INSTRUCTION MANUAL

2-WIRE POSITION TRANSMITTER
(linear motion type; 45-degree rotation)

MODEL VOS2T

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:
  VOS2T unit .................................................................(1)
  Cable, approx. 1 meter long (optional) .......................(1)
  Cable connector (optional) .........................................(1)
  Lever assembly
    Lever ......................................................................(1)
    Connecting pin ......................................................(1)
    Nailed nut ..............................................................(1)
    Nut with washer (M5) ..............................................(1)
  Screws for attaching the lever (M5 x 8) ......................(1)
  Plain washer (M5) .....................................................(1)
  Toothed washer (M5, external teeth) .........................(1)

Remark: Bracket and other components necessary to attach the VOS2T to an actuator are to be provided by the customer.
Clamp Set (model: VOCP) is available to simplify the connection.

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

POINTS OF CAUTION

■ CONFORMITY WITH EC DIRECTIVES
  • When the unit is mounted onto a grounded metal bracket, insert a noise filter for the output. COSEL Noise Filter Model NAC-04-472 or equivalent is recommended.

■ GENERAL PRECAUTION
  • Cut power supply to the unit before wiring to it.

■ ENVIRONMENT
  • Inside building. If outside, keep away from direct sunlight.
  • Operating temperature -5 to +60°C (23 to 140°F)
  • Operating humidity 30 to 90% RH

■ DESIGN OF MOUNTING BRACKET
  • The size 'a' indicated in Figure 2 must be longer than 10% of full-stroke of the actuator when it is in the middle position.
  • The VOS2T unit must be positioned in parallel or in vertical to the actuator stroke.

■ ACTUATOR SIDE LEVER
  • When the actuator side lever is provided by the customer, be sure that width of the hole threading the connecting pin is 5 millimeters or wider. Diameter of connecting pin: 5.0±0.03 mm

■ GASKET
  • Be sure to return the gasket when you close the unit cover after wiring or adjustments.

■ TORQUE
  • For the screws attached to the cover, tightening torque is between 1.2 and 1.6 N·m.
COMPONENT IDENTIFICATION

INSTALLATION

The output accuracy of the VOS2T is largely affected by its mechanical position relative to the actuator. The VOS2T should be installed according to the following instructions because an improper installation may lower its performance. No unnecessary strain should be applied to the VOS2T unit or the lever.

ATTACHING THE CONNECTING PIN TO THE VOS2T SIDE LEVER

Attach the connecting pin to the VOS2T side lever utilizing the nailed nut and the nut as in Figure 2. The nail could be positioned in either side of the lever, however it is limited to one side at the extreme end of the lever hole. As you see in Figure 3, the output signal of the VOS2T is proportional to the sine \( q \) of the lever angle. Position of the connecting pin is determined by the following equation.

\[ R = 2.613 \times \frac{S}{2} \]

where
- \( R \) = Distance between the centers of pin and lever (radius)
- \( S \) = Actuator stroke

Remark: It is recommended to set the connecting pin at this stage to the position a little nearer to the actuator than the calculated position in order to prevent over-range rotation of the VOS2T side lever. Move it back to the correct position later in the adjustment procedure.
Connecting the VOS2T Side Lever
Connect the lever to the VOS2T unit with a screw included in the package, with a plain washer and a toothed washer between them as in Figure 1. Lever direction can be changed by 90 degrees.

Connecting the VOS2T Unit to the Actuator
Set the VOS2T unit to the position where the VOS2T output is approximately 12mA with 50% actuator position (θ = 0° in Figure 3), and where the VOS2T side lever and the actuator side lever are positioned in a straight line. See Figure 4 below. The actuator side lever should be threaded with the connecting pin but left loose. Do not fix the connecting pin to the actuator side lever.

Electrical Connections
Remove the VOS2T unit cover (or the terminal box cover with limit switch box option) and wire to the terminals according to Figure 5.

Adjustment Procedure
Open the VOS2T unit cover. Set the action direction* with jumpers (JP1, JP2 in Figure 1) and adjust Zero (Z) and Span (S) behind it.

*Direct action: the output increases when the shaft turns clockwise (seen from the lever side).
Reverse action: the output increases when the shaft turns counterclockwise (seen from the lever side).

How to Adjust Zero and Span
1) If you need reverse action, change the setting now. Remove the cover and set the jumpers JP1 and JP2 to R position according to Figure 1. Factory set zero point may be slid by changing the action direction. Re-adjust according to the following.

2) First operate the actuator slowly for full-stroke and check that the VOS2T outputs approximately 0 – 100% (4 – 20mA DC) accordingly. Be sure also that the output signal increases or decreases without interruption.

3) With 50% input (actuator position), check that the output is approximately 50%. See Figure 6.

4) With 0% input, adjust the output to 0% with Zero adjustment. See Figure 7.

5) Set the input to 100%. If there is a deviation in output signal, compensate half of the deviation via the Zero adjustment. See Figure 8.

6) With 100% input, adjust the other half of the deviation with Span adjustment in order to get 100% output. See Figure 9.

7) Input 0%, 50% and 100% signals and check the output according to the respective input value. If the output value is shifted, repeat the above procedure (3) – (6).

Remark: If you set a wider output span (narrower input span), the VOS2T does not output above or below the full-scale range.
MAINTENANCE

■ MECHANICAL PARTS
- Check that screws are fastened tightly and if some of them are loosened, be sure to re-tighten them.
- Inspect visually that the connecting section of levers is stable and smooth. Check also that the connecting pin or lever is not worn. If it is, it must be replaced. Consult M-System or local representative. If the abrasion advances fairly quickly, there may be a problem in the link mechanism (e.g. connecting pin position).
- If the VOS2T is installed outside the building or where it is subject to water or metallic dust particles, check that there is no crack or bruise on the gasket. If you find any, consult M-System or local representative.
- Consult M-System or local representative also for inspection of packing (O-ring) in the moving parts.

■ ELECTRICAL PARTS
- Check first the mechanical parts as above.
- Change actuator positions and input 0%, 25%, 50%, 75% and 100% signals. Check the output with respective input value is within allowance indicated in the specifications. If not, go through “ADJUSTMENT PROCEDURE” again.

LIGHTNING SURGE PROTECTION
M-System offers a series of lightning surge protectors for protection against induced lightning surges. Please contact M-System to choose appropriate models.

M-SYSTEM WARRANTY
1. What is covered.
M-System Co., Ltd. ("M-System") warrants, only to the original purchaser of new M-System products purchased directly from M-System, or from M-System’s authorized distributors or resellers, for its own use not for resale, that the M-System products shall be free from defects in materials and workmanship and shall conform to the specifications set forth in the product catalogue applicable to the M-System products for the Warranty Period (see Paragraph 5 below for the Warranty Period of each product).
THE ABOVE WARRANTY IS THE ONLY WARRANTY APPLICABLE TO THE M-SYSTEM PRODUCTS AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

2. What is not covered.
This warranty does not cover any M-System product which has been: (1) modified, altered or subjected to abuse, misuse, negligence or accident; (2) improperly installed or installed in conjunction with any equipment for which it was not designed; or (3) damaged or destroyed by disasters such as fire, flood, lightning or earthquake. In no event shall M-System be liable for any special, incidental, consequential or other damages, costs or expenses (including, but not limited to, loss of time, loss of profits, inconvenience or loss of use of any equipment).

3. Remedies.
If a defective product is returned to M-System in accordance with the procedures described below, M-System will, at its sole option and expense, either: (1) repair the defective product; (2) replace the defective product; or (3) refund the purchase price for the defective product paid by the purchaser. Except as otherwise provided by applicable state law, these remedies constitute the purchaser’s sole and exclusive remedies and M-System’s sole and exclusive obligation under this warranty.

If the purchaser discovers a failure of the M-System products to conform to the terms of this warranty within the Warranty Period, the purchaser must promptly (and, in any event not more than 30 days after the discovery of such failure) notify the relevant party as described below either by telephone or in writing at the below address to obtain an Authorized Return (AR) number and return the defective product to the relevant party. The designated AR number should be marked on the outside of the return package and on all correspondence related to the defective product. The purchaser shall return, at purchaser’s expense, defective products only upon receiving an AR number. In order to avoid processing delays, the purchaser must include: copies of the original purchase order and sales invoice; the purchaser’s name, address and phone number; the model and serial numbers of the returned product; and a detailed description of the alleged defect.

5. Warranty Period.
Signal Conditioner: 36 months from the date of purchase.
M-Rester: 12 months from the date of purchase.
Valve Actuator: 18 months from the date of shipment from M-System or 12 months from the date of its installation, whichever comes first.
Other Products: 36 months from the date of purchase.

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