2 Test Indicator

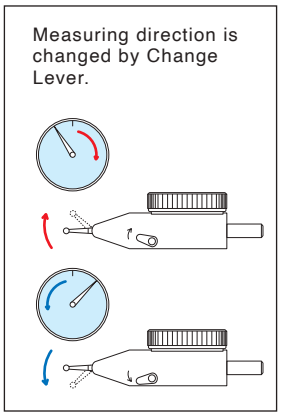
High-precision mesurement for dimension, parallelism and centering of work piece.

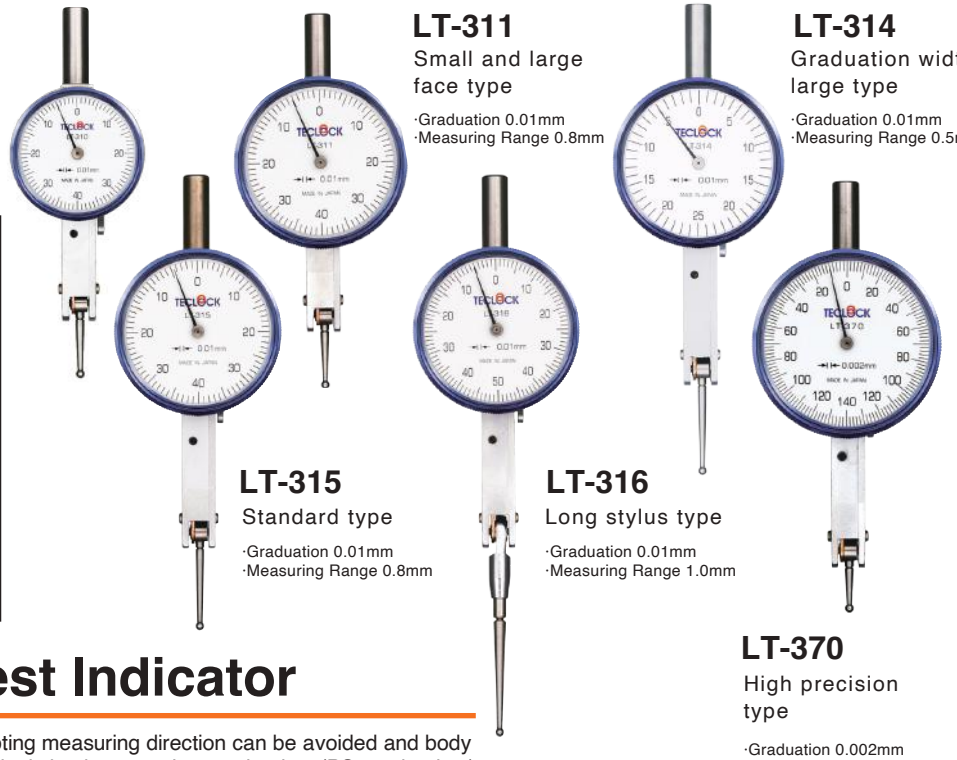
Dial Test Indicators are designed to the positioned for easy and accurate readability and are applicable for various usages such as measuring dimension, parallelism and centering of work piece and measuring revolution axis of machinery equipment and turnout of work pieces processed by lathe etc., and making table face of machinery equipment parallel. This has strong point if compared with standard dial indicator and has sensitivity for microscopic dimension displacement measurement. As its stylus is leg type with ball edge, narrow space can be measured, where its edge (standard ϕ 2mm ultra hand ball) can enter. ϕ0.6mm, ϕ0.8mm and ϕ1.0mm are available.

Measuring Centering

Lever Type Test Indicator

- Measuring direction can be changed with change lever.
- Main bearings are jeweled for all models.
- A carbide ball stylus is provided for less abrasion.
- Stylus is made of ϕ2mm stainless steel and it is unique threaded type which can be changed easily.
- Stylus and pointer are anti-magnetic and not affected by magnetism.
- Due to the low measuring force, this is suitable for measurement of thin work piece as well.





LT-310
Small and standard type
·Graduation 0.01mm
·Measuring Range 0.8mm

LT-311
Small and large face type
·Graduation 0.01mm
·Measuring Range 0.8mm

LT-314
Graduation width large type
·Graduation 0.01mm
·Measuring Range 0.5mm

LT-315
Standard type
·Graduation 0.01mm
·Measuring Range 0.8mm

LT-316
Long stylus type
·Graduation 0.01mm
·Measuring Range 1.0mm

LT-370
High precision type
·Graduation 0.002mm
·Measuring Range 0.28mm

PS Type Test Indicator

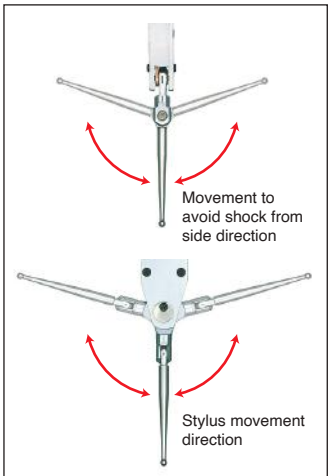
- Shock from the angle excepting measuring direction can be avoided and body is protected by Teclock original shock preventing mechanism (PS mechanism) of center of stylus.

Major dimension is equal to LT-315 and LT-316.

LT-315PS
Standard type
·Graduation 0.01mm
·Measuring Range 0.8mm

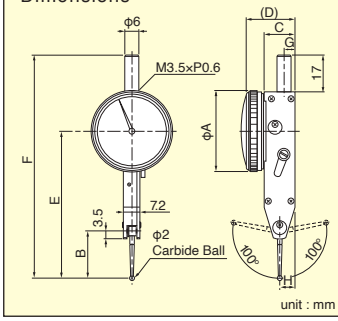
LT-316PS
Long stylus type
·Graduation 0.01mm
·Measuring Range 1.0mm

Shock Preventing mechanism



TECLOCK original PS mechanism is set at center of stylus to prevent shock excepting measuring directions.

Dimensions



Specifications

Model	A	B	C	D	E	F	G	H
LT-310	28.4	15.3	14	22.4	47.3	79.3	5	7
LT-311	35	15.3	14	23.3	47.3	79.3	5	7
LT-314	35	21.5	13.5	23	64.5	98.5	4.8	6.8
LT-315	35	20.1	13.5	23	63.1	97.1	4.8	6.8
LT-316	35	42.9	13.5	23	85.9	120	4.8	6.8
LT-370	38.4	12	13.5	23.2	55	89	4.8	6.8

unit : mm

Specifications

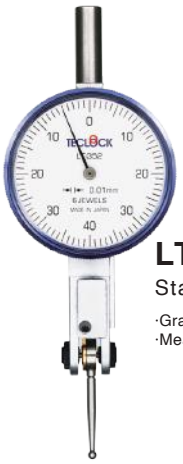
Model	Graduation (mm)	Measuring Range (mm)	Dial Reading	Measuring Force (N)	Repeatability (μm)	Adjacent Error(μm)	Entire measuring range in foward direction Error(μm)	Hysteresis (μm)	Standard Stylus	Weight (g)	Suggested List Price
LT-310	0.01	0.8	0-40-0	0.4 or less	3	5	9	4	ZS-700	50	12,870 JPY
LT-311	0.01	0.8	0-40-0	0.4 or less	3	5	9	4	ZS-700	55	12,870 JPY
LT-314	0.01	0.5	0-25-0	0.4 or less	3	5	6	4	ZS-701	70	12,870 JPY
LT-315	0.01	0.8	0-40-0	0.4 or less	3	5	9	4	ZS-702	65	12,870 JPY
LT-316	0.01	1.0	0-50-0	0.4 or less	3	5	10	5	ZS-704	65	15,730 JPY
LT-370	0.002	0.28	0-140-0	0.4 or less	1	2	4	3	ZS-713	75	15,950 JPY
LT-315PS	0.01	0.8	0-40-0	0.4 or less	3	5	9	4	ZS-703	70	19,580 JPY
LT-316PS	0.01	1.0	0-50-0	0.4 or less	3	5	10	5	ZS-705	70	23,980 JPY

Final inspection is done in the horizontal orientation and the accuracy is guaranteed.

Auto-Clutch Test Indicator

SmartSensor®

- As miniature bearing (pivot ball bearing) is used for stylus revolution bearing. It is not affected by shaft looseness and indication is stable.
- Measuring direction is automatically changed for proper and opposite by auto-clutch mechanism without changing lever. It is always read accurately in any case, as stylus rotates in clockwise direction..
- Stylus can be set at any desired position of angle of 220 circle.
- Stem with dovetail groove (Option) can be mounted to 2 points of front and back part.
- A carbide ball stylus is provided for less abrasion and stylus is made of stainless steel..
- Stylus and pointer are anti-magnetic and not affected by magnetism.



LT-352
Standard type

·Graduation 0.01mm
·Measuring Range 0.8mm

LT-353
Long stylus type

·Graduation 0.01mm
·Measuring Range 0.8mm

LT-354
Graduation width large type

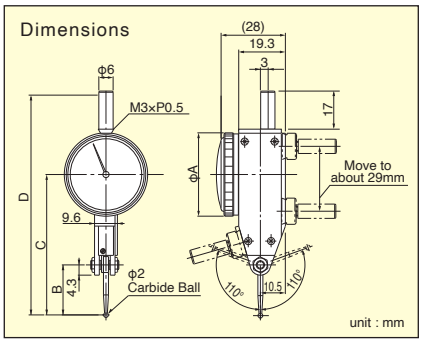
·Graduation 0.01mm
·Measuring Range 0.8mm

LT-355
High precision type

·Graduation 0.01mm
·Measuring Range 0.8mm

LT-358
Ultra precision type

·Graduation 0.001mm
·Measuring Range 0.2mm



Specifications

Model	A	B	C	D
LT-352	35	21	59	95
LT-353	35	40.6	78.6	114.6
LT-354	35	25.4	63.4	99.4
LT-355	38.4	18	56	92
LT-358	38.4	15	53	89

unit : mm

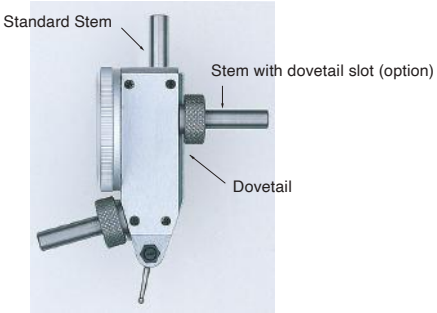
Specifications

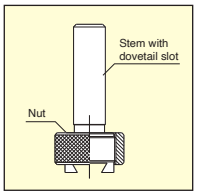
Model	Graduation (mm)	Measuring Range (mm)	Dial Reading	Measuring Force (N)	Repeatability (μm)	Adjacent Error(μm)	Entire measuring range in foward direction Error(μm)	Hysteresis (μm)	Standard Stylus	Weight (g)	Suggested List Price
LT-352	0.01	0.8	0-40-0	0.2 or less	3	5	9	4	ZS-709	75	12,100 JPY
LT-353	0.01	0.8	0-40-0	0.2 or less	3	5	10	5	ZS-710	75	15,730 JPY
LT-354	0.01	0.5	0-25-0	0.2 or less	3	5	6	4	ZS-799	75	16,390 JPY
LT-355	0.002	0.28	0-140-0	0.25 or less	1	2	4	3	ZS-711	75	15,730 JPY
LT-358	0.001	0.2	0-100-0	0.25 or less	1	2	4	3	ZS-712	75	19,360 JPY

Final inspection is done in the horizontal orientation and the accuracy is guaranteed.

Stems with dovetail slot for Auto-Clutch Test indicator (Option)

Standard stem diameter is 6mm but φ4mm and φ8mm are also available on request





Applicable for LT-352, LT-353, LT-354, LT-355, LT-358

Auto-Clutch Test Indicator (Low measuring force)

LT-352-5
Standard type

·Graduation 0.01mm
·Measuring Range 0.8mm
·Measuring Force 0.05N or less

LT-353-5
Long stylus type

·Graduation 0.01mm
·Measuring Range 0.8mm
·Measuring Force 0.05N or less

LT-355-10
High precision type

·Graduation 0.002mm
·Measuring Range 0.28mm
·Measuring Force 0.1N or less

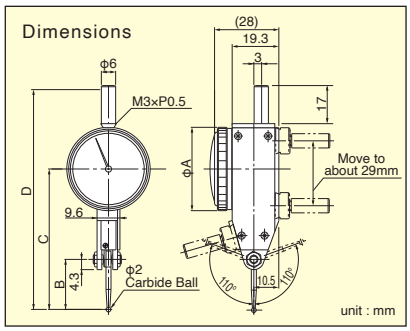
LT-358-15
Ultra precision type

·Graduation 0.001mm
·Measuring Range 0.2mm
·Measuring Force 0.15N or less

Specifications

Model	A	B	C	D
LT-352-5	35	21	59	95
LT-353-5	35	40.6	78.6	114.6
LT-355-10	38.4	18	56	92
LT-358-15	38.4	15	53	89

unit : mm



Specifications

Model	Graduation (mm)	Measuring Range (mm)	Dial Reading	Measuring Force (N)	Repeatability (μm)	Adjacent Error (μm)	Indication error on full range (μm)	Hysteresis (μm)	Standard Stylus	Weight (g)	Suggested List Price
LT-352-5	0.01	0.8	0-40-0	0.05 or less	3	5	8	3	ZS-709	75	16,500 JPY
LT-353-5	0.01	0.8	0-40-0	0.05 or less	3	5	8	4	ZS-710	75	19,140 JPY
LT-355-10	0.002	0.28	0-140-0	0.1 or less	1	2	3	2	ZS-711	75	19,140 JPY
LT-358-15	0.001	0.2	0-100-0	0.15 or less	1	2	3	2	ZS-712	75	22,770 JPY

Lever Test Indicator for Deflection

- This is the special indicator to check deflection level not deflection volume.
- Deflection which can not be measured with standard type can be checked by installing stylus depending on the shape of work piece.
- Unit is not available for gradation line. (Calibration certificate can not be issued.)
- Standard price of LR-316 does not include stylus. Select the stylus from the list below and use indicator by combining it.

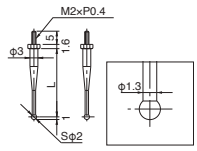
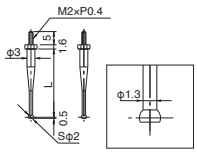
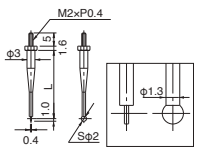
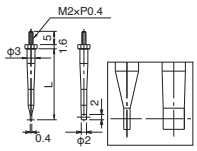
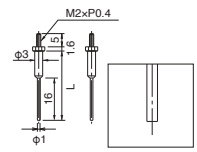
The photo shows the scene of detecting deflection of cutting tool edge installed to the machine and deflection.

Specifications

Model	Weight (g)	Suggested List Price (Only the main body)
LR-316	70	15,730 JPY

LR-316
for Run-out (TIR) measurement

LR-316 Stylus (With Fixing Nut)

Code No.	Shape of Stylus	L(mm)	Dimensions(mm)	Suggested List Price
ZS-777	Spherical Shape	26		1,800 JPY
ZS-782		68.9		3,340 JPY
ZS-778	Half Spherical Shape	26		2,620 JPY
ZS-783		68.9		4,560 JPY
ZS-779	Fan Shape	26		4,320 JPY
ZS-784		68.9		9,900 JPY
ZS-780	Square Shape	27.3		7,340 JPY
ZS-785		69.7		11,960 JPY
ZS-781	Round Bar Shape	26.8		6,400 JPY
ZS-786		69		8,500 JPY

Parts & Accessories

Stylus

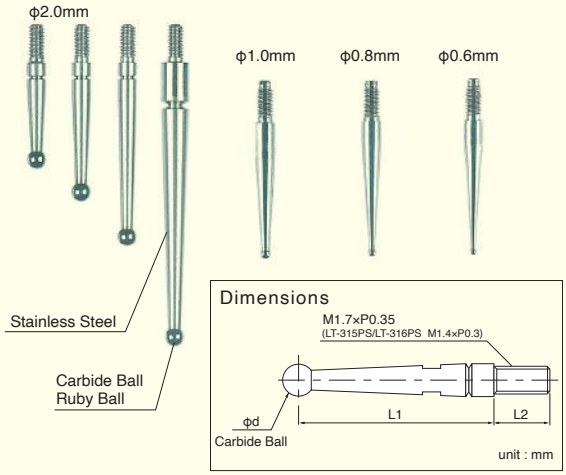
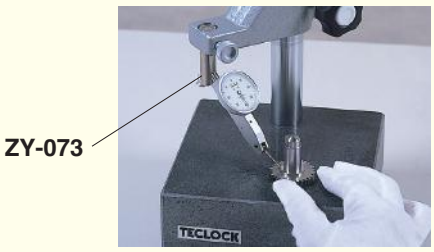


Table for applicable Stylus and Parts

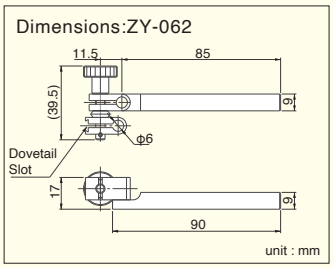
Model	L1 (mm)	L2 (mm)	φd(mm)				
			φ0.6	φ0.8	φ1.0	φ2.0(Standard)	φ2.0(Carbide Ball)
LT-310	13.30	4.00	ZS-744	ZS-755	ZS-766	ZS-700	ZS-787
LT-311	13.30	4.00	ZS-744	ZS-755	ZS-766	ZS-700	ZS-787
LT-314	19.45	4.00	ZS-745	ZS-756	ZS-767	ZS-701	ZS-788
LT-315	18.10	4.00	ZS-746	ZS-757	ZS-768	ZS-702	ZS-789
LT-316	28.40	4.00	ZS-748	ZS-759	ZS-770	ZS-704	ZS-790
LT-370	10.00	4.00	ZS-754	ZS-765	ZS-776	ZS-713	ZS-795
LT-352	17.80	4.00	ZS-750	ZS-761	ZS-772	ZS-709	ZS-791
LT-353	37.38	4.00	ZS-751	ZS-762	ZS-773	ZS-710	ZS-792
LT-354	22.16	4.00	ZS-811	ZS-812	ZS-813	ZS-799	ZS-815
LT-355	14.80	4.00	ZS-752	ZS-763	ZS-774	ZS-711	ZS-793
LT-358	11.80	4.00	ZS-753	ZS-764	ZS-775	ZS-712	ZS-794
LT-315PS	8.65	1.80	ZS-747	ZS-758	ZS-769	ZS-703	ZS-796
LT-316PS	28.40	1.80	ZS-749	ZS-760	ZS-771	ZS-705	ZS-797

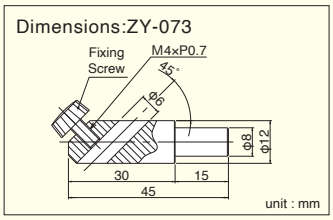
Lever Test Holder

This holder fixes lever test with φ6mm hole or dovetail.



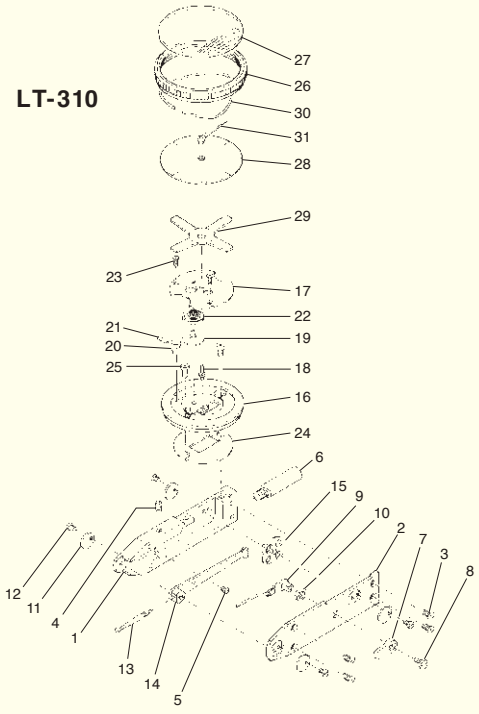
Code No.	Specification
ZY-062	Dovetail slot or φ6mm stem
ZY-073	φ6mm Stem Setting angle 45





Parts List

Test Indicator

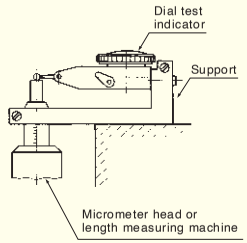
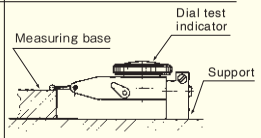
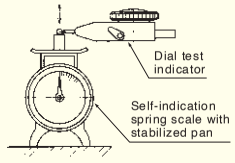


Key No.	Parts name
1	Frame
2	Frame Cover
3	Frame Cover Screw
4	Stop Screw A
5	Stop Screw B
6	Stem
7	Lever
8	Lever Screw
9	Stopper Assy.
10	Washer
11	Fulcrum Cover
12	Fulcrum Cover Screw
13	Contact Point
14	1# Fulcrum Assy.
15	Crown Gear Assy.
16	Base Plate Assy.

Key No.	Parts name
17	Upper Plate Assy.
18	Center Pinion
19	2# Gear Assy.
20	Received Hair Spring
21	Hair Spring Pin
22	Hair Spring
23	Upper Plate Screw
24	Cover
25	Base Plate Screw
26	Bezel
27	Dial Cover
28	Dial Plate
29	Dial Plate Spring
30	Bezel Spring
31	Pointer

Technical Sheet ■ Dial test indicators (lever type) JIS D 7533 : 2015 (Reter to JMA/JSA)

1)Measurement method for characteristics

Measurement item		Applicable type	Measurement method	Measurement point	Reference table
Errors of indication	Errors of indication per entire measuring range in forward direction	One revolution and greater than one revolution	"Sustain the dial test indicator, and after setting the starting point close to the rest point of stylus as its reference point so that errors of indication and indication itself are adjusted to zero, move the stylus in forward direction, and read errors of indication at each measuring point. Then after moving the stylus by three scale divisions or over from the end of the measuring range, move the stylus in backward direction, and read errors of indication at the same point of the forward direction. (Forward direction means that the stylus of dial test indicator moves against the measuring force, whole backward direction means that the stylus moves in the direction of measuring force.)"	Determine the difference between the maximum and minimum values to errors of indication in forward direction in the entire measuring range read in Table A.1 (1).	
	Errors of indication per 10 scale divisions (Adjacent error)			Determine the maximum value of deference of errors of indication to the measuring point per adjacent 10 scale divisions in forward direction from the starting point to the end point read in Table A.1 (1).	
	Errors of indication per one revolution	Greater than one revolution		Determine the maximum value of deference between the maximum value and the minimum value of errors of indication to the measuring range per one revolution by fixed zero method, in forward direction from the starting point to the end point read in Table A.1 (1).	
	Hysteresis errors	One revolution and greater than one revolution		Determine the maximum value of difference to errors of indication at the same point in forward and backward directions at the entire measuring point read in Table A.1(1).	
Repeatability			Sustain the dial test indicator with the stylus being parallel to upper plane of measuring base, operate the stylus rapidly or gently five times at an arbitrary point in the measuring range, and read the indicated value at each time.	Arbitrary points in the measuring range	
Measuring forces			Sustain the dial test indicator, move the stylus continuously and gradually in forward and backward directions respectively, and read the measuring force.	The starting point and the final point within themeasuring range	

Note
a) For reading errors of indication, either of the following may be chosen: reading the input quantity of measuring device by the primary pointer to scale line, or reading the indication of dial test indicator by replacement of measuring device.

2)Characteristics (MPE/MPL)

unit : mm

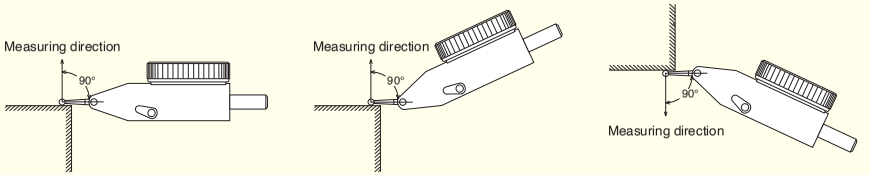
Scale interval(mm)		0.001/0.002			0.01			
Number of revolutions		One revolution	Greater than one revolution		One revolution		L1>35 b)	Greater than one revolution
Measuring range(mm)		~0.3	0.4~0.5	0.6	~0.5	~1.0	~1.0	~1.6
Error of indication (μm)(MPE)	Entire measuring range in forward direction	4	6	7	6	9	10	16
	One revolution	–	5	5	-	-	-	10
	10 scale divisions	2	2	2	5	5	5	5
Hysteresis of error of indication (μm)(MPEH)		3	4	4	4	4	5	5
Error of indication (μm)(MPER)		1	1	1	3	3	3	3
Measuring force (N)(MPL)	Maximum	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Minimum	0.01	0.01	0.01	0.01	0.01	0.01	0.01

Note
b) Stylus length

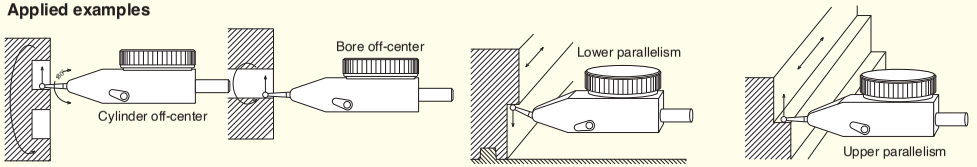
■ Lever Test; Precautions for Handling

The measuring probe shall be made perpendicular to the measuring direction.

Lever test shall be used by being fixed to a rigid retainer to prevent the influence of flexure or the like.
In measurement, the measuring direction shall be made perpendicular to the center line of the measuring probe.

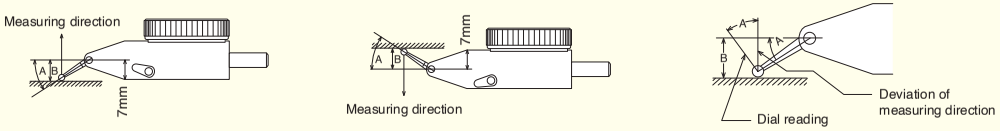


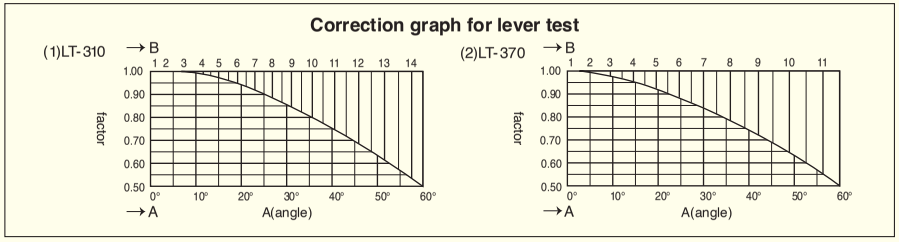
Applied examples



In case they are not perpendicular, a correction by the following formula is necessary.

Examples the graphs below, where the measuring prove is set at an non-perpendicular angles and the distance between the pivot of the contact point and the measuring device is signified by the letter B:
B = the length of prove × cosA





Example:
Using a LT-310 lever test, suppose the degree of angle A is 40°and
the pic test reading is 0.05mm, the factor for the LT-310 lever test from the graph is 0.77.
Modification = 0.05mm × 0.77 = 0.039mm

When modification is not necessary:

If the measuring tolerance is 10% and the graph factor is above 0.9, modification by calculation is unnecessary.

Bluetooth Digital Test Indicator NEW

SmartSensor®

1/1000mm
High-precision Mini Series

Features

- Line up for measuring range,0.8/2.0mm.
- Analog Display.
- IP54.
- Ultra Light 70g.
- SSL-350 spec. is changeable stylus type.
- Continuous outputting Sampling measuring value.
- One-touch data sending to PC by built-in Bluetooth.
- Data management by SmartMeasure®Lite (free).

SSL-250
·Measuring Range 0.8mm
·Stylus length : 12.5mm

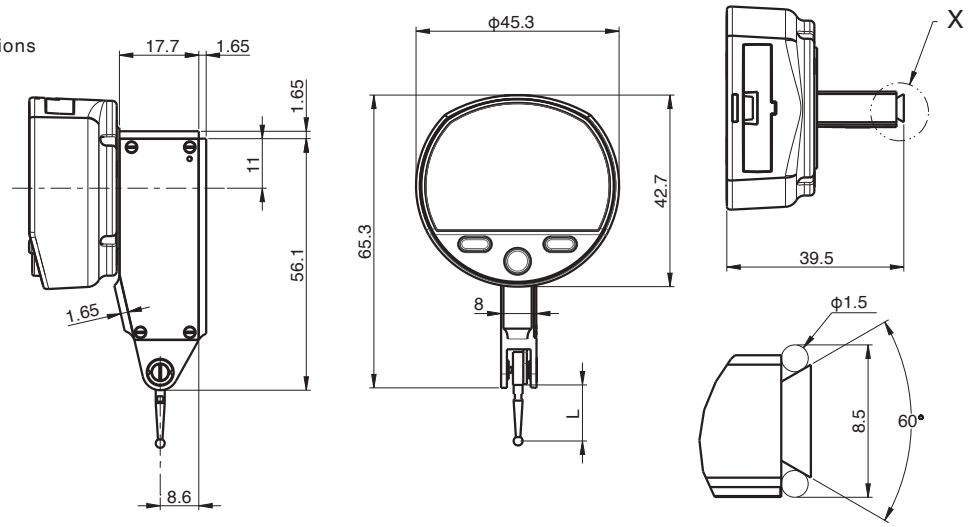
SSL-260
·Measuring Range 2.0mm
·Stylus length : 36.5mm

ZY-069
ϕ6mm

Stem with Dovetail slot

Style	Type	Stem Diameter
Standard		8mm
Option	ZY-069	6mm

Dimensions



Specifications

Model	L
SSL-250	12.5
SSL-260	36.5

unit : mm

Specifications

Model	Resolution (mm)	Measuring Range (mm)	Adjacent Error(μm)	Repeatability (μm)	Hysteresis (μm)	Min/Max/ Delta	Measuring Force(N)	Stylus Length (mm)	Standard Contact Point	IP Rating	Battery	Weight (g)	Suggested List Price
SSL-250	0.001	0.8	3	1	2	✓	0.15N±20%	12.5	ϕ2 Ball	IP54	CR2032	70	91,300 JPY
SSL-260	0.001	2.0	8	1	3	✓	0.06N±20%	36.5	ϕ2 Ball	IP54	CR2032	70	102,800 JPY
SSL-350	Same spec. as SSL-250 or SSL-260 by changeable stylus												113,200 JPY

MEMO

TECLOCK®

https://teclock.co.jp