

# Magnescale

SPEED X PRECISION

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Leading Edge Technology  
for Leading Edge Manufacturing

## Digital Gauge

Digital Gauge General Catalog



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Magnescale Co., Ltd.

# 摺動力。 The power of superior engineering design

Legendary reliability, quality and Magnescale technology are all part of the Digital Gauge products.

The Magnescale Digital Gauge products use a high-grade magnetic recording and detecting principle which has been developed over 50 years.

The Digital Gauge products embody the reliability and quality that Magnescale is known for. Magnescale Digital Gauges feature high resolution and high accuracy, along with environmental, shock and vibration resistance that are a unique feature to our magnetic detecting principle.

Sub-micron repeatability and improved torsion resistance comes from an innovative spindle design that enables environmental protection up IP67, allowing for a wide range of applications.



## Detection Principle MR Sensor

- ▶ Unique magnetic detecting principle
- ▶ High speed sampling (20MHz)
- ▶ No thermal drift

## Spindle Design Ball Spline Spindle Construction

- ▶ 250 Million cycles in testing
- ▶ 5 times greater radial load strength
- ▶ High shock and vibration resistance

## National measurement standards Traceability

- ▶ Accuracy inspection and calibration to national standards completed on certified equipment.
- ▶ Calibration certificates issued on-site

■ Wide variety of PLC fieldbus interfaces available

■ USB interface gauge with free software

■ Wide product lineup for various applications

■ Nationwide service & support network

■ Excellent resistance to harsh environments **IP67 versions available**

The magnetic technology of the Digital Gauge makes it highly resistant to water, oil and condensation.

Leading Edge Technology  
for Leading Edge Manufacturing

# Digital Gauge

Using a magnetic detecting principle allows for both high accuracy and high environmental resistance.

<Detecting Principle>

# MR Sensor

Precise magnetic recordings are applied to a special proprietary magnetic material.

Using a MR (Magneto Resistive) sensor with a unique detecting pattern allows for high accuracy, and also allows for high environmental resistance and strong resistance to temperature changes.

High Response Speed

- ▶ Over 20 million readings per second
- No tracking errors with high speed sampling

Repeatability of  $\pm 0.1 \mu\text{m}$  or better ( $2\sigma$ )

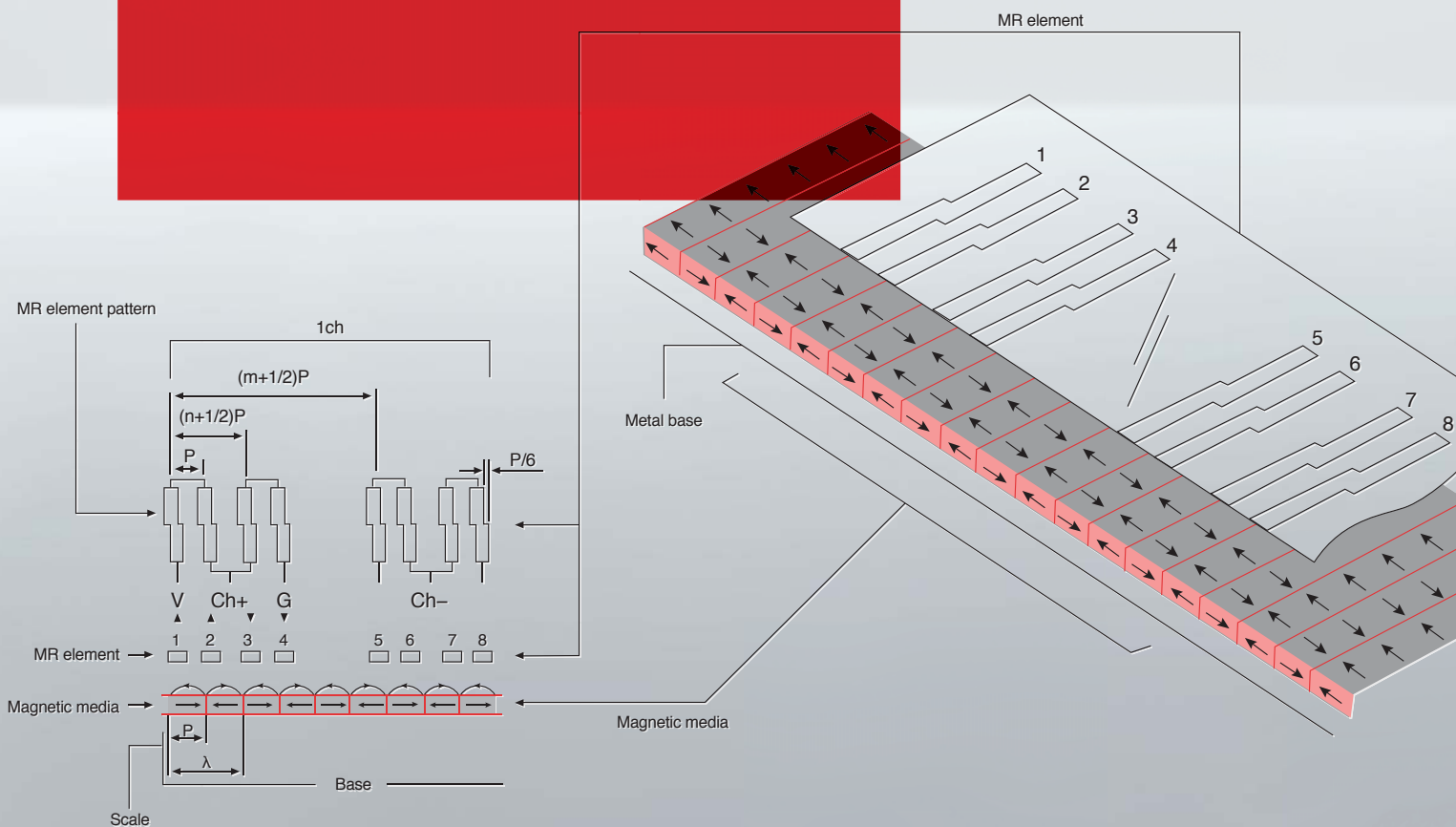
- ▶ Uses a continuous processing circuit
- A quadrature signal (sine/cosine) from the sensor and processing via a proprietary sequential processing circuit fulfills  $0.1 \mu\text{m}$  resolution and  $\pm 0.1 \mu\text{m}$  repeatability.

No Calibration

- ▶ Digital signal processing
- The signal is processed digitally, which does not require signal calibration like an differential transformer method.

No warm up time

- ▶ Excellent temperature characteristics
- There is no required warm-up time or stand-by time. The Digital Gauge can be used immediately upon power-up.

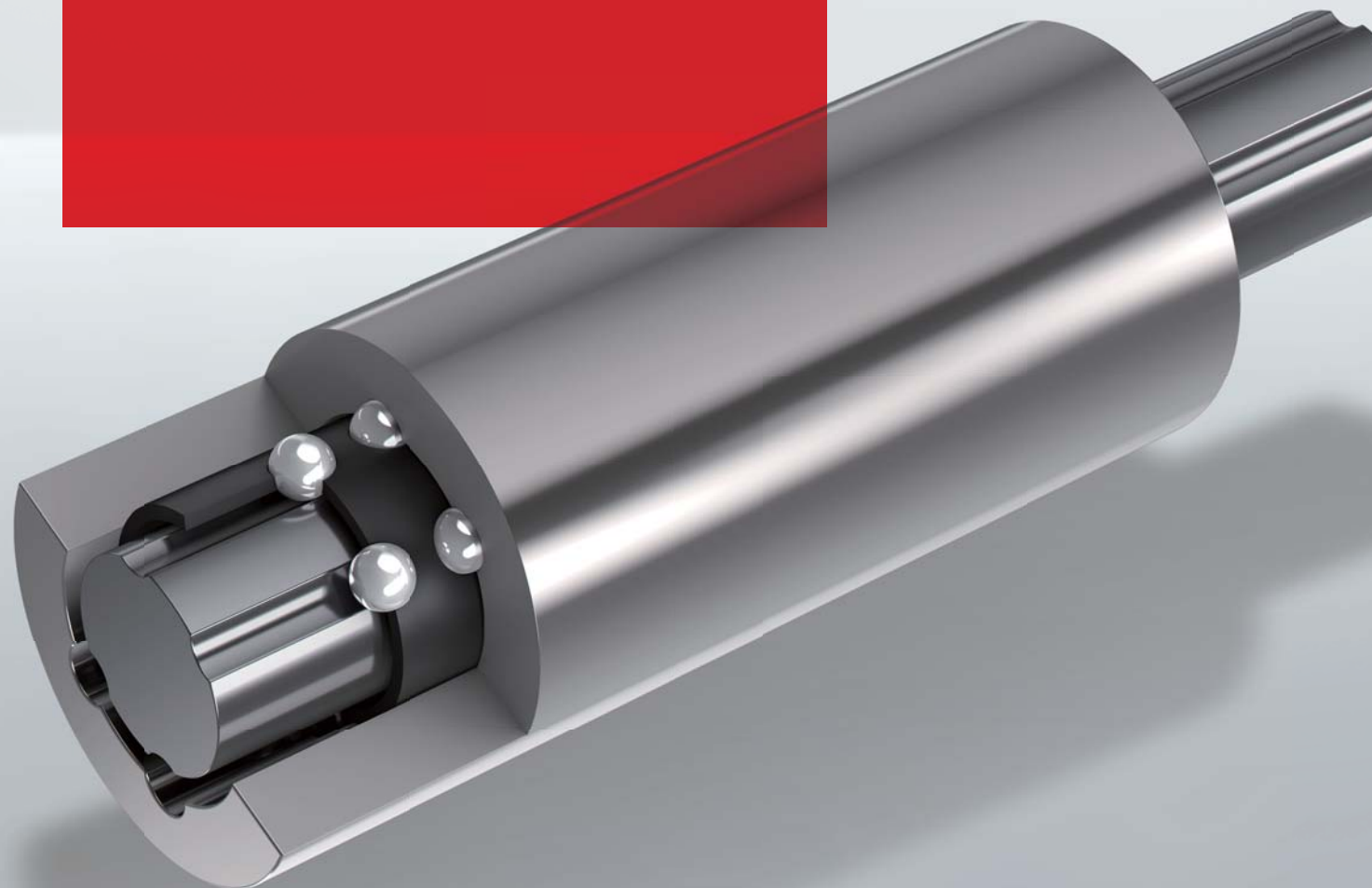


<Spindle Design>

# Ball Spline Spindle Construction

The Digital Gauge has been improved with both repeatability and spindle performance due to the ball spline spindle construction. Long operational life, with excellent shock and vibration resistance help reduce overall maintenance costs.

(As of August 2018, the gauges have reached 210 million strokes in an on going evaluation.)



## Improved performance to 250 million cycles

### High Durability

#### ▶ Lower lifetime cost

The number of cycles has reached 210 million, with a theoretical value of 250 million cycles. High durability, excellent vibration and shock resistance, along with the ball spline spindle construction contribute to a long operational life for a wide variety of applications.

### Lower the fluctuation of spindle resistance

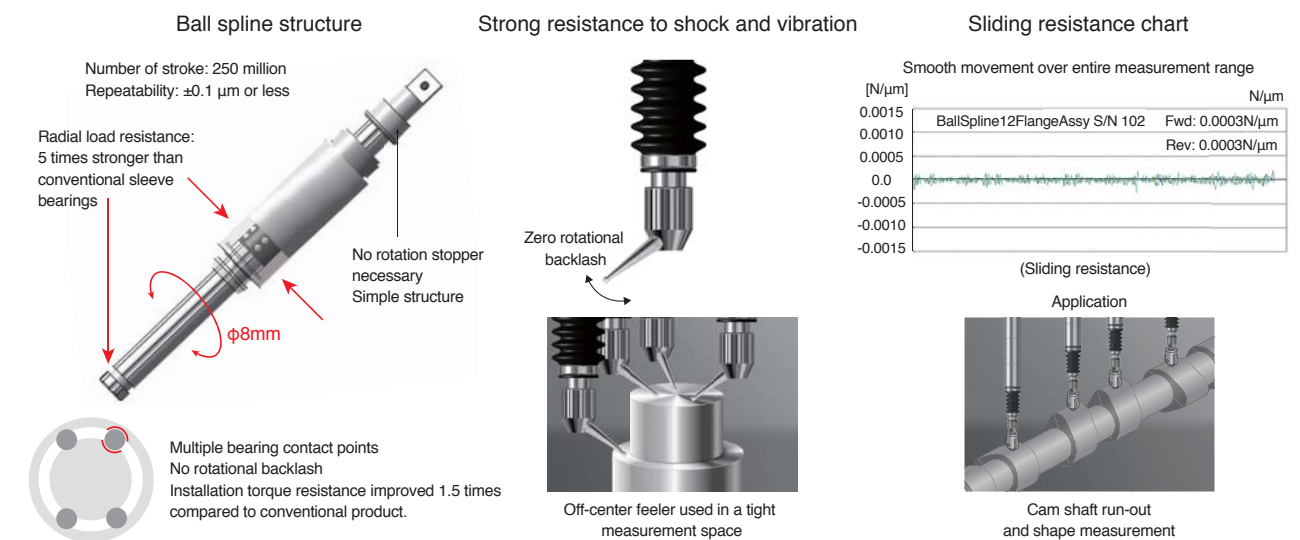
#### ▶ Improve high repeatability by stable spindle resistance

Repeatability has reached  $\pm 0.1 \mu\text{m}$  or better due to the ball spline spindle design with optimized pre-load control and precision cut groove.

### Strength against radial loads

#### ▶ The bearing structure strengthens the entire spindle

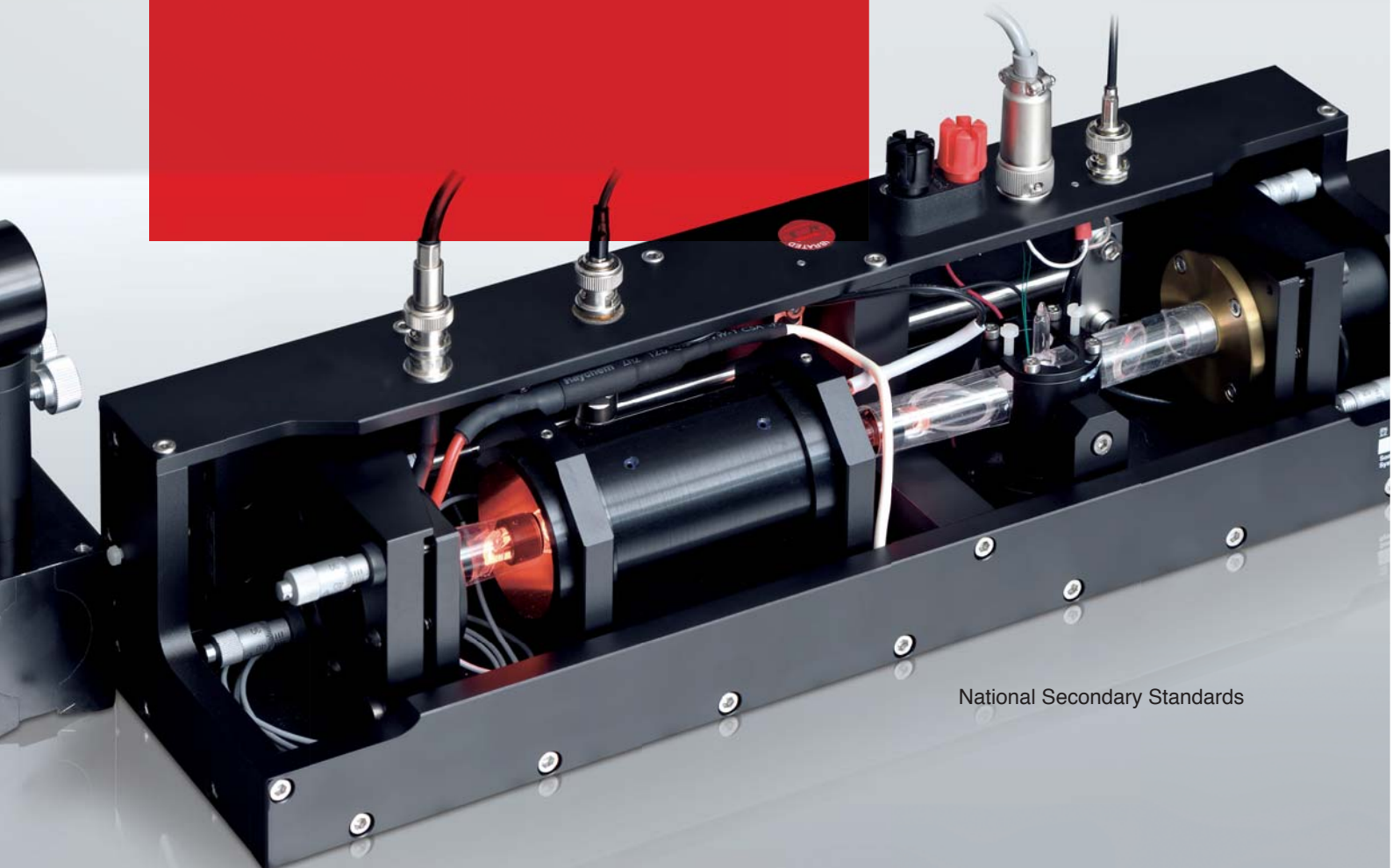
Due to the multiple points where the bearings come into contact with the spindle splines, the radial load capability is 5 times stronger than linear bush type, and allows for accurate measurements even at an angle and installation torque resistance improved 1.5 times.



<National measurement standards>

# Traceability

Magnescale Co., Ltd. is an authorized calibration contractor. An accuracy chart is attached with every product. Measurement data is generated by equipment traceable to national standards. Magnescale can also issue a calibration certificate after a products ships.



National Secondary Standards

## All Magnescale Digital Gauges are traceable to national measurement standards

All Magnescale measuring and inspection equipment is calibrated to national measurement standards

▶ Inspection and calibration traceable to the national measurement standards

Magnescale Co., Ltd. performs regular accuracy inspections and calibrations to ensure compliance.

Accuracy measurement during manufacturing

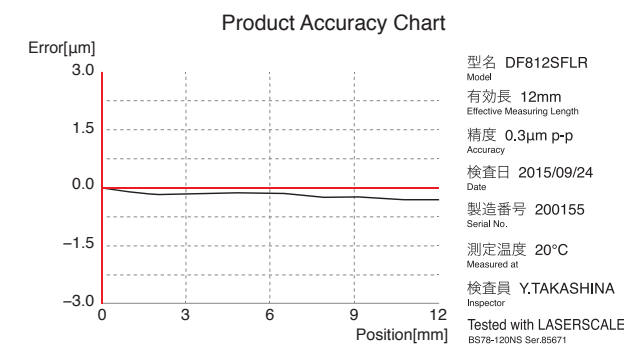
▶ Each product is shipped with an accuracy chart

All Digital Gauge products are shipped with an individual accuracy chart. If a customer loses a chart, we can re-issue it based on serial number information.

Product calibration certificates generated on-site

▶ Calibration certificates are also available after the product has shipped

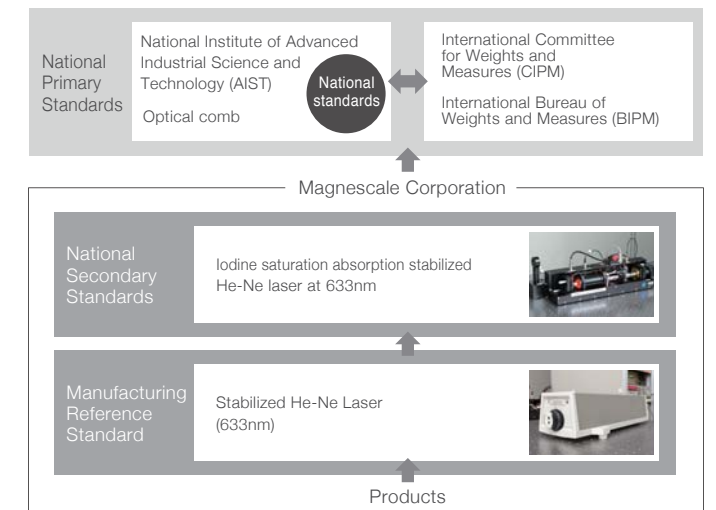
An accuracy chart is included with each shipment. Product calibration certificates required for ISO certifications are created on-site. Calibration certificates are also available after the product has shipped.



Certificate of Calibration



Length traceability system

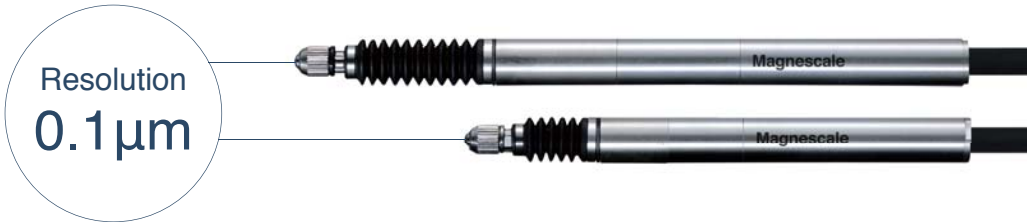


### A diverse lineup of gauges for a range of applications

## High Resolution

Using high-precision measurements, we improve the accuracy of post process assembly. Slim and compact, and offering 0.1 micron maximum resolution, these gauges also feature a highly durable mechanical structure capable of more than 210 million strokes.

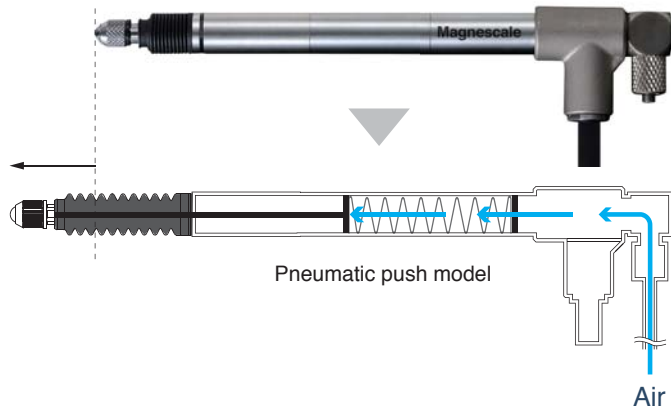
- ▶ DS800S series
- ▶ DF800S series
- ▶ DK800S series



## Air-driven

Using air allows for measurements to be tailored to the measurement piece and the application.

- ▶ DK800S series
- ▶ DS800S series
  - V model : Pneumatic push
  - L model : Vacuum suction
- ▶ DT series



## Flange Mount

Reduces the cost for custom mounting hardware, and lowers installation time.

- ▶ DS800S series
- ▶ DF800S series
- ▶ DK800S series
- F Type



### The ideal measurement solution for every application

## Robust, long measurement range

Long measurement ranges allow for objects of various sizes (205mm maximum). The robust structure creates superior environmental resistance and rigidity, and is able to be used in a wide range of applications.

- ▶ DK series



## General Purpose

The general purpose models can be used in simple applications, such as assembly checks and dimensional measurements. Lower cost, but still applicable to a wide range of applications.

- ▶ DT series



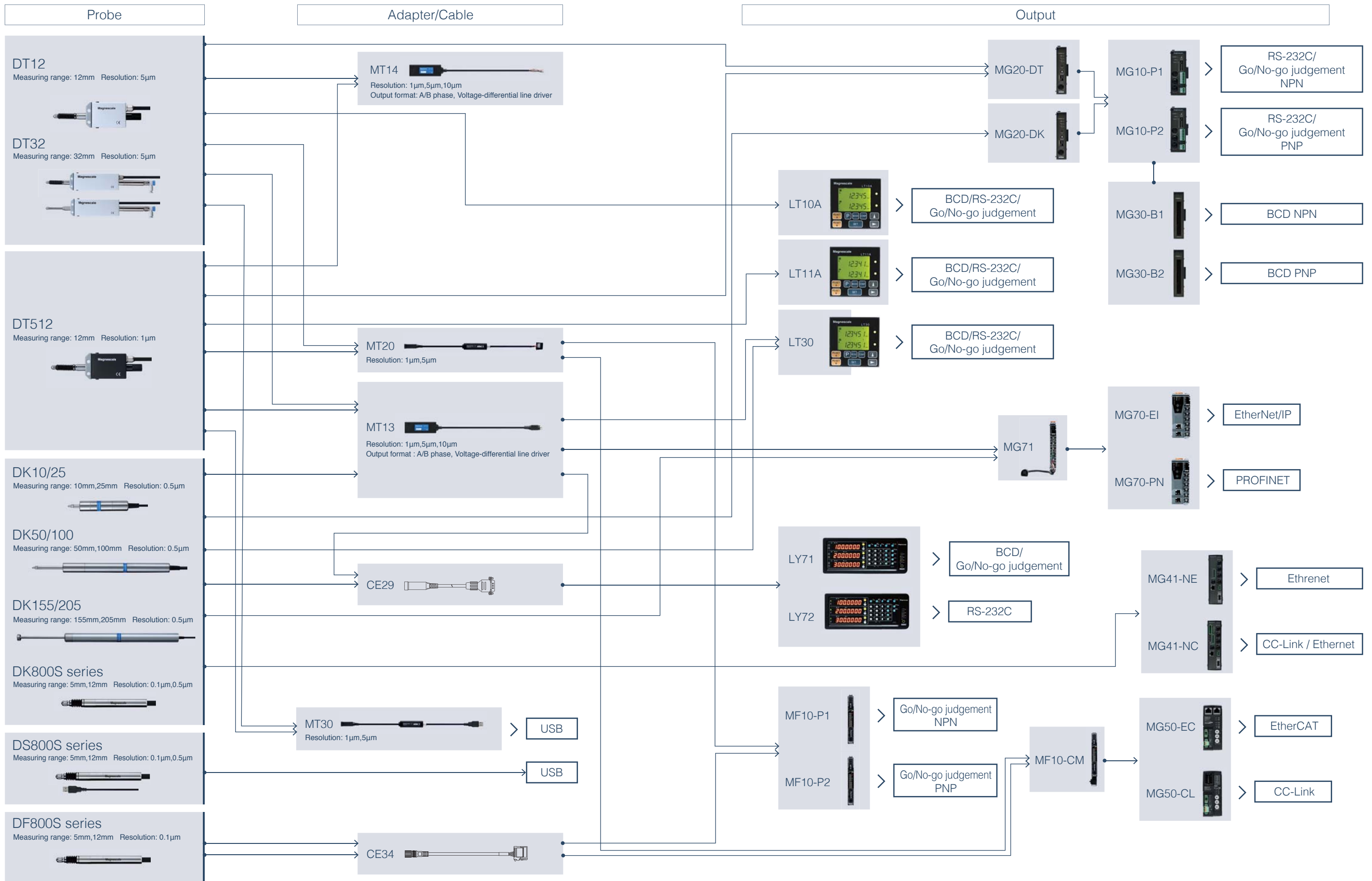
## USB Connection

Able to be directly connected to a computer via USB, enabling simple data acquisition. Perfect for post-process inspection.

- ▶ DS800S series



# Connection diagram



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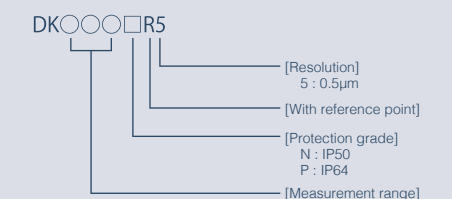
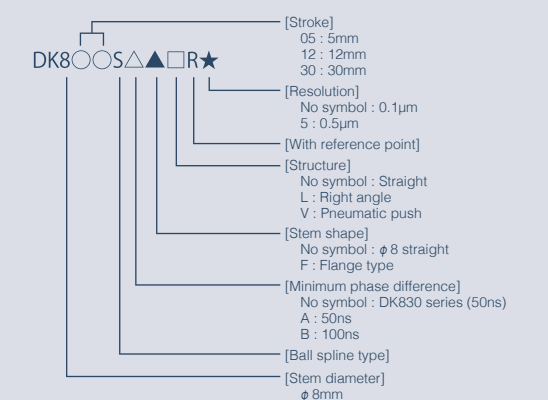
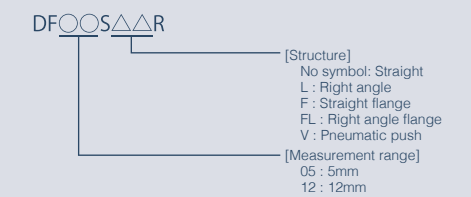
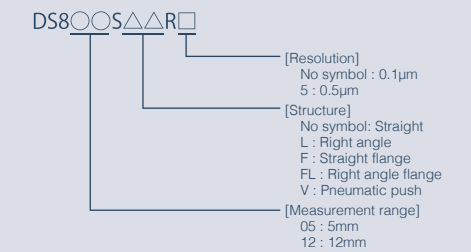
## Global Network

46

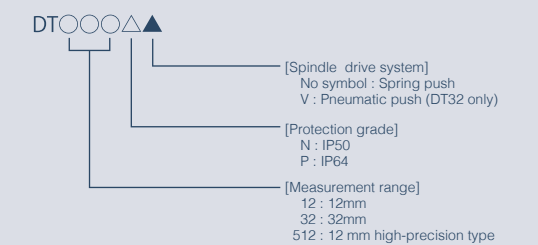
## Safety

47

## Details of digital gauge models



\*Please refer to the Specifications Table for the DK110 series.



# DS800S series

Directly connect to a PC or hub via USB.  
Communications and measurement software is also available.

## DS805S

- High resolution 0.1µm
- General purpose 0.5µm
- Spring push
- Pneumatic push
- Flange mount
- Straight body
- Right angle body
- Reference point function

- Stem: φ8
- Protection grade (probe section) IP67 : S/SF//SL\*/SFL\* type IP64 : SL/SFL type
- High-durability (Ball spline structure)
- Output: USB

\* When using the supplied hose elbow and a φ4mm tube



5mm stroke

## DS812S

- High resolution 0.1µm
- General purpose 0.5µm
- Spring push
- Pneumatic push
- Flange mount
- Straight body
- Right angle body
- Reference point function

- Stem: φ8
- Protection grade (probe section) IP67 : S/SF/SV/SL\*/SFL\* type IP64 : SL/SFL type
- High-durability (Ball spline structure)
- Output: USB

\* When using the supplied hose elbow and a φ4mm tube



12mm stroke

# DF800S series

Connects to digital tolerance indicator MF10 and compatible with various field bus

## DF805S

- High resolution 0.1µm
- General purpose 0.5µm
- Spring push
- Pneumatic push
- Flange mount
- Straight body
- Right angle body
- Reference point function

- Stem: φ8
- Protection grade (probe section) IP67 : S/SF/SL\*/SFL\* type IP64 : SL/SFL type
- High-durability (Ball spline structure)
- Output: Dedicated serial communications protocol

\* When using the supplied hose elbow and a φ4mm tube



5mm stroke

## DF812S

- High resolution 0.1µm
- General purpose 0.5µm
- Spring push
- Pneumatic push
- Flange mount
- Straight body
- Right angle body
- Reference point function

- Stem: φ8
- Protection grade (probe section) IP67 : S/SF/SV/SL\*/SFL\* type IP64 : SL/SFL type
- High-durability (Ball spline structure)
- Output: Dedicated serial communications protocol

\* When using the supplied hose elbow and a φ4mm tube



12mm stroke

# DK800S series

Connects to LT30 series counters and MG20, MG40 and MG70 series interface units  
A/B quadrature signal connects to PLC counter cards.

## DK805S

- High resolution 0.1µm
- General purpose 0.5µm
- Spring push
- Pneumatic push
- Flange mount
- Straight body
- Right angle body
- Reference point function

- Stem: φ8
- Protection grade (probe section) IP67 : SA/SAF/SB/SBF/SAL\*/SAFL\*/SBL\*/SBFL\* type IP64 : SAL/SAFL/SBL/SBFL type
- High-durability (Ball spline structure)
- Output: A/B/ reference point

\* When using the supplied hose elbow and a φ4mm tube



5mm stroke

## DK812S

- High resolution 0.1µm
- General purpose 0.5µm
- Spring push
- Pneumatic push
- Flange mount
- Straight body
- Right angle body
- Reference point function

- Stem: φ8
- Protection grade (probe section) IP67 : SA/SAF/SB/SBF/SAV/SBV/SAF\*/SAFL\*/SBL\*/SBFL\* type IP64 : SAL/SAFL/SBL/SBFL type
- High-durability (Ball spline structure)
- Output: A/B/ reference point

\* When using the supplied hose elbow and a φ4mm tube



12mm stroke

## DK830S

- High resolution 0.1µm
- General purpose 0.5µm
- Spring push
- Pneumatic push
- Flange mount
- Straight body
- Right angle body
- Reference point function

- Stem: φ8
- Protection grade (probe section) IP67 : SL\*/SV\* type IP53 : S/SL/V type
- High-durability (Ball spline structure)
- Output: A/B/ reference point

\* When the bellows set (optional accessory) is mounted



30mm stroke

### High-speed sampling (Maximum speed: 1 ms\*1)



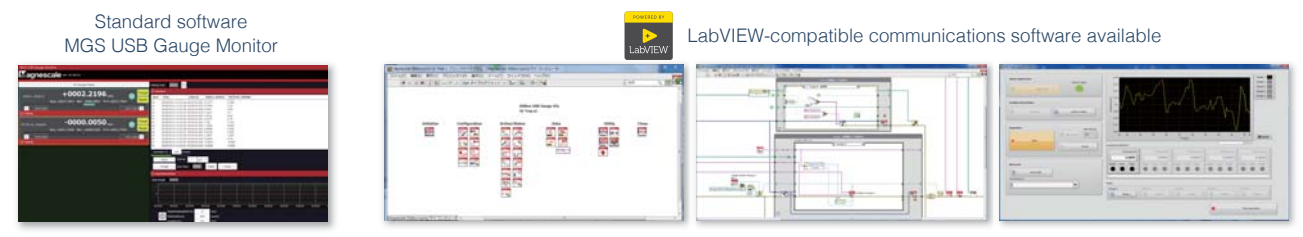
Able to perform multi-axis measurements using a powered hub\*2

### Recommended operating environment

- CPU: Intel Core i3 or higher
- RAM: 1 GB or higher
- OS: Windows 7 / Windows 10 (32 bit / 64 bit edition)
- For details of commands, please contact the Magnescale Sales Department.
- \*Windows and ActiveX are registered trademarks or trademarks of Microsoft Corporation in the United States and in other countries. Intel and Intel Core are registered trademarks or trademarks of Intel Corporation in the United States and in other countries.

- USB2.0SF-compatible digital gauges are capable of USB port-powered operation.
- A multi-axis configuration can be employed using a general-purpose USB hub. (Depending on the number of axes, the hub will require an external power supply).
- Operation verification software and sample programs are available free of charge from the Magnescale website.
- Functions can be executed via commands in the dedicated ActiveX Control provided by Magnescale.

### Standard software necessary for the display of measurement values is provided free of charge



An original Magnescale application provided with a wide range of display functions, including current value, maximum value, minimum value, P-P value, and judgment functions.

Importing data into Excel, VBA (OCX) and CSV makes it easy to create custom software solutions.

\*1 MGS sampling data when 1 axis is connected. Results may vary depending on specifications and environment.  
\*2 Please contact our sales about the maximum number of axes.

Long stroke / General-purpose resolution•Robust type

# DK series

Connects to LT30 series counters and MG20, MG40 and MG70 series interface units

## DK10/25

- High resolution 0.1µm
- General purpose 0.5µm
- Spring push
- Pneumatic push
- Flange mount
- Straight body
- Right angle body
- Reference point function

- Stem: φ20
- Protection grade (probe section) IP64 : N/NL type IP50 : P/PL type
- Output: A/B phases



## DK50/100

- High resolution 0.1µm
- General purpose 0.5µm
- Spring push
- Pneumatic push
- Flange mount
- Straight body
- Right angle body
- Reference point function

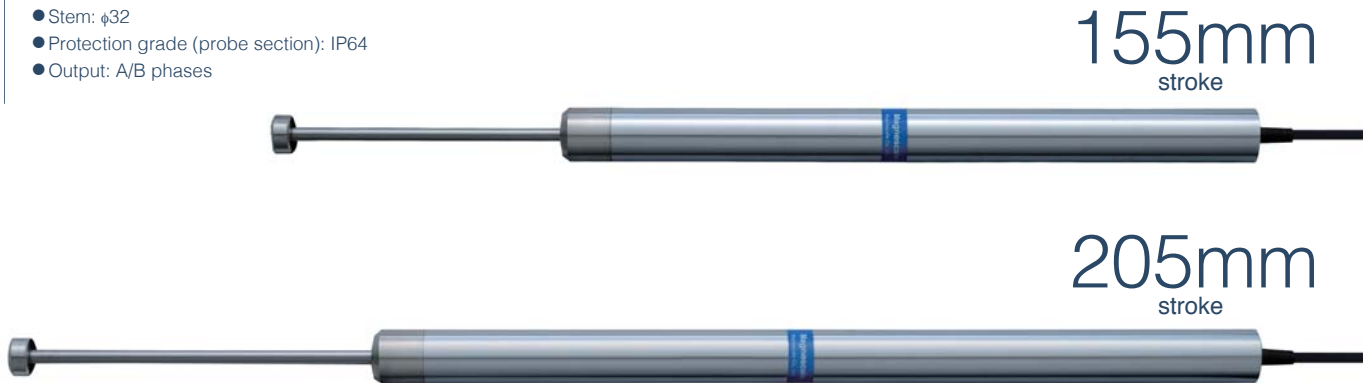
- Stem: φ20
- Protection grade (probe section) IP64 : N type IP50 : P type
- Output: A/B phases



## DK155/205

- High resolution 0.1µm
- General purpose 0.5µm
- Spring push
- Pneumatic push
- Flange mount
- Straight body
- Right angle body
- Reference point function

- Stem: φ32
- Protection grade (probe section): IP64
- Output: A/B phases



Small / General-purpose

# DT series

Connects to LT10A (DT12/DT32) / LT11A (DT512) counters and MG20 interface units

## DT512/12

- High resolution 0.1µm
- General purpose 1µm 5µm
- Spring push
- Pneumatic push
- Flange mount
- Straight body
- Right angle body
- Reference point function

- Stem: φ8
- Protection grade (probe section) IP64 : P type



## DT32

- High resolution 0.1µm
- General purpose 5µm
- Spring push
- Pneumatic push
- Flange mount
- Straight body
- Right angle body
- Reference point function

- Stem: φ8
- Protection grade (probe section) IP64 : P/PV type



DT gauge (DT12N/P, DT32N/NV/P/PV) compatible interpolators with A/B phase output

# Interpolator

When used in combination with DT gauges, able to convert measurement data to general-purpose A/B phase signal output. Able to be connected to PLC and other counter modules.

## MT13

- Resolution : 1 µm, 5 µm, 10 µm
- Output signal : A/B phase (The output becomes high impedance during an alarm)
- Output format : Voltage-differential line driver output (compliant with EIA-422)



## MT14

- Resolution : 1 µm, 5 µm, 10 µm
- Output signal : A/B phase, alarm (The output does not become high impedance during an alarm)
- Output format : Voltage-differential line driver output (compliant with EIA-422)



## MT20

- Resolution : 1 µm, 5 µm, 10 µm
- For MF10 only



## MT30

- Resolution : 1 µm, 5 µm, 10 µm
- USB2.0



# MG70/71

## Interface units for DK series digital gauges

Allow measurement data to be transferred to a PLC via EtherNet/IP or PROFINET fieldbuses.  
 Can also be connected to DT series general-purpose digital gauges using the MT30 interpolator.  
 Maximum number of length measurement unit connections: 85 axes  
 (Up to a maximum of 250 axes when a power supply module is employed)



MG70-EI MG71-CM

# MG40 series

## Interface units for DK series digital gauges

Interface units for DK series digital gauges  
 Allow measurement data to be transferred to a computer or PLC via Ethernet or CC-Link.  
 Maximum number of length measurement unit connections: 100 axes



MG41-NC MG41-NE MG42

# MG50

## Interface units for DF series digital gauges

Interface units for DF series digital gauges  
 Allow DF805S/DF812S series measurement data to be transferred to a PLC via EtherCAT or CC-Link fieldbuses.  
 Can also be connected to DT series general-purpose digital gauges using an MT20-01/05 interpolator.  
 Maximum number of length measurement unit connections:  
 MG50-EC: 30 axes  
 MG50-CL: 16 axes



MG50-CL MF10-CM MG50-EC MF10-CM

8 types of calculation functions are provided by the Function Block. Calculation functions can be executed easily by PLC programming.



\*Our function block is compatible with NJ series (OMRON), and Q and L series (Mitsubishi)  
 (Our function block does not support some versions.  
 For more details, please contact our sales staff.)

# MG10/20/30

## Interface units for DK and DT series digital gauges

Standard RS-232C output, allowing measurement data to be transferred to a computer or PLC.  
 Maximum number of length measurement unit connections: 16 axes (Up to a maximum of 64 axes using links)



MG30 MG10 MG20-DK MG20-DT

# MF10

## Compact display unit for DF series

Various mode displays  
(preset, tolerance setting, Go/NoGo display, output reversal function)  
Two types of tolerance settings and four setting methods can be selected  
Preset function allows arbitrary setting of origin point position

- Output Go/no-go Judgement
- MF10-P1 : NPN output type
- MF10-P2 : PNP output type
- MF10-CM : MG50 only



MF10-CM

# LY71

## High-function measurement display unit able to be connected to up to two axes

Fitted with general-purpose input/output terminals allowing selection of function  
Addition of expansion board enables BCD and comparator output

- Output BCD
- Output Go/no-go Judgement



# LT30 series (For DK and DK-S)

## Display unit for DK series

Equipped with functions necessary for measurement and judgment of tolerances, including preset, judgment output, external reset, latch, 2-axis addition, and P-P measurement

- Output BCD
- Output RS-232C
- Output Go/no-go Judgement



# LY72

## High-function display unit able to be connected to up to three axes

RS-232C fitted as standard, allowing operation by command

- Output RS-232C



# LT11A series (For DT512)

## Display unit for DT512

Equipped with functions necessary for measurement and judgment of tolerances, including preset, judgment output, external reset, latch, 2-axis addition, and P-P measurement

- Output BCD
- Output RS-232C
- Output Go/no-go Judgement



# LT10A series (For DT12/32)

## Display unit for DT12/DT32

Equipped with functions necessary for measurement and judgment of tolerances, including preset, judgment output, external reset, latch, 2-axis addition, and P-P measurement

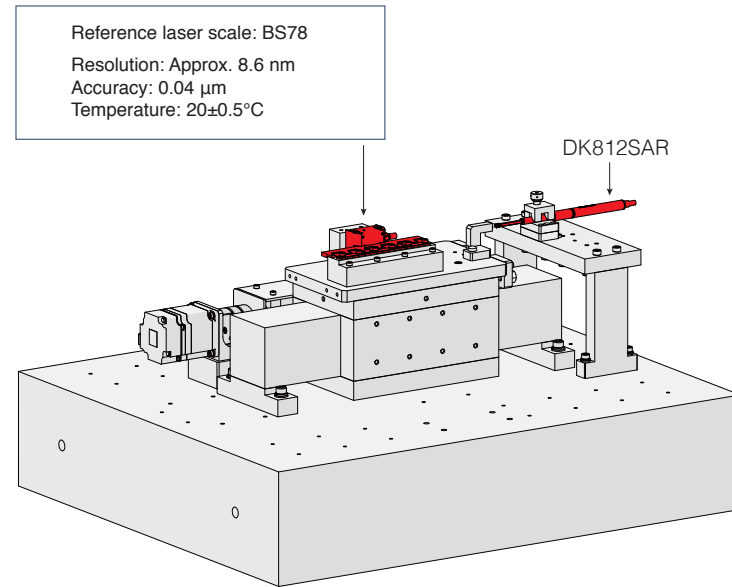
- Output BCD
- Output RS-232C
- Output Go/no-go Judgement



## DK812SAR repeatability

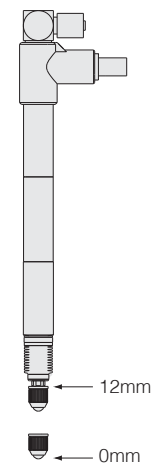
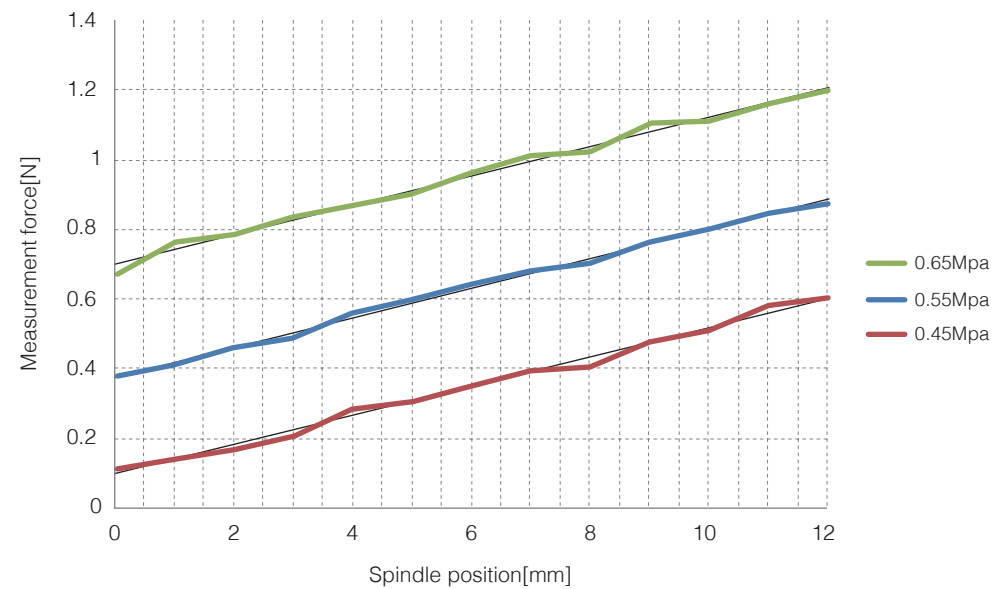
The result determined from measurements conducted five times each at various points between 1 mm and 12 mm from the reference position (DK812SAR spindle fully extended) using a Magnescale laser scale was  $2\sigma$ .

Measurement position	$2\sigma(\mu\text{m})$
1mm	0.068
2mm	0.066
3mm	0.056
4mm	0.039
5mm	0.038
6mm	0.048
7mm	0.052
8mm	0.029
9mm	0.038
10mm	0.018
11mm	0.031
12mm	0.027



## Relationship between DK812SAVR (pneumatic push type) air pressure and measurement pressure

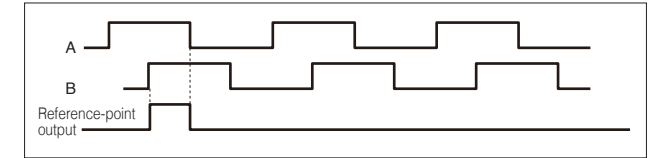
Product specifications: Upward direction:  $0.6\pm 0.5$  N (at 0.55 Mpa)  
 Side direction:  $0.7\pm 0.5$  N (at 0.55 Mpa)  
 Downward direction:  $0.8\pm 0.5$  N (at 0.55 Mpa)



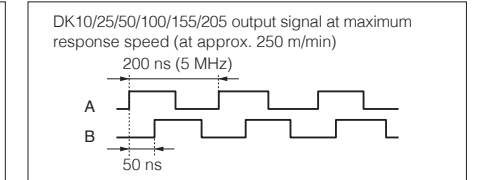
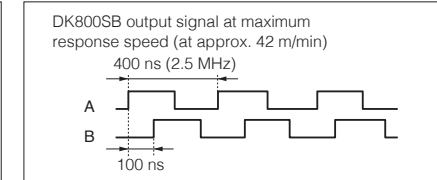
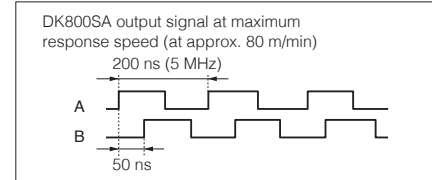
Measurement results and approximation lines for air pressure = 0.45 Mpa, 0.55 Mpa, and 0.65 Mpa and side direction N=1.

## DK Series measuring unit output signals

The signal output from these measuring units are A/B quadrature and reference point signals, voltage differential line driver output compliant with EIA-422.



The reference point is the synchronized reference point that is at Hi level when the signal A and signal B are at the Hi level.

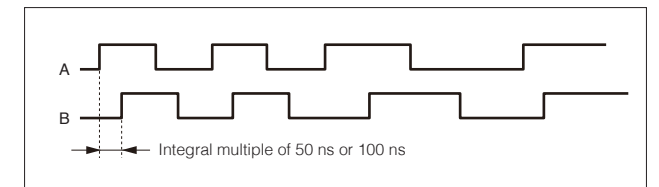


The A/B quadrature output signal by measuring unit is 5 MHz maximum with a minimum phase difference of 50 ns for DK800SA and is 2.5 MHz maximum with a minimum phase difference of 100 ns for DK800SB. The counter or control device capable of processing these signals should be used.

For DK the A/B quadrature output signal by measuring unit is 5 MHz maximum with a minimum phase difference of 50 ns. The counter or control device capable of processing these signals should be used.

### Output Signal Phase Difference

Moving length of the measuring unit is detected every 50 ns for the DK800SA/DK and every 100 ns for the DK800SB, and the phase difference proportional to the amount traveled is output. The amount of phase difference changes in integer multiples of 50 ns or 100 ns. Also, the minimum phase difference for the phase A and B is 50 ns for the DK800SA/DK and 100 ns for the DK800SB.

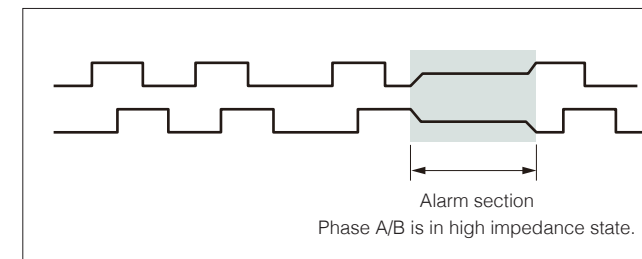


In the standard specifications, the minimum phase difference is fixed at 50 ns for the DK800SA and 100 ns for the DK800SB, however, the minimum phase differences in the following table below are available as special specifications.

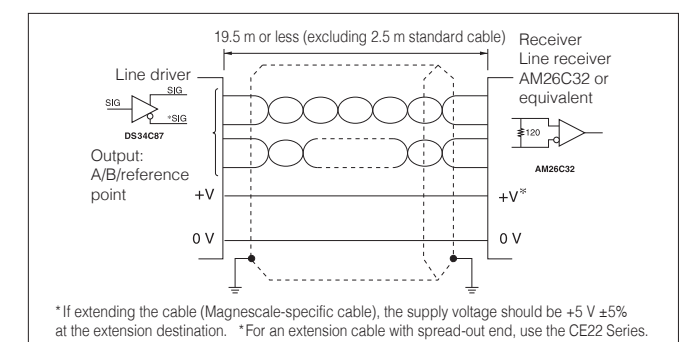
Phase A/B Minimum phase difference	Phase A single cycle	Counter's permissible frequency	Maximum response speed		Remarks
			Resolution 0.1 μm	Resolution 0.5 μm	
50ns	200ns	5MHz	80m/min	250m/min	DK800SA standard product
100ns	400ns	2.5MHz	42m/min	100m/min	DK800SB standard product
300ns	1.2μs	833kHz	14m/min	33m/min	Special specifications
500ns	2μs	500kHz	8.4m/min	20m/min	Special specifications

### Output Signal Alarm

If the response speed is exceeded, the phase A/B output from this measuring unit changes to high impedance state for about 400 ms as an alarm.

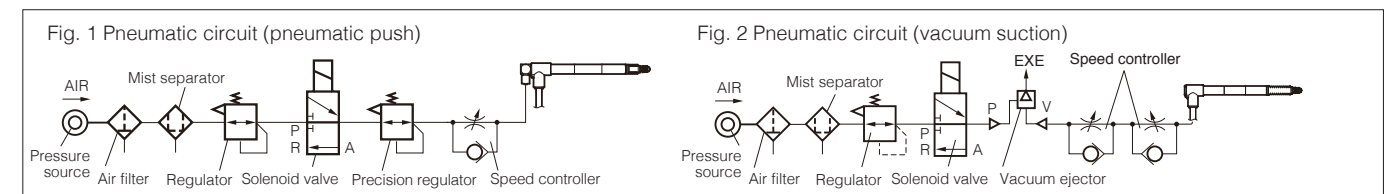


### Receiver



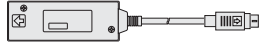
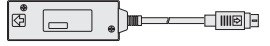
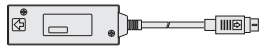


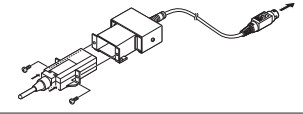


## DK Series operating cautions

- For the pneumatic push type, use of the pneumatic circuit shown in Fig. 1 enables the feeler to be air driven. Pressure regulation is required depending on the usage condition. A precision pressure regulator (e.g., SMC IR2010 or equivalent) should be used.
- For the vacuum suction type, use of the pneumatic circuit shown in Fig. 2 enables the feeler to be air driven.



# Compatible

Digital gauge	Adapter/conversion cable Note 1: MT12/13 is interpolator.	Counters	Interface unit	Old counters	External device	Extension cables	
DK800A/B Series <b>Discontinued</b> DK800S Series DK10/25/50/100/110/155/205 Series	Unnecessary	LT30 Series	MG20-DK MG41-NE/NC MG42			CE08-1(1 m) -3(5 m) -5(5 m) -10(10 m) -15(15 m) * Total cable length is 20 m or less. CK-T12(1 m) -T13(3 m) -T14(5 m) -T15(10 m) -T16(15 m) * High-flex cable/total cable length is 20 m or less. CE27-01(1 m) -03(3 m) -05(5 m) -10(10 m) * High-flex cable/large-dia. cable/total cable length is 30 m or less.	
	CE29 Series Cable length: 0.3/1/3/5/10 m 	LH71A/72 LY71/72					
	(Cable with flying leads) 					○ : connectable A/B reference point (Differential line receiver input)	CE22-01(1 m) -03(3 m) -05(5 m) -10(10 m) * High-flex cable/flying leads/total cable length is 20 m or less. CE26-01(1 m) -03(3 m) -05(5 m) -10(10 m) * High-flex cable/flying leads/large-dia. cable/total cable length is 30 m or less. CE27-01(1 m) -03(3 m) -05(5 m) -10(10 m)(extension cable for CE26) * High-flex cable/large-dia. cable/total cable length is 30 m or less.
DG Series (with HA13) <b>Discontinued</b> * Model with no "B" assigned	SZ05-T01	LH71A/72 LY71/72					
	SZ05 + SZ51 - MS01			LY51/52 <b>Discontinued</b>		Without extension cable	
	Unnecessary			LY100/110 LH20, etc. <b>Discontinued</b>			
DT12/32 Series	Unnecessary	LT10A Series	MG20-DT	LT10 Series <b>Discontinued</b>			
	MT12-05/10 Note 1 	LT20A Series		LT20 Series <b>Discontinued</b>			
	MT13-05/10 Note 1 	LT30 Series				CE08-1(1 m) -3(5 m) -5(5 m) -10(10 m) -15(15 m) * Total cable length is 20 m or less. CK-T12(1 m) -T13(3 m) -T14(5 m) -T15(10 m) -T16(15 m) * High-flex cable/total cable length is 20 m or less.	
DT512 Series	Unnecessary	LT11A Series	MG20-DT	LT11 Series <b>Discontinued</b>			
	MT13-01 Note 1 	LT30 Series					
DK800 Series <b>Discontinued</b> * Models with no "A/B" assigned to model	Unnecessary	LT30 Series	MG20-DK			CE27-01(1 m) -03(3 m) -05(5 m) -10(10 m) * High-flex cable/large-dia. cable/total cable length is 10 m or less. * When CE08-1(1 m) -3(3 m) or CK-T12(1 m) -T13(3 m) is used, the total cable length is 5 m or less.	
	CE29 Series Cable length: 0.3/1/3/5/10 m 	LH71A/72 LY71/72					
	(Cable with flying leads) 					○ : connectable A/B reference point (Differential line receiver input)	CE22-01(1m) -03(3 m) * High-flex cable/flying leads/total cable length is 5 m or less. CE26-01(1 m) -03(3 m) * High-flex cable/flying leads/large-dia. cable/total cable length is 10 m or less. CE27-01(1 m) -03(3 m) -05(5 m)(extension cable for CE26) * High-flex cable/large-dia. cable/total cable length is 10 m or less.
DG-B Series <b>Discontinued</b>	DZ51 + SZ70-1	LH71A/72 LY71/72					
	Unnecessary	LT20A Series	MG20-DG	LT20 Series <b>Discontinued</b>		Without extension cable	
	DZ51			LY51/52 <b>Discontinued</b>			
DE12BR/DE30BR <b>Discontinued</b>	SZ70-2 	LT30 Series					
	SZ70-1	LH71A/72 LY71/72				Without extension cable	
	Unnecessary			LY51/52 <b>Discontinued</b>			
DL310B/DL330B/ <b>Discontinued</b> DL10BR/DL30BR/DL60BR	Unnecessary	LT20A Series	MG20-DG	LT20 Series <b>Discontinued</b>		Without extension cable (DL310B, 330B)	
	DZ51 + SZ70 - 1	LH71A/72 LY71/72				* Cable may be manufactured to specified length on a production by order basis. Total cable length: 10 m or less	
	DZ51			LY51/52 <b>Discontinued</b>			



# DS800S series

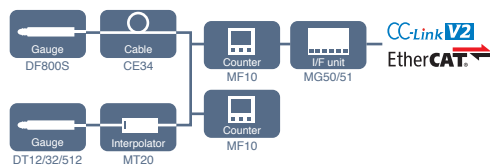


## DS805S/DS812S

Model	High-resolution models		General-purpose resolution models		High-resolution models		General-purpose resolution models	
	DS805SR, DS805SLR, DS805SFR, DS805SFLR		DS805SR5, DS805SLR5, DS805SFR5, DS805SFLR5		DS812SR, DS812SLR, DS812SFR, DS812SFLR		DS812SVR	
Measuring range	5mm				12mm			
Maximum resolution	0.1 μm		0.5 μm		0.1 μm		0.5 μm	
Accuracy(At 20°C)	1 μm p-p		1.5 μm p-p		1 μm p-p		1.5 μm p-p	
Repeatability	±0.1 μm or less							
Measuring force	Upward: 0.35±0.25N Horizontal: 0.4±0.25N Downward: 0.45±0.25N		Upward: 0.4±0.3N Horizontal: 0.5±0.3N Downward: 0.6±0.3N		Upward: 0.6±0.5N Horizontal: 0.7±0.5N Downward: 0.8±0.5N		Upward: 0.4±0.3N Horizontal: 0.5±0.3N Downward: 0.6±0.3N	
Maximum response speed	80m/min							
Reference point	Position at spindle movement of 1mm±0.5mm							
Reference point response speed	40m/min or less							
Output	USB2.0FS							
Spindle drive system	Spring push Vacuum suction: SL/SFL		Spring push Vacuum suction: SL/SFL		Air driving (Pneumatic push)		Spring push Vacuum suction: SL/SFL	
Protection grade <sup>2</sup>	IP67 (S/SF/SV), IP64 (SL/SFL), IP67 (SL/SFL) <sup>3</sup>							
Vibration resistance	100 m/s <sup>2</sup> (20~2000 Hz)							
Impact resistance	1000 m/s <sup>2</sup> (11 ms)							
Operating temperature and humidity range	0~+50 °C (No condensation)							
Storage temperature and humidity range	-20~+60 °C 90%RH or less							
Power supply	DC 5 V ±5 %							
Power consumption	120mA Max.							
Mass <sup>4</sup>	Approx. 30g							
Output cable length	Measuring unit ↔ Interpolation box : 2m Interpolation box ↔ USB : 0.5m							
Feeler	Carbide ball tip, Mounting screw M2.5		Steel ball tip, Mounting screw M2.5		Carbide ball tip, Mounting screw M2.5		Steel ball tip, Mounting screw M2.5	
Accessories	Spanner, Instruction Manual, Supplement Manual, +P M4x5 screw(2) SL/SFL only : Hose elbow, SF/SFL only : Tightening nut, Wave washer, Pin, Clamp spanner		Spanner, Instruction Manual, Supplement Manual, +P M4x5 screw(2) SL/SFL only : Tightening nut, Wave washer, Pin, Clamp spanner, DS812SF/SFL only : 2 mm collar for adjustment		Spanner, Instruction Manual, Supplement Manual, +P M4x5 screw(2) SL/SFL only : Hose elbow, SF/SFL only : Tightening nut, Wave washer, Pin, Clamp spanner, DS812SF/SFL only : 2 mm collar for adjustment		Spanner, Instruction Manual, Supplement Manual, +P M4x5 screw(2)	

\*1 Air pressure : 0.055MPa \*2 Not including interpolation box and connector \*3 When using the supplied hose elbow and a φ4mm tube \*4 Not including cable and interpolation box  
\*Magnescale reserves the right to change product specifications without prior notice.

# DF800S series

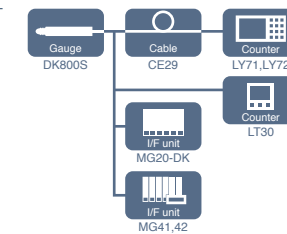


## DF805S/DF812S

Model	DF805SR, DF805SFR		DF805SLR, DF805SFLR		DF812SR, DF812SFR		DF812SLR, DF812SFLR		DF812SVR	
	Measuring range	5mm				12mm				
Maximum resolution	0.1 μm				0.1 μm					
Accuracy(At 20°C)	1 μm p-p				1 μm p-p					
Repeatability	±0.1 μm or less									
Measuring force	Upward: 0.35±0.25N Horizontal: 0.40±0.25N Downward: 0.45±0.25N				Upward: 0.35±0.25N Horizontal: 0.40±0.25N Downward: 0.45±0.25N				Upward: 0.6±0.5N <sup>1</sup> Horizontal: 0.7±0.5N <sup>1</sup> Downward: 0.8±0.5N <sup>1</sup>	
Maximum response speed	80 m/min									
Reference point	Position at spindle movement of 1±0.5 mm									
Reference point response speed	80 m/min									
Output	Serial communication protocol									
Spindle drive system	Spring push								Air driving (Pneumatic push)	
Protection grade <sup>2</sup>	IP67(S/SF/SV), IP64(SL/SFL), IP67(SL/SFL) <sup>3</sup>									
Vibration resistance	100 m/s <sup>2</sup> (20 ~ 2000 Hz)									
Impact resistance	1000 m/s <sup>2</sup> (11 ms)									
Operating temperature and humidity range	0~+50°C (No condensation)									
Storage temperature and humidity range	-20~+60°C 90%RH or less									
Power supply	DC+10~+30 V									
Power consumption	1.2 W or less									
Mass <sup>4</sup>	Approx. 30 g (Not including cable and interpolation box)									
Output cable length	2 m									
Feeler	Carbide ball tip, Mounting screw M2.5									
Accessories	Instruction Manual, Spanner DF8**S*L* only : Hose elbow DF8**S*F** only : Tightening nut, Clamp spanner, Wave washer, Pin									

\*1 Air pressure: 0.055MPa \*2 Excluding the interpolation box \*3 When Hose elbow and φ4mm tube is connected \*4 Excluding cable section and interpolation box  
\*Magnescale reserves the right to change product specifications without prior notice.

# DK800S series



## DK805S/DK812S

Model	High-resolution models		General-purpose resolution models		High-resolution models		General-purpose resolution models	
	DK805SAR, DK805SALR, DK805SAFR, DK805SAFLR		DK805SBR, DK805SBLR, DK805SBR5, DK805SBFLR		DK812SAR, DK812SALR, DK812SAFR, DK812SAFLR, DK812SAVR		DK812SBR, DK812SBLR, DK812SBR5, DK812SBFLR, DK812SBVR	
Measuring range	5 mm				12 mm			
Maximum resolution	0.1 μm		0.5 μm		0.1 μm		0.5 μm	
Accuracy(At 20°C)	1 μm p-p		1.5 μm p-p		1 μm p-p		1.5 μm p-p	
Repeatability	±0.1 μm or less							
Measuring force	Upward: 0.35±0.25N Horizontal: 0.40±0.25N Downward: 0.45±0.25N				Upward: 0.4±0.3N Horizontal: 0.5±0.3N Downward: 0.6±0.3N			
Maximum response speed	80 m/min	42 m/min	250 m/min	100 m/min	80 m/min	42 m/min	250 m/min	100 m/min
Reference point	Position at spindle movement of 1mm±0.5mm							
Reference point response speed	Same as the noted maximum response speed							
Output	A/B/Reference point Voltage-differential line driver output (conforming to EIA-422)							
Spindle drive system	Spring push Vacuum suction (DK805SALR/SAFLR/SBLR/SBFLR/SALR5/SAFLR5/SBLR5/SBFLR5)				Spring push Air driving (Pneumatic push)(DK812SAVR/SBVR/SAVR5/SBVR5) Vacuum suction (DK812SALR/SAFLR/SBLR/SBFLR/SALR5/SAFLR5/SBLR5/SBFLR5)			
Protection grade <sup>1</sup>	IP67(SA/SAF/SAV/SB/SBF/SBV), IP64(SAL/SAFL/SBL/SBFL), IP67(SAL/SAFL/SBL/SBFL) <sup>2</sup>							
Vibration resistance	100 m/s <sup>2</sup> (20~2000 Hz)							
Impact resistance	1000 m/s <sup>2</sup> (11 ms )							
Operating temperature	0~+50 °C							
Storage temperature	-20~+60 °C							
Power supply	DC 5 V ±5 %							
Power consumption	1 W							
Mass <sup>3</sup>	Approx. 30g							
Output cable length	2.5 m							
Feeler	Carbide ball tip	Mounting screw M2.5	Steel ball tip	Mounting screw M2.5	Carbide ball tip	Mounting screw M2.5	Steel ball tip	Mounting screw M2.5
Accessories	Instruction Manual +P M4 x 5 screw(2pc) tightening nut, Clamp spanner, wave washer, mounting pin 1 each(DK8**S*F** only) Hose elbow 1 pc(DK8**S*L** only) one spanner							

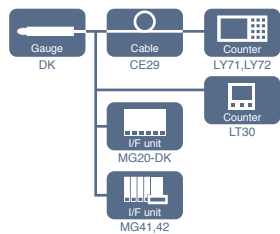
\*1 Excluding the interpolation box and connector \*2 When φ4mm tube is connected for right-angle model \*3 Excluding cable and interpolation box  
\*Magnescale reserves the right to change product specifications without prior notice.

## DK830S

Model	Straight type		Right-angle type		Pneumatic push type	
	DK830SR		DK830SLR		DK830SVR	
Measuring range	30 mm					
Maximum resolution	0.1 μm(0.5 μm resolution can also be selected as special specifications.)					
Accuracy(At 20°C)	1.3 μm p-p				1.7 μm p-p	
Repeatability	±0.1 μm or less					
Measuring force	Upward: 0.5±0.35N Horizontal: 0.6±0.35N Downward: 0.7±0.35N				Air pressure 0.07 Mpa: 1.9N or less in all directions Air pressure 0.09 Mpa: 2.6N or less in all directions	
Maximum response speed	80 m/min					
Reference point	Position at spindle movement of 1mm±0.5mm					
Reference point response speed	Same as the noted maximum response speed					
Output	A/B/Reference point Voltage-differential line driver output (conforming to EIA-422)					
Spindle drive system	Spring push				Air driving (Pneumatic push)	
Protection grade <sup>1</sup>	IP53				IP53/IP67 <sup>2</sup>	
Vibration resistance	100 m/s <sup>2</sup> (20~2000 Hz)					
Impact resistance	1000 m/s <sup>2</sup> (11 ms )					
Operating temperature	0 °C~+50 °C					
Storage temperature	-20 °C~+60 °C					
Power supply	DC +5 V ±5 %					
Power consumption	1 W					
Mass <sup>3</sup>	Approx. 70g				Approx. 80g	
Output cable length	2.5 m					
Feeler	Carbide ball tip, Mounting screw M2.5					
Accessories	Spanner Instruction Manual Supplement +P M4 x 5 screw(2pc)					

\*1 Excluding the interpolation box and connector \*2 When the bellows set(optional accessory) is mounted \*3 Excluding cable section and interpolation box  
\*Magnescale reserves the right to change product specifications without prior notice.

# DK series



## DK10/25/50/100

Model	Standard model		Protected type model		Standard model		Protected type model		Standard model		Protected type model	
	DK10NR5	DK10PR5	DK10PLR5	DK25NR5	DK25PR5	DK25NLR5	DK25PLR5	DK50NR5	DK50PR5	DK100NR5	DK100PR5	
Measuring range	10 mm				25 mm				50 mm		100 mm	
Maximum resolution	0.5 μm				2 μm p-p				4 μm			
Accuracy(At 20°C)	2 μm p-p				4 μm				4 μm			
Measuring force	Upward: 0.3±0.25N Horizontal: 0.6±0.3N Downward: 0.8±0.35N	4.9 N or less		Upward: 0.4±0.3N Horizontal: 0.7±0.35N Downward: 1±0.4N	4.9 N or less		Upward: 0.4±0.3N Horizontal: 0.7±0.35N Downward: 1±0.4N	4.9 N or less		Upward: - Horizontal: 1.8±0.65N Downward: 2.7±0.55N	9.3 N or less	
Maximum response speed	250 m/min											
Reference point	Position at the spindle movement of 1mm											
Reference point response speed	Same as the noted maximum response speed											
Output	A/B/Reference point Voltage-differential line driver output(conforming to EIA-422)											
Spindle drive system	Spring push											
Protection grade <sup>1</sup>	IP50	IP64	IP50	IP64	IP50	IP64	IP50	IP64	IP50	IP64	IP50	IP64
Vibration resistance	150 m/s <sup>2</sup> (10~2000 Hz)											
Impact resistance	1500 m/s <sup>2</sup> (11 ms )											
Operating temperature	0~+50 °C											
Storage temperature	-20~+60 °C											
Power Supply	DC 5 V±5 %											
Power consumption	1 W											
Mass <sup>2</sup>	Approx. 230g			Approx. 300g			Approx. 360g			Approx. 630g		
Output cable length	2.5 m											
Feeler	Carbide ball tip, Mounting screw M2.5											
Accessories	Instruction manual +P M4x5 screw(2pc)											

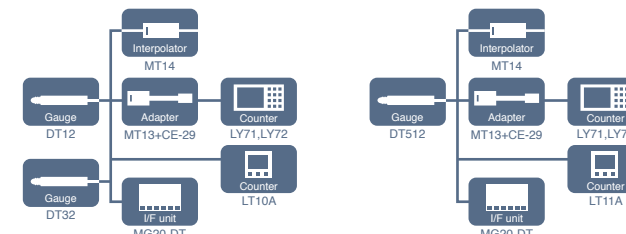
\*1 Excluding interpolation box and connector \*2 Excluding cable section and interpolation box \*Magnescale reserves the right to change product specifications without prior notice.

## DK155/205

Model	DK155PR5		DK205PR5	
	Measuring range	155 mm		205 mm
Maximum resolution	0.5 μm			
Accuracy(At 20°C)	5 μm p-p		6 μm p-p	
Maximum response speed	250 m/min			
Reference point	Position at the spindle movement of 5mm			
Reference point response speed	Same as noted maximum response speed			
Output	A/B/Reference point Voltage-differential line driver output(conforming to EIA-422)			
Spindle drive system	None			
Protection grade <sup>1</sup>	IP64			
Vibration resistance	150 m/s <sup>2</sup> (10~2000 Hz)			
Impact resistance	1500 m/s <sup>2</sup> (11 ms )			
Operating temperature	0~+50 °C			
Storage temperature	-20~+60 °C			
Power Supply	DC 5 V±5 %			
Power consumption	1 W			
Mass <sup>2</sup>	Approx. 1100g		Approx. 1300g	
Output cable length	2.5 m			
Feeler	DZ-181			
Surface to be measured	Soft magnetic material			
Magnetically attachable feeler	Magnetic attraction: 10N, Resistance against horizontal slip: 2.7N			
Spindle <sup>3</sup>	φ8 mm, radial swing: 0.04mm max			
Accessories	Instruction manual +P M4 x 5 screw(2pc)			

\*1 Excluding the interpolation box and connector \*2 Excluding cable section and interpolation box \*3 The spindle weighs about 400g. \*Magnescale reserves the right to change product specifications without prior notice.

# DT series



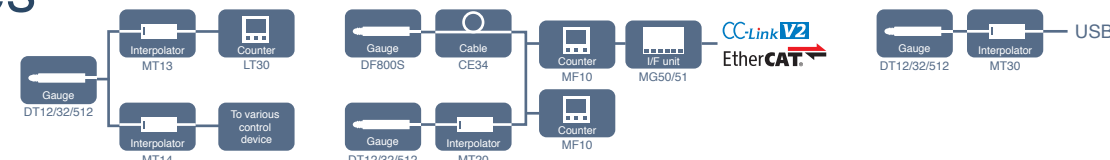
## DT12/32/512

Model	Standard model		Protected type model		Standard model		Protected type model		Standard model		Protected type model	
	DT512N	DT512P	DT12N	DT12P	DT32N	DT32NV	DT32P	DT32PV				
Measuring range	12 mm				32 mm				32 mm			
Maximum resolution	1 μm				5 μm				5 μm			
Accuracy(At 20°C)	6 μm p-p				10 μm p-p				10 μm p-p			
Measuring force	Upward: 0.7±0.5N Horizontal: 0.8±0.5N Downward: 0.9±0.5N	1.7N or less in all direction		Upward: 0.7±0.5N Horizontal: 0.8±0.5N Downward: 0.9±0.5N	1.7N or less in all direction		*1 Upward: 1.1±0.8N Horizontal: 1.3±0.8N Downward: 1.5±0.8N		2.9N or less in all direction		9N or less in all direction*2	
Maximum response speed	Depending on unit to be connected											
Reference point	None											
Spindle drive system	Spring push				Air driving (Pneumatic push)				Spring push		Air driving (Pneumatic push)	
Protection grade	—		IP64 or equivalent <sup>1</sup>		—		IP64 or equivalent <sup>1</sup>		—		IP64 or equivalent <sup>3</sup>	
Operating temperature	0~+50 °C											
Storage temperature	-10~+60 °C											
Mass	Approx. 75g <sup>2</sup>	Approx. 80g <sup>2</sup>	Approx. 75g <sup>2</sup>	Approx. 80g <sup>2</sup>	Approx. 120g <sup>4</sup>	Approx. 140g <sup>4</sup>	Approx. 120g <sup>4</sup>	Approx. 140g <sup>4</sup>	Approx. 120g <sup>4</sup>	Approx. 140g <sup>4</sup>	Approx. 120g <sup>4</sup>	Approx. 140g <sup>4</sup>
Output cable length	2 m											
Feeler	Steel ball tip, Mounting screw M2.5											
Accessories	Instruction manual											

\*1 At input air pressure of 1.96 x 10<sup>5</sup> Pa with speed controller open(DT32NV) \*2 At input air pressure of 2.35 x 10<sup>5</sup> Pa with speed controller open \*3 Excluding the connector \*4 Excluding cable section

\*Magnescale reserves the right to change product specifications without prior notice.

# MT series



## MT13/14

Model	MT13-01		MT13-05		MT13-10		MT14-01		MT14-05		MT14-10	
	Compatible measuring units	DT512/DT12/DT32										
Maximum response speed	100 m/min											
Resolution	1 μm		5 μm		10 μm		1 μm		5 μm		10 μm	
Power voltage	DC5 V ±4 %											
Power consumption	1.2 W (When output load of 120Ω is connected)											
Output format	A/B Voltage-differential line driver											
Operating temperature and humidity range	0~+50 °C (No condensation)											
Storage temperature and humidity range	-10~+60 °C (20 to 90 %RH)											
Mass	Approx. 90g											

\*Magnescale reserves the right to change product specifications without prior notice.

## MT20

Model	MT20-01		MT20-05	
	Compatible measuring units	DT512 series		DT12/DT32 series
Maximum response speed	150 m/min			
Resolution	1 μm		5 μm	
Power voltage	DC+10~+30V			
Power consumption	1.2 W or less			
Operating temperature and humidity range	0~+50 °C (No condensation)			
Storage temperature and humidity range	-10~+60 °C (90%RH or less)			
Mass	Approx. 50 g			

\*Magnescale reserves the right to change product specifications without prior notice.

## MT30

Model	MT30-01		MT30-05	
	Compatible measuring units	DT512 series		DT12/DT32 series
Maximum response speed	150 m/min			
Resolution	1 μm		5 μm	
Power voltage	DC5V ±5 %			
Power consumption	120mA Max			
Operating temperature and humidity range	0~+50 °C (No condensation)			
Storage temperature and humidity range	-10~+60 °C (90%RH or less)			
Mass	Approx. 50 g			

\*Magnescale reserves the right to change product specifications without prior notice.

# Interface unit

**MG70** Interface  
 ▲ MG70-EI : EtherNet/IP  
 ▲ MG70-PN : PROFINET RT

## Compatible with DK series

Model	Main module		Counter module
	MG70-EI	MG70-PN	MG71-CM
Communication	EtherNet/IP	PROFINET RT	Data transferred to main module by dedicated protocol
Data transfer speed	10 / 100 Mbps	100 Mbps	-
Node address setting method	Set with hexadecimal rotary switch	Set with hexadecimal rotary switch	-
Node address range	DxDD-DxFF		-
Maximum connectable measuring unit	Counter module	85 units <sup>*1</sup>	-
	Measuring unit	-	1 units
Cable length (Communication distance)	Segment length: Max. 100m between two station		-
Mounting method	35mm DIN rail mounting		-
Power supply voltage	DC24 V (DC20.4-28.8 V)		-
Power consumption	2W or less	2.5W or less	1.01W or less
Operating temperature and humidity range	Horizontal use: -25~+60°C Vertical use: -25~+50°C		-
Storage temperature and humidity range	-40~+85°C		-
Mass	Approx. 150g		Approx. 80g

\*1 This is the maximum number of connections when supplying power by one power supply module. Maximum of 250 units of MG71-CM can be connected by adding power supply modules.

\*Magnescale reserves the right to change product specifications without prior notice.

**MG50** Interface  
 ▲ MG50-EC : EtherCAT  
 ▲ MG50-CL : CC-Link (Compatible with iQSS)

## Compatible with DF/DT series

Model	Main module		Distribution module
	MG50-EC	MG50-CL	MG51
Communication	EtherCAT	CC-Link (Compatible with iQSS)	Data transferred to main module by dedicated protocol
Data transfer speed	100 Mbps	Maximu downlink speed of 10Mbps	-
Node address setting method	Set with decimal rotary switches or software	Set with decimal rotary switches	-
Node address range	000-192	Max. 64	-
Maximum connectable measuring unit	Counter module	30 units	10 units
	Distribution module	8 units	-
Cable length	Maximum cable length between main module and distribution module: 30m		
Mounting method	35mm DIN rail mounting		
Power supply voltage	DC24 V (DC20.4 ~26.4 V)		
Power consumption / Consumption current	2.4 W or less 100 mA or less (DC24V)		2W or less 80 mA or less (DC24V)
Operating temperature and humidity range	1-2 units are installed side by side: 0~+55°C 11-16 units are installed side by side: 0~+45°C	3-10 units are installed side by side: 0~+50°C 17-30 units are installed side by side: 0~+40°C 25-85%RH (No condensation or icing)	1-2 units are installed side by side: 0~+55°C 3-10 units are installed side by side: 0~+50°C 11-16 units are installed side by side: 0~+45°C 25-85%RH (No condensation or icing)
Storage temperature and humidity range	-30~+60°C 25-85%RH (No condensation or icing)		-30~+70°C 25-85%RH (No condensation or icing)
Mass	Approx. 95g		Approx. 40 g

\*Magnescale reserves the right to change product specifications without prior notice.

**MG40** Interface  
 ▲ MG41-NC : CC-Link/Ethernet  
 ▲ MG41-NE : Ethernet

## Compatible with DK series

Model	Main unit		Hub unit
	MG41-NC	MG41-NE	MG42-4
Communication	CC-Link / Ethernet		Ethernet
Maximum connectable measuring unit	Measuring unit (Entire system)	100 unit(Connection of 101th unit and later disabled)	
	Measuring unit (Each unit)	4 units	
	Hub unit	24 units	
Cable length	Total cable length between main unit and hub unit: 0.5 / 1 / 2 / 5 / 10 m (Connection cable MZ41(Optional)) Total cable length between the hub units: 0.5 / 1 / 2 / 5 / 10 m (Connection cable MZ41(Optional)) Total cable length from Main units: Max. 30m (Max. current: 4A or less)		
Output resolution <sup>*1</sup>	Input resolution <sup>*2</sup> at resolution of 0.1µm	0.1 / 0.5 / 1 / 5 / 10 µm	
	Input resolution <sup>*2</sup> at resolution of 0.5µm	0.5 / 1 / 5 / 10 µm	
Measuring unit data capture ability (Communication 10Mbps)	Maximum 10000 data/sec (When 100 axes are connected) <sup>*3</sup>		
Output data	Single axis	Recalculation of peak value is started by start function	
	At addition and subtraction	Current, maximum, minimum, and peak-to peak values for each axis	
Function	Comparator, Reset, Preset, Datum points setting function <sup>*4</sup> , Reference point <sup>*4</sup> , Master calibration <sup>*5</sup> , Measuring unit product information, Command setting		
Mounting method	35mm DIN rail mounting		
Power supply voltage (Terminal board)	DC12-24 V (DC11-26.4 V) <sup>*6</sup>		
Power consumption	System total (Max. current 4A) <sup>*7</sup>		
Operating temperature and humidity range	0~+50°C (No condensation)		
Storage temperature and humidity range	-10~+60°C (20-90 %RH)		
Mass	300 g		250 g

\*1 Settable output data resolution and display resolution. \*2 Measuring units resolution. \*3 The data for one axis is counted as one data. \*4 When master calibration function is not used

\*5 Addition / subtraction axis is not possible \*6 Use a power supply with a current that is 4 A or higher for every six MG42 hub units

\*7 When the maximum current is exceeded, the connection can be enabled by providing a power supply to the MG42 hub units that come later in the connection.

\*Magnescale reserves the right to change product specifications without prior notice.

**MG10/20/30** Interface  
 ▲ MG10-P1 : RS-232C(Conforming to EIA-232C)  
 ▲ MG10-P2 : RS-232C(Conforming to EIA-232C)

## Compatible with DK/DT Series

### Main module specifications

Model	MG10-P1	MG10-P2
Power source	Power supply	DC12-24 V (11-26.4 V) Start up time: 100ms or less
	Power consumption	2.0W + total power consumption for connected modules <sup>*1</sup>
	Inrush current(10 ms)	10A or less (When the maximum number of modules are connected)
Communication	Power supply protection	Fuses (5-A fuses is built in)
	Communication I/F	RS-232C (EIA-232C or equivalent)
	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 number of linking cable	10m
I/O	Input format	Source input(+COM) Sink input(-COM)
	Output format	Open collector output sink type(-COM) Source input(+COM)
	Input signal	Reset, Pause, Start, Latching, and Data out trigger to whole channel
	Output signal	Intergrated alarm
	Connectable modules	Counter modules MG20-DK, MG20-DG, MG20-DT (Available for mixed use, up to 16 modules) <sup>*1</sup> Interface modules MG30- B1, MG30-B2 <sup>*1</sup>

\*1 Total power of modules connected to MG10 should not be over 54W(at 12 VDC input) or 108W(at 24 VDC input)

\*Magnescale reserves the right to change product specifications without prior notice.

### Counter module specifications

Model	MG20-DK	MG20-DT
Power consumption	1W + power consumption for connected measuring unit	0.8 W
Measuring unit input	Corresponding mesuring unit	DK Series (Voltage differential A/B quadrature input)
	Allowable resolution setting <sup>*2</sup>	10/5/1/0.5/0.1 µm set with DIP switch
	Maximum response speed	Subject to the specification of connected measuring unit
	Maximum response accelration	Subject to the specification of connected measuring unit
	Reference point	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 reset command from MG10 or with the reset button of main unit

\*2 Set the resolution value of the connected mesuring unit

\*Magnescale reserves the right to change product specifications without prior notice.

### Interface module specifications

Model	MG30-B1	MG30-B2
Power consumption	1W	
I/O	Input format	Source input(+COM) Counterpart output circuit : Current sink input(-COM) Current sink input(-COM) Counterpart output circuit: Source type(+COM)
	Output format	Open collector output sink type(-COM) Source type(+COM) Source type(+COM) Counterpart output circuit(+COM): Source type(-COM)
	Input signal	DRQ, channel address, Measuring mode shifting, Comparator shifting, Reset, Start, Pause, Reference-point loaded
	Output signal	BCD data(6 digits) READY GO/No-go output Alarm referene point
Output setting	Timer(1 to 128ms) OUT/OR Polarity (Set with internal DIP switch)	

All models	Operation temperature and humidity range	0~+50 °C (No condensation)
	Storage temperature and humidity range	-10~+60 °C (20-90%RH)

\*Magnescale reserves the right to change product specifications without prior notice.

# MF10

Digital tolerance indicator / Counter module

Model	Digital tolerance indicator		Counter module
	MF10-P1	MF10-P2	MF10-CM
Function	NPN output (current sink)	PNP output (current source)	Counter module for MG50
I/O	Number of Go/No Go judgement output 2, Number of external inputs 1		-
Minimum display unit	0.1µm		-
Cable length	input/output, power cable 2m		-
Power supply	+10~30V DC including ripple (p-p) 10%		
Power supply voltage / Power consumption	2.1W or less / 85A or less (DC24V)		
Operating temperature and humidity range	When lining up 1 or 2 digital tolerance indicators: 0°C to +55°C 35% to 85% RH (with no condensation)		1 to 2 amplifiers connected : 0~55°C 3 to 10 amplifiers connected : 0~50°C 11 to 16 amplifiers connected : 0~45°C 17 to 30 amplifiers connected : 0~40°C 35~85%RH(No condensation)
Storage temperature and humidity range	-10°C ~ +60°C (with no icing or condensation)		
Mass	Approx. 75g		

\*Magnescale reserves the right to change product specifications without prior notice.

# LT30

For DK, DK-S

Model	LT30-1G	LT30-1GB	LT30-1GC	LT30-2G	LT30-2GB	LT30-2GC
Number of input axes	1 axis			2 axes		
Input resolution	0.1 / 0.5 / 1 / 5 / 10 µm (parameter setting for each axis)					
Number of display axes	1 axis			2 axes		
Display data	Current, max., min., peak-to-peak values (=max. value - min. value)			current, max., min., peak-to-peak values (=max. value - min. value), additional/subtraction value		
Direction	Switchable					
Alarm display	Alarm display, Addition and subtraction function (Except LT30-1**), Peak hold function, Restart, Hold (latch and pause), Comparator, Reset, Preset, Master calibration, Reference point, Key lock					
Input/output	I/O connector	○	○	○	○	○
	BCD output	-	○	-	-	○
	RS-232C	-	-	○	-	○
	RS-TRG	-	-	○	-	○
	Comparator judgement	○	○	○	○	○
Power supply	DC10.8~26.4 V					
Power consumption	5 W	5.5 W	5 W	8.5 W	9 W	8.5 W
Operating temperature and humidity range	0~+40°C					
Storage temperature and humidity range	-10~+50°C					
Mass	Approx. 200 g	Approx. 230 g	Approx. 220 g	Approx. 210 g	Approx. 270 g	Approx. 230 g

\*Magnescale reserves the right to change product specifications without prior notice.

# LT11A/LT10A

For DK, DK-S

Model	LT10A-105/LT11A-101	LT10A-105B/LT11A-101B	LT10A-105C/LT11A-101C	LT10A-205/LT11A-201	LT10A-205B/LT11A-201B	LT10A-205C/LT11A-201C
Number of input axes	1 axis			2 axes		
Input resolution	1 / 5 / 10 µm (parameter setting for each axis) (1µm resolution is available only for 11A)					
Number of display axes	1 axis			2 axes		
Display data	Current, max., min., peak-to-peak values (=max. value - min. value)			Current, max., min., peak-to-peak values (=max. value - min. value), additional/subtraction value		
Direction	Switchable					
Function	Alarm display, Addition and subtraction function (Except LT10A-105* and LT11A-101), peak hold function, restart, hold(latch and pause), comparator, reset, preset, master calibration, reference point, key lock					
Input/output	I/O connector	○	○	○	○	○
	BCD	-	○	-	-	○
	RS-232C	-	-	○	-	○
	RS-TRG	-	-	○	-	○
	Comparator judgement	○	○	○	○	○
Power supply	DC9~26.4 V					
Power consumption	1.8 W	2.9 W	2.0 W	2.3 W	4.0 W	2.5 W
Operating temperature and humidity range	0~+40°C					
Storage temperature and humidity range	-10~+50°C					
Mass	Approx. 200 g	Approx. 230 g	Approx. 220 g	Approx. 210 g	Approx. 270 g	Approx. 230 g

\*Magnescale reserves the right to change product specifications without prior notice.

# LY71/LY72

Compatible with DK series

\*Compatible with GB-ER series(Magnescale), PL20 series(Digiruler)

Model	LY71	LY72 <sup>1</sup>	
		When axis label A, B, and C are selected	When axis label X, Y, and Z are selected
Number of input axis	1 axis or 2 axes(by parameter setting)	1 axis, 2 axes, or 3 axes(by parameter setting)	
Input resolution	Linear standard : 0.1 / 0.5 / 1 / 5 / 10 µm (Expanded linear: 0.05/2/20/25/50/100 µm) Angle : 1 s / 10 s / 1 min / 10 min (Expanded angle : 1 degree)		
Number of display axes	3 axes(Axes A, B and C) <sup>1</sup>	3 axes(Axes A, B and C)	3 axes (Axes X, Y and Z)
Display data	Current, max., min., and peak-to-peak values (=max. value - min. value) of each axis or current, max., min., and peak-to-peak values(=max. value - min. value) of 2 axis addition and subtraction <sup>2</sup>	Current, max., min., and peak-to-peak values (=max. value - min. value) of each axis	Current value of each axis
Direction	Switchable		
Function	Alarm display, addition and subtraction <sup>3</sup> , peak hold, restart, hold(latch and pause), comparator <sup>5</sup> , positining, reset, preset, master calibration, Datum point/reference point, keylock, data storage, scaling, linear compensation	Alarm display, peak hold(When using axes A, B and C), restart(When using axes A, B and C), hold(latch and pause), reset, preset, master calibration(When using axes A, B and C), Datum point/reference point, keylock, data storage, scaling, linear compensation	Alarm display, hold(latch and pause), reset, preset datum point/reference point, keylock, data storage, scaling linear compensation
Input/Output	BCD output <sup>4</sup>	○	-
	RS-232C	-	○
	Comparator judgement function <sup>5</sup>	○	-
Power supply	Optional PSC-21/22/23 adapter is used		
Power consumption	32 VA max.(When optional AC adapter is used)		
Operating temperature and humidity range	0~+40°C(No condensation)		
Storage temperature and humidity range	-20~+60°C(No condensation)		
Mass	Approx. 1.5 kg		

<sup>1</sup> LY72 can select whether to use ABC or XYZ in the axis label lamp on the left side of counter display.

ABC is mainly used when using measurement unit. XYZ is mainly used when using scale measurement unit.

<sup>2</sup> Available only 1 axis (A axis display) when LZ71-KR is used. Only comparator display when showing B-axis and C-axis.

<sup>3</sup> Addition / subtraction display is not available when using two LZ71-B.

<sup>4</sup> Available only when LZ71-B is used

<sup>5</sup> Available only when LZ71-KR is used

\*Magnescale reserves the right to change product specifications without prior notice.

## LZ71-B

Model	LZ71-B
BCD output	7-digit parallel data (4 bits x7 digits) Sign (1bit) READY signal (1bit)
Output logic	Positive and negative logic can be selected individually for data and sign READY signal: Negative logic
Electrical specifications	Photocoupler output V <sub>CE</sub> : Recommended DC+12-24V I <sub>c</sub> : Maximum 15mA /terminal;TOTAL:300mA Output connector: 36 pin micro-ribbon connector
Output data at power ON and during alarm	Data output and alarm status (all OFF) can be selected (Via initial settings)
Output data	Current (1st-axis, 2nd-axis, addition axis), max., min., and peak-to-peak values
Latch	Selectable from BCD-only latch and BCD and display latch
Input signal	DRQ1-3 (Photocoupler:12-24V)
Output selection	3 DRQ input signals: DRQ 1-3; output data is assigned via settings. Ex.) DRQ1: Current value; DRQ2: Maximum value; DRQ3: Minimum value
Output modes	Constant output: Output irrespective of DRQ; prohibited when refreshing data Latch: BCD data-only latch LATCH: BCD data and display latch Request output: Output with DRQ input only. Otherwise, OFF can be selected
Operating temperature and humidity range	0~+40 °C (with no condensation)
Storage temperature and humidity range	-20~+60 °C (with no condensation)

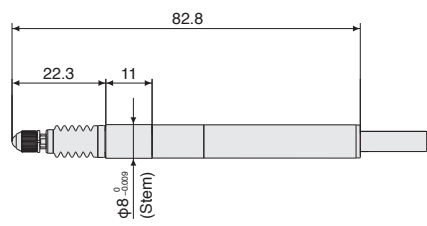
\*Magnescale reserves the right to change product specifications without prior notice.

## LZ71-KR

Model	LZ71-KR
Comparator function	Setting of comparator values 1 = 4 and judgment of magnitude of data
Comparable data	Current, max., min., and peak-to-peak values (Depends on setting)(For 1st-axis or Addition axis)
Combination of upper and lower values	With comparator values 1-4 as one group, data for 16 groups are selectable Selection method: Key operation or external contact input
Output data	5-terminal signal output Photocoupler (Withstand voltage: 24V) I <sub>c</sub> =15mA 5-terminal contact output DC24V AC120V 0.3A
External contacts	Photocoupler: 12-24V
Positioning function (One terminal)	Setting of positioning data, output signal ON for 0.5 sec when set value matches current value
Data to which position can be assigned	Current values only (In relation to 1st axis and additional axes)
Types of position value	Positioning values: With one terminal as one group, data for 16 groups are selectable Selection method: Same as comparator function
Operating temperature and humidity range	0~+40 °C (with no condensation)
Storage temperature and humidity range	-20~+60 °C (with no condensation)

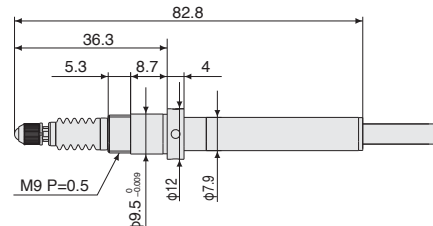
\*Magnescale reserves the right to change product specifications without prior notice.

DK805SAR/DK805SAR5/DK805SBR/DK805SBR5  
DS805SR/DS805SR5  
DF805SR

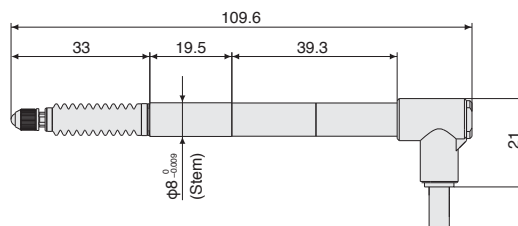


\*Upon installation, clamp the stem

DK805SAFR/DK805SAFR5/DK805SBFR/DK805SBFR5  
DS805SFR/DS805SFR5  
DF805SFR

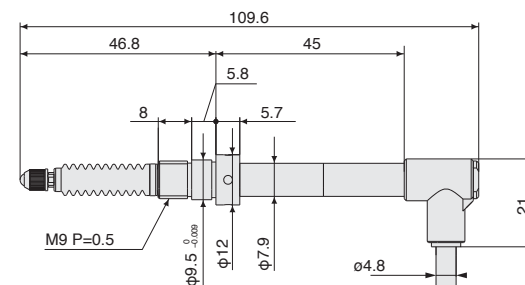


DK812SALR/DK812SALR5/DK812SBLR/DK812SBLR5  
DS812SLR/DS812SLR5  
DF812SLR

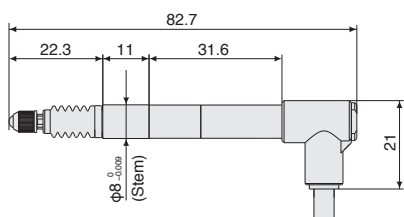


\*Upon installation, clamp the stem

DK812SAFLR/DK812SAFLR5/DK812SBFLR/DK812SBFLR5  
DS812SFLR/DS812SFLR5  
DF812SFLR

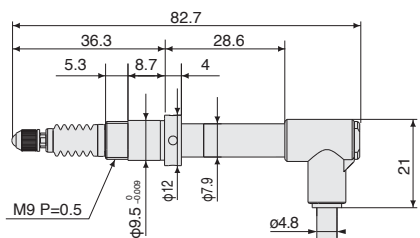


DK805SALR/DK805SALR5/DK805SBLR/DK805SBLR5  
DS805SLR/DS805SLR5  
DF805SLR

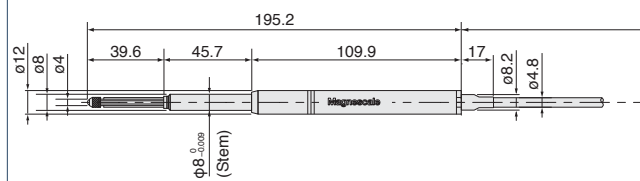


\*Upon installation, clamp the stem

DK805SAFLR/DK805SAFLR5/DK805SBFLR/DK805SBFLR5  
DS805SFLR/DS805SFLR5  
DF805SFLR

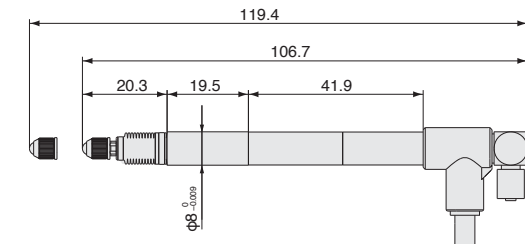


DK830SR



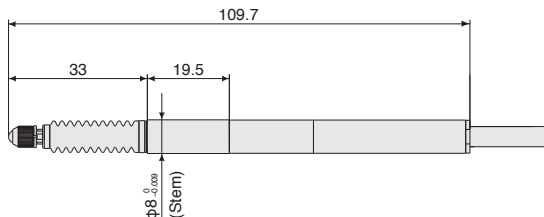
\*Upon installation, clamp the stem

DK812SAVR/DK812SAV5/DK812SBVR/DK812SBV5  
DF812SVR  
(Pneumatic push type)



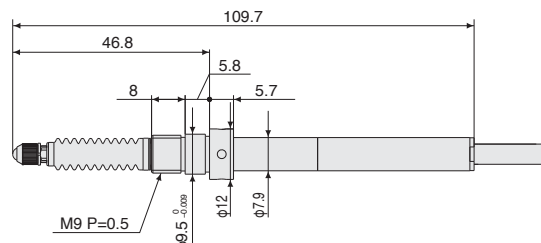
\*Upon installation, clamp the stem

DK812SAR/DK812SAR5/DK812SBR/DK812SBR5  
DS812SR/DS812SR5  
DF812SR

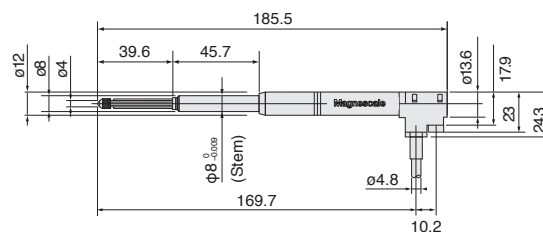


\*Upon installation, clamp the stem

DK812SAFR/DK812SAFR5/DK812SBFR/DK812SBFR5  
DS812SFR/DS812SFR5  
DF812SFR

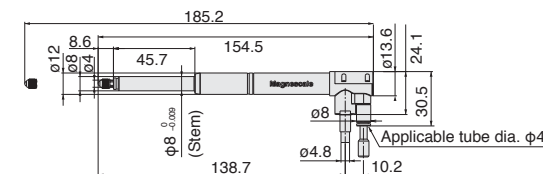


DK830SLR

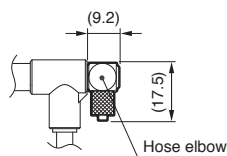


\*Upon installation, clamp the stem

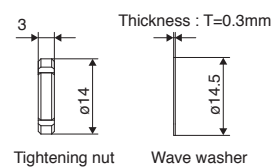
DK830SVR



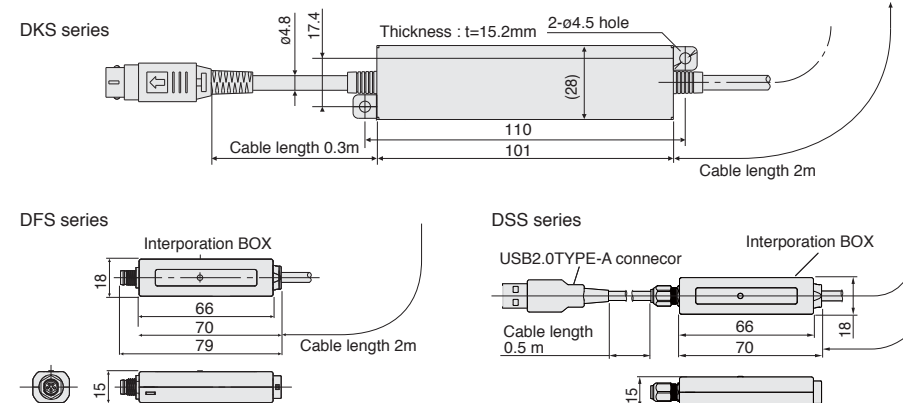
DK/DF/DS 8\*\*S\*L\*\* only

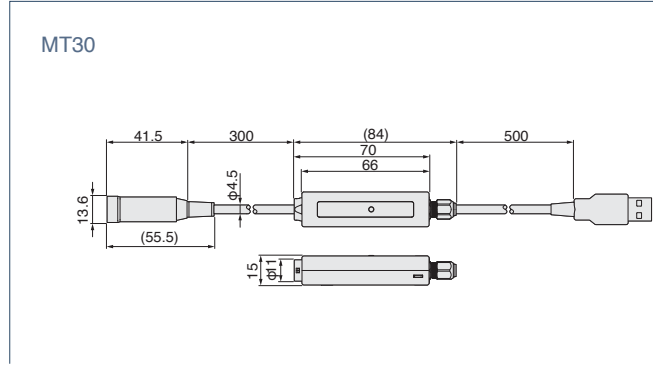
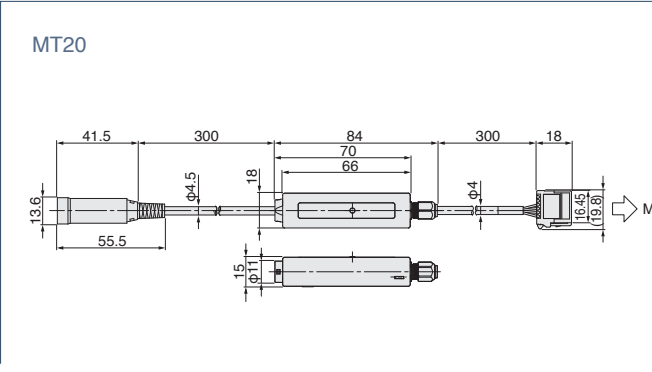
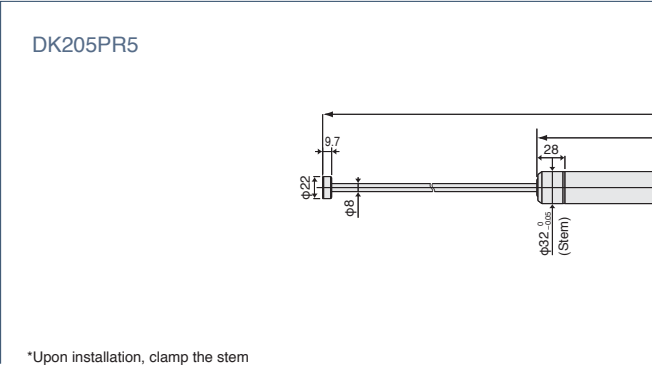
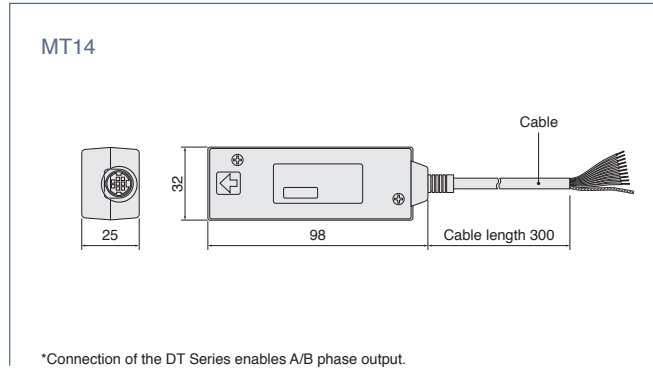
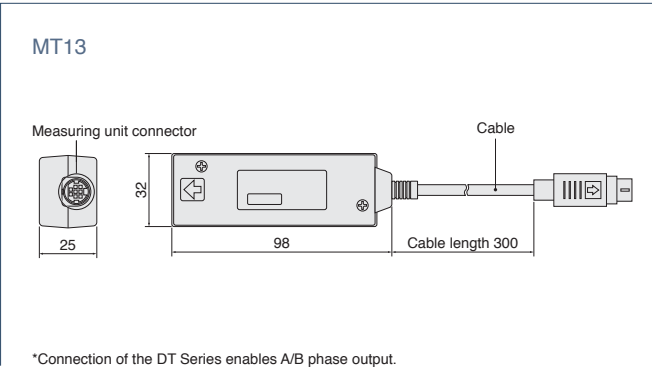
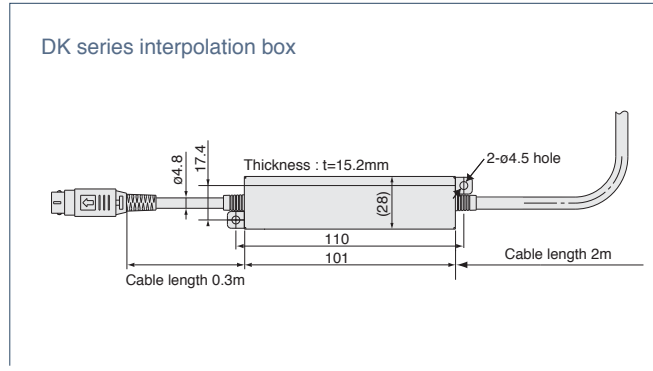
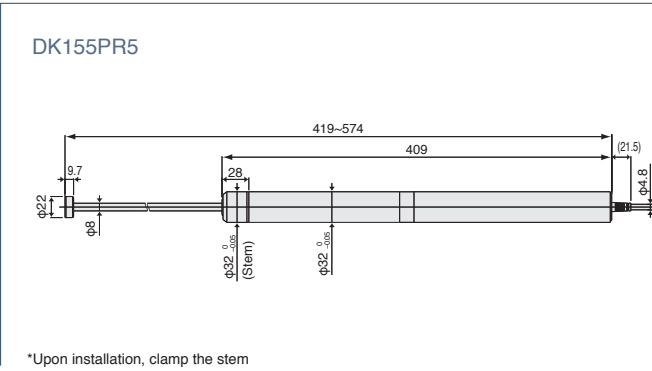
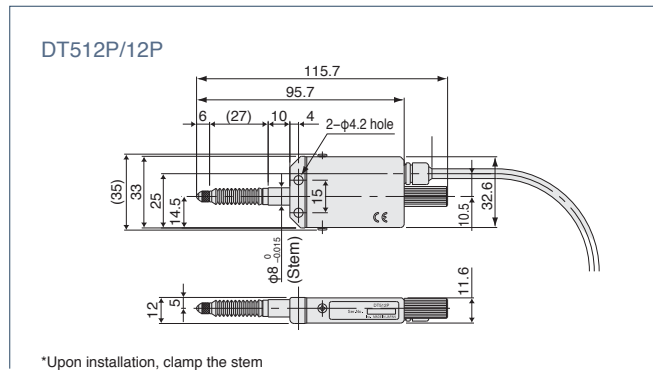
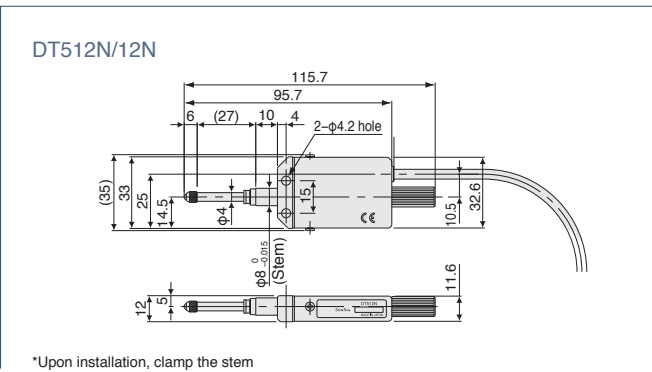
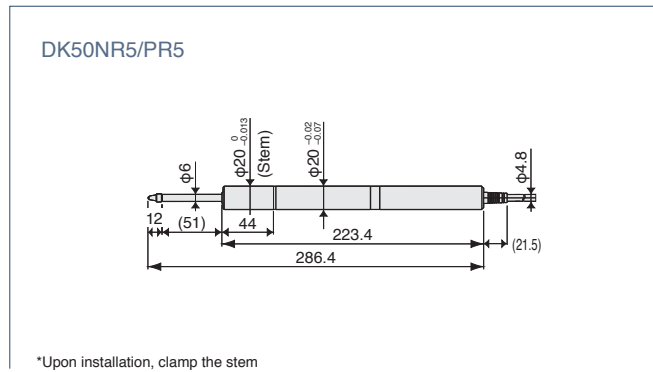
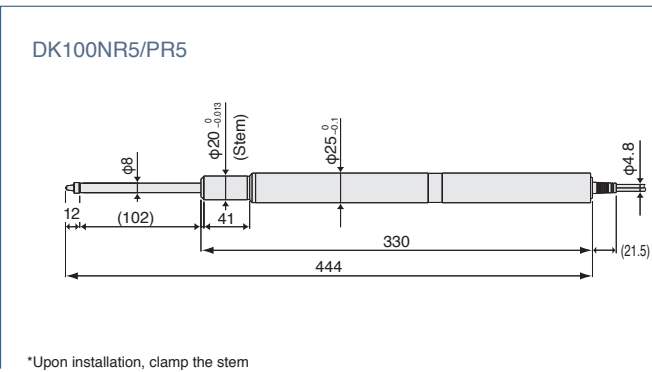
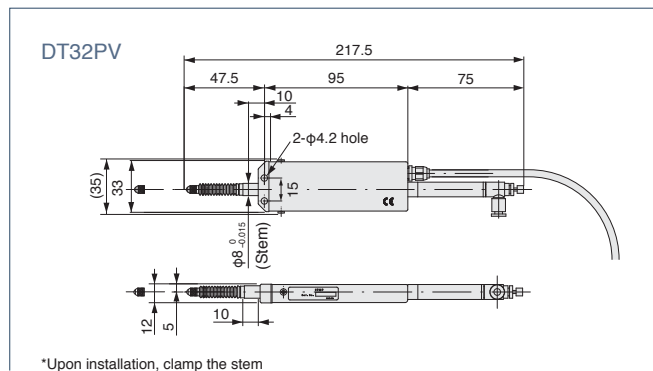
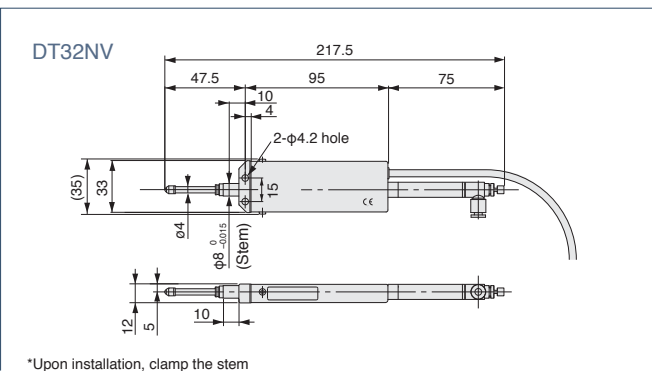
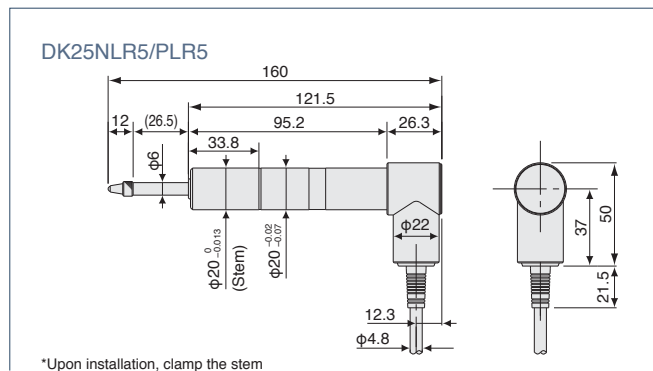
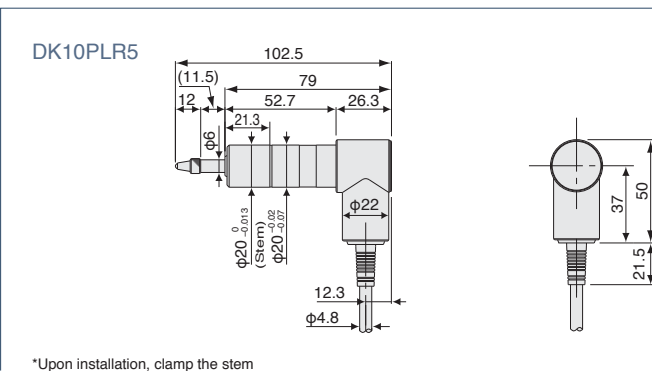
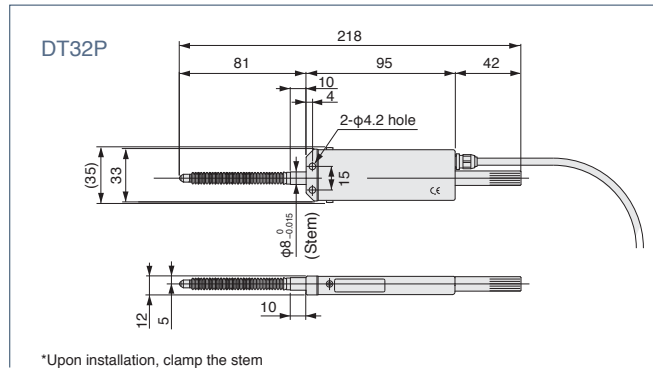
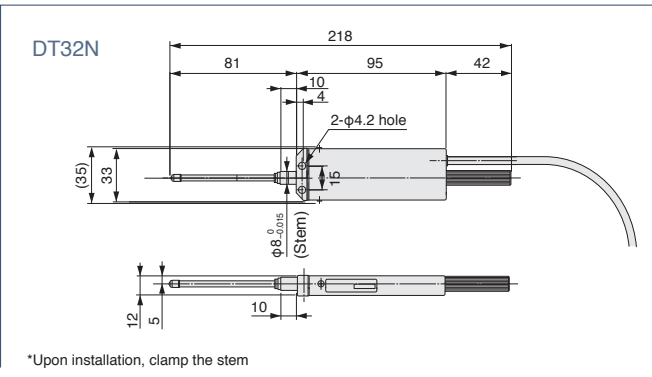
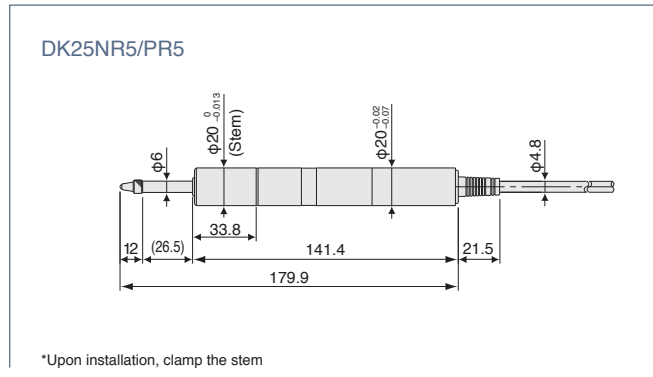
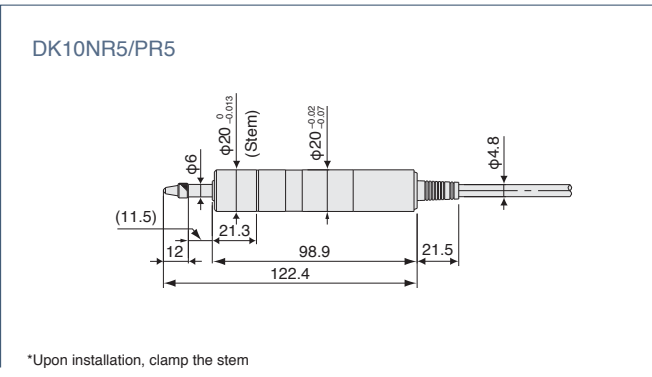


DK/DF/DS 8\*\*S\*F\* only



Interporation box

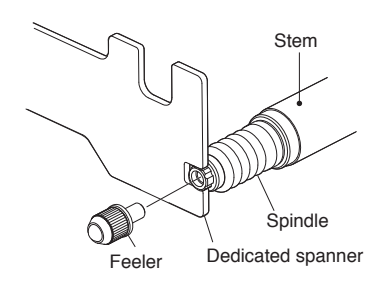




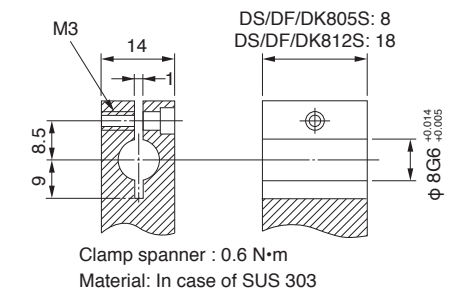
# Installation

## DS805S/812S, DF805S/812S, DK805S/812S installation cautions

Feeler installation/removal method



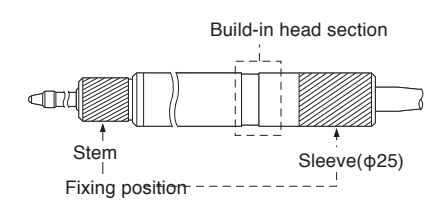
Mounting holder dimensions and tolerance



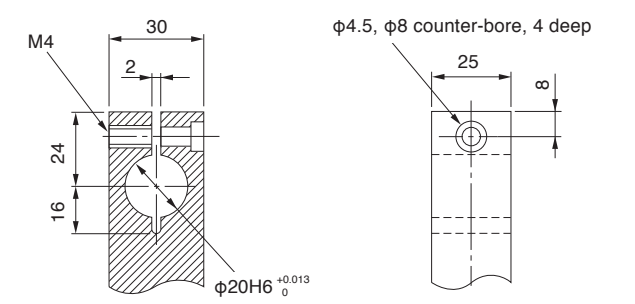
Unit: mm

## DK50/100 installation cautions

Mounting/fixing position



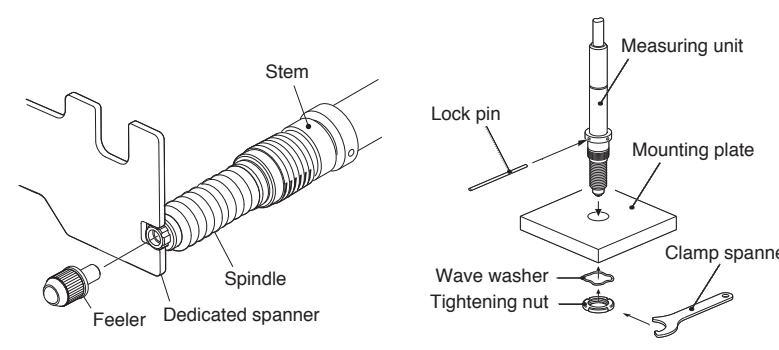
Mounting holder dimensions and tolerance



Unit: mm

## DS805SF/812SF, DF805SF/812SF, DK805SF/812SF installation cautions

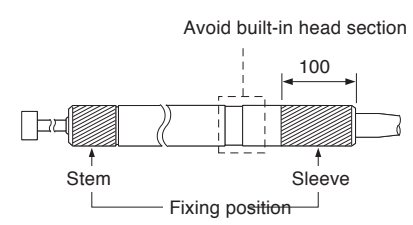
Feeler installation/removal method



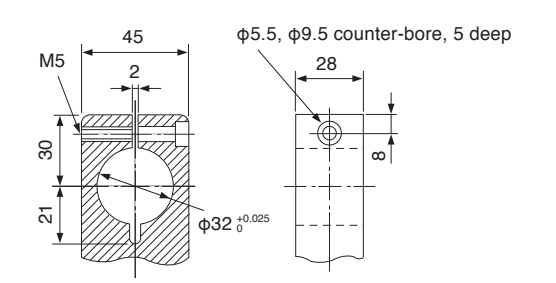
The recommended value of measuring unit mounting hole is  $\phi 9.7 \pm 0.15$ mm  
 The mounting thickness is as follows:  
 DS/DF/DK805SF : 7~11 mm  
 DS/DF/DK812SF : 9~11 mm  
 Mounting parallelism affects measurement accuracy  
 Adjust the squareness to the surface to be measured or parallelism with respect to traveling to 0.02mm/14mm or less

## DK155/DK205 installation cautions

Mounting/fixing position



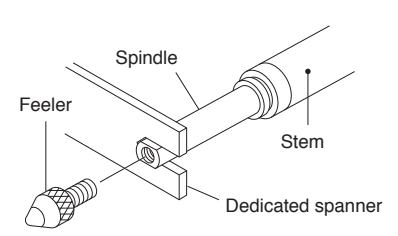
Mounting holder dimensions and tolerance



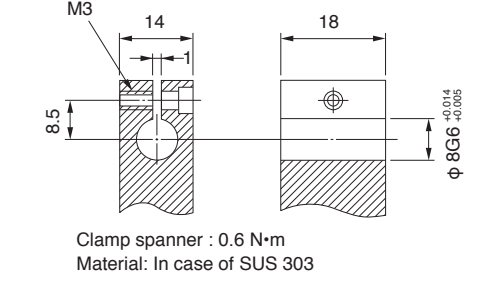
Unit: mm

## DK830 installation cautions

Feeler installation/removal method



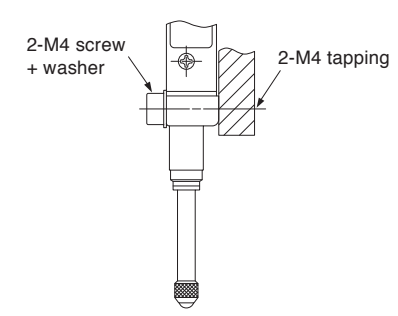
Mounting holder dimensions and tolerance



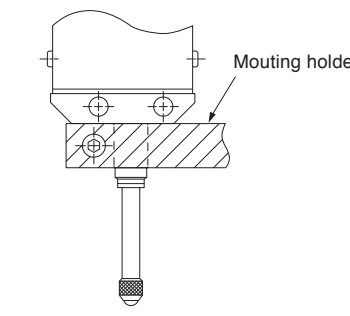
Unit: mm

## DT12/512/32 installation cautions

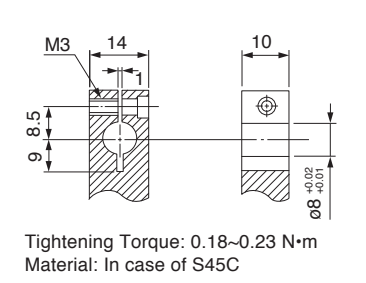
Mounting method using mounting hole



Mounting method using holder



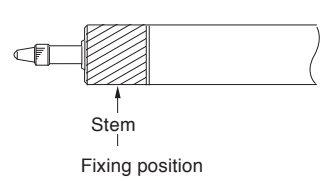
Mounting holder dimension



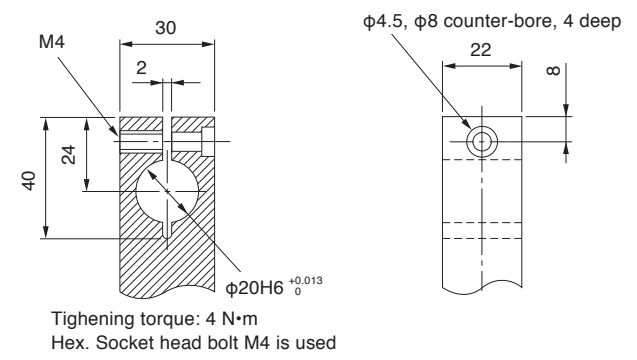
Unit: mm

## DK10/25 installation cautions

Mounting /fixing position

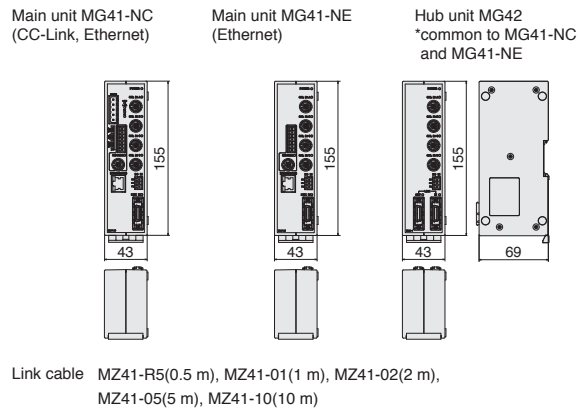


Mounting holder dimensions and tolerance



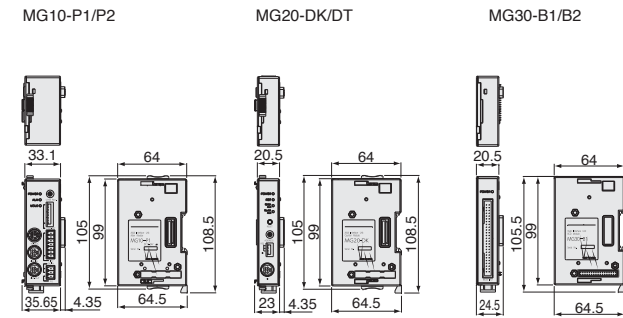
Unit: mm

MG40 Series



Link cable MZ41-R5(0.5 m), MZ41-01(1 m), MZ41-02(2 m), MZ41-05(5 m), MZ41-10(10 m)

MG10/20/30



Mounting of MG10/20/30/41/42 main unit

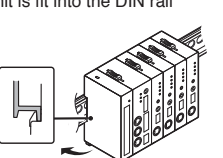
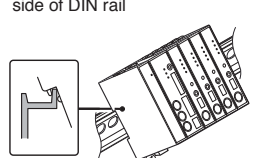
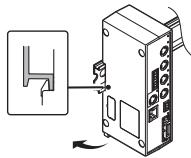
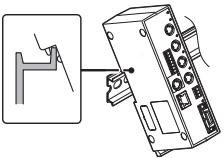
The MG series main unit can be mounted to a DIN rail in an electrical panel. Please note that the DIN rail lock is in the "locked" position from the factory. DIN rail specifications: 35mm

1. Match the upper side of groove on the back of the MG41 main unit with the upper side of DIN rail

2. Push and install the MG41 main unit until a click is heard so that the lower side of groove on the back of the MG41 main unit is fit into the DIN rail.

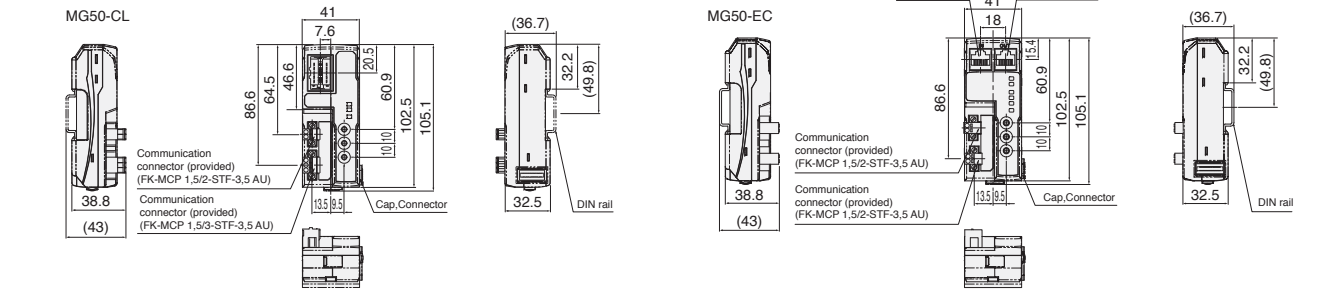
Mounting to DIN rail  
1. Match the upper side of groove on the back of the unit with the upper side of DIN rail

2. Push and install the unit until a click is heard so that the lower side of groove on the back of the unit is fit into the DIN rail



Note: Check that the entire unit is mounted to the DIN rail.

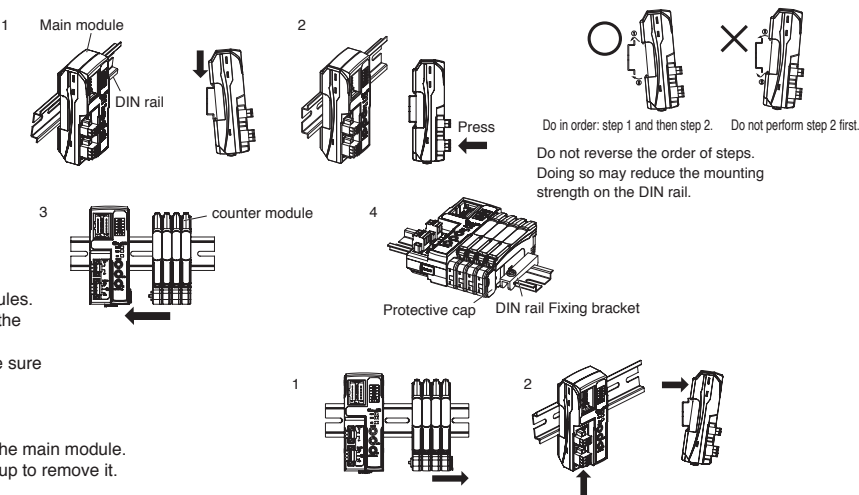
MG50 Series



MG50 installation cautions

Installation

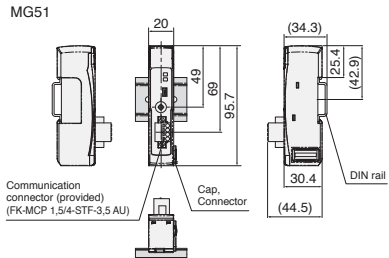
- Place the top part of the module onto the DIN rail.
- Press the bottom part of the module onto the DIN rail.
- Remove the protective cap from the right side of the Main module. Then, slide on the counter module, align the connector with the Main module, and press the modules together until you hear them lock into place.
- Secure the enclosed DIN rail Fixing brackets onto the ends so that there is no space between them and the modules. Finally, attach the protective cap you removed in step 3 to the Counter module on the far right end. After you have completed above procedure, check to make sure that the MG50-\*\* is mounted securely into place.



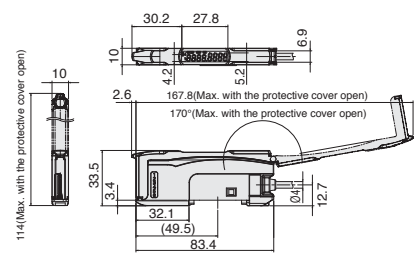
Removal Procedure

- Slide the counter modules apart to separate them from the main module.
- Press in on the Main module toward the DIN rail and lift up to remove it.

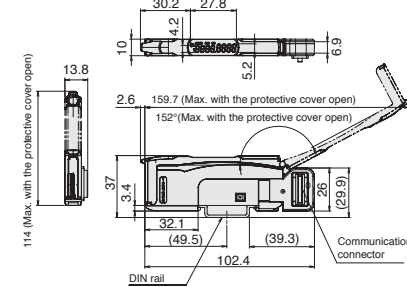
MG51 series



MF10-P1/P2



MF10-CM



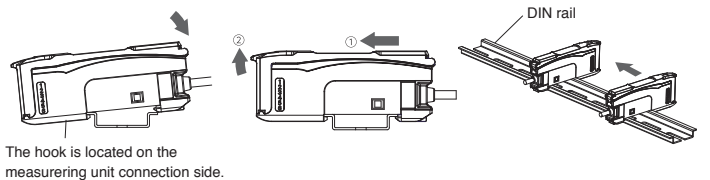
MG10 installation cautions

Mounting on Din rail

- Let the hook on the underside of the indicator catch the DIN rail track.
- Push the module until the hook clicks into place.

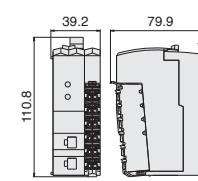
Removal from DIN rail

- Push the module in the direction 1.
- Lift the module in the direction of arrow 2 while performing step (1).

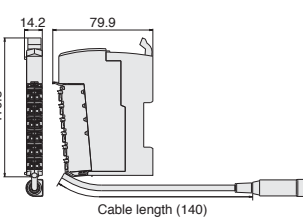


\*Up to 30 digital tolerance indicators can be installed in a row.

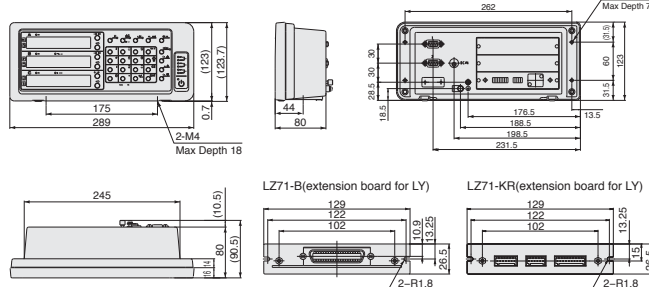
Main module MG70-EI/MG70-PN



Counter module MG71-CM



LY71 series

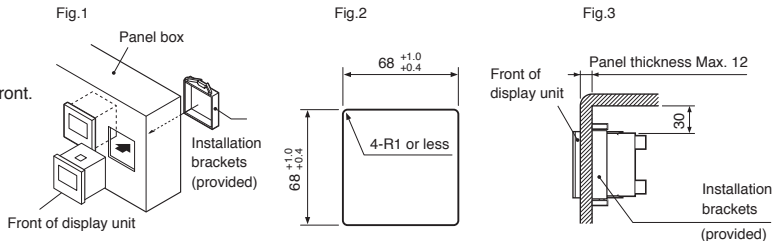


LT10A/11A/30 installation cautions

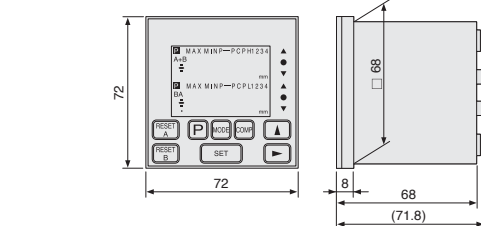
When mounting in a panel

- Cut out an opening to match the dimensions shown (Fig. 2).
- Insert the counter unit into the cut-out opening in the panel from the front.
- Attach the supplied counter stopper from the rear.
- Press in the counter stopper until it touches the panel.

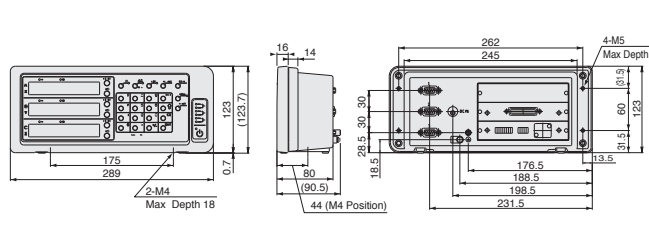
Note: When attaching the counter stopper to the counter unit, leave enough space (min. 30 mm/1,18") between the top and bottom. (Fig. 3)



LT30/LT11A/LT10A series

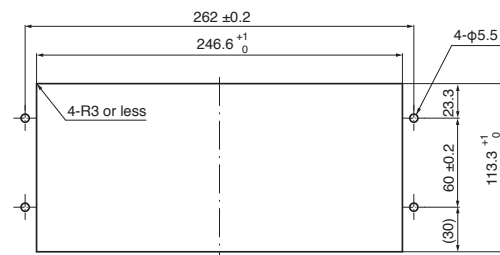


LY72 series



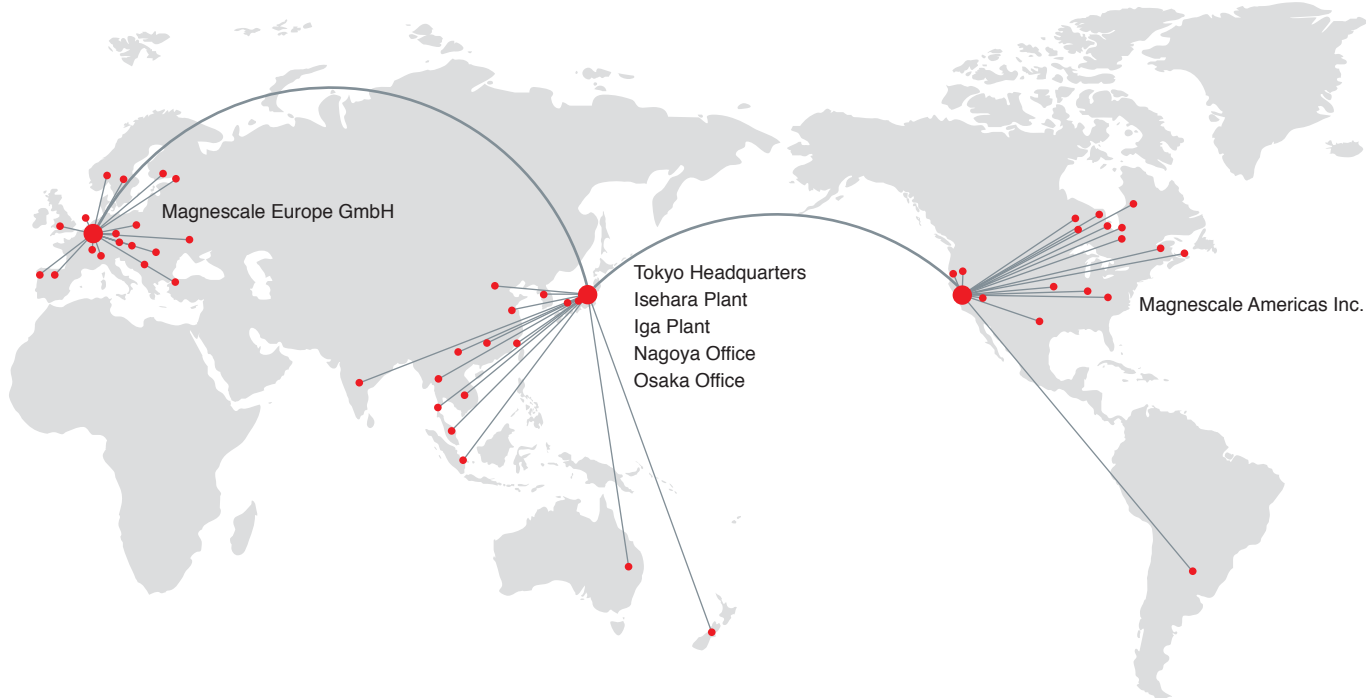
LY71/72 installation cautions

Panel cut-out diagram



Mounting the counter unit from the panel front.

Unit: mm



Offices

Tokyo Headquarters	3-1-4 Edagawa, Koto-ku, Tokyo 135-0051, Japan TEL:03-6632-7920 FAX:03-6632-7921	Tokyo Office	3-1-4 Edagawa, Koto-ku, Tokyo 135-0051, Japan TEL:03-6632-7922 FAX:03-6632-7928
Isehara Plant	45 Suzukawa, Isehara-shi, Kanagawa 259-1146, Japan TEL:0463-92-1011 FAX:0463-92-1012	Nagoya Office	2-35-16, Meieki, Nakamura-ku, Nagoya-shi, Aichi 450-0002, Japan TEL:052-587-1823 FAX:052-587-1848
Iga Plant	201 Midai, Iga-shi, Mie 519-1414, Japan TEL:0595-45-2663 FAX:0595-45-2683	Osaka Office	2-14-6, Nishi-Nakajima, Yodogawa-ku, Osaka-shi, Osaka 532-0011, Japan TEL:06-6305-3101 FAX:06-6304-6586

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Agency 34 countries in the world 82 agencies

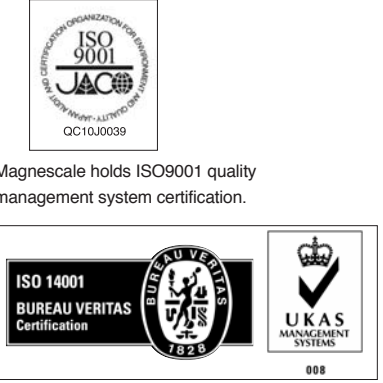
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|---|---|--|
| <p><b>Europe</b></p> <ul style="list-style-type: none"> <li>• Germany</li> <li>• Czech Republic</li> <li>• Finland</li> <li>• Spain</li> <li>• Italy</li> <li>• Norway</li> <li>• Ukraine</li> <li>• Portugal</li> <li>• Romania</li> <li>• United Kingdom</li> <li>• Sweden</li> <li>• Bulgaria</li> <li>• Denmark</li> <li>• France, 2 companies</li> <li>• Hungary</li> <li>• Nederland</li> <li>• Poland</li> <li>• Turkey, 2 companies</li> <li>• Switzerland</li> <li>• Austria, 2 companies</li> </ul> | <p><b>Asia · Oceania</b></p> <ul style="list-style-type: none"> <li>• China, 3 companies</li> <li>• Hong Kong</li> <li>• Taiwan</li> <li>• Korea</li> <li>• Vietnam, 2 companies</li> <li>• Indonesia, 2 companies</li> <li>• Singapore</li> <li>• Australia</li> <li>• Thailand, 2 companies</li> <li>• Malaysia</li> <li>• India, 2 companies</li> <li>• Philippine</li> <li>• New Zealand</li> </ul> | <p><b>America</b></p> <ul style="list-style-type: none"> <li>• America, 33 companies</li> <li>• Mexico, 3 companies</li> <li>• Canada, 3 companies</li> <li>• Argentina</li> </ul> |
|---|---|--|

Magnescale has established a comprehensive support system enabling us to provide superior products. We offer a wide range of sales and servicing support for Magnescale products and technologies throughout Japan.

Deploying a global-standard production system, from quality control to environmental protection, Magnescale is thoroughly committed to delivering high-precision products.



We have established a total quality control system that oversees our processes from design to manufacture, ensuring that we are able to supply products with an unwaveringly high level of safety, quality, and reliability, offering our customers 100% satisfaction. As one example, we obtained certification for length calibration that is compliant with the system of traceability stipulated by Japan's Measurement Act. In addition to this, we have obtained ISO9001 certification, enabling us to create a quality management system that satisfies our customers' needs. We are also responding to the problem of noise, which is a subject of regulation throughout the world, by introducing electromagnetic environment compatibility (EMC) testing equipment of the highest standard, focusing all of our energies on quality management.



Always aware that our products are incorporated in a wide range of devices and used throughout the world, we have obtained certification in CE Marking, UL, and other international standards.

We comply with the following standards:

- CE Marking (EMC Directive) EMI : EN61000-6-4 EMS : EN61000-6-2
- FCC standard FCC Part 15 Subpart B Class A

In the case of products with built-in AC power supplies, we also comply with the following standards:  
● UL61010-1 ● EN61010-1

In the case of products that use lasers, we comply with the following standards:  
● DHHS(21CFR1040.10) ● IEC60825-1

\*When using a device to which IEC Directive EN60204-1 (Safety of machinery) applies, please use the device only after taking steps to comply with the standard.  
\*Depending on the product, applicable standards may differ, or the product may not be certified. Please inquire before purchase if considering export, etc.