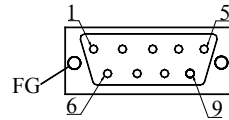


In the development and production of the KA series linear rulers, the company emphasizes both the optimal structure for easy installation, application and service, and the improvement of product precision. The product features up-to-standard accuracy, good rigidity, flatness and hermetically, rational design and elegant style. The modular accessories and spare parts save the user much installation time and even nonprofessional personnel may install and service the product. Please read the following chapters prior to use.

1. Technical Parameters

- a. Pitch: 0.02mm (50 lines/mm)
- b. Resolution: .05 μ m, 1 μ m and 5 μ m
- c. Accuracy: $\pm 3\mu$ m, $\pm 5\mu$ m and $\pm 10\mu$ m (20 $^{\circ}$ C)
- d. Range: 70 ~ 3000mm
- e. Max. Speed: 60 or 120m/min
- f. Working Voltage: +5V ($\pm 5\%$) 80mA
- g. Cable Length: 3m (various length available upon request)
- h. Working Temperature: 0 ~ 45 $^{\circ}$ C
- i. Plug Pin

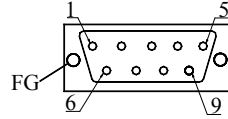


- 1) Applicable to the EIA-442-A signals output of KA-300, KA-500 and KA-600 NC raster rulers employing 9-pin sockets.

Pin	1	2	3	4	5	6	7	8	9
Signal	\bar{A}	OV	\bar{B}	Null	\bar{Z}	A	+5V	B	Z
Color	Green	Black	Blue	Red	Brown	Yellow	Pink	Orange	White

FG: Connected to metal case for shielding.

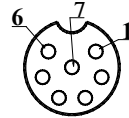
2) Applicable to the TTL signal output of KA-300, KA-500 and KA-600 raster rulers employing 9-pin sockets.



Pin	1	2	3	4	5	6	7	8	9
Signal	Null	OV	Null	Null	Null	A	+5V	B	Z
Color		Black				Green	Brown	Orange	White

FG: connected to metal case for shielding.

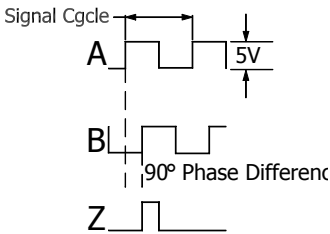
3) Applicable to the TTL signal output of KA-300, KA-500 and KA-600 NC raster rulers employing 7-pin sockets.



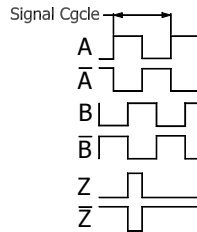
Pin	1	2	3	4	5	6	7
Signal	OV	Null	A	B	+5V	Z	Screen
Color	Black		Green	Orange	Brown	White	

j. Signal Oscillogram

The TTL signal output:



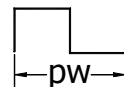
The EIA-442-A signal output:



k. Zero-Point Position: one every 500mm.

j. Cycle of the pulse signal output by grate scale (pw)

Resolution	Equivalent weight(pw)
5μm	20μm
1μm	4μm
0.5μm	2μm



2. Ruler Structure:

The raster ruler is composed mainly of the ruler assembly and the reading head assembly (See Fig. 1).

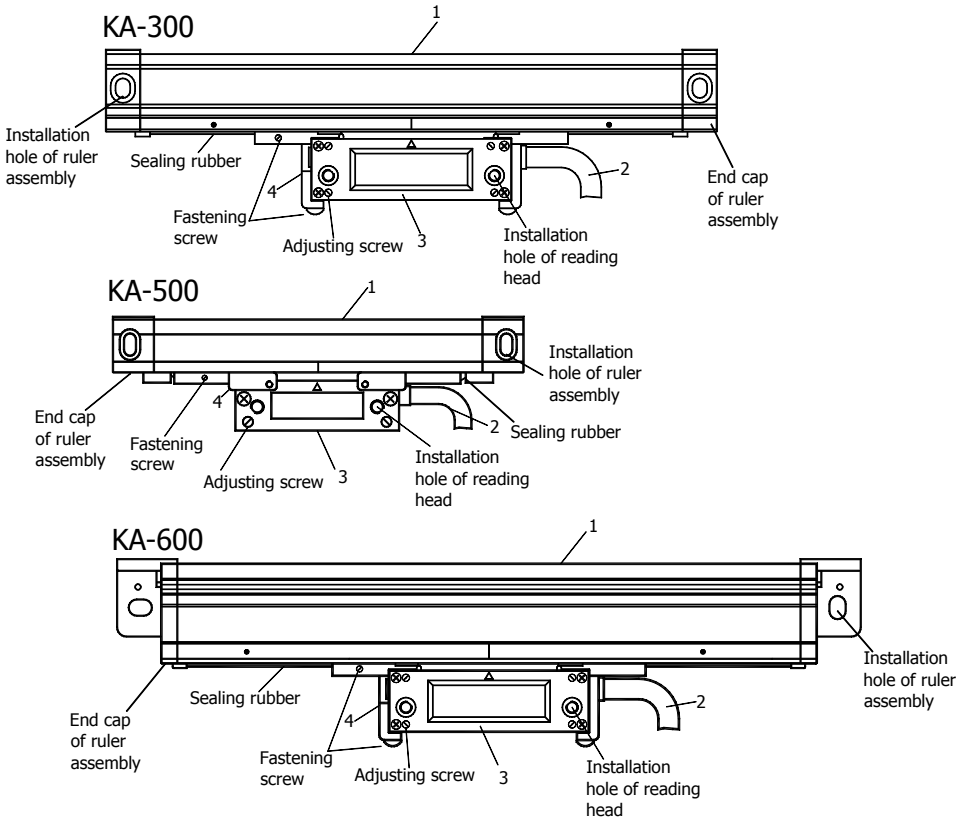


Fig.1

1. Ruler Assembly
2. Cable
3. Reading Head
4. Fixed Junction Plate for Reading Head

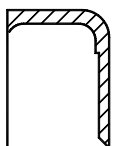
3. Spare Parts

In order to install and apply the rulers in various places, the company designs the following spare parts for them.

- 3.1 Cover Type A, for installation on finished surface, oil resistant and scrap proof (See Fig. 2).
- 3.2 Cover Type B and H, for installation on finished or unfinished surface, oil resistant and scrap proof, applicable to installation surface shorter than rulers, contributive to the ruler rigidity (See Fig. 3 and Fig. 7).
- 3.3 Economical Cover Type C, I and J, for installation on finished surface, a little inferior to Type A in liquid and scrap resistance (See Fig. 4, Fig. 8 and Fig. 10).
- 3.4 Economical Cover Type D and G, for installation on finished or unfinished surface, applicable to installation surface shorter than rulers, a little inferior to Type B and H in liquid and scrap resistance, contributive to the ruler rigidity (See Fig. 5).
- 3.5 Bearing Plate, for installation on finished or unfinished surface or surface shorter than rulers, contributive to ruler rigidity, not resistant to oil or scrap (See Fig. 6 and Fig. 9).

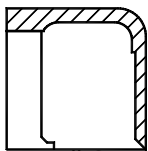
The user may select suitable parts according to the working environment and the installation condition.

KA-300:



Semi Cove
KA-300-A

Fig. 2



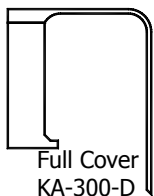
Full Cover
KA-300-B

Fig. 3



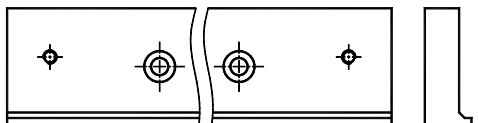
Semi Cover
KA-300-C

Fig. 4



Full Cover
KA-300-D

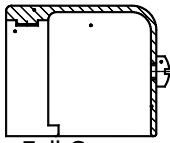
Fig. 5



Bearing Plate KA-300-PJ-/

Fig. 6

KA-500:



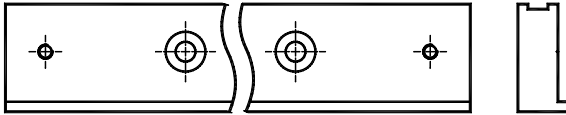
Full Cover
KA-500-H

Fig. 7



Semi Cove
KA-500-I

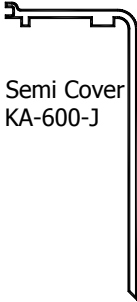
Fig. 8



Bearing Plate KA-500-PJ-B

Fig. 9

KA-600:



Semi Cover
KA-600-J

Fig. 10

4. Installation

4.1 Installation Dimension

Dimensions of KA-300 Raster Ruler

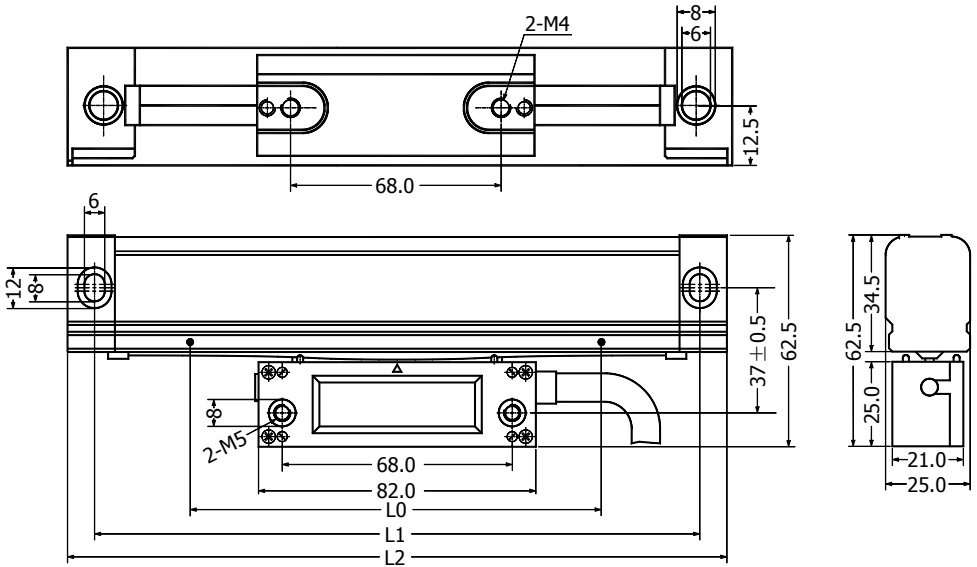


Fig. 11

Model	L0	L1	L2	Model	L0	L1	L2
KA300-70	70	160	176	KA300-570	570	660	676
KA300-120	120	210	226	KA300-620	620	710	726
KA300-170	170	260	276	KA300-670	670	760	776
KA300-220	220	310	326	KA300-720	720	810	826
KA300-270	270	360	376	KA300-770	770	860	876
KA300-320	320	410	426	KA300-820	820	910	926
KA300-370	370	460	476	KA300-870	870	960	976
KA300-420	420	510	526	KA300-920	920	1010	1026
KA300-470	470	560	576	KA300-1020	1020	1110	1126
KA300-520	520	610	626				

Dimensions of KA-500 Raster Ruler

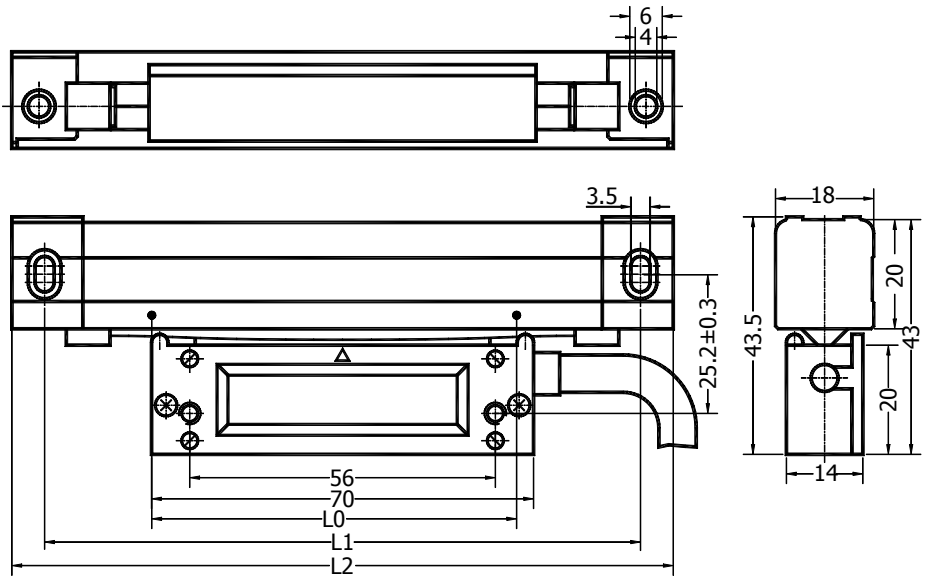


Fig. 12

Model	L0	L1	L2	Model	L0	L1	L2
KA500-70	70	172	182	KA500-320	320	422	432
KA500-120	120	222	232	KA500-370	370	472	482
KA500-170	170	272	282	KA500-420	420	522	532
KA500-220	220	322	332	KA500-470	470	572	582
KA500-270	270	372	382				

Dimensions of KA-600 Raster Ruler

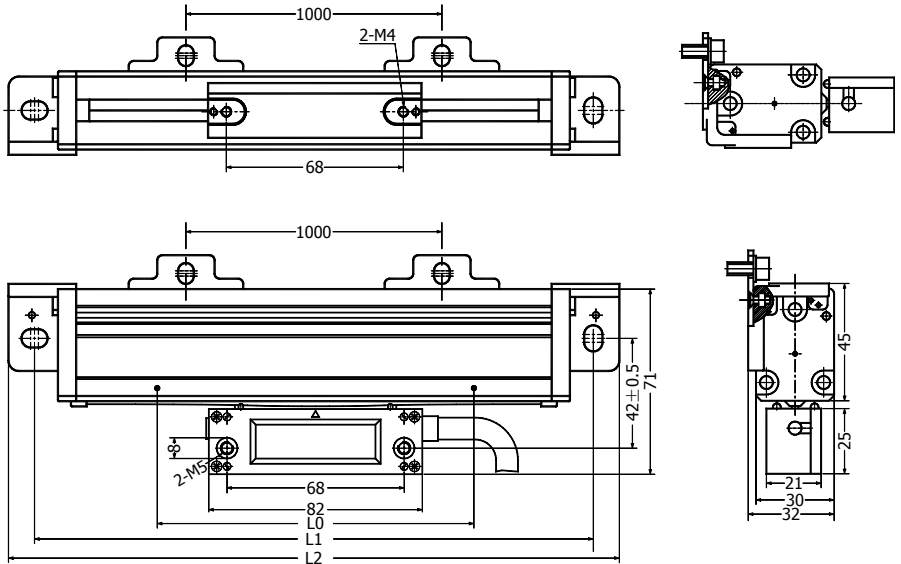


Fig. 13

Model	L0	L1	L2	Model	L0	L1	L2
KA600-1000	1000	1150	1170	KA600-2100	2100	2250	2270
KA600-1100	1100	1250	1270	KA600-2200	2200	2350	2370
KA600-1200	1200	1350	1370	KA600-2300	2300	2450	2470
KA600-1300	1300	1450	1470	KA600-2400	2400	2550	2570
KA600-1400	1400	1550	1570	KA600-2500	2500	2650	2670
KA600-1500	1500	1650	1670	KA600-2600	2600	2750	2770
KA600-1600	1600	1750	1770	KA600-2700	2700	2850	2870
KA600-1700	1700	1850	1870	KA600-2800	2800	2950	2970
KA600-1800	1800	1950	1970	KA600-2900	2900	3050	3070
KA600-1900	1900	2050	2070	KA600-3000	3000	3150	3170
KA600-2000	2000	2150	2170				

L0: Effective metering length

L1: Distance between installation holes

L2: Full ruler length

Attentions:

- a. The selection of the gauged ruler length depends on the travel length of the machine. The gauged ruler length shall be longer than the maximum travel length of the machine.**
- b. Proper spare parts shall be adopted according to the given installation length and surface.**
- c. The KA-600 ruler shall be equipped with a hook every 1000mm, i.e. 2 for $1000 \leq L < 2000$, 3 for $2000 \leq L < 3000$ and 4 for $L = 3000$.**

4.2 Priorities in Installation

The ruler shall use the leading rail of the machine as datum and be installed in parallel to it.

- a. The center of the ruler range shall be aligned to that of the travel length of the machine and the ruler range shall be able to cover the maximum travel length of the machine.
- b. The ruler shall be installed in the proximity of the transmission screw of the machine. In most cases, the installed ruler assembly shall move together with the working platform and the reading head is fixed on the machine.
- c. The installed ruler shall not obstruct the operation of the machine or compromise the machine's performance.
- d. The installed ruler shall not be exposed to any threat of knocks. During the production, the ruler shall not stand in the way of the machine handles, brakes or other outstanding parts and shall not be touched when loading or unloading work pieces.
- e. The ruler shall be installed vertically or horizontally as shown in Fig. 14. Never install it upside down (with the reading head over the ruler assembly). The sealing rubber of the ruler assembly must be kept away from the cooling oil nozzle of the machine.

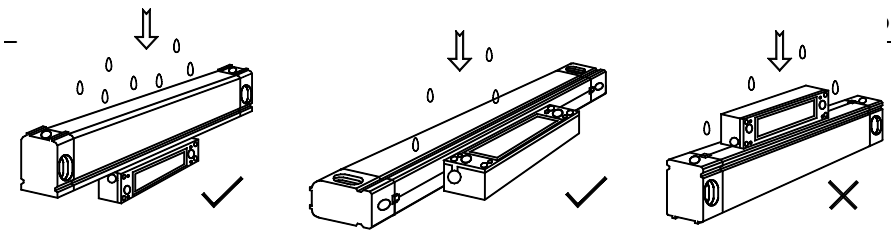


Fig. 14

4.3 Installation of the Ruler and Ruler Cover

(1) Installation of Rulers with Cover Type A

- a. Choose the proper installation position
- b. Mark out and drill M4 screw holes on the installation surface according to the given installation length.
- c. Install the ruler assembly to the installation surface loosely, check with a micrometer the parallelism of the ruler to the machine's leading rail, and adjust the parallelism well. (See Fig. 15)
- d. Wrench tight the ruler assembly to the installation surface.
- e. Adjust the fastening screws of the reading head till they touch the installation surface.
- f. Drill M4 screw holes in line with the installation holes of the reading head.
- g. Wrench tight the reading head and remove the junction plate.
- h. Drill M4 screw holes in line with the installation holes of the ruler cover.
- i. Fix the cover to the installation surface and wrench tight.

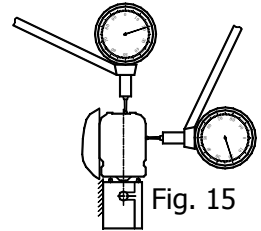
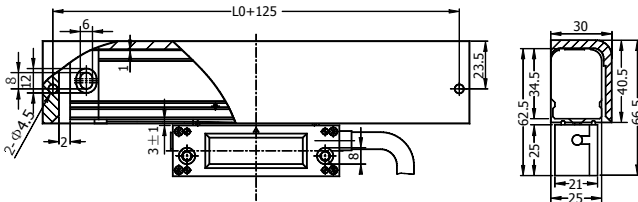


Fig. 15

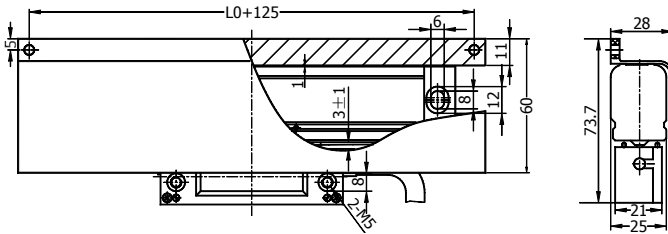


For installation dimensions, see Fig. 17, Fig. 18 and Fig. 19.

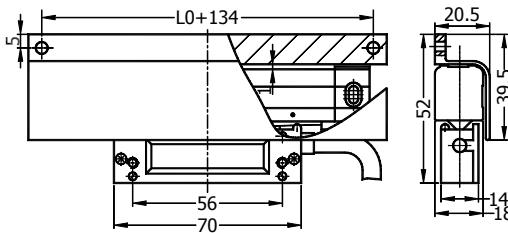
(2) Installation of Rulers with Cover Type C, I and J

See Installation of Rulers with Cover Type A.

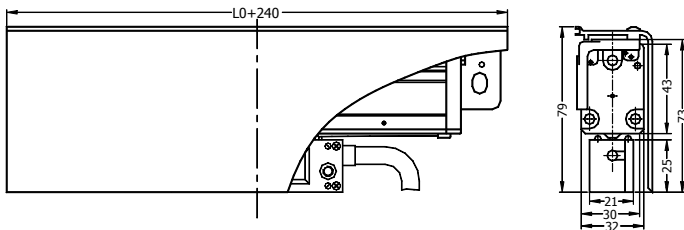
Ruler with Cover KA-300C:



Ruler with Cover KA-500I:



Ruler with Cover KA-600J:



For installation dimensions, see Fig. 17, Fig. 18 and Fig. 19.

(3) Installation of Rulers with Cover Type B

- Choose the proper installation position
- Mark out and drill M4 screw holes on the installation surface according to the installation dimension of ruler cover type B.
- Fix the strengthening plate of the cover to the installation surface loosely, check with a micrometer the parallelism of the ruler to the machine's leading rail, and adjust the parallelism well (See Fig. 16).

- d. Wrench tight the strengthening plate to the installation surface.
- e. Install the ruler assembly to the strengthening plate.
- f. Adjust the fastening screws of the reading head till they touch the installation surface.
- g. Drill M4 screw holes in line with the installation holes of the reading head.
- h. Wrench tight the reading head and remove the junction plate.
- i. Drill M4 screw holes in line with the installation holes of the ruler cover.
- j. Fix the cover to the strengthening plate and wrench tight.

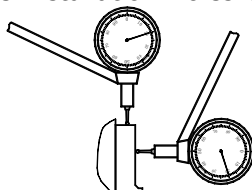
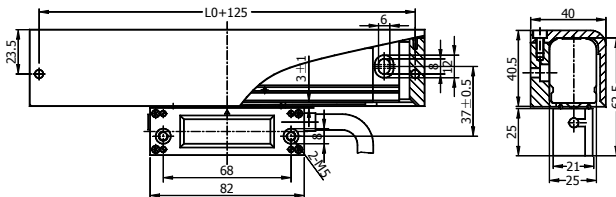


Fig. 16

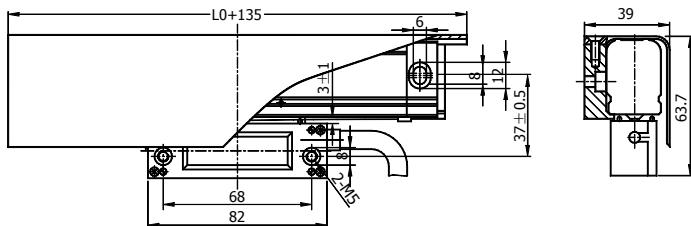


For installation dimensions, see Fig. 17, Fig. 18 and Fig. 19.

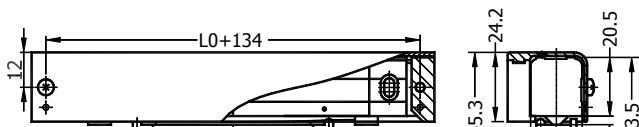
(4) Installation of Rulers with Cover Type D and G

See Installation of Rulers with Cover Type B and H.

Ruler with Cover KA-300D:



Ruler with Cover KA-500G:



For installation dimensions, see Fig. 17, Fig. 18 and Fig. 19.

KA-300:

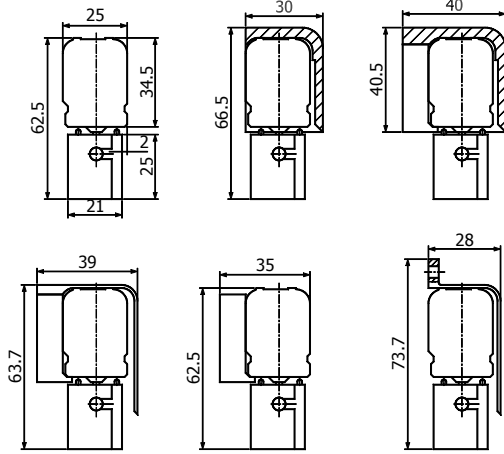


Fig. 17

KA-500:

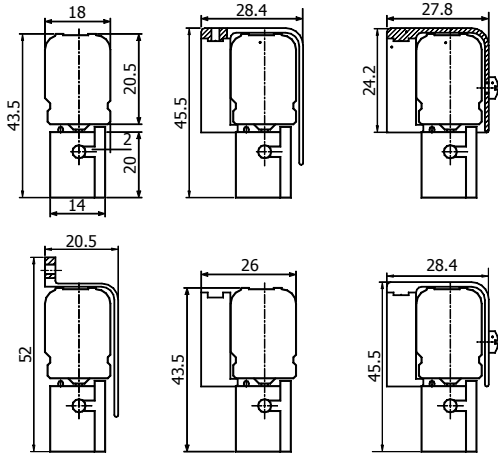


Fig. 18

KA-600:

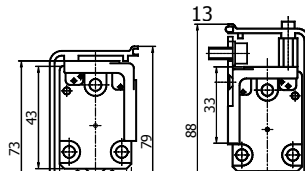


Fig. 19

4.4 Installation of the Reading Head

The reading head can be installed on finished or unfinished surface in a normal or converse way. Only in case of limited installation space, can it be installed conversely.

(1) Normal Installation

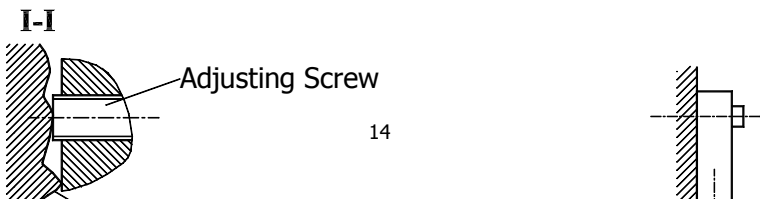
Fig. 20 illustrates the normal installation of the reading head. For installation procedure, see Installation of Ruler and Ruler Cover.

(2) Converse Installation

Fig. 21 illustrates the converse installation of the reading head. The installation procedure is given below:

Note: The following are rather typical installations of the device. The users may make their own combination and arrangement according to the actual situation.

- a. Fix a T frame (optional) to the machine.
- b. Remove the fixed junction plate of the reading head.
- c. Adjust the fastening screws of the T frame installation plate till they touch the reading head.
- d. Fix the reading head with M5 screws to the T frame installation plate.
- e. Adjust the T frame plates till the relative position of the reading head to the ruler assembly is as shown in Fig 21.
- f. Install the ruler by making use of the T frame (See Fig. 22 – Fig. 31. A: Plate A of T frame; B: Plate B of T frame; C: Extension plate C of T frame; D: Extension plate D of T frame; and E: Part E of T frame).



Unfinished Installation Surface

Adjusting Screw

Fig. 21

Fig. 20

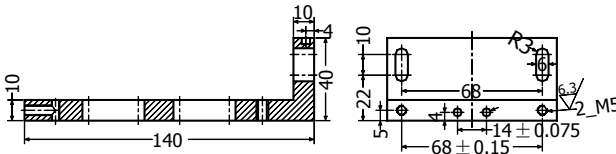


Plate A of T Frame

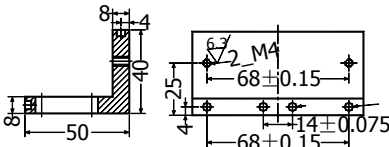
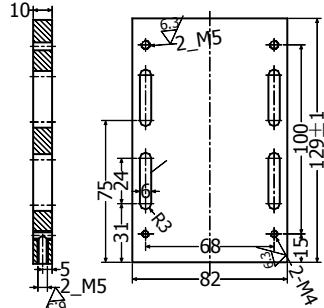
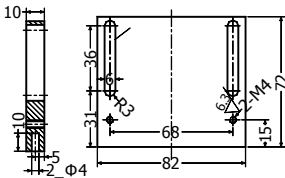


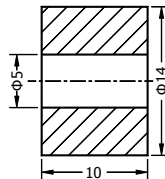
Plate B of T Frame



Extension Plate C of T Frame



Extension Plate D of T Frame



Part E of T Frame

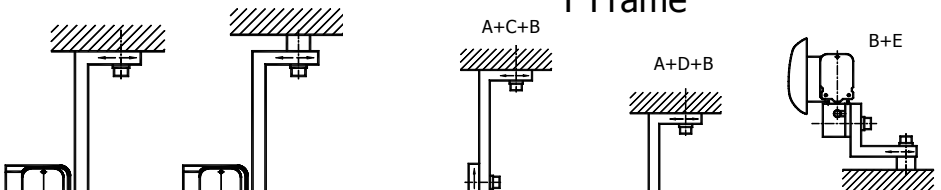


Fig. 22

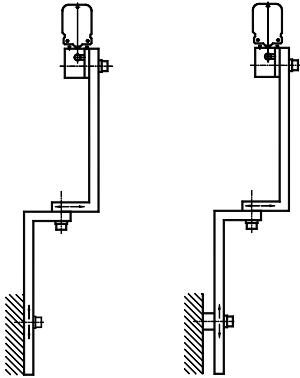


Fig. 23

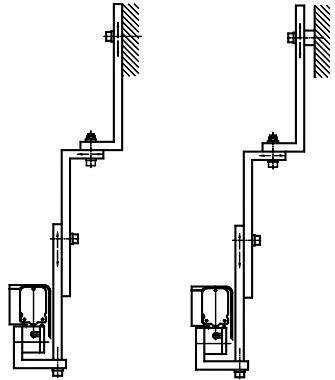


Fig. 24

Fig. 25

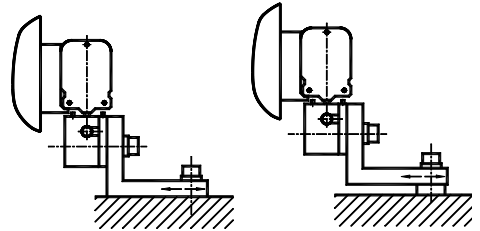
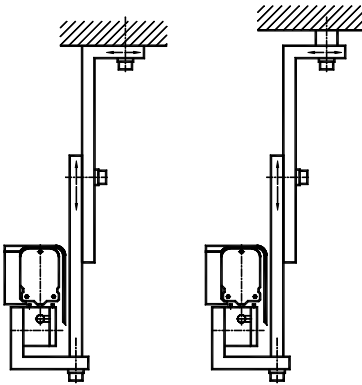


Fig. 26

Fig. 27

Figures above applicable to installation of KA-300 and KA-600 rulers

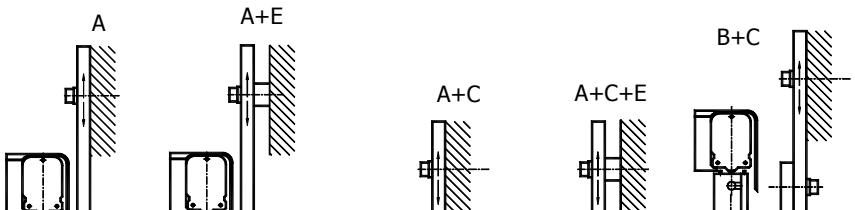


Fig. 28

Figures above applicable to installation of KA-300 and KA-600 rulers

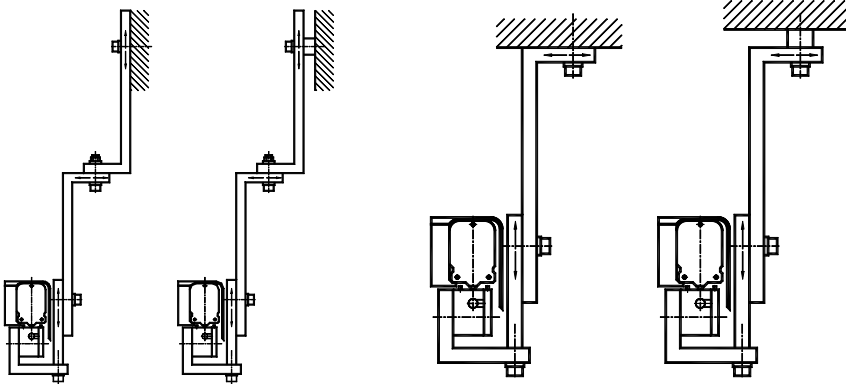


Fig. 29

Fig. 30

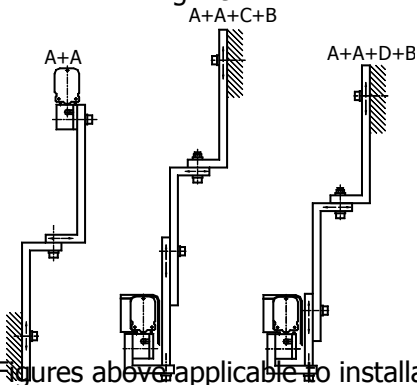


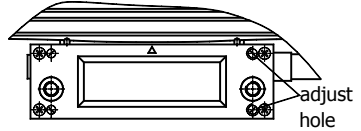
Fig. 31

Figures above applicable to installation of KA-300 and KA-600 rulers

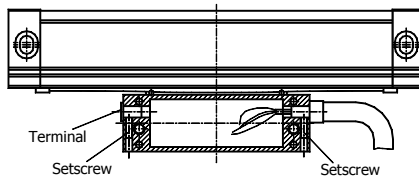
4.5 Rearrangement of Reading Head Cable

The cable of the reading head is arranged on the right in the factory. If it is inconvenient for use, the user may rearrange it in another direction in the following procedure:

- (1) Take out four M2 "+" setscrew in the figure cover and two M3 "-" bolt on the right of the cover.
- (2) M4 hexagram bolt into the adjust screw holt and please do this one by one for flab the cover board which has airproof bar at the top, when noticing the gap. Please pry the cover board along the top by the screwdriver.
- (3) Loose two M3 "-" bolt of the moor cable, remove the cable and end. Exchange the favor.
- (4) Before covering the cover board, you must clean the old airproof bar and wipe the new one, if do not have the new one, you can use butter order to instead of that, but the effect is not so good, only in support.
- (5) Take out of six M4 hexagram bolt, screw down the setscrew, fit on the cover board and the cover board bolt and adjust bolt.



Note: The tools usr in taking down in each step is partnership, avoiding the screw head sleeking.



5. Checking and accepting Tenet

- 5.1 The reading head join well enough, it shake headlong, you can notice that the data in the will appear have a little difference,

but if unlashed it, the figure of the is go back to the customary value.

5.2 The reading head is in the center of the scales. Make airproof bar symmetry. Following by Fig32, Fig 33 and Fig 34.

5.3 The reading head's place for ruler is like Fig32, Fig 33 and Fig 34.

5.4 The reading head's connecting ban can make sure that the reading head is stand in the middle of the scales for the place of the ruler body.

