Assembly Type ABSOLUTE Linear Scale ABS AT1300 User's Manual

(en)

Foreword

This is a simplified version of the installation manual.
The manual describes this product in detail is available on the Mitutoyo's website: http://www.mitutoyo.co.jp/eng/
• Mitutoyo Corporation assumes no responsibilities for any damage to the instrument, caused by its use not conforming to the procedure described in this User's Manual.
• Contents of this manual are subject to change without notice.

Conventions Used in This Manual

CAUTION Indicates a potentially hazardous situation which, if not avoided, may result in minor injury.

NOTICE Indicates a potentially hazardous situation which, if not avoided, may result in property damage.

Safety Precautions

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

CAUTION
- Read this User's Manual thoroughly before operating this product.
- Before connecting this product to the machine main unit, make sure that the power for the control unit is turned off.
- To maintain the shielding effect, firmly tighten the screws on the connectors of each connecting cable.
- To prevent defective contacts, do not touch the connecting terminals of the connectors with bare hands.

Electromagnetic Compatibility (EMC)

This product complies with the EMC Directive. Note that in environments where electromagnetic interference exceeds EMC requirements defined in this directive, appropriate countermeasures are required to ensure product performance.

Export Control Compliance

This product falls into the catch-all controlled goods and technologies (including programs) according to "Appended Table 1 in Export Trade Control Order of Foreign Exchange and Foreign Trade Control Law, or Article 16 in Appended Table of Foreign Exchange Order".
If you intend to re-export the product from a country other than Japan, re-selling the product in a country other than Japan, or re-providing the technology (including program), you shall observe the regulations of your country.
Also, if an option is added or modified to add a function to this product, this product may fall under the category of List-Control Goods and/or List-Control Technology (including Programs) under Category 1 - 15 of Appended Table 1 of the Export Trade Control Order or under Category 1 - 15 of the Appended Table of Foreign Exchange Control Order, based on Foreign Exchange and Foreign Trade Act of Japan. In that case, if you intend re-export of the product from a country other than Japan, re-sale of the product in a country other than Japan, or re-provision of the technology (including program), you are obligated to observe the regulations of your country. Please contact Mitutoyo in advance.

Notes on Export to EU Member Countries

When you intend to export this product to any of the EU member countries, you may be required to provide User's Manual(s) in English and EU Declaration of Conformity in English (under certain circumstances, User's Manual(s) in the destination country's official language and EU Declaration of Conformity in the destination country's official language). For detailed information, please contact Mitutoyo in advance.

Disposal of Old Electrical & Electronic Equipment (applicable in the European Union and other European countries with separate collection systems)

This symbol on the product or on its packaging is based on the WEEE Directive (Directive on Waste Electrical and Electronic Equipment), which is a regulation in EU member countries, and indicates that this product shall not be treated as household waste.
To reduce environmental impact and minimize the volume of landfill, please cooperate in reuse and recycling.
For information on how to dispose of the product, please contact your dealer or the nearest Mitutoyo sales office.

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

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr (VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
主体	○	○	○	○	○	○
电气连接部分	×	○	○	○	○	○
配件	○	○	○	○	○	○

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。

仅保使用期限标识，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识要求（SJ/T11364-2014），制定的适用于中国境内销售电子电气产品的标识。

电子电气产品只要按照安全及使用说明内容，正常使用情况下，从生产月期算起，在此期间内，产品中含有的有害有害物质不致发生外泄或突变，不致对环境造成严重污染或对其人身，财产造成严重损害。

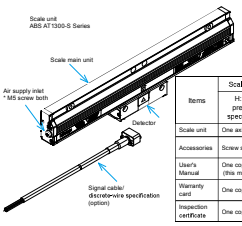
产品正常使用后，要废弃在环保使用年限内或者刚刚年限的产品时，请根据当家和本策取适当的方法进行处置。

另外，此期限不同于质量 · 功能的保证期限。

Warranty

In the event that this product should prove defective in workmanship or material, within one year from the date of original purchase for use, it will be repaired or replaced, at Mitutoyo's option, free of charge upon its prepaid return to Mitutoyo, without prejudice to the provisions of the Mitutoyo Software End User License Agreement.

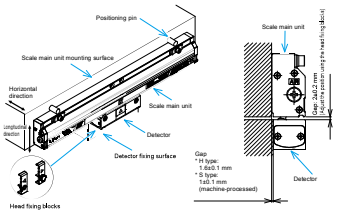
1. Checking the Scale Unit and the Supplied Accessories



Items	Scale main unit specifications	
	H: High precision specification	S: High rigidity specification
Scale unit	One axis	One axis
Accessories	Screw set	Leaf spring, screw set
User's Manual	One copy (this manual)	One copy (this manual)
Warranty card	One copy	One copy
Inspection certificate	One copy	One copy

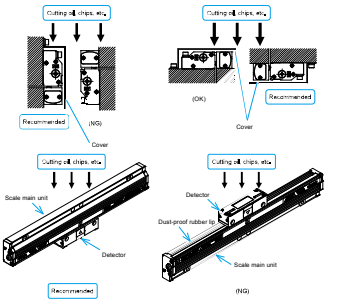
2. Designing the Mounting Surface of the Scale Unit

The mounting surface of the scale unit must be machine-processed to be that. Position dimensions and surface precision required for the machined surface differ depending on the scale main unit specification (H: high precision specification, S: high rigidity specification).
For details of the mounting specifications, refer to "10. External Dimensional Drawings of the Scale Main Unit".



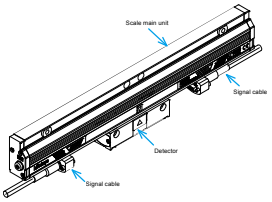
3. Scale Main Unit Mounting Directions and Cover Preparations

When installing this product, be sure to install the cover also so that cutting oil, chips, etc. do not splatter onto the scale main unit.
Also be careful about the mounting direction of the scale main unit.



4. Signal Cable Connecting Direction

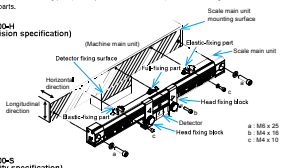
Connect the signal cable to the electronic components with one of the connectors provided on either side of the Detector.
Be sure to check the connecting direction and the routing of the signal cable.
For details, refer to "7. Connecting the Signal Cable".



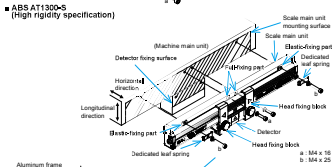
5. Mounting the Scale Main Unit

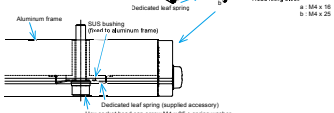
Temporarily fix the scale main unit to the fixing surface of the machine main unit with the supplied screws. Fully fix it after adjusting its position.
For details of the mounting specifications, refer to "10. External Dimensional Drawings of the Scale Main Unit".
• Tightening torque of screw
M4:3 N·m, M6:9 N·m
• Tightening procedure of screw
Be sure to tighten the full-fixing part (center part of scale main unit) first, and then tighten the elastic-fixing parts.

■ ABS AT1300-H
(High precision specification)



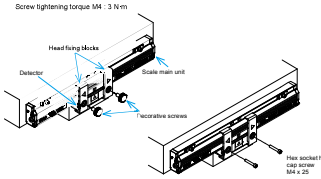
■ ABS AT1300-S
(High rigidity specification)



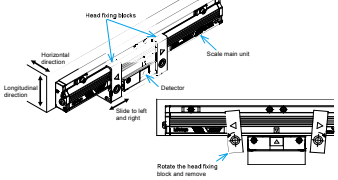


6. Mounting the Detector

1 Check the parallelism of the Detector mounting surface.
2 Remove the decorative screws, and fix the Detector with the supplied screws.
Screw tightening torque M4 : 3 N·m

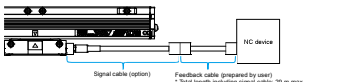


3 Remove the head fixing blocks.
Make sure that the Detector slides smoothly.

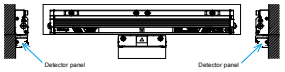


7. Connecting the Signal Cable

An example of the system configuration is shown below.

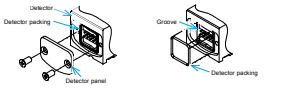


1 Decide the mounting direction of the signal cable.

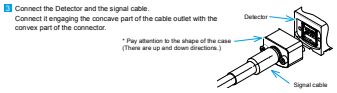


2 Remove the cable outlet panel at the mounting side of the signal cable.
Check that the Detector packing is attached.
If the Detector packing is not placed properly, set it in the groove of the signal cable outlet.

NOTICE
Water-resistance performance is impaired if the Detector packing is not attached properly.



3 Connect the Detector and the signal cable.
Connect it engaging the concave part of the cable outlet with the convex part of the connector.



8. Specifications

■ Specifications

Items	High precision specification	High rigidity specification
	ABS AT1300-H Series	ABS AT1300-S Series
Scale main unit installation specifications	Elastic fixing at three or five points	Elastic fixing at multiple points
Datum point position for length variation due to temperature changes	Center of effective measurement length	
ABS origin point (output data is 0)	Center of effective measurement length	
Effective measurement length (mm)	100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 750, 800, 900, 1000	100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1800, 2000, 2200
Detection method	Photoelectric type ABS linear encoder	
I/O method	High-speed serial interface	
Resolution (μm)	0.001/0.01/0.05	
Maximum response speed (m/min)	180	
Indication precision (μm) at 20 °C	$2+2L_1/1000$ L_1: Effective measurement length (mm)	$3+3L_1/1000$ L_1: Effective measurement length (mm)
Coefficient of thermal expansion	≈8 x 10⁻⁶/K	
Vibration resistance (55 Hz—2000 Hz)	≤ 147 m/s²	≤ 196 m/s²
Shock resistance (1/2 sin, 11 ms)	≤ 196 m/s²	≤ 343 m/s²
Power supply voltage/current consumption	5 VDC ± 10% / 270 mA (maximum value)	
Signal cable length	Maximum 29 m (signal cable + feedback cable)	
Used/storage temperature and humidity range	0 °C—50 °C / -20 °C—70 °C, 20 %—80 % RH (non condensation)	
Interface	Specifications made by Mitutoshi Electric Corporation and FANUC Corporation	

■ Discrete-wire specification cable

Cable color	Signal	Cable color	Signal
Brown	DT	White	+5 V
Red	/DT	Black	GND
Orange	RQDT	Shielded wire	Frame ground
Yellow	/RQDT		

* Connect the shielded wire to the ground bar.

■ Air Input

As a method to improve environmental resistance (coolant resistance, dust resistance), supply clean compressed air into the scale main unit.

NOTICE
Air supply is an auxiliary method for cleaning inside the scale main unit. For mounting directions and cover installation, follow the instruction of this manual.
When supplying air, it is necessary to periodically replace the air filter.

Air specification

Items	Specifications
Maximum particle diameter (μm)	0.1
Lowest pressure dew point (°C)	+3
Oil concentration (mg/m3)	0.01

*Corresponds to ISO8573-1 Class 1.4.1

Air flow

Supply air of 10 L/min—20 L/min per scale axis.

Conditions	Air flow rate
Using Mitutoyo's fixed diaphragm (ID: ø0.9)	Make adjustment with the air pressure, so that the air flow becomes 10 L/min—20 L/min (per scale unit). Reference values when supplying air to one axis are as follows. • If air pressure is 0.1 MPa: approx. 12.7 L/min • If air pressure is 0.2 MPa: approx. 19 L/min
Using other fixed diaphragms	Make adjustment with the air pressure, so that the air flow becomes 10 L/min—20 L/min (per scale unit).
Using flow rate adjustable valves	Make adjustment with the air pressure, so that the air flow becomes 10 L/min—20 L/min (per scale unit). For information on the air flow and pressure relationships, refer to the flow characteristics RO of the fixed diaphragm and flow-pressure relations) provided by each pneumatic component manufacturer. **NOTICE** Make sure not to supply a large amount of air before making adjustments. Otherwise, it may cause components to break thereby resulting in malfunctions.

■ Air Supply Unit

The specifications for recommended air devices and the manufacturer models are described in the following.

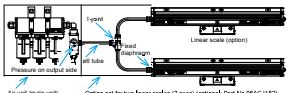
No.	Component	Appearance	Specifications	Part No. (Mitutoyo)	Part No. Manufacturer Model
(1)	Air filter		Fluid: Compressed air Maximum operating pressure: 1.0 MPa Proof pressure: 1.5 MPa Maximum particle diameter (filtration): 5 μm Secondary oil concentration: -	-	F100D-8-W (CKD)
(2)	Oil mist filter		Fluid: Compressed air Maximum operating pressure: 1.0 MPa Proof pressure: 1.5 MPa Maximum particle diameter (filtration): 0.01 μm Secondary oil concentration: 0.01 mg/m3 or below Element replacement: one year (8000 hours) or when pressure is lowered to 0.1 MPa or lower	-	M1000-8-W (CKD)
(3)	High performance oil mist filter		Fluid: Compressed air Maximum operating pressure: 1.0 MPa Proof pressure: 1.5 MPa Maximum particle diameter (filtration): 0.01 μm Secondary oil concentration: 0.001 mg/m3 or below Element replacement: one year (8000 hours) or when pressure is lowered to 0.1 MPa or lower	-	MX1000-8-W (CKD)
(4)	Regulator		Fluid: Compressed air Maximum operating pressure: 1.0 MPa Proof pressure: 1.5 MPa Set pressure range: 0.1 MPa—0.7 MPa Oil proof treatment type	-	RA-050-L (CKD)
(5)	Fixed diaphragm		Fluid: Air Set pressure range: 0.1 MPa—0.9 MPa Screw tightening torque: 1.0 N·m—1.5 N·m Flow rate at pressure 0.1 MPa: Approx. 12.7 L/min (per axis) Flow rate at pressure 0.2 MPa: Approx. 19 L/min (per axis)	06ACJ155	PC8-M5M-0.9 (Piaco custom order)
(1) to (4)	Air unit	See the next figure.	Equivalent to ISO-8573-1 Class 1.4.1 Maximum particle diameter (filtration): 0.01 μm Lowest pressure dew point: - Oil concentration (oil mist concentration): 0.001 mg/m3 or less Flow rate at pressure 0.1 MPa: 12.7 L/min (per axis) Insertable flow rate (maximum): 75 L/min When to replace each element: 1 year	06ACJ154	-

Appearance of air unit

■ Connection Method

Do not directly supply air from the compressor to the air unit. Make sure to use dry compressed air through the air dryer or main line air filter.
Attach the fixed diaphragm to the scale side.

When supplying air to two linear scales (2 axes)



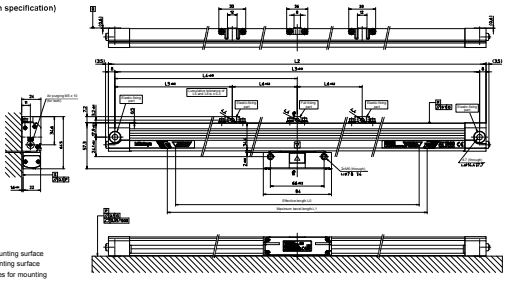
When supplying air to three linear scales (3 axes)

NOTICE
Make sure to use dry clean air.
Estimated time of element replacement for each filter is one year.
For information on maintenance, refer to the manual supplied with the air unit.

9. Signal Check Program

Signal check program (option, see the table below) to investigate the cause of the error in the scale is separately sold.
Use it as needed.

Set No.	Applicable models	Included items	
06AFY585	ABS AT1340	• Signal Check Program (CD-ROM) • Signal Check Program manual • Conversion unit (one of the units below) USB-485DS15P USB-422DS15P	• Conversion unit manual • Device Driver (CD-ROM) • Installation manual • Connecting cable A (USB cable) • Connecting cable B (for connecting to ABS AT1300)
06AFY587	ABS AT1340A		
06AFY589	ABS 1350		

10. External Dimensional Drawings of the Scale Main Unit

■ ABS AT1300-H (high precision specification)