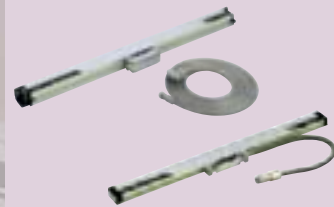




**"Linear Scale"  
Digital Length Measuring System**



Pages 332-338



**"Linear Scale"  
Digital Display Units**



Page 339



**Signal probe**

Page 339

## "Linear Scale" Digital Length Measuring System

- Linear Scale and counter enable the most accurate detection and display of axial displacements on tool machines or measuring instruments.
- The System can be combined according to your specific requirements, e.g. for application on lathes, milling or grinding machines. Select the optimum combination of scale and display unit for your special requirements.

## "Linear Scale" Type AT 202 / AT 500-S/H

- Mitutoyo linear scales for NC (numerical control) applications are glass scales with outstanding accuracy for direct installation in machines with automatic control systems.
- Should you require information on installation in your NC machine tools, we will be pleased to send you further details.
- Selection of NC glass scales e.g.:

### Type AT 202

- Output of rectangular pulse signals (according to RS-422 A).
- Resolution 0.5  $\mu\text{m}$ /1  $\mu\text{m}$  (switchable).
- Error limits  $(3 + 3L/1000) \mu\text{m} / (5 + 5L/1000) \mu\text{m}$ .
- Scale with reference mark.
- Max. drive speed 72 m/min.
- Measuring ranges L between 100 mm and 3000 mm.



### Type AT 500-S/H

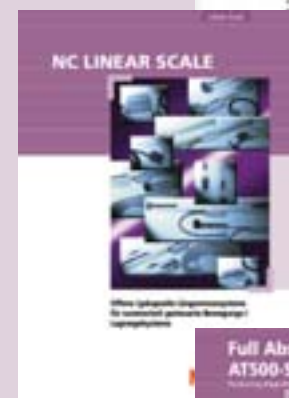
- Absolute linear scale.
- For applications with high speeds up to 150 m/min.
- AT 500-S series with high stability, vibration and impact resistance.
- AT 500-H series with maximum accuracy.  
( $2 + 2L/1000$ )  $\mu\text{m}$  and influence of temperature characteristic by selecting the reference point.



### Underground linear scale factory



Mitutoyo is the only manufacturer in Japan with an underground scale production site – protected against tremors and temperature fluctuations. Production is executed under clean room conditions (degree of purity 100). In this way, all sections of production remain free from even microscopic contaminations.



Request our detailed brochure!

# "Linear Scale" Digital Length Measuring System Type AT 115

## Specifications

Accuracy (20 °C): (5 + 5 L<sup>0</sup>/1000) μm  
 Max. drive speed: 50 m/min  
 Graduation: 20 μm  
 Reference points: every 50 mm  
 Operation temperature: 3° to 40 °C  
 Protection IP 53: IEC 529, DIN 40050

Note: The signal cable is fixed to the scale.

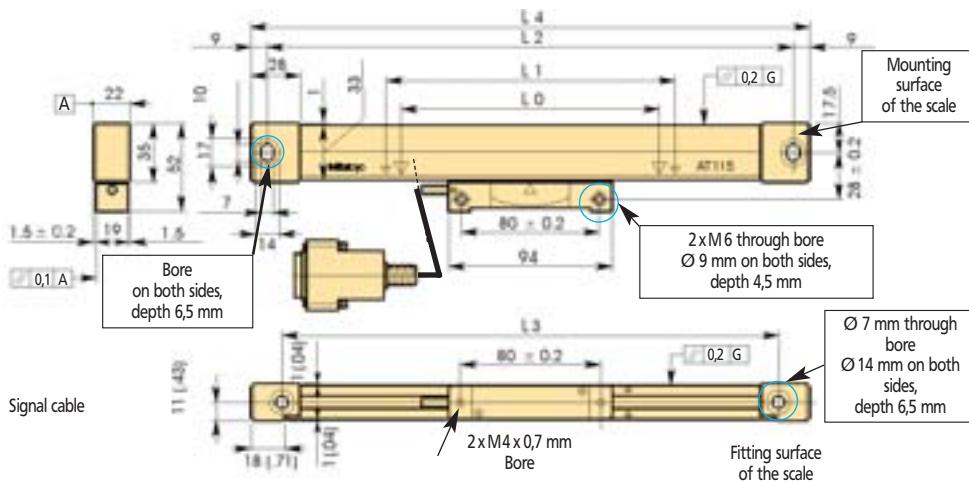
## Extension cable (AT 115)

2 m No. 09AAA720A  
 5 m No. 09AAA720B  
 7 m No. 09AAA720C

## Series 539

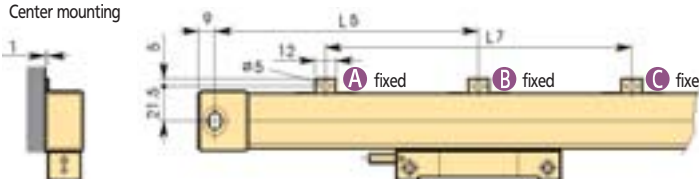
Standard version

Measuring range 100–1500 mm



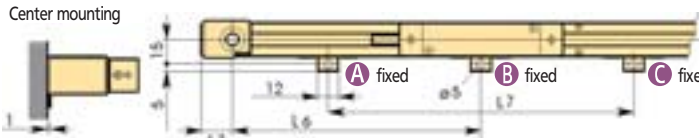
## Assembly 1

Center mounting



## Assembly 2

Center mounting



## Legend

Effective measuring (L<sup>0</sup>) mm  
 Max. measuring head displacement (L<sup>1</sup>) mm  
 Bore center distance (L<sup>2</sup>) mm  
 Total length (L<sup>3</sup>) mm  
 Distance of mountings (L<sup>4</sup>-L<sup>7</sup>) mm

No.	(L <sup>0</sup> ) mm	(L <sup>1</sup> ) mm	(L <sup>2</sup> ) mm	(L <sup>3</sup> ) mm	Signal cable	Mountings A B C	(L <sup>4</sup> ) mm	(L <sup>5</sup> ) mm	(L <sup>6</sup> ) mm	(L <sup>7</sup> ) mm
539-271	100	120	258	242	3,5 m		276			
539-272	150	170	308	292	3,5 m		326			
539-273	200	220	358	342	3,5 m		376			
539-274	250	270	408	392	3,5 m		426			
539-275	300	330	468	452	3,5 m		486			
539-276	350	380	518	502	3,5 m		536			
539-277	400	430	568	552	3,5 m		586			
539-278	450	480	618	602	3,5 m		636			
539-279	500	540	678	662	3,5 m	●	696	339	331	
539-281	600	640	778	762	3,5 m	●	796	389	381	
539-283	700	740	878	862	3,5 m	●	896	439	431	
539-284	750	780	918	902	3,5 m	●	936	459	451	
539-285	800	840	978	962	3,5 m	●	996	489	481	
539-286	900	940	1078	1062	3,5 m	●	1096	539	531	
539-287	1000	1040	1178	1162	5,0 m	●	1196	589	581	
539-288	1100	1140	1278	1262	5,0 m	●	1296			430
539-289	1200	1240	1378	1362	5,0 m	●	1396			460
539-290	1300	1340	1478	1462	5,0 m	●	1496			490
539-291	1400	1440	1578	1562	5,0 m	●	1596			530
539-292	1500	1540	1678	1662	5,0 m	●	1696			560

# "Linear Scale" Digital Length Measuring System Type AT 102

## Series 539

Long version

Measuring range 1600–3000 mm

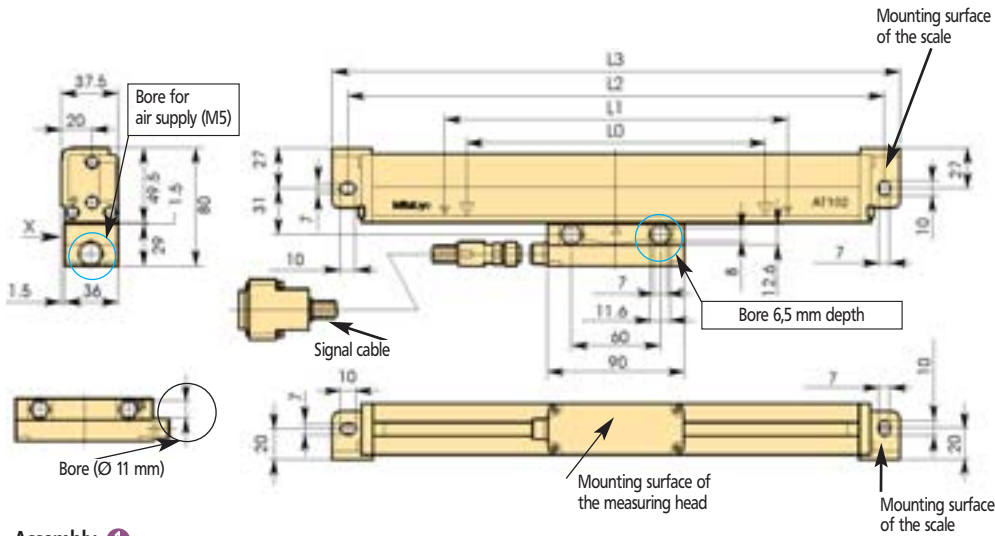


### Specifications

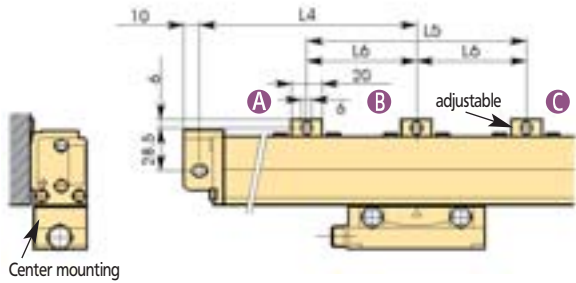
Accuracy (20 °C):	(5 + 5 L <sup>0</sup> /1000) μm
Max. drive speed:	50 m/min
Graduation:	20 μm
Reference points:	every 50 mm
Operation temperature:	3° to 40 °C
Protection IP 53:	IEC 529, DIN 40050

### Extension cable

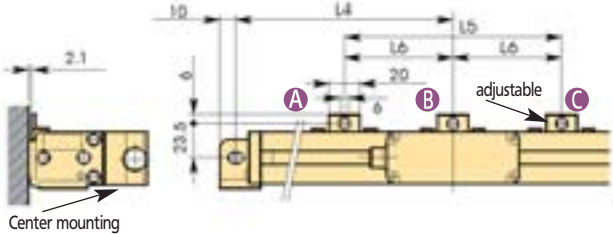
2 m	No. 09AAA033A
5 m	No. 09AAA033B
7 m	No. 09AAA033C



### Assembly ①



### Assembly ②



### Legend

Effective measuring	(L <sup>0</sup> ) mm
Max. measuring head displacement	(L <sup>1</sup> ) mm
Bore center distance	(L <sup>2</sup> ) mm
Total length	(L <sup>3</sup> ) mm
Distance of mountings	(L <sup>4</sup> –L <sup>6</sup> ) mm

No.	(L <sup>0</sup> ) mm	(L <sup>1</sup> ) mm	(L <sup>2</sup> ) mm	(L <sup>3</sup> ) mm	Signal cable	Mountings			(L <sup>4</sup> ) mm	(L <sup>5</sup> ) mm	(L <sup>6</sup> ) mm
						A	B	C			
539-133	1600	1690	1818	1838	5 m	●	●			610	
539-134	1700	1790	1918	1938	5 m	●	●			650	
539-135	1800	1890	2018	2038	5 m	●	●			670	
539-136	2000	2100	2228	2248	5 m	●	●			740	
539-137	2200	2300	2428	2448	5 m	●	●			800	
539-138	2400	2500	2628	2648	7 m	●	●	●	1314	1300	650
539-139	2500	2600	2728	2748	7 m	●	●	●	1364	1340	670
539-140	2600	2700	2828	2848	7 m	●	●	●	1414	1400	700
539-141	2800	2900	3028	3048	7 m	●	●	●	1514	1500	750
539-142	3000	3000	3228	3248	7 m	●	●	●	1614	1600	800

# "Linear Scale" Digital Length Measuring System Type AT 102

## Series 539

Long version

Measuring range greater than 3000 mm



### Specifications

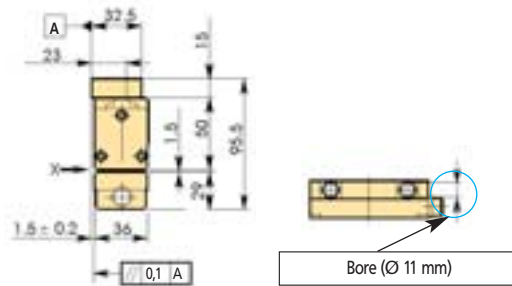
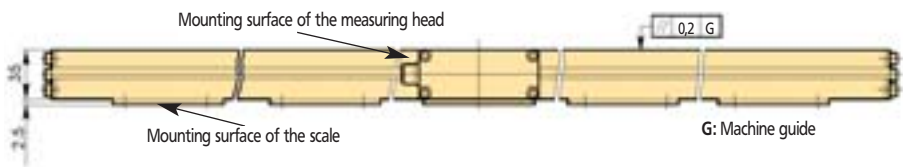
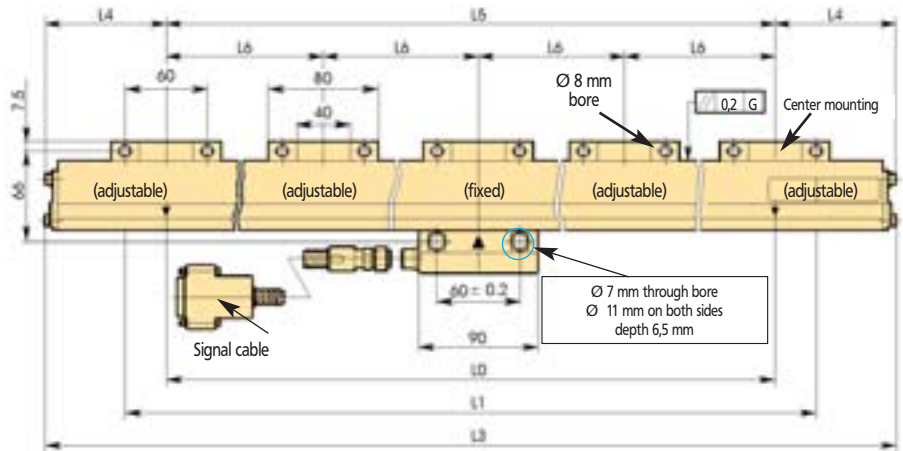
Accuracy (20 °C):	(5 + 8 L <sup>0</sup> /1000) μm
Max. drive speed:	50 m/min
Graduation:	20 μm
Reference points:	every 50 mm
Operation temperature:	3° to 40 °C
Protection IP 53:	IEC 529, DIN 40050

### Standard accessory

Mounting Set for Type AT 102

### Extension cable

2 m	No. 09AAA033A
5 m	No. 09AAA033B
7 m	No. 09AAA033C



### Legend

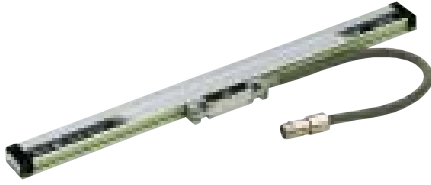
Effective measuring	(L <sup>0</sup> ) mm
Max. measuring head displacement	(L <sup>1</sup> ) mm
Total length	(L <sup>3</sup> ) mm
Distance of mountings	(L <sup>4</sup> -L <sup>6</sup> ) mm

No.	(L <sup>0</sup> ) mm	(L <sup>1</sup> ) mm	(L <sup>3</sup> ) mm	Signal cable	Mountings	(L <sup>4</sup> ) mm	(L <sup>5</sup> ) mm	(L <sup>6</sup> ) mm
539-143	3250	3350	3470	10 m	5 pcs.	135	3200	800
539-144	3500	3600	3720	10 m	5 pcs.	160	3400	850
539-145	3750	3850	3970	10 m	5 pcs.	125	3720	930
539-146	4000	4100	4220	10 m	5 pcs.	110	4000	1000
539-147	4250	4350	4470	10 m	5 pcs.	135	4200	1050
539-148	4500	4600	4720	10 m	5 pcs.	160	4400	1100
539-149	4750	4850	4970	15 m	7 pcs.	85	4800	800
539-150	5000	5100	5220	15 m	7 pcs.	120	4980	830
539-151	5250	5350	5470	15 m	7 pcs.	125	5220	870
539-152	5500	5600	5720	15 m	7 pcs.	130	5460	910
539-153	5750	5850	5970	15 m	7 pcs.	135	5700	950
539-154	6000	6100	6220	15 m	7 pcs.	110	6000	1000

# "Linear Scale" Digital Length Measuring System Type AT 112 F

## Series 539

Extra slim construction  
Measuring range 50–1020 mm



### Specifications

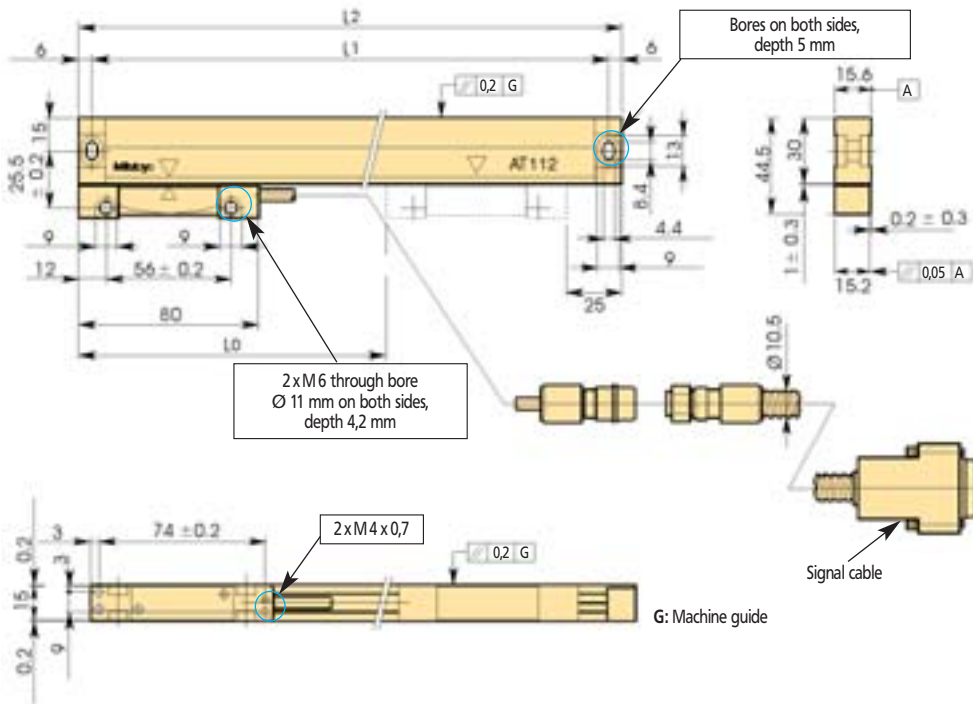
Accuracy (20 °C):	(3 + 3 L <sup>0</sup> /1000) μm
Max. drive speed:	50 m/min
Graduation:	20 μm
Reference points:	every 50 mm
Operation temperature:	3° to 40 °C
Protection IP 53:	IEC 529, DIN 40050

### Standard accessory

Mounting Set for Type AT 112 F

### Extension cable

2 m	No. 09AAA033A
5 m	No. 09AAA033B
7 m	No. 09AAA033C



No.	(L <sup>0</sup> ) mm	(L <sup>1</sup> ) mm	(L <sup>2</sup> ) mm	Signal cable
539-251-10	50	143	155	3 m
539-252-10	70	163	175	3 m
539-253-10	120	213	225	3 m
539-254-10	170	263	275	3 m
539-255-10	220	313	325	3 m
539-256-10	270	363	375	3 m
539-257-10	320	413	425	3 m
539-258-10	370	463	475	3 m
539-259-10	420	513	525	3 m
539-260-10	470	563	575	3 m
539-261-10	520	613	625	3 m
539-262-10	570	663	675	3 m
539-263-10	620	713	725	3 m
539-264-10	670	763	775	3 m
539-265-10	720	813	825	3 m
539-266-10	770	863	875	3 m
539-267-10	820	913	925	3 m
539-268-10	920	1013	1025	3 m
539-269-10	1020	1113	1125	3 m

### Legend

Effective measuring	(L <sup>0</sup> ) mm
Bore center distance	(L <sup>1</sup> ) mm
Total length	(L <sup>2</sup> ) mm

# ABSOLUTE "Linear Scale" Digital Length Measuring System Type AT 715

## Series 539

Version with ABSOLUTE System  
Measuring range 100–1800 mm

**ABSOLUTE™**  
Absolute System Patented by MITUTOYO

**IP55**

### Specifications

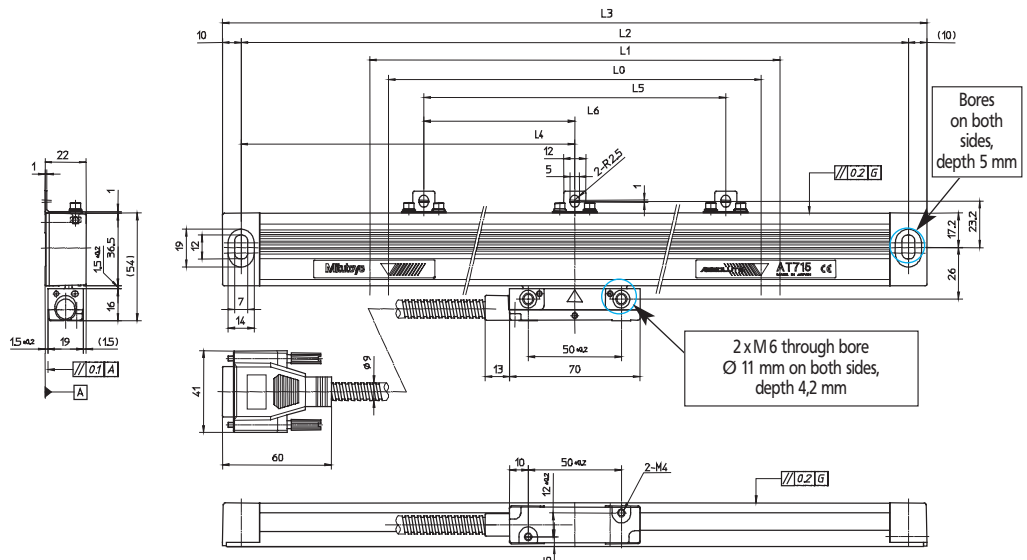
Connection:	exclusively to KA-Counter No. 174–173 D No. 174–175 D
Accuracy (20 °C):	7 μm
Max. processing speed:	50 m/min
Resolution:	1 μm
Operation temperature:	3° to 45 °C
Protection:	IP 55
Sliding force:	≤ 5 N

### Standard accessory

Mounting Set for Type AT 715

### Extension cable

2 m	No. 09AAB674A
5 m	No. 09AAB674B
7 m	No. 09AAB674C



No.	(L <sup>0</sup> ) mm	(L <sup>1</sup> ) mm	(L <sup>2</sup> ) mm	(L <sup>3</sup> ) mm	Signal cable
539-801	100	120	258	278	3,5 m
539-802	150	170	308	328	3,5 m
539-803	200	220	358	378	3,5 m
539-804	250	270	408	428	3,5 m
539-805	300	330	468	488	3,5 m
539-806	350	380	518	538	3,5 m
539-807	400	430	568	588	3,5 m
539-808	450	480	618	638	3,5 m
539-809	500	540	678	698	3,5 m
539-811	600	640	778	798	3,5 m
539-813	700	740	878	898	3,5 m
539-814	750	780	918	938	3,5 m
539-815	800	840	978	998	3,5 m
539-816	900	940	1078	1098	3,5 m
539-817	1000	1040	1178	1198	5,0 m
539-818	1100	1140	1278	1298	5,0 m
539-819	1200	1240	1378	1398	5,0 m
539-820	1300	1340	1478	1498	5,0 m
539-821	1400	1440	1578	1598	5,0 m
539-822	1500	1540	1678	1698	5,0 m
539-823	1600	1640	1778	1798	5,0 m
539-824	1700	1740	1878	1898	5,0 m
539-825	1800	1840	1978	1998	5,0 m

### Legend

Effective measuring	(L <sup>0</sup> ) mm
Max. measuring head displacement	(L <sup>1</sup> ) mm
Bore center distance	(L <sup>2</sup> ) mm
Total length	(L <sup>3</sup> ) mm

™ Patent numbers see page 464

# “Linear Scale” Digital Length Measuring System

## Series 174

### Displays

#### KA Counter

- The KA Counter is an easy to operate and multifunction display unit for all kinds of processing machines.

Counters of series K are available in two versions: as 2- and 3-axial types

Functions	KA Counter
	 Easy to operate and multifunction display unit
Zero setting	●
ABS origin (ABS zero point)	● (only with AT 715)
Switchable resolution	●
Counting direction switching	●
mm/inch switching	●
PRESET/ZERO setting	●
Halving of the display value	●
ABS/INC coordinates switching	●
ZERO approach function (INC coordinate)	●
Signal probe	optional**
Pitch circle processing	●
Processing of hole sequences	●
Scale reference points (call up)	●**
Tool specification	●
Addition of values from 2 axes	●*
Copying of coordinate data	●
RS-232 C output	optional
Linear error compensation	●
Stabilisation of the last display digits	●

● Standard function

\* This function is not available on the 2-axis version

\*\* Connection only with the use of glass scales AT-100 series



# "Linear Scale" Digital Display Unit

## Specifications

Resolution: 0,005 mm, 0,001 mm  
Connectable linear scale: AT 100 Series  
AT 700 Series  
Display: 7 digits, sign (-)  
Operation temperature: 0°C to 45°C

## Optional accessories

- No. 938140 Signal probe with clamping shaft  
Ø 20 mm  
No. 935094 Signal probe with clamping shaft  
Ø 32 mm  
No. 09CAB217 RS-232 C output  
No. 011418 Footswitch for KA Counter  
for data output No. 09CAB217  
No. 09CAB231 Adapter for Micrometer Head  
164-122

## Series 174

### KA Counter

Easy to operate and multifunction display unit



174-173 D

No.	Axes	Dimensions (W x H x D) mm	Mass kg
174-173 D	2	260 x 167 x 80	1,1
174-175 D	3	260 x 167 x 80	1,2

## Signal probe

- For setting the zero point in linear-scale display devices.
- For holding the current value on the display on contact with the workpiece.



938140

No.	Shaft diameter	Ball diameter	Connecting cable
938140	20 mm	10 ± 0,002 mm	3 m
935094	32 mm	10 ± 0,002 mm	3 m