

**BRUSHLESS ANGLE SENSOR
(90°use)**

MODEL **NRA**

BEFORE USE

Thank you for choosing M-System. Before use, please check contents of the package you received as outlined below. If you have any problems or questions with the product, please contact M-System's Sales Office or representatives.

PACKAGE INCLUDES:

- Angle sensor (1)
- Nut (1)
- Toothed washer (1)

MODEL NO.

Confirm Model No. marking on the product to be exactly what you ordered.

POINTS OF CAUTION

GENERAL

- When connecting between the shafts of the NRA and the device, their center line must be on the same straight line.
- The shaft of the NRA is loose by 0.8 mm max. in the shaft direction.
- DO NOT apply a thrust load or radial load to the shaft.
- The force which returns to 0 degree is applied to the shaft of the NRA because of its structure. Apply the force of 0.0147 N·m or more.
- The mechanical rotational angle of the unit is ±55 degrees. DO NOT apply an input out of this range. DO NOT use the stoppers of this unit to limit the rotation of the device.
- DO NOT disassemble or modify the unit. No modification to the shaft is allowed.

MAGNETIC SHIELD

- When installing the NRA, keep it away from magnetic fields that has a large time variation. If you must install it in such an environment, put it inside a proper shielding (e.g. steel plate of 0.3 mm or thicker).

COMPONENT IDENTIFICATION

See Figure 1.

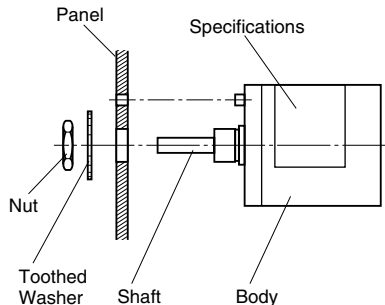


Figure 1. Component identification and panel mounting of the NRA

INSTALLATION

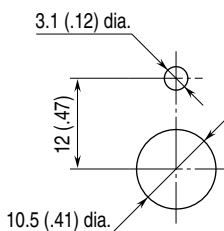
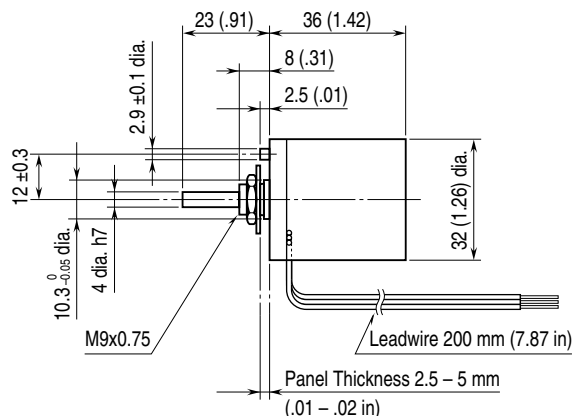
PANEL MOUNTING

Refer to Figure 1 when mounting the NRA onto a panel. Panel cutout is shown in Figure 2.

CONNECTING THE NRA TO THE DEVICE

The output of the NRA is proportional within ±45 degrees of the reference (center) position. It is necessary to set the correct reference position for adequate operation.

- 1) First, turn the shaft of the NRA to fully counterclockwise, and note the output voltage.
- 2) Then turn it to fully clockwise, and note the output.
- 3) Adjust the shaft to the position where the output voltage is average of the two voltage values.
- 4) Connect the device so that the center point of the device meets to the reference position of the NRA.



PANEL CUTOUT

Figure 2. Dimensions & panel cutout mm (inch)

TERMINAL CONNECTIONS

- M-System Angle Sensor Transmitter (Models: PNS, PNT, etc.) is recommended for connection. Wiring diagram is as shown in Figure 3.
- For connecting the NRA to other devices, refer to Figure 4. Other cautions are necessary as described below:
 - 1) The output waveform of the NRA is approx. 20 kHz in full-wave rectified form. When a CR circuit is used for smoothing the signal before supplying it to a receiving instrument, the resistance (R) must be 10 kΩ or greater.
 - 2) The NRA is designed to provide an output proportional to the supply voltage to the unit. Use a stable supply voltage source with small temperature drift or ripples.
 - 3) The output resistance of the NRA is approx. 12 kΩ. Output load affects the signal as described in the following equation. However, at the maximum of approx. 50 kΩ load does not affect the linearity.

δ : Load effect to the output [%]

R : Load resistance [kΩ]

$$\delta = \frac{12}{12 + R} \times 100$$

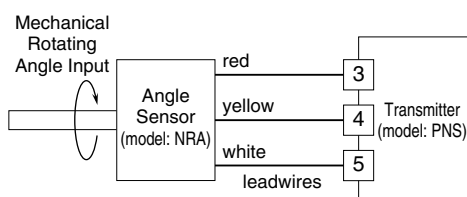


Figure 3. Wiring diagram for connecting the NRA to the PNS.

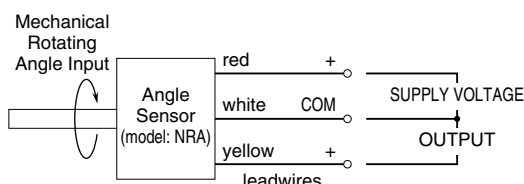


Figure 4. Wiring diagram for connecting the NRA to other devices.

CHECKING

When the NRA operates abnormally, check the following points:

- 1) Terminal wiring: Check that all cables are correctly connected according to the wiring diagram.
- 2) Supply voltage: Check voltage with a multimeter.
- 3) Mechanical connection: Check that the connection between the NRA and the device does not become loose.
- 4) Magnetic field: Check that there is no magnetic field as described in the "CAUTION" section.

LIGHTNING PROTECTION

For protecting the unit from induced surge voltage caused by lightning, the M-RESTER lightning arresters are recommended.