Magnescale

マルチインターフェースユニット・メインモジュール /
Multi Interface Unit/Main Module / Multi-Schnittstellengerät/Hauptmodul

MG10A-P1 / MG10A-P2

お買い上げいただき、ありがとうございます。
ご使用の前に、この取扱説明書を必ずお読みください。
ご使用に際しては、この取扱説明書どおりお使いください。
お読みになった後は、後日お役に立つこともございますので、必ず保管してください。

Read all the instructions in the manual carefully before use and strictly follow them.
Keep the manual for future references.

Lesen Sie die ganze Anleitung vor dem Betrieb aufmerksam durch und folgen Sie beim Betrieb des Geräts den Anweisungen. Bewahren Sie diese Bedienungsanleitung zum späteren Nachlesen griffbereit auf.

取扱説明書 / Instruction Manual / Bedienungsanleitung

Safety Precautions

Magnescale Co., Ltd. products are designed in full consideration of safety. However, improper handling during operation or installation is dangerous and may lead to fire, electric shock or other accidents resulting in serious injury or death. In addition, these actions may also worsen machine performance.

Therefore, be sure to observe the following safety precautions in order to prevent these types of accidents, and to read these "Safety Precautions" before operating, installing, maintaining, inspecting, repairing or otherwise working on this unit.

Warning Indication Meanings

The following indications are used throughout this manual, and their contents should be understood before reading the text.

⚠ Warning

Failure to observe these precautions may lead to fire, electric shock or other accidents resulting in serious injury or death.

⚠ Caution

Failure to observe these precautions may lead to electric shock or other accidents resulting in injury or damage to surrounding objects.

Symbols Requiring Attention

⚠ CAUTION ⚡ ELECTRICAL SHOCK

Symbols Prohibiting Actions

🚫 DO NOT DISASSEMBLE

⚠ Warning

- Do not use this unit with voltages other than the specified supply voltage as this may result in fire or electric shock.
- Do not handle the terminal with wet hands as this may result in electric shock.

- Do not open the cover of the MG10A-P1/MG10A-P2 to disassemble or modify the unit, as this may result in burns or injury. These actions may also damage the internal circuitry.
- This device operates with DC power supply. Absolutely do not connect an AC power supply to the terminals as this may result in fire or electrical shock. Doing so may also damage the internal circuitry.

⚠ Caution

- The unit does not have an explosion-proof structure. Therefore, do not use the unit in an atmosphere charged with inflammable gases as this may result in fire.
- Be sure to turn off the power before connecting or disconnecting power and signal connectors in order to prevent damage or misoperation.

Contents

Microsoft® Windows® is the trademark of Microsoft Corporation. It will be referred as Windows in the manual.
Other system names, product and service names described in the instruction manual are trademarks or registered trademarks of their corresponding manufacturers.

1. Overview

The MG10A main module combines counter modules and an I/F module into a single unit that can output measurement data and make various settings from a RS-232C port (standard feature) and an I/O connector. The minimum configuration includes one main module and one counter module; the maximum configuration consists of one main module, 16 counter modules and one I/F module. Furthermore, by connecting the units using a link cable, up to 16 units can be connected (up to 64 counter modules can be connected), and control can be exercised and data output from a single RS-232C connector.
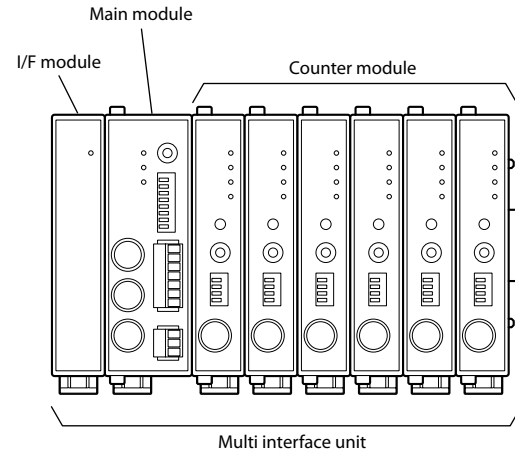
Counter modules are available for use with DK series, DG∗∗B series, DL∗∗B/BR series, and DT series measuring units. In addition, these counter modules can also be mixed and used in combination.

1-1. Features

- Small size ideally suited for incorporation inside an electrical parts panel
- Construction that allows for installation on DIN rails (35 mm DIN rail)
- Expansion from 1 to 16 channels enabled by module configuration
- Connection of up to 64 channels possible using the link cables
- Mixing and connection of any models in the DK series, DG∗∗B series, DL∗∗B/BR series and DT series measuring unit for use together
- Input resolutions of 0.1 μm, 0.5 μm, 1 μm, 5 μm and 10 μm supported
- Measurement of maximum values, minimum values and peak-to-peak values possible in addition to current values
- Go/No Go judgment can be carried out by the comparator function
- Four different sets of comparator setting values can be set
- Choice between two hold functions when the measuring unit is retracted for work changes:
  - ① Latch function for temporarily holding the current values
  - ② Pause function for temporarily stopping the updating of the maximum values, minimum values and peak-to-peak values
- RS-232C interface provided as standard
- BCD output enabled by connection of BCD module which is sold separately
- DC +12 to +24 V external power supply

1-2. Product Lineup

Product	Model	Remarks
Main module	MG10A-P1	Photocoupler-insulated open collector output (current sink type)
	MG10A-P2	Photocoupler-insulated output (source output)
Counter module (sold separately)	MG20A-DK	For DK series
	MG20A-DG	For DG✱✱B, DL✱✱B/BR series
	MG20A-DT	For DT series
I/F module BCD module (sold separately)	MG30-B1	Photocoupler-insulated open collector output (current sink type)
	MG30-B2	Photocoupler-insulated output (source output)
RS-232C cable (sold separately)	DZ252	For connecting MG10A with RS-232C port on external device
Link cable (sold separately)	LZ61	Used when linking a multiple number of units
Extension cable (sold separately)	CE08-✱✱	Used when extending the link cable

Multi interface unit

1-3. System Configuration

PLC

Computer

BCD
Go/No Go
judgment

RS-232C

Link (Max. 16 units)

Measuring unit

DK Series

DL Series

DG Series

DT Series
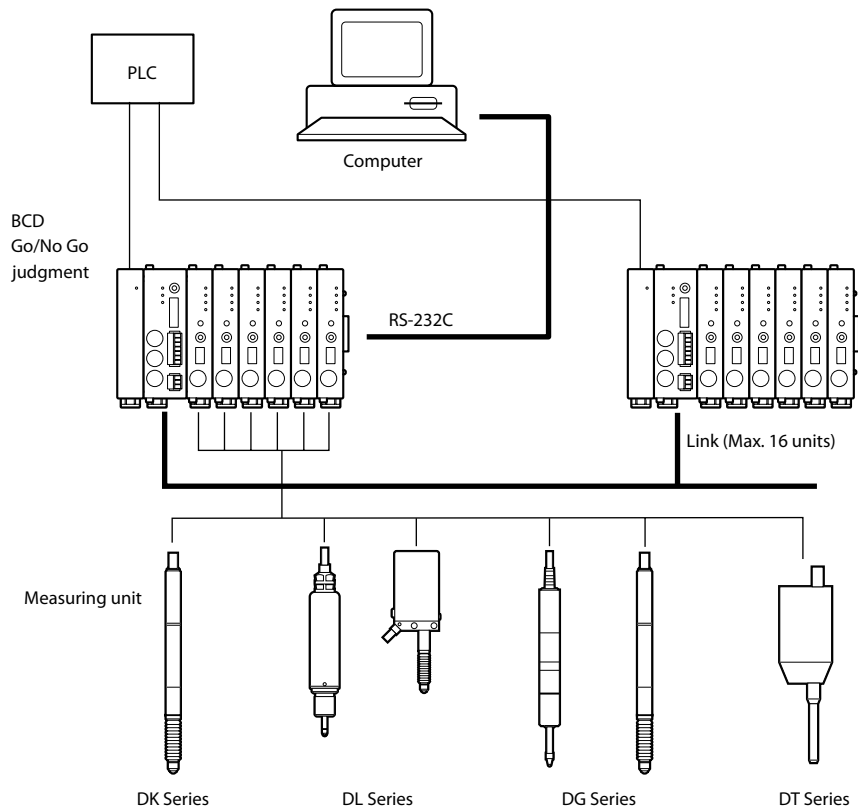
2. Name and Function of Each Part

POWER

HOLD

UNIT No.

232C - SET

I/O

DC - IN

FG

RS - 232C

LINK - IN

LINK - OUT
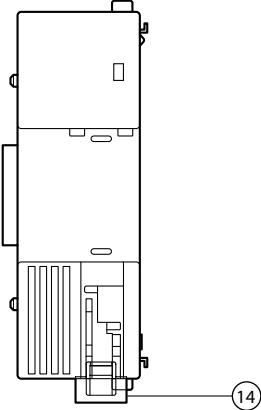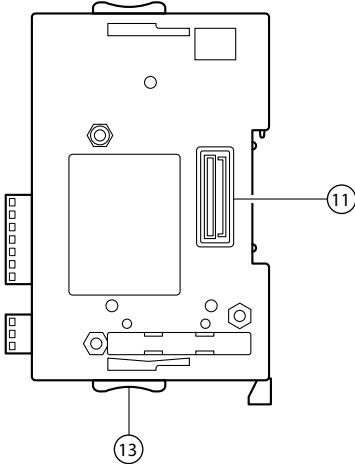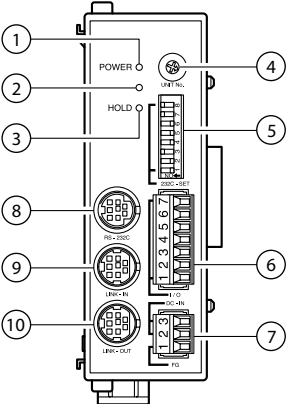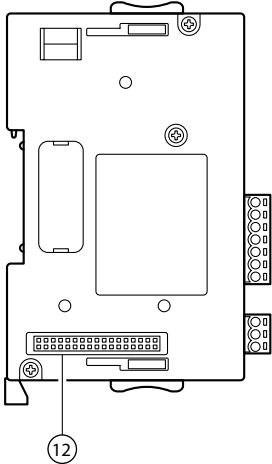
① **POWER lamp**

Lights green when the power is on and the unit is ready for operation.

② **Alarm lamp**

Lights red when any counter module of the unit enters the alarm status.

③ **HOLD lamp**

Lights orange when the hold function (in which current value output data is latched or the peak value data updating is stopped) is activated in any counter module of the unit.

④ **Unit number setting switch**

Sets the unit number to a number from 0 to F.

⑤ **RS-232C communication setting switch**

Sets the RS-232C communication specifications.

⑥ **I/O connector**

Connects the I/O connector of a PLC or other device and controls it.

⑦ **Power input socket**

The external power supply (DC +12 V to 24 V) is connected here.

⑧ **RS-232C connector**

Connects the unit to a computer or PLC host unit.
The connector at the end of the RS-232C cable (DZ252) sold separately is connected here.

⑨ **LINK IN connector**

When using the link connection for the units, the link cable (LZ61) is used to connect this connector with the LINK OUT connector of a higher order unit's main module.

⑩ **LINK OUT connector**

When using the link connection for the units, the link cable (LZ61) is used to connect this connector with the LINK IN connector of a lower order unit's main module.

⑪ **Counter module connector**

This is connected to the counter module.

⑫ **I/F module connector**

This is connected to the I/F module.

⑬ **Slide locks**

Secures a module which has been connected.

⑭ **DIN rail anchoring lever**

Secures the main unit to the DIN rails.

3. Connections and Installation

3-1. Connecting the Counter Modules

The type of counter module that can be connected is not limited. Counter modules can be mixed and used in accordance with the application. Up to 16 counter modules can be connected.

1 Remove the rubber cover installed over the counter module connector on the right side panel of the main module.
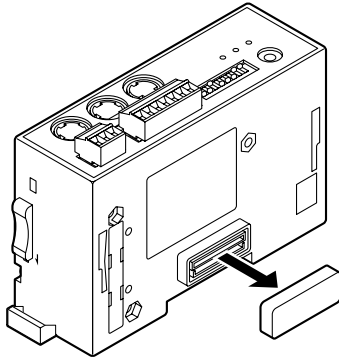
2 Set the slide lock position as shown in the figure.
Install the first counter module into the main module so that the counter module connector is aligned properly.
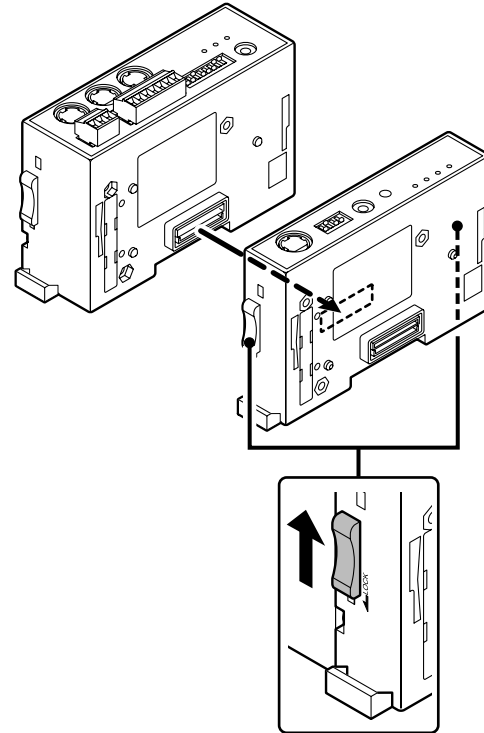
3 Secure the counter module using the top and bottom slide locks.
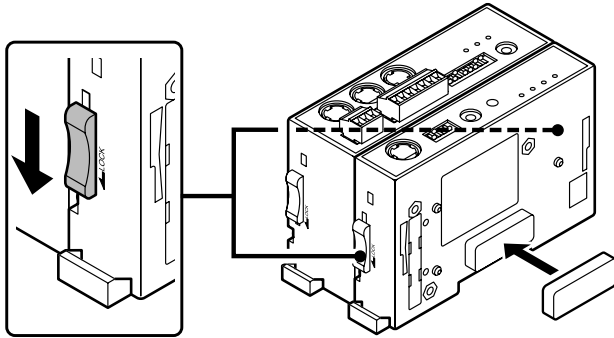
4 Repeat steps **2** and **3** to install all the counter modules, and then fit the rubber cover, which was removed in step **1** above, over the counter module connector which was installed last.

<When removing the connected counter modules>
Follow steps **1** to **4** above in reverse. Before removing the modules, do not forget to release the slide locks.

3-2. Connecting the I/F Module

Only one I/F module can be connected.

1 Use a screwdriver or other tool to remove the cover mounted on the left side panel of the main module.

| Note |

Take care not to let dirt or metal fragments enter the inside of the main unit.
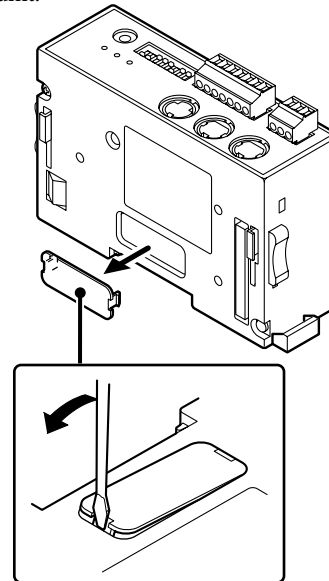
2 Set the slide lock position as shown in the figure. Install the I/F module into the main module so that the I/F module connectors are aligned properly.
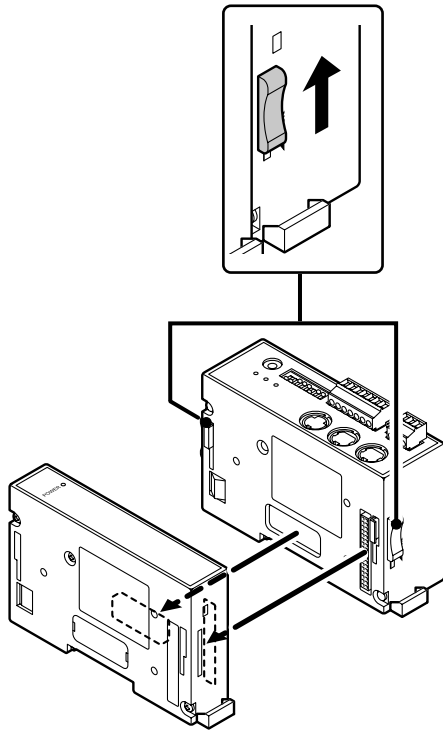
3 Secure the I/F module using the top and bottom slide locks.
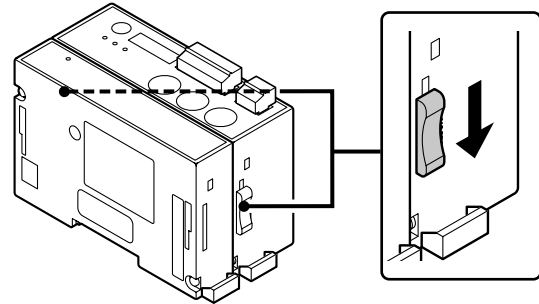
<When removing the connected I/F module>
Follow steps **1** to **3** above in reverse. Before removing the module, do not forget to release the top and bottom slide locks.

3-3. Installing the Unit on the DIN Rails

When the multi interface unit is shipped from the factory, the tabs on the DIN rail anchoring levers are locked.
DIN rail specifications: 35 mm

1 Align the top side of the groove in the unit's rear panel with the top of the DIN rails.
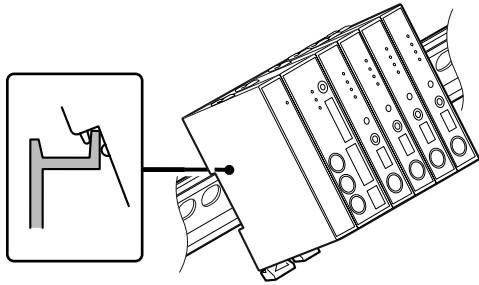
2 Install the unit by pushing it into position until a clicking sound is heard so that the bottom side of the groove in the unit's rear panel fits snugly on the DIN rails.

Note

Check that the whole unit has been installed properly.
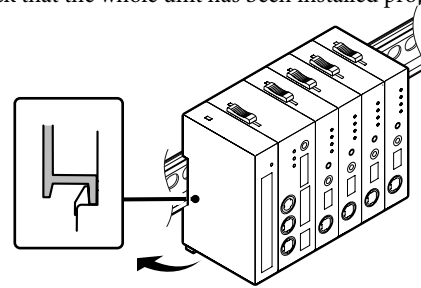
<When removing the unit from the DIN rails>
While holding the unit in place so that it will not fall, pull down the DIN rail anchoring levers of all the modules until a clicking sound is heard.
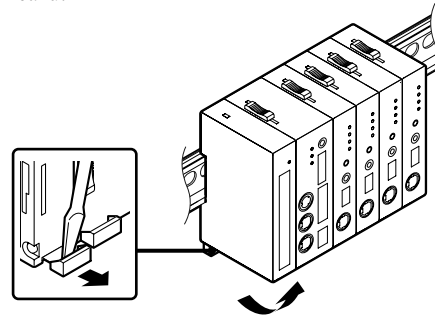
3-4. Connecting the Measuring Units

1 Connect the measuring units to the measuring unit connectors on the counter modules.
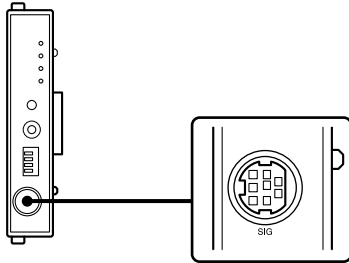
Note

Be sure to connect the measuring unit corresponding to the counter module. Connecting the wrong measuring unit can cause a breakdown of the connector.

3-5. Connecting the Power Connector

1 Wire the accessory 3-pin connector to the external power supply.

No.	I/O	Signal	Description
3	—	GND	Ground
2	—	Vin	DC +12 V to +24 V
1	—	FG	Frame ground

2 Connect the wired 3-pin connector to the power input socket.

Note

Be sure to turn off the power before making the connection.
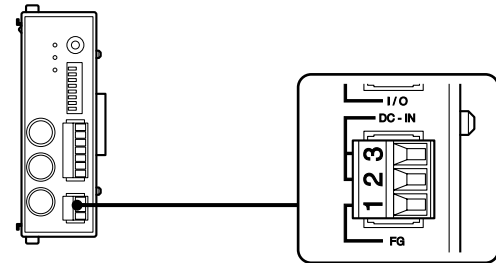
3-6. Link Connections

1 Connect the LINK OUT connector on the main module of the unit connected to the host unit and the LINK IN connector on the main module of the unit to be connected by link connection using the link cable (LZ61).

If the link cable is not long enough, use the CE08 extension cable sold separately to extend it.

| Note |

The multi interface unit will not work if the LINK IN connector and LINK OUT connector are connected the wrong way round.
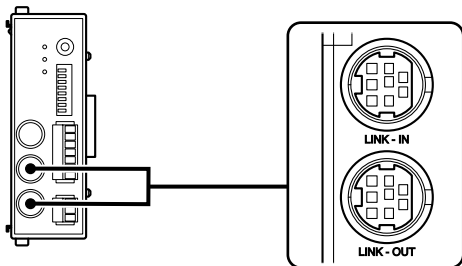
3-7. Connection to the Host Unit

1 Connect the RS-232C cable (DZ252) sold separately to the RS-232C connector of the host unit.
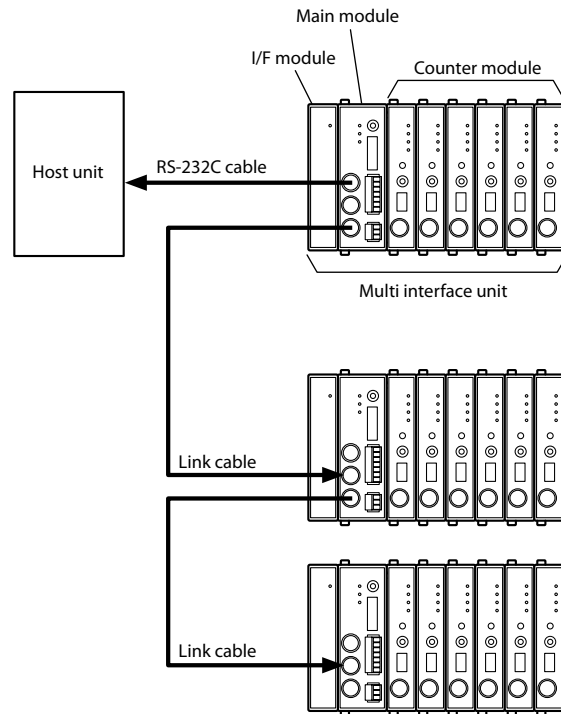
4. Functions

The multi interface unit comes with the following functions.

- Peak-hold
- Preset
- Reference point
- Reset
- Start
- Go/No GO judgment
- Hold

The functions are set by inputting the RS-232C commands.
(For details on the settings and operation, refer to the list of commands in chapters 5 and 6.)

4-1. Definition of Terms

Term	Definition
Current value	The value currently measured
Maximum (MAX) value	The maximum measured value
Minimum (MIN) value	The minimum measured value
Peak-to-peak (P-P) value	The value obtained by subtracting the minimum value from the maximum value
Measuring modes	Current value mode, maximum (MAX) value mode, minimum (MIN) value mode and peak-to-peak (P-P) mode
Measured values	A general term covering the current values, maximum values, minimum values and peak-to-peak values
Peak value	A general term covering maximum values, minimum values and peak-to-peak values (held inside the modules)
Go/No GO judgment output	The result obtained by comparing the upper and lower limits of the comparator with the measured value

4-2. Details of Functions

For details on the settings and inputs, refer to chapters 5 and 6.

4-2-1. Peak-hold

The MG10A holds the peak values at all times.
The peak values are checked by switching between the measuring modes.
The start function makes it possible to restart measurement from an optional position.

4-2-2. Preset

When the reference point is not used (factory setting)
When the preset value recall input is supplied, the preset value which has been set is set to the current value.

When the reference point is used
In this case, the function uses the master preset value (refer to the reference point specifications). When the master value is supplied as the preset value input after the reference point has been loaded for the first time, the distance from the master value (preset value) to the reference point is calculated, and the reference point offset value is generated internally and stored.
After the reference point has been loaded for the second and subsequent times, the reference point offset value is automatically loaded, which means that the preset value need not be input for the second and subsequent times.

4-2-3. Reference Point

When the reference point is not used (factory setting)
After the power is turned on, the measuring mode is established automatically.
(Incremental operation)

When the reference point is used
After the power is turned on, the unit automatically enters the reference point signal input wait status, and then automatically enters the measuring mode when the reference point is passed.

| Note |

This can be used only when using a measurement unit with a reference point.

[How to set the reference point (For DK series)]

1 Turn on the power.
The reference point lamp of the counter module starts flashing.
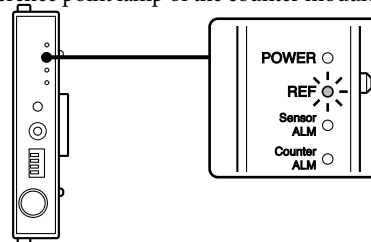
2 Push the spindle of the measuring unit upward by 1 mm or more, and retract it.

The reference point lamp of the counter module stops flashing and lights.

Push in at least 1 mm.
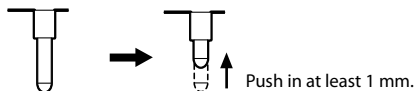
3 Align the measuring unit with the master object to be measured.
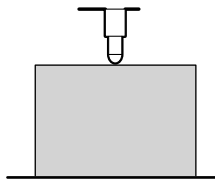
4 Input the master value as the preset value using the RS-232C command.

> **Note**
>
> Transmit the SETUP command, P command, then the CLOSE command, in this order.
>
> The reference point offset value is stored in the counter module.

Once this value is set, the reference point will be set automatically after the power is next turned on when the spindle of the measuring unit is pushed upward by 1 mm or more. To set the reference point again, clear the reference point offset value using the RS-232C command, and proceed again from step **1**.

4-2-4. Reset

This function resets all the measured values to zero regardless of whether the preset value is set.

> **Note**
>
> • The reference point setting is also canceled when the reference point is being used. Set the reference point again.
> • If a reset input is supplied while the reference point is being set, the reference point setting is canceled as soon as the reset input is supplied.

4-2-5. Start

This function starts updating the peak value as soon as an input is supplied.

Changes in measured values in each mode when an input is supplied

Current value	Remains unchanged
Maximum value	Current value prevailing when the input was supplied is set
Minimum value	Current value prevailing when the input was supplied is set
Peak-to-peak value	Value obtained by subtracting the minimum value (zero) from the maximum value when the input was supplied is set

4-2-6. Go/No GO Judgment (Comparator)

This function judges "go" or "no go" for the measured values in the measuring mode which is set.

The Go/No GO judgment results are added to the RS-232C data, or BCD data of MG30-B (sold separately), and output.

The comparator values set the upper and lower limits. Up to four sets of comparator values can be set, and the set of values used can be switched partway through the measurement.

Measured value	Judgment	RS-232C judgment output
Measured value > upper limit	Upper limit NG	U
Measured value = upper limit	GO	G
Lower limit < measured value < upper limit	GO	G
Measured value = lower limit	GO	G
Measured value < lower limit	Lower limit NG	L

4-2-7. Hold

Current value output data latch (latching)

In the current value mode, this function holds output data and Go/No GO judgment output for that value.

[Latch conditions]
- The start input signal is set as the hold input by the parameter setting.
- Current value mode

Note

This function does not operate when the measuring mode is peak value mode.

Latch ON Latch OFF Current value
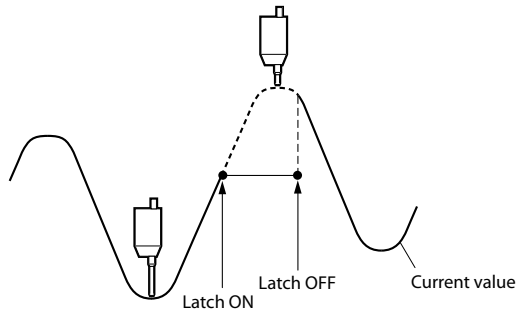
Peak value data update stop (pause)

This function enables the following measurements to be performed while the peak values are held.
It is useful when measuring the peak values for a multiple number of workpieces or for a multiple number of locations.

When the peak value data update stop function is set to ON
The peak value updating is stopped. The current value is constantly updated.
If the maximum value mode, minimum value mode or peak-to-peak value mode is set as the measuring mode, the Go/No GO judgment output and the output data are not updated even when the measuring unit is operated.

When the peak value data update stop function is set to OFF
The peak values are constantly updated.

Maximum value

Current value

Pause ON Pause OFF
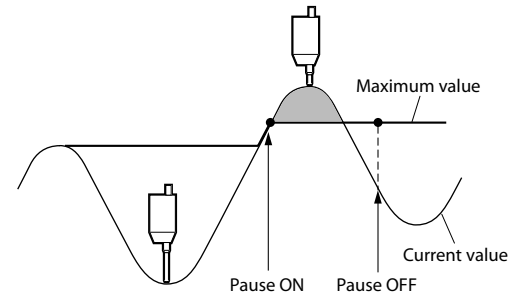
MG10A-P1 / MG10A-P2

5. Settings

The settings described in this chapter concern the setting of the parameters for initializing the main unit when the power is turned on. The settings of the parameters which have been set are retained even after the power has been turned off.

5-1. Factory Settings

Stored value settings

Settings are changed using the RS-232C setup command (see section 5-4).

Item	Factory setting
Reference point	Not used
Measuring mode	Current value mode
Preset value	0
Comparator set number	1
Comparator upper limit	0 ∗ For all set numbers 1 to 4
Comparator lower limit	0 ∗ For all set numbers 1 to 4
Start/Hold function	Start function
RS-232C trigger input setting	Low-speed mode setting
RS-232C output data format	Measuring mode + Go/No GO judgment result addition mode (mode 3) See section 6-1-3.
Unit	mm
RS-232C data transfer format	Separation by spaces

Communication parameter settings
(RS-232C communication setting switch)

These settings are changed using the DIP switches. (See section 5-2)

Communication speed : 9600 bps
Data length : 8 bits
Stop bit length : 1 bit
Parity : None
Delimiter output : "C_R" + "L_F"
Flow control : Hardware flow control (RTS, CTS)

5-2.   Main Module Settings

5-2-1.   Unit Number Settings

A unit number is set for each of the units.
Unit numbers are used in the commands which are input for the settings and operations.
Do not set the same unit number among linked units.

1 Use a screwdriver or other tool to align the direction of the arrow on the unit number setting switch with the number to be set.
Setting range: 0 to F
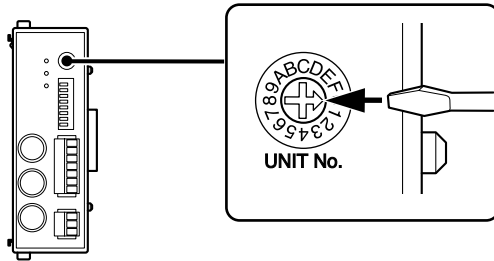
5-2-2. Communication Parameter Settings

These parameters are used to set the RS-232C communication specifications.
Bold print is used to indicate the factory settings.

> **Note**

When using a link connection, be sure to use all the same communication settings (except for the RS-232C communication setup switch SW1 master setting) and RS-TRG mode (high-speed/low-speed) parameter settings. Normal communications are impossible when the settings for each unit differ.
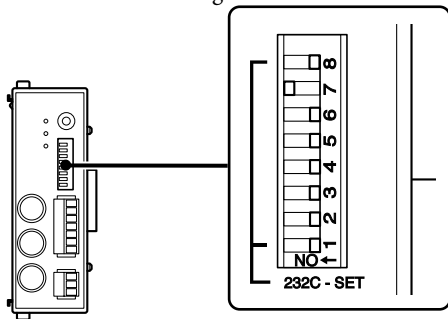
Communication speed setting	SW 7	SW 8
2400 bps	OFF	OFF
9600 bps	**ON**	**OFF**
19200 bps	OFF	ON
38400 bps	ON	ON

Data length setting	SW 6
8 bit	**OFF**
7 bit	ON

Stop bit setting	SW 5
1 bit	**OFF**
2 bit	ON

Parity setting	SW 3	SW 4
OFF	**OFF**	**OFF**
ON Even	ON	OFF
ON Odd	ON	ON

Delimiter setting	SW 2
"C_R" + "L_F"	**OFF**
"C_R"	ON

Link setting	SW 1
Normal setting	**OFF**
Master setting	ON

5-3. Settings of Counter Modules Sold Separately

For the counter module, the module address and the count polarity and resolution of the measuring unit to be connected are set by using switches.
For further details, refer to the operating instructions of the counter module.

5-3-1. Counter Module Number (Channel Number) Setting Switch

This switch is used to set the module number to a number from 0 to F.
Module numbers are used to designate the channel number of the measuring unit in the commands which are input for the settings and operations.
Do not use the same number for more than one module in the same unit.
Setting the same number for more than one module will prevent the system from operating properly.

5-3-2. Measuring Unit Settings

Set the measuring unit setting switches to suit the measuring unit to be connected.
For further details, refer to the operating instructions of the counter module concerned.

Count polarity setting	SW 1
Push-in direction "+"	**ON**
Push-in direction "−"	OFF

Bold print is used to indicate the factory settings.

Sensor supported	SW 2	SW 3	SW 4	Resolution
—	OFF	OFF	OFF	Not used
DK series (0.1 μm)	ON	OFF	OFF	0.1 μm
DK series (0.5 μm) DG∗∗B series	OFF	ON	OFF	0.5 μm
DT512	ON	ON	OFF	1 μm
DT12, DT32, DL∗∗BR	OFF	OFF	ON	5 μm
DL310B, DL330B	ON	OFF	ON	10 μm
—	OFF	ON	ON	Not used
—	ON	ON	ON	Not used

5-4. Changing the Factory Settings (RS-232C Commands)

The setup commands for RS-232C communication are used when the factory settings are to be changed. The new settings will take effect when the setup is ended by the close command.

The settings established here are stored in the internal memory where they are retained even after the power has been turned off. The unit starts up according to the new settings the next time the power is turned on. See "6-1. RS-232C Interface" for the communication specifications.

Note

It takes a maximum of about 3 seconds to save data after the CLOSE command has been sent. Never turn off the unit's power during this time as the unit may cease to start normally.

5-4-1. List of Setup Command

Command	Setting item
SETUP	Start parameter setup.
MODE	Set the measuring mode.
P	Set the preset value.
CH	Set the comparator upper limit.
CL	Set the comparator lower limit.
SCN	Set the comparator set number.
REF	Set whether the reference point is to be used or not.
LCLR	Clear the reference point setting (reference point offset value).
STTERM	Select the external start input function.
RSSEP	Select the RS-232C data transfer format (separator).
RSFORM	Select the RS-232C output data format.
RSTRG	Select the RS-232C trigger or internal timer.
SCALE	Select the scale unit (mm/inch).
CLOSE	Close the parameter setup.

5-4-2. Details of Command Settings

ASCII code is used for all the commands. A command is terminated by "C_R" or "C_R" + "L_F". ("C_R": carriage return; "L_F": line feed)

- Select using communication setting switch No. 2. on main unit.

  OFF : "C_R" + "L_F" (factory setting)
  ON : "C_R"

- On the pages to follow, "③" and "④" are used to indicate the value to be set.
- When inputting a setting, a numerical value inside the assigned range must be selected: otherwise, the value will not be set.
- If no polarity (+ or −) is input, it will be construed as +.

[Data which is input ahead of the commands]

Data	Selection range	Symbol used in descriptions
Unit number	0 to F or ∗	①
Module number	0 to F or ∗	②

- 0 to F are hexadecimal numbers which are equivalent to 0 to 15 under the decimal system.
- ∗ is used when the settings are to be established for all units or all modules.

Setup commands

Command Write/Read	Description
SETUP Command	Start parameter setup. SETUP Starts parameter setup.

MODE=/MODE=? Command/ Return format	Set the measuring mode.
	①②MODE=③
	③=0 : Current value (REAL) mode
	    1 : Maximum value (MAX) mode
	    2 : Minimum value (MIN) mode
	    3 : Peak-to-peak value (P-P) mode

P=/P=? Command/ Return format	Set the preset value. ①②P=③ ③=The value differs depending on the input resolution.

Resolution	Setting
0.1 µm	2-digit integer + decimal point + 4 decimal places −99.9999 to +99.9999
0.5 µm	−99.9995 to +99.9995 (last digit must always be a 5 or 0)
1 µm	3-digit integer + decimal point + 3 decimal places −999.999 to +999.999
5 µm	−999.995 to +999.995 (last digit must always be a 5 or 0)
10 µm	4-digit integer + decimal point + 2 decimal places −9999.99 to +9999.99

Setup commands

Command Write/Read	Description
CH=/CH=? **CL=/CL=?** Command/ Return format	Set the comparator upper limit. Set the comparator lower limit. ①②CH③=④ ①②CL③=④ ③=1 : Comparator set number 1 2 : Comparator set number 2 3 : Comparator set number 3 4 : Comparator set number 4 ④=The value differs depending on the input resolution.

Resolution	Setting
0.1 μm	2-digit integer + decimal point + 4 decimal places −99.9999 to +99.9999
0.5 μm	−99.9995 to +99.9995 (last digit must always be a 5 or 0)
1 μm	3-digit integer + decimal point + 3 decimal places −999.999 to +999.999
5 μm	−999.995 to +999.995 (last digit must always be a 5 or 0)
10 μm	4-digit integer + decimal point + 2 decimal places −9999.99 to +9999.99

Note

This setting is ignored if the lower limit value is actually larger than the upper limit value or if the upper value is actually smaller than the lower value. When changing the setting values, be certain after changes have been made that the upper limit value is greater than or equal to the lower limit value.

Command Write/Read	Description
SCN=/SCN=? Command/ Return format	Set the comparator set number. ①②SCN=③ ③=1 : Set number 1 2 : Set number 2 3 : Set number 3 4 : Set number 4
REF=/REF=? Command/ Return format	Set whether the reference point is to be used or not. ①②REF=③ ③=0 : Reference point not used (counter mode established) 1 : Reference point used (reference point load mode established)
LCLR Command format	Clear the reference point setting (reference point offset value) ①②LCLR

Note

LCLR command is valid only when REF is active "=1"

Command Write/Read	Description
STTERM=/STTERM=? Command/ Return format	Select the external start input function. ①STTERM=③ ③=0 : Start function 1 : Hold (latch) function
RSSEP=/RSSEP=? Command/ Return format	Select the RS-232C data transfer format (separator). ①RSSEP=③ ③=0 : SPACE 1 : "C_R" + "L_F"
RSFORM=/RSFORM=? Command/ Return format	Select the RS-232C output data format. ①RSFORM=③ ③=0 : Mode 1 1 : Mode 2 2 : Mode 3 (For details on modes 1 to 3, see section 6-1-3.)

Setup commands

Command Write/Read	Description
RSTRG=/RSTRG=? Command/ Return format	Select the RS-232C trigger or internal timer. ①RSTRG=③ ③=0 : RS-232C trigger low-speed mode, internal timer not used 1 : RS-232C trigger high-speed mode, internal timer not used 2 : RS-232C trigger not used, internal timer 0.2 s. 3 : RS-232C trigger not used, internal timer 0.5 s. 4 : RS-232C trigger not used, internal timer 1.0 s. 5 : RS-232C trigger not used, internal timer 5.0 s. 6 : RS-232C trigger not used, internal timer 10 s. 7 : RS-232C trigger not used, internal timer 30 s. 8 : RS-232C trigger not used, internal timer 60 s. 9 : RS-232C trigger not used, internal timer 300 s. Low-speed mode : Mechanical contact input (relay, switch, etc.) High-speed mode : Electronic contact input (transistor, etc.)

Note

The internal timer cannot be used when using a link connection. Be absolutely sure that all units have been set to either RS-TRG low-speed mode or high-speed mode. Normal communications are impossible when the settings for each unit differ.

SCALE Command format	Set the scale unit (mm or inch). ①SCALE=③ ③=0 : mm 1 : 1/25.4 mm
CLOSE Command	Close the parameter setup. CLOSE Close the parameter setup and store the setup data.

6. Operation

Operations are performed by commands which use RS-232C communication and by the input of signals from the I/O connector. (If the I/F module has been connected, operations from the I/F module can also be performed. For further details, refer to the instruction manual of the I/F module.)
Check the reference point setting while referring to section "4-2-3. Reference point" function as well.

| Note |

All contents other than those set by the setup commands are deleted when the power is turned off.

Type of operation	RS-232C	I/O connector
Measuring mode changes	○	
Preset value recall	○	
Reset	○	○ (All channels at once)
Start	○	○ (All channels at once)
Preset value setting	○	
Comparator value setting	○	
Comparator set number selection	○	
Peak value data update stop (Pause)	○	○ (All channels at once)
Current value data output latch	○	○ (All channels at once)
Reference point load	○	
Reference point offset value read	○	
Software version read	○	
Alarm output	○	○ (Overall alarm)

6-1. RS-232C Interface

6-1-1. RS-232C Interface Specifications

Compliant with EIA RS-232C standard

Signals   : Asynchronous, start-stop system, half-duplex system

Transfer rate: 2400, 9600, 19200, 38400 bps

Data   : 7 or 8 bits

Parity   : None, odd or even; selectable

Stop bit   : 1 or 2 bits

Cable length: Max. 15 meters

Flow control: Hardware flow control (RTS, CTS)

Use a DZ252 RS-232C cable (sold separately).

Connection

PIN No.		PIN No.
1		1
2		2
3		3
4		4
5		5
6		6
7		7
8		8
Case		9
	Shield cable	Case

8pin mini DIN

9pin Dsub

MG10A side | DZ252 | Personal computer side
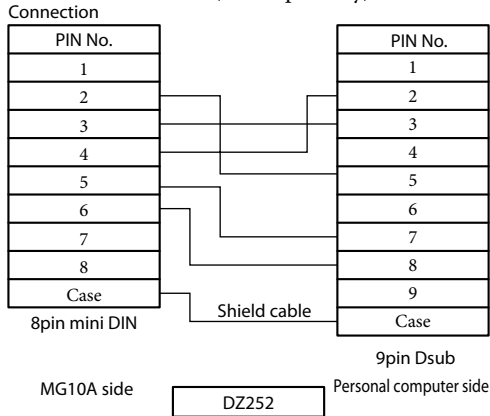
6-1-2. Connector Pin Assignment
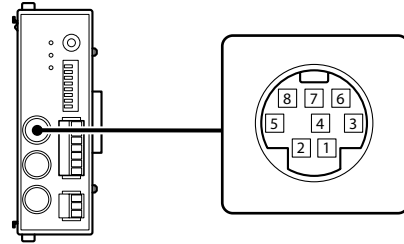
Pin description

Host unit side

Pin no.	I/O	Description	Signal
1		N.C	—
2		SG (Signal GND)	SG
3	I	RXD (Receive data)	TXD
4	O	TXD (Transmit data)	RXD
5	I	CTS (Clear to send)	RTS
6	O	RTS (Request to send)	CTS
7		+10 V	DSR
8		N.C	

6-1-3. Communication Format

Communication data output format

[Example]

Channel 0 Output data | Channel 1 Output data | Channel n Output data | Delimiter

▲ Header:

5 bytes (this differs depending on communication mode)

Byte 1 : Leading character....................unit number   0 to F

Byte 2 : 2nd character ....channel number   0 to F

Byte 3 : 3rd character ....mode   Current value mode   : N

                                  Maximum value mode   : A

                                    Minimum value mode   : I

                                    Peak-to-peak value mode : P

Byte 4 : 4th character ....unit M (mm)   I (inch)

Byte 5   : 5th character comparator

             judgment value ....Upper limit NG   : U

                                Within range   : G

                                Lower limit NG   : L

                                When an alarm has occurred : E

■ Numerical value:

Fixed at 8 bytes : + or − sign followed by the data (including decimal point)

[Example 1]   For a resolution of 0.1 μm
                             : "−99.9999" to "+99.9999"

[Example 2]   For a resolution of 10 μm
                             : "−9999.99" to "+9999.99"

[Example 3]   In the event of an overflow, the count continues but the leading character changes to "F."
                             "−99.9999" → "−F0.0000" → "−F0.0001"

[Example 4]   When an alarm has occurred, "Error" appears
                             : (" "," "," "E","r","r","o","r"," ")

□ Data separate character:

1 byte " " (space) or 2 bytes "C_R" + "L_F"

Select using RS-232C command (factory setting: space).

● Delimiter:

2 bytes "C_R" + "L_F" or 1 byte "C_R"

Select using communication setting switch No. 2. on main unit.

    OFF : "C_R" + "L_F" (factory setting)

    ON   : "C_R"

Communication modes

There are three modes each with a different header output.

Mode 1: Normal data output
Header consisting of 2 bytes (unit number + channel number)
[Example] "00−09.9999"

Mode 2: Data output with measuring mode information added
Header consisting of 4 bytes
(unit number + channel number + mode + unit)
[Example] "00NM−09.9999"

Mode 3: Data output with measuring mode and Go/No Go judgment result information added
Header consisting of 5 bytes (unit number + channel number + mode + unit + comparator judgment value)
[Example] "00NMG−09.9999"

6-1-4. Link Connection

Formats used during link connection

The data is output in the specified communication format (see section 6-1-3) beginning from the highest order unit regardless of the unit numbers which have been set.

The highest order unit is the unit connected to the host unit (PC or PLC), and the lower order units are ranked according to the link connection order from the highest order unit.

• The data of each unit is separated by delimiters, and output.
• No commands are used specifically for link connections.
• When extending the link cable (LZ61), use a cable length of 10 m or less.

Note

When using a link connection, be sure to use all the same communication settings (except for the RS-232C communication setup switch SW1 master setting) and RS-TRG mode (high-speed/low-speed) parameter settings. Normal communications are impossible when the settings for each unit differ.

6-1-5. Operation Commands

List of operation commands

Command	Setting item	Remarks
R	Load the data of all the channels.	
r	Load the data of specific channels.	
P-P	Switch to the peak-to-peak value mode.	
MAX	Switch to the maximum value mode.	
MIN	Switch to the minimum value mode.	
REAL	Switch to the current value mode.	
MODE	Set the measuring mode.	For details on how to set the measuring modes, see section 5-4.
RCL	Recall the preset value.	
RES	Reset. (Zero reset/reference point setting cancel)	
START	Start.	
P	Set the preset value.	For details on how to set this value, see section 5-4.
CH	Set the comparator upper limit.	For details on how to set this value, see section 5-4.
CL	Set the comparator lower limit.	For details on how to set this value, see section 5-4.
SCN	Set the comparator set number.	For details on how to set this number, see section 5-4.
PAU	Set the peak value data update stop.	
LCH	Set the current value output data latching.	
L	Load the reference point.	

Details of command operations

ASCII code is used for all the commands. A command is terminated by "C_R" or "C_R" + "L_F". ("C_R": carriage return; "L_F": line feed)

- Select using communication setting switch No. 2. on main unit.

    OFF : "C_R" + "L_F" (factory setting)

    ON : "C_R"

- On the pages to follow, "③" and "④" are used to indicate the value to be set.
- When inputting a setting, a numerical value inside the assigned range must be selected: otherwise, the value will not be set.
- If no polarity (+ or −) is input, it is construed as +.

[Data which is input ahead of the commands]

Data	Selection range	Symbol used in descriptions
Unit number	0 to F or ∗	①
Module number	0 to F or ∗	②

- 0 to F are hexadecimal numbers which are equivalent to 0 to 15 in the decimal system.
- ∗ is used when the settings are to be set for all units or all modules.

Operation commands

For the same commands as the setting commands (see the list of operation commands), refer to section 5-4 for details on how to set the commands.

Command	Description
P-P Command format	Switch to the peak-to-peak value mode. ①②P-P
MAX Command format	Switch to the maximum value mode. ①②MAX
MIN Command format	Switch to the minimum value mode. ①②MIN
REAL Command format	Switch to the current value mode. ①②REAL
RCL Command format	Recall the preset values. ①②RCL
RES	Reset ①②RES (zero reset/reference point setting cancel)
START	Start ①②START ∗ Set the current value established when the command is input as both the maximum and minimum values (zero for the peak-to-peak value), and start the peak value measurement.

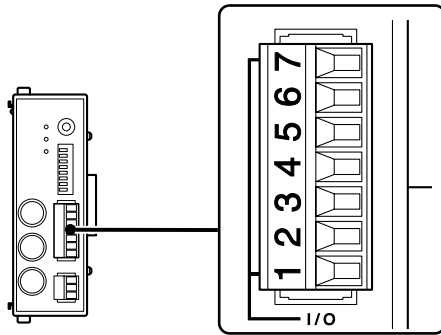| Command	Description
PAU Command format	Set the peak value data update stop. ①②PAU③ ③=ON : Peak value data update stop OFF: Peak value data update stop cancel
LCH Command format	Set the current value data latching. ①②LCH③ ③=ON : Current value output data latch stop OFF: Current value output data latch stop cancel
L Command format	Load the reference point. ①②L

Read commands

Command	Description
LO=? Command format Return format	Load the reference point offset value. ①②LO=? ①②LO=③ ③=Setting −99.9999 to +99.9999
VER=? Command format Return format	Read the software version. ①VER=? ①VER=③ ③=Version No. ∗ Starting from the leading byte: major version, minor version (Example) "0VER=10"

6-2.   I/O Connector

In addition to the RS-232C command, data can be output and the operations performed through the I/O connector.

Wire the I/O connector to the 7-pin connector provided and connect it to the main unit.

6-2-1.   I/O Connector Pin Assignment

No.	I/O	Pin	Description
7	–	Output Common	Output signal common pin (P1: −COM/P2: +COM)
6	O	Alarm	Alarm output
5	–	Input Common	Input signal common pin (P1: +COM/P2: −COM)
4	I	Start/latch input	When the start function is selected as the input setting: the peak value updating starts as soon as the input signal is supplied; when the latch function is selected: while the input signal is supplied, the value is compared with the current value and the comparator's result is latched.
3	I	Pause input	While the input signal is supplied, the updating of the peak value is temporarily stopped.
2	I	RS trigger input	The data of all the channels at the time when the input signal is supplied is latched and output from the RS-232C port. When a link connection is used to connect more than one unit, all data from the input unit and units connected below it is output from the RS-232C port.
1	I	Reset input	All the channels are reset.

6-2-2. Input/Output Circuits

MG10A-P1 input/output circuit

Input

MG10A-P1 : Photocoupler-insulated input, Source type +COM
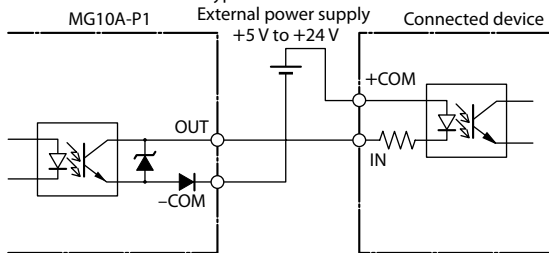Connected device: Current sink type −COM
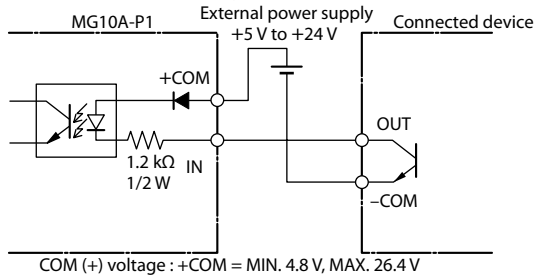
COM (+) voltage : +COM = MIN. 4.8 V, MAX. 26.4 V
Input voltage : V_{IL} = MAX. 0.5 V

Output

MG10A-P1 : Photocoupler-insulated open collector output, Current sink type −COM
Connected device: Source type +COM
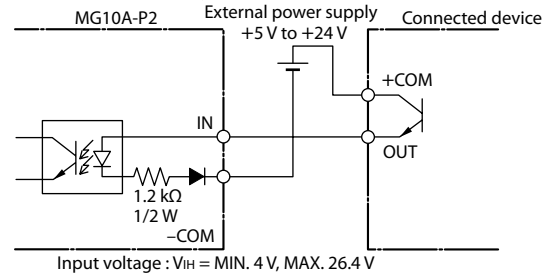

Output signal rating
On : V_{OL} = MAX. 1.4 V (when output current I_{OL} = 10 mA)
Off : V_{OH} = MAX. 26.4 V (output current I_{OH} = MAX. 50 µA)

MG10A-P2 input/output circuit

Input

MG10A-P2 : Photocoupler-insulated input, Current sink type −COM
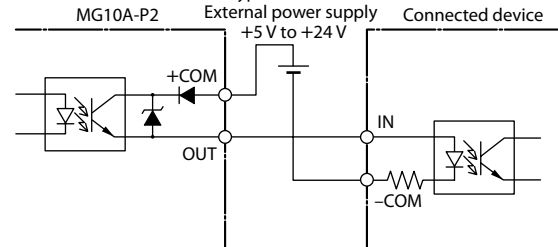Connected device: Source type +COM

Input voltage : V_{IH} = MIN. 4 V, MAX. 26.4 V

Output

MG10A-P2 : Photocoupler-insulated output, Source type +COM
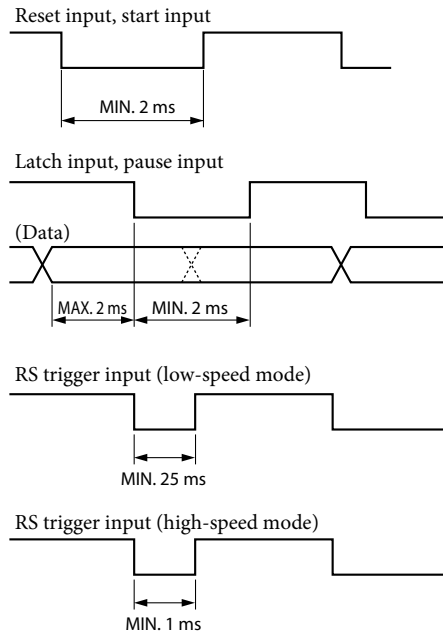Connected device : Current sink type −COM

Output signal rating
On : V_{OL} = MAX. 1.4 V (when output current I_{OL} = 10 mA)
Off : V_{OH} = MAX. 26.4 V (output current I_{OH} = MAX. 50 µA)

6-2-3. Signal Timing

Reset input, start input

```
‾‾‾|_____|‾‾‾‾‾‾‾‾‾|_____
   |←  MIN. 2 ms  →|
```

Latch input, pause input

```
‾‾‾‾|_____|‾‾‾‾‾‾|_____
```

(Data)

```
‾‾X‾‾‾‾‾‾‾X‾‾‾‾‾‾‾X‾‾‾‾‾‾
  |MAX. 2 ms|MIN. 2 ms|
```

RS trigger input (low-speed mode)

```
‾‾‾‾|____|‾‾‾‾‾|_____
    |←→|
    MIN. 25 ms
```

RS trigger input (high-speed mode)

```
‾‾‾‾|____|‾‾‾‾‾|_____
    |←→|
    MIN. 1 ms
```

The input interval varies with the number of the counter modules used or the RS-232C transmission speed.
Be sure to input signals after data acquisition is finished.

7. Alarm Display/Output

Alarm lamp	Item	Output		Cause	Solution
		I/O connector	RS-232C		
ON	• Measuring unit is not connected. • Connection has been cut. • Measuring unit speed over.	Alarm output	"Error" in the numerical value part of the data communication output. When this is output in mode 3, the fifth character following the leading character of the header changes to "E". [Example] Mode 1 "00 Error" Mode 2 "00NM Error" Mode 3 "00NME Error"	The measuring unit was replaced while the power was on.	Reset.
				The measuring unit is not connected or connection has been cut.	Remove the cause of the error, and reset.
				The measuring unit's spindle has exceeded the maximum response speed.	Reset.
	Count response speed over	Alarm output		The count response speed has been exceeded.	Reset.
OFF	Overflow	—	The second character in the numerical value of the communication data output changes to "F". [Example] Mode 1 "00 + F0.0000"	The number has more than 6 digits.	Limit input to 6 digits.

MG10A-P1 / MG10A-P2

8. Specifications

8-1. Electrical Specifications

Supply voltage	DC 12 to 24 V (11 to 26.4 V) Allowable power startup time: Max. 100 ms
Power consumption	2.0 W + total power of connected modules [*1]

Communication area

Communication interface	RS-232C (compliant with EIA-232C standard)
Baud rate setting	2400, 9600, 19200, 38400 bps
Data length	7 or 8 bits
Stop bit	1 or 2 bits
Parity	None, odd, even
Delimiter	"C_R", "C_R" + "L_F"
Flow control	Hardware flow control (RTS, CTS)

Link function

No. of units linked	Max. 16 units (total of 64 counter modules)
Cable length between links	Max. 10 meters

I/O area

Input format	−P1: source input (+COM)/−P2: sink input (−COM) Photocoupler-insulated, external power supply DC 5 to 24 V
Output format	−P1: open collector output, sink type (−COM) −P2: source type (+COM) Photocoupler-insulated, external power supply DC 5 to 24 V
Input signals	Reset, start/latch, pause, RS trigger (valid for all connected channels)
Output signals	General alarms

Modules which can be connected (sold separately)

Counter module	MG20A-DK, MG20A-DG, MG20A-DT Different models can be mixed and connected together; max. 16 units [*1]
I/F module	MG30-B1, MG30-B2 [*1]

Other

Operating temperature and humidity range	0 to +50 °C(no condensation)
Storage temperature and humidity range	−10 to +60 °C (20 to 90 % RH)

*1:   The system cannot be configured in such a way that the total power of the modules connected to the MG10A will exceed 54 W when the supply voltage is 12 V or will exceed 108 W when it is 24 V.

Design and specifications are subject to change without notice.

8-2. Accessories

7-pin connector for I/O made by Phoenix Contact
MC1.5/7-ST-3.5.................................... 1 pc (installed on main unit)
3-pin connector for power supply made by Phoenix Contact
MC1.5/3-ST-3.5 .... 1 pc (installed on main unit)
Link connector cap ....2 pcs (installed on main unit)
Counter module connector cap....... 1 pc (installed on main unit)
Instruction manual ....1 copy
Ferrite core 3

8-3. Outline Drawing

Units: mm

MG10A-P1 -P2

MG20A-DK -DG -DT

MG30-B1 -B2
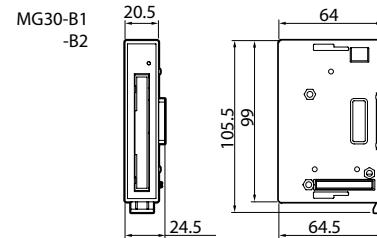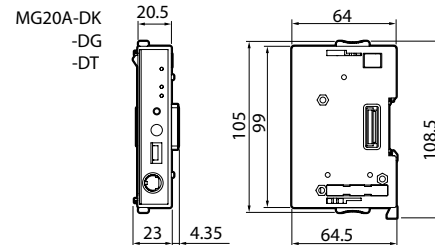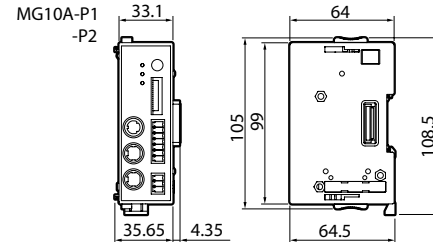
9. Troubleshooting

If trouble is suspected, check out the following points before requesting servicing.

① **No power.**
- Has the power connector been inserted all the way in?
- Is the correct voltage (+12 V to +24 V) being supplied?
- Is the power connector wired correctly?
- Does the power source have a sufficient capacity (W)?

② **No communication.**
- Has the RS-232C connector been inserted all the way in?
- Are the same communication settings used for both the host unit and MG10A?
- Is the cable too long?
- Are any cables carrying heavy currents from motors or other devices positioned near the communication cable?
- In the case of link connections, are all the MG10A communication settings the same?

③ **Problem in the count reading.**
- Has the count value overflowed?
- Is the alarm lamp on the MG10A lighted?
- Is the same main module number or counter module number being used more than once?
- Have the counter module switches been set correctly?

④ **Count reading does not change.**
- Is the HOLD lamp on the MG10A lighted?
- Is the peak value mode set?
- Is the data being transmitted correctly?
- Are the measuring sensors connected to the counter modules?
- Are the data request commands being output correctly?

⑤ **Reference point lamp on a counter module fails to stop flashing.**
- Is the measuring sensor connected to the counter module capable of outputting the reference point?
- Has the measuring sensor connected to the counter module been pushed in?

保 証 書

お客様	お名前	フリガナ 様	
	ご住所	〒　　　　　電話　　　-　　　-	
保証期間	お買上げ日	年　　月　　日	
	本　体	1　　年	
型名	**MG10A-P1 / MG10A-P2**		

お買上げ店住所・店名
電話　　-　　-　　　　　　　　　　印

本書はお買上げ日から保証期間中に故障が発生した場合には、右記保証規定内容により無償修理を行うことをお約束するものです。

保証規定

1 保証の範囲
① 取扱説明書、本体添付ラベル等の注意書に従った正常な使用状態で、保証期間内に故障した場合は、無償修理いたします。
② 本書に基づく保証は、本商品の修理に限定するものとし、それ以外についての保証はいたしかねます。

2 保証期間内でも、次の場合は有償修理となります。
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② 使用上の誤りおよび不当な修理や改造による故障。
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