



Installation Instructions for DeviceNet™ E51 Limit Switch Style inductive and Photoelectric Sensors



DESCRIPTION

General Information

- Network Media - DeviceNet
- Protocol - DeviceNet Rel 2.0
- Type - Group 2 Only Slave Device using Predefined Master Slave Connection Set
- Bandwidth - 125, 250, 500 Kbaud

E51 Sensors are comprised of two modular components: an inductive proximity or photoelectric sensor head and a solid state plug-in switch body. Operating heads (side and top sensing) are mounted on top of the switch body in any of four positions. Assembled sensors are rated NEMA 3, 3S, 4, 4X, 6, 6P, and 13.

INSTALLATION



WARNING

DO NOT INSTALL OR PERFORM MAINTENANCE ON THIS DEVICE WHILE THE CONTROLLER IS ENERGIZED. DEATH OR SEVERE PERSONAL INJURY CAN RESULT FROM CONTACT WITH ENERGIZED EQUIPMENT. VERIFY THAT NO VOLTAGE IS PRESENT BEFORE PROCEEDING WITH INSTALLATION OR MAINTENANCE. Only qualified persons, as defined in the National Electric Code, who are familiar with the installation, maintenance and operation of this device and the equipment onto which is to be installed, as well as applicable local, state and national regulations and industry standards and accepted practices regarding safety of personnel and the equipment safety should be permitted to install, maintain or operate this device. These instructions are provided only as a general guide to such qualified persons and are not all-inclusive. They do not cover every application or circumstances which may arise in the installation, maintenance or operation of this equipment. Users are advised to comply with all local, state and national regulations and industry standards and accepted practices regarding safety of personnel and the equipment safety.

MODELS COVERED BY THIS MANUAL

Catalog Number	Description
E51DNA	Solid State Switch Body with 2-meter cable
E51DNAC	Solid State Switch Body with 5-pin DeviceNet micro-connector

MOUNTING AND INSTALLATION

Sensors are mounted and wired through the switch body. The body is threaded for 1/2-inch NPT conduit entrance (catalog number E51DNA) or a DeviceNet 5-pin micro connector (catalog number E51DNAC), and accommodates both US and DIN limit switch mounting dimensions.

Two holes provide for front mounting with #10 or (M5) screws. Two threaded holes provide for rear mounting using #10-32 screws.



CAUTION

AVOID APPLYING POWER TO THE SWITCH WHILE THE HEAD IS NOT ATTACHED. AVOID ATTACHING THE HEAD WHILE POWER IS APPLIED TO THE SWITCH. IF A SHORT OCCURS DURING THE INSTALLATION OF THE HEADS, THE HEAD MUST BE REMOVED AND REINSTALLED CORRECTLY TO CLEAR THE FAULT.

TO MAINTAIN NEMA ENCLOSURE RATINGS, 18 LB.IN (2.03 NM) OF TORQUE ARE REQUIRED AT THE SENSOR HEAD SCREWS.

OPERATING CHARACTERISTICS

Sensors may be configured for Normally Open/Normally Closed, Target/No Target, or Light Operation/Dark Operation (according to head type) by using NetView or another DeviceNet configuration tool.

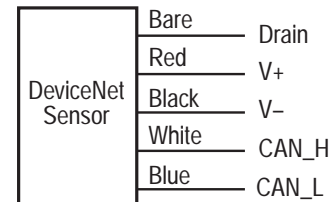


ATTENTION

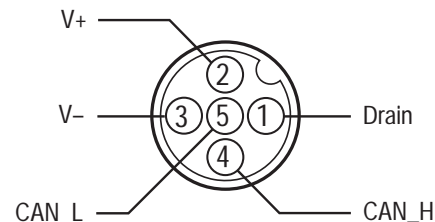
THE MANUAL SWITCH SETTING ON THE SENSOR HEADS MUST BE PLACED IN THE "NORMALLY OPEN," "TARGET" OR "DARK OPERATE" POSITION BEFORE BEING ATTACHED TO THE SWITCH BODY FOR PROPER SWITCH OPERATION.

WIRING CONSIDERATIONS

Cable Version



Connector Version-Face View Male



ATTENTION

THE DEVICENET CABLE IS NEC (UL) TYPE CL2 RATED. THE CABLE IS NOT SUITABLE FOR USE IN ENVIRONMENTS REQUIRING RESISTANCE TO CERTAIN OILS AND CUTTING FLUIDS. PLEASE CONSULT FACTORY FOR CABLING OPTIONS FOR THESE APPLICATIONS.

DEVICE CONFIGURATION



ATTENTION

THE OUTPUT TYPE SELECTOR POSITION ON THE SENSOR HEAD SHOULD BE PLACED IN THE "TARGET" OR "NORMALLY OPEN" POSITION.

Before using this E51 sensor, you must configure the device's baud rate and network address. The baud rate defaults to 125 kbaud, and the address defaults to 63. Additional parameters you may wish to configure include the on, off, and one-shot delay, and the operate mode. After connecting the device to the network, use NetView or another configuration tool to configure device.

Network Address

After connecting the E51 to the network, use the Netview configuration software (or other configuration software) to configure the device. Unless pre-configured, a new device will have a default address of 63 at a baud rate of 125 Kbaud when connected to the network.



CAUTION

SINCE ALL NEW DEVICENET DEVICES ARE FACTORY SET TO ADDRESS 63, IT IS USUALLY NOT A GOOD IDEA TO LEAVE AN ADDRESS SET AT 63. TWO NODES AT THE SAME ADDRESS WILL CAUSE A NETWORK FAULT!

Built into the Cutler-Hammer Netview configuration software is a function to locate nodes by illuminating the Module/Network Status LED. Verify that the software is communicating to the correct E51 sensor using this feature (see the chart in the next section). Once the Netview configuration software is communicating to the E51, the address and all other user configurable parameters can then be programmed. (See the Netview manual for specific information on how to change attributes.) A list of configurable attributes can be found on page 5 of this manual.

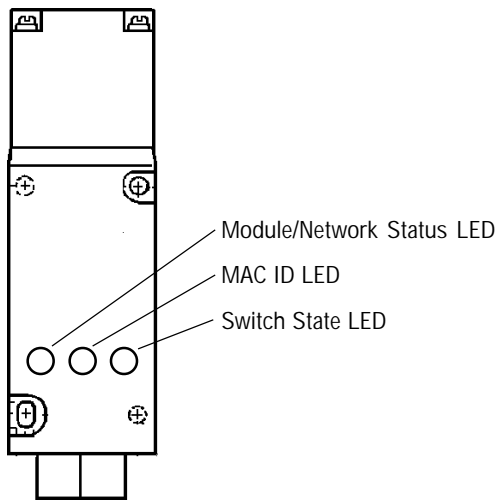
Now change the network address to the desired number. See the Cutler-Hammer DeviceNet system manual for a detailed description of choosing a network address.

Off-line Configuration

An E51 sensor may be configured off-line by connecting it directly to the configuration tool (PC with software or a hand-held type tool) and following the instructions for on-line configuration. 24 VDC must still be supplied to the switch in order to configure it off-line.

LED DEFINITIONS AND DIAGNOSTICS

The E51 includes three LED status indicators: Switch state indication, MAC ID, and network/module status indication.

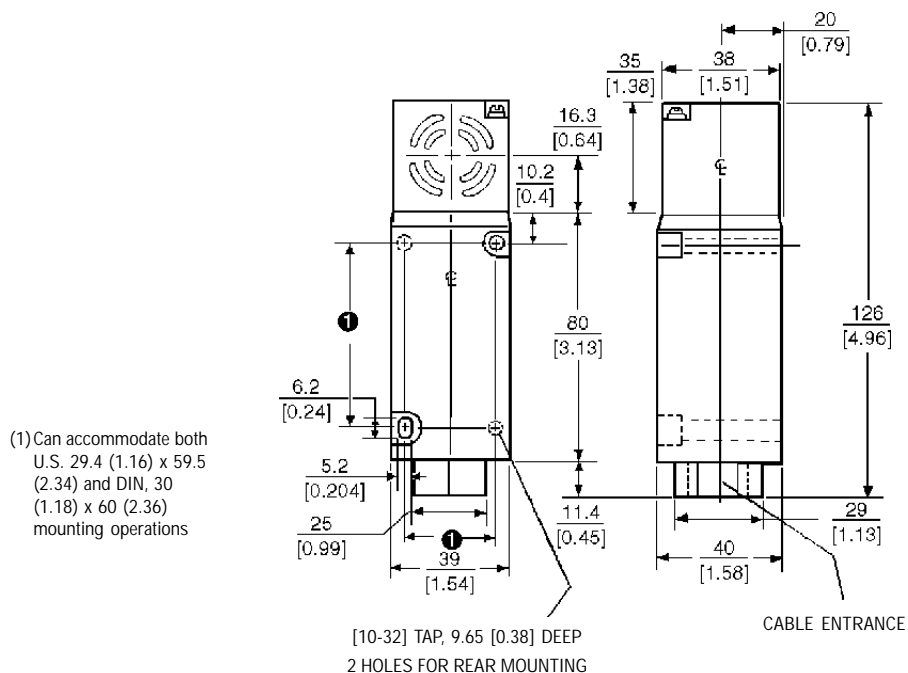
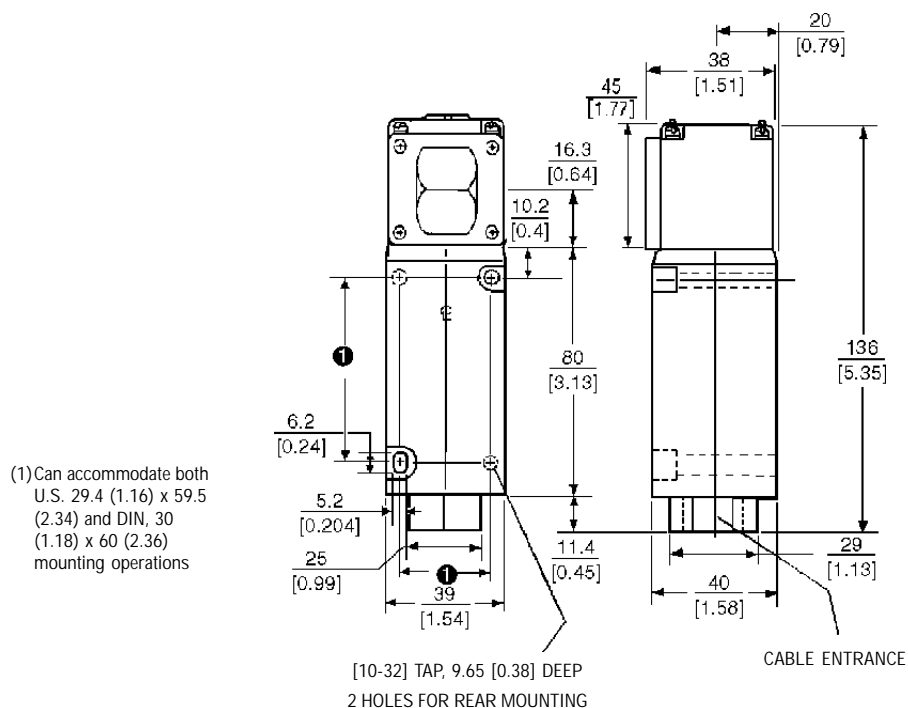


LED	Status
MODULE/NETWORK STATUS LED	
OFF	Device is neither on-line nor faulted - Device has not yet completed the Dup_MAC_ID test - Device may not be powered
Solid Green	Device is operating properly and properly allocated by a master.
Flashing Green	Device is operating properly and on-line but not allocated by a master.
Flashing Red	Device has detected a recoverable fault or a connection is in the timed-out state.
Solid Red	Device has detected an unrecoverable fault or is in the communications faulted state.
Flashing Green/Red Alternately	Device is faulted and visibly identifying itself.
MAC ID LED	
Flashing Red	The number of blinks is the ten's digit of the device MAC ID.
Flashing Green	The number of blinks is the one's digit of the device MAC ID.
SWITCH STATE LED	
Solid Red	Switch mechanism is actuated
OFF	Switch mechanism is not actuated

SPECIFICATIONS

- Material of Construction**
Zinc Die-Cast Alloy
- Enclosure Ratings**
IP67
NEMA 3, 3S, 4, 4X, 6, 6P, and 13
- Maximum Frequency of Operation**
160 operations/second
- Operating Temperature Range**
-25° to 70° C (-13° to 158° F)
- Storage Temperature Range**
-40° to 150° C (-40° to 302° F)
- Operating Range**
See sensor head specifications
- Repeat Accuracy**
See sensor head specifications
- Differential Travel (Hysteresis)**
See sensor head specifications
- Operating Humidity**
<95% RH, non-condensing
- Operating Voltage**
11 to 24 Vdc
- Minimum Operational Current**
33 mA @ 25 Vdc
- Maximum Operational Current**
120 mA @ 11 Vdc
- Maximum Inrush Current**
305 mA @ 25 Vdc
- Electromagnetic Compatibility Compliance**
- Immunity**
ESD per IEC 1000-4-2: +/- 6 kV
RFI per IEC 1000-4-3: 3 V/m
EFT per IEC 1000-4-4: 2 kV

APPROXIMATE DIMENSIONS Shown in mm (inches)

E51 PROXIMITY SWITCH WITH INDUCTIVE HEAD**E51 PROXIMITY SWITCH WITH PHOTOELECTRIC SENSOR HEAD**

APPENDIX: ELECTRONIC DATA SHEETS (Programming Information)

Connection Object - Class 5 (05_{HEX}), Instances 1, 2 and 3

This device supports Explicit Messaging (Instance 1), I/O Poll (Instance 2), and I/O Bit Strobe (Instance 3).

DeviceNet Object - Class 3 (03_{HEX}), Instance 1

Attribute	Attribute ID	Access
MAC ID (0..63)	1	Get/Set
Baud Rate (0=125K, 1=250K, 2=500K)	2	Get/Set
Bus-Off Interrupt	3	Get/Set
Bus-Off Counter	4	Get/Set
Allocation Information	5	Get
Bus-Off Separation	100	Get/Set

If *Bus-Off Interrupt* is true, the device automatically attempts to recover from a bus-off condition if it is on-line and hasn't been bus-off since power-up, or if it has sent and received at least *Bus-Off Separation* messages since the last bus-off condition.

Presence Sensing Object - Class 14 (0E_{HEX}), Instance 1

Attribute	Attribute ID	Access
Output (0..1)	1	Get
Diagnostic (0=OK, 1=fault)	4	Get
On Delay (0..65535 mS)	5	Get/Set
Off Delay (0..65535 mS)	6	Get/Set
One Shot Delay (0..65535 mS)	7	Get/Set
Operate Mode (0=normally open, 1=normally closed)	8	Get/Set
Switch State (0=nonactuated, 1=actuated)	100	Get
Head Actuation Count	101	Get/Set

Output takes into account the *On Delay*, *Off Delay*, *One Shot Delay*, and *Operate Mode*. *Switch state* represents the physical location of the limit switch.

Head Actuation Count increments each time the head is actuated.

The *Diagnose Nonactuated Switch* service causes the device to perform a self diagnostic on its sensing circuitry. The test is only valid if the limit switch is in the nonactuated position. Running this test is the only way to clear the *Diagnostic* bit.

Assembly Object Data - Class 4 (04_{HEX}), Instance 1

Attribute	Attribute ID	Access
Data	3	Get

Use Assembly Object Data to read diagnostic and output status. Data bit 0 is output status, which is obtained from Attribute 1 of the Presence Sensing Object. Data bit 1 is diagnostic status, which is obtained from Attribute 4 of the Presence Sensing Object. The remaining bits (2..7) are 0.

The I/O Poll and I/O Bit Strobe connections consume 0 bytes and product 1 byte. The one produced byte is *Data*.

Identity Object - Class 1 (01_{HEX}), Instance 1

Attribute	Attribute ID	Access
Vendor (68)	1	Get
Device Type (4)	2	Get
Product Code (50)	3	Get
Revision	4	Get
Status	5	Get
Serial Number	6	Get
Product Name ("E50")	7	Get
State	8	Get

Message Router Object - Class 2 (02_{HEX}), Instance 1

Attribute	Attribute ID	Access
Object List	1	Get

APPENDIX: ELECTRONIC DATA SHEETS (Continued)

Diagnostic Object - Class 198 (C6_{HEX}), Instance 1

Attribute	Attribute ID	Access
Number of Faults	1	Get
Fault List	2	Get
Overwrite (0 = preserve oldest faults) (1 = preserve newest faults)	3	Get/Set
Timestamp (0..65535)	4	Get/Set
Resolution (0..65535 mS)	5	Get/Set
Maximum Number of Faults (8)	6	Get

The **Fault List** is accessible via the *Get Member* service. Each member has the following structure:

Parameter	Data Type
Class	UINT
Instance	UINT
Error Code	USINT
Additional Error Code	USINT
Status	UINT
Timestamp	UINT

Test Object - Class 199 (C7_{HEX}), Instance 1

Attribute	Attribute ID	Access
Power OK	5	Get
LED Disable	6	Get/Set

SOFTWARE TIMING

The E50 is not capable of responding to all DeviceNet messages at all baud rates if multiple messages are sent in rapid succession. For best results, a master should wait for a response to a previous request before sensing a subsequent request.

HARDWARE SPECIFICATIONS**DeviceNet Wiring Connections**

V+	Power	Operating range: 11..27 V Protected range: -30..30 V referenced against V-
V-	Common	
CH	CAN high	Protected range: -30..30 V referenced against V-
CL	CAN low	Protected range: -30..30 V referenced against V-
D	Drain	

Still Need Help?

Contact Cutler-Hammer Advanced Product Support

Phone: 1-800-809-2772

Select 2 for Sensor and Application Assistance

Select 6 for DeviceNet Communication and Configuration Assistance

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