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Magnescale

SPEED X PRECISION

Leading Edge Technology
for Leading Edge Manufacturing

Digital Gauge

Digital Gauge General Catalog

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

- ▶ More than 270 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 available 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

<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.

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

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 (2σ)

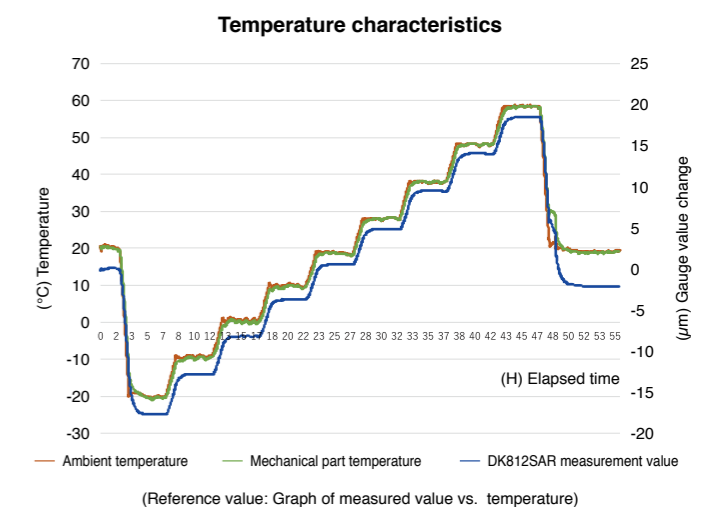
- ▶ Uses a continuous processing circuit
- A quadrature signal (sine/cosine) from the sensor and processing via a proprietary sequential processing circuit fulfills $0.1\mu\text{m}$ resolution and $\pm 0.1\mu\text{m}$ repeatability.

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

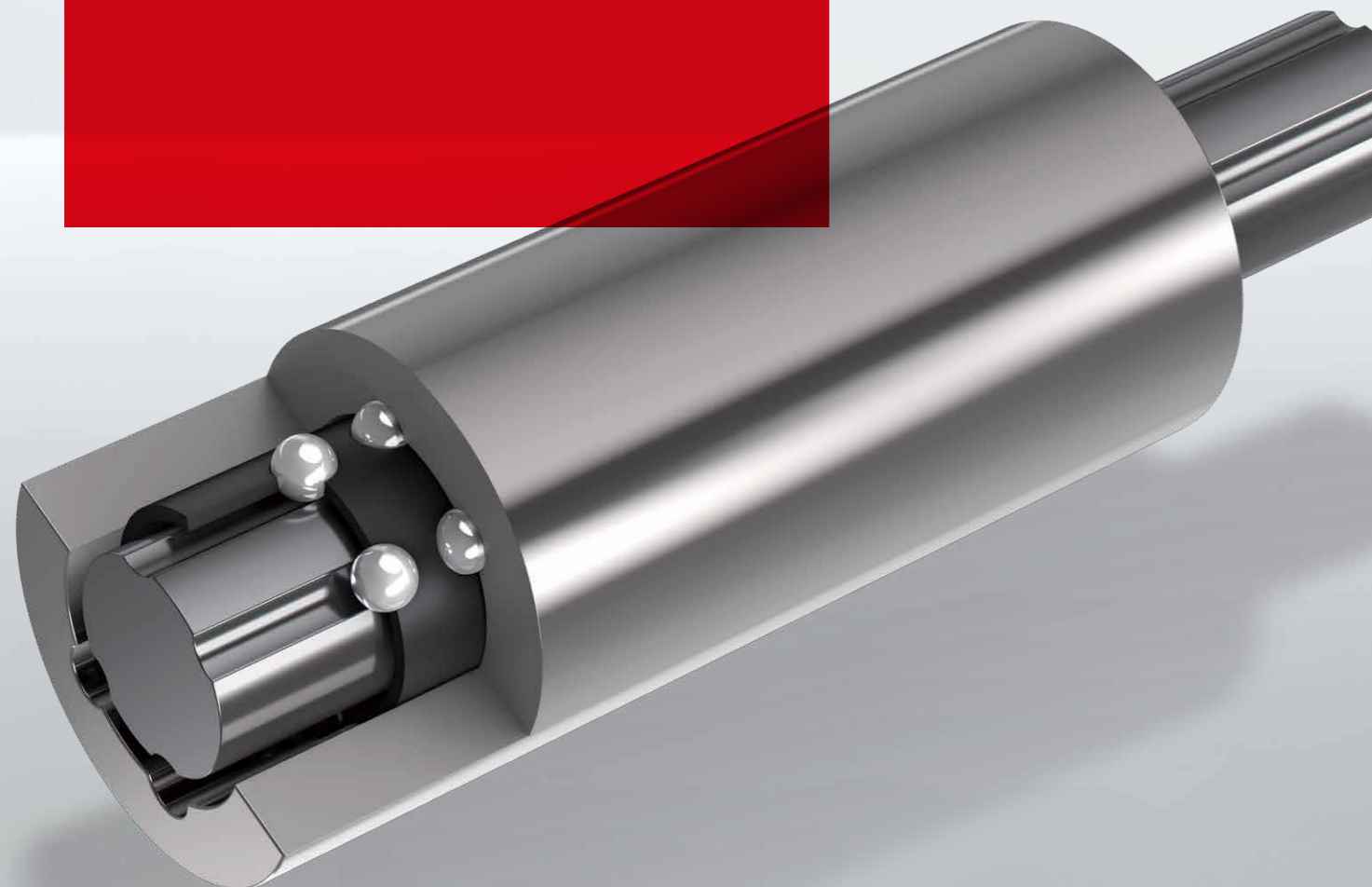
- ▶ Excellent temperature characteristics
- There is no required warm-up time or stand-by time. The Digital Gauge can be used immediately upon power-up.



<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.



Improved performance to 250 million cycles

High Durability

► Lower lifetime cost

The number of cycles has reached more than 270 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.

Ball spline structure

Number of stroke: 250 million
Repeatability: $\pm 0.1 \mu\text{m}$ or less

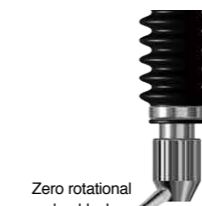
Radial load resistance:
5 times stronger than
conventional sleeve
bearings

No rotation stopper
necessary
Simple structure

No rotational
backlash

Multiple bearing contact points
No rotational backlash
Installation torque resistance
improved 1.5 times
compared to conventional product.

Strong resistance to shock and vibration

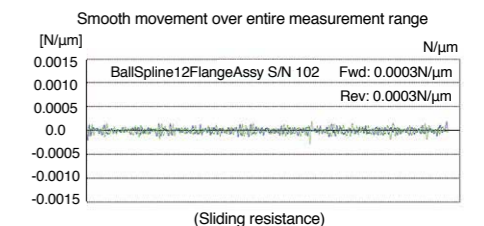


Zero rotational
backlash

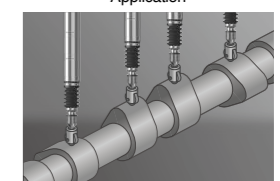


Off-center feeler used in a tight
measurement space

Sliding resistance chart



Application



Cam shaft run-out
and shape measurement

<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

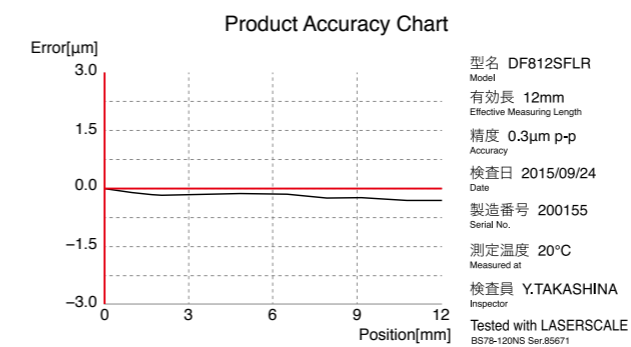
► Each product is shipped with an accuracy chart

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

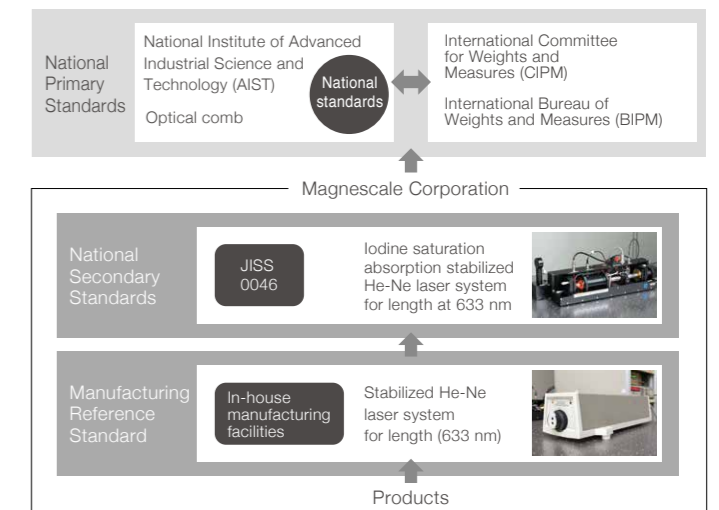
An accuracy chart is included with each shipment. Product calibration certificates required for ISO certifications are created on-site. Calibration certificates are also available after the product has shipped.



Certificate of Calibration



Length traceability system

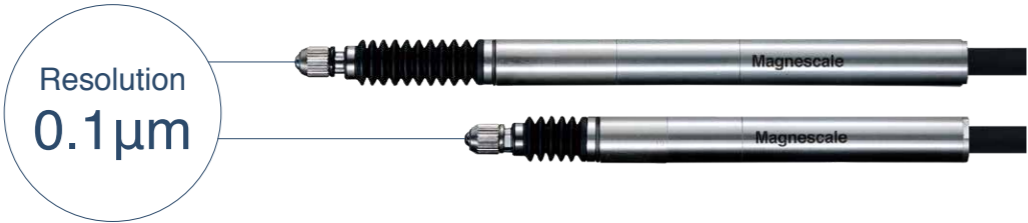


A diverse lineup of gauges for a range of applications

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 270 million strokes.

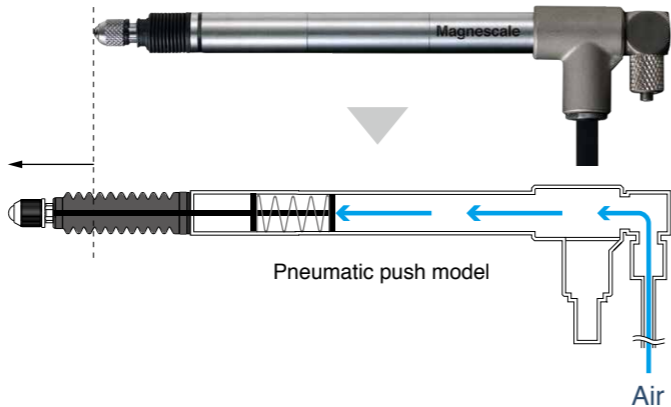
- ▶ DS800S series
- ▶ DF800S series
- ▶ DK800S series



Air-driven

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

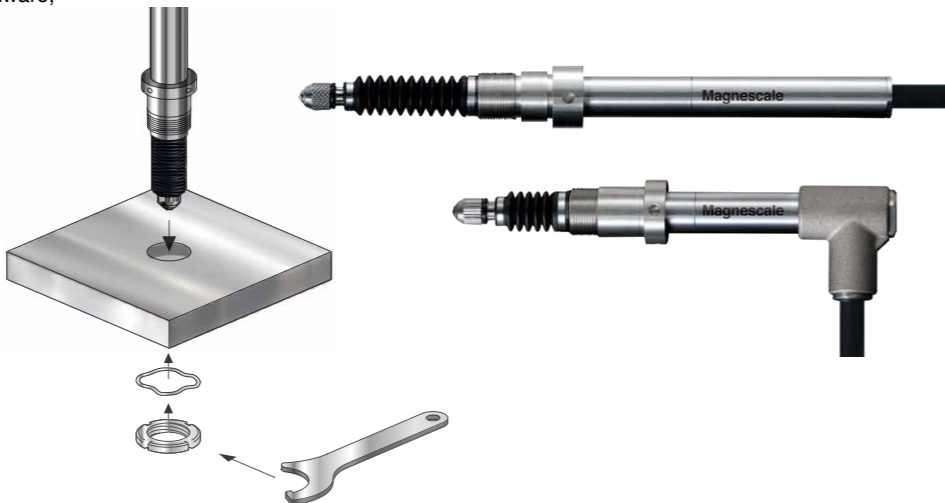
- ▶ DK800S series
- ▶ DF800S series
- ▶ DS800S series
 - V model : Pneumatic push
 - L model : Vacuum suction
- ▶ DT series



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





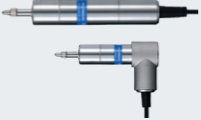

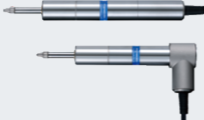









USB Connection

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

- ▶ DS800S series

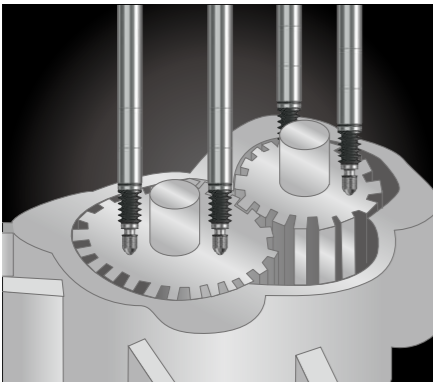


Measuring range Resolution	5 mm	10 mm	12 mm	25 mm	30 mm	32 mm	50 mm	100 mm	110 mm	155 mm	205 mm
0.1 μm	<div>DK805SAR/SALR DK805SAFR/SAFLR DK805SBR/SBLR DK805SBFR/SBFLR DF805SR/SLR DF805SFR/SFLR DS805SR/SLR DS805SFR/SFLR</div> <div></div>		<div>DK812SAR/SALR DK812SAFR/SAFLR DK812SAVR DK812SBR/SBLR DK812SBFR/SBFLR DK812SBVR DF812SR/SLR DF812SFR/SFLR DF812SVR DS812SR/SLR DS812SFR/SFLR DS812SVR</div> <div></div>			<div>DK830SR/SLR/SVR</div> <div></div>					
0.5 μm	<div>DK805SAR5/SALR5 DK805SAFR5/SAFLR5 DK805SBR5/SBLR5 DK805SBFR5/SBFLR5 DS805SR5/SLR5 DS805SFR5/SFLR5</div> <div></div>	<div>DK10NR5/PR5/PLR5</div> <div></div>	<div>DK812SAR5/SALR5 DK812SAFR5/SAFLR5 DK812SAVR5 DK812SBR5/SBLR5 DK812SBFR5/SBFLR5 DK812SBVR5 DS812SR5/SLR5 DS812SFR5/SFLR5</div> <div></div>	<div>DK25NR5/PR5 /NLR5/PLR5</div> <div></div>			<div>DK50NR5/PR5</div> <div></div>	<div>DK100NR5/PR5</div> <div></div>		<div>DK155PR5</div> <div></div>	<div>DK205PR5</div> <div></div>
1 μm			<div>DT512N/P</div> <div></div>								
5 μm			<div>DT12N/P</div> <div></div>			<div>DT32N/NV/P/PV</div> <div></div>					

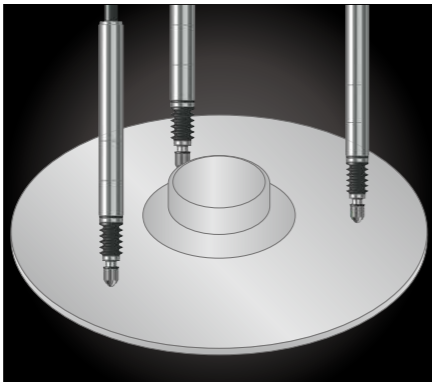
14



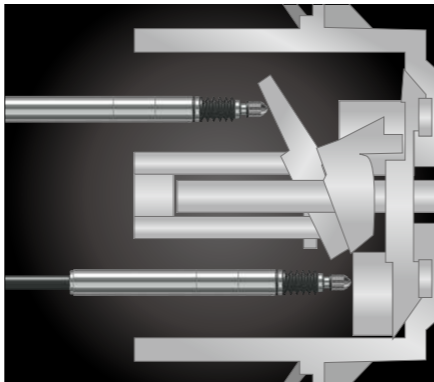
Height, flatness, and inclination measurements



Assembled part measurement and shim selection



Flatness measurement of compact motors



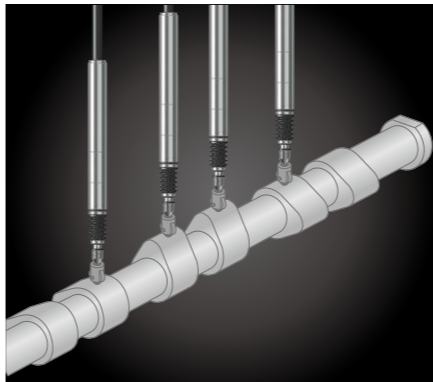
Thickness and Flexure measurement of compressor parts

- $\Phi 8\text{mm}$ body of the DK800S allows for multiple measurements in tight spaces at narrow measuring pitches.
- Magnetic technology ensures consistent measurements, even in harsh environments.
- Measurements can be taken immediately upon turning up.

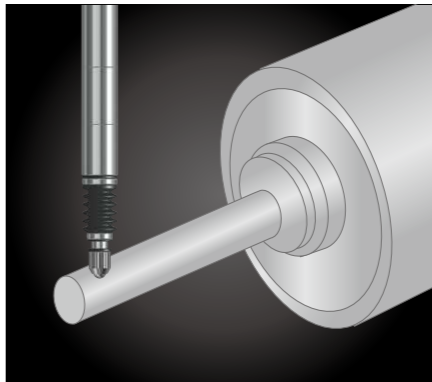
Others

- Cylinder block flatness measurement
- Bearing height measurement
- Toe and alignment test
- Crimp-on terminal caulking height
- Thread height
- Turbine blade shape measurement
- Camber measurement of die-cast chassis parts, etc.

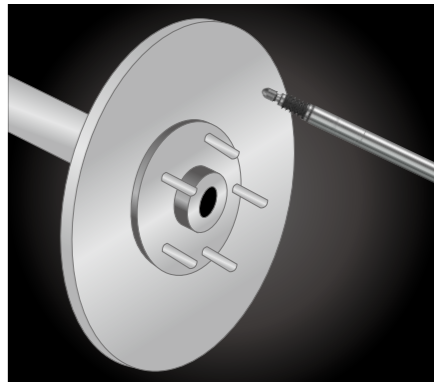
Deflection and shape measurement



Cam shaft run-out and shape measurement



Motor shaft run-out measurement



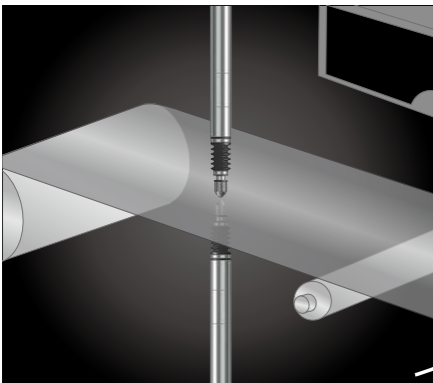
Disk run-out measurement

- The new construction of spindle bearings increases both side-load capacity and torque resistance.
- Digital data output allows for real-time measurements.

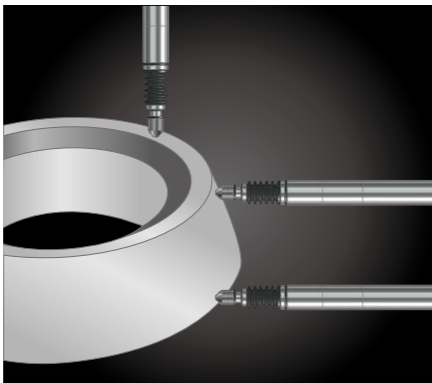
Others

- Crank shaft journal run-out measurement
- Drive shaft or propeller shaft run-out measurement
- Bearing part run-out measurement, etc.

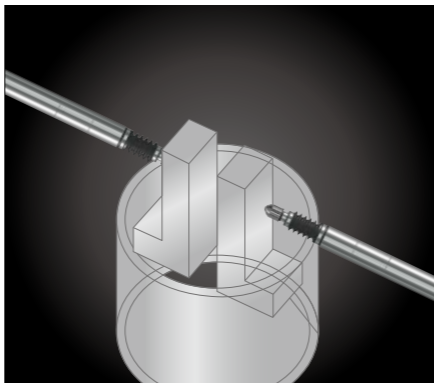
Thickness and inner and outer diameter measurements



Film thickness measurement



Tapered roller bearing measurement



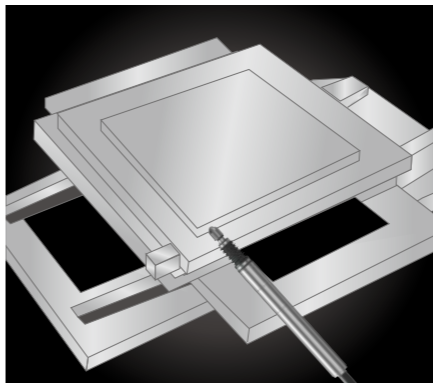
Bearing inner diameter measurement

- Digital measurement system assures full-stroke accuracy and supports multiproduct lines.
- Magnetic technology ensures consistent measurements, even in harsh environments.

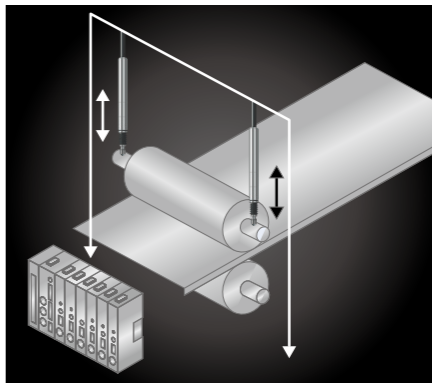
Others

- CVT belt thickness measurement
- Metal plate and resin plate thickness measurement
- Steel ball diameter measurement
- Measurements on a surface grinding machine
- Shim thickness measurement
- Gasket thickness measurement, etc.

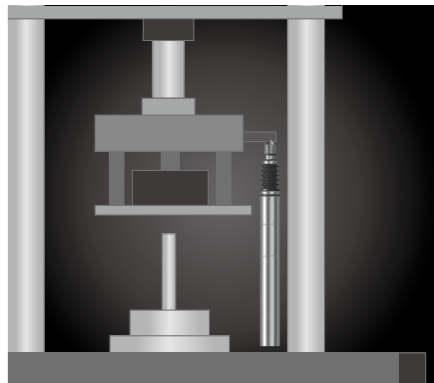
Displacement and stop position measurement



Work alignment measurement



Roller-to-roller gap measurement



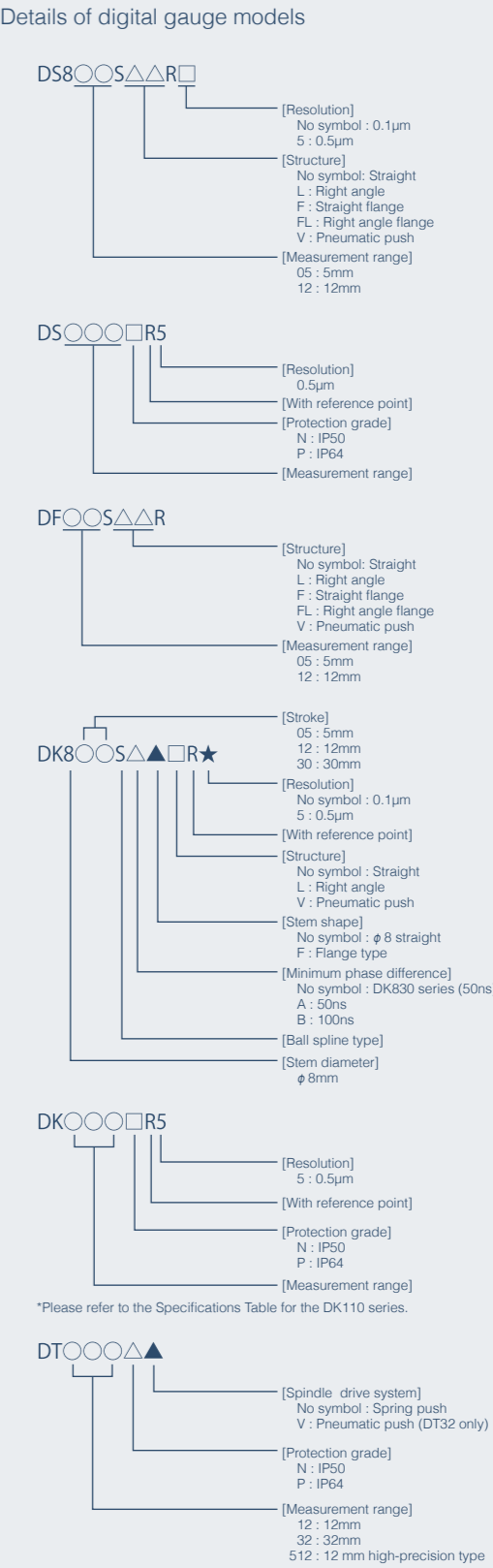
Pressing machine's or injection molding machine's stop position measurement

- Magnetic technology assures protection against impact resistance.
- Measurements can be taken immediately upon turning up.
- Real-time digital data output allows gauges to be used for position control applications in a full closed-loop system.

Others

- Top and bottom dead center control of piston parts
- Measurement of material strength (such as camber)
- Measurement of press-fit part's press-fit amount
- Coater's nozzle height measurement, etc.

Probe		
	DS805S	20
	DS812S	20
	DF805S	21
	DF812S	21
	DK805S	21
	DK812S	21
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Interpolator		
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	MT17	23
	MT20	23
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	MG50	26
	MF10	26
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	LT10A series (For DT12/32)	27
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Accessories		32
Specifications		
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	Counters/Compact display units	40
	Counters/Multi-function units	41
Dimensions		42
Global Network		50
Quality		51



DS800S series

Directly connect to a PC or hub via USB.
Communications and measurement software is also available.
• 30 mm stroke versions 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
• 30 mm stroke versions also available

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 MG80 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



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

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.

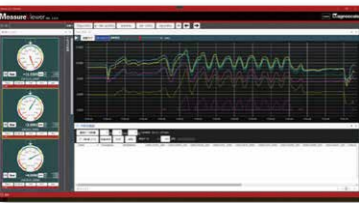
*Windows and ActiveX are registered trademarks or trademarks of Microsoft Corporation in the United States and in other countries. Intel and Intel Core are registered trademarks or trademarks of Intel Corporation in the United States and in other countries.

- 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.

Software to display measurements is available

MeasureViewer

(Paid Version)



- Advanced version of MGS USB Gauge Monitor
- Various measuring value displays including analog meters
- Save chart display • CSV data output

MeasureViewer Lite

(Free Download)



Magnescale's proprietary application with display functions such as current value, maximum value, minimum value, P-P value, and judgment function



LabVIEW-enabled communication software (Free Download)



In addition, Excel VBA (OCSX) and SDK are available.

* Please contact our sales about the maximum number of axes.

Long stroke / General-purpose resolution•Robust type

DK series

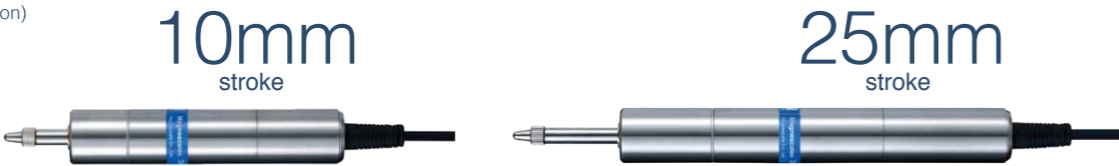
Connects to LT30 series counters and MG80 series interface units

DK10/25

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

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

*When using the air lifter DZ174 (accessory)

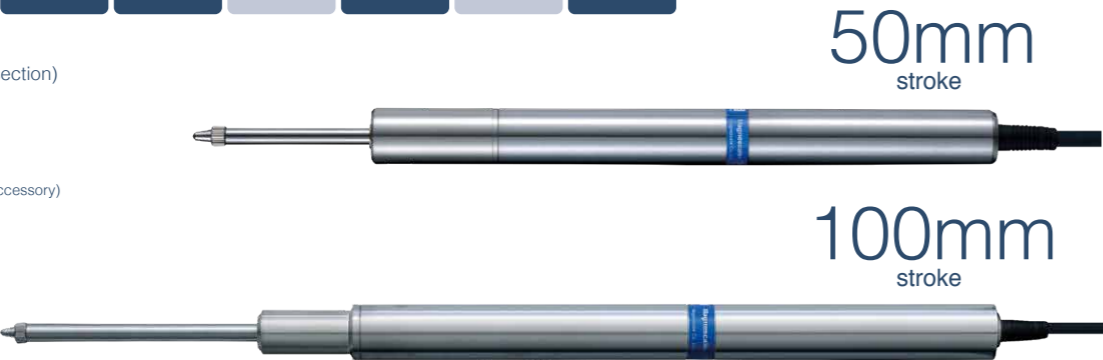


DK50/100

- High resolution
0.1μm
- General purpose
0.5μm
- Spring push
- Pnuematic push (DK50 only*)
- Flange mount
- Straight body
- Right angle body
- Reference point function

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

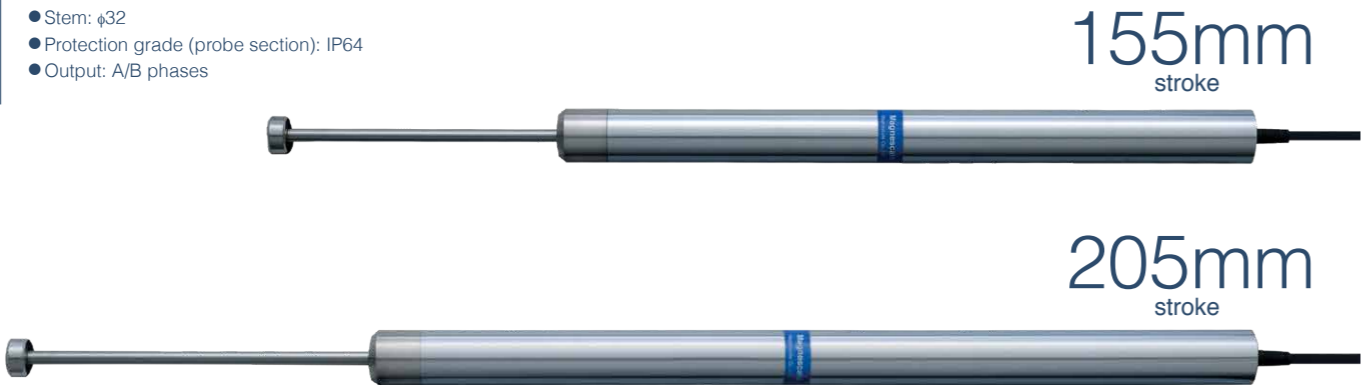
*When using the air lifter DZ174 (accessory)



DK155/205

- High resolution
0.1μm
- General purpose
0.5μm
- Spring push
- Pnuematic 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 MG80 interface units

DT512/12

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

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

*When using the air lifter DZ176 (accessory)



DT32

- High resolution
0.1μm
- General purpose
5μm
- Spring push
- Pnuematic 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, DT512N/P) compatible interpolators

Interpolator

Combine with DT gauges, to convert measurement data into various outputs

MT16

- Resolution : 1 μm, 5 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)
- For connection to LT30, MG80



MT17

- Resolution : 1 μm, 5 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)
- For connection to general-purpose counter card



MT20

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



MT30

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



LT80-NE/MG80-MA/MG80-LM/MG80-CM

Data acquisition system for DK800S/DK/DT series

Measurement data is transferred to PC via Ethernet cable.
Maximum connectable units: 32 axis



LT80



MG80-MA

MG80-CM

Display unit LT80

7-inch touch screen LCD display
Displays I/O status, add/sub results and measurement modes (Current value, Min, Max, P-P)
Three interfaces (SD card, USB, Ethernet) for data storage and input parameter

Main module MG80-MA

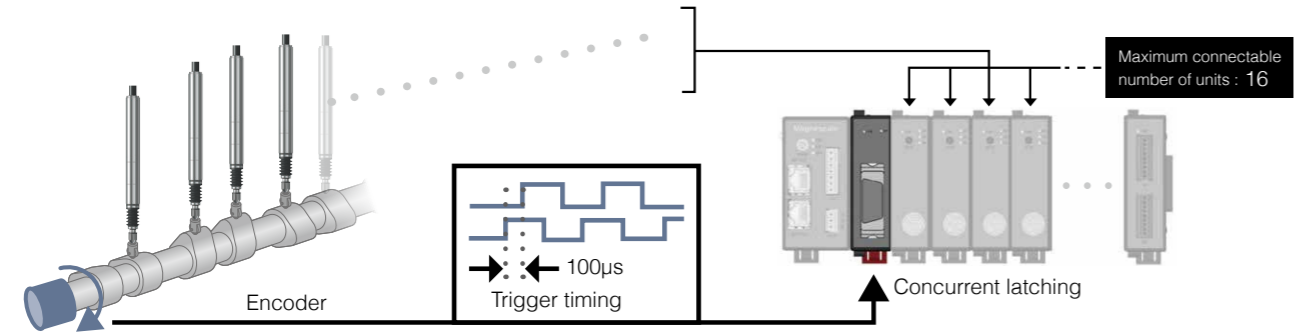
Module that connects to LT80 for integrated management of data from each length measuring gauge.

Counter module MG80-CM

Module to connect Digital Gauge

Latch module MG80-LM

Dynamic measurements synchronized with angle and position can be made in up to 16 axis by connecting to commercially available encoders.



I/O module LZ80

8 inputs and 8 outputs

MG80-PN/EC/EI/CL

Interface unit for DK800S/DK/DT series

Compatible with PROFINET, EtherCAT, EtherNet/IP, and CC-Link, measurement data can be transferred to a PC or PLC.



MG80-PN

MG80-EC

MG80-EI

MG80-CL

MG80-NE/MG80-SC

Interface unit for DK800S/DK/DT series

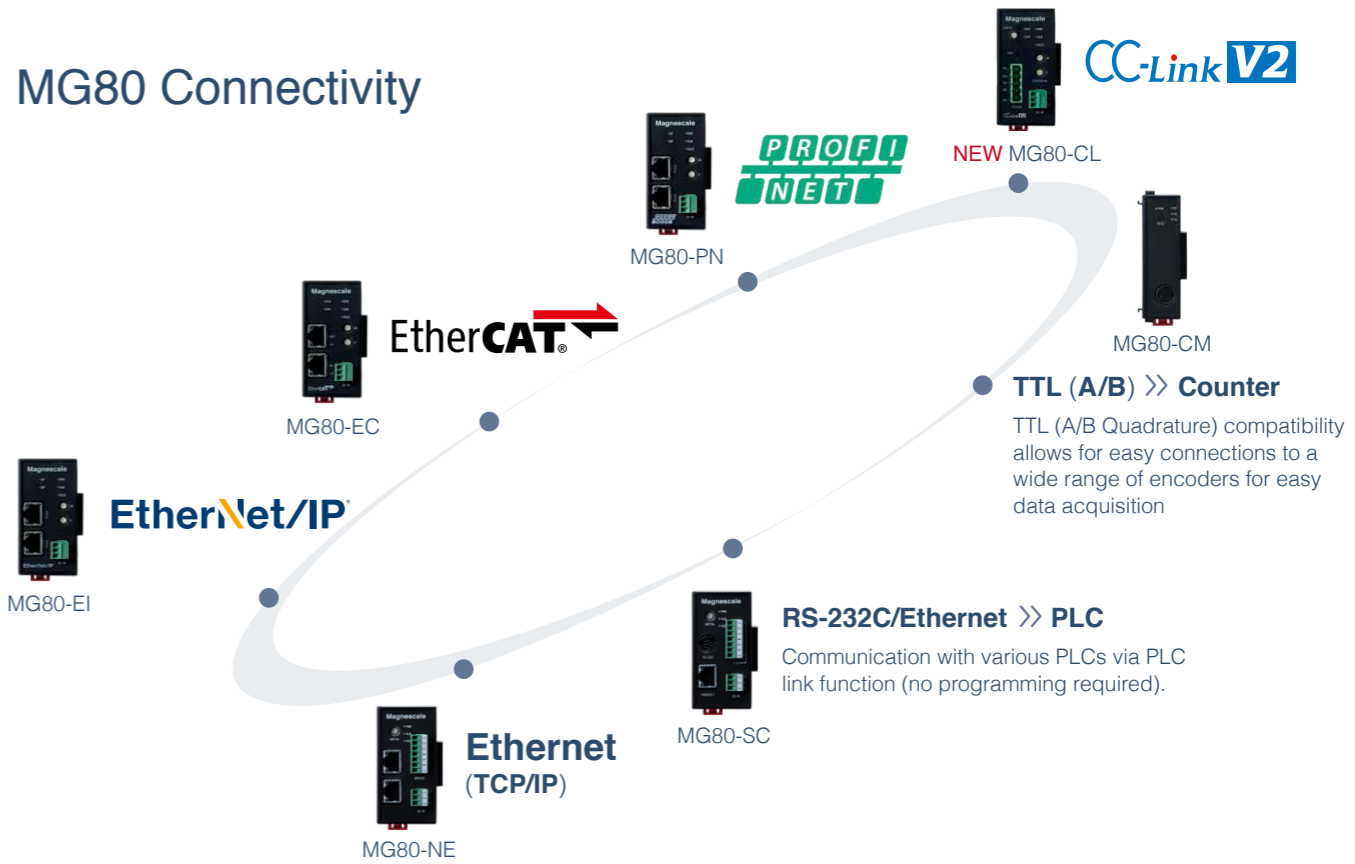
RS-232C and Ethernet are supported to transfer measurement data to a PC or PLC.



MG80-NE

MG80-SC

MG80 Connectivity



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

Communications
EtherCAT

Communications
CC-Link



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.



FB is compatible with Mitsubishi Electric Q and L series.
(Some versions are not yet supported. Please contact us for details.)

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



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

*Output reversal function : MF10-P1/P2 only



MF10-CM MF10-P1 MF10-P2

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

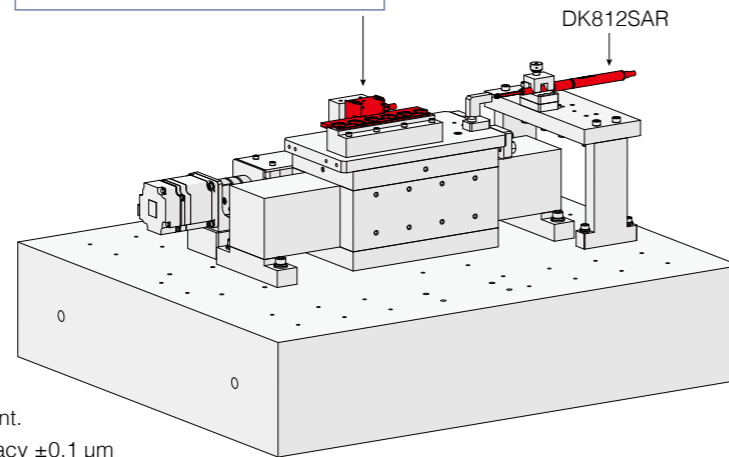


DK812SAR repeatability

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 BS78 Laserscale was 2σ .

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

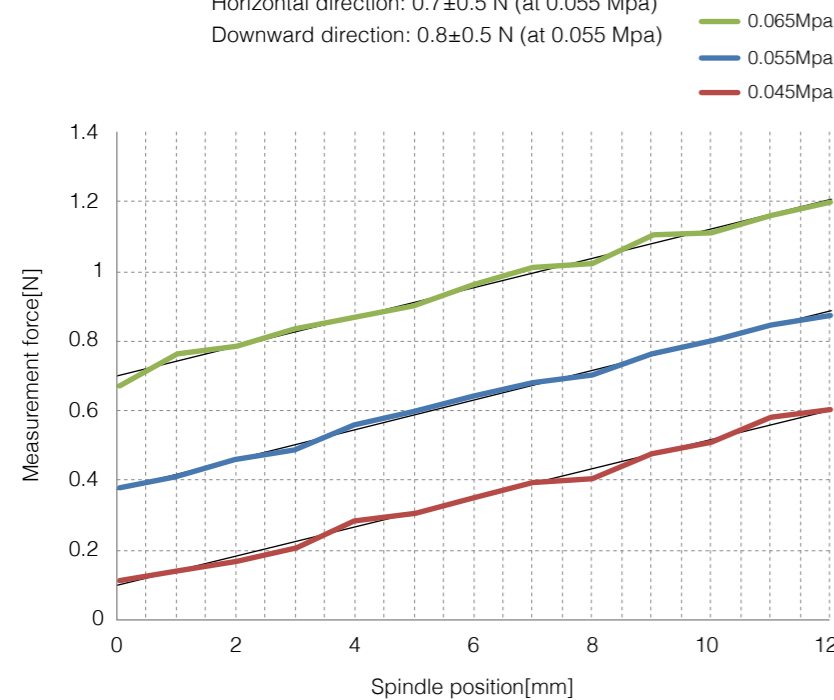
Reference laser scale: BS78
Resolution: Approx. 8.6 nm
Accuracy: 0.04 μm
Temperature: $20\pm 0.5^\circ\text{C}$



The models using ball spline bearings are as follows.
However, may vary depending on the measurement environment.
DK800S/DS800S/DF800S/DK830S series : Repeatability accuracy $\pm 0.1 \mu\text{m}$

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

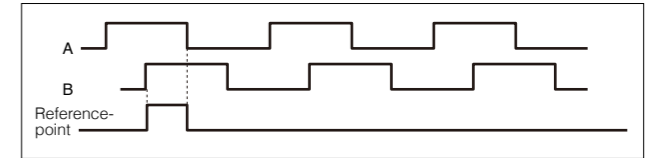
Product specifications: Upward direction: $0.6\pm 0.5 \text{ N}$ (at 0.055 Mpa)
Horizontal direction: $0.7\pm 0.5 \text{ N}$ (at 0.055 Mpa)
Downward direction: $0.8\pm 0.5 \text{ N}$ (at 0.055 Mpa)



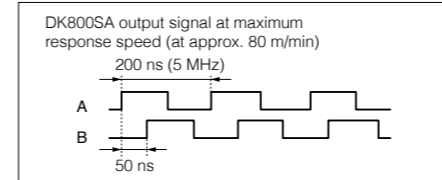
Measurement results and approximation lines
for air pressure = 0.045 Mpa, 0.055 Mpa, and 0.065 Mpa and side direction.

DK series output signals

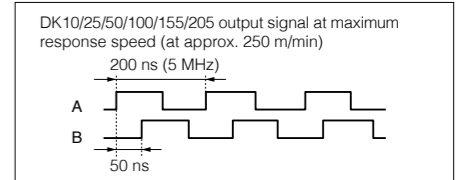
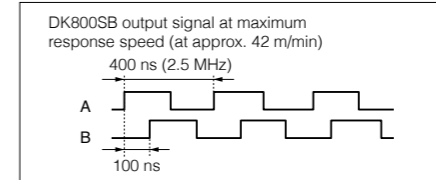
The signals output from this measuring unit are phase A/B/Reference point in the form of voltage-differential line driver output compliant with EIA-422.



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.



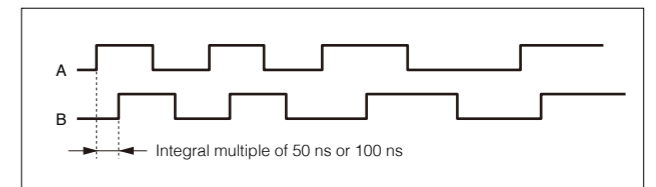
DK800SA outputs A/B quadrature signal with maximum frequency of 5MHz with a minimum phase difference of 50ns.
DK800SB outputs AB quadrature signal with maximum frequency of 2.5MHz with a minimum phase difference of 100ns.



DK10/25/50/100/155/205 outputs A/B quadrature signal with maximum frequency of 5MHz with a minimum phase difference of 50ns.
A 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.

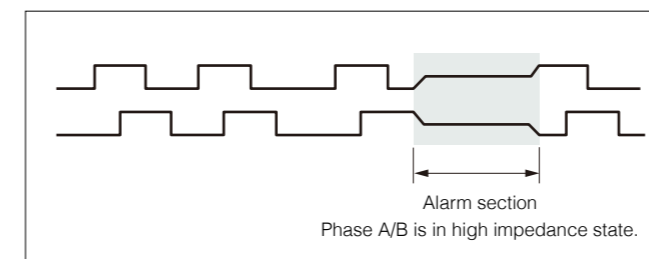


In the standard specifications, the minimum phase difference is fixed at 50 ns for the DK800SA and 100 ns for the DK800SB, however, the minimum phase differences in the following table below are available as special specifications.

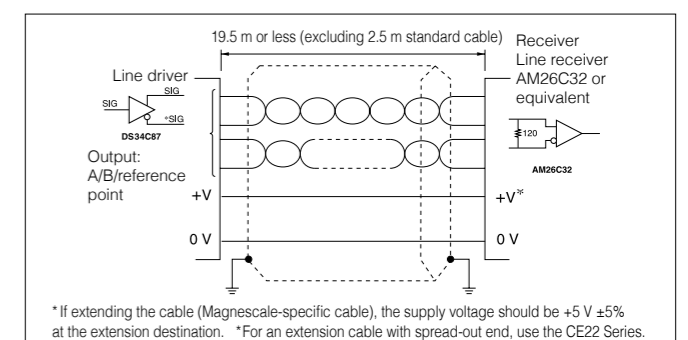
Phase A/B Minimum phase difference	Phase A single cycle	Counter's permissible frequency	Maximum response speed		Remarks
			Resolution 0.1 μm	Resolution 0.5 μm	
50ns	200ns	5MHz	80m/min	250m/min	DK800SA standard product
100ns	400ns	2.5MHz	42m/min	100m/min	DK800SB standard product
300ns	1.2 μs	833kHz	14m/min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



DK800S, DS800S, DF800S series operating cautions

- The pneumatic push type can be driven by air by using the pneumatic circuit shown in Fig. 1 and the vacuum pull type can be driven by air by using the pneumatic circuit shown in Fig. 2.
- Adjust the air pressure with a precision regulator (e.g., SMC IR2010 or equivalent) and the spindle travel speed with a speed controller according to the operating conditions.
- Since air pressure varies depending on the model, refer to the instruction manual of each model for details.

Fig. 1 Pneumatic circuit (pneumatic push)

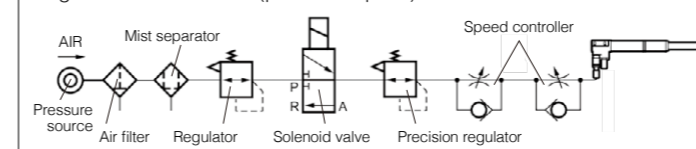
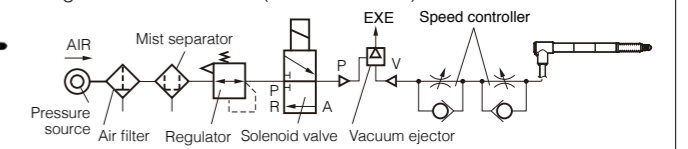
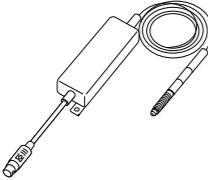
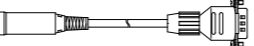
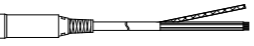
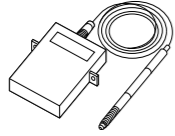
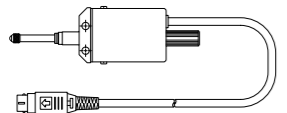

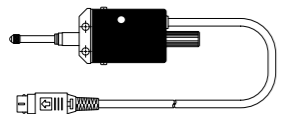

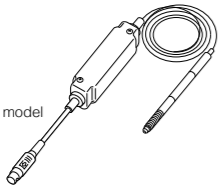

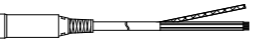

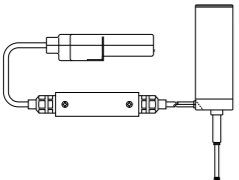
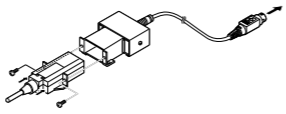
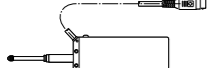
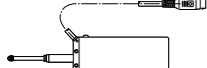
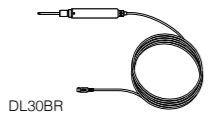


Fig. 2 Pneumatic circuit (vacuum suction)



Compatibility with discontinued products

Digital gauge	Adapter/conversion cable Note 1: MT16/17 is interpolator.	Counters	Interface unit	Old counters	Old interface unit	External device	Extension cables
DK800A/B series Discontinued DK800S series DK10/25/50/100/110/155/205 series 	Unnecessary	LT30 series	MG80 series		MG20A-DK Discontinued MG41-NE/NC Discontinued MG42 Discontinued		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: 0.3/1/3/5/10m 	LH71A/72 LY71/72					
	(Open-end cable) 					○: 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/open-end/total cable length is 20 m or less. CE26-01(1 m) -03(3 m) -05(5 m) -10(10 m) * High-flex cable/open-end/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) Discontinued * Model with no "B" assigned 	SZ05-T01	LH71A/72 LY71/72					Without extension cable
	SZ05 + SZ51-MS01			LY51/52 Discontinued			
	Unnecessary			LY100/110 LH20, etc Discontinued			
DT12/32 series 	Unnecessary	LT10A series		LT10 series Discontinued	MG20A-DT Discontinued		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.
	MT16-05/10 Note 1 	LT30 series	MG80 series	LT20 series Discontinued			
DT512 series 	Unnecessary	LT11A series		LT11 series Discontinued	MG20A-DT Discontinued		
	MT16-01 Note 1 	LT30 series	MG80 series				
DK800 series Discontinued * Models with no "A" or "B" assigned to model 	Unnecessary	LT30 series	MG80 series		MG20A-DK Discontinued		CE27-01(1m) -03(3m) -05(5m) -10(10m) * High-flex cable/total cable length is 10 m or less.
	CE29 series Cable length: 0.3/1/3/5/10m 	LH71A/72 LY71/72					
	(Open-end cable) 					○: connectable A/B reference point (Differential line receiver input)	CE22-01(1m) -03(3m) * High-flex cable/open-end/total cable length is 5 m or less. CE26-01(1m) -03(3m) * High-flex cable/open-end/large-dia. cable/total cable length is 10 m or less.
DG-B series Discontinued 	DZ51 Discontinued + SZ70-1	LH71A/72 LY71/72					Without extension cable
	Unnecessary	LT20A series		LT20 series Discontinued	MG20A-DG Discontinued		
	DZ51 Discontinued			LY51/52 Discontinued			
DE12BR/DE30BR Discontinued 	SZ70-2 	LT30 series					Without extension cable
	SZ70-1	LH71A/72 LY71/72					
	Unnecessary			LY51/52 Discontinued			
DL310B/DL330B DL10BR/DL30BR/DL60BR Discontinued   DL30BR 	Unnecessary	LT20A series		LT20 series Discontinued	MG20A-DG Discontinued		Without extension cable * Cable may be manufactured to specified length on a production by order basis. Total cable length: 10 m or less.
	DZ51 Discontinued + SZ70-1	LH71A/72 LY71/72					
	DZ51 Discontinued			LY51/52 Discontinued			

DS800S series

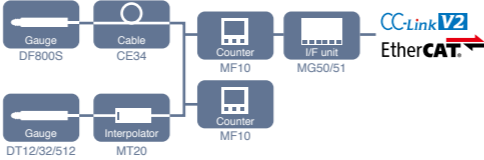


DS805S/DS812S

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		DS812SR5, DS812SLR5, DS812SFR5, DS812SFLR5		DS812SVR5	
Measuring range	5mm				12mm							
Maximum resolution	0.1μm		0.5μm		0.1μm				0.5μm			
Accuracy(At 20°C)	1μm p-p		1.5μm p-p		1μm p-p				1.5μm p-p			
Measuring force	Upward: 0.35±0.25N Horizontal: 0.40±0.25N Downward: 0.45±0.25N				Upward: 0.40±0.30N Horizontal: 0.50±0.30N Downward: 0.60±0.30N		Upward: 0.60±0.50N Horizontal: 0.70±0.50N Downward: 0.80±0.50N		Upward: 0.40±0.30N Horizontal: 0.50±0.30N Downward: 0.60±0.30N		Upward: 0.60±0.50N ^{*1} Horizontal: 0.70±0.50N ^{*1} Downward: 0.80±0.50N ^{*1}	
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		Air driving (Pneumatic push)	
Protection grade ^{*2}	IP67 (S/SF/SV), IP64 (SL/SFL), IP67 (SL/SFL) ^{*3}											
Vibration resistance	100 m/s ² (2 to 2,000 Hz)											
Impact resistance	1000 m/s ² (11 ms)											
Operating temperature and humidity range	0 to +50°C (No condensation)											
Storage temperature and humidity range	-20 to +60°C 90%RH or less											
Power supply	DC 5 V ±5 %											
Power consumption	120mA Max.											
Mass ^{*4}	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			
Recommended operating environment	CPU: Intel Core i3 or higher RAM: 1 GB or higher OS: Windows 7 / Windows 10 (32 bit / 64 bit edition)											
Accessories	Spanner, Instruction Manual, Supplement Manual, +P M4×5 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 M4×5 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 M4×5 screw(2)		Spanner, Instruction Manual, Supplement Manual, +P M4×5 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 M4×5 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.}
● 30 mm stroke versions also available

DF800S series

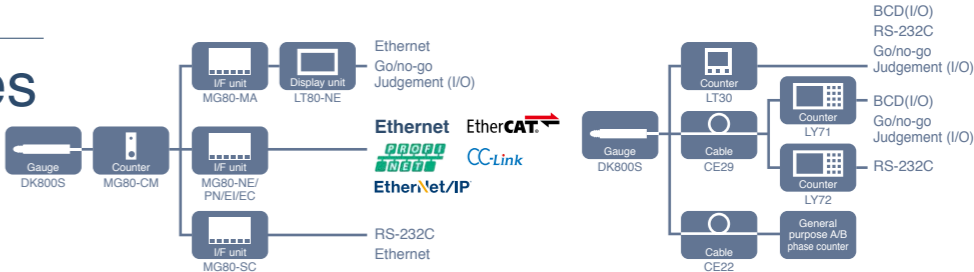


DF805S/DF812S

Model	DF805SR, DF805SFR	DF805SLR, DF805SFLR	DF812SR, DF812SFR	DF812SLR, DF812SFLR	DF812SVR
Measuring range	5mm		12mm		
Maximum resolution	0.1μm				
Accuracy(At 20°C)	1μm p-p				
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		Upward: 0.6±0.5N ^{*1} Horizontal: 0.7±0.5N ^{*1} Downward: 0.8±0.5N ^{*1}
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 ^{*2}	IP67(S/SF/SV),IP64(SL/SFL),IP67(SL/SFL) ^{*3}				
Vibration resistance	100 m/s ² (20 to 2,000 Hz)				
Impact resistance	1000 m/s ² (11 ms)				
Operating temperature and humidity range	0 to +50°C (No condensation)				
Storage temperature and humidity range	-20 to +60°C 90%RH or less				
Power supply	DC+10 to +30 V				
Mass ^{*4}	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 puressure: 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.}
● 30 mm stroke versions also available

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 DK805SBFR DK805SBFLR	DK805SAR5 DK805SALR5 DK805SAFR5 DK805SAFLR5	DK805SBR5 DK805SBLR5 DK805SBFR5 DK805SBFLR5	DK812SAR DK812SALR DK812SAFR DK812SAFLR DK812SAVR	DK812SBR DK812SBLR DK812SBFR DK812SBFLR DK812SBVR	DK812SAR5 DK812SALR5 DK812SAFR5 DK812SAFLR5 DK812SAVR5	DK812SBR5 DK812SBLR5 DK812SBFR5 DK812SBFLR5 DK812SBVR5
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	
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 0.6±0.5N(Pneumatic push type) 0.7±0.5N(Pneumatic push type) 0.8±0.5N(Pneumatic push type) Air puressure: 0.055MPa			
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	Sames 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 ¹	IP67(SA/SAF/SAV/SB/SBF/SBV), IP64(SAL/SAFL/SBL/SBFL), IP67(SAL/SAFL/SBL/SBFL) ²							
Vibration resistance	100 m/s ² (20 to 2,000 Hz)							
Impact resistance	1000 m/s ² (11 ms)							
Operating temperature	0 to +50°C							
Sotrage temperature	-20 to +60°C							
Power supply	DC 5 V ±5 %							
Power consumption	1 W							
Mass ³	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	
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*1	IP53		IP53/IP67*2			
Vibration resistance	100 m/s ² (20 to 2,000 Hz)					
Impact resistance	1000 m/s ² (11 ms)					
Operating temperature	0 to +50°C					
Sotrage temperature	-20 to +60°C					
Power supply	DC +5 V ±5 %					
Power consumption	1 W					
Mass*3	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.}

LT80

Display unit
Interface

▲ MG80-MA

▲ MG80-LM

Compatible with DK series, DT series

Model		LT80-NE
Power consumption		14 W or less
Maximum connectable units		4 units of MG80-MA*1
Measurement screen	Measurement display	Display measurement values of 2, 4, 8 or 16 axis, Alarm display, Comparator group, Measurement mode, Measurement bar graph, Reset, Preset
	I/O information	I/O condition monitoring (All I/O of device and module)
Setting menu	Measuring unit setting	Resolution, direction, with or without reference point connected to MG80-CM
	Display setting	Resolution display, number of axes to display (2, 4, 8, or 16 axes)
	Measurement mode	Measurement mode setting of each axis (current, MAX, MIN, P-P)
	Comparator value setting	8 groups with 2 stages, or 8 groups with 4 stages per axis Default setting of each axis
	I/O setting	I/O function assignments of LT80-NE, I/O function assignments of connected LZ80-K, Reference point detection, Reset, Preset, Comparator output, Alarm, Reference point passed, Each channel address, Change measurement mode, Saving measurement data
Calculation		Maximum of 16 combinations of add/subtract calculations per MG80-MA module, Scaling function
Maintenance display		Main body information, Service usage (Software update for LT80 and MG80)
System port command (using LAN port)		LT80 operation from PC (setting, measurement operation, data acquisition)
Power supply		DC10.8 to 26.4V
Operating temperature/humidity range		0 to +50°C (No condensation)
Storage temperature/humidity range		-20 to +60°C (20 to 90%RH)

*1 When using LINK function of MG80-MA dedicated port and MG80-MA

MG80-MA

Main module
Interface

▲ MG80-CM

Compatible with DK series, DT series

Model		MG80-MA1/MG80-MA2
Power consumption		2.4W or less
Maximum connectable units		(16) MG80-CM, (2) LZ80-K*1
I/O		7-pole connector Photo coupler insulated 4 input, 1 output MG80-MA1: Current Sink MG80-MA2: Current Source
Interface connector		For data: RJ45 x 2 (shielding compatible)
Communication protocol		100BASE-TX
Transmission speed		100 Mbit/s
Maximum cable length		20m (CAT5e shielding type recommended*2)
Setting menu		Rotary switch for setting unit number
Power supply		DC10.8 to 26.4V
Operating temperature/humidity range		0 to +50°C (No condensation)
Storage temperature/humidity range		-20 to +60°C (20 to 90%RH)

*1 Per each MG80-MA1/MA2. Total system maximum: (4) MG80-MA1/MA2, (32) MG80-CM, (8) LZ80-K
*2 Communication cables not included

MG80-CM

Counter module

Compatible with DK series, DT series

Model		MG80-CM
Power consumption		2.0 W or less (Measuring unit excluded)
Compatible measuring units		DK series, DT series (via MT)
Alarm		Frequency response exceeded, Measuring unit not connected, Broken connection
Supply voltage		DC10.8 to 26.4V
Operating temperature/humidity range		0 to +50°C (No condensation)
Storage temperature/humidity range		-20 to +60°C (20 to 90%RH)

LZ80-K

I/O module

Compatible with DK series, DT series

Model		LZ80-K1/LZ80-K2
Power consumption		2.0W or less
I/O		9-pole connector x 2 Photo coupler insulated 8 input, 8 output LZ80-K1: Current Sink LZ80-K2: Current Source
Power supply		DC10.8 to 26.4V
Operating temperature/humidity range		0 to +50°C (No condensation)
Storage temperature/humidity range		-20 to +60°C (20 to 90%RH)

MG80-LM

Latch module

Compatible with DK series, DT series

Model		MG80-LM
Power consumption		2.0 W or less (Not including encoder)
Data latch interval		100 μs (Measurement data acquisition only)
		400 μs (All functions can be used, including reference operation, arithmetic function, comparator function, MAX, MIN, P-P, etc.)
Encoder signal input		A/B/Reference point
		Voltage differential type line receiver (EIA-422 compliant)
A / B signal input minimum phase difference		50 ns
Power supply for connected encoder		DC5V 500 mA (Max)
Alarm		Input response frequency exceeded, encoder not connected, cable disconnection.
Supply voltage		DC10.8 to 26.4V
Operating temperature/humidity range		0 to +50°C (No condensation)
Storage temperature/humidity range		-20 to +60°C (20 to 90%RH)

MG80-NE/EI/PN/EC/CL

Interface module
Interface

▲ MG80-CM

Compatible with DK series, DT series

Model	MG80-NE	MG80-EI	MG80-PN	MG80-EC	MG80-CL
Communication protocol	Ethernet (TCP/TP) 100BASE-TX	EtherNet/IP	PROFINET	EtherCAT	CC-Link
Function	Resolution selection (0.1 to 10 μm), reference point setting, reset, preset, master preset, current value / maximum value / minimum value / P-P value output of each axis, calculation function (2-axis addition and subtraction), comparator function (Up to 8 sets of 2 or 4 steps can be set)				
Transmission speed	100 Mbit/s				10 Mbit/s (CC-Link fastest setting)
Maximum connectable counter modules	Up to 16 MG80-CM can be connected to each MG80-NE. This enables an overall configuration of up to 64 modules by linked connection.	Up to 16 MG80-CM can be connected to each MG80-EI or MG80-PN. Link up to 255 units via fieldbus IP address configuration.		Up to 16 MG80-CM can be connected to each MG80-EC. Link up to 65,535 units via fieldbus IP address configuration.	Up to 16 MG80-CM can be connected to each MG80-CL. According to CC-Link specifications, the maximum number of connections for the entire system is 32 units (84 stations).
Mounting method	35 mm DIN rail mounting				
Power supply	DC10.8 to 26.4V				
Operating temperature/humidity range	0 to +50°C (No condensation)				
Storage temperature/humidity range	-20 to +60°C (20 to 90%RH)				
Power consumption	2.4 W or less				
Maximum cable length*	20 m (shielded CAT5e LAN cable recommended)				30 m(For CC-Link dedicated cables, please refer to the CC-Link Association's installation manual)

*The customer must provide the communication cables.

MG80-SC

Main module
Interface

▲ MG80-CM

Compatible with DK series, DT series

Model		MG80-SC1(NPN) / MG80-SC2(PNP)
Communication protocol		RS-232C (2,400bit/s to 230,400bit/s) Ethernet (100BASE-TX : 100Mbit/s)
Function		Resolution selection (0.1 to 10 μm) / reset / master preset / current value, maximum value, minimum value, P-P value output of each axis / comparator function (Up to 2 or 4 steps can be set) / PLC link*1
Maximum connectable counter modules		Up to 16 MG80-CM can be connected (MG80-SC+MG80-CM x16)
Mounting method		35 mm DIN rail mounting
Power supply		DC10.8 to 26.4V
Operating temperature/humidity range		0 to +50°C (No condensation)
Storage temperature/humidity range		-20 to +60°C (20 to 90%RH)
Power consumption		2.4 W or less
Maximum communication cable length		RS-232C : 15 m*2 Ethernet : 20m(shielded CAT5e LAN cable recommended*3)

*1 Refer to the connection manual for compatible PLCs. *2 Please use DZ252 (sold separately) for RS-232C communication cable. *3 Ethernet communication cables not included.

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

*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	0.1 μm		
Cable length	input/output, power cable 2 m		-
Power supply	+10 to 30 V DC including ripple (p-p) 10%		
Power supply voltage / Power consumption	2.1 W or less / 85 A or less (DC24 V)		
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 amplifies connected : 0 to +55°C 3 to 10 amplifies connected : 0 to +50°C 11 to 16 amplifies connected : 0 to +45°C 17 to 30 amplifies connected : 0 to +40°C 35 to 85% RH (No condensation)
Storage temperature and humidity range	-10 to +60°C (with no icing or condensation)		
Mass	Approx. 75 g		

*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 to 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 to +40°C					
Storage temperature and humidity range		-10 to +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 DT512 (LT11A) For DT12/32 (LT10A)

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					
Maximum response speed	100 m/min			80 m/min		
Function	Alarm display, Addition and subtraction function (Except LT10A-105** anl 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 to 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 to+40°C					
Storage temperature and humidity range	-10 to +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 ^{*1}	
			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)		
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) ^{*1}		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 ^{*2}		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 ^{*3} , peak hold, restart, hold(latch and pause), comparator ^{*5} , 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 ^{*4}	○	-	
	RS-232C	-	○	
	Comparator judgement function ^{*5}	○	-	
Power supply		Optional PSC-21A/22A/23A adapter is used		
Power consumption		32 VA max.(When optional AC adapter is used)		
Operating temperature and humidity range		0 to +40°C (No condensation)		
Storage temperature and humidity range		-20 to +60°C (No condensation)		
Mass		Approx. 1.5 kg		

^{*1} 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.

^{*2} Available only 1 axis (A axis display) when LZ71-KR is used. Only comparator display when showing B-axis and C-axis.

^{*3} Addition / subtraction display is not available when using two LZ71-B.

^{*4} Available only when LZ71-B is used

^{*5} 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 (1 bit)
Output logic	Positive and negative logic can be selected individually for data and sign READY signal: Negative logic
Electrical specifications	Photocoupler output V _{CE} : Recommended DC+12-24V I _c : 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 to 24 V)
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 to +40°C (with no condensation)
Storage temperature and humidity range	-20 to +60°C (with no condensation)

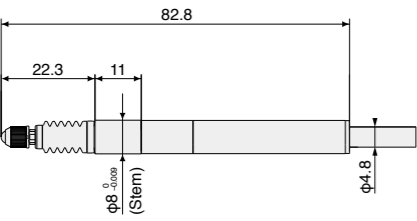
*Magnescale reserves the right to change product specifications without prior notice.

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: 24 V) I _c =15 mA 5-terminal contact output DC24 V AC120 V 0.3A
External contacts	Photocoupler: 12 to 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 to +40°C (with no condensation)
Storage temperature and humidity range	-20 to +60°C (with no condensation)

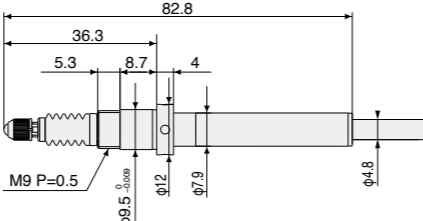
*Magnescale reserves the right to change product specifications without prior notice.

DK805SAR/DK805SAR5/DK805SBR/DK805SBR5
DS805SR/DS805SR5
DF805SR

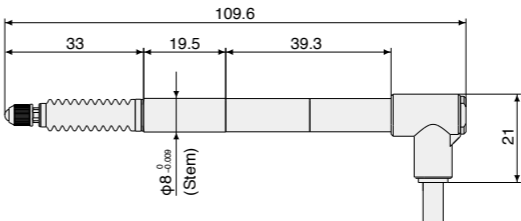


*Upon installation, clamp the stem

DK805SAFR/DK805SAFR5/DK805SBFR/DK805SBFR5
DS805SFR/DS805SFR5
DF805SFR

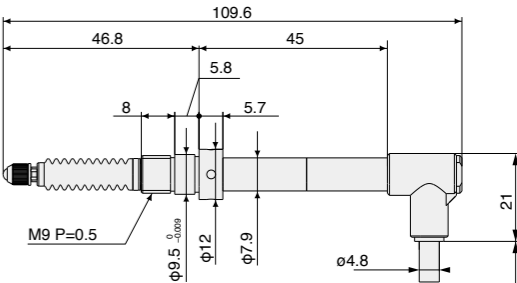


DK812SALR/DK812SALR5/DK812SBLR/DK812SBLR5
DS812SLR/DS812SLR5
DF812SLR

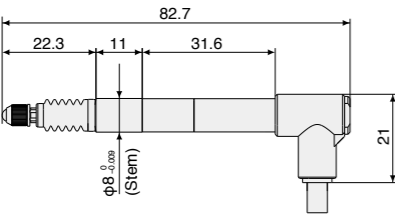


*Upon installation, clamp the stem

DK812SAFLR/DK812SAFLR5/DK812SBFLR/DK812SBFLR5
DS812SFLR/DS812SFLR5
DF812SFLR

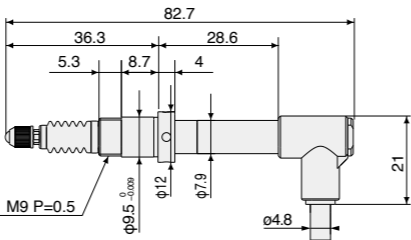


DK805SALR/DK805SALR5/DK805SBLR/DK805SBLR5
DS805SLR/DS805SLR5
DF805SLR

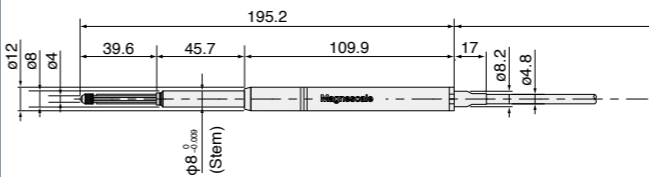


*Upon installation, clamp the stem

DK805SAFLR/DK805SAFLR5/DK805SBFLR/DK805SBFLR5
DS805SFLR/DS805SFLR5
DF805SFLR

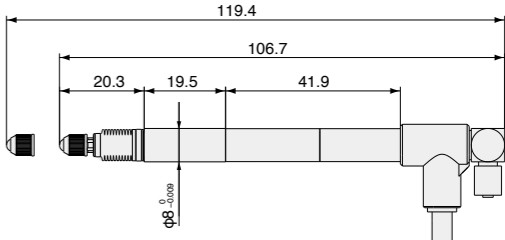


DK830SR



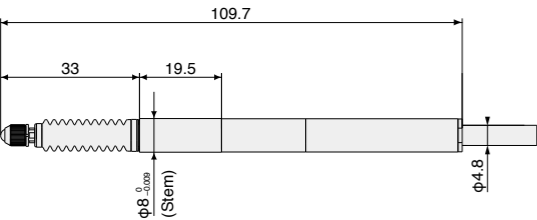
*Upon installation, clamp the stem

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



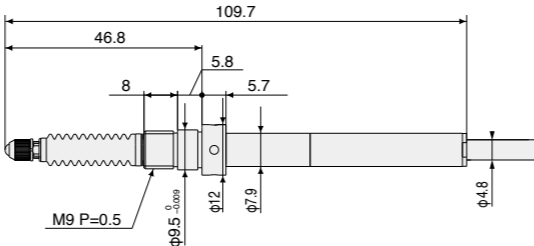
*Upon installation, clamp the stem

DK812SAR/DK812SAR5/DK812SBR/DK812SBR5
DS812SR/DS812SR5
DF812SR

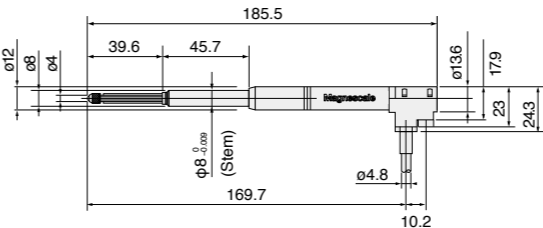


*Upon installation, clamp the stem

DK812SAFR/DK812SAFR5/DK812SBFR/DK812SBFR5
DS812SFR/DS812SFR5
DF812SFR

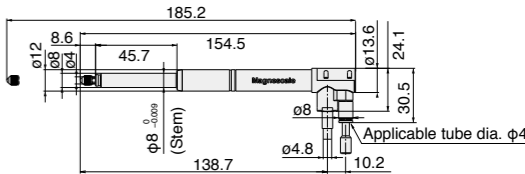


DK830SLR

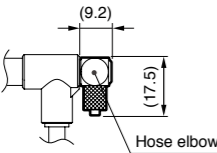


*Upon installation, clamp the stem

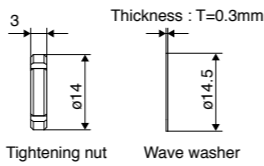
DK830SVR



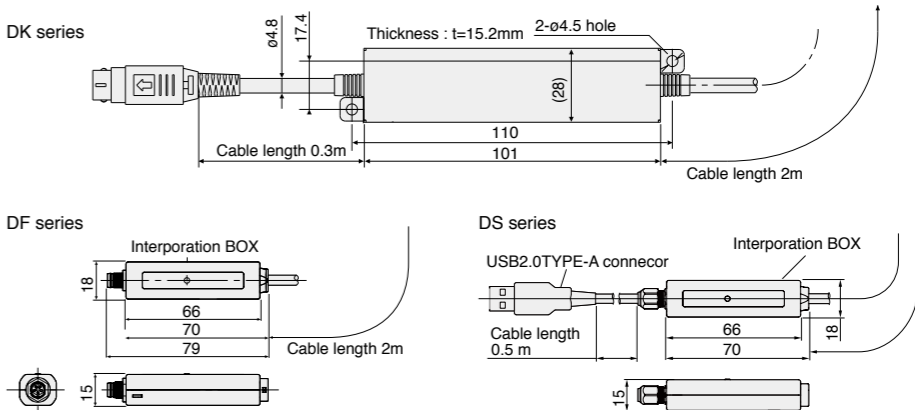
DK/DF/DS 8**S*L** only



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



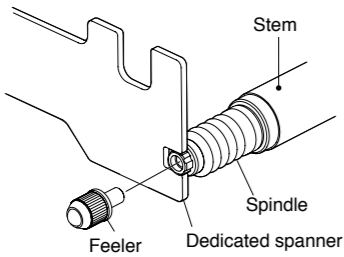
Interporation box



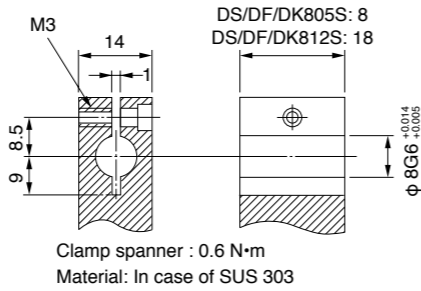
Installation

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

Feeler installation/removal method



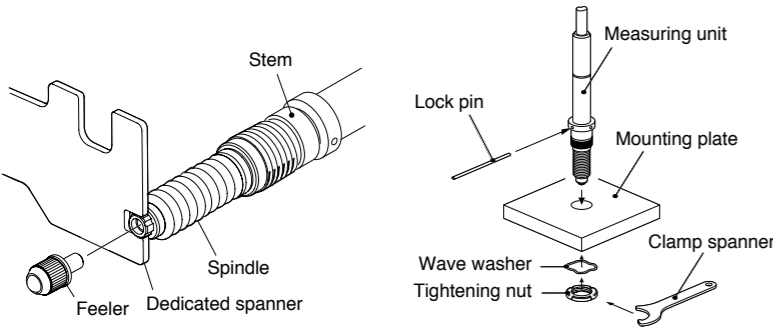
Mounting holder dimensions and tolerance



Unit: mm

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

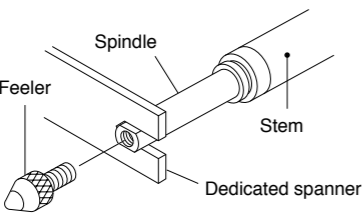
Feeler installation/removal method



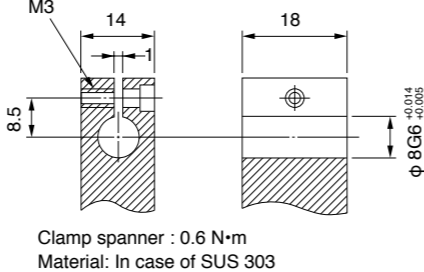
The recommended value of measuring unit mounting hole is $\phi 9.7 \pm 0.15$ mm
The mouting thickness is as follows:
DS/DF/DK805SF : 9 to 11 mm
DS/DF/DK812SF : 7 to 11 mm
Mouting parallelism affects measurement accuracy
Adjust the squareness to the surface
to be measured or parallelism with respect to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

DK830 installation cautions

Feeler installation/removal method



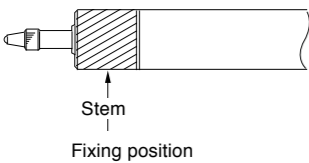
Mounting holder dimensions and tolerance



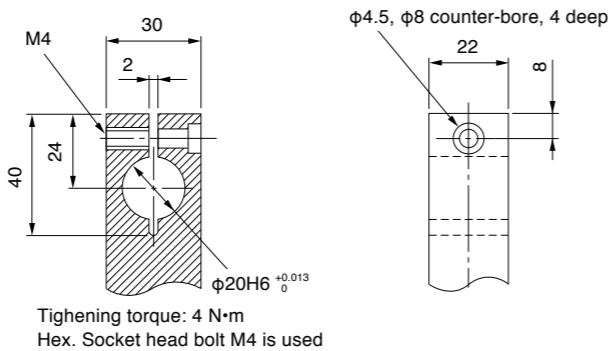
Unit: mm

DK10/25 installation cautions

Mounting /fixing position



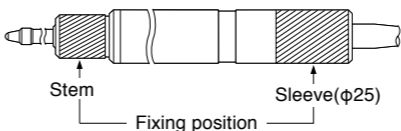
Mounting holder dimensions and tolerance



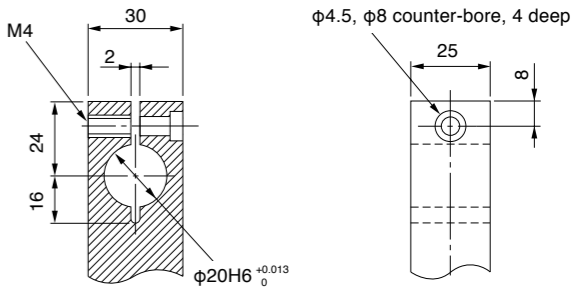
Unit: mm

DK50/100 installation cautions

Mounting/fixing position



Mounting holder dimensions and tolerance

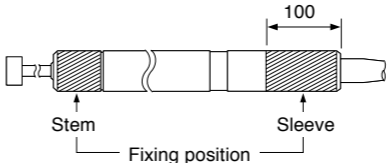


Tightening Torque: 4 N·m
Hex. Socket head bolt M4 is used

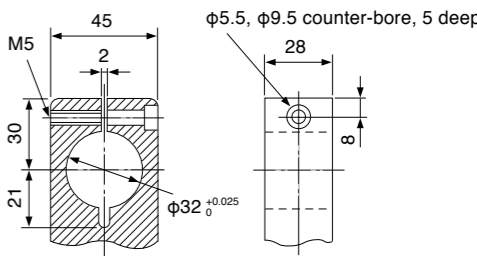
Unit: mm

DK155/DK205 installation cautions

Mouting/fixing position



Mouting holder dimensions and tolerance

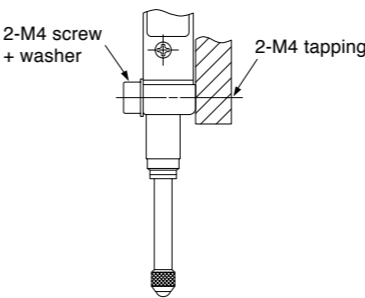


Tightening Torque: 6 N·m
Hex. Socket head bolt M5 is used

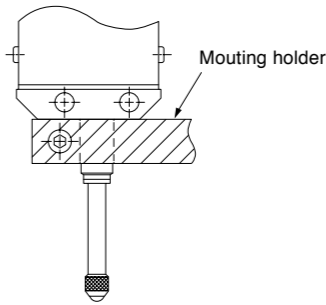
Unit: mm

DT12/512/32 installation cautions

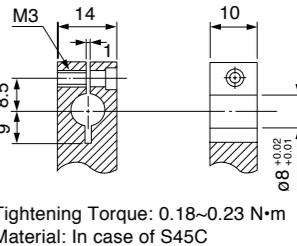
Mouting method using hounting hole



Mouting method using holder



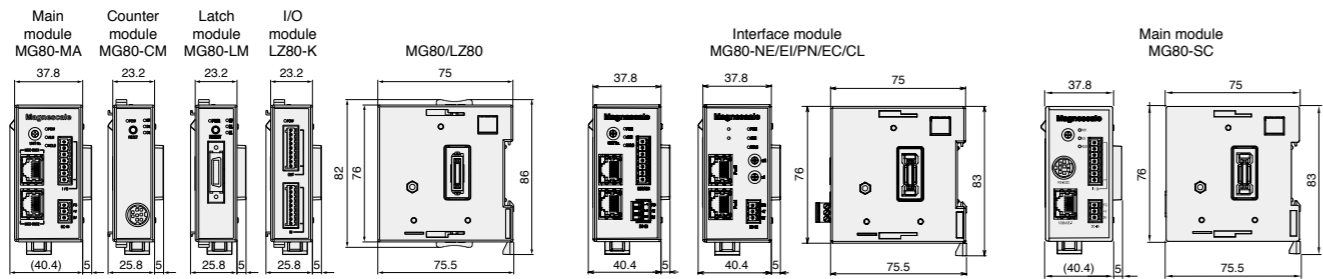
Moutint holder dimension



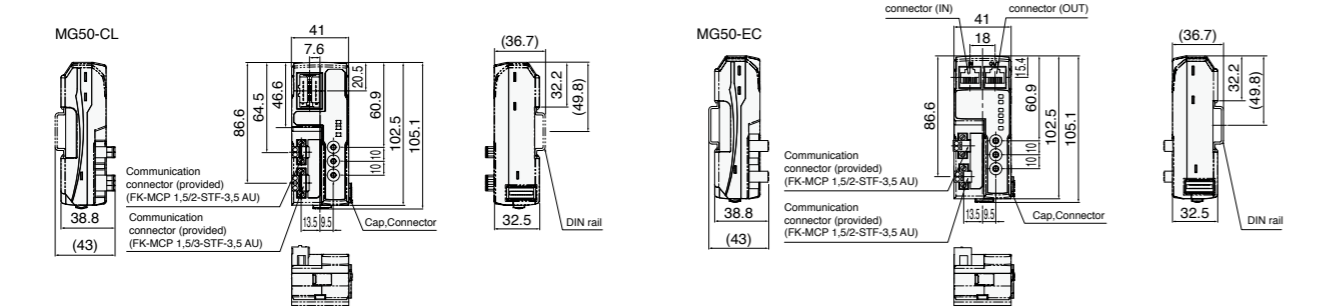
Tightening Torque: 0.18~0.23 N·m
Material: In case of S45C

Unit: mm

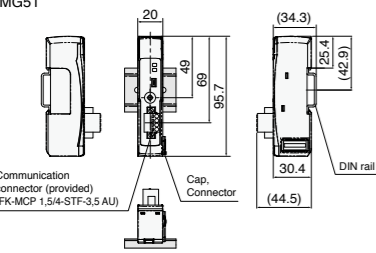
MG80 Series



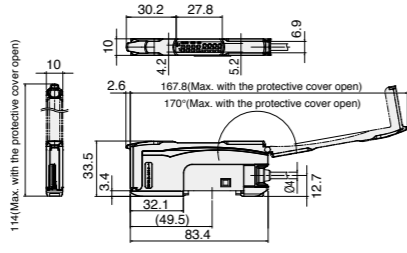
MG50 Series



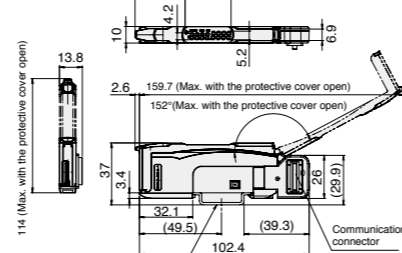
MG51 series



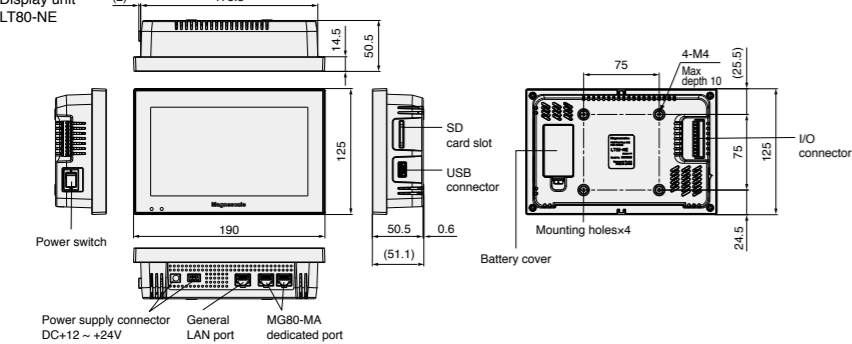
MF10-P1/P2



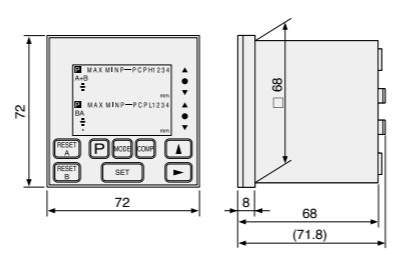
MF10-CM



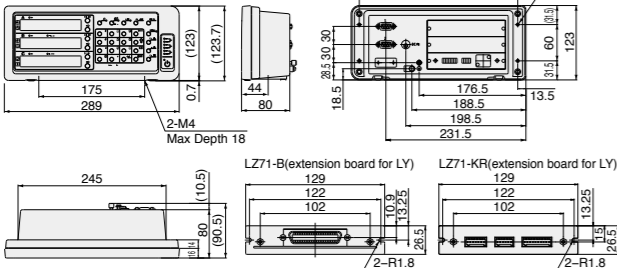
LT80



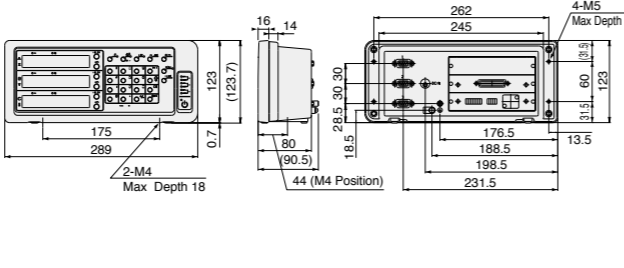
LT30/LT11A/LT10A series



LY71 series



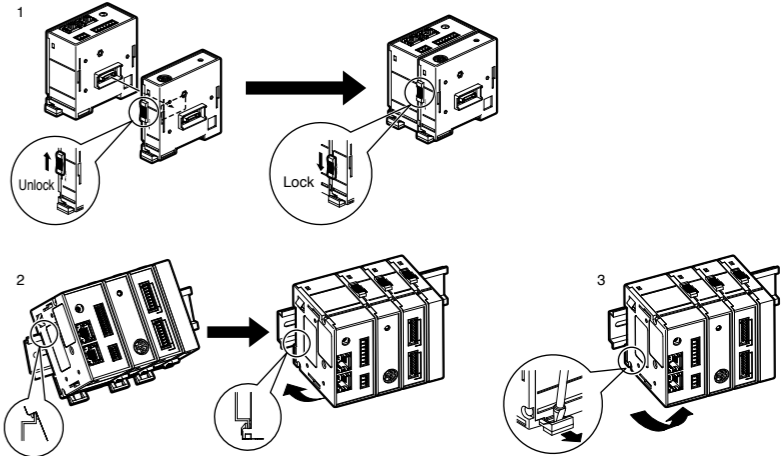
LY72 series



Unit: mm

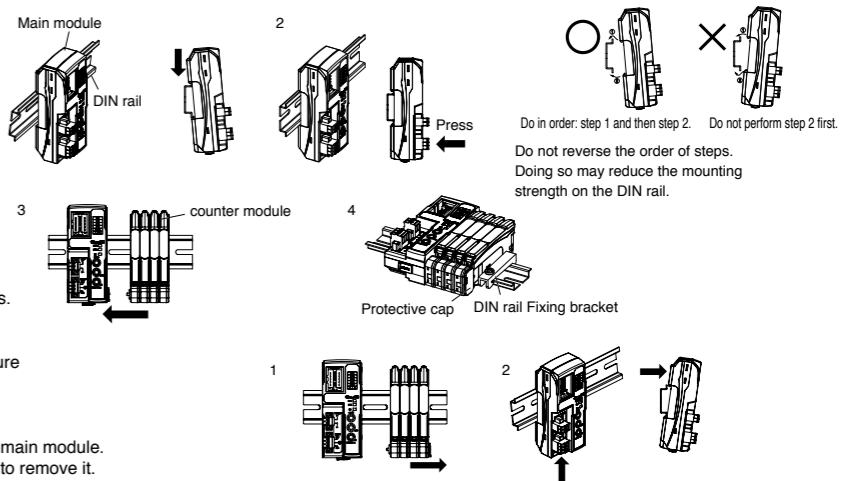
MG80 installation cautions

- 1. connecting the counter module
Unlock the slide lock of the counter module to be connected. Connect the interface module and counter module connectors, then return the upper and lower slide locks to their original positions to lock them.
- 2. Mounting on DIN rail
This product is compatible with 35 mm wide DIN rails. When shipped from the factory, the tabs on DIN rail fixing lever are Locked. Align the upper side of the groove on the back of the module with the upper side of DIN rail, and push the module into place until it clicks into place so that the lower side fits into DIN rail.
- 3. Removal from DIN rail
While holding the entire unit so that it does not fall, pull down the DIN rail fixing levers on all modules until they click into place.



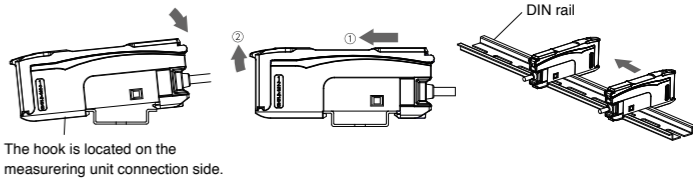
MG50 installation cautions

- Installation
1. Place the top part of the module onto the DIN rail.
2. Press the bottom part of the module onto the DIN rail.
3. 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.
4. 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
1. Slide the counter modules apart to separate them from the main module.
2. Press in on the Main module toward the DIN rail and lift up to remove it.



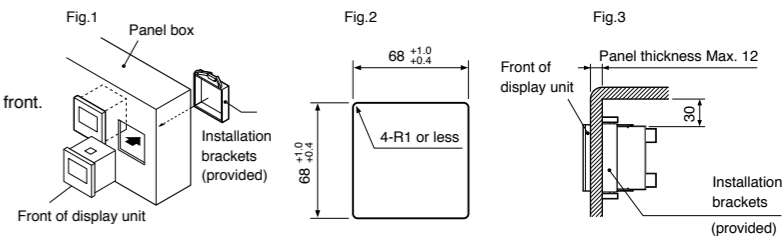
MF10 installation cautions

- Mounting on Din rail
1. Let the hook on the underside of the indicator catch the DIN rail track.
2. Push the module until the hook clicks into place.
 - Removal from DIN rail
1. Push the module in the direction 1.
2. 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.



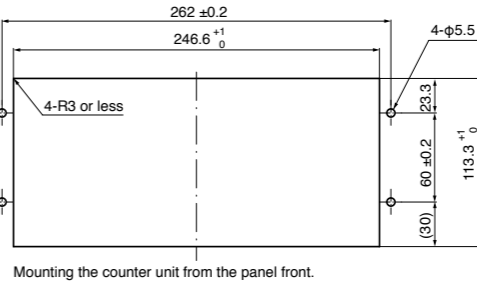
LT10A/11A/30 installation cautions

- When mounting in a panel
1. Cut out an opening to match the dimensions shown (Fig. 2).
2. Insert the counter unit into the cut-out opening in the panel from the front.
3. Attach the supplied counter stopper from the rear.
4. 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)

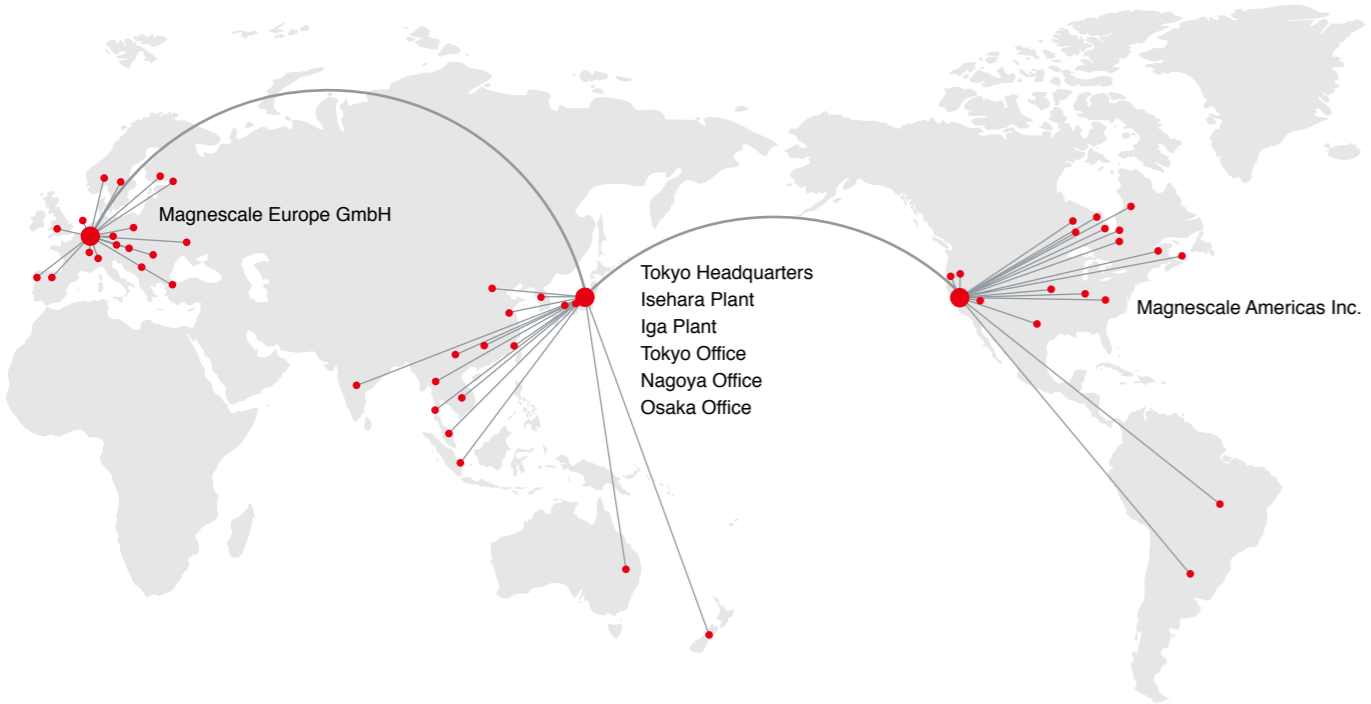


LY71/72 installation cautions

Panel cut-out diagram



Unit: mm



Offices

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•Finland	•Sweden	•Poland	•Taiwan, 2 companies	•Thailand, 2 companies	•Canada, 2 companies
•Spain	•Bulgaria	•Turkey, 2 companies	•Korea	•Malaysia	•Argentina
•Italy	•Denmark	•Switzerland	•Vietnam	•India, 2 companies	•Brazil
•Portugal	•France, 2 companies	•Austria, 2 companies	•Indonesia, 2 companies	•Philippines	

No compromise for high-accuracy products

The total quality control system that operates throughout the entire design and production process ensures products with enhanced safety, high quality, and high reliability that match our customers' requirements. The company is certified for length calibration in compliance with the traceability system required by the "Weights and Measures Act," and has been granted ISO 9001 certification, which is the international standard for quality assurance. In addition, we have introduced the highest level EMC (Electromagnetic Compatibility) testing equipment to address the noise problem that is becoming increasingly regulated around the world, and we are taking all possible measures to control quality.



Our products comply with CE/UKCA requirements, have acquired UL certifications and meet other international standards and regulations.

We have met:

- CE/UKCA Marking (EMC Directives) EMI : EN/BS 61000-6-4, EMS : EN/BS 61000-6-2
- CE/UKCA Marking (RoHS Directives) EN/BS 63000
- FCC regulation FCC Part 15 Subpart B Class A
- ICES regulation ICES-003 Class A
- EMS : EN/BS 61000-6-2

for Products with built-in AC power supply:	for Products with Laser:
● UL/cUL 61010-1 ● EN/BS 61010-1	● DHHS (21CFR1040.10) ● EN/BS 60825-1 ● JIS C 6802

*When using in equipment subject to conformity with Safety of Machinery - Electrical Appliances in Machinery (EN60204-1) applies, please use the device only after taking steps to comply with the standard.
*Please note that some products may have different standards or may not have been certified in all areas, so please check with our sales department before purchasing.