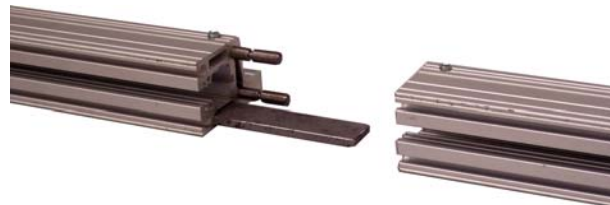


ASSEMBLING INSTRUCTIONS FOR MODULAR MX SCALES

- **Verify the integrity of the packaging to be sure that the transport has not damaged the contents**



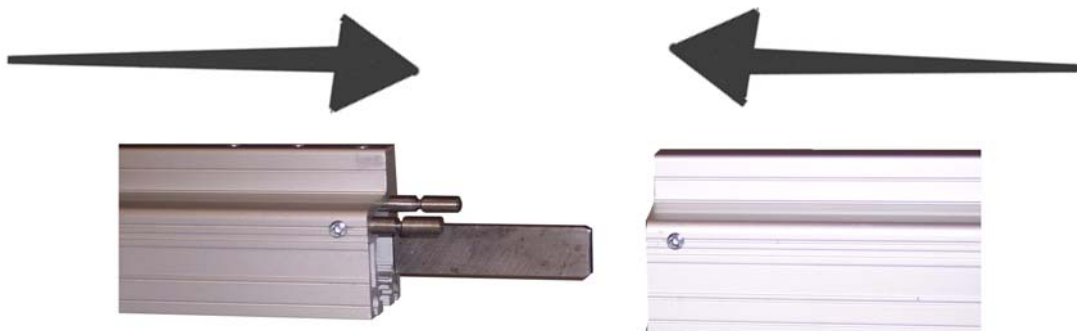
- **Check the contents of the packaging inside which you will find:**
 1. **the extruded aluminum that make up the total length of the scale**
 2. **a steel photoengraved tape reading of the same length of the scale**
 3. **four rubber lips**
 4. **a string cylindrical rubber**
 5. **a reading head with its cable**
 6. **a plastic tool for positioning the string within the scale**
 7. **a pair of plugs with gaskets and eight self-tapping screws**
 8. **spider part to set the string cylindrical rubber in the correct position**
- **Go along assembling the scale as follows.**
- **Put the pieces on a flat surface as shown in the picture 1.**

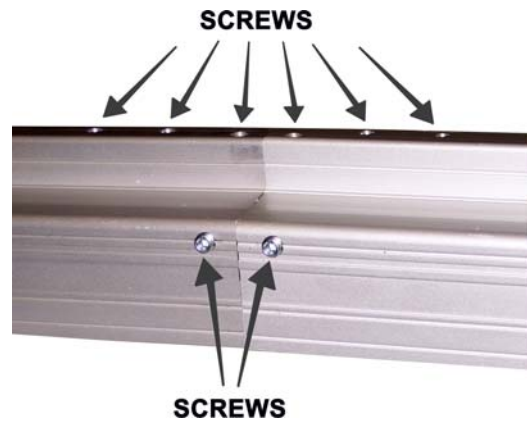


Picture 1

- **Now let coupling the two extruded uniting them with supplied cylindrical thorns and the small iron bar (that are already mounted onto one of the pieces as shown in picture 1). Push strongly the two parts against each other in order to obtain a perfect pairing. Then tighten the screws firmly using Allen keys (picture 3)**

Picture 2

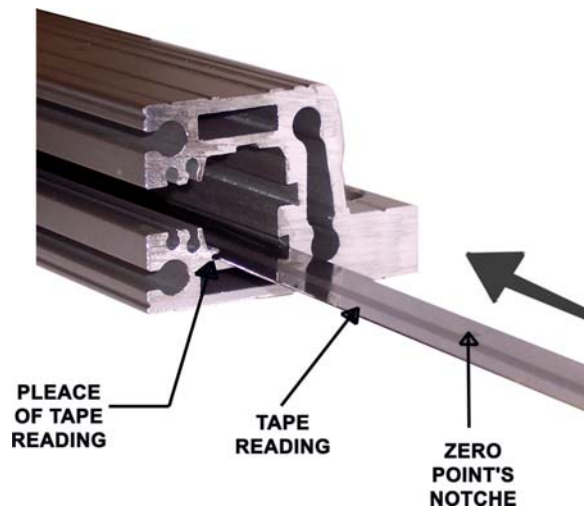




Picture 3

- Once assembled extrusions and obtained the scale in one piece, place the tape reading in its place as shown in the picture 4. Be careful that the zero point's notches must be positioned toward the scale side by the fixing holes.

n.b.: this stage is very important because the tape must be removed from the nylon envelope and gradually inserted in the scale body being careful not scratching it on his photoengraved side.



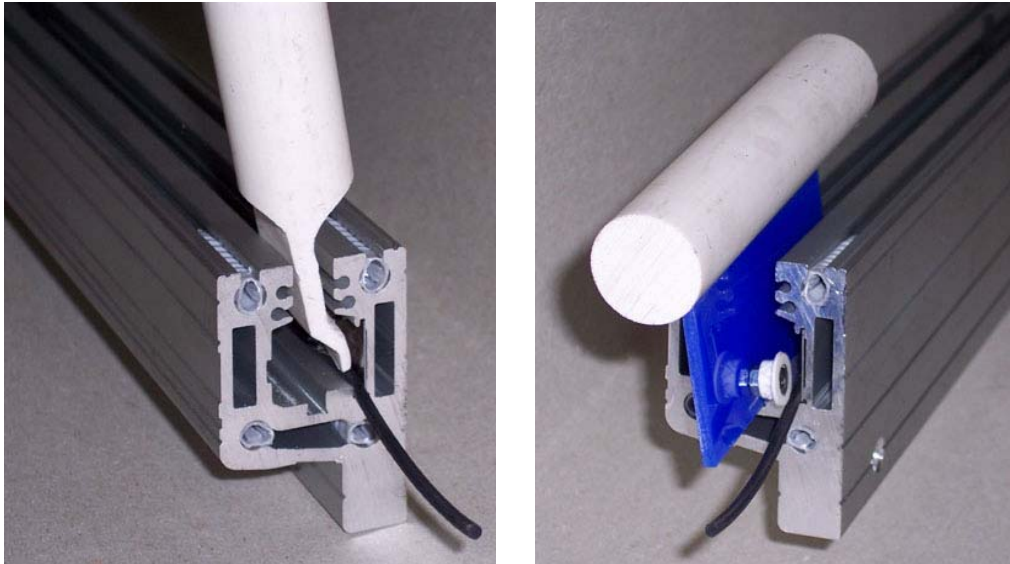
Picture 4

- Once fully inserted the tape in the row, let stop it with the appropriate string rubber. This operation is designed to maintain in its seat the tape reading. The string must be placed compressing it in the quarry by the supplied plastic tool. Look for this stage the

picture 5.

We recommend that the string must be very flat and must enter fully into the quarry and possibly stay in one piece (not conjunctions). To make this stage easier we recommend you to keep pulled the string so that its diameter will be perceptibly reduced.

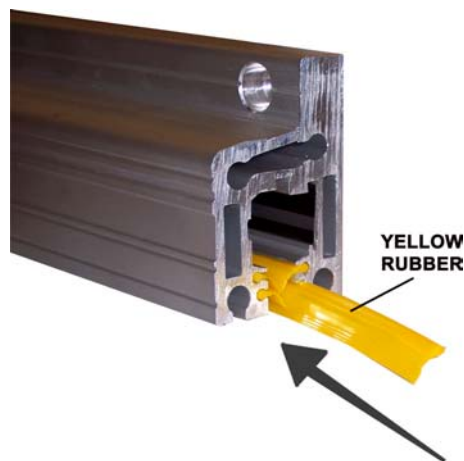
This phase will be easier if the scale is kept with the opening facing upwards.



Picture 5

Using this part, run along the length of the scale holding the string cylindrical rubber well stretched. With this procedure we wt to obtain a perfect compression of the string cylindrical rubber inside its place. Be very careful that the string cylindrical rubber does not exit in any point from the cave because this can compromize the correct working of the optical scale.

- The scale must be completed with the formal position of the four rubber lips, which must be arranged with the ledge outwards. Look for this stage to the picture 6. Now let entering for the first two lower lips. Once fully enter the four lips, the same must be cut a couple of mm longer then the extrusion.



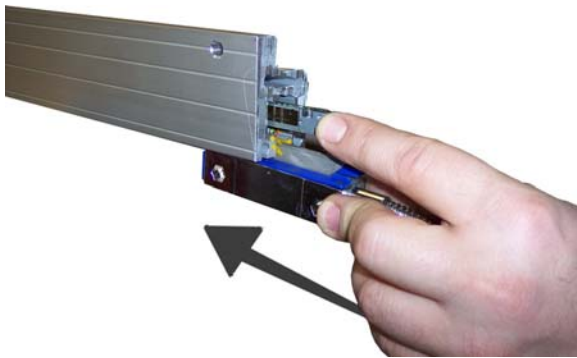
Picture 6

- Now go ahead installing the scale on the machine tool; if on the same is available a flat surface, the scale can be directly installed on the machine. Otherwise it is recommended to prepare, using a metal plate, a single continuous surface on which is possible to install the scale.

If the axis is horizontal the scale must absolutely be installed with the gaskets downwards.

ATTENTION: Regarding the installation of the scale on the machine tool, please refer to paragraph **INSTALLATION INSTRUCTIONS** of this handbook.

- Once verified the proper alignment of the scale (see **INSTALLATION INSTRUCTIONS**) proceed to the next step.
- Now place the reading head making sure that the collimator skate with the bearings on the photoengraved side of the tape. Look for this stage to the pictures 7 and 8.



Picture 7



Picture 8

- Attach the reading head to the machine using the appropriate brackets respecting the quotas set out in section **INSTALLATION INSTRUCTIONS**.
- The reading head must be aligned with the support of the blue plastic piece mounted on the same, which must be removed when the operation is completed..
- Everything must be completed with the two caps closing and the relating rubber gaskets.
- Once the assembling is completed, put slightly a small quantity of silicone on the juntion to make it impermeable to liquids.
- To install the scale on the machine tool, please refer to the attached installation instructions.

INSTALLATION INSTRUCTIONS MX SCALES

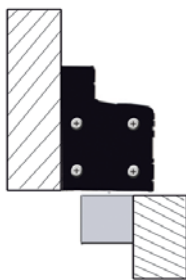
• PRECAUTIONS

- . The stroke length of the optical scale must be longer than the maximum stroke of the machine at least 10 mm on each side.
- . The installation of the scale must be done on a flat surface of the machine to avoid situations of wrong alignment. If there are not flat surfaces available, we suggest you to use blocks or for example calibrated thicknesses.
- . Use a vertical comparator to check the exact alignment of the scale.
- . The optic scale must be mounted not directly exposed to any intrusion of oil, water, dust or other foreign bodies; for this purpose should be provided to mount roofing adequately prepared although the scale model MX has a profile extremely hard and double gasket closing to make it adequately protected.
- . The holes for the fixing screws must have at least 6 fillets to lock securely the screws within the holes. For screws that must support a heavy load, instead, the fillets must be at least 8. Once threaded, the holes must be finished and properly cleaned.
- . All cables must be properly set in order to permit to the machine all the movements.

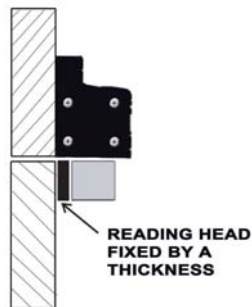
• NECESSARY CONDITIONS FOR THE INSTALLATION

1. Characteristics of mounting surface:

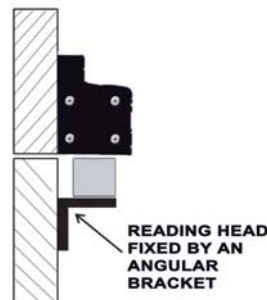
- . In case of installation like in pictures A, B and C, the maximum tolerance of the parallelism between the two mounting surfaces must be less than 0.1 mm.
- . In case of installation like in pictures D, the maximum tolerance of the perpendicularity of mounting surfaces must be less than 0.1 mm.



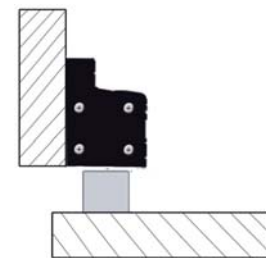
Picture A



Picture B



Picture C



Picture D

2. **Scale alignment:**
 - . The scale must be parallel to the movement of the machine. The MPE of parallelism between the scale and the movement of the machine must not exceed 0,2 mm.
3. **Tolerances allowed between the reading head and the body scale:**
 - . The maximum tolerance allowed between the reading head and the body of the scale must be between 0.8 mm and 1.5 mm.
 - . The parallelism between the reading head and the scale must be maintained within 0.5 mm.

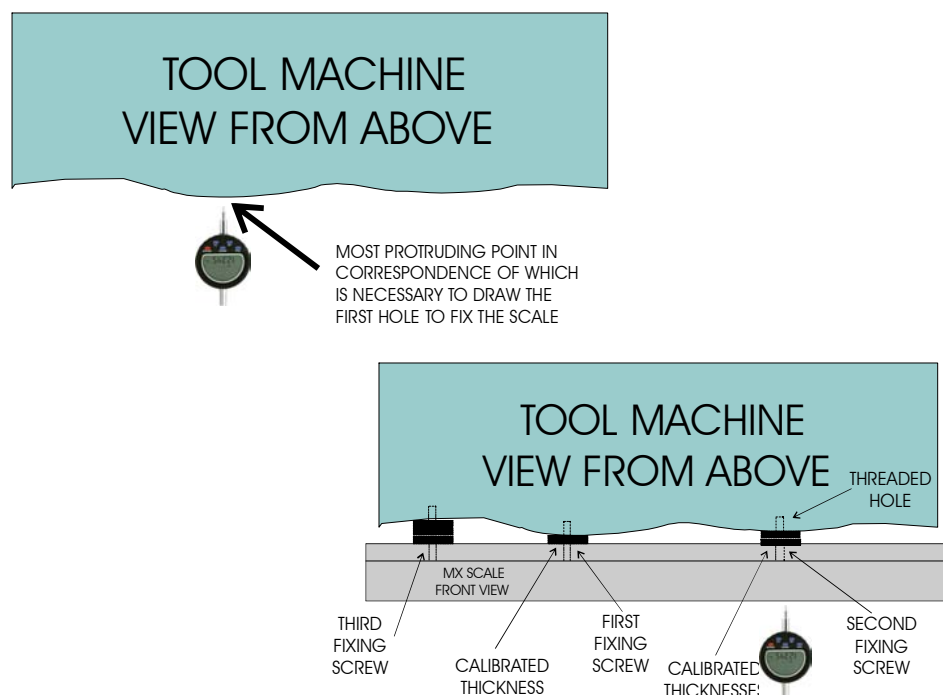
- **INSTALLATION OF MX SCALE**

If you install the MX scale on **horizontal movement**:

a) **if you have a flat worked surface** fix the scale with one of the provided screws using the central hole to keep the scale in balance.

With a spirit level or a comparator fix the scale horizontally; at one of the two ends draw an hole and secure the scale with a screw (without tighten it) even in this point. Go ahead drawing other holes and then secure the scale with screws (still without tighten them). Starting from the center align the scale at right and at left ensuring that the scale is parallel to the movement of the machine with a tolerance of not more than 0.2 mm and, finally, tighten firmly all the screws.

b) **if you have not a flat worked surface** and the fund is not worked, you must proceed as in the previous case but putting initially a thickness (of at least 1.5 mm) between the scale and the fund, in prossimity of the hole situated near the most protruded point of the machine surface where you want to install the scale (look the pictures under). Go ahead as in the previous paragraph putting the scale horizontally, running with a comparator on the face sight of the scale, drawing the next holes arranging the necessary calibrated thicknesses to be sure that the scale is properly aligned and parallel to the movement of the machine.

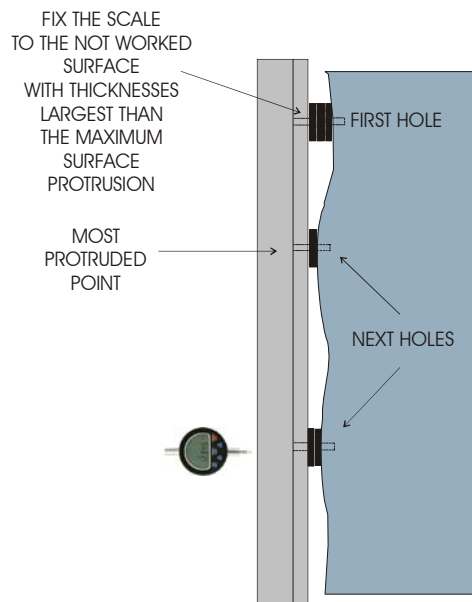


If you install the MX scale on vertical movement:

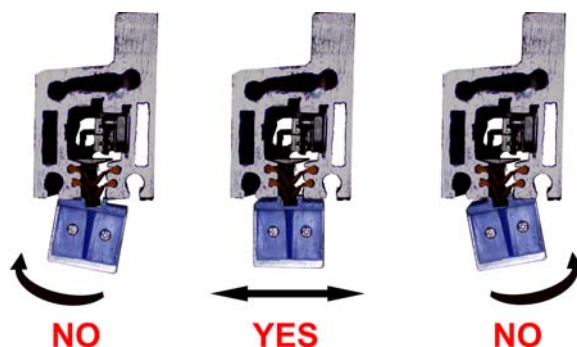
c) if you have a flat worked surface fix the scale with one of the provided screws using the upper hole to keep the scale in vertical balance.

With a spirit level or a comparator fix the scale vertically; draw the next holes and fix the screws (without tighten them). Starting from above align the scale ensuring that the scale is parallel to the movement of the machine with a tolerance of not more than 0.2 mm and, finally, tighten firmly all the screws.

d) if you have not a flat worked surface and the fund is not worked, you must proceed as in the previous case but putting initially a thickness between the scale and the fund, in prossimity of the upper hole, placing outside the most protruded point of surface. Go ahead as in the previous paragraph putting the scale vertically, drawing the next holes then, running with a comparator on the face sight of the scale, arrange the necessary thicknesses to be sure that the scale is properly aligned and parallel to the vertical movement of the machine.



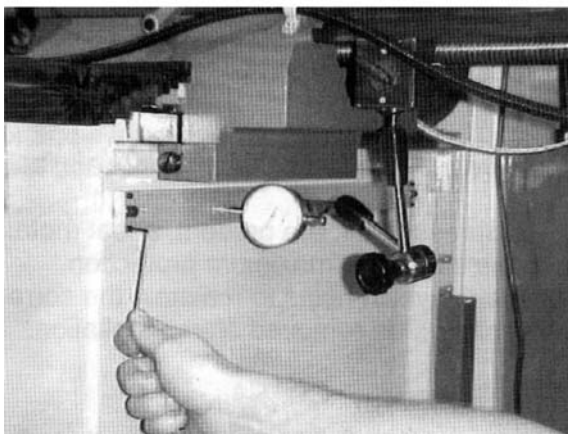
Once installed the scale, fix the reading head to the mobile side of the machine if the scale is fixed (eg lathe or milling machine fixed bed) or fix the reading head to the fixed part of the machine if the scale is movable (eg milling bench mobile). Make sure that the reading head is held parallel to the scale through the blue plastic spacer mounted on the same: this spacer also determines the proper distance between scale and reading head. Is possible to fix the reading head using the two threaded holes M5 on the two parallel sides OR using the four holes M4 on base.



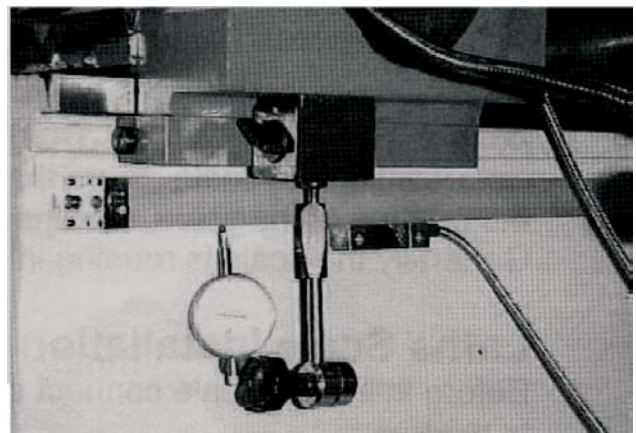


Once fixed the reading head pull out the blue spacer.
 Then proceed to fix the cable to allow all movements to the machine. Respect the minimum radius of curvature of cables.

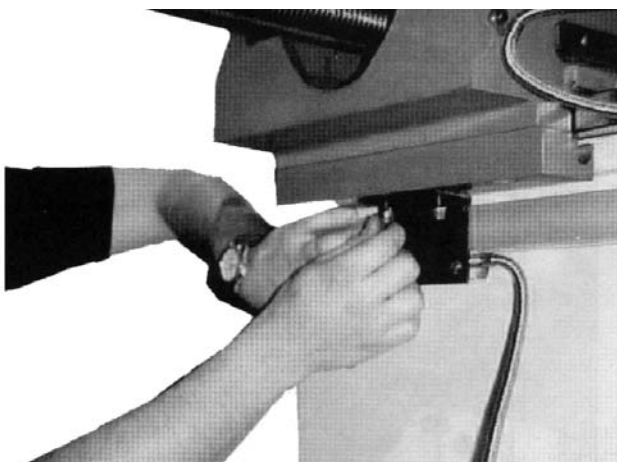
- **EXAMPLES OF INSTALLATION**
 (The following images are purely indicative)



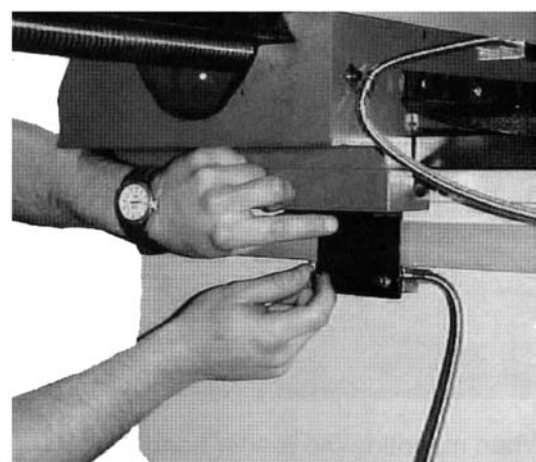
Preparation of the machine fixing a flat plate support for the scale

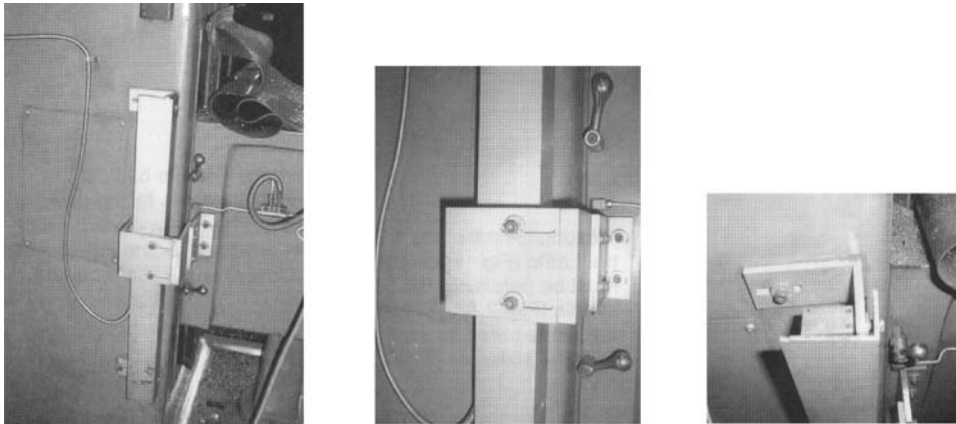


Alignment of the scale by a comparator



Example of fixing reading head to the horizontal mobile side of machine

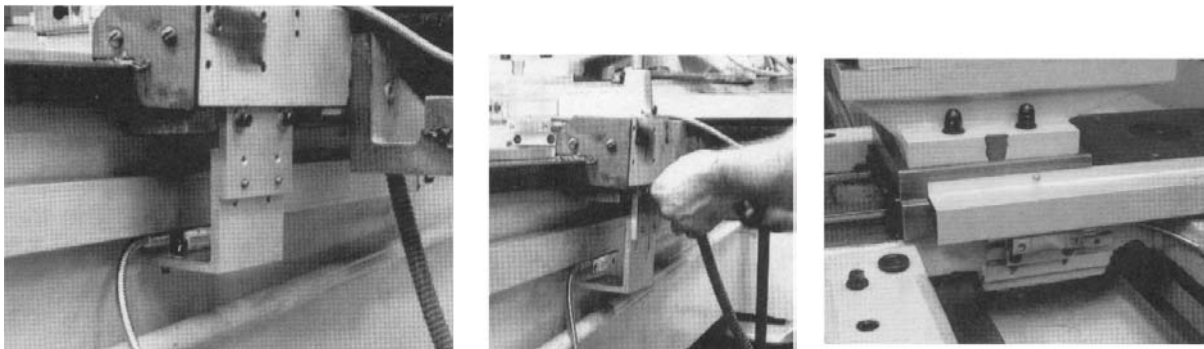




Example of fixing reading head to the vertical mobile side of machine

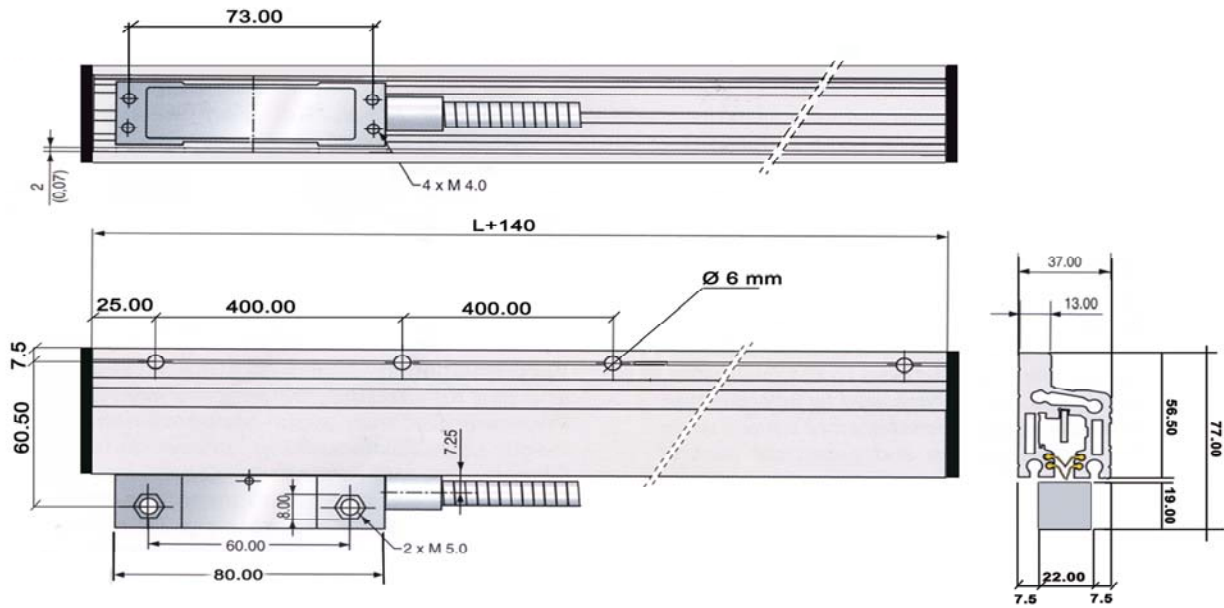


An example of horizontal alignment with a spirit level



Example of fixing reading head on the mobile side by a bracket fixed on holes M4 situated on the reading head's base side

MECHANICAL DIMENSIONS AND DISTANCE BETWEEN HOLES



MALE DB9 CONNECTOR

PIN	TTL		422A	
	segnale signal Signal	cablaggio cable Kabel	segnale signal Signal	cablaggio cable Kabel
1			A-	●
2	0V	●	0V	○
3			B-	●
4	Gnd	⊥	Gnd	⊥
5			R-	●
6	A	●	A+	●
7	+5V	●	5V	●
8	B	●	B+	●
9	R	●	R+	●

