



Digimatic Scale Units



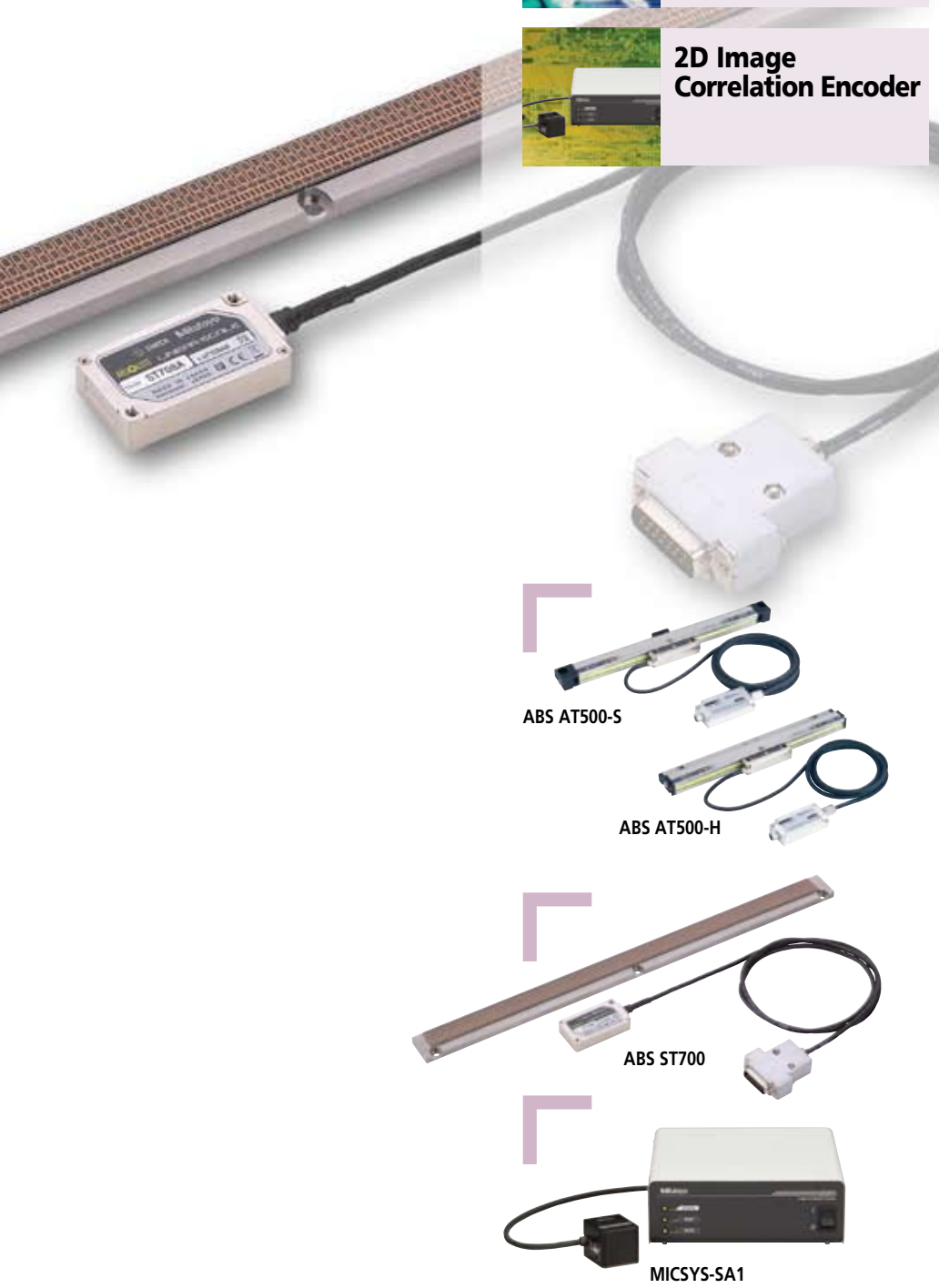
Linear Scales



2D Image Correlation Encoder

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ABS AT500-S

ABS AT500-H

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MICSYS-SA1

ABSOLUTE Coolant Proof Digimatic Scale Units

SERIES 572 — With Dust/Water Protection IP66 Level

FEATURES

- Newly employed detection method (Electromagnetic induction) enables use in adverse environments with water and cutting oil.
- Specially designed output cables are developed to maintain the water resistant structure.
- No overspeed error since it uses an ABSOLUTE scale which does not depend on counting scale graduations.
- Once an absolute zero (origin) point is set, the Digimatic Scale Unit shows the absolute distance from this point when powered on rather than "0.00".

SPC

IP66

(Refer to page VIII for details.)

ABSOLUTE
Absolute System Patented by MITUTOYO

(Refer to page VIII 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"/0-100mm	572-613	.001"/0.03mm
0 - 6"/0-150mm	572-614	.001"/0.03mm
0 - 8"/0-200mm	572-615	.001"/0.03mm

Technical Data

Accuracy: $\pm 0.03\text{mm}$
(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: IP66

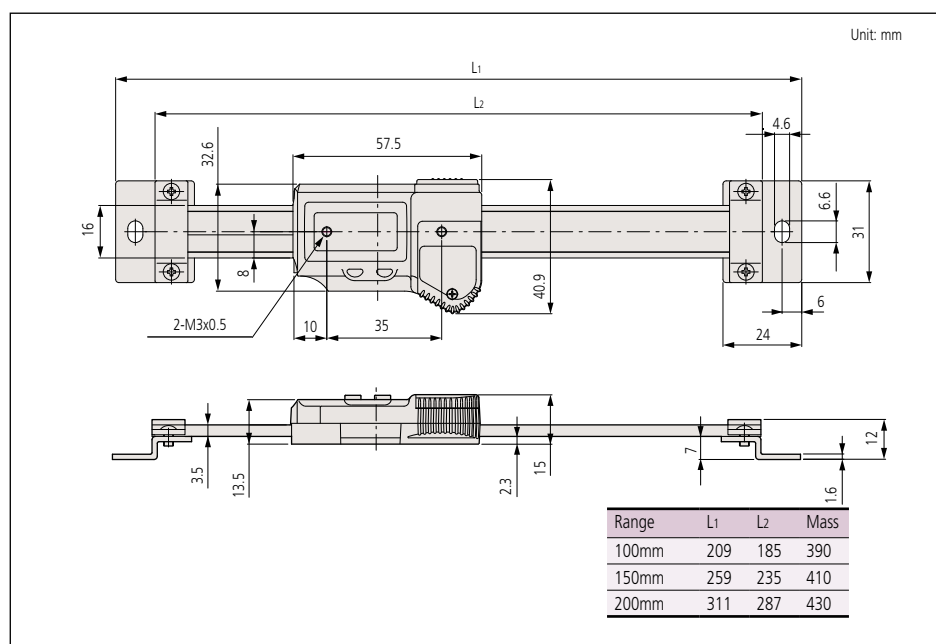
Functions

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

Optional Accessories

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

DIMENSIONS



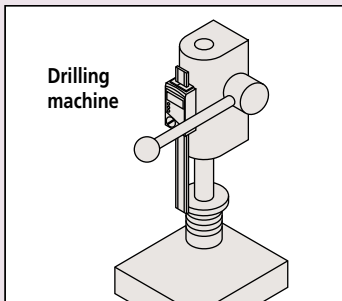
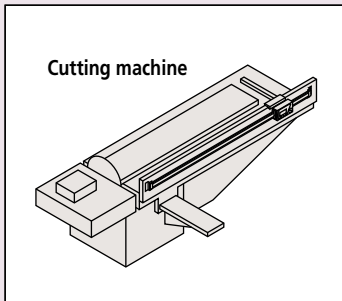
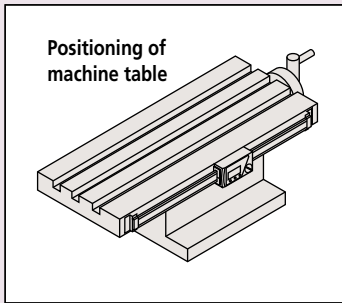
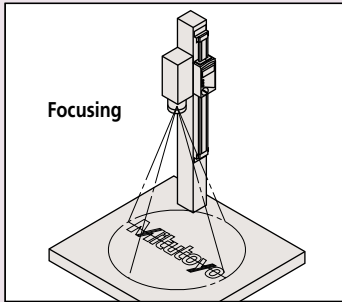
IP66 protection level

- 6 : First numeral means:
Dust-tight
No ingress of dust
- 6 : Second numeral means:
Protected against powerful water jets
Water projected in powerful jets against the enclosure from any direction will have no harmful effects

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 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 positioned where its own display cannot be viewed directly.



EC counter: 542-007

Coolant Proof Scale Unit



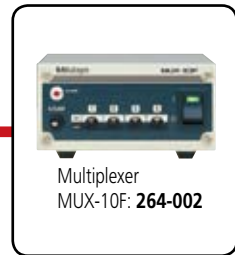
Single-function Type Scale Unit



Multi-function Type Scale Unit



Multi-function Type Scale Unit



RS-232C output

Data entry via USB



- 1. 05CZA624: 1m cable with data switch (For Coolant Proof Scale Unit)
- 05CZA625: 1m cable with data switch (For Coolant Proof Scale Unit)
- 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 absolute coordinates with a display of the true position from the origin point.
- No rack, no pinion, no glass scale. The Digimatic scale is safely embedded in the hardened stainless steel blade.
- Horizontal or vertical display according to the scale mounting direction.
- A special type provided with a diameter displaying function is available for lathes.
- All units come with two mounting brackets, each located at one end of the scale.
- With SPC data output.

SPC

ABSOLUTE®
Absolute System Patented by MITUTOYO

(Refer to page VIII for details.)

Horizontal single-function type



Horizontal multi-function type



Vertical single-function type



Vertical multi-function type



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

Functions

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

Optional Accessories

- 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
 (Measurement direction switching function is not provided.)

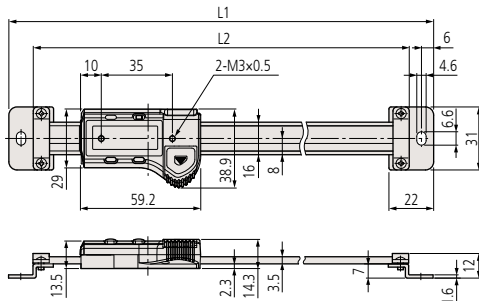
Inch/Metric			
Range	Order No.		Accuracy
	Horizontal	Vertical	
4"	572-210-20	572-310-10	.001"/0.03mm
	572-470*	572-570*	.001"/0.03mm
	572-490-10**	572-590-10**	.001"/0.03mm
6"	572-211-20	572-311-10	.001"/0.03mm
	572-471*	572-571*	.001"/0.03mm
	572-491-10**	572-591-10**	.001"/0.03mm
8"	572-212-20	572-312-10	.001"/0.03mm
	572-472*	572-572*	.001"/0.03mm
	572-492-10**	572-592-10**	.001"/0.03mm
12"	572-213-10	572-313-10	.002"/0.04mm
	572-473*	572-573*	.002"/0.04mm
	572-493-10**	572-593-10**	.002"/0.04mm
18"	572-474*	572-574*	.002"/0.04mm
	572-494-10**	572-594-10**	.002"/0.04mm
24"	572-475*	572-575*	.002"/0.04mm
	572-495-10**	572-595-10**	.002"/0.04mm
32"	572-476*	572-576*	.0025"/0.06mm
	572-496-10**	572-596-10**	.0025"/0.06mm
40"	572-477*	572-577*	.0025"/0.07mm
	572-497-10**	572-597-10**	.0025"/0.07mm

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

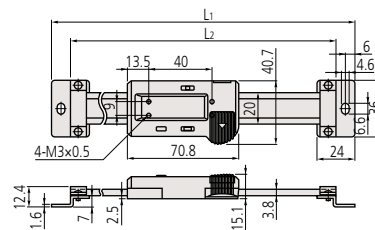
DIMENSIONS

Unit: mm

Horizontal single-function type (Range : 100-200mm)

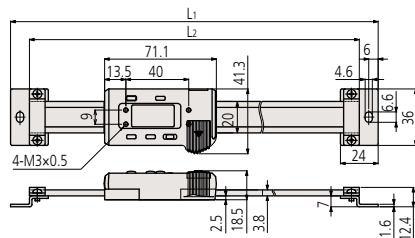


Horizontal single-function type (Range : 300mm)

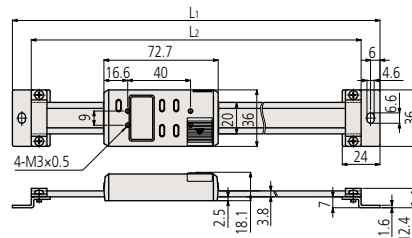


Range	L1	L2	Mass
100mm	209	185	230
150mm	259	235	250
200mm	311	287	270
300mm	444	420	370

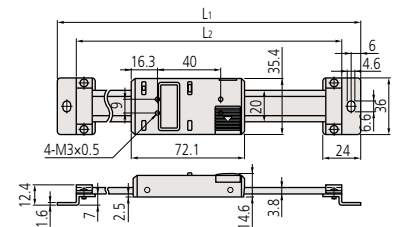
Horizontal multi-function type (Range : 100-300mm)



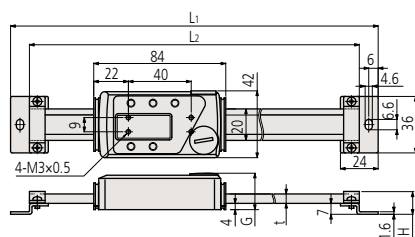
Vertical multi-function type (Range : 100-300mm)



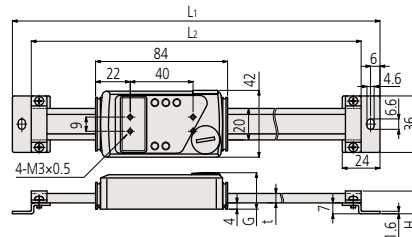
Vertical single-function type (Range : 100-300mm)



Horizontal multi-function type (Range : 450-1000mm)



Vertical multi-function type (Range : 450-1000mm)



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

Incremental scale unit

AT models -sealed type-

Sine-wave output

Standard spar type: AT103

Economy & slim spar type: AT116

Slim spar type: AT113

Super slim spar type: AT112

Plunger type: AT181

High vibration/shock-resistant type: AT402E

KA Counter

KLD200 Counter

Pulse signal unit
PSU-200

Square-wave output

Standard spar type: AT203

Slim spar type: AT216-T / AT216-TL

Slim spar and high speed type: AT211

ST models -exposed type-

Sine-wave & square-wave output

High accuracy type: ST36

Standard type: ST24 / ST44

Compact type: ST422 / ST46

Pulse signal unit
PSU-200

Various
NC
controllers

ABSOLUTE scale unit

AT models -sealed type-

High environmental resistance type: AT715

Standard type: AT300

Slime spar type: AT500

KA Counter

KLD200 Counter

ST models -exposed type-

High environmental resistant type: ST700

H

AT103 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 waveform:	Two 90° phase-shifted sinusoidal signals	
Maximum response speed:	120m/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	

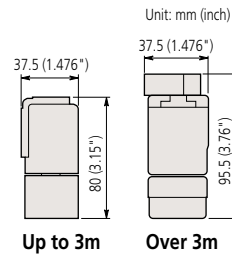
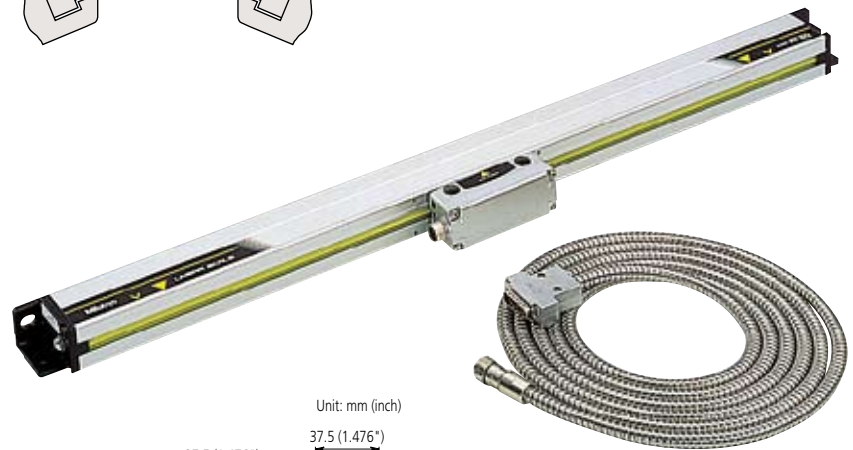
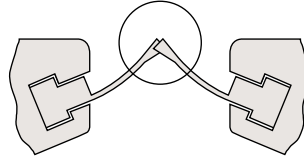
Optional Accessories

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



FEATURES

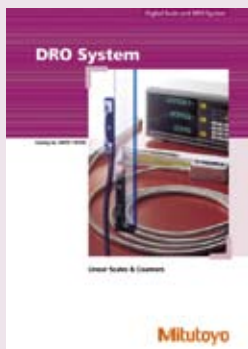
- Enhanced vibration resistance and durability.
- The innovative rubber lips keep out contaminants on a machine shop.
- An armored signal cable is used to connect the scale unit to the DRO counter for safe operation in harsh shop environments.
- The signal cable outlet can be positioned on either side of the slider so the signal cable can be connected from either direction.



SPECIFICATION

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

Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
1700mm (68")	539-134-30	539-134-40	5m
1800mm (72")	539-135-30	539-135-40	5m
2000mm (80")	539-136-30	539-136-40	5m
2200mm (88")	539-137-30	—	5m
2400mm (96")	539-138-30	—	7m
2500mm (100")	539-139-30	—	7m
2600mm (104")	539-140-30	—	7m
2800mm (112")	539-141-30	—	7m
3000mm (120")	539-142-30	—	7m
3250mm (130")	539-143-30	—	10m
3500mm (140")	539-144-30	—	10m
3750mm (150")	539-145-30	—	10m
4000mm (160")	539-146-30	—	10m
4250mm (170")	539-147-30	—	10m
4500mm (180")	539-148-30	—	10m
4750mm (190")	539-149-30	—	15m
5000mm (200")	539-150-30	—	15m
5250mm (210")	539-151-30	—	15m
5500mm (220")	539-152-30	—	15m
5750mm (230")	539-153-30	—	15m
6000mm (240")	539-154-30	—	15m



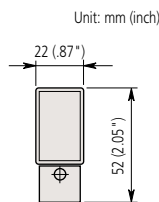
Refer to the DRO System leaflet (E4072) for more details.

AT116 Linear Scales

SERIES 539 — Economy and Slim Spar Type

FEATURES

- Suitable for milling machines, XY tables, jigs, etc.
- Dimensionally compatible with AT113 linear scale units.



SPECIFICATION

Effective range	Order No.	Signal cable length
100mm (4")	539-271-30	3.5m
150mm (6")	539-272-30	3.5m
200mm (8")	539-273-30	3.5m
250mm (10")	539-274-30	3.5m
300mm (12")	539-275-30	3.5m
350mm (14")	539-276-30	3.5m
400mm (16")	539-277-30	3.5m
450mm (18")	539-278-30	3.5m
500mm (20")	539-279-30	3.5m
600mm (24")	539-281-30	3.5m

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

Technical Data

Effective range: 100 - 1500mm
 Accuracy at 20°C: (5+5L/1000)µm
 L = Effective range (mm)
 Output waveform: 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

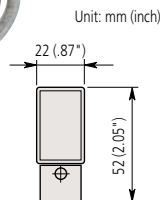
Optional Accessories

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



AT113 Linear Scales

SERIES 539 — Slim Spar Type



SPECIFICATION

Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
100mm (4")	539-201-30	539-201-40	3m
150mm (6")	539-202-30	539-202-40	3m
200mm (8")	539-203-30	539-203-40	3m
250mm (10")	539-204-30	539-204-40	3m
300mm (12")	539-205-30	539-205-40	3m
350mm (14")	539-206-30	539-206-40	3m
400mm (16")	539-207-30	539-207-40	3m
450mm (18")	539-208-30	539-208-40	3m
500mm (20")	539-209-30	539-209-40	3m
600mm (24")	539-211-30	539-211-40	3m

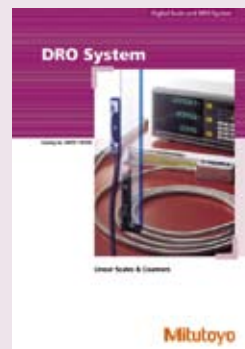
Effective range	Order No. (standard)	Order No. (high-accuracy)	Signal cable length
700mm (28")	539-213-30	539-213-40	3m
750mm (30")	539-214-30	539-214-40	3m
800mm (32")	539-215-30	539-215-40	3m
900mm (36")	539-216-30	539-216-40	3m
1000mm (40")	539-217-30	539-217-40	5m
1100mm (44")	539-218-30	539-218-40	5m
1200mm (48")	539-219-30	539-219-40	5m
1300mm (52")	539-220-30	539-220-40	5m
1400mm (56")	539-221-30	539-221-40	5m
1500mm (60")	539-222-30	539-222-40	5m

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 waveform: Two 90° phase-shifted sinusoidal signals
 Maximum response speed: 120m/min.
 Scale grating pitch: 20µm
 Scale reference point pitch: 50mm
 Dust/water protection level: IP53
 Operating temperature: 0°C to 45°C

Optional Accessories

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



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

AT112 Linear Scales

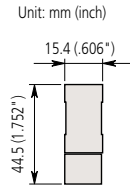
SERIES 539 — Super Slim Spar Type

Technical Data

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

Optional Accessories

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
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
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

Technical Data

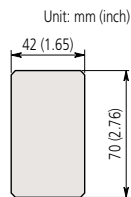
Effective range: 100 - 600mm
 Accuracy at 20°C:
 Standard type (5+5L/1000) μ m
 High-accuracy type (3+3L/1000) μ m
 L = Effective range (mm)
 Output waveform: Two 90° phase-shifted sinusoidal signals
 Maximum response speed: 50m/min.
 Scale grating pitch: 20 μ m
 Scale reference point pitch: 50mm
 Dust/water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

Optional Accessories

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

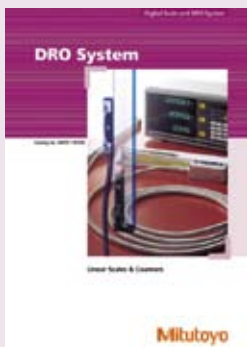
AT181 Linear Scales

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



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.

AT402E Linear Scales

SERIES 539 — High Vibration/Shock-Resistant Type

FEATURES

- World-class vibration resistance (20G) and shock resistance (40G) for use with heavy cutting machine tools.
- Multi-point elastic fastening allows 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 affordable Absolute Measuring System.
- High-response speed of 120m/min
- High measuring accuracy of ±2μm (up to 540mm)



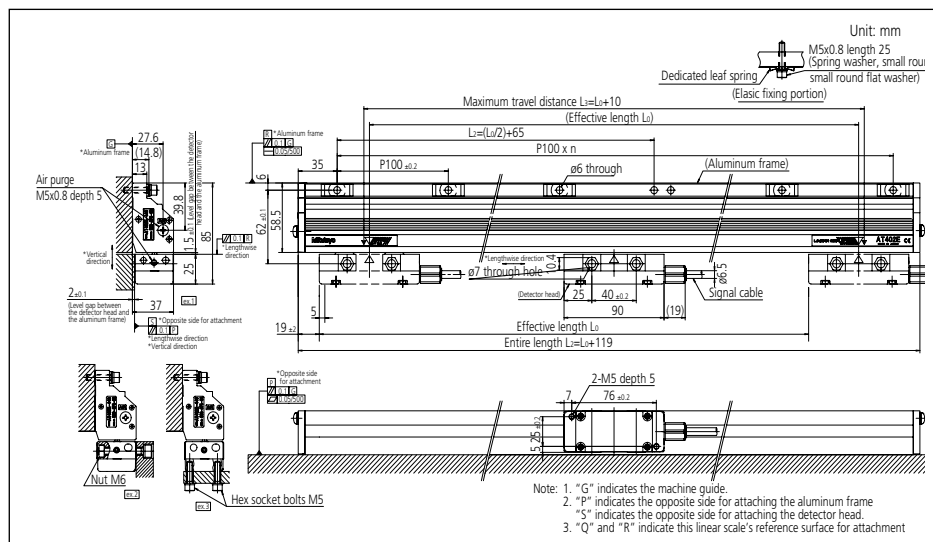
Technical Data

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

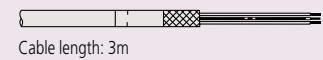
SPECIFICATION

Effective length	Order No. (w/o cable)	Order No. (w/ cable A)	Order No. (w/ cable B)	Order No. (w/ cable C)	L1 (mm)	L2 (mm)	L3 (mm)	n
140	539-371-00	539-371-01	539-371-02	539-371-03	259	135	150	2
240	539-373-00	539-373-01	539-373-02	539-373-03	359	185	250	3
340	539-374-00	539-374-01	539-374-02	539-374-03	459	235	350	4
440	539-375-00	539-375-01	539-375-02	539-375-03	559	285	450	5
540	539-376-00	539-376-01	539-376-02	539-376-03	659	335	550	6
640	539-377-00	539-377-01	539-377-02	539-377-03	759	385	650	7
740	539-378-00	539-378-01	539-378-02	539-378-03	859	435	750	8
840	539-379-00	539-379-01	539-379-02	539-379-03	959	485	850	9
940	539-380-00	539-380-01	539-380-02	539-380-03	1059	535	950	10
1040	539-381-00	539-381-01	539-381-02	539-381-03	1159	585	1050	11
1140	539-382-00	539-382-01	539-382-02	539-382-03	1259	635	1150	12
1240	539-383-00	539-383-01	539-383-02	539-383-03	1359	685	1250	13
1340	539-384-00	539-384-01	539-384-02	539-384-03	1459	735	1350	14
1440	539-385-00	539-385-01	539-385-02	539-385-03	1559	785	1450	15
1540	539-386-00	539-386-01	539-386-02	539-386-03	1659	835	1550	16
1640	539-387-00	539-387-01	539-387-02	539-387-03	1759	885	1650	17
1740	539-388-00	539-388-01	539-388-02	539-388-03	1859	935	1750	18
1840	539-389-00	539-389-01	539-389-02	539-389-03	1959	985	1850	19
2040	539-390-00	539-390-01	539-390-02	539-390-03	2159	1085	2050	21
2240	539-391-00	539-391-01	539-391-02	539-391-03	2359	1185	2250	23
2440	539-392-00	539-392-01	539-392-02	539-392-03	2559	1285	2450	25
2640	539-393-00	539-393-01	539-393-02	539-393-03	2759	1385	2650	27
2840	539-394-00	539-394-01	539-394-02	539-394-03	2959	1485	2850	29
3040	539-395-00	539-395-01	539-395-02	539-395-03	3159	1585	3050	31

DIMENSIONS

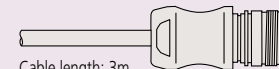


Cable A: Lead wires type



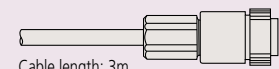
Cable length: 3m

Cable B: Connectable to Euro controller

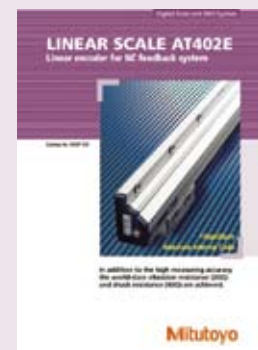


Cable length: 3m

Cable C: Connectable to FANUC serial board C



Cable length: 3m



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

AT715 Linear Scales

SERIES 539 — ABSOLUTE and High Environment Resistance Type



(Refer to page VIII for details.)



(Refer to page VIII for details.)

Technical Data

Effective range: 100 - 3000mm
 Accuracy at 20°C: ±5µm (Lo: 100 - 500mm)
 ±7µm (Lo: 600 - 1800mm)
 ±10µm (Lo: 2000 - 3000mm)
 L₀ = Effective range (mm)
 Measurement method: Electromagnetic induction system
 Maximum response speed: 50m/min.
 Dust/water protection level: IP67
 Operating temperature: 0°C to 45°C

FEATURES

- Uses an ABSOLUTE® electromagnetic induction system to achieve IP67 environmental resistance.
- Detects and outputs the absolute position - no reference point setup needed at each power-on.
- Abnormal calculations do not occur as a result of electronic noise.
- Very suitable scale for mounting on the X-axis of a small lathe. The scale main unit has 2 mounting directions for easy installation on machining tools with difficult mounting positions.



SPECIFICATION

Effective length L ₀	Order No.	L ₁ (mm)	L ₂ (mm)	L ₃ (mm)	L ₄ (mm)	L ₅ (mm)	L ₆ (mm)	L ₇ (mm)	Cable (m)
100mm (4")	539-801	120	258	242	278	—	—	—	3.5
150mm (6")	539-802	170	308	292	328	—	—	—	3.5
200mm (8")	539-803	220	358	342	378	—	—	—	3.5
250mm (10")	539-804	270	408	392	428	—	—	—	3.5
300mm (12")	539-805	330	468	452	488	—	—	—	3.5
350mm (14")	539-806	380	518	502	538	—	—	—	3.5
400mm (16")	539-807	430	568	552	588	—	—	—	3.5
450mm (18")	539-808	480	618	602	638	—	—	—	3.5
500mm (20")	539-809	540	678	662	698	339	331	—	3.5
600mm (24")	539-811	640	778	762	798	389	381	—	3.5
700mm (28")	539-813	740	878	862	898	439	431	—	3.5
750mm (30")	539-814	780	918	902	938	459	451	—	3.5

Effective length L ₀	Order No.	L ₁ (mm)	L ₂ (mm)	L ₃ (mm)	L ₄ (mm)	L ₅ (mm)	L ₆ (mm)	L ₇ (mm)	Cable (m)
800mm (32")	539-815	840	978	962	998	489	481	—	3.5
900mm (36")	539-816	940	1078	1062	1098	539	531	—	3.5
1000mm (40")	539-817	1040	1178	1162	1198	589	581	—	5
1100mm (44")	539-818	1140	1278	1262	1298	639	631	—	5
1200mm (48")	539-819	1240	1378	1362	1398	689	681	—	5
1300mm (52")	539-820	1340	1478	1462	1498	739	731	—	5
1400mm (56")	539-821	1440	1578	1562	1598	789	781	—	5
1500mm (60")	539-822	1540	1678	1662	1698	839	831	—	5
1600mm (64")	539-823	1640	1778	1762	1798	889	881	—	5
1700mm (68")	539-824	1740	1878	1862	1898	939	931	—	5
1800mm (72")	539-825	1840	1978	1962	1998	989	981	—	5
2000mm (80")	539-860	2040	2178	2162	2198	1089	1081	—	5
2200mm (88")	539-861	2240	2378	2362	2398	1189	1181	—	5
2400mm (96")	539-862	2440	2578	2562	2598	1289	1281	—	7
2500mm (100")	539-863	2540	2678	2662	2698	1339	1331	—	7
2600mm (104")	539-864	2640	2778	2762	2798	1389	1381	—	7
2800mm (112")	539-865	2840	2978	2962	2998	1489	1481	—	7
3000mm (120")	539-866	3040	3178	3162	3198	1589	1581	—	7

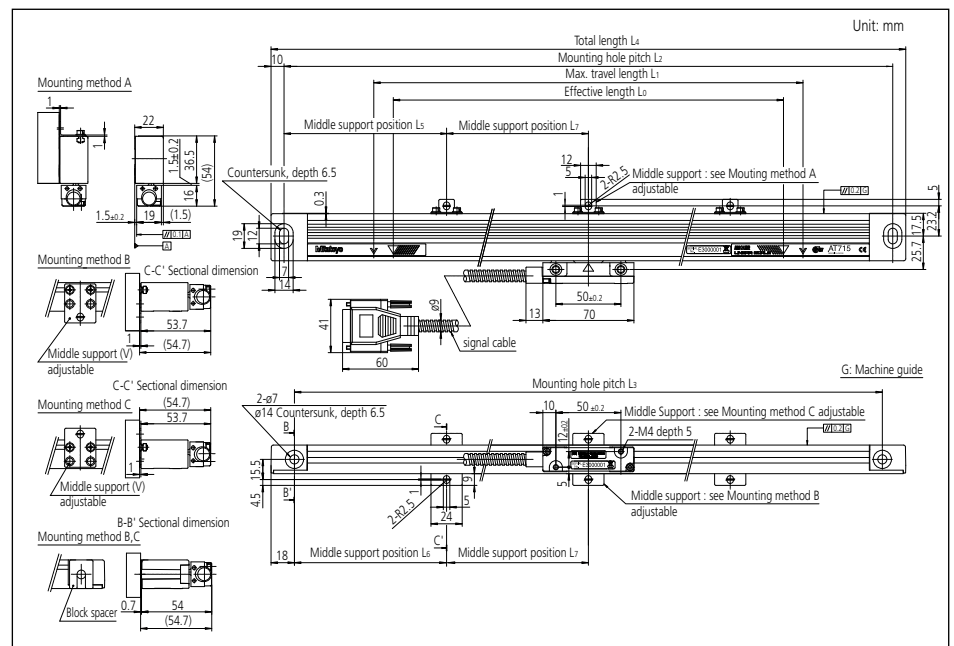
Optional Accessories

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



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

DIMENSIONS



KA Counter

SERIES 174 — Standard Type

FEATURES

- High performance/price ratio 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.
- Can be used with both the existing AT100 series optical scales and the new AT715 electromagnetic induction scale.



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



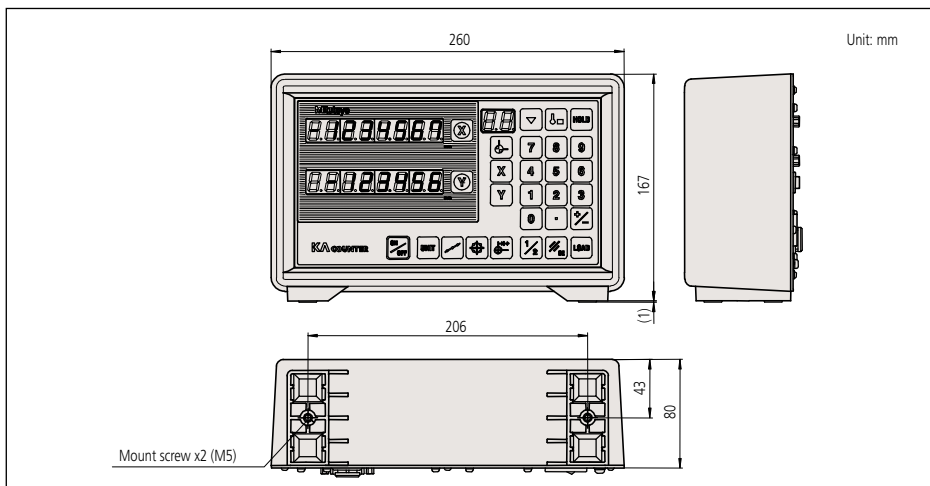
174-175
(for 3-axis)

SPECIFICATIONS

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

* To denote your AC power cable add the following suffixes to the order No.: **A** for UL/CSA, **B** for Asia, **D** for CEE, **DC** for CCC, **E** for BS, **F** for SAA, **K** for EK, **No suffix** is required for JIS/100V

DIMENSIONS



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:	1.25kg (2-axis), 1.33kg (3-axis)

Optional Accessories

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



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).

Functions

Function	Counter	KA	KLD 200
Diameter display		●	●
Addition of 2-scale data		●	—
Linearity error compensation		●	●
Smoothing		●	●
RS-232C Interface Unit		▲	●
BCD Code Out		—	▲
Limit signal output		—	●
Zero-setting		●	●
Preset		●	●
Resolution setting		●	●
Measurement 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 (INC mode)		●	—
Bolt-hole circle machining		●	—
Touch-signal probe		▲*	▲
Scale reference point setting		●	●
Maximum/minimum value hold		—	●

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

KLD200 Counter

SERIES 174 — Special Purpose Type with Limit Signal Output

Order No.*:

174-146 (2-step limit signal output)

174-147 (4-step limit signal output)

* To denote your AC power cable add the following suffixes to the order No.: **A** for UUCSA, **D** for CEE, **DC** for CCC, **E** for BS, **F** for SAA, **K** for EK, **No suffix** is required for JIS/100V

Technical Data: Common

Limit signal output: 2-step, 4-step

Scale input ports: 1

Resolution:

0.001mm (Indication range: -9999.999mm to +99999.999mm)

0.005mm (Indication range: -9999.995mm to +99999.995mm)

0.0001inch (Indication range: -999.9999inch to +8399.9999inch)

0.0005inch (Indication range: -999.9995inch to +8399.9995inch)

Display: 8digit

Limit value setting method: Digital switch

Power supply: 100V-240V AC, 50/60Hz

Mass: 3.0kg (2-step limit signal output type)

3.1kg (4-step limit signal output type)

Optional Accessories

965004: External load foot switch

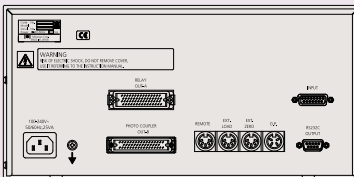
937326: External load box

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")



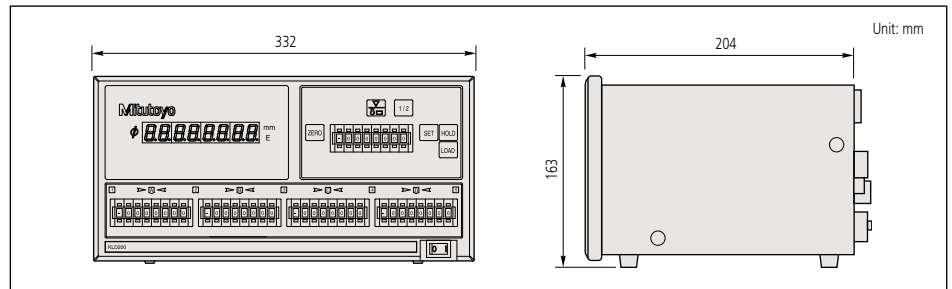
FEATURES

- A 1-axis counter designed to signal when a linear scale displacement value and a preset limit value coincide.
- Two types of limit settings are available: 2 step and 4 step.
- Appropriate for controlling vertical positioning on an EDM or a grinding machine.
- Can be connected to a personal computer or a sequencer via an RS-232C Interface or limit signal output (standard feature)

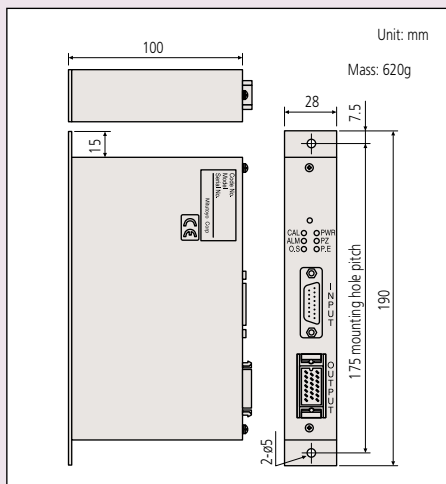


174-147

DIMENSIONS



DIMENSIONS



PSU-200

SERIES 539 — Pulse Signal Conversion Interface

FEATURES

- Compatible with Linear Scales using 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 indications (alarm, origin detection, low power supply voltage), Alarm output mode switching
Power supply	5V DC ±5%
Consumption	200mA



AT203 Linear Scales

SERIES 539 — Standard Spar Type

FEATURES

- Sealed type incremental linear scales suitable for feedback systems in NC machine tools.
- Direct connection with NC machine tools is possible.



SPECIFICATION

Effective range	Order No.	Signal cable length
100mm (4")	539-411-30	5m
150mm (6")	539-412-30	5m
200mm (8")	539-413-30	5m
250mm (10")	539-414-30	5m
300mm (12")	539-415-30	5m
350mm (14")	539-416-30	5m
400mm (16")	539-417-30	5m
450mm (18")	539-418-30	5m
500mm (20")	539-419-30	5m
600mm (24")	539-421-30	5m
700mm (28")	539-423-30	5m
750mm (30")	539-424-30	5m
800mm (32")	539-425-30	5m
900mm (36")	539-426-30	5m
1000mm (40")	539-427-30	5m
1100mm (44")	539-428-30	5m
1200mm (48")	539-429-30	5m
1300mm (52")	539-430-30	5m
1400mm (56")	539-431-30	5m
1500mm (60")	539-432-30	5m
1600mm (64")	539-433-30	5m

Effective range	Order No.	Signal cable length
1700mm (68")	539-434-30	5m
1800mm (72")	539-435-30	5m
2000mm (80")	539-436-30	5m
2200mm (88")	539-437-30	5m
2400mm (96")	539-438-30	5m
2500mm (100")	539-439-30	5m
2600mm (104")	539-440-30	5m
2800mm (112")	539-441-30	5m
3000mm (120")	539-442-30	5m
3250mm (130")	539-443-30	5m
3500mm (140")	539-444-30	5m
3750mm (150")	539-445-30	5m
4000mm (160")	539-446-30	5m
4250mm (170")	539-447-30	5m
4500mm (180")	539-448-30	5m
4750mm (190")	539-449-30	5m
5000mm (200")	539-450-30	5m
5250mm (210")	539-451-30	5m
5500mm (220")	539-452-30	5m
5750mm (230")	539-453-30	5m
6000mm (240")	539-454-30	5m

Technical Data

Effective range: 100 - 6000mm
 Accuracy (at 20°C):
 100 to 1500mm (3+3L/1000)µm
 1600 to 3000mm (5+5L/1000)µm
 3250 to 6000mm (5+8L/1000)µm
 L = Effective range (mm)
 Output signal: Two 90° phase-shifted quadrature signals
 Maximum response speed: 11-120m/min.
 Resolution: 0.1, 0.5, 1µm
 Scale reference point pitch: 50mm
 Dust/Water protection level: IP53

Numerical Motion Control System Applications

These scales are high-accuracy linear measurement systems suitable for a wide range of applications. They 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 are available: the AT series have the high-accuracy glass scale and the detector head protected by an aluminum casing for improved durability and resistance against vibration; the ultra-portable and lighter ST series have the scale and the detector head separate.

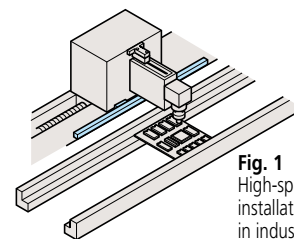


Fig. 1 High-speed, high-accuracy installation of electronics in industrial robots

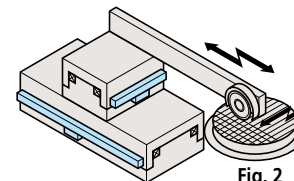


Fig. 2 Positioning dicing saw in semiconductor production processes

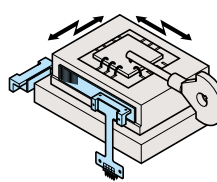


Fig. 3 Positioning IC tip for wire-bonding

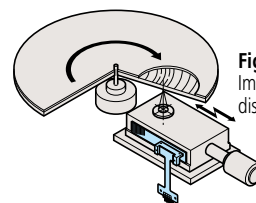


Fig. 4 Improving seek-time of disk drive systems

AT216-T / AT216-TL Linear Scales

SERIES 539 — Slim Sealed Type

FEATURES

- Slim, sealed type incremental linear scales suitable for feedback systems in NC machine tools
- Direct connection with NC machine tools is possible.

AT216-T model



Technical Data

Effective range: 100 - 1500mm
 Accuracy (at 20°C): (5+5L/1000)µm
 L = Effective range (mm)
 Output signal: Two 90° phase-shifted quadrature signals
 Signal output pitch: 20µm
 Maximum response speed: 48m/min: AT216-T
 50m/min: AT216-TL
 Resolution: 5µm: AT216-T
 1µm: AT216-TL
 Scale reference point pitch: 50mm
 Dust/Water protection level: IP53

AT211A / AT211B Linear Scales

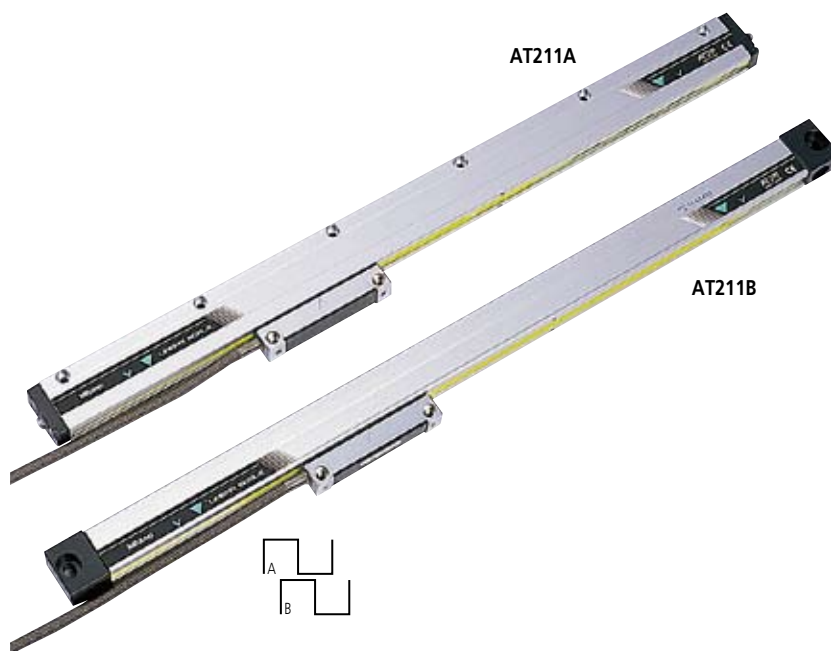
SERIES 539 — Slim Spar / High Speed Type

Technical Data

Effective range:	100 - 1500mm	
Accuracy at 20°C:		
Effective range	Standard type	High-accuracy type
100 to 500mm	$(3+3L/1000)\mu\text{m}$	$(2+2L/1000)\mu\text{m}$
500 to 1500mm	$(3+3L/1000)\mu\text{m}$	—
	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, 5 μm	
Signal output pitch:	20 μm	
Dust/Water protection level:	IP53	

FEATURES

- High-resolution, high-accuracy sealed type linear scales. Ideal for feedback control in positioning machines in semiconductor manufacturing systems, CNC machine tools, etc.
- Two types of models are available: the AT211A, the multiple-point installation type designed for improved resistance against vibration and shock, and the AT211B, which attaches to a machine at both ends. The AT211B is compatible with the AT111 slim type in size.

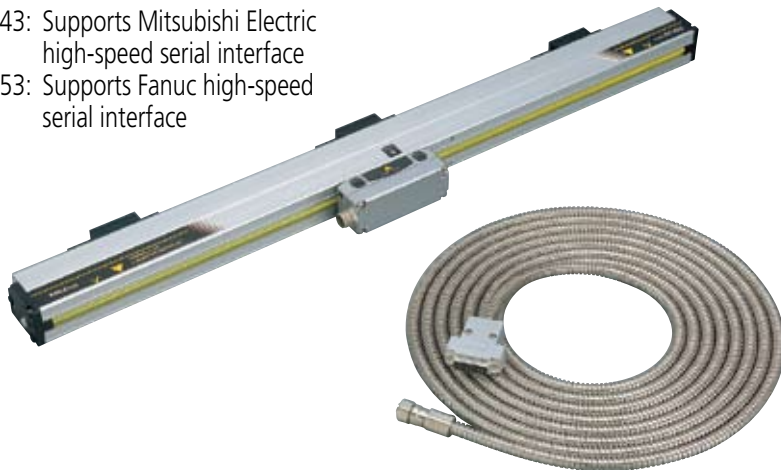


AT300 Linear Scales

SERIES 539 — ABSOLUTE, Standard Spar Type

FEATURES

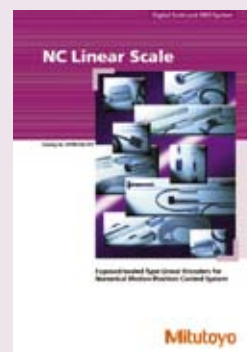
- Sealed type, ABSOLUTE linear scales with very fine resolution up to 0.05 μ m.
- Direct connection with NC machine tools is possible.
 - ABS AT303: Supports Mitutoyo standard serial interface
 - ABS AT343: Supports Mitsubishi Electric high-speed serial interface
 - ABS AT353: Supports Fanuc high-speed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



(Refer to page VIII for details.)

Technical Data

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



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

AT500 Linear Scales

SERIES 539 — ABSOLUTE, Slim Spar Type

FEATURES

- Sealed type, ABSOLUTE linear scales with very fine resolution up to 0.05/0.0005 μ m.
- Direct connection with NC machine tools is possible.
 - ABS AT505/AT503: Supports Mitutoyo standard serial interface
 - ABS AT545/AT543: Supports Mitsubishi Electric high-speed serial interface
 - ABS AT555/AT553: Supports Fanuc high-speed serial interface
- Two types are available:
 - S model: high-rigid type
 - H model: high-accuracy type.



(Refer to page VIII for details.)

Technical Data

Effective range:	
-S model	100 - 2200mm
-H model	100 - 1000mm
Accuracy (at 20°C):	
-S model	(3+3L/1000) μ m
-H model	(2+2L/1000) μ m
	L = Effective range (mm)
Signal output pitch:	20 μ m
Maximum response speed:	150m/min.
	(72m/min: ABS AT5_5-H model)
Resolution:	
ABS AT5_5 model:	0.005 μ m
ABS AT5_3 model:	0.05 μ m
Dust/Water protection level:	IP53



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

ST700 Linear Scales

SERIES 579 — ABSOLUTE, High Environmental Resistance Type



(Refer to page VIII for details.)

Technical Data

Effective range:	100 - 6000mm
Accuracy (at 20°C):	(5+5L/1000)µm L = Effective range (mm)
Measurement method:	Electromagnetic induction system
Resolution:	0.1, 0.5µm
Maximum response speed:	5000mm/sec

FEATURES

- Absolute measurement has been achieved with a separate type scale unit.
- Non-contact detection is optimal for high-speed/high acceleration control of linear motors, etc.
- Electromagnetic induction system provides high resistance to contamination by water and oil.
- Downsized the detector head to 1/3 of the conventional head by volume.
- A cable connection port, available in four directions.
- Installation slots are provided in upper and lateral directions.
- Indication accuracy of 5+5L/1000µm has been achieved. (Conventional scale unit: 8 + 5L/1000µm)
*L: Effective measuring length (mm)
- Supports servo amplifiers (high-speed serial interfaces) of various brands.



Technical Data

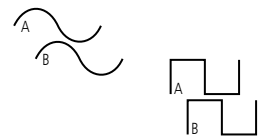
Effective range:	10 - 3000mm
Accuracy (at 20°C):	
10 - 300mm	±1µm
350 - 500mm	±2µm
600 - 1000mm	±3µm
1100 - 3000mm	±3µm/m
Output signal:	Two 90° phase-shifted sinusoidal signals Two 90° phase-shifted quadrature signals
Scale grating pitch:	20µm
Signal output pitch:	ST24: 10µm ST44: 20µm
Resolution:	ST24: 0.05, 0.1, 0.5, 1µm ST44: 0.05, 0.1, 0.5, 1, 5µm
Maximum response speed:	ST24: 1200mm/sec ST44: 2400mm/sec
Scale reference point pitch:	
10 - 80mm	Center point
100 - 3000mm	50mm

ST24 / ST44 Linear Scales

SERIES 579 — Standard Type

FEATURES

- Standard exposed type incremental linear scales.
- Maximum of up to 1200mm/s (ST44: 2400mm/s) response speed.
- Includes LED alarm for detection of over speed and sinusoidal signal anomaly errors.

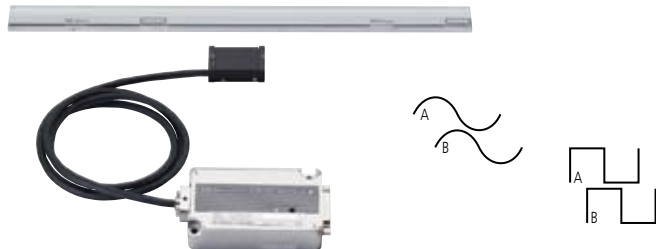


ST36 Linear Scales

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 4 μ m) and two-phase pulse signal simultaneously.
- Equipped with a compact interface box.



Technical Data

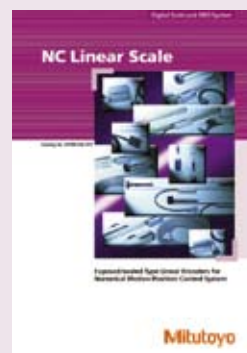
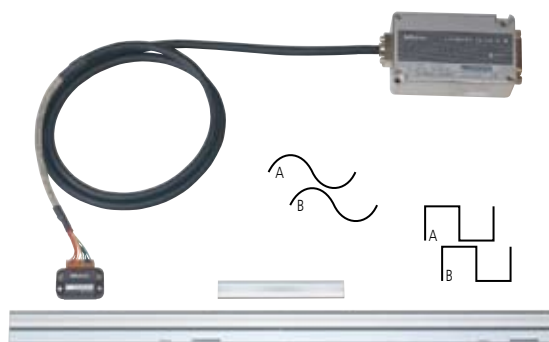
Effective range:	10 - 3000mm
Accuracy (at 20°C):	
10 - 300mm	±0.5 μ m
350 - 500mm	±1 μ m
600 - 1000mm	±2 μ m
1100 - 3000mm	±2 μ m/m
Output signal:	Two 90° phase-shifted sinusoidal signals Two 90° phase-shifted quadrature signals
Scale grating pitch:	8 μ m
Signal output pitch:	4 μ m
Resolution:	0.01, 0.02, 0.05, 0.1 μ m
Maximum response speed:	1200mm/sec
Scale reference point pitch:	
10 - 75mm	Center point
100 - 3000mm	50mm

ST422 Linear Scales

SERIES 579 — Compact 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.



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

Technical Data

Effective range:	10 - 3000mm
Accuracy (at 20°C):	
10 - 300mm	±1 μ m
350 - 500mm	±2 μ m
600 - 1000mm	±3 μ m
1100 - 3000mm	±3 μ m
Output signal:	Two 90° phase-shifted sinusoidal signals Two 90° phase-shifted quadrature signals
Scale grating pitch:	40 μ m
Signal output pitch:	40 μ m
Resolution:	0.2, 0.5, 1, 5 μ m
Maximum response speed:	5000mm/sec
Scale reference point pitch:	
10 - 75mm	Center point
100 - 1000mm	50mm

ST46 Linear Scales

SERIES 579 — Compact Type

FEATURES

- Space-saving design with small detector head and small control unit
- With a maximum effective length of 3000mm, it can be used for large devices.
- LED display function signals anomalies.
- Maximum response speed is 2600mm/sec. (Sine wave maximum respond speed at -3dB)



Technical Data

Effective range:	10 - 3000mm
Accuracy (at 20°C):	
±1 μ m, ±2 μ m, ±3 μ m	
Output signal:	Two 90° phase-shifted sinusoidal signals Two 90° phase-shifted quadrature signals
Scale grating pitch:	20 μ m
Signal output pitch:	20 μ m
Resolution:	0.05, 0.1, 0.5, 1 μ m
Maximum response speed:	2600mm/sec
Scale reference point pitch:	
10 - 80mm	Center point
100 - 3000mm	50mm

MICSYS-SA1 2D Image Correlation Encoder

SERIES 549

Technical Data

Effective range:	±100µm (2D)
Accuracy (at 20°C):	±100nm
Resolution:	1nm
Working Distance:	10±0.2mm (Including thickness of standard target: 6.1mm)
Linearity (at 20°C):	80nm
Repeatability (at 20°C):	5nm

FEATURES

- High accuracy non-contact 2D encoder using image correlation.
- Simultaneous X-Y position measurements.
- Nanometer resolution.
- Easy alignment.
- Allows minute strain measurement and deflection measurement.



