

# Weld Field Immune Inductive Proximity Sensors E2QW

## Square 9-Way Configurable Weld Field Immune DC 3-Wire & AC/DC 2-Wire Proximity Sensors Resist Weld Slag Build-up

- Weld field immunity and noise immunity ideal for automotive welding environments
- Sensing in any of nine directions
- High-temperature abrasion-resistant coating on sensing face repels weld slag
- Choose Euro, Micro or Mini connector versions
- DC 3-wire PNP-N.O. or AC/DC 2-wire shielded and unshielded models
- WFI rated to 20,000 Amps @ 1 inch



## Ordering Information

**Note:** Shaded models are normally stocked. Un-shaded models require 2-3 weeks delivery.

### ■ Sensors With Built-in 4-pin Euro Connector 10-30V DC 3-Wire, PNP-N.O. Non-Latching Short Circuit Protection

Type	Output type	Sensing distance	Connector type	Model DC3W PNP N.O.
Shielded	PNP-NO	15mm	4-Pin Euro	E2QW-N15B1-M1
	PNP-NO	25mm	4-Pin Euro	E2QW-N25B1-M1
Unshielded	PNP-NO	35mm	4-Pin Euro	E2QW-N35MB1-M1

### ■ Sensors With Built-in 3-pin Micro Connector or Mini Connector 20-150V AC/DC 2-Wire, N.O. Latching Short Circuit Protection

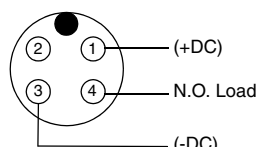
Type	Output type	Sensing distance	Connector type	Model AC/DC 2-Wire N.O.
Shielded	AC/DC 2W-NO	15mm	3-Pin Mini	E2QW-N15T1-MN3
	AC/DC 2W-NO	15mm	3-Pin Micro	E2QW-N15T1-M4
	AC/DC 2W-NO	25mm	3-Pin Mini	E2QW-N25T1-MN3
	AC/DC 2W-NO	25mm	3-Pin Micro	E2QW-N25T1-M4
Unshielded	AC/DC 2W-NO	35mm	3-Pin Mini	E2QW-N35MT1-MN3
	AC/DC 2W-NO	35mm	3-Pin Micro	E2QW-N35MT1-M4

**Note:** The connector end of the sensor is rotated down 90 degrees. See dimensional drawing.

## ■ Mating Single-ended Connector Cordsets

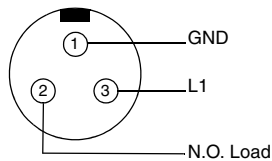
Male views shown

3 Wire DC N.O.



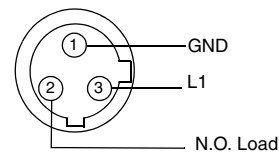
Euro

2 Wire AC/DC N.O.



Mini

2 Wire AC/DC N.O.



Micro

## Specifications

### ■ DC 3-Wire Sensors

Model	E2QW-N15B1-M1	E2QW-N25B1-M1	E2QW-N35MB1-M1
Size	40x40x68.5 mm	40x40x68.5 mm	40x40x68.5 mm
Type	Shielded	Shielded	Unshielded
Sensing distance	15mm +/- 10%	25mm +/- 10%	35mm +/- 10%
Sensing object	2" x 2" x .030" standard target size (1008 C.R.S.) Other materials will reduce the sensing range (Sn) as follows: Stainless Steel Sn x 0.85, Brass Sn x 0.5, Copper Sn x 0.46 Aluminum Sn x 0.40		
Hysteresis	15% max. of sensing distance 3 to 8% Typical		
Repeatability	< ±1%		
Operating voltage	(10 to 30 VDC) Use a class 2 power source only.		
Current consumption	6 mA @ 24VDC		
Power-up time	< 45ms		
Response time	30ms		
Control output	PNP-NO (Sourcing)		
Switching capacity	200mA		
Max. switching frequency	150 Hz		
Voltage drop	< 1.5 VDC @ 200mA		
Leakage current	< 10µA		
Circuit protection	Reverse Polarity, Short Circuit Protection Non-Latching Type		
Indicators	Dual LEDs Green = Power, Amber = Target, Flashing = SCP		
Ambient temperature	Storage: 0 to 70°C Operation: 0 to 70°C		
Temperature drift	10% max. @ 0 to 70°C		
Ambient humidity	Operating and Storage: 35% to 95%		
Voltage influence	±1% max. of sensing distance in rated voltage range ±10%		
Insulation resistance	50 MΩ min. (at 500 VDC) between current carrying parts and case		
Dielectric strength	1,000 VAC at 50/60 Hz for 1 minute between current carrying parts and case		
Vibration resistance	10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y and Z directions		
Shock resistance	1,000 m/s <sup>2</sup> , 10 times each in X, Y and Z directions		
Connection method	M12 4-Pin Euro Connector refer to dimension drawings for pin arrangements		
Standards & listings	-		
Enclosure rating	IEC	IP67 Degree of protection	
Material	Body Sensing face	Hard Coated Heavy Duty Die-Cast Metal Body Proprietary High-Temperature Abrasion-Resistant Coating	
Shipping weight	7 oz.		

**Note:** The response frequency is an average value. Measurement conditions are as follows: standard target, a distance of twice the standard target distance between targets, and a setting distance of half the sensing distance.

# Specifications

## ■ AC/DC 2-Wire Sensors

Model	E2QW-N15T1-MN3	E2QW-N15T1-M4	E2QW-N25T1-MN3	E2QW-N25T1-M4	E2QW-N35MT1-MN3	E2QW-N35MT1-M4
Size	40x40x68.5 mm		40x40x68.5 mm		40x40x68.5 mm	
Type	Shielded	Shielded	Shielded	Shielded	Unshielded	Unshielded
Sensing distance	15mm ± 10%	15mm ± 10%	25mm ± 10%	25mm ± 10%	35mm ± 10%	35mm ± 10%
Sensing object	2" x 2" x .030" standard target size (1008 C.R.S.) Other materials will reduce the sensing range (Sn) as follows: Stainless Steel Sn x 0.85, Brass Sn x 0.5, Copper Sn x 0.46 Aluminum Sn x 0.40					
Hysteresis	15% max. of sensing distance 3 to 8% Typical					
Repeatability	< ±1%					
Supply voltage	20 to 150V AC/DC					
Current consumption	N/A					
Power-up time	< 45ms					
Response time	30ms					
Control output operation	AC/DC 2-Wire Normally Open					
Switching capacity	200mA					
Max. switching frequency	10Hz					
Voltage drop	< 10V @ 200mA					
Leakage current	1.7mA @ 110VAC					
Circuit protection	Short Circuit Protection Latching Type Bipolar by design (cannot be mis-wired)					
Indicators	Dual LEDs Red = Power, Green = Target, Flashing = SCP					
Ambient temperature	Storage: 0 to 70°C Operation: 0 to 70°C					
Temperature drift	10% max. @ 0 to 70°C					
Ambient humidity	Operating and Storage: 35% to 95%					
Voltage influence	±1% max. of sensing distance in rated voltage range ±10%					
Insulation resistance	50 MΩ min. (at 500 VDC) between current carrying parts and case					
Dielectric strength	1,000 VAC at 50/60 Hz for 1 minute between current carrying parts and case					
Vibration resistance	10 to 55 Hz, 1.5-mm double amplitude for 2 hours each in X, Y and Z directions					
Shock resistance	1,000 m/s <sup>2</sup> , 10 times each in X, Y and Z directions					
Connection method	Micro 3-Pin or Mini 3-Pin (refer to dimension drawings for pin arrangements)					
Standards & listings	UL file E196555, cULus					
Enclosure	IEC rating	IP67 Degree of protection				
Material	Body Sensing face	Hard Coated Die-Cast Metal Body Proprietary High-Temperature Abrasion-Resistant Coating				
Shipping weight	7 oz.					

# Engineering Data

## ■ Influence of Sensing Object Size and Materials

Target size in %	150	125	100 (Standard target)	75	50	25	12.5
Deviation from sensing distance %	+10	+7	0	-7	-14	-27	-45

## Operation

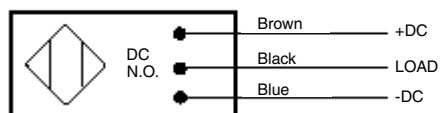
### ■ Timing Chart: AC/DC Version

	Red LED	Green LED	Control Output
Power off	Off	Off	Off
Power on (no object sensed)	On	Off	Off
Sense object (w/ power on)	On	On	On

### ■ DC 3-Wire PNP N.O. Output

Output circuit:

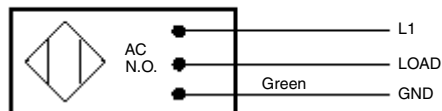
(3-wire DC N.O.)



### ■ AC/DC 2-Wire N.O. Output

Output circuit:

(2-wire AC/DC N.O.)



## ■ Nomenclature

### E2QW WELD FIELD IMMUNE SQUARE PROX

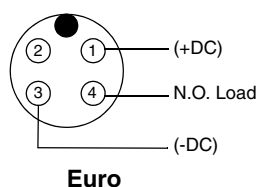
E2QW-1-2-3-4

- 1=BODY STYLE      N=SQUARE 9-WAY CONFIGURABLE
- 2=Sens. Dist. mm    ## in Millimeters
- 3=Output Type      T1=ACDC 2 WIRE  
B1=DC3W PNP-NO
- 4=Connection      M1=4 PIN EURO  
M4=3 PIN MICRO  
MN3=3 PIN MINI

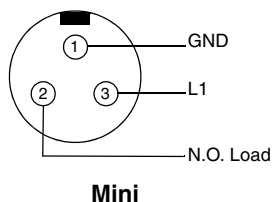
## Connection

Male views shown

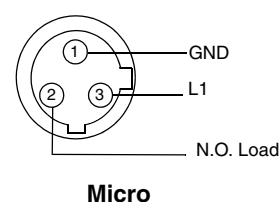
3 Wire DC N.O.



2 Wire AC/DC N.O.



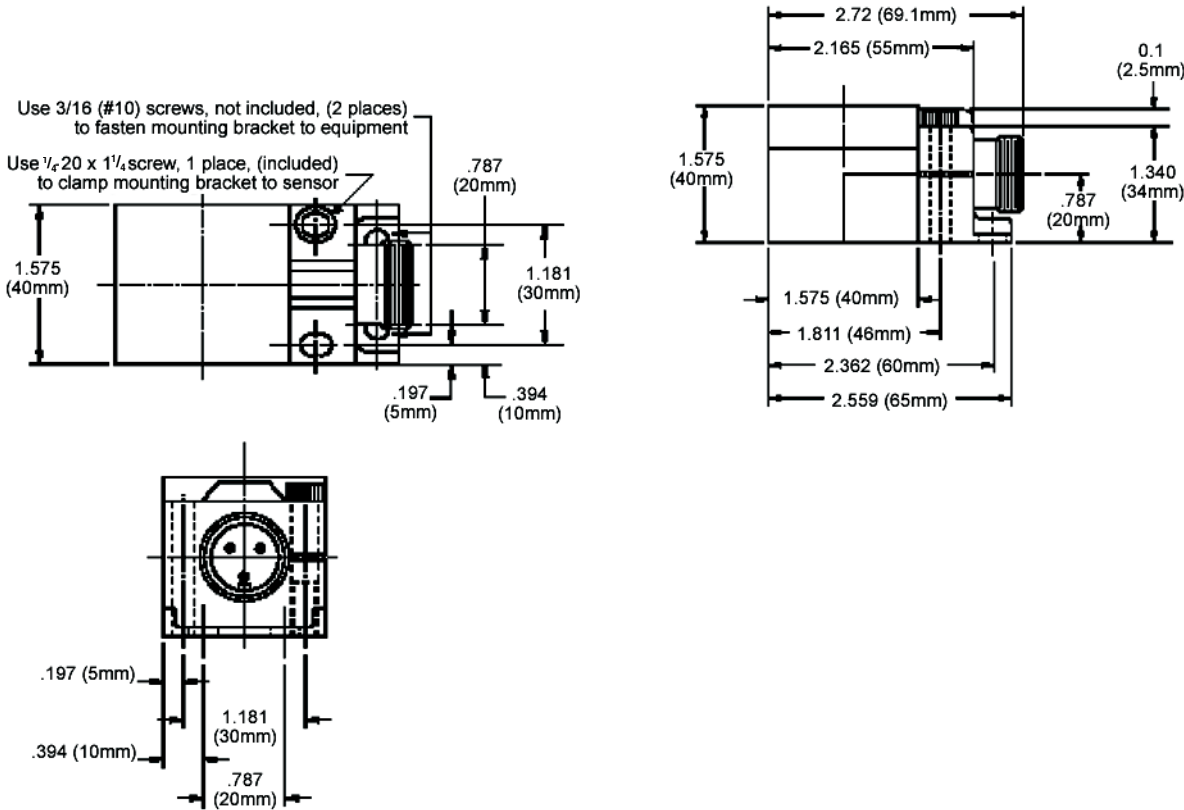
2 Wire AC/DC N.O.



# Sensor Dimensions

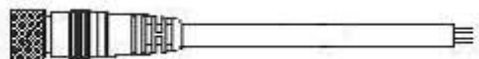
Note: Dimensions are in inches and (millimeters).

## ■ Mini Connector Model Shown



# Precautions

## ■ Sensor Cordsets



Sensor cordsets should never be under tension.



Always allow sufficient slack when connecting.

LED functions	2-Wire		3-Wire	
	Red	Green	Green	Yellow
Power off	Off	Off	Off	Off
Power on load de-energized	On	Off	On	Off
Power on load energized	Off	On	On	On
SCP mode activated	Flashing		Flashing	

## Description

Omron's 9-way configurable proximity sensors are 100% solid-state switches featuring Weld Field Immunity and Short Circuit Protection. These sensors are totally self-contained and completely epoxy encapsulated. The mechanical and electrical operating life of these sensors are largely determined by proper application and installation procedures. This publication will provide the necessary information to achieve these objectives. Please consult the factory should any questions remain after reading these instructions.

## ■ Operating Recommendations

Always operate the sensor with a resistive load that will limit the current in the circuit to levels that are within the sensor's specifications. Frequent activation of the sensor's short circuit protection could be an indication that a problem exists between the sensor and the load. Devices such as motors and incandescent bulbs should not be directly controlled by a proximity sensor, as their high inrush current typically exceeds the maximum load current rating for the sensor.

Some low voltage control systems may be incompatible with 2-wire AC/DC sensors due to voltage drop or leakage current limitations. Omron recommends careful inspection of the specifications of both the sensor and the system before attempting to install a 2-wire AC/DC sensor in a low-voltage application.

- Never install a sensor such that the target or actuator will make actual contact with the sensing face.
- Damage to the sensor's face can cause a malfunction or failure.
- Do not attempt to modify the sensor by cutting, grinding, filing, etc.
- All sensors are completely epoxy potted, and as such do not have any serviceable parts inside. Do not remove the cover or tamper with the cable or connector.

The user should refer to NFPA 70B, RECOMMENDED PRACTICE FOR ELECTRICAL EQUIPMENT MAINTENANCE, published by the National Fire Protection Association, for additional information.

## ■ Short Circuit Protection (SCP)

If the sensor is shorted, the sensor's Short Circuit Protection (SCP) will be activated. When this occurs on latching SCP models, both LED's will flash and the sensor will limit current flow to about 2.0mA. This state will be maintained until the short is cleared and power is recycled.

After the cause of the short has been corrected, cycling power will return a latching SCP - type sensor to normal operation. The Short Circuit Protection feature is designed to protect the proximity sensor and not the external circuit. Use of a Short Circuit Protected sensor does not eliminate the need for branch circuit fusing. Safety first - remove power before correcting short circuit condition.

## ■ Mounting and Reconfiguration

### Mounting the E2QW Sensor

The E2QW Sensor's mounting bracket provides two sets of mounting holes for easy retrofit of traditional rectangular sensors using the lower pair of holes (figure 1), or retrofit of limit switch -style sensors using the upper pair (figure 2).

The mounting holes are designed to accept standard #10 socket head cap screws.



Figure 1



Figure 2

If the lower mounting bolt pattern is used, a ¼ - 20 cap screw is provided to clamp the sensor body into the bracket. If the upper (limit switch) bolt pattern is used to mount the product, the right-hand mounting bolt provides a dual function of clamping and mounting the sensor, and the ¼ - 20 cap screw is not needed.

The connector shell assembly is designed to rotate to allow for convenient Cordset routing, particularly when used with 90-degree cordsets. This rotating feature is clamped in place using either the ¼ - 20 cap screw or a mounting bolt in the upper right position.

## Reconfiguring the E2QW Sensor

The E2QW Sensor is easily field-configurable to locate its sensing face in any of nine different positions. While in the top-sense position, the rotating feature of the mounting bracket allows convenient positioning of the LED indicators with respect to the mounting surface.

In the side-sense configuration, the sensor can be rotated and locked into the mounting bracket in eight different 45-degree positions (see figure 3).

Re-configuring the sensor between the top-sense and side-sense positions is accomplished by loosening two captive Phillips-head screws on the back of the sensor body (figure 4) and separating the upper and lower housings enough to position the sensing face into the desired location (figure 5). The upper and lower housings can be re-joined by tightening the two screws.



Figure 3



Figure 4



Figure 5



### WARNING:

A SWITCH IN A PROTECTIVE INTERLOCKING CIRCUIT SHOULD BE USED WITH AT LEAST ONE OTHER DEVICE THAT WILL PROVIDE A REDUNDANT PROTECTIVE FUNCTION, AND THE CIRCUIT SHOULD BE SO ARRANGED THAT EITHER DEVICE WILL INTERRUPT THE INTENDED OPERATION OF THE CONTROLLED EQUIPMENT. (PROPOSED NEMA ICS 2-225.95 St'd.)

SERVICING ENERGIZED INDUSTRIAL CONTROL EQUIPMENT CAN BE HAZARDOUS. SEVERE INJURY OR DEATH CAN RESULT FROM ELECTRICAL SHOCK, BURN OR UNINTENDED ACTUATION OF CONTROLLED EQUIPMENT. RECOMMENDED PRACTICE IS TO DISCONNECT AND LOCK OUT CONTROL EQUIPMENT FROM POWER SOURCES, AND DISCHARGE STORED ENERGY IN CAPACITORS, IF PRESENT. IF IT IS NECESSARY TO WORK IN THE VICINITY OF ENERGIZED EQUIPMENT, ONLY QUALIFIED PERSONNEL SHOULD BE PERMITTED TO PERFORM SUCH WORK, USING ALL APPLICABLE SAFETY PRACTICES AND PROTECTIVE EQUIPMENT.

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