Digimatic Scale Units

Linear Scales

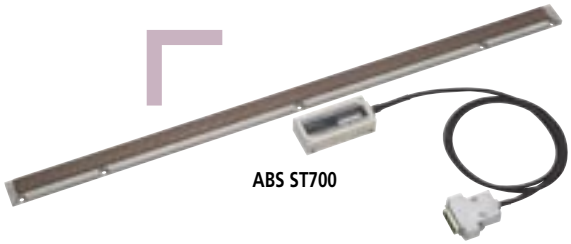
INDEX

Digimatic Scale Units	
ABSOLUTE Coolant Proof Digimatic Scale Units	340
ABSOLUTE Digimatic Scale Units	342
Linear Scales	
Linear Encoder System	344
AT102 Linear Scales	345
AT115 Linear Scales	346
AT111 Linear Scales	346
AT112 Linear Scales	347
AT181 Linear Scales	347
AT715 Linear Scales	348
AT202 Linear Scales	349
AT211A / AT211B Linear Scales	349
AT212 Linear Scales	350
AT402E Linear Scales	350
AT300 Series Linear Scales	351
AT500 Series Linear Scales	351
ST41A / 42A Linear Scales	352
ST41B /42B Linear Scales	352
ST36 Linear Scales	352
ST422 Linear Scales	353
ST700 Series Linear Scales	353
Laser Holoscale	353
KA Counter	354
KLD Counter	355
PSU-200	356

New Products

ABS AT500-S

ABS AT500-H



ABS ST700

Mitutoyo

ABSOLUTE Coolant Proof Digimatic Scale Units

SERIES 572 — With Dust/Water Protection IP66 Level

FEATURES

- Newly employed detection method (Electromagnetic induction method) enables use in adverse environments with water and cutting oil.
- Specially designed output cables are developed to maintain the water resistant structure.
- No over speed error since it employs absolute scale which reads the absolute value.
- Once an absolute zero (origin) point is set, the Digimatic Scale Unit shows its absolute distance from the point whenever turned on rather than" 0.00".

SPC

IP66 (Refer to the page 9 for details.)

ABSOLUTE® Absolute System Patented by MITUTOYO (Refer to the page 9 for details.)

SPECIFICATIONS

Metric

Range	Order No.	Accuracy
0 - 100mm	**572-600**	±0.03mm
0 - 150mm	**572-601**	±0.03mm
0 - 200mm	**572-602**	±0.03mm

Inch/Metric

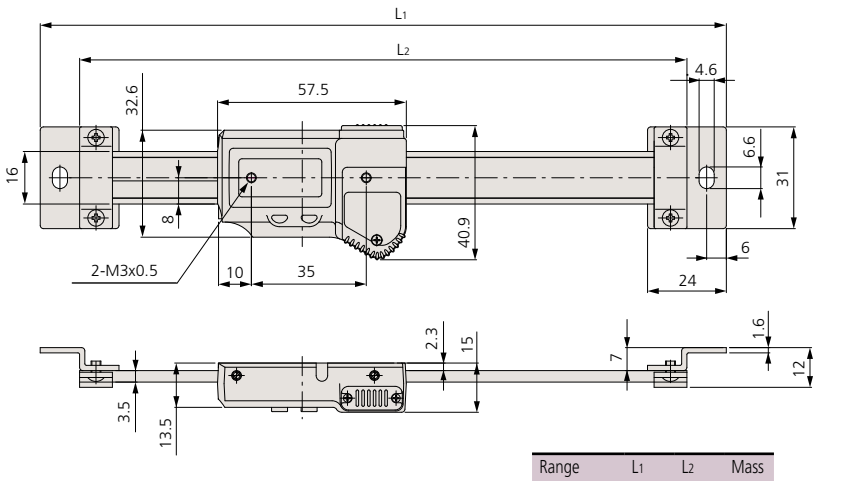
Range	Order No.	Accuracy
0 - 4"	**572-613**	±.001"
0 - 6"	**572-614**	±.001"
0 - 8"	**572-615**	±.001"

Inch

Range	Order No.	Accuracy
0 - 4"	**572-610**	.±001"
0 - 6"	**572-611**	±.001"
0 - 8"	**572-612**	±.001"

DIMENSION

Unit: mm



Range	L1	L2	Mass
100mm	209	185	390
150mm	259	235	410
200mm	311	287	430

Technical Data

Accuracy: ±0.03mm
(excluding quantizing error)
Resolution: 0.01mm or .0005"/0.01mm
Repeatability: 0.01mm
Display: LCD
Length standard: ABSOLUTE electromagnetic induction linear encoder
Max. response speed: Unlimited
Battery: SR44 (1 pc.), **938882**
Battery life: Approx. 1.5 years under normal use
Dust/Water protection level: IP67

Function

Origin-set, Zero-setting, Automatic power on/off, Data output, inch/mm conversion (inch/mm models)
Alarm: Low voltage, Counting value composition error

Optional Accessory

05CZA624: SPC cable with data switch (1m)
05CZA625: SPC cable with data switch (2m)

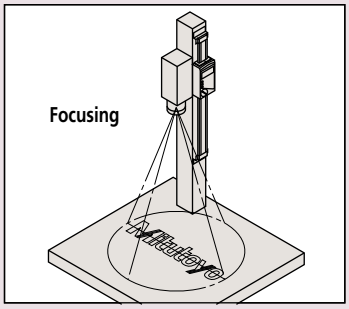
IP67 protection level

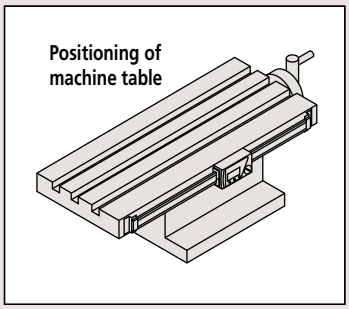
Level 6: Dust-tight
No ingress of dust.
Level 7: Protected against the effects of temporary immersion in water.
Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed 1 meter in water under standardized conditions of pressure and time (30 min.).

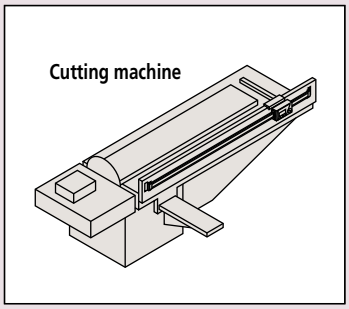
Mitutoyo's ABSOLUTE Digimatic Scale Units can be installed on almost any equipment, offering the user precise linear measurement capability with the added benefits of LCD readout and output for recording data and SPC.

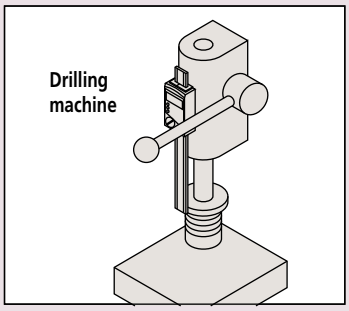
APPLICATIONS

- Positioning of tables, etc., in adverse environments
- Measuring equipment to be used on the workshop floor
- Measurement of structure displacements
- Positioning of plain machine tools
- Measuring equipment to be used outside (in the rain)









EC Counter

FEATURES

- The Digimatic Display Unit with GO/NG judgement function offers a large LED display for a Digimatic Scale Unit. The bright LED readout is ideal for low-light situations or when the scale unit must be inserted into an area where its own display cannot be viewed directly.

EC counter: **542-007**

Coolant Proof Scale Unit

Single Function Type Scale Unit

Multi-function Type Scale Unit

Multi-function Type Scale Unit

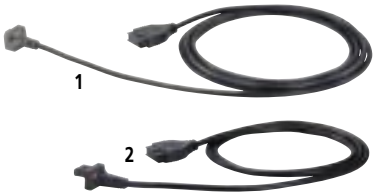
Digimatic Min-Processor
DP-1VR: **264-504**

Multiplexer
MUX-10: **264-002**

RS-232C output

Data input device
Input Tool: **264-012-10**

Data entry via USB



1. **05CZA624**: 1m cable with data switch
   05CZA625: 1m cable with data switch
2. **959149**: 1m cable with data switch
   959150: 1m cable with data switch
3. **905338**: 1m cable
   905409: 2m cable
4. **905689**: 1m cable
   905690: 2m cable
5. **905691**: 1m cable
   905692: 2m cable
6. **905693**: 1m cable
   905694: 2m cable
   936937: 1m cable
   965014: 2m cable

ABSOLUTE Digimatic Scale Units

SERIES 572

FEATURES

- The ORIGIN key allows setting of an absolute zero point to be used as reference in subsequent measurements. Once set, the ABS Digimatic Scale Unit is ready to show its true position whenever turned on rather than" 0.00" as with standard models.
- The ZERO/ABS key allows the display to be zero-set at any slider position along the beam for incremental comparison measurements. This key will also allow return to the absolute coordinate with a display of the true position from the origin point.• No rack, no pinion, no glass scale. Digimatic Scale Unit is safely embedded in the hardened stainless steel blade.
- Horizontal or vertical face according to the scale mounting direction.
- Special type that is provided with diameter displaying function is available for lathes.
- All units come with two mounting brackets, each located at either end of the scale.
- With SPC data output.

SPC

ABSOLUTE® Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)

Horizontal single function type

572-202-10

Horizontal multi-function type

572-461

Horizontal multi-function type

572-481

Vertical single function type

572-301-10

Vertical multi-function type

572-561

Vertical multi-function type

572-581

Technical Data

Accuracy: Refer to the list of specifications. (excluding quantizing error)
Resolution: 0.01mm or .0005"/0.01mm
Display: LCD
Length standard: ABSOLUTE electrostatic capacitance type linear encoder
Max. response speed: Unlimited
Battery: SR44 (1 pc.), **938882**
Battery life: Approx. 3.5 years under normal use

Function

Origin-set, Zero-setting, Power on/off, Presetting, Data hold, Data output, inch/mm conversion (inch/mm models), Counting direction switching*
Alarm: Low voltage, Counting value composition error
*not available for single function models

Optional Accessory

959143: Data hold unit for single function type
959149: SPC cable with data switch for single function type (1m)
959150: SPC cable with data switch for single function type (2m)
905338: SPC cable (1m, standard)
905409: SPC cable (2m, standard)
905689: SPC cable (1m, L-shape, back)
905690: SPC cable (2m, L-shape, back)
905691: SPC cable (1m, L-shape, right)
905692: SPC cable (2m, L-shape, right)
905693: SPC cable (1m, L-shape, left)
905694: SPC cable (2m, L-shape, left)

SPECIFICATIONS

Metric

Range	Order No.		Accuracy
	Horizontal	Vertical	
100mm	**572-200-20**	**572-300-10**	0.03mm
	572-460*	**572-560***	0.03mm
	572-480-10**	**572-580-10****	0.03mm
150mm	**572-201-20**	**572-301-10**	0.03mm
	572-461*	**572-561***	0.03mm
	572-481-10**	**572-581-10****	0.03mm
200mm	**572-202-20**	**572-302-10**	0.03mm
	572-462*	**572-562***	0.03mm
	572-482-10**	**572-582-10****	0.03mm
300mm	**572-203-10**	**572-303-10**	0.04mm
	572-463*	**572-563***	0.04mm
	572-483-10**	**572-583-10****	0.04mm
450mm	**572-464***	**572-564***	0.04mm
	572-484-10**	**572-584-10****	0.04mm
600mm	**572-465***	**572-565***	0.05mm
	572-485-10**	**572-585-10****	0.05mm
800mm	**572-466***	**572-566***	0.06mm
	572-486-10**	**572-586-10****	0.06mm
1000mm	**572-467***	**572-567***	0.07mm
	572-487-10**	**572-587-10****	0.07mm

* Multi-function type
** Multi-function type with diameter displaying function for lathe (Counting direction switching function is not provided.)

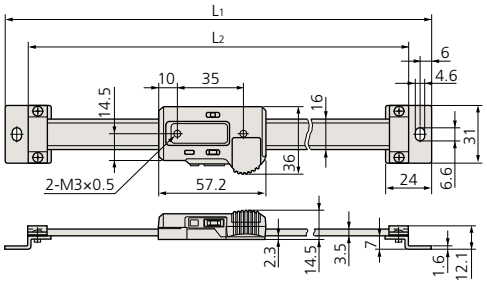
Inch/Metric

Range	Order No.		Accuracy
	Horizontal	Vertical	
4"	**572-210-20**	**572-310-10**	.001"
	572-470*	**572-570***	.001"
	572-490-10**	**572-590-10****	.001"
6"	**572-211-20**	**572-311-10**	.001"
	572-471*	**572-571***	.001"
	572-491-10**	**572-591-10****	.001"
8"	**572-212-20**	**572-312-10**	.001"
	572-472*	**572-572***	.001"
	572-492-10**	**572-592-10****	.001"
12"	**572-213-10**	**572-313-10**	.002"
	572-473*	**572-573***	.002"
	572-493-10**	**572-593-10****	.002"
18"	**572-474***	**572-574***	.002"
	572-494-10**	**572-594-10****	.002"
24"	**572-475***	**572-575***	.002"
	572-495-10**	**572-595-10****	.002"
32"	**572-476***	**572-576***	.0025"
	572-496-10**	**572-596-10****	.0025"
40"	**572-477***	**572-577***	.0025"
	572-497-10**	**572-597-10****	.0025"

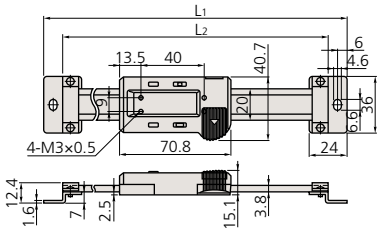
* Multi-function type
** Multi-function type with diameter displaying function for lathe (Counting direction switching function is not provided.)

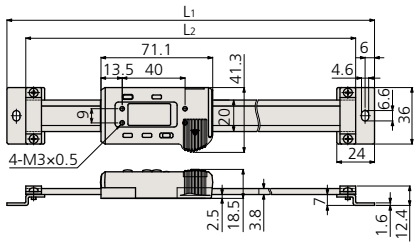
DIMENSION

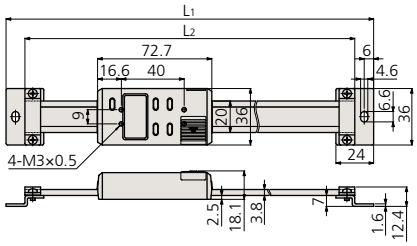
Unit: mm

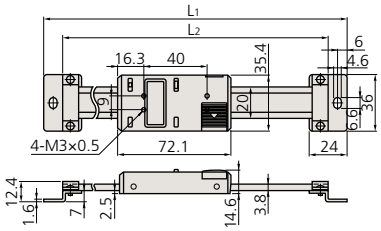


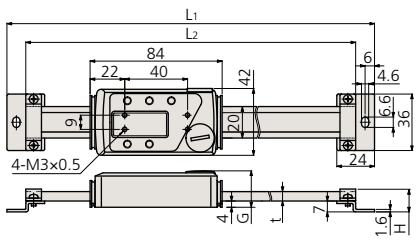
Range	L1	L2	Mass
100mm	209	185	230
150mm	259	235	250
200mm	311	287	270
300mm	444	420	370

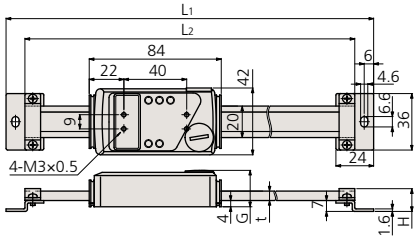










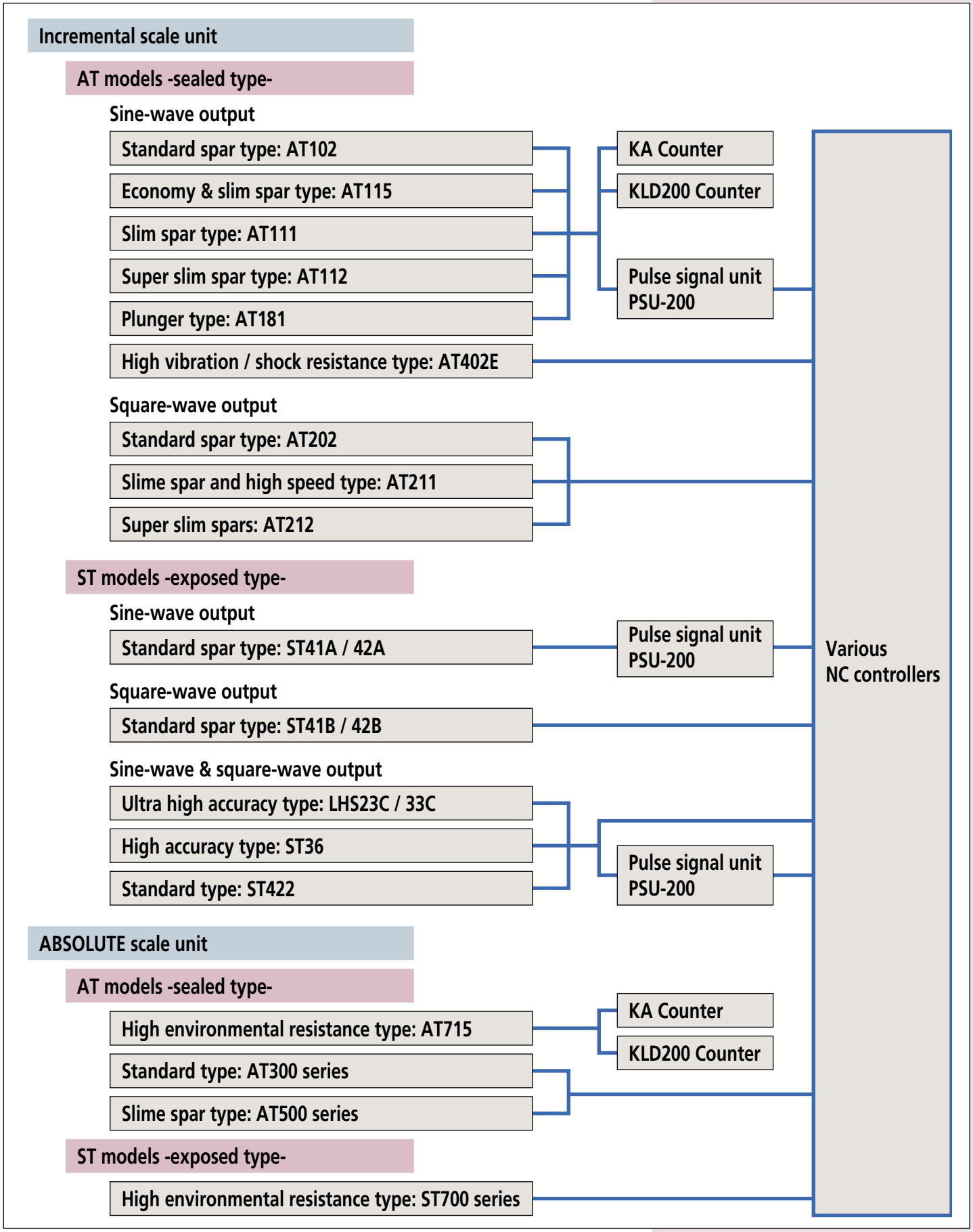


Range	L1	L2	Mass
100mm	244	220	250
150mm	294	270	280
200mm	344	320	310
300mm	444	420	370
450mm	594	570	760
600mm	774	750	900
800mm	974	950	1710
1000mm	1174	1150	2040

Linear Scale

Linear Encoder System

System Guide



AT102 Linear Scales

SERIES 539 — Standard Spar Type

Technical Data

Effective range: 100 - 6000mm
Accuracy at 20°C:

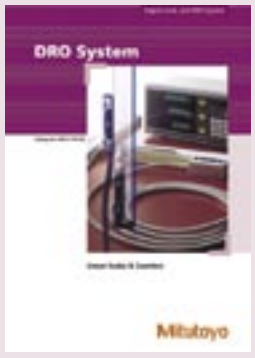
Effective range	Standard type	High-accuracy type
100 to 2000mm	(5+5L/1000)µm	(3+3L/1000)µm
2200 to 3000mm	(5+5L/1000)µm	—
3250 to 6000mm	(5+8L/1000)µm	—

L = Effective range (mm)

Output wave form: Two 90° phase-shifted sinusoidal signals
Maximum response speed: 72m/min. (up to 3000mm)
50m/min. (3250mm and over)
Scale grating pitch: 20µm
Scale reference point pitch: 50mm
Dust/water protection level: IP53
Operating temperature: 0°C to 45°C

Optional Accessory

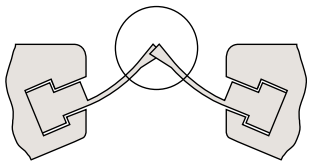
09AAA033A: Extension cable (2m)
09AAA033B: Extension cable (5m)
09AAA033C: Extension cable (7m)



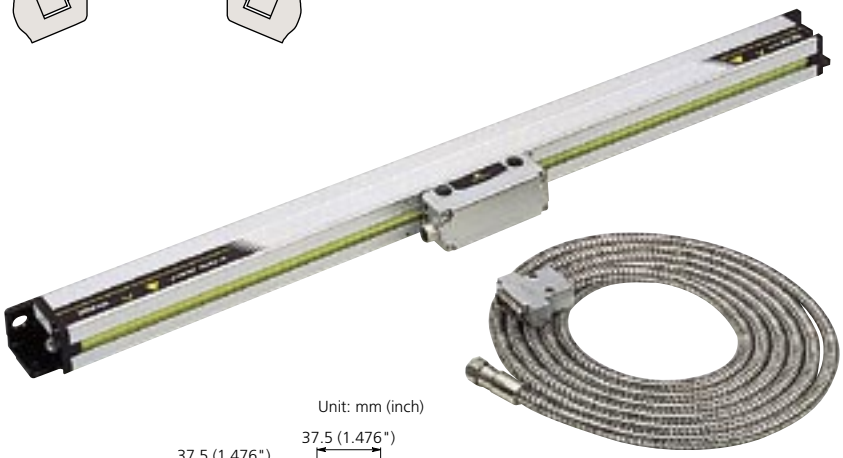
Refer to the DRO System leaflet (E4072) for more details.

FEATURES

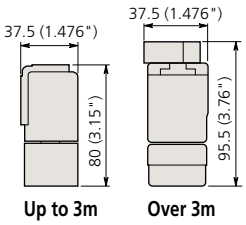
- Enhanced vibration-resistance and durability.
- The innovative rubber lips keep out contaminants on a machine shop.



- An armored signal cable is used to connect the scale unit to the DRO counter for safe operation in harsh shop environment.
- The signal cable outlet can be positioned on either side of the detecting head so the signal cable can be connected from either direction.



Unit: mm (inch)



Up to 3m Over 3m

SPECIFICATION

Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
100mm (4")	**539-111**	**539-111-10**	3m
150mm (6")	**539-112**	**539-112-10**	3m
200mm (8")	**539-113**	**539-113-10**	3m
250mm (10")	**539-114**	**539-114-10**	3m
300mm (12")	**539-115**	**539-115-10**	3m
350mm (14")	**539-116**	**539-116-10**	3m
400mm (16")	**539-117**	**539-117-10**	3m
450mm (18")	**539-118**	**539-118-10**	3m
500mm (20")	**539-119**	**539-119-10**	3m
600mm (24")	**539-121**	**539-121-10**	3m
700mm (28")	**539-123**	**539-123-10**	3m
750mm (30")	**539-124**	**539-124-10**	3m
800mm (32")	**539-125**	**539-125-10**	3m
900mm (36")	**539-126**	**539-126-10**	3m
1000mm (40")	**539-127**	**539-127-10**	5m
1100mm (44")	**539-128**	**539-128-10**	5m
1200mm (48")	**539-129**	**539-129-10**	5m
1300mm (52")	**539-130**	**539-130-10**	5m
1400mm (56")	**539-131**	**539-131-10**	5m
1500mm (60")	**539-132**	**539-132-10**	5m
1600mm (64")	**539-133**	**539-133-10**	5m

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

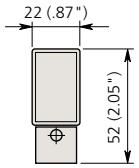
AT115 Linear Scales

SERIES 539 — Economy and Slim Spar Type

FEATURES

- Suitable for milling machines, XY tables, jigs, etc.
- Dimensionally compatible with AT111 linear scale units.

Unit: mm (inch)



Technical Data

Effective range:	100 - 1500mm
Accuracy at 20°C:	(5+5L/1000)µm
	L = Effective range (mm)
Output wave form:	Two 90° phase-shifted sinusoidal signals
Maximum response speed:	50m/min.
Scale grating pitch:	20µm
Scale reference point pitch:	50mm
Dust/water protection level:	IP53
Operating temperature:	0°C to 45°C

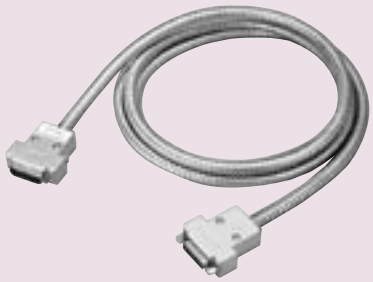
Optional Accessory

09AAA720A: Extension cable (2m)
09AAA720B: Extension cable (5m)
09AAA720C: Extension cable (7m)

SPECIFICATION

Effective range	Order No.	Signal cable length
100mm (4")	**539-271**	3.5m
150mm (6")	**539-272**	3.5m
200mm (8")	**539-273**	3.5m
250mm (10")	**539-274**	3.5m
300mm (12")	**539-275**	3.5m
350mm (14")	**539-276**	3.5m
400mm (16")	**539-277**	3.5m
450mm (18")	**539-278**	3.5m
500mm (20")	**539-279**	3.5m
600mm (24")	**539-281**	3.5m

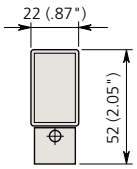
Effective range	Order No.	Signal cable length
700mm (28")	**539-283**	3.5m
750mm (30")	**539-284**	3.5m
800mm (32")	**539-285**	3.5m
900mm (36")	**539-286**	3.5m
1000mm (40")	**539-287**	5m
1100mm (44")	**539-288**	5m
1200mm (48")	**539-289**	5m
1300mm (52")	**539-290**	5m
1400mm (56")	**539-291**	5m
1500mm (60")	**539-292**	5m



AT111 Linear Scales

SERIES 539 — Slim Spar Type

Unit: mm (inch)



Technical Data

Effective range:	100 - 1500mm
Accuracy at 20°C:	
Standard type	(5+5L/1000)µm
High-accuracy type	(3+3L/1000)µm
	L = Effective range (mm)
Output wave form:	Two 90° phase-shifted sinusoidal signals
Maximum response speed:	72m/min.
Scale grating pitch:	20µm
Scale reference point pitch:	50mm
Dust/water protection level:	IP53
Operating temperature:	0°C to 45°C

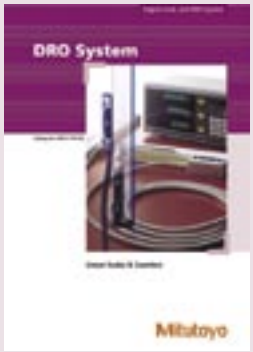
Optional Accessory

09AAA033A: Extension cable (2m)
09AAA033B: Extension cable (5m)
09AAA033C: Extension cable (7m)

SPECIFICATION

Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
100mm (4")	**539-201**	**539-201-10**	3.5m
150mm (6")	**539-202**	**539-202-10**	3.5m
200mm (8")	**539-203**	**539-203-10**	3.5m
250mm (10")	**539-204**	**539-204-10**	3.5m
300mm (12")	**539-205**	**539-205-10**	3.5m
350mm (14")	**539-206**	**539-206-10**	3.5m
400mm (16")	**539-207**	**539-207-10**	3.5m
450mm (18")	**539-208**	**539-208-10**	3.5m
500mm (20")	**539-209**	**539-209-10**	3.5m
600mm (24")	**539-211**	**539-211-10**	3.5m

Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
700mm (28")	**539-213**	**539-213-10**	3.5m
750mm (30")	**539-214**	**539-214-10**	3.5m
800mm (32")	**539-215**	**539-215-10**	3.5m
900mm (36")	**539-216**	**539-216-10**	3.5m
1000mm (40")	**539-217**	**539-217-10**	5m
1100mm (44")	**539-218**	**539-218-10**	5m
1200mm (48")	**539-219**	**539-219-10**	5m
1300mm (52")	**539-220**	**539-220-10**	5m
1400mm (56")	**539-221**	**539-221-10**	5m
1500mm (60")	**539-222**	**539-222-10**	5m



Refer to the DRO System leaflet (E4072) for more details.

AT112 Linear Scales

SERIES 539 — Super Slim Spar Type

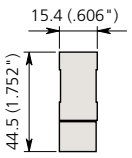
Technical Data

Effective range: 100 - 1020mm
Accuracy at 20°C:
Standard type (5+5L/1000)µm
High-accuracy type (3+3L/1000)µm
L = Effective range (mm)
Output wave form: Two 90° phase-shifted sinusoidal signals
Maximum response speed: 72m/min.
Scale grating pitch: 20µm
Scale reference point pitch: 50mm
Dust/water protection level: IP53
Operating temperature: 0°C to 45°C

Optional Accessory

09AAA033A: Extension cable (2m)
09AAA033B: Extension cable (5m)
09AAA033C: Extension cable (7m)

Unit: mm (inch)



SPECIFICATION

Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
50mm (1.5")	**539-251**	**539-251-10**	3m
70mm (2.5")	**539-252**	**539-252-10**	3m
120mm (4.5")	**539-253**	**539-253-10**	3m
170mm (6.5")	**539-254**	**539-254-10**	3m
220mm (8.5")	**539-255**	**539-255-10**	3m
270mm (10.5")	**539-256**	**539-256-10**	3m
320mm (12.5")	**539-257**	**539-257-10**	3m
370mm (14.5")	**539-258**	**539-258-10**	3m
420mm (16.5")	**539-259**	**539-259-10**	3m
470mm (18.5")	**539-260**	**539-260-10**	3m

Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
470mm (18.5")	**539-260**	**539-260-10**	3m
520mm (20")	**539-261**	**539-261-10**	3m
570mm (22")	**539-262**	**539-262-10**	3m
620mm (24")	**539-263**	**539-263-10**	3m
670mm (26")	**539-264**	**539-264-10**	3m
720mm (28")	**539-265**	**539-265-10**	3m
770mm (30")	**539-266**	**539-266-10**	3m
820mm (32")	**539-267**	**539-267-10**	3m
920mm (36")	**539-268**	**539-268-10**	3m
1020mm (40")	**539-269**	**539-269-10**	3m

AT181 Linear Scales

SERIES 539 — Plunger Type (High Water-proof Design)

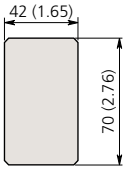
Technical Data

Effective range: 100 - 600mm
Accuracy at 20°C:
Standard type (5+5L/1000)µm
High-accuracy type (3+3L/1000)µm
L = Effective range (mm)
Output wave form: Two 90° phase-shifted sinusoidal signals
Maximum response speed: 50m/min.
Scale grating pitch: 20µm
Scale reference point pitch: 50mm
Dust/water protection level: IP54
Operating temperature: 0°C to 45°C

Optional Accessory

09AAA033A: Extension cable (2m)
09AAA033B: Extension cable (5m)
09AAA033C: Extension cable (7m)

Unit: mm (inch)



SPECIFICATION

Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
100mm (4")	**539-301**	**539-301-10**	3m
150mm (6")	**539-302**	**539-302-10**	3m
200mm (8")	**539-303**	**539-303-10**	3m
250mm (10")	**539-304**	**539-304-10**	3m
300mm (12")	**539-305**	**539-305-10**	3m
350mm (14")	**539-306**	**539-306-10**	3m
400mm (16")	**539-307**	**539-307-10**	3m
450mm (18")	**539-308**	**539-308-10**	3m
500mm (20")	**539-309**	**539-309-10**	3m
550mm (22")	**539-310**	**539-310-10**	3m
600mm (24")	**539-311**	**539-311-10**	3m

Refer to the DRO System leaflet (E4072) for more details.

AT715 Linear Scales

SERIES 539 — ABSOLUTE and High Environment Resistance Type

FEATURES

- Thanks to an absolute scale, AT715 detects and outputs an absolute position, no reference point setup needed at every power-on.
- Employing electromagnetic induction system and achieving IP55 environmental resistance..
- The best solution for the digitalization of conventional milling machines in combination with the KA counter.

Unit: mm (inch)

ABSOLUTE®
Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)

Technical Data

Effective range:	100 - 1800mm
Accuracy at 20°C:	(7+13L/1000)µm L = Effective range (mm)
Detecting method:	Electromagnetic induction system
Maximum response speed:	50m/min.
Dust/water protection level:	IP55
Operating temperature:	0°C to 45°C

Optional Accessory

09AAB674A: Extension cable (2m)
09AAB674B: Extension cable (5m)
09AAB674C: Extension cable (7m)

SPECIFICATION

Effective range	Order No.	Signal cable length
100mm (4")	**539-801**	3.5m
150mm (6")	**539-802**	3.5m
200mm (8")	**539-803**	3.5m
250mm (10")	**539-804**	3.5m
300mm (12")	**539-805**	3.5m
350mm (14")	**539-806**	3.5m
400mm (16")	**539-807**	3.5m
450mm (18")	**539-808**	3.5m
500mm (20")	**539-809**	3.5m
600mm (24")	**539-811**	3.5m
700mm (28")	**539-813**	3.5m
750mm (30")	**539-814**	3.5m

Effective range	Order No.	Signal cable length
800mm (32")	**539-815**	3.5m
900mm (36")	**539-816**	3.5m
1000mm (40")	**539-817**	5m
1100mm (44")	**539-818**	5m
1200mm (48")	**539-819**	5m
1300mm (52")	**539-820**	5m
1400mm (56")	**539-821**	5m
1500mm (60")	**539-822**	5m
1600mm (64")	**539-823**	5m
1700mm (68")	**539-824**	5m
1800mm (72")	**539-825**	5m

Refer to the Linear Scale AT715 leaflet (E4296) for more details.

AT202 Linear Scales

SERIES 539 — Standard Spar Type

Technical Data

Effective range: 100 - 3000mm
Accuracy (at 20°C):
100 to 1500mm (3+3L/1000)µm
1600 to 3000mm (5+5L/1000)µm
L = Effective range (mm)
Output signal: Two 90° phase-shifted quadrature signals
Maximum response speed: 72m/min.
Resolution: 0.5, 1µm
Scale reference point pitch: 50mm
Dust/Water protection level: IP53

Linear Scales for Numerical Motion Control System

The Linear Scales for the Numerical Motion Control System are high-accuracy linear measurement systems for a wide range of applications. These types of linear scales are designed to be integrated into precision machines and instruments including measuring machines and instruments, as well as machine tools, optics, data equipment, industrial robots, etc.
Two types of linear scales for the Numerical Motion Control System are available: the AT series have the high-accuracy glass scale and the detector head encased together in an aluminum casing for improved durability and resistance against vibration; the ultra-portable and lighter ST series have the scale and the detector head separately.

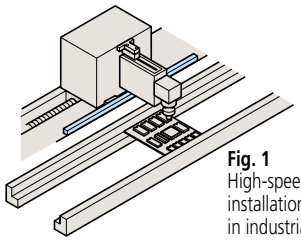


Fig. 1
High-speed, high-accuracy installation of electronics in industrial robots

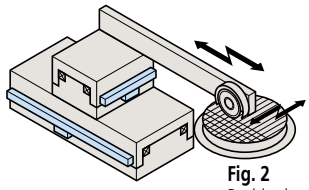


Fig. 2
Positioning dicing saw in semiconductor production process

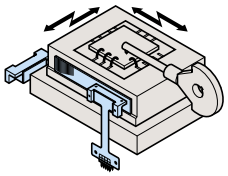


Fig. 3
Positioning IC tip for wire-bonding

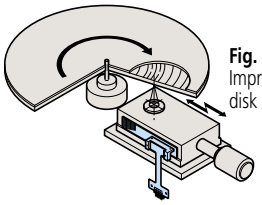
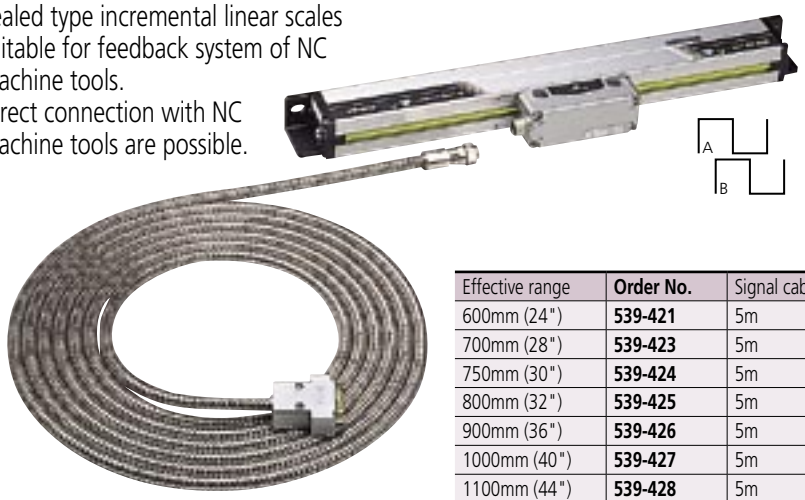


Fig. 4
Improving seek-time of disk drive system

FEATURES

- Sealed type incremental linear scales suitable for feedback system of NC machine tools.
- Direct connection with NC machine tools are possible.



SPECIFICATION

Effective range	Order No.	Signal cable length
100mm (4")	**539-411**	5m
150mm (6")	**539-412**	5m
200mm (8")	**539-413**	5m
250mm (10")	**539-414**	5m
300mm (12")	**539-415**	5m
350mm (14")	**539-416**	5m
400mm (16")	**539-417**	5m
450mm (18")	**539-418**	5m
500mm (20")	**539-419**	5m

Effective range	Order No.	Signal cable length
600mm (24")	**539-421**	5m
700mm (28")	**539-423**	5m
750mm (30")	**539-424**	5m
800mm (32")	**539-425**	5m
900mm (36")	**539-426**	5m
1000mm (40")	**539-427**	5m
1100mm (44")	**539-428**	5m
1200mm (48")	**539-429**	5m
1300mm (52")	**539-430**	5m
1400mm (56")	**539-431**	5m
1500mm (60")	**539-432**	5m
1600mm (64")	**539-433**	5m
1700mm (68")	**539-434**	5m
1800mm (72")	**539-435**	5m
2000mm (80")	**539-436**	5m
2200mm (88")	**539-437**	5m
2400mm (96")	**539-438**	5m
2500mm (100")	**539-439**	5m
2600mm (104")	**539-440**	5m
2800mm (112")	**539-441**	5m
3000mm (120")	**539-442**	5m

AT211A / AT211B Linear Scales

SERIES 539 — Slim Spar Type

Technical Data

Effective range: 100 - 1500mm
Accuracy at 20°C:

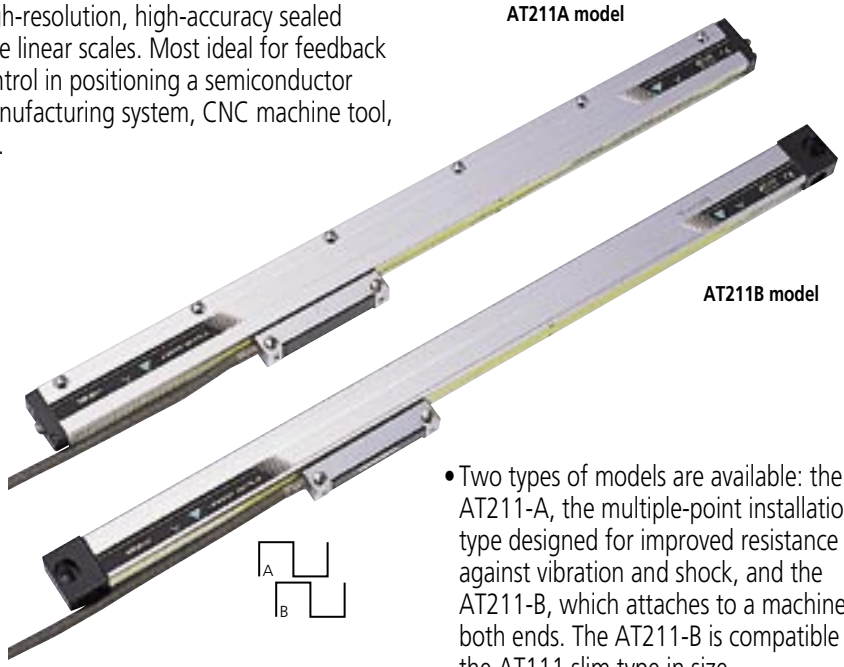
Effective range	Standard type	High-accuracy type
100 to 500mm	(3+3L/1000)µm	(2+2L/1000)µm
500 to 1500mm	(3+3L/1000)µm	—

L = Effective range (mm)
Output signal: Two 90° phase-shifted quadrature signals
Maximum response speed: 5.4 - 120m/min.
Resolution: 0.1, 0.2, 0.5, 1, 2.5, 5µm
Signal output pitch: 20µm
Dust/Water protection level: IP53

FEATURES

- High-resolution, high-accuracy sealed type linear scales. Most ideal for feedback control in positioning a semiconductor manufacturing system, CNC machine tool, etc.

AT211A model



AT211B model

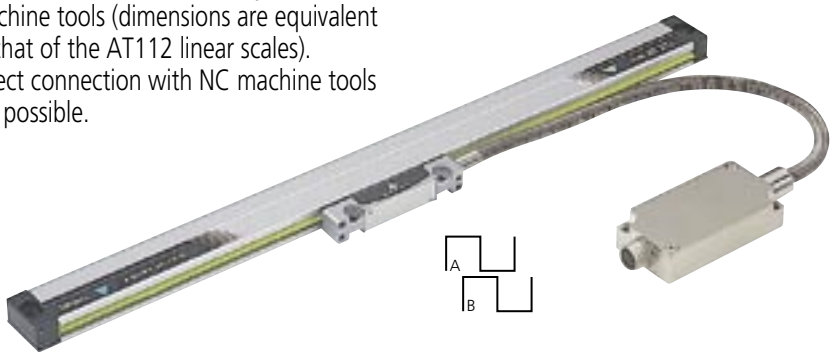
- Two types of models are available: the AT211-A, the multiple-point installation type designed for improved resistance against vibration and shock, and the AT211-B, which attaches to a machine at both ends. The AT211-B is compatible with the AT111 slim type in size.

AT212 Linear Scales

SERIES 539 — Super Slim Sealed Type Linear Encoder

FEATURES

- Super slim sealed type incremental linear scales suitable for feedback system of NC machine tools (dimensions are equivalent to that of the AT112 linear scales).
- Direct connection with NC machine tools are possible.



Technical Data

Effective range:	50 - 1020mm
Accuracy (at 20°C):	(3+3L/1000)µm L = Effective range (mm)
Output signal:	Two 90° phase-shifted quadrature signals
Signal output pitch:	20µm
Maximum response speed:	50m/min.
Resolution:	0.5, 1µm
Scale reference point pitch:	50mm
Dust/Water protection level:	IP53

AT402E Linear Scales

SERIES 539 — High Vibration / Shock Resistance Type

FEATURES

- Achiving the world-class vibration resistance (20G) and shock resistance (40G) for using with a heavy cutting machine tool.
- Multi-point elastic fixing for very linear and smooth expansion and contraction with temperature changes
- 1Vpp/20µm signal output for high connectivity with various machine controllers.
- Absolute Interval Code for a simple and afordable Absolute Measuring System.
- High-response speed of 120m/min
- High measuring accuracy of ±2µm (up to 540mm)

Technical Data

Effective range:	140 - 3040mm
Accuracy (at 20°C):	
140 to 540mm	±2µm
640 to 940mm	±3µm
1040 to 3040mm	±3µm/m
Output signal:	Two 90° phase-shifted sinusoidal signals (1 Vpp)
Maximum response speed:	120m/min.
Signal output pitch:	20µm
Dust/water protection level:	IP53
Operating temperature:	0°C to 45°C

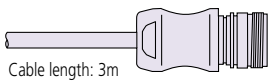
SPECIFICATION

Effective length	Order No. (w/o cable)	Order No. (w/ cable A)	Order No. (w/ cable B)	Order No. (w/ cable C)
140mm	**539-371-00**	**539-371-01**	**539-371-02**	**539-371-03**
240mm	**539-373-00**	**539-373-01**	**539-373-02**	**539-373-03**
340mm	**539-374-00**	**539-374-01**	**539-374-02**	**539-374-03**
440mm	**539-375-00**	**539-375-01**	**539-375-02**	**539-375-03**
540mm	**539-376-00**	**539-376-01**	**539-376-02**	**539-376-03**
640mm	**539-377-00**	**539-377-01**	**539-377-02**	**539-377-03**
740mm	**539-378-00**	**539-378-01**	**539-378-02**	**539-378-03**
840mm	**539-379-00**	**539-379-01**	**539-379-02**	**539-379-03**
940mm	**539-380-00**	**539-380-01**	**539-380-02**	**539-380-03**
1040mm	**539-381-00**	**539-381-01**	**539-381-02**	**539-381-03**
1140mm	**539-382-00**	**539-382-01**	**539-382-02**	**539-382-03**
1240mm	**539-383-00**	**539-383-01**	**539-383-02**	**539-383-03**
1340mm	**539-384-00**	**539-384-01**	**539-384-02**	**539-384-03**
1440mm	**539-385-00**	**539-385-01**	**539-385-02**	**539-385-03**
1540mm	**539-386-00**	**539-386-01**	**539-386-02**	**539-386-03**
1640mm	**539-387-00**	**539-387-01**	**539-387-02**	**539-387-03**
1740mm	**539-388-00**	**539-388-01**	**539-388-02**	**539-388-03**
1840mm	**539-389-00**	**539-389-01**	**539-389-02**	**539-389-03**
2040mm	**539-390-00**	**539-390-01**	**539-390-02**	**539-390-03**
2240mm	**539-391-00**	**539-391-01**	**539-391-02**	**539-391-03**
2440mm	**539-392-00**	**539-392-01**	**539-392-02**	**539-392-03**
2640mm	**539-393-00**	**539-393-01**	**539-393-02**	**539-393-03**
2840mm	**539-394-00**	**539-394-01**	**539-394-02**	**539-394-03**
3040mm	**539-395-00**	**539-395-01**	**539-395-02**	**539-395-03**

Cable A: Lead wires type

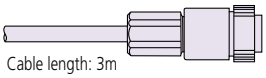
Cable length: 3m

Cable B: Connectable to Euro controller

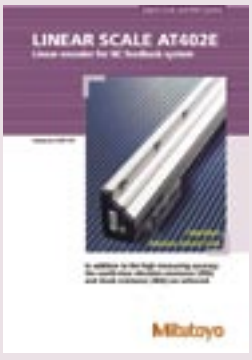


Cable length: 3m

Cable C: Connectable to FANUC serial board C



Cable length: 3m



Refer to the Linear Scale AT402E leaflet (E4287) for more details.

AT300 Series Linear Scales

SERIES 539 — ABSOLUTE and Standard Spar Type

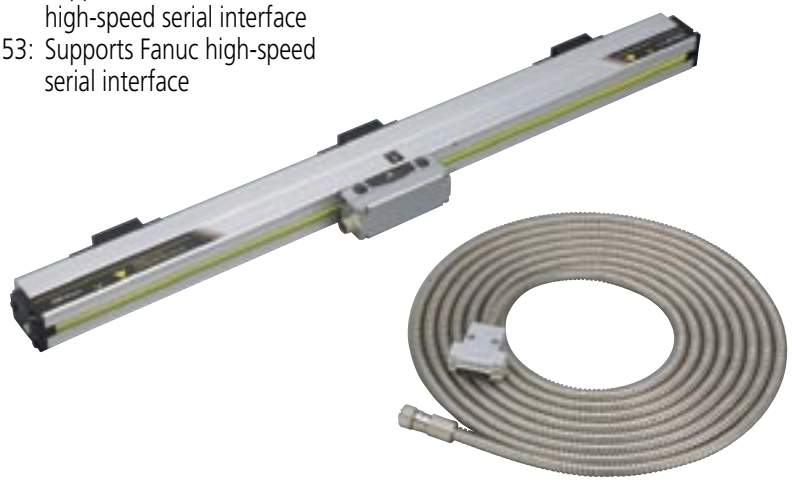
ABSOLUTE® Absolute System Patented by MITUTOYO (Refer to the page 9 for details.)

Technical Data

Effective range:	100 - 3000mm
Accuracy (at 20°C):	
100 to 1500mm	(3+3L/1000)µm
1600 to 3000mm	(5+5L/1000)µm
	L = Effective range (mm)
Signal output pitch:	20µm
Maximum response speed:	120m/min.
Resolution:	0.05µm
Dust/Water protection level:	IP53

FEATURES

- Sealed type absolute linear scales with very fine resolution up to 0.05µm.
- Direct connection with NC machine tools are possible.
  - ABS AT303: Supports Mitutoyo standard serial interface
  - ABS AT343: Supports Mitsubishi Electric high-speed serial interface
  - ABS AT353: Supports Fanuc high-speed serial interface



Refer to the NC Linear Scale leaflet (E4189) for more details.

AT500 Series Linear Scales

SERIES 539 — ABSOLUTE and Slime Spar Type

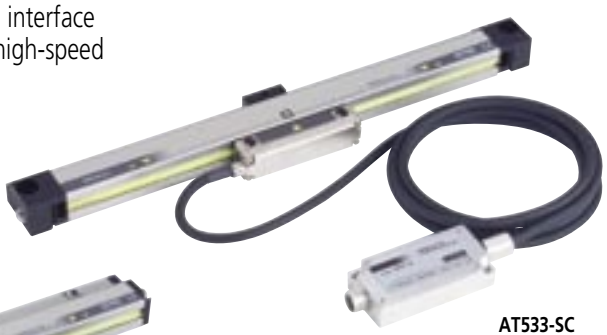
ABSOLUTE® Absolute System Patented by MITUTOYO (Refer to the page 9 for details.)

Technical Data

Effective range:	
-S model	100 - 2200mm
-H model	100 - 1000mm
Accuracy (at 20°C):	
-S model	(3+3L/1000)µm
-H model	(2+2L/1000)µm
	L = Effective range (mm)
Signal output pitch:	20µm
Maximum response speed:	150m/min.
Resolution:	0.05µm
Dust/Water protection level:	IP53

FEATURES

- Sealed type absolute linear scales with very fine resolution up to 0.05µm.
- Direct connection with NC machine tools are possible.
  - ABS AT503: Supports Mitutoyo standard serial interface
  - ABS AT543: Supports Mitsubishi Electric high-speed serial interface
  - ABS AT553: Supports Fanuc high-speed serial interface
- Two types are available:
  -S model: high-rigid type
  -H model: high-accuracy type.



AT533-SC

AT533-HC

Refer to the ABS Linear Scale AT500-S/H leaflet (E4265) for more details.

Mitutoyo

ST41A / 42A Linear Scales

SERIES 579 — Standard Type

FEATURES

- Outputs two 90° phase-shifted sinusoidal signals (signal pitch: 20µm).
- Suitable for a positioning sensor of high-accuracy closed loop control as an alternative to the rotary encoder.

Technical Data

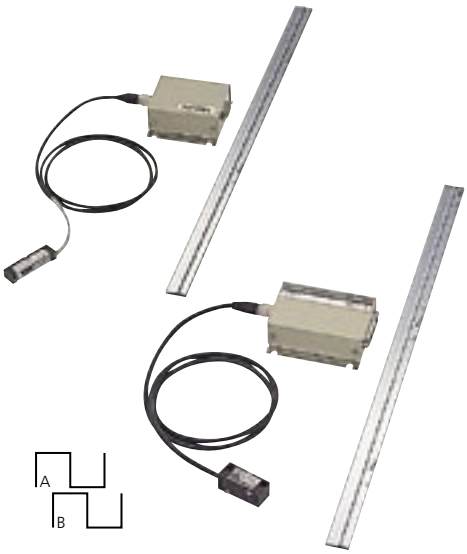
Effective range:	100 - 1000mm
Accuracy (at 20°C):	±3µm (up to 300mm) ±2µm (up to 500mm) ±3µm (up to 1000mm)
Output signal:	Two 90° phase-shifted sinusoidal signals
Scale grating pitch:	20µm
Signal output pitch:	20µm
Maximum response speed:	600mm/sec
Scale reference point pitch:	50mm (ST42A only)

ST41B / 42B Linear Scales

SERIES 579 — Standard Type

FEATURES

- Outputs two 90° phase-shifted quadrature signals or up/down pulse signals (signal pitch: 20µm).
- Suitable for a positioning sensor of high-accuracy closed loop control as an alternative to the rotary encoder.
- Directly connectable with a servo controller.



Technical Data

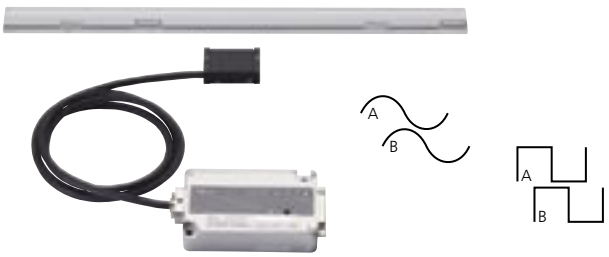
Effective range:	100 - 1000mm
Accuracy (at 20°C):	±3µm (up to 300mm) ±2µm (up to 500mm) ±3µm (up to 1000mm)
Output signal:	Two 90° phase-shifted quadrature signals or up/down pulse
Scale grating pitch:	20µm
Signal output pitch:	20µm
Resolution:	0.5, 1µm
Maximum response speed:	300mm/sec (0.5µm resolution) 600mm/sec (1µm resolution)
Scale reference point pitch:	50mm (ST42B only)

ST36 Linear Scales

SERIES 579 — High Accuracy Type

FEATURES

- High-resolution, high-accuracy and portable model designed for exposed installation.
- High-reliability with stable signal output.
- Outputs two-phase sine wave signal (signal pitch 4µm) and two-phase pulse signal simultaneously.
- Equipped with a compact interface box.



Technical Data

Effective range:	10 - 3000mm
Accuracy (at 20°C):	
10 - 300mm	±0.5µm
350 - 500mm	±1µm
500 - 1000mm	±2µm
1000 - 3000mm	±2µm/m
Output signal:	Two 90° phase-shifted sinusoidal signals Two 90° phase-shifted quadrature signals
Scale grating pitch:	8µm
Signal output pitch:	4µm
Resolution:	0.01, 0.02, 0.05, 0.1µm
Maximum response speed:	1200mm/sec
Scale reference point pitch:	
10 - 80mm	Center point
100 - 3000mm	50mm

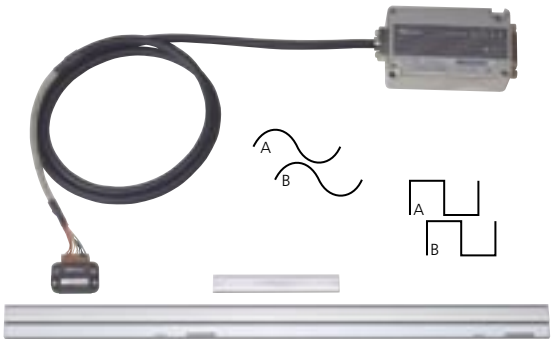
Refer to the NC Linear Scale leaflet (E4189) for more details.

ST422 Linear Scales

SERIES 579 — Standard Type

FEATURES

- Compact design exposed type incremental linear scales.
- Maximum of up to 5000mm/s high response speed.
- Provided with alarm LED error indication with fault detection signal output for over speed and sinusoidal signal anomaly errors.



Technical Data

Effective range:	10 - 1000mm
Accuracy (at 20°C):	
10 - 300mm	±1µm
350 - 500mm	±2µm
500 - 1000mm	±3µm
Output signal:	Two 90° phase-shifted sinusoidal signals Two 90° phase-shifted quadrature signals
Scale grating pitch:	40µm
Signal output pitch:	40µm
Resolution:	0.2, 0.5, 1, 5µm
Maximum response speed:	5000mm/sec
Scale reference point pitch:	
10 - 75mm	Center point
100 - 1000mm	50mm

ST700 Series Linear Scales

SERIES 579 — ABSOLUTE and High Environment Resistance Type

ABSOLUTE®
Absolute System Patented by MITUTOYO

(Refer to the page 9 for details.)

FEATURES

- Absolute scales have eliminated the need for origin restoration.
- Optimized for the control of linear motors.
- Optimized for high-speed, high-acceleration control.
- Provides high resistance to the contamination of water and oil.
- A non-contact detection system allows a longer service life.
- Signal adjustment at installation is automatically performed with dedicated software.

Technical Data

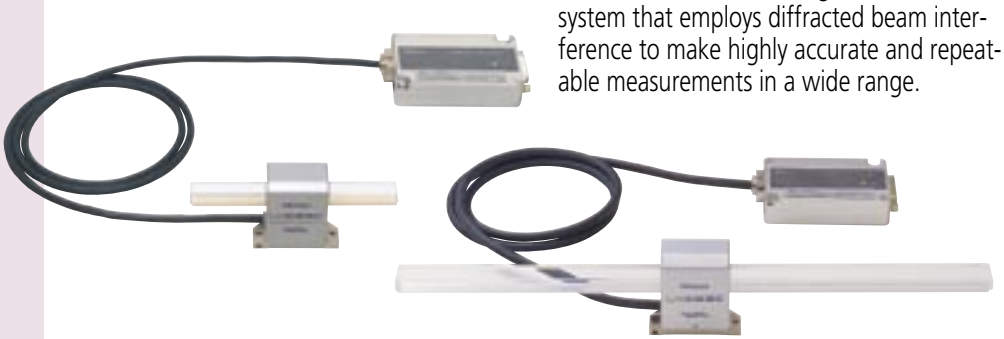
Effective range:	100 - 3000mm
Accuracy (at 20°C):	(8+5L/1000)µm L = Effective range (mm)
Detecting method:	Electromagnetic induction system
Maximum response speed:	5000mm/sec
Dust/Water protection level:	IP65

Refer to the Separate Type Absolute Linear Scale ST700 leaflet (E4266) for more details.

Laser Holoscale

SERIES 549 — Ultra High Accuracy Type

The Laser Holoscale is a high-end DRO system that employs diffracted beam interference to make highly accurate and repeatable measurements in a wide range.



Features

- It features ultra-fine diffraction gratings which are holographically recorded on the scale.
- Highly accurate measurement due to an ultra-high resolution of 0.001µm, which is close to the performance of laser interferometers.
- Excellent measuring stability – the compact detecting system is highly resistant to unfavorable environmental conditions such as changes in temperature and atmospheric pressure.
- A semiconductor laser is used as a light source to achieve a compact design for easy installation and adjustment.

KA Counter

SERIES 174 — Standard Type

FEATURES

- High cost performance 2/3-axis counter with new 10-coordinate function and existing KL counter functions
- The KA counter can be used as the " standard counter" or a" lathe counter" by modifying parameters.
- Both the existing AT100 series optical scales and the new AT715 electromagnetic induction scale can be connected.

174-173 (for 1-axis or 2-axis)

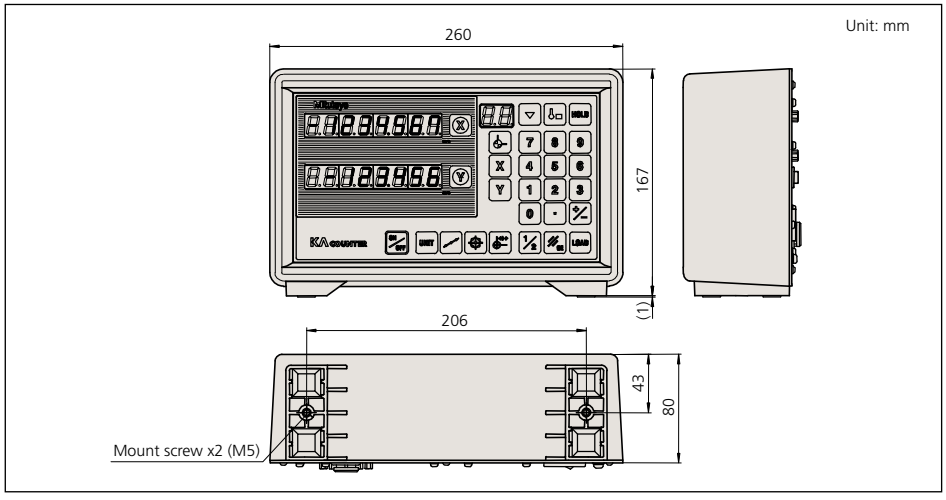
174-175 (for 3-axis)

SPECIFICATIONS

Order No.	174-173*	174-175*
Scale input ports	2	3

*To denote your AC line voltage add the following suffixes to the order No. (e.g.: **174-173A**): **A** for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

DIMENSION



Technical Data: Common

Scale input ports:	2, 3
Resolution:	0.001mm, 0.005mm, .0001", .0005" (changeable)
Display:	7-digit LED and a negative [-] sign
Power supply:	100V-240V AC, 50/60Hz
Mass:	1.1kg (2-axis), 1.2kg (3-axis)

Optional Accessory

938140: Touch signal probe (shank diameter: 20mm)
935094: Touch signal probe (shank diameter: 32mm)
09CAB217: RS232C code out unit

Functions

Function \ Counter	KA	KLD
Diameter display	●	●
Addition of 2-scale data	●	—
Direct data entry with Digimatic gage	—	—
Cutting tool selection	—	—
Coordinate data copy	—	—
One-touch macro keys	—	—
Part-program setting	—	—
Programmable remote controller	—	—
Linearity error compensation	●	●
Pitch error compensation	—	—
Lost motion compensation	—	—
Smoothing	●	●
RS-232C Interface Unit	▲	▲
Limit signal output via RS-232C	—	—
BCD Code Out	—	▲
Digimatic Code Out	—	—
GP-IB Interface	—	—
Limit signal output	—	●

●: Provided as standard, ▲: Optional accessory, —: Not available
▲*: Only available for AT100 series

KLD Counter

SERIES 174 — Special Purpose Type with Limit Signal Output

Technical Data: Common

Limit signal output: 1-step, 4-step, 8-step
Scale input ports: 1
Resolution: 0.0005mm, 0.001mm, 0.002mm, 0.005mm. 0.01mm .00002", .00005", .0001", .0002", .0005", .001"
Display: 9-digit LED and a negative [-] sign
Limit value setting method: Digital switch, Ten-keyboard
Power supply: 100-120V/200-240V AC, 50/60Hz
Mass: 4.5kg

Optional Accessory

907569: RS-232C Interface Unit
907570: BCD Code Out Unit
965004: External load foot switch
937326: External load box
936551: External zero-set box
938140: Touch-signal probe (shank dia.: 20mm)
935094: Touch-signal probe (shank dia.: 32mm)
902329: Touch-signal probe (shank dia.: 1/2")

Makes it easy to perform such operations as datum point setting (detecting the workpiece edge and setting the counter display to zero), workpiece centering, and dimensional measurement (detecting the workpiece end point and holding the counter display).

FEATURES

- A 1-axis counter dedicated to sending signals when a linear scale displacement value and a preset limit value coincide.
- Three types of limit settings are available: 2 steps, 4 steps, and 8 steps.
- For controlling a vertical position of an EDM or a grinding machine.
- Can be connected to a personal computer or a sequencer by installing an RS-232C Interface Unit or a BCD Code Out Unit. (Both interface units are optional accessories.)

174-143

SPECIFICATIONS

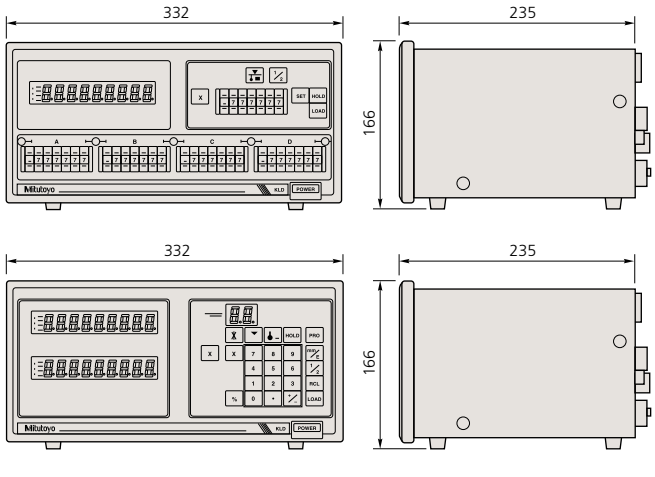
Order No.	174-141	174-143	174-145
Limit signal output	1-step	4-step	8-step
Limit value setting method	Digital switch	Digital switch	Ten-keyboard

*To denote your AC line voltage add the following suffixes to the order No. (e.g.: **174-141A**): **A** for UL/CSA, **D** for CEE, **E** for BS, **DC** for China, **K** for EK, **No suffix** is required for JIS/100V

Function \ Counter	KA	KLD
Zero-setting	●	●
Zero-set remote controller	—	—
Preset	●	●
Resolution setting	●	●
Counting direction setting	●	●
mm/inch conversion	●	●
1/2 calculation	●	●
ABS/INC coordinate selection	●	—
Lower digit blanking out	●	●
Memory backup	●	●
Expansion/contraction coefficient setting	—	●
Zero approach machining (ABS mode)	—	—
Zero approach machining (INC mode)	●	—
Bolt-hole circle machining	●	—
Touch-signal probe	▲*	▲
Scale reference point setting	●	●
Addition/subtraction	—	—
Maximum/minimum value hold	—	●

DIMENSION

Unit: mm



Mitutoyo

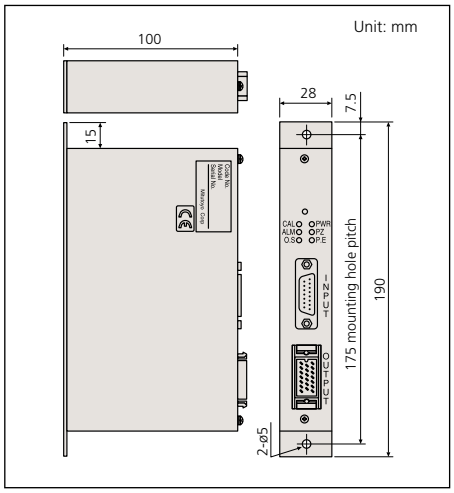
PSU-200

SERIES 539 — Pulse Signal Conversion Interface

FEATURES

- Applicable with Linear Scales with the sinusoidal signal output.
- Quadrature signal output (conforming to EIA standard RS422-A).
- Alarm function for detecting broken wires or short circuits in the detector, over-speed and fluctuation errors in the input signal from the detector.

SPECIFICATION

Order No.	539-005
Number of axes	1
Number of deviation	4, 8, 10, 20, 40, 80, 100 or 200 (switchable)
Functions	Division setting, Min. edge interval setting, LED for alarm indication, Alarm output mode switching, LED for origin detection, LED for low-level power supply voltage warning
Power supply	DC5V±5%
Consumption	200mA
Mass	620g

DIMENSION