



Separate Type Linear Scale

ST36

User's Manual - Instructions for use -

Read this document thoroughly before operating the product. After reading, retain it close at hand for future reference.

This English language version of the document contains the original instructions.

No. 99MBE048B5

Date of publication: May 1, 2025 (1)



■ Product names and model numbers covered in this document

Product name	Model number
Separate Type Linear Scale	ST36

■ Notice regarding this document

- Mitutoyo Corporation assumes no responsibilities for any damage to the product, caused by its use not conforming to the procedure described in this document.
- Upon loan or transfer of this product, be sure to attach this document to the product.
- In the event of loss or damage to this document, immediately contact the agent where you purchased the product or Mitutoyo sales office.
- Read this document thoroughly before operating the product. In particular, be sure to fully understand "Safety Precautions" and "Precautions for Use" in the preface.
- The contents in this document are based on the information current as of May 2025.
- No part or whole of this document may be transmitted or reproduced by any means without prior written permission of Mitutoyo Corporation.
- The corporation, organization and product names that appear in this document are their trademarks or registered trademarks.

©2019-2025 Mitutoyo Corporation. All rights reserved.

Conventions and Wording Used in This Document

■ Safety reminder conventions and wording warning against potential hazards

 DANGER	Indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury .
 WARNING	Indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury .
 CAUTION	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury .
 NOTICE	Indicates a situation which, if not avoided, may result in property damage .
	Electricity Alerts the user to a specific hazardous situation that means "Caution, risk of electric shock".

■ Conventions indicating prohibited and mandatory actions

	Indicates concrete information about prohibited actions.
	Indicates concrete information about mandatory actions.
	Indicates that grounding needs to be implemented.

■ Conventions and wording indicating referential information or referential locations

Tips Indicates further information and details relevant for the operating methods and procedures that are explained in that section.



Indicates referential locations if there is information that should be referred to in this document or an extraneous User's Manual.

E.g.: For further details on xxx, refer to  "1.2 System Configuration and Name of Each Part" (page 1)

Safety Precautions

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

NOTICE

- Read this document thoroughly before operating the system to use it properly.
- 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.

Precautions for Use

■ General safety precautions

- This product is a measuring instrument.
Do not use this product for any other purpose than measuring.
- This is an industrial product.
Do not use this product for any other purpose than industrial use.
- This product is a precision instrument.
Handle this product with extra care. Do not apply any strong impact or excessive force to the parts during use.

■ Required environment for installation

● Vibration

To install this product onto the machine main unit, select a location where there is as little vibration as possible.

If the scale unit is used for an extended period of time on a machine where there is a substantial amount of vibration, the built-in precision parts may be damaged, thereby adversely influencing the performance of the unit.

● Shock, dust, water protection

To protect the scale main unit from being directly exposed to machining oil and chips, or from being bumped by a workpiece, etc., prepare a cover that protects the entire scale main unit.

● Ambient temperature and humidity

This product should be operated in an environment where the temperature is 0 °C–40 °C and where the relative humidity is 20 %RH–80 %RH. Do not use this product in a place where sudden changes in temperature or humidity are observed.

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 is an industrial product. Not intended for use in a residential environment. Use of this product in a residential environment may cause an electromagnetic interference with other instruments. In such a case, appropriate measures against electromagnetic interference are required.

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.

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-providing of the technology (including Programs), 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, List-Control 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. 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-providing of the technology (including Programs), you shall observe the regulations of your country. Please contact Mitutoyo in advance.

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). For detailed information, please contact Mitutoyo in advance.

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.

For how to dispose of the product, please contact the agent where you purchased the product or a 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	汞	镉	六价铬	多溴联苯	多溴二苯醚
	(Pb)	(Hg)	(Cd)	(Cr(VI))	(PBB)	(PBDE)
本体	○	○	○	○	○	○
电气设备部分	×	○	○	○	○	○
配件	○	○	○	○	○	○

部件名称	有害物质			
	邻苯二甲酸二正丁酯	邻苯二甲酸二异丁酯	邻苯二甲酸丁基苄酯	邻苯二甲酸二(2-乙基己)酯
	(DBP)	(DIBP)	(BBP)	(DEHP)
本体	○	○	○	○
电气设备部分	○	○	○	○
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。



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《电器电子产品有害物质限制使用标识要求(SJ/T11364—2024)》制定的,适用于中国境内销售的电子电气产品的标识。

电器电子产品只要按照安全及使用说明内容在正常使用情况下,从生产日期算起,在此期限内产品中含有的有毒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。

产品使用后,要废弃在环保使用年限内或者刚到年限的产品,请根据国家标准采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

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 representative (図 "SERVICE NETWORK" on page App-1). This warranty, however, shall not affect any provisions of the Mitutoyo Software End User License Agreement.

If this product fails or is damaged for any of the following reasons, it will be subject to a repair charge, even if it is still under warranty.

- Failure or damage owing to fair wear and tear
- Failure or damage owing to inappropriate handling, maintenance or repair, or to unauthorized modification
- Failure or damage owing to transport, dropping, or relocation of the product after purchase
- Failure or damage owing to fire, salt, gas, abnormal voltage, lightning surge, or natural disaster
- Failure or damage owing to use in combination with hardware or software other than those designated or permitted by Mitutoyo
- Failure or damage owing to use in ultra-hazardous activities

This warranty is effective only where the product is properly installed and operated in conformance with the instructions in this document within the original country of the installation.

EXCEPT AS SPECIFIED IN THIS WARRANTY, ALL EXPRESS OR IMPLIED CONDITIONS, REPRESENTATIONS, AND WARRANTIES OF ANY NATURE WHATSOEVER INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, NONINFRINGEMENT OR WARRANTY ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE, ARE HEREBY EXCLUDED TO THE MAXIMUM EXTENT ALLOWED BY APPLICABLE LAW.

You assume all responsibility for all results arising out of its selection of this product to achieve its intended results.

Disclaimer

IN NO EVENT WILL MITUTOYO, ITS AFFILIATED AND RELATED COMPANIES AND SUPPLIERS BE LIABLE FOR ANY LOST REVENUE, PROFIT, OR DATA, OR FOR SPECIAL, DIRECT, INDIRECT, CONSEQUENTIAL, INCIDENTAL, OR PUNITIVE DAMAGES HOWEVER CAUSED AND REGARDLESS OF THE THEORY OF LIABILITY ARISING OUT OF THE USE OF OR INABILITY TO USE THIS PRODUCT EVEN IF MITUTOYO OR ITS AFFILIATED AND RELATED COMPANIES AND/OR SUPPLIERS HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

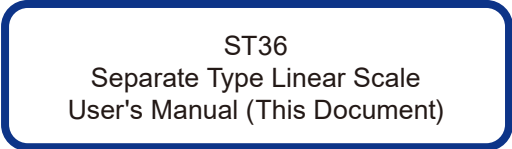
If, notwithstanding the foregoing, Mitutoyo is found to be liable to you for any damage or loss which arises out of or is in any way connected with use of this product by you, in no event shall Mitutoyo's and/or its affiliated and related companies' and suppliers' liability to you, whether in contract, tort (including negligence), or otherwise, exceed the price paid by you for the product only.

The foregoing limitations shall apply even if the above-stated warranty fails of its essential purpose. BECAUSE SOME COUNTRIES, STATES OR JURISDICTIONS DO NOT ALLOW THE EXCLUSION OR THE LIMITATION OF LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES, IN SUCH COUNTRIES, STATES OR JURISDICTIONS, MITUTOYO'S LIABILITY SHALL BE LIMITED TO THE EXTENT PERMITTED BY LAW.

About This Document

■ Positioning of this document in document map

● For linear scale



ST36
Separate Type Linear Scale
User's Manual (This Document)

■ Intended readers and purpose of this document

● Intended readers

This document is intended for first-time users of ST36 Separate Type Linear Scale.
Readers are assumed to be able to understand instructions by reading technical drawings.

● Purpose

The purpose of this document is to help you understand the ST36 Separate Type Linear Scale.

Contents

Conventions and Wording Used in This Document	i
Safety Precautions	ii
Precautions for Use	ii
Electromagnetic Compatibility (EMC)	iii
Export Control Compliance	iii
Notes on Export to European Countries	iii
Disposal of Products outside the European Countries	iii
Disposal of Old Electrical & Electronic Equipment (Applicable in the European Countries with Separate Collection Systems)	iv
China RoHS Compliance Information	iv
Warranty	v
Disclaimer	v
About This Document	vi
Contents	vii
1 Overview	1
1.1 Features	1
1.2 System Configuration and Name of Each Part	1
1.3 The Flow of Main Tasks	3
2 Setup for Installation	5
2.1 Checking the Equipment Model	5
2.2 Designing the Scale Mounting Surface	8
2.2.1 Mounting the Scale with the Effective Length of 10 mm–80 mm (Adhesive Fixing Type)	8
2.2.2 Mounting the Scale with the Effective Length of 100 mm–3000 mm	9
2.3 Designing the Detector Bracket	10
3 Installation onto the Machine Main Unit	11
3.1 Checking the Package Contents	11
3.2 Mounting the Scale	12
3.3 Mounting the Detector Bracket and Detector	15
3.4 Connecting the Feedback Cable	16

3.5	Adjusting the Detector Signals	17
3.5.1	Adjusting the Detector Mounting Position	17
3.5.2	Adjusting the Signals	20
3.6	Handling the Cables and Checking the Mounting State	23
3.6.1	Handling the Cables	23
3.6.2	Checking the Mounting and Adjustment States	24
3.6.3	Putting the Protection Cover	25
4	Specifications	27
4.1	Specifications	27
4.2	Output Circuits and Signal Waveforms	28
4.2.1	Main Signal Type: Type A, Type C	28
4.2.2	Main Signal Type: Type B, Type C	29
4.2.3	Main Signal Type: Type D	30
4.3	Pin Assignment	32
4.3.1	Main Signal Type: Type A	32
4.3.2	Main Signal Type: Type B	32
4.3.3	Main Signal Type: Type C	33
4.3.4	Main Signal Type: Type D	33
4.4	Production of Feedback Cable	34
4.5	Alarm Function	35
4.5.1	Main Signal Type: Type A	35
4.5.2	Main Signal Type: Type B, Type C	36
4.6	Adjusting the Signals Using the Check Adapter (Option)	38
4.7	Removing the Detector Cable	40
4.8	Changing the Output Settings	41
4.9	Maximum Response Speed	43
4.10	External View and Dimensional Drawings	44
4.10.1	Dimensional Drawings	44
4.10.2	Dimensional Drawings Table	45
5	Troubleshooting	47
SERVICE NETWORK		App-1

1 Overview

This chapter describes the features of this product, the names and functions of the parts, and the flow of the main tasks to use this product.

1.1 Features

The optical separate type linear scale detects changes in the amount of light using light emitting elements and light receiving elements based on the glass scale grids and outputs the amount of changes.

This can precisely measure moving amounts of various instruments including an aligner, wire bonding, and stage for semiconductor manufacturing.

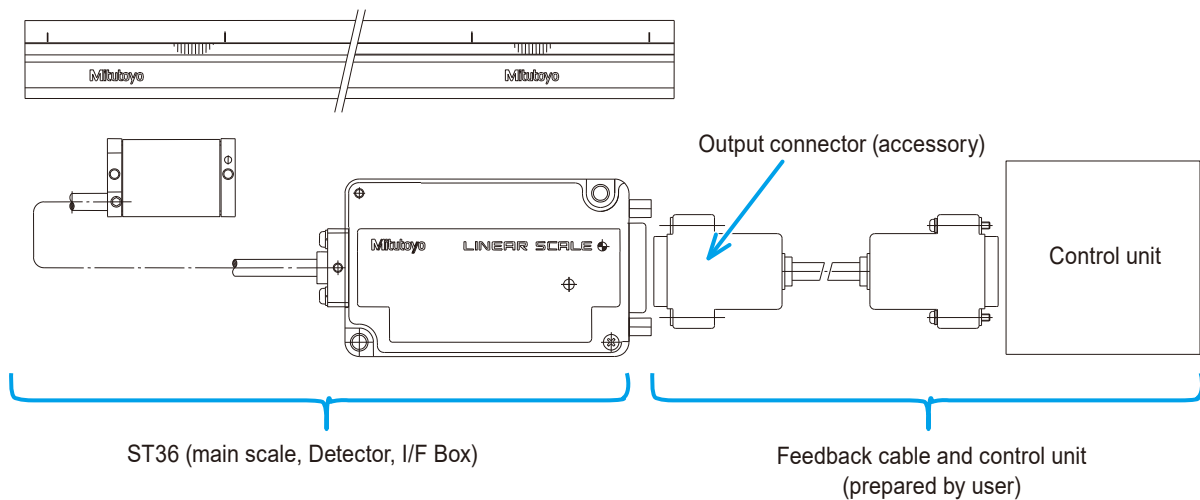
This product is a high-precision separate type linear scale with indication accuracy $\pm 0.5 \mu\text{m}$ (effective length of up to 300 mm). With successful reduction in Detector thickness to 11.5 mm and support for the maximum effective length of 3000 mm, it can be used even for large machines. It is also equipped with the LED Display function for signal errors.

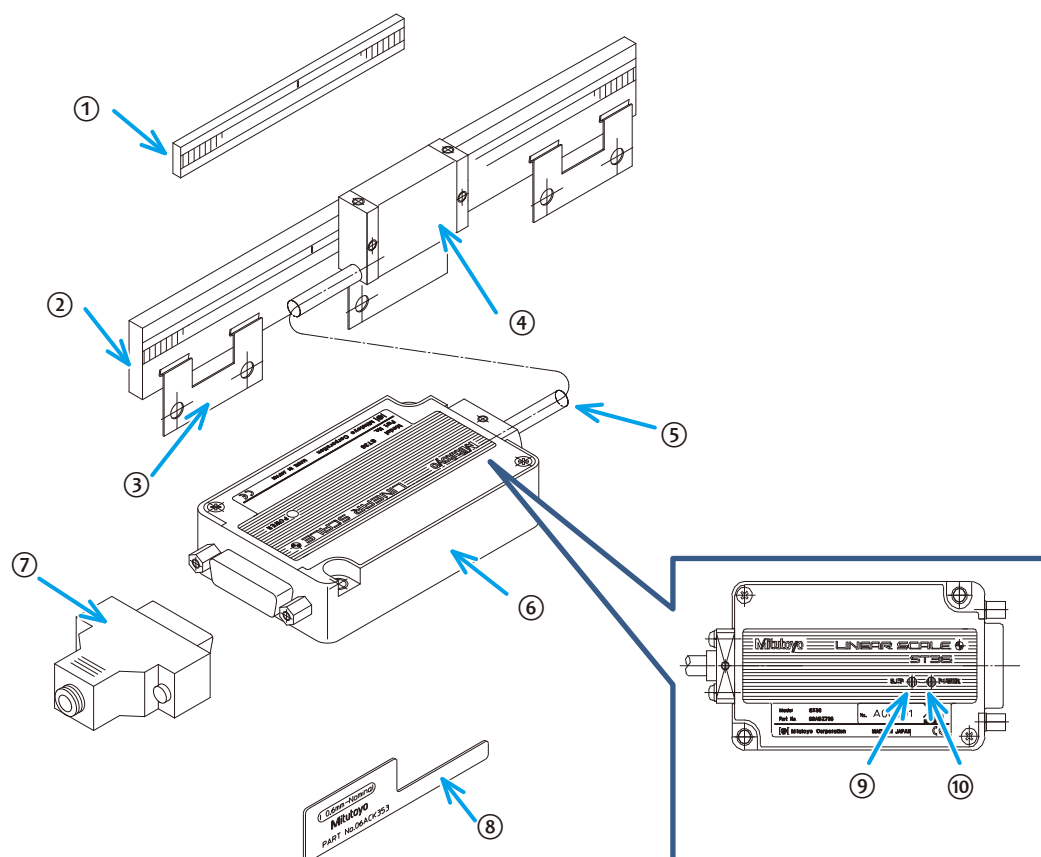
The following four output signal types are available in this product:

- Two-phase sine wave
- Two-phase square wave
- Two-phase square wave/two-phase sine wave
- Differential 1 Vpp sine wave

1.2 System Configuration and Name of Each Part

The system configuration and the name of each part are shown below.



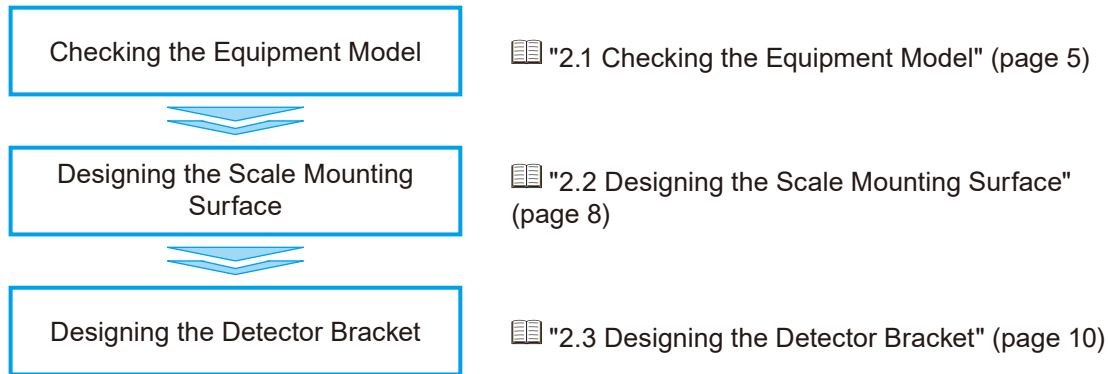


No.	Name
①	Main scale (effective length: 10 mm–80 mm)
②	Main scale (effective length: 100 mm–3000 mm)
③	Scale retaining spring
④	Detector
⑤	Detector cable
⑥	I/F Box
⑦	Output connector
⑧	Gap spacer
⑨	S.UP light
⑩	POWER light

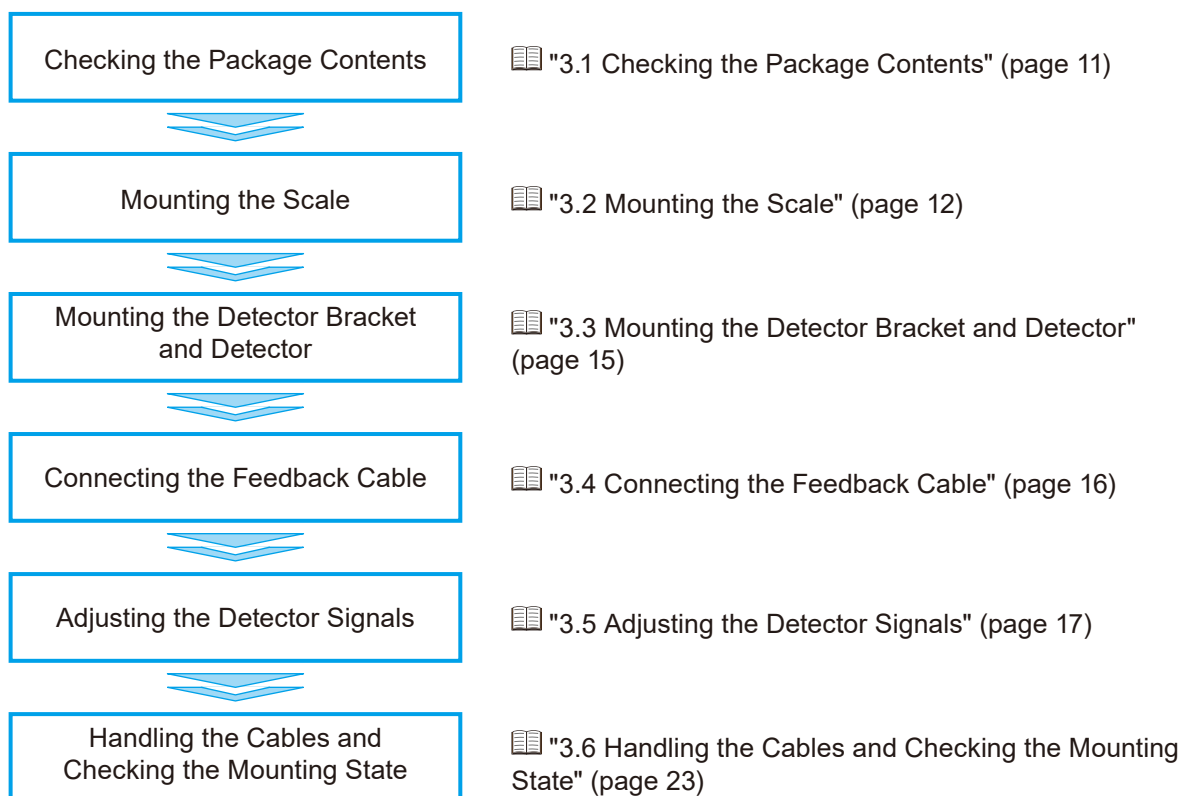
1.3 The Flow of Main Tasks

The following chart shows the flow of preliminary preparation and installation onto the machine main unit as tasks to use this product.

■ Preliminary preparation



■ Installation onto the machine main unit



MEMO

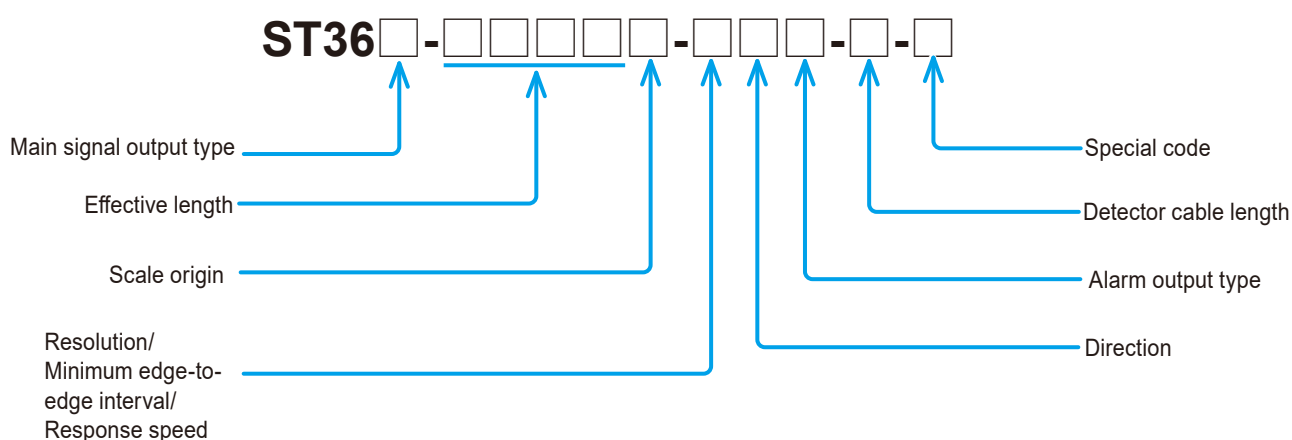
2 Setup for Installation

This chapter describes the preliminary preparation for installing this product onto the machine main unit.

2.1 Checking the Equipment Model

The ST36 model number is determined based on the main signal output type, effective length, scale origin, resolution/minimum edge-to-edge interval/response speed, direction, alarm output type, Detector cable length, and special code.

Make sure that your scale unit model satisfies desired specifications.



■ Main signal output type

Symbol	Output
A	Two-phase sine wave
B	Two-phase square wave + external reset input
C	Two-phase square wave + two-phase sine wave
D	Differential 1 Vpp sine wave

■ Effective length

Symbol	Effective length (mm)	Symbol	Effective length (mm)
0010	10	0400	400
0025	25	0500	500
0050	50	0600	600
0075	75	0700	700
0080	80	0800	800
0100	100	0900	900
0150	150	1000	1000
0200	200	1100	1100
0250	250	1200	1200
0300	300	1300	1300
0350	350	1400	1400

2 Setup for Installation

Symbol	Effective length (mm)	Symbol	Effective length (mm)
1500	1500	2400	2400
1600	1600	2500	2500
1700	1700	2600	2600
1800	1800	2800	2800
2000	2000	3000	3000
2200	2200		

■ Scale origin

Symbol	Effective length of 10 mm–80 mm
B	Center point
Z	Special point specification

Symbol	Effective length of 100 mm–3000 mm
A	50-mm pitch
B	Center point
Z	Special point specification

Tips

- For the effective length of 10 mm–80 mm, the default scale origin is B (center point).
- For the effective length of 100 mm–3000 mm, the default scale origin is A (50-mm pitch).

■ Resolution/minimum edge-to-edge interval/response speed

Minimum edge-to-edge interval (ns) / Resolution (μm)	125	250	500	1000
0.01	A: 72	B: 36	C: 18	D: 9
0.02	E: 144	F: 72	G: 36	H: 18
0.05	J: 360	K: 180	L: 90	M: 45
0.1	N: 720	P: 360	Q: 180	R: 90
–	Z: When the main signal output type is A (two-phase sine wave) or D (differential 1 V _{pp} sine wave), the maximum response speed is 1200 mm/s at sine wave decreasing of -3 dB.			

Tips

- The number each for symbols A–R represents the maximum response speed (mm/s).
- The minimum edge-to-edge interval varies within the range between 0% and -10 % depending on the operating condition.

■ Direction

Symbol	Description
1	Forward: PA phase advance
2	Reverse: PB phase advance
Z	When the main signal output type is A (two-phase sine wave) or D (differential 1 Vpp sine wave), the direction is not set.

■ Alarm output type

Symbol	Description
S	Alarm signal
H	High impedance
Z	When the main signal output type is A (two-phase sine wave) or D (differential 1 Vpp sine wave), the alarm output type is not set.

■ Detector cable length

Symbol	Length
A	1 m (high flexibility specification)
B	0.5 m (high flexibility specification)
Z	Special length specification (maximum: 2.5 m)

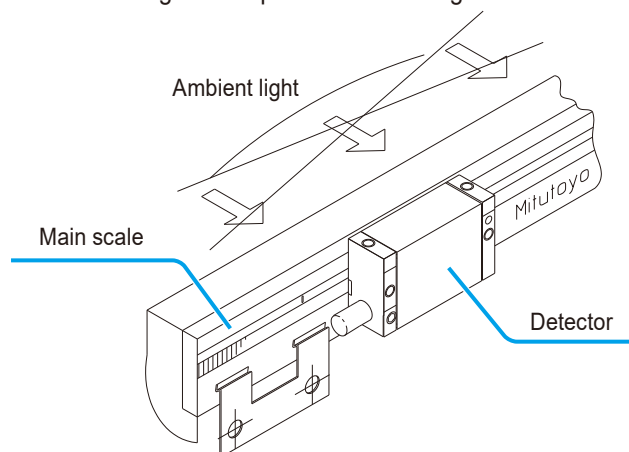
■ Special code

Symbol	Description
None	Standard selection specification
Z	Special specification

2.2 Designing the Scale Mounting Surface



If ambient light enters the main scale from the back side, it causes a malfunction. Design the main scale mounting area to prevent ambient light as shown in the figure below.

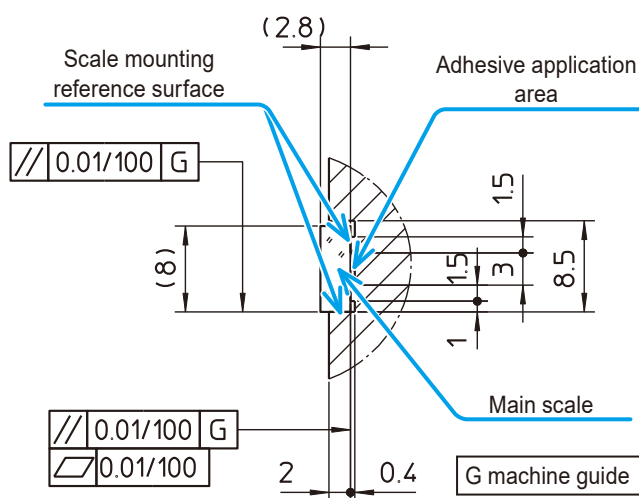


2.2.1 Mounting the Scale with the Effective Length of 10 mm–80 mm (Adhesive Fixing Type)

Mount the main scale with the effective length of 10 mm–80 mm (adhesive fixing type) by fixing with adhesives.

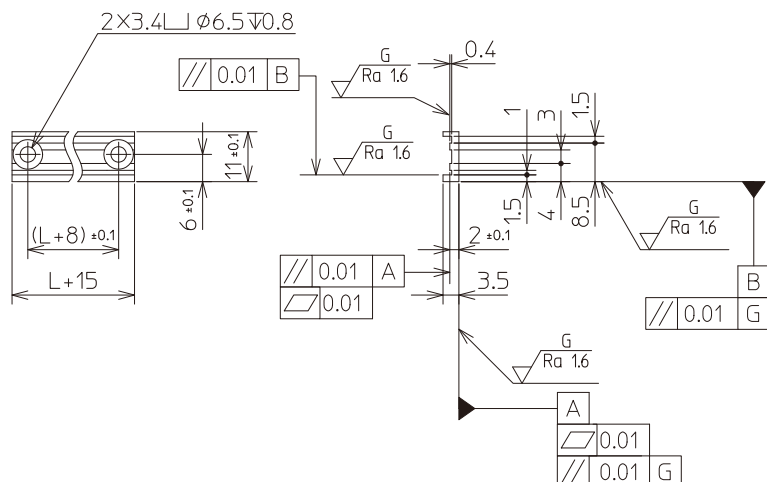


Design the main scale mounting area as shown in the figure below according to  "4.10.1 Dimensional Drawings" (page 44).



Tips

If you may need to mount the main scale with the effective length of 10 mm–80 mm (adhesive fixing type) again for maintenance, attach the main scale to the scale bracket shown in the figure below and fix it with bolts.

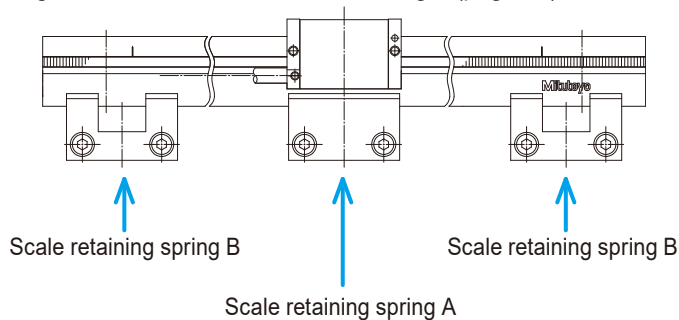


2.2.2 Mounting the Scale with the Effective Length of 100 mm–3000 mm

Mount the main scale with the effective length of 100 mm–3000 mm by fixing with scale retaining springs.



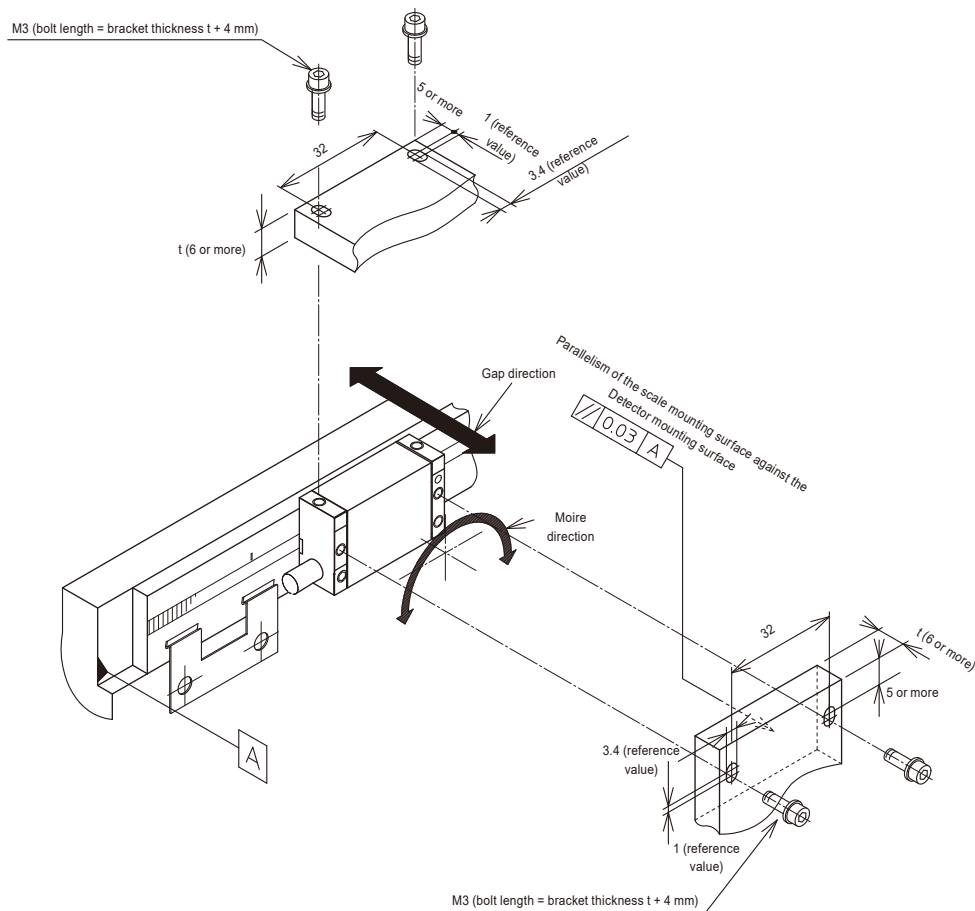
Secure working space for tightening the scale retaining spring A and scale retaining spring B according to "4.10.1 Dimensional Drawings" (page 44).



2.3 Designing the Detector Bracket



- Design the Detector bracket according to the figure below. Its shape must allow adjustment of the Detector position (moire/gap). It is recommended that the Detector fixing screw holes should be long holes to make it easier to adjust the Detector position.



- Design it so that the parallelism of the Detector mounting surface against the scale mounting surface is within 0.03 mm.

3 Installation onto the Machine Main Unit

This chapter describes the procedures, methods, and precautions required when mounting this product onto the machine main unit.

3.1 Checking the Package Contents

Before installation, make sure that the product package contains the following items.

If your scale does not satisfy the specified specifications or you have any questions or concerns about the product, please contact your dealer or the nearest Mitutoyo sales office/service center.

Name	Quantity	Note
Main scale	1	Check the effective length.
Detector + I/F Box	1	
Scale retaining spring		This accessory comes with the scale with the effective length of 100 mm or more. For details on the quantity, refer to  "4.10.2 Dimensional Drawings Table" (page 45).
Output connector	1	
Gap spacer	1	
Serial number sticker	1	This accessory comes with the scale with the effective length of 10 mm–80 mm.
User's Manual	1	This document
Inspection certificate	1	
Warranty card	1	



- To mount the Detector, prepare the following parts.

Part name	Quantity
Hex socket head cap screw (M3 x (bracket thickness + 4 mm) or less)	2

- To mount the scale with the effective length of 100 mm–3000 mm, prepare the following parts.

Part name	Quantity
Hex socket head cap screw (M4 x bottom hole size or less)	Number of scale retaining springs x 2
Plain washer (nominal diameter 4)	Number of scale retaining springs x 2
Spring washer (nominal diameter 4)	Number of scale retaining springs x 2

3.2 Mounting the Scale

NOTICE

The main scale is made of glass. Be very careful that the scale is not damaged or scratched.



- If dirt and dust are attached to the main scale, it causes a malfunction or deteriorates the accuracy. Wipe off the dirt and dust with a soft cloth soaked in alcohol or cleaning paper. Similarly, clean the scale mounting surface of the machine unit thoroughly with alcohol.
- Use elastic adhesives to attach the main scale with the effective length of 10 mm–80 mm (adhesive fixing type). Shin-Etsu Silicones' KE441T is recommended.

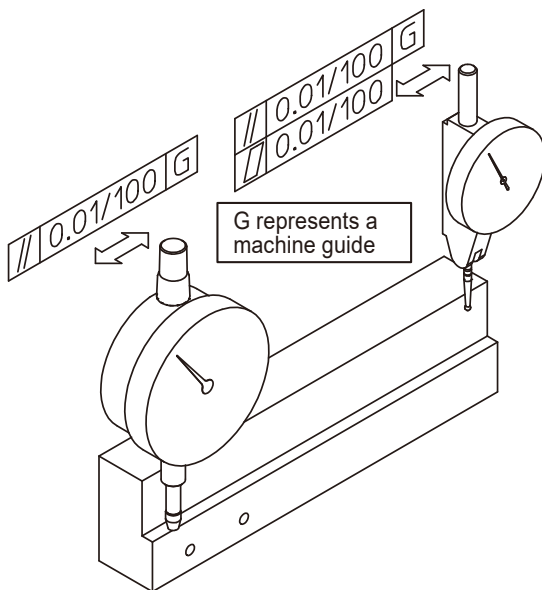
Tips

- Conduct temperature leveling thoroughly for both the main scale and mounting parts before fixing them. The accuracy of this product is guaranteed at 20 °C. The recommended temperature leveling is about 8 hours or longer at 20 °C for both the main scale and parts for mounting the scale. Perform installation after temperature leveling.
- If the temperature environment is insufficient, including temperature leveling, the predetermined indication accuracy may not be achieved.

- 1 Make sure that the scale mounting surface is prepared as shown below using a lever-type dial indicator or electric micrometer.

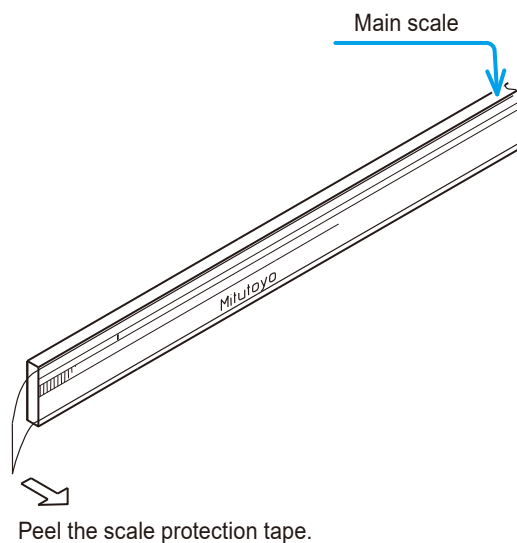


- Check the parallelism of the main scale mounting surface against the axis of motion of the machine unit.
- If the parallelism is insufficient, adjust the machine unit again.



3 Installation onto the Machine Main Unit

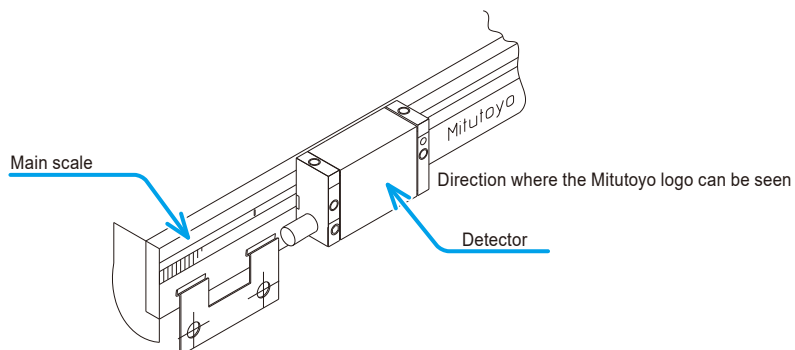
2 Peel the scale protection tape.



3 Mount the main scale.



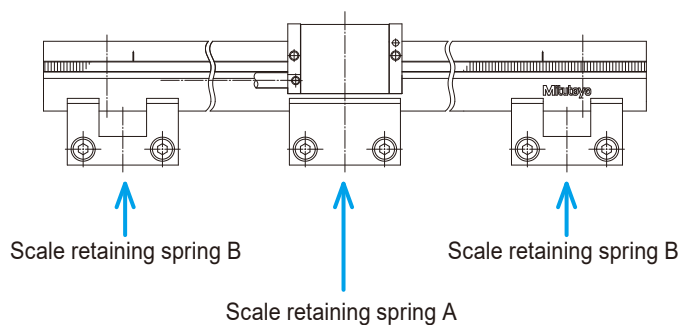
- Mount the main scale so that the Detector is placed on the grid surface (surface where rainbow colors appear when light is applied diagonally).
- For a scale with the Mitutoyo logo attached, the correct mounting direction is where the logo can be appropriately viewed from the Detector side.



- Put the serial number sticker near the location where the scale is mounted on the machine for the main scale with the effective length of 10 mm–80 mm (adhesive fixing type).

■ Installation using the scale retaining springs

- 1 Temporarily fix the center of the main scale with the scale retaining spring A.



- 2 Temporarily fix the main scale with the scale retaining springs B.



This must be performed in the order closer to the center of the main scale.

- 3 Conduct temperature leveling for 1 to 2 hours.

- 4 Fully tighten the bolts for scale retaining springs in the order from the center to both ends of the main scale.



The recommended tightening torque for scale retaining spring bolts is 1.5 N•m.

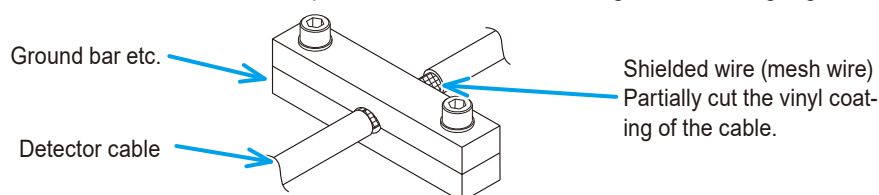
3.3 Mounting the Detector Bracket and Detector

NOTICE

Do not directly touch the I/F Box pins during installation. Otherwise, electronic parts may be damaged by static electricity. Be sure to take measures to prevent static electricity for installation.

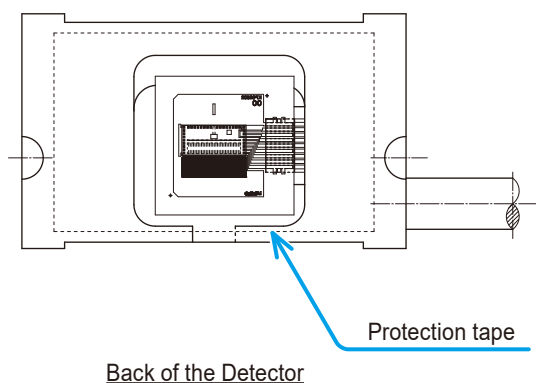


To use the scale with the Detector mounted, the machine main unit, as well as the attachment bracket, must be electrically grounded. Failure to do so may cause the scale unit and the Detector to be affected by external noise. When it is difficult to ground due to the characteristics of the bracket material, make sure that the shielded part of the Detector cable is grounded using a ground bar.



Example: Drawing of using a ground bar

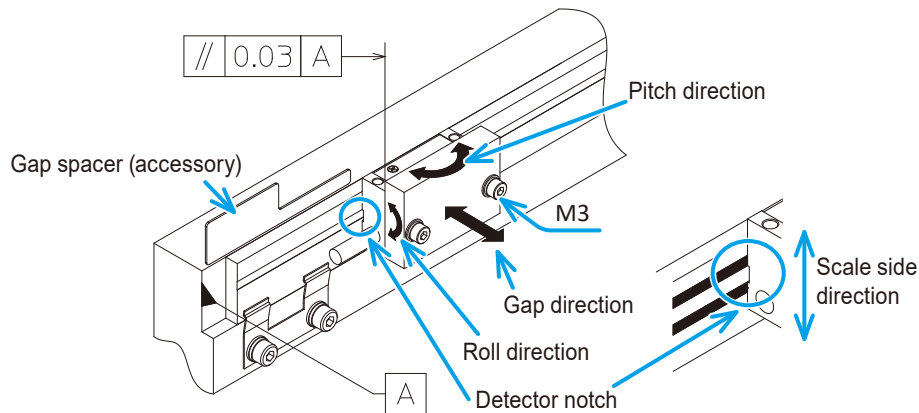
- 1 Peel the protection tape (blue) off the detecting surface of the Detector.



2 Attach the Detector to the Detector bracket.



Use a gap spacer as shown in the figure below to adjust the distance (gap) between the Detector and main scale to 0.6 mm.



3 Check the parallelism of the Detector against the main scale with a lever-type dial indicator or electric micrometer.



The parallelism of the Detector against the main scale must be within 0.03 mm.

4 Fix the Detector.



- The recommended tightening torque for Detector fixing screws is 1.14 N•m–1.5 N•m.
- After fixing the Detector, make sure that the distance (gap) between the Detector and main scale is 0.6 mm using the gap spacer.

3.4 Connecting the Feedback Cable



- Be sure to turn off the control unit before connecting the scale unit to the control unit with a feedback cable.
- A feedback cable must be prepared by the user. Find a cable that supports your model according to ["4.4 Production of Feedback Cable"](#) (page 34).

1 Connect the I/F Box to the control unit with the feedback cable.

2 Turn on the control unit.

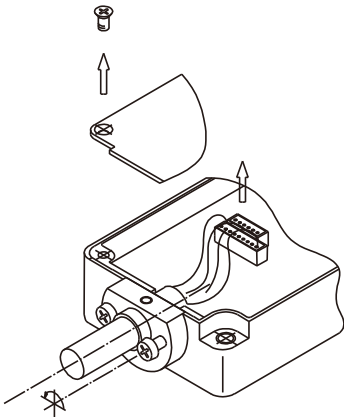
- » The POWER light on the I/F Box turns on.

3.5 Adjusting the Detector Signals

After mounting the main scale and Detector and connecting the feedback cable, adjust the Detector signals.

3.5.1 Adjusting the Detector Mounting Position

- 1 Remove the two screws and remove the I/F Box cover.

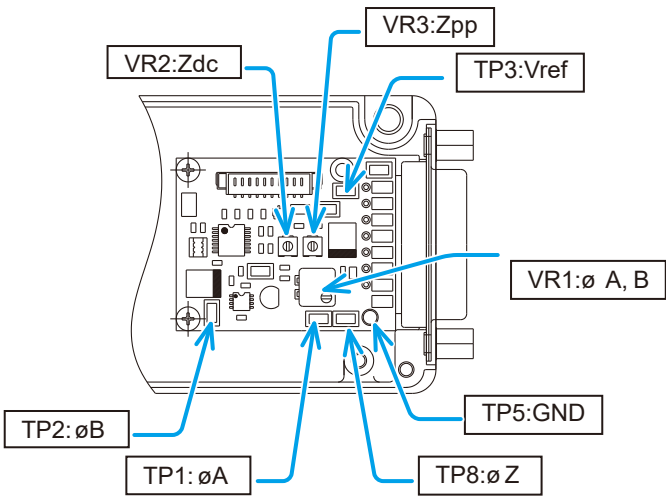


- 2 Set the oscilloscope as follows.

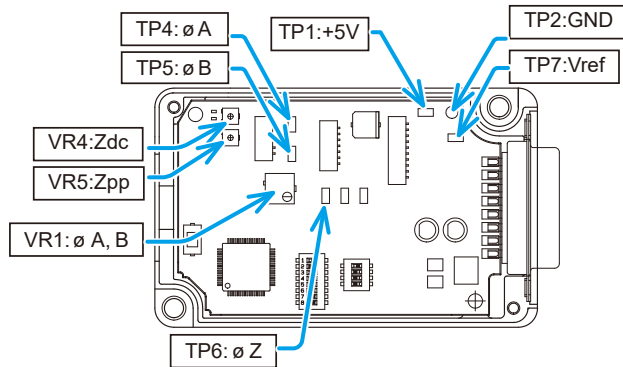
Item	Setting description
Measurement pressure range	0.5 V/div (50 mV/div when using a 10:1 probe)
Scan mode	X-Y

- 3 Clip the two probes and GND probe of the oscilloscope to Vref and GND on the I/F Box, respectively.

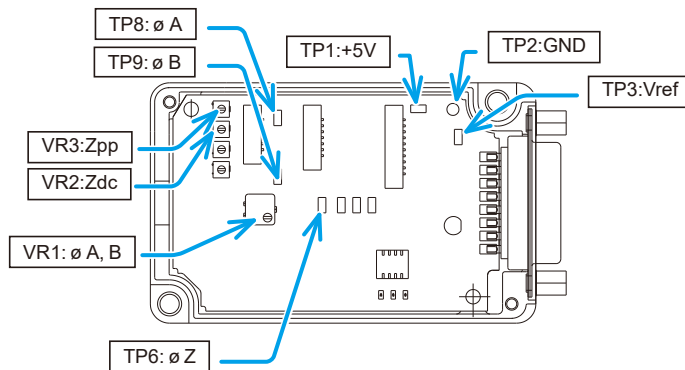
■ Main signal output type: A (two-phase sine wave)



- Main signal output type: B (two-phase square wave + external reset input), C (two-phase square wave + two-phase sine wave)



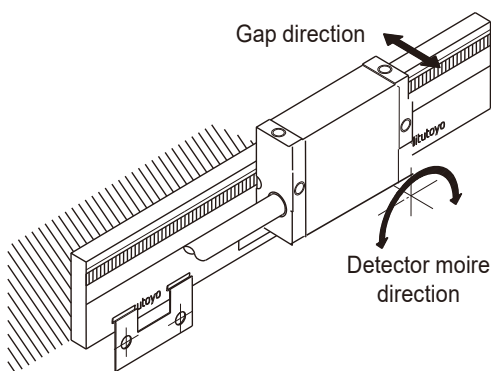
- Main signal output type: D (differential 1 Vpp sine wave)



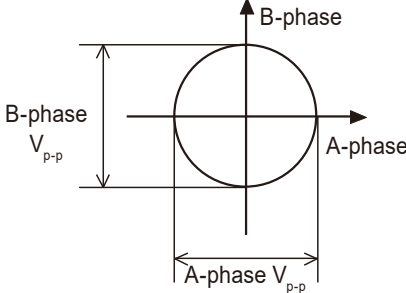
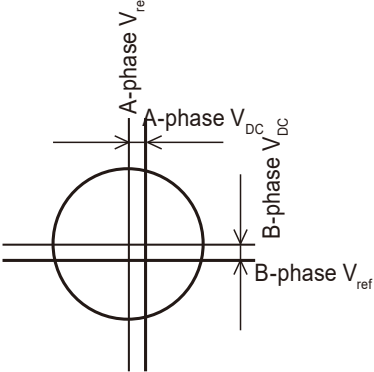
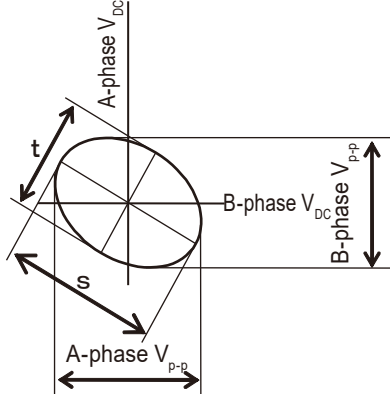
- 4 Adjust the horizontal/vertical positioning knob so that the blip on the oscilloscope is located in the center.
- 5 Clip the ch1 probe to øA (A-phase) and ch2 probe to øB (B-phase).
- 6 Make sure that the output signals from the I/F Box are within the following specified values.

Tips

If the signals are outside the specified values, adjust the moire direction of the Detector while moving the main scale or Detector.



3 Installation onto the Machine Main Unit

Item	Lissajous waveform	Specified value	Note
Amplitude voltage (Vpp)		$2.0 \pm 0.2 \text{ V}$	This value changes due to an adjustment error in the gap amount (between the Detector and main scale), parallelism, and moire angle.
Center voltage (VDC)		$[V_{ref}] \pm 0.1 \text{ V}$	Same as the above
Phase error (ϕ)		$0 \pm 2^\circ$	Same as the above



If measured values do not fall within the specified values, adjust the gap (gap: $0.6 \pm 0.1 \text{ mm}$).

Tips

- The Detector and I/F Box were already factory adjusted so that output signals fall within 1.8 V–2.2 V.
- You can fine-adjust the amplitude voltage (Vpp) by electrical adjustment described in ["3.5.2 Adjusting the Signals"](#) (page 20).
- Calculate the phase error (ϕ) from t/s (ratio of major axis to minor axis) shown in the figure above.

Phase error	0°	2°	4°	6°	8°	10°
t/s	1.000	0.966	0.933	0.901	0.871	0.841

- Make sure that the oscilloscope does not drift during measurement.

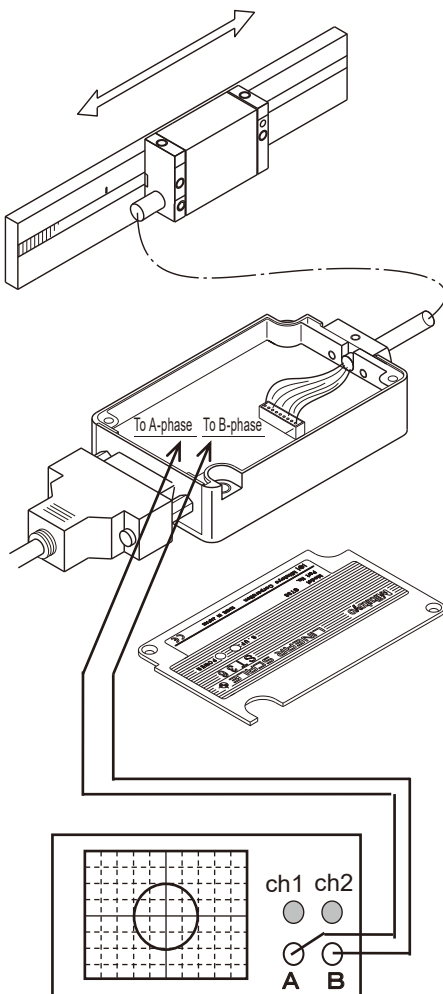
7 Fix the Detector.

8 Make sure that the output signals from the I/F Box are within the specified values.

3.5.2 Adjusting the Signals

■ Adjusting the main signals

- 1 Clip the two probes and GND probe of the oscilloscope to Vref and GND on the I/F Box, respectively.
- 2 Adjust the horizontal/vertical positioning knob so that the blip on the oscilloscope is located in the center.
- 3 Clip the ch1 probe to øA (A-phase) and ch2 probe to øB (B-phase).
- 4 Adjust the main signals (amplitude voltage) with the volume VR1 on the board while moving the Detector.



Tips

- The positions of the check pin (TP) and volume (VR1) on the I/F Box board are different depending on the main signal output type.
- Make sure that the oscilloscope does not drift during measurement.

For the details on the specified values of the amplitude voltage, center voltage, and phase error, refer to "3.5.1 Adjusting the Detector Mounting Position" (page 17).

■ Adjusting the origin signals



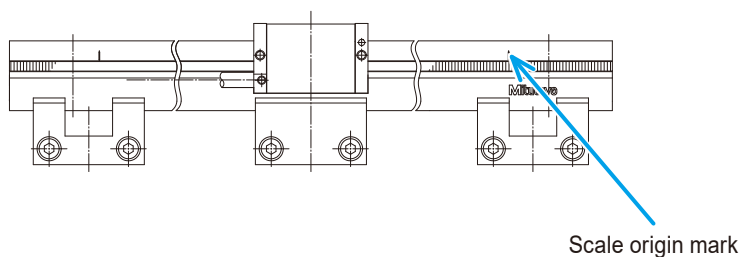
If the scale has multiple origins, adjust the origin signals at the origin (one position) you use.

1 Set the oscilloscope as follows.

Item	Setting description
Measurement pressure range	0.5 V/div DC mode (50 mV/div when using a 10:1 probe)
Scan mode	T-Y 20 ms

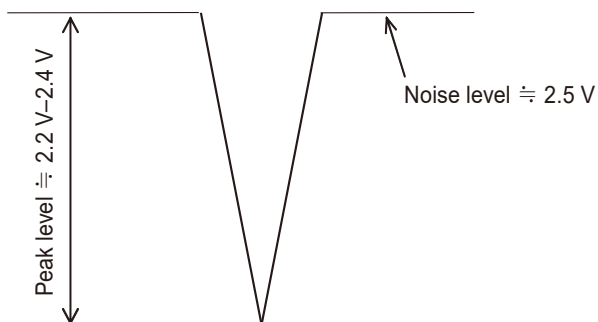
2 Clip the ch1 probe and GND probe of the oscilloscope to the check pin øZ and check pin GND on the I/F Box board, respectively.

3 Move the center of the Detector to near the scale origin mark on the main scale.



4 Move the scale or Detector in the measurement direction.

- » When the vicinity of the center of the Detector passes through the scale origin mark, the origin signal waveform is displayed on the oscilloscope screen.



5 Adjust the noise level of the origin signal waveform to about 2.5 V with the volume on the board.

Main signal output type	Volume to adjust
A (two-phase sine wave)	VR2
B (two-phase square wave + external reset input)	VR4
C (two-phase square wave + two-phase sine wave)	VR4
D (differential 1 Vpp sine wave)	VR2

- 6** Adjust the peak level of the origin signal waveform to about 2.2 V with the volume on the board.

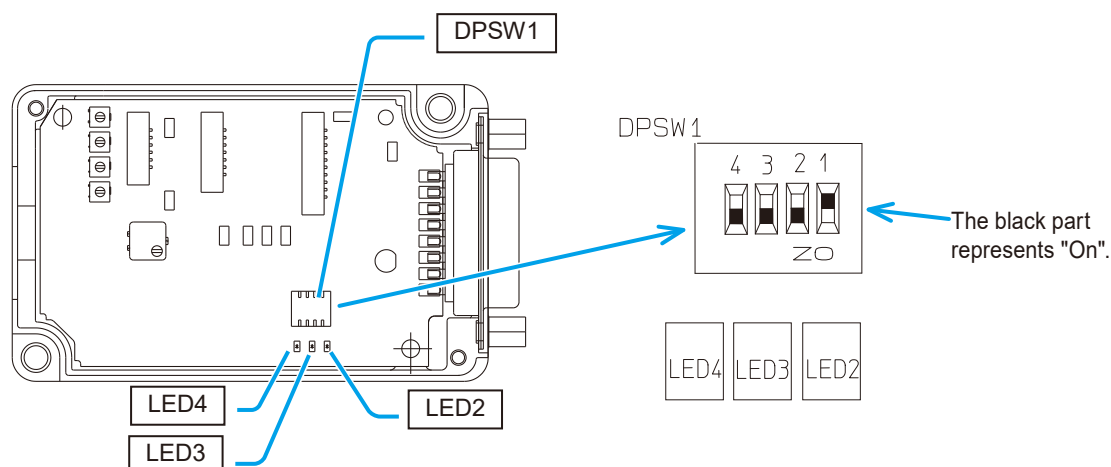
Main signal output type	Volume to adjust
A (two-phase sine wave)	VR3
B (two-phase square wave + external reset input)	VR5
C (two-phase square wave + two-phase sine wave)	VR5
D (differential 1 Vpp sine wave)	VR3

■ Adjusting the origin signals with the main signal output type D



- For the scale unit with the main signal output type D (differential 1 Vpp sine wave), you need to perform not only adjustment in "Adjusting the origin signals" (page 21) but also origin signal adjustment as shown below.
- Origin signal adjustment must be performed at the origin (one position) you use with the origin return method.
- After mounting the scale unit or performing other adjustment, be sure to adjust the origin signals again.

- 1** Turn on the switch 3 of the DIP switch DPSW1 on the I/F Box board.



- 2** Move the scale or Detector slowly (at a speed of 20 mm/s or less) in the origin return direction.
- 3** When it passes through the scale origin mark, make sure that LED4 turns on and LED2 and LED3 turns on or off.



If the scale has multiple origins, make it pass through the origin (one position) you use.

- 4** Set the switches 1 and 2 of the DIP switch DPSW1 according to the LED2 and LED3 on/off state.

LED on/off state		DPSW1 setting	
LED2	LED3	Switch 1	Switch 2
On	On	On	On
On	Off	On	Off
Off	On	Off	On
Off	Off	Off	Off

Tips

- The switch 4 of the DIP switch DPSW1 is always on.
- The switches 1 and 2 are factory set to off and on, respectively.

- 5 Turn off the switch 3 of the DIP switch DPSW1.

3.6 Handling the Cables and Checking the Mounting State

3.6.1 Handling the Cables

After adjusting the signals, fix the I/F Box and feedback cable.

- 1 Perform wiring paying attention to the twisting or bends of the cables.

NOTICE

Note that the feedback cable may malfunction if bundled with other cables that may cause electrical noise, or if it is located near a switching relay dealing with a large current.

- 2 Fix the I/F Box and feedback cable with cable clamps.



Clamp the feedback cable to a nearby part that moves along with the Detector so that force is not applied to the Detector when the machine unit is running.



Be sure to fix the I/F Box enclosure to the machine main unit with screws.

3.6.2 Checking the Mounting and Adjustment States

After fixing the I/F Box and feedback cable, check the mounting and adjustment states of the main scale and Detector again.

Tips

Perform this operation while making sure that the Detector does not make contact or interfere with any part of the machine unit or main scale.

1 Make sure that all the part screws and clamps are firmly tightened.

2 Turn off the control unit and turn it on again after 5 to 10 seconds.

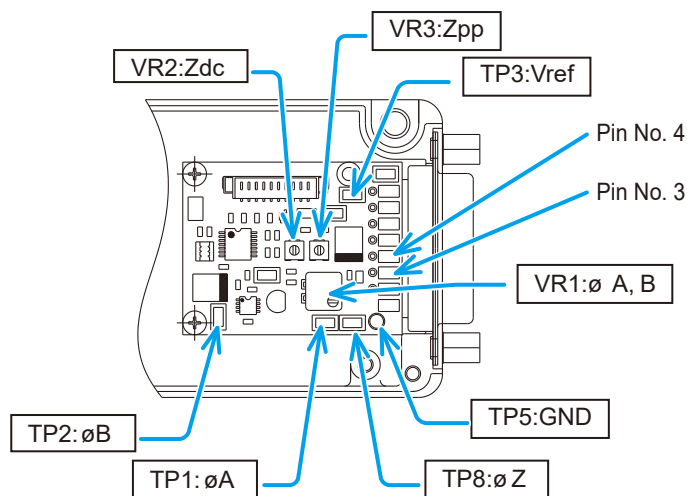
Tips

Turning off the control unit resets the alarm that occurred during adjustment.

3 Make sure that the input power voltage is $5\text{ V} \pm 5\%$ at the +5 V check pin and GND check pin on the I/F Box board.

Tips

For the I/F Box with the main signal output type A (two-phase sine wave), check the input power voltage at pins No.3 and No. 4 on the output connector.



4 Make sure that the output signals are within the specified values throughout the entire travel range of the machine unit.

Tips

If the specified values are not satisfied, check again if the main scale is dirty, fine-adjust the Detector position, and electrically fine-adjust the signals.

5 Make sure that no control unit alarm occurs throughout the entire travel range of the machine unit.

- 6** Remove the oscilloscope probes.
- 7** Attach the I/F Box cover with the two screws.

3.6.3 Putting the Protection Cover

After checking the mounting and adjustment states of the main scale and Detector again, put the protection cover.



- Make sure that the protection cover does not make contact with any machine unit part or scale unit cable.
- Check the above for the entire travel range of the machine unit.

MEMO

4 Specifications

4.1 Specifications

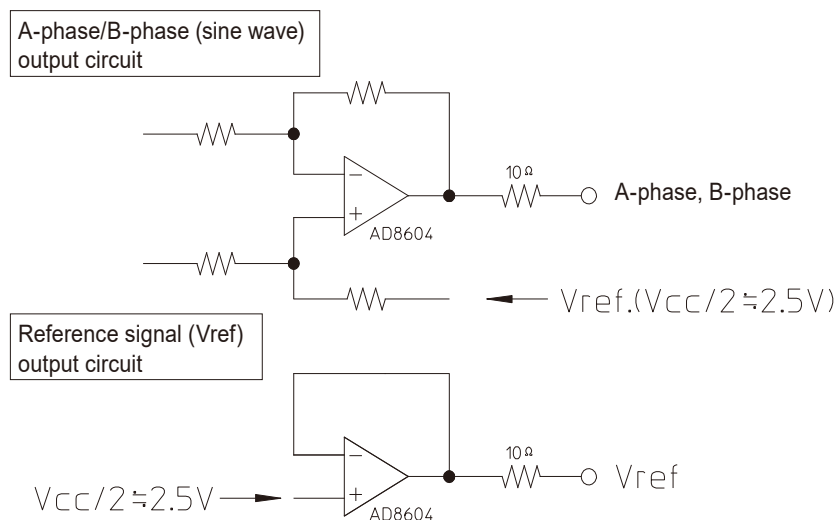
Item	Specification
Detection method	Optical reflection type linear encode
Main scale grid pitch	8 μm
Main signal output pitch	4 μm
Output signal type	A: Two-phase sine wave B: Two-phase square wave (reset input specification) C: Two-phase square wave, two-phase sine wave D: Differential 1 Vpp sine wave
Effective length	10 mm–3000 mm
Indication accuracy (20 °C)	Effective length of 10 mm–300 mm: $\pm 0.5 \mu\text{m}$ Effective length of 350 mm–500 mm: $\pm 1.0 \mu\text{m}$ Effective length of 600 mm–1000 mm: $\pm 2.0 \mu\text{m}$ Effective length of 1100 mm–3000 mm: $\pm 2.0 \mu\text{m/m}$
Coefficient of linear expansion	$\approx 8 \times 10^{-6}/\text{K}$
Maximum response speed	1200 mm/s (at two-phase sine wave output) For a two-phase square wave, the value changes depending on the resolution as follows (when the minimum edge-to-edge interval is 125 ns): 0.1 μm : 720 mm/s 0.05 μm : 360 mm/s 0.02 μm : 144 mm/s 0.01 μm : 72 mm/s * When the minimum edge-to-edge interval doubles, the maximum response speed halves.
Scale origin	Available (50 mm pitch, center point for effective length of 10 mm–80 mm)
Response speed at scale origin detection	20 mm/s
Power supply voltage	DC5 V $\pm 5\%$
Maximum current consumption	A: 120 mA B: 250 mA C: 250 mA D: 190 mA
Used temperature range	0 °C–40 °C
Storage temperature range	-20 °C–60 °C
Used/storage humidity range	20 %RH–80 %RH (non condensation)
Alarm Display function	A scale unit alarm is indicated with a LED on the I/F Box.
CE marking/UKCA marking	EMC Directive/Electromagnetic Compatibility Regulations: EN 61326-1 Immunity test requirement: Clause 6.2 Table 2 Emission limit: Class B RoHS Directive/The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations: EN IEC 63000

4.2 Output Circuits and Signal Waveforms

4.2.1 Main Signal Type: Type A, Type C

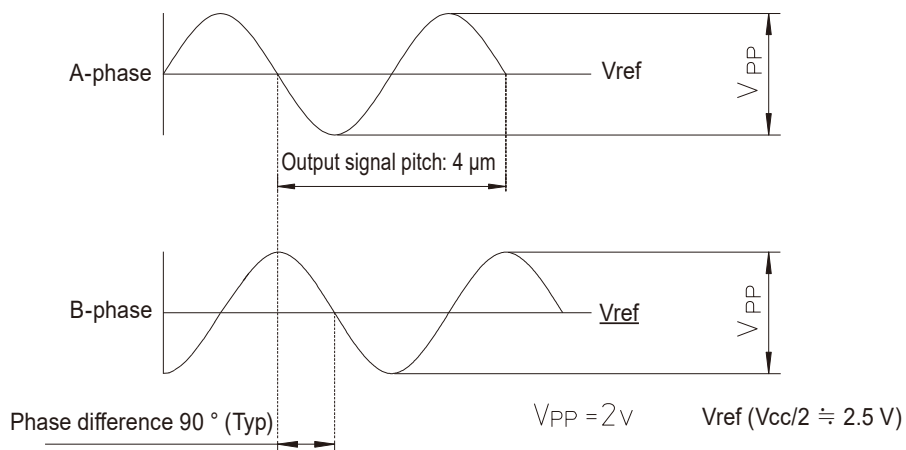
Output circuit

The output circuits of the sine wave output signals (A-phase, B-phase) and reference signal are as shown in the figure below.



Signal waveform

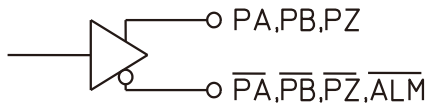
The waveforms of the sine wave output signals (A-phase, B-phase) are as shown in the figure below.



4.2.2 Main Signal Type: Type B, Type C

Output circuit

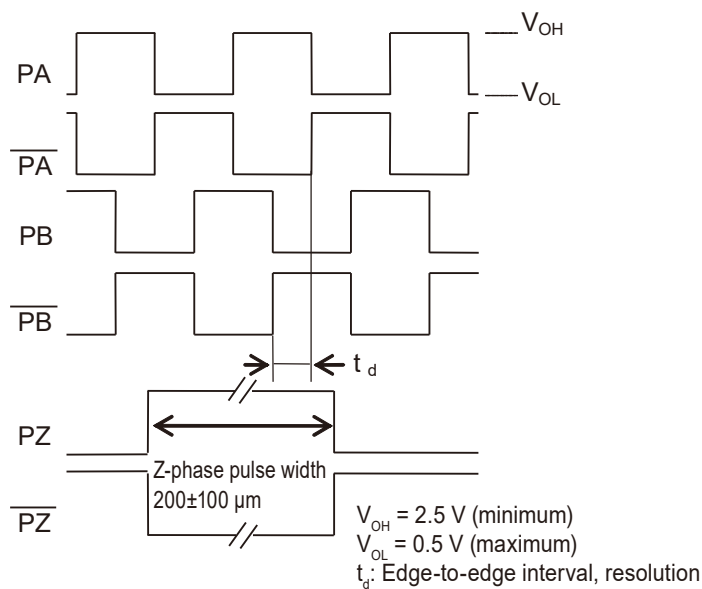
The output circuit of the square wave output signals (A-phase, B-phase), origin signals, and alarm signal is as shown in the figure below.



Differential line driver
Equivalent to AM26C31

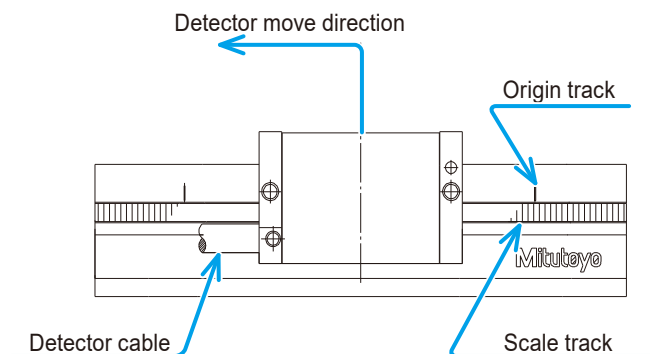
Signal waveform

The waveforms of the square wave output signals (A-phase, B-phase) and origin signals are as shown in the figure below.



Tips

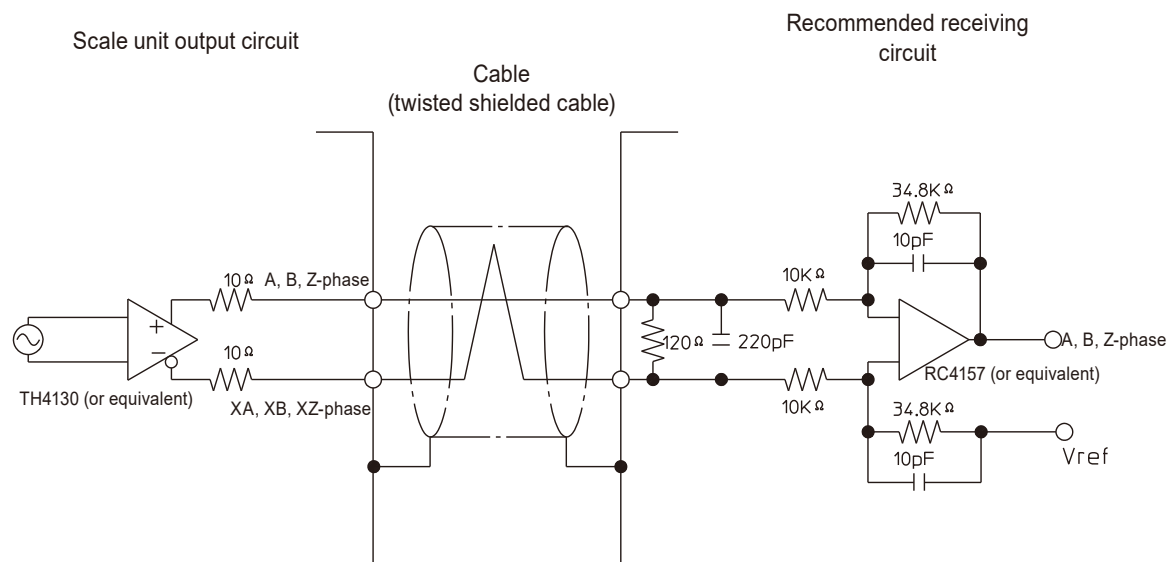
- A phase difference between PZ signal and PA signal (or PB signal) does not matter.
- The above figure shows waveforms when the Detector moves as follows with the switch 8 of the DIP switch DPSW2 on the I/F Box set to "On".



4.2.3 Main Signal Type: Type D

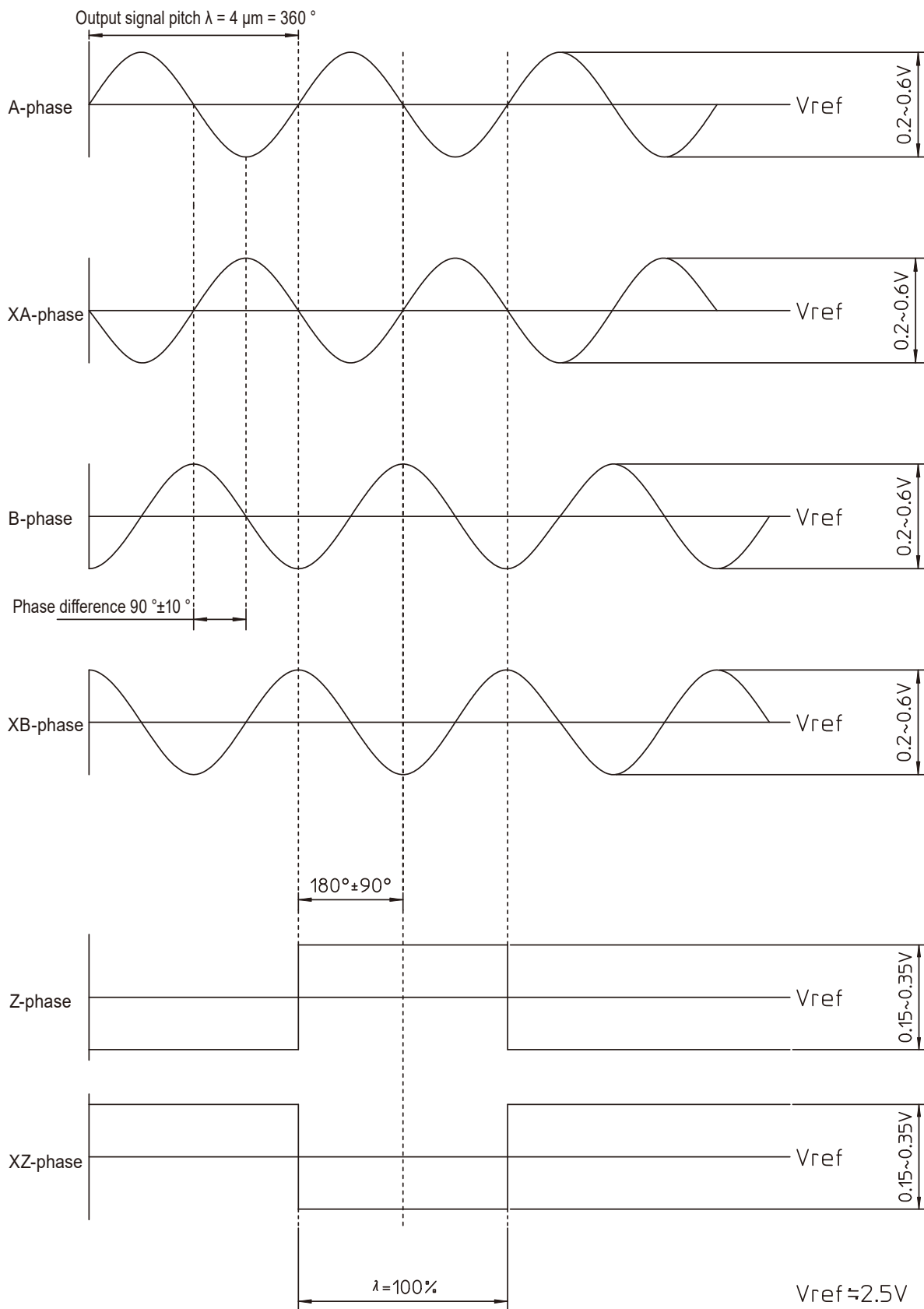
Output circuit

The output circuit and recommended receiving circuit of the differential 1 V_{pp} sine wave signals (A-phase, XA-phase, B-phase, XB-phase) and origin signals (Z-phase, XZ-phase) are as shown in the figure below.



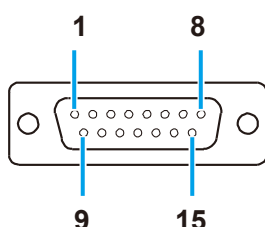
Signal waveform

The waveforms of the differential 1 Vpp sine wave signals (A-phase, XA-phase, B-phase, XB-phase) and origin signals (Z-phase, XZ-phase) are as shown in the figure below.



4.3 Pin Assignment

4.3.1 Main Signal Type: Type A

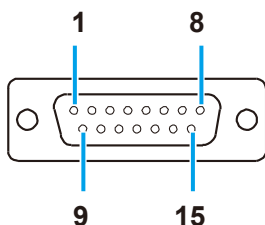


Pin No.	Signal
1	0 V (GND)
2	0 V (GND)
3	+5 V (Vcc)
4	+5 V (Vcc)
5	A-phase (sine wave)
6	B-phase (sine wave)
7, 10	Vref ($\div$ Vcc/2)
8	PZ (origin signal pulse)
9, 11–14	N.C.
15	F.G

Tips

The applicable connector (accessory) is D15-403N-110 (Technical Electron).

4.3.2 Main Signal Type: Type B

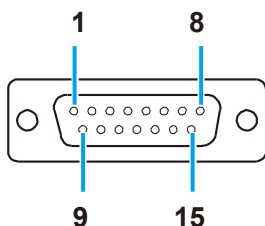


Pin No.	Signal
1	0 V (GND)
2	0 V (GND)
3	+5 V (Vcc)
4	+5 V (Vcc)
5	Reset input AL (anode)
6	Reset input AL (cathode)
7	Vref ($\div$ Vcc/2)
8	PZ (origin signal pulse_positive phase)
9	ALM (alarm)
10	PA (main signal pulse_positive phase)
11	$\overline{PA}$ (main signal pulse_reverse phase)
12	PB (main signal pulse_positive phase)
13	$\overline{PB}$ (main signal pulse_reverse phase)
14	$\overline{PZ}$ (origin signal pulse_reverse phase)
15	F.G

Tips

The applicable connector (accessory) is D15-403N-110 (Technical Electron).

4.3.3 Main Signal Type: Type C

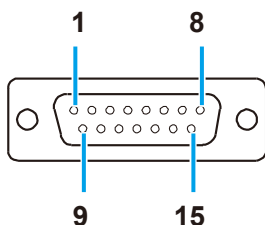


Pin No.	Signal
1	0 V (GND)
2	0 V (GND)
3	+5 V (Vcc)
4	+5 V (Vcc)
5	A-phase (sine wave)
6	B-phase (sine wave)
7	Vref ($\div$ Vcc/2)
8	PZ (origin signal pulse_positive phase)
9	$\overline{\text{ALM}}$ (alarm)
10	PA (main signal pulse_positive phase)
11	$\overline{\text{PA}}$ (main signal pulse_reverse phase)
12	PB (main signal pulse_positive phase)
13	$\overline{\text{PB}}$ (main signal pulse_reverse phase)
14	$\overline{\text{PZ}}$ (origin signal pulse_reverse phase)
15	F.G

Tips

The applicable connector (accessory) is D15-403N-110 (Technical Electron).

4.3.4 Main Signal Type: Type D



Pin No.	Signal
1	XA-phase (sine wave)
2	XB-phase (sine wave)
3	Z-phase (pulse)
4	+5 V (Vcc)
5	+5 V (Vcc)
6	N.C.
7	N.C.
8	N.C.
9	A-phase (sine wave)
10	B-phase (sine wave)
11	XZ-phase (pulse)
12	0 V (GND)
13	0 V (GND)
14	N.C.
15	0 V (GND)

Tips

The applicable connector (accessory) is D15-403N-150 inch thread specification (Technical Electron).

4.4 Production of Feedback Cable



The following conditions must be met for the feedback cable:

- Use a shielded cable.
- Clamp the shield (FG) to the metal case of the supplied connector. If it is difficult to clamp, connect it to pin No. 15.
- Set the cable impedance and length so that the power voltage is 4.75 V or more on the I/F Box.

$$V_{sp} - (R_c \div 2) \times L \times 2 \times 0.25 \geq 4.75 \text{ V}$$

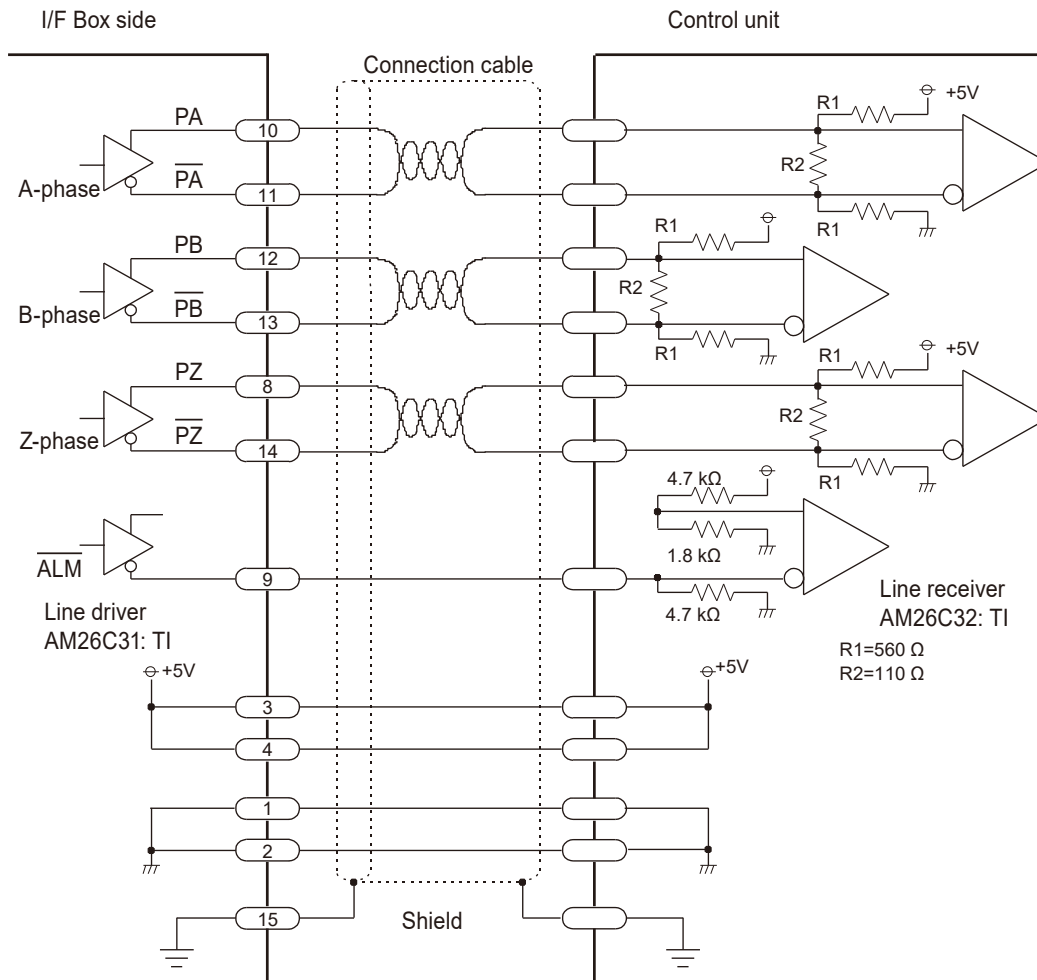
V_{sp} : Power voltage supplied from the control unit (Volts)

R_c : Cable power, ground wire impedance (Ω/m)

L : Cable length (m)

0.25: Maximum current consumption of the scale unit (A)

When a two-phase square wave is used on the scale unit with the main signal output type B (two-phase square wave + external reset input) or C (two-phase square wave + two-phase sine wave), connect the I/F Box to the control unit as shown below.





- When the control unit has the Disconnection Detection function for A-phase/B-phase ($\overline{PA}$, $\overline{PA}$, $\overline{PB}$, $\overline{PB}$), you do not need to connect the $\overline{ALM}$ output. In this case, turn on the switch 7 of the DIP switch DPSW2 on the I/F Box board to set the high impedance mode.
- If the control unit has no Disconnection Detection function or putting the A-phase/B-phase output in high impedance causes a problem for the system, connect the $\overline{ALM}$ output. In this case, turn off the switch 7 of the DIP switch DPSW2 on the I/F Box board to output the alarm signal.

For details on the DIP switch on the I/F Box board, refer to "4.8 Changing the Output Settings" (page 41).

4.5 Alarm Function

4.5.1 Main Signal Type: Type A

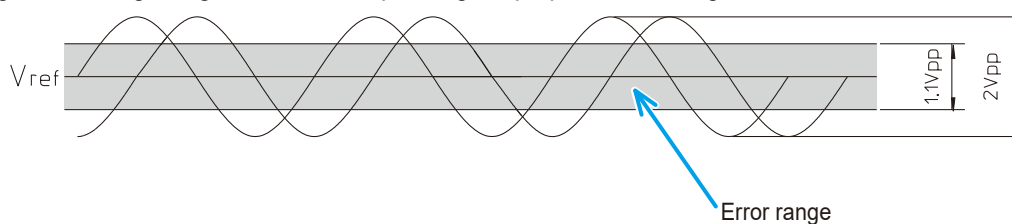
■ Detection details

If the waveform of the sine wave signal input to the I/F Box is within the following setting range, the POWER light turns on in red as it considers that an error signal is detected.

Range	POWER light	Setting range (approximate value)
OK	Solid green	2.0 ± 0.2 Vpp
Error	Solid red	1.1 Vpp or less

Tips

The above setting range is applied when the power voltage is 5.0 V. If the power voltage changes, the setting range also changes together with the input range in proportion to voltage.



■ Resetting the alarm

- 1 Eliminate the cause of the error signal.
- 2 Turn off the control unit and turn it on again after 10 seconds or more.

4.5.2 Main Signal Type: Type B, Type C

■ Detection details

● Over speed error

If the value exceeds the maximum response speed set in the minimum edge-to-edge interval and the number of divisions of the output pulse, the POWER light turns on in red.

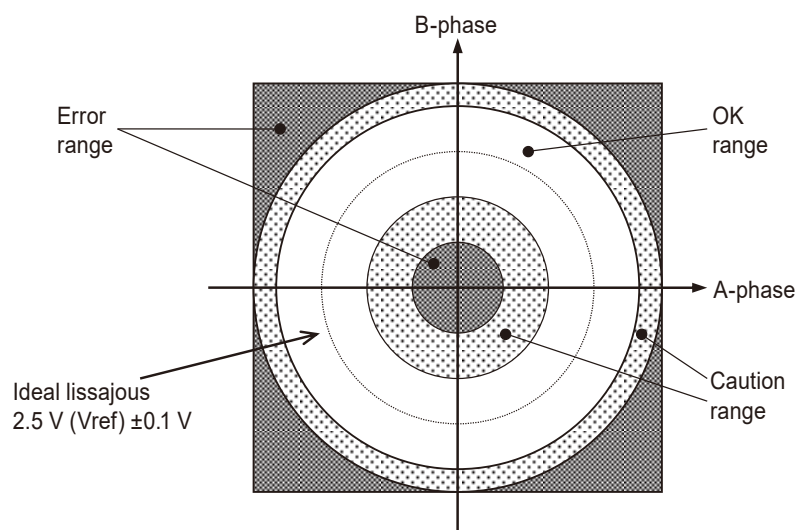
● Error signal detection

If the waveform of the sine wave signal input to the I/F Box is within the caution range or error range, the POWER light and S.UP (setup) light flash/turn on in red.

Range	S.UP light	POWER light	Alarm output
OK	Solid green	Solid green	Not available
Caution	Flashing red	Solid green	Not available
Error	Off	Solid red	Available

Tips

- If the scale is used within the caution range, no alarm occurs, but the accuracy of division is reduced.
- In error signal detection, the LED indicates one of the three ranges - normal, caution, and error - for the waveform levels (too large or too small) of the input sine wave signal as shown below.



- The caution and error setting ranges are as follows.

Range	Setting range (approximate value)
Caution	0.9 Vpp or less or 2.7 Vpp or more
Error	0.5 Vpp or less or 2.9 Vpp or more

- The above setting range is applied when the power voltage is 5.0 V. If the power voltage changes, the setting range also changes together with the input range in proportion to voltage.

Alarm behaviors

Item		Behavior
Line driver output	When the high impedance mode is on	All output is put in high impedance (not electrically H nor L but like floating).
	When the high impedance mode is off	The AL signal (active L) is output. However, others (PA, $\overline{\text{PA}}$, PB, $\overline{\text{PB}}$, PZ, $\overline{\text{PZ}}$) also continue to be output.
Alarm light		The POWER light changes from green to red.

Resetting the alarm

Turning on the power again

1 Eliminate the cause of the alarm.

2 Turn off the control unit and turn it on again after 10 seconds or more.

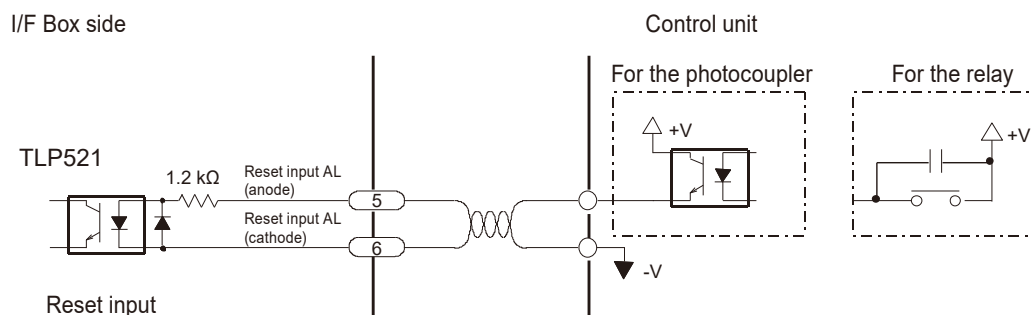
Alarm reset signal

3 Eliminate the cause of the alarm.

4 Input the alarm reset signal (pulse width of 10 ms or more).

Tips

- The alarm can be reset by the alarm reset signal only when the main signal output type is B (two-phase square wave + external reset input).
- Connect the alarm reset input circuit so that the current is 3 mA–10 mA.
- Since the product is equipped with a resistor (1.2 k Ω) inside, applying 5 V–12 V between the reset input AL (anode) and reset input AL (cathode) resets the alarm.



- To apply 12 V or more, add a resistor externally.

4.6 Adjusting the Signals Using the Check Adapter (Option)



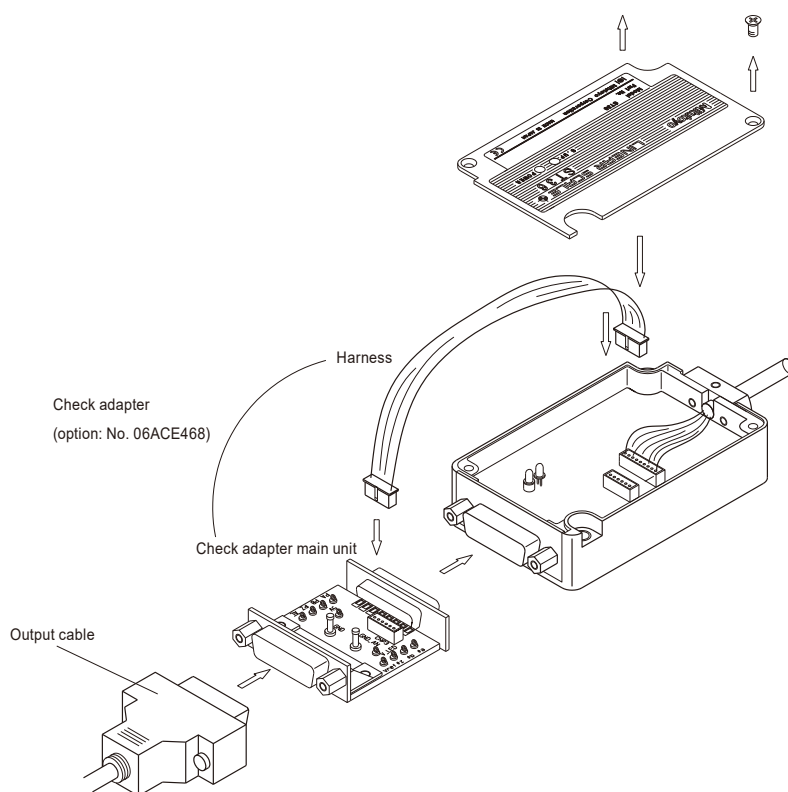
When you do not adjust the signals, remove the check adapter from the I/F Box.

Tips

- Signal adjustment using the check adapter is available only on the scale unit with the main signal output type B (two-phase square wave + external reset input) or C (two-phase square wave + two-phase sine wave).
- Only a little noise may be added to measured values during signal adjustment because the check adapter is not shielded.

You can adjust the signals more efficiently by using the optional check adapter (P/N: 06ACE468).

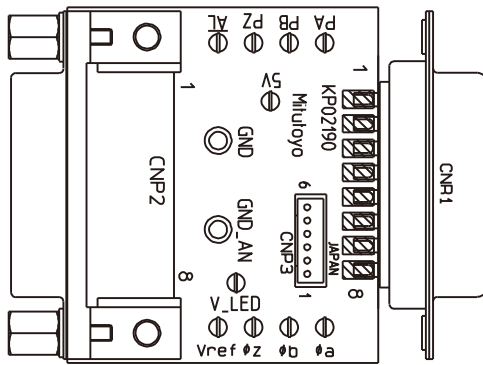
- 1 Connect the check adapter between the output connector of the I/F Box and the feedback cable.



- 2 Connect the harness (lead wire with a square connector) supplied with the check adapter between CNP3 on the check adapter board and CNP3 on the I/F Box board.

4 Specifications

- 3 Clip the GND probe of the oscilloscope to GND_AN on the check adapter.



- 4 Clip the two probes of the oscilloscope to Vref on the check adapter board.
- 5 Adjust the horizontal/vertical positioning knob so that the blip on the oscilloscope is located in the center.
- 6 Clip the ch1 probe to $\emptyset A$ (A-phase) and ch2 probe to $\emptyset B$ (B-phase) on the check adapter board.
- 7 Adjust the main signals (amplitude voltage) with the volume VR1 on the I/F Box board while moving the Detector.
 - » For details on how to adjust the main signals, refer to "Adjusting the main signals" (page 20).

Tips

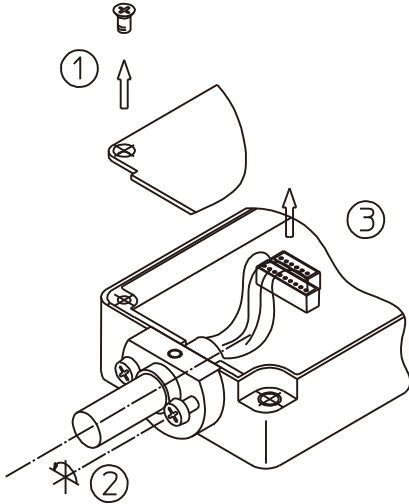
You can check the divided square waves and origin signal pulse at PA, PB, and PZ on the check adapter. To check the values, clip the GND probe of the oscilloscope to GND on the check adapter.

- 8 Clip the ch1 probe to $\emptyset Z$ on the check adapter board.
- 9 Move the center of the Detector to near the scale origin mark on the main scale.
- 10 Move the scale or Detector in the measurement direction.
 - » When the vicinity of the center of the Detector passes through the scale origin mark, the origin signal waveform is displayed on the oscilloscope screen.
 - » For details on how to adjust the origin signals, refer to "Adjusting the origin signals" (page 21).
- 11 Adjust the noise level of the origin signal waveform to about 2.5 V with VR4 on the I/F Box board.
- 12 Adjust the peak level of the origin signal waveform to about 2.2 V with VR5 on the I/F Box board.
- 13 Remove the check adapter and harness.

4.7 Removing the Detector Cable

When you need to replace the Detector or I/F Box, remove the Detector cable from the I/F Box.

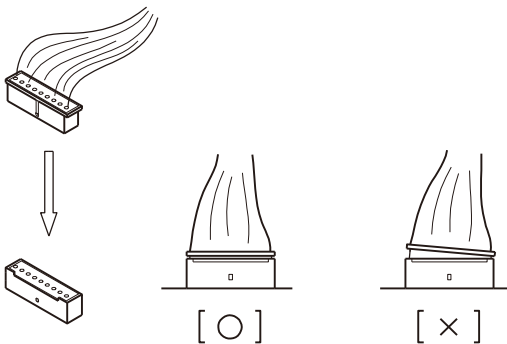
- 1 Remove the two screws and remove the I/F Box cover.



- 2 Loosen the two cable flange screws.
- 3 Pull the Detector cable from the connector on the board.

Tips

- To attach the Detector cable, perform the above procedure in reverse order.
- To insert the Detector cable into the connector on the board, make sure that it is inserted all the way in the correct connector notch direction.
- Firmly fix the two cable flange screws.
- If insertion into the connector or screw fixing is insufficient, it causes a malfunction.

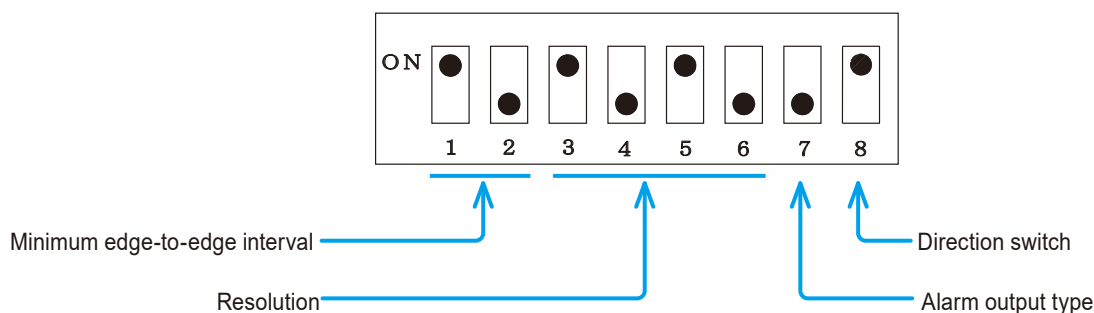


4.8 Changing the Output Settings

Tips

Output setting change is available only on the scale unit with the main signal output type B (two-phase square wave + external reset input) or C (two-phase square wave + two-phase sine wave).

You can change the output settings with the DIP switch DPSW2 on the I/F Box board.



■ Minimum edge-to-edge interval

Minimum edge-to-edge interval	1	2	Factory setting
125 ns	On	On	
250 ns	On	Off	●
500 ns	Off	On	
1000 ns	Off	Off	

Tips

The factory settings are subject to change upon customer's request.

■ Resolution

Resolution	3	4	5	6	Factory setting
0.01 μm	Off	On	Off	On	
0.02 μm	Off	Off	Off	On	
0.05 μm	Off	On	On	Off	
0.1 μm	On	Off	On	Off	●



The operation is not guaranteed for any other setting than the above.

Tips

The factory settings are subject to change upon customer's request.

■ Alarm output type

	7	Factory setting
When an alarm occurs, output is put in high impedance.	On	
When an alarm occurs, the alarm signal is output.	Off	●

Tips

The factory settings are subject to change upon customer's request.

■ Direction switch

Direction	8	Factory setting
Forward: PA phase advance	On	●
Reverse: PB phase advance	Off	

Tips

The factory settings are subject to change upon customer's request.

4.9 Maximum Response Speed

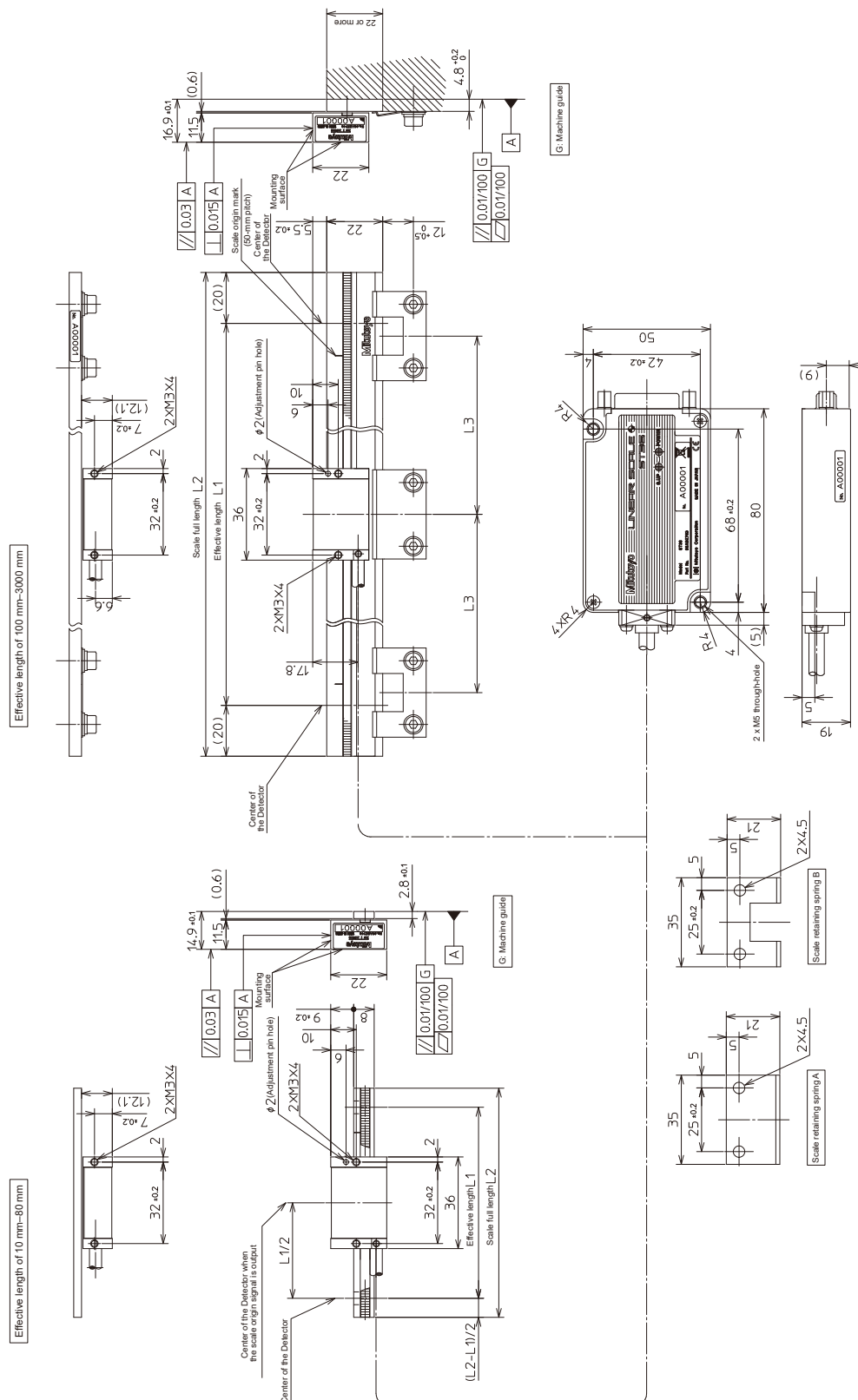
Tips

Maximum response speed change is available only on the scale unit with the main signal output type B (two-phase square wave + external reset input) or C (two-phase square wave + two-phase sine wave) that allows output setting change with the DIP switch DPSW2 on the I/F Box board.

Setting		Maximum response speed (mm/s) (main signal output pitch: 4 μ m)
Resolution (number of divisions)	Minimum edge-to-edge interval +0 %, -10 %	
0.01 μ m (400)	125 ns	72
	250 ns	36
	500 ns	18
	1 μ s	9
0.02 μ m (200)	125 ns	144
	250 ns	72
	500 ns	36
	1 μ s	18
0.05 μ m (80)	125 ns	360
	250 ns	180
	500 ns	90
	1 μ s	45
0.1 μ m (40)	125 ns	720
	250 ns	360
	500 ns	180
	1 μ s	90

4.10 External View and Dimensional Drawings

4.10.1 Dimensional Drawings



4.10.2 Dimensional Drawings Table

Code No. (*1)	Model number (*2)	Effective length L1 (mm)	Scale full length L2 (mm)	Scale fixed pitch L3 (mm)	Scale retaining spring A (quantity)	Scale retaining spring B (quantity)
579-501-0□	ST36◇-10	10	30	—	—	—
579-502-0□	ST36◇-25	25	45	—	—	—
579-503-0□	ST36◇-50	50	70	—	—	—
579-504-0□	ST36◇-75	75	90	—	—	—
579-505-0□	ST36◇-80	80	100	—	—	—
579-506-0□	ST36◇-100	100	140	50	1	2
579-507-0□	ST36◇-150	150	190	75	1	2
579-508-0□	ST36◇-200	200	240	100	1	2
579-509-0□	ST36◇-250	250	290	60	1	4
579-510-0□	ST36◇-300	300	340	75	1	4
579-511-0□	ST36◇-350	350	390	85	1	4
579-512-0□	ST36◇-400	400	440	100	1	4
579-513-0□	ST36◇-450	450	490	75	1	6
579-514-0□	ST36◇-500	500	540	80	1	6
579-515-0□	ST36◇-600	600	640	100	1	6
579-516-0□	ST36◇-700	700	740	85	1	8
579-517-0□	ST36◇-800	800	840	100	1	8
579-518-0□	ST36◇-900	900	940	90	1	10
579-519-0□	ST36◇-1000	1000	1040	100	1	10
579-520-0□	ST36◇-1100	1100	1140	90	1	12
579-521-0□	ST36◇-1200	1200	1240	100	1	12
579-522-0□	ST36◇-1300	1300	1340	130	1	10
579-523-0□	ST36◇-1400	1400	1440	100	1	14
579-524-0□	ST36◇-1500	1500	1540	125	1	12
579-525-0□	ST36◇-1600	1600	1640	100	1	16
579-526-0□	ST36◇-1700	1700	1740	120	1	14
579-527-0□	ST36◇-1800	1800	1840	100	1	18
579-528-0□	ST36◇-2000	2000	2040	100	1	20
579-529-0□	ST36◇-2200	2200	2240	100	1	22
579-530-0□	ST36◇-2400	2400	2440	100	1	24
579-531-0□	ST36◇-2500	2500	2540	95	1	26
579-532-0□	ST36◇-2600	2600	2640	100	1	26
579-533-0□	ST36◇-2800	2800	2840	100	1	28
579-534-0□	ST36◇-3000	3000	3040	100	1	30

*1: The □ mark in Code No. represents as follows:

- 1: Two-phase sine wave
- 2: Two-phase square wave + external reset input
- 3: Two-phase square wave + two-phase sine wave
- 4: Differential 1 Vpp sine wave

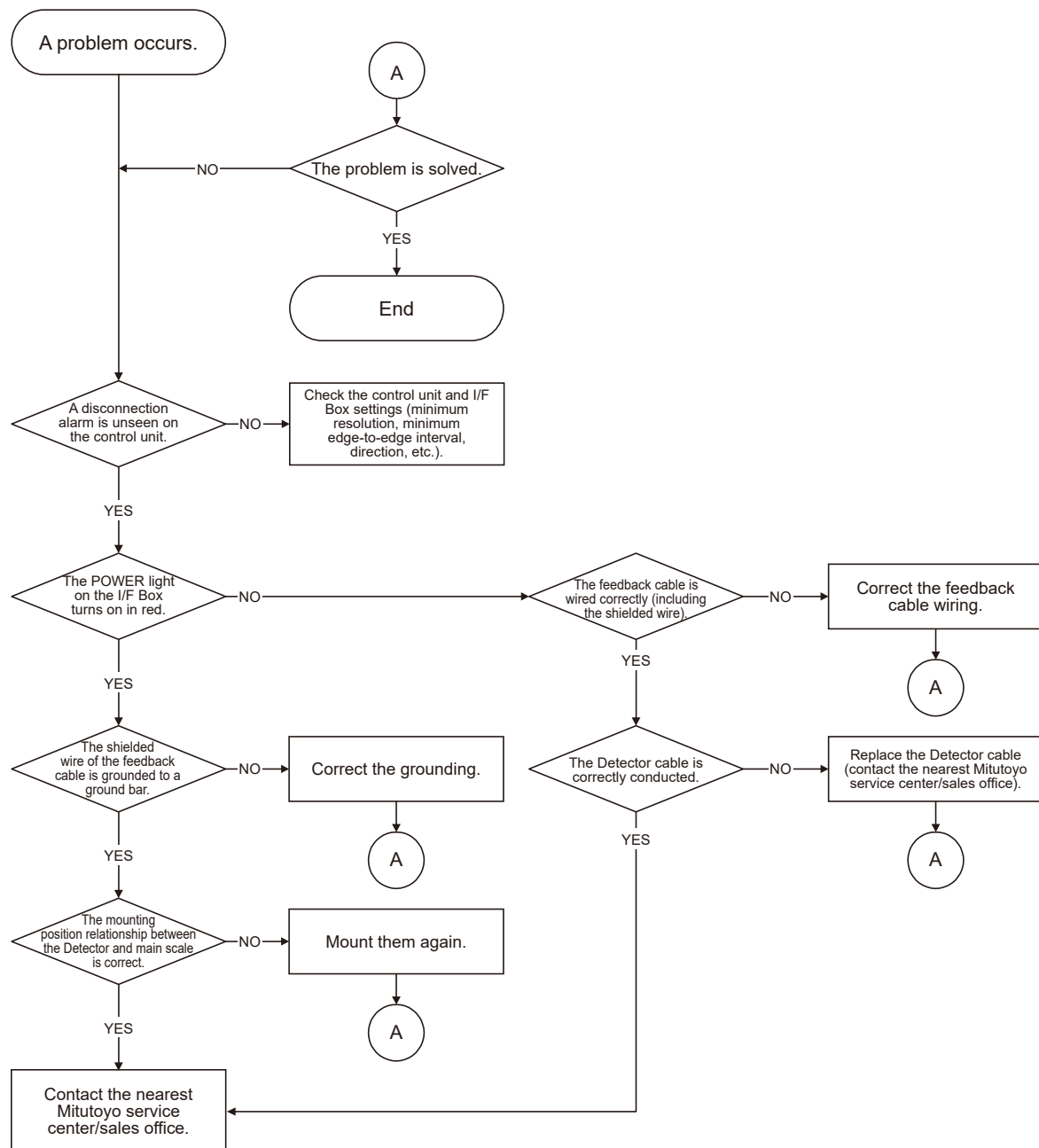
*2: The ◇ mark in Model number represents as follows:

- A: Two-phase sine wave
- B: Two-phase square wave + external reset input
- C: Two-phase square wave + two-phase sine wave
- D: Differential 1 Vpp sine wave

MEMO

5 Troubleshooting

This chapter describes how to check for the reasons why problems occur when initially powering on, or for when alarms are generated during operation.



MEMO

SERVICE NETWORK

*As of May 2025

Europe

Mitutoyo Europe GmbH

Borsigstrasse 8-10, 41469 Neuss, GERMANY
TEL: 49 (0)2137 102-0 FAX: 49 (0)2137 102-351

Mitutoyo CTL Germany GmbH

Von-Gunzert-Strasse 17, 78727 Oberndorf, GERMANY
TEL: 49 (0)7423 8776-0 FAX: 49 (0)7423 8776-99

KOMEG Industrielle Messtechnik GmbH

Zum Wasserwerk 3, 66333 Völklingen, GERMANY
TEL: 49 (0)6898 91110 FAX: 49 (0)6898 9111100

Germany

Mitutoyo Deutschland GmbH

Borsigstrasse 8-10, 41469 Neuss, GERMANY
TEL: 49 (0)2137 102-0 FAX: 49 (0)2137 86 85

M³ Solution Center Hamburg

Tempowerkring 9-im HIT-Technologiepark 21079
Hamburg, GERMANY
TEL: 49 (0)40 791894-0 FAX: 49 (0)40 791894-50

M³ Solution Center Berlin

Ernst-Lau-Straße 6, 12489 Berlin, GERMANY
TEL: 49(0)30 2611 267 FAX: 49 30 67988729

M³ Solution Center Eisenach

Neue Wiese 4, 99817 Eisenach, GERMANY
TEL: 49 (0)3691 88909-0 FAX: 49 (0)3691 88909-9

M³ Solution Center Ingolstadt

Marie-Curie-Strasse 1A, 85055 Ingolstadt, GERMANY
TEL: 49 (0)841 954920 FAX: 49 (0)841 9549250

M³ Solution Center Leonberg

Am Längenbühl 3, 71229 Leonberg, GERMANY
TEL: 49 (0)7152 6080-0 FAX: 49 (0)7152 608060

Mitutoyo Deutschland GmbH - Small Tool Sales Division

Am Längenbühl 4, 71229 Leonberg, GERMANY
TEL: 49 (0)7152 9237-0 FAX: 49 (0)7152 9237-29

U.K.

Mitutoyo (UK) Ltd. HQ

Joule Road, West Point Business Park,
Andover, Hampshire SP10 3UX, UNITED KINGDOM
TEL: 44 (0)1264 353123 FAX: 44 (0)1264 354883

Coventry M³ Solution Centre

Unit6, Banner Park, Wickmans Drive, Coventry,
West Midlands CV4 9XA, UNITED KINGDOM
TEL: 44 (0)2476 426300

Halifax M³ Solution Centre

Lowfields Business Park, Navigation Close, Elland,
West Yorkshire HX5 9HB, UNITED KINGDOM
TEL: 44 (0)1422 375566

East Kilbride M³ Solution Centre

The Bairds Building, Rankine Avenue, Scottish
Enterprise Technology Park, East Kilbride G75
0QF, UNITED KINGDOM
TEL: 44 (0)1355 581170

France

Mitutoyo France

Paris Nord 2-123 rue de la Belle Etoile, BP 59267
ROISSY EN FRANCE 95957 ROISSY CDG
CEDEX, FRANCE
TEL: 33 (0)149 38 35 00

M³ Solution Center LYON

Parc Mail 523, cours du 3ème millénaire, 69791
Saint-Priest, FRANCE
TEL: 33 (0)149 38 35 70

M³ Solution Center STRASBOURG

Parc de la porte Sud, Rue du pont du péage,
67118 Geispolsheim, FRANCE
TEL: 33 (0)149 38 35 80

M³ Solution Center CLUSES

290 Avenue des Lacs, 74950 Scionzier,
FRANCE
TEL: 33 (0)1 49 38 35 90

M³ Solution Center TOULOUSE

Aeroparc Saint Martin Cellule B08 ZAC de Saint
Martin du Touch 12 rue de Caulet 31300
Toulouse, FRANCE
TEL: 33 (0)1 49 38 42 90

M³ Solution Center RENNES

2, rue Claude Chappe, PA le Vallon - ZAC
Mivoie, 35230 Noyal-Châtillon-sur-Seiche,
FRANCE
TEL: 33 (0)1 49 38 42 10

Italy

Mitutoyo Italiana S.r.l.

Corso Europa, 7 - 20045 Lainate (MI), ITALY
TEL: 39 02 935781 FAX: 39 02 93578255

M³ Solution Center BOLOGNA

Via Stalingrado 67/22D 40128 Bologna, ITALY
TEL: 39 02 93578215

M³ Solution Center CHIETI

Contrada Santa Calcagna - 66020 Rocca S. Giovanni (CH), ITALY
TEL: 39 02 93578280 FAX: 39 02 93578255

M³ Solution Center PADOVA

Via G. Galilei 21/F - 35035 Mestrino (PD), ITALY
TEL: 39 02 93578268 FAX: 39 02 93578255

Netherlands

Mitutoyo Nederland B.V.

Storkstraat 30, 3905 KX Veenendaal,
THE NETHERLANDS
TEL: 31(0)318-534911

Mitutoyo Nederland B.V. / M³ Solution Center Enschede

Institutenweg 50, 7521 PK Enschede,
THE NETHERLANDS
TEL: 31(0)318-534911

Mitutoyo Nederland B.V. / M³ Solution Center Eindhoven

De Run 1115, 5503 LB Veldhoven,
THE NETHERLANDS
TEL: 31(0)318-534911

Mitutoyo Research Center Europe B.V.

De Rijn 18, 5684 PJ Best, THE NETHERLANDS
TEL: 31(0)499-320200 FAX: 31(0)499-320299

Belgium

Mitutoyo Belgium N.V. / M³ Solution Center Melsele

Schaarbeekstraat 20, B-9120 Melsele, BELGIUM
TEL: 32 (0)3-2540444

Sweden

Mitutoyo Scandinavia AB

Släntvägen 6, 194 61 Upplands Väsby, SWEDEN
TEL: 46 (0)8 594 109 50

Mitutoyo Scandinavia AB / M³ Solution Center Alingsås

Ängsvaktaregatan 3A, 441 38 Alingsås, SWEDEN
TEL: 46 (0)8 594 109 50

Mitutoyo Scandinavia AB / M³ Solution Center Värnamo

Kalkstensvägen 7, 331 44 Värnamo, SWEDEN
TEL: 46 (0)8 594 109 50

Switzerland

Mitutoyo (Schweiz) AG

Steinackerstrasse 35, 8902 Urdorf, SWITZERLAND
TEL: 41 (0)447361150

Mitutoyo (Suisse) SA

Rue Galilée 4, 1400 Yverdon-les Bains, SWITZERLAND
TEL: 41 (0)244259422

Poland

Mitutoyo Polska Sp.z o.o.

Skrzypowa 1, 54-530 Wrocław, POLAND
TEL: 48 (0)71354 83 50 FAX: 48 (0)71354 83 55

Czech Republic

Mitutoyo Česko s.r.o.

Dubská 1626, 415 01 Teplice, CZECH REPUBLIC
TEL: 420 417-514-011 Email: info@mitutoyo.cz

Mitutoyo Česko s.r.o. M³ Solution Center Ivančice

Ke Karlovu 62/10, 664 91 Ivančice, CZECH REPUBLIC
TEL: 420 417-514-011 Email: info@mitutoyo.cz

Mitutoyo Česko s.r.o. M³ Solution Center Ostrava Mošnov

Mošnov 314, 742 51 Mošnov, CZECH REPUBLIC
TEL: 420 417-514-050 Email: info@mitutoyo.cz

Mitutoyo Česko s.r.o. Slovakia Branch

Šoltésvej 346/1, 017 01 Považská Bystrica,
SLOVAKIA
TEL: 421 948-595-590 Email: info@mitutoyo.sk

Hungary

Mitutoyo Hungária Kft.

Galamb József utca 9, 2000 Szentendre, HUNGARY
TEL: 36 (30) 6410210

Romania

Mitutoyo Romania SRL

1A Drumul Garii Odai Street, showroom, Ground Floor, 075100 OTOPENI-ILFOV, ROMANIA
TEL: 40 (0)311012088 FAX: +40 (0)311012089

Showroom in Brasov

Strada Ionescu Crum Nr.1, Brasov Business Park Turnul 1, Mezanin, 500446 Brasov-Judetul Brasov, ROMANIA
TEL/FAX: 40 (0)371020017

Finland

Mitutoyo Scandinavia AB Finnish Branch

Autokeskuksentie 16B, 33960 Pirkkala, FINLAND

TEL: 358 (0)40 355 8498

Austria

Mitutoyo Austria GmbH

Salzburger Straße 260/2 und 260/3, 4600 Wels, AUSTRIA

TEL: 43 (0)7242 219 998

Mitutoyo Austria GmbH Goetzis Regional showroom

Lastenstrasse 48a, 6840 Götzis, AUSTRIA

Singapore

Mitutoyo Asia Pacific Pte. Ltd.

Head office / M³ Solution Center

24 Kallang Avenue, Mitutoyo Building, SINGAPORE 339415

TEL:(65)62942211 FAX:(65)62996666

Malaysia

Mitutoyo (Malaysia) Sdn. Bhd.

Kuala Lumpur Head Office / M³ Solution Center

Mah Sing Integrated Industrial Park, 4, Jalan Utarid U5/14, Section U5, 40150 Shah Alam, Selangor, MALAYSIA

TEL:(60)3-78459318 FAX:(60)3-78459346

Penang Branch office / M³ Solution Center

30, Persiaran Mahsuri 1/2, Sunway Tunas, 11900 Bayan Lepas, Penang, MALAYSIA

TEL:(60)4-6411998 FAX:(60)4-6412998

Johor Branch office / M³ Solution Center

70 (Ground Floor), Jalan Molek 1/28, Taman Molek, 81100 Johor Bahru, Johor, MALAYSIA

TEL:(60)7-3521626 FAX:(60)7-3521628

Thailand

Mitutoyo (Thailand) Co., Ltd.

Bangkok Head Office / M³ Solution Center

2327 Onnut Road Kwaeng Onnut Khet Suanluang Bangkok 10250, THAILAND

TEL:(66)2080 3500

Chonburi Branch / M³ Solution Center

7/1, Moo 3, Tambon Bowin, Amphur Sriracha, Chonburi 20230, THAILAND

TEL:(66)2080 3563 FAX:(66)3834 5788

ACC Branch / M³ Solution Center

122/8, 122/9, Moo 6, Tambon Donhuaroh, Amphur Muangchonburi, Chonburi 20000, THAILAND

TEL:(66)2080 3565

Indonesia

PT. Mitutoyo Indonesia

Head Office / M³ Solution Center

Jalan Sriwijaya No.26 Desa cibatu Kec. Cikarang Selatan Kab. Bekasi 17530, INDONESIA

TEL: (62)21-2962 8600 FAX: (62)21-2962 8604

Batam Branch Office

Business Center Adhya Building 3rd Floor Kompleks Permata Niaga Blok A No. 1, Jalan jendral Sudirman Kelurahan Sukajadi, Kecamatan Batam Kota, Kepulauan Riau 29444, INDONESIA

TEL: (62)-778-4888000

Vietnam

Mitutoyo Vietnam Co., Ltd

Hanoi Head Office / M³ Solution Center

1st & 2nd floor, MHDI Building, No. 60 Hoang Quoc Viet Road, Nghia Do Ward, Cau Giay District, Hanoi, VIETNAM

TEL:(84)24-3768-8963 FAX:(84)24-3768-8960

Ho Chi Minh City Branch Office / M³ Solution Center

Unit No. B-00.07, Ground Floor, C1 Building, No. 6, Street D9, An Loi Dong Ward, Thu Duc City, Ho Chi Minh City, VIETNAM

TEL:(84)28-3840-3489 FAX:(84)28-3840-3498

Hai Phong City Branch Office

Room 511, 5th Floor, Thanh Dat 3 Building, No. 4 Le Thanh Tong Street, May To Ward, Ngo Quyen District, Hai Phong City, VIETNAM

TEL:(84)22-5398-9909

Philippines

Mitutoyo Philippines, Inc.

Head Office / M³ Solution Center

Unit 1B & 2B LTI, Administration Building 1, Annex 1, North Main Avenue, Laguna Technopark, Binan Laguna 4024, PHILIPPINES

TEL/FAX:(63) 49 544 0272

India

Mitutoyo South Asia Pvt. Ltd. Head Office

C-122, Okhla Industrial Area, Phase-I, New Delhi-110 020, INDIA

TEL: (91) 11-40578485/86

MSA Technical Center

Plot no. 65, Ground Floor, Udyog Vihar, Phase-4 Gurgaon, Haryana - 122016, INDIA

TEL : (91) 124-2340286/287

Mumbai Region Head office

303, Sentinel Hiranandani Business Park Powai,
Mumbai-400 076, INDIA

TEL: (91) 22-25700684/685/837/839

Pune Office / M³ Solution Center

G4/G5, Pride Kumar Senate, Off. Senapati Bapat
Road, Pune-411 016, INDIA

TEL:(91) 20-25660043/44/45

Ahmedabad Office / M³ Solution Center

A-104 & A-105, First Floor, Solitaire Corporate
Park, Near Divya Bhaskar Press, S.G. Road,
Ahmedabad - 380 015, INDIA

TEL: (91) 079 - 29704902/903

Bengaluru Region Head office / M³ Solution Center

116/117-2, Ground Floor, Sy. No. 93 & 94, 3rd
Phase, Peenya Industrial Area, Bengaluru-560
058, INDIA

TEL: (91) 80-25630946/47/48/49

Coimbatore Office

Regus, Srivari Srimath, 3rd Floor, Door No:1045,
Avinashi Road, Coimbatore - 641 018,INDIA

TEL: (91) 9345005663

Chennai Office / M³ Solution Center

No. 624, Anna Salai Teynampet, Chennai-600 018, INDIA

TEL: (91) 44-24328823/24/25

Kolkata Office

Unit No. 1208,Om Tower, 32,J.L.Nehru Road,
Kolkata-700 071, INDIA

TEL: (91) 33-22267088/40060635/22266817

Taiwan**Mitutoyo Taiwan Co., Ltd. / M³ Solution Center Taipei**

4F., No.71, Zhouzi St., Neihu Dist.,Taipei City 114,
TAIWAN

TEL:886(2)5573-5900 FAX:886(2)8752-3267

Taichung Branch / M³ Solution Center Taichung

1F., No. 299, Gaotie 1st Rd., Wuri Dist., Taichung
City 414, TAIWAN

TEL:886(4)2338-6822 FAX:886(4)2338-6722

Kaohsiung Branch / M³ Solution Center Kaohsiung

1F., No.31-1, Haibian Rd., Lingya Dist.,
Kaohsiung City 802, TAIWAN

TEL:886(7)334-6168 FAX:886(7)334-6160

South Korea**Mitutoyo Korea Corporation****Head Office / M³ Solution Center**

33, Eungyejungang-ro 306beon-gil, Siheung-si,
Gyeonggi-do, 15120 KOREA

TEL:82(31)361-4200 FAX:82(31)361-4201

Busan Office / M³ Solution Center

(3150-3, Daejeo 2-dong) 8,Yutongdanji 1-ro
49beon-gil, Gangseo-gu, Busan, 46721 KOREA

TEL:82(51)324-0103 FAX:82(51)324-0104

Daegu Office / M³ Solution Center

(Galsan-dong, Daegu Business Center), 301-Ho, 217,
Seongseogongdan-ro, Dalseo-gu, Daegu 42704 KOREA

TEL:82(53)593-5602 FAX:82(53)593-5603

China**Mitutoyo Measuring Instruments (Shanghai) Co., Ltd.**

18/F, NEW BUND Shun Tak Center, No.18, Lane
666, West Haiyang Road, Pudong New District,
Shanghai 200124, CHINA

TEL:86(21)5836-0718 FAX:86(21)5836-0717

Suzhou Office / M³ Solution Center China (Suzhou)

1/2 Floor, Building 4, No.175 Songbei Road,
Suzhou Free Trade Zone, Suzhou City, Jiangsu
215000, CHINA

TEL:86(512)6522-1790 FAX:86(512)6251-3420

Wuhan Office / M³ Solution Corner

Room 1701, Wuhan Wanda Center, No. 96,
Linjiang Road, Wuchang District, Wuhan
Hubei 430060, CHINA

TEL:86(27)8544-8631 FAX:86(27)8544-6227

Chengdu Office

Room 1-102, 1st Floor, Unit 1, Building 1, No. 24,
Wannian Road (Wannianchang Cool), Chenghua
District, Chengdu City, Sichuan 610056, CHINA

TEL:86(28)8671-8936 FAX:86(28)8671-9086

Hangzhou Office

Room 329, 3F, Building D, West Square of
Hangzhoudong Railway Station, No. 260 Xin-
feng Road, Shangcheng District, Hangzhou City,
Zhejiang 310002, CHINA

TEL: 86(571)8288-0319 FAX: 86(571)8288-0320

Tianjin Office / M³ Solution Center China (Tianjin)

Room D 12/F, TEDA Building, No.256 Jie-fang
Nan Road Hexi District,Tianjin 300042, CHINA

TEL:86(22)5888-1700 FAX:86(22)5888-1701

Changchun Office

Room 815, 8F, Building A1, Upper East
International No.3000 Dongsheng Street,
Erdao District, Changchun, Jilin, 130031, CHINA

TEL:86(431)8192-6998 FAX:86(431)8192-6998

Chongqing Office

Room 1312, Building 3, Zhongyu Plaza, No.86,
Hongjin Avenue,Longxi Street, Yubei District,
Chongqing, 400000, CHINA

TEL:86(23)6595-9950 FAX:86(23)6595-9950

Qingdao Office

Room 638, 6F, No.192 Zhengyang Road, Chengyang District, Qingdao, Shandong, 266109, CHINA
TEL:86(532)8096-1936 FAX:86(532)8096-1937

Xi'an Office

Room 1503 Jianke Building, No.99 Yanta Road, Beilin District, Xi'an City, Shaanxi 710054, CHINA
TEL:86(29)8538-1380 FAX:86(29)8538-1381

Dalian Office / M³ Solution Center China (Dalian)

Room A-106 Shuijing SOHO, No.16 Harbin Road, Economic Development Zone, Dalian, 116600 CHINA
TEL:86(411)8718 1212 FAX:86(411)8754-7587

Zhengzhou Office

Room 5003, 50th Floor, South Tower of Greenland Centre, No.36 Yulin North Road, Zhengdong New District, Zhengzhou, Henan, 450000, CHINA
TEL:86(371)6097-6436 FAX:86(371)6097-6981

Dongguan Office / M³ Solution Center China (Dongguan)

Room 801, No 65, Chang'an Section Guanchang Road, Chang'an Town, Dongguan City, Guangdong 523841, CHINA
TEL:86(769)8541 7715 FAX:86(769)-8541 7745

Fuzhou Office

Unit 03, 7th floor of East Tower, Sansheng International Center, No.118 Wusi Road, Gulou District, Fuzhou City, Fujian 350001, CHINA
TEL: 86 (591) 8761 8095
FAX: 86 (591) 8761 8096

Changsha Office

Room 2207, Building 1, Shiner International Plaza, No. 88, Kaiyuan Middle Road, Changsha City, Hunan 410100, CHINA
TEL: 86 (731) 8401 9276
FAX: 86 (731) 8401 9376

Changzhou Office

Room 1502, Joint Financial Tower, No.255, Tongjiang North Road, Tianning District, Changzhou City, Jiangsu 2130002, CHINA
TEL:86(519)8815 8319 FAX:86(519)8815 8319

Wenzhou Office

Room 512, Building 4, Xinjingdujiayuan, Sanyang Street, Ouhai District, Wenzhou City, Zhejiang 325014, CHINA
TEL:86(577)8641 5280

Shunde Office

Room 1603, Building 26, Vanke Golden Riverside Plaza Phase II, No.13 Mid DeSheng Road, Shunde District, Foshan City, Guangdong 528300, CHINA
TEL/FAX: 86(757)2228 8621

Hefei Office

Unit B3111-1, 1F, Block B3, Huliabadi Huiyuan, Heping Road, Yaohai District, Hefei City, Anhui 230001, CHINA
TEL: 86(551)6560 1006

Mitutoyo Measuring Technology (Suzhou) Co., Ltd.

1/2 Floor, Building 4, No.175 Songbei Road, Suzhou Free Trade Zone, Suzhou City, Jiangsu 215000, CHINA
TEL:86(512)6252-2660 FAX:86(512)6252-2580

USA**Mitutoyo America Corporation**

965 Corporate Blvd., Aurora, IL 60502, U.S.A.
TEL:1-(630)820-9666 Toll Free No. 1-888-648-8869
FAX:1-(630)978-3501

Headquarters (Aurora) / M³ Solution Center

965 Corporate Blvd., Aurora, IL 60502, U.S.A.

Seattle (Renton) Office / M³ Solution Center

1000 SW 34th St. Suite G, Renton, WA 98057 U.S.A.
TEL:1-(888)-648-8869

Houston Office / M³ Solution Center

4560 Kendrick Plaza Drive Suite 120 Houston, TX 77032, U.S.A.
TEL:1-(888)-648-8869 FAX:1-(281)227-0937

Cincinnati (Mason) Office / M³ Solution Center

6220 Hi-Tek Ct., Mason, OH 45040, U.S.A.
TEL:1-(888)-648-8869 FAX:1-(513)754-0718

Detroit (Novi) Office / M³ Solution Center

46850 Magellan Drive, Suite 100 Novi, MI 48377, U.S.A.
TEL:1-(888)-648-8869 FAX: 1-(248)-926-0928

Los Angeles (City of Industry) Office / M³ Solution Center

16925 E. Gale Ave., City of Industry, CA 91745, U.S.A.
TEL:1-(888)-648-8869 FAX:1-(626)369-3352

Charlotte (Huntersville) Office / M³ Solution Center

11515 Vanstory Dr., Suite 140, Huntersville, NC 28078, U.S.A.
TEL:1-(888)-648-8869 FAX:1-(704)875-9273

Boston (Marlborough) Office / M³ Solution Center

753 Forest Street, Suite 110, Marlborough, MA 01752, U.S.A.
TEL:1-(888)648-8869 FAX:1-(508)485-0782

West Chester (Ohio) / Metrology Service Center

8876 Beckett road, West Chester, OH 45069, USA

TEL:1-(888)-648-8869

Mitutoyo America Corporation Calibration Lab

965 Corporate Blvd., Aurora, IL 60502, U.S.A.

TEL:1-(888)-648-8869 FAX:1-(630)978-6477

Mitutoyo America Corporation CT-Lab Chicago

965 Corporate Blvd., Aurora, IL 60502, U.S.A.

TEL: 1-(888)-648-8869 FAX: 1-(630)-820-3418

Mitutoyo Research & Development America, Inc.

11533 NE 118th St., Kirkland, WA 98034-7111, U.S.A.

TEL:1-(425)821-3906 FAX:1-(425)821-32280

Mitutoyo Research & Development America, Inc. - California Office

16925 Gale Ave. City of Industry, CA 91745-1806 U.S.A.

TEL: 1-(425)821-3906 FAX: 1-(425)821-3228

Canada

Mitutoyo Canada Inc.

2121 Meadowvale Blvd., Mississauga, Ont. L5N 5N1., CANADA

TEL:1-(905)821-1261 FAX:1-(905)821-4968

Montreal Office

7075 Place Robert-Joncas Suite 129, Montreal, Quebec H4M 2Z2, CANADA

TEL:1-(514)337-5994 FAX:1-(514)337-4498

Brazil

Mitutoyo Sul Americana Ltda.

Head office / M³ Solution Center

Avenida Mimes nº 25 – Loteamento Multivias II, Jardim Ermida I, CEP 13212-216 Jundiaí - SP, BRASIL

TEL: 55 (11) 5643-0004/0041

Filial Curitiba / M³ Solution Center

Rua Sergipe, nº 101, Sala A, Bairro Boneca do Iguacu, São José dos Pinhais – Paraná – BRASIL CEP 83040120

TEL: 55 (41) 3534-1728

Filial Joinville / M³ Solution Center

Rua Sorocaba, No.265, Bairro Floresta, Joinville, Santa Catarina, BRASIL, CEP 89212-210

TEL: 55 (47) 3025-8062

Filial Porto Alegre / M³ Solution Center

Rua Emilio Boeckel nº 325, Bairro: Flao, São Leopoldo - RS, BRASIL CEP 93020-600

TEL: 55 (51) 3037-9383

Argentina

Mitutoyo Sul Americana Ltda.

Argentina Branch / M³ Solution Center

AV. MITRE 1249 Piso. PB– FLORIDA – BUENOS AIRES ARGENTINA

TEL:54 (11) 4730-1433 FAX:54 (11) 4730-1411

Mexico

Mitutoyo Mexicana, S.A. de C.V.

Industria Eléctrica No.15, Parque Industrial, Naulcalpan de Juárez, Estado de México C.P.53370, MÉXICO

TEL: 52 (01-55) 5312-5612

FAX: 52 (01-55) 5312-3380

Monterrey Office / M³ Solution Center

Blv. Interamericana No. 103, Parque Industrial FINSA, C.P. 66636 Apodaca, N.L., MÉXICO

TEL: 52(01-81) 8398-8227/8228/8242/8244

FAX: 52(01-81) 8398-8226

Tijuana Office / M³ Solution Center

Calle José María Velazco 10501-C, Col. Cd. Industrial Nueva Tijuana, C.P. 22500 Tijuana, B.C., MÉXICO

TEL: 52 (01-664) 647-5024

Querétaro Office / M³ Solution Center

Av. Cerro Blanco No.500-1, Colonia Centro Sur, Querétaro, Querétaro, C.P. 76090, MÉXICO

TEL: 52 (01-442) 340-8018, 340-8019 and 340-8020

FAX: 52 (01-442) 340-8017

Mitutoyo Mexicana, S.A. de C.V. Querétaro Calibration Laboratory

Av. Cerro Blanco 500 30 Centro Sur, Querétaro, Querétaro, C.P. 76090, MÉXICO

TEL: 52 (01-442) 340-8018, 340-8019 and 340-8020

FAX: 52 (01-442) 340-8017

Aguascalientes Office / M³ Solution Center

Av. Aguascalientes No. 622, Local 15 Centro Comercial El Cilindro Fracc. Pulgas Pandas Norte, C.P. 20138, Aguascalientes, Ags. MÉXICO

TEL: 52 (01-449) 174-4140 and 174-4143

Irapuato Office / M³ Solution Center

Boulevard a Villas de Irapuato No. 1460 L.1 Col. Ejido Irapuato C.P. 36643

Irapuato, Gto., MÉXICO

TEL: 52 (01-462) 144-1200 and 144-1400

Revision Record

Date of publication	Revision status	Details of revision
March 1, 2019	Revised third edition	Completely revised and issued
January 1, 2021	Revised fourth edition	Revision due to changes of the harmonized European standards, etc.
May 1, 2025	Revised fifth edition	Change of China RoHS compliance

Mitutoyo Corporation

20-1, Sakado 1-Chome, Takatsu-ku, Kawasaki-shi, Kanagawa 213-8533, Japan
Tel: +81 (0)44 813-8230 Fax: +81 (0)44 813-8231
Home page: <https://www.mitutoyo.co.jp/global.html>

For the EU Directive, Authorized representative and importer in the EU:
Mitutoyo Europe GmbH
Borsigstrasse 8-10, 41469 Neuss, Germany

For the UK Regulation, Authorized representative and importer in the UK:
Mitutoyo (UK) Ltd.
Joule Road, West Point Business Park, Andover, Hampshire SP10 3UX, UNITED KINGDOM