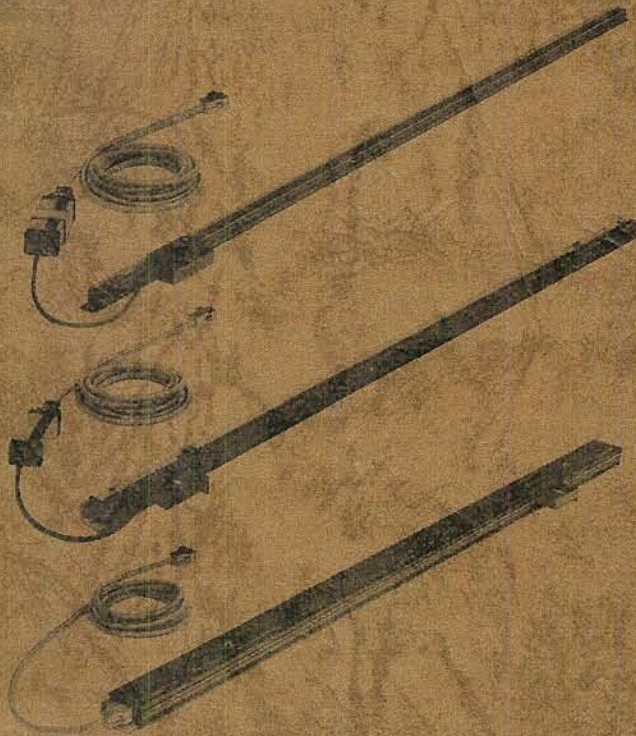


DIGITAL POSITIONING SYSTEMS

SOKKI
ELECTRONICS

INSTRUCTION MANUAL
FOR
JIKI SCALE UNIT

JS1 SERIES
JS3 SERIES
JS5 SERIES
JS6 SERIES



SOKKI ELECTRONICS CORPORATION

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[1] FEATURES

The JIKI SCALES, "JS1 series", "JS3 series", "JS5 series" and "JS6 series" are high precision scale units which use the newly developed high coercive magnetic metal scale.

- The magnetic readout system provides high vibration- and oil-resistance property.
- Being the same thermal expansion coefficient as iron, the scale itself provides temperature compensation so as to minimize error due to temperature difference.
- The main body of the JIKI SCALE has a shielded structure so that the scale will not be affected by external magnetic fields.
- For ensuring better noise suppression characteristics to improve the system accuracy, a special consideration is given in designing so that the head amplifier is built-in or placed very closer to the scale.
- The head amplifier and scale are assembled as one unit to enable unit replacement. If a trouble occurs in field operation, it can be replaced easily and quickly without the need to adjust the signal.

JS1 and JS3 series

- All the JIKI SCALES are provided with an absolute zero point. Even when misoperation or power failure occurs, the datum point can be recalled accurately by using the absolute zero point.
- A mounting guide with calibration marks on the entire scale is provided as standard for all the JIKI SCALES. It is possible to detach the head carrier and head amplifier to facilitate installation on the machine.

JS5 series

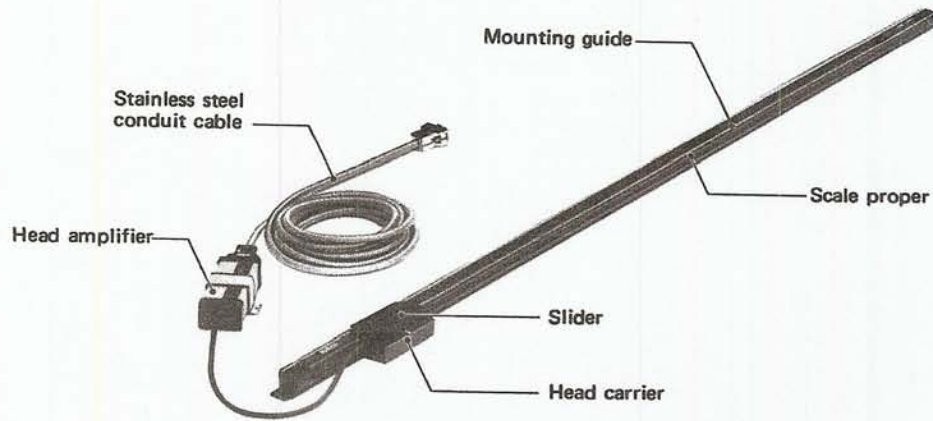
- The newly-developed head carrier travelling system makes installation easier to a place where the installation of the conventional system has been difficult.
- All the JIKI SCALES are provided with an absolute zero point.

JS6 series

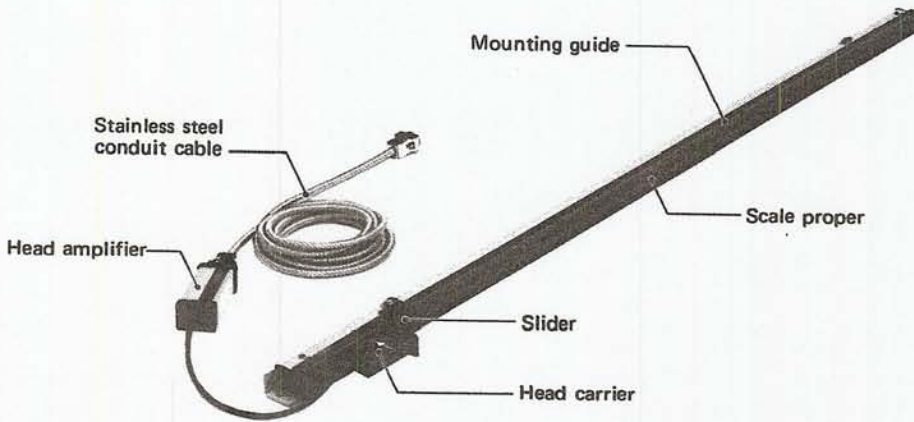
- A mounting guide with calibration marks on the entire scale is provided as standard for all JIKI SCALES. It is possible to detach the head carrier and head amplifier to facilitate installation on the machine.

[2] NAMES AND FUNCTION OF PARTS

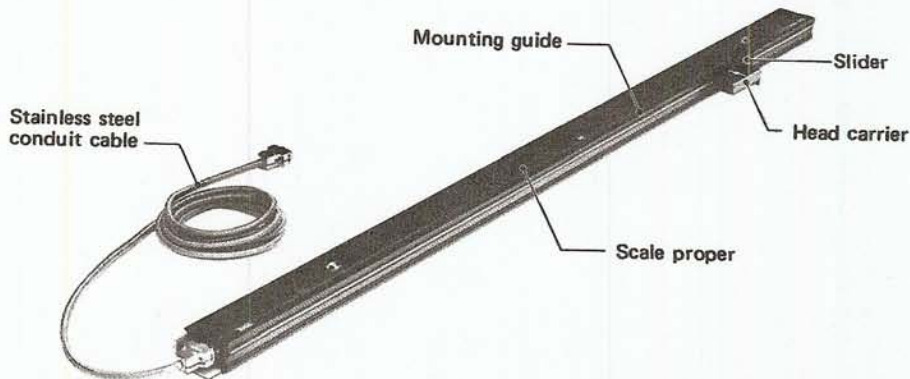
● JS1 and JS6 series



● JS3 series



● JS5 series



Scale proper:

A scale rod is stored in the iron housing. (JS5 series has a built-in amplifier.)

Head amplifier:

Amplifies a signal from the scale and sends it to the display unit.

Head carrier:

Holds the readout head and in case of JS1, JS3 & JS6 series should be mounted to machine bed and in case of JS5 series to machine table.

Slider:

Serves as the head carrier fixing board during in transit and as the simple guide for installation.

Mounting guide:

A slider serves as the simple guide.

Stainless steel conduit cable:

A signal cable protected by the stainless steel conduit for connecting the head amplifier and the display unit.

Effective length marks:

Measurement is possible within the length of these marks.

Absolute zero point mark:

Position for the absolute zero point.

[3] INSTALLATION

1. INSTALLATION PLACE AND PRECAUTIONS

- Select the installation position as near the object to be measured or the workpiece as possible to ensure the high measurement accuracy.
- Care must be taken so that the scale is not bent or twisted on installation.
- Avoid to install the unit in a place where the environmental conditions change drastically due to high voltage, temperature change, ferromagnetism, etc.
- It is recommended to put a protective cover on the scale in case the workpiece may touch the scale during machining.
- Mount the scale so that the head carrier faces down or sideways.
- Do not remove the slider until the scale installation is completed. (The gap between the readout head and absolute zero point is set prior to shipment for positioning of absolute zero point.)

◎ Tools required for installation

Electric drill

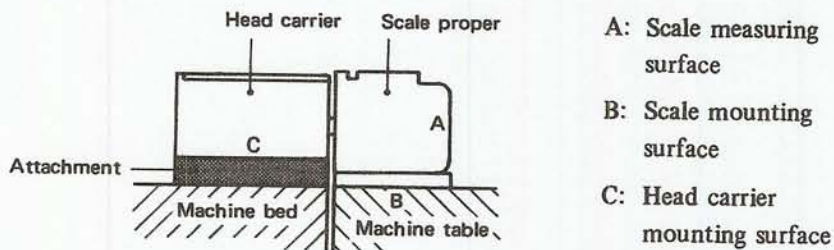
Drill $\phi 2.4$ For M3 (JS1, JS3, JS5, JS6)
 $\phi 3.3$ For M4 (JS1, JS3, JS5, JS6)
 $\phi 4.2$ For M5 (JS3, JS5)

Tap M3 (JS1, JS3, JS5, JS6)
 M4 (JS1, JS3, JS5, JS6)
 M5 (JS3, JS5)

Dial gauge 1/100 mm
 Tap handle, small
 ⊕ Screwdriver, small
 ⊕ Screwdriver, medium

○ Mounting accuracy

Mount the unit so that the parallelism on each surface is within the following limits.

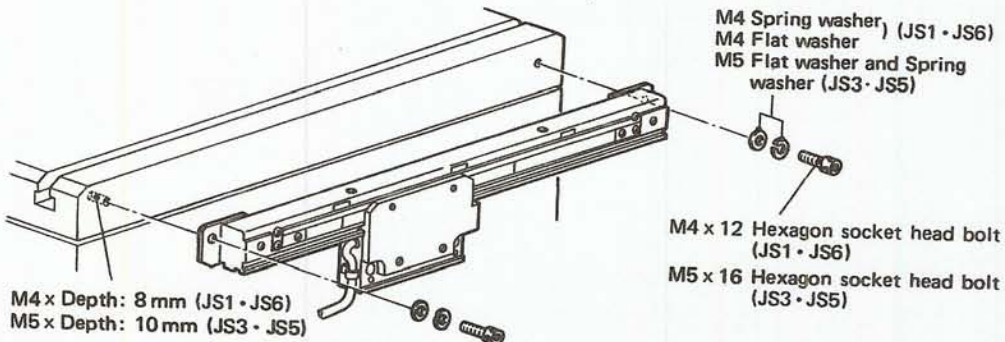


A · B	within 0.1 mm	} Should be within 0.5 mm in case the absolute zero point is not used. (except for JS6)
C	within 0.1 mm	
Parallelism of B and C	within 0.1 mm	
Space between B and C	7±0.1 mm (JS1 & JS6) 15±0.1 mm (JS3, JS5)	

2. SCALE MOUNTING

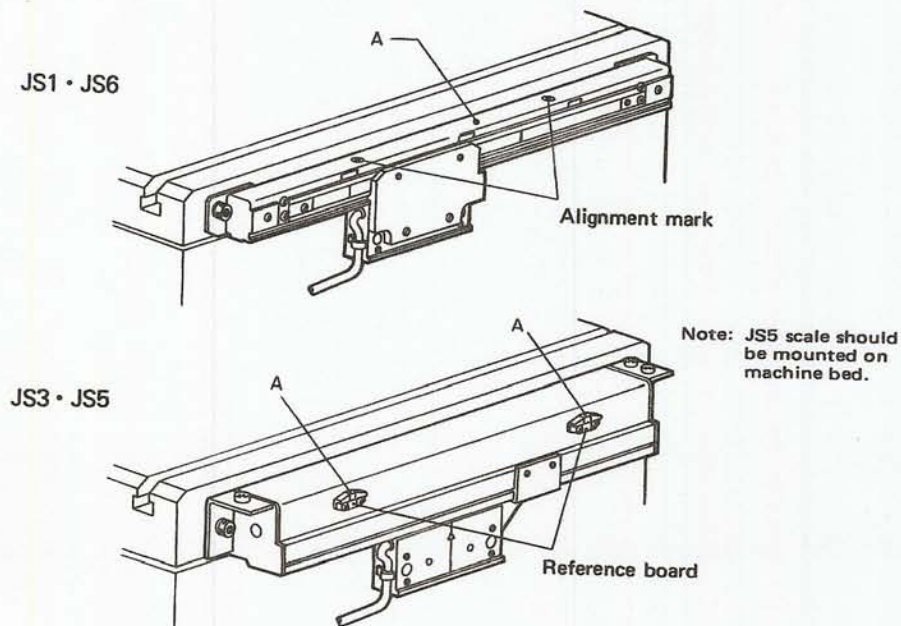
(1) Positioning · Drilling · Temporary Fixing

By referring to the mounting hole sizes on the drawing of scale outer dimensions, determine the mounting position on the mounting surface of the machine table, and drill and tap holes. Fix the scale temporarily to the machine table, using the hexagon socket head bolt and leave it for about 30 minutes until the scale temperature adapts itself to the machine temperature.



(2) Mounting

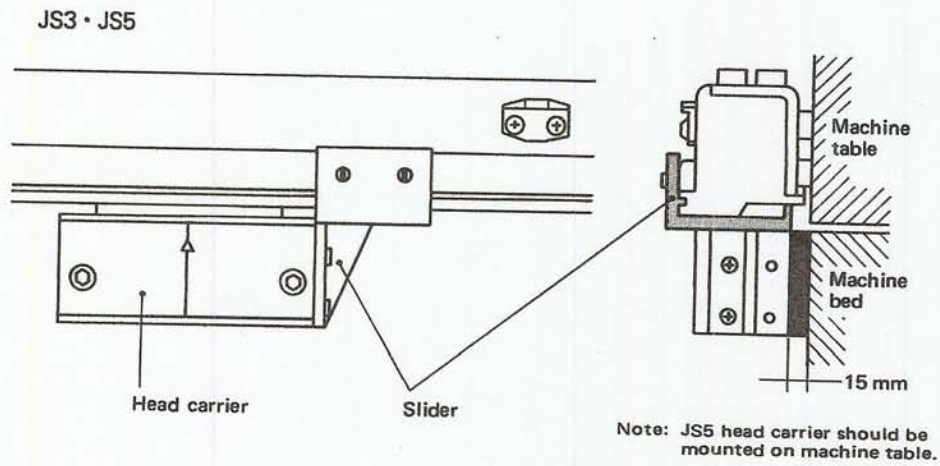
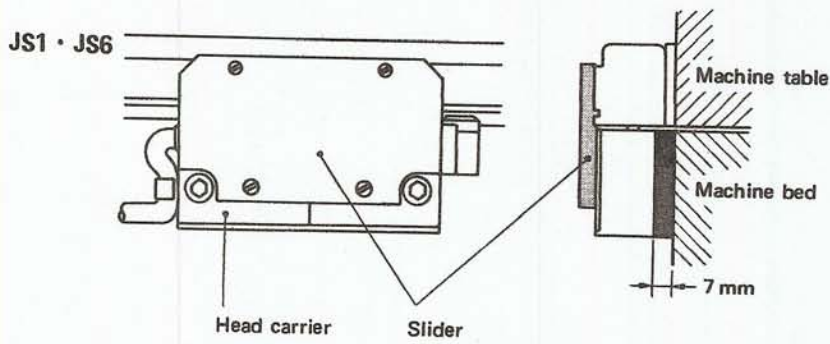
Measure the parallelism of the surface A (surface provided with the alignment marks or the reference board) of the temporarily fixed scale, using the dial gauge. (Measure the parallelism at the place where the alignment marks or the reference boards are attached.)



- The scales having the effective length of more than 1000 mm should be fixed after checking the parallelism in the vicinity of the attached mounting metal fitting (on the surface A) and at the alignment marks.
- If the alignment marks on the surface A cannot be measured directly by the dial gauge, measure the parallelism in the vicinity of the alignment marks.

3. HEAD CARRIER MOUNTING

Prepare an attachment for fixing the head carrier to the machine bed.



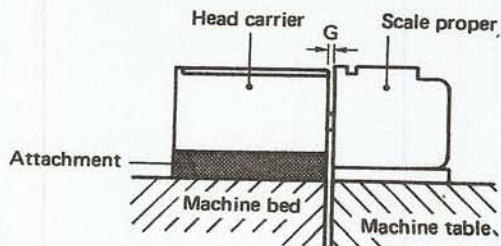
When the scale is attached directly to the table, the thickness of the attachment should be $7\text{ mm} \pm 0.1$ (JS1 · JS6) or $15\text{ mm} \pm 0.1$ (JS3 · JS5).

(It is recommended to use shim washer for fine adjustment of the thickness.)

In case the absolute zero point is used, check the gap (G) between the scale proper and the head carrier by inserting the provided thickness gauge.

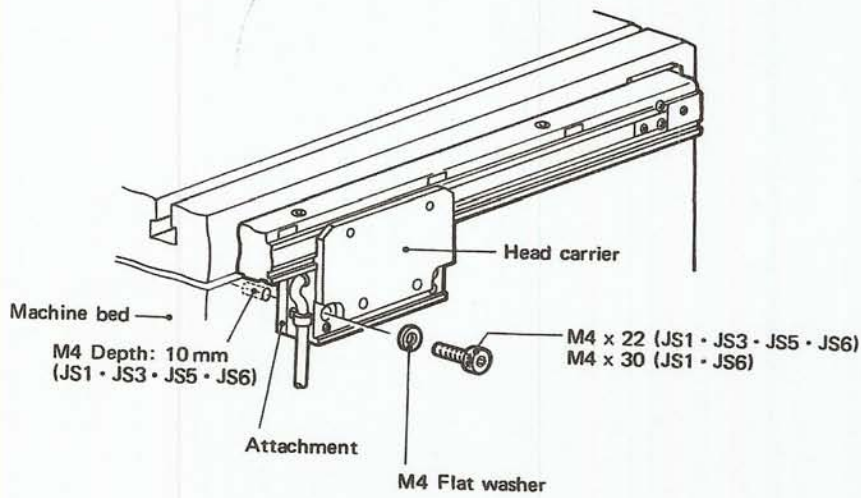
Gap allowance JS1, JS6 1 ± 0.1 mm (gauge 1 mm)

JS3, JS5 2.5 ± 0.1 mm (gauge 2.5 mm)



After the attachment is prepared, move the machine table to the desired mounting position of the head carrier.

Drill the mounting holes at the mounting position of the machine bed.

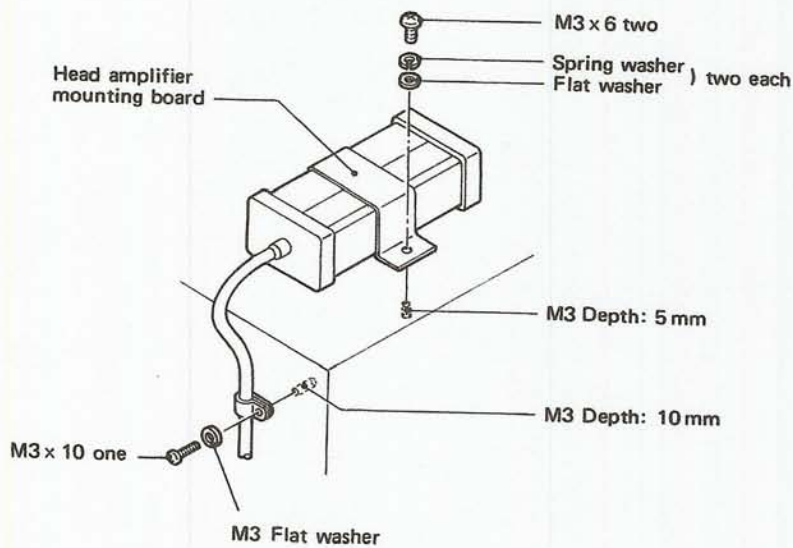


Remove the slider after mounting.

4. HEAD AMPLIFIER MOUNTING (only JS1, JS3 & JS6)

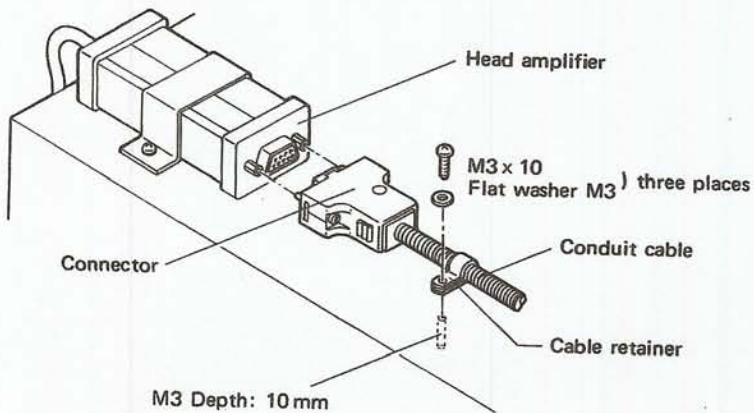
Mount the head amplifier in a place where it will not interfere with the moving parts of machine.

(Though the head amplifier is of enclosed type, avoid the place where coolant or swarf will reach.)

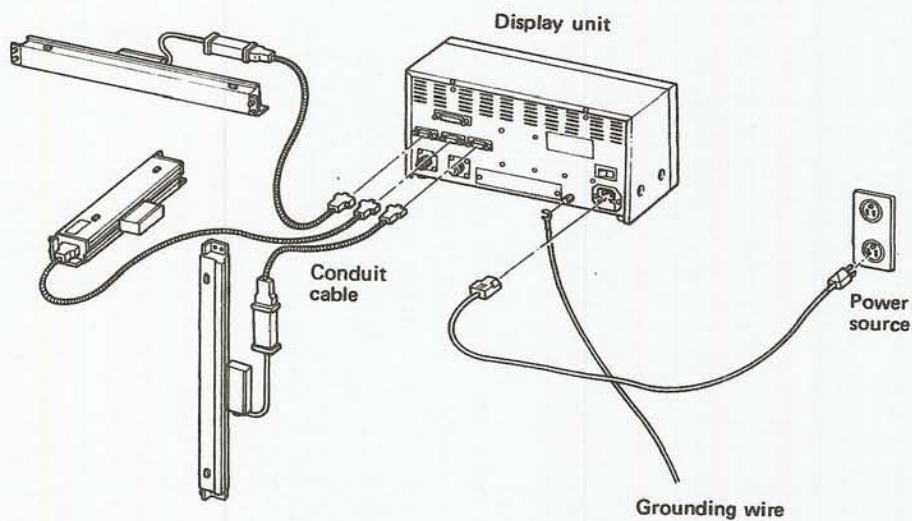


5. STAINLESS STEEL CONDUIT CABLE MOUNTING

Connect the connector to the head amplifier (the head amplifier is built-in to the scale proper in case of JS5) and mount the cable properly so that it does not interfere with other unit.



6. CONNECTION TO THE DISPLAY UNIT



The connector on one end of the conduit cable is connected with the head amplifier. Connect the connector on the other end of the conduit cable with the specified axis on the display unit.

(Tighten the mounting screws of the connector securely.)

Be sure to connect the conduit cable to the display unit after turning the power off.

Connect the attached grounding wire to the machine body.

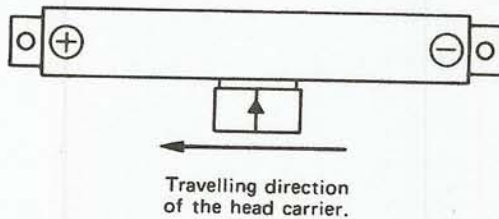
[4] ADJUSTMENT OF THE ABSOLUTE ZERO POINT (for the scale unit with the new display unit)

Adjust the absolute zero point after mounting the scale to the machine.

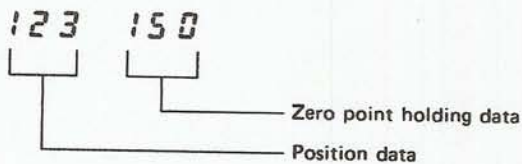
- ① Remove the parameter switch cover on the rear panel of the display unit. (See the section about the parameter switch in the separate instruction manual for the display unit.)
- ② Turn the switch 2-4 on. (common to X-, Y- and Z-axis)
- ③ Set the axis selection switch 1 as follows.

	SW1 values
X-axis	7
Y-axis	8
Z-axis	9

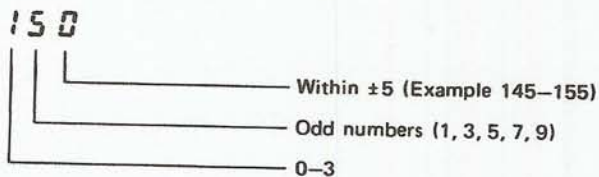
- ④ The machine table should be travelled only in one direction so as to get better machining accuracy. The absolute zero point is detected when the head carrier passes over the zero point while the machine table is shifted in one direction, + or - direction can be set by the parameter switch of the display unit. The direction of the following picture is ⊕.



- ⑤ Turn on the power switch of the display unit. Indicates 2 numbers of 3 figures like the following example:

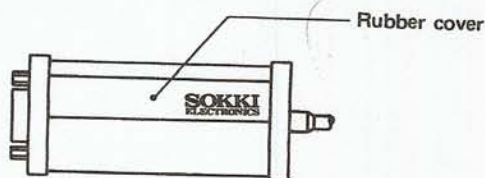


- ⑥ Move the table to the direction determined in the clause ④ to pass the zero point. A buzzer beeps and the zero point holding data is displayed. Check the data is within the limits specified below:

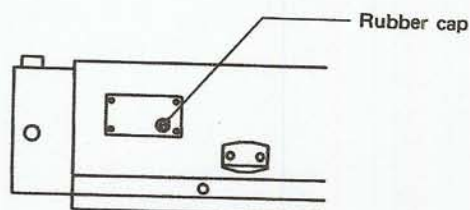


- ⑦ If the displayed values are out of the above specified range, perform the following procedures.

JS1 · JS3 · JS6



JS5

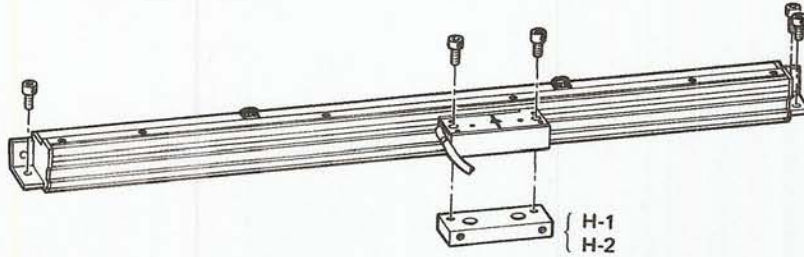


- JS1, JS3, JS6: Remove the rubber cover on the head amplifier. Turn the adjusting knob V5 slightly to the right or left. Move again the table to pass the zero point.
- JS5: Remove the rubber cap on the zero point adjusting hole on the head amplifier. Turn the adjusting knob V5 slightly to the right or left. Move again the table to pass the zero point. Repeat the above procedure until the specified holding data is obtained.
- When the holding data is not obtained even if the adjusting knob V5 (OFS) is turned more than half revolution, re-check the mounting dimension of the scale unit and head carrier.
- ⑧ Repeat the above procedures from section ③ to ⑦ for Y and Z axis.
- ⑨ After the displayed values are within the specified range, turn the SW2-4 off and set the SW1 to 3.
- ⑩ Upon completion of adjustment, mount the rear panel of the display unit and rubber cap of the zero point adjusting hole.
- Turn off the power once before starting measurement.

[5] EXAMPLES OF SCALE MOUNTING AND MOUNTING BRACKETS LIST

- For mounting the JIKI SCALE unit directly to the machine, an attachment is necessary only for mounting the head carrier section.

JIKI SCALE type	Attachment
JS1 • JS1H series	H-1
JS3 • JS3H series	H-2
JS5 • JS5H series	H-2
JS6 series	H-1

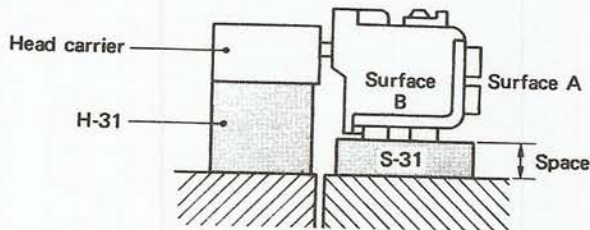
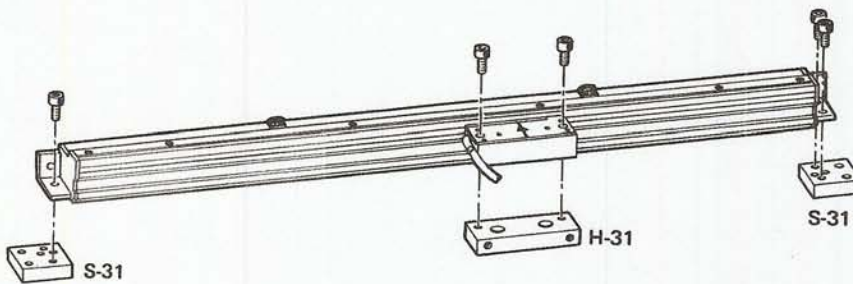


- When a space is required between the JIKI SCALE unit and the machine, use the following attachment.

< Attachment for JS3 • JS3H series >

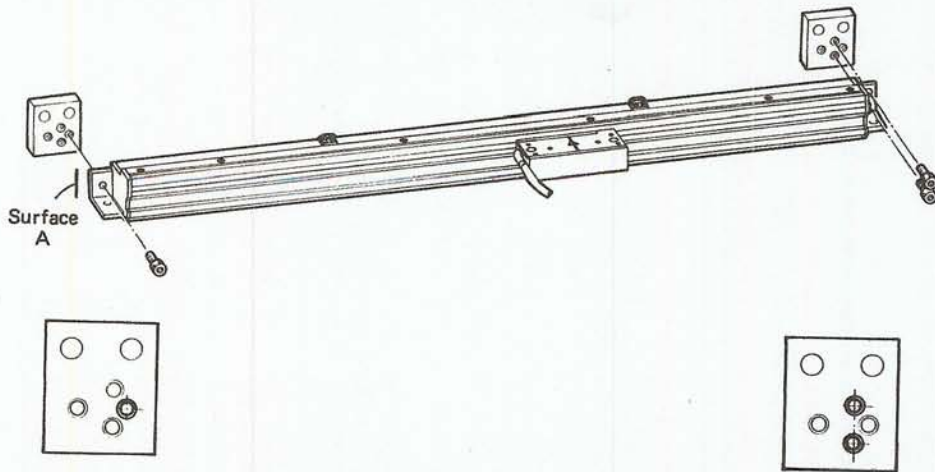
JS3 • JS3H series

Attachment set	Space (mm)	Details			
		Scale proper (pcs.)		Head carrier (pcs.)	
AT-31	10	S-31	2	H-31	1
AT-32	20	S-32	2	H-32	1

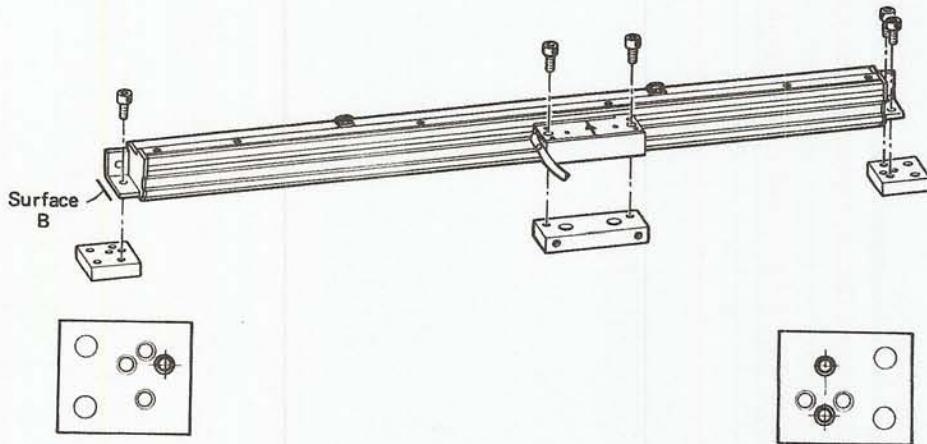


(When AT-31 is used)

- For mounting the scale unit on the surface A, using the attachment S-31 for JS3.



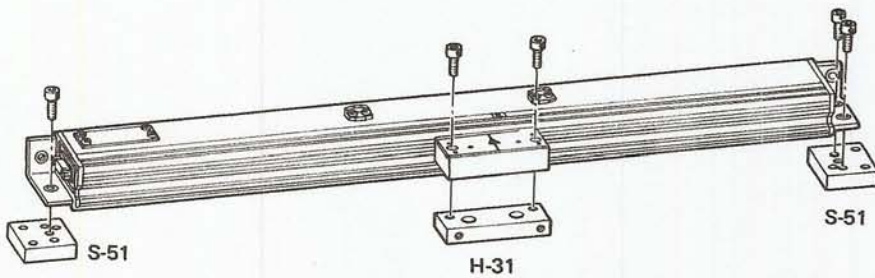
- For mounting the scale unit on the surface B, using the attachment S-31 for JS3.

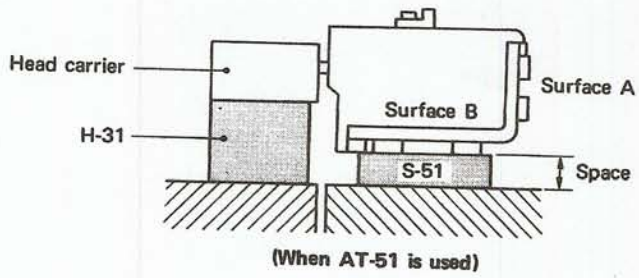


< Attachments for JS5 • JS5H series >

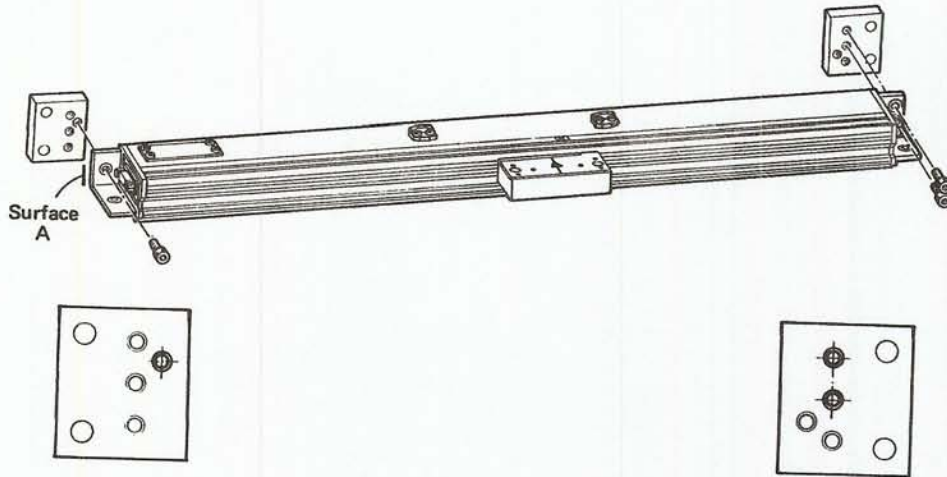
JS5 • JS5H series

Attachment set	Space (mm)	Details			
		Scale proper (pcs.)		Head carrier (pcs.)	
AT-51	10	S-51	2	H-31	1
AT-52	20	S-52	2	H-32	1

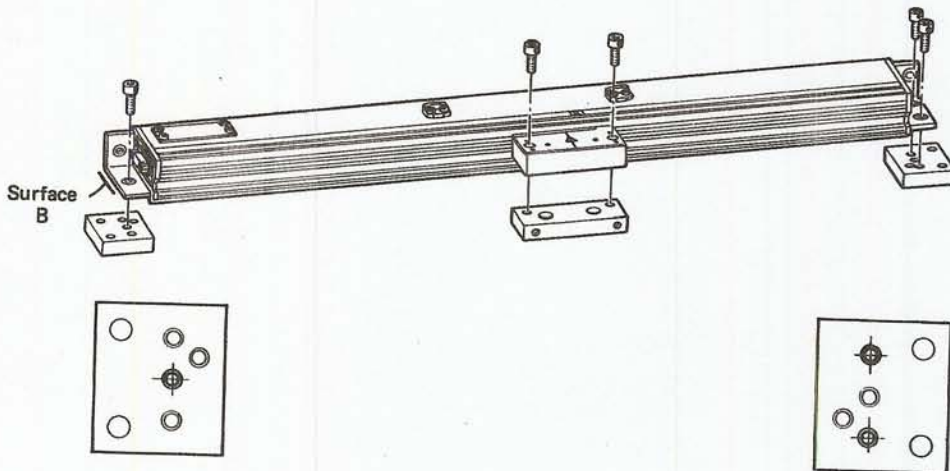




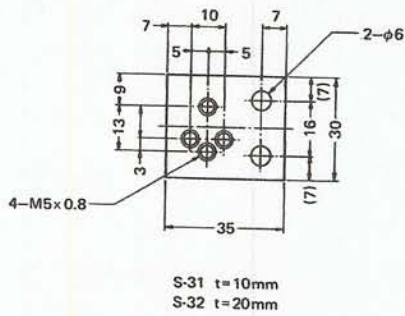
- For mounting the scale unit on the surface A, using the attachment S-51 for JS5.



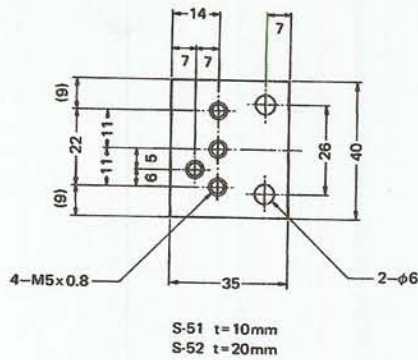
- For mounting the scale unit on the surface B, using the attachment S-51 for JS5.



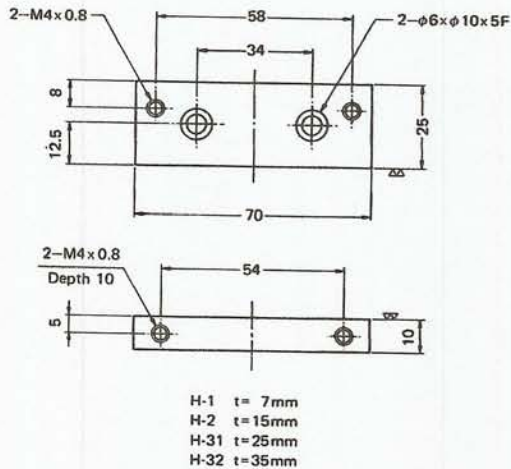
Attachment for JS3 series (example)



Attachment for JS5 series (example)



Head carrier attachment for JS3 and JS5 series (example)



[6] SPECIFICATIONS

Effective length:	} See the dimensional drawing and list.
Total length:	
Maximum movable length:	
Scale accuracy:	Standard type (JMAS first class) $(5 + \frac{5}{1000} L) \mu\text{m}$
	High accuracy type (H type) $(3 + \frac{3}{1000} L) \mu\text{m}$
	Super high accuracy type $(2 + \frac{2}{1000} L) \mu\text{m}$
	L: effective length (mm)
Parallel installation tolerance:	0.1 mm/m (when the absolute zero point is used) 0.5 mm/m
Thermal expansion coefficient:	$11 \times 10^{-6} \text{ mm}/^\circ\text{C}$
Response speed:	75 m/min (Standard type) 18 m/min (High accuracy H type; Super high accuracy type)
Display resolution:	$5 \mu\text{m}/10 \mu\text{m}$, $0.5 \mu\text{m}/1 \mu\text{m}$ (H type) (The resolutions show the values obtainable in combination with the display unit.)

[7] LIST OF ACCESSORIES

Accessories

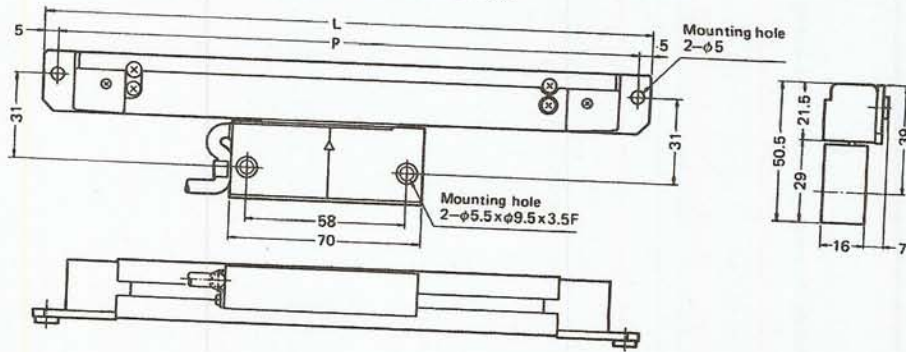
	Type										
	JS1		JS3				JS5				JS6
	1010 1100	1110 1200	3010 3100	3110 3200	3220 3300	3325 3350	5010 5100	5110 5200	5220 5300	5325 5350	6020 6050
Hexagon socket head bolt											
M5 x 16			3	4	5	6	3	4	5	6	
M4 x 8		1									
M4 x 12	2	2									2
22	2	2	2	2	2	2	2	2	2	2	2
30	2	2									2
⊕ Pan head screw											
M3 x 6	2	2	2	2	2	2					2
M3 x 10	4	4	4	4	4	4	3	3	3	3	4
M2.5 x 3							2	2	2	2	
Flat washer											
For M5			3	4	5	6	3	4	5	6	
For M4	4	5	2	2	2	2	2	2	2	2	4
For M3	6	6	6	6	6	6	3	3	3	3	6
Spring washer											
For M5			3	4	5	6	3	4	5	6	
For M4	2	3									2
Thickness gauge											
1 mm	1	1									1
2.5 mm			1	1	1	1	1	1	1	1	
Cable retainer											
φ8	3	3	3	3	3	3	3	3	3	3	3
φ5	1	1	1	1	1	1					1
Allen wrench											
For M4	1	1	1	1	1	1	1	1	1	1	1
For M5			1	1	1	1	1	1	1	1	

[8] EXTERNAL VIEW DRAWING AND LIST OF TYPES

JS1 SCALE UNIT (Effective length 100–1000 mm)

JS6 SCALE UNIT (Effective length 200–500 mm)

Unit: mm



JS1

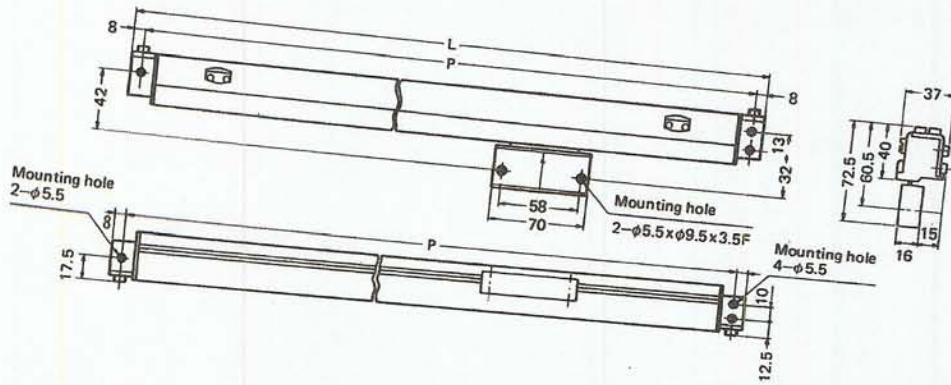
Type		Effective length	Scale overall length	Maximum movable length	Mounting pitch
			L		
JS1010	JS1010H	100	250	120	P
JS1015	JS1015H	150	300	170	240
JS1020	JS1020H	200	350	220	290
JS1025	JS1025H	250	400	270	340
JS1030	JS1030H	300	450	320	390
JS1035	JS1035H	350	500	370	440
JS1040	JS1040H	400	550	420	490
JS1045	JS1045H	450	600	470	540
JS1050	JS1050H	500	650	520	590
JS1055	JS1055H	550	700	570	640
JS1060	JS1060H	600	750	620	690
JS1065	JS1065H	650	800	670	740
JS1070	JS1070H	700	850	720	790
JS1075	JS1075H	750	900	770	840
JS1080	JS1080H	800	950	820	890
JS1085	JS1085H	850	1000	870	940
JS1090	JS1090H	900	1050	920	990
JS1095	JS1095H	950	1100	970	1040
JS1100	JS1100H	1000	1150	1020	1090
					1140

JS6

Type	Effective length	Scale overall length	Maximum movable length	Mounting pitch
		L		
JS6020	200	400	270	P
JS6025	250	450	320	390
JS6030	300	500	370	440
JS6035	350	550	420	490
JS6040	400	600	470	540
JS6045	450	650	520	590
JS6050	500	700	570	640
				690

JS3 SCALE UNIT (Effective length 100–1000 mm)

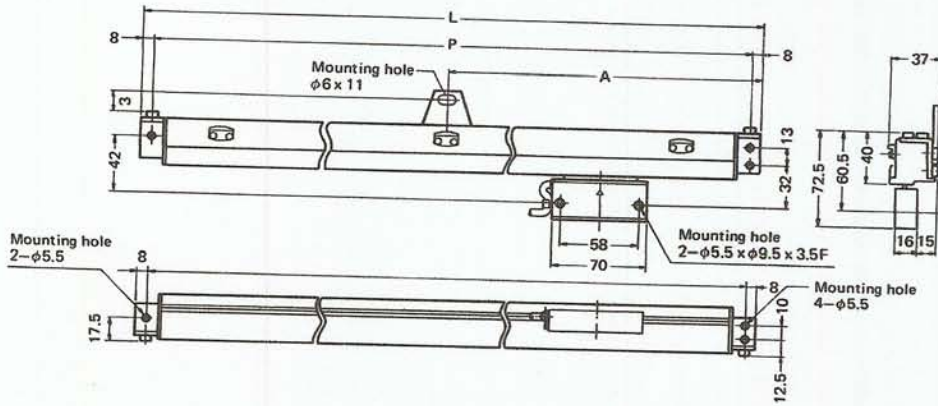
Unit: mm



Type		Effective length	Scale overall length	Maximum movable length	Mounting pitch
			L		
JS3010	JS3010H	100	280	138	264
JS3015	JS3015H	150	330	188	314
JS3020	JS3020H	200	380	238	364
JS3025	JS3025H	250	430	288	414
JS3030	JS3030H	300	510	368	494
JS3035	JS3035H	350	560	418	544
JS3040	JS3040H	400	610	468	594
JS3045	JS3045H	450	660	518	644
JS3050	JS3050H	500	710	568	694
JS3055	JS3055H	550	760	618	744
JS3060	JS3060H	600	810	668	794
JS3065	JS3065H	650	860	718	844
JS3070	JS3070H	700	910	768	894
JS3075	JS3075H	750	960	818	944
JS3080	JS3080H	800	1010	868	994
JS3085	JS3085H	850	1060	918	1044
JS3090	JS3090H	900	1110	968	1094
JS3095	JS3095H	950	1160	1018	1144
JS3100	JS3100H	1000	1210	1068	1194

JS3 SCALE UNIT (Effective length 1100–2000 mm)

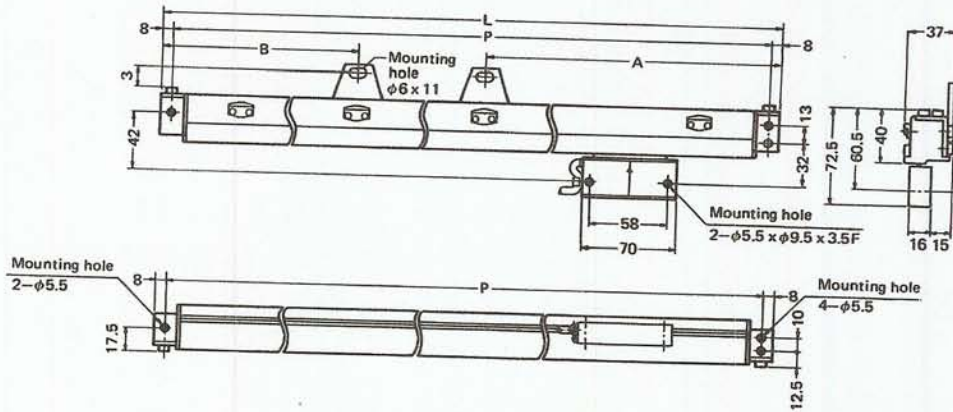
Unit: mm



Type		Effective length	Scale overall length	Maximum movable length	Mounting pitch	Location of hole on mounting board
			L		P	A
JS3110	JS3110H	1100	1310	1168	1294	666
JS3120	JS3120H	1200	1410	1268	1394	716
JS3130	JS3130H	1300	1510	1368	1494	766
JS3140	JS3140H	1400	1610	1468	1594	816
JS3150	JS3150H	1500	1710	1568	1694	866
JS3160	JS3160H	1600	1810	1668	1794	916
JS3170	JS3170H	1700	1910	1768	1894	966
JS3180	JS3180H	1800	2010	1868	1994	1016
JS3190	JS3190H	1900	2110	1968	2094	1066
JS3200	JS3200H	2000	2210	2068	2194	1116

JS3 SCALE UNIT (Effective length 2200–3000 mm)

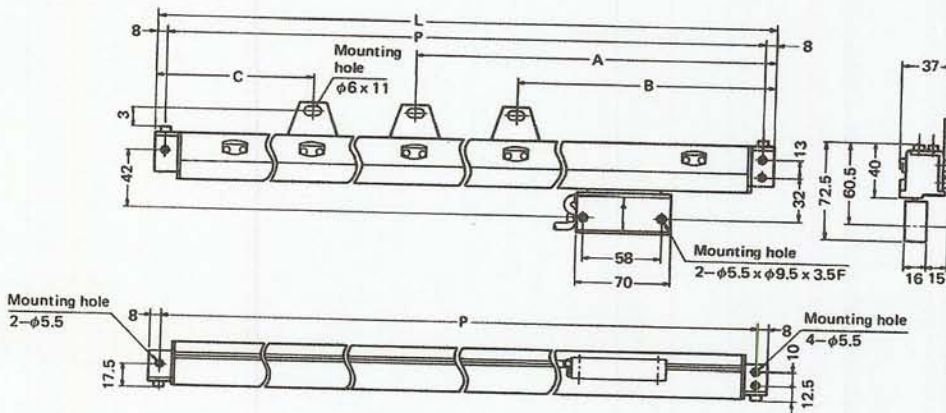
Unit: mm



Type	Effective length	Scale overall length	Maximum movable length	Mounting pitch	Location of hole on mounting board A	Location of hole on mounting board B
		L		P	A	B
JS3220	2200	2410	2268	2394	827	875
JS3240	2400	2610	2468	2594	894	942
JS3260	2600	2810	2668	2794	960	1008
JS3280	2800	3010	2868	2994	1027	1075
JS3300	3000	3210	3068	3194	1094	1142

JS3 SCALE UNIT (Effective length 3250–3500 mm)

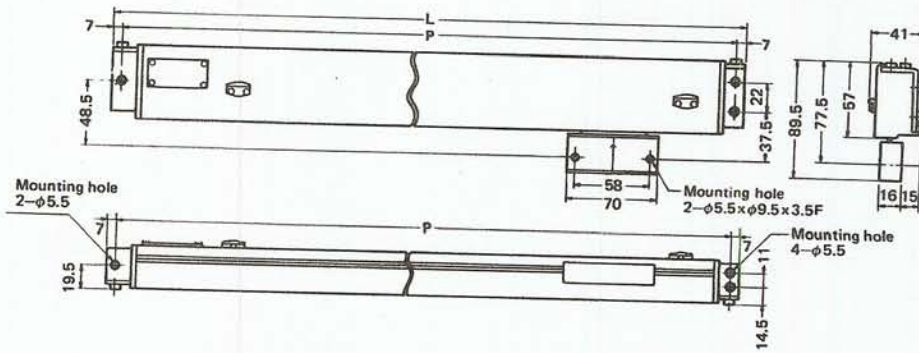
Unit: mm



Type	Effective length	Scale overall length	Maximum movable length	Mounting pitch	Location of hole on mounting board A	Location of hole on mounting board B	Location of hole on mounting board C
		L		P	A	B	C
JS3325	3250	3460	3318	3444	1741	895	943
JS3350	3500	3710	3568	3694	1866	957	1022

JS5 SCALE UNIT (Effective length 100–1000 mm)

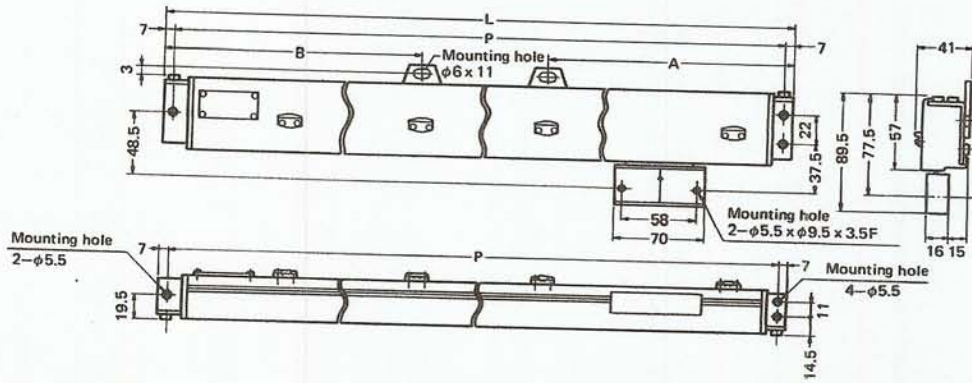
Unit: mm



Type		Effective length	Scale overall length	Maximum movable length	Mounting pitch
			L		P
JS5010	JS5010H	100	330	138	316
JS5015	JS5015H	150	380	188	366
JS5020	JS5020H	200	430	238	416
JS5025	JS5025H	250	480	288	466
JS5030	JS5030H	300	560	368	546
JS5035	JS5035H	350	610	418	596
JS5040	JS5040H	400	660	468	646
JS5045	JS5045H	450	710	518	696
JS5050	JS5050H	500	760	568	746
JS5055	JS5055H	550	810	618	796
JS5060	JS5060H	600	860	668	846
JS5065	JS5065H	650	910	718	896
JS5070	JS5070H	700	960	768	946
JS5075	JS5075H	750	1010	818	996
JS5080	JS5080H	800	1060	868	1046
JS5085	JS5085H	850	1110	918	1096
JS5090	JS5090H	900	1160	968	1146
JS5095	JS5095H	950	1210	1018	1196
JS5100	JS5100H	1000	1260	1068	1246

JS5 SCALE UNIT (Effective length 2200–3000 mm)

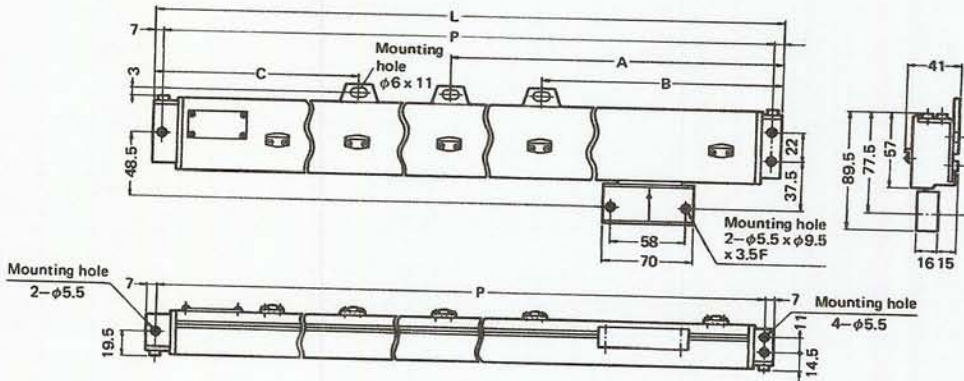
Unit: mm



Type	Effective length	Scale overall length	Maximum movable length	Mounting pitch	Location of hole on mounting board A	Location of hole on mounting board B
		L			A	B
JS5220	2200	2460	2268	2446	849	833
JS5240	2400	2660	2468	2646	916	900
JS5260	2600	2860	2668	2846	982	966
JS5280	2800	3060	2868	3046	1049	1033
JS5300	3000	3260	3068	3246	1116	1100

JS5 SCALE UNIT (Effective length 3250–3500 mm)

Unit: mm



Type	Effective length	Scale overall length	Maximum movable length	Mounting pitch	Location of hole on mounting board A	Location of hole on mounting board B	Location of hole on mounting board C
		L			A	B	C
JS5325	3250	3510	3318	3496	1763	917	901
JS5350	3500	3760	3568	3746	1888	979	963



(Head Office)

SOKKI ELECTRONICS CORPORATION

2-11-13, Shibuya, Shibuya-ku, Tokyo 150, Japan

Phone: 03-409-6221

Fax.: 03-409-6225

Telex: 34381 SOKKICO J

(U.S.A. Office)

SOKKI ELECTRONICS USA INC.

Howard O'hare Business Court, Unit No. 236
200 East Howard Street, Des Plaines,
IL 60018, USA.

Phone: 312-298-7510

Fax.: 312-298-3460