User's Guide

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The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.
WARNING: These products are not designed for use in, and should not be used for, human applications.

NOTE: Refer to Omega's "Operation & Maintenance Guide" for installation, operation and cleaning instructions for the basic flow monitor cartridge. The following instructions are specifically for monitors with electrical switches for flow alarms. This is an addendum to the basic flow monitor instructions.

General Information

Omega's Flow Transmitters are typically used to transmit a signal proportional to flow rate to a process control computer, a PLC, a recorder, or a panel-mount display. The Flow Transmitters are used as the primary input device to record flow rates through hydraulic and pneumatic systems.

The universal output transmitter circuit employed by the Omega Flow Transmitter is capable of producing output signals of 4-20 mA, 0-5 VDC, and 0-2000 Hz square wave pulse. A 1-5 VDC signal may be obtained by placing a 249 Ω resistor within the 4-20 mA loop.

Overview

Illustration 1 shows a Flow Transmitter with the cover removed. The follower moves in unison with an orifice plate inside of the unit's pressure vessel via a magnetic coupling in order to indicate flow rate. As the follower moves with changes in flow rate, the flow rate is determined by relating the position of the flow indicator line to the increments on the flow rate scale.

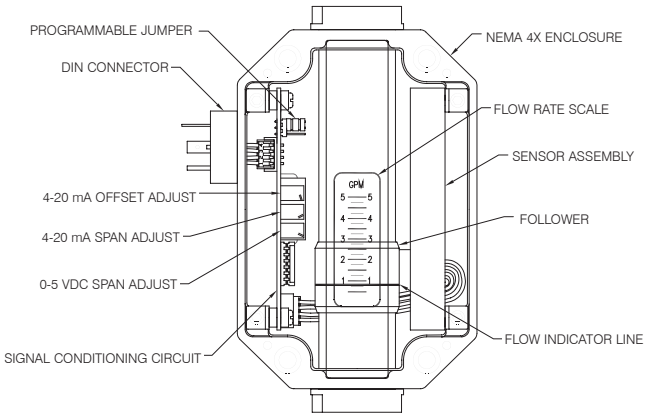


Illustration 1

The sensor array located in the sensor assembly sends a signal relative to the position of the follower to the signal conditioning circuit. The signal conditioning circuit converts the signal from the sensor array into three different signals that are all directly proportional to the reading that is determined by relating the position of the flow indicator line to the flow rate scale.

The user may choose between reading a 0-2000 Hz square wave pulse, a 0-5 VDC analog signal, or a two-wire 4-20 mA analog signal by connecting to the appropriate pins on the 4-pin Hirschmann® din connector and by placing the programmable jumper in the appropriate position for the desired output.

An analog 1-5 VDC output may also be obtained by configuring the unit for the two-wire 4-20 mA output and then placing a 249W ohm resistor in the current loop. The exact output pins and jumper positions that correspond to each output are discussed later in this manual.

4-20 mA Output Connections

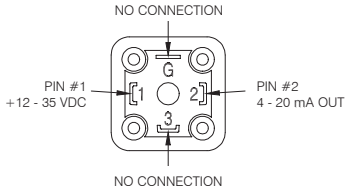
Input Voltage:

The supply voltage must be between 12 and 35 VDC.The maximum resistance that may be placed within the current loop is given by the following formula:

$$R_{max} = 50(V_s - 12)$$

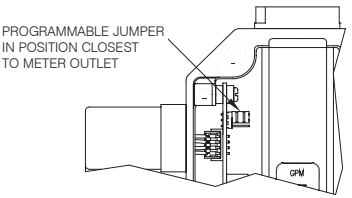
Where: R_{max} = the maximum resistance that may be placed in the current loop (Ω)

V_S = the value of the supply voltage (VDC)



ELECTRICAL CONNECTION - 4-20 mA

Illustration 2



JUMPER POSITION - 4-20 mA

Illustration 3

4-20 mA Output Connections

Wiring Instructions (Refer to Illustrations 2 and 3 above):

1) Move the programmable jumper on the signal conditioning board into the position closest to the meter's outlet, as shown in **Illustration 3**.

2) Connect the positive DC power source (+12 to +35 VDC) to terminal #1 on the din connector

3) Connect terminal #2 of the din connecter to the positive current input on the receiving device.

4) If the power source does not originate from the receiving device, the negative side of the power supply must be connected to the signal ground of the receiving device.

5) If the transmitter is operating properly, the green LED on the signal conditioning board will illuminate dimly at zero flow and will increase in intensity as flow increases.

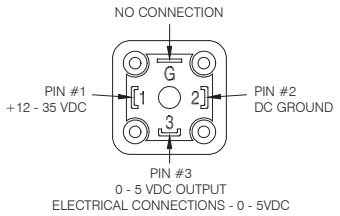


Illustration 4

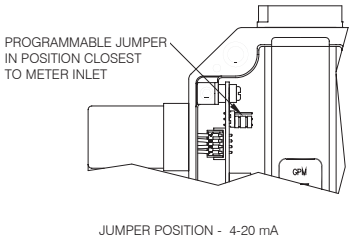


Illustration 5

0-5 VDC Output Connections

Wiring Instructions (Refer to Illustrations 4 and 5 above):

1) Move the programmable jumper on the circuit board into the position closest to the meter's inlet, as shown in **Illustration 5**.

2) Connect the positive voltage source (+12 to +35 VDC) to terminal #1 of the din connector.

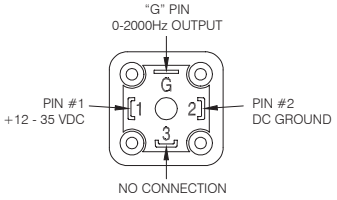
3) Connect terminal #2 of the din connector to the negative side of the DC voltage source.

4) Connect terminal #3 of the din connector to the 0-5 VDC input of the receiving device.

5) If the power source does not originate at the receiving device, a wire will need to be connected between the negative side of the voltage source and the signal ground of the receiving device.

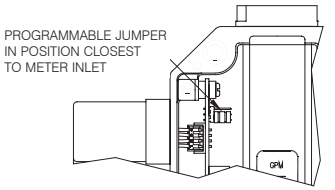
6) If the transmitter is operating correctly, the green LED on the circuit board will illuminate brightly when power is applied to the unit.

NOTE: The input impedance (resistance) of the receiving device must not be lower than 100W or non-linearities may result. Lower impedance will not damage the transmitter.



ELECTRICAL CONNECTIONS - 0-2000Hz OUTPUT

Illustration 6



JUMPER POSITION - 0-2000Hz PULSE OUTPUT

Illustration 7

0-2000 Hz Pulse Output Connections

Wiring Instructions (Refer to Illustrations 6 and 7 above):

1) Move the programmable jumper on the circuit board into the position closest to the meter's inlet, as shown in **Illustration 7**.

2) Connect the positive voltage source (+12 to +35 VDC) to terminal #1 of the din connector.

3) Connect terminal #2 of the din connector to the negative side of the DC voltage source.

4) Connect the "G" terminal of the din connector to the pulse input of the receiving device.

5) If the power source does not originate at the receiving device, a wire will need to be connected between the negative side of the voltage source and the signal ground of the receiving device.

6) If the transmitter is operating properly, the green LED on the circuit board will illuminate brightly when power is applied to the unit.

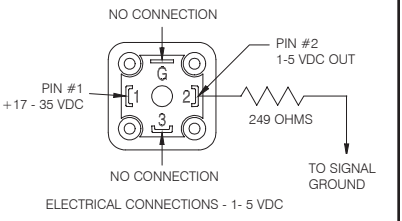


Illustration 8

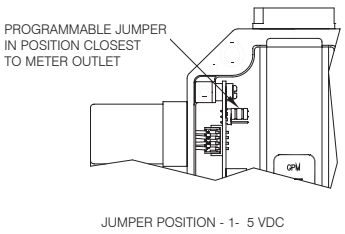


Illustration 9

1-5 VDC Output Connections

Wiring Instructions (Refer to Illustrations 8 and 9 above):

1) Move the programmable jumper on the signal conditioning board into the position closest to the meter's outlet, as shown in **Illustration 9**.

2) Connect the positive voltage (+17 to +35 VDC) to terminal #1 of the din connector.

3) Connect terminal #2 of the DIN to the 1-5 VDC input of the receiving device.

4) If the power source does not originate at the receiving device, a wire will need to be connected between the negative side of the voltage source and the signal ground of the receiving device.

5) If the transmitter is operating properly, the green LED on the circuit board will illuminate dimly at zero flow and will increase in intensity as flow rate increases.

Connectors

Standard flow sensors are prewired with 4-wire Hirschmann-type DIN connectors which consist of a male section as shown in Illustration 10 and a female section as shown in Illustration 11. In order to make the user connections, the screw terminals located inside of the female section must be accessed.

To open the female section, first remove the screw and then lift the connector portion out of the casing by inserting the head of a screwdriver into the slot marked for that purpose.

Illustration 10

Illustration 11

Illustration 12 shows the disassembled female section. The screw terminal connections can be seen on the piece located at the far right side of the illustration.

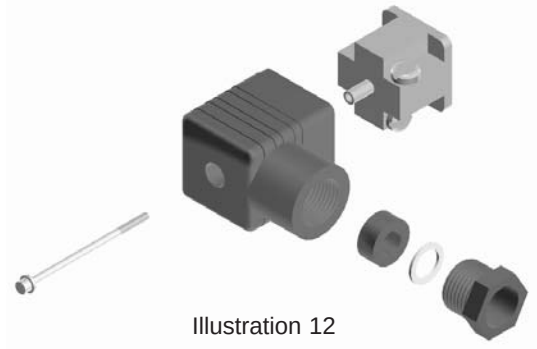


Illustration 12

Alternate connectors are available on a custom basis. Nearly any type of commercially available electrical connector may be installed on an Omega Flow Transmitter. If an alternate connector is required, please consult the Omega factory.

User Adjustments

The 4-20 mA, 0-5V, and 0-2000 Hz square wave outputs on the Omega Flow Transmitter are all factory calibrated. User adjustment should be unnecessary and any adjustment of the potentiometer on the signal conditioning board is **strongly discouraged**. If one of the outputs does fall out of calibration, the following procedure may be used to recalibrate the unit.

1) Turn off the flow through the system.

2) Connect between +12 and +35 VDC to pin 1 of the din connector. Connect terminal 2 of the din connector to the negative terminal of the DC supply.

3) Move the programmable jumper on the signal conditioning board into the position closest to the sensor's inlet, as shown in **Illustrations 5 and 7**.

4) Connect the positive terminal of a voltmeter to pin 3 of the din connector. Connect the negative terminal to pin 2 of the din connector.

5) Gradually increase the flow through the system until the flow rate indicated on the printed flow rate scale reaches full-scale (the highest value printed on the scale).

6) Adjust the 0-5 VDC Span potentiometer until a reading of 5.00 VDC is obtained on the voltmeter.

7) Turn off the flow through the system and remove the voltmeter.

8) Move the programmable jumper on the signal conditioning board into the position closest to the sensor's outlet, as shown in **Illustrations 3 and 9**.

9) Disconnect pin 1 of the din connector from the positive terminal of the DC power supply.

10) Connect the positive terminal of an ammeter to the positive terminal of the DC power supply. Connect the negative terminal of the ammeter to pin 1 of the sensor's din connector.

11) Adjust the 4-20 mA Offset potentiometer (**see Illustration 1**) until a reading of 4.00 mA is obtained on the ammeter.

12) Gradually increase the flow through the system until the flow rate indicated on the printed flow rate scale reaches full-scale (the highest value printed on the scale).

13) Adjust the 4-20 mA span potentiometer (see Illustration 1) until a reading of 20.00 mA is obtained on the ammeter.

14) Gradually decrease the flow through the system until a value equal to 50% of full-scale is obtained on the sensor's flow rate scale. Verify a reading of between 11.92 and 12.08 mA.

Trouble Shooting

Symptom	Solution
The green LED does not illuminate when power is applied.	1) Re-check the wiring diagram for the communication protocol that is being used and verify that the wiring is correct. 2) Verify that the DC supply that is being used is capable of producing at least 12 VDC. 3) Make sure that the cable that is soldered to the din connector inside of the sensor enclosure is plugged into the connector opposite to the programmable jumper.
The readings obtained from the electronic output do not agree with the readings shown on the printed flow rate scale.	1) Make sure that the programmable jumper is in the correct position for the communication protocol that is being used.
The green LED illuminates, but no readings are obtained from the sensor's electronic output.	1) Re-check the wiring diagram for the communication protocol that is being used and verify that the wiring is correct. 2) Make sure that the cable from the sensor assembly is plugged into the connect on the signal conditioning board located near the sensor inlet.
When the flow rate in the systems changes, the follower and electronic output do not respond.	1) Remove the flow sensor from the hydraulic systems and inspect the intervals to see if anything has caused them to become jammed. Make sure that the 200 mesh, 74 micron filtration requirement of the flow sensor is being observed.

NOTES:

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

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2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

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