MK Series

Closed linear grating scale

GUANGDONG GDXH DIGITAL READOUTS Co.,Ltd.

Directory

General Description

Many thanks for your use of this series of encoder. It is China's most famous international brand. It will be your best bet once you choose it. We are a professional factory dedicated to manufacture of encoder numerical display. By continuous modification and improvement through years of research and production, we have developed today's MK series linear encoder. The MK series encoder under this manual includes MK-300, MK-600, MK-500. which can meet the requirements in different applications.

MK-300 is a type of encoder with wide applications. It features in optimal structure, good appearance and high rigidity, able to meet the needs of the majority of general machine users. The length is 70~1020mm.

MK-600 encoder, which is specifically designed for large machine tool, features in large size and good rigidity. Support may be added to any position of the encoder to enhance the rigidity and stability. The length is 1000~3000mm.

MK-500 is a mini-encoder specially designed for the machine tool which has a low installation size and small operation space. It can meet the needs of those customers who have requirements for position. The length is 70~470mm.

Operating Guideline

- Before use, the user must read the General Description, Safety Considerations and all the contents in Chapter1~3.
- Except the General Description, Safety Considerations and all the contents in Chapter 1~3, the technicians for installation, testing and repair must thoroughly understand all the contents in Chapter 4~5.
- This Operating Instructions is only applicable to GDXH's MK series integrated linear encoder.
- Please read the Safety Considerations below. It is critical information related to safe use of your linear encoder.

Safety Considerations

Caution:

- To avoid electric shock or fire, the equipment connected to encoder shall be kept from moisture or direct contact with cooling liquids.
- Encoder is a precision measuring instrument. To ensure its normal function, never expose it to external shock or vibration.

Warning:

- To prevent mal-alignment of encoder and avoid electric shock, never open any seal on encoder. There is no part that needs the user's repair. Please ask the authorized technicians to repair.

Notes :

- If finding any smoke or smell from the reading head, please immediately cut off the power supply. As the encoder connects with the numerical display to form a precision measuring instrument, continued use in event of above phenomena might cause fire or electric shock to the numerical display. Please contact GUANGDONG GDXH DIGITAL READOUTS Co.,Ltd. or its dealer. Never try to repair by yourself.
- Once the wire between numerical display and encoder is broken or damaged during use, it will cause error to the test data. The user shall take special care on this.
- Never try to repair or refit the scale, as it might cause failure, trouble or damage.

CE The displacement sensor complies with 2006/95/EC directive for low-voltage electric apparatus and 2004/108/EC directive for EMC.

In light of the principle focused on easy installation, use and maintenance by the user, GUANGDONG GDXH DIGITAL READOUTS Co.,Ltd. has developed MK series linear encoder based on the condition of optimized structure and guaranteed precision. With a precision conforming to standard, this product features in good rigidity, straightness, sealing and appearance. The accessories and spare parts are easy to install and repair, resulting in largely reduced installation labors. Please read the following chapters thoroughly, so that you may use this device more easily.

1 · Technical Parameter

1.1 Scaling distance: 0.02 mm (50lines /mm)

1.2 Resolution: 5μm、1μm、0.5μm

1.3 1.3 Precision: ±3μm、±5μm、±15μm/m（20±0.1℃）

1.4 Measuring range: 70~3000mm

1.5 Moving speed: High-speed encoder 120 m/min(To be customized)

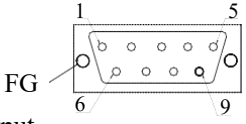
Ordinary encoder 60m/min

1.6 Power supply: +5V±5%、80mA

1.7 Cable length: Standard 3m (Special length available according to the user's needs)1

1.8 Working Temperature: 0~45℃

1.9 9 Pin Description:



1) Applicable to:9 pin socket RS-422 signal Output.

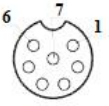
Pin Position	1	2	3	4	5	6	7	8	9
Signal	$\overline{A}$	*0V*	*B*	Empty	$\overline{Z}$	*A*	+5V	*B*	*Z*
Color	Green Black	Black	Orange black	FG	White black	Green	Red	Orange	White

FG: Shield connected to metal casing.

2) Applicable to: 9 pin socket TTL signal Output.

Pin Position	1	2	3	4	5	6	7	8	9
Signal	Empty	*OV*	Empty	Empty	Empty	*A*	+5V	*B*	*Z*
Color	—	Black	—	FG	—	Green	Red	Orange	White

FG: Shield connected to metal casing.

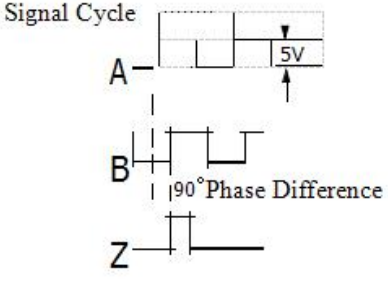


3) Applicable to: 7 pin socket TTL signal Output.

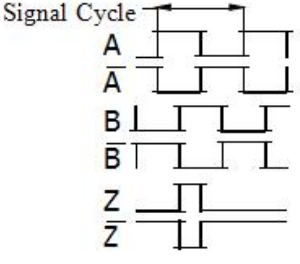
Pin Position	1	2	3	4	5	6	7
Signal	*OV*	Empty	*A*	*B*	+5V	*Z*	Shield
Color	Black	—	Green	Orange	Red	White	—

1.10 Signal Waveform

TTL signal Output:



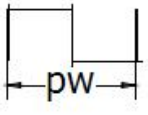
RS-422 signal Output:



1.11 Encoder Zero Position: 1 every 50mm

1.12 Output pulse signal cycle of encoder PW

Resolution	Equivalent per pulse PW
5μm	20μm
1μm	4μm
0.5μm	2μm



2. Encoder Structure:

The encoder mainly consists of scaling body and reading head, as shown in Fig.1:

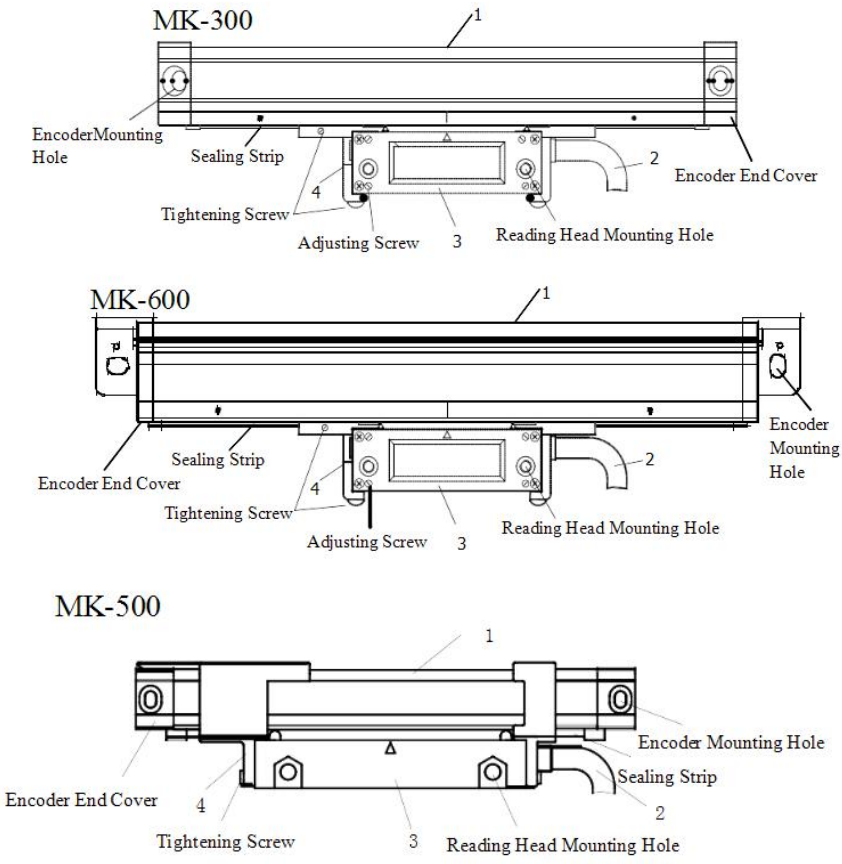


Fig. 1

1. Scaling body 2. Cable 3. Read head 4. Connection plate fixing the reading head

3. 3. Optional Parts

To install and use the encoder normally under different conditions, we have designed the following spare parts:

MK-300:

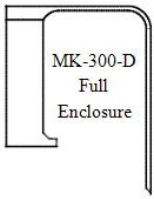


Fig. 2

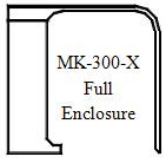


Fig. 3

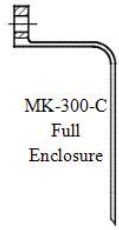
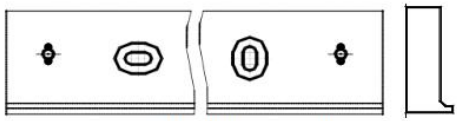


Fig. 4



MK-300 Supporting Plate

Fig. 5

MK-600:

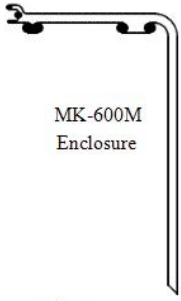
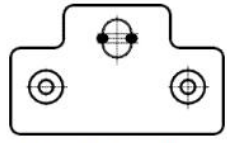


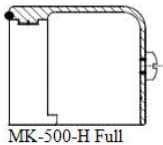
Fig. 7



MK600 Hanging Plate

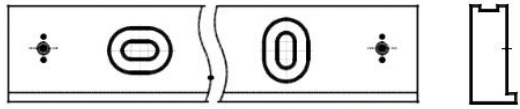
Fig. 8

MK-500:



MK-500-H Full Enclosure

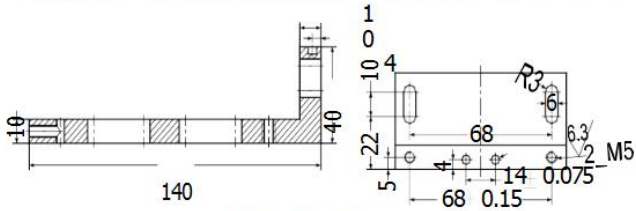
Fig.9



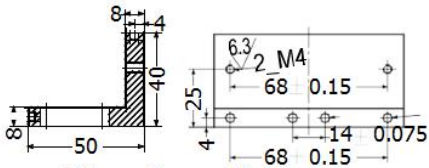
MK-500 Supporting Plate

Fig. 10

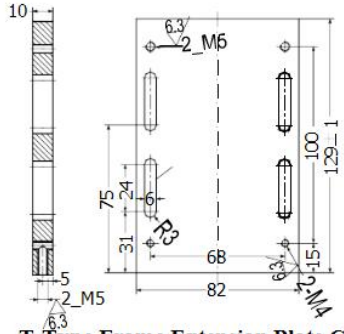
General Parts for Installation: T-Type Frame A, B, C, D, E



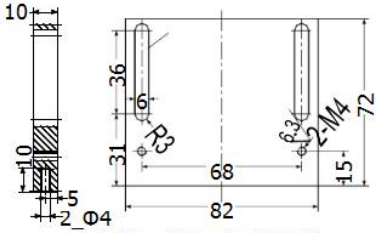
T-type Frame A



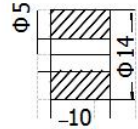
T-type Frame B



T-Type Frame Extension Plate C



T-Type Extension Plate D



T-Type Frame E

Fig. 15

4. Installation

4.1 Installation Dimension

Overall Dimension of MK-300 Encoder

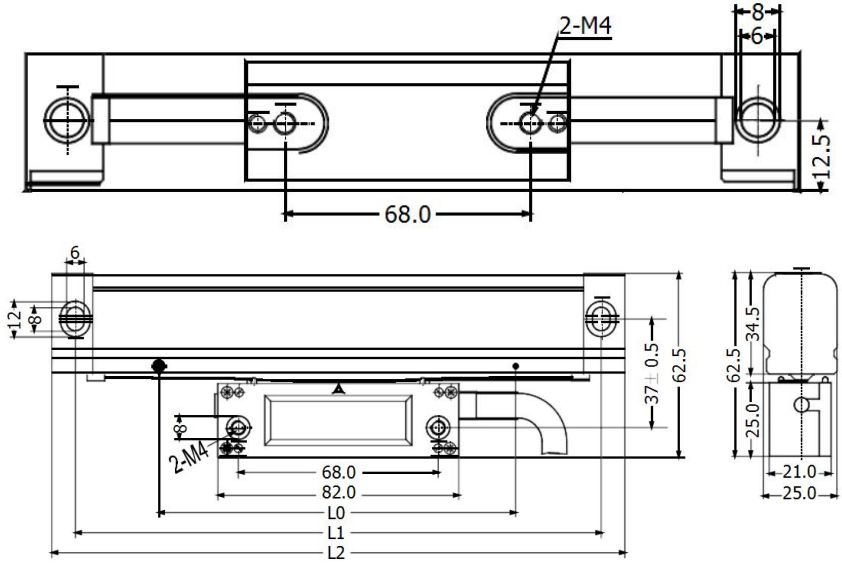


Fig.16

Model	L0	L1	L2	Model	L0	L1	L2
MK300-70	70	160	176	MK300-570	570	660	676
MK300-120	120	210	226	MK300-620	620	710	726
MK300-170	170	260	276	MK300-670	670	760	776
MK300-220	220	310	326	MK300-720	720	810	826
MK300-270	270	360	376	MK300-770	770	860	876
MK300-320	320	410	426	MK300-820	820	910	926
MK300-370	370	460	476	MK300-870	870	960	976
MK300-420	420	510	526	MK300-920	920	1010	1026
MK300-470	470	560	576	MK300-970	970	1060	1076
MK300-520	520	610	626	MK300-1020	1020	1110	1126

L0: Effective measuring length of encoder L1: Dimension of encoder mounting hole L2: Encoder overall dimension

Overall Dimension of MK-600 Encoder

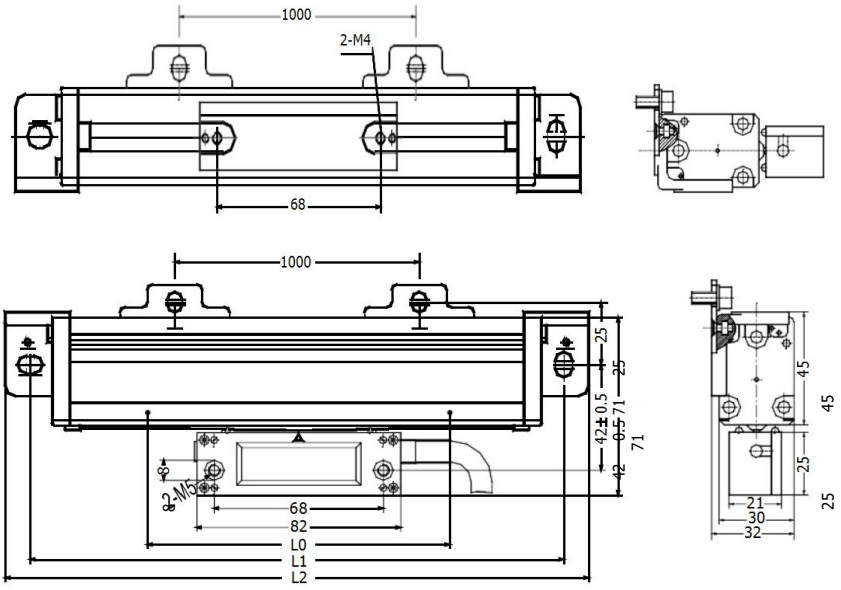


Fig.17

Model	L0	L1	L2	Model	L0	L1	L2
MK600-1000	1000	1150	1170	MK600-2100	2100	2250	2270
MK600-1100	1100	1250	1270	MK600-2200	2200	2350	2370
MK600-1200	1200	1350	1370	MK600-2300	2300	2450	2470
MK600-1300	1300	1450	1470	MK600-2400	2400	2550	2570
MK600-1400	1400	1550	1570	MK600-2500	2500	2650	2670
MK600-1500	1500	1650	1670	MK600-2600	2600	2750	2770
MK600-1600	1600	1750	1770	MK600-2700	2700	2850	2870
MK600-1700	1700	1850	1870	MK600-2800	2800	2950	2970
MK600-1800	1800	1950	1970	MK600-2900	2900	3050	3070
MK600-1900	1900	2050	2070	MK600-3000	3000	3150	3170
MK600-2000	2000	2150	2170				

L0: Effective measuring length of encoder L1: Dimension of encoder mounting hole L2: Encoder overall dimension

Overall Dimension of MK-500 Encoder

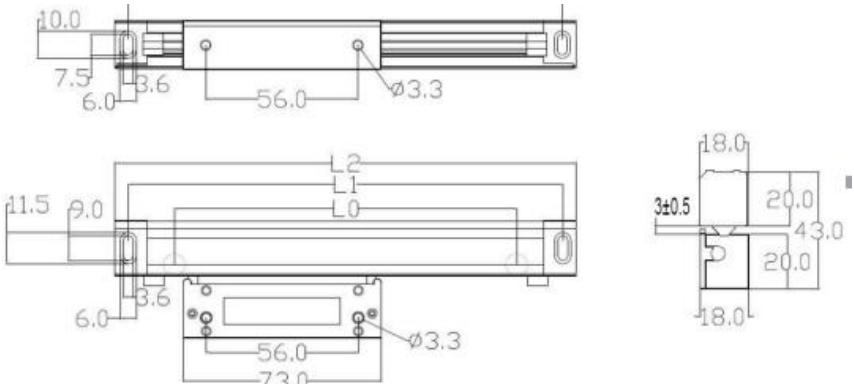


Fig.18

Model	L0	L1	L2	Model	L0	L1	L2
MK500-70	70	172	182	MK500-320	320	422	432
MK500-120	120	222	232	MK500-370	370	472	482
MK500-170	170	272	282	MK500-420	420	522	532
MK500-220	220	322	332	MK500-470	470	572	582
MK500-270	270	372	382				

L0: Effective measuring length of encoder L1: Dimension of encoder mounting hole L2: Encoder overall dimension

Note: (1) Select the measuring range of encoder according to the travel of machine tool. The measuring range of encoder must be higher than the maximum travel of the machine tool.

(2) Select proper parts according to the length and mounting plane provided.

(3) The hanging plate needed for MK-600 encoder shall be arranged Every 1000mm, respectively 2 hanging plates if 1000≤L<2000; 3 plates if 2000≤L<3000; and 4 plates if L=3000.

4.2 Principle of Installation:

(1) The encoder must be installed with the guide rail of machine tool as the benchmark and be kept in parallel. The center of encoder measuring range must be positioned on the center of travel of machine tool. Ensure that the actual measuring range of encoder is higher than the maximum travel of machine tool.

(2) The installation shall be based on priority principle as such that the encoder shall be installed close to the drive screw of machine tool. After installation, the body of encoder moves with the work bench, while the reading head is fixed on the machine tool.

(3) The encoder shall be so installed that it will not obstacle the operation or reduce the function of machine tool.

(4) After installation, the encoder shall be kept from knock. During machining, it shall not obstacle the handle of machine tool or affect the brake or other protrusions. It is not easy to contact when a work piece drops.

(5) The encoder shall be vertically installed, as shown in Fig. 19. But wherever impermissible, horizontal installation is also acceptable. Never install the encoder upside down (that is, reading head on top and encoder body at lower). Never direct the rubber seal of encoder toward the outlet of cooling oil from machine tool.

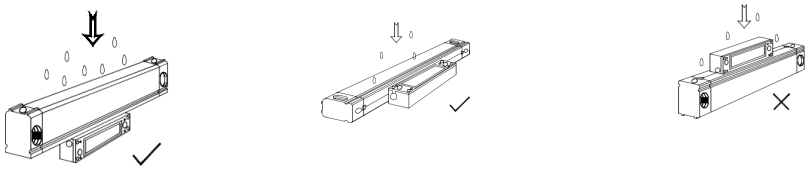


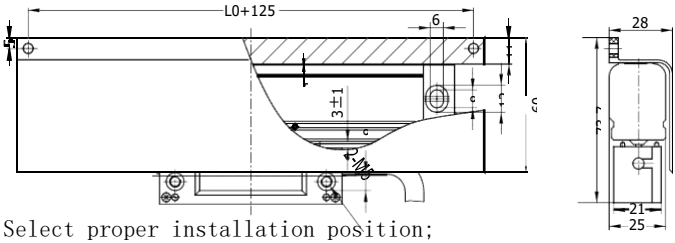
Fig 19

(6) The encoder enclosure shall be securely earthed to ensure the signal integrity.

(7) The parallelism and verticality between encoder and guide rail of machine tool shall be within 0.10 mm/m.

4.3 Installation of Encoder and its Enclosure

(1) Installation of MK-300C Enclosure Encoder



A. Select proper installation position;

B. Mark line on the mounting plane according to the length of installation, and drill M4 mounting hole.

C. Install the encoder onto mounting plane. Use the dial gauge to check the parallelism between encoder and guide rail of machine tool, and adjust it to best state. (See Fig. 20)

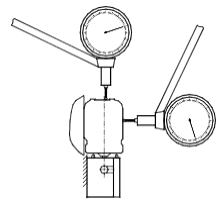


Fig .20

D. Fix the encoder onto mounting plane.

E. Adjust the screw fixing the reading head, making it slightly touch the mounting plane.

F: Drill M4 screw hole according to the mounting hole on reading head.

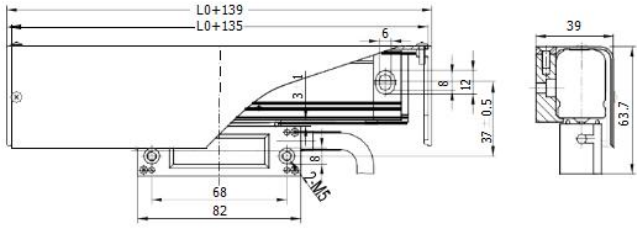
G. Fix the reading head and remove the connection plate.

H. Drill M4 screw hole according to the mounting hole on encoder enclosure.

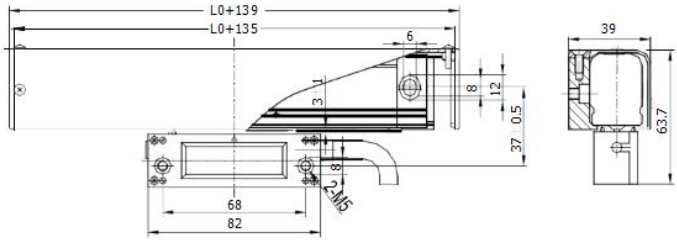
I. Fix the ncoder onto mounting plane.

(2) Installation of D, X & H Enclosure Encoder

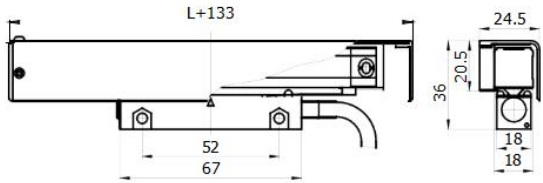
MK-300D Enclosure Encoder:



MK-300X Enclosure Encoder:

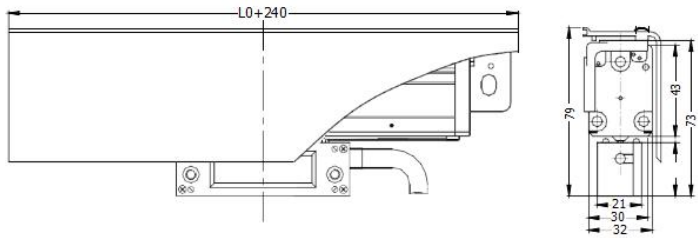


MK-500H Enclosure Encoder:



The installation method is same as that for MK-300B enclosure encoder.

(3) Installation of MK-600M Enclosure Encoder



4.4 Installation of Reading Head

The reading head may be positively or reversely installed on the machined or non-machined plane. Generally, positive installation is used. The reverse installation is used only when the installation space is not enough and it is not easy to install positively.

(1) Positive Installation of Reading Head

Shown in Fig. 23 is positive installation of reading head. During installation, take care
that the encoder plane shall be kept parallel to the reading head plane and that their sectional centers shall be kept consistent, with an error within 0.10mm.

(2) Reverse Installation of Reading Head

Shown in Fig. 24 is reverse installation of reading head. The installation steps are as follows:

a. Install T-frame (optional) onto machine tool.
b. Remove the connection plate fixing the reading head.
c. Adjust the tightening screw on T-frame mounting plate, making it slightly touch the reading head.
d. Use front and rear M5 screw to fix the reading head onto mounting plate of T-frame.
e. Adjust the position of T-frame plates, making the reading head in a relative position to the encoder as shown in Fig. 24.
f. Install the encoder by using T-frame.

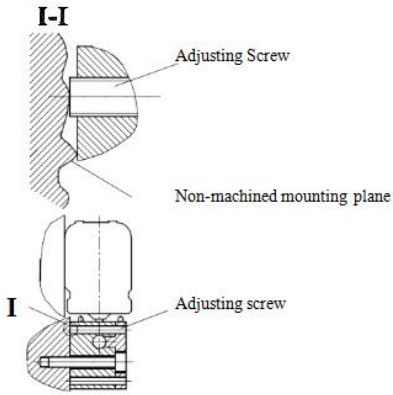


Fig. 23

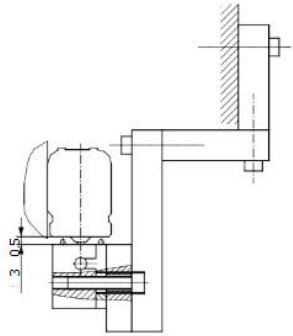
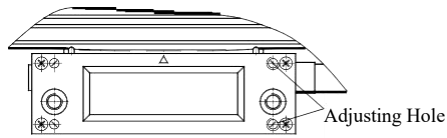


Fig .24

4.5 Switchover of Reading Head Cable (Applicable to MK-300, MK-500 and MK-600)

Upon shipment, left or right outlet is available for the reading head cable according to different specifications. You may change the direction of the cable if needed. The steps are as follows:



(1) Loosen and remove 4 cross-head screws M2 fixing the reading head cover and 2 adjusting screws M3 on the right side of reading head.

(2) Put 2 socket hexagonal screws M4 into the adjusting screw hole and screw forward respectively to prop up the cover plate. When there is a clearance, use screwdriver to prize up the cover plate along the edge of reading head.

(3) Loosen 2 slotted-head screws M3 fixing the cable on the bottom of reading head. Remove the cable and terminal. Change the direction.

(4) Before reinstalling the cover plate, remove the original sealing

glue before applying new sealing glue.
(5) Remove socket hexagonal screw M4. Reinstall the cover plate and tighten 4 cross-head screws M2.
Note: To avoid slippery of screw head, please use correct tools in each step.

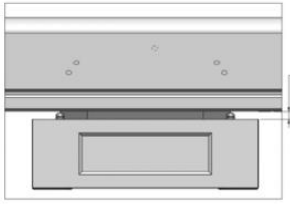
5. Acceptance Rules

T- The connection of reading head shall have adequate rigidity. Shaking with force and observing the numerical display, the value shown on it will have some deviation. If releasing your hand, the value on numerical display shall be able to resume to original value.

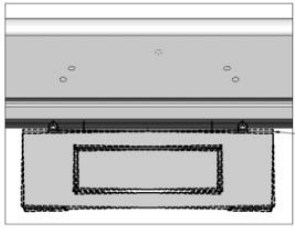
U- The reading head shall located at the center of encoder, so that the sealing strip may close or open symmetrically, as shown.

V- The connecting plate may guarantee the position of reading head in encoder center and its relative position to encoder body.

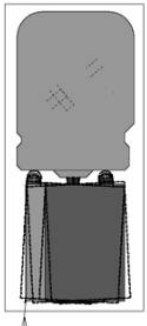
W- The position of reading head relative to encoder and its mounting dimension are shown below.



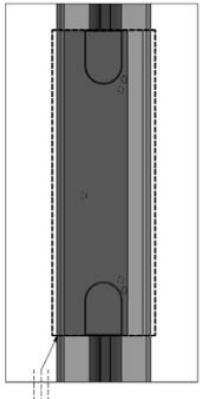
The distance between read head and scaling body is 3mm ± 0.5mm.



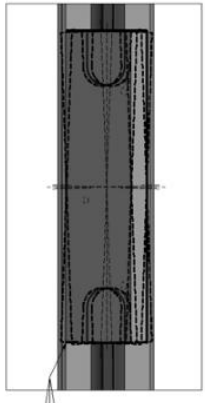
Permissible angle tolerance is ±0.2mm.



Permissible angle tolerance is ±0.2mm.



Permissible horizontal offset is



Permissible angle tolerance is ±0.2mm.