Revolver (with centering and parfocal) for VMU

Precautions for Use

Important

● When assembling or operating the "**Revolver** (with centering and parfocal) for **VMU**", handle it carefully so that no part is subjected to any impact or excessive force.

● The "**Revolver** (with centering and parfocal) for **VMU**" consists of precise components. Accordingly, do not ever disassemble any portion other than the portions to be disassembled when replacing consumable parts. Otherwise, the performance may be adversely affected; or electric shock, injury or failure may be caused. If you should disassemble this product, the performance cannot be guaranteed even within the warranty period. Furthermore, if you should disassemble this product so that this product has failed, it will be subject to a repair charge.

Warranty

In the event that the Mitutoyo product, except software 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 our option, free of charge upon its prepaid return to us.

If the 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 inappropriate handling or 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, or natural disaster.

Export Control Compliance

This product falls into the Catch-All-Controlled Goods or Program under the Category 16 of the Separate Table 1 of the Export Trade Control Order or the Category 16 of the Separate Table of the Foreign Exchange Control Order, based on the Foreign Exchange and Foreign Trade Law of Japan.

Further, this User's Manual also falls into the Catch-All-Controlled Technology for use of the Catch-All-Controlled Goods or Program, under the Category 16 of the Separate Table of the Foreign Exchange Control Order.

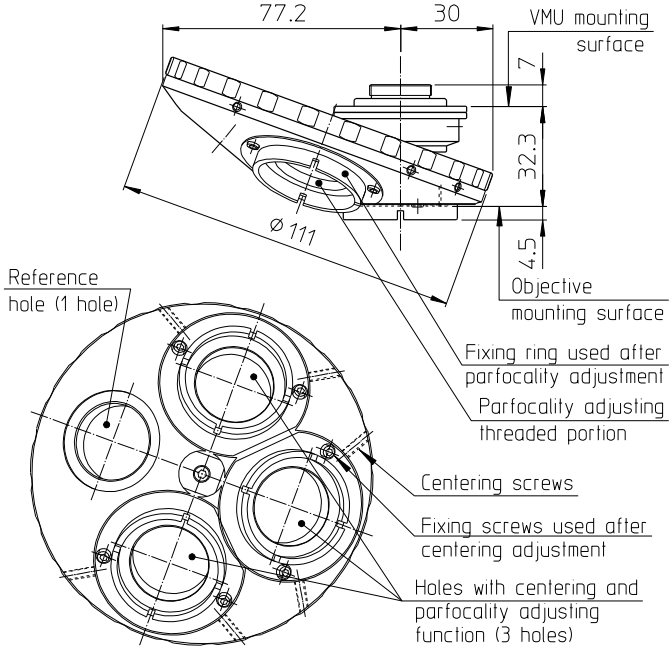
If you intend re-exporting or re-providing the product or technology to any party other than yourself, please consult with Mitutoyo prior to such re-exporting or re-providing.

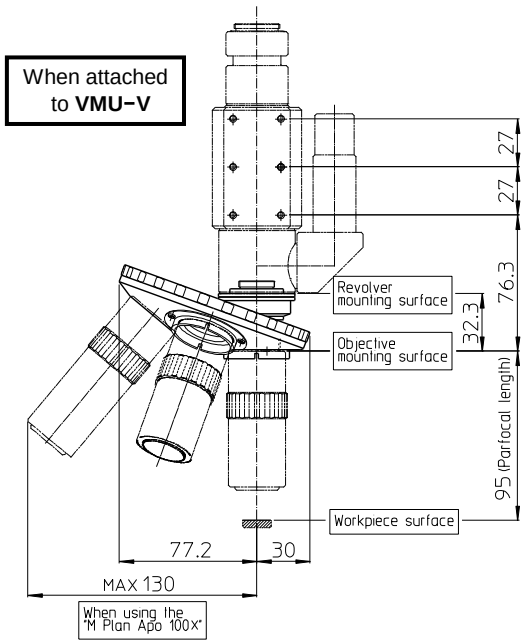
1. Overview

The "**Revolver** (with centering and parfocal) for **VMU**" should be attached to the video microscope unit "**VMU** series", and includes a function of aligning the center of FOV about objectives (centering) and adjusting the parfocal distance (focused position) of objectives.

Consequently, the "**Revolver** (with centering and parfocal) for **VMU**" can prevent the center of FOV from shifting and also prevent unfocused state from occurring when the objective is switched. These phenomena occur when a revolver without the adjusting function is used.

2. Component Names and Dimensions





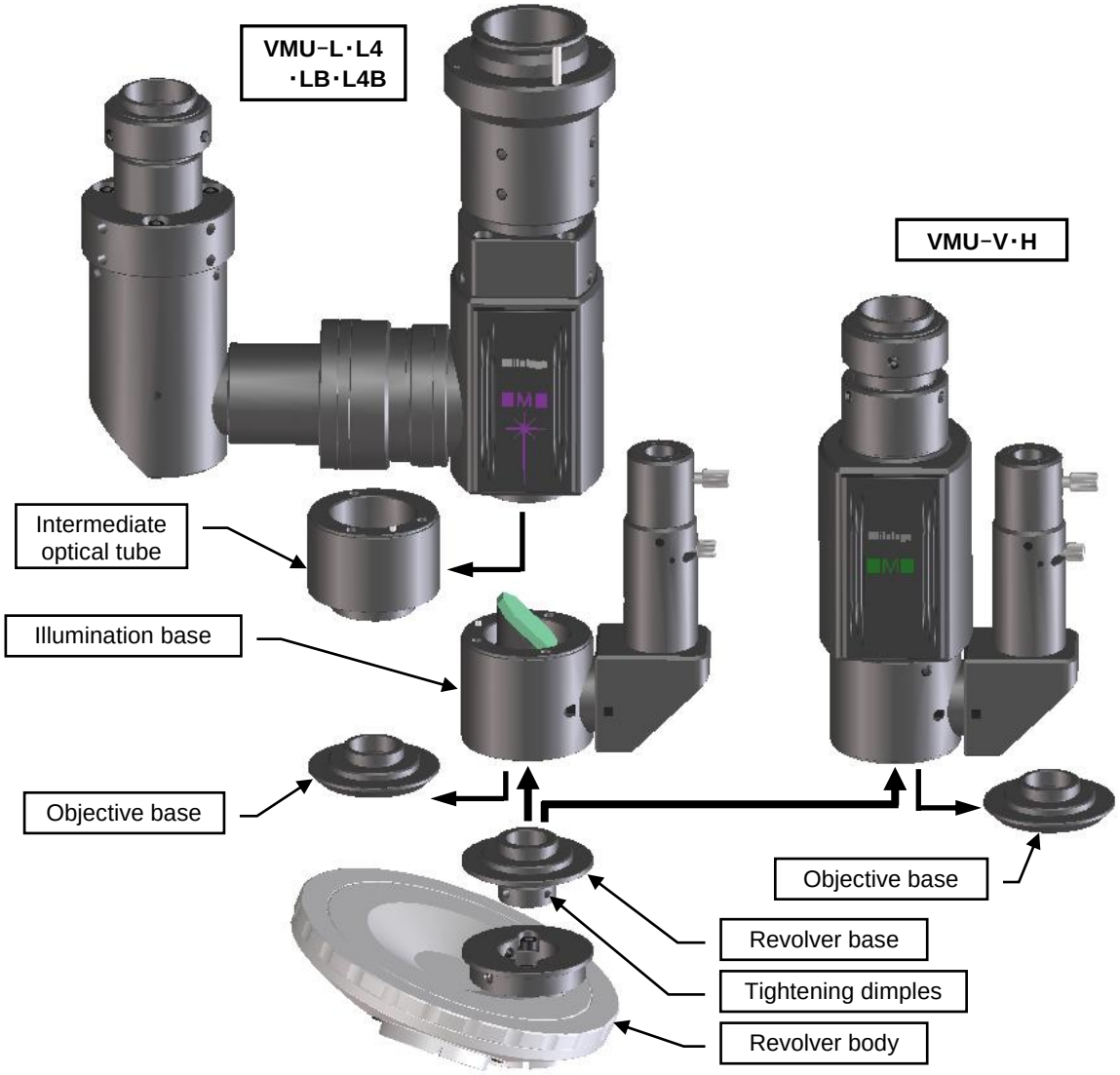
6. Setup

3.2 Unpacking and Checking

Before shipment from Mitutoyo plant, the "**Revolver** (with centering and parfocal) for **VMU**" is strictly inspected so that mechanically and optically good performances are fully guaranteed. Unpack the **Revolver** for **VMU**, and confirm that all the components and accessories exist and that the **Revolver** for **VMU** has not been damaged during transportation. If you have any question, contact your dealer or the nearest Mitutoyo sales office.

3.2 Attaching Revolver

- Remove the objective base from **VMU** by using the provided revolver attaching wrench.
  (For **VMU-L·L4·LB·L4B**) Remove the intermediate optical tube by loosening the intermediate optical tube fixing screws.
- Remove the revolver base from the revolver body by loosening three pieces of hexagon socket set screws (M4). Then screw the removed revolver base into the illumination base.
- Attach the revolver body to the revolver base by using three pieces of hexagon socket set screws (M4).



Important	● Concerning **VMU-L·L4·LB·L4B**, since the half mirror is exposed when the intermediate optical tube is removed, pay attention not to damage the half mirror. Note that even when the intermediate optical tube is not removed, the "**Revolver** (with centering and parfocal) for **VMU**" can be attached to the **VMU**. However, if you perform laser cutting in the state that the intermediate optical tube is attached, the objective may be damaged. ● Be sure to firmly fix the revolver body to the revolver base by using the tightening dimples. Otherwise, the revolver may be loosened when the revolver is rotated.
Tip	● Concerning **VMU-V·H**, the total length is extended for 27 mm by attaching the "**Revolver** (with centering and parfocal) for **VMU**". However, since this extension amount is equal to the pitch of the VMU attaching holes, the compatibility for attaching the VMU can be ensured.

3.3 Mounting Objectives

- Remove the cap from the **Revolver**, and then screw objectives into the **Revolver**. A maximum of four objectives can be mounted.
- Among the four holes for mounting objectives, one hole is a fixed threaded hole without centering function and is used as the reference for centering the FOV and adjusting the parfocality of the other objectives. This fixed threaded hole is called “reference hole”. Be sure to mount the highest-magnification objective to the reference hole. Even when you use three or less objectives, be sure to mount the highest-magnification objective to the reference hole.

7. Adjustment Procedure

4.1 Adjustment of **VMU**

Before performing the centering adjustment and parfocality adjustment of the **Revolver**, adjust the **VMU** so that good centering and parfocality for the highest-magnification objective and the lowest-magnification objective is obtained. (Refer to User’s Manual of **VMU**.)
As a result, adjustment of the **Revolver** is required only for intermediate-magnification objectives.

4.2 Adjusting Parfocality

To prevent unfocused state from occurring when the objective is switched, perform the parfocality adjustment according to the following procedure:

① Rotate the revolver to select the highest-magnification objective mounted in the reference hole.

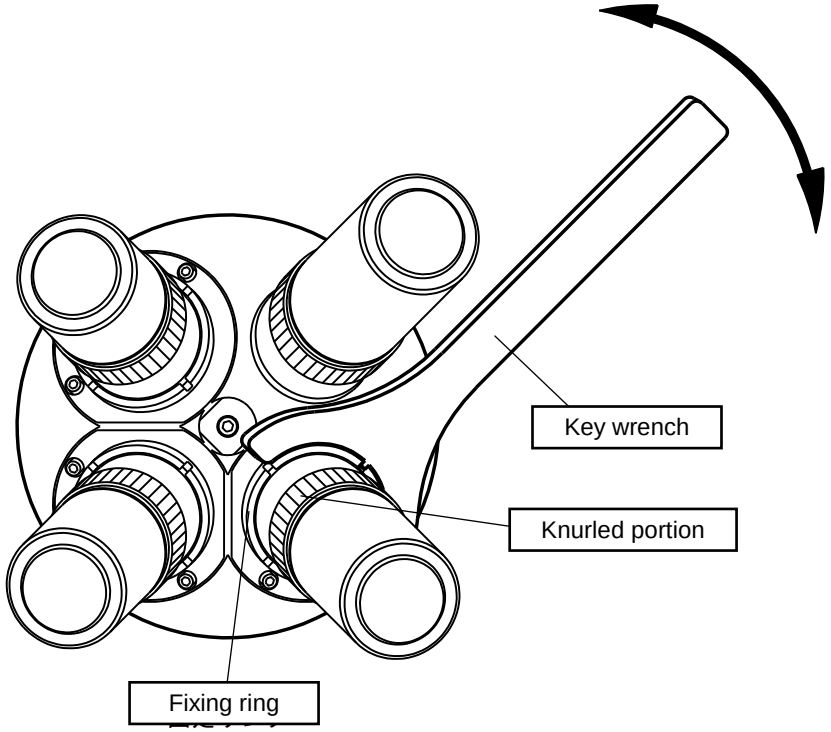
② Arrange reference workpiece on the stage, and then perform the focusing operation.

③ Rotate the **Revolver** to switch the currently-selected objective to the objective, about which the parfocality should be adjusted.

④ Check whether or not the image is focused.
When the image is focused, go to the above step ③.
On the other hand, when the image is not focused, loosen the fixing ring by using the provided key wrench. (Pay attention not to rotate the **Revolver** by the force applied by the key wrench.)

⑤ Rotate the objective to find the position where the image is focused. Then tighten the fixing ring firmly by using the key wrench. (Pay attention not to rotate the objective when tightening the fixing ring.)

⑥ Go to the above step ④.



Important

- When grasping the objective, be sure to grasp the knurled portion of the objective. Otherwise, the objective may be broken.
- Be sure to tighten the fixing ring firmly. Otherwise, when removing the objective, the fixing ring may be loosened.

4.3 Centering (Aligning Center of FOV)

To prevent the center of FOV (field of view) from shifting when the objective is switched, perform the centering adjustment according to the following procedure:

① Rotate the **Revolver** to select the highest-magnification objective mounted in the reference hole.

② Arrange reference workpiece on the stage, and then perform the focusing operation. Then move the stage so that the target position of the reference workpiece is positioned at the center of the video monitor.

③ Rotate the **Revolver** to switch the currently-selected objective to the objective, about which the centering should be adjusted.

④ Check whether or not the target position is positioned at the center of the video monitor.
When the target position is positioned at the center of the video monitor, go to the above step ③.
On the other hand, when the target position is not positioned at the center of the video monitor, slightly loosen two pieces of centering flange fixing screws by using the hexagon socket screw key (nominal: 1.5) so that the centering flange can move.

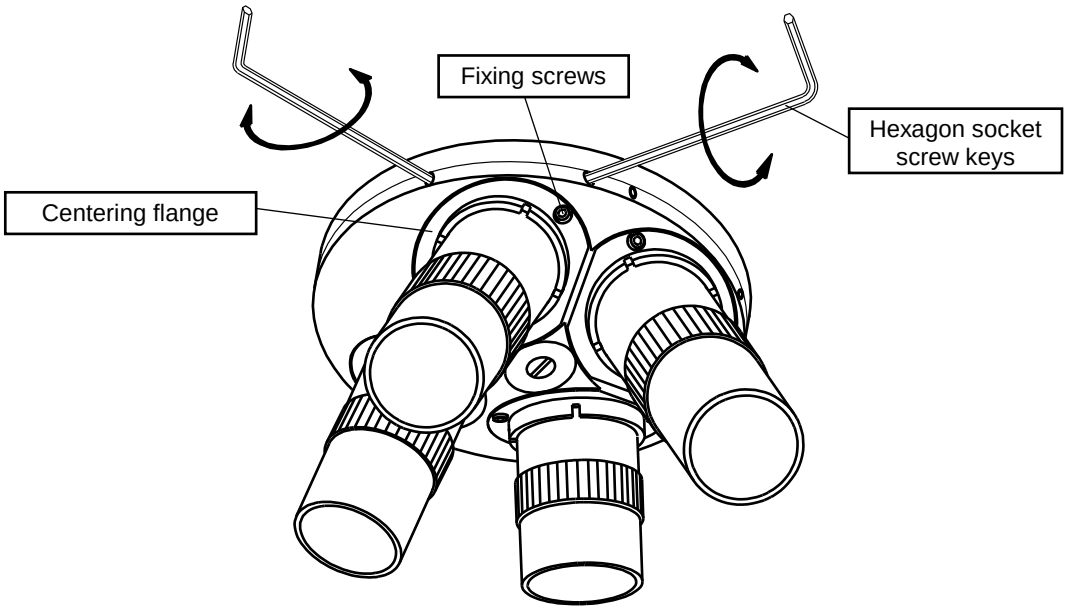
⑤ Insert two pieces of hexagon socket screw keys (nominal: 1.5) into two threaded holes arranged on the peripheral surface of the revolver.

⑥ Focus the image by moving the **VMU**. Then rotate two pieces of inserted hexagon socket screw keys in such a manner that the target position of the reference workpiece moves to the center of the video monitor. Then tighten the fixing screws.

⑦ Go to the above step ④.

When the centering adjustment has been completed, confirm that each fixing screw has been firmly tightened.

Note
- If any fixing screw is not firmly tightened, the centering flange may drop along with the objective so that the workpiece or the equipment may be damaged.
- If the workpiece or the equipment has been damaged because your handling was not appropriate, Mitutoyo shall not owe the responsibility.



8. Specifications

Number of holes for mounting objectives	**4** (Fixed hole: **1**, Hole with centering and parfocality adjusting function: **3**)
Adjusting range	Centering: ±**0.5** mm Parfocal: ±**0.5** mm
Mass	**1** kg

6. Accessories

Name	Part No.	Qty.
Revolver attaching wrench	02AKF420	1
Key wrench	12BAC033	1
Hexagon socket screw key (Nominal: **1.5**)	—	2
User's Manual	99MBA115B	1