Featured Products

Attached Type Scale Unit for ABSOLUTE Systems

ABS AT1300 Series

Refer to page H-11 for details.

Attached Type Scale Unit for ABSOLUTE Systems

ABS AT1100 Series

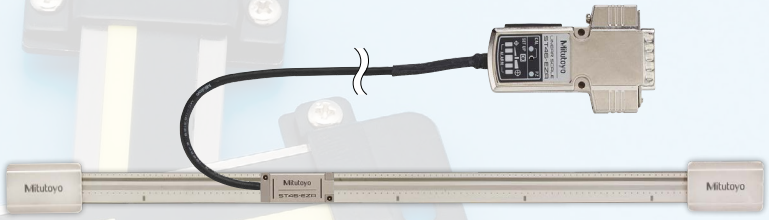
Refer to page H-12 for details.

DRO Retrofit Packages

Refer to page H-18 for details.

H

Digimatic Scale Units
Linear Scales



Exposed, Compact Linear Scales & Multiple Mounting Options

ST46-EZA Series

Refer to page H-20 for details.

INDEX

IP66 IP67

IP Codes

These are codes that indicate the degree of protection provided (by an enclosure) for the electrical function of a product against the ingress of foreign bodies, dust and water as defined in IEC standards (IEC 60529: 2001) and JIS C 0920: 2003.

PROPRIETARY INSPECTION CERTIFICATE

Measuring Instruments Shipped with Inspection Certificate

Mitutoyo guarantees product quality as a leading precision measuring instrument manufacturer and ships measuring instruments with an inspection certificate that includes inspection data so that customers can use them with confidence.

ABSOLUTE™

ABSOLUTE Linear Encoder

Mitutoyo developed the unique ABSOLUTE method to retain position information after the power is turned off.
The origin is set once - thereafter the live position is displayed when the power is turned on.

Mitutoyo

ABSOLUTE Digimatic Scale Units

IP66 ABSOLUTE™

Applicable models: **SD-G**

SD ABSOLUTE Digimatic Scale Units SERIES 572

Horizontal single-function type (Water-proof type)
572-602 SD-20G

Horizontal single-function type
572-202-30 SD-20AX
572-203-10 SD-30D

Horizontal multi-function type
572-461 SD-15E

Vertical single-function type
572-303-10 SDV-30D

Vertical multi-function type
572-561 SDV-15E

- **SD** series facilitates mounting on jigs, tools, and small machine tools to enable accurate positioning.
- Built-in ABSOLUTE scale including the ABS point does not require a zero-set every time the power is turned on.
  In addition, reliability has improved thanks to elimination of overspeed errors.
- Horizontal or vertical display according to the scale mounting direction.
- The dust resistance and the environmental resistance of the display has improved. The **SD-G** series offers dust/water protection level IP66.
- Long battery life.
- **EC** counters are available as external display units.
- Equipped with an output port to transfer measurement data, allowing implementation in control systems and gaging systems.

Functions

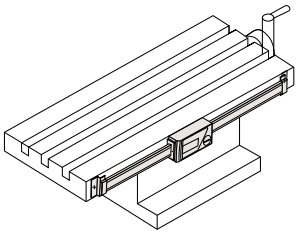
- ABS (ABSOLUTE) measurement function
- INC (Incremental) measurement function
- Zero-setting function
- Presetting function (2 preset values can be set. Not available for SD-G, SD-AX, SD-D, SDV-D)
- Double reading function (Available only for SD-F or SDV-F)
- Direction switch function
  (Available only for SD-E, SDV-E)
- Hold function*
- Measurement value composition error alarm
- Low battery alarm
- Output function

* To activate the hold function when using SD-AX, SD-D or SDV-D models, an optional hold unit is required. Simultaneous activation with the output function is not available.

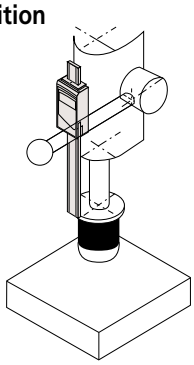
Note: These units use 1.5 V silver oxide cells for the power supply. Therefore, when the units are directly fixed to the frame of a machine tool that requires a high voltage, malfunctions such as display digit fluctuations and errors may occur. Countermeasure examples are described in the user manuals provided.

Typical Applications

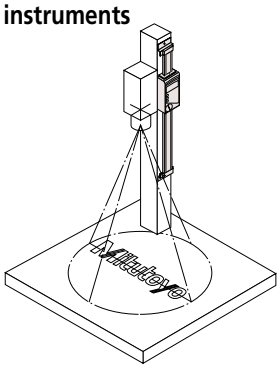
Machine table position



Drilling machine stroke position

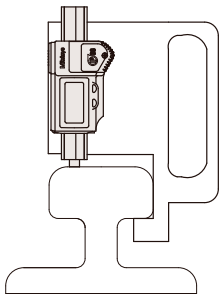


Focus setting on optical instruments

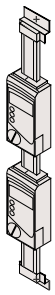


Special Applications

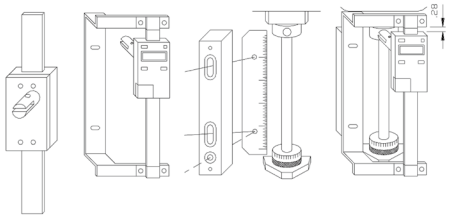
Please contact Mitutoyo for special applications.



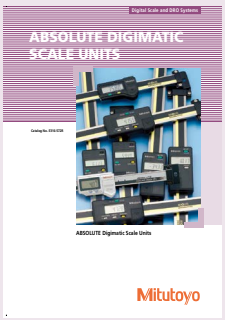
As a measurement jig for outdoor use (SD-G)



Detector head mechanism



The Mitutoyo Quill Kit mounted on a vertical mill



Refer to the ABSOLUTE Digimatic Scale Units Brochure (**E316-572R**) for more details.

ABSOLUTE Digimatic Scale Units

System Diagram

[Scale units] **[Display units]**

Single-function Type with High Dust / Water Resistance

SD-G (Horizontal)

*2

EC Counter*3

Refer to page G-11 for details.

→ Tolerance judgment output*1

Single-function type

SD-AX (Horizontal)

Note 1: **SD-30D** for the measuring range of 300 mm.

SDV-D (Vertical)

Multi-function type

SD-E (Horizontal)

SDV-E (Vertical)

Multi-function type

SD-F (Horizontal)

SDV-F (Vertical)

*3 Digimatic mini-processor
DP-1VA LOGGER
264-505A
Palm-sized printer for printing and statistical analysis

*3 4-Input Interface Unit
MIG-4USB
64AAB639
Interface unit for the **RS-232C** conversion and output **RS-232C** output

→ USB keyboard RS-232C output

*3 USB Input Tool Direct
USB-ITN-D
06AFM380D
An interface that easily transfers data to widely used software such as Excel. Slim, with integrated cable.

→ USB keyboard signal conversion

*3 Input Tool (USB keyboard signal conversion model)
IT-020U
264-020
USB Interface unit that converts and transfers data into spreadsheets

→ USB keyboard signal conversion

Note 2: May also be connected to an RS-232C conversion type (**IT-007R**) input tool.

USB Input Tool Direct
USB-ITN-A **06AFM380A**
USB-ITN-C **06AFM380C**
USB-ITN-F **06AFM380F**

→ USB keyboard signal conversion

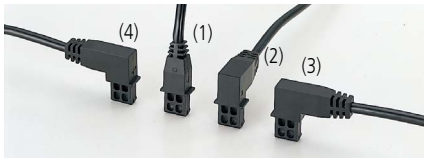
Measurement Data Wireless Communication System
U-WAVE
The data output from the **SD** Series can be sent to the computer by wireless communication without using the **EC** counter. Refer to pages A-9 to A-14 for details.

→ USB keyboard signal conversion

Connecting cable with the water-proof type output switch*2 1 m: **05CZA624** 2 m: **05CZA625**

Connecting cable with the output switch 1 m: **959149** 2 m: **959150**

Connecting cable with the output switch



(1) 1 m: **905338** 2 m: **905409**
(2) 1 m: **905689** 2 m: **905690**
(3) 1 m: **905691** 2 m: **905692**
(4) 1 m: **905693** 2 m: **905694**

Connecting cable 1 m: **936937** 2 m: **965014**

*1 Select the tolerance judgment output or Digimatic output when setting the parameters.
*2 Connecting cable with the water-proof type output switch can be used only for **SD-G** or Water-proof Digital Caliper equipped with the external output function.
*3 Connecting of SD series and **DP-1VA LOGGER/MIG-8USB, MIG-4USB/IT-020U** is also available without passing through the **EC** counter. In this case, connect these units and **SD** series with the cables used for connection with the **EC** counter.

H

Mitutoyo

ABSOLUTE Digimatic Scale Units

ABSOLUTE Digimatic Scale Units
SERIES 572
SPECIFICATIONS

Type	Unit spec.	Order No.	Model	Range	Resolution	Accuracy	Repeatability	Response speed*2	Battery life
Horizontal single-function type (Water-proof type)	Inch/Metric	572-613	SD-4" /10G	4 in/100 mm	0.0005 in/0.01 mm	0.001 in/0.03 mm	0.0005 in/0.01 mm	Unlimited	Approx. 13,000 hours
		572-614	SD-6" /15G	6 in/150 mm					
		572-615	SD-8" /20G	8 in/200 mm					
	Metric	572-600	SD-10G	100 mm	0.01 mm	0.03 mm	0.01 mm		
		572-601	SD-15G	150 mm					
		572-602	SD-20G	200 mm					
Horizontal single-function type	Inch/Metric	572-210-30	SD-4" AX	4 in/100 mm	0.0005 in/0.01 mm	0.001 in/0.03 mm	0.0005 in/0.01 mm		Approx. 18,000 hours
		572-211-30	SD-6" AX	6 in/150 mm					
		572-212-30	SD-8" AX	8 in/200 mm					
		572-213-10	SD-12" D	12 in/300 mm		0.002 in/0.04 mm			Approx. 20,000 hours
	Metric	572-200-30	SD-10AX	100 mm	0.01 mm	0.03 mm	0.01 mm		Approx. 18,000 hours
		572-201-30	SD-15AX	150 mm					
		572-202-30	SD-20AX	200 mm					
		572-203-10	SD-30D	300 mm		0.04 mm			Approx. 20,000 hours
Horizontal multi-function type	Inch/Metric	572-470	SD-4" E	4 in/100 mm	0.0005 in/0.01 mm	0.001 in/0.03 mm	0.0005 in/0.01 mm		Approx. 5,000 hours
		572-471	SD-6" E	6 in/150 mm					
		572-472	SD-8" E	8 in/200 mm					
		572-473	SD-12" E	12 in/300 mm		0.002 in/0.04 mm			
		572-474	SD-18" E	18 in/450 mm					
		572-475	SD-24" E	24 in/600 mm		0.002 in/0.05 mm			
		572-476	SD-32" E	32 in/800 mm		0.0025 in/0.06 mm			
		572-477	SD-40" E	40 in/1000 mm		0.003 in/0.07 mm			
	Metric	572-460	SD-10E	100 mm	0.01 mm	0.03 mm	0.01 mm		
		572-461	SD-15E	150 mm					
		572-462	SD-20E	200 mm					
		572-463	SD-30E	300 mm		0.04 mm			
		572-464	SD-45E	450 mm					
		572-465	SD-60E	600 mm		0.05 mm			
		572-466	SD-80E	800 mm		0.06 mm			
		572-467	SD-100E	1000 mm		0.07 mm			
Horizontal multi-function type (equipped with double reading function)	Inch/Metric	572-490-10*1	SD-4" F	4 in/100 mm	0.0005 in/0.01 mm	0.001 in/0.03 mm	0.0005 in/0.01 mm (Radius indication, not diameter)		Approx. 5,000 hours
		572-491-10*1	SD-6" F	6 in/150 mm					
		572-492-10*1	SD-8" F	8 in/200 mm					
		572-493-10*1	SD-12" F	12 in/300 mm		0.002 in/0.04 mm			
		572-494-10*1	SD-18" F	18 in/450 mm					
		572-495-10*1	SD-24" F	24 in/600 mm		0.002 in/0.05 mm			
		572-496-10*1	SD-32" F	32 in/800 mm		0.0025 in/0.06 mm			
		572-497-10*1	SD-40" F	40 in/1000 mm		0.003 in/0.07 mm			
	Metric	572-480-10*1	SD-10F	100 mm	0.01 mm	0.03 mm	0.01 mm (Radius indication, not diameter)		
		572-481-10*1	SD-15F	150 mm					
		572-482-10*1	SD-20F	200 mm					
		572-483-10*1	SD-30F	300 mm		0.04 mm			
		572-484-10*1	SD-45F	450 mm					
		572-485-10*1	SD-60F	600 mm		0.05 mm			
		572-486-10*1	SD-80F	800 mm		0.06 mm			
		572-487-10*1	SD-100F	1000 mm		0.07 mm			
Vertical single-function type	Inch/Metric	572-310-10	SD-4" D	4 in/100 mm	0.0005 in/0.01 mm	0.03 mm/0.001 in	0.0005 in/0.01 mm		Approx. 20,000 hours
		572-311-10	SD-6" D	6 in/150 mm					
		572-312-10	SD-8" D	8 in/200 mm					
		572-313-10	SD-12" D	12 in/300 mm		0.04 mm/0.002 in			
	Metric	572-300-10	SDV-10D	100 mm	0.01 mm	0.03 mm	0.01 mm		
		572-301-10	SDV-15D	150 mm					
		572-302-10	SDV-20D	200 mm					
		572-303-10	SDV-30D	300 mm		0.04 mm			
Vertical multi-function type	Inch/Metric	572-570	SDV-4" E	4 in/100 mm	0.0005 in/0.01 mm	0.001 in/0.03 mm	0.0005 in/0.01 mm		Approx. 5,000 hours
		572-571	SDV-6" E	6 in/150 mm					
		572-572	SDV-8" E	8 in/200 mm					
		572-573	SDV-12" E	12 in/300 mm		0.002 in/0.04 mm			
		572-574	SDV-18" E	18 in/450 mm					
		572-575	SDV-24" E	24 in/600 mm		0.002 in/0.05 mm			
		572-576	SDV-32" E	32 in/800 mm		0.0025 in/0.06 mm			
		572-577	SDV-40" E	40 in/1000 mm		0.003 in/0.07 mm			
	Metric	572-560	SDV-10E	100 mm	0.01 mm	0.03 mm	0.01 mm		
		572-561	SDV-15E	150 mm					
		572-562	SDV-20E	200 mm					
		572-563	SDV-30E	300 mm		0.04 mm			
		572-564	SDV-45E	450 mm					
		572-565	SDV-60E	600 mm		0.05 mm			
		572-566	SDV-80E	800 mm		0.06 mm			
		572-567	SDV-100E	1000 mm		0.07 mm			
Vertical multi-function type (equipped with double reading function)	Inch/Metric	572-590-10*1	SDV-4" F	4 in/100 mm	0.0005 in/0.01 mm	0.001 in/0.03 mm	0.0005 in/0.01 mm (Radius indication, not diameter)		Approx. 5,000 hours
		572-591-10*1	SDV-6" F	6 in/150 mm					
		572-592-10*1	SDV-8" F	8 in/200 mm					
		572-593-10*1	SDV-12" F	12 in/300 mm		0.002 in/0.04 mm			
		572-594-10*1	SDV-18" F	18 in/450 mm					
		572-595-10*1	SDV-24" F	24 in/600 mm		0.002 in/0.05 mm			
		572-596-10*1	SDV-32" F	32 in/800 mm		0.0025 in/0.06 mm			
		572-597-10*1	SDV-40" F	40 in/1000 mm		0.003 in/0.07 mm			
	Metric	572-580-10*1	SDV-10F	100 mm	0.01 mm	0.03 mm	0.01 mm (Radius indication, not diameter)		
		572-581-10*1	SDV-15F	150 mm					
		572-582-10*1	SDV-20F	200 mm					
		572-583-10*1	SDV-30F	300 mm		0.04 mm			
		572-584-10*1	SDV-45F	450 mm					
		572-585-10*1	SDV-60F	600 mm		0.05 mm			
		572-586-10*1	SDV-80F	800 mm		0.06 mm			
		572-587-10*1	SDV-100F	1000 mm		0.07 mm			

*1 Available to special order *2 High slider speed does not cause data errors. Position feedback and output data may not be used while the slider is moving.

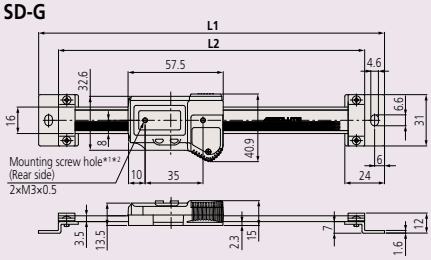
ABSOLUTE Digimatic Scale Units

DIMENSIONS

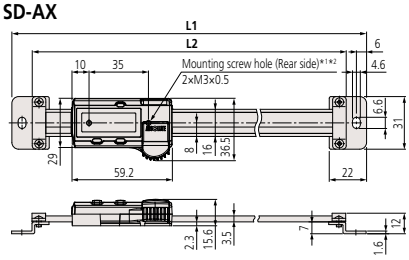
Note: the hole dimensions are on the back.

Unit: mm

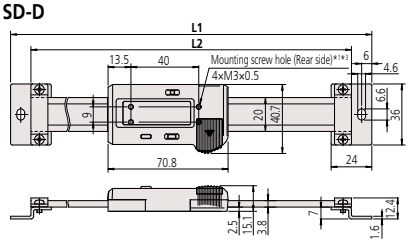
SD-G



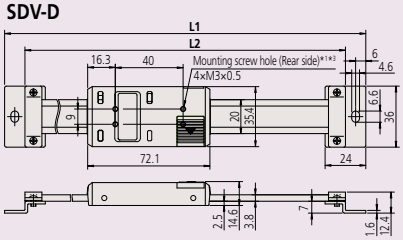
SD-AX



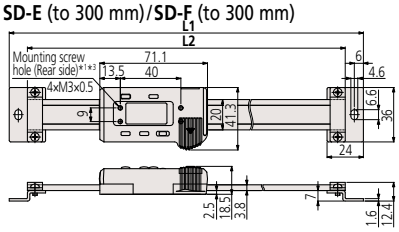
SD-D



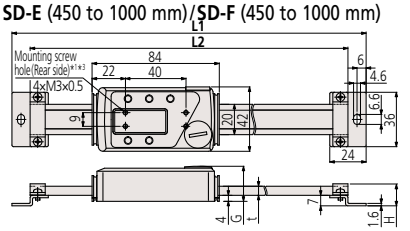
SDV-D



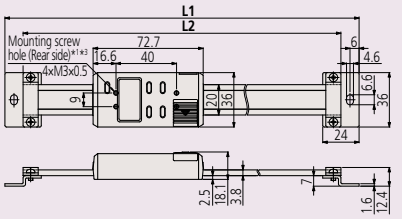
SD-E (to 300 mm)/**SD-F** (to 300 mm)



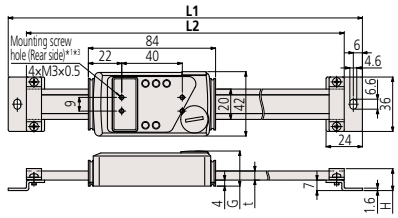
SD-E (450 to 1000 mm)/**SD-F** (450 to 1000 mm)



SDV-E (to 300 mm)/**SDV-F** (to 300 mm)



SDV-E (450 to 1000 mm)/**SDV-F** (450 to 1000 mm)



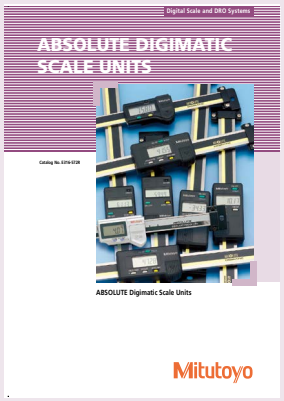
*1 Refer to the dimension table for details of the depth including the screw on the rear of the display.
*2 Mounting screw hole: 2×No.5-40 UNC (Inch type, Inch/Metric switching type)/2×M3×0.5 (Metric type) Screwed depth on the rear side of display unit: under 2 mm
*3 Mounting screw hole: 4×No.5-40 UNC (Inch type, Inch/Metric switching type)/4×M3×0.5 (Metric type) Screwed depth on the rear side of display unit: under 2 mm

SPECIFICATIONS

1inch = 25.4mm

Model	Range (mm)	Dimensions (mm)					Depth including the screw on the rear of the display	Mass (g)
		L1	L2	t	G	H		
SD-G	100	209	185	—	—	—	Less than 2 mm	390
	150	259	235	—	—	—		410
	200	311	287	—	—	—		430
SD-AX	100	209	185	—	—	—		235
	150	259	235	—	—	—		255
	200	311	287	—	—	—		275
SD-30D	300	444	420	—	—	—		370
SD-E SD-F	100	244	220	—	—	—		250
	150	294	270	—	—	—		280
	200	344	320	—	—	—		310
	300	444	420	—	—	—		370
	450	594	570	6	23.2	14.6	Less than 3 mm	760
	600	774	750					900
	800	974	950	10	27.2	18.6		1710
	1000	1174	1150					2040
SDV-D	100	244	220	—	—	—	Less than 2 mm	250
	150	294	270	—	—	—		280
	200	344	320	—	—	—		310
	300	444	420	—	—	—		370
SDV-E SDV-F	100	244	220	—	—	—		250
	150	294	270	—	—	—		280
	200	344	320	—	—	—		310
	300	444	420	—	—	—		370
	450	594	570	6	23.2	14.6	Less than 3 mm	760
	600	774	750					900
	800	974	950	10	27.2	18.6		1710
	1000	1174	1150					2040

Talk to Sales



Refer to the ABSOLUTE Digimatic Scale Units Brochure (**E316-572R**) for more details.

H

Quill Kit with ABSOLUTE Encoder

Easy Installation Fits Most Vertical Knee Mills

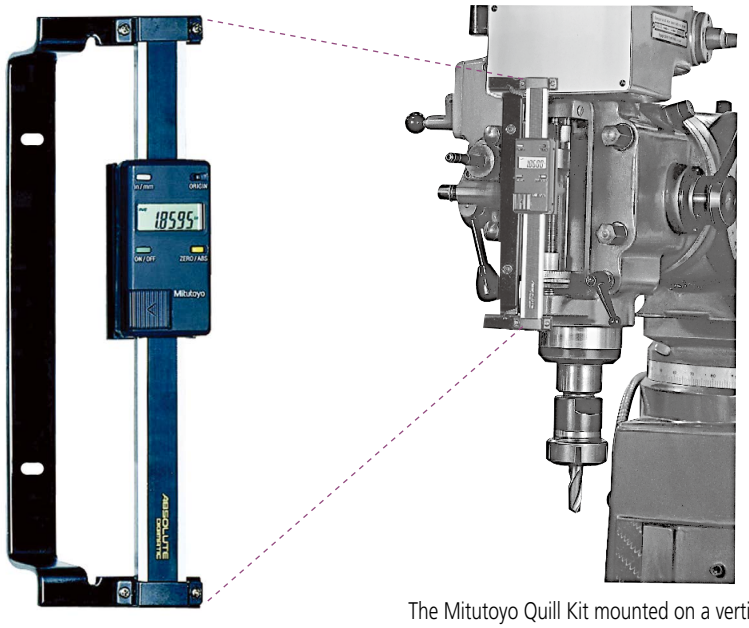
- Easy-to-read LCD with resolution of .0005"/0.01mm. 0 -5" travel inch/mm
- Push button controls for inch/mm, zero-set and on/off.
- Powered by a single SR-44 battery which lasts about 1 year with normal use.
- SPC Output for data transmission to data processors or a remote display.

SPECIFICATIONS

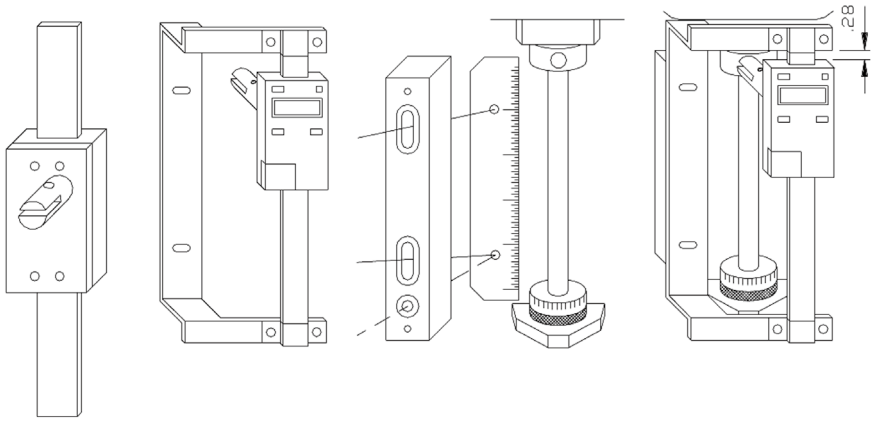
Order No.	Description
053906B	Digimatic Quill Kit complete with brackets & scale for Bridgeport-type machines.

Optional Accessories

905338: SPC cable (40" / 1m standard)
905409: SPC cable (80" / 2m standard)
264-505A: DP-1VA data processor, 120V AC
02AZD810D: U-Wave-R (wireless receiver)
02AZD730D: U-Wave-T/IP67 type (wireless transmitter)
02AZD790F: U-Wave connecting cable F
02AZE200: U-Wave-T installation brackets kit



The Mitutoyo Quill Kit mounted on a vertical mill.



Find a Distributor

KA-200 Counter
SERIES 174 — Standard Type

- High performance, low cost 2 & 3 axis counter.
- ABSOLUTE and incremental modes (10 presets each).
- Non-linear and linear error compensation
- Adjustable high-brightness, high-refresh rate LED displays .
- Calculator function.
- Outputs data into spreadsheets (optional USB card).
- Standard and lathe modes.
- Connects to AT715 and AT100 series Linear Scales.

174-183A
KA-212

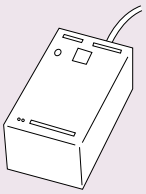
174-185A
KA-213

SPECIFICATIONS

Model	KA-212	KA-213
Order No.	**174-183A**	**174-185A**
Number of axes to be displayed	2	3
Resolution	(Changeable according to the parameter) When **AT100** is connected: 0.05 to 0.0001 mm When **AT715** is connected: 0.01 to 0.001 mm	
Display/digit	Main display: 9 digits including sign Sub display: 8 digits	
Power supply voltage	AC100 to 240 V, 50/60 Hz	
Dimensions	300 (W) ×70 (D) ×167 (H) mm	
Output (optional)	RS-232C	
Mass	1.25 kg	1.3 kg

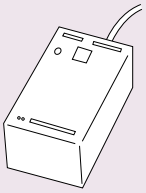
Optional Accessories

06AET993	Code out unit - USB output, RS232C output, Digimatic Input
06ACB393	Adapter for Linear gages with origin
06ACB913	Adapter for Linear gages without origin
06ACB391	Adapter for AT211 Linear Scales
06ACB392	Adapter for ST Series
09CAB231	Adapter for micrometer head
09AAA207	Adapter for previous model 6 pin linear scales
937179T	Foot switch to trigger USB output (06AET993 needed)
64AAB336	Foot switch to trigger RS-232C output (06AET993 needed)
06ACF941	Extension cable for remote load & zero (06AET993 needed)
965004	Foot switch to trigger RS-232C output (for 06ACF941 only)
937328	External load box (06AET993 & 06ACF941 needed)
936553	External zero box (06AET993 & 06ACF941 needed)
09EAA094	Counter cable RS232C for DP-1VA
64AAB519	RS232C output cable 6-ft. (25-9 pin)



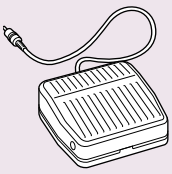
External Zero Box
Zeroes the counter just by pressing the button when using the counter's data output function. For KA-200 Counter (equipped with RS-232C output).

936553



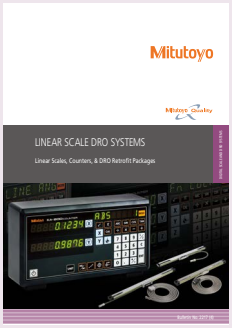
External Load Box
Outputs counter value just by pressing the button when using the counter's data output function. For KA-200 Counter (equipped with RS-232C output).

937328



External Load Foot Switch
Connects to the external load/ zero cable (06ACF941) when also using the optional RS-232C card of KA, KS and KC counters. The foot switch can be used to output the displayed data

965004



Refer to the Linear Scale DRO Systems Brochure (**No. 2217 (4)**) for more details.

Linear Scales

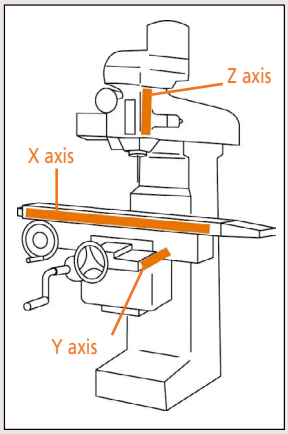
IP67

Digital Readout / DRO Packages 2-Axis / 3-Axis Travels

- KA-200 counter
- AT715 electromagnetic ABSOLUTE linear scales
- Brackets for linear scales
- Display arm kit

2 Axis Milling Machine System Packages

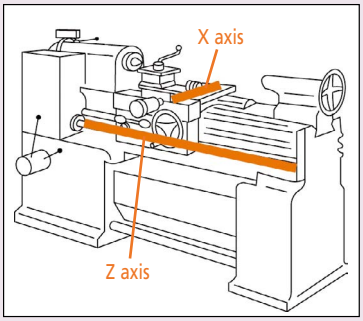
X Axis Travel (AT715 Slim Electromagnetic)	Y Axis Travel (AT715 Slim Electromagnetic)			
	12" (539-805N)	14" (539-806N)	16" (539-806N)	18" (539-808N)
24" (539-811N)	**64PKA170A**	**64PKA172B**		
30" (539-814N)	**64PKA058D**	**64PKA060C**	**64PKA175B**	
32" (539-815N)		**64PKA169A**	**64PKA176A**	
36" (539-816N)	**64PKA059D**	**64PKA168B**	**64PKA062D**	**64PKA178B**
40" (539-817N)	**64PKA171B**	**64PKA061B**	**64PKA063C**	**64PKA064C**
44" (42") (539-815N)	**64PKA173B**		**64PKA177A**	



2-Axis Lathe Package

- KA-200 counter
- AT113 and AT715 linear scale combinations (with cables)
- Mounting bracket kit
- Counter tray
- Additional extension cable (2m) included in 60" and 72" packages

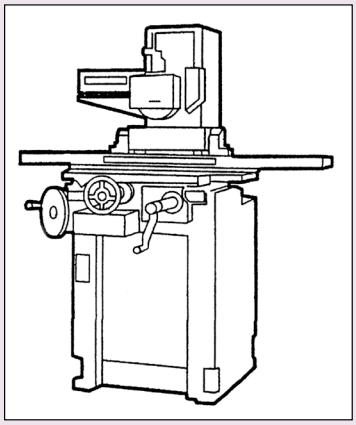
Z axis travel (AT715 Slim Electromagnetic)	X Axis Travel (AT113 Slim Glass Scale)					
	6"(539-202-30)	8"(539-203-30)	10"(539-204-30)	12"(539-205-30)	14"(539-206-30)	16"(539-207-30)
28" (539-813N)	**64PKA035B**					
30" (539-814N)	**64PKA036D**					
36" (539-816N)	**64PKA037C**	**64PKA194B**				
40" (539-817N)	**64PKA038B**	**64PKA039B**	**64PKA042C**	**64PKA046C**	**64PKA052C**	
44" (539-818N)		**64PKA040B**	**64PKA043B**	**64PKA047C**	**64PKA053C**	
48" (539-819N)		**64PKA041B**	**64PKA044B**	**64PKA048B**	**64PKA054B**	
52" (539-820N)		**64PKA195A**	**64PKA198A**	**64PKA049C**	**64PKA055C**	
60" (539-822N)		**64PKA196B**	**64PKA045C**	**64PKA050B**	**64PKA056C**	**64PKA057C**
68" (539-824N)		**64PKA220A**		**64PKA200A**		
72" (539-825N)				**64PKA051C**		
80" (539-860N)		**64PKA197B**	**64PKA199B**	**64PKA210B**	**64PKA203B**	
88" (539-861N)			**64PKA223A***	**64PKA201B**		
96" (539-862N)					**64PKA222B**	
120" (539-866N)			**64PKA211A***	**64PKA202A***	**64PKA224B/ 64PKA204A**	**64PKA205A***



2-Axis, KA Counter Grinder System

- KA-200 counter
- AT113 glass linear scales
- Mounting bracket kit
- Display arm kit

Vertical (AT113 Slim Glass Scale)	Cross Side (AT113 Slim Glass Scale)				
	6" (539-202-30)	8" (539-203-30)	10" (539-204-30)	12" (539-205-30)	14"(539-206-30)
12"(539-205-30)	**64PKA026B**	**64PKA028C**			
14"(539-206-30)	**64PKA027C**	**64PKA029B**			
16"(539-207-30)		**64PKA030D**			
18"(539-208-30)	**64PKA206A**	**64PKA212A**	**64PKA031B**	**64PKA033B**	
20"(539-209-30)				**64PKA034B**	
24"(539-211-30)			**64PKA032C**	**64PKA207**	**64PKA208A**



H

Milling Packages
Electro-Magnetic ABSOLUTE DRO Packages for Milling Machines

3 Axis (Quill) - AT715 Slim Electromagnetic for all axes

Order No.	Description
64PKA065C	ABS Scales, 12" x 30" x 6" w/3 axis KA-200 Counter (174-175A)
64PKA066C	ABS Scales, 12" x 36" x 6",w/3 axis KA-200 Counter (174-175A)
64PKA067C	ABS Scales, 16" x 36" x 6" w/3 axis KA-200 Counter (174-175A)
64PKA179B	ABS SCALES 32" X 14" X 4" w/3 axis KA-200 Counter (174-185A)
64PKA180B	ABS SCALES 36" X 14" X 4" w/3 axis KA-200 Counter (174-185A)
64PKA181B	ABS SCALES 36" X 16" X 4" w/3 axis KA-200 Counter (174-185A)
64PKA182B	ABS SCALES 30" X 14" X 6" w/3 axis KA-200 Counter (174-185A)
64PKA183B	ABS SCALES 32" X 14" X 6" w/3 axis KA-200 Counter (174-185A)
64PKA184B	ABS SCALES 36" X 14" X 6" w/3 axis KA-200 Counter (174-185A)
64PKA185A	ABS SCALES 32" X 16" X 6" w/3 axis KA-200 Counter (174-185A)
64PKA186B	ABS SCALES 40" X 18" X 6" w/3 axis KA-200 Counter (174-185A)
64PKA213B	ABS SCALES 40" X 16" X 5" w/3 axis KA-200 Counter (174-185A)
64PKA216B	ABS SCALES 40" X 12" X 5" w/3 axis KA-200 Counter (174-185A)
64PKA217A	ABS SCALES 48" X 18" X 18" w/3 axis KA-200 Counter (174-185A)
64PKA218C	ABS SCALES 60" X 24" X 28" w/3 axis KA-200 Counter (174-185A)
64PKA219B	ABS SCALES 80" X 32" X 28" w/3 axis KA-200 Counter (174-185A)
64PKA225A	ABS SCALES 48" X 18" X 22" w/3 axis KA-200 Counter (174-185A)

Scale lengths provided above specify travel.

3 Axis (Knee) - AT715 Slim Electromagnetic for all axes

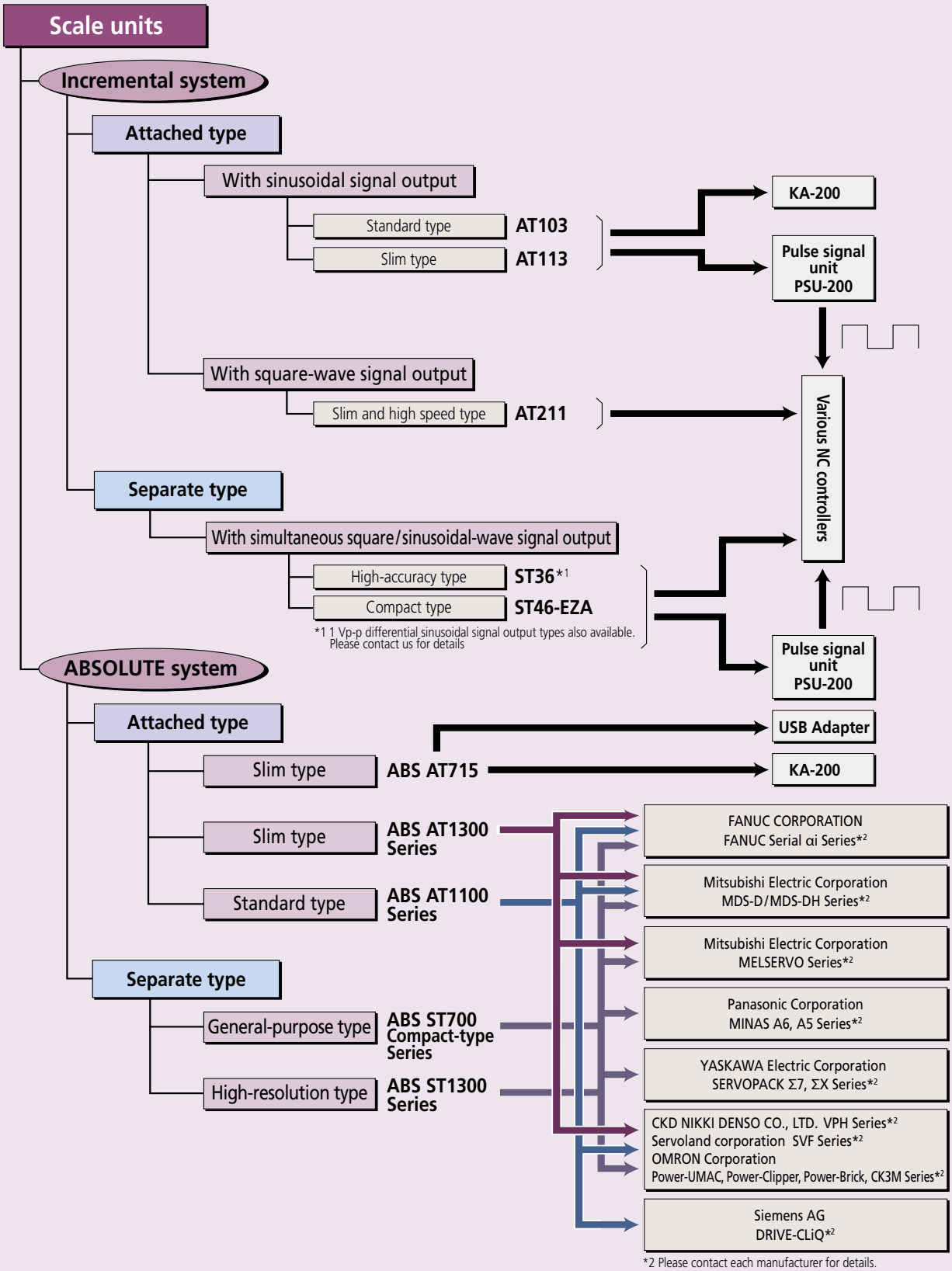
Order No.	Description
64PKA187B	ABS SCALES 32" X 13"/14" X 16" w/3 axis KA-200 Counter (174-185A)
64PKA188C	ABS SCALES 36" X 13"/14" X 16" w/3 axis KA-200 Counter (174-185A)
64PKA189C	ABS SCALES 30" X 14" X 16" w/3 axis KA-200 Counter (174-185A)
64PKA190B	ABS SCALES 36" X 16" X 16" w/3 axis KA-200 Counter (174-185A)
64PKA191B	ABS SCALES 36" X 16" X 18" w/3 axis KA-200 Counter (174-185A)
64PKA192C	ABS SCALES 40" X 18" X 16" w/3 axis KA-200 Counter (174-185A)
64PKA193B	ABS SCALES 40" X 18" X 18" w/3 axis KA-200 Counter (174-185A)
64PKA209A	ABS SCALES 32" X 16" X 16" w/3 axis KA-200 Counter (174-185A)
64PKA214C	ABS SCALES 30" X 12" X 16" w/3 axis KA-200 Counter (174-185A)
64PKA215B	ABS SCALES 40" X 12" X 16" w/3 axis KA-200 Counter (174-185A)

Scale lengths provided above specify travel.

Got Questions?

Linear Scales

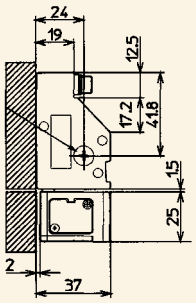
Linear Scale System Diagram



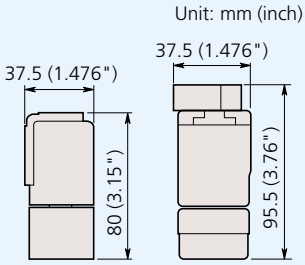
H

Name	Type	Page
AT103	Standard	H-13
AT113	Slim type	H-14
AT211	Slim type high speed	H-15
AT-715	Slim (IP67)	H-16
AT1300	Slim	H-17
AT1100	General-purpose	H-18
ST36	High Accuracy type (Exposed)	H-19
ST46-EZA	Compact type (Exposed)	H-20
ABS ST700	General Purpose Compact type (Exposed)	H-21
ST1300	High Spteed High Accuracy (Exposed)	H-22

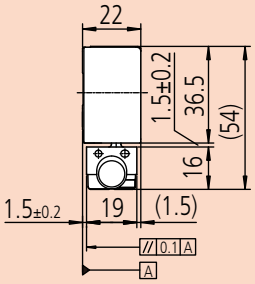
AT1100



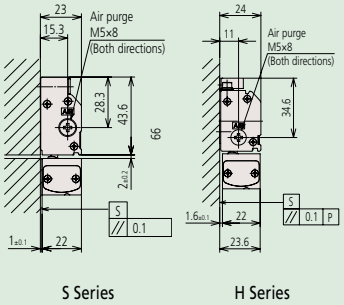
AT103



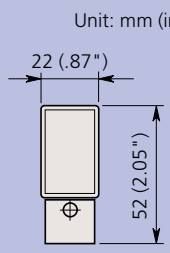
AT715



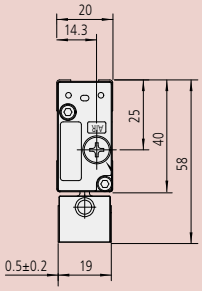
AT1300



AT113



AT211



H

Mitutoyo

Linear Scales

Linear Scales AT103
SERIES 539 — Standard Type

- Standard type scale for longer ranges of travel.
- Connectable to the KA-200 counter or PSU-200 square wave adapter.

SPECIFICATIONS

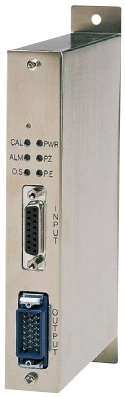
Model	AT103
Effective range	1600 to 6000 mm
Resolution	5 µinch / 0.1 µm
Accuracy (20 °C)	Effective range 1600 to 3000 mm: (5 + 5L0/1000) µm *1 Effective range 3250 to 6000 mm: (5 + 8L0/1000) µm *1
Output signal	Two 90° phase-shifted sinusoidal signals
Maximum response speed	120 m/min (50 m/min when the effective measuring length is 3250 to 6000 mm)
Signal output pitch	20 µm
Scale reference point	Output in 50 mm pitch
Operating temperature	0 to 45° C

Note 1: High precision model **AT103F** (JIS Class 0, (3 + 3L0/1000) µm) is also available to special order for the effective range of 100 to 2000 mm.
Note 2: Ultra-high precision model **AT103S** (2 + 2L0/1000) µm is also available to special order for the effective range of 100 to 500 mm.
*1 **L0=Effective range (mm),** see table below

AT103		Effective range Lo Inch / mm	Signal cable length (m)
Order No.	Model		
539-133-30	**AT103-1600**	64 in / 1600 mm	5
539-134-30	**AT103-1700**	68 in / 1700 mm	
539-135-30	**AT103-1800**	72 in / 1800 mm	
539-136-30	**AT103-2000**	80 in / 2000 mm	
539-137-30	**AT103-2200**	88 in / 2200 mm	
539-138-30	**AT103-2400**	96 in / 2400 mm	7
539-139-30	**AT103-2500**	100 in / 2500 mm	
539-140-30	**AT103-2600**	104 in / 2600 mm	
539-141-30	**AT103-2800**	112 in / 2800 mm	
539-142-30	**AT103-3000**	120 in / 3000 mm	
539-143-30	**AT103-3250**	130 in / 3250 mm	10
539-144-30	**AT103-3500**	140 in / 3500 mm	
539-145-30	**AT103-3750**	150 in / 3750 mm	
539-146-30	**AT103-4000**	160 in / 4000 mm	
539-147-30	**AT103-4250**	170 in / 4250 mm	
539-148-30	**AT103-4500**	180 in / 4500 mm	
539-149-30	**AT103-4750**	190 in / 4750 mm	15
539-150-30	**AT103-5000**	200 in / 5000 mm	
539-151-30	**AT103-5250**	210 in / 5250 mm	
539-152-30	**AT103-5500**	220 in / 5500 mm	
539-153-30	**AT103-5750**	230 in / 5750 mm	
539-154-30	**AT103-6000**	240 in / 6000 mm	

* Models for the effective range 3250 mm or more are made-to-order.

- The **PSU-200** splits the sinusoidal signal output by Mitutoyo linear scales into a minimum of four and a maximum of 200 divisions, and converts the signal to a square-wave signal so that NC feedback systems, measurement control devices, etc., can be used with linear scales in order to achieve highly accurate positioning.
- Connectable to **AT103** and **AT113** Linear Scales.



539-005

Pulse Signal/Square-Wave adapter (PSU-200)

Optional Accessories

539-005: Pulse Signal/Square-Wave adapter (PSU-200)
09AAA033A: Extension cable (80" / 2m)
09AAA033B: Extension cable (200" / 5m)
09AAA033C: Extension cable (280" / 7m)

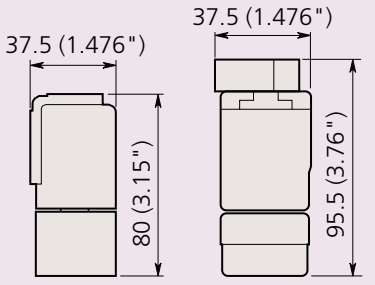
174-183A 2-Axis KA Counter
174-185A 3-Axis KA Counter

174-183A

See page H-8 for details

Cross Section

Unit: mm (inch)

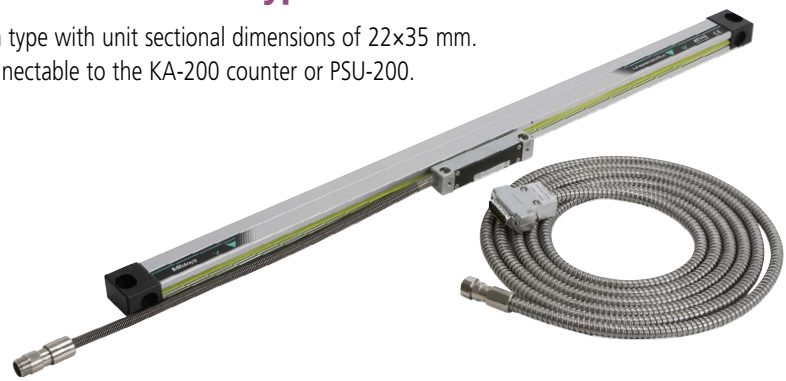


Up to 3m **Over 3m**

Refer to the Linear Scale DRO Systems Brochure (**No. 2217 (4)**) for more details.

Linear Scales AT113
SERIES 539 — Slim Type

- Slim type with unit sectional dimensions of 22×35 mm.
- Connectable to the KA-200 counter or PSU-200.



- Slim type scale.
- Connectable to the KA-200 counter or PSU-200 square wave adapter.

Optional Accessories

539-005: Pulse Signal/Square-Wave adapter (PSU-200)
09AAA033A: Extension cable (80″ / 2m)
09AAA033B: Extension cable (200″ / 5m)
09AAA033C: Extension cable (280″ / 7m)

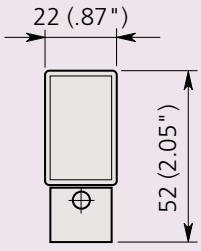
174-183A 2-Axis KA Counter
174-185A 3-Axis KA Counter

174-183A

See page H-8 for details

Cross Section

Unit: mm (inch)



Refer to the Linear Scale DRO Systems Brochure (**No. 2217 (4)**) for more details.

SPECIFICATIONS

Model	AT113
Effective range	100 to 1500 mm
Resolution	5 µinch / 0.1 µm
Accuracy (20 °C)	(5 + 5L₀/1000) µm *1
Output signal	Two 90° phase-shifted sinusoidal signals
Maximum response speed	120 m/min
Signal output pitch	20 µm
Scale reference point	Output in 50 mm pitch
Operating temperature	0 to 45° C

*1 **L₀=Effective range (mm),** see table below
Note : High precision model **AT113F** (JIS Class 0, 3 + 3L₀/1000) µm is also available to special order.

AT113		Effective range Lo inch / mm	Signal cable length (m)
Order No.	Model		
539-201-30	**AT113-100**	4 in / 100 mm	3
539-202-30	**AT113-150**	6 in / 150 mm	
539-203-30	**AT113-200**	8 in / 200 mm	
539-204-30	**AT113-250**	10 in / 250 mm	
539-205-30	**AT113-300**	12 in / 300 mm	
539-206-30	**AT113-350**	14 in / 350 mm	
539-207-30	**AT113-400**	16 in / 400 mm	
539-208-30	**AT113-450**	18 in / 450 mm	
539-209-30	**AT113-500**	20 in / 500 mm	
539-211-30	**AT113-600**	24 in / 600 mm	
539-213-30	**AT113-700**	28 in / 700 mm	
539-214-30	**AT113-750**	30 in / 750 mm	
539-215-30	**AT113-800**	32 in / 800 mm	
539-216-30	**AT113-900**	36 in / 900 mm	
539-217-30	**AT113-1000**	40 in / 1000 mm	5
539-218-30	**AT113-1100**	44 in / 1100 mm	
539-219-30	**AT113-1200**	48 in / 1200 mm	
539-220-30	**AT113-1300**	52 in / 1300 mm	
539-221-30	**AT113-1400**	56 in / 1400 mm	
539-222-30	**AT113-1500**	60 in / 1500 mm	

H

Linear Scales

Linear Scales AT211-A (Multipoint Mounting)
AT211-B (Double-end Mounting)
SERIES 539 — Slim and High Speed Type

- This is a slim, sealed, 2-phase square-wave scale that can be directly connected to a control unit.
- Scale alarm LED enables easy maintenance.
- A wide range of specifications to best suit your application.
- Suitable for the control (positioning and speed) of semiconductor manufacturing systems and NC machine tools.
- Contact Mitutoyo America for an estimate.

SPECIFICATIONS

Model	AT211 Only available via special quote due to large possibility of specification combinations.
Effective range*	100 to 1500 mm
Resolution	Selectable down to 5 µinch / 0.1 µm
Accuracy (20 °C)*	(3 + 3L0/1000) µm **L0=effective range (mm)**
	(2 + 2L0/1000) µm (L0≤500 mm)
Output signal	2-phase square-wave signals (RS-422A compatible)
Maximum response speed*	5.4 to 120 m/min (varies depending on the resolution or minimum edge interval)
Resolution*	0.1/0.2/0.5/1.0/2.5/5.0 µm
Scale reference point*	50 mm pitch/Center point/Left-edge point/Right-edge point
Operating temperature	0 to 45° C

* Desired specification is selectable.

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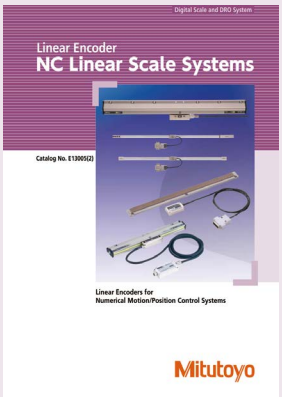
Meaning of Model No.

AT211 - 0100 A 1 S - P 1 - A B

- 0100: Effective range: 100 to 1500 mm
- A: Mounting method: Multipoint mounting/Double-end mounting
- 1: Scale reference point: 50 mm pitch/Center point/Left edge point/Right edge point
- S: Indication accuracy: (3 + 3L0/1000) µm/(2 + 2L0/1000) µm
- P: Resolution/Minimum edge-to-edge interval: 0.1 to 5 µm/125 to 1000 ns, 22 types
- 1: Direction: PA/PB phase
- A: Head cable: 0.3 to 9 m, 9 types
- B: Signal cable: 3 to 7 m/None, 10 types

Where to Buy



Refer to the NC Linear Scale Systems Brochure (**E13005**) for more details.

ABSOLUTE™

IP67

- The electromagnetic induction principle adopted means ABSOLUTE system-type linear scales are highly resistant to environmental contamination.
- ABSOLUTE scales have eliminated the need for origin restoration, also drastically reducing power consumption.
- Comes with 5 year warranty.

Linear Scales ABS AT715
SERIES 539 — Slim Type

SPECIFICATIONS

Model	ABS AT715
Detection method	Electromagnetic induction
Minimum resolution	20 µinch to .001 0.001 mm to 0.01 mm (Changeable by parameter on the **KA-200** counter)
Effective range	100 to 3000 mm
Accuracy (20° C)	±5 µm (L₀: 100 to 500 mm) ±7 µm (L₀: 600 to 1800 mm) ±10 µm (L₀: 2000 to 3000 mm)*1
Maximum response speed	50 m/min
Protection level	IP67
Sliding force	5 N or less
Signal cable	Standard Accessories Refer to the dimension table shown below for the length.
Connectable counter	**KA-200** Counter

*1 **L₀=Effective range (mm)**

AT715		Effective range Lo inch / mm	Signal cable length (m)
Order No.	Model		
539-801N	**ABS AT715-100**	4 in / 100 mm	3.5
539-802N	**ABS AT715-150**	6 in / 150 mm	
539-803N	**ABS AT715-200**	8 in / 200 mm	
539-804N	**ABS AT715-250**	10 in / 250 mm	
539-805N	**ABS AT715-300**	12 in / 300 mm	
539-806N	**ABS AT715-350**	14 in / 350 mm	
539-807N	**ABS AT715-400**	16 in / 400 mm	
539-808N	**ABS AT715-450**	18 in / 450 mm	
539-809N	**ABS AT715-500**	20 in / 500 mm	
539-811N	**ABS AT715-600**	24 in / 600 mm	
539-813N	**ABS AT715-700**	28 in / 700 mm	
539-814N	**ABS AT715-750**	30 in / 750 mm	
539-815N	**ABS AT715-800**	32 in / 800 mm	
539-816N	**ABS AT715-900**	36 in / 900 mm	
539-817N	**ABS AT715-1000**	40 in / 1000 mm	5
539-818N	**ABS AT715-1100**	44 in / 1100 mm	
539-819N	**ABS AT715-1200**	48 in / 1200 mm	
539-820N	**ABS AT715-1300**	52 in / 1300 mm	
539-821N	**ABS AT715-1400**	56 in / 1400 mm	
539-822N	**ABS AT715-1500**	60 in / 1500 mm	
539-823N	**ABS AT715-1600**	64 in / 1600 mm	
539-824N	**ABS AT715-1700**	68 in / 1700 mm	
539-825N	**ABS AT715-1800**	72 in / 1800 mm	
539-860N	**ABS AT715-2000**	80 in / 2000 mm	
539-861N	**ABS AT715-2200**	88 in / 2200 mm	
539-862N	**ABS AT715-2400**	96 in / 2400 mm	7*
539-863N	**ABS AT715-2500**	100 in / 2500 mm	
539-864N	**ABS AT715-2600**	104 in / 2600 mm	
539-865N	**ABS AT715-2800**	112 in / 2800 mm	
539-866N	**ABS AT715-3000**	120 in / 3000 mm	

* Combination of a 5 m signal cable and a 2 m extension cable

Optional Accessories

09AAB674A: Extension cable (80" / 2m)
09AAB674B: Extension cable (200" / 5m)
09AAB674C: Extension cable (280" / 7m)

64AAB545: USB Adapter (virtual COM port)

174-183A 2-Axis KA Counter
174-185A 3-Axis KA Counter

174-183A

See page H-8 for details

Refer to the Linear Scale DRO Systems Brochure (**No. 2217 (4)**) for more details.

Linear Scales

ABSOLUTE™

Linear Scales ABS AT1300 — Slim Type
Attached Type Scale Unit for ABSOLUTE Systems

ABS AT1300-S

ABS AT1300-H

- Outstanding resistance to contamination compared to conventional optical types by using a new detection principle (in-house testing result).
- Features a new coolant-proof design incorporating a high-performance rubber seal to provide higher reliability in the harsh factory environment.
- Delivers high accuracy and the outstanding resolution of 0.001 µm, the best-in-class in ABSOLUTE scales.
- Allows space-saving design thanks to a slim form.
- Supports the interfaces of various manufacturers allowing a variety of system configurations.

SPECIFICATIONS

	High rigidity type	High accuracy type
Model	**ABS AT13□□(A)-S**	**ABS AT13□□(A)-H**
Detection method	Optical	
Resolution	0.001/0.01/0.05 µm (1 / 10 / 50 nanometer)	
Maximum response speed	3 m/s	
Maximum effective measuring length	2.2 m	1 m
Accuracy (20° C)	(3 + 3L0/1000) µm*1	(2 + 2L0/1000) µm*1
Reference point*2	Center of the effective measuring length	
Operating temperature (humidity) range	0 to 50° C (RH 20 to 80%, non-condensing)	
Storage temperature (humidity) range	–20 to 70° C (RH 20 to 80%, non-condensing)	

*1 **L0=Effective range (mm)**
*2 Scale is mechanically fixed at this point, therefore expansion caused by temperature fluctuations are relative to this point.

H

Meaning of Model No.

ABS AT13□□□ - □□□□ - □

- ABS AT13□□□: Interface specifications
- □□□□: Effective range
- □: Type of the scale unit
  - **S**: High rigidity type
  - **H**: High accuracy type

Model	Applicable system
ABS AT135□	FANUC CORPORATION Serial αi Interface
ABS AT134□	Mitsubishi Electric Corporation MDS-D/MDS-DH Series
ABS AT134□A	Mitsubishi Electric Corporation MELSERVO servo amplifier MR-J5 Series, MR-J4 Series
ABS AT138□A	YASKAWA Electric Corporation SERVOPACK Σ7, ΣX Series
ABS AT130□A	Mitutoyo ENSIS

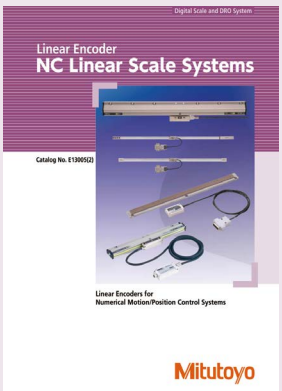
Note 1: Be sure to contact each manufacturer for details of the applicable systems.

Note 2: **ABS AT13□□□**
- Resolution
  - **7**: 0.001 µm
  - **4**: 0.01 µm
  - **3**: 0.05 µm
- Transmission method
  - Nothing: Full duplex communication
  - **A**: Half-duplex communication

Signal cable specifications (optional)

Items	Specifications
Cable length	1 m, 2 m, 3 m, 4 m, 5 m, 6 m, 7 m, 8 m, 9 m, 12 m
Cable material	PVC sheath (ø6.5 mm), High-flex connecting cable (No metal conduit)
I/O output connector	Flying lead specifications FANUC specifications Mitsubishi specifications D-sub specifications (Alarm display LED mounted)

Get a Quote



Refer to the NC Linear Scale Systems Brochure (**E13005**) for more details.

Linear Scales ABS AT1100
Attached Type Scale Unit for ABSOLUTE Systems

- Features a new coolant-proof design incorporating a high-performance rubber seal to provide higher reliability in the harsh factory environment.
- The 0.4 mm air gap between the sensors is approximately four times wider than the conventional optical or magnetic sensors. Therefore, the chance of foreign objects lodging in this gap is lower. This air gap is the world's largest in this class of scale used on machine tools.
- The de facto standard multi-point fixing method for the frame is adopted, resulting in high vibration/shock-resistance.
- Due to an improvement in the signal processing technique for the electromagnetic induction ABSOLUTE linear encoder, the repeatability is six times better than our conventional model.
- Being compatible with the high-speed serial interface of each company, a direct connection to the NC controller is possible.

ABS AT1100

SPECIFICATIONS

Model	**ABS AT11□3(A)**
Detection method	Electromagnetic induction
Mounting method	Frame multipoint
Effective range	140 to 3040 mm
Resolution	0.05 µm (50 nanometer)
Maximum response speed	3 m/s
Accuracy (20° C)	Effective range L_0=140 to 2040 mm: 3 + 5L_0/1000 (µm) Effective range L_0=2240 to 3040 mm: 5 + 5L_0/1000 (µm)
Expansion coefficient	≈8×10^{-6}/K
Vibration resistance	≤196 m/s^2 (20 G) (55 to 2000 Hz)
Shock resistance	Effective range L_0=140 to 2040 mm: ≤ 343 m/s^2 (35 G) Effective range L_0=2240 to 3040 mm: ≤ 294 m/s^2 (30 G) (1/2 sin 11 ms)
Power supply voltage	**ABS AT1153/1143/1103A**: 5 VDC ± 10% **ABS AT1123**: DC24 V (Conforming to DRIVE-CLiQ)
Maximum current consumption	**AT1153**: 300 mA (Max.) **AT1143**: 290 mA (Max.) **AT1123**: 140 mA (Max.) **AT1103A**: 300 mA (Max.)
Operational temperature (humidity) ranges	0 to 50° C (RH 20 to 80%, non-condensing)
Storage temperature (humidity) ranges	–20 to 70° C (RH 20 to 80%, non-condensing)

*1 **L_0=Effective range (mm),** see table below

Meaning of Model No.

ABS AT11□3 - □□□□

- **ABS AT11□3**: Interface specifications
- **□□□□**: Effective range

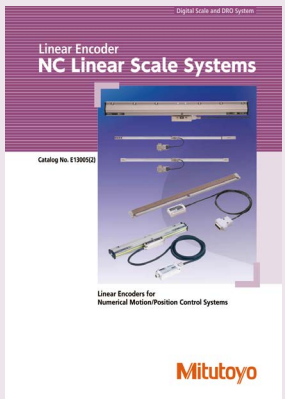
Model	Applicable system
ABS AT1153	FANUC CORPORATION Serial αi Interface
ABS AT1143	Mitsubishi Electric Corporation MDS-D/MDS-DH Series
ABS AT1123	Siemens AG DRIVE-CLiQ
ABS AT1103A	Mitutoyo ENSIS

Note 1: Please contact each manufacturer for details of the applicable systems.

Note 2: **ABS AT11□3□**
- **□**: Transmission method
  - Nothing: Full duplex communication
  - **A**: Half-duplex communication

Signal cable specifications (optional)

Items	Specifications
Cable length	1 m, 3 m, 6 m, 9 m, 12 m
Cable material	PVC sheath ø6.5 Without conduit, High-flex specification with conduit PUR sheath ø6.5 Without conduit
I/O output connector	Flying lead specifications FANUC specifications Mitsubishi specifications Mitutoyo standard specifications Siemens specifications M12 connector specifications



Refer to the NC Linear Scale Systems Brochure (**E13005**) for more details.

Linear Scales

Linear Scales ST36
SERIES 579 — High Accuracy Type

- Outputs 2-phase sinusoidal wave signals at 4 µm pitch.
- The maximum effective measuring length is 3000 mm when the resolution is 0.01/0.02/0.05/0.1 µm (2-phase square-wave is output).
- Compact detector head enables space saving design.
- Along with the output specifications of 2-phase sinusoidal wave and 2-phase square-wave, the output specification of 1 Vp-p wave is also available.
- Equipped with the function to display signal errors on the LED.

SPECIFICATIONS

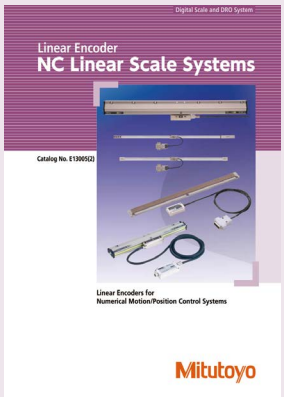
Model	**ST36**
Detection method	Optical
Output signal	**ST36A**: 2 Vp-p sinusoidal signals **ST36B**: 2-phase square-wave signals (RS-422A compatible), Alarm reset input **ST36C**: 2-phase square-wave signals (RS-422A compatible), 2-phase sinusoidal signals **ST36D**: 1 Vp-p differential sinusoidal signals
Main scale grating pitch	8 µm
Signal output pitch	4 µm
Effective range	10 to 3000 mm
Accuracy (20° C)*1	±0.5 µm, ±1 µm, ±2 µm/m
Maximum response speed*2	1200 mm/s
Scale reference point	10 to 80 mm: 1 center point; 100 to 300 mm: 50 mm pitch
Power supply voltage	5 VDC ± 5%
Operating temperature (humidity) range	0 to 40° C (20 to 80% RH, non-condensing)
Storage temperature (humidity) range	–20 to 60° C (20 to 80% RH, non-condensing)
Head cable length	1 m (high-flex connecting cable)

*1

Effective range	Accuracy
300 mm or less	±0.5 µm
500 mm or less	±1 µm
1000 mm or less	±2 µm
3000 mm or less	±2 µm/m

*2 Maximum response speed when sinusoidal signals are output

Need Support?



Refer to the NC Linear Scale Systems Brochure (**E13005**) for more details.

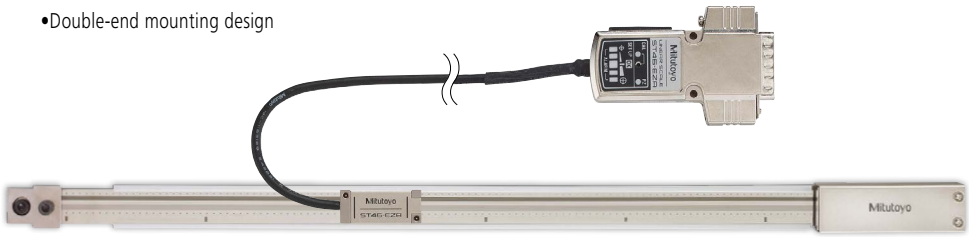
Linear Scales ST46-EZA
SERIES 579 — Compact Type

- Includes an automatic adjusting function for the signal (EZA function) at the push of a button.
- Detector head mounting and signal adjustment possible without oscilloscope or PC.
- A setup indicator for checking signal strength is included.
- When connected with a PC it is possible to check signal strength and set parameter (Optional application program required).
- I/F circuit integrated in connector shell reduces volume to compared to conventional interface.
- The thickness of the detector head is only 7.5 mm. The metal tape scale type has a mounting surface area of 12.5 by 9.325 mm, allowing use in applications where a space-saving design is important.
- Glass and metal tape versions are available.

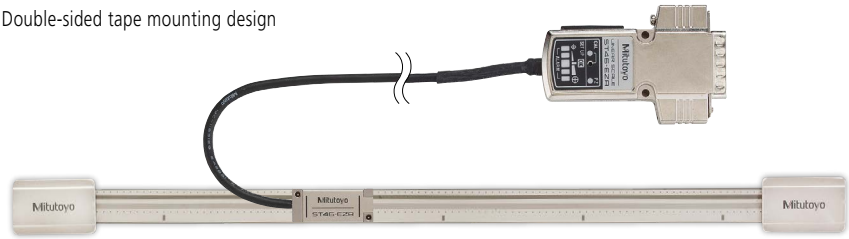
Glass Scale Type

Metal Tape Scale Type

•Double-end mounting design



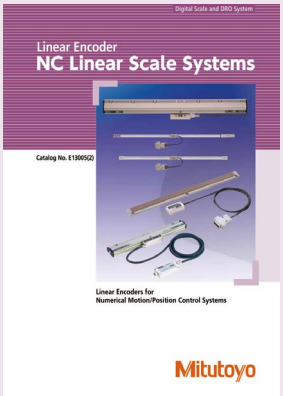
•Double-sided tape mounting design



SPECIFICATIONS

Model	ST46-EZA	
Detection method	Optical	
Scale type	Glass	Metal tape
Main scale grating pitch	20 µm	
Output signal	Type B: 2-phase square-wave signals (RS-422A compatible), reference point pulse, external reset input. Type C: 2-phase square-wave signals (RS-422A compatible), reference point pulse, 2-phase sinusoidal signals.	
Effective range	10 to 3000 mm	
Accuracy (20° C)	Effective range 10 to 300 mm: ±1 µm Effective range 350 to 500 mm: ±2 µm Effective range 600 to 1000 mm: ±3 µm Effective range 1100 to 3000 mm: ±3 µm/m	Effective range 10 to 1000 mm: ±5 µm*1 Effective range 1100 to 3000 mm: ±5 µm/m*1
Maximum response speed	2.6 m/s (at the point where the sinusoidal signal amplitude has decreased by 3 dB)	
Scale reference point	10 to 80 mm: 1 center point; 100 to 300 mm: 50 mm pitch	
Power supply voltage	5 VDC ± 5%	
Operating temperature (humidity) range	0 to 40° C (RH 20 to 80%, non-condensing)	
Storage temperature (humidity) range	–20 to 60° C (RH 20 to 80%, non-condensing)	
Head cable length	1 m (high-flex connecting cable)	

*1 The above accuracy applies to individual scales. For double-end mounting designs, perform point-to-point correction after ensuring the metal tape is tensioned correctly.

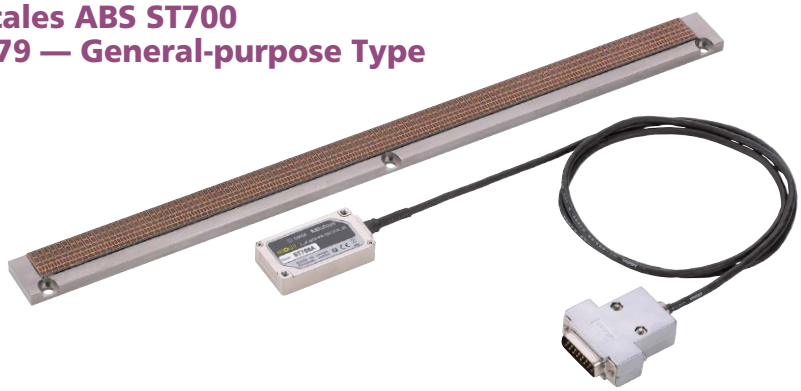


Refer to the NC Linear Scale Systems Brochure (**E13005**) for more details.

Linear Scales

ABSOLUTE™

Linear Scales ABS ST700
SERIES 579 — General-purpose Type



- ABSOLUTE measurement with separate type scales
- Non-contact detection is optimal for high speed and high acceleration devices such as linear motors
- Electromagnetic induction principle means scales are unaffected by water and oil contamination
- The detector head is approximately 1/3 the previous model size: 50 mm (W) × 28 mm (D) ×11 mm (H)
- Cable outlets can be in four directions, with mounting holes on the top and sides
- Compatible with servo amplifiers from a range of companies (high-speed serial interfaces)

SPECIFICATIONS

Model	ABS ST700	
Scale type	Scale base	
Resolution	0.1 µm	
Detection method	Electromagnetic induction	
Max. effective range	100 to 3000 mm	3200 to 6000 mm
Accuracy (20° C)	5 + (5L/1000) µm*1	5 + (5L/1000) µm*1
Maximum response speed	5 m/s	
Power supply voltage	5 VDC ± 10% (at the detection head) (Ripple+spike noise component should be less than 100 mV)	
Maximum current consumption	270 mA	
Head cable length	1 m (high-flex connecting cable)	
Maximum cable length	29 m (including the head cable length)	
Operating temperature (humidity) range	0 to 50° C (RH 20 to 80%, non-condensing)	0 to 50° C (RH 20 to 70%, non-condensing)
Storage temperature (humidity) range	–20 to 70° C (RH 20 to 80%, non-condensing)	–20 to 60° C (RH 20 to 70%, non-condensing)

*1 **Lo=Effective range (mm)**

Meaning of Model No.

ABS ST7 0 8 A L - 100 A - R

ABSOLUTE type

Series name
Separate Type ABSOLUTE Linear Scale
ABS ST700 Compact-type Series (Effective range ≤ 3 m)
ABS ST700 Compact-type Series (3.2 m ≤ Effective range ≤ 6 m)

Interface specification*1
0:Supports Mitutoyo ENSIS high-speed serial interface
ABS ST708A
4:Supports Mitsubishi Electric Corporation, high-speed serial interface
ABS ST748A, **ABS ST748**
5:Supports FANUC CORPORATION, high-speed serial interface
ABS ST758, **ST758L**
7:Supports Panasonic Corporation, high-speed serial interface
ABS ST778A
8:Supports YASKAWA Electric Corporation, high-speed serial interface
ABS ST788A

Detection head form and resolution
8: Form: 50 (W)×28 (D)×11 (H) mm
Resolution: 0.1 µm
9: 0.05 µm resolution (to special order)

Transmission method
A: 2-wire system
Nothing: 4-wire system

Nothing: 100 to 3000 mm
L: 3200 to 6000 mm

Effective range: 100 to 6000 mm

A: Scale base type

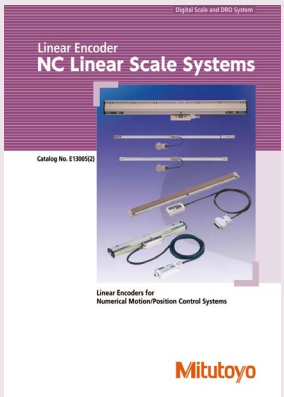
Head cable outlet direction
R: Right side
L: Left side
U: Upper side
D: Lower side

Available Interfaces*1

FANUC CORPORATION, FANUC Serial αi Series
Mitsubishi Electric Corporation, MDS-D/MDS-DH Series
Mitsubishi Electric Corporation, MELSERVO Series Servo Amplifier MR-J5 Series, MR-J4 Series, MR-J3 Series
YASKAWA Electric Corporation, SERVOPACK Σ7, ΣX Series
Panasonic Corporation, MINAS A6, A5 Series
Mitutoyo ENSIS*2 CKD NIKKI DENSO CO., LTD. VPH Series Servoland Corporation SVF Series OMRON Corporation Power-UMAC, Power-Clipper, Power-Brick, CK3M Series

*1 Be sure to contact each manufacturer for details of the applicable systems (availability of connection).
*2 ENSIS is a registered trademark of Mitutoyo Corporation.

Need Service?



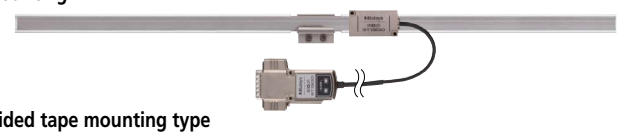
Refer to the NC Linear Scale Systems Brochure (**E13005**) for more details.

Linear Scales ABS ST1300 SERIES 579

- Effective range: 12 m, Maximum response speed: 8 m/s, Resolution: 1 nm
- Various interfaces are supported.
- A new detection method has improved robustness in regards to contamination resistance and gap tolerance (in-house testing result).
- Can be mounted using double-sided tape or screws (on both sides or at the center of the unit).
- Signal check program enables integrity check and maintenance.

Double-end mounting type

Center mounting



Double-sided tape mounting type

SPECIFICATIONS

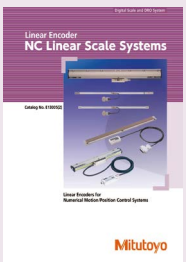
Model	ABS ST1300		
Detection method	Optical		
Scale type	Double-end mounting	Center mounting	Double-sided tape mounting
Maximum effective range	12000 mm	6000 mm	3000 mm
Accuracy (20° C)	±5 µm (1 m or less), ±5 µm/m (1.1 m or more)*4	With system parameters: ±5 µm (1 m or less), ±5 µm/m (1.1 m or more) Without system parameters: ±10 µm (1 m or less), ±10 µm/m (1.1 m or more)	±5 µm (1 m or less), ±5 µm/m (1.1 m or more)
Maximum response speed	8 m/s or less		
Expansion coefficient	≈10×10^{-6}/K*5	≈10×10^{-6}/K	≈10×10^{-6}/K*2
Power supply	5 VDC ± 10%		
Maximum current consumption	270 mA or 250 mA (depends on interface)		
Cable length	1 m (high-flex connecting cable)		
Maximum cable length	29 m (including head cable)		
Usable temperature (humidity) range	0 to 50° C (RH 20 to 70%, non-condensing)		
Storage temperature (humidity) range	–20 to 70° C (RH 20 to 70%, non-condensing)		

*2 Thermal expansion coefficient occasionally change, as the difference between scale material's and sealing surface material's is excessive.
*4 Tension fix is adopted to be stable the temperature property. Because scale tension is longer 250 µm/m, the accuracy compensation is needed over the system.
*5 Thermal expansion coefficient after mounted conform to expansion/contraction of mounted surface by changing outer temperature (Double-end fixing type).
Note: For details on specification, mounting procedure, and adjustments, refer to the corresponding brochure and operation manual.

Available Interfaces*1

FANUC CORPORATION, FANUC Serial αi Series
Mitsubishi Electric Corporation, MELSERVO Series Servo Amplifier MR-J5 Series, MR-J4 Series
YASKAWA Electric Corporation, SERVOPACK Σ7, ΣX Series
Panasonic Corporation, MINAS A6, A5 Series
Mitutoyo ENSIS*2

*1 Be sure to contact each manufacturer for details of the applicable systems (availability of connection).
*2 ENSIS is a registered trademark of Mitutoyo Corporation.



Refer to the NC Linear Scale Systems Brochure (**E13005**) for more details.

Meaning of Model No.

ABS ST13 4 1 A - 1200 D

ABSOLUTE type

Series name
Separate Type ABSOLUTE Linear Scale

Interface specification*1
0: Supports Mitutoyo ENSIS high-speed serial interface
ABS ST130□A
4: Supports Mitsubishi Electric Corporation, high-speed serial interface
ABS ST134□A
5: Supports FANUC CORPORATION, high-speed serial interface
ABS ST135□
7: Supports Panasonic Corporation, high-speed serial interface
ABS ST137□A
8: Supports YASKAWA Electric Corporation, high-speed serial interface
ABS ST138□A

Resolution
1: Resolution 0.01 µm
2: Resolution 0.001 µm

Transmission method
A: Half-duplex method
Nothing: Full duplex method or Half-duplex method/Half-duplex method

Effective range: 10 to 12000 mm

Scale mount
D: Double-end mounting
E: Double-sided tape mounting
F: Center mounting (With system parameters)
G: Center mounting (Without system parameters)

H

Glossary

ABSOLUTE (ABS) system
A measurement mode in which every point measurement is made relative to a fixed origin point.

Incremental system
A measurement mode in which every point measurement is made relative to a certain stored reference point.

Origin offset
A function that enables the origin point of a coordinate system to be translated to another point offset from the fixed origin point. For this function to work, a system needs a permanently stored origin point.

Restoring the origin point
A function that stops each axis of a machine accurately in position specific to the machine while slowing it with the aid of integrated limit switches.

Sequence control
A type of control that sequentially performs control steps according to a prescribed order.

Numerical control
A way of controlling the movements of a machine by encoded commands created and implemented with the aid of a computer (CNC). A sequence of commands typically forms a 'part program' that instructs a machine to perform a complete operation on a workpiece.

Binary output
Refers to output of data in binary form (ones and zeros) that represent numbers as integer powers of 2.

RS-232C
An interface standard that uses an asynchronous method of serial transmission of data over an unbalanced transmission line for data exchange between transmitters located relatively close to each other. It is a means of communication mainly used for connecting a personal computer with peripherals.

Line driver output
This output features fast operating speeds of several tens to several hundreds of nanoseconds and a relatively long transmission distance of several hundreds of meters. A differential-voltmeter line driver (RS-422A compatible) is used as an I/F to the NC controller in the linear scale system.

RS-422
An interface standard that uses serial transmission of bits in differential form over a balanced transmission line. RS-422 is superior in its data transmission characteristics and in its capability of operating with only a single power supply of 5 VDC.

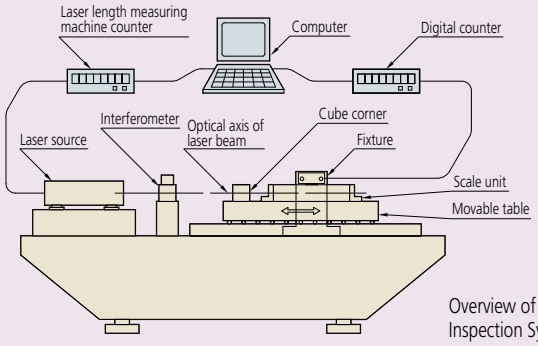
Accuracy
The accuracy specification of a scale is given in terms of the maximum error to be expected between the indicated and true positions at any point, within the range of that scale, at a temperature of 20 °C. Since there is no international standard defined for scale units, each manufacturer has a specific way of specifying accuracy. The accuracy specifications given in our catalog have been determined using laser interferometry.

Narrow range accuracy
Scale gratings on a scale unit normally adopt 20 µm pitch though it varies according to the kind of scale. The narrow range accuracy refers to the accuracy determined by measuring one pitch of each grating at the limit of resolution (1 µm for example).

Specifying Linear Scale Accuracy

Positional Indication accuracy

The accuracy of a linear scale is determined by comparing the positional value indicated by the linear scale with the corresponding value from a laser length measuring machine at regular intervals using the accuracy inspection system as shown in the figure below. As the temperature of the inspection environment is 20° C, the accuracy of the scale applies only in an environment at this temperature. Other inspection temperatures may be used to comply with internal standards.



Overview of Accuracy Inspection System

The accuracy of the scale at each point is defined in terms of an error value that is calculated using the following formula:

Error = Value indicated by Laser length measuring machine – Corresponding value indicated by the linear scale

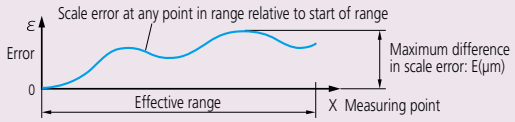
A graph in which the error at each point in the effective positioning range is plotted is called an accuracy diagram.

There are two methods used to specify the accuracy of a scale, unbalanced or balanced, described the right.

(1) Unbalanced accuracy specification - maximum minus minimum error

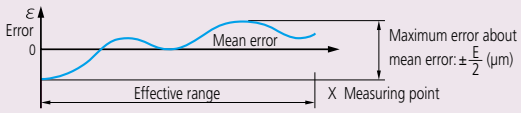
This method simply specifies the maximum error minus the minimum error from the accuracy graph, as shown below. It is of the form: $E = (\alpha + \beta L)$ µm. L is the effective range (mm), and α and β are factors specified for each model.

For example, if a particular type of scale has an accuracy specification of $(3+\frac{3L}{1000})$ µm and an effective range of 1000 mm, E is 6 µm.



(2) Balanced accuracy specification - plus and minus about the mean error

This method specifies the maximum error relative to the mean error from the accuracy graph. It is of the form: $e = \pm\frac{E}{2}$ (µm). This is mainly used in separate-type (retrofit) scale unit specifications.



A linear scale detects displacement based on graduations of constant pitch. Two-phase sinusoidal signals with the same pitch as the graduations are obtained by detecting the graduations. Interpolating these signals in the electrical circuit makes it possible to read a value smaller than the graduations by generating pulse signals that correspond to the desired resolution. For example, if the graduation pitch is 20 µm, interpolated values can generate a resolution of 1 µm.

The accuracy of this processing is not error-free and is called interpolation accuracy. The linear scale's overall positional accuracy specification depends both on the pitch error of the graduations and interpolation accuracy.