

No.99MBA107A5

SERIES No.378

Power Revolver

For
Microscope Unit
VMU

User's Manual

**Read this User's Manual thoroughly
before operating the instrument. After reading,
retain it close at hand for future reference.**

Mitutoyo

CONVENTIONS USED IN THIS MANUAL

Safety Precautions

To ensure that instruments are operated correctly and safely, Mitutoyo manuals use various safety symbols (Signal Words and Safety Alert Symbols) to identify and warn against hazards and potential accidents.

The following symbols indicate **general** warnings:



Indicates an imminently hazardous situation which, if not avoided, will result in serious injury or death.



Indicates a potentially hazardous situation which, if not avoided, could result in serious injury or death.



Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

The following safety signs indicate **specific** warnings or prohibited actions, or indicate a mandatory action:



Alerts the user to a specific hazardous situation. The given example means “To warn of electricity”.



Prohibits a specific action. The given example means “Do not touch”.



Specifies a mandatory action. The given example means “Connect an earth to the ground”.

CONVENTIONS USED IN THIS MANUAL

Types of Notes

The following types of **notes** are used in this manual to help the operator obtain reliable measurement data through correct instrument operation.

IMPORTANT An *important note* provides information essential to use the product. You cannot disregard this note.

An *important note* is a type of precaution, which if neglected could result in degraded performance or accuracy, or instrument malfunction/failure.

NOTE A *note* provides information to be especially noted or supplemented to use the product. A *note* also supplies information to be noted for specific operations (e.g., memory limitation, instrument configuration, or details that apply to specific versions of a program).

TIP A *tip* is a type of note that helps the user to apply the operation method and procedures to his or her specific conditions.

A *tip* also indicates the reference destination if there is information to be referred to.

The specifications and information in this manual are subject to change without notice.

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Labels on Product

Product Safety Labels

This measuring instrument has been designed and manufactured with human safety taken as a major consideration. Additionally, in order to use it more safely, Product Safety Labels have been applied to the main unit and all peripheral devices. This section describes the label application places and warning information at each place.

Before operating the measuring instrument, be sure to carefully read this section to use it safely for an extended period of service life.

<Product Safety Labels>

※		Warning; Crushing of Hands (Prevents the operator from the risk of injury due to pinched fingers.) Do not insert your fingers or hand between the rotating revolver and the VMU (Video Microscope Unit). Otherwise, a personal injury may result.
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※ For details about where this product safety label is stuck, see Section 2.4.

Electromagnetic Compatibility (EMC)

This product complies with the EMC Directive and the UK Electromagnetic Compatibility Regulations; however, if this receives electromagnetic interference that exceeds these requirements, it will be out of warranty and require appropriate measures.

This product is an industrial product, and is not intended to be used in residential environment. If this product is used in residential environment, this product may cause electromagnetic interference with other instruments. In such a case, it is required to take appropriate measures for preventing such electromagnetic interference.

Precautions for Use

- **This system is a precision machine.**

Exercise great care when handling this system. Never bump or apply excessive force to all of its system components during operation.

- **Rectify installation environments.**

- Close to 20°C in ambient temperature.
- Free of extreme humidity.
- Free of dust and dirt.
- Free of vibration.

- **Turn off the power before connection and maintenance works.**

To prevent accidents or electric shock caused by system malfunction during connection or maintenance works, be sure to turn off the power before conducting connection or maintenance works.

- **Power supply**

Observe the following precautions regarding the power supply.

- The power supply specification of this machine

Pollution Degree : 2

Overvoltage Category : II

Class of equipment : Class I equipment

- If the system is subjected to a short-term power interruption, the system may restore itself to the power-on state. Before operating the system again, confirm the safety of the system and its surroundings.

- **Confirm the input voltage before turning the power switch on**

For the input voltage of this system of “100V~240V” is applied to this system. Connect the power plug with the plug socket after checking that the rated voltage of the system corresponds to the voltage of the plug socket.

- **Power cord**

Use only the power cord supplied for this system.

- **Disassembly prohibition**

Disassembling any of the components / parts of this unit will damage its performance and may result in electric shock, injury or malfunction.

Never disassemble any of the components / parts of this unit other than components / parts specifically foretold for adjustment.

Important

This instrument consists of precision components, and its performance cannot be guaranteed, even within the warranty period, if it is disassembled by the user.

All equipment failures that occur after user disassembly will be repaired on a fee-for-service basis.

- **Danger prevention**

For danger prevention, do not use the system in any place where volatile gases could be generated.

- **Maintenance**

Gently wipe the system components on lint-free and soft cloth. If it is still dirtied, wipe it on cloth containing neutral detergent and then wipe it lightly on dry cloth or cloth well-wrung after soaked in water. Do not use organic solvent such as thinner or benzine.

- **Take special shielding measures when using the machine in the following locations:**

- Where noise caused by static electricity is generated.
- Near strong electric fields.
- Where power source lines pass nearby.
- Where there is a risk of radioactivity.
- Where the system components could be subject to corrosive gas.

Installation Environments

Temperature

This measuring system has been assembled and adjusted in the temperature-controlled room at 20°C. To use the measuring system at the rated measuring accuracy in the specification, the temperature at the installation site should be close to 20°C with minimum temperature fluctuation. (The ideal temperature is standard temperature condition level 1, 20°C ± 1°C, that is specified as “Standard Condition of Precision Measurement Environments” in JMAS5011.) Also, the temperature gradient should be 2°C as reference for 8 hours. If this temperature environment is worse than the above condition, the measuring system may not meet the specified measuring accuracy. Even if the specified accuracy is temporarily obtained by adjustment, uncertain measurements will be displayed at 20°C.

Humidity

Humidity does not affect the accuracy of the measuring system directly. High environmental humidity may corrode important machined surfaces and may adversely affect electronic parts. The environmental humidity should be maintained within a range of 55 % to 65%.

Dust and dirt

The measuring system consists of high-precision parts including guide ways, linear scale units and optical units that must be kept free of dust and dirt. Use the system in a site free of dust and dirt.

System Environments

Place	The indoor use
Operating altitude	2000m or less
Operating temperature range	5 to 40°C
Operating humidity range	20 to 80%RH (with no condensation)

Preservation environments

Storage temperature range	-10 to 50°C
Storage humidity range	5 to 80%RH (with no condensation)

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.

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.

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

This warranty is effective only where the instrument is properly installed and operated in conformance with the instructions in this manual 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.

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. For detailed information, please contact Mitutoyo in advance.

Disposal of Products outside the European Union and Other 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 your dealer or the nearest Mitutoyo sales office.

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Service Network

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Overview

This chapter describes the configuration of the Power Revolver. The name and function of each part are also given here.

1.1 Outline

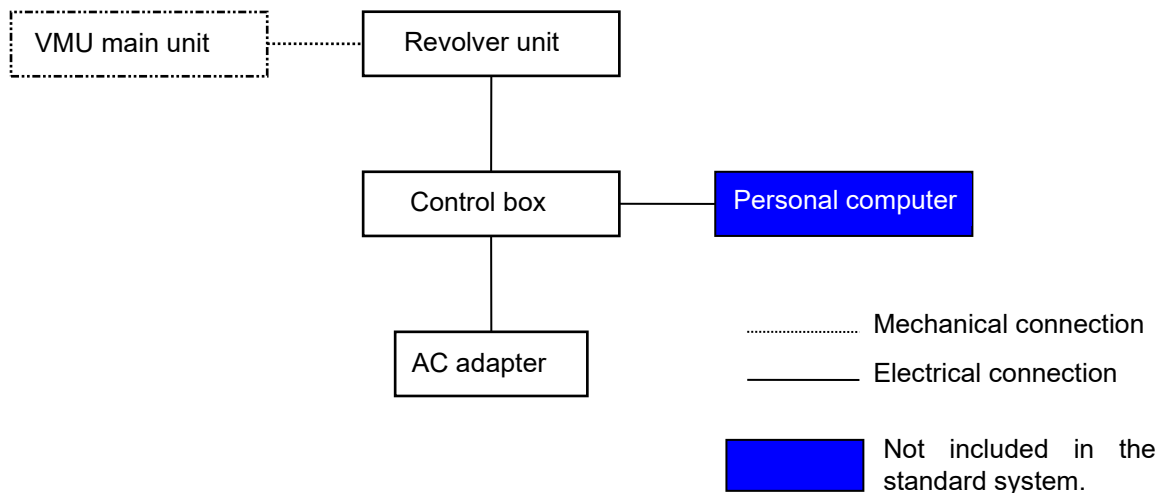
The Power Revolver is a unit for electrically switching the objectives by installing in the microscope unit VMU series which has been incorporated in machine equipment.

This revolver allows the objectives to be switched without touching directly by hand, and thus makes them free from contamination.

Also, if a personal computer is connected to the VMU system, the computer can switch the objectives externally. This enables automation of observing and laser-machining a workpiece.

1.2 System Configuration

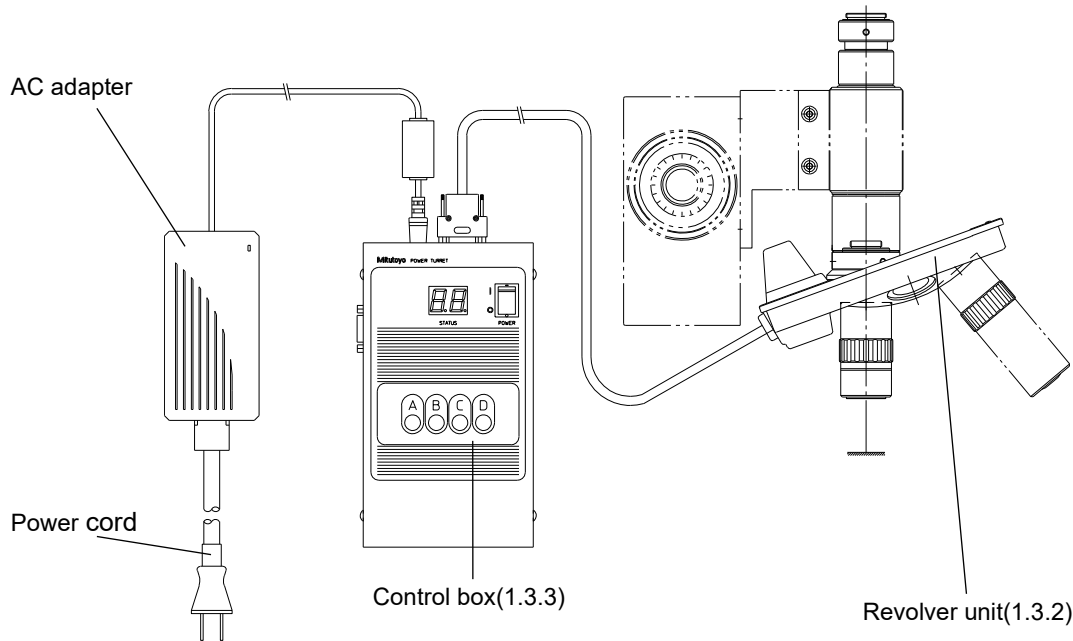
The Power Revolver consists of the revolver unit, control box, and AC adapter.



1.3 Name and Function of Each Part

This section gives the name and function of each part of the Power Revolver.

1.3.1 System appearance



1.3.2 Revolver unit

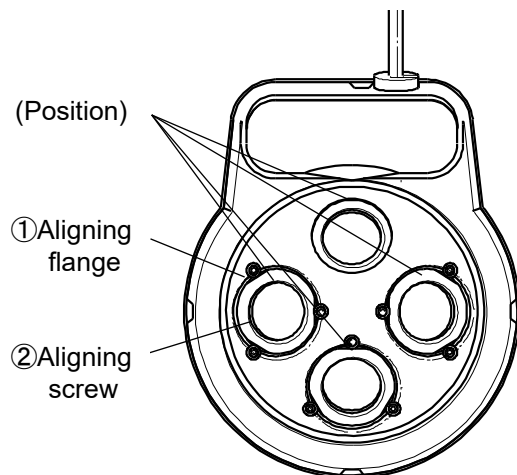
This unit is mounted on the microscope unit and allows a maximum of 4 objectives to be attached to. A desired objective is selected with the Position Select buttons (see § 1.3.3) on the control box. Revolver units have objective centering mechanisms that can adjust the field of view by slightly moving an objective.

① Aligning flange

This flange, in which an objective is screwed, allows the objective to be aligned by being slightly moved within the horizontal plane with the aligning screws.

② Aligning screws

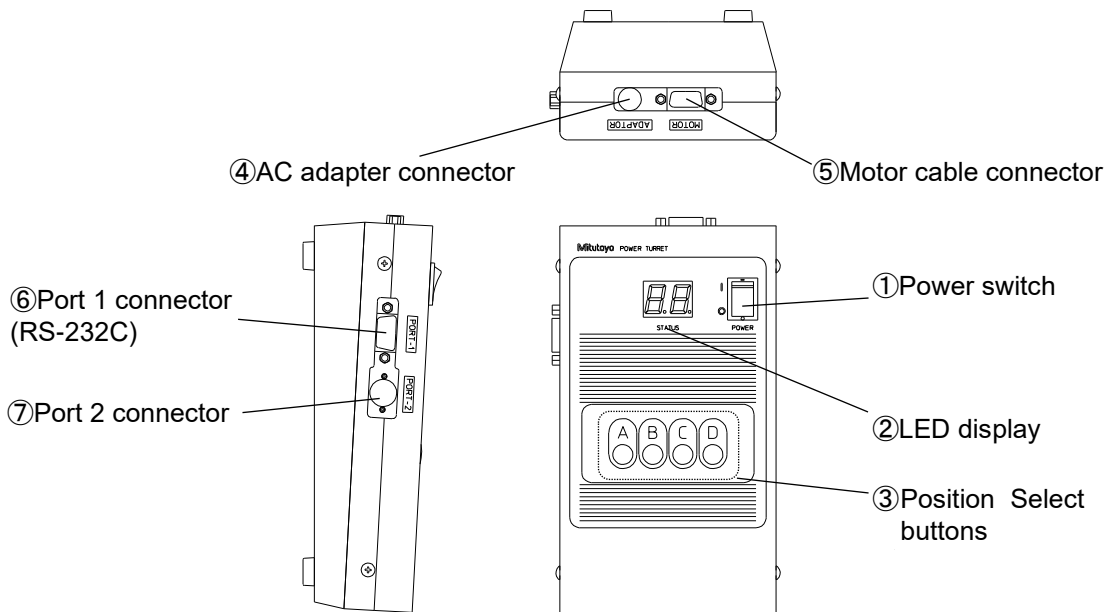
These screws are to align the objective by slightly moving the aligning flange within the horizontal plane.



TIP **What is Aligning?** : Positioning an objective by moving slightly within the horizontal plane so that any objective can observe the same position of a specimen even if the objective is switched with the revolver.

What is the position? : Four tapped hole positions where the objectives are mounted.

1.3.3 Control box



- ① Power switch
Turns on and off the power to the control box.
- ② LED display
Displays the selection status of position, error (see § 4.2), etc., with the two-digit LED.

Display	Status	Display	Status
<i>PA</i> (P A)	Position A (of objectives) is selected.	<i>Pd</i> (P d)	Position D (of objectives) is selected.
<i>Pb</i> (P b)	Position B (of objectives) is selected.	<i>AC</i> (A C)	The revolver is turning.
<i>PC</i> (P C)	Position C (of objectives) is selected.		

- ③ Position Select buttons
Either of the buttons is pressed to switch to a desired objective.
- ④ AC adapter connector
Connects the AC adapter.
- ⑤ Motor cable connector
Connects the revolver unit.
- ⑥ Port 1 connector (RS-232C)
Connects to the personal computer with the dedicated cable.
- ⑦ Port 2 connector
Connects to the control box for the Power Focus Unit (option) with the dedicated cable.

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2

Installation

This chapter explains how to install the Power Revolver in the microscope unit and adjust each of the parts.

2.1 Unpacking and Checking

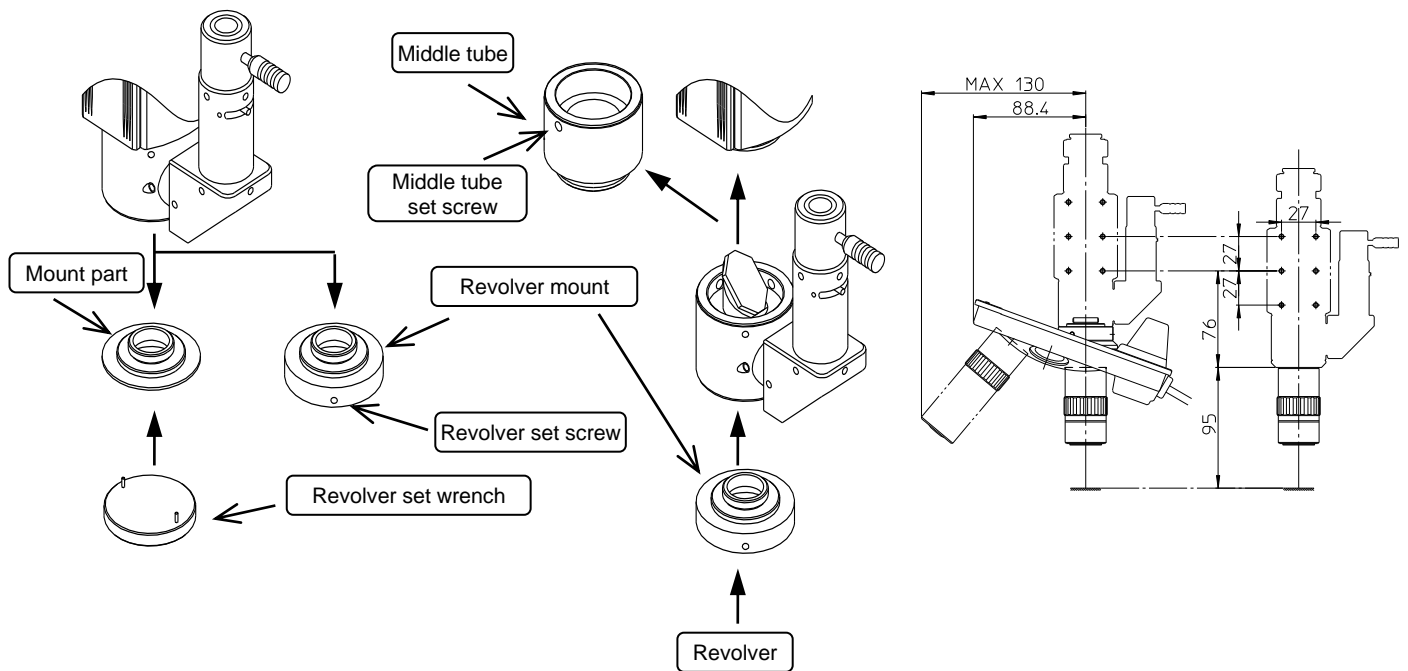
Prior to shipment from the factory, the Power Revolver is thoroughly inspected and its mechanical, optical, and electrical operation are fully guaranteed.

Unpack the Power Revolver, and make sure that all accessories and components are present, and that the Power Revolver was not damaged during shipment. If you have any questions, contact your dealer or nearest Mitutoyo Service Center.

2.2 Mounting the Revolver

Mount the Power Revolver unit on the microscope unit according to the following procedure.

- ① Use the revolver set wrench provided to remove the mount part.(L·L4 series)
Loosen the middle tube set screw and remove the middle tube.
- ② Screw the revolver mount onto the main unit illumination.
- ③ Mount the power revolver on the revolver mount and tighten the revolver set screw to fix the revolver in place.



Important

When mounting the Power Revolver, refer to the items of Important and Tip in VMU User's Manual 「3.1 Mounting a Bright-field revolver (BF)」.

Note

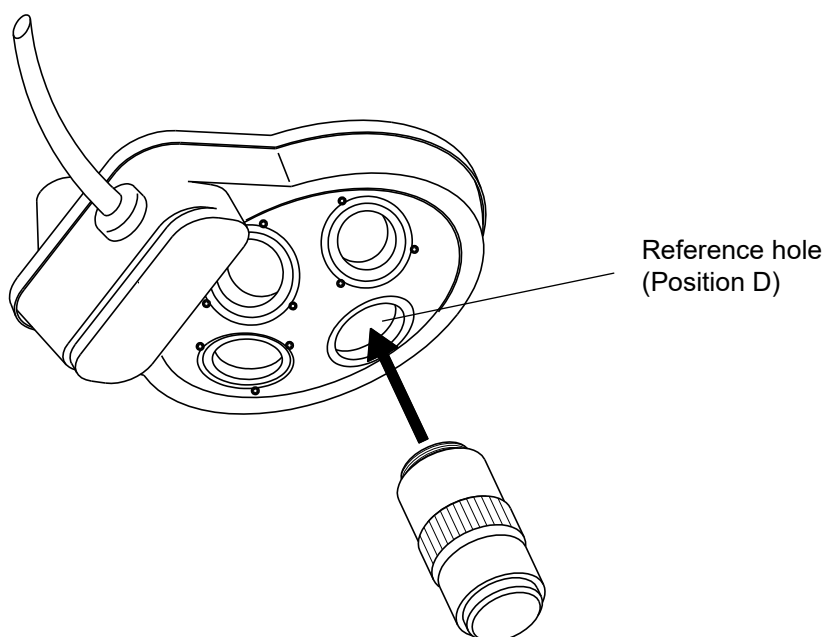
Using the Power Revolver with Focusing Unit B is impossible.
Use Focusing Unit A with the column stand so that the optical axis is aligned with the center of the column stand stage.

2.3 Attaching Objectives to the Revolver

Unscrew the caps mounted on the Power Revolver unit and screw objectives to attach to the revolver. It is possible to attach a maximum of 4 objectives.

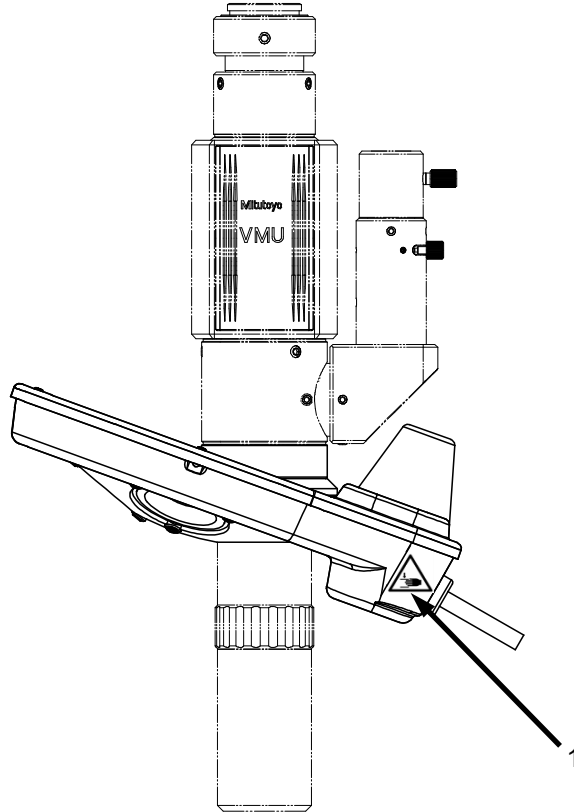
Among the four objective holes one tapping hole, that is fixed with no aligning mechanism provided, is assigned as position [D]. This objective hole is called the reference hole and becomes the reference for aligning.

Be sure to attach the highest magnification lens of the objectives to be used to the reference hole. Even if there are 3 objectives or less for use, make sure that the highest magnification lens is attached to the reference hole.



2.4 Sticking Precaution Labels

When mounting the power revolver to the VMU (Video Microscope Unit), be sure to stick the supplied precaution seal as shown in the figure below.



Example of location where the precaution seal should be stuck

【Product Safety Labels】

1		<p>Warning; Crushing of Hands (Prevents the operator from the risk of injury due to pinched fingers.)</p> <p>Do not insert your fingers or hand between the rotating revolver and the VMU (Video Microscope Unit).</p> <p>Otherwise, a personal injury may result.</p>
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Stick the precaution labels at locations easy to watch, and pay enough attention when handling the power revolver. According to the orientation of mounting the revolver to VMU, stich the precaution labels to locations each to watch.

2.5 Setting-up the Power Supply

Use the dedicated AC adapter for the power supply to this unit. The AC power voltage for the Power Revolver must be between 100V and 240VAC \pm 10% and have a frequency of 50/60Hz.

A two-pole outlet or a two-pole outlet with a ground terminal is required as the AC power outlet. Make allowance for the power output capacity in consideration of the total consumption of the system.

NOTE Only allow the power outlet at the installation site to be used for the machinery including the Power Revolver. Do not plug other electric equipment into the outlet.

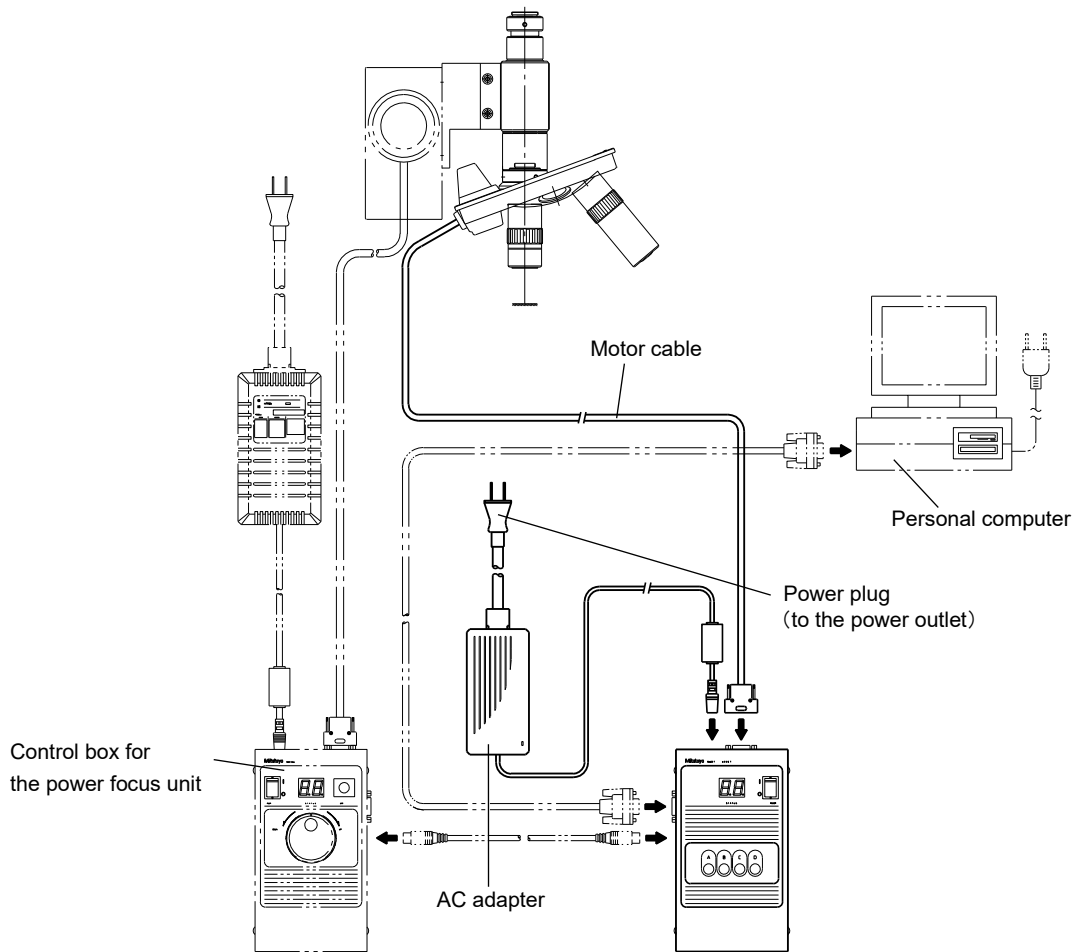
TIP The system may require a power regulator if power fluctuation is not within \pm 10% of the specified voltage. An uninterruptible power system is required if there is the potential for power failure.
For more information, contact your dealer or the nearest Mitutoyo sales office.

2.6 Connecting Each Part

Connect the cables of each part according to the following figure.

Connect the motor cable connector and the AC adapter plug to the control box, and finally connect the power plug to the AC outlet.

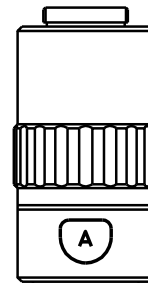
If a personal computer and the power focus unit are used, connect them using the dedicated cables (optional accessories)



2.7 Labeling the Position ID Seals

To identify in which position of A, B, C, and D the individual objectives are attached, label the ID seal around each objective tube.

- ① Turn on the power switch on the control box.
- ② Press the Position Select button A.
The revolver rotates the objective attached in position A to the observation position.
- ③ Label the seal [A] around the tube of the objective that has come in the observation position.
- ④ Similarly label the seal corresponding to the position on other objectives.



2.8 Aligning the Visual Field Center

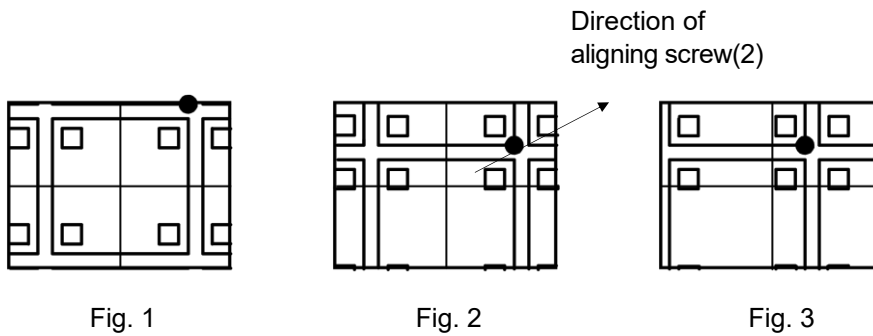
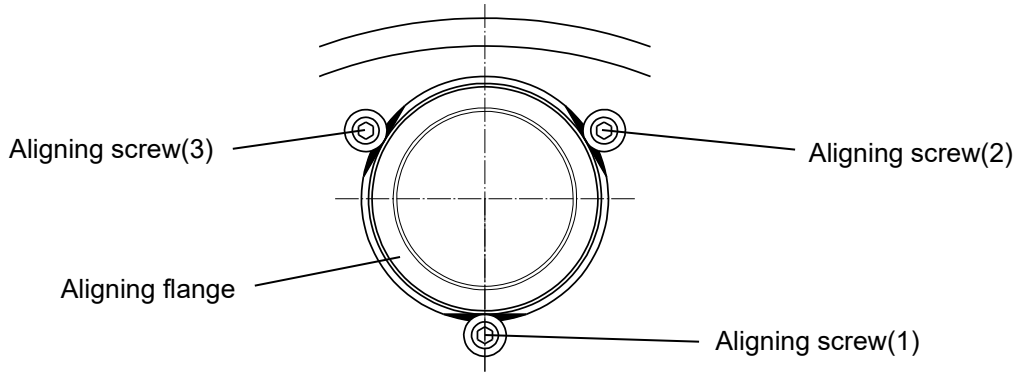
Aligning is performed to position objectives so as not to deviate the visual field center when an objective is switched to.

- ① Press the Position Select button [D] to rotate the revolver and select the highest magnification objective that was attached to the reference hole.
- ② Set a specimen on the stage as an index of observation and focus on it. Decide a marker position such as a corner or a character on the specimen to be observed. Move the stage so as to align the marker position with the CCD center.
- ③ Press a Position Select button to rotate the revolver and select a desired objective to be aligned.
- ④ Bring the specimen into focus, and check where the marker position on the specimen is in the field of view.
If the marker is at the center, the objective does not need to be aligned.
- ⑤ If the marker is deviated from the center, it is necessary to align the objective. Loosen once the three aligning screws that secure the aligning flange with the Allen wrench (nominal 2mm), then lightly tighten them.

The following explains the procedure for aligning the black circle in Fig.1 as a marker with the center.

- ⑥ Tighten gently the aligning screw (1) so that the black circle comes on the line passing through the aligning screw (2) and the center. (See Fig.2.)
- ⑦ Loosen the aligning screw (2) to be able to move the black circle toward the center. (See Fig.3.)

- ⑧ Select the aligning screw that can approach the black circle to the center by tightening the screw, and then adjust it.
- ⑨ Select the aligning screw that can approach the black circle to the center by loosening the screw, and then adjust it.
- ⑩ Repeat steps ⑧ and ⑨ to gradually approach the black circle to the center. Finally tighten the aligning screws to correctly align the black circle with the center.
- ⑪ Similarly align the other objectives (2 pieces at most).



3

Operating Procedure

This chapter explains the procedure for operating the Power Revolver when using the microscope.

3.1 Operation from the Control Box

- ① Turn on the power switch. (The current objective position on the revolver such as [PA] is displayed on the display unit.)
- ② Select a desired objective.
Check the position ID of the seal labeled on the desired objective, then press the Position Select button of the same ID. The revolver will rotate in the following direction depending on the selected objective position.

Selected position	Rotating direction (when viewed from above)
Adjacent to the observation position	Clockwise or counterclockwise by 90°
180° opposed to the observation position	Clockwise

3.2 Operation from a Personal Computer

When using a personal computer, turn on the power according to the following procedure.

- ① Turn on the power to the personal computer.
- ② Turn on the power to the control box.

When turning off the power, turn off the control box first then turn off the personal computer.

For information about the communication command specification, refer to "5.4 Specification for Connecting a Personal Computer".



CAUTION

Operate prudently so that the objective may not contact a workpiece when switching the objective. On the damage which originates from the handling, Mitutoyo assumes no responsibility.

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Troubleshooting

Although a problem may occur when this unit is being used, this does not necessarily indicate a failure. Determine the nature of the problem, and then take corrective action according to the following table. If the problem is not corrected after taking corrective action, contact your dealer or the nearest Mitutoyo sales office.

4.1 Troubleshooting and Remedies

Symptoms	Check points	Remedies	Ref.
The Power Revolver will not rotate when a Position Select button is pressed.	<ol style="list-style-type: none">1) Check if power is on.2) Check if [P*] (* : either of A, b, C, or d) is displayed on the display unit.3) Check if the Position Select button that has already been selected is pressed.4) Check whether the LED display does not indicate [P*] although the power switch has been turned on.	<ol style="list-style-type: none">1) Plug the power cord plug into the power outlet.2) Turn on the power switch. 3) Press another Position Select button except the button that has been selected.4) The electronic fuse in the control box may have been actuated due to excessive current. Turn off the power switch and wait about 10 minutes before turning it on again.	
The Power Revolver will not rotate by the command from the personal computer.	<ol style="list-style-type: none">1) Confirm the procedure to turn on the power supply is correct.2) Check if the command from the personal computer is transmitted in the format of 1-byte capital letter.	<ol style="list-style-type: none">1) First turn on the power supply of the personal computer, then the control box.2) Transmit the command in the format of 1-byte capital letter.	§3.2 §5.5

4.2 Error Messages and Remedies

LED display	LED status	Meaning and remedy
E1	Blinking	RS-232C parity error ···Restart the system power.
E2		RS-232C over-run error ···Restart the system power.
E3		RS-232C framing error ···Restart the system power.
E4		Timeout error (occurs if the time between the rotation instruction reception and the rotation completion exceeds the specified time.) ···Restart the system power.
E5		Sensor detection failure error (occurs if no sensor input comes from anywhere during motor stop.) ···Press a Position Select button to rotate the revolver.

5

Specifications

5.1 Revolver unit

Order No.	3 7 8 – 7 0 8
Observation	Bright field
Number of mounting holes for the objective	4 (fixed hole: 1, aligning hole: 3)
Drive method	Gear drive with a DC motor
External dimensions	164(W) x 137(D) x 65(H) mm 6.46"(W) x 5.39"(D) x 2.56"(H)
Mass	Approx. 1400 g

5.2 Control Box

LED display	7 -segment LED (2 digits)
Control switch	Power switch, Position Select buttons
Input voltage	12 VDC (AC adapter output voltage)
Power consumption	Approx. 6 W
External output	RS-232C
External dimensions	108(W) x 193(D) x 72(H) mm 4.25"(W) x 7.60"(D) x 2.83"(H)
Mass	Approx. 810 g

5.3 Accessories

Part name	Part No.	Quantity	Remark(※1)
Warning seal ; Crushing of Hands	42ZAA203A	3 pcs	○
Position ID seal	12BAC011	4 sets	○
AC adapter (Input voltage: 100V to 240VAC, 50/60Hz)	357651	1 pc.	○
Power cord	Differs depending on the destination country.	1 pc.	○
User's Manual	99MBA107A	1 copy	○
RS-232C cable (2m)	12AAA807	1 pc.	△
Link cable (0.6m) (※2)	12AAB283	1 pc.	△

※1) ○ ; Standard accessory △ ; Optional accessory(User option)

2) Used for linking the power revolver with the power focus unit.

5.4 CE marking / UKCA marking

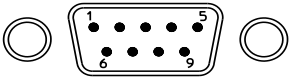
EMC Directive / Electromagnetic Compatibility Regulations	EN61326-1 Immunity test requirements Clause 6.2Table2 Emission class:ClassA
RoHS Directive	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations: EN IEC 63000

5.5 Specification for Connecting a Personal Computer

5.5.1 RS-232C communication protocol

Communication method	:	Half duplex
Synchronizing method	:	Asynchronous (start/stop method)
Baud rate	:	1200, 2400, 4800, or 9600 bps (selectable with DIP switch)
Bit configuration	:	Data bit 8 bits (ASCII code) Parity bit None/even/odd Stop bit 1 bit

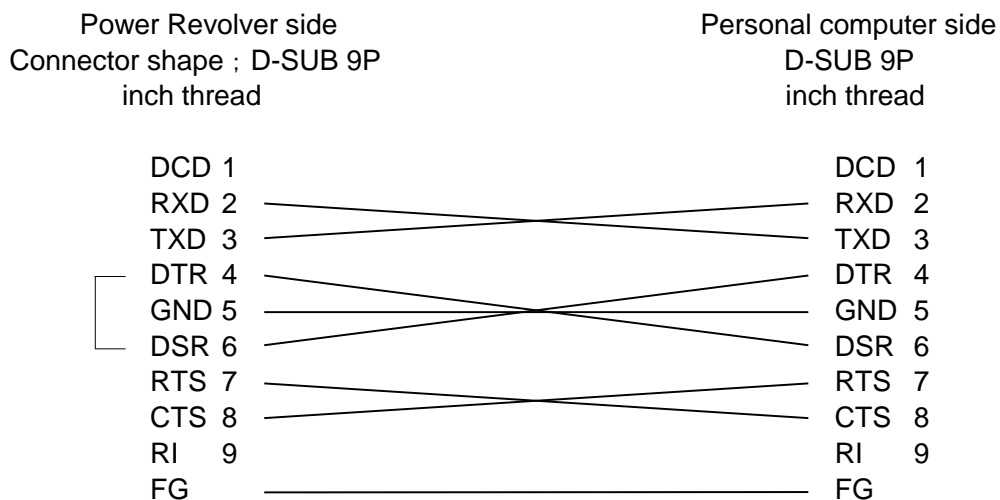
5.5.2 RS-232C connector

Connector shape	Pin No.	Signal name	I/O (※)	Description
 <p>D-sub, 9 pins, male, inch thread</p>	1			
	2	RD	IN	Receive data
	3	TD	OUT	Transmit data
	4	DTR	OUT	Data terminal ready
	5	SG	—	Signal ground
	6	DSR	IN	Data set ready
	7	RTS	OUT	Request to send
	8	CTS	IN	Clear to send
	9			
	FG	—	—	Frame ground

※Each signal input/output depends on the direction viewed from the control box of the Power Revolver.

The input/output circuits used are equivalent to MAX232 (MAXIM Corporation).

5.5.3 Connection of RS-232C cable



5.5.4 Setup of DIP switches

If it is necessary to change factory settings, set the DIP switches again according to each conditions.

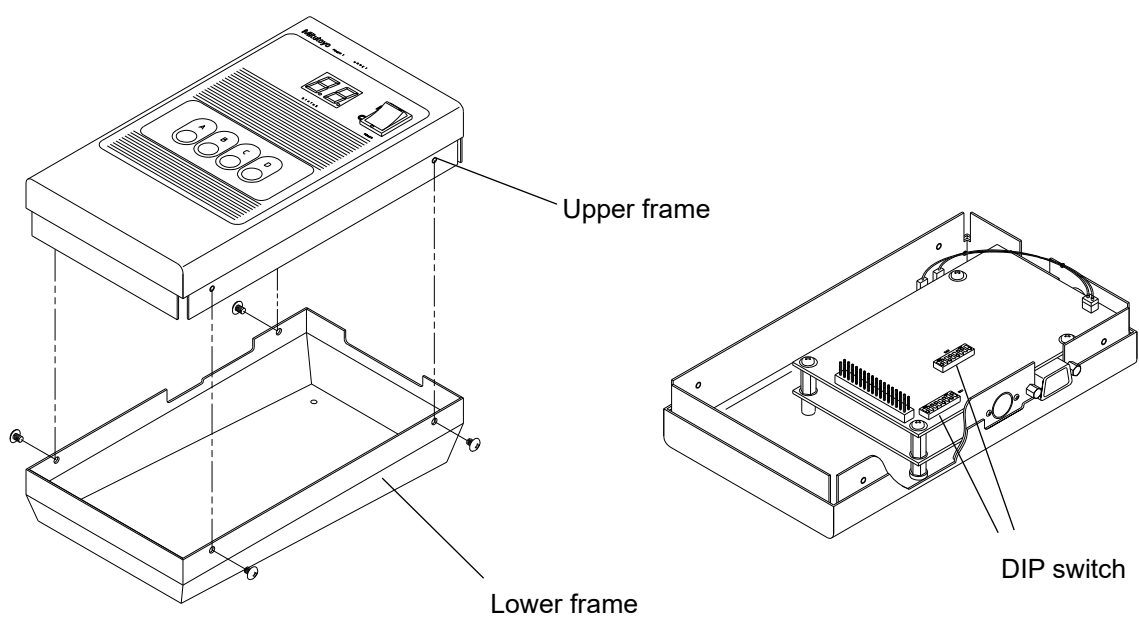
The procedure for setting the DIP switches is described below.

① Disassembling the control box

Turn off the power switch on the control box, and then disconnect the cables.

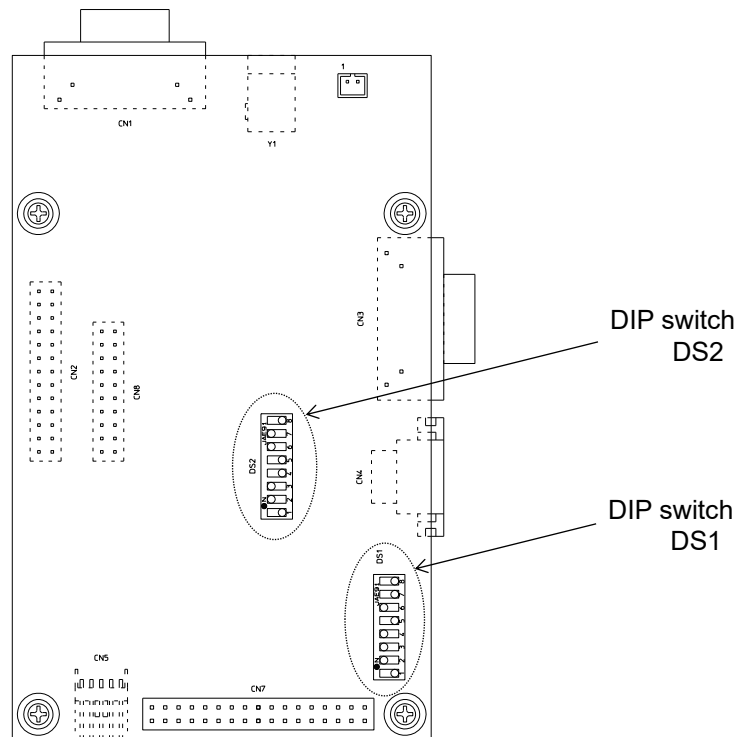
Unscrew the four screws with a screwdriver, then remove the lower frame from the upper frame in which switches are built in.

Turn the upper frame over, and set the DIP switches again.



② DIP switch position

Confirm the position of the DIP switch to be changed.

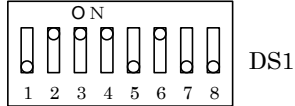


Be sure to turn off the power before starting this procedure.

③ Setting DIP switches

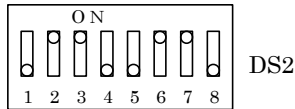
Set the DIP switches according to the tables below.

Factory settings



Setting	Switch No.								Description
	1	2	3	4	5	6	7	8	
Fixed	OFF								Do not change
Fixed		ON							Do not change
Fixed			ON						Do not change
Fixed				ON					Do not change
Fixed					OFF				Do not change
Parity check: even/odd						ON			Even parity check
						OFF			Odd parity check
Parity check: used/none							ON		Parity check: None
							OFF		Parity check: Used
Fixed								OFF	Do not change

Factory settings



Setting	Switch No.								Description																		
	1	2	3	4	5	6	7	8																			
Fixed	OFF								Do not change																		
Fixed		ON							Do not change																		
RS-232C baud rate			*1						<table border="1"> <tr> <td></td> <td>bps</td> <td>1200</td> <td>2400</td> <td>4800</td> <td>9600</td> </tr> <tr> <td>*1</td> <td>Switch No. 3</td> <td>ON</td> <td>OFF</td> <td>ON</td> <td>OFF</td> </tr> <tr> <td>*2</td> <td>Switch No. 4</td> <td>ON</td> <td>ON</td> <td>OFF</td> <td>OFF</td> </tr> </table>		bps	1200	2400	4800	9600	*1	Switch No. 3	ON	OFF	ON	OFF	*2	Switch No. 4	ON	ON	OFF	OFF
		bps	1200	2400	4800	9600																					
*1	Switch No. 3	ON	OFF	ON	OFF																						
*2	Switch No. 4	ON	ON	OFF	OFF																						
				*2																							
Fixed					OFF				Do not change																		
Fixed						ON			Do not change																		
Fixed							ON		Do not change																		
Fixed								OFF	Do not change																		

5.5.5 RS-232C communication specification

"EM" and "CRLF" described in tables are defined as the following meaning.

- "EM" : End mark
- "CRLF" : Carriage return, line feed

Control command (Use a 1-byte capital letter for the command.)

These commands are used for the case in which the rotation of the Power Revolver is controlled from the personal computer.

(1)Rotation to position A

Header			Sub-field			EM	
R	W	R	M	V	A	CR	LF

(2)Rotation to position B

Header			Sub-field			EM	
R	W	R	M	V	B	CR	LF

(3)Rotation to position C

Header			Sub-field			EM	
R	W	R	M	V	C	CR	LF

(4)Rotation to position D

Header			Sub-field			EM	
R	W	R	M	V	D	CR	LF

(5)Stop

Header			Sub-field			EM	
R	W	R	S	T	P	CR	LF

This command is used for the case in which the rotation of the revolver is stopped in the position except for position A, B, C and D.

Note) In this case, the positioning accuracy is not guaranteed.

Answer data (The data from the Power Revolver is returned in the format of 1-byte capital letter.)

The Power Revolver sends one of the following responses, when the control command from the personal computer is accepted.

Normal response

Header			EM	
R	O	K	CR	LF

Abnormal response

Header			Status		EM	
R	N	G	*	*	CR	LF

Status	Description
0 9	An undefined command was received.
1 0	Another command is being executed.
1 1	The power supply of power focus unit is not turned on.
1 2	Though the command for the power focus unit was received, the power focus unit is not connected.

(Response timing to commands)

In response to the control command from the personal computer, the Power Revolver sends its status at the time of accepting the command.

Read command (Use a 1-byte capital letter for the command.)

These commands are sent by the personal computer to know the current status of the Power Revolver.

Basic command

Header			Sub-field			EM	
R	R	D	S	T	U	CR	LF

Reads the status of the Power Revolver from the personal computer.

The response of the Power Revolver to the basic commands above from the personal computer is as below.

Header			Data								EM	
R	O	K	①	②	③	④	⑤	⑥	⑦	⑧	CR	LF

Data	Number of bytes	Description
① Operation status of the Power Revolver	1	0 : Ready status 1 : The revolver is rotating.
② Not assigned	1	0 : Fixed value
③ Not assigned	1	0 : Fixed value
④ Not assigned	1	0 : Fixed value
⑤ Communication	1	0 : Normal 1 : Parity error 2 : Over-run error 3 : Framing error
⑥ Connection status	1	0 : The power focus unit is connected. 1 : The power revolver is connected. 2 : The power focus unit and power revolver are connected.
⑦ Version of the program	1	1 : Ver. 1.00
⑧ Position sensor detection status	1	0 : No sensor detects the position. 1 : Sensor A detects the position. 2 : Sensor B detects the position. 3 : Sensor C detects the position. 4 : Sensor D detects the position.

(Response timing to commands)

The Power Revolver sends the response to the personal computer after completion of the processing for the read command.

Note **The commands (signals) from the personal computer are not accepted, when one of the errors "E1" to "E4" blinks in the display. Cancel the error by initiating the control box and personal computer.**

MEMO

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

Steinbeisstrasse 2, 71229 Leonberg, GERMANY
TEL: 49(0)7152 6080-0 FAX: 49(0)7152 608060

Mitutoyo-Messgeräte Leonberg GmbH

Heidenheimer Strasse 14, 71229 Leonberg, GERMANY
TEL: 49(0)7152 9237-0 FAX: 49(0)7152 9237-29

U.K.

Mitutoyo (UK) Ltd.

Joule Road, West Point Business Park, Andover, Hampshire
SP10 3UX, UNITED KINGDOM
TEL: 44(0)1264 353 123 FAX: 44(0)1264 354883

M³ Solution Center Coventry

Unit6, Banner Park, Wickmans Drive, Coventry,
Warwickshire CV4 9XA, UNITED KINGDOM
TEL: 44(0)2476 426300 FAX: 44(0)2476 426339

M³ Solution Center Halifax

Lowfields Business Park, Navigation Close, Elland, West
Yorkshire HX5 9HB, UNITED KINGDOM
TEL: 44(0)1422 375566 FAX: 44(0)1422 328025

M³ Solution Center East Kilbride

The Baird Building, Rankine Avenue, Scottish Enterprise
Technology Park, East Kilbride G75 0QF, UNITED
KINGDOM
TEL: 44(0)1355 581170 FAX: 44(0)1355 581171

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

Espace Scionzier 480 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 dei Carpini1/A - 40011 Anzola Emilia (BO), ITALY
TEL: 39 02 93578215 FAX: 39 02 93578255

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.

Wiltonstraat 25, 3905 KW 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 FAX: 46(0)8 590 924 10

M³ Solution Center Alingsås

Ängsvaktaregatan 3A, 441 38 Alingsås, SWEDEN
TEL: 46(0)8 594 109 50 FAX: 46(0)322 63 31 62

M³ Solution Center Värnamo

Storgatsbacken 1, 331 30 Värnamo, SWEDEN
TEL: 46(0)8 594 109 50 FAX: 46(0)370 463 34

Switzerland

Mitutoyo (Schweiz) AG

Steinackerstrasse 35, 8902 Urdorf, SWITZERLAND
TEL: 41(0)447361150 FAX: 41(0)447361151

Mitutoyo (Suisse) SA

Rue Galilée 4, 1400 Yverdon-les Bains, SWITZERLAND
TEL: 41(0)244259422 FAX: 41(0)447361151

SERVICE NETWORK

*As of October 2020

Poland

Mitutoyo Polska Sp.z o.o.

Ul.Graniczna 8A, 54-610 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 FAX: 420 417-579-867

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

Ke Karlovu 62/10, 664 91 Ivančice, CZECH REPUBLIC
TEL: 420 417-514-011 FAX: 420 417-579-867

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

Mošnov 314, 742 51 Mošnov, CZECH REPUBLIC
TEL: 420 417-514-050 FAX: 420 417-579-867

Mitutoyo Česko s.r.o. Slovakia Branch

Hviezdoslavova 124, 017 01 Povážská Bystrica, SLOVAKIA
TEL: 421 948-595-590

Hungary

Mitutoyo Hungária Kft.

Záhony utca 7, D-épület / fsz, 1031 Budapest, HUNGARY
TEL: 36(0)1 2141447 FAX: 36(0)1 2141448

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

Russian Federation

Mitutoyo RUS LLC

13 Sharikopodshipnikovskaya, bld.2, 115088 Moscow,
RUSSIAN FEDERATION
TEL: 7 495 7450 752

Finland

Mitutoyo Scandinavia AB Finnish Branch

Vihertiitäjä 2A, 33960, Pirkkala, FINLAND
TEL: 358(0)40 355 8498

Austria

Mitutoyo Austria GmbH

Salzburger Straße 260 / 3A-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

76/3-5, Chaengwattana Road, Kwaeng Anusaawaree, Khet
Bangkaen, Bangkok 10220, THAILAND
TEL: (66)2080 3500 FAX:(66)2521 6136

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

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

123 Dien Bien Phu Street, Ward 15, Binh Thanh District,
Ho Chi Minh City, VIETNAM
TEL: (84)28-3840-3489 FAX: (84)28-3840-3498

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: (63)49 544 0272 FAX: (63)49 544 0272

India

Mitutoyo South Asia Pvt. Ltd. Head Office

C-122, Okhla Industrial Area, Phase-1, New Delhi-110 020,
INDIA

TEL: (91) 11-26372090 FAX: (91) 11-26372636

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) 22-25700684/837/839 FAX: (91) 22-25700685

Pune Office / M³ Solution Center

G4/G5, Pride Kumar Senate, Off. Senapati Bapat Road,
Pune-411 016, INDIA
TEL: (91) 20-25660043/44/45 FAX: (91) 20-66033644

Bengaluru Region Head office / M³ Solution Center

No. 5, 100 Ft. Road, 17th Main, Koramangala, 4th Block,
Bengaluru-560 034, INDIA
TEL: (91) 80-25630946/47/48 FAX: (91) 80-25630949

SERVICE NETWORK

*As of October 2020

Chennai Office / M[®] Solution Center

No. 624, Anna Salai Teynampet, Chennai-600 018, INDIA
TEL: (91) 44-24328823/24 FAX: (91) 44-24328825

Kolkata Office

Unit No. 1208, Om Tower, 32, J.L. Nehru Road, Kolkata-700 071, INDIA
TEL: 91 33-22267088/40060635 FAX: (91)33-22266817

Ahmedabad Office/M[®] Solution Center (Ahmedabad)

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

Coimbatore Office

Regus, Srivari Srimath, 3rd Floor, Door No: 1045, Avinashi Road, Coimbatore - 641 018, INDIA
TEL: (91)9345005663

Taiwan

Mitutoyo Taiwan Co., Ltd. / M[®] Solution Center Taipei

4F., No.71, Zhouzi St., Neihu Dist., Taipei City 114, TAIWAN (R.O.C.)

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

Taichung Branch / M[®] Solution Center Taichung

1F., No. 299, Gaotie 1st Rd., Wuri Dist., Taichung City 414, TAIWAN(R.O.C.)

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

Kaohsiung Branch / M[®] Solution Center Kaohsiung

1F., No.31-1, Haibian Rd., Lingya Dist., Kaohsiung City 802, TAIWAN (R.O.C.)

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

South Korea

Mitutoyo Korea Corporation

Head Office / M[®] Solution Center

(Sanbon-Dong, Geumjeong High View Build.), 6F, 153-8, Ls-Ro, Gunpo-Si, Gyeonggi-Do, 15808 KOREA

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

Busan Office / M[®] Solution Center

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

TEL: 82(51)718-2140 FAX: 82(51)324-0104

Daegu Office / M[®] 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.

8th Floor, Tower 1 Lujiazui Jinkong Square No.1788/1800 Century Ave., Pudong New District, Shanghai 200122, CHINA

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

Suzhou Office / M[®] Solution Center (Suzhou)

No. 46 Baiyu Road, Suzhou 215021, CHINA

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

Wuhan Office / M[®] 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

1-701, New Angle Plaza, 668# Jindong Road, Jinjiang District, Chengdu, Sichuan 610066, CHINA

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

Hangzhou Office

Room 804, Eastern International Business Center Building 1, No.600 Jinsha Road of Hangzhou Economic and Technological Development Zone, 310018, CHINA

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

Tianjin Office / M[®] 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 805, Xi'an International Trade Center, No. 196

Xiaozhai East Road, Xi'an, 710061, CHINA

TEL: 86(29)8538-1380 FAX: 86(29)8538-1381

Dalian Office / M[®] 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

Room1801,18/F,Unit1,Building No.23, Shangwu Inner Ring Road, Zhengdong New District, Zhengzhou City, Henan 450018, CHINA

TEL: 86(371)6097-6436 FAX: 86(371)6097-6981

Dongguan Office / M[®] Solution Center China (Dongguan)

No.26, Chang'an Section Guanchang Road, Chang'an Town, Dongguan City, Guangdong 523855, CHINA

TEL: 86(769)8541 7715 FAX: 86(769)-8541 7745

Fuzhou Office

Room 2104, City Commercial Centre, No.129 Wu Yi Road N., Fuzhou City, Fujian 350005, 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

Mitutoyo Leepport Metrology (Hong Kong) Limited

Room 818, 8/F, Vanta Industrial Centre, No.21-33, Tai Lin Pai Road, Kwai Chung, NT, HONG KONG

TEL: (852)2992-2088 FAX: (852)2670-2488

Mitutoyo Measuring Instruments (Suzhou) Co., Ltd.

No. 46 Baiyu Road, Suzhou 215021, CHINA

TEL: 86(512)6252-2660 FAX: 86(512)6252-2580

U.S.A.

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

M[®] Solution Center-Illinois

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

M[®] Solution Center-Ohio

6220 Hi-Tek Ct., Mason, OH 45040, U.S.A.

TEL: 1-(888)-648-8869 FAX: 1-(513)754-0718

M[®] Solution Center-Michigan

46850 Magellan Drive, Suite 100, Novi, MI 48377, U.S.A.

TEL: 1-(888)-648-8869 FAX: 1-(248)-926-0928

M[®] Solution Center-California

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

TEL: 1-(888)-648-8869 FAX: 1-(626)369-3352

SERVICE NETWORK

*As of October 2020

M^o Solution Center-North Carolina

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

M^o Solution Center-Alabama

2100 Riverchase Center, Suite 106, Birmingham, AL 35244, U.S.A.

TEL: 1-(888)-648-8869 FAX: 1-(205)-988-3423

M^o Solution Center-Washington

1000 SW 34th St. Suite G, Renton, WA 98057 U.S.A.

TEL: 1-(888)-648-8869

M^o Solution Center-Texas

4560 Kendrick Plaza Drive Suite 120 Houston, TX 77032, U.S.A.

TEL: 1-(888)-648-8869 FAX: 1-(281)227-0937

M^o Solution Center-Massachusetts

753 Forest Street, Suite 110, Marlborough, MA 01752, U.S.A.

TEL: 1-(888)648-8869 FAX: 1-(508)485-0782

Mitutoyo America Corporation Calibration Lab

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

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

Micro Encoder, Inc.

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

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

Micro Encoder Los Angeles, Inc.

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

TEL: 1-626-961-9661 FAX: 1-626-333-8019

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

Tijuana Office / M^o Solution Center

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

TEL: 52(01-664) 647-5024

Querétaro Office / M^o 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 / M^o 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 / M^o 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

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 / M^o Solution Center / Factory

Rodovia Índio Tibiriçá 1555, CEP 08655-000 - Vila Sol Nascente - Suzano - SP - BRASIL

TEL: 55(11) 5643- 0040

Argentina

Mitutoyo Sul Americana Ltda.

Argentina Branch / M^o Solution Center

Av. B. Mitre 891/899 - C.P. (B1603CQI) Vicente López -Peia. Buenos Aires - ARGENTINA

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

Sucursal Cordoba / M^o Solution Center

Av. Amadeo Sabattini, 1296, esq. Madrid B° Crisol Sur - CP 5000, Cordoba, ARGENTINA

TEL/FAX: 54(351)456-6251

Mexico

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

Industria Eléctrica No.15, Parque Industrial,

Naucalpan de Juárez, Estado de México C.P.53370, MÉXICO

TEL: 52 (01-55) 5312-5612 FAX: 52 (01-55) 5312-3380

Monterrey Office / M^o 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

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: <http://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