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- pH, Conductivity & Dissolved Oxygen Instruments

M-2843/0403

User's Guide



<http://www.omega.com>
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FLCN-101 & -111 Series Flow/No-Flow Compact Relay Controller

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 a Return Material Authorization (RMA) number immediately upon 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, misuse or other operating conditions outside of OMEGA's control. Components which are not warranted, including but not limited to contact points, fuses, and relays.

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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 damage in transit.

FOR WARRANTY RETURNS, please have the OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA: OMEGA's purchase order number under which the product was PURCHASED, Model and serial number of the product under repair, and 3. Repair instructions and/or specific problems relative to the product.

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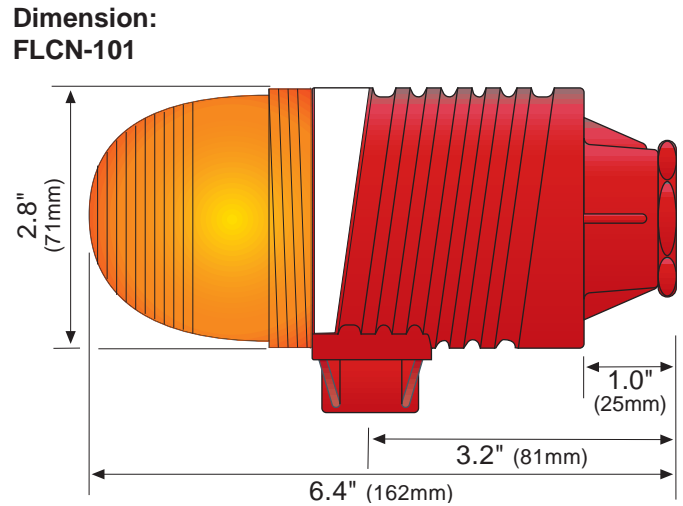
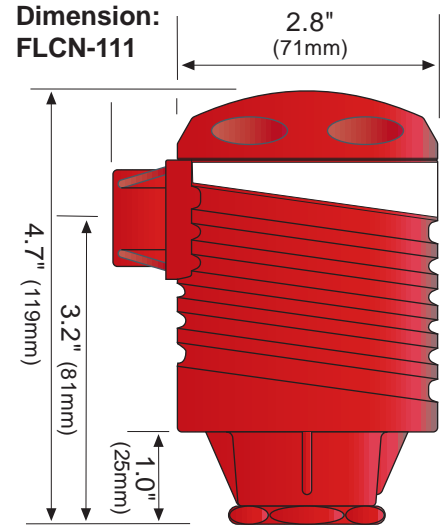
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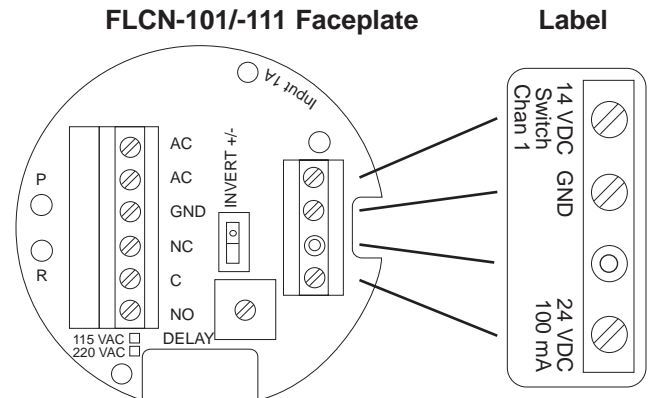
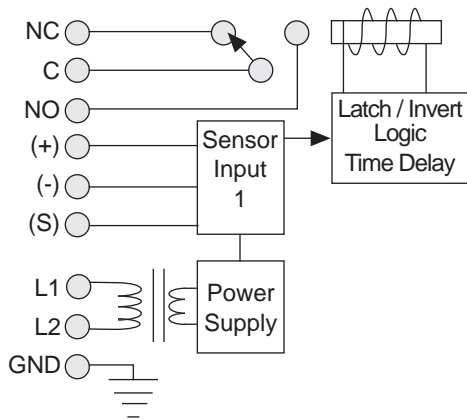
SPECIFICATIONS

Step One

Supply voltage:	120 / 240 VAC @ 50 - 60 Hz.
Consumption:	5 watts max.
Strobe type:	FLCN-111: N/A FLCN-101: Xenon tube
Strobe flash:	FLCN-111: N/A FLCN-101: 1 per second
Sensor inputs:	(1) four wire flow switch
Sensor supply:	13.5 VDC @ 100 mA
Contact type:	(1) SPDT relay
Contact rating:	250 VAC @ 10A
Contact delay:	0-60 seconds
LED indication:	Sensor, power and relay status
Electronics temp.:	F: -40° to 158° C: -40° to 70°
Enclosure rating:	NEMA 4X (IP65)
Enclosure material:	FLCN-111: PP, UL 94 VO FLCN-101: PP, UL 94 VO & Polycarbonate
Enclosure mounting:	3/4" NPT
Enclosure rotation:	300° swivel base
Conduit connection:	1/2" NPT
Classification:	General purpose
Certificate number:	CSA: LR 79326-3
CE compliance:	EN 50082-2 immunity EN 55011 emission EN 61010-1 safety
Configuration:	FLCN-111: Flow/no-flow alarm FLCN-101: Flow/no-flow alarm w/ Strobe



Internal Controller Logic



SAFETY PRECAUTIONS

Step Two

About This Manual:

PLEASE READ THE ENTIRE MANUAL PRIOR TO INSTALLING OR USING THIS PRODUCT. This manual includes information on two different models of Compact Relay Controllers from Omega: FLCN-111 and FLCN-101. The FLCN-111 series is a single-input controller with an optional Strobe Alert™ on the FLCN-101. Many aspects of installation and use are similar between the three models.

User's Responsibility for Safety:

OMEGA manufactures several models of controller, with different mounting and switching configurations. It is the user's responsibility to select a controller model that is appropriate for the application, install it properly, perform tests of the installed system, and maintain all components.

Electrical Shock Hazard:

It is possible to contact components on the controller that carry high voltage, causing serious injury or death. All power to the controller and the relay circuit(s) it controls should be turned OFF prior to working on the controller. If it is necessary to make adjustments during powered operation, use extreme caution and use only insulated tools. Making adjustments to powered controllers is not recommended. Wiring should be performed by qualified personnel in accordance with all applicable national, state and local electrical codes.

Flammable or Explosive Applications:

Sensor mount controllers (FLCN-101 series series) should not be used with explosive or flammable liquids, which require an intrinsically safe rating. If you are unsure of the suitability of a controller for your installation, consult your Omega representative for further information.

Install In a Dry Location:

The FLCN-101 series series controller housing is liquid-resistant and made of Polypropylene (PP). When installed properly, the controller is not designed to be immersed. It should be mounted in such a way that it does not normally come into contact with fluid. Refer to an industry reference to ensure that compounds that may splash onto the controller housing will not damage it. Such damage is not covered by the warranty.

Relay Contact Rating:

The relay is rated for a 10 amp resistive load. Many loads (such as a motor during start-up or incandescent lights) are reactive and may have an inrush current characteristic that may be 10 to 20 times their steady-state load rating. The use of a contact protection circuit may be necessary for your installation if the 10 amp rating does not provide an ample margin for such inrush currents.

INTRODUCTION

Step Three

Make a Fail-Safe System:

Design a fail-safe system that accommodates the possibility of relay or power failure. If power is cut off to the controller, it will de-energize the relay. Make sure that the de-energized state of the relay is the safe state in your process. For example, if controller power is lost, a pump filling a tank will turn off if it is connected to the Normally Open side of the relay.

While the internal relay is reliable, over the course of time relay failure is possible in two modes: under a heavy load the contacts may be "welded" or stuck into the energized position, or corrosion may build up on a contact so that it will not complete the circuit when it should. In critical applications, redundant backup systems and alarms must be used in addition to the primary system. Such backup systems should use different sensor technologies where possible.

While this manual offers some examples and suggestions to help explain the operation of OMEGA products, such examples are for information only and are not intended as a complete guide to installing any specific system.

Sensor-mount controllers:

The FLCN-101 series is a cost-effective, modular liquid level controller whose body incorporates a female 3/4" NPT fitting, allowing it to be mounted directly onto any Omega sensor or any 3/4" connection. Simply provide its required AC power and a controlled device such as a valve, pump, or alarm that can be switched by the controller's relay in response to the sensor input.

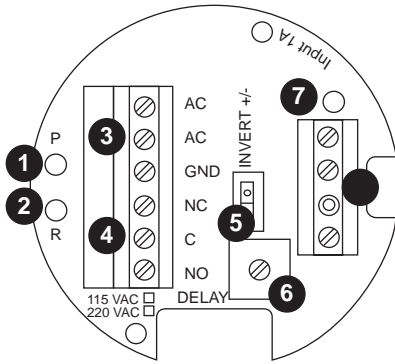
Features of the FLCN-101 series Single Input Controller:

The FLCN-101 series Controller is designed to receive a signal from a single flow switch. It turns its internal relay On or Off (as set by the invert switch) in response to the presence of flow or no-flow, and changes the relay status back again when the sensor reverses. The FLCN-101 series may be used with the OMEGA FST-200/-300 series flow switch. The relay is a single pole, double throw type; the controlled device can be connected to either the normally open or normally closed side of the relay. A time delay from 0 to 60 seconds can be set before the relay responds to the sensor input.

Typical applications for the FLCN-101 series are flow or no-flow switch/alarm operations (activating an alarm at no-flow).

GUIDE TO CONTROLS

Step Four



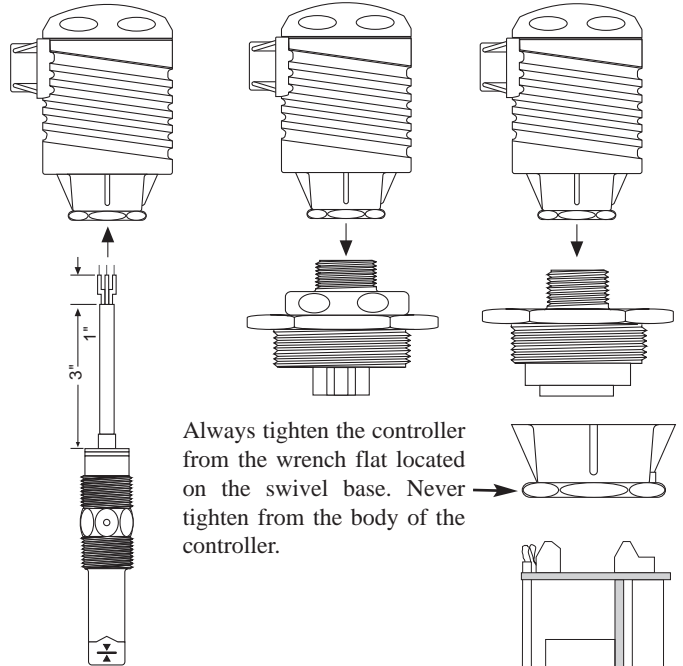
1. **Power indicator:** This green LED lights when AC power is ON.
2. **Relay indicator:** This red LED will light whenever the controller energizes the relay, in response to the proper condition at the sensor input(s) and after the time delay.
3. **AC Power terminals:** Connection of 120 VAC power to the controller. The setting may be changed to 240 VAC if desired. This requires changing internal jumpers; this is covered in the Installation section of the manual. Polarity (neutral and hot) does not matter.
4. **Relay terminals (NC, C, NO):** Connect the device you wish to control (pump, alarm etc.) to these terminals: supply to the COM terminal, and the device to the NO or NC terminal as required. The switched device should be a noninductive load of not more than 10 amps; for reactive loads the current must be derated or protection circuits used. When the red LED is ON and the relay is in the energized state, the NO terminal will be closed and the NC terminal will be open.
5. **Invert switch:** This DIP switch reverses the logic of the relay control in response to the sensor(s): conditions that used to energize the relay will make it turn off and vice versa.
6. **Time Delay:** After the input(s) change(s) state, this control sets a delay from 0.15 to 60 seconds before the relay will respond.
7. **Input 1:** This amber LED will light immediately whenever the appropriate sensor attached to the terminals detects liquid, and will turn off when it is dry.
8. **Input terminals:** Connect the wiring from the sensors to these terminals. Note the polarity: (+) is a 13.5 VDC, 100 mA power supply (to be connected to the red wire of a Omega sensor), and (-) is the return path from the sensor (to be connected to the black and green wires of a Omega sensor). (S) is the signal input to be connected to the white wire.

INSTALLATION

Step Five

3/4" NPT Mounting Thread:

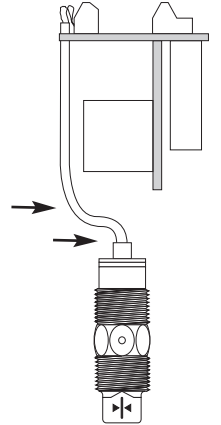
Installation of the compact relay controller takes advantage of the 3/4" NPT thread located on its base. This makes the controller fully compatible with any of Omega's flow switches or LVM-10 series or LVM-50 series mounting systems.



Always tighten the controller from the wrench flat located on the swivel base. Never tighten from the body of the controller.

Switch Cable:

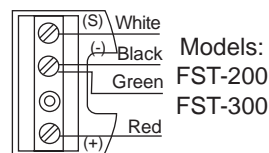
When installing a Omega flow switch, adjust the cable away from the printed circuit boards in the controller body. Avoid breaking the seal between the top of the level switch and the plastic coated cable.



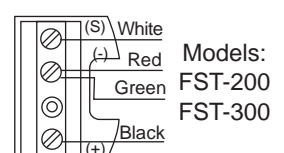
Connecting switches to input terminals:

Please note a difference between OMEGA flow switches. All flow switches (models FST-200 series and FST-300) will be wired with the Red wire to the (+) terminal, the Black wire and Green wire to the (-) terminal and the White wire to the (S) terminal. See the illustration below to indicate wiring for your switch. **Note:** the Shield wire will be used only for long cable runs or where excessive electrical noise is present.

Flow Switch Normally Closed



Flow Switch Normally Open

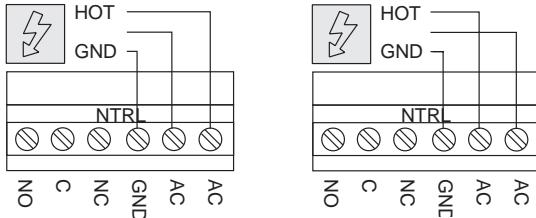


INSTALLATION

Step Six

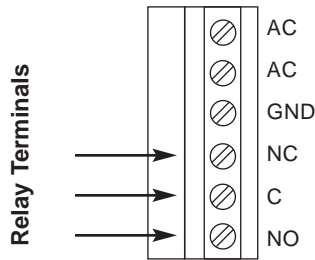
VAC Power Input Wiring:

Observe the labeling on the FLCN-101 series. *Note: Polarity does not matter with the AC input terminal.*



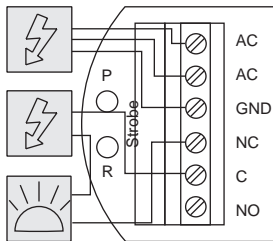
Relay Input Wiring

The relay is a single pole, double throw type rated at 250 Volts AC, 10 Amps, 1/2 Hp. The two terminal NO and NC (normally open and normally closed) will be used in different applications. Remember that the "normal" state is when the relay coil is de-energized and the Red relay LED is Off / de-energized.



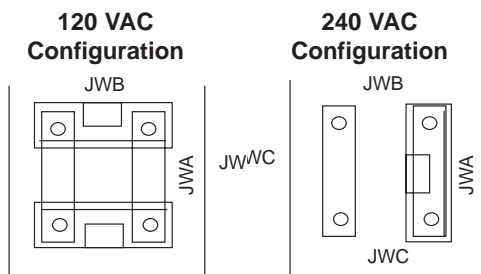
Strobe Alert Output

With the Strobe Alert wired NC, it can be used as a high or low level alarm, depending on the setting for the invert switch. Strobe can also be wired NO.



Changing from 120 to 240 VAC

1. Remove the two screws from the top of the printed circuit board (PCB) and gently slide the PCB from the housing. Use caution when removing the PCB.
2. Located jumpers JWA, JWB and JWC on the PCB.
3. To change to 240 VAC, remove jumpers from JWB and JWC and place a single jumper across JWA. To change to 120 VAC, remove jumper JWA and place jumpers across JWB and JWC.
4. Gently return PCB into housing and replace the two screws.



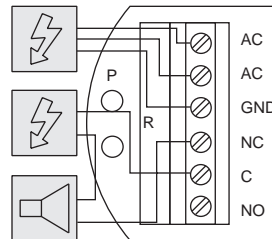
APPLICATION EXAMPLES

Step Seven

Low Flow Alarm

The goal is to indicate when the flow rate falls below a certain point. If it does, an alarm is supposed to sound, alerting the operator of a low flow condition.

If power is accidentally cut to the controller, the sensor's ability to notify the operator of a low flow condition could be lost. The system must alert the operator not only to low flow, but to controller power loss.

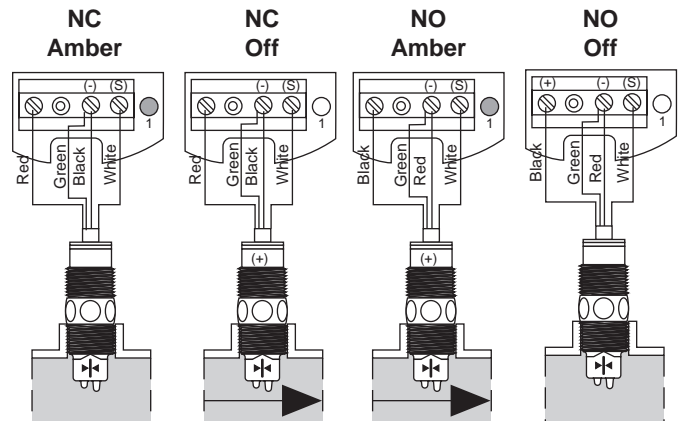


To do this, connect the hot lead of the alarm to the NC side of the relay terminal of the controller. If power is lost, the relay will be de-energized, and the alarm will sound (if there is still power to the alarm circuit itself). The alarm circuit should have a non-interruptible power supply or some other indicator or backup alarm to warn of a power failure in the alarm circuit.

In this application, the normal status is when the sensor is in the flow condition, and the relay will be energized holding the alarm circuit open. Please note that the flow switch can be wired either normally closed or normally open (Step 5). When the switch is wired NC, the input LED will be off and the relay LED will be on. So for this application, Invert should be set to the On position. When the switch is wired NO, the input LED and the relay LED will be on simultaneously. So for this application, Invert should be set to the Off position.

LED Indication:

Use LED's located above the input terminals to indicate whether the switch is in a flow or no-flow state. When the switch is wired NC, Amber indicates no-flow and Off indicates flow. Reversing the polarity (Normally Open), Amber indicates flow and Off indicates no-flow.



TROUBLESHOOTING

Step Eight

Controller Logic

For all controllers, please use the following guide to understand the operation of the OMEGA FLCN-101 series controller.

- 1. Power LED:** Make sure the Green power LED is On when power is supplied to the controller.
- 2. Input LED:** For NC switch wiring, the input LED on the controllers will be Amber when the switch reads no-flow and Off when the switch reads flow.
- 3. Invert Operation:** When the input LED turn Off and On, the relay LED will also switch. With invert Off, the relay LED will be On when the input LED is On and Off when the input LED is Off. With invert On, the relay LED will be Off when the input LED is On and On when the input LED is Off.
- 4. Relay Operation:** The relay may be wired either NO or NC. The normal state of the relay is when its LED is Off. With the LED On, the relay is in the energized mode and all terminal connections are reversed.

Step Nine