Magnescale

SPEED X PRECISION

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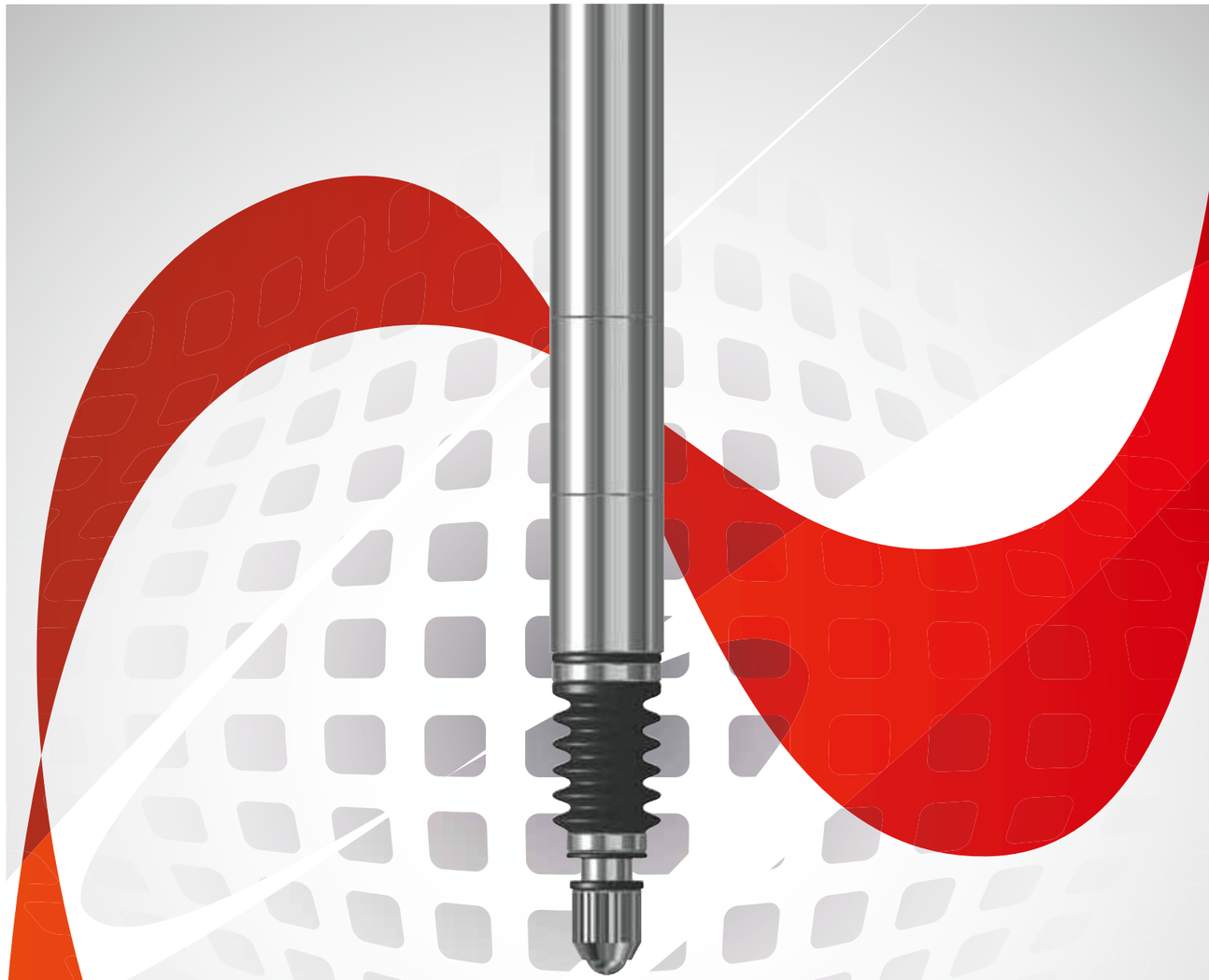
Magnescale

SPEED X PRECISION

Digital Gauge General Catalog



Digital Gauge

Magnescale Co., Ltd.

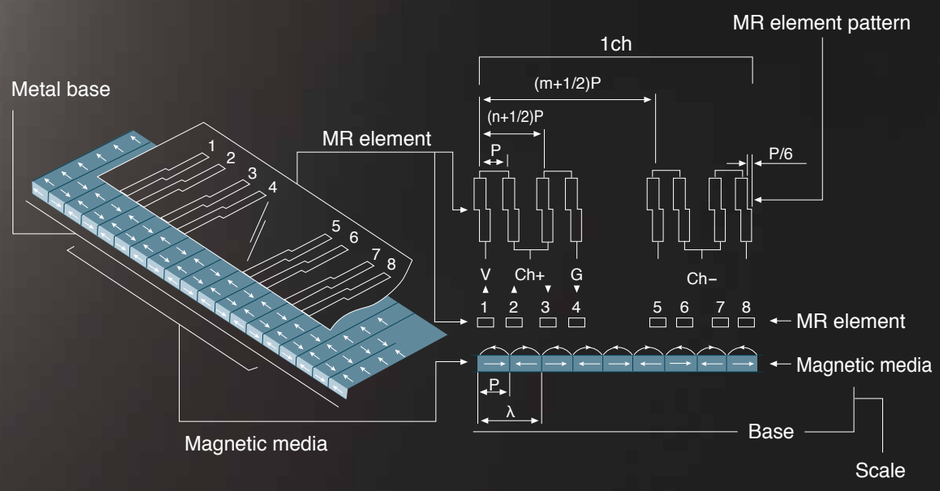
摺動力

Magnescale's advanced ball-spline construction allows for smoother measurements while also increasing side-load capacity, torsion resistance and performance up to 60 million strokes.

This innovative new construction allows for high precision measurements even in the most severe environments.

This is the new DK-S Series.

Conceptual diagram



Magnescale magnetic technology diagram

Digital Gauge Features & Superiority

DK SERIES
Digital Gauge

DK800S Series

Adapts bearings of new construction superior in sliding force and durability. It has slim shape whose main body size is φ8 mm and is high-precision digital gauge suitable for automatic measurements.

- Achieved number of strokes: 60 million
- Maximum resolution: 0.1 μm
- Response Speed: 250 m/min (at resolution of 0.5 μm)
- Adopt: High-flex cable (standard)
- Adopt: IP67 rating with bellows
- Linear encoder technology allows high precision measuring over the entire range.

DK Series

High rigidity Φ20mm body is suitable for harsh environments. Also, it enables high response speed in automatic measurements.

- According to varied materials to be measured, measuring force can be selected.
- Available in lengths up to 205mm with 0.5μm resolution.
- Magnetic feeler tips equipped as standard make it easy to integrate into machines. (DK155/205)
- High-flex cable (standard): 250 m/min (at resolution of 0.5 μm)
- High-flex cable (standard)
- Linear encoder technology allows high precision measuring over the entire range.

DT SERIES
Digital Gauge

Easy integration into machines with compact square body.

- Compact size and high rigidity

It is suitable for general purpose and automatic measurements.

LT SERIES
Counter

Compact LT Series counters of DIN size

- Current, maximum and minimum, and P-P value measuring function
- Comparator
- 2-axis ADD/SUB function
- BCD/RS-232C input/output
- Reference point function

LY SERIES
Counter

Multifunctional counters

- Optional expansion boards available (LY71)
- BCD output(LY71)
- Comparator(Relay,open collector output) (LY71)
- RS232-C Output (LY72)

MG SERIES
Interface Network

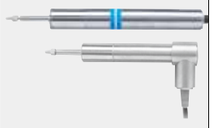
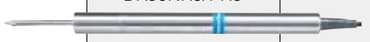
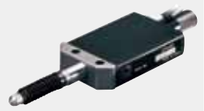
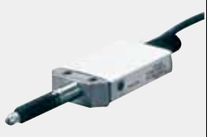
Multipoint measurement
Intelligent Network Systems: MG40 series

- Equipped with Ethernet interface as standard and supporting CC-Link

Unit: MG10/20/30 series

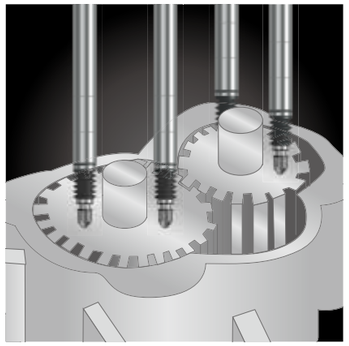
- Equipped with RS-232C interface as standard

Lineup

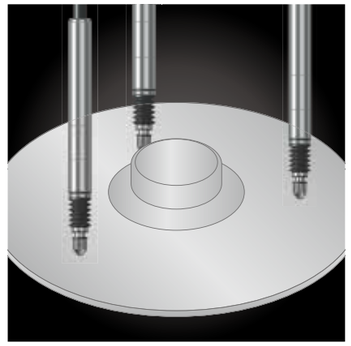
Measuring range / Resolution	5 mm	10 mm	12 mm	25 mm	30 mm	32 mm	50 mm	100 mm	110 mm	155 mm	205 mm
0.1 µm	DK805SAR/SALR DK805SAFR/SAFLR DK805SBR/SBLR DK805SBFR/SBFLR  P.12		DK812SAR/SALR DK812SAFR/SAFLR DK812SAVR DK812SBR/SBLR DK812SBFR/SBFLR DK812SBVR  P.13		DK830SR/SLR/SVR  P.14						
0.5 µm	DK805SAR5/SALR5 DK805SAFR5/SAFLR5 DK805SBR5/SBLR5 DK805SBFR5/SBFLR5  P.12	DK10NR5/PR5/PLR5  P.15	DK812SAR5/SALR5 DK812SAFR5/SAFLR5 DK812SAVR5 DK812SBR5/SBLR5 DK812SBFR5/SBFLR5 DK812SBVR5  P.13	DK25NR5/PR5 /NLR5/PLR5  P.15			DK50NR5/PR5  P.16	DK100NR5/PR5  P.16	 DK110NLR5 (Stand and balancer are optional.) P.18	DK155PR5  P.17	DK205PR5 P.17
1 µm			DT512N/P  P.20								
5 µm			DT12N/P  P.20			DT32N/NV/P/PV  P.21					

Application

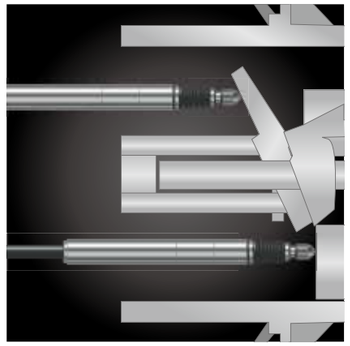
Height, flatness, and inclination measurements



Assembled part measurement and shim selection



Flatness measurement of compact motors



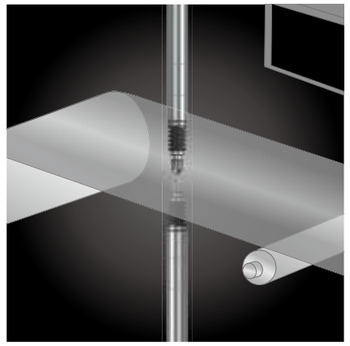
Thickness and Flexure measurement measurement of compressor parts

- Φ8mm 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.

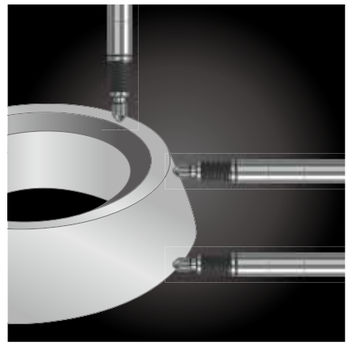
Others

- 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.

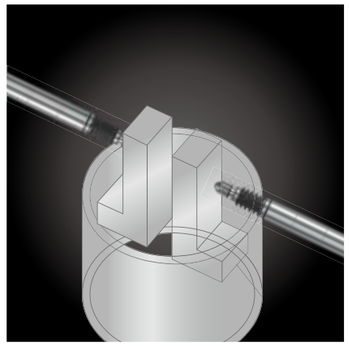
Thickness and inner and outer diameter measurements



Film thickness measurement



Tapered roller bearing measurement



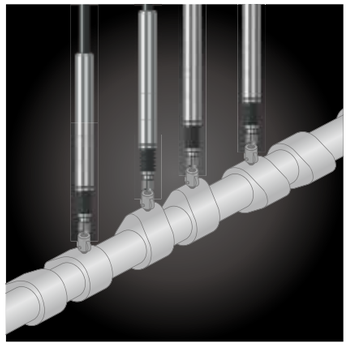
Bearing inner diameter measurement

- Digital measurement system assures full-stroke accuracy and supports multiproduct lines.
- Magnetic technology ensures consistent measurements, even in harsh environments.
- The DK-S Series has been achieved 60 million strokes, ensuring years of service.

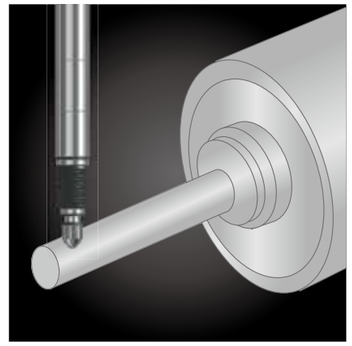
Others

- 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.

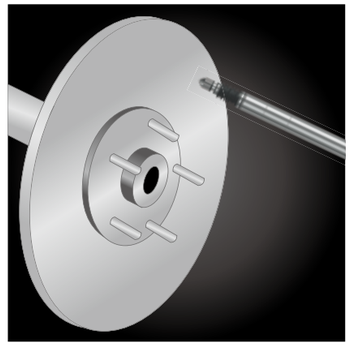
Deflection and shape measurement



Cam shaft run-out and shape measurement



Motor shaft run-out measurement



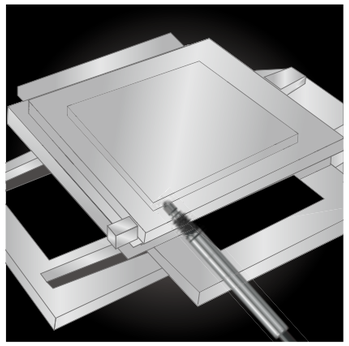
Disk run-out measurement

- The new construction of spindle bearings increases both side-load capacity and torque resistance.
- Digital data output allows for real-time measurements.
- The DK-S Series has been achieved 60 million strokes, ensuring years of service.

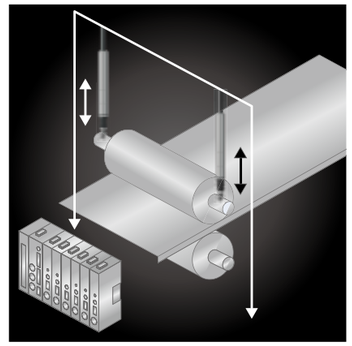
Others

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

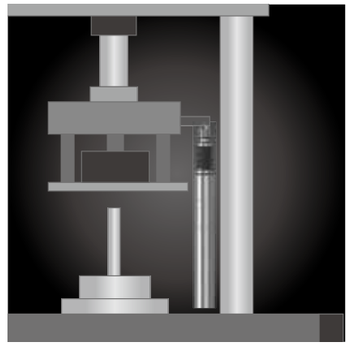
Displacement and stop position measurement



Work alignment measurement



Roller-to-roller gap measurement



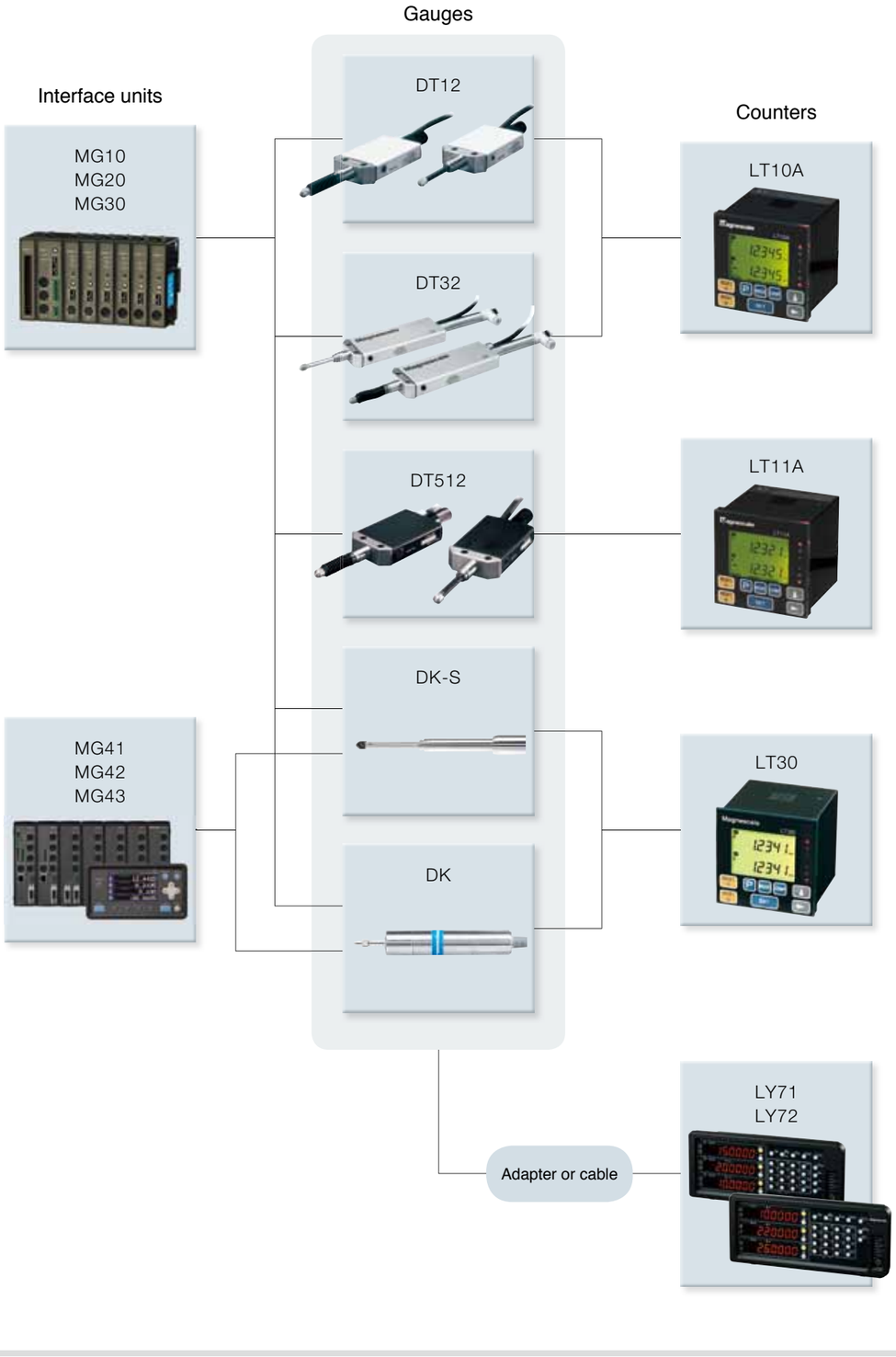
Pressing machine's or injection molding machine's stop position measurement

- 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.

System



Gauges

Description of digital gauge model

DK8○○S△▲□R★

- [Stroke]
  - 05 : 5mm
  - 12 : 12mm
  - 30 : 30mm
- [Resolution]
  - No symbol : 0.1 μm
  - 5 : 0.5 μm
- [With reference point]
- [Shape]
  - No symbol : straight
  - L : right angle
  - V : pneumatic push
- [Stem shape]
  - No symbol : φ8-mm straight
  - F : flange type
- [Minimum phase difference]
  - No symbol : DK830 Series (50 ns)
  - A : 50ns
  - B : 100ns
- [Ball spline model]
- [Stem diameter]
  - φ8mm

DK○○○□R5

- [Resolution]
  - 5 : 0.5 μm
- [With reference point]
- [Protection grade]
  - N : IP50
  - P : IP64
- [Measurement range]

* For the DK110 Series, see the specifications sheet.

DT○○○△▲

- [Spindle drive system]
  - No symbol : Spring push-out
  - V : pneumatic push (DT32 only)
- [Protection grade]
  - N : IP50
  - P : IP64
- [Measurement range]
  - 12 : 12mm
  - 32 : 32mm
  - 512 : 12mm, high-precision type

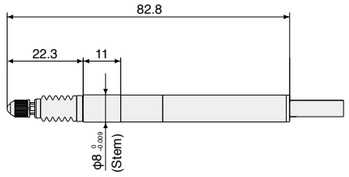
DK805S	12
DK812S	13
DK830S	14
DK10/25	15
DK50/100	16
DK155/205	17
DK110	18
DT512/12	20
DT32	21
MT12/13/14	22
U Series	23

DK DK805S

Resolution 0.1μm | Resolution 0.5μm | Stem φ8 | Stroke 5mm | Output A/B phase

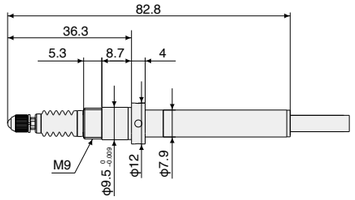
* DK805SAR/DK805SAR5/DK805SBR/DK805SBR5

DK805SAR/DK805SAR5
DK805SBR/DK805SBR5

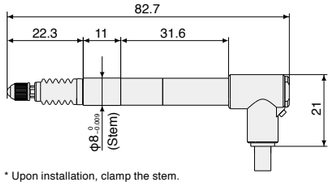


* Upon installation, clamp the stem.

DK805SAFR/DK805SAFR5
DK805SBFR/DK805SBFR5

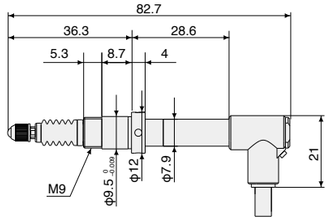


DK805SALR/DK805SALR5
DK805SBLR/DK805SBLR5



* Upon installation, clamp the stem.

DK805SAFLR/DK805SAFLR5
DK805SBFLR/DK805SBFLR5



Unit: mm

DK805S Gauge | CE29 Cable | LY71,LY72 Counter | LT30 Counter | MG20-DK I/F unit | MG41,42 I/F unit

Specifications

Model	High-resolution models		General-purpose resolution models	
	DK805SAR, DK805SALR DK805SAFR, DK805SAFLR	DK805SBR, DK805SBLR DK805SBFR, DK805SBFLR	DK805SAR5, DK805SALR5 DK805SAFR5, DK805SAFLR5	DK805SBR5, DK805SBLR5 DK805SBFR5, DK805SBFLR5
Measuring range	5 mm			
Maximum resolution	0.1 μm		0.5 μm	
Accuracy (at 20°C/68°F)	1 μm		1.5 μm	
Measuring force (at 20°C/68°F)	Upward: 0.35±0.25 N Horizontal: 0.40±0.25 N Downward: 0.45±0.25 N			
Maximum response speed	80 m/min	42 m/min	250 m/min	100 m/min
Reference point	Position at 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 Vacuum suction (DK805SALR/SAFLR/SBLR/SBFLR/SALR5/SAFLR5/SBLR5/SBFLR5)			
Number of cycles tested*1	60 million			
Protection grade*2	Straight model: IP66, right-angle model: IP64 (IP67*3)			
Vibration resistance	20 to 2000 Hz 100 m/s²			
Impact resistance	1000 m/s² 11 ms			
Operating temperature	0 to 50 °C			
Storage temperature	–20 to 60 °C			
Power supply	5 VDC±5 %			
Power consumption	1 W			
Mass*4	Approx. 30 g			
Output cable length	2.4 m			
Feeler	Carbide ball tip, Mounting screw M2.5		Steel ball tip, Mounting screw M2.5	
Accessories	Instruction Manual, +P M4 × 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			

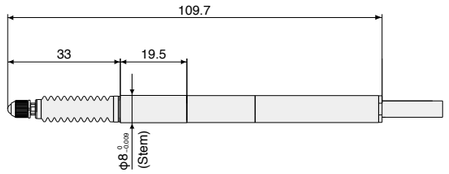
*1 Under specific test conditions defined by Magnescale Co., Ltd. *2 Excluding the interpolation box and connector
*3 When φ4 mm tube is connected for right-angle model *4 Excluding cable section and interpolation box

DK DK812S

Resolution 0.1μm | Resolution 0.5μm | Stem φ8 | Stroke 12mm | Output A/B phase

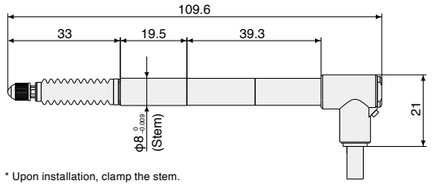
* DK812SAR/DK812SAR5/DK812SBR/DK812SBR5

DK812SAR/DK812SAR5
DK812SBR/DK812SBR5



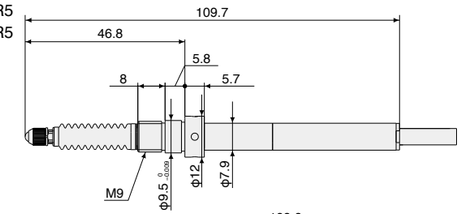
* Upon installation, clamp the stem.

DK812SALR/DK812SALR5
DK812SBLR/DK812SBLR5

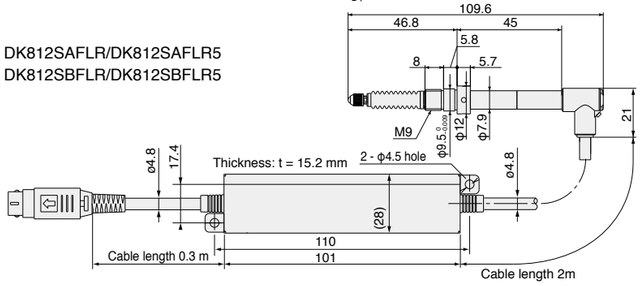


* Upon installation, clamp the stem.

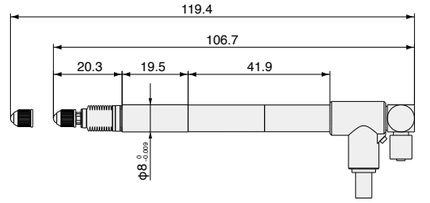
DK812SAFR/DK812SAFR5
DK812SBFR/DK812SBFR5



DK812SAFLR/DK812SAFLR5
DK812SBFLR/DK812SBFLR5



DK812SAVR/DK812SAVR5
DK812SBVR/DK812SBVR5
(Pneumatic push model)



* Upon installation, clamp the stem.

Unit: mm

DK812S Gauge | CE29 Cable | LY71,LY72 Counter | LT30 Counter | MG20-DK I/F unit | MG41,42 I/F unit

Specifications

Model	High-resolution models		General-purpose resolution models	
	DK812SAR, DK812SALR DK812SAFR, DK812SAFLR DK812SAVR	DK812SBR, DK812SBLR DK812SBFR, DK812SBFLR DK812SBVR	DK812SAR5, DK812SALR5 DK812SAFR5, DK812SAFLR5 DK812SAVR5	DK812SBR5, DK812SBLR5 DK812SBFR5, DK812SBFLR5 DK812SBVR5
Measuring range	12 mm			
Maximum resolution	0.1 μm		0.5 μm	
Accuracy (at 20°C/68°F)	1 μm		1.5 μm	
Measuring force (at 20°C/68°F)	Upward: 0.4±0.3 N Horizontal: 0.5±0.3 N Downward: 0.6±0.3 N	0.6±0.5 N (Pneumatic push type) 0.7±0.5 N (Pneumatic push type) 0.8±0.5 N (Pneumatic push type)		
Maximum response speed	80 m/min	42 m/min	250 m/min	100 m/min
Reference point	Position at 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 Pneumatic push (DK812SAVR/SBVR/SAVR5/SBVR5) Vacuum suction (DK812SALR/SAFLR/SBLR/SBFLR/SALR5/SAFLR5/SBLR5/SBFLR5)			
Number of strokes*1	60 million			
Protection grade*2	Straight model: IP66, right-angle model: IP64 (IP67*3)			
Vibration resistance	20 to 2000 Hz 100 m/s²			
Impact resistance	1000 m/s² 11 ms			
Operating temperature	0 to 50 °C			
Storage temperature	–20 to 60 °C			
Power supply	5 VDC±5 %			
Power consumption	1 W			
Mass*4	Approx. 30 g			
Output cable length	2.4 m			
Feeler	Carbide ball tip, Mounting screw M2.5		Steel ball tip, Mounting screw M2.5	
Accessories	Instruction Manual, +P M4 × 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			

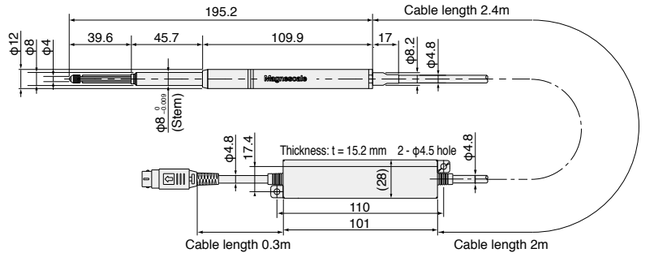
*1 Under specific test conditions defined by Magnescale Co., Ltd. Pueumatic push Model: 30 million time *2 Excluding the interpolation box and connector
*3 When φ4 mm tube is connected for right-angle model *4 Excluding cable section and interpolation box

DK DK830S

Resolution 0.1μm | Stem φ8 | Stroke 30mm | Output A/B phase

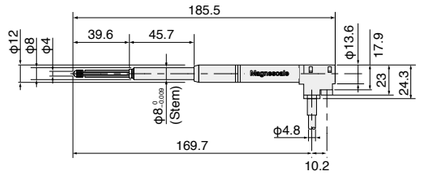
* DK830SR

DK830SR



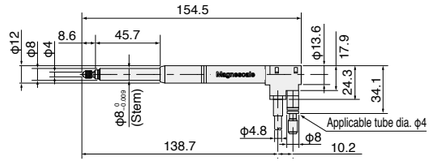
* Upon installation, clamp the stem.

DK830SLR



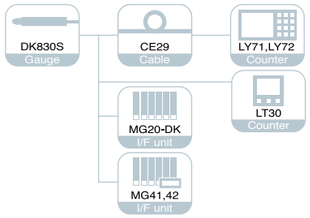
* Upon installation, clamp the stem.

DK830SVR



* Upon installation, clamp the stem.

Unit: mm



Specifications

Model	Straight model	Right angle model	Pneumatic push type
	DK830SR	DK830SLR	DK830SVR
Measuring range	30 mm		
Maximum resolution	0.1 μm (0.5 μm resolution can also be selectable as special specifications.)		
Accuracy (at 20°C/68°F)	1.3 μm		1.7 μm
Measuring force (at 20°C/68°F)	Upward: 0.5±0.35 N Horizontal: 0.6±0.35 N Downward: 0.7±0.35 N		Upward: 0.5±0.35 N Horizontal: 0.6±0.35 N Downward: 0.7±0.35 N
Maximum response speed	80 m/min		
Reference point	Position at spindle movement of 1mm		
Reference-point response speed	Same as the noted maximum response speed		
Output	A/B/reference poin Voltage-differential line driver output (conforming to EIA-422)		
Spindle drive system	Spring push		Pneumatic push
Achieved number of strokes*1	60 million		30 million
Protection grade*2	IP53	IP53/IP67*3	
Vibration resistance	20 to 2000 Hz 100 m/s²		
Impact resistance	1000 m/s² 11 ms		
Operating temperature	0 °C to 50 °C		
Storage temperature	–20 °C to 60 °C		
Power supply	5 VDC±5 %		
Power consumption	1 W		
Mass*4	Approx. 70 g		Approx. 80 g
Output cable length	2.4 m		
Feeler	Carbide ball tip, Mounting screw M2.5		
Accessories	Instruction Manual, +P M4 × 5 screw (2pc)		

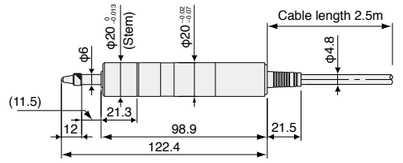
*1 Under specific test conditions defined by Magnescale Co., Ltd. *2 Excluding the interpolation box and connector
*3 When the bellows set (optional accuracy) is mounted *4 Excluding cable section and interpolation box

DK DK10/25

Resolution 0.5μm | Stem φ20 | Stroke 10mm | Stroke 25mm | Output A/B phase

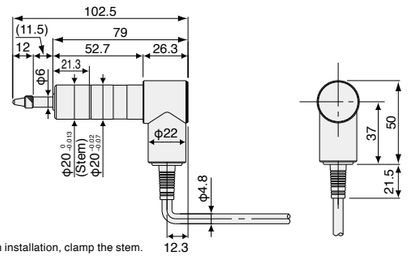
* DK50NR5/PR5

DK10NR5/PR5



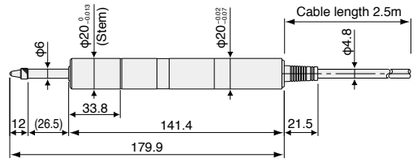
* Upon installation, clamp the stem.

DK10PLR5



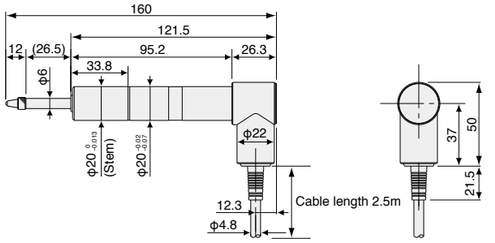
* Upon installation, clamp the stem.

DK25NR5/PR5



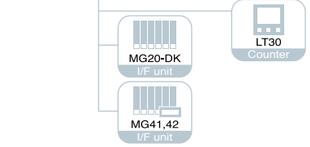
* Upon installation, clamp the stem.

DK25NLR5/PLR5



* Upon installation, clamp the stem.

Unit: mm



Specifications

Model	Standard model	Protected type model		Standard model	Protected type model	Standard model	Protected type model
	DK10NR5	DK10PR5	DK10PLR5	DK25NR5	DK25PR5	DK25NLR5	DK25PLR5
Measuring range	10 mm			25 mm			
Maximum resolution	0.5 μm						
Accuracy (at 20°C/68°F)	2 μm						
Measuring force (at 20°C/68°F)	Upward: 0.3±0.25 N Horizontal: 0.6±0.3 N Downward: 0.8±0.35 N	4.9 N or less		Upward: 0.4±0.3 N Horizontal: 0.7±0.35 N Downward: 1±0.4 N	4.9 N or less	Upward: 0.4±0.3 N Horizontal: 0.7±0.35 N Downward: 1±0.4 N	4.9 N or less
Maximum response speed	250 m/min						
Reference point	Position at spindle movement of 1 mm						
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*1	IP50	IP64		IP50	IP64	IP50	IP64
Vibration resistance	10 to 2000 Hz 150 m/s²						
Impact resistance	1500 m/s² 11 ms						
Operating temperature	0 to 50 °C						
Storage temperature	–20 to 60 °C						
Power supply	5 VDC±5 %						
Power consumption	1 W						
Mass*2	Approx. 230 g			Approx. 300 g			
Output cable length	2.4 m						
Feeler	Carbide ball tip, Mounting screw M2.5						
Accessories	Instruction Manual, +P M4 × 5 screw (2pc)						

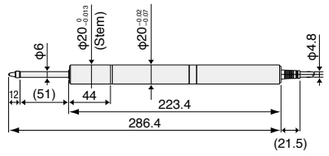
*1 Excluding the interpolation box and connector
*2 Excluding cable section and interpolation box

DK DK50/100

Resolution 0.5μm | Stem ϕ20 | Stroke 50mm | Stroke 100mm | Output A/B phase

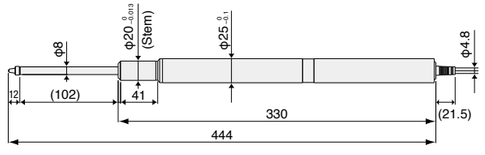
* DK50NR5/PR5

DK50NR5/PR5



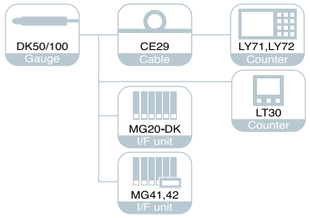
* Upon installation, clamp the stem.

DK100NR5/PR5



* Upon installation, clamp the stem.

Unit: mm



Specifications

Model	Standard model	Protected type model	Standard model	Protected type model
	DK50NR5	DK50PR5	DK100NR5	DK100PR5
Measuring range	50 mm		100 mm	
Maximum resolution	0.5 μm			
Accuracy (at 20°C/68°F)	2 μm		4 μm	
Measuring force (at 20°C/68°F)	Upward: – Horizontal: 0.9±0.4 N Downward: 1.3±0.5 N	6.2 N or less	Upward: – Horizontal: 1.8±0.65 N Downward: 2.7±0.55 N	9.3 N or less
Maximum response speed	250 m/min			
Reference point	Position at spindle movement of 1 mm			
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*1	IP50	IP64	IP50	IP64
Vibration resistance	10 to 2000 Hz 150 m/s²			
Impact resistance	1500 m/s² 11 ms			
Operating temperature	0 to 50 °C			
Storage temperature	–20 to 60 °C			
Power supply	5 VDC±5 %			
Power consumption	1 W			
Mass*2	Approx. 360 g		Approx. 630 g	
Output cable length	2.4 m			
Feeler	Carbide ball tip, Mounting screw M2.5			
Accessories	Instruction Manual, +P M4 × 5 screw (2pc)			

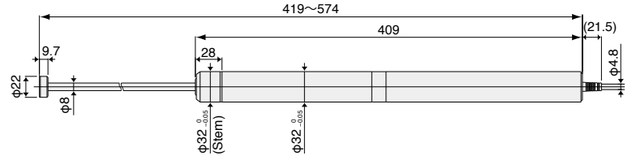
*1 Excluding the interpolation box and connector
*2 Excluding cable section and interpolation box

DK DK155/205

Resolution 0.5μm | Stem ϕ32 | Stroke 155mm | Stroke 205mm | Output A/B phase

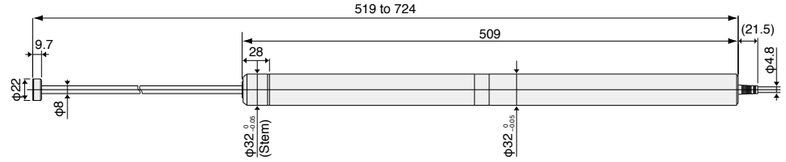
* DK155PR5

DK155PR5



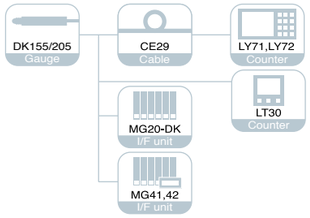
* Upon installation, clamp the stem.

DK205PR5



* Upon installation, clamp the stem.

Unit: mm



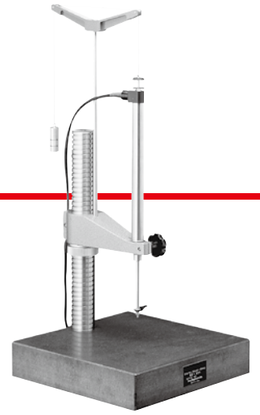
Specifications

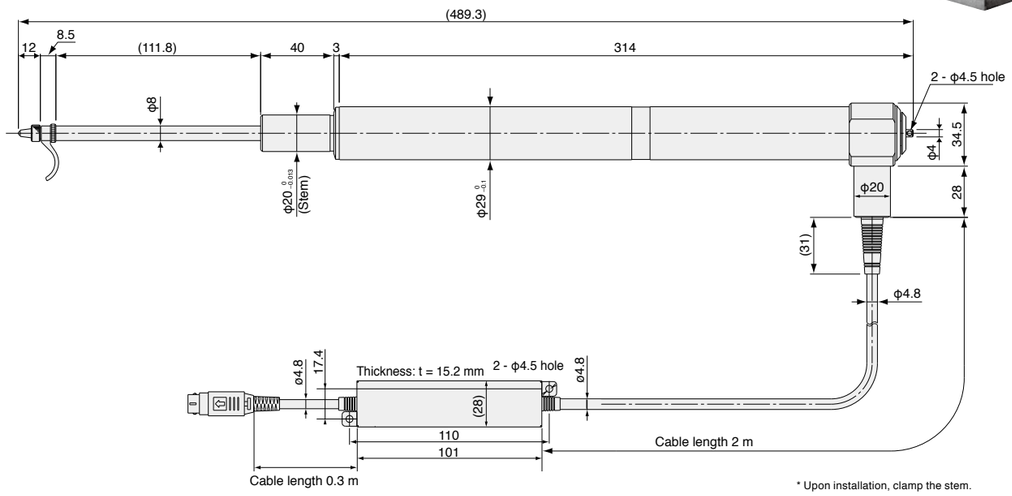
Model	DK155PR5	DK205PR5
Measuring range	155 mm	205 mm
Maximum resolution	0.5 μm	
Accuracy (at 20°C/68°F)	5 μm	6 μm
Maximum response speed	250 m/min	
Reference point	Position at spindle movement of 5 mm	
Reference-point response speed	Same as the noted maximum response speed	
Output	A/B/reference point Voltage-differential line driver output (conforming to EIA-422)	
Spindle drive system	None	
Protection grade*1	IP64	
Vibration resistance	10 to 2000 Hz 150 m/s²	
Impact resistance	1500 m/s² 11 ms	
Operating temperature	0 to 50 °C	
Storage temperature	–20 to 60 °C	
Power supply	5 VDC±5 %	
Power consumption	1 W	
Mass*2	Approx. 1100 g	Approx. 1300 g
Output cable length	2.4 m	
Surface to be measured	Soft magnetic material	
Magnetically attachable feeler	Magnetic attraction: 10 N, resistance against horizontal slip: 2.7 N, Provided with a ϕ4 mm carbide ball tip	
Spindle*3	ϕ8 mm, radial swing: 0.04 mm max.	
Accessories	Instruction Manual, +P M4 × 5 screw (2pc)	

*1 Excluding the interpolation box and connector
*2 Excluding cable section and interpolation box
*3 The spindle weighs about 400 g.

DK DK110

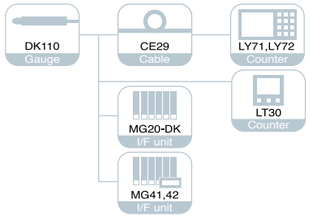
Resolution 0.5μm | Stem φ20 | Stroke 110mm | Output A/B phase





* Upon installation, clamp the stem.

Unit: mm



Specifications

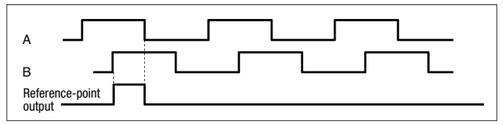
Model	DK110NLR5
Measuring range	110 mm
Maximum resolution	0.5 μm
Accuracy (at 20°C/68°F)	4 μm
Maximum response speed	250 m/min
Reference point	Position at spindle movement of 5 mm
Reference-point response speed	Same as the noted maximum response speed
Output	A/B/reference point Voltage-differential line driver output (conforming to EIA-422)
Spindle drive system	Spring push
Protection grade*1	IP50
Vibration resistance	10 to 2000 Hz 150 m/s²
Impact resistance	1500 m/s² 11 ms
Operating temperature	0 to 50 °C
Storage temperature	–20 to 60 °C
Power supply	5 VDC±5 %
Power consumption	1 W
Mass*2	Approx. 800 g
Output cable length	2.4 m
Feeler	Carbide ball tip, Mounting screw M2.5
Accessories	Instruction Manual, +P M4 × 5 screw (2pc), Lift lever DZ-161

*1 Excluding the interpolation box and connector

*2 Excluding cable section and interpolation box

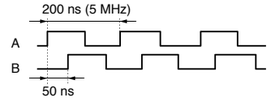
DK Series measuring unit output signals

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

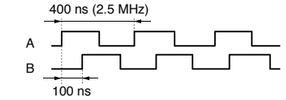


The reference point is synchronized with A and B phases at high impedance. (Note: this may not be worded correctly)

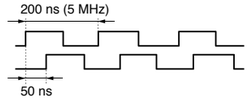
DK800SA output signal at maximum response speed (at approx. 80 m/min)



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



DK10/25/100/155/205/110 output signal at maximum response speed (at approx. 250 m/min)

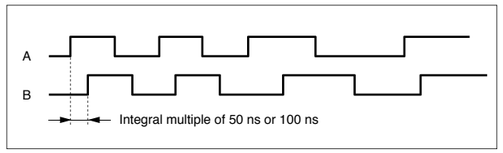


The A/B quadrature output signal by measuring unit is 5 MHz maximum with a minimum phase difference of 50 ns for DK800SA and is 2.5 MHz maximum with a minimum phase difference of 100 ns for DK800SB.
The counter or control devise capable of processing these signals should be used.

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 devise 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.

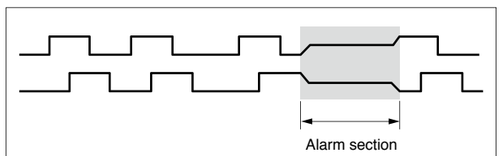


In the standard specifications, the minimum phase difference is fixed at 50 ns for the DK800SA and 100 ns for the DK800SB, however, the minimum phase differences in the following table below are available as special specifications.

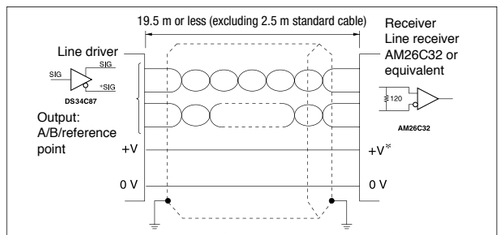
Phase A/B Minimum phase difference	Phase A single cycle	Counter's permissible frequency	Maximum response speed		Remarks
			Resolution 0.1 μm	Resolution 0.5 μm	
50ns	200ns	5MHz	80m/min	250m/min	DK800SA standard product
100ns	400ns	2.5MHz	42m/min	100m/min	DK800SB standard product
300ns	1.2μs	833kHz	14m/min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



*If extending the cable (Magnescale-specific cable), the supply voltage should be +5 V ±5% at the extension destination. *For an extension cable with spread-out end, use the CE22 Series.

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.

Fig. 1 Pneumatic circuit (pneumatic push)

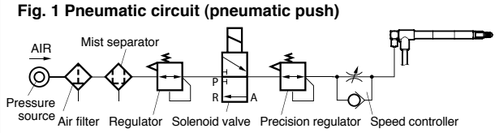
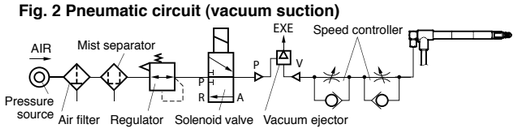


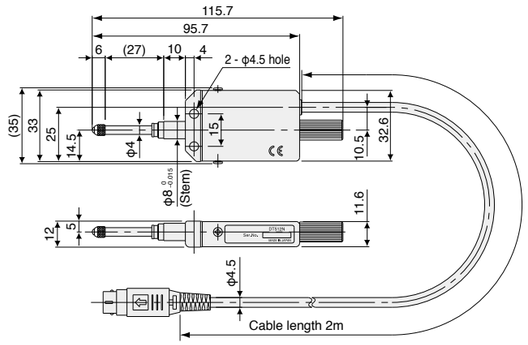
Fig. 2 Pneumatic circuit (vacuum suction)



DT DT512/12

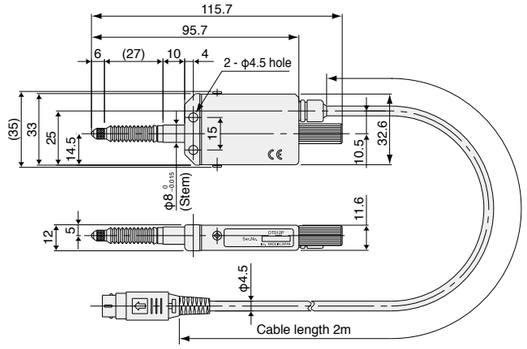
Resolution 1μm | Resolution 5μm | Stem φ8 | Stroke 12mm

DT512N/12N



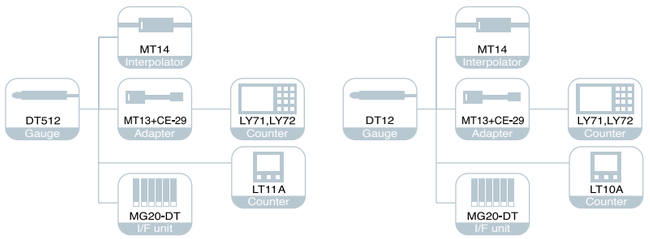
* Upon installation, clamp the stem.

DT512P/12P



* Upon installation, clamp the stem.

Unit: mm

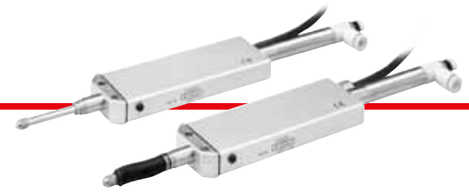


Specifications

Model	Standard model	Protected type model	Standard model	Protected type model
	DT512N	DT512P	DT12N	DT12P
Measuring range	12 mm			
Maximum resolution	1 μm		5 μm	
Accuracy (at 20°C/68°F)	6 μm		10 μm	
Measuring force (at 20°C/68°F)	Upward: 0.7±0.5 N Horizontal: 0.8±0.5 N Downward: 0.9±0.5 N	1.7 N or less in all directions	Upward: 0.7±0.5 N Horizontal: 0.8±0.5 N Downward: 0.9±0.5 N	1.7 N or less in all directions
Maximum response speed	Depending on unit to be connected			
Reference point	None			
Spindle drive system	Spring push-out			
Achieved number of strokes*1	5 million			
Protection grade*2	—	IP64 or equivalent	—	IP64 or equivalent
Operating temperature	0 to 50 °C			
Storage temperature	–10 to 60 °C			
Mass*3	Approx. 75 g	Approx. 80 g	Approx. 75 g	Approx. 80 g
Output cable length	2 m			
Feeler	Steel ball tip, Mounting screw M2.5			
Accessories	Instruction Manual			

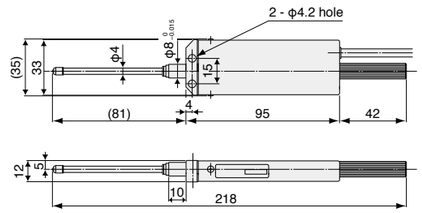
*1 Under specific test conditions defined by Magnescale Co., Ltd.
*2 Excluding the connector
*3 Excluding cable section

DT DT32



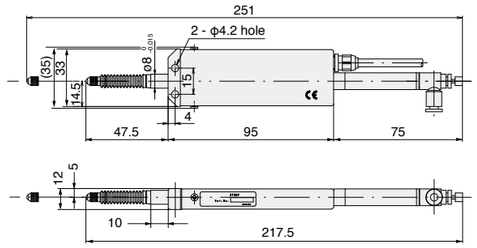
Resolution 5μm | Stem φ8 | Stroke 32mm

DT32N



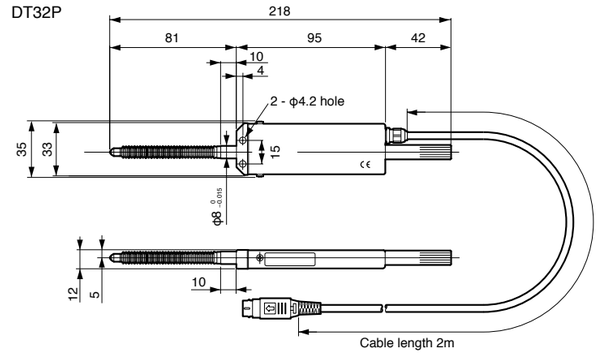
* Upon installation, clamp the stem.

DT32PV

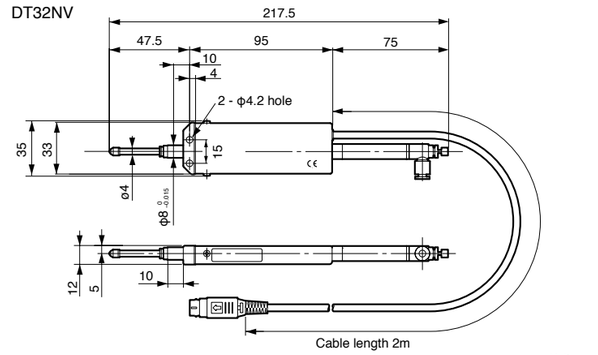


* Upon installation, clamp the stem.

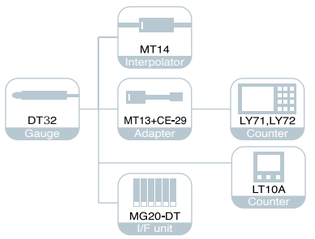
DT32P



DT32NV



Unit: mm



Specifications

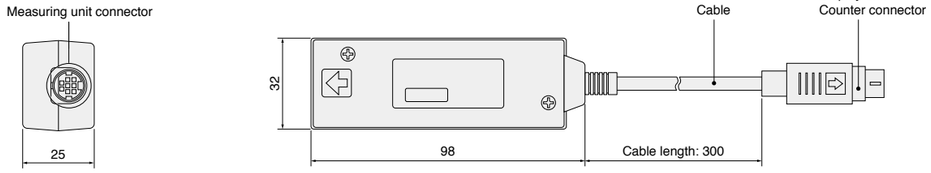
Model	Standard model		Protected type model	
	DT32N	DT32NV	DT32P	DT32PV
Measuring range	32 mm			
Maximum resolution	5 μm			
Accuracy (at 20°C/68°F)	10 μm			
Measuring force (at 20°C/68°F)	*1 Upward: 1.1±0.8 N Horizontal: 1.3±0.8 N Downward: 1.5±0.8 N		2.9 N or less in all directions	*2 9 N in all directions
Maximum response speed	Depending on unit to be connected			
Reference point	None			
Spindle drive system	Spring push-out	Pneumatic push	Spring push-out	Pneumatic push
Achieved number of strokes*3	5 million			
Protection grade*4	—		IP64 or equivalent	
Operating temperature	0 to 50 °C			
Storage temperature	–10 to 60 °C			
Mass*5	Approx. 120 g	Approx. 140 g	Approx. 120 g	Approx. 140 g
Output cable length	2 m			
Feeler	Provided with a steel ball tip, Mounting screw M2.5			
Accessories	Instruction Manual			

*1 At input air pressure of 1.96 × 105 Pa with speed controller open (DT32N) *2 At input air pressure of 2.35 × 105 Pa with speed controller open
*3 Based on the Magnescale-specified evaluation method *4 Excluding the connector *5 Excluding cable section

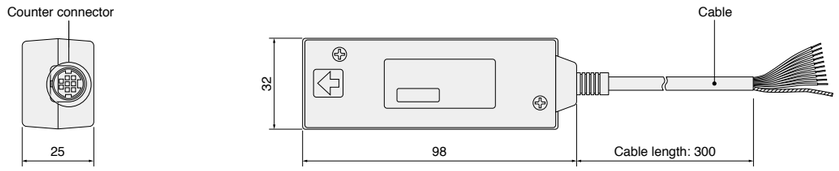
MT MT12/13/14

Output A/B phase

MT12 /13

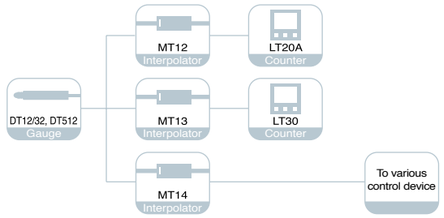


MT14



Unit: mm

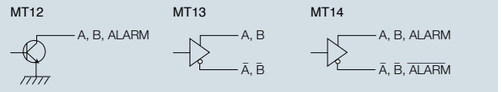
* Connection of the DT Series enables A/B phase output.



Phase difference for phase A/B output

Model	MT□□-01	MT□□-05	MT□□-10	Output phase difference (μs)
Velocity: v (m/min)	0< v ≤2.5	0< v ≤12.5	0< v ≤25	20
	2.5< v ≤6.25	12.5< v ≤31.25	25< v ≤62.5	8
	6.25< v ≤12	31.25< v ≤60	62.5< v ≤(100)*	5
	12< v ≤24	60< v ≤(100)*	—	2.5
	24< v ≤60	—	—	1
	60< v ≤(100)*	—	—	0.5

* An alarm is output at a traveling velocity of 100 to 115 m/min. The sampling frequency of the output signal is 120 μs.



Cable color MT12

Output signal: Phase A/B
Alarm output format: NPN open collector output (max. rated voltage: 31 V, max. rated current: 50 mA)

Pin no.	Description	Cable color
1	+5 V	Red
2	—	—
3	0 V	Black
4	A	Yellow
5	B	Blue
6	—	—
7	—	—
8	ALARM	Gray
9	0 V	Purple
10	0 V	Orange
Case	FG	Shield

* Connector used: Hosiden TCP8938 or equivalent product 0 V and the shield (FG) are connected via a capacitor. Nothing should be connected to cables with colors not found in this table.

Cable color MT13

Output signal: Phase A/B (The output becomes High impedance during an alarm.)
Output format: Voltage-differential line driver output (compliant with EIA-422)

Pin no.	Description	Cable color
1	+5 V	Purple
2	0 V	Black
3	A	Blue
4	Ā	Yellow
5	B	Orange
6	B̄	Gray
7	—	—
8	—	—
Case	FG	Shield

* Connector used: Hosiden TCP6182 or equivalent product 0 V and the shield (FG) are connected via a capacitor. Nothing should be connected to cables with colors not found in this table.

Cable color MT14

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)

Description	Cable color
+5 V	Red
0 V	White
0 V	Brown
0 V	Black
A	Yellow
Ā	Blue
B	Gray
B̄	Orange
ALARM	Purple
ALARM	Green
FG	Shield

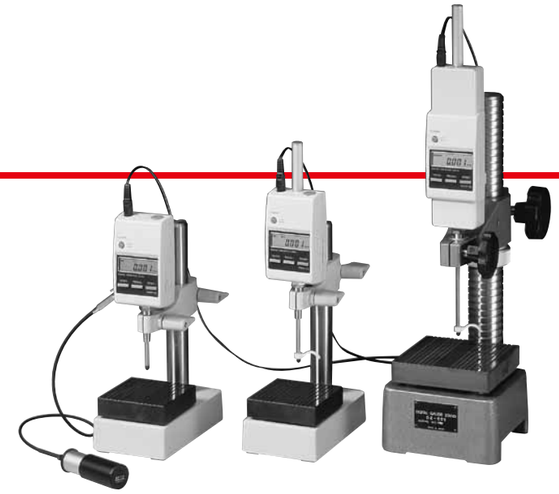
* 0 V and the shield (FG) are connected with a capacitor.

Specifications

Model	MT12-05	MT12-10	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	5 μm	10 μm	1 μm	5 μm	10 μm	1 μm	5 μm	10 μm
Power voltage	5 VDC±5 %							
Power consumption	0.9 W		1.2 W (when output load of 120Ω is connected)					
Output format	Open collector		A/B Voltage-differential line driver					
Operating temperature and humidity range	0 to 50 °C (No condensation)							
Storage temperature and humidity range	–10 to 60 °C (20 to 90 %RH)							
Mass	Approx. 90 g							

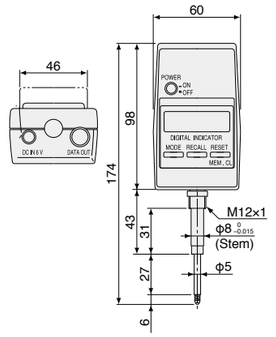
U U Series

Resolution 1μm | Stem φ8 | Stroke 12mm | Stroke 30mm | Stroke 60mm | Output RS-232C

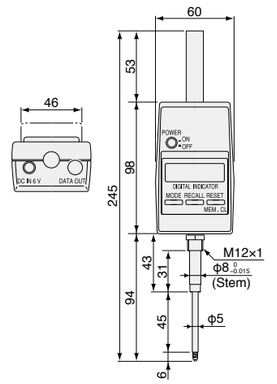


* Set bushing DZ-811 (optional) is required to use U60B with gauging stand DZ-501.
* The air release and the gauging stand are optional accessories.

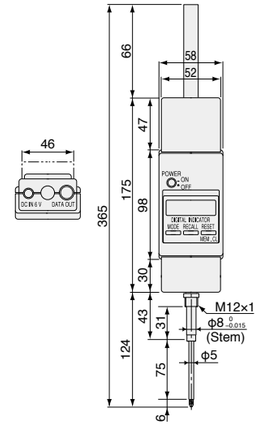
U12B



U30B



U60B



Unit: mm

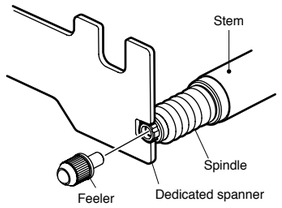
Specifications

Model	U12B	U30B	U60B
Measuring range	12 mm	30 mm	60 mm
Maximum resolution	1 μm		
Accuracy (at 20°C/68°F)	2 μm		3 μm
Measuring force (at 20°C/68°F)	1.3 N or less	1.5 N or less	2.2 N or less
Travel length of the release	Full stroke		32 mm
Display	LCD display element (6 digits, minus display)		
Maximum response speed	0.4 m/s (24 m/min)		
Operating temperature	0 to 40°C (no condensation)		
Storage temperature	–10 to 50°C (no condensation)		
Power supply	6 VDC±10 % (With DC IN jack) 6 to 9 VDC±10 % (With data conecctor used)		
Power consumption	1 W		
Mass	Approx. 190 g	Approx. 230 g	Approx. 300 g
Feeler	Carbide ball tip, Mounting screw M2.5		
Accessories	Instruction Manual, AC adapter available (We DO NOT provide an AC adaptor with these.), lift lever, and dedicated spanner		

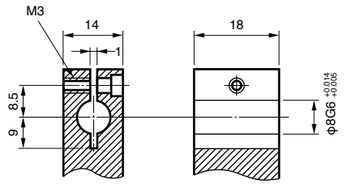
Installation

DK812S installation cautions

Feeler installation/removal method



Mounting holder dimensions and tolerance

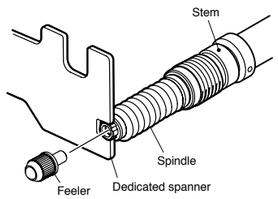


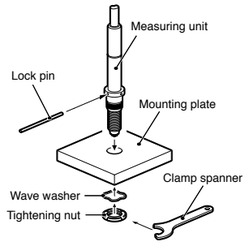
Tightening torque: 0.6 N·m
Material: In case of SUS303

Unit: mm

DK812SF installation cautions

Feeler installation/removal method

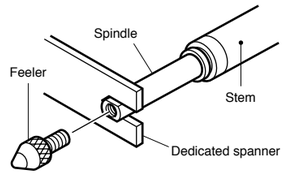




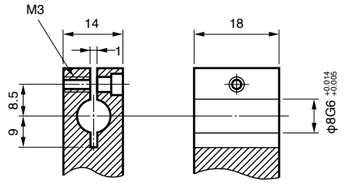
- The recommended value of measuring unit mounting hole is ϕ9.7 ±0.15 mm.
- The mounting thickness is as follows:
  DK812SF Series: 7 to 11 mm
  DK805SF Series: 9 to 11 mm
- Mounting parallelism affects measurement accuracy.
- Adjust the squareness to the surface to be measured or parallelism with respect to traveling to 0.02 mm/14 mm or less.

DK830 installation cautions

Feeler installation/removal method



Mounting holder dimensions and tolerance

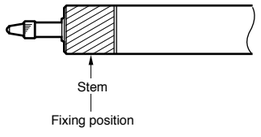


Tightening torque: 0.6 N·m
Material: In case of SUS303

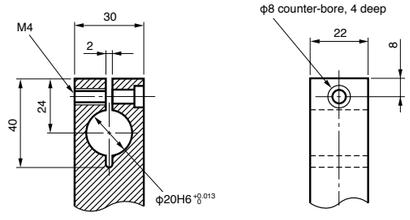
Unit: mm

DK10/25 installation cautions

Mounting/fixing position



Mounting holder configuration dimensions (for reference)

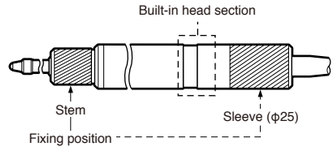


Tightening torque: 4 N·m
Hex. socket head bolt M4 is used.

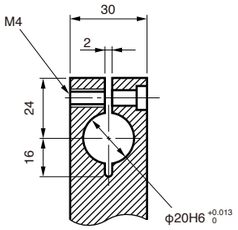
Unit: mm

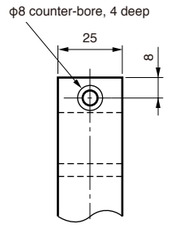
DK50/100 installation cautions

Mounting/fixing position



Mounting holder configuration dimensions (for reference)



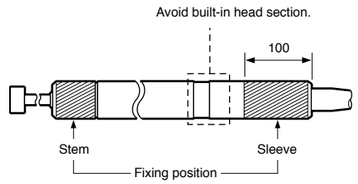


Tightening torque: 4 N·m
Hex. socket head bolt M4 is used.

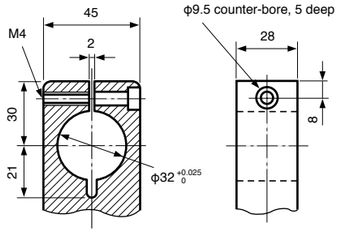
Unit: mm

DK155/DK205 installation cautions

Mounting/fixing position



Mounting holder configuration dimensions (for reference)



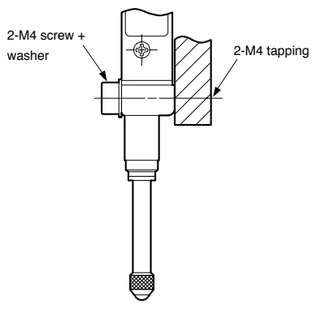
Tightening torque: 6 N·m
Hex. socket head bolt M5 is used.

Unit: mm

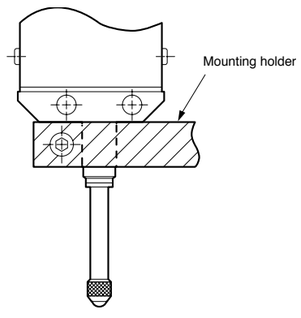
Unit: mm

DT12/512/32 installation cautions

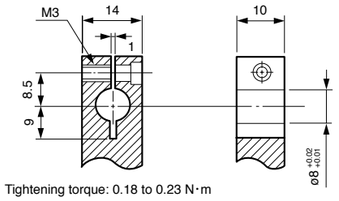
Mounting method using mounting hole



Mounting method using holder



Mounting holder dimensions and tolerance



Tightening torque: 0.18 to 0.23 N·m
Material: In case of S45C

Unit: mm

Interface unit

MG40 Series 28

MG10/20/30 29

MG MG40 Series

Communication Ethernet | Communication CC-Link

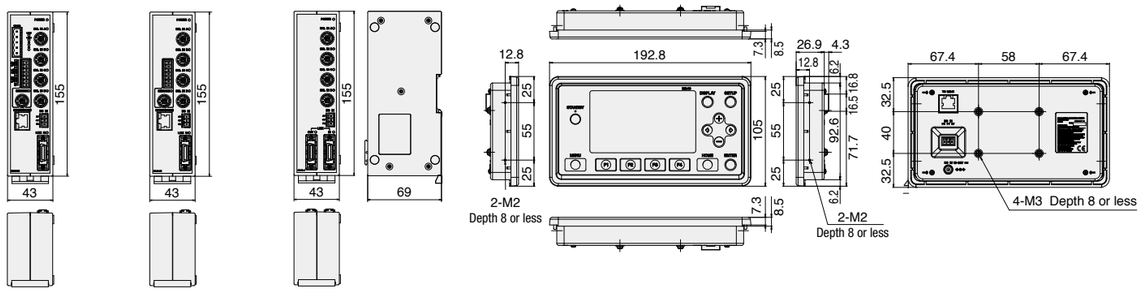
Main unit MG41-NC (for CC-Link, Ethernet)

Main unit MG41-NE (for Ethernet)

Hub unit MG42

* Common to MG41-NC and MG41-NE

Display unit MG43



Link cable MZ41-R5(0.5 m), MZ41-R01(1 m), MZ41-R5(5 m)MZ41-10(10 m)

Unit: mm

Specifications

Item		Conditions, etc.	Description					Remarks
Communication method			MG41-NC (CC-Link/Ethernet incorporated) / MG41-NE (Ethernet incorporated) / MG42-4 (hub unit)					
No. of connectable measuring units		Entire system	1 to 100 units (Connection of 101th unit and later disabled)					Up to 24 connected MG42 hub units
		MG41 main unit MG42 hub unit	0 to 4 units					
Connectable measuring units			DK800S, DK830S, DK800A/DK800B Series, DK10, DK25, DK50, DK100, DK110, DK155, DK205					
Connection cable length			MG41 main unit to MG42 hub unit, MG42 total cable length to MG42 hub unit: 0.5 m, 1 m, 2 m, 5 m, 10 m Total cable length from MG41 main unit: 30 m max. (Max. current: 4 A or less)					Connection cable MZ41-** (optional)
Resolution			Settable output data resolution and display resolution					
	Measuring unit resolution	0.1 μm	0.1 μm	0.5 μm	1 μm	5 μm	10 μm	
	(Input resolution)	0.5 μm	–	0.5 μm	1 μm	5 μm	10 μm	
Measuring unit data fetching capacity		10 Mbps data transfer	Maximum 10,000 data/sec (when 100 axes are connected)					Data for one axis is counted as one data.
Peak-hold function			Calculation of maximum, minimum, and peak-to-peak values for each axis (including pause, latch, and start functions)					
			Peak value is not updated during pause.					
			No output and display data updated during latching (but internal data is updated)					
			Recalculation of peak value is started by start function.					
Output-enable data		Single axis	Current, maximum, minimum, and peak-to-peak values for each axis					
		At addition and subtraction	Current, maximum, minimum, and peak-to-peak values of addition and subtraction axes of two axes					Single-axis calculation of addition and subtraction axes is disabled.
Comparator function			Data of each axis (single axis, addition/subtraction axis) is compared and measured to output the comparator results (Comparator is also latched during latch)					
	Comparator setting values		2 values	4 values	8 values	16 values		
	No. of setting value sets		16 groups	8 groups	4 groups	2 groups		
Ethernet			100Base-T (compliant with IEEE 802.3) 100 Mbps/10 Mbps (Auto-negotiation) Command input, data output, and parameter setting enabled.					
Reset function			The Current value for each axis is reset (with command).					
Preset function			The Value is preset to the current value of each axis (with command).					
Datum-point setting function			The Datum point of each axis is settable (with command).					When master calibration function is not used
Reference point function			The datum point of each axis can be reproduced using the reference point (with command).					
Master calibration function			Master calibration of each axis can be reproduced using the reference point (with command).					Addition and subtraction axes are unavailable.
Measuring unit product information			The product information of the connected measuring unit can be acquired (with command). Product code, serial no., production date					
Command/setting enabled or disabled for each communication line						Ethernet	CC-Link	
			Command	Reset function		○	○	
				Preset function		○	○	
				Datum-point setting function		○	○	When master calibration function is not used
				Reference point function		○	○	
				Master calibration function		○	○	
				Comparator value setting		○	○	
				Comparator group number setting		○	○	
				Start		○	○	
				Pause		○	○	
				Latch		○	○	
			Data output	Current value/Peak value (All axes)		○	×	
				Current value/Peak value (each unit)		○	○	
				Comparator judgment result		○	○	
				Alarm (Communication/Measuring unit)		○	○	
				Software version		○	○	
				Measuring unit product information		○	○	
			Settings	Input resolution		○	○	
				Display and output resolution		○	○	
				Axis addition		○	○	
				Comparator mode (2, 4, 8, or 16 values in 1 group)		○	○	
Supply voltage		Terminal board	12 to 24 V (11 to 26.4 V) DC					Used by adding power at a current of 4A or more on a six MG42 hub units basis. (Recommended: +24 V)
Power consumption		Cautions for connecting conditions	System total: Max. current 4 A					
			If system power consumption exceeds the maximum current, supplying power to a succeeding MG42 hub unit enables the main unit to be connected to the succeeding MG42 hub unit.					
			<Details of power consumption for each unit> MG41 main unit: 4 W, MG42 hub unit: 1 W/unit, Measuring unit supply: 1 W/unit					
Operating temperature and humidity range			0 to +50 °C (no condensation)					
Storage temperature and humidity range			-10 to +60 °C (20 to 90 % RH)					
Mass			MG41: 300 g MG42: 250 g					

* If DK800S connected to MG40 is connected to LT30 or MG10/20, the reference point cannot be recognized. For more information, contact our Sales Dept. in charge. * Connection of MG41 to MG43 using Ethernet connection requires an additional Ethernet hub.

Display unit MG43 specifications

Item	Description
Compatible main units	MG41-NE/MG41-NC
Compatible hub units	Hub units supported by the main unit
Compatible measuring units	Measuring units supported by the main unit and hub units
Main functions	Measured data monitoring, system monitoring, setting monitoring
Communication protocol	Specific protocol on TCP/IP
Screen display	480 x 272 pixels, 4.3-inch TFT LCD with backlight

Item	Description
Network interface	100Base-TX/10Base-T (compliant with IEEE802.3) Auto-negotiation
Power supply	12 to 14 V (11 to 26.4 V) DC
Power consumption	4 W
Operating temperature & humidity range	0 to +40 °C(no condensation)
Storage temperature & humidity range	–10 to +60 °C(20 to 90 %RH)
Mass	Approx. 500 g

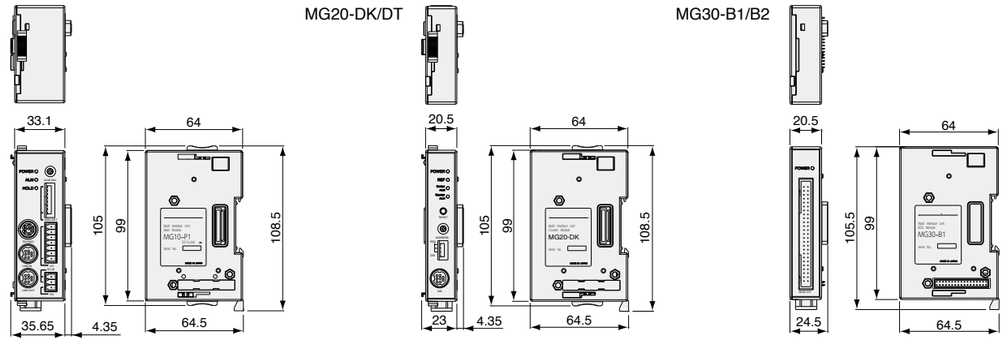
MG MG10/20/30

Output BCD | Output RS-232C | Output Go/no-go judgment

MG10-P1/P2

MG20-DK/DT

MG30-B1/B2



Unit: mm

Main module specifications

Model		MG10-P1	MG10-P2
Power source	Power supply	12-24 V (11-26.4 V) DC, Min. startup time: 100ms or less	
	Power consumption	2.0 W + total power consumption for connected modules*1	
	Inrush current (10 ms)	10 A or less (when maximum number of modules are connected)	
	Power supply protection	Fuse (5-A fuse is built in.)	
Communication	Communication I/F	RS-232C (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 length of linking cable	10 m	
I/O	Input format	Source input (+COM)	Sink input (–COM)
		Photocoupler insulation, external power: 5-24 V DC	
	Output format	Open collector output sink type (–COM)	Source type (+COM)
		Photocoupler insulation, external power: 5-24 V DC	
	Input signal	Reset, pause, start, latching, and data out trigger to whole channels	
	Output signal	Integrated alarm	
Connectable modules	Counter modules	MG20-DK, MG20-DG, and MG-20DT (available for mixed use, up to 16 modules)*1	
	Interface modules	MG30-B1, MG30-B2*1	

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

Counter module specifications

Model		MG20-DK	MG20-DT
Power consumption		1 W + power consumption for connected gauge	0.8 W
Measuring unit input	Corresponding gauge	DK Series (Voltage differential A/B quadrature input)	DT Series
	Allowable resolution setting*2	10/5/1/0.5/0.1 μm	5 μm(DT12/32) 1 μm(DT512)
		Set with DIP switch	
	Maximum response speed	Subject to the specification of the connected gauge	1m/s
	Maximum response acceleration	REF-LED (reference-point loaded) shows on the display after the reference point is detected.	2400m/s^2
	Reference point	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 gauge.

Interface module specifications

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

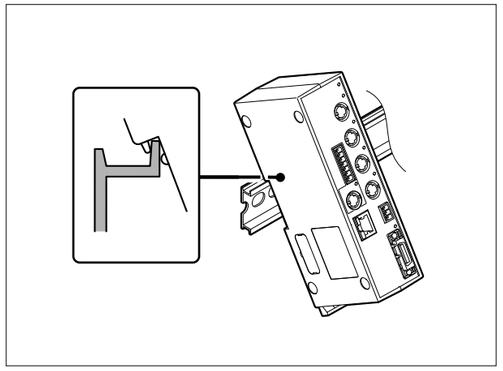
All models	Operating temperature	0 to +50 °C(No condensation)
	Storage temperature	–10 to +60 °C(20 to 90%RH)

Installation

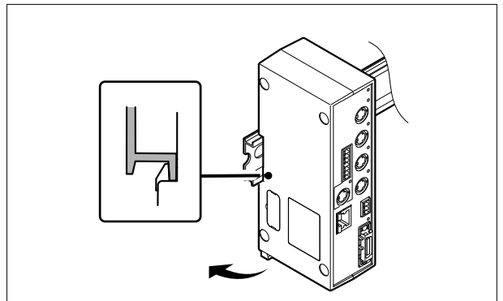
Mounting of MG41/42 main unit

The MG41/42 main unit can be mounted to DIN rail in electrical component panel.
At factory shipment, the hook of DIN rail fixing lever is locked.
DIN rail specifications: 35 mm

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



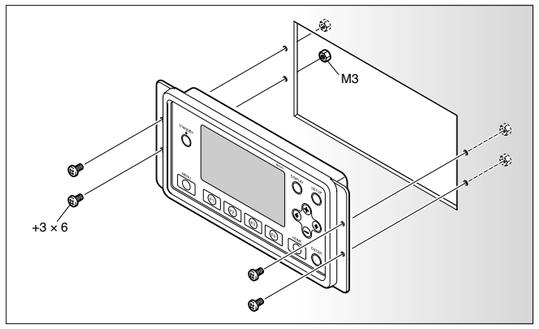
2. Push and install the MG41 main unit until a click is heard so that the lower side of groove on the back of the MG41 main unit is fit into the DIN rail.



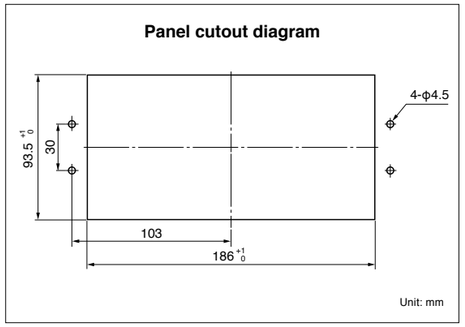
Note: Check that the entire unit is mounted to the DIN rail.

MG43 Mounting to panel

Install the main unit to panel using provided four screws (+3 × 6) and four nuts (M3).

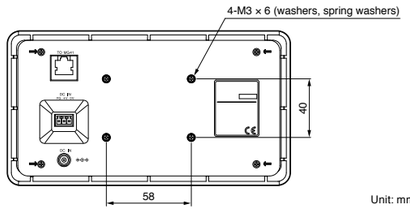


Panel cutout diagram



Unit: mm

Reference: If a mounting screw hole cannot be drilled in the panel, the MG43 may be installed using four screws on the back of the main unit.



Note: Do not use a screw other than those provided for the MG43 main unit.

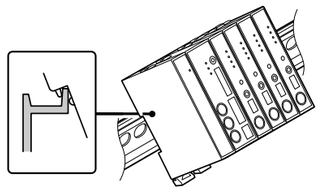
Unit: mm

MG10/20/30 connection

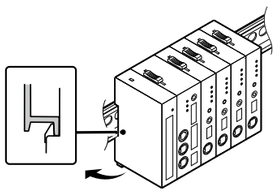
The multi-interface unit is composed of various modules.

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.



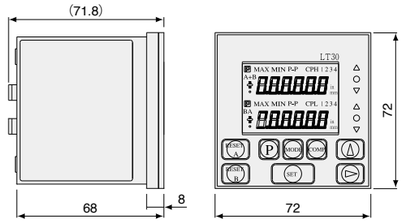
Counter

LT30 Series	34
LT11A Series	35
LT10A Series	36
LY71	37
LY72	38

LT LT30 Series (for DK, DK-S)

Output BCD | Output RS-232C | Output Go/no-go judgment

LT30-2GB



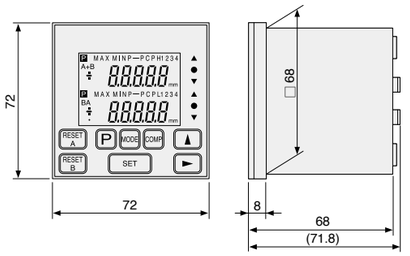
Unit: mm

Specifications

Model	LT30-1G	LT30-1GB (BCD output model)	LT30-1GC (RS-232C input/output model)	LT30-2G	LT30-2GB (BCD output model)	LT30-2GC (RS-232C input/output model)
Number of input axes	DK Series gauges can be connected.					
	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., and peak-to-peak values (= max. value – min. value)			Current, max., min., and peak-to-peak values (= max. value – min value) of each axis or A-axis display: current, max., min., and peak-to-peak values (= max. value – min value) of 2-axis addition and subtraction B-axis display: single axis (1st or 2nd axis) (Caution for 2-axis addition or subtraction display setting: single-axis display can be only provided on monitor and cannot be operated.) (Selected by parameter setting)		
Display resolution	Same resolution as input resolution or resolution rougher than that can be selected for each axis (parameter setting).					
Direction	Parameter-based polarity setting for each axis					
Alarm display	Measuring unit unconnected, excess speed, display-digit overflow					
Addition and subtraction function	—			A+B, A–B, B–A can be set with the direction setting.		
Peak hold function	Peak calculation (max., min., and peak-to-peak values) is possible.			Peak calculation of each axis or addition/subtraction value is possible. (However, during 2-axis addition or subtraction, only 1st or 2nd axis display is possible in B-axis display.)		
Restart	Starts peak hold calculation of each axis. Operation is made by external input.			Starts peak hold calculation of each axis. Operation is made by external input (for each axis).		
Hold function (latch and pause) Latch = display and output holding Pause = peak calculation holding	Provided					
Comparator function	A set of upper and lower limits is settable.	Four sets of upper and lower limits are settable. Switching of a set is made through BCD connector.	A set of upper and lower limits is settable.	A set of upper and lower limits is settable for each axis. However, single-axis setting cannot be made during addition or substation.	Four sets of upper and lower limits are settable for each axis. However, single-axis setting cannot be made during addition or substation. Switching of a set is made through BCD connector.	A set of upper and lower limits is settable for each axis. However, single-axis setting cannot be made during addition or substation.
Input signal	Reset, start/latching, and pause of each axis					
	—	—	RS-TRg input (RS-232C data output command)	—	—	RS-TRg input (RS-232C data output command)
	Input circuit: Photocoupler (input voltage V = 4 to 26.4 V)					
Output signal	Comparator judgment output of each axis					
	Output circuit: NPN open collector (output voltage V = 5 to 26.4 V)					
Comparator judgment output	NPN open collector output					
BCD output	—	Current value and peak value (max., min., and peak-to-peak values) can be output.	—	—	Current value and peak value (max., min., and peak-to-peak values) can be output.	—
RS-232C input/output	—	—	Each function can be activated using RS-232C command instead of key operation. Current, max., min., and peak-to-peak values can be output using RS-232C data output command.	—	—	Each function can be activated using RS-232C command instead of key operation. Current, max., min., and peak-to-peak values can be output using RS-232C data output command.
Reset	Reset can be made by key operation or external reset input.					
Preset	Key operation		Key operation or command via RS-232C	Key operation		Key operation or command via RS-232C
Master calibration function	○					
Reference point function	○					
Key lock function	○					
Power supply	10.8 to 26.4 VDC					
Power consumption	5 W	5.5 W	5 W	8.5 W	9 W	8.5 W
Operating temperature range	0 to 40 °C					
Storage temperature range	–10 to 50 °C					
Mass	Approx. 200 g	Approx. 230 g	Approx. 220 g	Approx. 210 g	Approx. 270 g	Approx. 230 g

LT LT11A Series (for DT512)

Output BCD | Output RS-232C | Output Go/no-go judgment



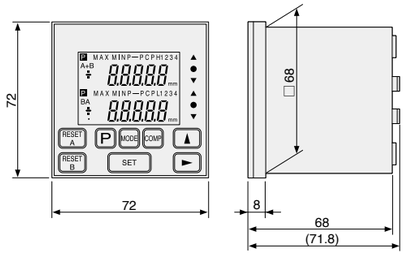
Unit: mm

Specifications

Model	LT11A-101	LT11A-101B (BCD output model)	LT11A-101C (RS-232C input/output model)	LT11A-201	LT11A-201B (BCD output model)	LT11A-201C (RS-232C input/output model)
Number of input axes	DT512 Series gauge can be connected.					
	1 axis			2 axes		
Input resolution	1/5/10 μm (parameter setting for each axis)					
Number of display axes	1 axis			2 axes		
Display data	Current, max., min., and peak-to-peak values (= max. value – min. value)			Current, max., min., and peak-to-peak values (= max. value – min value) of each axis or A-axis display: current, max., min., and peak-to-peak values (= max. value – min value) of 2-axis addition and subtraction B-axis display: single axis (1st or 2nd axis) (Caution for 2-axis addition or subtraction display setting: single-axis display can be only provided on monitor and cannot be operated.) (Selected by parameter setting)		
Display resolution	Same resolution as input resolution for each axis					
Direction	Parameter-based polarity setting for each axis					
Alarm display	Measuring unit unconnected, excess speed, display-digit overflow					
Addition and subtraction function	—			A+B, A–B, B–A can be set with the direction setting.		
Peak hold function	Peak calculation (max., min., and peak-to-peak values) is possible.			Peak calculation of each axis or addition/subtraction value is possible. (However, during 2-axis addition or subtraction, only 1st or 2nd axis display is possible in B-axis display.)		
Restart	Starts peak hold calculation. Operation is made by external input.			Starts peak hold calculation of each axis. Operation is made by external input (for each axis).		
Hold function (latch and pause) Latch = display and output holding Pause = peak calculation holding	Provided					
Comparator function	A set of upper and lower limits is settable.	Four sets of upper and lower limits are settable. Switching of a set is made through BCD terminal.	A set of upper and lower limits is settable.	A set of upper and lower limits is settable for each axis. However, single-axis setting cannot be made during addition or substation.	Four sets of upper and lower limits are settable for each axis. However, single-axis setting cannot be made during addition or substation. Switching of a set is made through BCD connector.	A set of upper and lower limits is settable for each axis. However, single-axis setting cannot be made during addition or substation.
Input signal	Reset, start/latching, and pause of each axis					
	—	—	RS-TRg input (RS-232C data output command)	—	—	RS-TRg input (RS-232C data output command)
	Input circuit: Photocoupler (input voltage V = 4-26.4 V)					
Output signal	Comparator judgment output of each axis					
	Output circuit: NPN open collector (output voltage V = 5-26.4 V)					
Comparator judgment output	NPN open collector output					
BCD output	—	Current value and peak value (max., min., and peak-to-peak values) can be output.	—	—	Current value and peak value (max., min., and peak-to-peak values) can be output.	—
RS-232C input/output	—	—	Each function can be activated using RS-232C command instead of key operation. Current, max., min., and peak-to-peak values can be output using RS-232C data output command.	—	—	Each function can be activated using RS-232C command instead of key operation. Current, max., min., and peak-to-peak values can be output using RS-232C data output command.
Reset	Reset can be made by key operation or external reset input.					
Preset	Key operation		Key operation or command via RS-232C	Key operation		Key operation or command via RS-232C
Master calibration function	○					
Reference point function	—					
Key lock function	○					
Power supply	9 to 26.4 VDC					
Power consumption	1.8 W	2.9 W	2.0 W	2.3 W	4.0 W	2.5 W
Operating temperature range	0 to 40 °C					
Storage temperature range	–10 to 50 °C					
Mass	Approx. 200 g	Approx. 230 g	Approx. 220 g	Approx. 210 g	Approx. 270 g	Approx. 230 g

LT LT10A Series (for DT12/32)

Output BCD | Output RS-232C | Output Go/no-go judgment



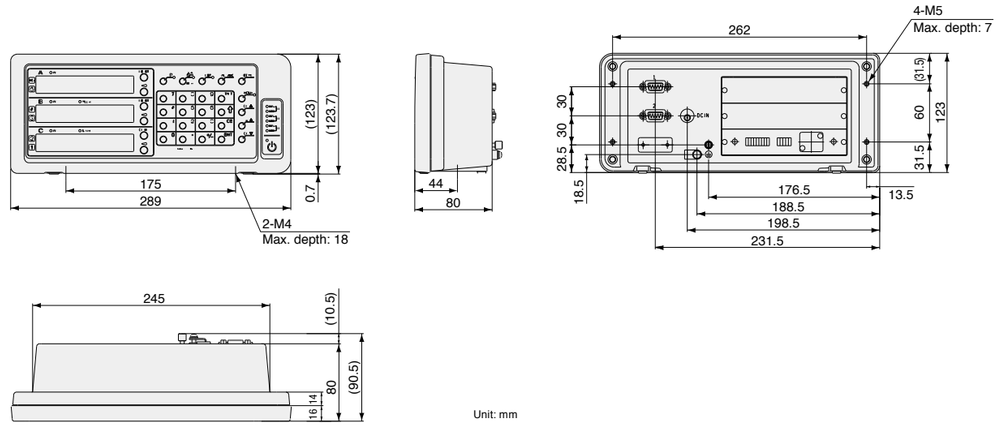
Unit: mm

Specifications

Model	LT10A-105	LT10A-105B (BCD output model)	LT10A-105C (RS-232C input/output model)	LT10A-205	LT10A-205B (BCD output model)	LT10A-205C (RS-232C input/output model)
Number of input axes	DT12/32 Series gauges can be connected.					
	1 axes			2 axes		
Input resolution	5/10 μm (parameter setting for each axis)					
Number of display axes	1 axes			2 axes		
Display data	Current, max., min., and peak-to-peak values (= max. value – min. value) (selected by parameter setting)			Current, max., min., and peak-to-peak values (= max. value – min value) of each axis or A-axis display: current, max., min., and peak-to-peak values (= max. value – min value) of 2-axis addition and subtraction B-axis display: single axis (1st or 2nd axis) (Caution for 2-axis addition or subtraction display setting: single-axis display can be only provided on monitor and cannot be operated.) (Selected by parameter setting)		
Display resolution	Same resolution as input resolution for each axis					
Direction	Parameter-based polarity setting for each axis					
Alarm display	Measuring unit unconnected, excess speed, display-digit overflow					
Addition and subtraction function	—			A+B, A–B, B–A can be set with the direction setting.		
Peak hold function	Peak calculation (max., min., and peak-to-peak values) is possible.			Peak calculation of each axis or addition/subtraction value is possible. (However, during 2-axis addition or subtraction, only 1st or 2nd axis display is possible in B-axis display.)		
Restart	Starts peak hold calculation. Operation is made by external input.			Starts peak hold calculation of each axis. Operation is made by external input (for each axis).		
Hold function (latch and pause) Latch = display and output holding Pause = peak calculation holding	Provided					
Comparator function	A set of upper and lower limits is settable.	Four sets of upper and lower limits are settable. Switching of a set is made through BCD connector.	A set of upper and lower limits is settable.	A set of upper and lower limits is settable for each axis. However, single-axis setting cannot be made during addition or substation.	Four sets of upper and lower limits are settable for each axis. However, single-axis setting cannot be made during addition or substation. Switching of a set is made through BCD connector.	A set of upper and lower limits is settable for each axis. However, single-axis setting cannot be made during addition or substation.
Input signal	Reset, start/latching, and pause of each axis					
	—	—	RS-TRg input (RS-232C data output command)	—	—	RS-TRg input (RS-232C data output command)
	Input circuit: Photocoupler (input voltage V = 4-26.4 V)					
Output signal	Comparator judgment output of each axis					
	Output circuit: NPN open collector (output voltage V = 5-26.4 V)					
Comparator judgment output	NPN open collector output					
BCD output	—	Current value and peak value (max., min., and peak-to-peak values) can be output.	—	—	Current value and peak value (max., min., and peak-to-peak values) can be output.	—
RS-232C input/output	—	—	Each function can be activated using RS-232C command instead of key operation. Current, max., min., and peak-to-peak values can be output using RS-232C data output command.	—	—	Each function can be activated using RS-232C command instead of key operation. Current, max., min., and peak-to-peak values can be output using RS-232C data output command.
Reset	Reset can be made by key operation or external reset input.					
Preset	Key operation		Key operation or command via RS-232C	Key operation		Key operation or command via RS-232C
Master calibration function	○					
Reference point function	—					
Key lock function	○					
Power supply	9 to 26.4 VDC					
Power consumption	1.8 W	2.9 W	2.0 W	2.3 W	4.0 W	2.5 W
Operating temperature range	0 to 40 °C					
Storage temperature range	–10 to 50 °C					
Mass	Approx. 200 g	Approx. 230 g	Approx. 220 g	Approx. 210 g	Approx. 270 g	Approx. 230 g

LY LY71

Output BCD | Output Go/no-go judgment



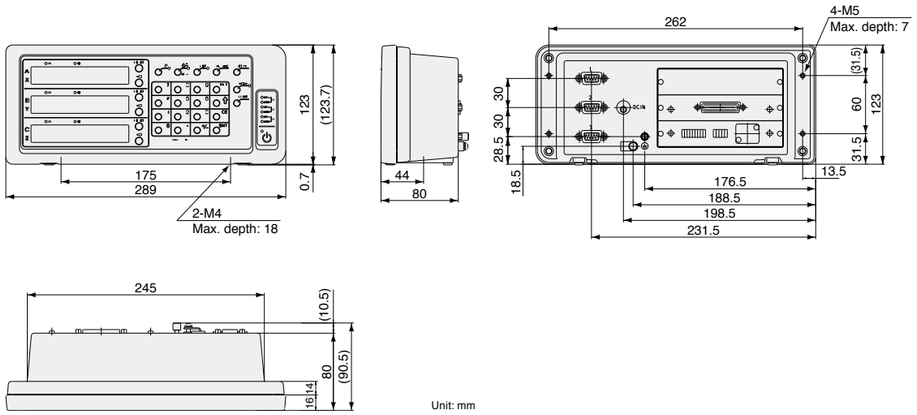
Unit: mm

Specifications

Model	LY71
Compatible measuring units	DK Series (connection cable CE29 required), GB-ER, SJ700A Series (Magnescale)/PL20 Series (Digiruler)
Number of input axes	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), When LZ71-KR is used: 1 axis (A-axis display) only, B- and C-axis display is fixed to comparator value display.
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 Setting of axis to be displayed can be set by parameter. Data (current value, max. value, etc.) to be displayed can be switched by key operation. (Addition and subtraction display is impossible if two LZ71-Bs are used.)
Display resolution	Measuring unit input resolution or more. It is possible to provide simple angle display by adhering Digiruler in arc. (There are limitations on displayable resolution depending on radius size.)
Direction	Parameter-based polarity setting for each axis
Alarm display	Measuring unit unconnected, excess speed, display-digit overflow
Addition and subtraction function	2-axis addition and subtraction is possible, but axis-based calculation is impossible during addition or subtraction (addition and subtraction display is impossible during use of two LZ71-Bs).
Peak hold function	Peak calculation of each axis or addition or subtraction value can be made (calculation of each axis (single axis) cannot be made during addition or subtraction).
Restart	Starts peak hold calculation of each axis/all axes. Operation is made by key operation or general external input.
Hold function (latch and pause) Latch = display and output holding Pause = peak calculation holding	Latch function or pause function (selected by parameter setting) Operation: key operation or general external input
Comparator function	Available only when LZ71-KR is used (separated into 5 areas). 16 sets of set values can be set with 1 to 4 set values taken as 1 set for 1 axis or addition/subtraction value, but single-axis setting cannot be made during addition or subtraction. (Switching of a set is made by key operation or LZ71-KR external input.)
Positioning function	Available only when LZ71-KR is used. A pulse signal of 0.5 s is output when a set value (1 point) is passed through. 16 sets of set values are settable. Unavailable if comparator function is selected. (Comparator/positioning function is selected by parameter setting.)
Input signal	External reset and external preset recall for each axis (4 in total), 1 general input for each axis and 1 common (3 in total)
	For general input, 3 items are selected from hold, restart, display switching (switching between current and peak values), and reference point loaded (datum value reproduction start).
	Input circuit: +12-24 V photocoupler (isolation from internal circuit = power supply Vcc = 12-24 V required)
Output signal	2 for each axis (4 in total)
	General output (2 items are selected from alarm, display data (current or peak value), reference-point passing, reference-point alarm, and zero-point passing.)
	Output circuit: open collector (photocoupler) 12-24 V, isolated from internal circuit
Comparator judgment output	Available only when LZ71-KR is used. Open collector (isolated from photocoupler and 12-24 V internal circuit) and relay (24 V DC/100 V AC at 0.3 A, ON time: approx. 2 ms, OFF time: approx. 1 ms)
BCD output	Available only when LZ71-B is used. One LZ71-B is used: 1st or 2nd axis or current and peak values of addition and subtraction values. When two LZ71-Bs are used: current and peak values of 1st axis for 1st LZ71-B and current and peak values of 2nd axis for 2nd LZ71-B. One LZ71-B can output three types of values.
RS-232C input/output	—
A/B phase output	Available only when LZ71-HT01 is used.* Top stage is fixed to 1st-axis output, while middle stage is fixed to 2nd-axis output. *Please consult our sales representative for details.
Expansion unit	LZ71-KR, LZ71-B, LZ71-HT01 (Up to two units can be used)
Reset	Reset can be made by key operation or external reset input.
Preset	A value can be set by key operation and a value set by external preset recall can be recalled.
Master calibration function	Provided
Datum point/Reference point function	Provided
Key lock function	Provided (presence/absence of setting is set by parameter)
Data storage	Storage/no-storage can be set.
Scaling function	Provided (0.100000 to 9.99999)
Liner compensation	Provided (±600 μm/m)
Power supply	Optional PSC-21/22/23 adapter is used.
Power consumption	32 VA max. (when optional AC adapter is used)
Operating temperature range	0 to 40 °C
Storage temperature range	–20 to 60 °C
Mass	Approx. 1.5 kg

LY LY72

Output
RS-232C



Unit: mm

Specifications

Model	LY72	
Compatible measuring units	DK Series (connection cable CE29 required), GB-ER, SJ700A Series (Magnescale)/PL20 Series (Digiruler)	
Number of input axes	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 (A-, B-, and C-axis display)	3 axes (X-, Y-, and Z-axis display)
Display data	When axis label A, B, and C are selected	When axis label X, Y, and Z are selected
	Current, max., min., and peak-to-peak values (= max. value − min value) of each axis	Current value of each axis
Display resolution	Measuring unit input resolution or more. It is possible to provide simple angle display by adhering Digiruler in arc. (There are limitations on displayable resolution depending on radius size.)	
Direction	Parameter-based polarity setting for each axis	
Alarm display	Measuring unit unconnected, excess speed, display-digit overflow	
Addition and subtraction function	—	
Peak hold function	Peak calculation of each axis is possible.	None
Restart	Starts peak hold calculation of each axis/all axes. Operation is made by key operation or general external input.	
Hold function (latch and pause) Latch = display and output holding Pause = peak calculation holding	Operable using RS-232C command in addition to those at the left	Only latch function is possible. Operation is made by key operation or general external input only (no RS-232C command).
Comparator function	None	
Positioning function	None	
Input signal	External reset and external print for each axis (4 in total), 1 general input for each axis (3 in total)	
	External reset of each axis and general input (One of latch, reference point loaded, display switching, and preset recall is selected)	External reset of each axis and general input (One of latch, reference-point load, and pre-set recall is selected)
	Input circuit: +12-24 V photocoupler (isolation from internal circuit = power supply Vcc = 12-24 V required)	
Output signal	1 for each axis (3 in total)	
	General output (One of alarm, display data, reference-point passing, and reference-point alarm is selected.)	General output (One of alarm, reference-point passing, and reference-point alarm is selected.)
	Output circuit: open collector (photocoupler) 12-24 V, isolated from internal circuit	
Comparator judgment output	—	
BCD output	—	
RS-232C input/output	Each function can be activated using RS-232C command instead of key operation.	
	Current, max., min., and peak-to-peak values of each axis can be output using RS-232C data output commands.	Current value of each axis can be output using RS-232C data output command.
A/B phase output	—	
Expansion unit	—	
Reset	Reset can be made by key operation or external reset input.	
Preset	Value is settable by key operation or using RS-232C command. A value set by external preset recall can be recalled.	
Master calibration function	Provided	None
Datum point/Reference point function	Provided	
Key lock function	Provided (presence/absence of setting is set by parameter)	
Data storage	Storage/no-storage can be set.	
Scaling function	Provided (0.100000 to 9.99999)	
Linear correction	Provided (±600 μm/m)	
Power supply	Optional PSC-21/22/23 adapter is used.	
Power consumption	32 VA max. (when optional AC adapter is used)	
Operating temperature range	0 to 40 °C	
Storage temperature range	–20 to 60 °C	
Mass	Approx. 1.5 kg	

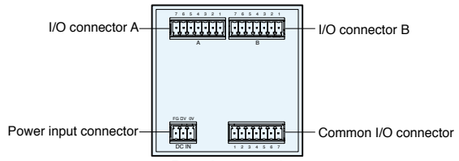
Technical information

LT Series Usage Notes

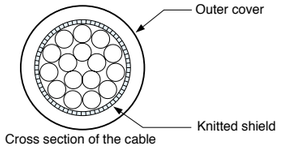
I/O connector

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

< Connector pin assignment >



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



Connector used: MC1.5/7-ST-3.5 (provided) made by Phoenix Contact

I/O connector (common)

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

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

I/O connector description
I/O connector A

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

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

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

< Go/no-go judgment output >
High: Display value > upper limit →"L" (ON)
Go: Upper limit ≥ display value ≥ lower limit →"L" (ON)
Low: Lower limit > display value →"L" (ON)
Note: All go/no-go judgment outputs become "H" (OFF) if alarm occurs.

<Start/latch input>
- If judgment output is "L" (ON), the max. and min. values are set to the current value (and peak-to-peak value is "0"), and new holding starts (start function).
- When initial settings are set to shipment settings, if the measuring mode is in current value mode, go/no-go judgment output (I/O connector) and display are held at "L" (ON) (latch function).

Note: While judgment output is "L" (ON), reset/present value recall by reset key or using an external reset/preset value recall input signal becomes invalid.

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

Installing the LT10A/11A/30 counter unit

When mounting in a panel

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

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

Fig.1

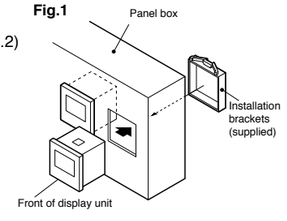


Fig.2

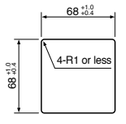
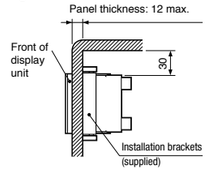


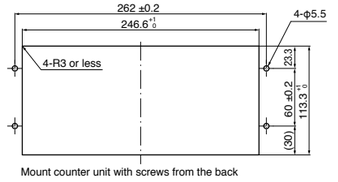
Fig.3



Unit: mm/inch

LY71/72 panel mounting

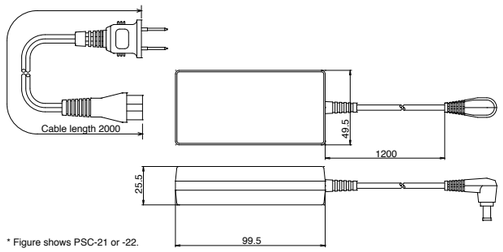
Panel cutout diagram

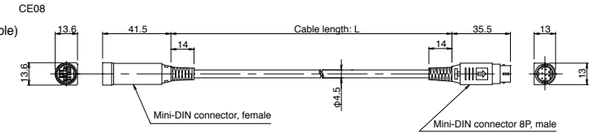


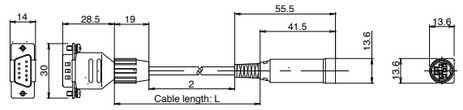
Unit: mm

Accessories

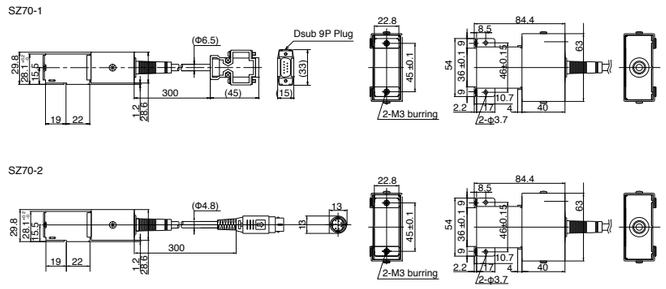
	DK-S	DK20φ	DT	U	LY	LT	MG
PSC (AC adapter) PSC-21 (for Japan only: 100 V) PSC-22 (for the US only: 120 V) PSC-23 (for Europe and other countries : 220 to 240 V) Provided with Europlug cable	—	—	—	—	●	—	—
CE (extension cable) CE08-1(1m) CE08-3(3m) CE08-5(5m) CE08-10(10m) CE08-15(15m)	●	●	●				
(Conversion cable for counter connection) CE29-003(0.3m) CE29-01(1m) CE29-03(3m) CE29-05(5m) CE29-10(10m)	●	●	—				
Extension cable, bare leads CE22-01(1m) CE22-03(3m) CE22-05(5m) CE22-10(10m)	●	●					
LZ LZ71-B (BCD unit) LZ71-KR (relay/open collector) LZ61	—	—	—	—	● LY71 only (LZ71-B, KR)	—	— For MG10 (LZ61)

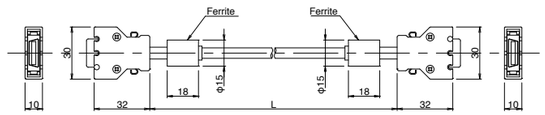


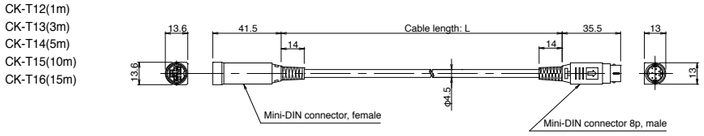




	DK-S	DK20φ	DT	U	LY	LT	MG
SZ (conversion cable) SZ70-1 (for LY71 and 72) SZ70-2 (for LT30)	—	—	—	—	●	●	—
MZ (link cable) MZ41-R5(0.5m) MZ41-01(1m) MZ41-02(2m) MZ41-05(5m) MZ41-10(10m)							● MG41
CK (High-flex extension cable) CK-T12(1m) CK-T13(3m) CK-T14(5m) CK-T15(10m) CK-T16(15m)	●	●	●	—	—	—	—



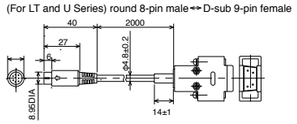




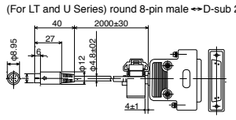
DZ

DZ252
DZ253A
DZ254
DZ174-010
DZ174-025
DZ174-050
DZ176
DZ521
DZ830F
DZ-161
DZ830B
DZ830BV
DZ-123
DZ-121
DZ-191
DZ-181
DZ-5100
DZ-122
DZ-100
DZ531
DZ581

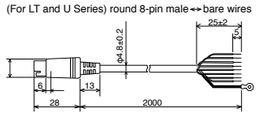
Cable for DZ252 RS232C
(For LT and U Series) round 8-pin male ↔ D-sub 9-pin female



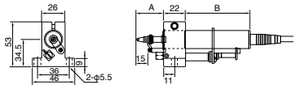
Cable for DZ253A RS-232C
(For LT and U Series) round 8-pin male ↔ D-sub 25-pin male



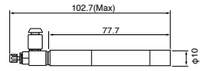
Cable for DZ254 RS-232C
(For LT and U Series) round 8-pin male ↔ bare wires



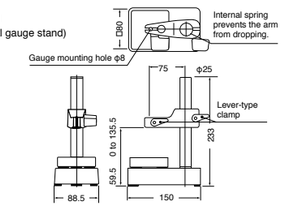
DZ174-010/DZ174-025/DZ174-050 (for DK10, 25, and 50)



DZ176 air lifter
(For DT512, 12)

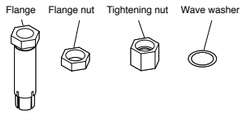


DZ521
(Digital gauge stand)

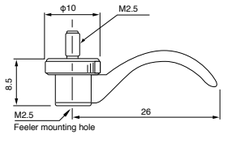


Measuring units to be used	A	B
DK10NR5, PR5	32.5	75.5
DK10PLR5	32.5	56
DK25NR5, PR5	47.5	118
DK25NLR5, PLR5	47.5	98.5
DK50NR5/PR5	72	200

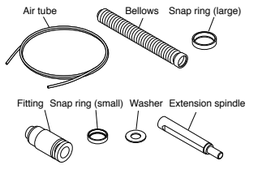
DZ830F (for DK830)



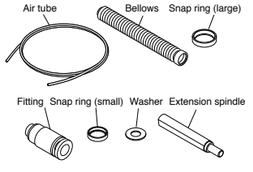
DZ-161 lift lever



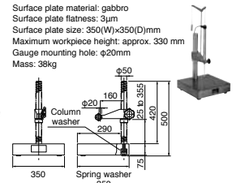
DZ830BL (bellows set for DK830SLR)



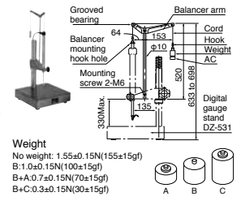
DZ830BV (bellows set for DK830SVR)



Digital gauge stand DZ-531 (for DK110)



Measuring force balancer DZ-581 (for DK110)

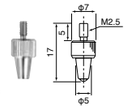


Weight
No weight: 1.55±0.15N(155±15gf)
B:1.0±0.15N(100±15gf)
B+A:0.7±0.15N(70±15gf)
B+C:0.3±0.15N(30±15gf)

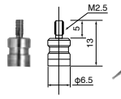
Feeler set DZ-5100
(Not including DK155/205)

* Four types of feelers shown above are provided as a set.

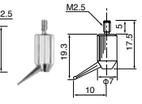
Plastic spherical feeler
Contact point: 3 mm/0.118" nylon



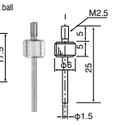
Carbide flat feeler



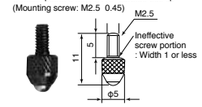
Off-center feeler
Contact point: 1 mm/0.039" steel ball



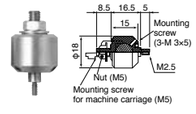
Pin feeler



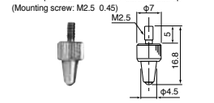
Feeler DZ-123 (not including DK155/205)
Contact point: 3 mm/0.118" carbide ball tip
(Mounting screw: M2.5 0.45)



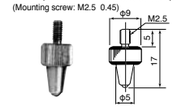
Coupling DZ-191



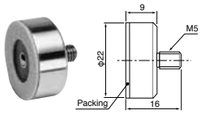
Feeler DZ-122 (for DK10, 25, and 50)
Contact point: 2.5 mm/0.098" carbide ball tip
(Mounting screw: M2.5 0.45)



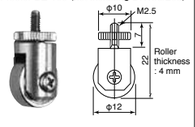
Feeler DZ-121 (for DK100/110)
Contact point: 2.5 mm/0.098" carbide ball tip
(Mounting screw: M2.5 0.45)



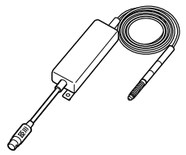
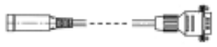
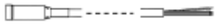
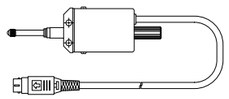
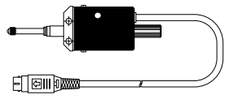
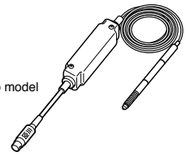
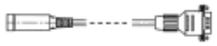
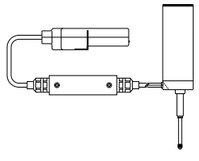
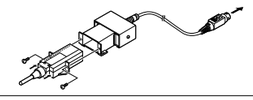
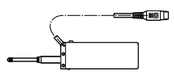
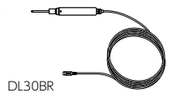
Magnetic feeler DZ-181 (for DK155/205)



Roller feeler DZ-100 (not including DK155/205)



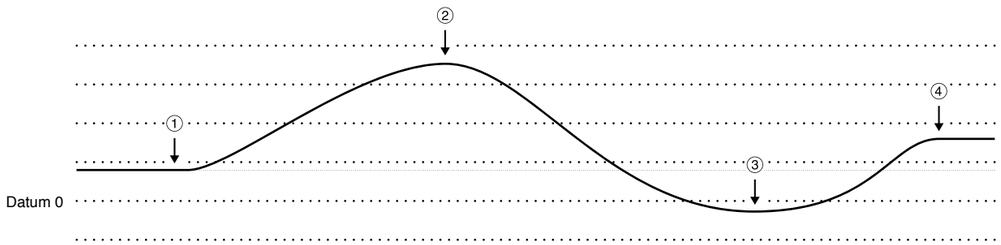
Compatibility

Digital gauge	Adapter/conversion cable Note 1: MT12/13 is interpolator.	Counters	Interface unit	Old counters	External device	Extension cables
DK800A/B Series 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 	LH70/71/71A/72 LY71/72				
	(Cable with bare wires) 				○: 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/bare wires/total cable length is 20 m or less. CE26-01(1 m) -03(3 m) -05(5 m) -10(10 m) * High-flex cable/bare wires/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) * Model with no “B” assigned 	SZ05-T01	LH70/71/71A/72 LY71/72				Without extension cable * Cable may be manufactured to specified length on a production by order basis.
	SZ05 + SZ51 – MS01			LY51/52		
	Unnecessary			LY100/110 LH20, etc.		
DT12/32 Series 	Unnecessary	LT10A Series	MG20-DT	LT10 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.
	MT12-05/10 Note 1 	LT20A Series		LT20 Series		
	MT13-05/10 Note 1 	LT30 Series				
DT512 Series 	Unnecessary	LT11A Series	MG20-DT	LT11 Series		
	MT13-01 Note 1 	LT30 Series				
DK800 Series * 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 CE08-01(1 m) -03(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 	LH70/71/71A/72 LY71/72				
	(Cable with bare wires) 				○: connectable A/B reference point (Differential line receiver input)	CE22-01(1m) -03(3 m) * High-flex cable/bare wires/total cable length is 5 m or less. CE26-01(1 m) -03(3 m) * High-flex cable/bare wires/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 	DZ51 + SZ70-1	LH70/71/71A/72 LY71/72				Without extension cable * Cable may be manufactured to specified length on a production by order basis.
	Unnecessary	LT20A Series	MG20-DG	LT20 Series		
	DZ51			LY51/52		
DE12BR/DE30BR 	SZ70-2 	LT30 Series				Without extension cable * To be supported by special specifications
	SZ70-1	LH70/71/71A/72 LY71/72				
	Unnecessary			LY51/52		
DL310B/DL330B/DL10BR/DL30BR/DL60BR  	Unnecessary	LT20A Series	MG20-DG	LT20 Series		Without extension cable (DL310B, 330B) * Cable may be manufactured to specified length on a production by order basis. Total cable length: 10 m or less
	DZ51 + SZ70 – 1	LH70/71/71A/72 LY71/72				
	DZ51			LY51/52		

Technical Information

Useful functions of counter units LT10A/LT11A/LT30

The combination of a high-accuracy digital gauge and an LT-series multifunction counter allows the following measurements to be made. The internal counter always holds “current value,” “maximum value,” “minimum value,” and “peak-to-peak value” irrespective of the measuring mode (current, maximum, minimum, and peak-to-peak values).



When ① to ④ are traced in the current-value measuring mode, current value ④ is displayed at position ④. Here (at position ④), if the measuring mode is changed to the maximum value, indication becomes as in ②. In the same way, if the measuring mode is changed to minimum value, indication becomes as in ③ and when it is set to peak-to-peak value, indication becomes as in ②-③. In this way, the measuring mode is switched through the BCD terminal for models with BCD output or switched externally using RS-232C command to display and output data.

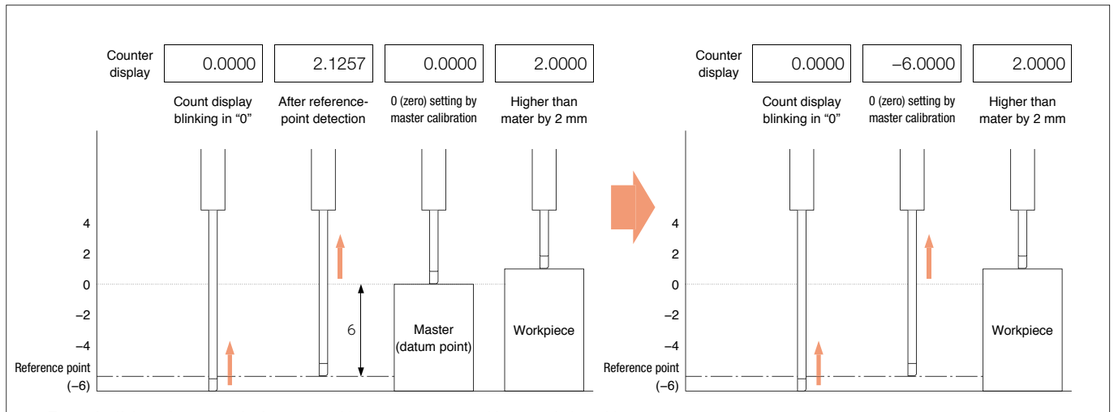
Datum-point reproduction function using a DK Series digital gauge and LT30 Series counter

Up to now, even when master (datum point) calibration is made, the current position is reset if power supply is turned OFF. Thus, master (datum point) calibration needs to be made again using the master (datum point) at power ON. The DK Series Digital Gauges incorporate the reference point; once master (datum point) calibration is made, the counter can store data and reproduce the datum point without master (datum point) calibration in the reference-point referring function.

① First, a difference value between a digital gauge’s built-in reference point and master (datum point) is measured to preset the master (datum point). If the master (datum point) is 0 (zero), a difference value is preset to 0 (zero).

* The reference point is at the position where the spindle is pushed by 1 mm or more.

② When the counter’s power supply is turned ON again, the counter starts up in the reference-point referring mode and display blinks in “0”, causing the counter to enter reference-point detection waiting status. When the spindle is pushed and passes through the reference point, counting is made by the current value display from the master (datum point) position. (The counter stores internally a difference value between the master (datum point) and reference point in memory.)



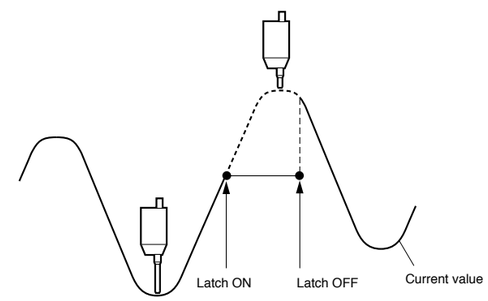
Example: if the reference point is –6 mm with respect to master (datum point) position

Latch function

The latch function holds output data and go/no-go judgment output with respect to its value in the current value mode.

[Latch conditions]
Start input signal is set as latch input in parameter setting.
Current value mode

Note: This function does not work if the measuring mode is in peak-value mode.



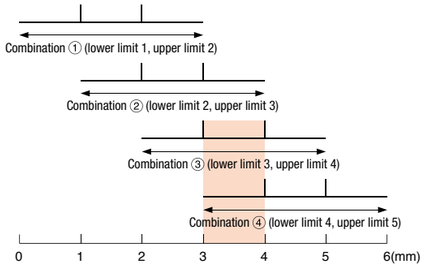
Using an LT Series Counter as a multistage comparator

For the LT Series counters, comparator settings are lower and upper limit settings as standard; no setting range can be increased. The LT Series’ BCD output specifications allow up to four sets of combinations of setting values (upper and lower limits) of the comparator to be registered. This allows an LT Series counter as a multistage comparator. Combining ON/OFF of pins 35 and 36 of the BCD output connector allows four ways (4 sets) of switching to be made. (Four sets of comparators can be set from 1st set (smallest range) to 4th set (largest range).)

BCD output connector "L"(ON) "H"(OFF)

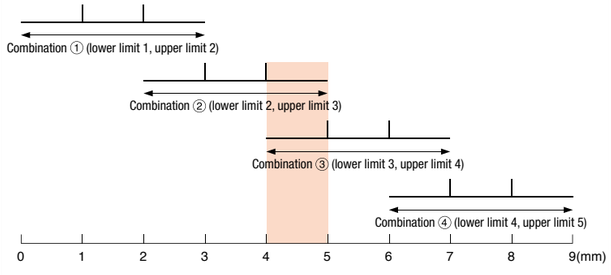
No. 35 pin	No. 36 pin	Upper and lower limits of comparator values
H	H	Upper and lower limits of 1st set
L	H	Upper and lower limits of 2nd set
H	L	Upper and lower limits of 3rd set
L	L	Upper and lower limits of 4th set

Judgment	LED display	Conditions
High	△	Measured data > upper limit
Go	○	Upper limit ≥ measured data ≥ lower limit
Low	▽	Lower limit > measured data



Example 1: Case where the counter is used as a 6-stage comparator

In measurements where judgment output GO (OK) signal and comparator combinations (4 sets) are observed in PLC I/O, four sets of comparators are switched from the 1st set to the 4th in turn and a comparator for which judgment output becomes GO has an OK region. (If judgment output becomes GO in the 3rd set, the comparator concerned has the region of 3 mm or more to 4 mm inclusive.)



Example 2: Case where the counter is used as a 9-stage comparator

In measurements where judgment output LO, GO, and HI signals and comparator combinations (4 sets) are observed in PLC I/O, if four sets of comparators are switched from the 1st set to the 4th in turn and judgment output becomes high limit (HI), which judgment output (LO, GO, or HI) is produced in next combination is seen to determine which region applies.
(If judgment output becomes HI in the 2nd set and judgment output is LO in the 3rd set, an area of over 4 mm to 5 mm not inclusive applies.)

Safety

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.

ISO 9001 JACO QC10J0039

ISO 14001 BUREAU VERITAS Certification BUREAU VERITAS 1828 UKAS MANAGEMENT SYSTEMS 008

Magnescale Co., Ltd. is registered to ISO 9001 (Quality)

Our products comply with CE Marking requirements, have acquired UL certifications and meet other regulations, ensuring safe use the world over.

We have met:

- EMC Directives(CE)
  EMI: EN 55011 Group 1 Class A / 91
  EMS: EN 61000-6-2
- FCC regulation
  FCC Part 15 Subpart B Class A

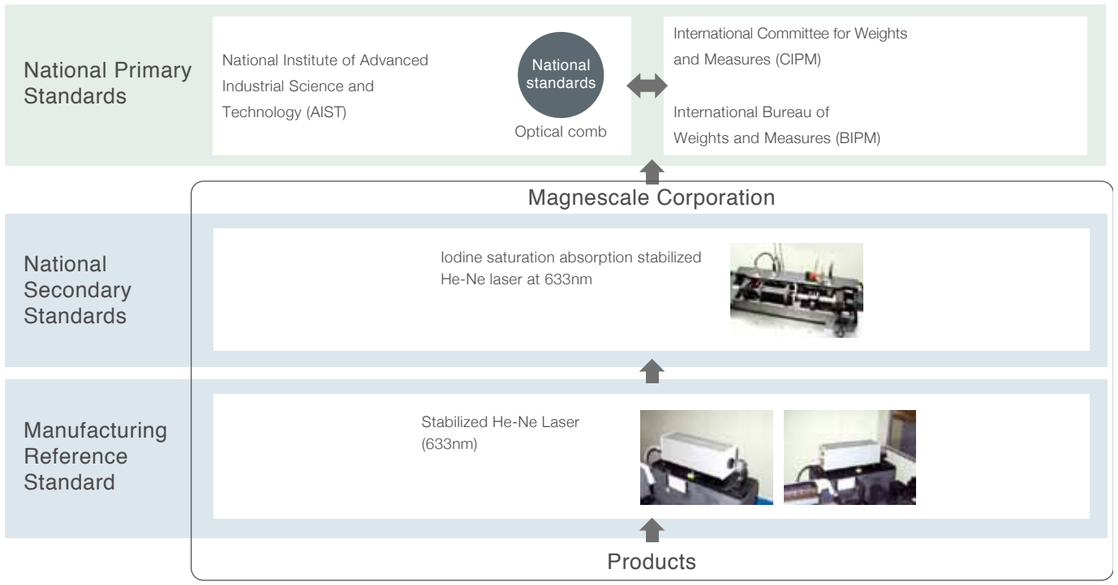
for Products with built-in AC power supply:
•UL61010-1 •EN61010-1

for Products with Laser:
•DHHS (21CFR1040.10) •IEC60825-1

* When using our devices with machines to which the European Machinery Drirective applies, please make sure that the devices when installed on the machines fulfil the applicable requirements of the Directive.
* Standards or regulations to be complied with may vary by product.

Traceability

Traceability Flow Chart (Length)



MEMO

Magnescale

SPEED X PRECISION

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http://www.magnescale.com

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Magnescale

SPEED X PRECISION

Tough Sensor

High Rigidity × High Operability = Tough Sensor

Magnescale Co., Ltd.

Precision Judgment Makes a Difference

Digital Tolerance Indicator
MF10 Series

Tough Sensor

Digital Gauge
DF805S/DF812S Series

Digital Gauge
DF805S/DF812S Series

[Long life]

High durability capable of withstanding up to 60 million strokes.

[Impact resistance]

Use of metal materials realizes impact resistance of 1,000 m/s^2.

[High precision]

High precision measurement with 0.1um maximum resolution

Digital Tolerance Indicator
MF10 Series

[Operability]

Simple settings make operability easy.

[Ultra compact]

DIN rail mounting saves spaces even when using multiple channels

[Versatile]

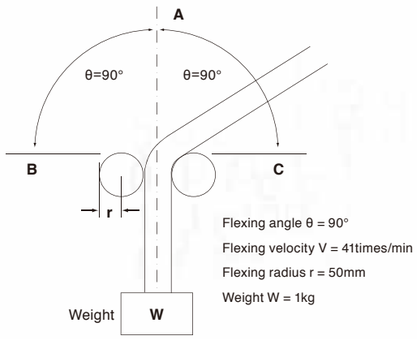
Multi-limit switch

In addition to Go/NoGo judgment, the digital tolerance indicator can also be used as a stepless limit switch within the measurement range.

Provides High Rigidity, an Ultra-Compact Size, and High Precision

Stability & High Rigidity

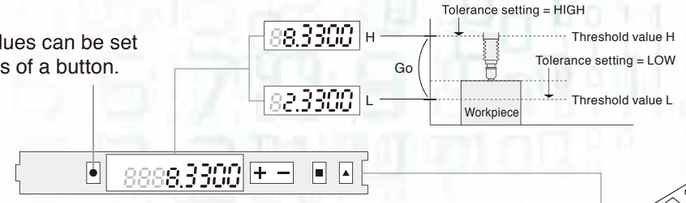
- **Magnescale reliable ball spline structure**
  Achieved numbers of strokes: 60 million
- **Magnescale magnetic scale technology**
  Resistant to the effects of condensation
- **Built-in reference point**
  Enables position reproduction
- **Includes a flex-resistant cable**
  Approximately 10 million flex cycles
- **Flange type**
  Easy mounting
- **Slim-type ø8 mm body**
- **IP66**[straight body models], **IP67**[right angle models with hose elbow]



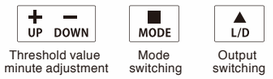
- **High-resolution 0.1 µm**
- **High-precision 1 µm**

Quick and Easy Operation

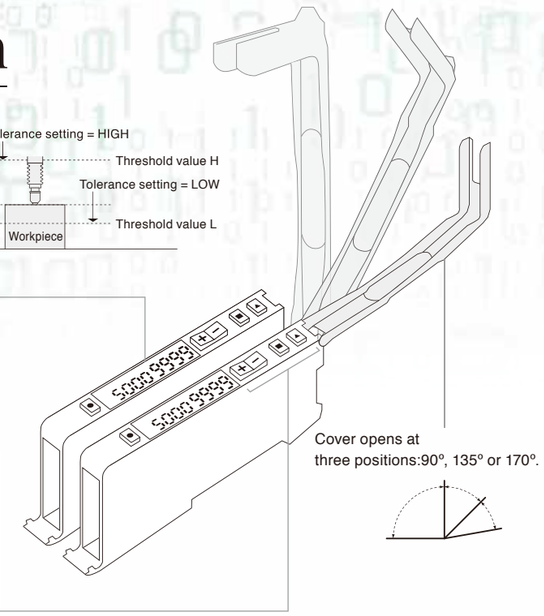
Threshold values can be set with two clicks of a button.



Buttons are easy to remember and operate



- Various mode displays (preset, tolerance setting, Go/NoGo indication, output inversion function)
- Two types of tolerance settings and four different setting methods can be selected.
- A preset function enables setting of arbitrary reference points.



- **Ultra-compact size**
  just 10 mm thick

- **Highly visible white LED**

The digital display improves for Easy-to-read

Digital Gauge

DF805S/DF812S Series

Digital Tolerance Indicator

MF10 Series

Digital Gauge
DF805S/DF812S Series


DF805SR


DF805SLR

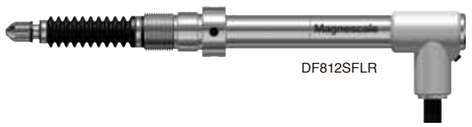

DF812SR


DF812SLR


DF805SFR


DF805SFLR


DF812SFR


DF812SFLR

DF805S□□R
DF812S□□R

No letters: Straight
L: Right angle
F: Flange
FL: Flange & Right angle

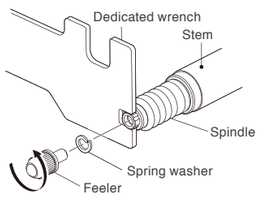
S: Ball spline

05: measurement range 5 mm
12: measurement range 12 mm

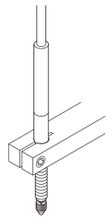
DF800S mounting method and features <standard ø8 mounting>

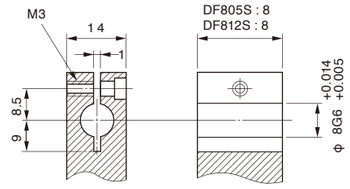
Attaching/removing feeler

[Dedicated wrench included]



Recommended mounting holder dimensions





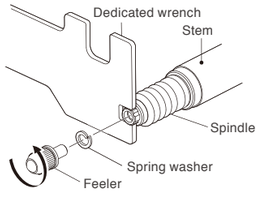
Tightening torque: 0.6 N•m
Material: When SUS303

Unit: mm

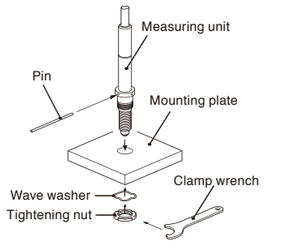
DF800SF mounting method and features <Easy mounting possible without applying excessive force to the bearing>

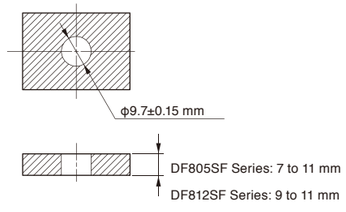
Attaching/removing feeler

[Dedicated wrench included]



Recommended mounting holder dimensions

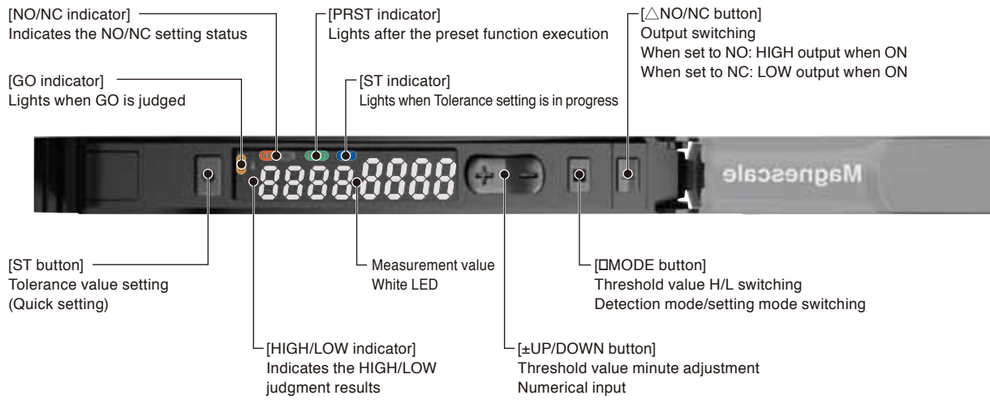




Digital Tolerance Indicator
MF10 Series

<cover closed>

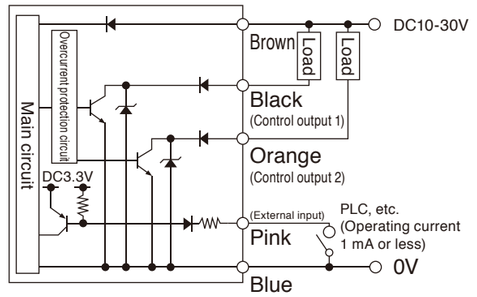
<cover open>



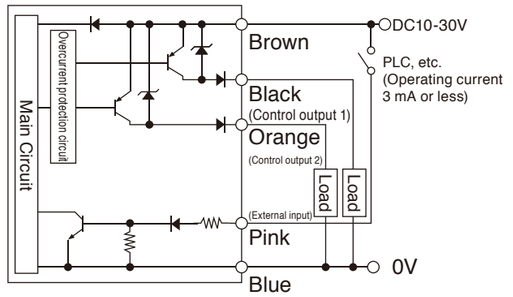
MF10-P1 Current sink (NPN)
MF10-P2 Current source (PNP)

MF10 series Input/Output Circuit Diagram

MF10-P1 (NPN type)



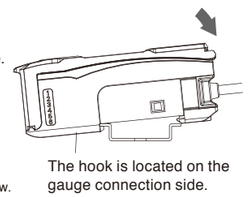
MF10-P2 (PNP type)

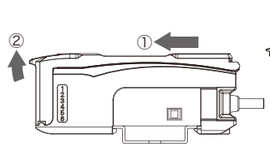


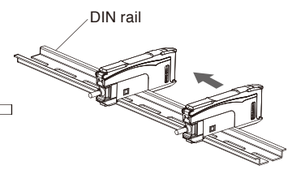
■ Mounting on DIN rail
① Let the hook on the underside of the indicator catch the DIN rail track.
② Push in the unit until the hook clicks into place.

■ Removing from DIN rail
① Push the unit in the direction of arrow 1.
② Lift the unit in the direction of arrow 2 while performing step ①.

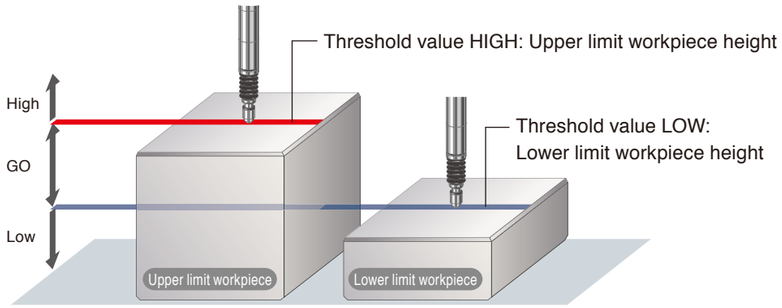
*Up to 30 digital tolerance indicators can be installed in a row.



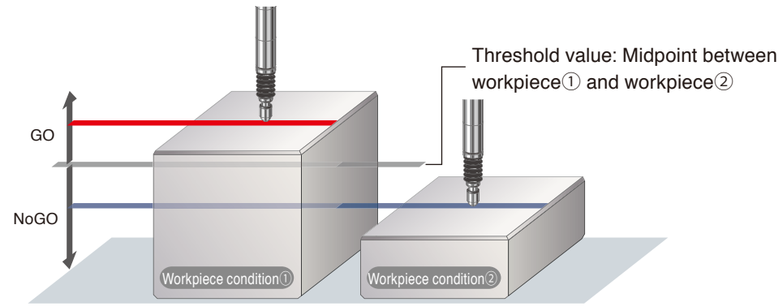




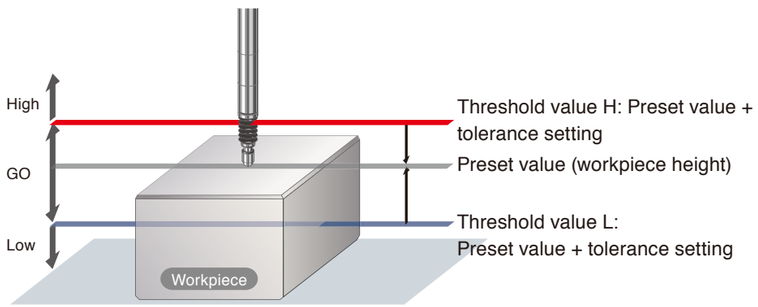
Setting the upper and lower limit range



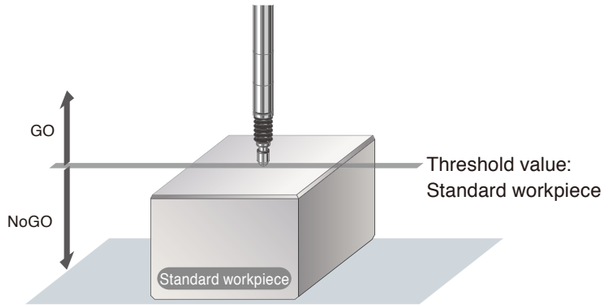
Setting relative to a single reference

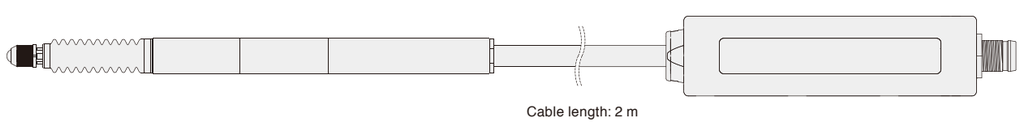


Setting the ± tolerance relative to the work



Setting the standard workpiece as the reference



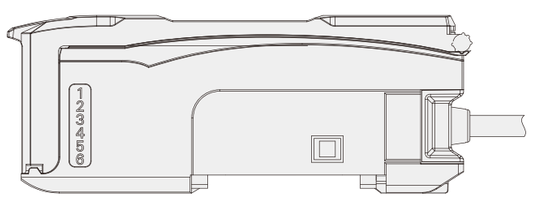


1 Digital gauge

Total 8 models

2 Cable

CE34-005 CE34-02
CE34-05 CE34-10
CE34-15 CE34-20



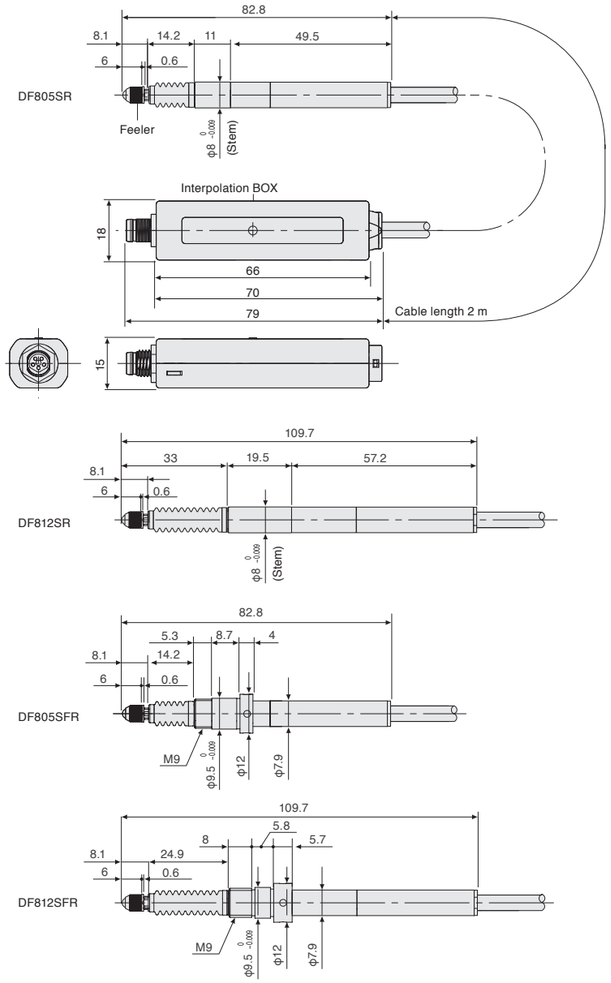
3 Digital Tolerance indicator

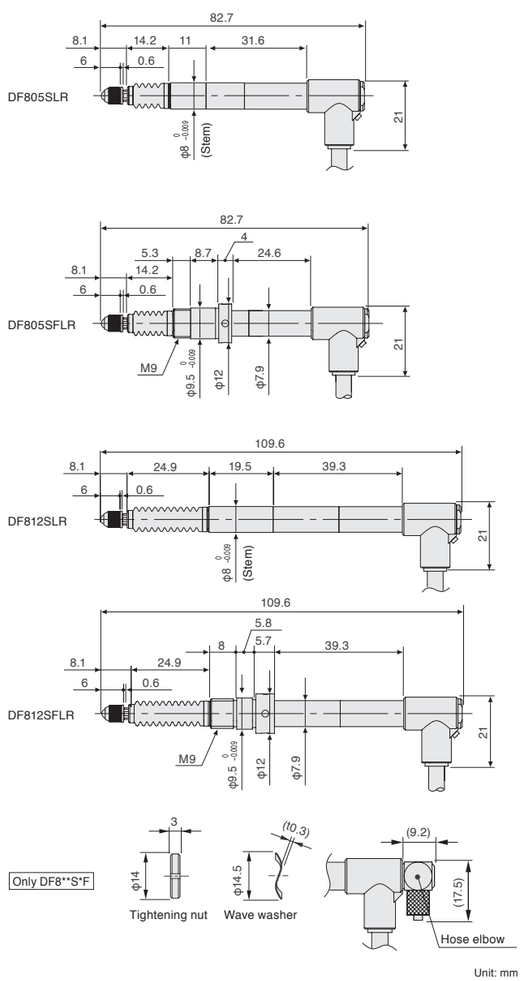
Current sink (NPN)
Current source (PNP)

Digital Gauge

DF805/DF812 Series

Main Specifications								
Model name	DF805SR	DF805SFR	DF805SLR	DF805SFLR	DF812SR	DF812SFR	DF812SLR	DF812SFLR
Measuring range	5mm				12mm			
Resolution	0.1μm							
Accuracy (at 20°C/68°F)	1μm							
Measuring force (at 20°C/68°F)	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	80m/min							
Reference point	at 1±0.5 mm position of spindle movement							
Reference point response speed	80m/min							
Output	Dedicated serial communication protocol							
Spindle driving	Spring push							
Achieved number of strokes	60 million strokes (under specific test conditions defined by Magnescale Co., Ltd.)							
Protective structure	IP66		IP54 When a ø4 mm tube is connected : IP67		IP66		IP54 When a ø4 mm tube is connected : IP67	
Impact resistance	1000m/s² (11ms)							
Vibration resistance	100m/s² (20-2000HZ)							
Operating temperature	0-55°C							
Storage temperature	-20-60°C							
Power supply voltage	+10 to +30V DC including ripple (p-p) 10%							
Power consumption	1.2 W or less							
Mass	Approx. 30 g (not including cable parts and interpolation box)							
Probe part cable length	2m							
Output cable length	Max. 20 m (Use the optional CE34.)							
Feeler	Provided with a carbide ball tip Mount screw M2.5							
Accessories	Instruction Manual, 1 wrench, 1 hose elbow (only DF8**S*L**) Tightening nut, clamp wrench, wave washer, stop pin (1 each) (only DF8**S*F**)							





Unit: mm

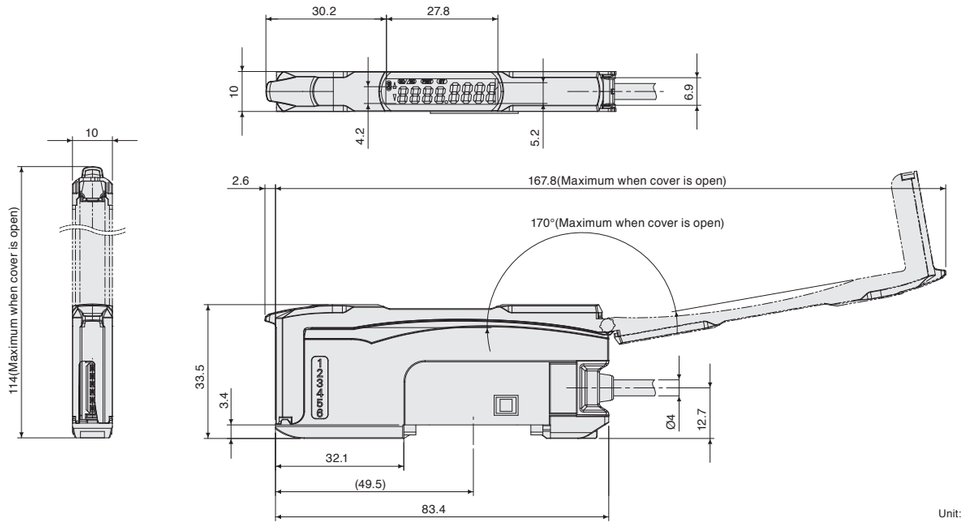
Digital Tolerance Indicator

MF10 Series

Main Specifications			
Model name		MF10-P1	MF10-P2
Type	I/O circuit	NPN output (current sink)	PNP output (current source)
I/O	Number of Go/NoGo judgment outputs	2	
	Number of external inputs*4	1	
Minimum display unit		0.1μm	
Power supply voltage		+10 to +30V DC including ripple (p-p) 10%	
Power consumption*1		Power supply voltage 24 V normal mode: 2040 mW or less (Power consumption 85 mA or less) Power-saving ECO mode: 1920 mW or less(Current consumption 80 mA or less)	
Go/NoGo judgment output*2		Load voltage: DC 30 V or less, open collector output type Load current: the total of the two outputs must be 100 mA or less (Residual voltage and load current less than 10 mA: 1 V or less Load current 10 mA to 100 mA: 2 V or less) Off-state current: 0.1 mA or less	
Protection circuit		Power supply reverse connection protection, output short-circuit protection and output reverse connection protection	
Number of banks		4 (Can be set 4 kinds of judgment value)	
Ambient temperature range*3		Operating: When lining up 1 or 2 digital tolerance indicators: 0°C to +55°C Storage: -10°C to +60°C (with no icing or condensation)	
Ambient humidity range		Operating and storage: 35% to 85% RH (with no condensation)	
Mass (main unit)		Approx. 75 g	
Cable length		2m	

*1. At a power supply voltage of 10 to 30 V, Normal mode: 2250 mW or less (power supply voltage 30 V: power consumption 75 mA or less / power supply voltage 10 V: power consumption 155 mA or less), power-saving ECO mode: 2100 mW or less (power supply voltage 30 V: power consumption 70 mA or less / power supply voltage 10 V: power consumption 135 mA or less) *2. When lining up 4 or more digital tolerance indicators, the 2 output total is 20 mA or less. *3 When used in a row, the operating ambient temperature range is 0°C to +50°C for 3 to 10 units, 0°C to +45°C for 11 to 16 units, and 0°C to +40°C for 17 to 30 units. *4. The input details are as follows.

	Contact input (relay or switch)	Non-contact input (transistor)	Input time
NPN Type	ON: Connection to 0 V (Outflow current: 1 mA or less) OFF: Open or short-circuited to Vcc	ON: 1.5 V or less (Outflow current: 1 mA or less) OFF: Vcc-1.5V to Vcc (Leakage current: 0.1 mA or less)	ON: 9ms or more OFF: 9ms or more
PNP Type	ON: Connection to Vcc (Sink current: 3 mA or less) OFF: Open or short-circuited to 0V	ON: Vcc-1.5V to Vcc (Sink current: 3 mA or less) OFF: 1.5V or less (Leakage current: 0.1 mA or less)	

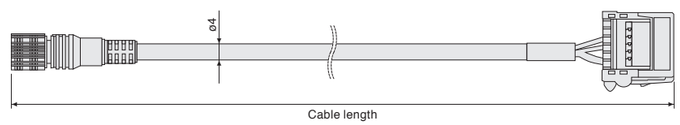


Unit: mm

Cable

CE34-

Main Specifications						
Model Name	CE34-005	CE34-02	CE34-05	CE34-10	CE34-15	CE34-20
Cable length	0.5m	2.0m	5.0m	10m	15m	20m



Digital gauge DF805S / DF812S series

Main specification								
Model name	DF805SR	DF805SFR	DF805SLR	DF805SFLR	DF812SR	DF812SFR	DF812SLR	DF812SFLR
Measuring range	5mm				12mm			
Resolution	0.1μm							
Accuracy (at 20°C)	1μm							
Protective structure	IP66		When a ϕ4mm tube is connected: IP67		IP66		When a ϕ4mm tube is connected: IP67	

Connection cable CE34 series (CE34 cable is necessary when connecting DF805S/812S series to MF10 series)

Main specification						
Model name	CE34-005	CE34-02	CE34-05	CE34-10	CE34-15	CE34-20
Cable length	0.5m	2.0m	5.0m	10m	15m	20m

Digital Gauge DT series

Main specification								
Model name	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	12mm				32 mm			
Resolution	1μm		5μm					
Accuracy (at 20°C)	6μm		10μm					
Protective structure	-	IP64 or equivalent	-	IP64 or equivalent	-		IP64 or equivalent	

Interpolator for DT series MT20 series (MT20 interpolator is necessary when connecting DT series to MF10 series)

Main specification		
Model name	MT20-01 (For DT512 series)	MT20-05 (For DT12/32 series)
Resolution	Resolution 1μm	Resolution 5 μm

Digital tolerance indicator / Counter module MF10 series

Main specification			
Model name	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		-
Mounting method	35mm DIN rail mounting		
Power supply voltage	+10-30V DC including ripple (p-p) 10%		
Power consumption / Consumption current	2.1W or less / 85A or less		
Mass	75g		

Interface unit MG50 series

Main specification			
Model name	Main module		Distribution module
	MG50-EC	MG50-CL	MG51
Commnication protocol	EtherCAT	CC-Link	Data transferred to main moduble by dedicated protocol
Baud rate	100Mbps	Maximum downlink speed of 10 Mbps	-
Node address setting method	Set with decimal rotary switches or software	Set with decimal rotary switches	-
Node address range	000-192	Max. 64	-
Maximum connectable counter modules	30	16	10
Maximum connectable distribution modules	8		-
Maximum cable length	Maximum cable length between main module and distribution module: 30m		
Mounting method	35mm DIN rail mounting		
Power supply voltage	DC24V (20.4-26.4V)		
Power consumption / Consumption current / Current consumption	2.4 W or less 100 mA or less		2W or less 80 mA or less

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NEW gauging system

Magnescale

SPEED × PRECISION

「Speed」×「High Rigidity」

NEW

Fieldbus interface unit

EtherCAT® CC-Link V2

A new network interface compatible with our Tough Sensor lineup.
Data output and Go/No Go judgement functions are available.
Output data can be calculated and controlled by PLC via open network.

Main module MG50
Maximum connectable counter modules
EtherCAT
MG50-EC Maximum 30
CC-Link
MG50-CL Maximum 16

Distribution module MG51
Maximum connectable distribution modules per main module
Maximum 8

Wire-saving
Total extension 30m
2 wire power 2 output line RS485 wiring

Maximum connectable counter modules per distribution module
Maximum 10

Counter module MF10
Slim body and space saving design

8 types of functional calculations
Function block

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.)

High resistance to shock and vibration
Ball spline structure

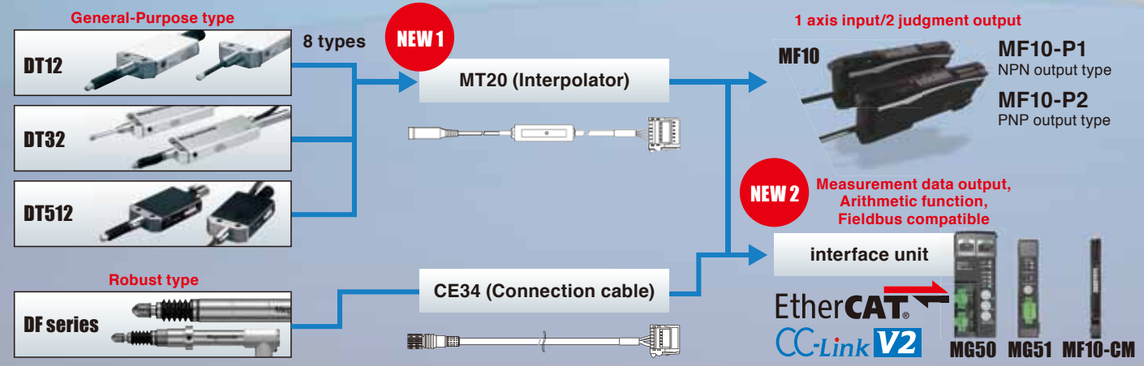
The new ball spline construction provides approximately 5 times the radial load resistance and zero rotational backlash compared to the previous model which utilized a ball-point contact structure.

Achieved numbers of strokes: ***92*** *million*
(full stroke sliding test 2 years passed as of March, 2014)

Resistant to the effects of water and condensation
IP67 *1

Magnescale employes a magnetic detection principle that is resistant to the effects of oil, water and condensation. This principle allows for the achievement of high positioning accuracy even in severe environments. The spindle can be driven by air easily with the right angle type using the provided hose connection. This adhesion structure has successfully completed a 72 hour underwater stroke test which exceeds an IP67 rating.

*1. When air hose is connected for right angle type.



DF800S Series
Slim & Compact

Compact φ8mm body is suitable for various measurement applications. Our broad lineup including angle and flange type models make it easy to integrate into machines and route the cables.