Magnescale

SPEED X PRECISION

NEW

DK800S Series

2012.07

Magnescale

SPEED X PRECISION

LT30

Magnescale

12341

RESET P MODE COMP

SET

Magnescale Co., Ltd.

摺動力

Magnescale-specific mechanical technology realizes high-following capability

enabling measurement of various shapes by smooth movement

and high rigidity withstanding strokes as many as 30million strokes.

Force enabling quick measurements at high precision and even in severe environments.

This is the "sliding force" of the DK-S Series.

Conceptual diagram

Achieved number of strokes

30 *million*

Stem diameter

ø8

Maximum resolution

0.1μm

DK SERIES
Digital Gauge

Slim, compact, significant durability and high performance

Slim, compact, and having a high resolution of 0.1 μm maximum
The maximum response speed has also further advanced.
The DK Series employs the magnetic detection principle, thereby being capable of performing stable measurements even in harsh environments.
Moreover, it features high durability because it uses steel materials.

- Measuring range: 5 mm to 30 mm
- Accuracy: 1 μm (high-resolution models), 1.5 μm (general-purpose resolution models)
- Maximum resolution:0.1μm, 0.5 μm
- Maximum response speed:
  80 m/min (resolution 0.1 μm)
  250 m/min (resolution 0.5 μm)
- Built-in reference point
- Excellent resistance to water and oil
- Enabling spindle driving by pneumatic pressure (DK830SVR)
- Adopts a flexing-resistance cable

Full - scale

Full - scale

Achieved number of strokes*

30 million

Adoption of the ball spline structure enables realization of high durability.

※: under specific test conditions defined by Magnescale Co, .Ltd.

Stem diameter   **Maximum resolution**

ø8   0.1μm

New DK800S Series

Covering a wide measuring range of 5 mm to 30 mm at a maximum resolution of 0.1 μm
An abundant lineup allowing the performance of every type of measurement

Description of dial gauge model

DK8○○S△▲□R★

[Stroke]
05 : 5mm
12 : 12mm
30 : 30mm

[Resolution]
With no symbol: 0.1 μm
5 : 0.5μm

[With reference point]

[Shape]
With no symbol: Straight
L: Right angle

[Stem shape]
With no symbol: φ8 straight
F: Flange type

[Min. phase difference]
With no symbol: DK830 Series (50 ns)
A : 50ns
B : 100ns

[Ball spline model]

[Stem diameter]
φ8mm
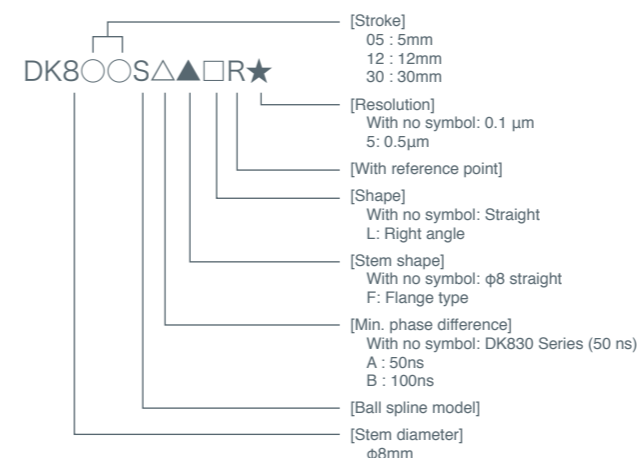
NEW DK805SAR/DK805SAR5
DK805SBR/DK805SBR5

NEW DK805SALR/DK805SALR5
DK805SBLR/DK805SBLR5

NEW DK805SAFR/DK805SAFR5
DK805SBFR/DK805SBFR5

NEW DK805SAFLR/DK805SAFLR5
DK805SBFLR/DK805SBFLR5

NEW DK812SAR/DK812SAR5
DK812SBR/DK812SBR5

NEW DK812SALR/DK812SALR5
DK812SBLR/DK812SBLR5

NEW DK812SAFR/DK812SAFR5
DK812SBFR/DK812SBFR5

NEW DK812SAFLR/DK812SAFLR5
DK812SBFLR/DK812SBFLR5

DK830SLR

DK830SVR

DK830SR

LT SERIES
Counter

Compact counters of the DIN size

LT30 Series

■ Maximum display resolution: 0.1 μm
■ Reference-point detecting function
■ BCD or RS-232C I/O models are available.
■ Compact and lightweight: DIN standards (72 mm W x 72 mm H)
■ Comparator function
■ Reset/Preset
■ Alarm for exceeded max. response speed, disconnected measuring unit, etc.
■ Setting value storage
■ 2 channels ADD/SUB (2 channels model only)
■ Measurements of the current, maximum, minimum, peak-to-peak values and pass/fail judgment function as standard
■ Key locking function

LY SERIES
Counter

For measurements and control in diverse field uses.
The required output board can be extended.

LY71

■ Various outputs are enabled by mounting extension boards.
  - BCD output (option)
  - Comparator function: Relay/open collector (option)
■ Peak hold function convenient for statistical data collection
■ Various external input functions convenient
  for automatic measurement
■ Display resolution switching
■ Data storage
■ Reset/preset/restart
■ Reference-point detection of measuring unit
■ Scaling
■ Flicker control
■ The power supply requires an optional AC adapter.
■ Input axis 1 to 2 axes

For measurements and control in diverse field uses.
Multifunction counter with RS-232C interface as standard

LY72

■ Equipped with RS-232C function as standard
■ Peak hold function convenient for statistical data collection
■ Various external input functions convenient for
  automatic measurement
■ Display resolution switching
■ Data storage
■ Reset/preset/restart
■ Reference-point detection of measuring unit
■ Scaling
■ Flicker control
■ The power supply requires an optional AC adapter.
■ Input axis 1 to 3 axes

MG SERIES
Interface Network

Intelligent network system
MG40 Series

Enables performance of

multipoint measurements at high efficiency

■Equipped with an Ethernet interface, enabling remote data processing and storage by high-speed data communication of 10 Mbps.

■Adopts the hub connection method, and installment of extension units enables easy connection of 100 axes of gauges using one cable between hubs.

■Use of Ethernet or CC-Link interface eliminates the need for BCD wiring or RS-232C wiring with PLC. (It is not possible to use Ethernet and CC-Link simultaneously.)

■In the case of a communication error, the communication retry function enables the acquisition of correct positional information.

■Bidirectional digital communication with gauges enables significant improvement of the measuring response speed of the gauges.

■DIN rail (35 mm) can be mounted by one touch. (With the exception of the MG43 counter unit)

MG41-NE / MG41-NC / MG42-4

MG43

Multipoint measurement unit
MG10/20/30 Series

For flexible multipoint measurements

■Modular configuration allows extension of the channels by a required number of axes in a range of 1 to 16 channels.

■Link connection enables connection of a maximum of 64 channels.

■Supports the input resolution : 0.1 μm, 0.5 μm, 1 μm, 5 μm, and 10 μm

■Option with the RS-232C interface as standard Use of MG30 enables performance of BCD output.

■The operating voltage is 12 V to 24 V DC.

■Can be mounted to DIN rail (35 mm) with a single motion

MG10 / 20 / 30

Equipped with the Ethernet interface as standard and supports CC-Link (MG41-NC)

Intelligent network measurement system enabling the performance of high-speed communication, multi-axes measurements, and data management.

The new measurement system allows porting of the main functions of a counter unit to the gauge bodies at a high level.

The MG40 Series eliminates the need for counting of sensor analog outputs or AB phase outputs of gauges and acquires positional information directly through full digital communication with the gauges.

The response speed is 20 times the theoretical value, miscounting caused by an external noise is solved, and a communication failure is momentarily recovered by reread.

Even if the number of gauges connected to each unit is changed, operations are available.

FA computer   PLC

MG43   Ethernet   MG43   CC-LINK

MG41-NE   MG41-NC

MG42-4   MG42-4
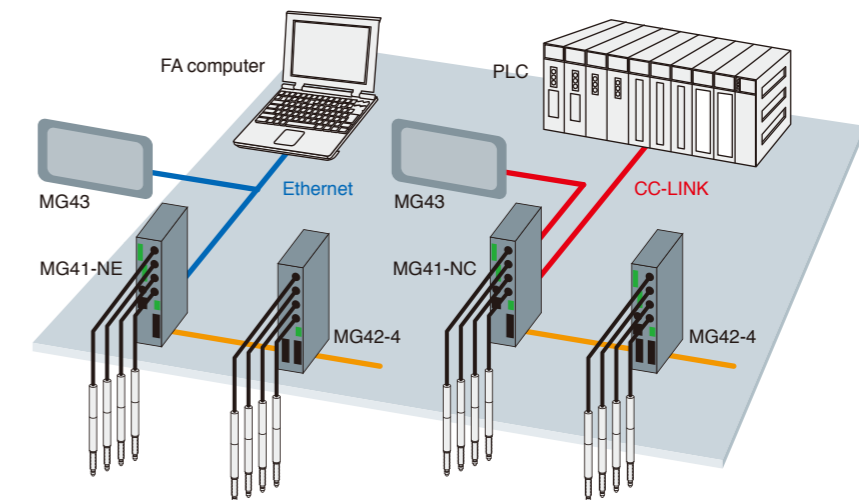
Equipped with the RS-232C interface as standard

This modular measurement system is applicable to multipoint measurements of digital gauges or system connection flexibly.

The MG10 Series multi-interface unit realizes multipoint measurements, data transfer to a computer, integrated data processing, and wire saving and improves the measurement efficiency of production lines.

BCD   MG10 / 20 / 30

RS-232C

PLC

8

9

[New] DK805S Series/DK812S Series

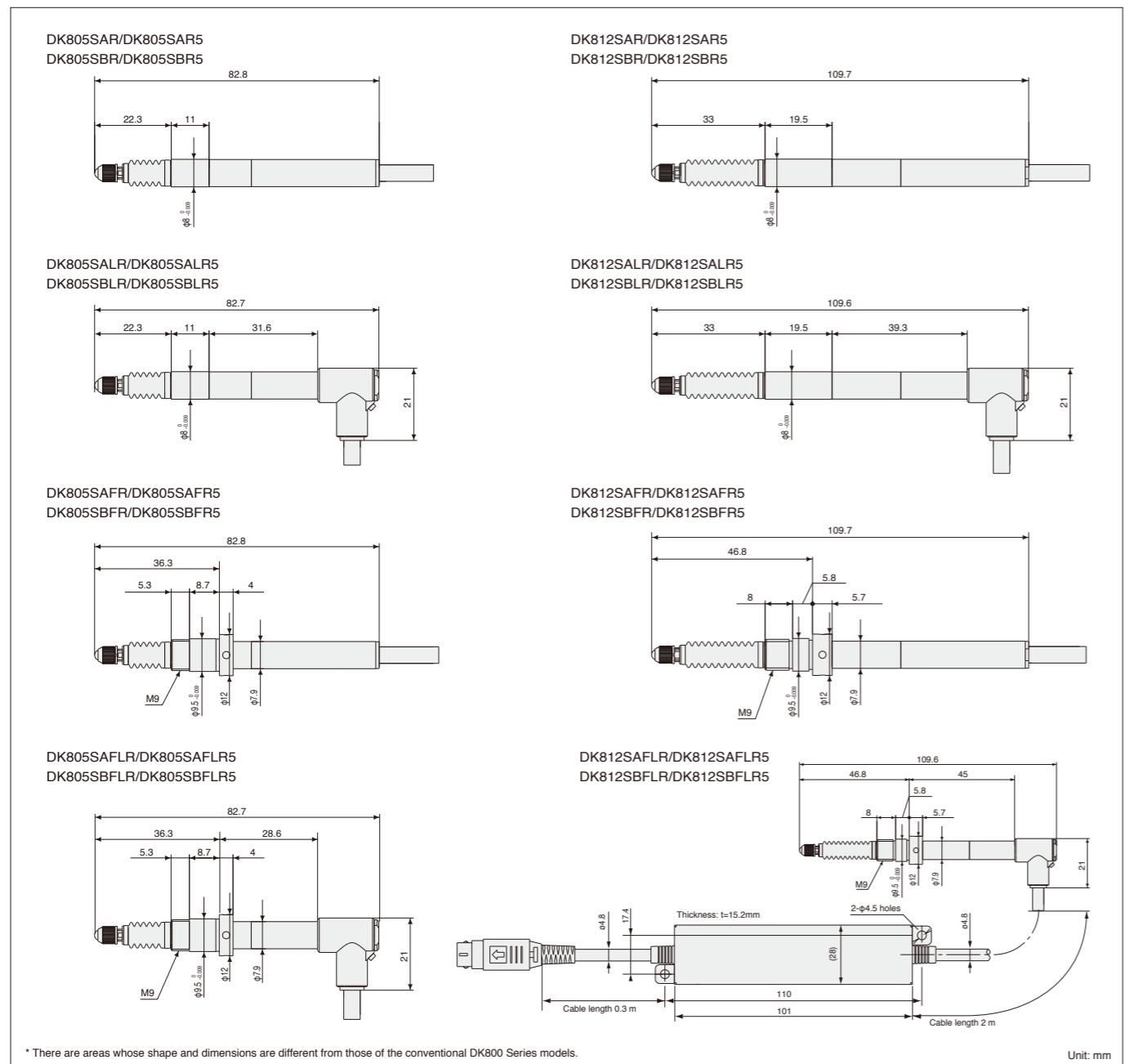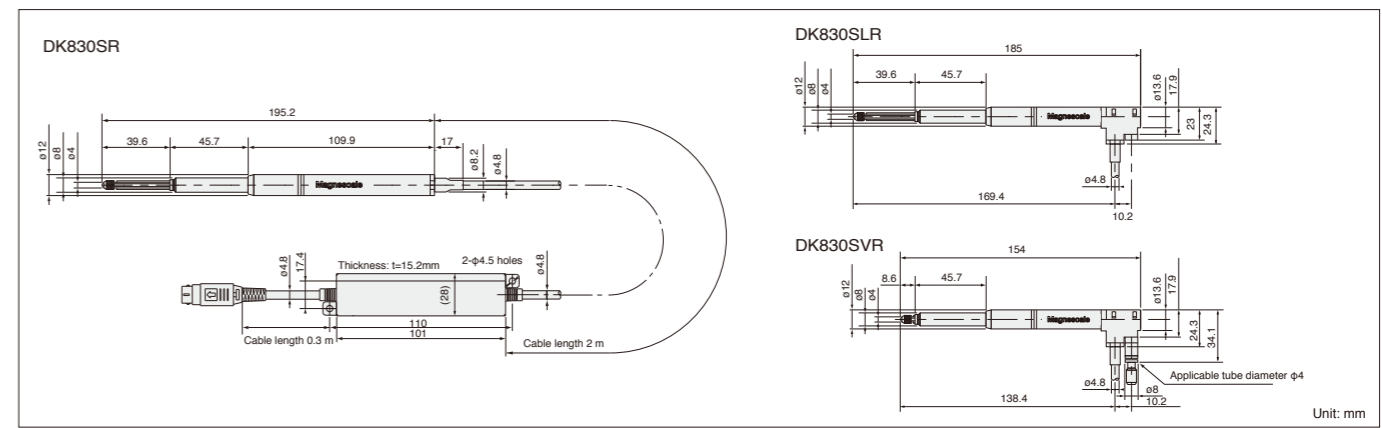| Model	DK805S Series		DK812S Series	
	High-resolution model	General-purpose resolution model	High-resolution model	General-purpose resolution model
Model	DK805SAR, DK805SALR DK805SAFR, DK805SAFLR DK805SBR, DK805SBLR DK805SBFR, DK805SBFLR	DK805SAR5, DK805SALR5 DK805SAFR5, DK805SAFLR5 DK805SBR5, DK805SBLR5 DK805SBFR5, DK805SBFLR5	DK812SAR, DK812SALR DK812SAFR, DK812SAFLR DK812SBR, DK812SBLR DK812SBFR, DK812SBFLR	DK812SAR5, DK812SALR5 DK812SAFR5, DK812SAFLR5 DK812SBR5, DK812SBLR5 DK812SBFR5, DK812SBFLR5
Measuring range	5mm	5mm	12mm	12mm
Maximum resolution	0.1μm	0.5μm	0.1μm	0.5μm
Accuracy (at 20°C)	1μm	1.5μm	1μm	1.5μm
Measuring force (at 20°C)	Upward: 0.35 ±0.25 N Horizontal: 0.40 ±0.25 N Downward: 0.45 ±0.25 N		Upward: 0.4 ±0.3 N Horizontal: 0.5 ±0.3 N Downward: 0.6 ±0.3 N	
Operating temperature	0 to 50°C			
Storage temperature	-20 to 60°C			
Maximum response speed (*1)	80m/min (42m/min)	250m/min (100m/min)	80m/min (42m/min)	250m/min (100m/min)
Air driving	Vacuum suction DK805SALR, DK805SAFLR, DK805SBLR, DK805SBFLR, DK805SALR5, DK805SAFLR5, DK805SBLR5, DK805SBFLR5 DK812SALR, DK812SAFLR, DK812SBLR, DK812SBFLR, DK812SALR5, DK812SAFLR5, DK812SBLR5, DK812SBFLR5			
Reference-point response speed	Same as maximum response speed noted above			
Reference point	Position where the spindle is moved by 1 mm			
Protection grade	Straight type: IP66, right-angle type: IP64 (IP67 *2)			
Vibration	20 to 2000 Hz, 100 m/s²			
Impact resistance	1000m/s² 11ms			
Power supply voltage	5 V DC ±5%			
Power consumption	1W			
Output	A/B/reference point, voltage differential line driver output (compliant with EIA-422)			
Mass *3	30g			
Feeler	Provided with a carbide ball tip, mounting screw M2.5	Provided with a steel ball tip, mounting screw M2.5	Provided with a carbide ball tip, mounting screw M2.5	Provided with a steel ball tip, mounting screw M2.5
Output cable length (up to succeeding electronic section)	22m max.			
Achieved number of strokes *4	30 million			
Accessories	One copy of the Instruction Manual, two +P M4 x 5 screws, tightening nuts, clamp spanner, curved washers, mounting pins 1 each (for DK8**S*F** only), one hose elbow (for DK8**S*L** only), one spanner, and one copy of the supplementary remarks			

*1 Values in parentheses show those of model B. *2 When φ4 mm tube is used in the right angle model *3 Excluding interpolation box and connector *4 under specific test conditions defined by Magnescale Co, .Ltd.
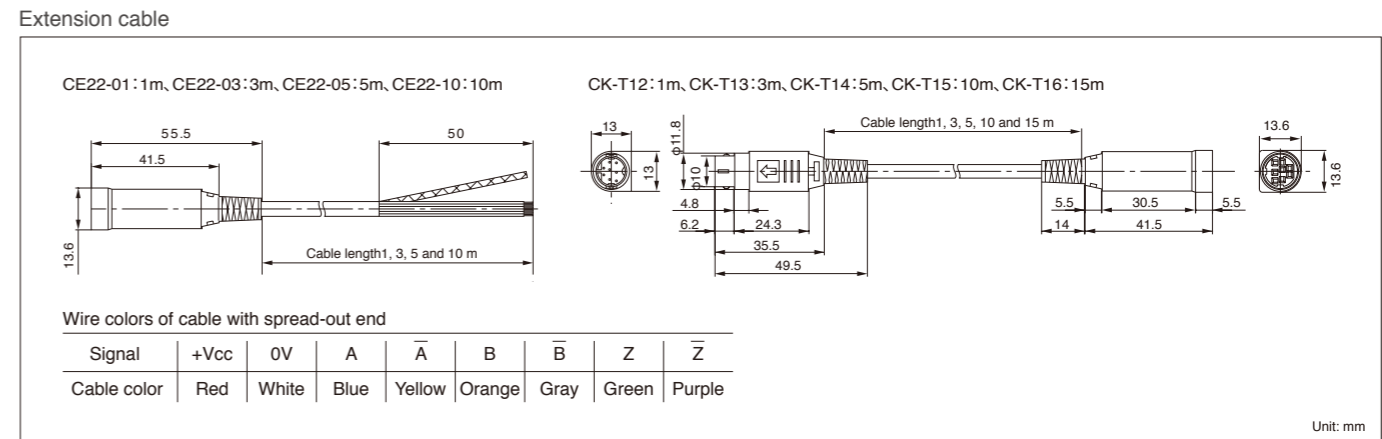
DK805SAR/DK805SAR5
DK805SBR/DK805SBR5

DK812SAR/DK812SAR5
DK812SBR/DK812SBR5

DK805SALR/DK805SALR5
DK805SBLR/DK805SBLR5

DK812SALR/DK812SALR5
DK812SBLR/DK812SBLR5

DK805SAFR/DK805SAFR5
DK805SBFR/DK805SBFR5

DK812SAFR/DK812SAFR5
DK812SBFR/DK812SBFR5

DK805SAFLR/DK805SAFLR5
DK805SBFLR/DK805SBFLR5

DK812SAFLR/DK812SAFLR5
DK812SBFLR/DK812SBFLR5

* There are areas whose shape and dimensions are different from those of the conventional DK800 Series models.

Unit: mm

DK830S Series

Model	DK830SR	DK830SLR	DK830SVR
Measuring range	30mm		
Maximum resolution	0.1μm *5		
Accuracy (at 20°C)	1.3μm		1.7μm
Measuring force (at 20°C)	Upward: 0.5 ±0.35 N		1.9 N or less in all directions at a pneumatic pressure of 0.07 MPa
	Horizontal: 0.6 ±0.35 N		2.6 N or less in all directions at a pneumatic pressure of 0.09 MPa
	Downward: 0.7 ±0.35 N		
Operating temperature	0 to 50°C		
Storage temperature	-20 to 60°C		
Maximum response speed	80m/min		
Air driving	None		Pneumatic pressure pushing
Reference-point response speed	80m/min		
Reference point	Position where the spindle is moved by 1 mm		
Protection grade *1	IP53	IP53/IP67 *2	
Vibration	10 to 2000 Hz, 100 m/s²		
Impact resistance	1000m/s² 11ms		
Power supply voltage	5 V DC ±5%		
Power consumption	1W		
Output	A/B/reference point, voltage differential line driver output (compliant with EIA-422)		
Mass *3	Approx. 70 g		Approx. 80 g
Feeler	Provided with a carbide ball tip, mounting screw M2.5		
Output cable length (up to succeeding electronic section)	22m MAX		
Achieved number of strokes *4	30 million		10 million
Accessories	One copy of the Instruction Manual, +P M4 x 5 screws (2 pcs), spanner, and one copy of the supplementary remarks		

*1 Excluding interpolation box and connector *2 When a bellows set (optional accessory) is used *3 Excluding cable and interpolation box *4 under specific test conditions defined by Magnescale Co, .Ltd. *5 Please refer to table of p12

DK830SR

DK830SLR

DK830SVR

Unit: mm

Optional Accessory

Extension cable

CE22-01：1m、CE22-03：3m、CE22-05：5m、CE22-10：10m

Cable length1, 3, 5 and 10 m

CK-T12：1m、CK-T13：3m、CK-T14：5m、CK-T15：10m、CK-T16：15m

Cable length1, 3, 5, 10 and 15 m

Wire colors of cable with spread-out end

Signal	+Vcc	0V	A	A̅	B	B̅	Z	Z̅
Cable color	Red	White	Blue	Yellow	Orange	Gray	Green	Purple

Unit: mm

Bellows set

Bellows	Extension spindle

DZ830BL(for DK830SLR)

DZ830BV(for DK830SVR)

Unit: mm

Feeler set DZ-5100

■Plastic ball contact point: φ3-mm nylon ball　　■Flat carbide contact point　　■Off-center contact point: φ1-mm nylon ball　　■Pin contact point

* The four contacts shown above are included.
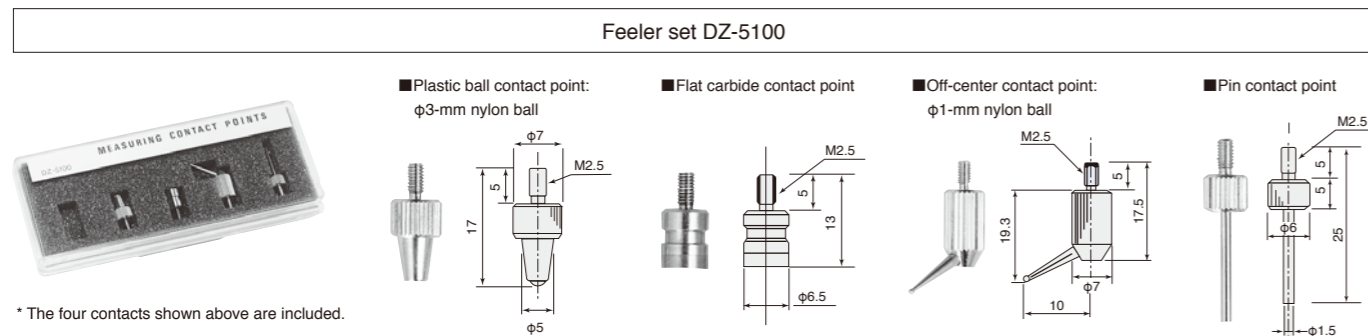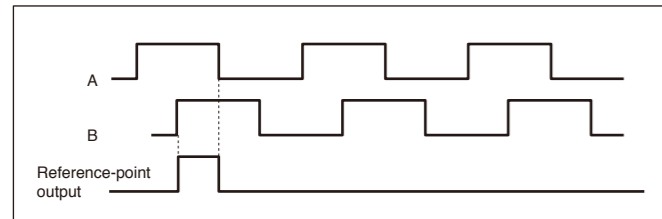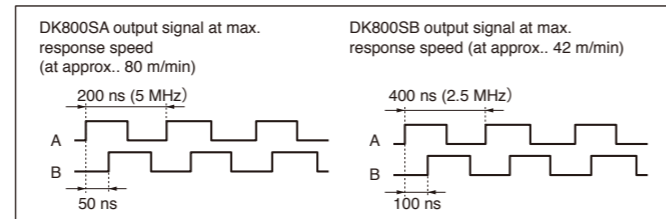

Measuring Unit Output Signals

The signals output from the measuring unit are the A/B quadrature and reference-point output signal in the form of a voltage differential line driver compliant with EIA-422.


A
B
Reference-point output

The reference point is the synchronous reference point that is at high impedance when phases A and B are at the high level.

DK800SA output signal at max. response speed (at approx.. 80 m/min)

A
B
50 ns
200 ns (5 MHz)

DK800SB output signal at max. response speed (at approx.. 42 m/min)

A
B
100 ns
400 ns (2.5 MHz)

The A/B quadrature signals output by the measuring unit are 5 MHz maximum with a minimum phase difference of 50 ns for DK800SA and 2.5 MHz maximum with a minimum phase difference of 100 ns for DK800SB. The counter or control device capable of processing these signals should be used.

Output Signal Phase Difference

The moving length of the measuring unit is detected every 50 ns for DK800SA or every 100 ns for DK800SB and output in a phase difference proportional to the moving length. The amount of phase difference changes in integral multiples of 50 ns or 100 ns. Moreover, the minimum phase difference between phases A and B is 50 ns for DK800SA and 100 ns for DK800SB.

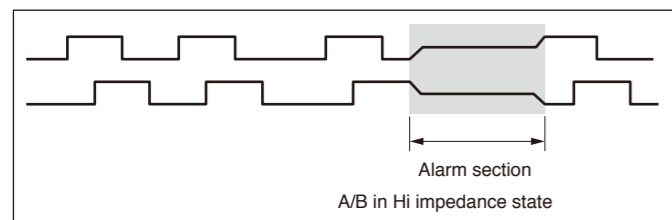

A
B
Integral multiple of 50 ns or 100 ns
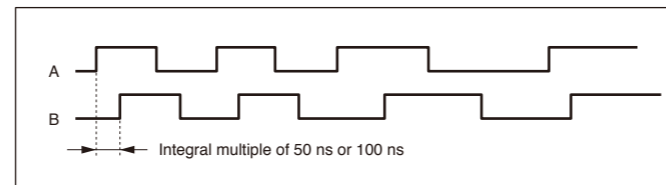
In the standard specifications, the minimum phase difference is fixed at 50 ns for DK800SA and 100 ns for DK800SB; however, the minimum phase differences in the following table are available as special specifications.

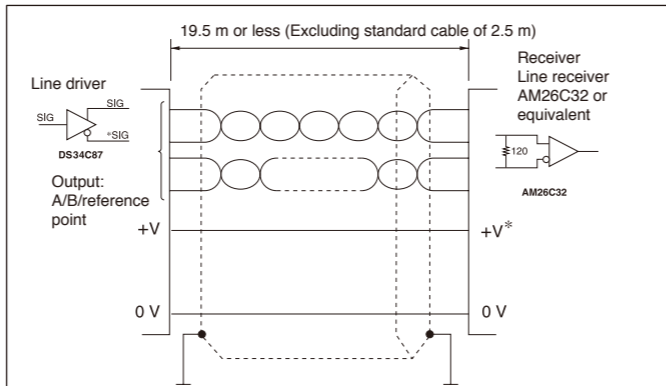| A/B minimum phase difference	A signal cycle	Counter allowable frequency	Max. response speed		Remarks
			Resolution of 0.1 μm	Resolution of 0.5 μm	
50ns	200ns	5MHz	80m/min	250m/min	DK800SA standard product
100ns	400ns	2.5MHz	42m/min	100m/min	DK800SB standard product
300ns	1.2μs	833kHz	14m/min	33m/min	Special spec.
500ns	2μs	500kHz	8.4m/min	20m/min	Special spec.

*please consult our sales

Output signal alarm

If the response speed has been exceeded, the A/ B output from the measuring unit changes to high impedance state for approx. 400 ms as an alarm.

Alarm section
A/B in Hi impedance state

Receiver

19.5 m or less (Excluding standard cable of 2.5 m)

Line driver
DS34C87
Output: A/B/reference point
+V
0 V

Receiver Line receiver AM26C32 or equivalent
AM26C32
+V*
0 V

If extending the cable (it must be a Magnescale-specified cable), the supply voltage at the extension destination should be +5 V ±5%. For an extension cable with spread-out end, use the CE22 Series (optional accessory).

LT30 Series

Specifications

Model	LT30-1G	1GB	1GC	2G	2GB	2GC
Display		6 digits, LCD with backlight, mode display					
I/O — Measuring unit input		1 CH			2 CH		
I/O — I/O connector*1		○					
I/O — Reset function	—	○	—	—	○	—
I/O — Preset function	—	—	○	—	—	○
I/O — Comparator function	—	—	○	—	—	○
Reset function		Reset key and external input (I/O connector)					
Reset function	—	—	RS-232C command	—	—	RS-232C command
Preset function		Preset value is set with preset key and recalled with reset key.					
Preset function	—	—	Set and recalled by RS-232C command	—	—	Set and recalled by RS-232C command
Comparator function		The comparator value is set with keys on the three-level comparator front panel. Result evaluation: LED display and I/O connector output (photocoupler)					
Comparator function	—	Four comparator values are settable (key input). Switched with BCD terminal	Set by RS-232C command	—	Four comparator values are settable (key input). Switched with BCD terminal	Set by RS-232C command
Peak hold function		Max., min., and peak-to-peak values. Measurement started by start input through I/O connector; update stopped by pause input					
Peak hold function	—	—	RS-232C supports both setting and start.	—	—	RS-232C supports both setting and start.
Input resolution		0.0001 mm, 0.0005 mm, 0.001 mm, 0.005 mm, or 0.01 mm selectable					
Display resolution		0.0001 mm, 0.0005 mm, 0.001 mm, 0.005 mm, or 0.01 mm selectable					
Direction		Can be switched					
Reference point function		Enabling/disabling of function use can be selected (if use is enabled, the unit waits for a reference-point signal to be input at the same time as power-on).					
Maximum response frequency		20 MHz (at A/B phase difference)					
Addition and subtraction function		A + B, A – B, or B – A can be set with the direction setting.					
Alarm		Excess speed, wire break, etc. (displayed on LCD and I/O connector's comparator outputs are all "H" (OFF))					
Alarm	—	BCD alarm terminal "H" (OFF)	—	—	BCD alarm terminal "H" (OFF)	—
Data storage		Resolution, direction, comparator value, present value, each mode, etc.					
Data storage	—	BCD sign	Transfer rate, etc.	—	BCD sign	Transfer rate, etc.
Key lock function		Key lock or release by pressing digit selector key for a long time					
Temperature range		Operating temp: 0 to 40°C, storage temp: -10 to 50°C					
Power consumption*5	5 W	5.5 W	5 W	8.5 W	9 W	8.5 W
Mass	Approx. 200 g	Approx. 230 g	Approx. 220 g	約210 g	Approx. 270 g	Approx. 230 g
Power supply		Power input connector (3 pins): 9.0–26.4 V DC					
Compatible measuring unit		DK Series					

*1 I/O connector
Input: Reset, peak-hold start, peak-hold pause, and RS trigger (RS-232C model only)
Output: Result evaluation (photocoupler)
*2 BCD (36-pin half pitch connector)
Input: Comparator value selection (4 settings) and measuring mode
(current, max., min., and peak-to-peak values) selection
Output: 6 digits (open collector) One of current, max., min., and peak-to-peak values is selected and output.
Alarm output

*3 RS-232C (8-pin mini-DIN connector)
Reset, preset value setting/recall, peak-hold start, peak-hold pause, current value latch, software version read, comparator value setting, current, max., min., and peak-to-peak value measuring mode selection and output, key lock and release.
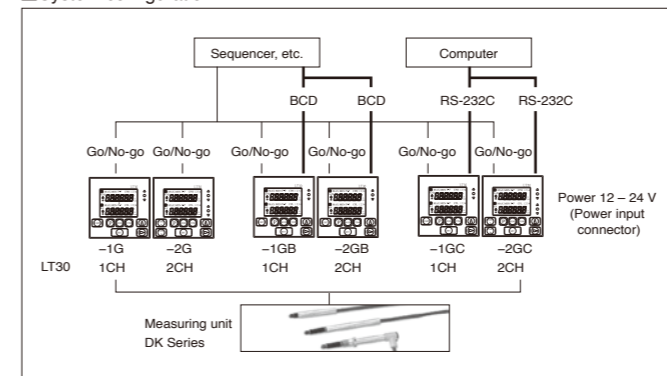*4 RS-TRG terminal
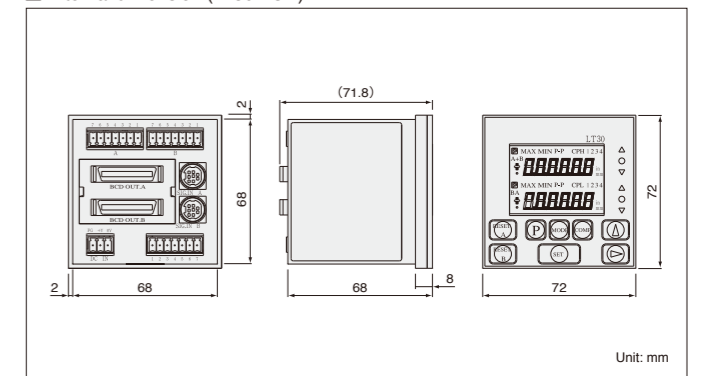Trigger input for RS-232C data output
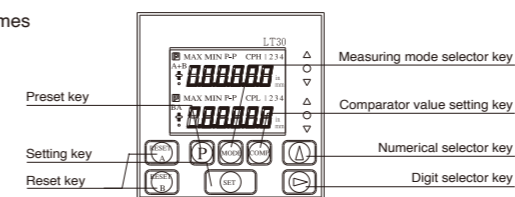*5 When measuring unit is connected

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System Structure

■System configuration

Sequencer, etc.　　Computer
BCD　BCD　RS-232C　RS-232C
Go/No-go Go/No-go Go/No-go Go/No-go Go/No-go Go/No-go
Power 12–24 V (Power input connector)
LT30　–1G 1CH　–2G 2CH　–1GB 1CH　–2GB 2CH　–1GC 1CH　–2GC 2CH
Measuring unit DK Series

■External dimension (LT30-2GB)

(71.8)
68
2　68　68　8　72

Unit: mm

■Part names

Preset key
Setting key
Reset key
Measuring mode selector key
Comparator value setting key
Numerical selector key
Digit selector key

■I/O terminal

I/O connector input: Reset, peak-hold start, peak-hold pause Output: Go/no-go judgment
Power input connector: 12–24 V DC power
BCD (36-pin half pitch connector)
Input: comparator value selection (4 settings),
measuring mode (current, max., min., & peak-to-peak values) selection
Output (open collector): Measured data (6 digits) and alarm output
RS-232C (8-pin mini-DIN connector)
Reset, preset value setting/recall, peak-hold start, peak-hold pause, comparator value setting, measuring mode (current, max., min., and peak-to-peak value) selection and output
RS-TRG Trigger input for RS-232C data output

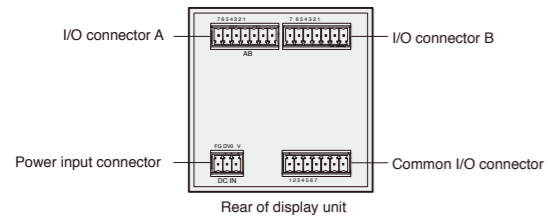## Optional Accessories

●RS-232C cable for connection to computer
DZ252 (round 8-pin ⇔ D-sub 9-pin female) (2 m)
DZ253A (round 8-pin ⇔ D-sub 25-pin male) (2 m)
DZ254 (round 8-pin ⇔ cable with spread-out end) (2 m)

I/O connector

The I/O connector on the rear panel of the counter unit has functions for Go/No Go check output based on the comparator function, start input, pause input, RS-232C trigger input, and reset input.

<Connector pin assignment>

I/O connector A

I/O connector B

Power input connector

Common I/O connector

Rear of display unit

Use a shielded cable for connection and connect the shield to the FG pin on the rear of the display unit.
(Prepare a shield cable by yourself.)

Outer cover

Knitted shield

Cross section of the cable
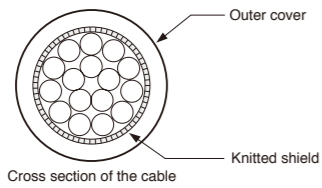
Connector used: MC1.5/7-ST-3.5 (provided) made by Phoenix Contact

Description of I/O connectors

I/O connector A

Pin No.	Signal name	IN/OUT	Description
1	GND	-	
2	NC	-	Connection prohibited
3	RESET (A)	IN	Reset input (A CH)
4	LO (A)	OUT	Go/No-go output Low (A CH)
5	GO (A)	OUT	Go/No-go output Go (A CH)
6	HI (A)	OUT	Go/No-go output High (A CH)
7	GND	-	

I/O connector B (not provided for 1-channel model)

Pin No.	Signal name	IN/OUT	Description
1	GND	-	
2	NC	-	Connection prohibited
3	RESET (B)	IN	Reset input (B CH)
4	LO (B)	OUT	Go/No-go output Low (B CH)
5	GO (B)	OUT	Go/No-go output Go (B CH)
6	HI (B)	OUT	Go/No-go output High (B CH)
7	GND	-	

I/O connector (common)

Pin No.	Signal name	IN/OUT	Description
1	GND	-	
2	START(A)	IN	Start/latch input (A)
3	PAUSE (A)	IN	Pause input (A)
4	START(B)	IN	Start/latch input (B)[*1]
5	PAUSE (B)	IN	Pause input (B)[*1]
6	RS-TRG	IN	RS-232C data output/trigger input[*2]
7	GND	-	

*1 Connection is prohibited for 1-channel model.
*2 Connection is prohibited for any model other than the RS-232C model.

<Go/No-go check output>
High: reading > high limit → "L" (ON)
Go: high limit ≥ reading ≥ low limit → "L" (ON)
Low: low limit ≥ reading → "L" (ON)
Note: Go/No-go check output becomes all "H" (OFF) in case of alarm occurrence.

<Start/latch input>
■When go/no-go output is "L" (ON), the maximum and minimum values are set to the current value (peak-to-peak value "0"), and new holding is started (start function).
■When a factory-configured setting is selected for the initial setting, if the measuring mode is in current value mode, go/no-go check output (I/O connector) and display are held at "L" (ON) (latch function).
Note: While "L" (ON) is activated, the Reset key and recall of a reset/preset value based on an external reset/preset value recalling input signal are disabled.

<Reset input>
If "L" (ON) is caused, the measured value is set to "0." In this case, if a preset is made, a preset value is recalled.
Note: Even if "L" (ON) is left as is, go/no-go check output (I/O connector) and display are not held.

Installing the display unit

When mounting in a panel
1. Cut out an opening to match the dimensions shown (Fig.2).
2. Insert the display unit into the cut-out opening in the panel from the front.
3. Attach the supplied installation brackets (upper/lower) from the rear.
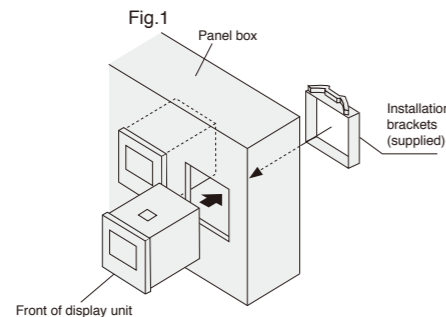4. Use fingers to tighten and secure.

Fig.1

Panel box

Installation brackets (supplied)

Front of display unit

Fig.2 Cut-out dimensions

68 +1.0/+0.4

68 +1.0/+0.4

4-R1 or less

Fig.3

Panel thickness: Max. 12
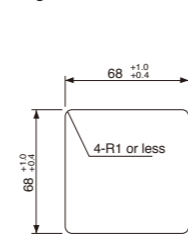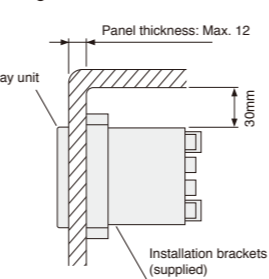
Front of display unit

30mm

Installation brackets (supplied)

Note: When attaching the installation brackets to the display unit, leave sufficient space (min. 30mm) between it and the panel (Fig.3).
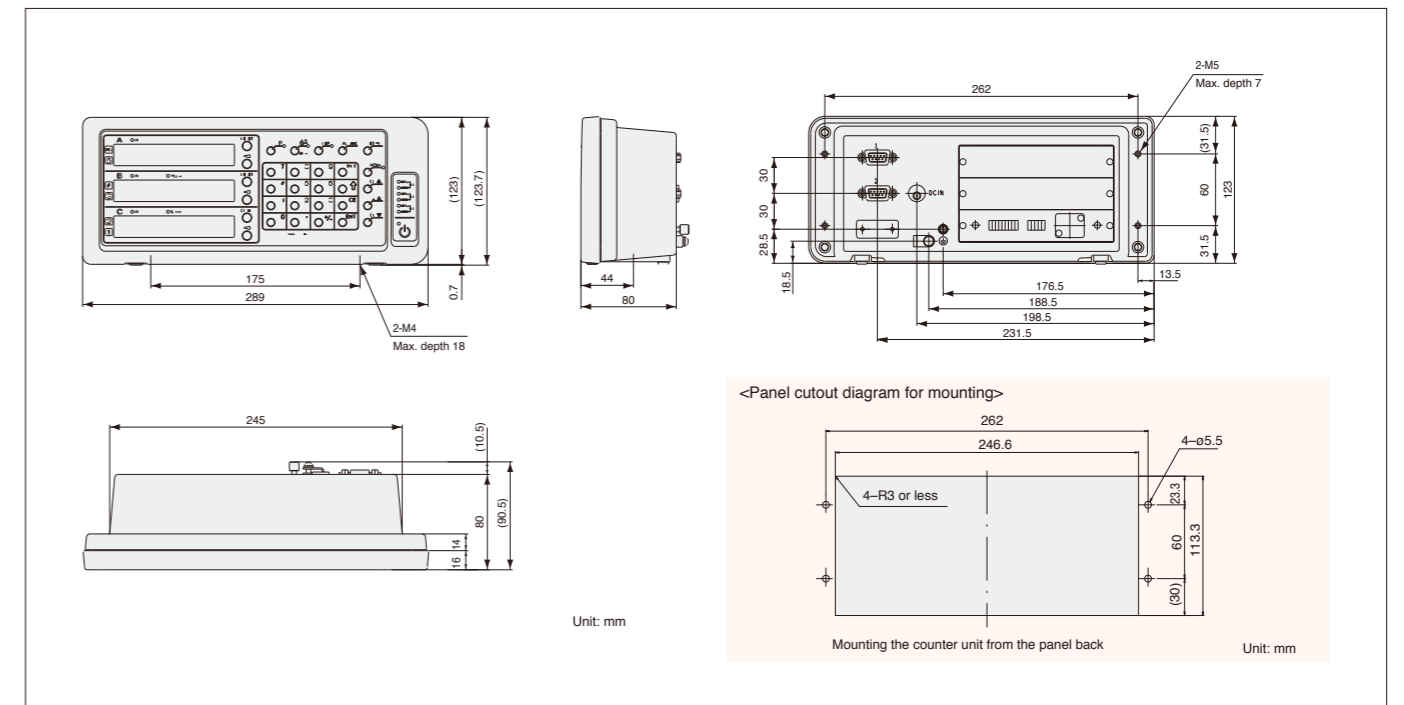
Unit: mm

LY71

Specifications

Model name	LY71
Number of input axes	1 or 2 axes (2-axes add function available; only addition is displayed when adding)
Display	7 digits and minus are displayed. Color: amber Display window: for 1 to 3 axes (axis unnecessary for setting may be turned Off. Display location of each data depends on setting.)
Display data	Current, max., min., and peak-to-peak values of each axis
Input resolution	When linear is used, the following can be added: Standard: 0.1 μm, 0.5 μm, 1 μm, 5 μm, and 10 μm Extended: 100 μm, 50 μm, 25 μm, 20 μm, 2 μm, and 0.05 μm When angle is used, the following can be added: Standard: 1 s, 10 s, 1 min, and 10 min Extended: 1 degree
Display resolution	Measuring unit input resolution or higher and supported inch units Inch: Basic: 0.000005", 0.00001", 0.00005", 0.0002", 0.0005" Inch: Expanded: 0.000002", 0.0001", 0.001", 0.002", 0.005"
Input signal	A/B quadrature signal (minimum phase difference 50 ns), Z signal (compliant with EIA-422)
Alarm display	Measuring unit disconnected, Excess speed, Maximum display amount exceeded, Power failure, error in stored data
Reset	Current value reset, alarm cancel, external reset input provided
Restart	Restart of peak value calculation for each axis/all axes
Preset	It is possible to store/edit up to three values for each axis (External input can recall a preset value).
Master calibration function	The master calibration value is relocated when exceeding the reference point at power is turned on.
Datum point / reference point operations	It is possible to store/edit one value for each axis (when not using the master calibration function).
Hold function	Selectable from latch and pause Latch: Display held while latched (display hold) Pause: Peak calculation stopped while paused (peak calculation hold)
Linear compensation	A fixed compensation amount is applied to the measuring unit's count value. Compensation amount Standard: ±600 μm/m (Expanded: ±1000 μm/m)
Scaling function	Scaling factor: 0.100000 to 9.999999
Input/output	BCD expansion board (option: LZ71B) 1 to 2 boards can be used (if two boards are used, addition disabled) Comparator expansion board (option: LZ71-KR)
Power supply	12 V DC, Rating 0.75 A Max. 1 A 100 V to 240 V AC ±10% when using the AC adaptor PSC-22 (for U.S. only) or PSC-23 (for Europe and other countries) *Option
Power consumption	Max. 32 VA connected at the AC adaptor.
Temperature range	Operation: 0 to 40°C (no condensation), storage: -20 to 60°C (no condensation)
Mass	Approx. 1.5 kg

*1 Connection to the DK Series requires adapter cable CE29.

2-M5
Max. depth 7
262
(31.5)
30
60
123
28.5
18.5
31.5
13.5
176.5
188.5
198.5
231.5

175
289

2-M4
Max. depth 18

(123)
(123.7)
0.7

44
80

245
80
(90.5)
(10.5)
16 (4

<Panel cutout diagram for mounting>

262
246.6
4–ø5.5
4–R3 or less
(23.3)
60
113.3
(30)

Mounting the counter unit from the panel back

Unit: mm

Unit: mm

LY72

Specifications

Model name	LY72	
Specification by application	Applications as gauge (set axis labels A, B, and C)	Applications as scale (set axis labels X, Y, and Z)
Number of input axes	1 to 3 axes	
Display	7 digits and minus display, Color amber, Display window: for 1 to 3 axes (axis unnecessary to be set can be turned Off. Display location of each data depends on setting)	
Display data	Current, max., min. and peak-to-peak values of each axis	Current (1st axis, 3rd axis, addition axis)
Input resolution	When linear is used, the following can be added: Standard: 0.1 µm, 0.5 µm, 1 µm, 5 µm, and 10 µm Extended: 100 µm, 50 µm, 25 µm, 20 µm, 2 µm, and 0.05 µm When angle is used, the following can be added:Standard: 1 s, 10 s, 1 min, and 10 min Extended: 1 degree	
Display resolution	Measuring unit input resolution or higher and supported inch units Inch: Basic: 0.000005", 0.00001", 0.00005", 0.0002", 0.0005" Inch: Expanded: 0.000002", 0.0001", 0.001", 0.002", 0.005"	
Input signal	A/B quadrature signal (minimum phase difference 50 ns), Z signal (compliant with EIA-422)	
Alarm display	Measuring unit disconnected, Excess speed, Maximum display amount exceeded, Power failure, Error in stored data	
Reset	Current value reset, alarm cancel, external reset input provided	
Restart	Restart of peak value calculation for each axis/all axes	—
Preset	It is possible to store/edit up to three values for each axis.	
Master calibration function	The master calibration value is relocated when exceeding the reference point after the power is turned on.	—
Datum point / reference point operations	It is possible to store/edit one value for each axis (when not using the master calibration function).	
Hold function	Selectable from latch and pause Latch : Display held while latched (Display hold) Pause : Peak calculation stopped while paused (Peak calculation hold)	Display hold
Linear compensation	A fixed compensation amount is applied to the measuring unit's count value. Compensation amount Standard: ±600 µm/m (Expanded: ±1000 µm/m)	
Scaling function	Scaling factor: 0.100000 to 9.999999	
Input/output	RS232C provided as standard: Asynchronous, start-stop system, and full-duplex Data format: All axes on same line/New line for each axis Peak-to-peak value Transfer rate: 38400/19200/9600/4800/2400/1200 bps Parity: None / Odd / Even Stop bit: 1 or 2 Data length: 8 bits or 7 bits Data format : The same line for all axes / New line	
Input/output — Timer output	OFF/0.2/0.5/1/5/10/30/60/300 seconds	—
Input/output — Output data	Current value/Maximum value/Minimum value/Peak-to-Peak value	Current value
Power supply	12 V DC, Rating 0.75 A Max. 1 A 100 V AC to 240 V ±10% when using the AC adaptor PSC-22 (for U.S. only) or PSC-23 (for Europe and other countries) *Option	
Power consumption	MAX. 32 VA connected at the AC adaptor.	
Temperature range	Operation: 0 to 40°C (no condensation), Storage: -20 to 60 °C (no condensation)	
Mass	Approx. 1.5 kg	

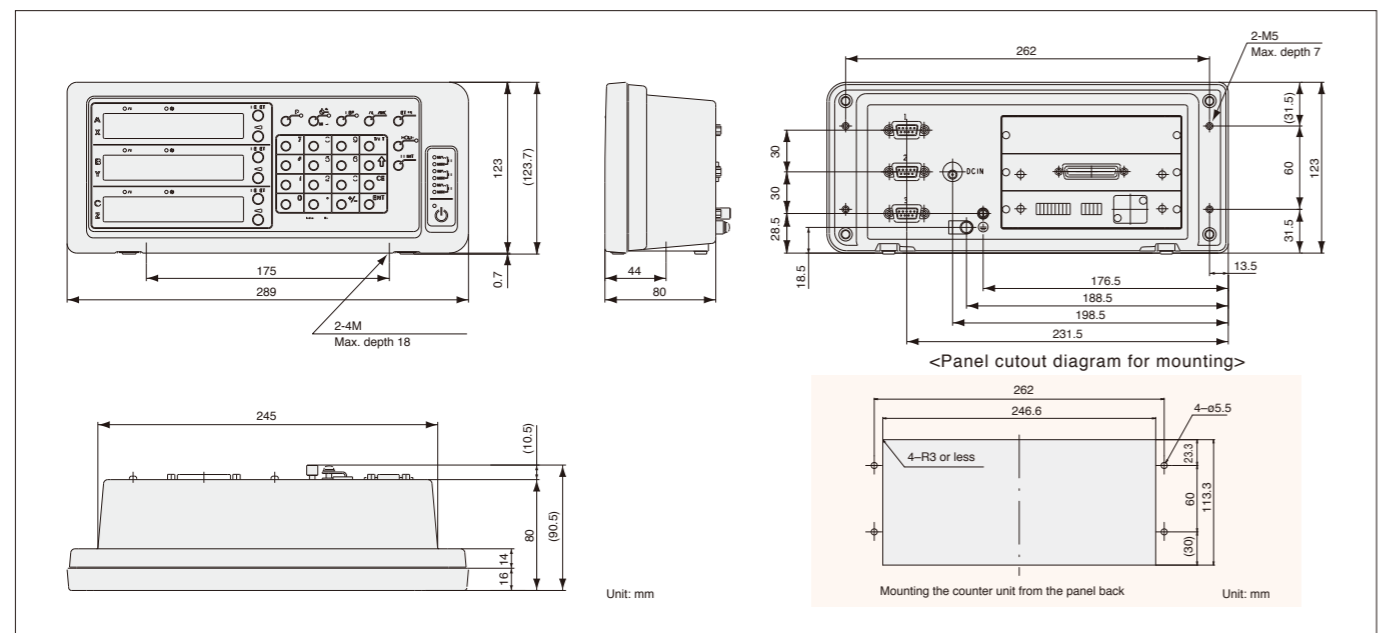*1 Connection to the DK Series requires adapter cable CE29.

262
2-M5 Max. depth 7
123 (123.7)
175
289
2-4M Max. depth 18
245
176.5
188.5
198.5
231.5
13.5
44
80

<Panel cutout diagram for mounting>
262
246.6
4-ø5.5
4-R3 or less
Mounting the counter unit from the panel back
Unit: mm

RS-232C Input/Output

■Electrical rating

1) Driver side: MAX232 or equivalent is used.

Output voltage amplitude	±5 V to ±10 V
Output resistance	300 Ω or more
Output short-circuiting current	

2) Receiver side: MAX232 or equivalent is used.

Input resistance	3 to 7 Ω or more
Allowable input voltage	
Input threshold	

3) I/O connector

Plug	DB-25P (JAE) or equivalent
Receptacle	DB-25S (JAE) or equivalent

4) Cable length

Cable should be used in 15 m or less.
Moreover, a shielded cable should be used and the shield should always be connected to the connector shell.

Cross section of the cable
Outer cover
Knitted shield

■RS-232C input/output connector

13   1
25   14

LY72 RS-232C connector

Pin no.	Description	Abbreviation	Connected device side connector Abbreviation
1	Frame GND	FG	FG
2	Receive data	RXD	TXD
3	Send data	TXD	RXD
4	Clear to send	CTS	RTS
5	Send request	RTS	CTS
6	Pull up to +10 V	DTR	DSR
7	GND for signal	SG	SG
8~25		NC	DTR

Notes:
・Connection of TXD, RXD, and SG pins allows LY72 to operate; however, connect other wires according to the specifications of the connected side (computer).
・Pin number 6 has been pulled up to +10 V inside the LY72.

Optional Accessories

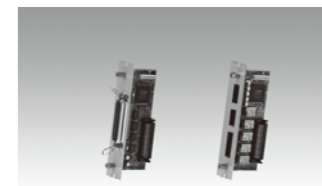### LZ71 Series Expansion boards (for LY71)

The functions of your LY71 counter unit can be expanded simply by inserting the expansion unit into the LY71.

LZ71-B
- ●BCD output of various data
- ●Various output modes
- ●Open collector output

LZ71-KR
- ●Comparator function for various data
- ●Switching between 16 sets of data
- ●Open collector output/relay output

LZ71-B   LZ71-KR

Specifications

Model	LZ71-B (BCD unit)
BCD output	7 digit parallel data (4 bits x 7 digits), sign (1 bit), READY signal (1 bit) Output logic positive and negative logic can be selected individually for the data and sign by the settings.
Electrical specifications	Photocoupler output VCE: Recommended DC +12 to 24 V IC: Max. 15 mA/terminal, Total: 300 mA Output connector: 36-pin micro ribbon connector
Latch	Selectable from "BCD only latch" and "BCD & display latch" by the initial settings. Input signal : DRQ1 to 3 (Photocoupler: 12 to 24 V)

Model	LZ71-KR (relay/open collector)
Comparator function	Sets 1 to 4 comparator values for judging the data size.
Differential value input function	Only a differential value can be additionally input when modifying and inputting a setting.
Comparable data	Current, max., min. and peak-to-peak values (based on the settings) (with respect to 1st axis or addition axis)
Upper limit and lower limit combinations	Selectable from 16 data sets consisting of 1 to 4 comparator setting values
Judgment outputs	5-point output signal Photocoupler (voltage resistance: 24 V), Ic = 15 mA 5-point output signal Relay: Panasonic Co., Ltd. ATQ209 24 V DC, 120 V AC, 0.3 A
External input	Photocoupler: supports 12 to 24 V
Positioning function (1 point) modes	Sets the positioning data and turns the output signal on for 0.5 s when the set value and the current value match.
Applicable data	Current value only (with respect to 1st axis or addition axis)

LZ71-B   LZ71-KR
Unit: mm
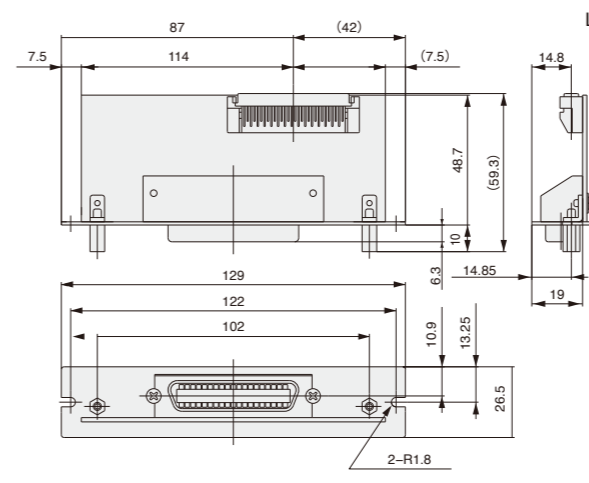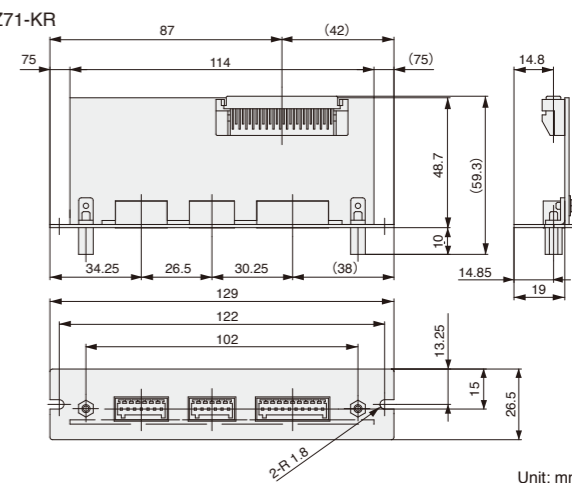
Other accessories

- ●Adopter cable for connection to DK800   CE29-003 (0.3 m), CE29-01 (1 m), CE29-03 (3 m), CE29-05 (5 m), and CE29-10 (10 m)
- ●RS-232C cable connectors for computer connection
  - DZ252 (round 8 pins – D-sub 9 pins, female) (2 m)
  - DZ253A (round 8 pins – D-sub 25 pins, male) (2 m)
  - DZ254 (round 8 pins – unterminated end) (2 m)

Power supply adopters

AC adopters for LH71A/72 or LY71/72
- ●PSC-21 (Japan)
- ●PSC-22 (USA)
- ●PSC-23 (Europe and other countries)

PSC-21 (optional)

MG40

Specifications

| Item	Conditions, etc.	Description					Remarks
Communication method		MG41-NC (CC-Link/Ethernet incorporated) / MG41-NE (Ethernet incorporated) / MG42-4 (hub unit)					
Number of connectable measuring units	Overall system	1 to 100 units (connection of 101th unit and later disabled)					Number of MG42 hub units connectable: up to 24
	MG41 main unit	0 to 4 units					
	MG42 hub unit						
Connectable measuring units		DK800S, DK830S, DK800A/DK800B Series, DK10、DK25、DK50、DK100、DK110、DK155、DK205					
Connection cable length		MG41 main unit to MG42 hub unit or MG42 hub unit to MG42 hub unit: 0.5 m, 1 m, 2 m, 5 m, 10 m Total cable length from MG41 main unit: 30 m max. (max. current: 4 A or less)					Connection cable MZ41-** (option)
Resolution		Settable output data resolution and display resolution					
Measuring unit resolution (Input resolution)	0.1μm	0.1μm	0.5μm	1μm	5μm	10μm	
	0.5μm	-	0.5μm	1μm	5μm	10μm	
Measuring unit data fetching capacity	Communication 10 Mbps	Max. of 10000 data/sec (at 100 axes connection)					Data of one axis is taken as 1 data.
Peak hold function		Max., min., and peak-to-peak values of each axis are calculated (with pause, latch, and start functions available)					
		No peak value is updated during pause.					
		No output and display data are updated during latch (but, internal data is updated).					
		Recalculation at peak is started when Start is pressed.					
Output-enable data	At single axis	Current, max., min., and peak-to-peak values of each axis					
	At addition/subtraction	Current, max., min., and peak-to-peak values of addition and subtraction axes of two axes					Single-axis calculation of addition and subtraction axes is disabled.
Comparator function		Data of each axis (single axis, addition and subtraction axes) is compared and measured to output the comparator results (comparator is also latched during latch).					
Comparator setting value		2 setting values	4 setting values	8 setting values	16 setting values		
Number of setting value sets		16 sets	8 sets	4 sets	2 sets		
Ethernet		100Base-T (IEEE 802.3 compliant) / 100 Mbps/10 Mbps (auto-negotiation) Command input, data output, and parameter setting enabled					
Reset function		The current value of each axis is reset (with command).					
Preset function		The value is preset to the current value of each axis (with command).					
Datum point setting function		The datum point of each axis is settable (with command).					
Reference point function		The datum point of each axis can be reproduced using the reference point (with command).					When master calibration function is not used
Master calibration function		Master calibration of each axis can be reproduced using the reference point (with command).					Addition and subtraction axes are unavailable.
Measuring unit product information		Product information of the connected measuring unit can be acquired (with command). Product code, serial no., manufacturing date					

				Ethernet	CC-Link		
Commands for each communication line / enable/disable of setting	Command	Reset function		○	○		
		Preset function		○	○		
		Datum point setting function		○	○		
		Reference point function		○	○		When master calibration function is not used
		Master calibration function		○	○		
		Comparator value setting		○	○		
		Comparator set number setting		○	○		
		Start		○	○		
		Pause		○	○		
		Latch		○	○		
	Data output	Current and peak values (all axes)		○	○		
		Current and peak values (on unit basis)		○	○		
		Comparator Go/No-go results		○	○		
		Alarm (communication and measuring units)		○	○		
		Software version		○	○		
		Measuring unit product information		○	○		
	Various settings	Input resolution		○	○		
		Display and output resolution		○	○		
		Axis addition		○	○		
		Comparator mode (2 / 4 / 8 / 16 units as a set)		○	○		
Power supply	Terminal board input	12–24 V (11–26.4 V) DC					Use by adding power at a current of 4 A or more on a six MG42 hub units basis (recommended: +24 V).
Power consumption	Cautions for connecting conditions	Total of system: Max. current of 4 A					
		If the maximum current is exceeded, supplying power to a succeeding MG42 hub unit enables connection at the succeeding unit.					
		<Details of power consumption of each unit> MG41 main unit: 4 W, MG42 hub unit: 1 W/unit, Measuring unit: 1 W/unit					
Operating temperature & humidity ranges		0 to +50°C (no condensation)					
Storage temperature & humidity ranges		-10 to 60°C (20 to 90% R.H)					
Mass		MG41:300g MG42:250g					

* If DK800S connected to MG40 is connected to LT30 or MG10/20, the reference point cannot be recognized. For more information, consult our relevant sales department.
* Connection of MG41 to MG43 using Ethernet connection requires an additional Ethernet hub additionally.

Display unit MG43

Specifications

Item	Description	Item	Description
Compatible main unit	MG41-NE/MG41-NC	Network interface	100Base-T (IEEE 802.3 compliant) / 100 Mbps/10 Mbps (auto-negotiation)
Compatible hub unit	Hub units supported by the main unit	Power supply	12–24 V (11–26.4 V) DC
Compatible measuring unit	Measuring units supported by the main unit and hub units	Power consumption	4W
Main functions	Measured data monitoring / system monitoring / setting monitoring	Operating temperature range	0 to +40°C (no condensation)
Communication protocol	Specific protocol on TCP/IP	Storage temperature range	-10 to 60°C (20 to 90% R.H)
Screen display	480 x 272 pixels, 4.3-inch TFT LCD with backlight	Mass	Approx. 500 g
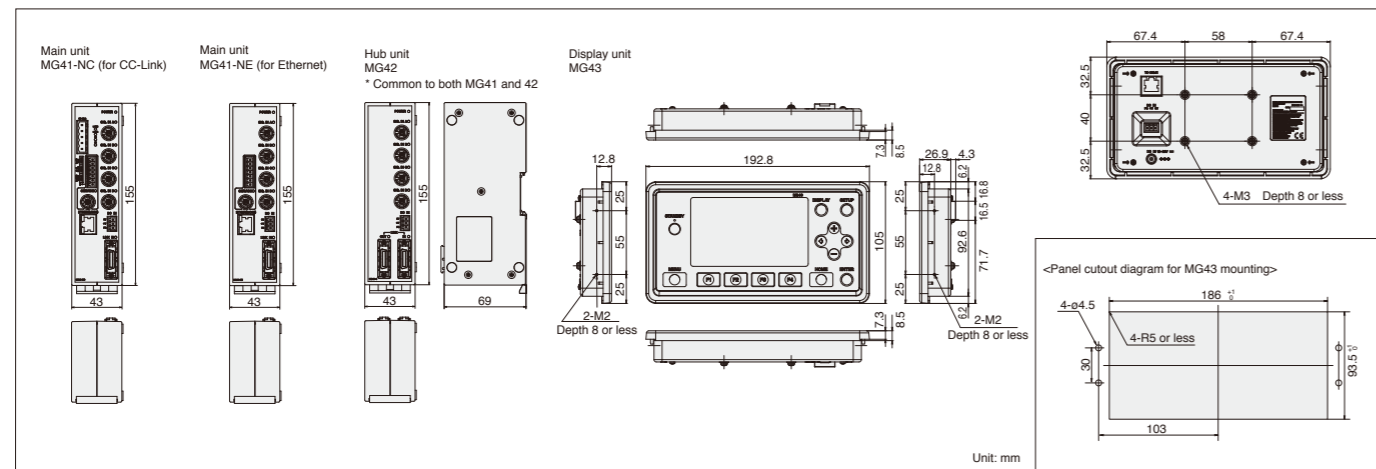
Link cable MZ41-R5(0.5m), MZ41-R01(1m), MZ41-R5(5m)MZ41-10(10m)

MG10/20/30 Series

Module specifications

Model name		MG10–P1	MG10–P2
Power source	Power supply voltage	12-24 V (11-26.4 V) DC, Min. startup time: 100ms or less	
	Power consumption	2.0 W + total power consumption for connected modules*1	
	Inrush current (10ms)	10 A or less (when maximum number of modules are connected)	
	Power supply protection	Fuse (5 A fuse is built in.)	
Communication	Communication I/F	RS-232C (conform to EIA-232C)	
	Baud rate setting	2400 / 9600 / 19200 / 38400 bps (set with DIP switch)	
	Data length	7/8 bit (set with DIP switch)	
	Stop bit	1/2 bit (set with DIP switch)	
	Parity	None / ODD / EVEN (set with DIP switch)	
	Delimiter	CR / CR+LF (set with DIP switch)	
Linkage function	Maximum number of linkages	16 (total of counter modules: 64)	
	Maximum length of linking cable	10 m	
I/O	Input format	Source input (+COM)	Sink input (–COM)
		Photocoupler insulation, external power: 5 – 24 V DC	
	Output format	Open collector output sink type (–COM)	Source type (+COM)
		Photocoupler insulation, external power: 5 – 24 V DC	
	Input signal	Reset, pause, start, latching, and data out trigger to whole channels	
	Output signal	Integrated alarm	
Connectable modules	Counter module	MG20-DK, MG20-DG and MG-20DT (available for mixed use, up to 16 modules) *1	
	Interface module	MG30- B1、MG30-B2*1	

*1: Total power of modules connected to MG10 should not exceed 54 W (12 V DC input) or 108 W (24 V DC input).
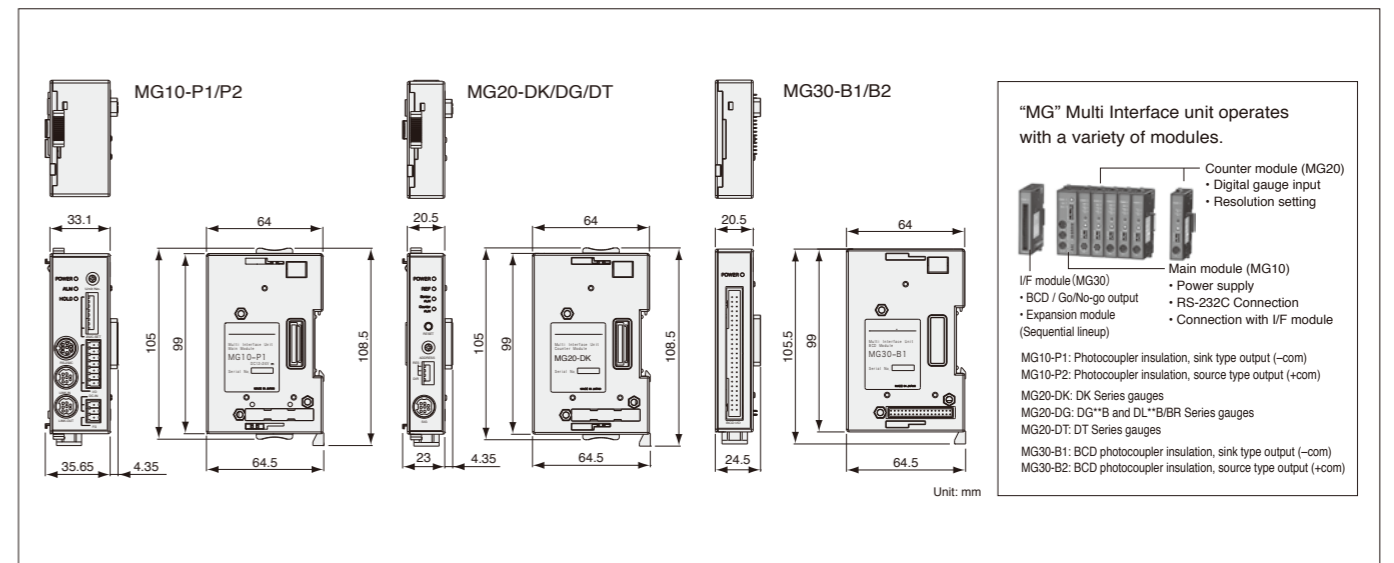
Counter module specifications

Model		MG20–DK	MG20–DG	MG20–DT
Power consumption		1W + power consumption for connected gauge	1.4W (connected to DG-B) / 0.5W (connected to DL-B)	0.8W
Measuring unit input	Corresponding gauge	DK Series (A/B quadrature input)	DG**B Series, DL**B/DL**BR Series	DT Series
	Allowable resolution setting *2	10/5/1/0.5/0.1μm	10/5/0.5μm	5 μm (DT12/32) 1μm (DT512)
		Set with DIP switch		
	Maximum response speed	Subject to the specification of the connected gauge		1m/s
	Maximum response acceleration	Subject to the specification of the connected gauge		2400m/s²
	Reference point *3	REF-LED (reference point loaded) shows on the display after the reference point is detected. Set "0" or preset value on the counter when the reference point is detected.		–
Others	Alarm	S-ALM LED activates by excess speed/acceleration of measuring unit. C-ALM LED activates by excess speed of the internal circuit of counter.		
		The alarm display is cancelled by the reset command from MG10 or with the reset button of the main unit.		

*2: Set the resolution value of the connected gauge. *3: MG20-DG works only when connected to the DL**BR Series

Interface module specifications

Model name		MG30–B1	MG30–B2
Power consumption		1W	
I/O	Input format	Source type (+com), Other-side output circuit: Current sink input (–com)	Current sink input (–com), Other-side output circuit: Source type (+com)
		Photo coupler insulation, external power: 5 – 24 V DC	
	Output format	Open collector output current sink type (–com), Other-side output circuit: Source type (+com)	Source type (+com), Other-side output circuit (+com): source type (–com)
		Photocoupler insulation, external power: 5 – 24 V DC	
	Input signal	DRQ / channel address / measuring mode shifting / comparator shifting / reset / start / posing / reference point loaded	
	Output signal	BCD data (6 digits) / READY / code / Go/No-Go output / alarm / reference point loaded	
Output setting		Timer (1 to 128ms) / OUT / OR / polarity (set with internal DIP switch)	

All models	Operating temperature	0 to +50°C (No condensation)	
	Storage temperature	−10 to +60°C (20 to 90%RH)	

"MG" Multi Interface unit operates with a variety of modules.

Counter module (MG20)
• Digital gauge input
• Resolution setting

I/F module(MG30)
• BCD / Go/No-go output
• Expansion module (Sequential lineup)

Main module (MG10)
• Power supply
• RS-232C Connection
• Connection with I/F module

MG10-P1: Photocoupler insulation, sink type output (–com)
MG10-P2: Photocoupler insulation, source type output (+com)
MG20-DK: DK Series gauges
MG20-DG: DG**B and DL**B/BR Series gauges
MG20-DT: DT Series gauges
MG30-B1: BCD photocoupler insulation, sink type output (–com)
MG30-B2: BCD photocoupler insulation, source type output (+com)

Unit: mm