

Foreword

- Mitutoyo Corporation assumes no responsibilities for any damage to the product, caused by its use not conforming to the procedure described in this document.
- Contents of this document are subject to change without notice.

Conventions Used in This Document

Table with 2 columns: Symbol and Description. Includes NOTICE (Indicates a situation which, if not avoided, may result in property damage.), Prohibited actions (Indicates concrete information about prohibited actions.), IMPORTANT (Indicates information that must be known when using the product.), and Tips (Indicates further information and details relevant for the operating methods and procedures that are explained in that section.)

Safety Precautions

Observe the following descriptions to make full use of the performance of this product:

Table with 2 columns: Symbol and Description. Includes NOTICE (To prevent defective contacts, do not touch the connecting terminals of the connectors with bare hands.), IMPORTANT (Read this document thoroughly before operating the product.), and Tips (Before connecting this product to the machine main unit, make sure that the power for the control unit is turned off. Maintain the shielding effect, firmly tighten the screws on the connectors of each connecting cable.)

Electromagnetic Compatibility (EMC)

This product complies with the EMC Directive and the UK Electromagnetic Compatibility Regulations, however, if this receives electromagnetic interference that exceeds these requirements, it will be out of warranty and require appropriate measures. This product is an industrial product, and is not intended to be used in residential environment.

Export Control Compliance

This product falls into the Catch-All-Controlled Goods and/or Catch-All-Controlled Technologies (including Programs) under Category 16 of Appended Table 1 of Export Trade Control Order or under Category 16 of Appended Table of Foreign Exchange Control Order, based on Foreign Exchange and Foreign Trade Act of Japan.

Also, if an option is added or modified to add a function to this product, this product may fall under the category of List-Controlled Goods, List-Controlled Technology (including Programs) under Category 1 - 15 of Appended Table 1 of Export Trade Control Order or under Category 1 - 15 of Appended Table of Foreign Exchange Control Order, based on Foreign Exchange and Foreign Trade Act of Japan.

Notes on Export to European Countries

When you intend exporting of this product to any of the European countries, it may be required to provide User's Manual(s) in English and Declaration of Conformity in English (in some cases, the official language of the country to be exported).

Disposal of Products outside the European Countries

- Please follow the official instruction in each community and country.

Disposal of Old Electrical & Electronic Equipment (Applicable in the European Countries with Separate Collection Systems)

This symbol on the product or on its packaging is based on WEEE Directive (Directive on Waste Electrical and Electronic Equipment), and this symbol indicates that this product shall not be treated as household waste. To reduce the environmental impact and minimize the volume of landfills, please cooperate in reuse and recycle.

China RoHS Compliance Information

This product meets China RoHS requirements. See the table below.

产品中有害物质的名称及含量

Table with columns: Part Name, Lead (Pb), Mercury (Hg), Cadmium (Cd), Hexavalent Chromium (Cr(VI)), Polybrominated Biphenyls (PBB), and Polybrominated Diphenyl Ethers (PBDE).

本表格依据 SJ/T 11364 的规定编制。
○：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。
×：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。

环保使用期限标识是根据《电器电子产品有害物质限制使用管理办法》以及《电子电气产品有害物质限制使用标志要求(SJ/T11364-2014)》制定的。适用于中国境内销售的电子电气产品。
电子电气产品只要按照安全及使用说明内容在正常使用情况下,从生产日期起,在此期限内产品中含有的有害物质不会发生外泄或突变,不会对环境和人体造成严重危害,财产造成严重损害。
产品使用后,要废弃在环保使用年限内或者刚过年限的产品,请根据国家标准采取适当的方法进行处理。
另外,此期限不同于质量/功能的保证期限。

Warranty

This product has been manufactured under strict quality management, but should it develop problems within one year of the date of purchase in normal use, repair shall be performed free of charge. Please contact the agent where you purchased the product or Mitutoyo sales office.

1. Checking the Scale and the Supplied Accessories

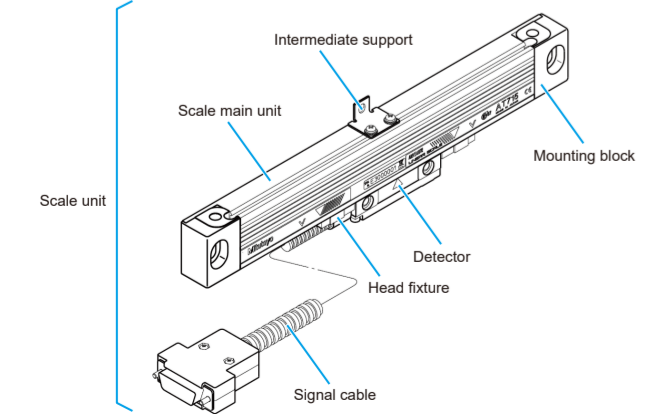


Table listing Scale unit, Intermediate support set, Extension cable (2 m), User's Manual, Warranty card, and Inspection certificate with their respective quantities.

Table listing Accessories including Hex socket head cap screw (M6 x 25), Plain washer (nominal 6), Hex socket head cap screw (M4 x 25), Plain washer (nominal 4), Cable stopper, Hex socket head cap screw (M4 x 8), and Spacer set.

Table listing Intermediate support set with columns for Effective length (500 mm-1000 mm, 1100 mm-1500 mm, 1600 mm-2000 mm, 2200 mm-2600 mm, 2800 mm-3000 mm) and rows for Intermediate support, Intermediate support (V), Hex socket head cap screw, Plain washer, Spring washer, Hex socket head cap screw with plain washer, Hexagonal nut, Countersunk screw, and Block spacer.

2. Designing the Installation of the Scale Unit and Setting Up for Installation

Checking the scale size

Make sure that the scale unit's maximum travel length L1 is greater than the travel distance of the machine. The accuracy is guaranteed only within the effective length L0.

- If the maximum travel length or the effective length of the scale unit is insufficient, one of the following actions is required:
- Reduce the travel distance of the machine (by installing a mechanical stopper or limit switch).
- Change the scale unit size.

Checking the counter to be connected

The scale unit can be connected only to the KA-200 counter.

Checking the installation location and installation method of the scale main unit

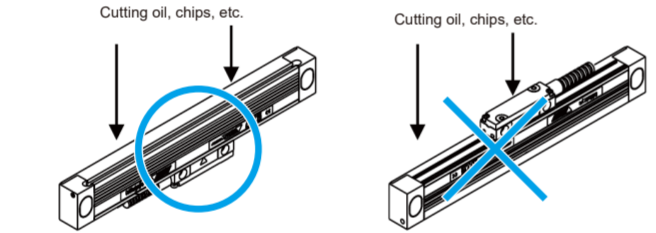
Note the following when deciding the installation location of the scale unit:

Easy installation

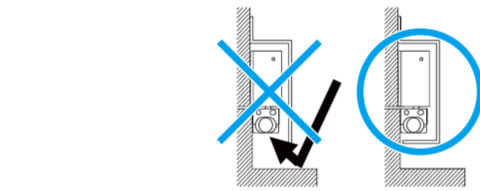
Choose the installation location and the installation method so that the scale main unit, detector and cables do not interfere with the machine handle and other parts. To make installation easy, mount the scale unit and brackets on the machined surface if possible.

Protection from cutting oil, chips, etc.

The scale unit is designed so that cutting oil and chips do not easily enter the main unit. To prevent the scale main unit from being exposed to cutting oil, chips, etc., however, decide the mounting direction while giving consideration to their splattering directions.

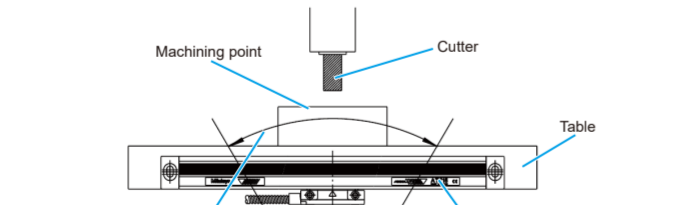


To further ensure protection against the exposure, prepare a cover that protects the entire scale unit as well. This requires an assumption that the cutting oil and chips splatter on the opening side of the cover.



Accuracy

The entire system accuracy of the machine with the scale unit mounted is affected by the accuracy of the scale unit and the motion accuracy of the machine. A machine containing a slide table, particularly, requires special consideration on installation to reduce geometrical errors caused by the motion straightness of the movable part as much as possible.

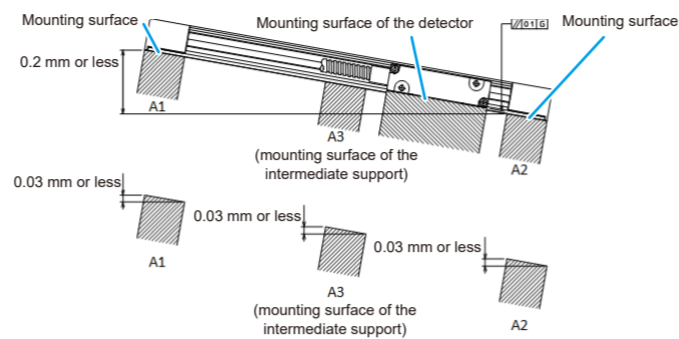


Others

- Pay extra attention to routing the signal cable because moving the detector also moves the slide table and even the signal cable.
- Mount the scale unit in a location not exposed to air blow. When removing chips with an air duster, make sure that they do not scatter over the scale unit.
- Choose the installation location based on maintainability because maintenance may be required if an abnormality occurs.

Designing a bracket for mounting the scale unit

Design and make a mounting bracket according to 7 External View and Dimensional Drawings of the Scale Main Unit. Be sure to note the following on designing and making:
- The bracket must achieve the mounting relation shown in 7 External View and Dimensional Drawings of the Scale Main Unit.
- Provide some margins for screw holes or use the spacers to adjust the parallelism of the mounting surfaces against the machine guide (G) as shown below.
- Entire parallelism of the mounting surfaces A1, A2, and A3 of the scale main unit: 0.2 mm or less
- Parallelism of each mounting surface (A1, A2, and A3) of the scale main unit: 0.03 mm or less
- Parallelism of the mounting surface of the detector: 0.1 mm or less



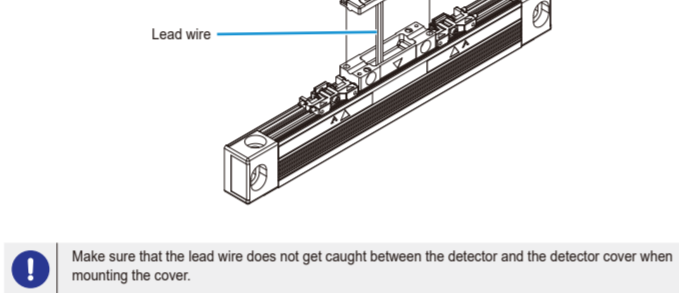
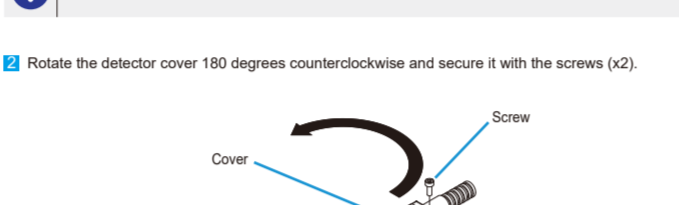
- The bracket must have high rigidity because if the rigidity is insufficient, the scale unit may malfunction due to machine vibrations.
- Even when you mount the bracket directly on the machine, use the above parallelism for the mounting surfaces of the scale main unit and the detector.

Checking the routing direction of the signal cable

Check the routing direction of the signal cable. In this product, the routing direction of the signal cable can be changed.

- Remove the screws (x2) that fix the detector cover.

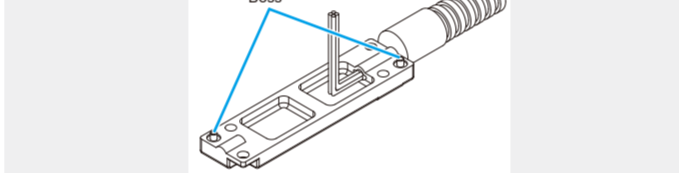
Do not pull the lead wire forcibly.



- Make sure that the lead wire does not get caught between the detector and the detector cover when mounting the cover.

Tips

Mount the detector cover by aligning with the bosses.



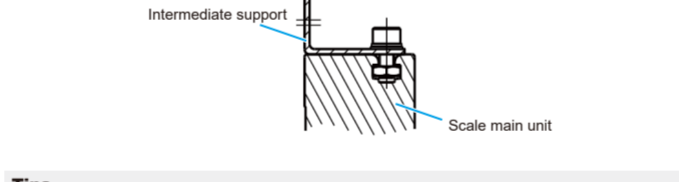
Installing the intermediate support

Install the intermediate support and the intermediate support (V) for a scale unit that has an effective length of 500 mm or more.

The installation method using the intermediate support described in the mounting method 1 shown in 7 Exterior and Mounting Dimension of the Scale Main Unit will be specified below.

- Insert the hexagonal nuts into the T-slots on the scale main unit.
- Fix the intermediate support with the hex socket head cap screws (M3 x 6 with plain washer and spring washer).

To further ensure protection against the exposure, prepare a cover that protects the entire scale unit as well. This requires an assumption that the cutting oil and chips splatter on the opening side of the cover.



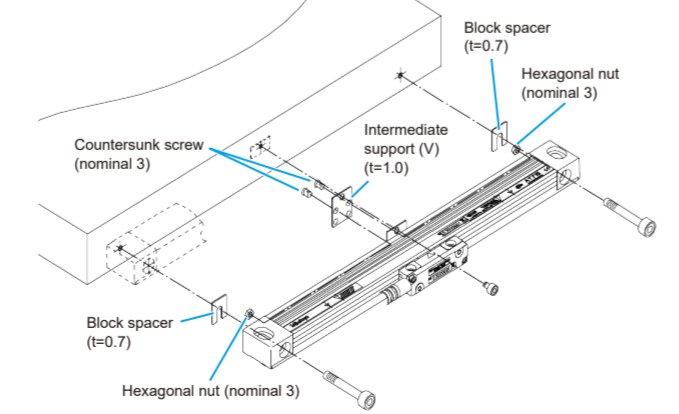
For the recommended fixing position of the intermediate support, see 7 External View and Dimensional Drawings of the Scale Main Unit. The intermediate support can be moved to any position.

The installation method using the intermediate support described in the mounting method 2 and 3 shown in 7 Exterior and Mounting Dimension of the Scale Main Unit will be specified below.

- Insert a hex nut into the T-slot of the scale main unit.
- Secure the intermediate support (V) with hex bolts (M3x6, plain and spring washers).

Tips

To mount the scale main unit and the intermediate support using the installation method 2 or 3 shown in 7 External View and Dimensional Drawings of the Scale Main Unit, use the intermediate support (V) and the block spacers according to the figure below because they are mounted on the same surface.



3. Mounting the Scale Main Unit and Adjusting the Position

- The head fixture that fix the detector are used to maintain the positional relationship between the scale main unit and the detector. Do not remove the head fixture until the scale main unit and the detector are mounted on the machine.

Temporarily fixing the scale main unit and intermediate support

- IMPORTANT: The tap depth of screw holes for mounting the scale main unit must be 16 mm or more. For a scale main unit that has an effective length of 500 mm or more, drill screw holes on the mounting surface by aligning with the screw holes on the intermediate support. The tap depth of screw holes for mounting the intermediate support must be 12 mm or more.

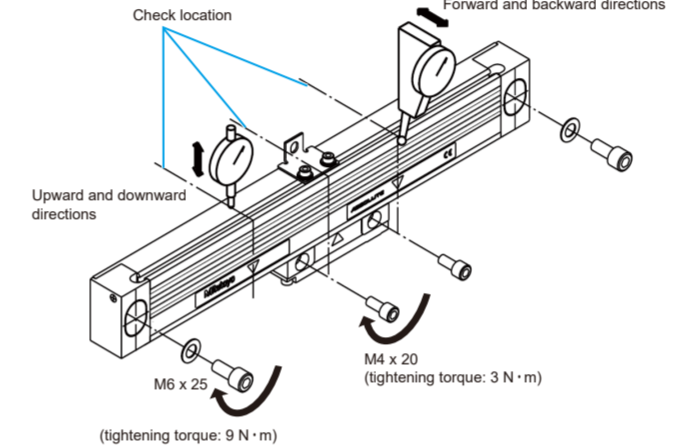
- Temporarily fix the scale main unit with the hex socket head cap screws (M6 x 25) and the plain washers (nominal 6).

Tips: For a scale main unit that has an effective length of 500 mm or more, use the hex socket head cap screws (M4 x 8), plain washers (nominal 4), and spring washers (nominal 4) to temporarily fix the intermediate support.

Checking and adjusting the parallelism

- Use a dial indicator or the like to check the parallelism.

Table with 2 columns: Check item and Description. Includes Parallelism allowance (See 7 External View and Dimensional Drawings of the Scale Main Unit.), Check direction (Forward, backward, upward, and downward directions of the mounting surface), and Check location (Near the effective length mark of the scale main unit. For a scale main unit that has an effective length of 500 mm or more, check near the mounting location of the intermediate support.)



Fully fixing the scale main unit and intermediate support

- Fully fix the scale main unit and the intermediate support.

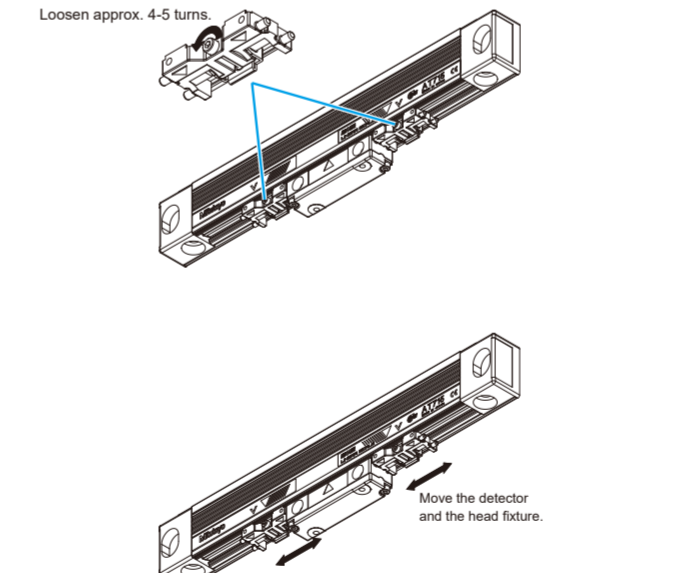
Table with 2 columns: Screws for fixing the scale at both ends and Intermediate support, with tightening torques of 9 N·m and 3 N·m respectively.

4. Mounting the Detector and Adjusting the Position

- Check the parallelism of the mounting surface of the detector.

IMPORTANT: The parallelism of the mounting surface of the detector against the machine guide must be 0.1 mm or less.

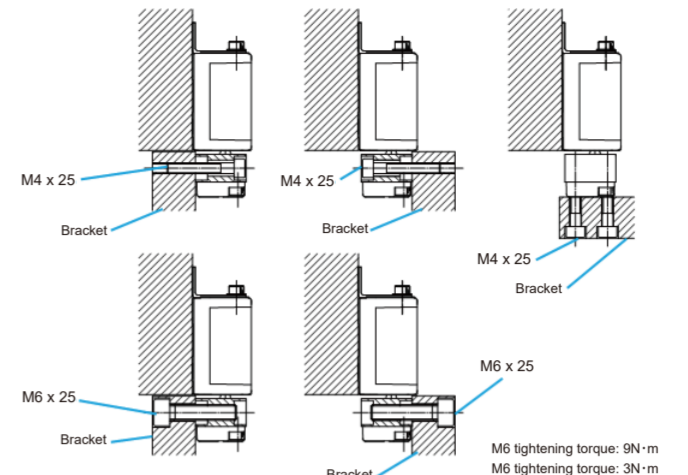
- Loosen the bolt of the both head fixture by about 4-5 turns, and slide the detector and the head fixture to the position where they are attached to the bracket.



- Tips: Do not remove the head fixture while working. The detector may fall. The head fixture determines the positional relationship between the scale main unit and the detector. This is to maintain this positional relationship when attaching the scale unit to the machine main unit.

- Temporarily fix the detector.

- Tips: If there is a gap between the detector and the bracket, insert the provided spacer. The detector can be fixed to the bracket from the following directions.

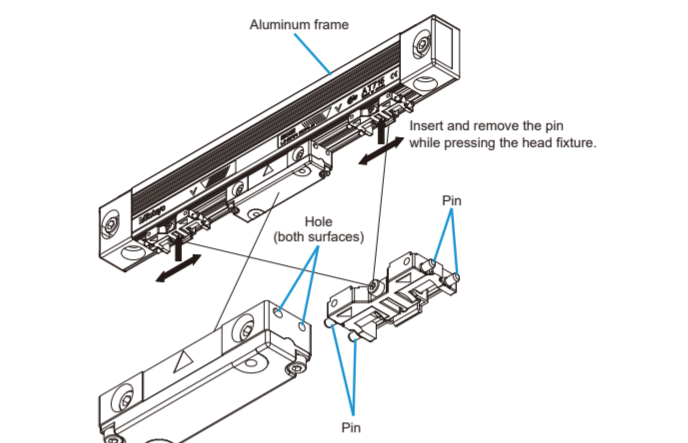


- Tighten the bolt of the head fixture. (Tightening Torque 0.36 N·m)

- Fully fix the detector.

- Loosen the bolt of the head fixture by about 4-5 turns.

- While pressing the head fixture against the aluminum frame, confirm that the pin of the head fixture can be inserted into and removed from the hole of the detector smoothly.



- If a gap is generated when the head fixture are inserted or the blocks cannot be smoothly inserted, reinsert them and adjust the positional relationship between the detector and the bracket.

Tips

Make sure that you do not lose the head fixture because they will be used to mount the scale unit again.

7. External View and Dimensional Drawings of the Scale Main Unit

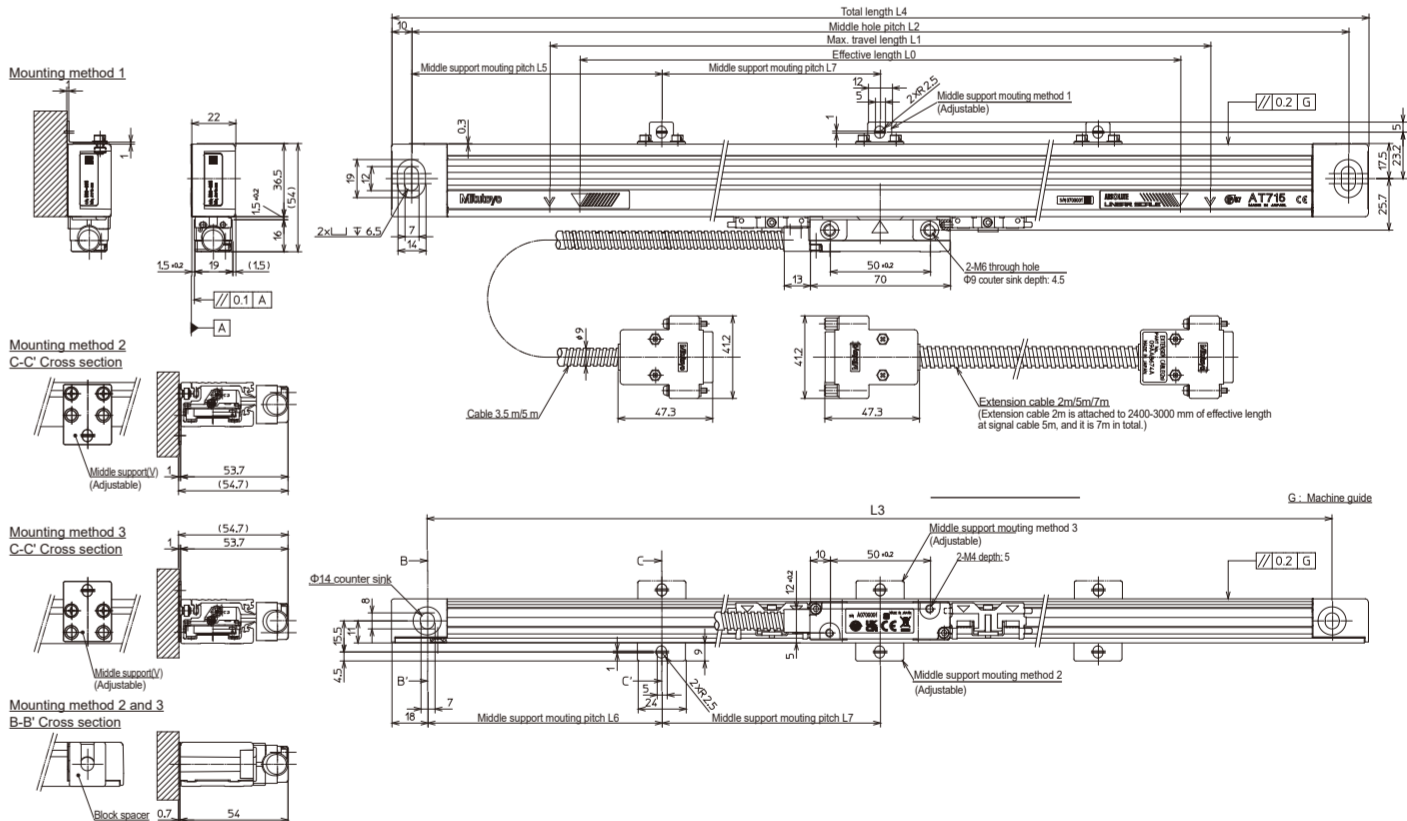


Table with columns: Code No., Model number, Effective length L0 (mm), Maximum travel length L1 (mm), Mounting hole pitch L2 (mm), Full length L4 (mm), Intermediate support length L3 (mm), Intermediate support length L5 (mm), Intermediate support length L6 (mm), Intermediate support length L7 (mm), Number of intermediate supports, and Signal cable length (m).

5. Handling the Signal Cable

- Route the signal cable while noting the following:
- The signal cable must have an extra length between the scale unit and the counter.
- The bend radius of the signal cable must be as follows:

Table with 2 columns: When the detector is fixed (signal cable is fixed) and When the detector moves (signal cable is repeatedly bent). Radii are 50 mm or more and 100 mm or more respectively.

- When the detector moves, the signal cable moves accordingly. Therefore, make sure that excessive force is not applied to the signal cable and no friction occurs when the detector moves.
- Do not bundle the signal cable with other cables that may cause electrical noise or place it near a relay that handles a large current. Otherwise, a malfunction may occur.

Tips

If there is a long distance to the counter connected to the scale unit, the following extension cables can be used:

Table with 2 columns: Code No. and Cable length. Lists codes 09AAB674A (2 m), 09AAB674B (5 m), and 09AAB674C (7 m).

IMPORTANT

The total cable length of the signal cable and the extension cable must not exceed 15 m.

- Fix the signal cable with the supplied cable stopper.
- Make sure that excessive force is not applied to the signal cable or there is no interference with other objects throughout the entire stroke.
- Attach the cover.
- Make sure that the cover does not touch the scale unit and the signal cable throughout the entire stroke.

6. Specifications

Table with 2 columns: Specification and Value. Includes Minimum resolution (0.005 mm, 0.001 mm, 0.0005 inch, 0.0001 inch), Indication accuracy, Maximum response speed (50 min), Current consumption (Maximum 50 mA), Dustproof and water-proof (IP67), Sliding force (5 N), Used temperature and humidity range, Storage temperature and humidity range, CE marking/UKCA marking, and EMC Directive/Electromagnetic Compatibility Regulations.