft key to display the FncMode menu.

3. Press the **FncMode** soft key to display the FunctionMode menu.

FncMode Off					

4. Press the **Leak Test** soft key to display the Leak Test menu.

— Function Mode —				
Off	LeakTest	Statistics	%ERROR	

5. Press the **Time** soft key to display the following screen.

FncMode LeakTest	Time		Start	Stop	

6. Use the arrow (▲, ▼, ◄, and ►) keys to set the leak test time, and press **ENTER**.

LeakTest Time	00: 00: 00	

7. Press the **Start** soft key to start a leak test.

   When the specified leak test time is reached, the leak test automatically stops. You can also stop the leak test by pressing the **Stop** soft key.

FncMode LeakTest	Time		Start	Stop	

During a leak test

On the sub screen, the start pressure value, start time, pressure measurement difference, leak rate, and the elapsed time of the leak test are displayed. The leak rate appears approximately 10 seconds after starting a leak test.

When an over-range or overflow occurs, the Delta and Rate values are displayed as -NA-.

Display item
Start: Start pressure value and start time
Delta: Pressure measurement difference
Rate: Leak rate
Time: Elapsed time of a leak test

After the Leak Test Stops

The stop pressure value and stop time are also displayed on the sub screen.

Leak test result
Stop: Stop pressure value and stop time

3

Pressure Measurement

Explanation

The amount of pressure change per unit time (leak rate) is measured.

Leak Test Time (Time)

Set the measurement time of leak tests. The setting range is 00:00:00 to 23:59:59.

Displayed Items

The following items are displayed on the screen in leak tests.
- Start: Start pressure value and start time. The start pressure value is the measured pressure at the start of a leak test.
- Stop: Stop pressure value and stop time. The stop pressure value is the measured pressure when the leakage test is stopped.
- Delta: Pressure measurement difference. When a leak test is in progress, this is the difference between the measured pressure during the leak test (current pressure value) and the start pressure value. After the leak test stops, this is the difference between the stop pressure value and start pressure value.
  If an over-range or overflow occurs while a leak test is in progress, -NA- is displayed.
- Rate: Leak rate. This indicates the pressure measurement difference per minute. This appears approximately 10 seconds after starting a leak test.
  If an over-range or overflow occurs while a leak test is in progress, -NA- is displayed.

During a leak test

$$\text{Leak rate} = \frac{\text{Start pressure} - \text{current pressure}}{\text{Elapsed time of a leak test (min)}}$$

After the leak test stops

$$\text{Leak rate} = \frac{\text{Start pressure} - \text{stop pressure}}{\text{Leak test period (min)*}}$$

  * The leak test period is the time until the leak test time is reached or until the leak test is manually stopped after it is started.

- Time: Elapsed time of a leak test.

3.5 Performing Statistical Processing (Maximum, Minimum, Average, Standard Deviation)

Procedure

Note

In the following situations, statistical processing cannot be turned on.
- When the relative value display is on (see section 3.1)
- When the MAX/MIN display is on (see section 3.2)

1. Press **MENU** to display the top menu.

2. Press the **Function** soft key to display the FncMode menu.

3. Press the **FncMode** soft key to display the FunctionMode menu.

FncMode					
Off					

4. Press the **Statistics** soft key to display the Statistics menu.

Function Mode					
Off	LeakTest	Statistics	%ERROR		

5. Press the **Start** soft key to start statistical processing.

FncMode					
Statistics			Start	Stop	

Displayed Items While Statistical Processing Is in Progress

When an over-range or overflow occurs, the AVG and σ values are displayed as -NA-.

```
            100.000
                         kPa
```

Max	100.000	AVG		78.000	ERR	0	Time
Min	50.000	σ		17.205	NUM 10000	00:01:00	

FncMode					
Statistics			Start	Stop	

Display item
Max: Maximum value
Min: Minimum value
AVG: Average value
σ: Standard deviation
ERR: The number of error data values
NUM: The number of acquired data values
Time: Elapsed time of statistical processing

6. Pressing the **Stop** soft key stops the statistical processing.

   If the number of statistical processing data values reaches 10000 before the Stop soft key is pressed, statistical processing stops automatically.

Max	100.000	AVG		78.000	ERR	0
Min	50.000	σ		17.205	NUM 10000	

FncMode					
Statistics			Start	Stop	

Statistical processing result

Explanation

Statistical processing (maximum, minimum, average, and standard deviation) is performed on pressure measurements.

Displayed Items

In statistical processing, the following items of pressure measurement are displayed on the screen.

- Max: Maximum value.
- Min: Minimum value.
- AVG: Average value. If an over-range or overflow occurs in pressure measurements while statistical processing is in progress, -NA- is displayed.
- σ: Standard deviation. If pressure measurements result in over-range or overflow while statistical processing is in progress, -NA- is displayed.
- ERR: The number of error data values. This is the number of pressure measurement data values that resulted in over-range or overflow during statistical processing.
- NUM: The number pressure measurements acquired from start to stop.
- Time: Elapsed time of statistical processing. This is displayed only while statistical processing is in progress.

Note

Statistical processing cannot be performed on the measured values of the DMM function.

3.6 Using the Percentage Display and Percentage Error Display of Measurements (/DM Option)

Procedure

Note

In the following situations, percentage display nor percentage error display cannot be turned on.
- When the relative value display is on (see section 3.1)
- When the MAX/MIN display is on (see section 3.2)

To use the percentage error display, turn on the DMM function (/DM option) in advance. For the procedure, see section 4.4.

1. Press **MENU** to display the top menu.

2. Press the **Function** soft key to display the FncMode menu.

3. Press the **FncMode** soft key to display the FunctionMode menu.

FncMode					
Off					

4. Press the **%ERROR** soft key to display the %ERROR menu.

	Function Mode			
Off	LeakTest	Statistics	%ERROR	

Setting the 0% and 100% Values

The 0% and 100% values can be set by entering the values directly or by assigning actual pressure values.

Entering Values

5. Press the **Value 0%** soft key to display the following screen.

FncMode	Value	Value	Auto	Auto	
%ERROR	0%	100%	0%	100%	

6. Use the arrow (▲, ▼, ◄, and ►) keys to enter the value, and press **ENTER**.

Value	
0%	0. 0000

7. Press the **Value 100%** soft key. Enter Value 100% in the same manner as Value 0%.

FncMode	Value	Value	Auto	Auto	
%ERROR	0%	100%	0%	100%	

Assigning Measured Pressure Values

5. When the measured pressure value to assign to 0% is displayed, press the **Auto 0%** soft key.

| FncMode %ERROR | Value 0% | Value 100% | Auto 0% | Auto 100% | |

6. When the measured pressure value to assign to 100% is displayed, press the **Auto 100%** soft key.

| FncMode %ERROR | Value 0% | Value 100% | Auto 0% | Auto 100% | |

Display Screen

The current measured pressure converted into a percentage based on the specified 0% and 100% pressure values is displayed on the sub screen.

100.000
kPa

Pressure   50.00% ———— **Percentage display of the pressure value**

| FncMode %ERROR | Value 0% | Value 100% | Auto 0% | Auto 100% | |
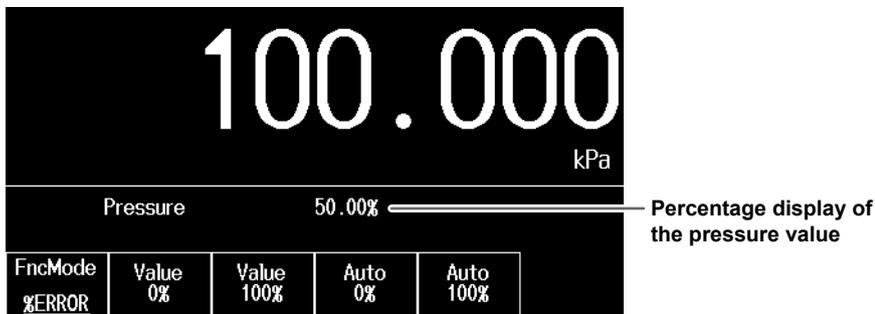
On Models with the /DM Option

The pressure percentage, the voltage (current) percentage, and percentage error are displayed on the sub screen.

100.000
kPa
5.0000 v

| Pressure | 50.00% | | |
| DMM | 100.00% | ERROR | 50.00% |

— **Display item**
Pressure: Percentage display of the pressure value
DMM: Percentage display of the voltage (current)
ERROR: Percentage error display

| Measure Config | ZeroCal | Store Setting | Function %ERROR | Utility | |
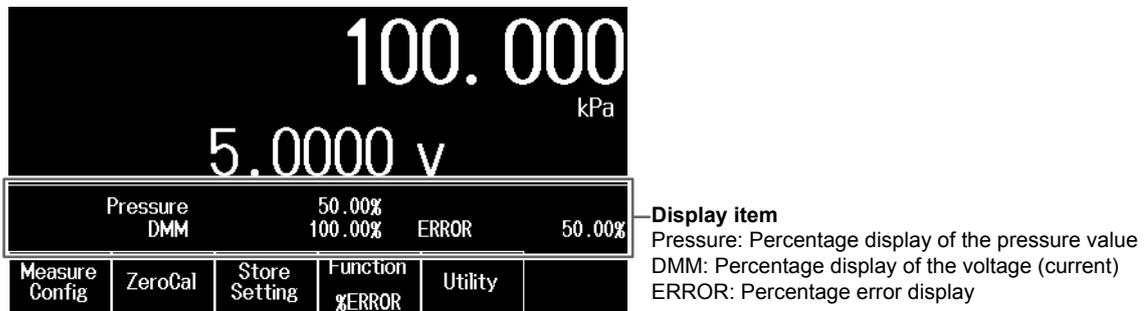
Explanation

How to Set the 0% and 100% Values

The 0% and 100% values can be set by entering the values directly or by assigning actual pressure values.

Entering values (Value 0%, Value 100%)
Set the pressure values to assign to 0% and 100% by entering values.

Assigning Measured Pressure Values (Auto 0%, Auto 100%)
The measured pressure values displayed on the screen are assigned to 0% and 100%.

Displayed Items

The measured value is displayed as a percentage.

Pressure: Percentage display of the pressure value. When pressure values are assigned to 0% and 100%, pressure measurements are displayed as percentages based on those settings. The display range is ±999.99%. When the display range is exceeded, "-OverFlow" or "+OverFlow" is displayed.

Calculation Example of the Percentage Display of Pressure

20 kPa is assigned to 0% and 100 kPa to 100%. If the input pressure is 40 kPa, the percentage display of pressure is 25%.

Percentage display (%) of the pressure value
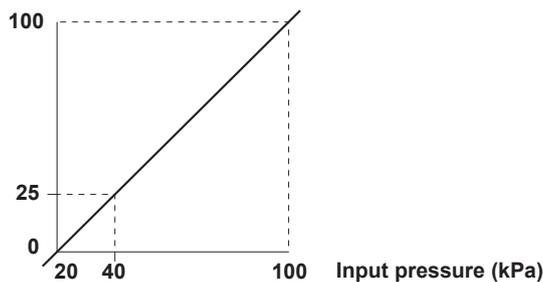
On Models with the /DM Option

The following items are displayed on models with the /DM option.
*   DMM: Percentage display of the voltage (current). The voltage range (1 V to 5 V) or current range (4 mA to 20 mA) is assigned to 0 to 100%, and the voltage (current) is displayed as a percentage. The display range is -25 to 125% (0 to 6 V or 0 to 24 mA). When the display range is exceeded, "-OverRange" or "+OverRange" is displayed.
*   ERROR: Percentage error display. The percentage error display shows (voltage (current) percentage – pressure percentage). This can be used to check the output voltage (current) in relation to the input pressure to the differential pressure or pressure transmitter. The display range is ±999.99%. When the display range is exceeded, "-OverFlow" or "+OverFlow" is displayed.

Calculation Example of Percentage Error Value

20 kPa is assigned to 0% and 100 kPa to 100%. If the input pressure is 40 kPa, the percentage display of pressure is 25%. If the output current from the differential pressure or pressure transmitter is correct, the current percentage display is also 25% (8 mA).

If the input pressure is 40 kPa, when the current is 8 mA, the percentage error value is (25 – 25) = 0%. When the current is 10 mA the percentage error value is (37.5 – 25) = 12.5%.

Percentage display (%) of the pressure value
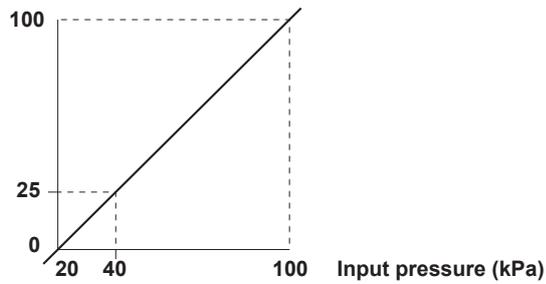
Percentage display (%) of the current value
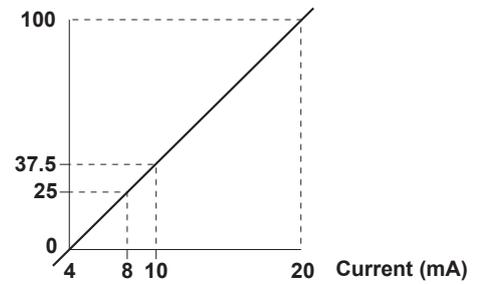
3.7 Correcting for the Tilt (Absolute Pressure Model)

Procedure

Note

This function is valid only for the absolute pressure model.

This function is available on absolute pressure models with factory firmware version 2.02 or later. Absolute pressure models with factory firmware version 1.02 or earlier cannot use this function by simply updating the firmware. For more details, contact your nearest YOKOGAWA dealer.

In the following situations, the tilt alarm and tilt correction cannot be switched on or off.
- When the relative value display is on (see section 3.1)
- When the MAX/MIN display is on (see section 3.2)
- When the scaling is on (see section 3.3)
- When the leak test is on (see section 3.4)
- When the statistical processing function is on (see section 3.5)
- When the percentage display or percentage error display is on (see section 3.6)

In the following situation, tilt alarm cannot be turned on.
- When storage is in progress (see section 5.1)

1. Press **MENU** to display the top menu.

2. Press the **Measure Config** soft key and then the **Next** soft key. The following menu appears.

3. Press the **Tilt Corr Setting** soft key to display the Tilt Correction Setting menu.

Unit kPa	Scaling	Tilt Corr Setting		Next 2/3	

Turning the Tilt Alarm On/Off (Tilt Alarm)

4. Press the **Tilt Alarm On Off** soft key to set the tilt alarm to On or Off.

   On: Tilt alarm is enabled. Proceed to "Correcting for the Tilt."

   Off: Tilt alarm is disabled.

Tilt Alarm On Off	Tilt Corr				

Note

Tilt correction (Tilt Corr) is enabled only when the tilt alarm is on. When the tilt alarm is turned off, tilt correction is turned off (disabled).

Correcting for the Tilt

5. Press the **Tilt Corr** soft key to display the Tilt Correction menu.

   To set the correction value by calculating from the measured pressure values, proceed to "Setting the Correction Value by Calculating from the Measured Pressure Values for Horizontal and Vertical Orientations (H Set/V Set) (V-H Exec)."

   To enter the correction value manually, proceed to "Manually Entering the Correction Value (Value)."

Setting the Correction Value by Calculating from the Measured Pressure Values for Horizontal and Vertical Orientations (H Set/V Set) (V-H Exec)

6. Open the input to the atmosphere, and put the instrument in the horizontal orientation.

Note

When setting the pressure values, note the following:
- Make sure that the bottom and rear feet of the instrument are not damaged.
- Install the instrument on a level and stable surface.
- Open the input to the atmosphere.
- Wait at least 4 seconds after changing the orientation, and then set the pressure values for horizontal and vertical orientations, respectively.

7. Press the **H Set** soft key to assign the currently measured pressure value (displayed value) to the horizontal pressure value (H Set).

Tilt Corr	Value	H Set	V Set	V-H
On Off	0.000	0.000	0.000	Exec

8. Likewise, open the input to the atmosphere, and put the instrument in the vertical orientation.

9. Press the **V Set** soft key to assign the currently measured pressure value (displayed value) to the vertical pressure value (V Set).

Tilt Corr	Value	H Set	V Set	V-H
On Off	0.000	0.000	0.000	Exec

10. Press the **V-H Exec** soft key. The correction amount is calculated from the H Set and V Set settings, and the result is assigned to the correction value (Value) for tilt correction (V-H Exec).
    After setting the correction value, proceed to "Turning the Tilt Correction On/Off (Tilt Corr)."

Tilt Corr	Value	H Set	V Set	V-H
On Off	0.000	0.000	0.000	Exec

Manually Entering the Correction Value (Value)

6. Press the **Value** soft key to display the following screen.

Tilt Corr	Value	H Set	V Set	V-H
On Off	0.000	0.000	0.000	Exec

7. Use the arrow (▲, ▼, ◄, and ►) keys to enter the value, and press **ENTER**. Sets the correction value (Value) for tilt correction.
   After setting the value, proceed to "Turning the Tilt Correction On/Off (Tilt Corr)."

Offset Value	0. 000

Turning the Tilt Correction On/Off (Tilt Corr)

11. Press the **Tilt Corr On Off** soft key to set the tilt correction to On or Off.

    On: Tilt correction is enabled.

    Off: Tilt correction is disabled.

Tilt Corr	Value	H Set	V Set	V-H
On Off	0.000	0.000	0.000	Exec

Note
- When the correction value is set correctly, the measured pressure value when the instrument is in the vertical orientation and tilt correction is on is equivalent to that when the instrument is in the horizontal orientation (tilt correction off).
- To set the correction value again, set tilt correction to off. The correction value cannot be set when tilt correction is on.

Explanation

The tilt correction function corrects for the offset (amount of influence) of measured pressure values when the body of an absolute pressure model is used in a vertical orientation. It also determines the orientation state of the instrument and displays a warning.

Tilt Alarm

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

When the tilt alarm is on, the **T.AL** icon appears at the top of the screen.

| HOLD | INT | T.AL | | 2024/01/24 09:34:00 |

Tilt Correction

The tilt correction on/off setting is enabled only when the tilt alarm is on.

The tilt correction value can be set either by calculating it from the measured pressure values for horizontal and vertical orientations or by entering the value manually.

Note
The zero CAL value is retained regardless of whether tilt correction is turned on or off.

Setting the Correction Value by Calculating from the Measured Pressure Values for Horizontal and Vertical Orientations (H Set/V Set) (V-H Exec)

Set the instrument in the horizontal orientation (reference orientation), and set the pressure value for horizontal orientation (H Set) to the measured pressure value (displayed value). Likewise, set the instrument in the vertical orientation (correction orientation), and set the pressure value for vertical orientation (V Set) to the measured pressure value (displayed value). The values are not set if the measured pressure values are abnormal. Usually, V Set is smaller than H Set.

The correction amount is calculated by subtracting the specified H Set value from V Set, and setting the result as the correction value (Value) for tilt correction (V-H Exec). The value is not set if the result of the calculation is outside the correction amount range. When the correction value setting is applied, H Set and V Set are cleared.

Manually Entering the Correction Value (Value)

Directly enter a numeric value to set the correction value for tilt correction. When the setting is applied, H Set and V Set are cleared.

Note
The setting range and resolution vary depending on the pressure range and unit. The setting range is the same as the negative side of the influence due to instrument's orientation (at 90° forward or backward inclination). The setting resolution is the same as the display resolution. For details on influence due to orientation and display resolution, see section 6.1 in the Getting Started Guide (IM MT300-02EN).

3

Pressure Measurement

Indication according to Tilt Correction Settings and the Orientation State of the Instrument

The result judged from the tilt correction settings (tilt alarm and correction on/off) and the orientation state of the instrument is displayed as a warning by changing the display color of the measured pressure value.

Horizontal to vertical orientation: A vertical orientation is detected when the tilt is about 50° or more.

Vertical to horizontal orientation: A horizontal orientation is detected when the tilt is about 40° or less.

Vertical orientation

Horizontal orientation
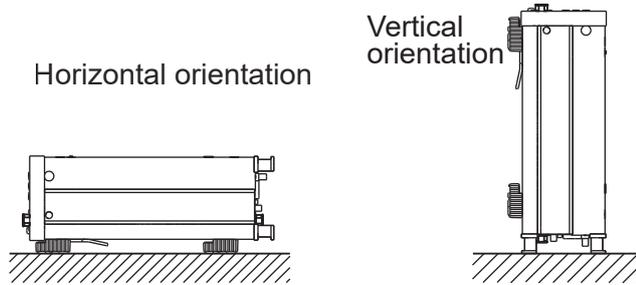
Indication

Blue value indicates that the instrument is installed in the appropriate orientation and that tilt correction is on.

Note

Red value indicates that the combination of the installation orientation and the tilt correction on/off state is inappropriate. Check the installation orientation and the tilt correction setting.

		Vertical Orientation	Horizontal Orientation
Tilt Alarm ON	Tilt Corr ON	T.AL 100.000 kPa Tilt Corr On Off / Value −0.300 / H Set 0.000 / V Set 0.000 / V-H Exec	T.AL 100.300 kPa Tilt Corr On Off / Value −0.300 / H Set 0.000 / V Set 0.000 / V-H Exec
		T.AL 99.700 kPa Tilt Corr On Off / Value −0.300 / H Set 0.000 / V Set 0.000 / V-H Exec	T.AL 100.000 kPa Tilt Corr On Off / Value −0.300 / H Set 0.000 / V Set 0.000 / V-H Exec
Tilt Alarm OFF*	Tilt Corr OFF	99.700 kPa Tilt Alarm On Off / Tilt Corr	100.000 kPa Tilt Alarm On Off / Tilt Corr

*   If Tilt Alarm is off, Tilt Corr is disabled (off).

4.1   Setting the Measurement Mode (/F1 Option)

Procedure

1. Press **MENU** to display the top menu.

2. Press the **Measure Config** soft key, the **Next** soft key, and then the **Next** soft key. The following menu appears.

MeasMode Standard	D/A	Compare	DMM	Next 3/3	

3. Press the **MeasMode** soft key to display the Measure Mode menu.

4. Press the soft key corresponding to the measurement mode (**Measure Mode**) you want to use.

| Measure Mode |||||
| Standard | Middle | Fast | | | |

Explanation

Measurement Mode (Measure Mode)

When you change the measurement mode, the display update interval and measurement integration time change. Select from the following:

Normal Measurement Mode (Standard)

The display update interval is 250 ms.
You can select the measurement integration time. For instructions on how to set the measurement integration time, see section 2.3.

Mid-Speed Measurement Mode (Middle)

The display update interval is 100 ms. The measurement integration time is fixed to 100 ms.

High-Speed Measurement Mode (Fast)

The display update interval is 100 ms. The measurement integration time is fixed to 20 ms.

4

Optional Features

4.2 Transmitting Measured Values through the D/A Output (/DA Option)

Procedure

1. Press **MENU** to display the top menu.

2. Press the **Measure Config** soft key, the **Next** soft key, and then the **Next** soft key. The following menu appears.

3. Press the **D/A** soft key to display the D/A menu.

MeasMode Standard	D/A	Compare	DMM	Next 3/3	

4. Press the **D/A** soft key to set the D/A output to On or Off.

   On: D/A output is enabled.

   Off: D/A output is disabled.

D/A On Off	Range 2V 5V	Dynamic On Off	Scaling		

5. Press the **Range** soft key to select the range.

   2V: 2V range

   5V: 5V range

D/A On Off	Range 2V 5V	Dynamic On Off	Scaling		

6. Press the **Dynamic** soft key to set the dynamic mode to On or Off.

   On: Dynamic mode is enabled.

   Off: Dynamic mode is disabled.

D/A On Off	Range 2V 5V	Dynamic On Off	Scaling		

Note

Dynamic mode appears only on models with the /F1 option.

Selecting the D/A Scaling Setting Method (Input)

7. Press the **Scaling** soft key to display the D/A scaling menu.

D/A On Off	Range 2V 5V	Dynamic On Off	Scaling		

8. Press the **Input** soft key to select Two or Dir.
   If you select Two, proceed to "Using the 2-Point Mode (Two Point Value)."
   If you select Dir, proceed to "Using the Direct Input Mode (Direct Value)."

Scaling On Off	Input Two Dir	Two Point Value	Direct Value		

Using the 2-Point Mode (Two Point Value)

9. Press the **Two Point Value** soft key to display the following menu.

| Scaling On Off | Input Two Dir | Two Point Value | Direct Value | | |

10. Press the **Span Upper** soft key to display the following screen.

| Span Upper | Span Lower | Scale Upper | Scale Lower | | |

11. Use the arrow (▲, ▼, ◄, and ►) keys to enter the value, and press **ENTER**.

| Span Upper | 200. 000 |

12. Like Span Upper, press the **Span Lower**, **Scale Upper**, and **Scale Lower** soft keys, and enter values.

Using the Direct Input Mode (Direct Value)

9. Press the **Direct Value** soft key to display the following menu.

| Scaling On Off | Input Two Dir | Two Point Value | Direct Value | Next 1/2 | |

10. Press the **Gain** soft key to display the following screen.

| A Value | B Value | | | | |

11. Use the arrow (▲, ▼, ◄, and ►) keys to enter the value, and press **ENTER**.

| A Value | 10. 00000E+00 |

12. Like Gain, enter the **Offset**.

Note
Instead of entering a numeric value with **Offset**, pressing **Auto Offset** sets Offset to the currently measured pressure value (displayed value).

Turning the D/A Scaling On/Off (Scaling)

13. Press the **Scaling** soft key to set the D/A scaling to On or Off.

On: D/A scaling is enabled.

Off: D/A scaling is disabled. (D/A output without scaling)

Explanation

D/A Output (D/A)

Measured pressure values are D/A converted into voltages and output.

D/A Output Range (Range)

There are two output ranges: 2V and 5V.
The output voltage is scaled according to the pressure range.

Relationship between the Measured Pressure and Output Voltage (gauge pressure 200 kPa model, D/A scaling OFF)
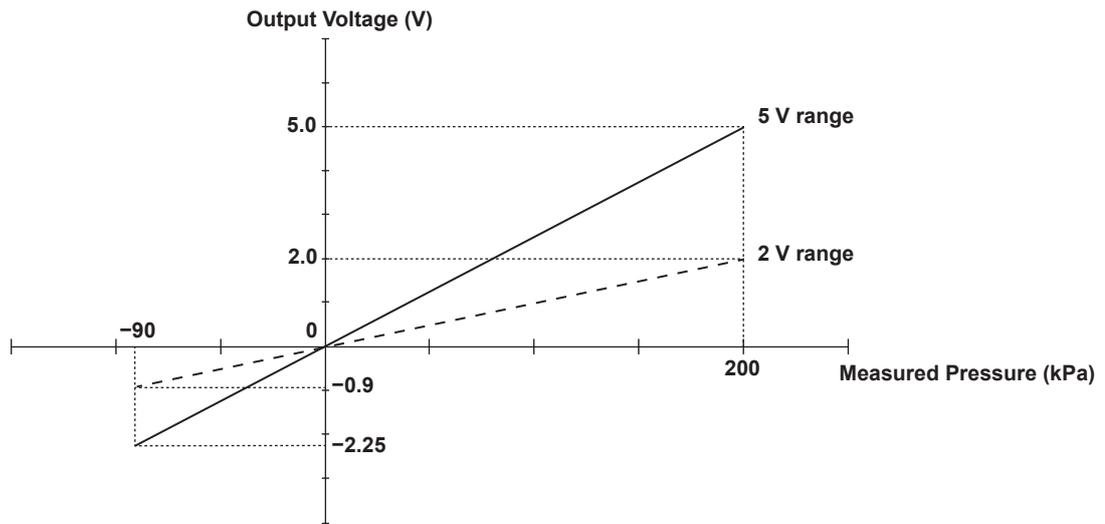
Relationship between Display Updating and Output Voltage

The D/A output update interval varies depending on the measurement mode and dynamic mode settings. For the D/A output specifications, see section 6.3 in the Getting Started Guide (IM MT300-02EN).
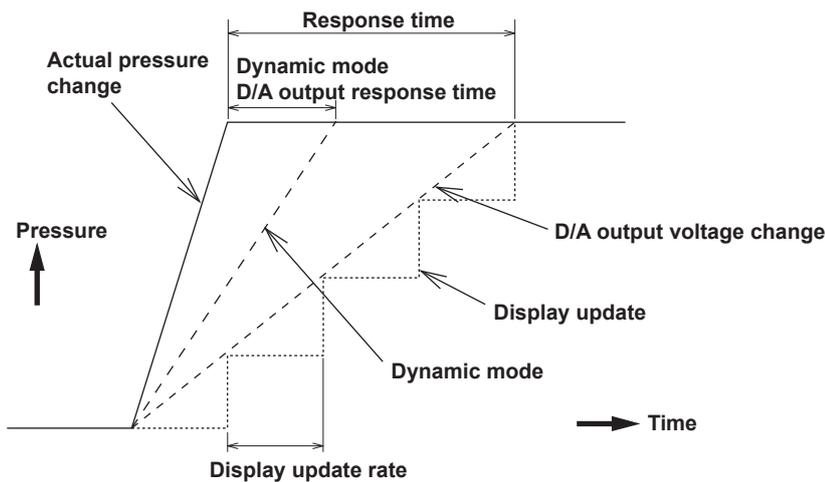
Dynamic Mode (Dynamic)

When dynamic mode is turned on, the D/A output response time and output up the interval can be reduced.
The measurement integration time is set to 2 ms.

D/A Scaling (Scaling)

Any range within the pressure measurement ranges is output in full scale of the D/A output range.

Note

This function is available on models with the /DA option with firmware version 2.02 or later. You can download the latest firmware from the YOKOGAWA website.

D/A Scaling Setting Method (Input)

D/A scaling can be set using the 2-point mode (Two) or direct input mode (Dir).

2-Point Mode (Two Point Value)

Set the upper/lower limits (Span Upper/Span Lower) of the span (pressure measurement value) and the corresponding upper/lower limits (Scale Upper/Scale Lower) of the scale (D/A output value).

The setting range and resolution of the upper and lower span limits depend on the pressure type, range, and suffix code (/R1 option). The setting range and resolution are the same as ±(measurement range) and display resolution, respectively. For details on measurement range and display resolution, see section 6.1 in the Getting Started Guide (IM MT300-02EN).

The setting range of the upper and lower limits of the scale is as follows. The setting resolution is 0.0001 V for all ranges.

2V range: -2.0000 to 2.0000 V
5V range: -5.0000 to 5.0000 V

Note

The unit of upper and lower span limits is fixed to kPa.

Example of 2-Point Mode
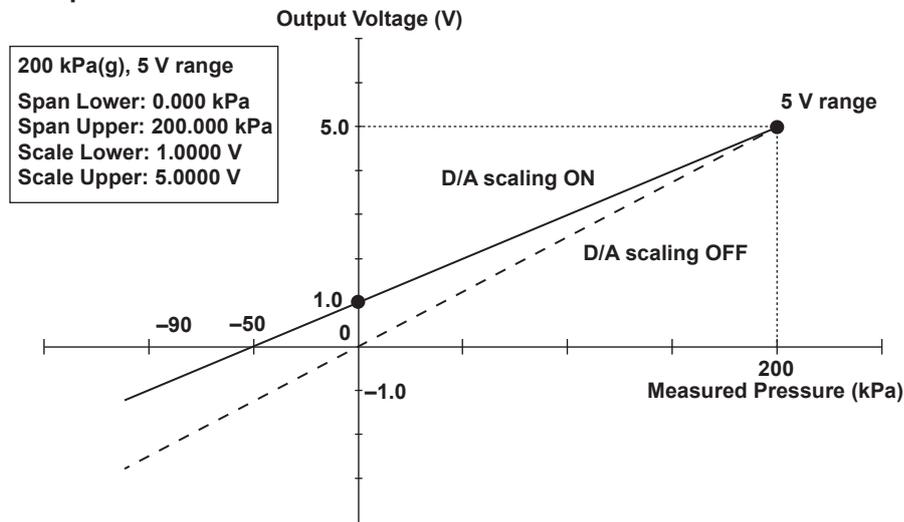
Direct Input Mode (Direct Value)

Set the pressure measurement value gain (Gain) per 1 V D/A output and the pressure measurement value offset (Offset) at 0 V D/A output by direct input. The offset can be set to the currently measured pressure value (displayed value) by using Auto Offset.

The setting range and resolution depend on the pressure type, range, and suffix code (/R1 option). The setting range and resolution are the same as ±(measurement range) and display resolution, respectively. For details on measurement range and display resolution, see section 6.1 in the Getting Started Guide (IM MT300-02EN).

Note

The units of gain and offset are fixed to kPa/V and kPa, respectively.

Example of Direct Input Mode
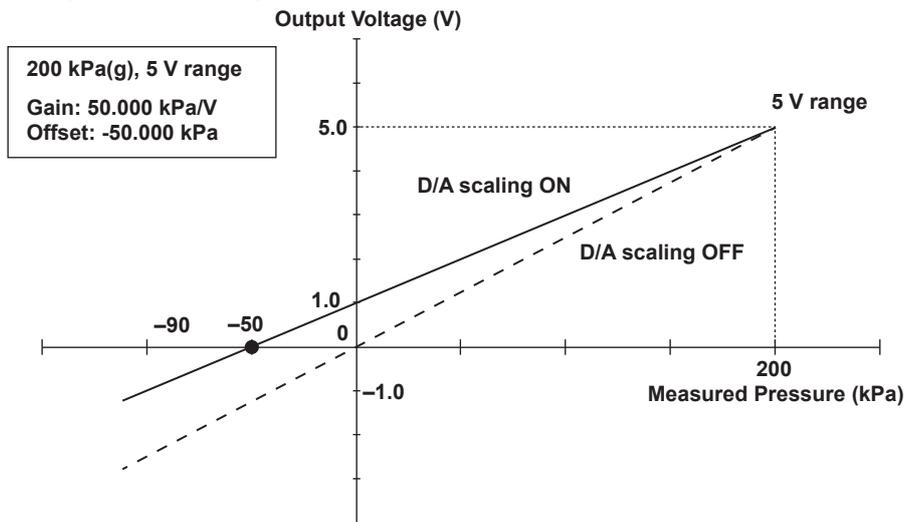
4.3 Using the Comparator Function (/DA option)

Procedure

1. Press **MENU** to display the top menu.

2. Press the **Measure Config** soft key, the **Next** soft key, and then the **Next** soft key. The following menu appears.

3. Press the **Compare** soft key to display the Compare menu.

MeasMode Standard	D/A	Compare	DMM	Next 3/3	

4. Press the **Compare** soft key to set the comparator output to On or Off.

On: The comparator output is enabled.

Off: The comparator output is disabled.

Compare On Off	Upper 200.000	Lower 0.000			

5. Press the **Upper** soft key to display the following screen.

Compare On Off	Upper 200.000	Lower 0.000			

6. Use the arrow (▲, ▼, ◄, and ►) keys to enter the upper limit, and press **ENTER**.

Compare Upper	200. 000	

7. Press the **Lower** soft key. Like Upper, enter the lower limit.

Explanation

Comparator Function (Compare)

The measured pressure value is compared to the specified upper and lower limits, and the judgment result is displayed according to the following table.

The result is also output through the comparator output interface.

State	Judgment result
Measured pressure > Upper limit	HI
Upper limit ≥ Measured pressure ≥ Lower limit	IN
Measured pressure < Lower limit	LO

BUSY Signal Operation

The BUSY signal is set to high level when the COMP signal (HI, IN, LO) is in transition.

When the BUSY is set to low level, the COMP signal is established.

Timing Chart of the BUSY and COMP signals
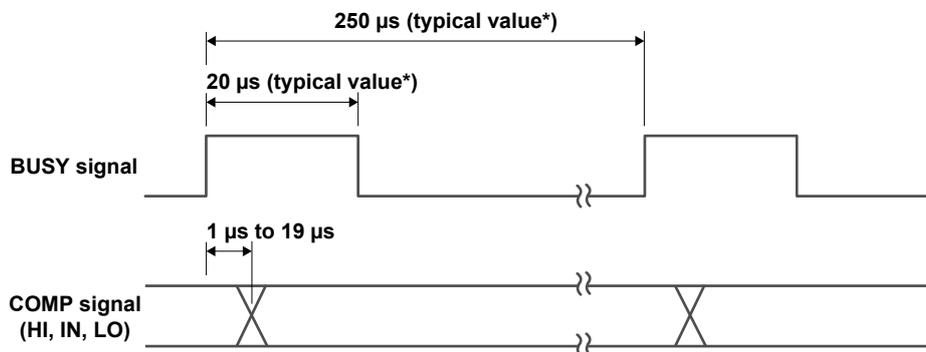
*   Typical value represents a typical or average value. It is not strictly warranted.

Upper Limit (Upper) and Lower Limit (Lower)

Set the upper and lower limits for making comparisons. The setting range is the same as the display range.

Note

- Set the limits so that the upper limit is greater than the lower limit.
- The setting range and resolution vary depending on the pressure type, range, and unit. The setting range and resolution are the same as the measurement display range and display resolution. For details on the measurement display range and display resolution, see section 6.1 in the Getting Started Guide (IM MT300-02EN).

4.4 Measuring Voltage and Current (/DM option)

This section explains the following settings for measuring voltage and current:
• Wiring method
• Instrument configuration

CAUTION

Do not apply voltage or current exceeding the maximum allowable input. If you do, the instrument may malfunction.

French

ATTENTION

Ne pas appliquer de tension ou courant supérieur à la tension d'entrée maximum. Si vous le faites, l'instrument risque de ne pas fonctionner correctement.

Wiring method

Voltage Measurement

The positive side of the signal input terminal is the voltage input terminal (V), and the negative side is the common terminal (COM).
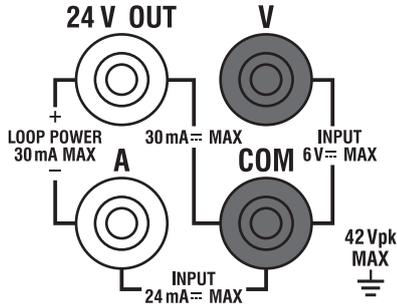
Current Measurement

The positive side of the signal input terminal is the current input terminal (A), and the negative side is the common terminal (COM).

Procedure

Instrument configuration

1. Press **MENU** to display the top menu.

2. Press the **Measure Config** soft key, the **Next** soft key, and then the **Next** soft key. The following menu appears.

3. Press the **DMM** soft key to display the DMM menu.

MeasMode Standard	D/A	Compare	DMM	Next 3/3	

4. Press the **DMM** soft key to set the DMM function to On or Off.

    On: The DMM function is enabled.

    Off: The DMM function is disabled.

DMM On Off	Range 5V 20mA	250Ω On Off	Average On Off		

5. Press the **Range** soft key to select the range.

    5V: DC voltage is measured.

    20mA: DC current is measured.

DMM On Off	Range 5V 20mA	250Ω On Off	Average On Off		

6. Press the **Average** soft key to set averaging to On or Off.

    On: Averaging is enabled.

    Off: Averaging is disabled.

DMM On Off	Range 5V 20mA	250Ω On Off	Average On Off		

Explanation

DMM Function (DMM)

The DMM function measures voltage or current. The measured results (DMM measurement values) are displayed on the screen.

Voltage Measurement

DC voltages in the range of 0 to ±5.25 V can be measured.
Set the measurement range to 5V, and turn the DMM function on.

Current Measurement

DC currents in the range of 0 to ±21 mA can be measured.
Set the measurement range to 20mA, and turn the DMM function on.

Measurement Range (Range)

Set the measurement range to 5V or 20mA.

5V: DC voltages in the range of 0 to ±5.25 V can be measured.
        The display range is –6.0000 V to + 6.0000 V.

20mA: DC currents in the range of 0 to ±21 mA can be measured.
        The display range is –24.000 mA to + 24.000 mA.

Note

When the value is outside the display range, "-OverRange" or "+OverRange" is displayed.

Averaging (Average)

A moving average is taken over the DMM measurement values. The moving average count and time depend on this instrument's measurement mode and measurement integration time and are automatically set to the values shown in the following table.

Measurement mode	Measurement integration time	Moving average count	Moving average time
Standard	250 ms	1 times	Approx. 300 ms
	1500 ms	5 times	Approx. 1500 ms
	2500 ms	8 times	Approx. 2400 ms
	4000 ms	13 times	Approx. 3900 ms
Middle[1]	100 ms[2]	1 times	Approx. 300 ms
Fast[1]	20 ms[2]	1 times	Approx. 300 ms

1 This is available on models with the /F1 option.

2 If you set the measurement mode to mid-speed or high-speed, the measurement integration time is fixed.

4

Optional Features

4.5 Performing Loop Current Measurements (/DM option)

This section explains the following settings for measuring current that flows when a 24 VDC constant voltage is output.
- Wiring method
- Instrument configuration

CAUTION

- Do not apply voltage or current exceeding the maximum allowable input. If you do, the instrument may malfunction.
- Do not short or apply an external voltage to the 24 VDC output terminal. If you do, the instrument may malfunction.
- If this instrument is run continuously off of the battery pack with the load current through the 24 VDC output exceeding 20 mA, the battery pack consumption will increase, which will reduce the instrument running time.

French

ATTENTION

- Ne pas appliquer de tension ou courant supérieur à la tension d'entrée maximum. Si vous le faites, l'instrument risque de ne pas fonctionner correctement.
- Ne pas court-circuiter ou appliquer une tension externe à la borne de sortie de 24 VDC. Si vous le faites, l'instrument risque de ne pas fonctionner correctement.
- Si cet instrument fonctionne en continu hors du pack de batteries avec un courant de charge sur la sortie de 24 VDC supérieur à 20 mA, la consommation du pack de batteries augmente, ce qui réduit le temps de fonctionnement de l'instrument.

Wiring method

The positive side of the signal input terminal is the 24 VDC output terminal (24 V OUT) and the negative side is the current input terminal (A).

Procedure

Instrument configuration

1. Press **MENU** to display the top menu.

2. Press the **Measure Config** soft key, the **Next** soft key, and then the **Next** soft key. The following menu appears.

3. Press the **DMM** soft key to display the DMM menu.

MeasMode Standard	D/A	Compare	DMM	Next 3/3	

4. Press the **DMM** soft key to set the DMM function to On or Off.

    On: The DMM function is enabled.

    Off: The DMM function is disabled.

DMM On Off	Range 5V 20mA	250Ω On Off	Average On Off		

5. Press the **Range** soft key to select 20mA.

DMM On Off	Range 5V 20mA	250Ω On Off	Average On Off		

6. Press the **250Ω** soft key to set the communication resistor to On or Off.

    On: The communication resistor is enabled.

    Off: The communication resistor is disabled.

DMM On Off	Range 5V 20mA	250Ω On Off	Average On Off		

7. Press the **Average** soft key to set averaging to On or Off.

    On: Averaging is enabled.

    Off: Averaging is disabled.

DMM On Off	Range 5V 20mA	250Ω On Off	Average On Off		

Outputting 24 VDC

8. Press **ON/OFF**. 24 VDC is output, and the ON/OFF key lights.

    The current value is displayed on the screen.

    To stop the 24 VDC output, press **ON/OFF** again.

    The 24 VDC output stops, and the ON/OFF key turns off.

4

Optional Features

Explanation

Loop Current Measurement

The instrument measures current while outputting 24 VDC across the measurement terminals. This can be used in differential pressure and pressure transmitter loop tests.

DC currents in the range of 0 to +21 mA are measured. The display range is –24.000 mA to + 24.000 mA.

When 24 V OUT is turned on, 24 VDC is output across the current input terminal (A) and the 24 VDC output terminal (24 V OUT). For details on the measurement range (Range) and averaging (Average), see section 4.4.

Communication Resistor (250 Ω)

This instrument has an built-in communication resistor.

When you turn on the communication resistor, you do not have to connect an external resister when making loop current measurements.

24 VDC Output

A 24 VDC voltage is output across the signal input terminals.

Note

If an overcurrent is detected while 24 VDC is being output, the ON/OFF key blinks, and the 24 VDC output is turned off. When you press ON/OFF, the ON/OFF key turns off.

Remove the cause of the overcurrent, and then press the key again.

5.1   Storing (Saving) Data

Procedure

> *Note*
>
> In the following situations, data cannot be stored even when you press STORE or START/STOP.
> - When the relative value display is on (see section 3.1)
> - When the MAX/MIN display is on (see section 3.2)
> - When the leak test is on (see section 3.4)
> - When the statistical processing function is on (see section 3.5)
> - When the percentage display or percentage error display is on (see section 3.6)
> - When the tilt alarm is on (see section 3.7)

Setting the Storage Mode

1. Press **MENU** to display the top menu.

2. Press the **Store Setting** soft key to display the following menu.

3. Press the **Mode** soft key to set the storage mode to Man or Auto.

   Man: Data is stored manually.

   Auto: Data is stored automatically.

Mode Auto **Man**	Period 1s	Count 50	Update PCList	Next 1/2	

   If you select Man, proceed to "Manual Storage." If You Select Auto, proceed to "Auto Storage."

Manual Storage

4. Press **START/STOP**. The START/STOP key lights, and storage is enabled.

5. Press **STORE**. The STORE key lights, and measured data is stored once.
   When the storage of the measured data is completed, the STORE key turns off. Measured data is stored each time you press STORE.

6. Press **START/STOP**. The START/STOP key turns off, and storage is disabled.

Auto Storage

If the trigger mode is set to external trigger or sync trigger, proceed to step 6.
If the trigger mode is set to internal trigger, set the data storage interval.
For details on the trigger mode, see section 2.2.

4. Press the **Period** soft key to display the Store Period menu.

Mode **Auto** Man	Period 1s	Count 50	Update PCList	Next 1/2	

5. Press the soft key corresponding to the storage interval (**Store Period**) you want to use. Press the **Next** soft key to select other storage intervals.

Store Period				Next 1/3	
250ms	0.5s	**1s**	2s		

6. Press the **Count** soft key to display the following screen.

| Mode
Auto Man | Period
1s | Count
50 | Update
PCList | Next
1/2 | |

7. Use the arrow (▲, ▼, ◄, and ►) keys to enter the storage interval, and press **ENTER**.

| Store
Count | 5**0** | |

8. Press **START/STOP**. The START/STOP key lights, and storage starts.

    When the specified storage count is reached, the START/STOP key turns off, and storage ends.
    The abort storage, press **START/STOP**. The START/STOP key turns off, and storage is aborted.

Note

Storage data is saved in the RAM backed up by a battery in the instrument. Note that if the internal battery dies, storage data cannot be saved.

Displaying the Internal Storage Usage

1. Press **MENU** to display the top menu.

2. Press the **Store Setting** soft key and then the **Next** soft key. The following menu appears.

3. Press the **Storage Info** soft key to display the STORE storage information screen.

| Property | Data
View | Storage
Info | Delete | Next
2/2 | |

4. Press **ESC** to return to the previous screen.

```
- STORE storage information


FILE        :    10 of   200 Used
DATA        :  1000 of 30000 Used
```

The number of stored files
Maximum number of files

Total number of data values
The total number of occupied data values stored in the internal storage

Note

The unit storage block of storage data is 150 data values. The following table shows the number of occupied data values according to the number of storage entries. Depending on the settings, the number data values that can be stored may be less than 30000.

Number of storage entries	Number of occupied data values		Internal storage (30000 data values)	Number of data values
1	150			1
50	150	Unit storage block (150 data values)		150
150	150			300
151	300			450
200	300			600
300	300			•
•	•			•
•	•			•
•	•			

Selecting the CSV File Format

When data is saved using manual storage or auto storage, a CSV file is automatically created. You can set the CSV file format.

1. Press **MENU** to display the top menu.

2. Press the **Utility** soft key and then the **Next** soft key. The following menu appears.

3. Press the **CSV Setting** soft key to display the following menu.

Beep On Off	CSV Setting	Overview	Time Adjust	Next 2/3	

4. Press the **Dec Point** soft key to select the decimal point symbol.

.: The decimal point symbol is set to a period.

, : The decimal point symbol is set to a comma.

			Dec Point . ,	Separate , ;	

5. Press the **Separate** soft key to select the CSV file separator.

,: The CSV file separator is set to a comma.

;: The CSV file separator is set to a semicolon.

			Dec Point . ,	Separate , ;	

5

Storing (Saving), Displaying, and Deleting Data

Explanation

The following items are stored (saved) in the internal storage of the instrument.
- The instrument settings in use when the data is stored
- Measured pressure[1]
- Measured pressure state[2]
- Measured voltage/current[3]
- Measured voltage/current state[2, 3]

1 Scaling factor A and offset B are not included in stored pressure measurements.
2 The measured value state (normal, over-range, overflow, no data) is stored. This is saved in a CSV file. You cannot view it on this instrument.
3 This is displayed when the DMM function is set to on during a measurement on models with the /DM option.

Storage Mode (Mode)

Manual Storage (Man)

A measured value is stored each time you press **STORE**. Or, data is stored when the instrument receives a manual storage command.
When the hold function is on, the displayed value is stored.

Auto Storage (Auto)

Measured values are stored according to the specified interval and count.
The timing at which data is stored varies depending on the trigger mode.

Internal trigger: Data is stored at the specified storage interval.

External trigger: Data is stored when a trigger is received and the measurement integration time elapses.

Sync trigger: The pressure value is acquired immediately after a trigger is received, and the data is stored.

When the hold function is on, the measured value is stored.

Storage Interval (Period)

This is the data storage interval when the storage mode is set to Auto and the trigger mode is set to internal trigger.
When the display update rate is 0.1 s: 0.10 s, 0.5 s, 1 s, 2 s, 5 s, 10 s, 30 s, 60 s, 2 min, 5 min
When the display update rate is 0.25 s: 0.25 s, 0.5 s, 1 s, 2 s, 5 s, 10 s, 30 s, 60 s, 2 min, 5 min

Storage Count (Count)

This is the number of times to store data. You can select a value between 1 and 10000.

Internal Storage Usage (Storage Info)

The number of files stored in the internal storage and the total number of occupied data values are displayed.
The maximum number of files and total number data values that can be stored in the internal storage are as follows:
Maximum number of files: 200
Total number of data values: 30000

CSV File Format (CSV Setting)

The following format combinations are available.
- The decimal point is a period, and the separator is a comma.
- The decimal point is a comma, and the separator is a semicolon.

For instructions on how to view CSV files, see section 5.4.

Procedure

Displaying the File List

1. Press **MENU** to display the top menu.

2. Press the **Store Setting** soft key to display the file list.

3. Use the arrow (▲ and ▼) keys to select the file ID to display.

Date and time when the data was stored

File ID   Storage count

FILE ID	STORE DATE	STORE COUNT
11	2019/06/07 14:11:00	16
10	2019/06/07 14:10:00	20
9	2019/06/07 14:09:00	30
8	2019/06/07 14:08:00	50
7	2019/06/07 14:07:00	40
6	2019/06/07 14:06:00	12
5	2019/06/07 14:05:00	21
4	2019/06/07 14:04:00	31
3	2019/06/07 14:03:00	232
2	2019/06/07 14:02:00	12
1	2019/06/07 14:01:00	22

File list

Mode Auto Man	Period 1s	Count 50	Update PCList	Next 1/2

4. Press the **Next** soft key to display the next menu.

Mode Auto Man	Period 1s	Count 50	Update PCList	Next 1/2

Displaying Properties

5. Press the **Property** soft key to display properties.

Property	Data View	Storage Info	Delete	Next 2/2

6. Press **ESC** to return to the previous screen.

FILE ID : 10 Property ————————————————— File ID

MEASURE CONFIG : ————————————————— Measurement conditions
 TRIGGER MODE(Internal)
 INTEGRATION TIME(250ms)

STORE CONFIG : ————————————————— Storage Conditions
 STORE MODE(AUTO)

5

Storing (Saving), Displaying, and Deleting Data

Displaying Measured Data

5. Press the **Data View** soft key to display the data in the selected file.

Property	Data View	Storage Info	Delete	Next 2/2	

6. Use the arrow (▲ and ▼) keys to scroll.

Data number   **Date and time when the data was stored**   **Measured pressure**

DATA NO.	STORE DATE	Pressure (kPa)
1	2019/06/07 14:00:00	0.0000
2	2019/06/07 14:00:01	1.0000
3	2019/06/07 14:00:02	2.0000
4	2019/06/07 14:00:03	3.0000
5	2019/06/07 14:00:04	4.0000
6	2019/06/07 14:00:05	+OverRange
7	2019/06/07 14:00:06	6.0000
8	2019/06/07 14:00:07	7.0000
9	2019/06/07 14:00:08	8.0000
10	2019/06/07 14:00:09	9.0000
11	2019/06/07 14:00:10	10.0000
12	2019/06/07 14:00:11	-OverRange
13	2019/06/07 14:00:12	12.0000

When the DMM Is On (/DM option)

The DMM measurement values displayed.

DMM measurement value

DATA NO.	STORE DATE	Pressure (kPa)	DMM (V)
1	2019/06/07 14:00:00	0.0000	-OverRange
2	2019/06/07 14:00:01	1.0000	0.100
3	2019/06/07 14:00:02	2.0000	---------
4	2019/06/07 14:00:03	3.0000	0.300
5	2019/06/07 14:00:04	4.0000	0.400
6	2019/06/07 14:00:05	+OverRange	0.500
7	2019/06/07 14:00:06	6.0000	0.600
8	2019/06/07 14:00:07	7.0000	0.700
9	2019/06/07 14:00:08	8.0000	0.500
10	2019/06/07 14:00:09	9.0000	+OverRange
11	2019/06/07 14:00:10	10.0000	0.700
12	2019/06/07 14:00:11	-OverRange	0.700
13	2019/06/07 14:00:12	12.0000	0.700

7. Press **ESC** to return to the previous screen.

Explanation

You can display the properties and measured data in the files saved to the internal storage of the instrument.

File List

This is a list of files saved in the internal storage of the instrument.

Properties (Property)

The following settings that were used when the file was saved are displayed.

File ID

This is a number for identifying the file.

Measurement Conditions

Trigger mode, measurement integration time, measurement mode,[1] measurement range,[2] communication resistor (250 Ω) ON/OFF,[2] averaging ON/OFF[2]

Storage Conditions

Storage mode

1 Displayed on models with the /F1 option.
2 Displayed on models with the /DM option when the DMM function is set to on during measurement.

Measured Data Display (Data View)

The data number, the date and time when the data was stored, the measured pressure, and the DMM measurement value[*] are displayed.

* Displayed on models with the /DM option when the DMM function is set to on during measurement.

Note

Up to 260 data values from the beginning can be viewed using Data View.

5

Storing (Saving), Displaying, and Deleting Data

5.3 Deleting Files

The following is a procedure for deleting the files saved in the internal storage of the instrument.

1. Press **MENU** to display the top menu.

2. Press the **Store Setting** soft key to display the file list.

3. Use the arrow (▲ and ▼) keys to select the file ID to delete.

4. Press the **Next** soft key to display the next menu.

5. Press the **Delete** soft key to display the following screen.

6. Press the **Exec** soft key to delete the file.

If you press **ESC**, the file is not deleted, and the screen returns to the file list.

5.4 Copying CSV Files to a PC

Procedure

1. Connect this instrument to a PC. For the connection procedure, see section 9.2.
2. Set the USB function (USB Function) to Storage. For the setup procedure, see section 9.3.

Updating the List of CSV Files Displayed on the PC

3. Press **MENU** to display the top menu.
4. Press the **Store Setting** soft key to display the following menu.
5. Press the **Update PCList** soft key to update the list of CSV files displayed on the PC.

Mode Auto Man	Period 1s	Count 50	Update PCList	Next 1/2	

Copying CSV Files to a PC

6. On the list of CSV files on the PC, click the appropriate CSV file and copy it.

Explanation

CSV files can be copied to the PC through the USB mass storage function.

Updating the List of CSV Files (Update PC List)

The list of CSV files displayed on the PC can be updated.

File Name

The file name is "date and time when saving was started"_"file ID".csv.

Example: 2019_1001_171158_001.csv
→ Data saved starting at 17 hours 11 minutes 58 seconds on October 1, 2019 with the file ID at 1

Note

CSV files are stored in the data folder shown on the PC.

6.1 Displaying the Zero Calibration History

Procedure

Gauge Pressure/Differential Pressure Model

1. Press **MENU** to display the top menu.

2. Press the **Zero Cal** soft key to display the Zero Cal menu.

3. Press the **History** soft key to display the zero calibration history.

History			Initialize Exec	Exec	

4. Press **ESC** to return to the previous screen.

DATE	VALUE(kPa)	METHOD
2019/02/07 14:00:00	0.1300	Exec
2019/03/09 14:01:00	0.2000	Initialize
2019/04/11 14:02:00	0.1500	Exec
2019/05/13 14:03:00	0.1300	Exec
2019/06/15 14:04:00	0.1800	Exec
2019/07/17 14:05:00	0.3000	Initialize
2019/08/19 14:06:00	0.1900	Exec

History			Initialize Exec	Exec	

Absolute Pressure Model

1. Press **ZERO CAL** to display the Zero Cal menu.

   You can also display the menu by pressing **MENU** and then the **Zero Cal** soft key.

2. Press the **History** soft key to display the zero calibration history.

History			Exec Value	Exec	

3. Press **ESC** to return to the previous screen.

DATE	INPUT(kPa)	VALUE(kPa)	METHOD
2019/02/07 14:00:00	0.0000	0.1300	Exec
2019/03/09 14:01:00	0.1000	0.2000	Exec(V)
2019/04/11 14:02:00	0.0000	0.1500	Exec
2019/05/13 14:03:00	0.0000	0.1300	Exec
2019/06/15 14:04:00	0.0000	0.1800	Exec
2019/07/17 14:05:00	0.2300	0.3000	Exec(V)
2019/08/19 14:06:00	0.0000	0.1900	Exec

History			Exec Value	Exec	

6

Other Features

Explanation

History (History)

The zero calibration (zero CAL) history is displayed.

The following items are saved: date and time, input reference (absolute pressure models only), zero calibration value, and method.

Date and Time (DATE)

This is the date and time when zero calibration was executed or the zero calibration value was initialized.

Input Reference (INPUT)

This is displayed on the absolute pressure model. The unit is kPa.

This is the input reference that was used when an absolute pressure zero calibration (with offset) was executed. This is set to 0 kPa when an absolute pressure zero calibration is executed.

Zero Calibration Value (VALUE)

This is the amount of correction that was applied when a zero calibration was executed. The unit is kPa.

Gauge Pressure/Differential Pressure Model

This is set to the measured value when a zero calibration was executed or the measured value when a communication command was received. This is set to 0 kPa when zero calibration is initialized.

Absolute Pressure Model

This is set to the measured value when an absolute pressure zero calibration was executed. This is set to the difference between the measured value when the Exec Value soft key was pressed and the input reference if an absolute pressured zero calibration (with offset) is executed.

Method (METHOD)

The following is displayed depending on the method in which a zero calibration was executed.

Gauge Pressure/Differential Pressure Model

Exec: A zero calibration was executed.
Initialize: The zero calibration value was initialized.

Absolute Pressure Model

Exec: An absolute pressure zero calibration was executed.
Exec (V): An absolute pressure zero calibration (with offset) was executed.

Note

The maximum number of history entries that can be saved is 10. If this number is exceeded, the oldest history entry is overwritten with the latest entry.

6.2　Setting the Screen Brightness and Displaying Range Information

Procedure

Setting the Screen Brightness

1. Press **MENU** to display the top menu.

2. Press the **Utility** soft key to display the following menu.

3. Press the **Display** soft key.

| Remote I/F | Display | Error Log | Initialize | Next 1/3 | |

4. Press the **Bright** soft key to display the Brightness menu.

| Bright 3 | RngInfo On Off | RngColor BLACK | | | |

5. Press the soft key corresponding to the brightness (**Brightness**) you want to select.
You can set the brightness level in the range of 1 (darkest) to 5 (brightest).

Brightness				
1	2	3	4	5

Displaying Range Information

1. Press **MENU** to display the top menu.

2. Press the **Utility** soft key to display the following menu.

3. Press the **Display** soft key.

| Remote I/F | Display | Error Log | Initialize | Next 1/3 | |

4. Press the **RngInfo** soft key to set the range information display to On or Off.

On: Range information is displayed.

Off: Range information is not displayed.

| Bright 3 | RngInfo On Off | RngColor BLACK | | | |

5. Press the **RngColor** soft key to display the Range Information Color menu.

| Bright 3 | RngInfo On Off | RngColor BLACK | | | 200kPa GAUGE |

6. Press the soft key corresponding to the color (**Range Information Color**) you want to set.
Press the **Next** soft key to select other colors. You can select from eight colors.

Range Information Color				Next 1/2	200kPa GAUGE
BLACK	RED	GREEN	BLUE		

Other Features

6.3 Setting the Beep Sound

Procedure

1. Press **MENU** to display the top menu.

2. Press the **Utility** soft key and then the **Next** soft key. The following menu appears.

3. Press the **Beep** soft key to set the beep sound to On or Off.

On: Beep sound is enabled.

Off: Beep sound is disabled.

Beep On Off	CSV Setting	Overview	Time Adjust	Next 2/3	

Explanation

You can turn the beep sound on or off for the following notifications. You cannot change the volume.

- When an error is detected during a self-test executed at power-on or executed manually (error codes:* 920 to 959)
- When you press a key

* For details on the error codes, see section 5.2 in the Getting Started Guide (IM MT300-02EN).

6.4   Changing the Error Message Language

Procedure

1. Press **MENU** to display the top menu.

2. Press the **Utility** soft key, the **Next** soft key, and then the **Next** soft key. The following menu appears.

3. Press the **Language** soft key to display the Language menu.

Language English	Mainte nance			Next 3/3	

4. Press the soft key corresponding to the language (**Language**) you want to use.

Language					
English	Japanese	Chinese	Korean		

Explanation

You can set the error message language to English, Japanese, Chinese, or Korean.

Note

- The language is applicable only to error messages.
- Communication commands are displayed using ASCII codes.

6.5 Holding the Displayed Value

Procedure

1. With the measured value displayed, press **HOLD**.

The HOLD key lights, the word "HOLD" is displayed on the screen, and the measured value is held.

Displayed only while the measure value is held.

2. To release the hold, press **HOLD** again.

The HOLD key turns off, and the displayed value is updated.

Explanation

When you press HOLD, the measured pressure, the DMM measurement values (/DM option), and the measured values displayed on the sub screen are held.

Note

While the screen is held, zero calibration cannot be executed.

6.6 Locking the Keys (Key lock)

Procedure

1. Press **KEY LOCK** to display the Key Lock Mode menu.

2. Press the soft key corresponding to the mode (**Key Lock Mode**) you want to use.

```
Key Lock Mode
Off    Z.Lock   K.Lock
```

If you press the **Z. Lock** or **K. Lock** soft key, the word "Z. LOCK " or "K. LOCK" is displayed on the screen.

Displayed when Z. LOCK is in use
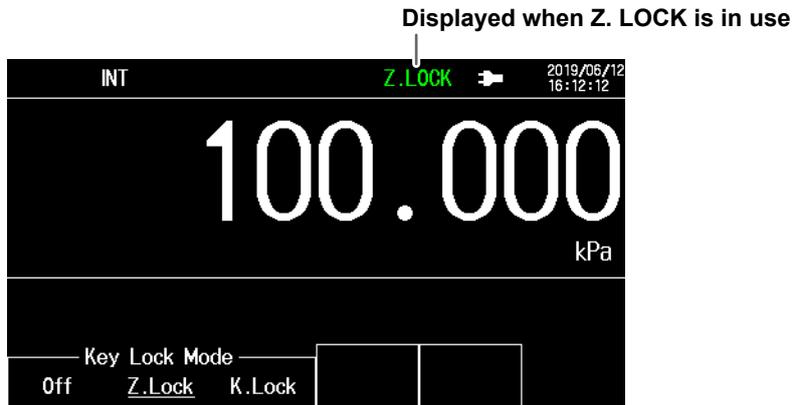
3. To release the key lock, press **KEY LOCK** again and then the **Off** soft key.

Explanation

You can set whether to lock the keys.

Off: Keys are not locked.

Z. Lock: Only the ZERO CAL key is locked.

K. Lock: All keys are locked except KEY LOCK.

Note
- During a remote connection, all keys are locked except LOCAL.
- When Local Lockout is in effect, all keys are locked.

Other Features

7.1   GP-IB Interface Features and Specifications

GP-IB Interface Features

Reception Feature
*   With the exception of turning the power switch on and off, you can use the reception feature to specify the same settings that you specify by using the front panel keys.
*   The instrument can receive output requests for measured data, settings, and error codes.

Transmission Feature
*   Measured values can be output.
*   Settings and status byte can be output.
*   Errors can be output when they occur.

Note
Listen-only, talk-only, and controller capabilities are not available.

GP-IB Interface Specifications

Item	Specifications
Supported devices	National Instruments • PCI-GPIB and PCI-GPIB+ • PCIe-GPIB and PCIe-GPIB+ • GPIB-USB-HS and GPIB-USB-HS + Driver NI-488.2M Version 2.8.1 and later
Electrical and mechanical	Complies with IEEE St'd 488-1978
Functional specifications	See the table below.
Protocol	Complies with IEEE St'd 488.2-1992
Code	ISO (ASCII) codes
Mode	Addressable mode
Address	The address can be set in the range of 0 to 30.
Clear remote mode	Press ESC (LOCAL) to clear remote mode. This is not possible when local lockout has been activated by the controller.

Functional Specifications

Function	Subset Name	Description
Source handshaking	SH1	Full source handshaking capability
Acceptor handshaking	AH1	Full acceptor handshaking capability
Talker	T6	Basic talker capability, serial polling, and untalk on MLA (My Listen Address). No talk-only capability.
Listener	L4	Basic listener capability and unlisten on MTA (My Talk Address). No listen-only capability
Service request	SR1	Full service request capability
Remote local	RL1	Full remote/local capability
Parallel polling	PP0	No parallel polling capability
Device clear	DC1	Full device clear capability
Device trigger	DT1	Full device trigger capability
Controller	C0	No controller capability

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GP-IB Interface

Switching between Remote and Local Modes

When Switching from Local to Remote Mode

The instrument switches to remote mode when it is in local mode and receives a remote transition request from the PC.

- The REMOTE indicator lights.
- All operations using the panel keys are disabled except for switching to local mode using the ESC (LOCAL) key.
- Settings entered in local mode are retained even when the instrument switches to remote mode.

When Switching from Remote to Local Mode

When the instrument is in remote mode and you press ESC (LOCAL) or when the instrument receives a local transition request from a PC, the instrument switches to local mode. However, this is not possible when local lockout has been activated by the controller.

- The REMOTE indicator turns off.
- Operations using the panel keys are enabled.
- Settings entered in remote mode are retained even when the instrument switches to local mode.

Note

You cannot use the GP-IB interface simultaneously with other interfaces (Ethernet or USB).

7.2 Connecting through the GP-IB Interface

GP-IB Cable

This instrument is equipped with an IEEE St'd 488-1978 24-pin GP-IB connector. Use a GP-IB cable that conforms to this standard.

Connection Procedure

Connect the cable as shown below.

Notes on Connection
* Firmly tighten the screws on the GP-IB cable connector.
* On the PC end, use a GP-IB board (or card) made by NI (National Instruments). For details, see section 7.1.
* The instrument may not operate properly if the instrument is connected to the PC through converters (such as a GP-IB to USB converter). For more details, contact your nearest YOKOGAWA dealer.
* Multiple cables can be used to connect multiple devices. However, no more than 15 devices, including the controller, can be connected on a single bus.
* When connecting multiple devices, you must assign a unique address to each device.
* Use cables that are 2 m or shorter in length to connect devices.
* Make sure the total length of all cables does not exceed 20 m.
* When devices are communicating, have at least two-thirds of the devices on the bus turned on.
* To connect multiple devices, use a daisy-chain or star configuration as shown below. You can also mix these configurations. Loop configuration is not allowed.

CAUTION

Be sure to turn off the PC and the instrument before you connect or remove GP-IB cables. Otherwise, erroneous operation may result, or the internal circuitry may break.

French

ATTENTION

Veillez à éteindre le PC et l'instrument lorsque vous branchez ou débranchez les câbles GP-IB. Dans le cas contraire, un fonctionnement erroné pourrait en résulter ou le circuit interne pourrait se rompre.

7.3 Configuring the Instrument's GP-IB Settings

This section explains the communication interface settings for controlling the instrument remotely through a GP-IB interface.

Procedure

Setting the GP-IB Address

1. Press **MENU** to display the top menu.

2. Press the **Utility** soft key to display the following menu.

3. Press the **Remote I/F** soft key.

Remote I/F	Display	Error Log	Initialize	Next 1/3	

4. Press the **GPIB** soft key to display the following screen.

CmdType Nrm Cmp	GPIB 1	Ethernet	USB TMC		

5. Use the arrow (▲, ▼, ◄, and ►) keys to enter the GP-IB address, and press **ENTER**.

GPIB Address	1	

Setting the Command Type

4. Press the **CmdType** soft key to select the command type.

   Nrm: The instrument operates on normal commands.

   Cmp: The instrument operates on MT210/MT210F/MT220 compatible commands.

CmdType Nrm Cmp	GPIB 1	Ethernet	USB TMC		

When you change the command type, restart the instrument.

7

GP-IB Interface

Explanation

To use the GP-IB interface, you must set the GP-IB address and command type.

GP-IB Address

Set the GP-IB address in the following range. Assign a unique address to the instrument.
0 to 30

Command Type (CmdType)

This instrument is compatible with the remote control commands of its predecessor model, the MT210/MT210F/MT220. Select the command type depending on your situation. The command type setting takes effect when you restart the instrument.

Normal Command (Nrm)

The instrument complies with IEEE488.2. The instrument operates on commands listed in chapter 11.

Compatible Command (Cmp)

The instrument operates on the commands used by the MT210/MT210F/MT220. To control the instrument using compatible commands, set the instrument to remote mode. The instrument can be controlled using compatible commands only in remote mode. When set to remote mode, the instrument is initialized.

If you select Cmp, the instrument will not accept normal commands nor communicate using Ethernet or USB TMC.

Notes on Using Existing Programs

- To use an existing program for the MT210/MT210F/MT220 on this instrument, connect the PC and the instrument through the GP-IB or USB (CDC) interface. MT210/MT210F/MT220 compatible commands cannot be used with the Ethernet or USB (TMC) interface.
- For details on the compatible commands, see appendix 4. Because functions are different between the MT210/MT210F/MT220 and MT300, behavior may be different even with compatible commands.

Note

- Use only one of GP-IB, Ethernet, or USB for the communication interface. If you send commands simultaneously on multiple communication interfaces, the instrument will not execute the commands properly.
- Do not change the address when the controller is communicating with the instrument or other devices through GP-IB.
- Each device connected in a GP-IB system has its own unique address. This address distinguishes it from other devices. Therefore, you must assign a unique address to the instrument when connecting it to a PC or other device.
- Compatible commands support the following pressure types and pressure ranges. The softkey of CmdType is displayed only for the pressure types and the pressure ranges below.

Pressure type	Pressure range	Suffix code
Gauge pressure	10 kPa	-G01
	200 kPa	-G03
	1000 kPa	-G05
	3500 kPa	-G06
Absolute pressure	130 kPa	-A03
Differential pressure	1 kPa	-D00
	10 kPa	-D01
	130 kPa	-D03
	700 kPa	-D05

7.4 Responses to Interface Messages

Responses to Interface Messages

Responses to Uni-Line Messages

- **IFC(Interface Clear)**

  Clears the talker and listener functions. Stops data transmission if it is in progress.

- **REN(Remote Enable)**

  Switches between the remote and local modes.

  IDY (Identify) is not supported.

Responses to Multi-Line Messages (Address commands)

- **GTL(Go To Local)**

  Switches the instrument to local mode.

- **SDC(Selected Device Clear)**
  - Clears the program message (command) being received and the output queue (see section 12.5).
  - Discards `*OPC` and `*OPC?` commands that are being executed.
  - Immediately aborts `*WAI` and `COMMunicate:WAIT` commands.

  PPC (Parallel Poll Configure), TCT (Take Control), and GET (Group Execute Trigger) are not supported.

Responses to Multi-Line Messages (Universal commands)

- **LLO(Local Lockout)**

  Prohibits switching to local mode through the use of the ESC (LOCAL) key on the front panel.

- **DCL(Device Clear)**

  The same operation as the SDC message.

- **SPE(Serial Poll Enable)**

  Sets the talker function on all devices on the bus to serial polling mode. The controller will poll each device one by one.

- **SPD(Serial Poll Disable)**

  Clears the serial polling mode of the talker function on all devices on the bus.

  PPU (Parallel Poll Unconfigure) is not supported.

What Are Interface Messages?

Interface messages are also referred to as interface commands or bus commands. They are commands that are issued by the controller. They are classified as follows:

Uni-line Messages

A single control line is used to transmit uni-line messages. The following three types are available.
- IFC(Interface Clear)
- REN(Remote Enable)
- IDY(Identify)

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GP-IB Interface

Multi-line Messages

Eight data lines are used to transmit multi-line messages. The messages are classified as follows:

- **Address Commands**

   Some address commands are valid when a device is designated as a listener, and some are valid when it is designated as a talker. The following five commands are available.

   Commands available to a device designated as a listener
   - GTL (Go To Local)
   - SDC (Selected Device Clear)
   - PPC (Parallel Poll Configure)
   - GET (Group Execute Trigger)

   Commands available to a device designated as a talker
   - TCT(Take Control)

- **Universal Commands**

   Universal commands are available to all devices regardless of their listener or talker designation. The following five commands are available.
   - LLO (Local Lockout)
   - DCL (Device Clear)
   - PPU (Parallel Poll Unconfigure)
   - SPE (Serial Poll Enable)
   - SPD (Serial Poll Disable)

There are other interface messages: listener-address, talk-address, and secondary commands.

Interface messages

Uni-line messages	**Multi-line messages**	
	Address command	**Universal command**
★IFC ★REN IDY	★GTL ★SDC PPC GET TCT	★LLO ★DCL PPU ★SPE ★SPD
Listener address	**Talker address**	**Secondary command**
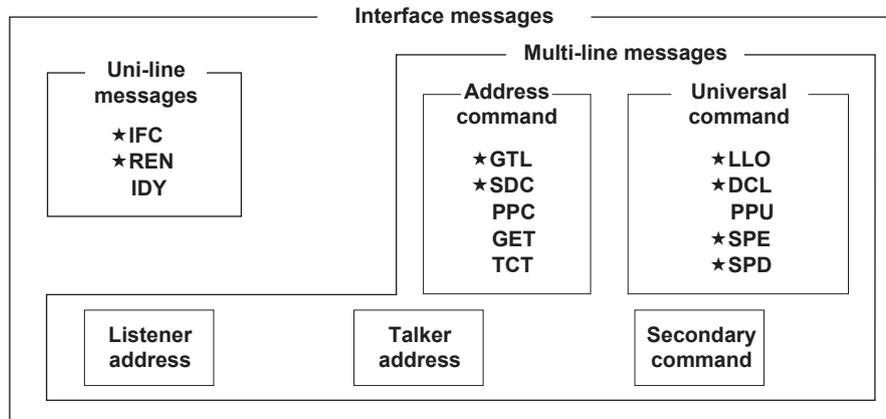
The instrument supports interface messages marked with a ★.

Note

Difference between SDC and DCL

In multi-line messages, SDC messages are address commands that require talker or listener designation and DCL messages are universal commands that do not require a designation. Therefore, SDC messages are directed at a particular instrument while DCL messages are directed at all instruments on the bus.

8.1   Ethernet Interface Features and Specifications

Ethernet Interface Features

Reception Feature
*   With the exception of turning the power switch on and off, you can use the reception feature to specify the same settings that you specify by using the front panel keys.
*   The instrument can receive output requests for measured data, settings, and error codes.

Transmission Feature
*   Measured values can be output.
*   Settings and status byte can be output.
*   Errors can be output when they occur.

Ethernet Interface Specifications

Item	Specifications
Electrical and mechanical	IEEE 802.3 compliant
Simultaneous connections	3
Communication protocol	TCP/IP
Transmission system	ETHERNET(100BASE-TX/10BASE-T)
Supported services	DHCP, VXI-11
Connector type	RJ-45 connector
PC system requirements	A PC running the English or Japanese version of Windows 10 (32 bit/64 bit) or Windows 11

Switching between Remote and Local Modes

When Switching from Local to Remote Mode
The instrument switches to remote mode when it is in local mode and receives a remote transition request from the PC.
*   The REMOTE indicator lights.
*   All operations using the panel keys are disabled except for switching to local mode using the ESC (LOCAL) key.
*   Settings entered in local mode are retained even when the instrument switches to remote mode.

When Switching from Remote to Local Mode
When the instrument is in remote mode and you press ESC (LOCAL) or when the instrument receives a local transition request from a PC, the instrument switches to local mode.
*   The REMOTE indicator turns off.
*   Operations using the panel keys are enabled.
*   Settings entered in remote mode are retained even when the instrument switches to local mode.

Note
You cannot use the Ethernet interface simultaneously with other interfaces (GP-IB or USB).

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Ethernet Interface

8.2 Connecting through the Ethernet Interface

Connection Procedure

Connect an STP (Shielded Twisted-Pair) cable that is connected to a hub or other network device to the Ethernet port on the instrument rear panel.

Hub or router that supports 100BASE-TX/10BASE-T

MT300

PC

**STP cable
(straight cable)**

Ethernet port

RJ-45 modular jack
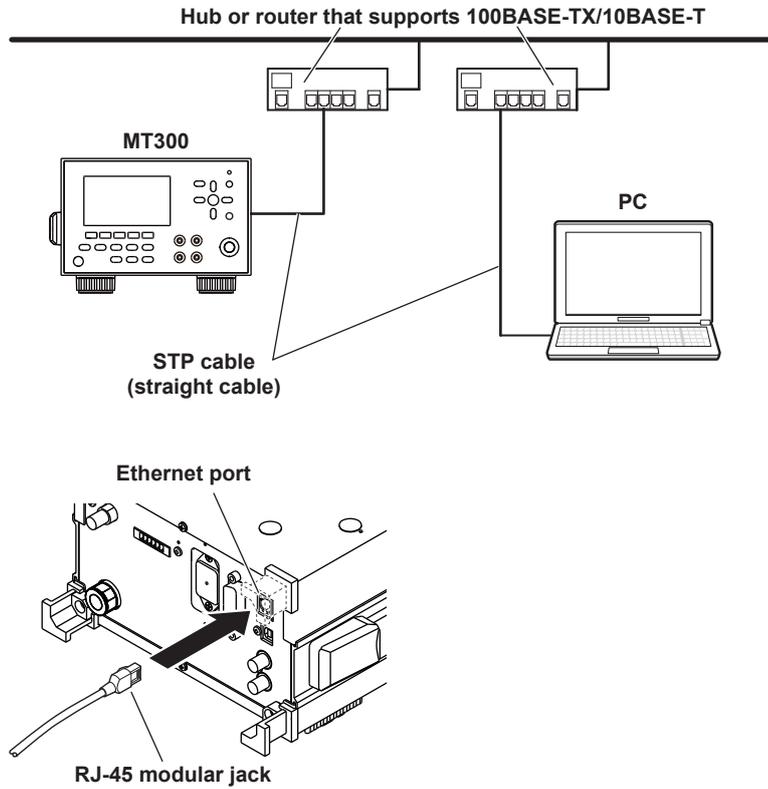
Notes on Connection

- To connect the instrument to a PC through a hub or router, use straight cables. To directly connect the instrument to a PC (one-to-one connection), use a crossover cable.
- Use a network cable that supports the data rate of your network.

8.3 Configuring the Instrument's Ethernet Settings

This section explains the communication interface settings for remotely controlling the instrument via the Ethernet interface:

Turning DHCP On/Off

1. Press **MENU** to display the top menu.
2. Press the **Utility** soft key to display the following menu.
3. Press the **Remote I/F** soft key.

| Remote I/F | Display | Error Log | Initialize | Next 1/3 | |

4. Press the **CmdType** soft key to select the Nrm command type.

   If you change from Cmp to Nrm, restart the instrument.

5. Press the **Ethernet** soft key to display the following menu.

| CmdType Nrm Cmp | GPIB 1 | Ethernet | USB TMC | | |

6. Press the **DHCP** soft key to set DHCP to On or Off.

   On: Connect to a network supporting DHCP servers.

   Off: Set the IP address, subnet mask, and default gateway.

| DHCP On Off | | | | | |

Setting the IP Address, Subnet Mask, and Default Gateway
If you set DHCP to Off, set the IP address, subnet mask, and default gateway.

7. Press the **DHCP** soft key to set DHCP to Off. The following menu appears.

| DHCP On Off | | | | | |

8. Press the **IP Address** soft key to display the following screen.

| DHCP On Off | IP Address | Subnet mask | Default Gateway | | |

9. Use the arrow (▲, ▼, ◄, and ►) keys to enter the IP address, and press **ENTER**.

| IP Address | 192. 168. 0. 1 | |

8

Ethernet Interface

10. Press the **Subnet mask** soft key to display the following screen.

DHCP	IP	Subnet	Default		
On Off	Address	mask	Gateway		

11. Use the arrow (▲, ▼, ◄, and ►) keys to enter the subnet mask, and press **ENTER**.

Subnet mask	255. 255. 255. 0	

12. Press the **Default Gateway** soft key to display the following screen.

DHCP	IP	Subnet	Default		
On Off	Address	mask	Gateway		

13. Use the arrow (▲, ▼, ◄, and ►) keys to enter the default gateway, and press **ENTER**.

Default Gateway	0. 0. 0. 0	

Explanation

To use the Ethernet interface, you must specify TCP/IP settings.

DHCP

DHCP is a protocol that temporarily allocates necessary information to a device so that it can connect to the Internet.

On

If you are connecting the instrument to a network with a DHCP server, you can turn on the DHCP setting. In this case, when you connect the instrument to the network, an IP address is assigned automatically. You do not need to set the IP address.

Off

If you set DHCP to OFF, set the appropriate IP address, subnet mask, and default gateway for your network.

IP Address, Subnet Mask, and Default Gateway

Set the values according to the network you are connecting to. For details on the network, check with your network administrator.

Command Type

For details on the command type, see section 7.3. With the Ethernet interface, only normal commands (Nrm) can be used. If the command type is set to compatible commands (Cmp) in other interfaces, change it to normal commands (Nrm). After changing, restart the instrument.

9.1   USB Interface Features and Specifications

USB Interface Features

Reception Feature
*   With the exception of turning the power switch on and off, you can use the reception feature to specify the same settings that you specify by using the front panel keys.
*   The instrument can receive output requests for measured data, settings, and error codes.

Transmission Feature
*   Measured values can be output.
*   Settings and status byte can be output.
*   Errors can be output when they occur.

USB Interface Specifications

Item	Specifications
Number of ports	1
Connector	Type B connector (receptacle)
Electrical and mechanical	Complies with USB Rev.2.0
Supported transfer modes	HS (High Speed; 480 Mbps) and FS (Full Speed; 12 Mbps)

Supported protocols	USB-FUNCTION interface
	    USBTMC-USB488 (USB Test and Measurement Class Ver.1.0)
	Virtual COM port
	  CDC (Communication Device Class)
	Storage
	  Mass storage devices that comply with USB Mass Storage Class Ver. 1.1

PC system requirements	A PC with a USB port, running the English or Japanese version of Windows 10 (32 bit/64 bit) or Windows 11

Switching between Remote and Local Modes

When Switching from Local to Remote Mode
The instrument switches to remote mode when it is in local mode and receives a remote transition request from the PC.
*   The REMOTE indicator lights.
*   All operations using the panel keys are disabled except for switching to local mode using the ESC (LOCAL) key.
*   Settings entered in local mode are retained even when the instrument switches to remote mode.

When Switching from Remote to Local Mode
When the instrument is in remote mode and you press ESC (LOCAL) or when the instrument receives a local transition request from a PC, the instrument switches to local mode. However, this is not possible when local lockout has been activated by the controller.
*   The REMOTE indicator turns off.
*   Operations using the panel keys are enabled.
*   Settings entered in remote mode are retained even when the instrument switches to local mode.

Note
You cannot use the USB interface simultaneously with other interfaces (GP-IB or Ethernet).

9

USB Interface

9.2 Connecting through the USB Interface

Connection Procedure

Connect the cable as shown below.
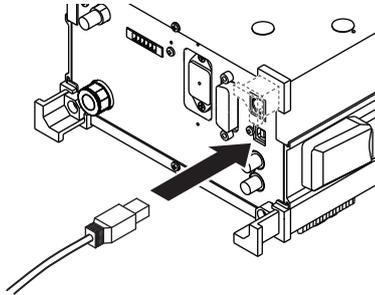
Notes on Connection

- Be sure to insert the USB cable connector firmly into the USB port.
- If you are connecting multiple devices by using a USB hub, connect the instrument to the USB hub port that is closest to the port that the controller is connected to.
- Do not connect or remove the USB cable from the time when the instrument is turned on until operation becomes available (approximately 20 to 30 seconds). If you do, the instrument may malfunction.
- Before connecting a PC to the USB port for PCs, ground the PC to the same electrical potential as the instrument.
- Do not connect a device other than a controller (e.g., PC) to the USB port for PCs.

Note

Use only one of GP-IB, Ethernet, or USB for the communication interface. If you send commands simultaneously on multiple communication interfaces, the instrument will not execute the commands properly.

9.3   Configuring the Instrument's USB Settings

This section explains the communication interface settings for connecting the instrument to a PC through the USB interface.

Procedure

Selecting the USB Interface

1. Press **MENU** to display the top menu.

2. Press the **Utility** soft key to display the following menu.

3. Press the **Remote I/F** soft key.

Remote I/F	Display	Error Log	Initialize	Next 1/3	

4. Press the **USB** soft key to display the USB Function menu.

CmdType Nrm Cmp	GPIB 1	Ethernet	USB TMC		

5. Press the soft key corresponding to the USB function (**USB Function**) you want to use.

	USB Function			
	TMC Storage CDC			

Setting the Terminator
If you set the USB function to CDC, set the terminator.

5. Press the **CDC** soft key to display the following menu.

	USB Function			
	TMC Storage CDC			

6. Press the **Terminator** soft key to display the Terminator menu.

CmdType Nrm Cmp	GPIB 1	Ethernet	USB CDC	Terminator CR+LF	

7. Press the soft key corresponding to the terminator (**Terminator**) you want to use.

		Terminator		
		CR LF CR+LF		

Setting the Command Type

4. Press the CmdType soft key to select the command type.

Nrm: The instrument operates on normal commands.

Cmp: The instrument operates on MT210/MT210F/MT220 compatible commands.

CmdType	GPIB		USB		
Nrm Cmp	1	Ethernet	TMC		

When you change the command type, restart the instrument.

Explanation

USB Function (USB Function)

You can set the communication function that is used when the instrument is connected to a PC through USB from the following options.

TMC: You can use communication commands to remotely control this instrument from a PC. Only normal commands (Nrm) can be used.

Storage: You can use the instrument's internal storage as a PC's USB storage device. From a PC, you can copy the data saved in the internal storage of the instrument.

CDC: You can use communication commands to remotely control this instrument from a PC. Normal commands (Nrm) and compatible commands (Cmp) can be used.
To remotely control the instrument using Cmp, execute the <ESC>R command (see appendix 4) to set the instrument to remote mode. The instrument can be controlled using compatible commands only in remote mode. When set to remote mode, the instrument is initialized.

To use the TMC and CDC functions, you need the following files on the PC. Contact your nearest YOKOGAWA dealer, or download the files from our website. For the installation procedure, see the manual that is downloaded together.

https://tmi.yokogawa.com/library/documents-downloads/software/usb-drivers/
Required files: YTUSB USB driver, YKCDC USB driver

* TMC
You need YOKOGAWA's USB TMC (Test and Measurement Class) driver (YTUSB). Do not use USB TMC drivers (or software) of other companies.

* CDC
If you install the system definition file (YKCDC system definition file) for our products, MT Series will be displayed in the device manager port, making it easier to identify the instrument. There is no need to install a dedicated USB driver since the Windows standard USB driver is used.

Terminator

If you set the USB function to CDC, specify the terminator for sending data.
Select from the following:

CR: Carriage return

LF: Linefeed

CR+LF: Carriage return + linefeed

Command Type

For details on the command type, see section 7.3. If Cmp is selected, the TMC USB function above cannot be selected.

Note

Use only one of GP-IB, Ethernet, or USB for the communication interface. If you send commands simultaneously on multiple communication interfaces, the instrument will not execute the commands properly.

10.1   Messages

Messages

Messages are used to exchange information between the controller and the instrument. Messages that are sent from the controller to the instrument are called program messages, and messages that are sent from the instrument back to the controller are called response messages.

If a program message contains a command that requests a response (a query), the instrument returns a response message upon receiving the program message. The instrument returns a single response message in response to a single program message.

Program Messages

The program message syntax is shown below.

\<Program message unit\>
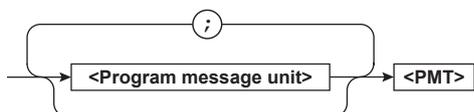
A program message consists of one or more program message units. Each unit corresponds to one command. The instrument executes the commands in the order that they are received.

Separate each program message unit with a semicolon.

For details on the program message syntax, see the next section.

Example

```
:SYSTem:CLOCk:DATE "2019/11/01";
TIME "00:00:00"        Unit
        Unit
```

\<PMT\>

This is a program message terminator. The following three types are available.

`NL` (new line):
        Same as LF (line feed). ASCII code "0AH"
`^END`:   The END message as defined by IEEE 488.1. (The data byte that is sent with the END message is the last data byte of the program message.)
`NL^END`: NL with an END message attached. (NL is not included in the program message.)

Program Message Unit Syntax

The program message unit syntax is shown below.

\<Program Header\>
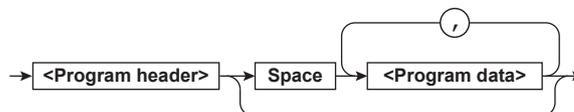
The program header indicates the command type. For details, see section 10.2.

\<Program Data\>

Attach program data if there are conditions that are required to execute a command. Separate the program data from the header with a space (ASCII code 20H). If there are multiple sets of program data, separate each set with a comma.

For details, see section 10.4.

Example

```
:SYSTem:CLOCk:DATE "2019/11/01"<PMT>
```
        Header   Data

Response Messages

The response message syntax is shown below.

\<Response Message Unit\>
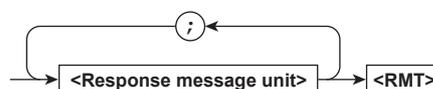
A response message consists of one or more response message units. Each unit corresponds to one response.

Separate each response message unit with a semicolon.

For details on the response message syntax, see the next page.

Example

```
:SYSTEM:CLOCK:DATE "2019/11/01";
TIME "00:00:00"        Unit 1
        Unit 2
```

\<RMT\>

RMT is a response message terminator. It is `NL^END`.

Note

If the virtual COM port is selected, you can use the `:SYSTem:COMMunicate:USB:TERMinator` command to set the terminator.

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Programming Overview

Response Message Unit Syntax

The response message unit syntax is shown below.

<Response header>
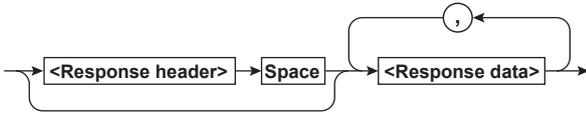
A response header sometimes precedes the response data. Separate the data from the header with a space. For details, see section 10.3.

<Response Data>

Response data contains the content of the response. If there are multiple sets of response data, separate each set with a comma. For details, see section 10.3.

Example

If there are multiple queries in a program message, responses are returned in the same order that the queries were received in. In most cases, a single query returns a single response message unit, but there are a few queries that return multiple units. The first response message unit always corresponds to the first query, but the nth response unit may not necessarily correspond to the nth query. Therefore, if you want to make sure that every response is retrieved, divide the program messages into individual messages.

Notes on Sending and Receiving Messages

• If the controller sends a program message that does not contain a query, the controller can send the next program message at any time.

• If the controller sends a program message that contains a query, the controller must finish receiving the response message before it can send the next program message. If the controller sends the next program message before receiving the response message in its entirety, an error will occur. A response message that is not received in its entirety will be discarded.

• If the controller tries to receive a response message when there is none, an error will occur. If the controller tries to receive a response message before the transmission of the program message is complete, an error will occur.

• If the controller sends a program message containing multiple message units, but the message contains incomplete units, the instrument will try to execute the ones that are believed to be complete. However, these attempts may not always be successful. In addition, if such a message contains queries, the instrument may not necessarily return responses.

Deadlock

The instrument can store at least 1024 bytes of messages in its transmit and receive buffers (the number of available bytes varies depending on the operating conditions). If both the transmit and receive buffers become full at the same time, the instrument will no longer be able to operate. This condition is called a deadlock. If this happens, you can resume operation by discarding response messages. Deadlock will not occur if the program message (including the <PMT>) is kept below 1024 bytes. Program messages that do not contain queries never cause deadlocks.

10.2 Commands

Commands

There are three types of commands (program headers) that a controller may send to the instrument. The commands differ in their program header formats.

Common Command Header

Commands that are defined in IEEE 488.2-1992 are called common commands. The common command header syntax is shown below. Be sure to include an asterisk (*) at the beginning of a common command.
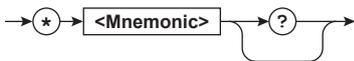
Common command example `*CLS`

Compound Header

Commands, other than common commands, that are specific to the instrument are classified and arranged in a hierarchy according to their functions. The compound header syntax is shown below. Be sure to use a colon to specify a lower hierarchical level.
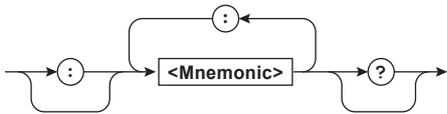
Simple Header

These commands are functionally independent and are not contained within a hierarchy. The format of a simple header is shown below.
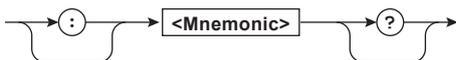
Note
A <mnemonic> is an alphanumeric character string.

When Concatenating Commands

• **Command Groups**
A command group is a group of commands that have common compound headers arranged in a hierarchy. A command group may contain sub-groups.

Example   System (date and time) group (partial)
```
:SYSTem:CLOCk?
:SYSTem:CLOCk:DATE
:SYSTem:CLOCk:TIME
```

• **When Concatenating Commands of the Same Group**
The instrument stores the hierarchical level of the command that is currently being executed and processes the next command on the assumption that it belongs to the same level. Therefore, the common header section can be omitted for commands that belong to the same group.

Example `:SYSTem:CLOCk:DATE "2019/11/01";`
`TIME "00:00:00"<PMT>`

• **When Concatenating Commands of Different Groups**
If the subsequent command does not belong to the same group, place a colon in front of the header (this colon cannot be omitted).

Example `:SYSTem:CLOCk:DATE "2019/11/01";:`
`SYSTem:BEEP ON<PMT>`

• **When Concatenating Simple Headers**
If a simple header follows another command, place a colon in front of the simple header (this colon cannot be omitted).

• **When Concatenating Common Commands**
Common commands that are defined in IEEE 488.2-1992 are independent of hierarchy. A colon is not needed before a common command.

Example `:SYSTem:CLOCk:DATE "2019/11/01";`
`*CLS;:SYSTem:CLOCk:`
`TIME "00:00:00"<PMT>`

• **When Separating Commands with <PMT>**
If you separate two commands with a terminator, two program messages will be sent. Therefore, the common header must be specified for each command even when commands belonging to the same command group are being concatenated.

Example `:SYSTem:CLOCk:DATE "2019/11/01"`
`<PMT>:SYSTem:CLOCk:`
`TIME "00:00:00"<PMT>`

Upper-level Query

An upper-level query is a query that is made by appending a question mark to a command higher in the group. The controller can receive all of the settings in a group collectively by executing a highest-level query. Some upper-level queries of a group, which may be comprised of more than three hierarchical levels, can cause the instrument to transmit all the lower level settings.

Example :STSTem?<PMT>
```
-> :SYSTEM:CLOCK:DATE "2020/10/16";
   TIME "03:14:41";:SYSTEM:BEEP 0;
   DISPLAY:STATE 1;BRIGHTNESS 3;
   RANGE:STATE 0;COLOR BLACK;:
   SYSTEM:DISPLAY:MASK 0;:
   SYSTEM:KLOCK OFF;HOLD 0;
   LANGUAGE JAPANESE;
   SAVE:DPOINT PERIOD;:
   SYSTEM:COMMUNICATE:GPIB:ADDRESS 1;:
   SYSTEM:COMMUNICATE:ETHERNET:DHCP 1;
   IP "0.0.0.0";MASK "255.255.255.255";
   GATEWAY "0.0.0.0";
   MACADDRESS "00:00:00:00:00:00"<RMT>
```

The response to an upper-level query can be sent back to the instrument as a program message. This enables the settings that were present when the upper-level query was made to be reproduced later on. However, some upper-level queries do not return setup parameters that are not currently in use. Exercise caution because not all of a group's information is necessarily returned in a response.

Header Interpretation Rules

The instrument interprets the header that it receives according to the rules below.

- Mnemonics are not case sensitive.

  Example "CALCulate" can also be written as "calculate" or "CALCULATE."

- The lower-case characters can be omitted.

  Example "CALCulate" can also be written as "CALCu" or "CALC."

- The question mark at the end of a header indicates that it is a query. You cannot omit the question mark.

  Example The shortest abbreviation for "SYSTem?" is "SYST?."

- Parts of commands and parameters enclosed in square brackets ([ ]) can be omitted.

  Example :SENSe:DMM:OHM250[:STATe] ON can also be written as ":SENS:DMM:OHM250 ON."

  However, the last section enclosed in square brackets cannot be omitted in an upper-level query.

  Example "SYSTem?" and "SYSTem:COMMunicate?" are different queries.

10.3 Responses

Responses

When the controller sends a query with a question mark, the instrument returns a response in the following format.

- **Response with a Header and Data**
  Responses that can be used as program messages without any changes are returned with command headers attached.

  Example `:SYSTem:CLOCk:DATE?<PMT>`
  `-> :SYSTEM:CLOCK:DATE "2019/11/01"`
  `<RMT>`

- **Response with Only Data**
  Responses that cannot be used as program messages unless changes are made (query-only commands) are returned without headers. However, there are query-only commands that return responses with headers.

  Example `:MEASure:PRESsure?<PMT>`
  `-> 50.000<RMT>`

If You Want the Instrument to Return Responses without Headers

You can configure the instrument so that even responses that have both headers and data are returned without headers. Use the `COMMunicate:HEADer` command for this purpose.

Abbreviated Form

The instrument normally returns response headers with the lower-case section removed. You can configure the instrument so that full headers are returned. Use the `COMMunicate:VERBose` command for this purpose. The sections enclosed in square brackets ([ ]) are also omitted in the abbreviated form.

10.4 Data

Data

Data contains conditions and values that are written after the header. A space separates the data from the header. Data is classified as follows:

Data	Description
<Decimal>	A value expressed in decimal notation
<Voltage>, <Current>, <Time>	A physical value Example: D/A range setting `-> :OUTPut:DA:RANGE: 5V`
<Register>	A register value expressed as binary, octal, decimal or hexadecimal Example: Extended event register value `-> STATUS:EESE #HFE`

<Character data>	Predefined character string (mnemonic). Select from the available strings in braces.
	Example: Select the source function
	`-> :SENSe:UNIT {PA|HPA|KPA|`
	`   MPA|MBAR|BAR|ATM}`

<Boolean>	Indicates on and off. Specify ON, OFF, or a value. Example: Response to a query `-> :COMMUNICATE:HEADER ON`

<String data>	User-defined string
	Example: Ethernet IP address setting
	`-> SYSTem:COMMunicate:`
	`   ETHernet:IP "192.168.0.1"`

<Block data>	Data that contains 8-bit values

<Decimal>

<Decimal> indicates a value expressed as a decimal number, as shown in the table below. Decimal values are written in the NR form as specified in ANSI X3.42-1975.

Symbol	Description	Examples		
<NR1>	Integer	125	−1	+1000
<NR2>	Fixed point number	125.0	−.90	+001.
<NR3>	Floating-point number	125.0E+0	−9E−1	+.1E4
<NRf>	Any form from <NR1> to <NR3>			

- The instrument can receive decimal values that are sent from the controller in any of the forms <NR1> to <NR3>. This is expressed as <NRf>.
- The instrument returns a response to the controller in one of the forms from <NR1> to <NR3> depending on the query. The same form is used regardless of the size of the value.
- For the <NR3> form, the plus sign after the "E" can be omitted. You cannot omit the minus sign.
- If a value outside the setting range is specified, an error "222: Data out of range." occurs.
- If a value has more significant digits than are available, the value will be rounded.

<Voltage>, <Current>, <Time>

<Voltage>, <Current>, and <Time> indicate decimal values that have physical significance. A <Multiplier> or <Unit> can be attached to the form that was described earlier. Use one of the following syntaxes.

Form	Example
<NRf><Multiplier><Unit>	5MV
<NRf><Unit>	5E-3V
<NRf><Multiplier>	5M
<NRf>	5E-3

- **<Multiplier>**

  Multipliers that you can use are indicated in the following table.

Symbol	Word	Multiplier
EX	Exa	10^{18}
PE	Peta	10^{15}
T	Tera	10^{12}
G	Giga	10^{9}
MA	Mega	10^{6}
K	Kilo	10^{3}
M	Milli	10^{-3}
U	Micro	10^{-6}
N	Nano	10^{-9}
P	Pico	10^{-12}
F	Femto	10^{-15}
A	Atto	10^{-18}

- **<Unit>**

  Units that you can use are indicated in the following table.

Symbol	Word	Description
V	Volt	Voltage
A	Ampere	Current
S	Second	Time

- <Multiplier> and <Unit> are not case sensitive.
- "U" is used to indicate micro (μ).
- "MA" is used for Mega to distinguish it from Milli. However, "MA" is interpreted as milliampere for current.
- If both <Multiplier> and <Unit> are omitted, the basic unit (V, A, PA, or S) is used.

<Register>

<Register> indicates an integer, and can be expressed in hexadecimal, octal, or binary as well as a decimal number. This is used when each bit of the value has a particular meaning. Use one of the following syntaxes.

Form	Example
<NRf>	1
#H <Hexadecimal value made up of the digits 0 to 9 and A to F>	#H0F
#Q <Octal value made up of the digits 0 to 7>	#Q777
#B <Binary value made up of the digits 0 and 1>	#B001100

* <Register> is not case sensitive.
* Response messages are always expressed in the <NR1> form.

<Character Data>

<Character Data> is a specified string of character data (a mnemonic). It is mainly used to indicate options and is chosen from the character strings given in { }. The data interpretation rules are the same as those described in "Header Interpretation Rules" in section 10.2.

Form	Example
{INTernal|EXTernal|SYNC}	INTernal

* As with the header, the COMMunicate:VERBose command can be used to select whether to return the response in the full form or in the abbreviated form.
* The COMMunicate:HEADer setting does not affect <Character data>.

<Boolean>

<Boolean> is data that indicates ON or OFF. Use one of the following syntaxes.

Form	Example
{ON|OFF|<NRf>}	ON OFF 1 0

* When <NRf> is expressed in the form, "OFF" is selected if the rounded integer value is 0, and "ON" is selected for all other cases.
* A response message is always returned with a 1 if the value is ON and with a 0 if the value is OFF.

<String Data>

<String data> is not a specified character string like <Character data>. It is an arbitrary character string. The character string must be enclosed in single quotation marks (') or double quotation marks (").

Form	Example
<String data>	'ABC' "IEEE488.2-1987"

* If a character string contains a double quotation mark ("), the double quotation mark is expressed as two consecutive quotation marks (""). This rule also applies to single quotation marks.
* A response message is always enclosed in double quotation marks (").
* <String data> is any character string. Therefore, the instrument assumes that the remaining program message units are part of the character string if no closing single (') or double quotation mark (") is encountered. As a result, no error is detected if a quotation mark is omitted.

<Block Data>

<Block data> contains 8-bit values. It is only used in response messages on the instrument. The syntax is as follows:

Form	Example
#N <N-digit decimal number> <Data byte sequence>	#6000010ABCDEFGHIJ

* **#N**
  Indicates that the data is <Block data>. N indicates the number of succeeding data bytes (digits) in ASCII code.

* **<N-digit decimal number>**
  Indicates the number of bytes of data.

  Example 000010 = 10 bytes

* **<Data byte sequence>**
  Expresses the actual data.

  Example ABCDEFGHIJ

* Data is comprised of 8-bit values (0 to 255). This means that the ASCII code "0AH," which stands for "NL," can also be included in the data. Hence, care must be taken when programming the controller.

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10.5 Synchronization with the Controller

Overlap and Sequential Commands

There are two types of commands: overlap and sequential. With overlap commands, the execution of the next command may start before the execution of the previous command is finished. With sequential commands, the execution of the next command is held until the execution of the previous command is finished (even if multiple commands are sent consecutively). All commands of this instrument are sequential commands. Even when only sequential commands are available, there are times when it is necessary to achieve synchronization to properly query the measured data. For example, if you want to query the most recent numeric data each time that the measured data is updated, you can attempt to do this by sending the `:MEASure:PRESsure?` command with some arbitrary timing. However, because this instrument returns the current measured data regardless of whether the measured data has been updated since the previous query, this method may return data that is the same as the previous data. If this happens, you must use the following method to synchronize with the end of measured data updating.

* **Using the STATus:CONDition? Query**
`:STATus:CONDition?` is used to query the contents of the condition register (see section 12.4). You can determine whether the measured data is being updated by reading bit 0 of the condition register. If bit 0 of the condition register is 1, the measured data is being updated. If it is 0, the measured data can be queried.
However, in the case of this instrument, it is difficult to determine the updating of measured data with `:STATus:CONDition?` because the period during which bit 0 of the condition register remains at 1 is very short.

* **Using the Extended Event Register**
The changes in the condition register can be reflected in the extended event register (see section 12.4 for details).

Example `:STATus:FILTer1 FALL;:STATus:EESE 1;EESR?;*SRE 8<PMT>`
(Read the response to `:STATus:EESR?`)
`Loop`
(Wait for a service request)
`:MEASure:PRESsure?<PMT>`
(Read the response to `:MEASure:PRESsure?`)
`:STATus:EESR?<PMT>`
(Read the response to `:STATus:EESR?`)
(Return to `Loop`)

The `:STATus:FILTer1 FALL` command sets the transition filter so that bit 0 in the extended event (FILTer1) is set to 1 when bit 0 in the condition register changes from 1 to 0, in other words when the updating of measured data is finished.
The `:STATus:EESE 1` command is used to only change the status byte based on bit 0 in the extended event register.
The `:STATus:EESR?` command is used to clear the extended event register.
The `*SRE 8` command is used to generate service requests based only on the changes in the extended event register bits.
The `:MEASure:PRESsure?` command is not executed until a service request is generated.

* **Using the COMMunicate:WAIT Command**
The `:COMMunicate:WAIT` command is used to wait for a specific event to occur.

Example `:STATus:FILTer1 FALL;:STATus:EESR?<PMT>`
(Read the response to `:STATus:EESR?`)
`Loop`
`:COMMunicate:WAIT 1<PMT>`
`:MEASure:PRESsure?<PMT>`
(Read the response to `:MEASure:PRESsure?`)
`:STATus:EESR?<PMT>`
(Read the response to `:STATus:EESR?`)
(Return to `Loop`)

For a description of `:STATus:FILTer1 FALL` and `:STATus:EESR?`, see the previous section about the extended event register.
The `:COMMunicate:WAIT 1` command specifies that the program will wait for bit 0 in the extended event register to be set to 1.
`:MEASure:PRESsure?` is not executed until bit 0 in the extended event register becomes 1.

11.1   List of Commands

Command	Function	Page
CALCulate Group		
:CALCulate?	Queries all the settings of the computation function.	11-6
:CALCulate:COMPare?	Queries all the settings of the comparator function.	11-6
:CALCulate:COMPare:LOWer	Sets or queries the lower limit of the comparator function.	11-6
:CALCulate:COMPare:RESult?	Queries the comparator judgment result.	11-6
:CALCulate:COMPare:STATe	Sets or queries the on/off state of the comparator function.	11-6
:CALCulate:COMPare:UPPer	Sets or queries the upper limit of the comparator function.	11-6
:CALCulate:FUNCtion:LEAKtest?	Queries all the settings of the leak test function.	11-6
:CALCulate:FUNCtion:LEAKtest:RESult?	Queries the leak test result.	11-7
:CALCulate:FUNCtion:LEAKtest:RESult:DELTa?	Queries the pressure difference of the leak test result.	11-7
:CALCulate:FUNCtion:LEAKtest:RESult:RATE?	Queries the leak rate of the leak test result.	11-7
:CALCulate:FUNCtion:LEAKtest:RESult:STARt:PRESsure?	Queries the start pressure of the leak test result.	11-7
:CALCulate:FUNCtion:LEAKtest:RESult:STARt:TIME?	Queries the start time of the leak test result.	11-7
:CALCulate:FUNCtion:LEAKtest:RESult:STOP:PRESsure?	Queries the stop pressure of the leak test result.	11-7
:CALCulate:FUNCtion:LEAKtest:RESult:STOP:TIME?	Queries the stop time of the leak test result.	11-7
:CALCulate:FUNCtion:LEAKtest:STARt	Starts a leak test.	11-7
:CALCulate:FUNCtion:LEAKtest:STOP	Stops a leak test.	11-8
:CALCulate:FUNCtion:LEAKtest:TIME	Sets or queries the leak test time.	11-8
:CALCulate:FUNCtion:MODE	Sets or queries the on/off state of the leak test, statistical processing, and percentage display functions.	11-8
:CALCulate:FUNCtion:PERCent?	Queries all percentage display settings.	11-8
:CALCulate:FUNCtion:PERCent:AUTO:P100	Assigns the measured pressure to the pressure value corresponding to 100%.	11-8
:CALCulate:FUNCtion:PERCent:AUTO:PZERO	Assigns the measured pressure to the pressure value corresponding to 0%.	11-8
:CALCulate:FUNCtion:PERCent:DMM?	Queries the percentage display of the DMM measurement value.	11-8
:CALCulate:FUNCtion:PERCent:ERRor?	Queries the percentage error.	11-8
:CALCulate:FUNCtion:PERCent:P100	Sets or queries the pressure value corresponding to 100%.	11-9
:CALCulate:FUNCtion:PERCent:PRESsure?	Queries the percentage display of the measured pressure.	11-9
:CALCulate:FUNCtion:PERCent:PZERO	Sets or queries the pressure value corresponding to 0%.	11-9
:CALCulate:FUNCtion:STATistics:RESult?	Queries the statistical processing result.	11-9
:CALCulate:FUNCtion:STATistics:RESult:AVERage?	Queries the average of the statistical processing result.	11-9
:CALCulate:FUNCtion:STATistics:RESult:ERRor?	Queries the number of error data values among the statistically processed values.	11-9
:CALCulate:FUNCtion:STATistics:RESult:MAXimum?	Queries the maximum of the statistical processing result.	11-10
:CALCulate:FUNCtion:STATistics:RESult:MINimum?	Queries the minimum of the statistical processing result.	11-10
:CALCulate:FUNCtion:STATistics:RESult:SIGMa?	Queries the standard deviation of the statistical processing result.	11-10

11.1 List of Commands

Command	Function	Page
`:CALCulate:FUNCtion:STATistics:RESult:TIME?`	Queries the elapsed time of statistical processing.	11-10
`:CALCulate:FUNCtion:STATistics:RESult:NUMBer?`	Queries the number of data values (pressure measurements) acquired from when statistical processing was started until it was stopped.	11-10
`:CALCulate:FUNCtion:STATistics:STARt`	Starts statistical processing.	11-10
`:CALCulate:FUNCtion:STATistics:STOP`	Stops statistical processing.	11-10
`:CALCulate:MAXMin?`	Queries all the settings of the MAX/MIN display function.	11-10
`:CALCulate:MAXMin:DMM?`	Queries all the maximum and minimum values of the DMM measurement values.	11-10
`:CALCulate:MAXMin:DMM:MAX?`	Queries the maximum value of the DMM measurement values.	11-11
`:CALCulate:MAXMin:DMM:MIN?`	Queries the minimum value of the DMM measurement values.	11-11
`:CALCulate:MAXMin:PRESsure?`	Queries all the maximum and minimum values of the pressure measurement values.	11-11
`:CALCulate:MAXMin:PRESsure:MAX?`	Queries the maximum value of the pressure measurement values.	11-11
`:CALCulate:MAXMin:PRESsure:MIN?`	Queries the minimum value of the pressure measurement values.	11-11
`:CALCulate:MAXMin:STATe`	Sets or queries the on/off state of the MAX/MIN display function.	11-11
`:CALCulate:RELative?`	Queries all the settings of the relative value display function.	11-11
`:CALCulate:RELative:MODE`	Sets or queries the relative value mode.	11-11
`:CALCulate:RELative:REFerence?`	Queries the reference value of the relative value.	11-12
`:CALCulate:RELative:SETTing:VALue?`	Sets or queries the manual reference value of the relative value.	11-12
`:CALCulate:RELative:STATe`	Sets or queries the on/off state of the relative value display function.	11-12
`:CALCulate:RELative:VALue?`	Queries the relative value.	11-12
`:CALCulate:SCALing?`	Queries all scaling settings.	11-12
`:CALCulate:SCALing:FIXed?`	Queries all settings related to the fix decimal point mode of scaling.	11-12
`:CALCulate:SCALing:FIXed:POINt`	Sets or queries the on/off state of the fixed decimal point mode of scaling.	11-12
`:CALCulate:SCALing:FIXed:VALue`	Sets or queries the fixed exponent of the fixed decimal point mode of scaling.	11-12
`:CALCulate:SCALing:INPut`	Sets or queries the method of setting the scaling coefficient and offset of scaling.	11-12
`:CALCulate:SCALing:PARameter?`	Queries all scaling parameter settings.	11-13
`:CALCulate:SCALing:PARameter:A`	Sets or queries scaling coefficient A for scaling direct input mode.	11-13
`:CALCulate:SCALing:PARameter:B`	Sets or queries offset B for scaling direct input mode.	11-13
`:CALCulate:SCALing:PARameter:SCALe?`	Queries all scale settings for scaling 2-point mode.	11-13
`:CALCulate:SCALing:PARameter:SCALe:LOWer`	Sets or queries the lower scaling limit for scaling 2-point mode.	11-13
`:CALCulate:SCALing:PARameter:SCALe:UPPer`	Sets or queries the upper scaling limit for scaling 2-point mode.	11-13
`:CALCulate:SCALing:PARameter:SPAN?`	Queries all span value settings for scaling 2-point mode.	11-13
`:CALCulate:SCALing:PARameter:SPAN:LOWer`	Sets or queries the lower span limit for scaling 2-point mode.	11-14
`:CALCulate:SCALing:PARameter:SPAN:UPPer`	Sets or queries the upper span limit for scaling 2-point mode.	11-14
`:CALCulate:SCALing:STATe`	Sets or queries the on/off state of the scaling function.	11-14
`:CALCulate:SCALing:UNIT:STRing`	Sets or queries the user unit string of scaling.	11-14
`:CALCulate:TILT?`	Queries all settings of the tilt correction function.	11-14
`:CALCulate:TILT:ALARm:STATe`	Sets or queries the on/off state of the tilt alarm of the tilt correction function.	11-14
`:CALCulate:TILT:ALARm:RESult?`	Queries the judgment result of the tilt alarm of the tilt correction function.	11-15
`:CALCulate:TILT:CORRection?`	Queries all correction settings of the tilt correction function.	11-15
`:CALCulate:TILT:CORRection:HSET`	Assigns the measured pressure value to the pressure value when the instrument is horizontal.	11-15
`:CALCulate:TILT:CORRection:STATe`	Sets or queries the on/off state of the correction for the tilt correction function.	11-15
`:CALCulate:TILT:CORRection:VALue`	Sets or queries the correction value of the tilt correction function.	11-15
`:CALCulate:TILT:CORRection:VH:EXECute`	Executes the calculation of the correction for the tilt correction function.	11-16
`:CALCulate:TILT:CORRection:VSET`	Assigns the measured pressure value to the pressure value when the instrument is vertical.	11-16

Command	Function	Page
COMMunicate Group		
:COMMunicate?	Queries all communication settings.	11-17
:COMMunicate:HEADer	Sets or queries whether headers are attached to query responses.	11-17
:COMMunicate:LOCKout	Sets or queries the local lockout state.	11-17
:COMMunicate:REMote	Sets or queries whether the instrument is in remote or local mode.	11-17
:COMMunicate:VERBose	Sets or queries whether the response to a query is returned fully spelled out or in its abbreviated form.	11-17
:COMMunicate:WAIT	Waits for a specified extended event to occur.	11-17
:COMMunicate:WAIT?	Creates the response that is returned when a specified extended event occurs.	11-17
MEASure Group		
:MEASure:DMM?	Queries the DMM measurement value.	11-18
:MEASure:PRESsure?	Queries the measured pressure.	11-18
OUTPut Group		
:OUTPut?	Queries all the settings of the output function.	11-19
:OUTPut:DA?	Queries all D/A output settings.	11-19
:OUTPut:DA:DYNamic	Sets or queries the on/off state of the D/A output dynamic mode.	11-19
:OUTPut:DA:RANGe	Sets or queries the D/A output range.	11-19
:OUTPut:DA:SCALing?	Queries all D/A scaling settings.	11-19
:OUTPut:DA:SCALing:INPut	Sets or queries the parameter mode used for D/A scaling.	11-19
:OUTPut:DA:SCALing:PARameter?	Queries all D/A scaling parameter settings.	11-19
:OUTPut:DA:SCALing:PARameter:AUTO:OFFSet	Assigns the measured pressure value to the D/A scaling offset.	11-19
:OUTPut:DA:SCALing:PARameter:GAIN	Sets or queries the D/A scaling gain.	11-20
:OUTPut:DA:SCALing:PARameter:OFFSet	Sets or queries the D/A scaling offset.	11-20
:OUTPut:DA:SCALing:PARameter:SCALe?	Queries all scale value settings for D/A scaling.	11-20
:OUTPut:DA:SCALing:PARameter:SCALe:LOWer	Sets or queries the lower scaling limit for D/A scaling.	11-20
:OUTPut:DA:SCALing:PARameter:SCALe:UPPer	Sets or queries the upper scaling limit for D/A scaling.	11-20
:OUTPut:DA:SCALing:PARameter:SPAN?	Queries all span value settings for D/A scaling.	11-20
:OUTPut:DA:SCALing:PARameter:SPAN:LOWer	Sets or queries the lower span limit for D/A scaling.	11-21
:OUTPut:DA:SCALing:PARameter:SPAN:UPPer	Sets or queries the upper span limit for D/A scaling.	11-21
:OUTPut:DA:SCALing:STATe	Sets or queries the on/off state of D/A scaling.	11-21
:OUTPut:DA:STATe	Sets or queries the on/off state of D/A output.	11-21
:OUTPut:V24out?	Queries all 24 VDC output settings.	11-21
:OUTPut:V24out:STATe	Sets or queries the on/off state of 24 VDC output.	11-21
SENSe Group		
:SENSe?	Queries all the settings of the measurement function.	11-22
:SENSe:DMM?	Queries all the settings of the DMM function.	11-22
:SENSe:DMM:AVERage[:STATe]	Sets or queries the on/off state of averaging (moving average) of the DMM function.	11-22
:SENSe:DMM:OHM250[:STATe]	Sets or queries the on/off state of the communication resistor (250 Ω) of the DMM function.	11-22
:SENSe:DMM:RANGe	Sets or queries the measurement range of the DMM function.	11-22
:SENSe:DMM:STATe	Set or queries the on/off state of the DMM function.	11-22
:SENSe:ITIMe	Sets or queries the measurement integration time.	11-22
:SENSe:MODE	Sets or queries the measurement mode.	11-23
:SENSe:TRIGger?	Queries all trigger settings.	11-23
:SENSe:TRIGger:DELay	Sets or queries the trigger delay.	11-23
:SENSe:TRIGger:LED	Sets or queries the on/off state of the TRIG key indicator.	11-23

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Commands

11.1 List of Commands

Command	Function	Page
:SENSe:TRIGger:MODE	Sets or queries the trigger mode.	11-23
:SENSe:UNIT	Sets or queries the pressure unit.	11-23
:SENSe:ZERO:EXECute	Executes a zero calibration.	11-23
:SENSe:ZERO:EXECute:REFerence	Executes a zero calibration with an offset on an absolute pressure model.	11-24
:SENSe:ZERO:HISTory?	Queries the zero calibration history.	11-24
:SENSe:ZERO:INITialize	Initializes the zero calibration value.	11-24

STATus Group

Command	Function	Page
:STATus?	Queries all the settings of the communication status feature.	11-25
:STATus:CONDition?	Queries the contents of the condition register.	11-25
:STATus:EESE	Sets or queries the extended event enable register.	11-25
:STATus:EESR?	Queries the contents of the extended event register and clears the register.	11-25
:STATus:ERRor?	Queries the error code and message of the last error that has occurred (top of the error queue).	11-25
:STATus:FILTer<x>	Sets or queries the transition filter.	11-25
:STATus:QENable	Sets or queries whether messages other than errors will be stored to the error queue.	11-25
:STATus:QMESsage	Sets or queries whether message information will be attached to the response to the STATus:ERRor? query.	11-25

STORe group

Command	Function	Page
:STORe?	Queries all storage settings.	11-26
:STORe:CATalog?	Queries the ID list of the stored files.	11-26
:STORe:COUNt	Sets or queries the data storage count.	11-26
:STORe:DELete	Deletes the specified file.	11-26
:STORe:EXECute	Storage is executed when the storage mode is set to manual.	11-26
:STORe:USED?	Queries all settings related to the number of files and the total number of occupied data values.	11-26
:STORe:USED:DATA?	Queries the total number of stored occupied data values.	11-26
:STORe:USED:FILE?	Queries the number of stored files.	11-26
:STORe:MODE	Sets or queries the storage mode.	11-26
:STORe:PERiod	Sets or queries the storage interval.	11-26
:STORe:READ:ASCii:DATA<x>?	Queries in ASCII format the data in the specified file ID.	11-27
:STORe:READ:BINary:DATA<x>?	Queries in binary format the data in the specified file ID.	11-27
:STORe:READ:BINary:ENDian?	Sets or queries the endian (little or big) of the binary data.	11-28
:STORe:READ:COUNt<x>?	Queries the number of stored data values at the specified file ID.	11-28
:STORe:READ:DATE<x>?	Queries the storage start date and time of the specified file ID.	11-28
:STORe:STATe	Set or queries the on/off state of the storage function.	11-28
:STORe:UPDate:LIST	Updates the list of CSV files displayed on the PC.	11-28

SYSTem Group

Command	Function	Page
:SYSTem?	Queries all system settings.	11-29
:SYSTem:BATTery?	Queries all battery settings.	11-29
:SYSTem:BATTery:SCALe?	Queries the battery level scale.	11-29
:SYSTem:BATTery:STATus?	Queries the battery status.	11-29
:SYSTem:BEEP	Sets or queries the beep sound on/off state.	11-29
:SYSTem:CALibration:DATE:LATest:DA?	Queries the YOKOGAWA calibration date or the user calibration date of the D/A output, whichever is most recent.	11-29
:SYSTem:CALibration:DATE:LATest:DMM?	Queries the YOKOGAWA calibration date or the latest user calibration date of the DMM function, whichever is most recent.	11-29
:SYSTem:CALibration:DATE:LATest:PRESsure?	Queries the YOKOGAWA calibration date or the latest user calibration date of pressure calibration, whichever is most recent.	11-30
:SYSTem:CALibration:DATE:USER?	Queries all the settings of the user calibration date.	11-30
:SYSTem:CALibration:DATE:USER:DA	Sets or queries the user calibration date of the D/A output.	11-30
:SYSTem:CALibration:DATE:USER:DMM	Sets or queries the user calibration date of the DMM function.	11-30
:SYSTem:CALibration:DATE:USER:PRESsure	Sets or queries the user calibration date of the pressure calibration.	11-30
:SYSTem:CALibration:DATE:YOKogawa:DA?	Queries the YOKOGAWA calibration date of the D/A output.	11-30

Command	Function	Page
`:SYSTem:CALibration:DATE:YOKogawa:DMM?`	Queries the YOKOGAWA calibration date of the DMM function.	11-30
`:SYSTem:CALibration:DATE:YOKogawa:PRESsure?`	Queries the YOKOGAWA calibration date of the pressure calibration.	11-30
`:SYSTem:CLOCk?`	Queries all date/time settings.	11-31
`:SYSTem:CLOCk:DATE`	Sets or queries the date.	11-31
`:SYSTem:CLOCk:TIME`	Sets or queries the time.	11-31
`:SYSTem:COMMunicate`	Queries all communication settings.	11-31
`:SYSTem:COMMunicate:TYPE`	Sets or queries the command type.	11-31
`:SYSTem:COMMunicate:ETHernet?`	Queries all Ethernet communication settings.	11-31
`:SYSTem:COMMunicate:ETHernet:DHCP`	Sets or queries the Ethernet DHCP on/off state.	11-31
`:SYSTem:COMMunicate:ETHernet:GATeway`	Sets or queries the Ethernet default gateway.	11-31
`:SYSTem:COMMunicate:ETHernet:IP`	Sets or queries the Ethernet IP address.	11-31
`:SYSTem:COMMunicate:ETHernet:MACaddress`	Sets or queries the Ethernet MAC address.	11-32
`:SYSTem:COMMunicate:ETHernet:MASK`	Sets or queries the Ethernet subnet mask.	11-32
`:SYSTem:COMMunicate:GPIB?`	Queries all GP-IB communication settings.	11-32
`:SYSTem:COMMunicate:GPIB:ADDRess`	Sets or queries the GP-IB address.	11-32
`:SYSTem:COMMunicate:USB:FUNCtion`	Sets or queries the USB function selection (USB TMC, USB CDC, storage).	11-32
`:SYSTem:COMMunicate:USB:TERMinator`	Sets or queries the terminator used to send data from this instrument when a virtual COM port is selected.	11-32
`:SYSTem:DIGit:MASK`	Sets or queries the mask for the least significant digits displayed.	11-32
`:SYSTem:DISPlay?`	Queries all screen settings.	11-32
`:SYSTem:DISPlay:BRIGhtness`	Sets or queries the screen brightness.	11-32
`:SYSTem:DISPlay:RANGe:COLor`	Sets or queries the display color of the range information on the screen.	11-33
`:SYSTem:DISPlay:RANGe[:STATe]`	Sets or queries the on/off state of the range information on the screen.	11-33
`:SYSTem:HOLD`	Sets or queries the display hold.	11-33
`:SYSTem:KLOCk`	Sets or queries the key lock.	11-33
`:SYSTem:LANGuage`	Sets or queries the error message language.	11-33
`:SYSTem:PRESsure?`	Queries all pressure settings.	11-33
`:SYSTem:PRESsure:POSition?`	Queries the height of the reference point of the pressure receiving section.	11-33
`:SYSTem:PRESsure:RANGe?`	Queries the pressure range.	11-33
`:SYSTem:PRESsure:TYPE?`	Queries the pressure type.	11-33
`:SYSTem:REBoot`	Restarts the instrument when the specified time elapses.	11-34
`:SYSTem:SAVE:DPOint`	Sets or queries the decimal point and separator used when data is saved to CSV files.	11-34
`:SYSTem:USER:MEMO`	Sets or queries the user notes.	11-34

Common Command Group

`*CLS`	Clears the standard event register, extended event register, and error queue.	11-35
`*ESE`	Sets or queries the standard event enable register.	11-35
`*ESR?`	Queries and clears the standard event register.	11-35
`*IDN?`	Queries the instrument model.	11-35
`*OPC`	Sets bit 0 (the OPC bit) of the standard event register to 1 upon the completion of the specified overlap command.	11-35
`*OPC?`	Returns ASCII code 1 when the specified overlap command is completed.	11-35
`*OPT?`	Queries the installed options.	11-35
`*RST`	Initializes settings.	11-36
`*SRE`	Sets or queries the service request enable register value.	11-36
`*STB?`	Queries the Status Byte Register value.	11-36
`*TRG`	Generates an external trigger.	11-36
`*TST?`	Executes a self-test and queries the result.	11-36
`*WAI`	Holds the execution of the subsequent command until the specified overlap command is completed.	11-36

11

Commands

11.2 CALCulate Group

The commands in this group deal with computations.
The front panel keys that correspond to the commands in this group are RELATIVE and MAX/MIN. The commands also correspond to the Function and Scaling soft keys.

:CALCulate?
Function   Queries all the settings of the computation function.
Syntax   :CALCulate?

:CALCulate:COMPare?
Function   Queries all the settings of the comparator function.
Syntax   :CALCulate:COMPare?

:CALCulate:COMPare:LOWer
Function   Sets or queries the lower limit of the comparator function.
Syntax   :CALCulate:COMPare:LOWer <NRf>
           :CALCulate:COMPare:LOWer?
           <NRf> = The setting range and resolution depend on the pressure measurement (display) range.
Example   :CALCULATE:COMPARE:LOWER 200.000
           :CALCULATE:COMPARE:LOWER?
           -> :CALCULATE:COMPARE:
              LOWER -156.000E+00
Description • If a value outside the setting range is specified, a "222:Data out of range" error will occur.
           • On models without the /DA option, a "241: Hardware missing" error will occur.
           • The unit is set using ":SENSe:UNIT."

:CALCulate:COMPare:RESult?
Function   Queries the comparator judgment result.
Syntax   :CALCulate:COMPare:RESult?
Example   :CALCUlATE:COMPARE:RESULT?
           -> :CALCUlATE:COMPARE:RESULT 0
Description • On models without the /DA option, a "241: Hardware missing" error will occur.
           • The bit assignments of the comparator judgment result are as follows.

Bit No	Name	Description
0	HI	Set to 1 when the comparator judgment result is "HI".
1	IN	Set to 1 when the comparator judgment result is "IN".
2	LO	Set to 1 when the comparator judgment result is "LO".
3	-	Always zero
4	-	Always zero
5	-	Always zero
6	-	Always zero
7	-	Always zero

:CALCulate:COMPare:STATe
Function   Sets or queries the on/off state of the comparator function.
Syntax   :CALCulate:COMPare:STATe <Boolean>
           :CALCulate:COMPare:STATe?
           ON|1: Comparator function on
           OFF|0: Comparator function off
Example   :CALCULATE:COMPARE:STATE ON
           :CALCULATE:COMPARE:STATE?
           -> :CALCULATE:COMPARE:STATE 1
Description On models without the /DA option, a "241: Hardware missing" error will occur.

:CALCulate:COMPare:UPPer
Function   Sets or queries the upper limit of the comparator function.
Syntax   :CALCulate:COMPare:UPPer <NRf>
           :CALCulate:COMPare:UPPer?
           <NRf> = The setting range and resolution depend on the pressure measurement (display) range.
Example   :CALCULATE:COMPARE:UPPER 200.000
           :CALCULATE:COMPARE:UPPER?
           -> :CALCULATE:COMPARE:
              UPPER 200.000E+00
Description • If a value outside the setting range is specified, a "222:Data out of range" error will occur.
           • On models without the /DA option, a "241: Hardware missing" error will occur.
           • The unit is set using ":SENSe:UNIT."

:CALCulate:FUNCtion:LEAKtest?
Function   Queries all the settings of the leak test function.
Syntax   :CALCulate:FUNCtion:LEAKtest?

:CALCulate:FUNCtion:LEAKtest:RESult?

Function   Queries the leak test result.

Syntax   :CALCulate:FUNCtion:LEAKtest:RESult?

Response <start pressure>,<start time>,<stop
pressure>,<stop time>,<pressure
difference>,<leak rate>

<Start pressure>,<Stop pressure>,

<Pressure difference>,

<Leak rate> = The setting range and resolution
depend on the pressure
measurement (display) range.

Example   :CALCULATE:FUNCTION:LEAKTEST:RESULT?

-> :CALCULATE:FUNCTION:LEAKTEST:
RESULT:START:PRESSURE 200.000E+00;
TIME "10:38:52";:CALCULATE:
FUNCTION:LEAKTEST:RESULT:STOP:
PRESSURE 190.000E+00;
TIME "10:39:22";:CALCULATE:
FUNCTION:LEAKTEST:RESULT:
DELTA 10.0000E+00;RATE 20.0000E+00

Description If the start pressure or stop pressure is
+OverRange or +OverFlow, +9.90E+37 is
returned.
If the start pressure or stop pressure is
-OverRange or -OverFlow, -9.90E+37 is returned.
If the pressure difference or leak rate is
+OverRange, +OverFlow, -OverRange or
-OverFlow, +9.91E+37 is returned.
If there is no leak test result, 9.91E+37 is
returned. For the start time and stop time, "00:
00: 00" is returned.

:CALCulate:FUNCtion:LEAKtest:RESult:DELTa?

Function   Queries the pressure difference of the leak test
result.

Syntax   :CALCulate:FUNCtion:LEAKtest:RESult:
DELTa?
The setting range and resolution depend on the
pressure measurement (display) range.

Example   :CALCULATE:FUNCTION:LEAKTEST:RESULT:
DELTA?

-> :CALCULATE:FUNCTION:LEAKTEST:
RESULT:DELTA 10.0000E+00

:CALCulate:FUNCtion:LEAKtest:RESult:RATE?

Function   Queries the leak rate of the leak test result.

Syntax   :CALCulate:FUNCtion:LEAKtest:RESult:
RATE?
The setting range and resolution depend on the
pressure measurement (display) range.

Example   :CALCULATE:FUNCTION:LEAKTEST:RESULT:
RATE?

-> :CALCULATE:FUNCTION:LEAKTEST:
RESULT:RATE 20.0000E+00

:CALCulate:FUNCtion:LEAKtest:RESult:STARt:PRESsure?

Function   Queries the start pressure of the leak test result.

Syntax   :CALCulate:FUNCtion:LEAKtest:RESult:
STARt:PRESsure?
The setting range and resolution depend on the
pressure measurement (display) range.

Example   :CALCULATE:FUNCTION:LEAKTEST:RESULT:
START:PRESSURE?

-> :CALCULATE:FUNCTION:LEAKTEST:
RESULT:START:PRESSURE 200.000E+00

:CALCulate:FUNCtion:LEAKtest:RESult:STARt:TIME?

Function   Queries the start time of the leak test result.

Syntax   :CALCulate:FUNCtion:LEAKtest:RESult:
STARt:TIME?

Example   :CALCULATE:FUNCTION:LEAKTEST:RESULT:
START:TIME?

-> :CALCULATE:FUNCTION:LEAKTEST:
RESULT:START:TIME "10:38:52"

:CALCulate:FUNCtion:LEAKtest:RESult:STOP:PRESsure?

Function   Queries the stop pressure of the leak test result.

Syntax   :CALCulate:FUNCtion:LEAKtest:RESult:
STOP:PRESsure?
The setting range and resolution depend on the
pressure measurement (display) range.

Example   :CALCULATE:FUNCTION:LEAKTEST:RESULT:
STOP:PRESSURE?

-> :CALCULATE:FUNCTION:LEAKTEST:
RESULT:STOP:PRESSURE 190.000E+00

:CALCulate:FUNCtion:LEAKtest:RESult:STOP:TIME?

Function   Queries the stop time of the leak test result.

Syntax   :CALCulate:FUNCtion:LEAKtest:RESult:
STOP:TIME?

Example   :CALCULATE:FUNCTION:LEAKTEST:RESULT:
STOP:TIME?

-> :CALCULATE:FUNCTION:LEAKTEST:
RESULT:STOP:TIME "10:39:22"

:CALCulate:FUNCtion:LEAKtest:STARt

Function   Starts a leak test.

Syntax   :CALCulate:FUNCtion:LEAKtest:STARt

Example   :CALCULATE:FUNCTION:LEAKTEST:START

Description If you execute this command while the relative
value display function, MAX/MIN display function,
leak test, statistical processing, or percentage
display function is in progress, a "053: Attempted
to perform an operation not allowed in the
instrument's current mode" error will occur.

:CALCulate:FUNCtion:LEAKtest:STOP

Function   Stops a leak test.

Syntax   :CALCulate:FUNCtion:LEAKtest:STOP

Example   :CALCULATE:FUNCTION:LEAKTEST:STOP

Description This command is ignored if it is sent while the leak test function is not in progress.

:CALCulate:FUNCtion:LEAKtest:TIME

Function   Sets or queries the leak test time.

Syntax   :CALCulate:FUNCtion:LEAKtest:
             TIME <String>
             :CALCulate:FUNCtion:LEAKtest:TIME?
             <String> = "hh:mm:ss"
                 hh: Hour 0 to 23
                 mm: Minute 0 to 59
                 ss: Second 0 to 59

Example   :CALCULATE:FUNCTION:LEAKTEST:
             TIME "12:00:00"
             :CALCULATE:FUNCTION:LEAKTEST:TIME?
             -> :CALCULATE:FUNCTION:LEAKTEST:
                TIME "12:00:00"

Description If a value outside the setting range is specified, a "222:Data out of range" error will occur.

:CALCulate:FUNCtion:MODE

Function   Sets or queries the on/off state of the leak test, statistical processing, and percentage display functions.

Syntax   :CALCulate:FUNCtion:MODE {OFF|
             LEAKtest|STATistics|PERCent}
             :CALCulate:FUNCtion:MODE?
             OFF: Function off
             LEAKtest: Leak test function on
             STATistics: Statistical processing function on
             PERCent: Percentage display function on

Example   :CALCULATE:FUNCTION:MODE ON
             :CALCULATE:FUNCTION:MODE?
             -> :CALCULATE:FUNCTION:MODE LEAK

Description When the relative value display function and MAX/MIN function is set to off, you can set the leak test, statistical processing, or percentage display function to on. If you set it when the relative value display function or MAX/MIN is not set to off, a "053: Attempted to perform an operation not allowed in the instrument's current mode" error will occur.

:CALCulate:FUNCtion:PERCent?

Function   Queries all percentage display settings.

Syntax   :CALCulate:FUNCtion:PERCent?

:CALCulate:FUNCtion:PERCent:AUTO:P100

Function   Assigns the measured pressure to the pressure value corresponding to 100%.

Syntax   :CALCulate:FUNCtion:PERCent:AUTO:
             P100

Example   :CALCULATE:FUNCTION:PERCENT:AUTO:
             P100

Description If the percentage display status or relative value is being displayed or if the measured pressure is over-range or overflow, the 100% value cannot be set automatically. An execution error will occur, and a "056: Overrange or overflow occurred in the measured pressure value" error will occur.

:CALCulate:FUNCtion:PERCent:AUTO:PZERO

Function   Assigns the measured pressure to the pressure value corresponding to 0%.

Syntax   :CALCulate:FUNCtion:PERCent:AUTO:
             PZERO

Example   :CALCULATE:FUNCTION:PERCENT:AUTO:
             PZERO

Description If the percentage display status or relative value is being displayed or if the measured pressure is over-range or overflow, the 0% value cannot be set automatically. An execution error will occur, and a "056: Overrange or overflow occurred in the measured pressure value" error will occur.

:CALCulate:FUNCtion:PERCent:DMM?

Function   Queries the percentage display of the DMM measurement value.

Syntax   :CALCulate:FUNCtion:PERCent:DMM?

Example   :CALCULATE:FUNCTION:PERCENT:DMM?
             -> :CALCULATE:FUNCTION:PERCENT:
                DMM 100.00E+00

Description On models without the /DM option, a "241: Hardware missing" error will occur.

:CALCulate:FUNCtion:PERCent:ERRor?

Function   Queries the percentage error.

Syntax   :CALCulate:FUNCtion:PERCent:ERRor?

Example   :CALCULATE:FUNCTION:PERCENT:ERROR?
             -> :CALCULATE:FUNCTION:PERCENT:
                ERROR 5.0000E+00

Description On models without the /DM option, a "241: Hardware missing" error will occur.

:CALCulate:FUNCtion:PERCent:P100

Function   Sets or queries the pressure value corresponding to 100%.
Syntax   :CALCulate:FUNCtion:PERCent:
            P100 <NRf>
            :CALCulate:FUNCtion:PERCent:P100?
            <NRf> = The setting range and resolution depend on the pressure measurement (display) range.
Example   :CALCULATE:FUNCTION:PERCENT:
            P100 200.000
            -> :CALCULATE:FUNCTION:PERCENT:
               P100 200.000E+00
Description • If a value outside the setting range is specified, a "222:Data out of range" error will occur.
            • The unit is set using ":SENSe:UNIT."

:CALCulate:FUNCtion:PERCent:PRESsure?

Function   Queries the percentage display of the measured pressure.
Syntax   :CALCulate:FUNCtion:PERCent:
            PRESsure?
Example   :CALCULATE:FUNCTION:PERCENT:
            PRESSURE?
            -> :CALCULATE:FUNCTION:PERCENT:
               PRESSURE 95.000E+00

:CALCulate:FUNCtion:PERCent:PZERO

Function   Sets or queries the pressure value corresponding to 0%.
Syntax   :CALCulate:FUNCtion:PERCent:
            PZERO <NRf>
            :CALCulate:FUNCtion:PERCent:PZERO?
            <NRf> = The setting range and resolution depend on the pressure measurement (display) range.
Example   :CALCULATE:FUNCTION:PERCENT:
            PZERO 0.000
            -> :CALCULATE:FUNCTION:PERCENT:
               PZERO 0.00000E+00
Description • If a value outside the setting range is specified, a "222:Data out of range" error will occur.
            • The unit is set using ":SENSe:UNIT."

:CALCulate:FUNCtion:STATistics:RESult?

Function   Queries the statistical processing result.
Syntax   :CALCulate:FUNCtion:STATistics:
            RESult?
            Response <maximum pressure>,
                      <minimum ressure>,
                      <average pressure>,
                      <standard deviation>,
                      <error account>,
                      <total number of acquired
                      data values>
            The setting range and resolution depend on the pressure measurement (display) range.
Example   :CALCULATE:FUNCTION:STATISTICS:
            RESULT?
            -> :CALCULATE:FUNCTION:STATISTICS:
               RESULT:MAXIMUM 200.000E+00;
               MINIMUM 130.000E+00;
               AVERAGE 180.000E+00;
               SIGMA 24.5220E+00;ERROR 0;
               NUMBER 153;TIME "00:00:38"
Description If the maximum pressure or minimum pressure is +OverRange or +OverFlow, +9.90E+37 is returned.
            If the maximum pressure or minimum pressure is -OverRange or -OverFlow, -9.90E+37 is returned.
            For average pressure and standard deviation, if the maximum pressure or minimum pressure is +OverRange, +OverFlow, -OverRange, or -OverFlow, -9.91E+37 is returned.
            If there is no statistical processing result, 9.91E+37 is returned.

:CALCulate:FUNCtion:STATistics:RESult:AVERage?

Function   Queries the average of the statistical processing result.
Syntax   :CALCulate:FUNCtion:STATistics:
            RESult:AVERage?
            The setting range and resolution depend on the pressure measurement (display) range.
Example   :CALCULATE:FUNCTION:STATISTICS:
            RESULT:AVERAGE?
            -> :CALCULATE:FUNCTION:STATISTICS:
               RESULT:AVERAGE 180.000E+00

:CALCulate:FUNCtion:STATistics:RESult:ERRor?

Function   Queries the number of error data values among the statistically processed values.
Syntax   :CALCulate:FUNCtion:STATistics:
            RESult:ERRor?
Example   :CALCULATE:FUNCTION:STATISTICS:
            RESULT:ERROR?
            -> :CALCULATE:FUNCTION:STATISTICS:
               RESULT:ERROR 0

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:CALCulate:FUNCtion:STATistics:RESult: MAXimum?

Function   Queries the maximum of the statistical processing result.

Syntax   :CALCulate:FUNCtion:STATistics: RESult:MAXimum?

The setting range and resolution depend on the pressure measurement (display) range.

Example :CALCULATE:FUNCTION:STATISTICS: RESULT:MAXIMUM?

-> :CALCULATE:FUNCTION:STATISTICS: RESULT:MAXIMUM 200.000E+00

:CALCulate:FUNCtion:STATistics:RESult: MINimum?

Function   Queries the minimum of the statistical processing result.

Syntax   :CALCulate:FUNCtion:STATistics: RESult:MINimum?

The setting range and resolution depend on the pressure measurement (display) range.

Example :CALCULATE:FUNCTION:STATISTICS: RESULT:MINIMUM?

-> :CALCULATE:FUNCTION:STATISTICS: RESULT:MINIMUM 130.000E+00

:CALCulate:FUNCtion:STATistics:RESult: SIGMa?

Function   Queries the standard deviation of the statistical processing result.

Syntax   :CALCulate:FUNCtion:STATistics: RESult:SIGMa?

Example :CALCULATE:FUNCTION:STATISTICS: RESULT:SIGMA?

-> :CALCULATE:FUNCTION:STATISTICS: RESULT:SIGMA 24.5220E+00

:CALCulate:FUNCtion:STATistics:RESult: TIME?

Function   Queries the elapsed time of statistical processing.

Syntax   :CALCulate:FUNCtion:STATistics: RESult:TIME?

Example :CALCULATE:FUNCTION:STATISTICS: RESULT:TIME?

-> :CALCULATE:FUNCTION:STATISTICS: RESULT:TIME "00:00:38"

Description The elapsed time is returned only when the statistical processing is in progress. If it is not in progress, "00:00:00" is returned.

:CALCulate:FUNCtion:STATistics:RESult: NUMBer?

Function   Queries the number of data values (pressure measurements) acquired from when statistical processing was started until it was stopped.

Syntax   :CALCulate:FUNCtion:STATistics: RESult:NUMBer?

Example :CALCULATE:FUNCTION:STATISTICS: RESULT:NUMBER?

-> :CALCULATE:FUNCTION:STATISTICS: RESULT:NUMBER 153

:CALCulate:FUNCtion:STATistics:STARt

Function   Starts statistical processing.

Syntax   :CALCulate:FUNCtion:STATistics:STARt

Example :CALCULATE:FUNCTION:STATISTICS:START

Description If you execute this command while the relative value display function, MAX/MIN display function, leak test, statistical processing, or percentage display function is in progress, a "053: Attempted to perform an operation not allowed in the instrument's current mode" error will occur.

:CALCulate:FUNCtion:STATistics:STOP

Function   Stops statistical processing.

Syntax   :CALCulate:FUNCtion:STATistics:STOP

Example :CALCULATE:FUNCTION:STATISTICS:STOP

Description This command is ignored if it is sent while statistical processing is not in progress.

:CALCulate:MAXMin?

Function   Queries all the settings of the MAX/MIN display function.

Syntax   :CALCulate:MAXMin?

:CALCulate:MAXMin:DMM?

Function   Queries all the maximum and minimum values of the DMM measurement values.

Syntax   :CALCulate:MAXMin:DMM?

Description On models without the /DM option, a "241: Hardware missing" error will occur.

:CALCulate:MAXMin:DMM:MAX?
Function   Queries the maximum value of the DMM
            measurement values.
Syntax   :CALCulate:MAXMin:DMM:MAX?
Example   The following is an example for when the value is
            +OverRange.
            :CALCULATE:MAXMIN:DMM:MAX?
            -> :CALCULATE:MAXMIN:DMM:
               MAX 9.90E+37
Description • If the value is +OverRange, 9.90E+37 is
              returned. If the value is -OverRange, -9.90E+37
              is returned. If the DMM function is off or if there
              is no data, 9.91E+37 is returned.
            • On models without the /DM option, a "241:
              Hardware missing" error will occur.

:CALCulate:MAXMin:DMM:MIN?
Function   Queries the minimum value of the DMM
            measurement values.
Syntax   :CALCulate:MAXMin:DMM:MIN?
Example   The following is an example for when the value is
            -OverRange.
            :CALCULATE:MAXMIN:DMM:MIN?
            -> :CALCULATE:MAXMIN:DMM:
               MIN -9.90E+37
Description • If the value is +OverRange, 9.90E+37 is
              returned. If the value is -OverRange, -9.90E+37
              is returned. If the DMM function is off or if there
              is no data, -9.91E+37 is returned.
            • On models without the /DM option, a "241:
              Hardware missing" error will occur.

:CALCulate:MAXMin:PRESsure?
Function   Queries all the maximum and minimum values of
            the pressure measurement values.
Syntax   :CALCulate:MAXMin:PRESsure?

:CALCulate:MAXMin:PRESsure:MAX?
Function   Queries the maximum value of the pressure
            measurement values.
Syntax   :CALCulate:MAXMin:PRESsure:MAX?
Example   The following is an example for when the value is
            +OverRange.
            :CALCULATE:MAXMIN:PRESSURE:MAX?
            -> :CALCULATE:MAXMIN:PRESSURE:
               MAX 9.90E+37
Description If the value is +OverRange or +OverFlow,
            9.90E+37 is returned.
            If the value is -OverRange or -OverFlow,
            -9.90E+37 is returned.
            If there is no data, 9.91E+37 is returned.

:CALCulate:MAXMin:PRESsure:MIN?
Function   Queries the minimum value of the pressure
            measurement values.
Syntax   :CALCulate:MAXMin:PRESsure:MIN?
Example   The following is an example for when the value is
            -OverRange.
            :CALCULATE:MAXMIN:PRESSURE:MIN?
            -> :CALCULATE:MAXMIN:PRESSURE:
               MIN -9.90E+37
Description If the value is +OverRange or +OverFlow,
            9.90E+37 is returned.
            If the value is -OverRange or -OverFlow,
            -9.90E+37 is returned.
            If there is no data, -9.91E+37 is returned.

:CALCulate:MAXMin:STATe
Function   Sets or queries the on/off state of the MAX/MIN
            display function.
Syntax   :CALCulate:MAXMin:STATe <Boolean>
            :CALCulate:MAXMin:STATe?
            ON|1: MAX/MIN display on
            OFF|0: MAX/MIN display off
Example   :CALCULATE:MAXMIN:STATE ON
            :CALCULATE:MAXMIN:STATE?
            -> :CALCULATE:MAXMIN:STATE 1
Description When the relative value display function is off
            and the leak test, statistical processing, and
            percentage display function are off, you can
            turn on and off the MAX/MIN display. If you set
            it when the relative value display function, leak
            test, statistical processing, or percentage display
            function is not set to off, a "053: Attempted
            to perform an operation not allowed in the
            instrument's current mode" error will occur.

:CALCulate:RELative?
Function   Queries all the settings of the relative value
            display function.
Syntax   :CALCulate:RELative?

:CALCulate:RELative:MODE
Function   Sets or queries the relative value mode.
Syntax   :CALCulate:RELative:MODE {MEASure|
            SETTing}
            :CALCulate:RELative:MODE?
            MEASure: Pressure measurement reference
            SETTing: Manually set reference
Example   :CALCULATE:RELATIVE:MODE MEASURE
            :CALCULATE:RELATIVE:MODE?
            -> :CALCULATE:RELATIVE:MODE SETTING
Description Setting or querying is possible regardless of
            whether the relative value display function is on
            or off.

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:CALCulate:RELative:REFerence?

Function	Queries the reference value of the relative value.
Syntax	:CALCulate:RELative:REFerence?
	The range and resolution depend on the pressure measurement (display) range.
Example	:CALCULATE:RELATIVE:REFERENCE?
	-> :CALCULATE:RELATIVE:
	REFERENCE 200.000E+00

:CALCulate:RELative:SETTing:VALue?

Function	Sets or queries the manual reference value of the relative value.
Syntax	:CALCulate:RELative:SETTing: VALue <NRf>
	:CALCulate:RELative:SETTing:VALue?
	<NRf> = The setting range and resolution depend on the pressure measurement (display) range.
Example	:CALCULATE:RELATIVE:SETTING: VALUE 200.000
	:CALCULATE:RELATIVE:SETTING:VALUE?
	-> :CALCULATE:RELATIVE:SETTING: VALUE 200.000E+00
Description	• If a value outside the setting range is specified, a "222:Data out of range" error will occur.
	• The unit is set using ":SENSe:UNIT."

:CALCulate:RELative:STATe

Function	Sets or queries the on/off state of the relative value display function.
Syntax	:CALCulate:RELative:STATe <Boolean>
	:CALCulate:RELative:STATe?
	ON|1: Relative value display on
	OFF|0: Relative value display off
Example	:CALCULATE:RELATIVE:STATE ON
	:CALCULATE:RELATIVE:STATE?
	-> :CALCULATE:RELATIVE:STATE 1
Description	When the MAX/MIN display function is off and the leak test, statistical processing, and percentage display function are off, you can turn on and off the relative value display. If you set it when the MAX/MIN function, leak test, statistical processing, or percentage display function is not set to off, a "053: Attempted to perform an operation not allowed in the instrument's current mode" error will occur. If the measured pressure or the DMM measurement value is over-range or overflow, a "056: Overrange or overflow occurred in the measured pressure value" error will occur.

:CALCulate:RELative:VALue?

Function	Queries the relative value.
Syntax	:CALCulate:RELative:VALue?
	The range and resolution depend on the pressure measurement (display) range.
Example	:CALCULATE:RELATIVE:VALUE?
	-> :CALCULATE:RELATIVE: VALUE 200.000E+00

:CALCulate:SCALing?

Function	Queries all scaling settings.
Syntax	:CALCulate:SCALing?

:CALCulate:SCALing:FIXed?

Function	Queries all settings related to the fix decimal point mode of scaling.
Syntax	:CALCulate:SCALing:FIXed?

:CALCulate:SCALing:FIXed:POINt

Function	Sets or queries the on/off state of the fixed decimal point mode of scaling.
Syntax	:CALCulate:SCALing:FIXed: POINt <Boolean>
	:CALCulate:SCALing:FIXed:POINt?
	ON|1: Fixed decimal point display
	OFF|0: Floating decimal point display
Example	:CALCULATE:SCALING:FIXED:POINT ON
	:CALCULATE:SCALING:FIXED:POINT?
	-> :CALCULATE:SCALING:FIXED:POINT 1

:CALCulate:SCALing:FIXed:VALue

Function	Sets or queries the fixed exponent of the fixed decimal point mode of scaling.
Syntax	:CALCulate:SCALing:FIXed:VALue <NR1>
	:CALCulate:SCALing:FIXed:VALue?
	<NR1> = -24 to 24
Example	:CALCULATE:SCALING:FIXED:VALUE 14
	:CALCULATE:SCALING:FIXED:VALUE?
	-> :CALCULATE:SCALING:FIXED:VALUE 14
Description	If a value outside the setting range is specified, a "222:Data out of range" error will occur.

:CALCulate:SCALing:INPut

Function	Sets or queries the method of setting the scaling coefficient and offset of scaling.
Syntax	:CALCulate:SCALing:INPut {TWO|DIRect}
	:CALCulate:SCALing:INPut?
	TWO: 2-point mode
	DIRect: Direct input mode
Example	:CALCULATE:SCALING:INPUT TWO
	:CALCULATE:SCALING:INPUT?
	-> :CALCULATE:SCALING:INPUT TWO

:CALCulate:SCALing:PARameter?

Function   Queries all scaling parameter settings.

Syntax   :CALCulate:SCALing:PARameter?

:CALCulate:SCALing:PARameter:A

Function   Sets or queries scaling coefficient A for scaling direct input mode.

Syntax   :CALCulate:SCALing:PARameter:A <NRf>

      :CALCulate:SCALing:PARameter:A?

      <NRf> = -9.99999E±24 to +9.99999E±24 without a unit

Example   :CALCULATE:SCALING:PARAMETER:A 10

      :CALCULATE:SCALING:PARAMETER:A?

      -> :CALCULATE:SCALING:PARAMETER:
A 10.0000E+00

Description If a value outside the setting range is specified, a "222:Data out of range" error will occur.

:CALCulate:SCALing:PARameter:B

Function   Sets or queries offset B for scaling direct input mode.

Syntax   :CALCulate:SCALing:PARameter:B <NRf>

      :CALCulate:SCALing:PARameter:B?

      <NRf> = -9.99999E±24 to +9.99999E±24 without a unit

Example   :CALCULATE:SCALING:PARAMETER:B 0.1

      :CALCULATE:SCALING:PARAMETER:B?

      -> :CALCULATE:SCALING:PARAMETER:
B 100.000E-03

Description If a value outside the setting range is specified, a "222:Data out of range" error will occur.

:CALCulate:SCALing:PARameter:SCALe?

Function   Queries all scale settings for scaling 2-point mode.

Syntax   :CALCulate:SCALing:PARameter:SCALe?

:CALCulate:SCALing:PARameter:SCALe:LOWer

Function   Sets or queries the lower scaling limit for scaling 2-point mode.

Syntax   :CALCulate:SCALing:PARameter:SCALe:LOWer <NRf>

      :CALCulate:SCALing:PARameter:SCALe:LOWer?

      <NRf> = -9.99999E±24 to +9.99999E±24 without a unit

Example   :CALCULATE:SCALING:PARAMETER:SCALE:LOWER -50

      :CALCULATE:SCALING:PARAMETER:SCALE:LOWER?

      -> :CALCULATE:SCALING:PARAMETER:
SCALE:LOWER -50.0000E+00

Description If a value outside the setting range is specified, a "222:Data out of range" error will occur.

:CALCulate:SCALing:PARameter:SCALe:UPPer

Function   Sets or queries the upper scaling limit for scaling 2-point mode.

Syntax   :CALCulate:SCALing:PARameter:SCALe:UPPer <NRf>

      :CALCulate:SCALing:PARameter:SCALe:UPPer?

      <NRf> = -9.99999E±24 to +9.99999E±24 without a unit

Example   :CALCULATE:SCALING:PARAMETER:SCALE:UPPER 50

      :CALCULATE:SCALING:PARAMETER:SCALE:UPPER?

      -> :CALCULATE:SCALING:PARAMETER:
SCALE:UPPER 50.0000E+00

Description If a value outside the setting range is specified, a "222:Data out of range" error will occur.

:CALCulate:SCALing:PARameter:SPAN?

Function   Queries all span value settings for scaling 2-point mode.

Syntax   :CALCulate:SCALing:PARameter:SPAN?

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:CALCulate:SCALing:PARameter:SPAN:LOWer

Function   Sets or queries the lower span limit for scaling 2-point mode.

Syntax   `:CALCulate:SCALing:PARameter:SPAN:LOWer <NRf>`
`:CALCulate:SCALing:PARameter:SPAN:LOWer?`
`<NRf>` = The setting range and resolution depend on the pressure measurement (display) range.

Example   `:CALCULATE:SCALING:PARAMETER:SPAN:LOWER 10`
`:CALCULATE:SCALING:PARAMETER:SPAN:LOWER?`
`-> :CALCULATE:SCALING:PARAMETER:SPAN:LOWER 10.0000E+00`

Description   • If a value outside the setting range is specified, a "222:Data out of range" error will occur.
• The unit is set using ":SENSe:UNIT."

:CALCulate:SCALing:PARameter:SPAN:UPPer

Function   Sets or queries the upper span limit for scaling 2-point mode.

Syntax   `:CALCulate:SCALing:PARameter:SPAN:UPPer <NRf>`
`:CALCulate:SCALing:PARameter:SPAN:UPPer?`
`<NRf>` = The setting range and resolution depend on the pressure measurement (display) range.

Example   `:CALCULATE:SCALING:PARAMETER:SPAN:UPPER 200.000`
`:CALCULATE:SCALING:PARAMETER:SPAN:UPPER?`
`-> :CALCULATE:SCALING:PARAMETER:SPAN:UPPER 200.000E+00`

Description   • If a value outside the setting range is specified, a "222:Data out of range" error will occur.
• The unit is set using ":SENSe:UNIT."

:CALCulate:SCALing:STATe

Function   Sets or queries the on/off state of the scaling function.

Syntax   `:CALCulate:SCALing:STATe <Boolean>`
`:CALCulate:SCALing:STATe?`
ON|1: Scaling on
OFF|0: Scaling off

Example   `:CALCULATE:SCALING:STATE ON`
`:CALCULATE:SCALING:STATE?`
`-> :CALCULATE:SCALING:STATE 1`

:CALCulate:SCALing:UNIT:STRing

Function   Sets or queries the user unit string of scaling.

Syntax   `:CALCulate:SCALing:UNIT:STRING <String>`
`:CALCulate:SCALing:UNIT:STRing?`
`<String>` = Up to 15 characters
0 to 9, A to Z, a to z, /, @, -, blank

Example   `:CALCULATE:SCALING:UNIT:STRING`
`:CALCULATE:SCALING:UNIT:STRING?`
`-> :CALCULATE:SCALING:UNIT:STRING "11ABCdef"`

Description   If `<String>` is too long or contains an invalid character, a "151: Invalid string data" error will occur.

:CALCulate:TILT?

Function   Queries all settings of the tilt correction function.

Syntax   `:CALCulate:TILT?`

:CALCulate:TILT:ALARm:STATe

Function   Sets or queries the on/off state of the tilt alarm of the tilt correction function.

Syntax   `:CALCulate:TILT:ALARm:STATe <Boolean>`
`:CALCulate:TILT:ALARm:STATe?`
ON|1: Tilt alarm on
OFF|0: Tilt alarm off

Example   `:CALCULATE:TILT:ALARM:STATE ON`
`:CALCULATE:TILT:ALARM:STATE?`
`-> :CALCULATE:TILT:ALARM:STATE 1`

Description   On gauge pressure or differential pressure models, a "241: Hardware missing" error will occur.
If the relative value display function, MAX/MIN display function, scaling, leak test, statistical processing, or percentage display function is in progress, or if the store function is in the START state (:STORe:STATe ON), a "053: Attempted to perform an operation not allowed in the instrument's current mode" error will occur.

:CALCulate:TILT:ALARm:RESult?

Function   Queries the judgment result of the tilt alarm of the tilt correction function.

Syntax   `:CALCulate:TILT:ALARm:RESult?`

Example   `:CALCULATE:TILT:ALARM:RESULT?`
     `-> :CALCULATE:TILT:ALARM:RESULT 0`

Description   • On gauge pressure or differential pressure models, a "241: Hardware missing" error will occur.
     • The bit assignments of the tilt alarm judgment result are as follows.

Bit No	Name	Description
0	HORIZONTAL	Set to 1 when the tilt alarm judgment result is "HORIZONTAL".
1	VERTICAL	Set to 1 when the tilt alarm judgment result is "VERTICAL".
2	-	Always zero
3	-	Always zero
4	-	Always zero
5	-	Always zero
6	-	Always zero
7	-	Always zero

:CALCulate:TILT:CORRection?

Function   Queries all correction settings of the tilt correction function.

Syntax   `:CALCulate:TILT:CORRection?`

:CALCulate:TILT:CORRection:HSET

Function   Assigns the measured pressure value to the pressure value when the instrument is horizontal.

Syntax   `:CALCulate:TILT:CORRection:HSET`

Example   `:CALCULATE:TILT:CORRECTION:HSET`

Description   On gauge pressure or differential pressure models, a "241: Hardware missing" error will occur.
If the measured pressure value is over-range or overflow, the pressure value when the instrument is horizontal cannot be set automatically. A "056: Overrange or overflow occurred in the measured pressure value" execution error will occur.

:CALCulate:TILT:CORRection:STATe

Function   Sets or queries the on/off state of the correction for the tilt correction function.

Syntax   `:CALCulate:TILT:CORRection:STATe <Boolean>`
     `:CALCulate:TILT:CORRection:STATe?`
     ON|1: Correction on
     OFF|0: Correction off

Example   `:CALCULATE:TILT:CORRECTION:STATE ON`
     `:CALCULATE:TILT:CORRECTION:STATE?`
     `-> :CALCULATE:TILT:CORRECTION:STATE 1`

Description   On gauge pressure or differential pressure models, a "241: Hardware missing" error will occur.
If the relative value display function, MAX/MIN display function, scaling, leak test, statistical processing, or percentage display function is in progress, or if the store function is in the START state (:STORe:STATe ON), a "053: Attempted to perform an operation not allowed in the instrument's current mode" error will occur.

:CALCulate:TILT:CORRection:VALue

Function   Sets or queries the correction value of the tilt correction function.

Syntax   `:CALCulate:TILT:CORRection:VALue <NRf>`
     `:CALCulate:TILT:CORRection:VALue?`
     <NRf> = The setting range and resolution depend on the setting range and resolution of the corrcetion value of the tilt correction function.

Example   `:CALCULATE:TILT:CORRECTION:VALUE -0.650`
     `:CALCULATE:TILT:CORRECTION:VALUE?`
     `-> :CALCULATE:TILT:CORRECTION:VALUE -650.000E-03`

Description   • On gauge pressure or differential pressure models, a "241: Hardware missing" error will occur.
If the correction for tilt correction is ON, a "053: Attempted to perform an operation not allowed in the instrument's current mode" error will occur.
If a value outside the setting range is entered, a "222:Data out of range" error will occur.
     • The unit is set using ":SENSe:UNIT."

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:CALCulate:TILT:CORRection:VH:EXECute

Function   Executes the calculation of the correction for the tilt correction function.

Syntax   :CALCulate:TILT:CORRection:VH:EXECute

Example   :CALCULATE:TILT:CORRECTION:VH:EXECUTE

Description • On gauge pressure or differential pressure models, a "241: Hardware missing" error will occur.
    If the correction for the tilt correction is ON, or if you execute this command with the calculation result outside the correction value setting range, a "053: Attempted to perform an operation not allowed in the instrument's current mode" error will occur.
  • The unit is set using ":SENSe:UNIT."

:CALCulate:TILT:CORRection:VSET

Function   Assigns the measured pressure value to the pressure value when the instrument is vertical.

Syntax   :CALCulate:TILT:CORRection:VSET

Example   :CALCULATE:TILT:CORRECTION:VSET

Description On gauge pressure or differential pressure models, a "241: Hardware missing" error will occur.
    If the measured pressure value is over-range or overflow, the pressure value when the instrument is vertical cannot be set automatically. A "056: Overrange or overflow occurred in the measured pressure value" execution error will occur.

11.3 COMMunicate Group

The commands in this group deal with communications.

There are no front panel keys that correspond to the commands in this group.

:COMMunicate?
Function	Queries all communication settings.
Syntax	:COMMunicate?

:COMMunicate:HEADer
Function	Sets or queries whether headers are attached to query responses.
Syntax	:COMMunicate:HEADer <Boolean>
	:COMMunicate:HEADer?
	ON|1: Headers are attached.
	OFF|0: Headers are not attached.
Example	:COMMUNICATE:HEAD ON
	:COMMUNICATE:HEAD?
	-> :COMMUNICATE:HEADER 1

:COMMunicate:LOCKout
Function	Sets or queries the local lockout state.
Syntax	:COMMunicate:LOCKout <Boolean>
	:COMMunicate:LOCKout?
Example	:COMMUNICATE:LOCK ON
	:COMMUNICATE:LOCK?
	-> :COMMUNICATE:LOCKOUT 1
Description	When a virtual COM port is in use, the instrument is artificially placed in a GP-IB local lockout mode.

:COMMunicate:REMote
Function	Sets or queries whether the instrument is in remote or local mode.
Syntax	:COMMunicate:REMote <Boolean>
	:COMMunicate:REMote?
	ON|1: Remote
	OFF|0: Local
Example	:COMMUNICATE:REMOTE ON
	:COMMUNICATE:REMOTE?
	-> :COMMUNICATE:REMOTE 1
Description	When a virtual COM port is in use, the instrument is artificially placed in a GP-IB remote mode.

:COMMunicate:VERBose
Function	Sets or queries whether the response to a query is returned fully spelled out or in its abbreviated form.
Syntax	:COMMunicate:VERBose <Boolean>
	:COMMunicate:VERBose?
	ON|1: Returned fully spelled out
	OFF|0: Returned in abbreviated form
Example	:COMMUNICATE:VERBOSE ON
	:COMMUNICATE:VERBOSE?
	-> :COMMUNICATE:VERBOSE 1
Description	Example of a response fully spelled out
	:COMMUNICATE:VERBOSE 1
	Example of a response in abbreviated form
	:COMM:VERB 0

:COMMunicate:WAIT
Function	Waits for a specified extended event to occur.
Syntax	:COMMunicate:WAIT <Register>
	<Register> = 0 to 65535 (extended event register)
Example	:COMMUNICATE:WAIT #H0008
Description	For details on how to use the :COMMunicate:WAIT command to synchronize the instrument, see section 10.5.
	For details on the extended event register, see section 12.4.

:COMMunicate:WAIT?
Function	Creates the response that is returned when a specified extended event occurs.
Syntax	:COMMunicate:WAIT? <Register>
	<Register> = 0 to 65535 (extended event register)
Example	:COMMUNICATE:WAIT? 65535 -> 1
Description	For details on the extended event register, see section 12.4.

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Commands

11.4 MEASure Group

The commands in this group deal with pressure measurement and DMM measurement output.
There are no front panel keys that correspond to the commands in this group.

:MEASure:DMM?

Function   Queries the DMM measurement value.

Syntax   :MEASure:DMM?

Example   :MEASURE:DMM? ->

            5 V range

            :MEASURE:DMM 5.0000E+00

            20 mA range

            :MEASURE:DMM 20.000E-03

Description • If the value is +OverRange or +OverFlow,
              9.90E+37 is returned.
              If the value is -OverRange or -OverFlow,
              -9.90E+37 is returned.
              If there is no data or if the DMM function is off ,
              9.91E+37 is returned.
            • On models without the /DM option, a "241:
              Hardware missing" error will occur.

:MEASure:PRESsure?

Function   Queries the measured pressure.

Syntax   :MEASure:PRESsure?

            The setting range and resolution depend on the
            pressure measurement (display) range

Example   :MEASURE:PRESSURE?

            -> :MEASURE:PRESSURE 200.000E+00

Description If the value is +OverRange or +OverFlow,
            9.90E+37 is returned.
            If the value is -OverRange or -OverFlow,
            -9.90E+37 is returned.
            If there is no data, 9.91E+37 is returned.

11.5 OUTPut Group

The commands in this group deal with D/A output and 24 VDC output.

The front panel key that corresponds to the commands in this group is ON/OFF. The commands also correspond to the D/A soft key.

:OUTPut?
Function   Queries all the settings of the output function.
Syntax   :OUTPut?

:OUTPut:DA?
Function   Queries all D/A output settings.
Syntax   :OUTPut:DA?
Description On models without the /DA option, a "241: Hardware missing" error will occur.

:OUTPut:DA:DYNamic
Function   Sets or queries the on/off state of the D/A output dynamic mode.
Syntax   :OUTPut:DA:DYNamic <Boolean>
           :OUTPut:DA:DYNamic?
           ON|1: D/A output dynamic mode on
           OFF|0: D/A output dynamic mode off
Example   :OUTPUT:DA:DYNAMIC ON
           :OUTPUT:DA:DYNAMIC?
           -> :OUTPUT:DA:DYNAMIC 1
Description On models without the /DA or /F1 option, a "241: Hardware missing" error will occur.

:OUTPut:DA:RANGe
Function   Sets or queries the D/A output range.
Syntax   :OUTPut:DA:RANGe <Voltage>
           :OUTPut:DA:RANGe?
           <Voltage> = 2, 5 (V)
Example   :OUTPUT:DA:RANGE 2V
           • When <Voltage> is 2 V
             :OUTPUT:DA:RANGE?
             -> :OUTPUT:DA:RANGE 2.0E+00
           • When <Voltage> is 5 V
             :OUTPUT:DA:RANGE?
             -> :OUTPUT:DA:RANGE 5.0E+00
Description On models without the /DA option, a "241: Hardware missing" error will occur.

:OUTPut:DA:SCALing?
Function   Queries all D/A scaling settings.
Syntax   :OUTPut:DA:SCALing?
Description On models without the /DA option, a "241: Hardware missing" error will occur.

:OUTPut:DA:SCALing:INPut
Function   Sets or queries the parameter mode used for D/A scaling.
Syntax   :OUTPut:DA:SCALing:INPut {TWO|DIRect}
           :OUTPut:DA:SCALing:INPut?
           TWO: 2-point mode
           DIRect: Direct input mode
Example   :OUTPUT:DA:SCALING:INPUT TWO
           :OUTPUT:DA:SCALING:INPUT?
           -> :OUTPUT:DA:SCALING:INPUT TWO
Description On models without the /DA option, a "241: Hardware missing" error will occur.

:OUTPut:DA:SCALing:PARameter?
Function   Queries all D/A scaling parameter settings.
Syntax   :OUTPut:DA:SCALing:PARameter?
Description On models without the /DA option, a "241: Hardware missing" error will occur.

:OUTPut:DA:SCALing:PARameter:AUTO:OFFSet
Function   Assigns the measured pressure value to the D/A scaling offset.
Syntax   :OUTPut:DA:SCALing:PARameter:AUTO:OFFSet
Example   :OUTPUT:DA:SCALING:PARAMETER:AUTO:OFFSET
Description • On models without the /DA option, a "241: Hardware missing" error will occur.
           If the measured pressure value is outside the setting range, a "053: Attempted to perform an operation not allowed in the instrument's current mode" error will occur. In addition, if the measured pressure value is over-range or overflow, a "056: Overrange or overflow occurred in the measured pressure value" error will occur. In either case, the offset cannot be set automatically.
           • The unit is fixed to kPa.

:OUTPut:DA:SCALing:PARameter:GAIN

Function   Sets or queries the D/A scaling gain.

Syntax   :OUTPut:DA:SCALing:PARameter:
            GAIN <NRf>
            :OUTPut:DA:SCALing:PARameter:GAIN?
            <NRf> = The setting range and resolution depend
                    on the setting range and resolution of
                    the D/A scaling gain.

Example   :OUTPUT:DA:SCALING:PARAMETER:
            GAIN 40.000
            :OUTPUT:DA:SCALING:PARAMETER:GAIN?
            -> :OUTPUT:DA:SCALING:PARAMETER:
               GAIN 40.000E+00

Description • On models without the /DA option, a "241:
              Hardware missing" error will occur.
              If a value outside the setting range is entered,
              a "222:Data out of range" error will occur.
            • The unit is fixed to kPa.

:OUTPut:DA:SCALing:PARameter:OFFSet

Function   Sets or queries the D/A scaling offset.

Syntax   :OUTPut:DA:SCALing:PARameter:
            OFFSet <NRf>
            :OUTPut:DA:SCALing:PARameter:OFFSet?
            <NRf> = The setting range and resolution depend
                    on the setting range and resolution of
                    the D/A scaling offset.

Example   :OUTPUT:DA:SCALING:PARAMETER:
            OFFSET 0.000
            :OUTPUT:DA:SCALING:PARAMETER:OFFSET?
            -> :OUTPUT:DA:SCALING:PARAMETER:
               OFFSET 0.000E+00

Description • On models without the /DA option, a "241:
              Hardware missing" error will occur.
              If a value outside the setting range is entered,
              a "222:Data out of range" error will occur.
            • The unit is fixed to kPa.

:OUTPut:DA:SCALing:PARameter:SCALe?

Function   Queries all scale value settings for D/A scaling.

Syntax   :OUTPut:DA:SCALing:PARameter:SCALe?

Description On models without the /DA option, a "241:
            Hardware missing" error will occur.

:OUTPut:DA:SCALing:PARameter:SCALe:LOWer

Function   Sets or queries the lower scaling limit for D/A
            scaling.

Syntax   :OUTPut:DA:SCALing:PARameter:SCALe:
            LOWer <Voltage>
            :OUTPut:DA:SCALing:PARameter:SCALe:
            LOWer?
            <Voltage> = The setting range and resolution
                        depend on the setting range and
                        resolution of the scale value for D/A
                        scaling.

Example   :OUTPUT:DA:SCALING:PARAMETER:SCALE:
            LOWER -5.0000V
            :OUTPUT:DA:SCALING:PARAMETER:SCALE:
            LOWER?
            -> :OUTPUT:DA:SCALING:PARAMETER:
               SCALE:LOWER -5.0000

Description On models without the /DA option, a "241:
            Hardware missing" error will occur.
            If a value outside the setting range is entered, a
            "222:Data out of range" error will occur.

:OUTPut:DA:SCALing:PARameter:SCALe:UPPer

Function   Sets or queries the upper scaling limit for D/A
            scaling.

Syntax   :OUTPut:DA:SCALing:PARameter:SCALe:
            UPPer <Voltage>
            :OUTPut:DA:SCALing:PARameter:SCALe:
            UPPer?
            <Voltage> = The setting range and resolution
                        depend on the setting range and
                        resolution of the scale value for D/A
                        scaling.

Example   :OUTPUT:DA:SCALING:PARAMETER:SCALE:
            UPPER 5.0000V
            :OUTPUT:DA:SCALING:PARAMETER:SCALE:
            UPPER?
            -> :OUTPUT:DA:SCALING:PARAMETER:
               SCALE:UPPER 5.0000

Description On models without the /DA option, a "241:
            Hardware missing" error will occur.
            If a value outside the setting range is entered, a
            "222:Data out of range" error will occur.

:OUTPut:DA:SCALing:PARameter:SPAN?

Function   Queries all span value settings for D/A scaling.

Syntax   :OUTPut:DA:SCALing:PARameter:SPAN?

Description On models without the /DA option, a "241:
            Hardware missing" error will occur.

:OUTPut:DA:SCALing:PARameter:SPAN:LOWer

Function   Sets or queries the lower span limit for D/A scaling.

Syntax   :OUTPut:DA:SCALing:PARameter:SPAN:LOWer <NRf>
             :OUTPut:DA:SCALing:PARameter:SPAN:LOWer?
             <NRf> = The setting range and resolution depend on the setting range and resolution of the span value for D/A scaling.

Example   :OUTPUT:DA:SCALING:PARAMETER:SPAN:LOWER -200.000
             :OUTPUT:DA:SCALING:PARAMETER:SPAN:LOWER?
             -> :OUTPUT:DA:SCALING:PARAMETER:SPAN:LOWER -200.000E+00

Description • On models without the /DA option, a "241: Hardware missing" error will occur.
               If a value outside the setting range is entered, a "222:Data out of range" error will occur.
             • The unit is fixed to kPa.

:OUTPut:DA:SCALing:PARameter:SPAN:UPPer

Function   Sets or queries the upper span limit for D/A scaling.

Syntax   :OUTPut:DA:SCALing:PARameter:SPAN:UPPer <NRf>
             :OUTPut:DA:SCALing:PARameter:SPAN:UPPer?
             <NRf> = The setting range and resolution depend on the setting range and resolution of the span value for D/A scaling.

Example   :OUTPUT:DA:SCALING:PARAMETER:SPAN:UPPER 200.000
             :OUTPUT:DA:SCALING:PARAMETER:SPAN:UPPER?
             -> :OUTPUT:DA:SCALING:PARAMETER:SPAN:UPPER 200.000E+00

Description • On models without the /DA option, a "241: Hardware missing" error will occur.
               If a value outside the setting range is entered, a "222:Data out of range" error will occur.
             • The unit is fixed to kPa.

:OUTPut:DA:SCALing:STATe

Function   Sets or queries the on/off state of D/A scaling.

Syntax   :OUTPut:DA:SCALing:STATe <Boolean>
             :OUTPut:DA:SCALing:STATe?
             ON|1: D/A scaling on
             OFF|0: D/A scaling off

Example   :OUTPUT:DA:SCALING:STATE ON
             :OUTPUT:DA:SCALING:STATE?
             -> :OUTPUT:DA:SCALING:STATE 1

Description On models without the /DA option, a "241: Hardware missing" error will occur.

:OUTPut:DA:STATe

Function   Sets or queries the on/off state of D/A output.

Syntax   :OUTPut:DA:STATe <Boolean>
             :OUTPut:DA:STATe?
             ON|1: D/A output on
             OFF|0: D/A output off

Example   :OUTPUT:DA:STATE ON
             :OUTPUT:DA:STATE?
             -> :OUTPUT:DA:STATE 1

Description On models without the /DA option, a "241: Hardware missing" error will occur.

:OUTPut:V24out?

Function   Queries all 24 VDC output settings.

Syntax   :OUTPut:V24out?

Description On models without the /DM option, a "241: Hardware missing" error will occur.

:OUTPut:V24out:STATe

Function   Sets or queries the on/off state of 24 VDC output.

Syntax   :OUTPut:V24out:STATe <Boolean>
             :OUTPut:V24out:STATe?
             ON|1: 24 VDC output on
             OFF|0: 24 VDC output off

Example   :OUTPUT:V24OUT:STATE ON
             :OUTPUT:V24OUT:STATE?
             -> :OUTPUT:V24OUT:STATE 1

Description On models without the /DM option, a "241: Hardware missing" error will occur.

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Commands

11.6   SENSe Group

The commands in this group deal with the measurement settings.
The front panel key that corresponds to the commands in this group is ZERO CAL. The commands also correspond to the Trigger, IntegTime, Unit, and DMM soft keys.

:SENSe?

Function	Queries all the settings of the measurement function.
Syntax	`:SENSe?`

:SENSe:DMM?

Function	Queries all the settings of the DMM function.
Syntax	`:SENSe:DMM?`
Description	On models without the /DM option, a "241: Hardware missing" error will occur.

:SENSe:DMM:AVERage[:STATe]

Function	Sets or queries the on/off state of averaging (moving average) of the DMM function.

Syntax	`:SENSe:DMM:AVERage[:STATe] <Boolean>`
	`:SENSe:DMM:AVERage[:STATe]?`
	ON|1: Averaging on
	OFF|0: Averaging off

Example	`:SENSE:DMM:AVERAGE:STATE ON`
	`:SENSE:DMM:AVERAGE:STATE?`
	`-> :SENSE:DMM:AVERAGE 1`

Description	On models without the /DM option, a "241: Hardware missing" error will occur.

:SENSe:DMM:OHM250[:STATe]

Function	Sets or queries the on/off state of the communication resistor (250 Ω) of the DMM function.

Syntax	`:SENSe:DMM:OHM250[:STATe] <Boolean>`
	`:SENSe:DMM:OHM250[:STATe]?`
	ON|1: Communication resistor on
	OFF|0: Communication resistor off

Example	`:SENSE:DMM:OHM250:STATE ON`
	`:SENSE:DMM:OHM250?`
	`-> :SENSE:DMM:OHM250 1`

Description	On models without the /DM option, a "241: Hardware missing" error will occur.

:SENSe:DMM:RANGe

Function	Sets or queries the measurement range of the DMM function.

Syntax	`:SENSe:DMM:RANGe {VOLTage,<Voltage>|`
	`CURRent,<Current>}`
	`:SENSe:DMM:RANGe?`
	<Voltage>: 5 (V)
	<Current>: 20 (mA)

Example	`:SENSE:DMM:RANGE VOLTAGE,5V`
	• When <Voltage> is 5 V
	  `:SENSE:DMM:RANGE?`
	  `-> :SENSE:DMM:RANGE VOLTAGE,`
	     `5.000E+00`
	• When <Current> is 20 mA
	  `:SENSE:DMM:RANGE?`
	  `-> :SENSE:DMM:RANGE CURRENT,`
	     `20.0E-03`

Description	On models without the /DM option, a "241: Hardware missing" error will occur.

:SENSe:DMM:STATe

Function	Set or queries the on/off state of the DMM function.

Syntax	`:SENSe:DMM:STATe <Boolean>`
	`:SENSe:DMM:STATe?`
	ON|1: DMM function on
	OFF|0: DMM function off

Example	`:SENSE:DMM:STATE ON`
	`:SENSE:DMM:STATE?`
	`-> :SENSE:DMM:STATE 1`

Description	On models without the /DM option, a "241: Hardware missing" error will occur.

:SENSe:ITIMe

Function	Sets or queries the measurement integration time.

Syntax	`:SENSe:ITIMe <Time>`
	`:SENSe:ITIMe?`
	<Time> = 0.25, 1.5, 2.5, 4 (s)

Example	`:SENSE:ITIME 0.25S`
	The following is an example for when <Time> is 250 ms.
	`:SENSE:ITIME?`
	`-> :SENSE:ITIME 250.0E-03`

:SENSe:MODE

Function   Sets or queries the measurement mode.
Syntax   :SENSe:MODE {STANdard|MIDDle|FAST}
            :SENSe:MODE?
            STANdard: Normal measurement mode
            MIDDle: Mid-speed measurement mode
            FAST: High-speed measurement mode
Example   :SENSE:MODE STANDARD
            :SENSE:MODE?
            -> :SENSE:MODE STANDARD
Description On models without the /F1 option, a "241:
            Hardware missing" error will occur.

:SENSe:TRIGger?

Function   Queries all trigger settings.
Syntax   :SENSe:TRIGger?

:SENSe:TRIGger:DELay

Function   Sets or queries the trigger delay.
Syntax   :SENSe:TRIGger:DELay <Time>
            :SENSe:TRIGger:DELay?
            <Time> = 0 ms to 10 s   Resolution: 1 ms
Example   :SENSE:TRIGGER:DELAY 100MS
            :SENSE:TRIGGER:DELAY?
            -> :SENSE:TRIGGER:DELAY 0.100

:SENSe:TRIGger:LED

Function   Sets or queries the on/off state of the TRIG key
            indicator.
Syntax   :SENSe:TRIGger:LED <Boolean>
            :SENSe:TRIGger:LED?
            ON|1: The LED of the TRIG key lights each time
                it is triggered.
            OFF|0: The LED of the TRIG key is turned off.
Example   :SENSE:TRIGGER:LED ON
            :SENSE:TRIGGER:LED?
            -> :SENSe:TRIGger:LED 1

:SENSe:TRIGger:MODE

Function   Sets or queries the trigger mode.
Syntax   :SENSe:TRIGger:MODE {INTernal|
            EXTernal|SYNC}
            :SENSe:TRIGger:MODE?
            INTernal: Internal trigger
            EXTernal: External trigger
            SYNC: Sync trigger
Example   :SENSE:TRIGGER:MODE INTERNAL
            :SENSE:TRIGGER:MODE?
            -> :SENSE:TRIGGER:MODE EXTERNAL

:SENSe:UNIT

Function   Sets or queries the pressure unit.
Syntax   :SENSe:UNIT {PA|HPA|KPA|MPA|MBAR|
            BAR|ATM}
            PA: Pa
            HPA: hPa
            KPA: kPa
            MPA: MPa
            MBAR: mbar
            BAR: bar
            ATM: atm
            On -U1 models, the above units can be used.
            For -U2 models, see appendix 2 in the Getting
            Started Guide (IM MT300-02EN).
Example   :SENSE:UNIT KPA
            :SENSE:UNIT? -> :SENSE:UNIT KPA

:SENSe:ZERO:EXECute

Function   Executes a zero calibration.
Syntax   :SENSe:ZERO:EXECute
Example   :SENSE:ZERO:EXECUTE
Description • A "053: Attempted to perform an operation not
            allowed in the instrument's current mode" error
            will occur in the following cases:
            • When Z.Lock is enabled
            • When the relative value display function,
              MAX/MIN display function, leak test, statistical
              processing, or percentage display function is
              in progress
            • When the storage function is in the START
              state (:STORe:STATe ON)
            • When the tilt alarm and correction of the tilt
              correction are on
            • When display hold is on
          • If the measured pressure is over-range or
            overflow, a "056: Overrange or overflow
            occurred in the measured pressure value" error
            will occur.

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:SENSe:ZERO:EXECute:REFerence

Function Executes a zero calibration with an offset on an absolute pressure model.

Syntax :SENSe:ZERO:EXECute:REFerence <NRf>
<NRf> = 0 to 1.0000 (models without the /R1 option)
0 to 1.00000 (models with the /R1 option)

Example :SENSE:ZERO:EXECUTE:REFERENCE 1.000

Description
• On gauge pressure or differential pressure models, a "241: Hardware missing" error will occur.
  • A "053: Attempted to perform an operation not allowed in the instrument's current mode" error will occur in the following cases:
    • When Z.Lock is enabled
    • When the relative value display function, MAX/MIN display function, leak test, statistical processing, or percentage display function is in progress
    • When the storage function is in the START state (:STORe:STATe ON)
    • When the tilt alarm and correction of the tilt correction are on
    • When display hold is on
• If the measured pressure is over-range or overflow, a "056: Overrange or overflow occurred in the measured pressure value" error will occur.
• The unit is fixed to kPa.

:SENSe:ZERO:HISTory?

Function Queries the zero calibration history.

Syntax :SENSe:ZERO:HISTory?
Response.<String>
• Gauge pressure/differential pressure model
  "<Date>,0,<Zero CAL value>,<Method>;
  <Date>,0,<Zero CAL value>,<Method>;
  … "
    <Date> = yyyy/mm/dd
    <Zero CAL value> = Measured pressure converted into kPa
    <Method> = Exec or Initialize
• Absolute pressure model
  "<Date>,<Offset value>,<Zero CAL value>,<Method>;<Date>,<Offset value>,<Zero CAL value>,
  <Method>; … "
    <Date> = yyyy/mm/dd
    <Offset> = Entered offset
    <Zero CAL value> = Measured pressure converted into kPa
    <Method> = Exec or Exec (V)

Example
• Gauge pressure/differential pressure model
  :SENSE:ZERO:HISTORY?
  -> :SENSE:ZERO:HISTORY "2019/02/07,
    0.000,0.100,Exec;2019/02/07,0.000,
    0.050,Initialize; … "
• Absolute pressure model
  :SENSE:ZERO:HISTORY?
  -> :SENSE:ZERO:HISTORY "2019/02/07,
    0.000,0.020,Exec;2019/02/07,0.300,
    0.330,Exec(V); … "

Description If there is no history, "NONE" is returned.

:SENSe:ZERO:INITialize

Function Initializes the zero calibration value.

Syntax :SENSe:ZERO:INITialize

Example :SENSE:ZERO:INITIALIZE

Description
• On absolute pressure models, a "241: Hardware missing" error will occur.
  • A "053: Attempted to perform an operation not allowed in the instrument's current mode" error will occur in the following cases:
    • When Z.Lock is enabled
    • When the relative value display function, MAX/MIN display function, leak test, statistical processing, or percentage display function is in progress
    • When the storage function is in the START state (:STORe:STATe ON)
    • When display hold is on

11.7 STATus Group

The commands in this group are used to make settings and queries related to the communication status feature.

There are no front panel keys that correspond to the commands in this group.

For information about status reports, see chapter 12.

:STATus?

Function	Queries all the settings of the communication status feature.
Syntax	:STATus?

:STATus:CONDition?

Function	Queries the contents of the condition register.
Syntax	:STATus:CONDition?
Example	:STATUS:CONDITION? -> :STATUS:CONDITION 16
Description	For information about the condition register, see chapter 12, "Status Reports."

:STATus:EESE

Function	Sets or queries the extended event enable register.
Syntax	:STATus:EESE <Register> :STATus:EESE? <Register> = 0 to 65635
Example	:STATUS:EESE #H7659 :STATUS:EESE? -> :STATUS:EESE 30297
Description	For information about the extended event enable register, see chapter 12, "Status Reports."

:STATus:EESR?

Function	Queries the contents of the extended event register and clears the register.
Syntax	:STATus:EESR?
Example	:STATUS:EESR? -> :STATUS:EESR 1
Description	For information about the extended event register, see chapter 12, "Status Reports."

:STATus:ERRor?

Function	Queries the error code and message of the last error that has occurred (top of the error queue).
Syntax	:STATus:ERRor?
Example	:STATUS:ERROR? -> 113,"Undefine header"

:STATus:FILTer<x>

Function	Sets or queries the transition filter.
Syntax	:STATus:FILTer<x> {BOTH|FALL|RISE|NEVer} :STATus:FILTer<x>? <x> = 1 to 16
Example	:STATUS:FILTER2 RISE :STATUS:FILTER2? -> :STATUS:FILTER2 RISE
Description	• Set how each bit in the condition register must change to trigger the setting of an event. If you specify RISE, a change from 0 to 1 triggers the setting of an event. • For information about the transition filter, see chapter 12, "Status Reports."

:STATus:QENable

Function	Sets or queries whether messages other than errors will be stored to the error queue.
Syntax	:STATus:QENable <Boolean> :STATus:QENable?
Example	:STATUS:QENABLE ON :STATUS:QENABLE? -> :STATUS:QENABLE 1

:STATus:QMESsage

Function	Sets or queries whether message information will be attached to the response to the STATus:ERRor? query.
Syntax	:STATus:QMESsage <Boolean> :STATus:QMESsage?
Example	:STATUS:QMESSAGE OFF :STATUS:QMESSAGE? -> :STATUS:QMESSAGE 0

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11.8 STORe group

The commands in this group deal with the data storage settings.

The front panel keys that correspond to the commands in this group are STORE and START/STOP. The commands also correspond to the Store Setting soft key.

:STORe?
Function	Queries all storage settings.
Syntax	:STORe?

:STORe:CATalog?
Function	Queries the ID list of the stored files.
Syntax	:STORe:CATalog?
	The file IDs are output in order from the latest.
	File ID range = 1 to 200
Example	:STORE:CATALOG?
	-> :STORE:CATALOG "200,199,198, … ,
	2,1,9,10"
Description	If this command is executed while storage is in progress, "0" is returned.

:STORe:COUNt
Function	Sets or queries the data storage count.
Syntax	:STORe:COUNt <NRf>
	:STORe:COUNt?
	<NRf> = 1 to 10000
Example	:STORE:COUNT 100
	:STORE:COUNT?
	-> :STORE:COUNT 100

:STORe:DELete
Function	Deletes the specified file.
Syntax	:STORe:DELete <NRf>
	<NRf> = 1 to 200 (file ID)
Example	:STORE:DELETE 1
Description	If the specified file does not exist, an execution error will occur, and "057: File not found" will be generated.
	If a value outside the setting range is specified, a "222:Data out of range" error will occur.
	You can use ":STORe:CATalog?" to view the file IDs that can be deleted.

:STORe:EXECute
Function	Storage is executed when the storage mode is set to manual.
Syntax	:STORe:EXECute
Example	:STORE:EXECUTE
Description	This command is valid when the storage function is in the START state (:STORe:STATe ON) and the storage mode is set to MANual.

:STORe:USED?
Function	Queries all settings related to the number of files and the total number of occupied data values.
Syntax	:STORe:USED?

:STORe:USED:DATA?
Function	Queries the total number of stored occupied data values.
Syntax	:STORe:USED:DATA?
	Response <Total number of stored occupied data values>
Example	:STORE:USED:DATA?
	-> :STORE:USED:DATA 5000

:STORe:USED:FILE?
Function	Queries the number of stored files.
Syntax	:STORe:USED:FILE?
	Response <Number of stored files>
Example	:STORE:USED:FILE?
	-> :STORE:USED:FILE 150

:STORe:MODE
Function	Sets or queries the storage mode.
Syntax	:STORe:MODE {AUTO|MANual}
	:STORe:MODE?
	AUTO: Auto storage mode
	MANual: Manual storage mode
Example	:STORE:MODE AUTO
	:STORE:MODE?
	-> :STORE:MODE MANUAL

:STORe:PERiod
Function	Sets or queries the storage interval.
Syntax	:STORe:PERiod <Time>
	<Time> = 100, 250, 500 (ms), 1, 2, 5, 10, 30, 60, 120, 300 (s)
	:STORe:PERiod?
Example	:STORE:PERIOD 300S
	:STORE:PERIOD?
	-> :STORE:PERIOD 300.000E+00
Description	If you specify 250 ms when MIDDle or FAST is selected with the ":SENSe:MODE" command, 100 ms will be selected.
	If you specify 100 ms when STANdard is selected with the ":SENSe:MODE" command, 250 ms will be selected.

:STORe:READ:ASCii:DATA<x>?

Function Queries in ASCII format the data in the specified
file ID.

Syntax `:STORe:READ:ASCii:DATA<x>? {TM|PS|PV|`
`DS|DV}`

<x> = 1 to 200 (file ID), 1 if omitted

TM: Requests for the date and time column

PS: Requests for the pressure status column

PV: Requests for the pressure measurement
column

DS: Requests for the DMM status column

DV: Requests for the DMM measurement column

• Response Data sequence
`<Value 1>,<Value 2>, … ,<Value n>`

Example `:STORE:READ:ASCII:DATA? TM`
`-> "2019/01/01 00:00:00",`
`   "2019/01/01 00:00:01", …`
`:STORE:READ:ASCII:DATA? PS`
`-> 3,0,1,0,0,2,0 …`
`:STORE:READ:ASCII:DATA? PV`
`-> 200.000E+00,199.999E+00,198.000E+00 …`

When the DMM status column is requested

• When there is no data
`:STORE:READ:ASCII:DATA? DS -> 3`

• On models without the /DM option or when the
DMM function is off
`:STORE:READ:ASCII:DATA? DS -> 4`

When the DMM measurement column is
requested

• When there is no data or item
`:STORE:READ:ASCII:DATA? DV`
`-> 9.91E+37`

Description • If this command is executed when the specified
file does not exist or when storage is in
progress, no item is returned.

• Date and time column:
<String> format "yyyy/mm/dd hh: mm: ss"
When there is no item: 0000/00/00 00:00:00

• Pressure status column or DMM status column:
<NR1> format

	ASCII format
Normal	0
+OverRange	1
-OverRange	2
No data	3
No item (when the DMM function is off or on models without the /DM option)	4

• Pressure measurement column or DMM
measurement column
Normal data: <NR3> format (mantissa: up
to 7 digits, exponent: 2 digits. Example:
[-]123.456E+00)
Error data:

	ASCII format
+OverRange	"9.90E+37" (+INFinity)
-OverRange	"-9.90E+37" (-INFinity)
No data or no item	"9.91E+37" (Not A Number)

:STORe:READ:BINary:DATA<x>?

Function Queries in binary format the data in the specified
file ID.

Syntax `:STORe:READ:BINary:DATA<x>? {TM|PS|PV|`
`DS|DV}`

<x> = 1 to 200 (file ID), 1 if omitted

TM: Requests for the date and time column

PS: Requests for the pressure status column

PV: Requests for the pressure measurement
column

DS: Requests for the DMM status column

DV: Requests for the DMM measurement column

• Response Data sequence
<Block data>:#N (N-digit number of bytes)
(data byte sequence)

Example `:STORE:READ:BINARY:DATA? TM`
`-> #60000140200010901020204010203040506`
`:STORE:READ:BINARY:DATA? PS`
`-> #60000640001020304 …`
`:STORE:READ:BINARY:DATA? PV`
`-> #60000644069000000000000000406A400`
`   000000000 …`

When the DMM status column is requested

• When there is no data
`:STORE:READ:BINARY:DATA? DS`
`-> #600000103`

When the DMM measurement column is
requested

• On models without the /DM option or when the
DMM function is off
`:STORE:READ:BINARY:DATA? DV`
`-> #600000847D2A37DCED46143`

Description • If this command is executed when the specified
file does not exist or when storage is in
progress, no item is returned.

• Date and time column:
yyyymmddhhmmss, 14-byte byte sequence
For 12:34:56 on December 24, 2019:
0200010901020204010203040506

1-byte hexadecimal

No item: 0000000000000000000000000000

• Pressure status column or DMM status column:
1-byte byte sequence

	Binary format
Normal	00
+OverRange	01
-OverRange	02
No data	03
No item (when the DMM function is off or on models without the /DM option)	04

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• Pressure measurement column or DMM
measurement column
Normal data:
IEEE double-precision floating point (8-byte)
format
Error data:

	Binary format
+OverRange	0x47D29EAD3677AF6F (+9.90E+37)
-OverRange	0xC7D29EAD3677AF6F (-9.90E+37)
No data or no item	0x47D2A37DCED46143 (9.91E+37)

:STORe:READ:BINary:ENDian?
Function   Sets or queries the endian (little or big) of the
            binary data.
Syntax   :STORe:DATA:ENDian {LITTle|BIG}
            :STORe:DATA:ENDian?
            LITTle: The byte order of binary format is set to
                    little endian.
            BIG: The byte order of binary format is set to
                    big endian.
Example   :STORE:DATA:ENDIAN LITTLE
            :STORE:DATA:ENDIAN? -> LITTLE

:STORe:READ:COUNt<x>?
Function   Queries the number of stored data values at the
            specified file ID.
Syntax   :STORe:READ:COUNt<x>?
            <x> = 1 to 200 (file ID), 1 if omitted
Example   :STORE:READ:COUNT2?
            -> :STORE:READ:COUNT2 0
Description The number of measured data values stored in
            the specified file ID is output. If this command is
            executed when the specified file does not exist or
            when storage is in progress, 0 is returned.

:STORe:READ:DATE<x>?
Function   Queries the storage start date and time of the
            specified file ID.
Syntax   :STORe:READ:DATE<x>?
            <x> = 1 to 200 (file ID), 1 if omitted
Example   :STORE:READ:DATE3?
            -> :STORE:READ:DATE3 "2019/03/06 00:
               00:00"
Description The storage start date and time stored in the
            specified file ID are output. If this command
            is executed when the specified file does
            not exist or when storage is in progress,
            "0000/00/00 00:00:00" is returned.

:STORe:STATe
Function   Set or queries the on/off state of the storage
            function.
Syntax   :STORe:STATe <Boolean>
            :STORe:STATe?
            ON|1: Storage function start
            OFF|0: Storage function stop
Example   :STORE:STATE 1
            :STORE:STATE?
            -> :STORE:STATE 1
Description • The instrument switches to storage start state
              when the ":STORe:STATe ON" command is
              executed. Storage is not executed yet.
              ": STORe: MODE"The data storage timing
              varies depending on the storage mode selected
              with the ":STORe:MODE" command.
            • When the storage mode is set to AUTO, data
              is stored based on trigger input. (The timing at
              which data is stored varies depending on the
              trigger mode. For details, see section 5.1.)
              When the storage mode is set to MANual,
              measured data (measured pressure, DMM
              measurement value (when the DMM function
              is set to on)) is stored when you press STORE
              or when the ":STORe:EXECute" is received.
            • When the number of data values specified
              by ":STORe:COUNt" are stored, the storage
              mode is automatically turned off, and the
              START/STOP key LED turns off. When the
              ":STORe:STATe OFF" command is executed,
              storage is terminated, the START/STOP key
              LED turns off.

:STORe:UPDate:LIST
Function   Updates the list of CSV files displayed on the PC.
Syntax   :STORe:UPDate:LIST
Example   :STORE:UPDATE:LIST

11.9 SYSTem Group

The commands in this group deal with communication, ground condition, and beep settings.
There are no front panel keys that correspond to the commands in this group.

:SYSTem?

Function	Queries all system settings.
Syntax	`:SYSTem?`

:SYSTem:BATTery?

Function	Queries all battery settings.
Syntax	`:SYSTem:BATTery?`

:SYSTem:BATTery:SCALe?

Function	Queries the battery level scale.
Syntax	`SYSTem:BATTery:REMain:SCALe?`
	SCALE3: 60 % or more
	SCALE2: Less than 60 %
	SCALE1: Less than 25 %
	SCALE0: Less than 15 % or 10 V or less
	NONE: Battery not connected
Example	`:SYSTEM:BATTERY:SCALE?`
	`-> :SYSTEM:BATTERY:SCALE SCALE3`

:SYSTem:BATTery:STATus?

Function	Queries the battery status.
Syntax	`SYSTem:BATTery:STATus?`
	`<NR1>` = 0: YOKOGAWA standard
	1: Nonstandard
	2: Battery not connected
Example	`SYSTEM:BATTERY:STATUS?`
	`-> :SYSTEM:BATTERY:STATUS 0`

:SYSTem:BEEP

Function	Sets or queries the beep sound on/off state.
Syntax	`:SYSTem:BEEP <Boolean>`
	`:SYSTem:BEEP?`
Example	`:SYSTEM:BEEP ON`
	`:SYSTEM:BEEP? -> :SYSTEM:BEEP 1`

:SYSTem:CALibration:DATE:LATest:DA?

Function	Queries the YOKOGAWA calibration date or the user calibration date of the D/A output, whichever is most recent.
Syntax	`:SYSTem:CALibration:DATE:LATest:DA?`
	Response
	`<String>,{YOKOGAWA|USER|NONE}`
	`<String>` = "YYYY/MM/DD"
	(YYYY = year, MM = month, DD = day)
Example	`:SYSTEM:CALIBRATION:DATE:LATEST:DA?`
	`-> :SYSTEM:CALIBRATION:DATE:LATEST:`
	`DA "2018/11/15",YOKOGAWA`
Description	On models without the /DA option, a "241: Hardware missing" error will occur.
	If there is no YOKOGAWA calibration date or user calibration date, "0000/00/00", NONE is returned.

:SYSTem:CALibration:DATE:LATest:DMM?

Function	Queries the YOKOGAWA calibration date or the latest user calibration date of the DMM function, whichever is most recent.
Syntax	`:SYSTem:CALibration:DATE:LATest:DMM?`
	Response
	`<String>,{YOKOGAWA|USER|NONE}`
	`<String>` = "YYYY/MM/DD"
	(YYYY = year, MM = month, DD = day)
Example	`:SYSTEM:CALIBRATION:DATE:LATEST:DMM?`
	`-> :SYSTEM:CALIBRATION:DATE:LATEST:`
	`DMM "2018/11/15",YOKOGAWA`
Description	On models without the /DM option, a "241: Hardware missing" error will occur.
	If there is no YOKOGAWA calibration date or user calibration date, "0000/00/00", NONE is returned.

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:SYSTem:CALibration:DATE:LATest:PRESsure?

Function   Queries the YOKOGAWA calibration date or the latest user calibration date of pressure calibration, whichever is most recent.

Syntax   :SYSTem:CALibration:DATE:LATest:
PRESsure?
Response
<String>,{YOKOGAWA|USER|NONE}
<String> = "YYYY/MM/DD"
(YYYY = year, MM = month, DD = day)

Example   :SYSTEM:CALIBRATION:DATE:LATEST:
PRESSURE?
-> :SYSTEM:CALIBRATION:DATE:LATEST:
PRESSURE "2018/11/15",YOKOGAWA

Description If there is no YOKOGAWA calibration date or user calibration date, "0000/00/00", NONE is returned.

:SYSTem:CALibration:DATE:USER?

Function   Queries all the settings of the user calibration date.

Syntax   :SYSTem:CALibration:DATE:USER?

Description On models without the /DA option or /DM option, the user calibration date is not output.

:SYSTem:CALibration:DATE:USER:DA

Function   Sets or queries the user calibration date of the D/A output.

Syntax   :SYSTem:CALibration:DATE:USER:
DA <String>
:SYSTem:CALibration:DATE:USER:DA?
<String> = "YYYY/MM/DD"
(YYYY = year, MM = month, DD = day)

Example   :SYSTEM:CALIBRATION:DATE:USER:
DA "2019/01/21"
:SYSTEM:CALIBRATION:DATE:USER:DA?
-> :SYSTEM:CALIBRATION:DATE:USER:
DA "2018/11/15"

Description On models without the /DA option, a "241: Hardware missing" error will occur.

:SYSTem:CALibration:DATE:USER:DMM

Function   Sets or queries the user calibration date of the DMM function.

Syntax   :SYSTem:CALibration:DATE:USER:
DMM <String>
:SYSTem:CALibration:DATE:USER:DMM?
<String> = "YYYY/MM/DD"
(YYYY = year, MM = month, DD = day)

Example   :SYSTEM:CALIBRATION:DATE:USER:
DMM "2019/01/21"
:SYSTEM:CALIBRATION:DATE:USER:DMM?
-> :SYSTEM:CALIBRATION:DATE:USER:
DMM "2018/11/15"

Description On models without the /DM option, a "241: Hardware missing" error will occur.

:SYSTem:CALibration:DATE:USER:PRESsure

Function   Sets or queries the user calibration date of the pressure calibration.

Syntax   :SYSTem:CALibration:DATE:USER:
PRESsure <String>
:SYSTem:CALibration:DATE:USER:
PRESsure?
<String> = "YYYY/MM/DD"
(YYYY = year, MM = month, DD = day)

Example   :SYSTEM:CALIBRATION:DATE:USER:
PRESSURE "2019/01/21"
:SYSTEM:CALIBRATION:DATE:USER:
PRESSURE?
-> :SYSTEM:CALIBRATION:DATE:USER:
PRESSURE "2018/11/15"

:SYSTem:CALibration:DATE:YOKogawa:DA?

Function   Queries the YOKOGAWA calibration date of the D/A output.

Syntax   :SYSTem:CALibration:DATE:YOKogawa:DA?
<String> = "YYYY/MM/DD"
(YYYY = year, MM = month, DD = day)

Example   :SYSTEM:CALIBRATION:DATE:YOKOGAWA:DA?
-> :SYSTEM:CALIBRATION:DATE:
YOKOGAWA:DA "2018/11/15"

Description On models without the /DA option, a "241: Hardware missing" error will occur.

:SYSTem:CALibration:DATE:YOKogawa:DMM?

Function   Queries the YOKOGAWA calibration date of the DMM function.

Syntax   :SYSTem:CALibration:DATE:YOKogawa:
DMM?
<String> = "YYYY/MM/DD"
(YYYY = year, MM = month, DD = day)

Example   :SYSTEM:CALIBRATION:DATE:YOKOGAWA:
DMM?
-> :SYSTEM:CALIBRATION:DATE:
YOKOGAWA:DMM "2018/11/15"

Description On models without the /DM option, a "241: Hardware missing" error will occur.

:SYSTem:CALibration:DATE:YOKogawa:PRESsure?

Function   Queries the YOKOGAWA calibration date of the pressure calibration.

Syntax   :SYSTem:CALibration:DATE:YOKogawa:
PRESsure?
<String> = "YYYY/MM/DD"
(YYYY = year, MM = month, DD = day)

Example   :SYSTEM:CALIBRATION:DATE:YOKOGAWA:
PRESSURE?
-> :SYSTEM:CALIBRATION:DATE:
YOKOGAWA:PRESSURE "2018/11/15"

:SYSTem:CLOCk?
Function   Queries all date/time settings.
Syntax   :SYSTem:CLOCk?

:SYSTem:CLOCk:DATE
Function   Sets or queries the date.
Syntax   :SYSTem:CLOCk:DATE <String>
            :SYSTem:CLOCk:DATE?
            <String> = "YYYY/MM/DD"
Example   :SYSTEM:CLOCK:DATE "2018/11/19"
            :SYSTEM:CLOCK:DATE?
            -> :SYSTEM:CLOCK:DATE "2018/11/19"

:SYSTem:CLOCk:TIME
Function   Sets or queries the time.
Syntax   :SYSTem:CLOCk:TIME <String>
            :SYSTem:CLOCk:TIME?
            <String> = "HH:MM:SS"
Example   :SYSTEM:CLOCK:TIME "13:45:00"
            :SYSTEM:CLOCK:TIME?
            -> :SYSTEM:CLOCK:TIME "13:45:03"

:SYSTem:COMMunicate
Function   Queries all communication settings.
Syntax   :SYSTem:COMMunicate?

:SYSTem:COMMunicate:TYPE
Function   Sets or queries the command type.
Syntax   :SYSTem:COMMunicate:TYPE {NORMal|
            COMPatible}
            :SYSTem:COMMunicate:TYPE?
            NORMal: Normal commands (488.2 format)
            COMPatible: Compatible commands (MT210/
                        MT210F/MT220 format)
Example   :SYSTEM:COMMUNICATE:TYPE COMPATIBLE
            :SYSTEM:COMMUNICATE:TYPE?
            -> :SYSTEM:COMMUNICATE:
               TYPE COMPATIBLE
Description • If the pressure type or pressure range in use
              is not supported by compatible commands, a
              "241: Hardware missing" error will occur.
            • Compatible commands support the following
              pressure types and pressure ranges.

Pressure type	Pressure range	Suffix code
Gauge pressure	10 kPa	-G01
	200 kPa	-G03
	1000 kPa	-G05
	3500 kPa	-G06
Absolute pressure	130 kPa	-A03
Differential pressure	1 kPa	-D00
	10 kPa	-D01
	130 kPa	-D03
	700 kPa	-D05

:SYSTem:COMMunicate:ETHernet?
Function   Queries all Ethernet communication settings.
Syntax   :SYSTem:COMMunicate:ETHernet?

:SYSTem:COMMunicate:ETHernet:DHCP
Function   Sets or queries the Ethernet DHCP on/off state.
Syntax   :SYSTem:COMMunicate:ETHernet:
            DHCP <Boolean>
            :SYSTem:COMMunicate:ETHernet:DHCP?
Example   :SYSTEM:COMMUNICATE:ETHERNET:DHCP ON
            :SYSTEM:COMMUNICATE:ETHERNET:DHCP?
            -> :SYSTEM:COMMUNICATE:ETHERNET:
               DHCP 1

:SYSTem:COMMunicate:ETHernet:GATeway
Function   Sets or queries the Ethernet default gateway.
Syntax   :SYSTem:COMMunicate:ETHernet:
            GATeway <String>
            :SYSTem:COMMunicate:ETHernet:
            GATeway?
            <String> = "x.x.x.x", where x is within the 0 to 255
                       range
Example   :SYSTEM:COMMUNICATE:ETHERNET:
            GATEWAY "192.168.0.1"
            :SYSTEM:COMMUNICATE:ETHERNET:
            GATEWAY?
            -> :SYSTEM:COMMUNICATE:ETHERNET:
               GATEWAY "192.168.0.1"

:SYSTem:COMMunicate:ETHernet:IP
Function   Sets or queries the Ethernet IP address.
Syntax   :SYSTem:COMMunicate:ETHernet:
            IP <String>
            :SYSTem:COMMunicate:ETHernet:IP?
            <String> = "x.x.x.x", where x is within the 0 to 255
                       range
Example   :SYSTEM:COMMUNICATE:ETHERNET:
            IP "192.168.0.100"
            :SYSTEM:COMMUNICATE:ETHERNET:IP?
            -> :SYSTEM:COMMUNICATE:ETHERNET:
               IP "192.168.0.1"

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:SYSTem:COMMunicate:ETHernet:MACaddress

Function   Sets or queries the Ethernet MAC address.

Syntax   :SYSTem:COMMunicate:ETHernet:
            MACaddress?
            <String> = "00:00:64: xx:xx:xx"
                where xx is a value between 0 and FF

Example   :SYSTEM:COMMUNICATE:ETHERNET:
            MACADDRESS
            :SYSTEM:COMMUNICATE:ETHERNET:
            MACADDRESS?
            -> :SYSTEM:COMMUNICATE:ETHERNET:
               MACADDRESS "00:00:64:XX:XX:XX"

:SYSTem:COMMunicate:ETHernet:MASK

Function   Sets or queries the Ethernet subnet mask.

Syntax   :SYSTem:COMMunicate:ETHernet:
            MASK <String>
            :SYSTem:COMMunicate:ETHernet:MASK?
            <String> = "x.x.x.x", where x is within the 0 to 255
                       range

Example   :SYSTEM:COMMUNICATE:ETHERNET:
            MASK "255.255.255.0"
            :SYSTEM:COMMUNICATE:ETHERNET:MASK?
            -> :SYSTEM:COMMUNICATE:ETHERNET:
               MASK "255.255.255.0"

:SYSTem:COMMunicate:GPIB?

Function   Queries all GP-IB communication settings.

Syntax   :SYSTem:COMMunicate:GPIB?

:SYSTem:COMMunicate:GPIB:ADDRess

Function   Sets or queries the GP-IB address.

Syntax   :SYSTem:COMMunicate:GPIB:
            ADDRess <NRf>
            :SYSTem:COMMunicate:GPIB:ADDRess?
            <NRf> = 0 to 30 (resolution: 1), GP-IB address

Example   :SYSTEM:COMMUNICATE:GPIB:ADDRESS 1
            :SYSTEM:COMMUNICATE:GPIB:ADDRESS?
            -> :SYSTEM:COMMUNICATE:GPIB:
               ADDRESS 1

:SYSTem:COMMunicate:USB:FUNCtion

Function   Sets or queries the USB function selection
            (USB TMC, USB CDC, storage).

Syntax   :SYSTem:COMMunicate:USB:
            FUNCtion {TMC|CDC|STORage}
            :SYSTem:COMMunicate:USB:FUNCtion?
            TMC: Command control using USB TMC
            CDC: Command control using a virtual COM port
            STORage: Storage function

Example   :SYSTEM:COMMUNICATE:USB:
            FUNCTION STORAGE
            :SYSTEM:COMMUNICATE:USB:FUNCTION?
            -> :SYSTEM:COMMUNICATE:USB:
               FUNCTION STORAGE

:SYSTem:COMMunicate:USB:TERMinator

Function   Sets or queries the terminator used to send data
            from this instrument when a virtual COM port is
            selected.

Syntax   :SYSTem:COMMunicate:USB:
            TERMinator {CR|LF|CRLF}
            :SYSTem:COMMunicate:USB:TERMinator?

Example   :SYSTEM:COMMUNICATE:USB:
            TERMINATOR CRLF
            :SYSTEM:COMMUNICATE:USB:TERMINATOR?
            -> :SYSTEM:COMMUNICATE:USB:
               TERMINATOR CRLF

:SYSTem:DIGit:MASK

Function   Sets or queries the mask for the least significant
            digits displayed.

Syntax   :SYSTem:DIGit:MASK <Boolean>
            :SYSTem:DIGit:MASK?
            ON|1: ON   The least significant digit is
            masked.
            OFF|0: OFF   The least significant digit is not
            masked.

Example   :SYSTEM:DIGIT:MASK ON
            :SYSTEM:DIGIT:MASK?
            -> :SYSTEM:DIGIT:MASK 1

:SYSTem:DISPlay?

Function   Queries all screen settings.

Syntax   :SYSTem:DISPlay

:SYSTem:DISPlay:BRIGhtness

Function   Sets or queries the screen brightness.

Syntax   :SYSTem:DISPlay:BRIGhtness <NRf>
            :SYSTem:DISPlay:BRIGhtness?
            <NRf> = 1 to 5
                    1 (darkest), 5 (brightest)

Example   :SYSTEM:DISPLAY:BRIGHTNESS 5
            :SYSTEM:DISPLAY:BRIGHTNESS?
            -> :SYSTEM:DISPLAY:BRIGHTNESS 5

:SYSTem:DISPlay:RANGe:COLor

Function   Sets or queries the display color of the range
            information on the screen.
Syntax   :SYSTem:DISPlay:RANGe:COLor {BLACk|
            RED|GREen|BLUE|YELLow|MAGenta|CYAN|
            ORANge}
            :SYSTem:DISPlay:RANGe:COLor?

            BLACk: Black
            RED: Red
            GREen: Green
            BLUE: Blue
            YELLow: Yellow
            MAGenta: Magenta
            CYAN: Cyan
            ORANge: Orange
Example   :SYSTEM:DISPLAY:RANGE:COLOR RED
            :SYSTEM:DISPLAY:RANGE:COLOR?
            -> :SYSTEM:DISPLAY:RANGE:COLOR? RED

:SYSTem:DISPlay:RANGe[:STATe]

Function   Sets or queries the on/off state of the range
            information on the screen.
Syntax   :SYSTem:DISPlay:
            RANGe[:STATe] <Boolean>
            :SYSTem:DISPlay:RANGe[:STATe]?
            ON|1: ON
            OFF|0: OFF
Example   :SYSTEM:DISPLAY:RANGE:STATE ON
            :SYSTEM:DISPLAY:RANGE:STATE?
            -> :SYSTEM:DISPLAY:RANGE 1

:SYSTem:HOLD

Function   Sets or queries the display hold.
Syntax   :SYSTem:HOLD <Boolean>
            :SYSTem:HOLD?
            ON|1: ON   Display updating is stopped.
            OFF|0: OFF Display updating is not stopped.
Example   :SYSTEM:HOLD ON
            :SYSTEM:HOLD? -> :SYSTEM:HOLD 1

:SYSTem:KLOCk

Function   Sets or queries the key lock.
Syntax   :SYSTem:KLOCk {OFF|ZLOCk|KLOCk}
            :SYSTem:KLOCk?
            OFF: Unlocked
            ZLOCk: Only the ZERO CAL key is locked.
            KLOCk: All keys are locked except KEY LOCK.
Example   :SYSTEM:KLOCK KLOCK
            :SYSTEM:KLOCK? -> :SYSTEM:KLOCK KLOCK

:SYSTem:LANGuage

Function   Sets or queries the error message language.
Syntax   :SYSTem:LANGuage {ENGLish|JAPANese|
            CHINese|KORean}
            :SYSTem:LANGuage?
            ENGLish: English
            JAPANese: Japanese
            CHINese: Chinese
            KORean: Korean
Example   :SYSTEM:LANGUAGE ENGLISH
            :SYSTEM:LANGUAGE?
            -> :SYSTEM:LANGUAGE ENGLISH

:SYSTem:PRESsure?

Function   Queries all pressure settings.
Syntax   :SYSTem:PRESsure?

:SYSTem:PRESsure:POSition?

Function   Queries the height of the reference point of the
            pressure receiving section.
Syntax   SYSTem:PRESsure:POSition?
Example   :SYSTEM:PRESSURE:POSITION?
            -> :SYSTEM:PRESSURE:POSITION 63

:SYSTem:PRESsure:RANGe?

Function   Queries the pressure range.
Syntax   SYSTem:PRESsure:RANGe?
            1E+03:   1 kPa range
            10E+03:   10 kPa range
            130E+03:   130 kPa range
            200E+03:   200 kPa range
            700E+03:   700 kPa range
            1E+06:   1000 kPa range
            3.5E+06:   3500 kPa range
            16E+06:   16 MPa range
            70E+06:   70 MPa range
Example   :SYSTEM:PRESSURE:RANGE?
            -> :SYSTEM:PRESSURE:RANGE 10E+03

:SYSTem:PRESsure:TYPE?

Function   Queries the pressure type.
Syntax   SYSTem:PRESsure:TYPE?
            GAUGe: Gauge pressure
            ABSolute: Absolute pressure
            DIFFerential: Differential pressure
Example   :SYSTEM:PRESSURE:TYPE?
            -> :SYSTEM:PRESSURE:TYPE GAUGE

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Commands

:SYSTem:REBoot

Function	Restarts the instrument when the specified time elapses.
Syntax	`:SYSTem:REBoot <NR1>`
	`<NR1>` = 0 s to 60 s (resolution: 1 s). Time until the instrument restarts (s)
Example	`:SYSTEM:REBOOT 3`

:SYSTem:SAVE:DPOint

Function	Sets or queries the decimal point and separator used when data is saved to CSV files.
Syntax	`:SYSTem:SAVE:DPOint {PERiod|COMMa}`
	`:SYSTem:SAVE:DPOint?`
	PERiod: Decimal point ".", separator ","
	COMMa: Decimal point ",", separator ";"
Example	`:SYSTEM:SAVE:DPOINT PERIOD`
	`:SYSTEM:SAVE:DPOINT?`
	`-> :SYSTEM:SAVE:DPOINT PERIOD`

:SYSTem:USER:MEMO

Function	Sets or queries the user notes.
Syntax	`:SYSTem:USER:MEMO <String>`
	`:SYSTem:USER:MEMO?`
	`<String>` = Up to 15 characters
	0 to 9, a to z, A to Z, -, /, @, blank
Example	`:SYSTEM:USER:MEMO "ABCDE0123abs/"`
	`:SYSTEM:USER:MEMO?`
	`-> :SYSTEM:USER:MEMO "ABCDE0123abs/"`

11.10 Common Command Group

The commands in this group are defined in IEEE 488.2-1992 and are independent from the instrument's individual functions. There are no front panel keys that correspond to the commands in this group.

*CLS
Function   Clears the standard event register, extended event register, and error queue.
Syntax   `*CLS`
Example   `*CLS`
Description If the *CLS command is located immediately after the program message terminator, the output queue is also cleared.
             For information about each register and queue, see chapter 12.

*ESE
Function   Sets or queries the standard event enable register.
Syntax   `*ESE <NRf>`
             `*ESE?`
             `<NRf> = 0 to 255`
Example   `*ESE 251`
             `*ESE? -> 251`
Description • Specify the value as a sum of the values of each bit in decimal format. For example, specifying *ESE 251 will cause the standard enable register to be set to 11111011. In this case, bit 2 of the standard event register is disabled. This means that bit 5 (ESB) of the status byte register is not set to 1, even if a query error occurs.
             • The default value is *ESE 0 (all bits disabled).
             • A query using *ESE? will not clear the contents of the standard event enable register.
             • For information about the standard event enable register, see page 12-4.

*ESR?
Function   Queries and clears the standard event register.
Syntax   `*ESR?`
Example   `*ESR? -> 32`
Description • Specify the value as a sum of the values of each bit in decimal format. For example, specifying *ESE 251 will cause the standard enable register to be set to 11111011. In this case, bit 2 of the standard event register is disabled. This means that bit 5 (ESB) of the status byte register is not set to 1, even if a query error occurs.
             • The default value is *ESE 0 (all bits disabled).
             • A query using *ESE? will not clear the contents of the standard event enable register.
             • For information about the standard event enable register, see page 12-4.

*IDN?
Function   Queries the instrument model.
Syntax   `*IDN?`
Example   `*IDN?`
             `-> "YOKOGAWA,MT300,0,1.01"`
Description • This command returns a string in the following format: <Manufacturer>, <Model>, <Serial no.>, <Firmware version>. "MT300" is returned for <Model>.

*OPC
Function   Sets bit 0 (the OPC bit) of the standard event register to 1 upon the completion of the specified overlap command.
Syntax   `*OPC`
Example   `*OPC`
Description This instrument does not have overlap commands. The OPC bit is always set to 1.

*OPC?
Function   Returns ASCII code 1 when the specified overlap command is completed.
Syntax   `*OPC?`
Example   `*OPC? -> 1`
Description This instrument does not support overlap commands. 1 is always returned.

*OPT?
Function   Queries the installed options.
Syntax   `*OPT?`
Example   `*OPT? -> F1,DM,DA,R1`
Description This command returns the availability of <measurement mode switching function>,<DMM function, 24 VDC output>,<D/A output, comparator output>,<one additional display resolution digit>.
             • Measurement mode switching function: F1
             • DMM function, 24 VDC output: DM
             • D/A output, comparator output: DA
             • One additional display resolution digit: R1
             An error occurs if there is a query after this command.

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Commands

*RST

Function	Initializes settings.
Syntax	*RST
Example	*RST
Description	• All settings except communication settings are reset to their factory default values.
	• For details on initialization, see the Getting Started Guide (IM MT300-02EN).

*SRE

Function	Sets or queries the service request enable register value.
Syntax	*SRE <NRf>
	*SRE?
	<NRf> = 0 to 255
Example	*SRE 239
	*SRE? -> 175 (because the bit 6, MSS, setting is ignored)
Description	• Specify the value as a sum of the values of each bit in decimal format. For example, specifying *SRE 239 will cause the standard enable register to be set to 11101111. In this case, bit 4 of the service request enable register is disabled. This means that bit 4 (MAV) of the status byte register is not set to 1, even if the output queue is not empty. Bit 6 (MSS) of the status byte register is the MSS bit itself and is therefore ignored.
	• The default value is *SRE 0 (all bits disabled).
	• A query using *SRE? will not clear the contents of the service request enable register.
	• For information about the service request enable register, see page 12-2.

*STB?

Function	Queries the Status Byte Register value.
Syntax	*STB?
Example	*STB? -> 4
Description	• A sum of the values of each bit is returned as a decimal value. Because the register is read without executing serial polling, bit 6 is an MSS bit, not an RQS bit. For example, if a value of 4 is returned, this indicates that the status byte register is set to 00000100. This means that the error queue is not empty (in other words, an error occurred).
	• A query using *STB? will not clear the contents of the status byte register.
	• For information about the status byte register, see page 12-2.

*TRG

Function	Generates an external trigger.
Syntax	*TRG
Example	*TRG
Description	This trigger operates in the same manner as when the TRIG key on the front panel is pressed. A multi-line message GET (Group Execute Trigger) also performs the same operation.

*TST?

Function	Executes a self-test and queries the result.
Syntax	*TST?
Example	*TST? -> 0
Description	• For details on self-test, see the Getting Started Guide (IM MT300-02EN).
	• This command returns 0 if the self-test is successful and 1 otherwise. It takes approximately 20 seconds for the test to complete. When receiving a response from the instrument, set the timeout to a relatively large value.

*WAI

Function	Holds the execution of the subsequent command until the specified overlap command is completed.
Syntax	*WAI
Example	*WAI
Description	This instrument does not have overlap commands. This command will be ignored.

12.1   About Status Reports

Status Reports

The figure below shows the format of status reports that are read by serial polling. This status report format is an extended version of the status report format defined in IEEE 488.2-1992.

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Status Reports
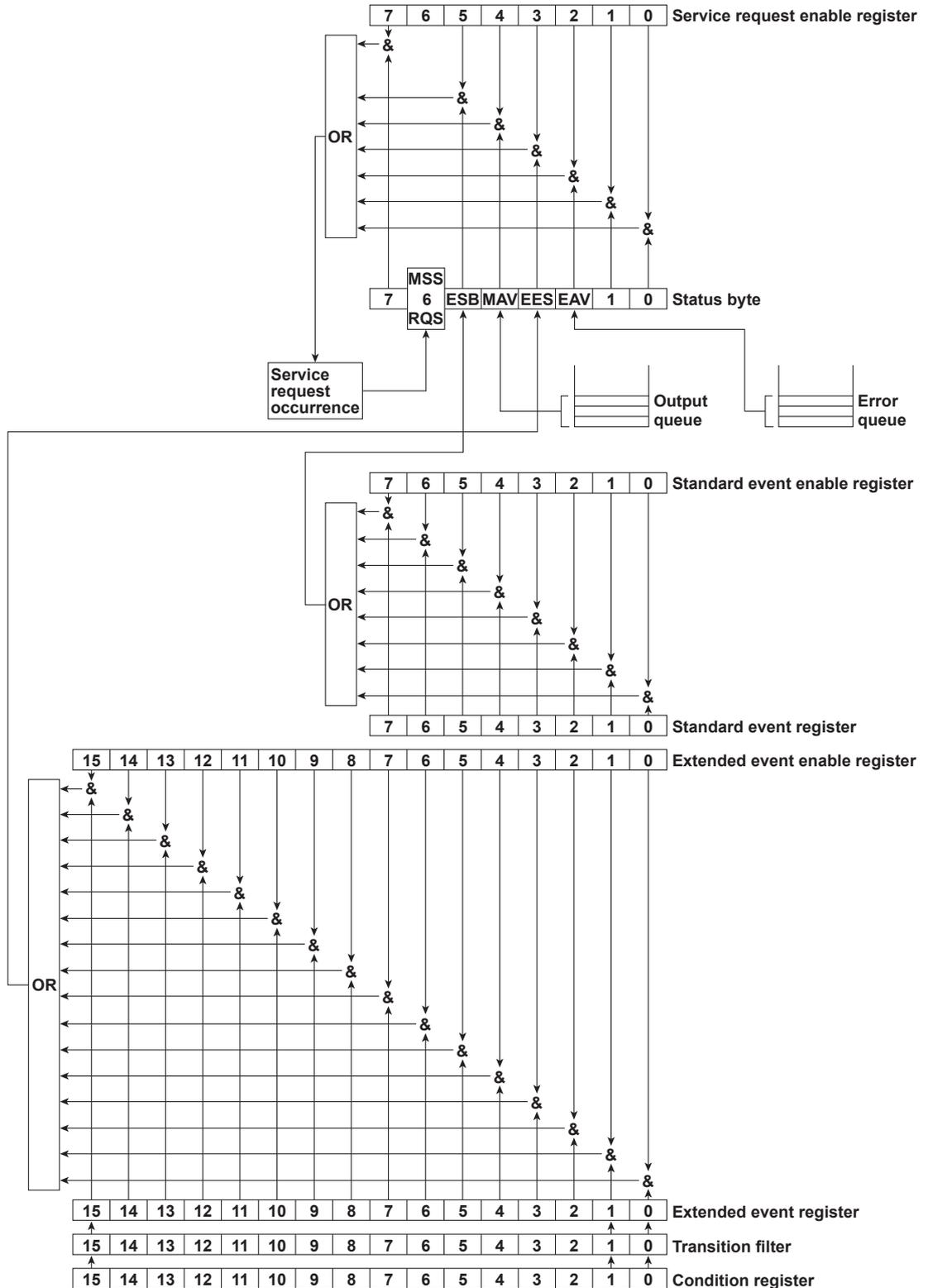
Overview of Registers and Queues

Name	Function	Writing	Reading
Status byte	–	–	Serial polling (RQS), *STB? (MSS)
Service request enable register	Status byte mask	*SRE	*SRE?
Standard event register	Indicates device status changes	–	*ESR?
Standard event enable register	Standard event register mask	*ESE	*ESE?
Extended event register	Indicates device status changes	–	STATus:EESR?
Extended event enable register	Extended event register mask	STATus:EESE	STATus:EESE?
Condition register	Current device status	–	STATus:CONDition?
Transition filter	Conditions that change the extended event register	STATus:FILTer<x>	STATus:FILTer<x>?
Output queue	Stores response messages for queries	Query commands	
Error queue	Stores error numbers and messages	–	STATus:ERRor?

Registers and Queues That Affect the Status Byte

The following registers affect the status byte bits.

Register	Affected Status Byte Bit
Standard event register	Sets bit 5 (ESB) to 1 or 0
Output queue	Sets bit 4 (MAV) to 1 or 0
Extended event register	Sets bit 3 (EES) to 1 or 0
Error queue	Sets bit 2 (EAV) to 1 or 0

Enable Registers

The following registers are used to mask a bit so that the bit will not affect the status byte even when it is set to 1.

Masked Register	Mask Register
Status byte	Service request enable register
Standard event register	Standard event enable register
Extended event register	Extended event enable register

Reading and Writing to Registers

For example, use the *ESE command to set the standard event enable register bits to 1 and 0. You can use the *ESE? command to query whether the standard event enable register bits are ones or zeros. For details on these commands, see chapter 11.

12.2 Status Byte

Status Byte

	RQS						
7	6	ESB	MAV	EES	EAV	1	0
	MSS						

- **Bits 0, 1, and 7**
  Not used (always 0)
- **Bit 2 EAV (Error Available)**
  This bit is 1 when the error queue is not empty. In other words, this bit is set to 1 when an error occurs. See section 12.5.
- **Bit 3 EES (Extend Event Summary Bit)**
  This bit is set to 1 when the logical AND of the extended event register and the extended event enable register is 1. In other words, this bit is set to 1 when a certain event takes place inside the instrument. See section 12.4.
- **Bit 4 MAV (Message Available)**
  This bit is 1 when the output queue is not empty. In other words, this bit is set to 1 when there is data to be transmitted in response to a query. See section 12.5.
- **Bit 5 ESB (Event Summary Bit)**
  This bit is set to 1 when the logical AND of the standard event register and the standard event enable register is 1. In other words, this bit is set to 1 when a certain event takes place inside the instrument. See section 12.3.
- **Bit 6 RQS (Request Service)/MSS (Master Status Summary)**
  This bit is 1 when the logical AND of the status byte excluding bit 6 and the service request enable register is 1. In other words, this bit is set to 1 when the instrument requests service from the controller. RQS is set to 1 when the MSS bit changes from 0 to 1 and is cleared when serial polling is carried out or when the MSS bit changes to 0.

Bit Masking

To mask a bit in the status byte so that it does not cause an SRQ, set the corresponding bit of the service request enable register to 0.

For example, to mask bit 2 (EAV) so that service is not requested when an error occurs, set bit 2 of the service request enable register to 0. Do this using the `*SRE` command. To query whether each bit of the service request enable register is 1 or 0, use `*SRE?`. For details on the `*SRE` command, see chapter 11.

Status Byte Operation

A service request is issued when bit 6 in the status byte becomes 1. Bit 6 is set to 1 when any other bit becomes 1 (when the corresponding bit of the service request enable register is also set to 1). For example, if an event occurs and the logical OR of a standard event register bit and its corresponding enable register bit is 1, then bit 5 (ESB) is set to 1. At this point, if bit 5 of the service request enable register is 1, bit 6 (MSS) is set to 1, and the instrument requests service from the controller.

You can check what type of event occurred by reading the contents of the status byte.

Reading the Status Byte

There are two ways to read the contents of the status byte.

- **`*STB?` Query**
  Bit 6 functions as MSS when a query is made using `*STB?`. This causes the MSS to be read. This query does not cause any of the status byte bits to be cleared after the status byte is read.
- **Serial polling**
  Serial polling causes bit 6 to function as an RQS bit. This causes the RQS to be read. After the status byte is read, only the RQS bit is cleared. You cannot read the MSS bit when serial polling is used.

Clearing the Status Byte

There is no way to clear all the bits in the status byte. The bits that are cleared for each operation are shown below.

- **`*STB?` Query**
  None of the bits are cleared.
- **Serial Polling**
  Only the RQS bit is cleared.
- **When a `*CLS` Command Is Received**
  When a `*CLS` command is received, the status byte itself is not cleared, but the contents of the standard event register, which affects the bits in the status byte, are cleared. As a result, the corresponding status byte bits are cleared. Because the output queue is not cleared with a `*CLS` command, bit 4 (MAV) in the status byte is not affected. However, the output queue will be cleared if the `*CLS` command is received just after a program message terminator.

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Status Reports

12.3 Standard Event Register

Standard Event Register

7	6	5	4	3	2	1	0
PON	URQ	CME	EXE	DDE	QYE	RQC	OPC

- **Bit 7 PON (Power ON)**
  This bit is set to 1 when the instrument is turned on.
- **Bit 6 URQ (User Request)**
  Not used (always 0)
- **Bit 5 CME (Command Error)**
  This bit is set to 1 when there is a command syntax error.

  Example Command names are misspelled, or character data that is not one of the available options has been received.

- **Bit 4 EXE (Execution Error)**
  This bit is set to 1 when the command syntax is correct, but the command cannot be executed in the current state.

  Example A command whose parameter is outside the allowable range was received.

- **Bit 3 DDE (Device Error)**
  This bit is set to 1 when a command cannot be executed for internal reasons other than a command syntax error or command execution error.
- **Bit 2 QYE (Query Error)**
  This bit is set to 1 when a query command is received, but the output queue is empty or the data is lost.

  Example There is no response data, or data is lost due to an overflow in the output queue.

- **Bit 1 RQC (Request Control)**
  Not used (always 0)
- **Bit 0 OPC (Operation Complete)**
  This bit is set to 1 upon the completion of the operation designated by the `*OPC` command (see chapter 11 for details).

Bit Masking

To mask a certain bit of the standard event register so that it does not cause bit 5 (ESB) in the status byte to change, set the corresponding bit of the standard event enable register to 0.
For example, to mask bit 2 (QYE) so that ESB will not be set to 1 even if a query error occurs, set bit 2 of the standard event enable register to 0. Do this using the `*ESE` command. To query whether each bit of the standard event enable register is 1 or 0, use `*ESE?`.
For details on the `*ESE` command, see chapter 11.

Standard Event Register Operation

The standard event register indicates eight types of events that occur inside the instrument. When one of the bits in this register becomes 1 (and the corresponding bit of the standard event enable register is also 1), bit 5 (ESB) in the status byte is set to 1.

Example
1. A query error occurs.
2. Bit 2 (QYE) is set to 1.
3. When bit 2 of the standard event enable register is 1, bit 5 (ESB) in the status byte is set to 1.

You can also check what type of event occurred in the instrument by reading the contents of the standard event register.

Reading the Standard Event Register

You can use the `*ESR?` command to read the contents of the standard event register. The register is cleared after it is read.

Clearing the Standard Event Register

The standard event register is cleared in the following three cases.
- When the contents of the standard event register are read using the `*ESR` command.
- When a `*CLS` command is received.
- When the instrument is restarted.

12.4 Extended Event Register

The extended event register receives information about changes in the condition register, which indicates the instrument's internal condition. The information is the result of edge detection performed by the transition filter.

FILTer<x> →	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Condition register `:STATus:CONDition?`	15 -	14 -	13 -	12 SRT	11 DOVR	10 DOVF	9 OC	8 POVR	7 POVF	6 -	5 -	4 -	3 -	2 STR	1 -	0 UPD
Transition filter `:STATus:FILTer<x>` `{RISE|FALL|BOTH|NEVer}`	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Extended event register `:STATus:EESR?`	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
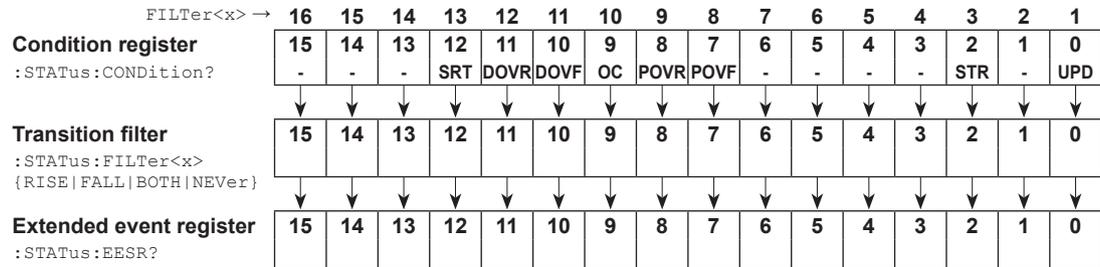
The condition register bits are described below.

Bit 0	UPD (Updating)	Set to 1 when the measured data is being updated. UPD changing from 1 to 0 indicates that updating has been completed.
Bit 1	-	-
Bit 2	STR (Store Busy)	Set to 1 during storage.
Bit 3	-	-
Bit 4	-	-
Bit 5	-	-
Bit 6	-	-
Bit 7	POVF (Pressure Overflow)	Set to 1 if the computed result overflows when the pressure value is updated.
Bit 8	POVR (Pressure Overrange)	Set to 1 when the pressure value is over-range.
Bit 9	OC (Over Current)	Set to 1 if the output is turned off by force when an overload occurs during 24 VDC output.
Bit 10	DOVF (DMM Overflow)	Set to 1 if the computed result overflows when the DMM measurement value is updated.
Bit 11	DOVR (DMM Overrange)	Set to 1 when the DMM measurement value is over-range.
Bit 12	SRT(Start Busy)	Set to 1 when statistical processing or a leak test is in progress.
Bit 13	-	-
Bit 14	-	-
Bit 15	-	-

The transition filter parameters detect changes in the specified condition register bits (numeric suffixes 1 to 16) and overwrite the extended event register in the following ways.

RISE	The specified extended event register bit is set to 0 when the corresponding condition register bit changes from 0 to 1.
FALL	The specified extended event register bit is set to 1 when the corresponding condition register bit changes from 1 to 0.
BOTH	The specified extended event register bit is set to 1 when the corresponding condition register bit changes from 0 to 1 or from 1 to 0.
NEVer	Always zero.

12.5 Output and Error Queues

Output queue

The output queue stores query response messages. For example, if you send an `*IDN?` command, which queries the instrument model, the response message is stored in the output queue until it is read.

As shown below, error messages are stored in order and read from the oldest message first. The output queue is cleared in the following cases.

*   When a new message is received from the controller.
*   When a deadlock occurs (see section 12.1).
*   When a device clear command (DCL or SDC) is received.
*   When the instrument is restarted.

The `*CLS` command does not clear the output queue. You can determine whether or not the output queue is empty by checking bit 4 (MAV) in the status byte.
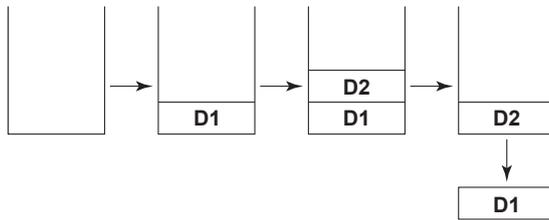
Error Queue

When an error occurs, the error queue stores the error number and message. For example, if the instrument receives an incorrect program message from the controller, the error number (113) and the error message ("Undefined header") are stored in the error queue when the instrument displays the error message.

You can use the `:STATus:ERRor?` query to read the contents of the error queue. Like the output queue, the messages in the error queue are read from the oldest one first.

If the error queue overflows, the last message is replaced with the following message: 350, "Queue overflow."

The error queue is cleared in the following cases.

*   When a `*CLS` command is received.
*   When the instrument is restarted.

You can determine whether or not the error queue is empty by checking bit 2 (EAV) in the status byte.

Appendix 1 Block Diagram

The fluid pressure to be measured is sent to the Silicon resonant sensor section. The Silicon resonant sensor section consists of a Silicon resonant sensor developed by YOKOGAWA, an excitation circuit, and other components to convert the fluid pressure to a frequency signal. The pressure calculation section samples the frequency signal and converts it into pressure values. The converted pressure values are moving-averaged at the measurement integration time according to the measurement mode and sent to the main CPU to be displayed.

With external triggering (External), every time a falling signal is received through the TRIG IN/SYNC IN terminal, a single measurement is made, and a sync signal is output through the SYNC OUT terminal. With sync triggering (Sync), every time a falling signal is received through the TRIG IN/SYNC IN terminal, a sync signal is output through the SYNC OUT terminal.

The /DA option section is made up of a D/A output section and a comparator output section that controls the comparator output. The D/A output section outputs the D/A signal corresponding to the pressure value obtained in the pressure calculation section at 2 ms or 0.25 ms* intervals. The comparator output section output the result of comparing the measured pressure to the specified upper and lower pressure limits.

Models with the /F1 option has a function for switching between three measurement modes: standard (Standard), mid-speed (Middle), and high-speed (Fast). High-speed D/A output is possible when the measurement mode is set to mid-speed or high-speed or when dynamic mode is turned on on models with the /DA option.

Models with the /DM option have a DMM function and a 24 VDC output function.
The DMM section is controlled by the main CPU. The input current signal or voltage signal is converted into a digital signal by the DMM computation section and then converted into a current or voltage value and sent to the main CPU to be displayed. The 24 VDC output is turned on and off by the main CPU. The instrument has an overcurrent detection function, which turns off the 24 VDC output when an overcurrent is detected.

* In the following situations, D/A output is possible at 0.25 ms intervals.
  • On a model with the /F1 option when dynamic mode is set to on
  • On a model with the /F1 option when the measurement mode is set to mid-speed or high-speed regardless of whether dynamic mode is set to on or off

App
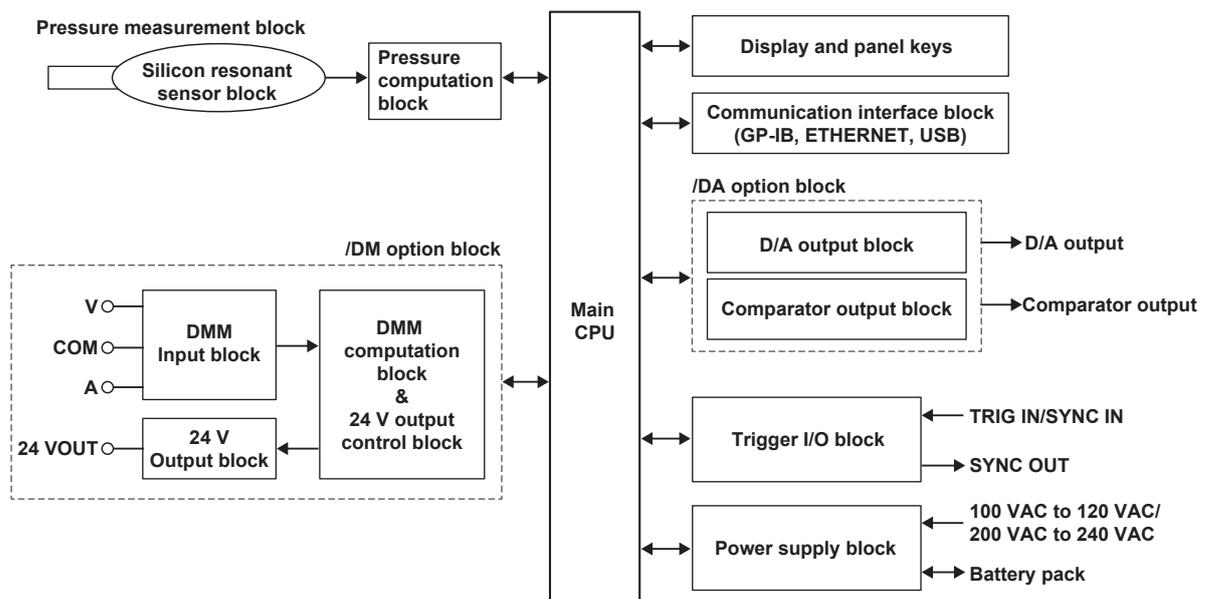
Appendix

Appendix 2 CSV File Format

The CSV file format is shown below.

	A	B	C	D	E	
1	START	TIME	2019/5/7 20:33			
2	TRIGGER	MODE	INT			
3	TRIGGER	DELAY	0			
4	INTEGRATION	TIME	1500ms			
5	PRESSURE	UNIT	kPa			
6	STORE	MODE	AUTO			
7	STORE	COUNT	10			
8	STORE	PERID	250ms			
9	SCALING	MODE	OFF			
10	SCALING	INPUT	TWO_POINT			
11	SCALING	SPAN UPPER	0			
12	SCALING	SPAN LOWER	0			Settings
13	SCALING	SCALE UPPER	1			
14	SCALING	SCALE LOWER	200			
15	SCALING	A VALUE	1			
16	SCALING	B VALUE	0			
17	SCALING	UNIT STRING				
18	SCALING	FIXED POINT MODE	OFF			
19	SCALING	FIXED POINT VALUE	0			
20	MEASURE	MODE	STANDARD	Displayed on models with the /F1 option		
21	DMM	MODE	ON			
22	DMM	RANGE	5V	Displayed on models with the /DM option		
23	DMM	250Ω	OFF			
24	DMM	AVERAGE MODE	ON			
25						
26						
27						
28				Displayed when the DMM function is on		
29						
30	DATE&TIME	Pressure Status	Pressure Value	DMM Status	DMM Value	
31	2019/5/7 20:33	MinusOverRange	-9.90E+37	MinusOverRange	-9.90E+37	
32	2019/5/7 20:33	OK	-110.55	OK	-4.5177	
33	2019/5/7 20:33	OK	-80.55	OK	-3.2658	
34	2019/5/7 20:33	OK	-50.55	OK	-2.0139	
35	2019/5/7 20:33	OK	-20.55	OK	-0.762	Measured values
36	2019/5/7 20:33	OK	9.45	OK	-0.002	Measured values are
37	2019/5/7 20:33	OK	39.45	OK	0.4899	displayed from line 30
38	2019/5/7 20:33	OK	69.45	OK	1.7418	starting with the title.
39	2019/5/7 20:33	OK	99.45	OK	2.9937	
40	2019/5/7 20:33	PlusOverRange	9.90E+37	PlusOverRange	9.90E+37	
41						
42						

Note

If the beginning of the instrument's user unit string is set to numeral 0, the numeral 0 is not displayed when the CSV file is opened in a spreadsheet application.

Value

Item		Description
START	TIME	Date and time when data storage was started
TRIGGER	MODE	Trigger mode
TRIGGER	DELAY	Trigger delay
INTEGRATION	TIME	Measurement integration time
PRESSURE	UNIT	Pressure unit
STORE	MODE	Storage mode
STORE	COUNT	Storage count
STORE	PERID	Storage interval
SCALING	MODE	Scaling On/Off
SCALING	INPUT	Scaling input method
SCALING	SPAN UPPER	Upper span limit
SCALING	SPAN LOWER	Lower span limit
SCALING	SCALE UPPER	Upper scale limit
SCALING	SCALE LOWER	Lower scale limit
SCALING	A VALUE	Value A of direct input mode
SCALING	B VALUE	Value B of direct input mode
SCALING	UNIT STRING	User unit string
SCALING	FIXED POINT MODE	Fixed decimal point mode
SCALING	FIXED POINT VALUE	Fixed exponent
MEASURE	MODE	Measurement mode[1]
DMM	MODE	DMM function On/Off [2]
DMM	RANGE	Measurement range[2]
DMM	250Ω	Communication resistor On/Off[2]
DMM	AVERAGE MODE	Averaging On/Off[2]

1 Displayed on models with the /F1 option

2 Displayed on models with the /DM option

Measured value

Item	Description
DATE&TIME	Date and time when the data was stored
Pressure Status	Measured pressure state. Displays any of the following: OK (normal), MinusOverRange (negative over-range), PlusOverRange (positive over-range), MinusOverFlow (negative overflow), PlusOverFlow (positive overflow), NoData (no data)
Pressure Value	Measured pressure
DMM Status*	DMM measurement state. Displays any of the following: OK (normal), MinusOverRange (negative over-range), PlusOverRange (positive over-range), MinusOverFlow (negative overflow), PlusOverFlow (positive overflow), NoData (no data)
DMM Value*	Measured value by the DMM function

* Displayed on models with the /DM option when the DMM function is set to on

App

Appendix

Appendix 3 About the IEEE 488.2-1992 Standard

This instrument's GP-IB interface conforms to the IEEE 488.2-1992 standard. This standard specifies that the following 23 items be stated in the document. This section describes these items.

(1) Of the IEEE 488.1 interface functions, the subsets that are supported
See section 7.1, "GP-IB Interface Features and Specifications."

(2) The operation of the device when it is assigned an address outside the 0 to 30 range.
The address of this instrument cannot be set to an address outside the 0 to 30 range.

(3) Reaction of the device when the user changes the address
The address change is detected when the user presses UTILITY -> Remote I/F -> GPIB and sets the address. The new address is valid until the next time it is changed.

(4) Device settings at power-on. The commands that can be used at power-on.
As a basic rule, the previous settings (the settings that were in use when the instrument was turned off) are used.
There are no limitations on the commands that can be executed when the power is on.

(5) Message exchange options
(a) Input buffer size
1024 bytes.
(b) Queries that return multiple response messages
See the example of the commands given in chapter 11.
(c) Queries that create response data when the command syntax is being analyzed
All queries create response data when the command syntax is analyzed.
(d) Queries that create response data during reception
There are no queries of which the response data are created upon receiving a send request from the controller.
(e) Commands that have parameters that restrict one another
See the example of the commands given in chapter 11.

(6) Items that are included in the functional or composite header elements constituting a command
See chapters 10 and 11.

(7) Buffer sizes that affect block data transmission
When block data is being transmitted, the output queue is expanded to match the size of the data that is being transmitted.

(8) A list of program data elements that can be used in equations and their nesting limitations
Equations cannot be used.

(9) Syntax of the responses to queries
See the example of the commands given in chapter 11.

(10) Communication between devices that do not follow the response syntax
Not supported.

(11) Size of the response data block
0 to 220009 bytes

(12) A list of supported common commands
See section 11.10, "Common Command Group."

(13) Device condition after a successful calibration
*CAL is not supported.

(14) The maximum length of block data that can be used for the *DDT trigger macro definition
Not supported.

(15) The maximum length of the macro label for defining macros, the maximum length of block data that can be used for the macro definition, and the process when recursion is used in macro definitions
Macro functions are not supported.

(16) Reply to the *IDN? query
See section 11.10, "Common Command Group."

(17) Size of storage area for protected user data for PUD and *PUD?
*PUD and *PUD? are not supported.

(18) The length of the *RDT and *RDT? resource names
*RDT and *RDT? are not supported.

(19) The change in the status due to *RST, *LRN?, *RCL, *SAV, and *RST
See section 11.10, "Common Command Group."
*LRN?, *RCL, *SAV
These common commands are not supported.

(20) The extent of the self-test using the *TST? command
See section 11.10, "Common Command Group."

(21) The structure of the extended return status
See chapter 12.

(22) Whether each command is processed in an overlapped manner or sequentially
See section 10.5, "Synchronization with the Controller" and chapter 11.

(23) The description of the execution of each command
See the functions of the commands given in chapter 11.

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Appendix 4   Compatible Commands

This instrument (MT300) can use a portion of the communication commands (compatible commands) of the legacy model instruments MT210, MT210F, and MT220.

Because the functions of the MT210, MT210F, and MT220 are different from those of the MT300, the following restrictions apply depending on the command.

- The instrument behavior may differ even with compatible commands.
- There are commands that cannot be used on the MT300.
  For details on the commands that cannot be used on the MT300, see the User's Manual of the legacy model.

List of Commands

For details on each command, see "Command Explanation" in the following pages.

Command	Function	Page
For MT210, MT210F, and MT220		
AG/AG?	Sets or queries the on/off state of averaging.	App-8
BL/BL?	Sets or queries the screen brightness.	App-8
BP/BP?	Sets or queries the beep sound (key click sound).	App-8
CMD/CMD?	Sets or queries the lower and upper limits of the comparator. This command is valid on models with the /DA option.	App-8
CMP/CMP?	Sets or queries the comparator output. This command is valid on models with the /DA option.	App-8
DL/DL?	Sets or queries the terminator of the communication output data.	App-9
DR/DR?	Sets or queries the D/A output range. This command is valid on models with the /DA option.	App-9
E/<interface message GET>	Generate a trigger.	App-9
H/H?	Sets or queries the header to include in the communication output measurement data.	App-9
HD/HD?	Sets or queries the trigger mode.	App-9
IM/IM?	Sets or queries what causes status byte interrupts.	App-9
OD	Requests for the measured data to be output.	App-9
OE	Requests for the error code to be output.	App-10
OS	Requests for the settings to be output.	App-10
PD/PD?	Sets or queries the number of displayed digits for the measured pressure and percentage display values. (On legacy models, the percentage display is only available on the MT220.)	App-10
PU/PU?	Sets or queries the pressure unit.	App-10
PZ	Executes zero calibration of pressure.	App-11
RC	Initializes the settings.	App-11
REL/REL?	Sets or queries the relative pressure display.	App-11
SI/SI?	Sets or queries the measurement integration time. This command is valid on models with a -D00 suffix code (differential pressure 1 kPa model).	App-11
MT210F Commands		
DY/DY?	Sets or queries the D/A output dynamic mode. This command is valid on models with the /F1 and /DA options.	App-11
MS/MS?	Sets or queries the measurement mode. This command is valid on models with the /F1 option.	App-12
MT220 Commands		
AH	Assigns the current measured pressure to the 100% pressure value. This command is valid on models with the /DM option.	App-12
AL	Assigns the current measured pressure to the 0% pressure value. This command is valid on models with the /DM option.	App-12

Command	Function	Page
DF/DF?	Sets or queries the voltage and current measurement. This command is valid on models with the /DM option.	App-12
DIS/DIS?	Sets or queries the percentage display and %ERROR display (display mode). This command is valid on models with the /DM option.	App-12
DMM/DMM?	Sets or queries the on/off state of the DMM function. This command is valid on models with the /DM option.	App-13
MH/MH?	Sets or queries the 100% pressure value. This command is valid on models with the /DM option.	App-13
ML/ML?	Sets or queries the 0% pressure value. This command is valid on models with the /DM option.	App-13
VO/VO?	Sets or queries the on/off state of 24 VDC output. This command is valid on models with the /DM option.	App-13

Commands that use the <ESC> code

<ESC>S	Executes serial polling.	App-13
<ESC>R	Switches to remote mode.	App-13
<ESC>L	Switches to local mode.	App-13
<ESC>C	Execute a device clear.	App-13

Commands Unavailable on the MT300

CAD
CAL/CAL?
CAP/CAP?
CVD
CVP/CVP?
DA
DB/DB?
OM
ORD
RNO/RNO?
RO/RO?
SM/SM?
SND/SND?
SNO/SNO?
SO/SO?
SR/SR?
ST
SY/SY?

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Appendix

Command Explanation

This section explains the function, syntax, and example of the communication commands that are available on the legacy model instruments MT210, MT210F, and MT220, which can also be used on the MT300.

For MT210, MT210F, and MT220

These commands can be used in common on the MT210, MT210F, and MT220 and can also be used on this instrument (MT300). However, the functions that operate and restrictions may be different.

AG/AG?
Function   Sets or queries the on/off state of averaging.
Syntax   `AGm<terminator>`
            `AG?<terminator>`
            m = 0 to 3

On models without the /DM option (legacy models MT210, MT210F)

0:	Pressure measurement averaging off
1:	Pressure measurement averaging on

On models with the /DM option (legacy model MT220)

0:	Pressure averaging off, DMM averaging off
1:	Pressure averaging on, DMM averaging off
2:	Pressure averaging off, DMM averaging on
3:	Pressure averaging on, DMM averaging on

Example   `AG1`
Description • On models with the /F1 option, the averaging setting is valid in normal measurement mode. In mid-speed or high-speed measurement mode, it cannot be set because the averaging function does not work. Error 15 will occur.
• Setting is not possible when relative value display, percentage display, or %ERROR display is in use. Error 15 will occur.
• On the differential pressure 1 kPa model, when the measurement integration time is 4000 ms, pressure averaging (`AG1`) cannot be specified. Error 12 will occur.
• On legacy models, an error occurs as follows.
  • On the MT210F, the averaging setting is valid in normal measurement mode. In mid-speed or high-speed measurement mode, it cannot be set because the averaging function does not work. Error 15 will occur.
  • On the 767320 (differential pressure 1 kPa model), when the pressure sample rate is 4000 ms (set with the `SI` command), pressure averaging on (`AG1`) cannot be specified. Error 12 will occur.
  • The setting cannot be changed and recall mode. Error 14 will occur.

BL/BL?
Function   Sets or queries the screen brightness.
Syntax   `BLm<terminator>`
            `BL?<terminator>`
            m = 0, 1

	0:	Brightness 1 (Backlight off on legacy models)
	1:	Brightness 3 (Backlight off on legacy models)

Example   `BL0`

BP/BP?
Function   Sets or queries the beep sound (key click sound).
Syntax   `BPm<terminator>`
            `BP?<terminator>`
            m = 0, 1

	0:	Beep sound off
	1:	Beep sound on

Example   `BP1`

CMD/CMD?
Function   Sets or queries the lower and upper limits of the comparator. This command is valid on models with the /DA option.
Syntax   `CMDm,n<terminator>`
            `CMD?<terminator>`
            m = Lower comparator limit
            n = Upper comparator limit
            The m and n setting range is the same as the pressure measurement display range.
            The m and n resolution is the same as the pressure measurement display resolution.
Example   `CMD? -> CMD0.000,130.000`
Description Specify the lower limit parameter first and then the upper limit. Be careful because it is possible to set the lower limit to a value greater than equal to the upper limit.

CMP/CMP?
Function   Sets or queries the comparator output. This command is valid on models with the /DA option.
Syntax   `CMPm<terminator>`
            `CMP?<terminator>`
            m = 0, 1

	0:	Comparator output off
	1:	Comparator output on

Example   `CMP1`

DL/DL?

Function   Sets or queries the terminator of the communication output data.

Syntax   `DLm<terminator>`
          `DL?<terminator>`
          m = 0 to 2

	GP-IB	RS-232
0:	CR+LF+EOI	CR+LF
1:	LF+EOI	LF
2:	EOI	CR

Example   `DL0`

DR/DR?

Function   Sets or queries the D/A output range. This command is valid on models with the /DA option.

Syntax   `DRm<terminator>`
          `DR?<terminator>`
          m = 0, 1
          0:    2 V DC range
          1:    5 V DC range

Example   `DR0`

E/<interface message GET>

Function   Generate a trigger.

Syntax   `E<terminator>`
          or
          `<interface messageGET>`

Description • This command is valid only when the trigger mode is set to EXT. Otherwise, the command is ignored.
            • On legacy models, this command is valid when the data hold is on. Error 15 will occur if the data hold is off.

H/H?

Function   Sets or queries the header to include in the communication output measurement data.

Syntax   `Hm<terminator>`
          `H?<terminator>`
          m = 0, 1
          0:    No header
          1:    Include header

Example   `H1`

HD/HD?

Function   Sets or queries the trigger mode.

Syntax   `HDm<terminator>`
          `HD?<terminator>`
          m = 0, 1
          0:    Trigger mode INT
          1:    Trigger mode EXT

Example   `HD0`

Description • On legacy models, this command is used to set or query the data hold state.
            When m = 0
                Data hold is set to off (release)
            When m = 1
                Data hold is set to on (execute)
            • A data hold command is not available in the compatible commands of this instrument.

IM/IM?

Function   Sets or queries what causes status byte interrupts.

Syntax   `IMm<terminator>`
          `IM?<terminator>`
          m = 0 to 31
          Cause of interrupts
          1: Computation END
          2: Auto store END
          4: Syntax error
          8: OVER
          16: 24VOUT-OL-

Example   `IM29`

Description • To combine several interrupts, specify the sum of the interrupt numbers.
            • Interrupt number 2, even when specified, will not cause interrupts on this instrument. On legacy models, interrupt numbers 2 and 16 are valid only on the MT220.

OD

Function   Requests for the measured data to be output.

Syntax   `OD<terminator>`

Example   `OD`

Description • On models with the /R1 option, the measured pressure is output with an extra digit.
            • On legacy models, executing this command in recall mode will cause error 14.
            • For the output format of measured and computed data, see the User's Manual of the legacy model. Note that if this instrument has the /R1 option, the data block of the measured pressure will be seven digits.

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OE

Function Requests for the error code to be output.

Syntax   `OE<terminator>`

Example `OE`

Description For details on error codes, see the User's Manual of the legacy model.
However, the following error numbers are not output.
14, 16, 21 to 23, 32, 33, 38, 53, 60 to 63, 83, 84, 90 to 94

OS

Function Requests for the settings to be output.

Syntax   `OS<terminator>`

Description For the output format of panel settings, see the User's Manual of the legacy model. However, the following section is different on this instrument from the legacy models.
• The following is output in the model line.
MDLMT300-G01
MDL: Signifies "model"
MT300: Indicates MT300
G01: Indicates the suffix code
• On models with the /DM option, the following fixed information is output in the data memory function line.
`SM0;SN01;SR0;SND20`

PD/PD?

Function Sets or queries the number of displayed digits for the measured pressure and percentage display values. (On legacy models, the percentage display is only available on the MT220.)

Syntax   `PDm<terminator>`
`PD?<terminator>`
m = 0, 1
0: Measured pressure 5.5 digits, percentage display 4.5 digits
1: Measured pressure 4.5 digits, percentage display 3.5 digits

Models with a -D05 suffix code (700 kPa model, in the case of legacy models: 767305, 767315, 767323, 767335)

0: Measured pressure 4.5 digits, percentage display 4.5 digits
1: Measured pressure 3.5 digits, percentage display 3.5 digits

Models with the /R1 option

0: Measured pressure 6.5 digits, percentage display 4.5 digits
1: Measured pressure 5.5 digits, percentage display 3.5 digits

Models with the /R1 option with a -D05 suffix code (700 kPa model)

0: Measured pressure 5.5 digits, percentage display 4.5 digits
1: Measured pressure 4.5 digits, percentage display 3.5 digits

Example `PD0`

Description The measured value in the next digit after the specified displayed digits is rounded to display the value. On models with the /DM option, the value in the DMM display is also rounded in the same manner.
Example: When the measured pressure is 100.1347
• If the number of displayed digits of the measured pressure is 5.5, the value "7" in the next lower digit is rounded.
Displayed value: 100.135
• If the number of displayed digits of the measured pressure is 4.5, the value "4" in the next lower digit is rounded.
Displayed value: 100.13

PU/PU?

Function Sets or queries the pressure unit.

Syntax   `PUm<terminator>`
`PU?<terminator>`
m = 4
4: Pressure unit kPa
On -U1 models, the above units can be used.
For -U2 models, see appendix 2 in the Getting Started Guide (IM MT300-02EN).

Example `PU4`

Description When relative value display, percentage display, or %ERROR display is in use, you cannot set the unit. Error 15 will occur.

PZ

Function   Executes zero calibration of pressure.

Syntax   `PZ<terminator>`

Example   `PZ`

Description • If the reference pressure applied to the instrument is abnormal when executing a zero calibration, zero calibration will not be executed. Error 17 will occur. Below are such situations.
     • If the measured pressure is over-range ("+OverRange" or "-OverRange" is displayed)
     • When relative value display, percentage display, or %ERROR display is in use
     • If the zero calibration value is outside the ±1 kPa range of the factory default value on models with a -A03 suffix code (absolute pressure model)
    • Legacy models have a recall mode function. Executing this command in recall mode will cause error 14.

RC

Function   Initializes the settings.

Syntax   `RC<terminator>`

REL/REL?

Function   Sets or queries the relative pressure display.

Syntax   `RELm<terminator>`
       `REL?<terminator>`
       m = 0, 1
         0: Relative pressure display off
         1: Relative pressure display on

Example   `REL0`

Description • If the measured pressure is over-range ("+OverRange" or "-OverRange" is displayed), the relative pressure display cannot be turned on. Error 15 will occur.
    • When percentage display or %ERROR display is in use, the relative display cannot be turned on. Error 15 will occur.
    • Legacy models have a recall mode function. Executing this command in recall mode will cause error 14.

SI/SI?

Function   Sets or queries the measurement integration time. This command is valid on models with a -D00 suffix code (differential pressure 1 kPa model).

Syntax   `SIm<terminator>`
       `SI?<terminator>`
       m = 0, 1
         0: Measurement integration time 250 ms
         1: Measurement integration time 4000 ms

Example   `SI0`

Description • On legacy models, this command is used to set or query the pressure sample rate.
     When m = 0
       Pressure sample rate 250 ms
     When m = 1
       Pressure sample rate 4000 ms
     • The function for switching the pressure sample rate is available only on the 767320 (differential pressure 1 kPa model). Setting is not possible on other models. Error 11 will occur.
     • If the pressure sample rate is set to 4000 ms, the pressure measurement averaging (set with the AG command) is set to off.
    • Setting is not possible when relative value display, percentage display, or %ERROR display is in use. Error 15 will occur.
    • A pressure sample rate command is not available in the compatible commands of this instrument.

MT210F Commands

These commands are exclusive to the MT210F but can also be used on this instrument (MT300). However, the functions that operate and restrictions may be different.

DY/DY?

Function   Sets or queries the D/A output dynamic mode. This command is valid on models with the /F1 and /DA options.

Syntax   `DYm<terminator>`
       `DY?<terminator>`
       m = 0, 1
         0: D/A output dynamic mode off
         1: D/A output dynamic mode on

Example   `DY0`

Description • This setting is fixed to off on models other than those with the /F1 and /DA options. It cannot be turned on.
    • On the legacy model MT210/MT220, this is fixed off even if it has the /DA option. It cannot be turned on.

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MS/MS?

Function	Sets or queries the measurement mode. This command is valid on models with the /F1 option.
Syntax	`MSm<terminator>`
	`MS?<terminator>`
	m = 0 to 2

    0:    Normal measurement mode

    1:    Mid-speed measurement mode

    2:    High-speed measurement mode

Example	`MS0`
Description	• Setting is not possible when relative value display, percentage display, or %ERROR display is in use. Error 15 will occur.
	• On legacy models, this command is only valid on the MT210F. On the MT210 and MT220, this is fix to normal measurement mode.

MT220 Commands

These commands are exclusive to the MT220 but can also be used on this instrument (MT300). However, the functions that operate and restrictions may be different.

AH

Function	Assigns the current measured pressure to the 100% pressure value. This command is valid on models with the /DM option.
Syntax	`AH<terminator>`
Example	`AH`
Description	On legacy models, an error occurs in the following situations.
	• Setting is not possible when relative value display, percentage display, or %ERROR display is in use. Error 15 will occur.
	• Executing this command in recall mode will cause error 14.

AL

Function	Assigns the current measured pressure to the 0% pressure value. This command is valid on models with the /DM option.
Syntax	`AL<terminator>`
Example	`AL`
Description	On legacy models, an error occurs in the following situations.
	• Setting is not possible when relative value display, percentage display, or %ERROR display is in use. Error 15 will occur.
	• Executing this command in recall mode will cause error 14.

DF/DF?

Function	Sets or queries the voltage and current measurement. This command is valid on models with the /DM option.
Syntax	`DFm<terminator>`
	`DF?<terminator>`
	m = 1, 2

    1:    DC voltage (5 V range)

    2:    DC current (20 mA range)

Example	`DF1`
Description	On legacy models, an error occurs in the following situations.
	• If this command is executed while data is being held, error 15 will occur.
	• If this command is executed when the DMM function is off, error 16 will occur.
	• Executing this command in recall mode will cause error 14.

DIS/DIS?

Function	Sets or queries the percentage display and %ERROR display (display mode). This command is valid on models with the /DM option.
Syntax	`DISm<terminator>`
	`DIS?<terminator>`
	m = 0 to 2

    0:    Percentage display function off

    1:    Percentage display function on (percentage display)

    2:    Percentage display function on (%ERROR display)

Between 1 and 2, the DMM header in the measured data output with the OD command is different. For 1, the percentage display header is included. For 2, the %ERROR display (error display) header is included. For details, see "Output Format for Measurement and Computation Data" in the User's Manual of the legacy model.

Legacy model

0:	Normal measurement display
1:	Percentage display
2:	%ERROR display (can be set when the DMM function is on)

Example	`DIS0`
Description	If this command is executed when the relative value display is in use, error 15 will occur.

DMM/DMM?

Function Sets or queries the on/off state of the DMM function. This command is valid on models with the /DM option.

Syntax `DMMm<terminator>`
`DMM?<terminator>`
m = 0, 1
    0:    DMM function off
    1:    DMM function on

Example `DMM1`

Description On legacy models, an error occurs in the following situations.
• If this command is executed while data is being held, error 15 will occur.
• Executing this command in recall mode will cause error 14.

MH/MH?

Function Sets or queries the 100% pressure value. This command is valid on models with the /DM option.

Syntax `MHm,n<terminator>`
`MHm?<terminator>`
m: Pressure unit. See the `PU` command.
n: Manually enter the 100% pressure value. The setting range and resolution of n are the same as the measurement display range and display resolution. For details on the measurement display range and display resolution, see section 6.1 in the Getting Started Guide (IM MT300-02EN).

Example `MH4,130.000`

ML/ML?

Function Sets or queries the 0% pressure value. This command is valid on models with the /DM option.

Syntax `MLm,n<terminator>`
`MLm?<terminator>`
m: Pressure unit. See the `PU` command.
n: Manually enter the 0% pressure value. The setting range and resolution of n are the same as the measurement display range and display resolution. For details on the measurement display range and display resolution, see section 6.1 in the Getting Started Guide (IM MT300-02EN).

Example `ML4,0.000`

VO/VO?

Function Sets or queries the on/off state of 24 VDC output. This command is valid on models with the /DM option.

Syntax `VOm<terminator>`
`VO? <terminator>`
m = 0, 1
    0:    24 VDC output off
    1:    24 VDC output on

Example `VO0`

Commands that use the <ESC> code

Commands that use the <ESC> code can also be used on this instrument (MT300).

<ESC>S

Function Executes serial polling.
Syntax `<ESC>S<terminator>`
Example `<ESC>S<terminator>`
Description When this instrument receives the <ESC> code (1BH) and then the S command, it outputs the status byte.

<ESC>R

Function Switches to remote mode.
Syntax `<ESC>R<terminator>`
Example `<ESC>R<terminator>`
Description When this instrument receives the <ESC> code (1BH) and then the R command, it switches to remote mode and no longer accepts panel keys. To clear remote mode, press **ESC**.

<ESC>L

Function Switches to local mode.
Syntax `<ESC>L<terminator>`
Example `<ESC>L<terminator>`
Description If this instrument receives the <ESC> code (1BH) and then the L command when the instrument is in remote mode, it returns to local mode.

<ESC>C

Function Execute a device clear.
Syntax `<ESC>C<terminator>`
Example `<ESC>C<terminator>`
Description When this instrument receives the <ESC> code (1BH) and then the C command, it initializes the internal communication device.

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Commands Unavailable on the MT300

```
CAD
CAL/CAL?
CAP/CAP?
CVD
CVP/CVP?
DA
DB/DB?
OM
ORD
RNO/RNO?
RO/RO?
SM/SM?
SND/SND?
SNO/SNO?
SO/SO?
SR/SR?
ST
SY/SY?
```

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