



**QUALITY PROCEDURE
RHOTHOR™ MIRROR EXCHANGE**

NEWSON ENGINEERING NV

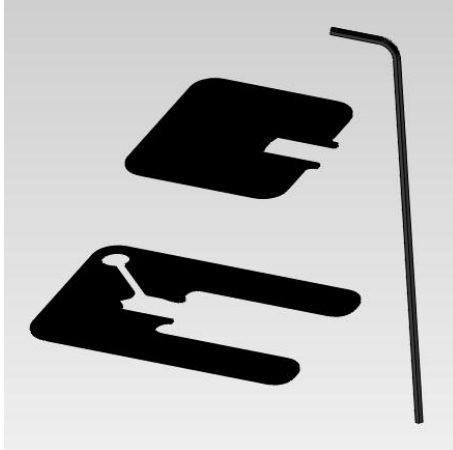
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MIRROR EXCHANGE PROCEDURE

The following procedure outlines the steps necessary to exchange mirrors within the rhothor™ deflection head.

1.1 TOOLS



Before starting the procedure check if you have following attributes:

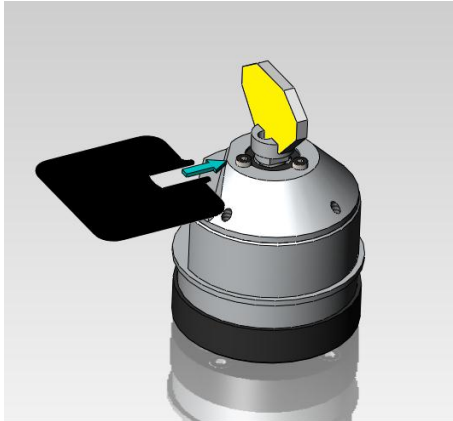
- Hexagonal key for M2.
- Mirror fix tool.
- Mirror alignment tool.
- Gloves to hold/handle optics.
- PC with rhothor™ software to control the deflection head.

The mirror fix tool will be used to catch the force when (un)tightening the screws.

The mirror alignment tool will be used to align the mirror holder on the rhothor™ motor.

1.2 DISMOUNT MIRROR PROCEDURE

1.



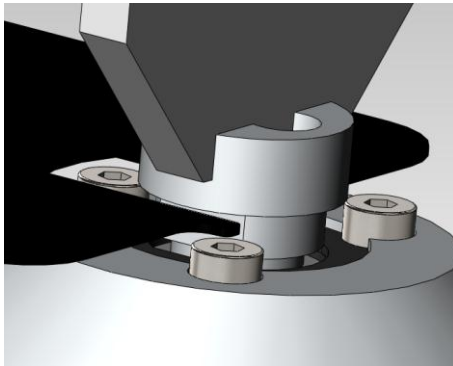
Power off the system.

Insert the **mirror fix tool** around the mirror mount.

Note the orientation of the reflective coating! This side should point towards the mirror fix tool.

(The reflective coating is indicated on the figure with a yellow colour)

2.



The mirror mount contains mechanical strokes where you can place the fix tool.

3.

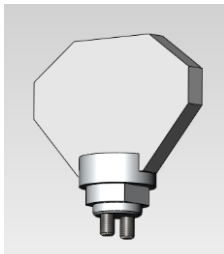


Place the **hexagonal key** in one of the two locking screws of the mirror. To prevent touching the mirror surface hold the Hexagonal key away from the mirror surface. This means you unscrew the mirror screws by holding the Hexagonal key under a certain angle.

Unghten the mirror by starting to unscrew the two locking screws on the mirror. Use the mirror fix tool to catch the forces put by the hexagonal key.

Work softly! **Prevent that the screws touch the bottom side of the mirror.** Unscrew the two screws in an alternated fashion. Pull the mirror holder from the motor before the screws touch the bottom side of the mirror. Make sure not to touch the mirror surface with any of the tools.

4.

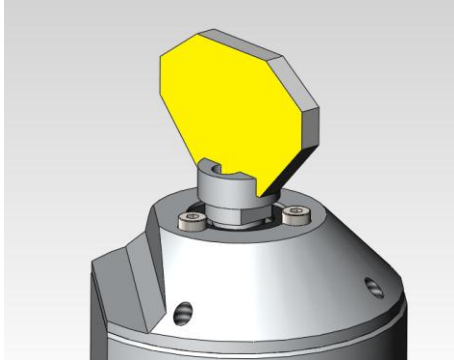


Once both screws are untightened you can remove the fix tool and hold the mirror on the side faces while unscrewing completely both locking screws of the mirror. Wear gloves when holding the mirror.

Don't put force on the mirror when unscrewing the screws. **Handle the mirror with care!**

1.3 MOUNT MIRROR PROCEDURE

1.

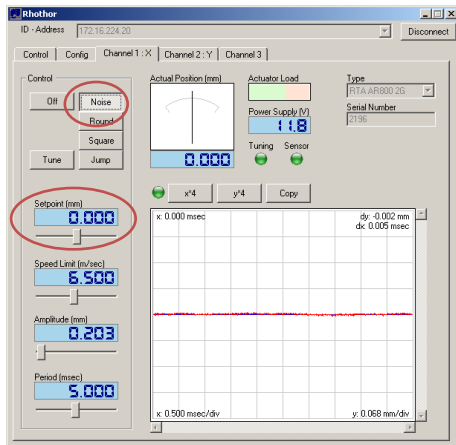


Power on the system.

Mount the mirror on the motor by screwing the both **locking screws** on the mirror **with a few turns**. Keep the hexagonal key away from the mirror surface by keeping “an angle” when screwing. Don't tighten the locking screws yet as you still need to align the mirrors.

Note the orientation of the reflective coating!

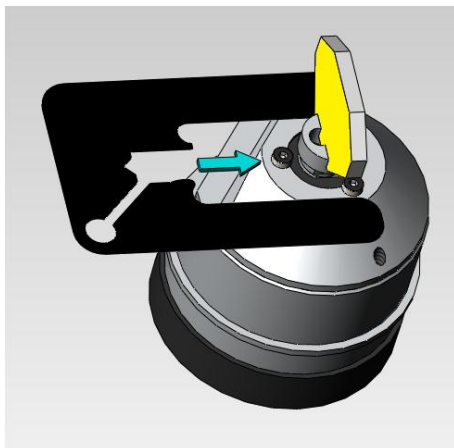
2.



Start **rhothor™** software. Move to the appropriate Channel Tab and press the “Noise” button. This will set the motor on the 0 position. You can verify this as the Setpoint will indicate 0. Keep in mind that every force made on the motor will now introduce current into the motor (counterforce).

When too much force is made on the motor the controller card will turn off the motor due to its overcurrent protection. The Actuator Load bar will show as a red bar. If this happens repress the “Noise” button to reset the motor.

3.

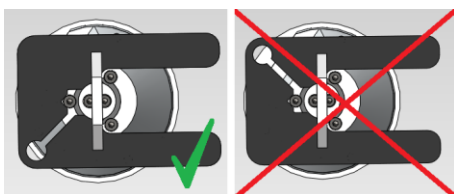


Insert **the alignment tool** on top of the motor using the alignment notch to guide the tool to its position.

Note the orientation of the reflective coating. This side should point towards the mirror alignment tool.

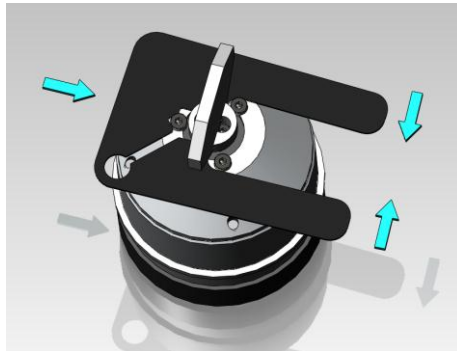
(The reflective coating is indicated on the figure with a yellow colour)

REMARK: Keep the round cut out on the tool towards you as seen on the figure!



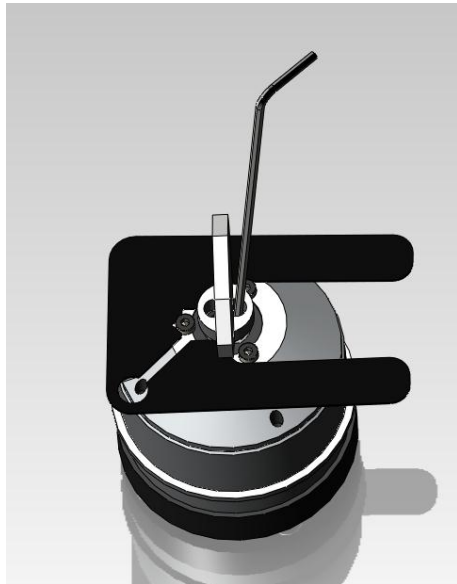
Check when the alignment tool is on place if it looks like this figure on the left. The alignment notch is pressed against the motor screw that faces the reflective coating.

4.



Press the legs of the **alignment tool** softly together to align the mirror holder on the motor.

5.

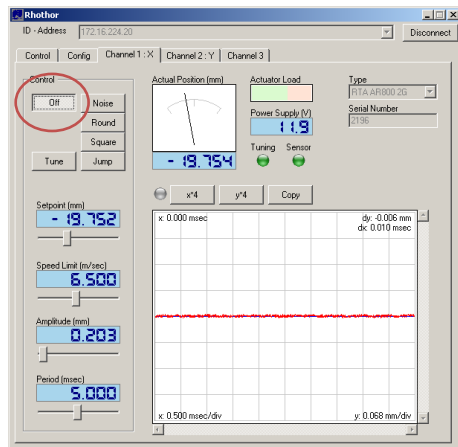


While pressing the alignment tool around the mirror holder, softly tighten the mirror locking screws without putting force on the motor itself. When too much force is given on the motor, the controller card will turn off the motors.

To prevent touching the mirror surface hold the **Hexagonal key** away from the mirror surface. This means you screw the mirror locking screws by holding the Hexagonal key under a certain angle.

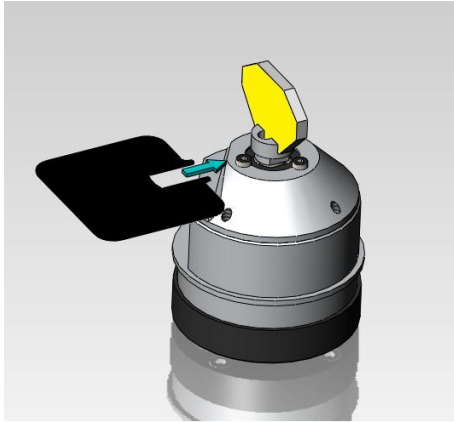
Remove the alignment tool.

6.



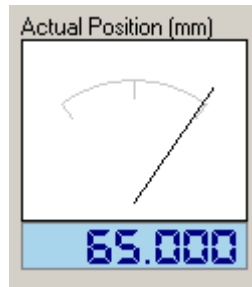
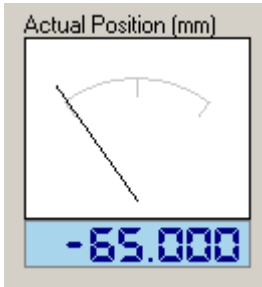
Press the "Off" button to switch off the deflector.

7.



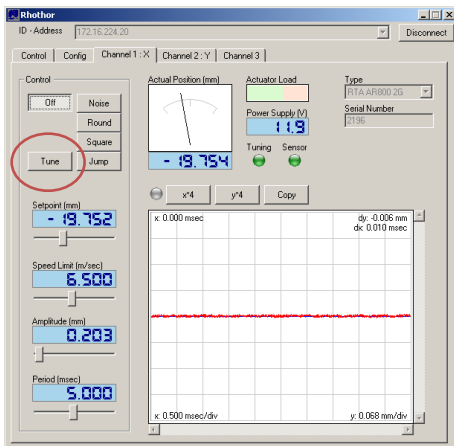
To tighten both locking screws on the mirror, use the **fix tool** as described in the **dismount** procedure. Use this tool to catch any forces placed by the Hexagonal key.

8. **Softly** move the mirror to the minimal and maximal position (motor limits) by pressing on the backside of the mirror and read out the Actual Position on the screen. You should be able to reach the complete field.
[-FieldSize/2, FieldSize/2]. If you are not able to reach the complete field then the mirror was not mounted in the middle and you have to repeat the complete procedure.



In this example the field size was set to 130 mm. In this case after mounting the mirror you need to be able to reach a minimum less than -65 mm and a maximum more than 65 mm.

9.



Retune the motor to finish the mirror exchange procedure. To do so press the "Tune" button.