



- **LPR™ Cylindicator®**
- **DuraProx™**
- **Hammerhead™**
- **Hardcoat™ Tubulars**
- **FlatPak®**
- **C2000™**



WFI Sensors for Automotive Manufacturing

**How
Tough
Does A
Sensor
Have To
Be?**

No Matter How Tough Your Electronic Sensor Has to Be, If It's a Namco, It's Covered by a Lifetime Replacement Program

A Lifetime Product Replacement Program That Makes Sense

All Namco self-contained, fully solid state proximity sensors and photoelectric switches are covered by a "lifetime" replacement program. Both our standard as well as our Weld Field Immune products are included.

Namco had the very first lifetime warranty for sensor users back in 1987. This program was originally offered to very large users of our Weld Field Immune sensors.

We have such confidence in our products, that this same protection has now been extended to all users of our non-contact, fully electronic sensors.

And, all that's required is the registration of your facility every three (3) years, not individual registration of each sensor you purchase.

The Namco Pledge

All Namco self-contained, fully encapsulated, solid state proximity and photoelectric sensors, and device network products that have been specified by a Registered User and that have been applied and used within those products' specifications and ratings will have the warranty of specified products supplied on the Program equipment extended from one (1) year to The Life of the Equipment. "Life" is as long as that equipment remains at the original installation site and continues to produce the product for which it was originally installed.

See Conditions of Sale paragraph 7, "Warranty Limitations and Exclusions," for limitations of warranty.

Electronic sensors require no periodic maintenance, other than maintaining mounting and interconnections. Sensors must be used within their stated ratings. See I&O sheet packaged with each sensor.



Official Lifetime Replacement Program Registration

- 1) Read carefully the Lifetime Replacement Program details on the following page.
- 2) Fill-in this Registration Form completely. All questions must be answered to qualify.
- 3) Fax this page to Namco.
- 4) That's all that is required for your facility to become registered for a 3-year period. Renewal forms will be mailed automatically after 3 years.

Please Print or Type

Date _____

End User
Company/Corporation _____

Division/Subsidiary _____

Plant/Department _____

Your Name _____

Title _____

Phone _____

Mailing Address:

Address _____

City _____ State _____ Zip _____

Shipping Address:

Address _____

City _____ State _____ Zip _____

List the individual responsible for the following functions at your Plant/Department.

Engineering _____

Maintenance _____

Procurement _____

Manufacturing _____

What is the product and/or service produced at your facility? _____

Does your facility have a plant specification for sensors?

Yes No

Is Namco preferred approved used

Method used to approve new sensors: _____

Who at your facility decides what sensors will be used? _____

Namco Sensors in use at this plant/facility:

- ET Series Proximity Sensors
- EE Series WFI Proximity Sensors
- PB Series ProxBlox Sensor Wiring Systems
- ER Series HMD's, Flow Sensors, Long Range Prox
- EP Series Photoelectric Sensors
- Other _____

Signed _____

Lifetime Replacement Program Conditions

I. Conditions of Sale

For Conditions of Sale see back page of this catalog.

II. General Conditions for Warrantee

WARRANTIES; LIMITATIONS AND EXCLUSIONS. Seller warrants products manufactured by it to be free from defects in materials and workmanship for a period of one (1) year from date of shipment to purchaser. If within this period any such products shall be proved to Seller's reasonable satisfaction to be so defective, they shall be repaired or replaced at Seller's option. This warranty shall not apply to, (a) products not manufactured by Seller, (b) products which shall have been repaired or altered by others than Seller so as, in its judgment, to affect same adversely, (c) products which shall have been subjected to negligence, accident or damage by circumstances beyond Seller's control, or to improper operation, maintenance or storage, or to other than normal use or service with respect to products not manufactured by Seller, the warranty obligations of Seller shall conform to the warranty actually extended to Seller by its suppliers subject to the limitations and exclusions hereafter stated. The foregoing warranties do not cover reimbursement for transportation, removal, installation, or other expenses which may be incurred in connection with repair or replacement.

Except as may be expressly provided in the authorized writing by Seller, Seller shall not be subject to any other obligations or liabilities whatsoever with respect to products manufactured by Seller or services rendered by Seller.

THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES EXCEPT WARRANTIES OF TITLE, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Anything to the contrary herein contained notwithstanding, SELLER SHALL NOT BE LIABLE FOR ANY CONSEQUENTIAL, CONTINGENT OR INCIDENTAL DAMAGES WHATSOEVER.

III. Lifetime Replacement Program

- A. All Namco self-contained fully encapsulated solid state proximity sensors, photoelectric sensors and sensor network products that have been specified by a Registered End User and that have been applied and used within the product's stated specifications and ratings, will have the warranty of specified products, installed in the End User's facility, extended from one (1) year to the Life of the Equipment on which specified products are originally installed.
- B. **Life** - "Life" is as long as the equipment on which specified products are originally installed remains at the original installation site and continues to produce the End User product for which that equipment was originally installed.
- C. **Covered Products** - All inductive and capacitive proximity sensors, photoelectric sensors, and sensor network products that are totally solid state, and that have been applied and used within the products' stated specifications and ratings and that have a production date code of 1987 or later (1995 or later for sensor network products) are included. Specifications and ratings are listed on I/O sheet, packaged with each sensor.
- D. **Excluded Products** - All products not specifically covered in paragraph III, C, including but not limited to mechanical switches, control modules, and sensors that include mechanical relays are not covered by this program. Also excluded are products that have been applied and/or used outside their specifications and ratings, and products that have been damaged in use. This Program also excludes coverage of the functional content and performance of embedded software ("firmware"), or its compatibility with software-based products from other manufacturers.
- E. **Damaged Products Excluded** - Products damaged due to physical impact, exposed to environmental conditions outside stated ratings, subjected to loads and power sources outside

stated ratings, subjected to continuous or excessive vibration and movement of the sensor or connecting cable, and any other damage caused in the application and use, are specifically excluded from coverage.

- F. **Determination of Cause** - Any product(s) returned to Namco for repair or replacement under this program will be subjected to inspection and test at Namco's facility. Determination of cause for any loss of function of returned products will be at Namco's sole discretion.
- G. **Method of Registration** - Complete and return to Namco the postage paid Lifetime Replacement Program Registration form, publication SD/HT. All information requested must be provided. Registration is on a facility by facility basis. Large, multi-plant facilities must have each plant registered separately. Registration will last for three (3) years. A renewal registration form will be mailed automatically in January or July prior to third year anniversary and if returned within 30 days coverage will be renewed for the next three (3) years without interruption.
- H. **Return of Products** - To return products covered under this program contact Namco Controls Customer Service Department 1-800-626-8324 FAX 1-800-678-6263 and request an RGA (Return Goods Authorization) or contact your local Namco Representative. Package products securely to prevent damage in shipment including the RGA packing slip and follow instructions on RGA form.
Returned products will be processed generally within two (2) weeks following receipt by Namco. Returned products will be repaired or replaced if covered under this program. Products that are found to meet stated specifications and/or damaged and Excluded Products will be returned to the End User.
- I. **Method of Replacement** - Any returned product covered under this program will be replaced free of charge with an equal or equivalent sensor. Namco reserves the right to make replacement with the latest design for the returned product or to substitute any equivalent function sensor in case of non-availability or obsolescence of the exact model and type being returned.

IV. Application Assistance

Namco Sales Representatives are available to assist with the application and selection of Namco products. Additional assistance is available by calling the Namco Application Hotline: 1-800-NAMTECH

Refer to Installation and Operation Sheet(s) packaged with each unit for specifications and ratings. Follow all recommended procedures for installation.

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.

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 TO 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.

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

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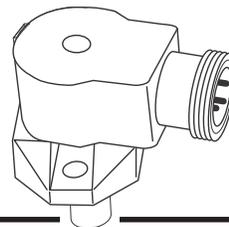
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For technical assistance, call 1-800-NAMTECH

**Weld
Field
Immune**

LPR Cylindicator[®] Sensors

**DC
AC/DC**



Proximity Sensors

- **Both 3,000 and 5,000 PSI Pressure Ratings**
- **Weld Field and Electrical Noise Immunity**
- **Standard Latching Short Circuit Protection (SCP) — Non-latching Available in DC Models**
- **Predictable, Consistent Electrical Performance**
- **100% Tested and Burned-in**
- **Purpose-Designed Housings and Materials**

For over 25 years, the Cylindicator sensor has been the standard for industrial applications that require end-of-stroke indication on Hydraulic and Pneumatic Cylinders. Available in both 3,000 and 5,000 PSI pressure ratings, they are the standard for many OEM cylinder manufacturers. All Cylindicators are completely PLC compatible with many output configurations, including a UL Listed Intrinsically Safe version (see EE931 series for details).

LPR 3000 (3,000 PSI)

Probe Length	3-pin Micro, N.O.	3-pin Mini, N.O.		4-pin Mini, N.O.		4-pin Euro, N.O.	
	2-wire, 20-230V, AC/DC Latching SCP	2-wire, 20-230V, AC/DC Latching SCP		3-wire, 10-30V DC, Sourcing (PNP) 10µA leakage current		3-wire, 10-30V DC Sourcing (PNP) 10µA leakage current	
	1.7mA leakage current	1.7mA leakage current	4.5mA leakage current	Latching SCP	Non-Latching SCP	Latching SCP	Non-Latching SCP
1.025	EE230-10423	EE230-10420	EE260-10420	EE210-10440	EE210-10400	EE210-10444	EE210-10404
1.250	EE230-11323	EE230-11320	EE260-11320	EE210-11340	EE210-11300	EE210-11344	EE210-11304
1.500	EE230-12323	EE230-12320	EE260-12320	EE210-12340	EE210-12300	EE210-12344	EE210-12304
1.750	EE230-13323	EE230-13320	EE260-13320	EE210-13340	EE210-13300	EE210-13344	EE210-13304
2.062	EE230-18723	EE230-18720	EE260-18720	EE210-18740	EE210-18700	EE210-18744	EE210-18704
2.875	EE230-17823	EE230-17820	EE260-17820	EE210-17840	EE210-17800	EE210-17844	EE210-17804
3.775	EE230-19023	EE230-19020	EE260-19020	EE210-19040	EE210-19000	EE210-19044	EE210-19004
4.560	EE230-18623	EE230-18620	EE260-18620	EE210-18640	EE210-18600	EE210-18644	EE210-18604

LPR 5000 (5,000 PSI)

Probe Length	3-pin Micro, N.O.	3-pin Mini, N.O.		4-pin Mini, N.O.		4-pin Euro, N.O.	
	2-wire, 20-230V, AC/DC Latching SCP	2-wire, 20-230V, AC/DC Latching SCP		3-wire, 10-30V DC, Sourcing (PNP) 10µA leakage current		3-wire, 10-30V DC Sourcing (PNP) 10µA leakage current	
	1.7mA leakage current	1.7mA leakage current	4.5mA leakage current	Latching SCP	Non-Latching SCP	Latching SCP	Non-Latching SCP
1.025	EE230-10427	EE230-10425	EE260-10425	EE210-10445	EE210-10405	EE210-10446	EE210-10406
1.250	EE230-11327	EE230-11325	EE260-11325	EE210-11345	EE210-11305	EE210-11346	EE210-11306
1.500	EE230-12327	EE230-12325	EE260-12325	EE210-12345	EE210-12305	EE210-12346	EE210-12306
1.750	EE230-13327	EE230-13325	EE260-13325	EE210-13345	EE210-13305	EE210-13346	EE210-13306
2.062	EE230-18727	EE230-18725	EE260-18725	EE210-18745	EE210-18705	EE210-18746	EE210-18706
2.875	EE230-17827	EE230-17825	EE260-17825	EE210-17845	EE210-17805	EE210-17846	EE210-17806
3.775	EE230-19027	EE230-19025	EE260-19025	EE210-19045	EE210-19005	EE210-19046	EE210-19006
4.560	EE230-18627	EE230-18625	EE260-18625	EE210-18645	EE210-18605	EE210-18646	EE210-18606

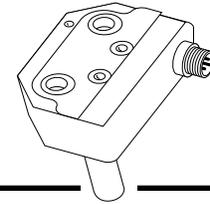
► Consult factory for Normally Closed and DC Sinking model availability.



**Weld
Field
Immune**

**Low-Profile
Cylindicator® Sensors**

**DC
AC/DC**



Proximity Sensors

- Weld Field and Electrical Noise Immunity
- 1500 PSI Continuous Pressure Rating
- Standard Latching Short Circuit Protection (SCP), Non-Latching Available in DC Models
- Predictable, Consistent Electrical Performance
- 100% Tested and Burned-in
- Purpose-Designed Housings and Materials

For over 25 years, the Cylindicator sensor has been the standard for industrial applications that require end-of-stroke indication on Hydraulic and Pneumatic Cylinders. Available in several styles, they are the standard for many OEM cylinder manufacturers. All Cylindicators are completely PLC compatible with many output configurations, including a UL Listed Intrinsically Safe version (see EE931 series for details).

	3-Pin Micro Connector 2-W, 20-230V, AC/DC, N.O.		4-Pin Euro Connector 3-W, 10-30V, DC Sourcing (PNP), N.O.	
	Latching Short-Circuit Protection (SCP)		Non-Latching SCP	
	1.7mA Leakage Current	4.5mA Leakage Current	10µA Leakage Current	
Probe Length	EE230-	EE260-	EE210-	EE210-
0.915"	EE230-28820	EE260-28820	EE210-28844	EE210-28804
0.950"	EE230-20120	EE260-20120	EE210-20144	EE210-20104
1.025"	EE230-20420	EE260-20420	EE210-20444	EE210-20404
1.130"	EE230-20320	EE260-20320	EE210-20344	EE210-20304
1.250"	EE230-21320	EE260-21320	EE210-21344	EE210-21304
1.350"	EE230-21720	EE260-21720	EE210-21744	EE210-21704
2.062"	EE230-28720	EE260-28720	EE210-28744	EE210-28704
2.775"	EE230-27420	EE260-27420	EE210-27444	EE210-27404
2.875"	EE230-27820	EE260-27820	EE210-27844	EE210-27804
3.775"	EE230-29020	EE260-29020	EE210-29044	EE210-29004
4.560"	EE230-28620	EE260-28620	EE210-28644	EE210-28604



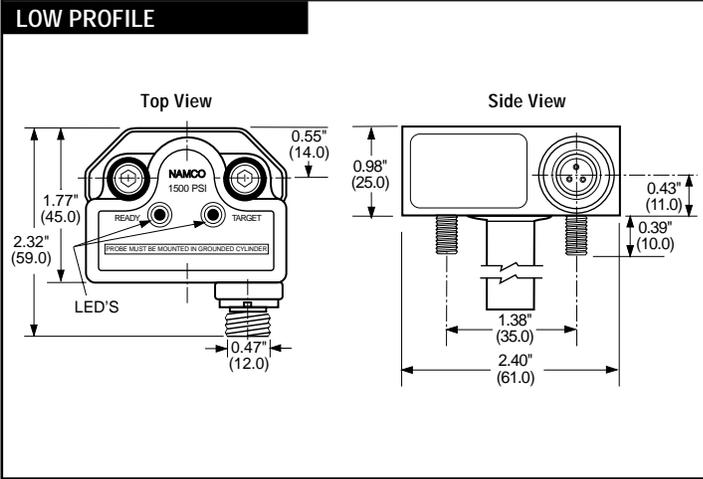
► Consult factory for Normally Closed, DC Sinking, and Cable model availability.

Common Sensor Characteristics

CYLINDRICATOR® SENSORS		
	AC/DC	DC
Nominal Sensing Range (±10%)	0.080"	
Current Consumption	1.7 or 4.5mA	10µA
Voltage Drop	≈10 VAC	2.0V@100mA
Temperature Drift (Max.)	±10%	
Short Circuit Protection	yes	
Reverse Polarity Protected	yes	
Ambient Temperature Range	-4°F to +158°F	
Maximum Switching Frequency	16Hz	
Hysteresis	3-10%	
Repeatability	<±1.25%	
Designed to meet NEMA Enclosure Type	4, 6, 12 & 13	
Load Current	5mA to 500mA	200mA max.
LED Indicator	red = power green = target	green = power amber = target
Shipping Weight	12 oz.	

See Cylindricator® Sensor Design Guide Section for details.

Dimensional Drawings



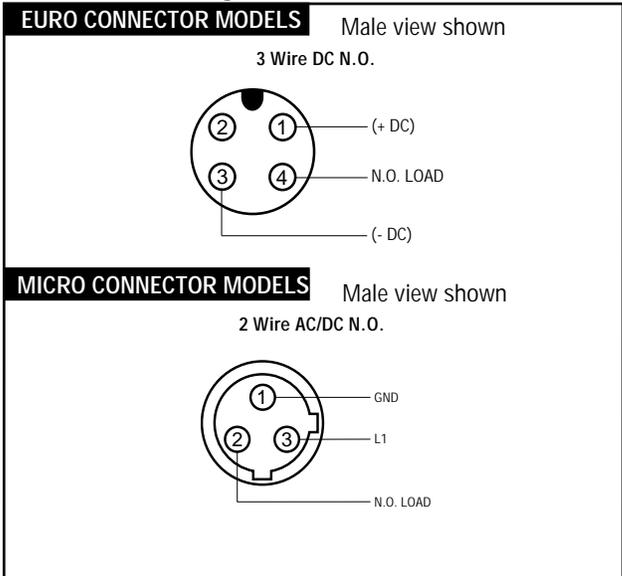
Proximity Sensors

LED Functions

	10-30V DC		20-230V AC/DC	
	Green	Amber	Red	Green
Power Off	Off	Off	Off	Off
Power On Load De-energized	On	Off	On	Off
Power On Load Energized	On	On	Off	On
*SCP Mode Activated	Both Flashing		Both Flashing	

*Short Circuit Protection: If the sensor is shorted, the sensor's Short Circuit Protection (SCP) will be activated. When this occurs, both LEDs will flash and the sensor will limit current flow to about 2.0mA.

Circuit Drawings



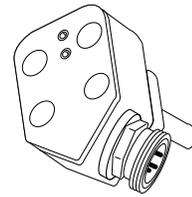
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For technical assistance, call 1-800-NAMTECH

**Weld
Field
Immune**

90° Rotatable Cylindicator® Sensors

**DC
AC/DC**



Proximity Sensors

- Weld Field and Electrical Noise Immunity
- 3000 PSI Pressure Rating
- Standard Latching Short Circuit Protection (SCP), Non-Latching Available in DC Models
- Predictable, Consistent Electrical Performance
- 100% Tested and Burned-in
- Purpose-Designed Housings and Materials

For over 25 years, the Cylindicator sensor has been the standard for industrial applications that require end-of-stroke indication on Hydraulic and Pneumatic Cylinders. Available in several styles, they are the standard for many OEM cylinder manufacturers. All Cylindicators are completely PLC compatible with many output configurations, including a UL Listed Intrinsically Safe version (see EE931 series for details).



Probe Length	3-Pin Mini 2-W, 20-230V AC/DC, N.O.		4-Pin Mini* 3-Wire, 10-30V DC, N.O., 10µA Leakage Current				
	Latching SCP		Non-Latching SCP		Latching SCP		
	1.7mA Leakage Current	4.5mA Leakage Current	SI (NPN)	SO (PNP)	SI (NPN)	SO (PNP)	SI/SO*
	EE230	EE260	EE210-	EE210-	EE210-	EE210-	EE210-
0.915	—	—	EE210-38820	EE210-38800	EE210-38860	EE210-38840	EE210-38880
0.950	EE230-30120	EE260-30120	EE210-30120	EE210-30100	EE210-30160	EE210-30140	EE210-30180
1.025	EE230-30420	EE260-30420	EE210-30420	EE210-30400	EE210-30460	EE210-30440	EE210-30480
1.050	EE230-30520	EE260-30520	EE210-30520	EE210-30500	—	EE210-30540	—
1.125	EE230-30820	EE260-30820	EE210-30820	EE210-30800	EE210-30860	EE210-30840	EE210-30880
1.150	EE230-30920	EE260-30920	—	—	—	—	—
1.225	EE230-31220	—	—	EE210-31200	—	EE210-31240	—
1.250	EE230-31320	EE260-31320	EE210-31320	EE210-31300	EE210-31360	EE210-31340	EE210-31380
1.275	EE230-31420	EE260-31420	—	—	—	—	—
1.295	EE230-31520	EE260-31520	EE210-31520	EE210-31500	EE210-31560	EE210-31540	EE210-31580
1.350	EE230-31720	EE260-31720	—	—	—	EE210-31740	—
1.400	EE230-31920	—	EE210-31920	—	EE210-31960	EE210-31940	EE210-31980
1.475	EE230-32220	EE260-32220	—	—	—	—	—
1.500	EE230-32320	EE260-32320	EE210-32320	EE210-32300	—	EE210-32340	EE210-32380
1.525	EE230-32420	—	—	—	—	—	—
1.625	EE230-32820	—	—	—	—	—	—
1.725	EE230-33220	EE260-33220	EE210-33220	EE210-33200	EE210-33260	EE210-33240	EE210-33280
1.750	EE230-33320	EE260-33320	—	EE210-33300	—	EE210-33340	EE210-33380
1.875	EE230-33820	EE260-33820	EE210-33820	EE210-33800	EE210-33860	EE210-33840	EE210-33880
2.062	EE230-38720	EE260-38720	EE210-38720	EE210-38700	EE210-38760	EE210-38740	EE210-38780
2.125	EE230-34820	EE260-34820	EE210-34820	EE210-34800	EE210-34860	EE210-34840	EE210-34880
2.275	EE230-35420	EE260-35420	EE210-35420	EE210-35400	EE210-35460	EE210-35440	EE210-35480
2.375	EE230-35820	—	—	—	—	—	—
2.775	EE230-37420	EE260-37420	—	—	—	—	—
2.875	EE230-37820	EE260-37820	EE210-037820	EE210-37800	EE210-37860	EE210-37840	EE210-37880
3.750	EE230-39120	—	—	—	—	—	—
3.775	EE230-39020	EE260-39020	—	EE210-39000	—	EE210-39040	—
4.560	EE230-38620	EE260-38620	EE210-38620	—	EE210-38660	EE210-38640	EE210-38680
4.850	EE230-38920	EE260-38920	EE210-38920	EE210-38900	EE210-38960	—	EE210-38980
4.990	EE230-38520	—	EE210-38520	EE210-38500	EE210-38560	—	EE210-38580

* Sink/Source Combination Devices Use a 5-Pin, 4-Wire Connector!

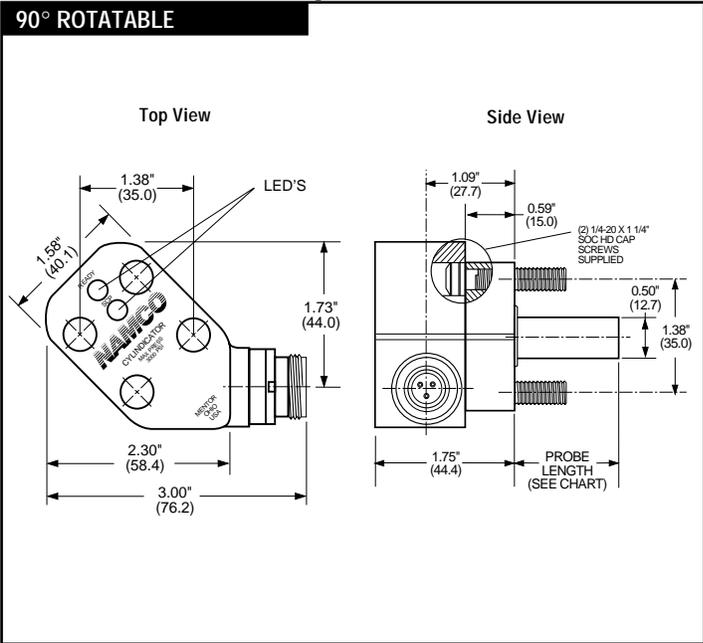
► Consult factory for Normally Closed, DC Sinking, and Cable model availability.

Common Sensor Characteristics

CYLINDRATOR® SENSORS		
	AC/DC	DC
Nominal Sensing Range (±10%)	0.080"	
Current Consumption	1.7 or 4.5mA	10µA
Voltage Drop	≈10 VAC	2.0V@100mA
Temperature Drift (Max.)	±10%	
Short Circuit Protection	yes	
Reverse Polarity Protected	yes	
Ambient Temperature Range	-4°F to +158°F	
Maximum Switching Frequency	16Hz	
Hysteresis	3-10%	
Repeatability	<±1.25%	
Designed to meet NEMA Enclosure Type	4, 6, 12 & 13	
Load Current	5mA to 500mA	200mA max.
LED Indicator	red = power green = target	green = power amber = target
Shipping Weight	12 oz.	

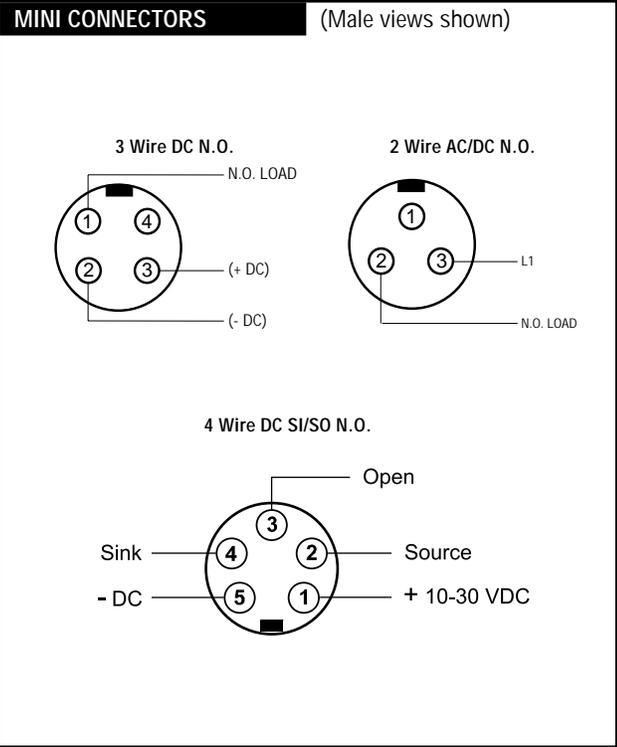
See Cylindicator® Sensor Design Guide Section for details.

Dimensional Drawings



Proximity Sensors

Circuit Drawings



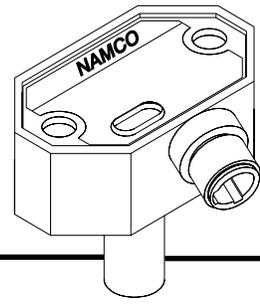
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For technical assistance, call 1-800-NAMTECH

**Weld
Field
Immune**

C2™ Cylindicator® Sensors

**DC
AC/DC**



Proximity Sensors

- Low Mass - Less Susceptible to Damage from Shock and Vibration
- Lowest Profile Cylinder Sensor on the Market
- Weld Field and Electrical Noise Immunity
- 300 PSI Continuous Pressure Rating
- Single Piece Rugged Die-Cast Housing
- Tested to over 20 Million Switching Cycles
- Purpose-Designed Housings and Materials
- Standard Latching Short Circuit Protection (SCP), Non-Latching Available in DC Models

As the leader in end-of-stroke cylinder position sensing for over 18 years, Namco is proud to introduce the newest member of the Namco Cylindicator series: the C2™ Cylindicator® sensor.

Many developments in cylinder position sensing have resulted in sophisticated, overly-complicated sensors. The C2 sensor, on the other hand, is a “back to basics” design. This new design capitalizes on the real needs of the pneumatic power clamp cylinder user.

	3-Pin Micro	4-Pin Euro	
	2-W, 20-150V AC/DC, N.O. 1.7mA Leakage Current Latching SCP	3-W, 10-30V DC, N.O., Sourcing (PNP) 10µA Leakage Current Latching SCP	EE210- Non-Latching SCP
Probe Length	EE230-	EE210-	EE210-
1.025"	EE230-60420	EE210-60444	EE210-60404
1.250"	EE230-61320	EE210-61344	EE210-61304
1.500"	EE230-62320	EE210-62344	EE210-62304
1.750"	EE230-63320	EE210-63344	EE210-63304
2.062"	EE230-68720	EE210-68744	EE210-68704
2.875"	EE230-67820	EE210-67844	EE210-67804
3.775"	EE230-69020	EE210-69044	EE210-69004
4.560"	EE230-68620	EE210-68644	EE210-68604



Common Sensor Characteristics

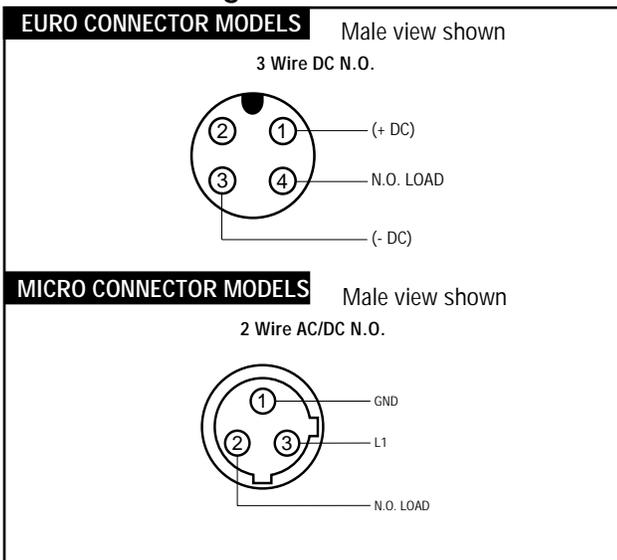
C2 CYLINDRATOR® SENSORS		
Nominal Sensing Range (±10%)	0.080"	
Supply Voltage	10-30V DC	20-150V AC/DC
Voltage Drop	≤ 2.5V @ 200mA	≤ 10V
	≤ 2.0V @ ≤ 100mA	
Max. Load Current @ 25°C	200mA	
Inrush Current (rms 1Hz)	-	1.5A
Leakage Current	10µA	1.7mA
Max. Continuous Pressure	300 psi	
Response Time	30ms	
Power-up Time	35ms to 45ms	
Max. Switching Frequency	15Hz	
Ambient Temp. Range	-25°C to 70°C (-13°F to 158°F)	

LED Functions

	10-30V DC		20-150V AC/DC	
	Green	Amber	Red	Green
Power Off	Off	Off	Off	Off
Power On Load De-energized	On	Off	On	Off
Power On Load Energized	On	On	Off	On
*SCP Mode Activated	Both Flashing		Both Flashing	

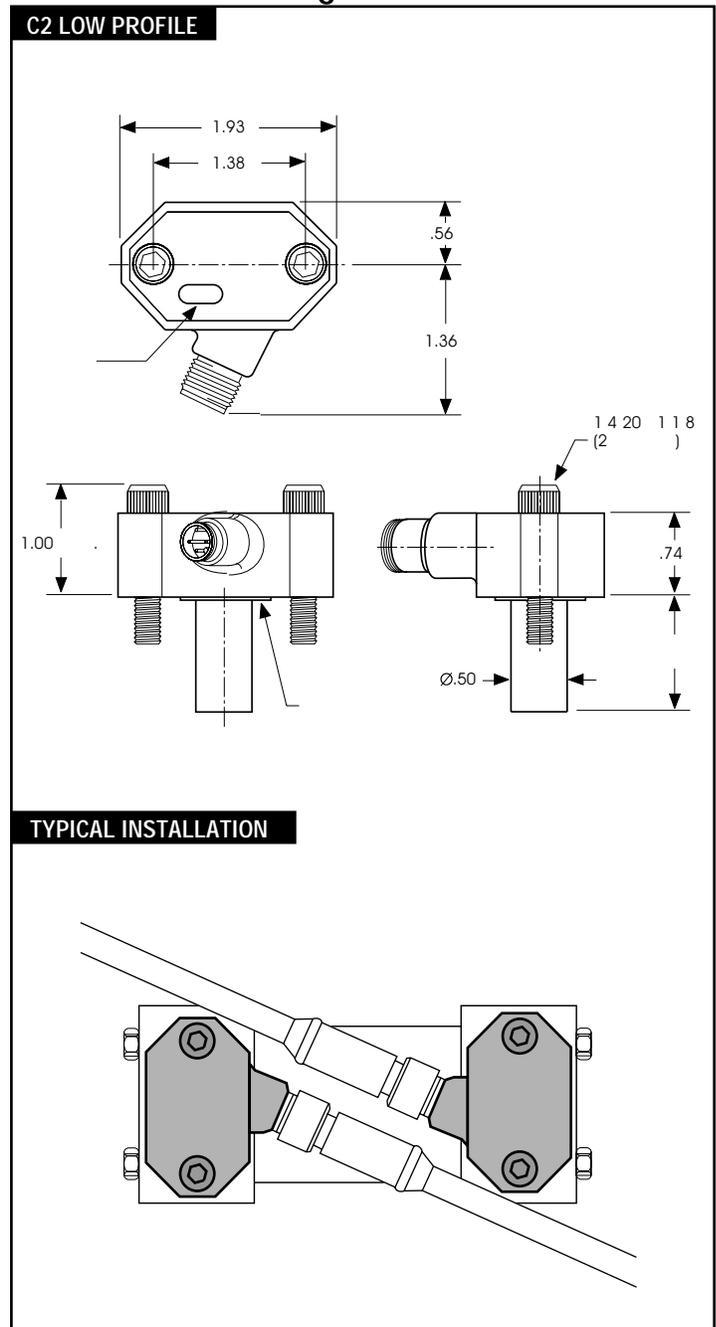
*Short Circuit Protection: If the sensor is shorted, the sensor's Short Circuit Protection (SCP) will be activated. When this occurs, both LEDs will flash and the sensor will limit current flow to about 2.0mA.

Circuit Drawings



Dimensional Drawings

DC, AC/DC

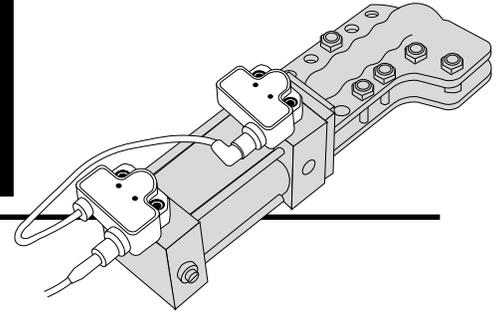


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Tandem Low Profile - Power Clamp Sensor Kit



- Cabling is Reduced 50%
- Cabling is Industry-Standard Micro Style
- Outputs Remain Independent - Power and Ground Connectors are Factory Interconnected
- Cable Terminations Reduced for Installer
- Cable Bundle Density Reduced
- Reduces Junction Box Size
- Reduces Fitting Size
- Reduces Panel Size

The new Namco LP2™ Tandem Low Profile Power Clamp Sensor Kit is an adaptation of our successful Low Profile Cylindicator® sensor.

This new version reduces the cabling necessary by 50% when two sensors are required on an air or hydraulic cylinder.

The system consists of a new Low Profile Cylindicator sensor specially constructed as a common wiring point. Cabling is brought to the Master unit, then the built-in cable from the Master unit is connected to a standard Low Profile Cylindicator sensor. This eliminates 50% of the wiring density and labor required as compared to “conventional” practices.

The LP2™ sensor kit is the most cost effective, highest reliability solution for reducing sensor wiring complexity and cost in power clamp applications.

Applications:

Patented Weld Field Immune circuitry permits application within one inch of resistance welder tips carrying 20,000 Amperes. This system is ideal for end-of-stroke detection on hydraulic or pneumatic clamping cylinders in automotive assembly, metal fabricating, and general automated welding applications.

Cylindicator is a registered trademark of Namco Controls Corporation.

LP2 is a trademark of Namco Controls Corporation.

Ordering Information

Description	Part No.	Part No.
	2-wire AC/DC	3-wire DC
Standard LP2 Kit, 1.025" Probe	EE270-20420	EE280-20446
Kit includes: 1 Master Low Profile Cylindicator® Sensor with “pigtail” interconnect 1 Standard Low Profile Cylindicator® Sensor	EE270-20421 EE230-20420	EE280-20447 EE210-20444



Specifications

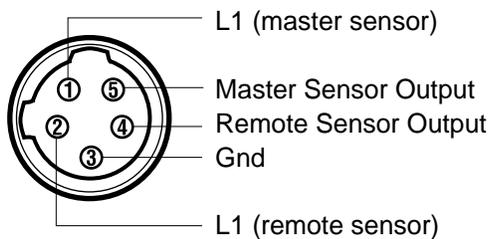
LP2 POWER CLAMP SENSOR KIT		
Supply Voltage	10-30V DC	20-230V AC/DC
Voltage drop	≤2.5V @ 200mA ≤2.0V@≤100mA	≤10V
Max. Load Current @ 25°C	200mA	500mA
Inrush Current (rms 1Hz)	—	3A
Leakage Current	10µA	1.7mA
Response Time	30ms	
Power-up Time	35ms to 45ms	
Max. Switching Frequency	15 Hz	
Ambient Temp. Range	-20°C to 70°C	
Max. Continuous Pressure	1500 PSI	

	LED Functions			
	10-30V DC		20-230V AC/DC	
	Green	Amber	Red	Green
Power Off	Off	Off	Off	Off
Power On Load De-energized	On	Off	On	Off
Power On Load Energized	On	On	Off	On
*SCP Mode Activated	Both Flashing		Both Flashing	

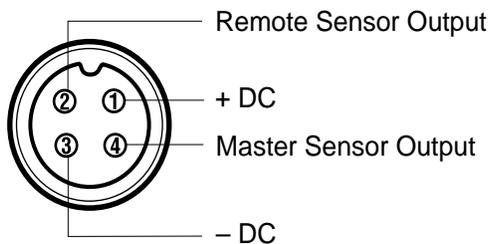
* Short Circuit Protection: If the sensor is shorted, the sensor's Short Circuit Protection (SCP) will be activated. When this occurs, both LED's will flash and the sensor will limit current flow to about 2.0mA.

Wiring Diagram

2WAC/DC

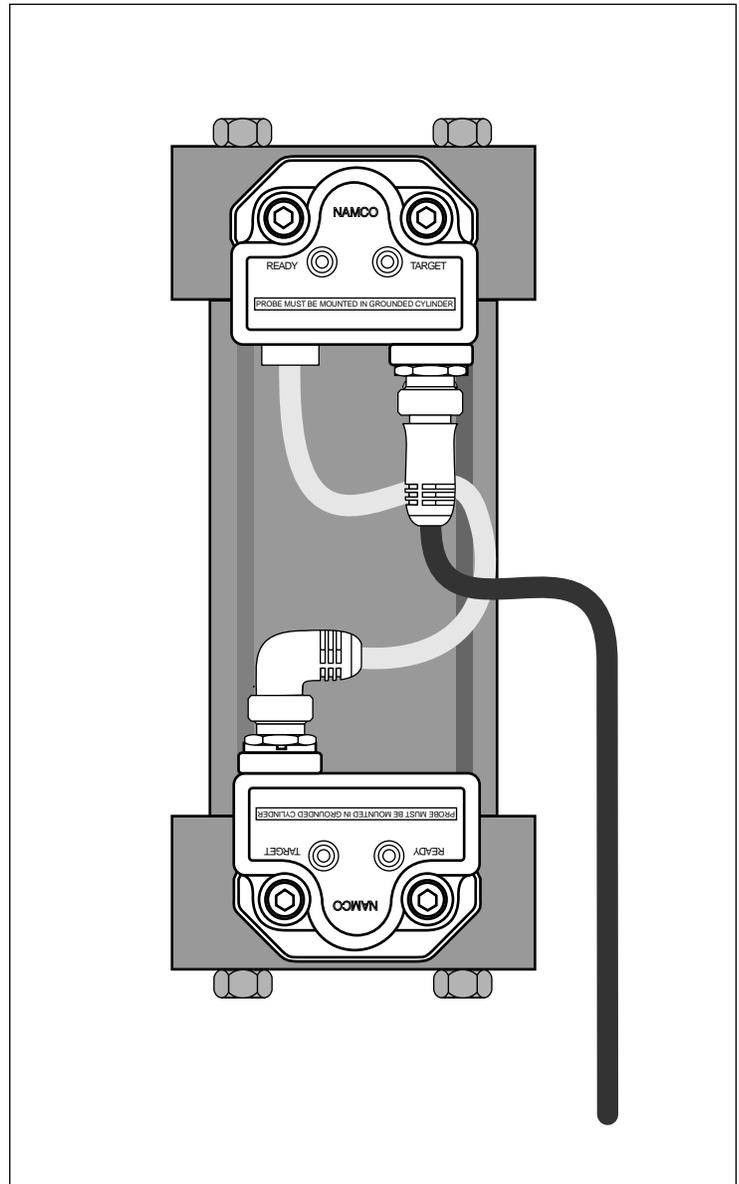


3WDC



Tandem Low Profile - Power Clamp Sensor Kit

EE270-2



Proximity Sensors

NAMCO

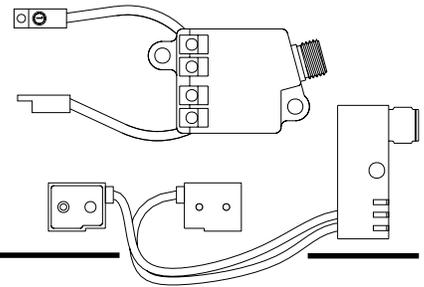
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**For
Power
Clamps**

C2000™ Cylindicator® Sensor Kits

**Types
91, 92 & 93**



Proximity Sensors

- **Single cordset reduces wiring time and material costs as compared to two discrete sensors**
- **Two 10-30V, 3-wire DC WFI sensors, with non-latching Short Circuit Protection**
- **100mm, 160mm or 200mm cable lengths available**
- **Cross-drilled hole pattern for mounting flexibility**
- **Rugged, fully encapsulated housings**
- **Status LED's indicate clamp position, viewable nearly 180° for mounting flexibility, easy troubleshooting**
- **Standard 4-pin euro connector**

The C200 Cylindicator sensors kits are designed to fit new enclosed style power clamps from major suppliers utilizing integral sensors. Kit senses both open and closed clamp positions

All Namco WFI sensors pass the NEMA noise tests and exhibit no false turn-ons from walkie-talkies or other in-plant sources of RF Noise.

C2000 Cylindicator Sensors - Types 91, 92 & 93

Description	Part Number
C2000 Type 91	
10-30VDC, PNP, 4-pin, Euro Connector, 100mm Leads	EE280-91100
10-30VDC, PNP, 4-pin, Euro Connector, 160mm Leads	EE280-91160
10-30VDC, PNP, 4-pin, Euro Connector, 200mm Leads	EE280-91200
C2000 Type 92	
10-30VDC, PNP, 4-pin, Euro Connector, 140mm Leads	EE280-92140
C2000 Type 93	
10-30VDC, PNP, 4-pin, Euro Connector, 110mm Leads	EE280-93110

▶ Consult factory for normally closed model availability.



Common Sensor Characteristics

	Type 91/93	Type 92
Supply Voltage	10-30VDC	
Ripple	<10%	N/A
Sensing Range	(Embeddable) 2.0mm (.08")±10%	2.0mm (.08")±10%
Current Consumption	10mA	
Voltage Drop	2.0V @ 100 mA	
Load Current	200mA max. (100mA ea.)	200 mA max.
No Load Current	<10mA	N/A
Leakage Current	<10µA	10µA
Weld Field Immune/RF Immune	Yes	
Over Current Protection	Yes	N/A
Protection Class	IP67	N/A
Short Circuit Protection (SCP)	Yes	
Reverse Polarity Protection	Yes	
Response Time (On)	30ms	
Response Time (Off)	1 ms	
Switching Frequency	50Hz	16Hz
Temperature Drift	±15%	±10% (max.)
Hysteresis	3-8% typical, 15% max.	3-10%
Connector	4-pin single-key Euro	
Operating Temperature Range	-25° C to +70° C	

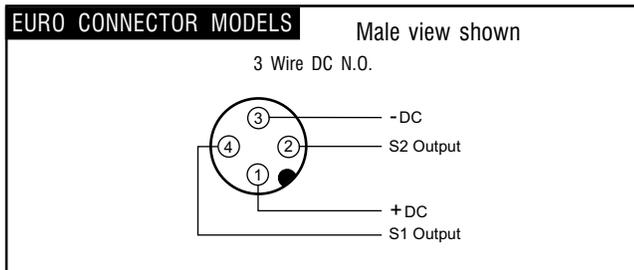
Type 91/93

LED Functions	S1	Ready	S2
Power/Ready	Off	Green	Off
Sensor # 1 - Targeted	Yellow	Green	Off
Sensor # 2 - Targeted	Off	Green	Red
Sensor # 1 SCP Tripped	Off	Flashing	Off
Sensor # 2 SCP Tripped	Off	Flashing	Off

Type 92

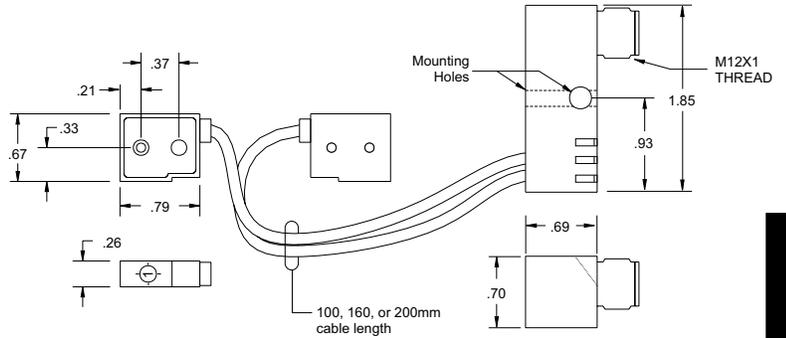
LED Functions	3-wire DC version			
	Sensor 1		Sensor 2	
	Ready	S1	Ready	S2
Power/Ready	Green	Off	Green	Off
Sensor 1 Targeted	Green	Yellow	Green	Off
Sensor 2 Targeted	Green	Off	Green	Yellow
Sensor 1 SCP Tripped	Flash	Off	Flash	Off
Sensor 2 SCP Tripped	Flash	Off	Flash	Off

Circuit Drawing

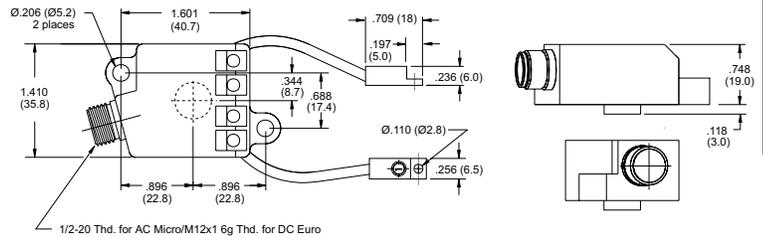


Dimensional Drawings Type 91/92/93

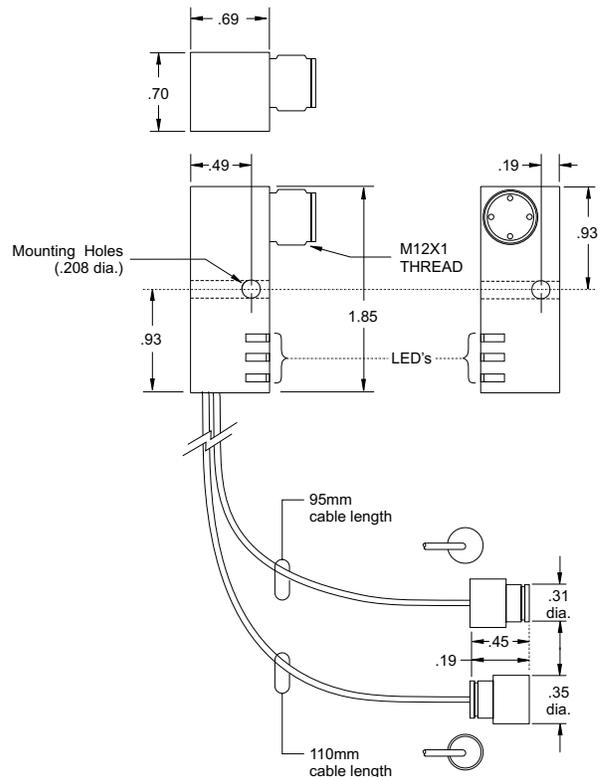
C2000 - TYPE 91



C2000 - TYPE 92



C2000 - TYPE 93



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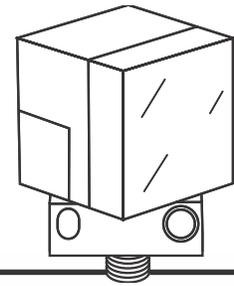
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**Weld
Field
Immune**

DuraProx™

9-Way Configurable Proximity Sensors

**DC
AC/DC**



Proximity Sensors

Introducing the Namco DuraProx™ Proximity Sensor: Evolution Means Survival of the Fittest.

All Metal Body Stands up to Abuse

To evolve means to adapt to your surroundings. The DuraProx sensor is completely enclosed in a rugged die-cast body. All metal means more strength in the face of abuse.

9-Way Position Flexibility

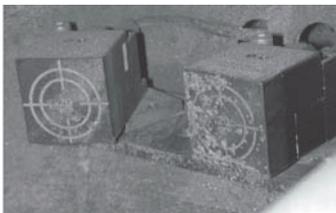
Eight-point indexed side-sense, plus top sense configuration make the DuraProx sensor "9-sensors-in-one."

Positive Grip Compression Clamp Bracket

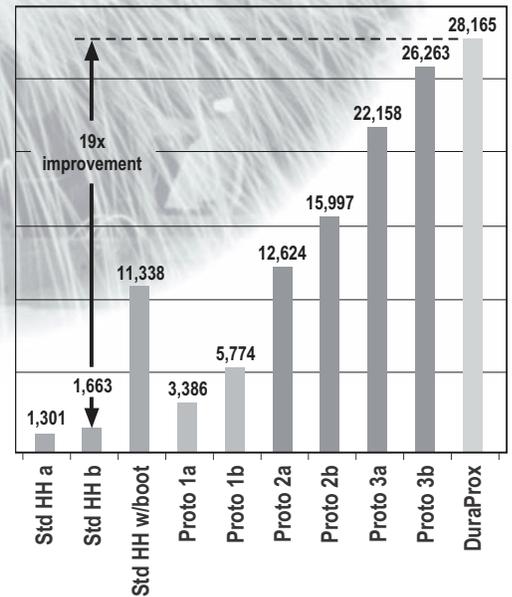
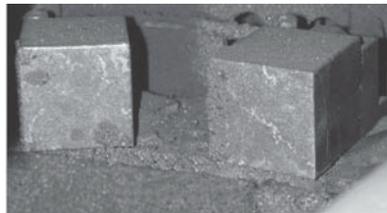
Provides superior mounting strength.



Standard Sensor Failed due to weld slag adhesion after 1,663 Weld Cycles



Namco DURAPROX™ Sensor after 28,000 Weld Cycles: Superior Resistance to Slag Build-Up and Adhesion



A wide range of materials were tested to determine optimal surface hardness and thermal characteristics necessary to survive the rigors of the automotive welding environment.

Proven in independent laboratory testing, Namco DURAPROX™ survives weld-slag buildup UPTO 19 TIMES LONGER than standard proxes.

DURAPROX

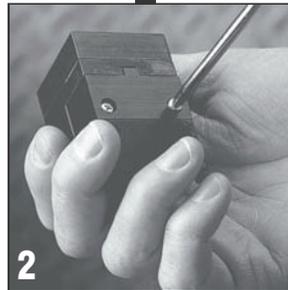
Streamlined Design Shakes off Weld Slag . . . Without Protective "Boots"

The DuraProx sensor's face incorporates a proprietary high-temperature abrasion-resistant coating that is weld slag resistant, so even heavy deposits roll right off. Plus, because it has no nooks or crevices for slag to accumulate, you'll never have to worry about "false triggering" from slag build-up.

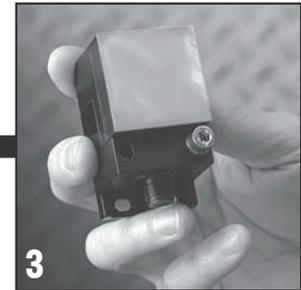


An Easy Upgrade. Directly Replaces Other Configurable Sensors

Two sets of mounting holes on bracket allow easy retrofit of traditional rectangular sensors (using lower pair of holes), or retrofit of limit switch-style sensors (using the upper pair).



Adjustment screws go straight in . . . no difficult angles to slow things down.



Configuring is as easy as "1-2-3"

The DuraProx sensor is field-adaptable to positions for top, front, left or right sensing. This means you can site-adapt sensors to changing application conditions.

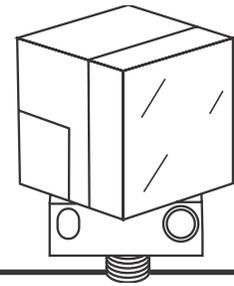
Simplifies Ordering

Because it is "9-sensors-in-one," the DuraProx sensor makes things easy for your Purchasing Department. A single part number replaces as many as five conventional rectangular proximity sensors.



360° Connector Swivel

Allows for convenient cordset routing, especially with 90° cordsets.



- **Designed to Survive the Toughest Automotive Welding Environments**
- **New Extended Range Versions — 25mm Shielded / 35mm Unshielded — Keeps the Sensor Out of Harm's Way**
- **Proprietary High-Temperature Abrasion-Resistant Coating on Sensing Face**
- **Patented Short Circuit Protection**

- **Covered by Namco Lifetime Replacement Program**
- **Rugged metal body and clamp bracket**

The DuraProx sensor is field-configurable to sense in nine different positions: top, front, back, left, right, and four 45° side sense positions.

The DurProx sensor features Namco's famous weld field immune circuit proven reliable the world over in the harshest conditions. Totally epoxy encapsulated, the electronics are truly "automotive grade."

Connector Type	Circuit Description	Housing Dimensions	Non-latching SCP Model No.	Latching SCP Model No.	Maximum Load Current	Leakage Current	Voltage Drop	Short Circuit Protected
15mm SENSING RANGE DC 10-30V (SHIELDED)								
4-pin Mini	3W, PNP, NO	40x40x68.5mm	EE510-90001	EE510-90401	200mA	< 10µA	1.5V	Yes
4-pin Euro	3W, PNP, NO	40x40x68.5mm	EE510-90041	EE510-90441	200mA	< 10µA	1.5V	Yes
20mm SENSING RANGE DC 10-30V (SHIELDED)								
4-pin Mini	3W, PNP, NO	40x40x68.5mm	EE510-91001	EE510-91401	200mA	< 10µA	1.5V	Yes
4-pin Euro	3W, PNP, NO	40x40x68.5mm	EE510-91041	EE510-91441	200mA	< 10µA	1.5V	Yes
25mm SENSING RANGE DC 10-30V (SHIELDED)								
4-pin Mini	3W, PNP, NO	40x40x68.5mm	EE510-93001	EE510-93401	200mA	< 10µA	1.5V	Yes
4-pin Euro	3W, PNP, NO	40x40x68.5mm	EE510-93041	EE510-93441	200mA	< 10µA	1.5V	Yes
25mm SENSING RANGE DC 10-30V (UNSHIELDED)								
4-pin Mini	3W, PNP, NO	40x40x68.5mm	EE510-92001	EE510-92401	200mA	< 10µA	1.5V	Yes
4-pin Euro	3W, PNP, NO	40x40x68.5mm	EE510-92041	EE510-92441	200mA	< 10µA	1.5V	Yes
35mm SENSING RANGE DC 10-30V (UNSHIELDED)								
4-pin Mini	3W, PNP, NO	40x40x68.5mm	EE510-94001	EE510-94401	200mA	< 10µA	1.5V	Yes
4-pin Euro	3W, PNP, NO	40x40x68.5mm	EE510-94041	EE510-94441	200mA	< 10µA	1.5V	Yes
15mm SENSING RANGE AC/DC 20-150V (SHIELDED)								
3-pin Mini	2W, NO	40x40x68.5mm		EE530-90401	200mA	1.7mA	10V	Yes
3-pin Micro	2W, NO	40x40x68.5mm		EE530-90421	200mA	1.7mA	10V	Yes
20mm SENSING RANGE AC/DC 20-150V (SHIELDED)								
3-pin Mini	2W, NO	40x40x68.5mm		EE530-91401	200mA	1.7mA	10V	Yes
3-pin Micro	2W, NO	40x40x68.5mm		EE530-91421	200mA	1.7mA	10V	Yes
25mm SENSING RANGE AC/DC 20-150V (SHIELDED)								
3-pin Mini	2W, NO	40x40x68.5mm		EE530-93401	200mA	1.7mA	10V	Yes
3-pin Micro	2W, NO	40x40x68.5mm		EE530-93421	200mA	1.7mA	10V	Yes
25mm SENSING RANGE AC/DC 20-150V (UNSHIELDED)								
3-pin Mini	2W, NO	40x40x68.5mm		EE530-92401	200mA	1.7mA	10V	Yes
3-pin Micro	2W, NO	40x40x68.5mm		EE530-92421	200mA	1.7mA	10V	Yes
35mm SENSING RANGE AC/DC 20-150V (UNSHIELDED)								
3-pin Mini	2W, NO	40x40x68.5mm		EE530-94401	200mA	1.7mA	10V	Yes
3-pin Micro	2W, NO	40x40x68.5mm		EE530-94421	200mA	1.7mA	10V	Yes



Common Sensor Characteristics

DURAPROX SENSORS		
	2-Wire AC/DC	3-Wire DC
Operating Voltage	20-150 VAC/DC	10-30 VDC
Output Circuit	2-Wire	PNP (Sourcing)
Load Current	200mA	200mA
Leakage Current		< 10µA
No Load Current	<1.7 ma @ 110VAC	< 6mA @ 24 VDC
LED Indicators	RED = POWER GREEN = TARGET	GREEN = POWER AMBER = TARGET
Voltage Drop	<10V @ 200ma	<1.5V @ 200mA
Switching Speed	10 Hz	150 Hz
Range Accuracy		±10%
Temperature Range		-25°C to +70°C
Temperature Drift		±15% max.
Hysteresis		3% - 8% typical, 15% max.
Enclosure Type		IP67
Mis-Wire Protected		YES
Short-Circuit Protected		YES
Weld Field Immune		YES

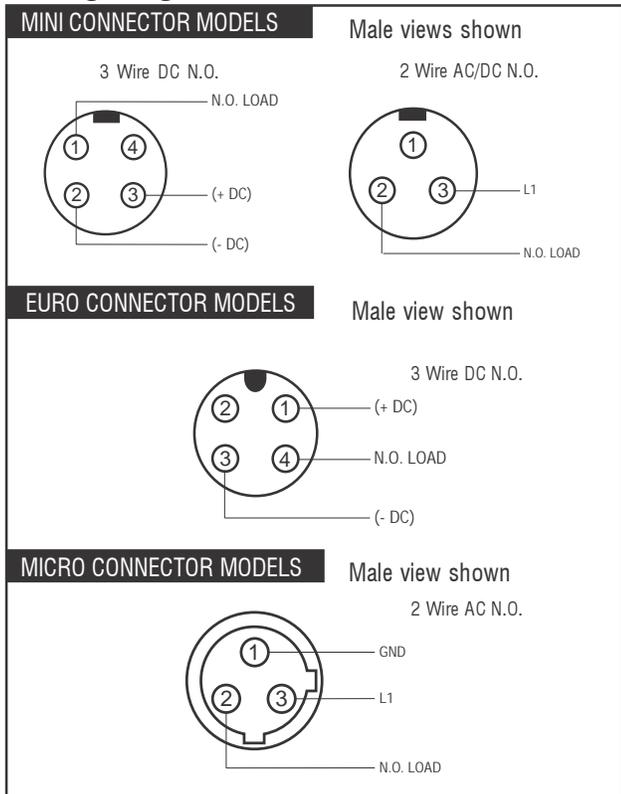
LED Functions

	2 Wire AC/DC		3 Wire DC	
	Red	Green	Green	Amber
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	Both Flashing		Both Flashing	

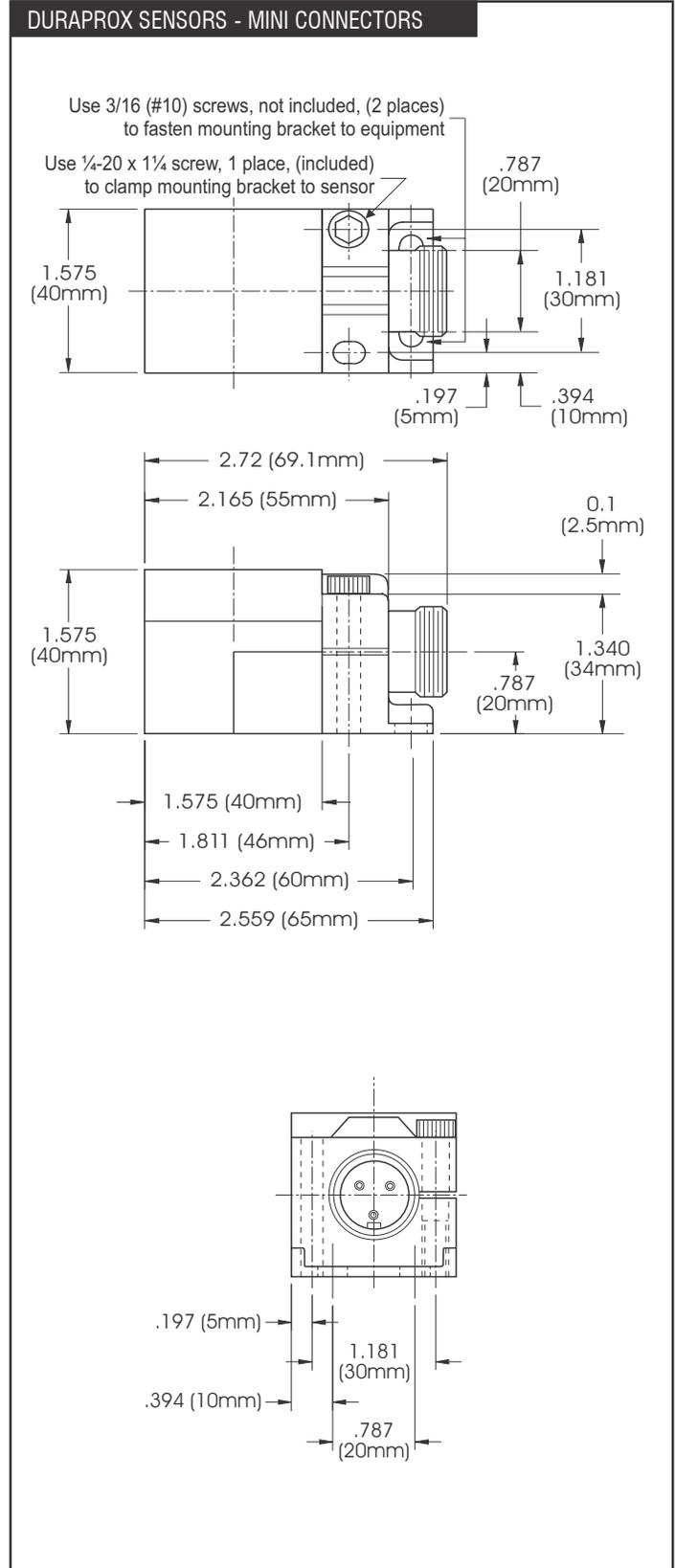
*Short Circuit Protection: If the sensor is shorted, the sensor's Short Circuit Protection (SCP) will be activated. When this occurs, both LEDs will flash and the sensor will limit current flow to about 2.0mA.

- Namco 2-wire AC/DC sensors are bipolar by design - they cannot be mis-wired.
- Namco 3-wire DC sensors incorporate reverse polarity protection.

Wiring Diagrams



Dimensional Drawings



NAMCO

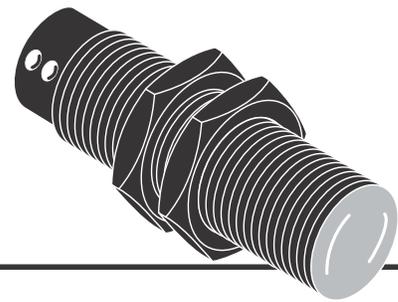
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**Weld
Field
Immune**

DuraProx™ Hardcoat 18mm Tubular

**DC
AC/DC**



Proximity Sensors

- **Weld Field and Electrical Noise Immunity**
- **Standard Latching Short Circuit Protection (SCP), Non-Latching SCP available for DC models only**
- **Proprietary High-Temperature Abrasion-Resistant Coating on Sensing Face**
- **New Hardcoat housings are resistant to weld expulsion**

These sensors are specifically designed for extreme duty use in harsh applications (i.e., automotive fabrication, assembly plants, etc.). The tubular series is popular as part present and machine location sensors for demanding applications such as resistance welding of body assemblies. Namco's proprietary Hardcoat housings and high-temperature abrasion-resistant coating on sensing face resists weld slag build-up more than 10 TIMES LONGER than standard proxes.

Connector Type	Circuit Description	Housing Material	Housing Length	Shielded Model No.	Unshielded Model No.	Maximum Load Current	Leakage Current	Voltage Drop*	Maximum Switching Frequency		Short Circuit Protected
									Shielded	Unshielded	
18mm WFI DC 10-30V DuraProx Hardcoat, 5mm (Shielded) and 8mm (Unshielded) Sensing Ranges											
4-pin Euro	3W, PNP, NO	Metal-HC**	76mm	EE510-73443	EE510-72443	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Latching
4-pin Euro	3W, PNP, NO	Metal-HC**	76mm	EE510-73043	EE510-72043	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Non-Latching
90° 4-pin Euro	3W, PNP, NO	Metal-HC**	67mm	EE510-73453	EE510-72453	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Latching
90° 4-pin Euro	3W, PNP, NO	Metal-HC**	76mm	EE510-73053	EE510-72053	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Non-Latching
4-pin Mini	3W, PNP, NO	Metal-HC**	76mm	EE510-73403	EE510-72403	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Latching
4-pin Mini	3W, PNP, NO	Metal-HC**	76mm	EE510-73003	EE510-72003	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Non-Latching
90° 4-pin Mini	3W, PNP, NO	Metal-HC**	67mm	EE510-73423	EE510-72423	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Latching
90° 4-pin Mini	3W, PNP, NO	Metal-HC**	76mm	EE510-73023	EE510-72023	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Non-Latching
18mm WFI AC/DC 20-230V DuraProx Hardcoat, 5mm (Shielded) and 8mm (Unshielded) Sensing Ranges											
3-pin Mini	2W, NO	Metal-HC**	76mm	EE530-73403	EE530-72403	500mA	1.7mA	< 10V	16Hz	16Hz	Latching
3-pin Mini	2W, NO	Metal-HC**	76mm	EE560-73403	EE560-72403	500mA	4.5mA	< 10V	16Hz	16Hz	Latching
3-pin Micro	2W, NO	Metal-HC**	76mm	EE530-73433	EE530-72433	500mA	1.7mA	< 10V	16Hz	16Hz	Latching
90° 3-pin Mini	2W, NO	Metal-HC**	67mm	EE530-73423	EE530-72423	500mA	1.7mA	< 10V	16Hz	16Hz	Latching
90° 3-pin Mini	2W, NO	Metal-HC**	67mm	EE560-73423	EE560-72423	500mA	4.5mA	< 10V	16Hz	16Hz	Latching

* Across conducting sensor
 ** Hard Coat: Weld spatter resistant
 *** Non-hardcoat versions

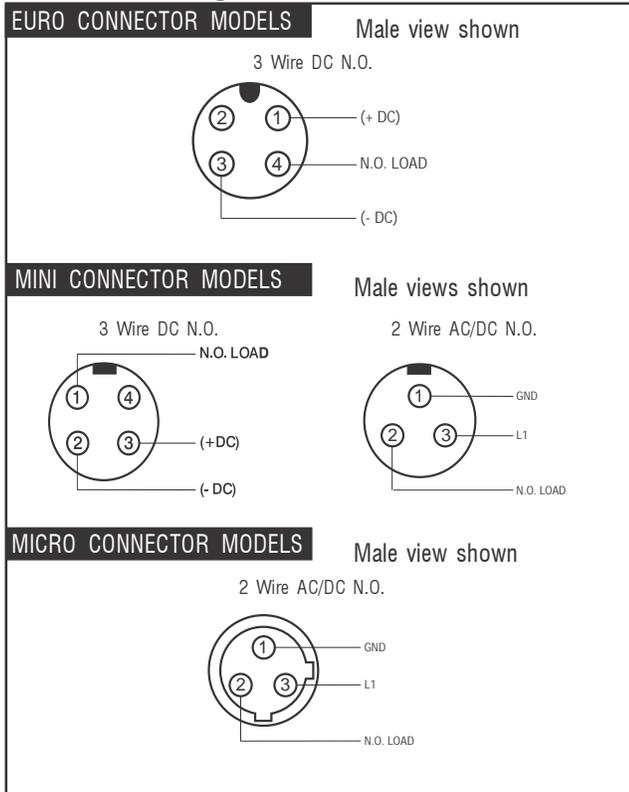
► Consult factory for normally closed model availability.



Common Sensor Characteristics

18mm DIAMETER WFI SENSORS		
	18mm	12mm
Shielded Sensing Range ($\pm 10\%$)	5mm	2mm
Unshielded Sensing Range ($\pm 10\%$)	8mm	4mm
Short Circuit Protection	yes	yes
Repeatability	$< \pm 1\%$	
Hysteresis	3-10%	
Temperature Drift (max.)	$\pm 10\%$	
Ambient Temperature Range	-4°F to +158°F	
Reverse Polarity Protected	yes	
Current Consumption (3-wire DC only)	10mA	
NEMA Enclosure Type	1, 3, 4, 6, 13	
LED Indicator (AC/DC)	red = power, grn = target	
LED Indicator (DC)	grn = pwr, Amber = target	
Metal Housings	Weld Flash Proof	
Shipping Weight	4 oz.	

Circuit Drawings

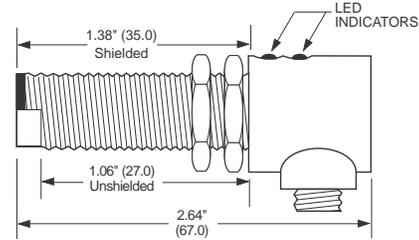
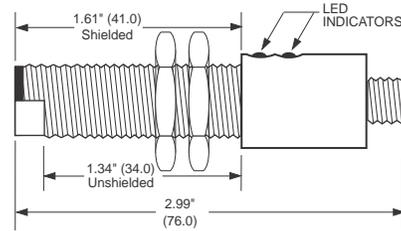


Dimensional Drawings

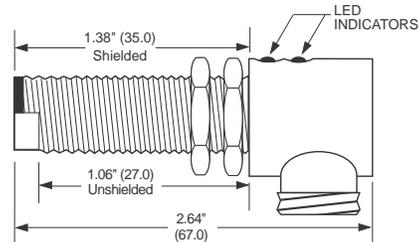
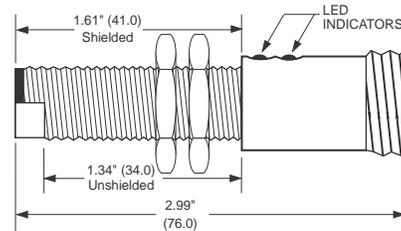
18mm-WFI

18mm EURO CONNECTOR

Body threads = M18x1



18mm MINI CONNECTOR



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Field
Immune**

DuraProx™ Hardcoat 30mm Tubular

**DC
AC/DC**



Proximity Sensors

- **Weld Field and Electrical Noise Immunity**
- **Standard Latching Short Circuit Protection (SCP), Non-Latching SCP available for DC models only.**
- **Dual LED indicators**
- **Predictable, consistent electrical performance**
- **Proprietary High-Temperature Abrasion-Resistant Coating on Sensing Face**
- **100% tested & burned-in**
- **New Hardcoat housings are resistant to weld expulsion**

These sensors are specifically designed for extreme duty use in harsh applications (i.e., automotive fabrication, assembly plants, etc.). The tubular series is popular as part present and machine location sensors for demanding applications such as resistance welding of body assemblies. Namco's proprietary Hardcoat housings will not allow the hot weld expulsion to adhere to the housing.

10mm (Shielded) and 15mm (Unshielded) Sensing Range

Connector Type	Circuit Description	Housing Material	Housing Length	Shielded Model No.	Unshielded Model No.	Maximum Load Current	Leakage Current	Voltage Drop*	Maximum Switching Frequency		Short Circuit Protected
									Shielded	Unshielded	
WFI DC 10-30V											
4-pin Euro	3W, PNP, NO	Metal-HC	76mm	EE510-77443	EE510-76443	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Latching
4-pin Mini	3W, PNP, NO	Metal-HC	76mm	EE510-77403	EE510-76403	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Latching
4-pin Euro	3W, PNP, NO	Metal-HC	76mm	EE510-77043	EE510-76043	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Non-Latching
4-pin Mini	3W, PNP, NO	Metal-HC	76mm	EE510-77003	EE510-76003	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Non-Latching
WFI AC/DC 20-230V											
3-pin Mini	2W, AC/DC, NO,LL	Metal-HC	76mm	EE530-77403	EE530-76403	500mA	1.7mA	<10V	16Hz	16Hz	Latching
3-pin Mini	2W, AC/DC, NO, HL	Metal-HC	76mm	EE560-77403	EE560-76403	500mA	4.5mA	<10V	16Hz	16Hz	Latching
3-pin Micro	2W, AC/DC, NO	Metal-HC	76mm	EE530-77433	EE530-76433	500mA	1.7mA	<10V	16Hz	16Hz	Latching

* Across conducting sensor

► Consult factory for normally closed model availability.



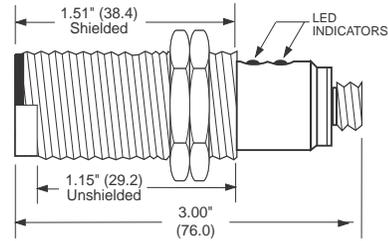
Common Sensor Characteristics

Shielded Sensing Range ($\pm 10\%$)	10mm
Unshielded Sensing Range ($\pm 10\%$)	15mm
Short Circuit Protection	yes
Repeatability	$< \pm 1\%$
Hysteresis	3-10%
Range Drift over Temperature	$\pm 10\%$
Operating Temperature Range	-4°F to +158°F
Reverse Polarity Protected	yes
Current Consumption (3-wire DC only)	10mA
NEMA Enclosure Type	1, 3, 4, 6, 13
LED Indicator (AC/DC)	red = pwr, green = target
LED Indicator (DC)	green = pwr, amber = target
Metal Housings	Weld Flash Proof
Shipping Weight	5 oz.

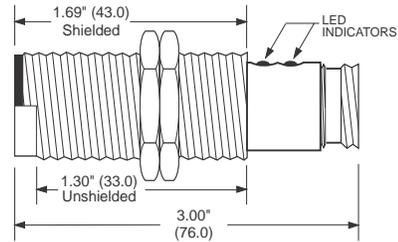
Dimensional Drawings

EURO/MICRO CONNECTOR MODELS

Body threads = M30x1.5



MINI CONNECTOR MODELS

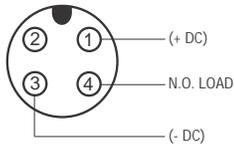


Circuit Drawings

EURO CONNECTOR MODELS

Male view shown

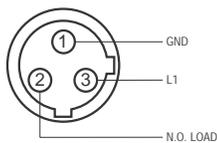
3 Wire DC N.O.



MICRO CONNECTOR MODELS

Male view shown

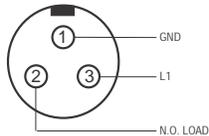
2 Wire AC/DC N.O.



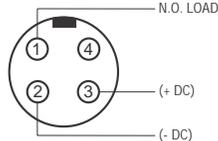
MINI CONNECTOR MODELS

Male views shown

2 Wire AC/DC N.O.



3 Wire DC N.O.



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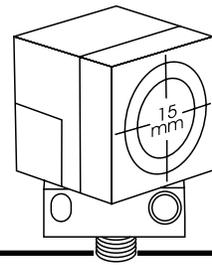
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**Weld
Field
Immune**

HammerHead™

9-Way Configurable Proximity Sensors

**DC
AC/DC**



Proximity Sensors

- Nine-way position flexibility
- Weld Field Immune circuitry is designed to operate within 1" of a resistance welding electrode carrying 20,000 Amperes RMS (45,000 Amp. peak) without changing state
- Will not exhibit false turn-ons from walkie-talkies or other in-plant sources of RF noise
- Patented Short Circuit Protection

- Covered by Namco Lifetime Replacement Program
- Rugged metal body and clamp bracket

The HammerHead sensor is field-configurable to sense in nine different positions: top, front, back, left, right, and four 45° side sense positions.

The HammerHead sensor features Namco's famous weld field immune circuit proven reliable the world over in the harshest conditions. Totally epoxy encapsulated, the electronics are truly "automotive grade."

Connector Type	Circuit Description	Housing Dimensions	Non-latching SCP Model No.	Latching SCP Model No.	Maximum Load Current	Leakage Current	Voltage Drop	Short Circuit Protected
15mm SENSING RANGE DC 10-30V (SHIELDED)								
4-pin Mini	3W, PNP, NO	40x40x68.5mm	EE510-90000	EE510-90400	200mA	< 10µA	2.5V	Yes
4-pin Euro	3W, PNP, NO	40x40x68.5mm	EE510-90040	EE510-90440	200mA	< 10µA	2.5V	Yes
20mm SENSING RANGE DC 10-30V (SHIELDED)								
4-pin Mini	3W, PNP, NO	40x40x68.5mm	EE510-91000	EE510-91400	200mA	< 10µA	2.5V	Yes
4-pin Euro	3W, PNP, NO	40x40x68.5mm	EE510-91040	EE510-91440	200mA	< 10µA	2.5V	Yes
25mm SENSING RANGE DC 10-30V (SHIELDED)								
4-pin Mini	3W, PNP, NO	40x40x68.5mm	EE510-93000	EE510-93400	200mA	< 10µA	2.5V	Yes
4-pin Euro	3W, PNP, NO	40x40x68.5mm	EE510-93040	EE510-93440	200mA	< 10µA	2.5V	Yes
25mm SENSING RANGE DC 10-30V (UNSHIELDED)								
4-pin Mini	3W, PNP, NO	40x40x68.5mm	EE510-92000	EE510-92400	200mA	< 10µA	2.5V	Yes
4-pin Euro	3W, PNP, NO	40x40x68.5mm	EE510-92040	EE510-92440	200mA	< 10µA	2.5V	Yes
35mm SENSING RANGE DC 10-30V (UNSHIELDED)								
4-pin Mini	3W, PNP, NO	40x40x68.5mm	EE510-94000	EE510-94400	200mA	< 10µA	2.5V	Yes
4-pin Euro	3W, PNP, NO	40x40x68.5mm	EE510-94040	EE510-94440	200mA	< 10µA	2.5V	Yes
15mm SENSING RANGE AC/DC 20-150V (SHIELDED)								
3-pin Mini	2W, NO	40x40x68.5mm		EE530-90400	200mA	1.7mA	10V	Yes
3-pin Micro	2W, NO	40x40x68.5mm		EE530-90420	200mA	1.7mA	10V	Yes
20mm SENSING RANGE AC/DC 20-150V (SHIELDED)								
3-pin Mini	2W, NO	40x40x68.5mm		EE530-91400	200mA	1.7mA	10V	Yes
3-pin Micro	2W, NO	40x40x68.5mm		EE530-91420	200mA	1.7mA	10V	Yes
25mm SENSING RANGE AC/DC 20-150V (SHIELDED)								
3-pin Mini	2W, NO	40x40x68.5mm		EE530-93400	200mA	1.7mA	10V	Yes
3-pin Micro	2W, NO	40x40x68.5mm		EE530-93420	200mA	1.7mA	10V	Yes
25mm SENSING RANGE AC/DC 20-150V (UNSHIELDED)								
3-pin Mini	2W, NO	40x40x68.5mm		EE530-92400	200mA	1.7mA	10V	Yes
3-pin Micro	2W, NO	40x40x68.5mm		EE530-92420	200mA	1.7mA	10V	Yes
35mm SENSING RANGE AC/DC 20-150V (UNSHIELDED)								
3-pin Mini	2W, NO	40x40x68.5mm		EE530-94400	200mA	1.7mA	10V	Yes
3-pin Micro	2W, NO	40x40x68.5mm		EE530-94420	200mA	1.7mA	10V	Yes



Common Sensor Characteristics

HAMMERHEAD SENSORS		
	2 Wire AC/DC	3 Wire DC
Supply Voltage	20-150V	10-30V
Voltage Drop	10V	2.5V
Max. Load Current	200mA	200mA
Current Consumption	N/A	11mA
Leakage Current	1.7mA	< 10µA
Mis-wiring Protected	Yes ¹	Yes ²
Response Time	30ms	30ms
Output Circuit	2 Wire	Sourcing
Ambient Temperature Range	-25°C to 70°C (-13°F to 158°F)	

LED Functions

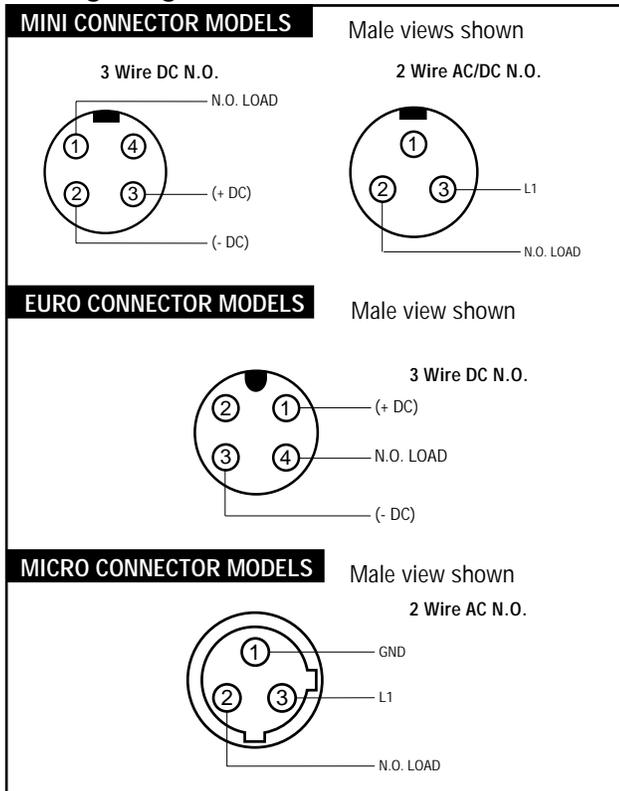
	2 Wire AC/DC		3 Wire DC	
	Red	Green	Green	Amber
Power Off	Off	Off	Off	Off
Power On Load De-energized	On	Off	On	Off
Power On Load Energized	Off	On	On	On
*SCP Mode Activated	Both Flashing		Both Flashing	

*Short Circuit Protection: If the sensor is shorted, the sensor's Short Circuit Protection (SCP) will be activated. When this occurs, both LEDs will flash and the sensor will limit current flow to about 2.0mA.

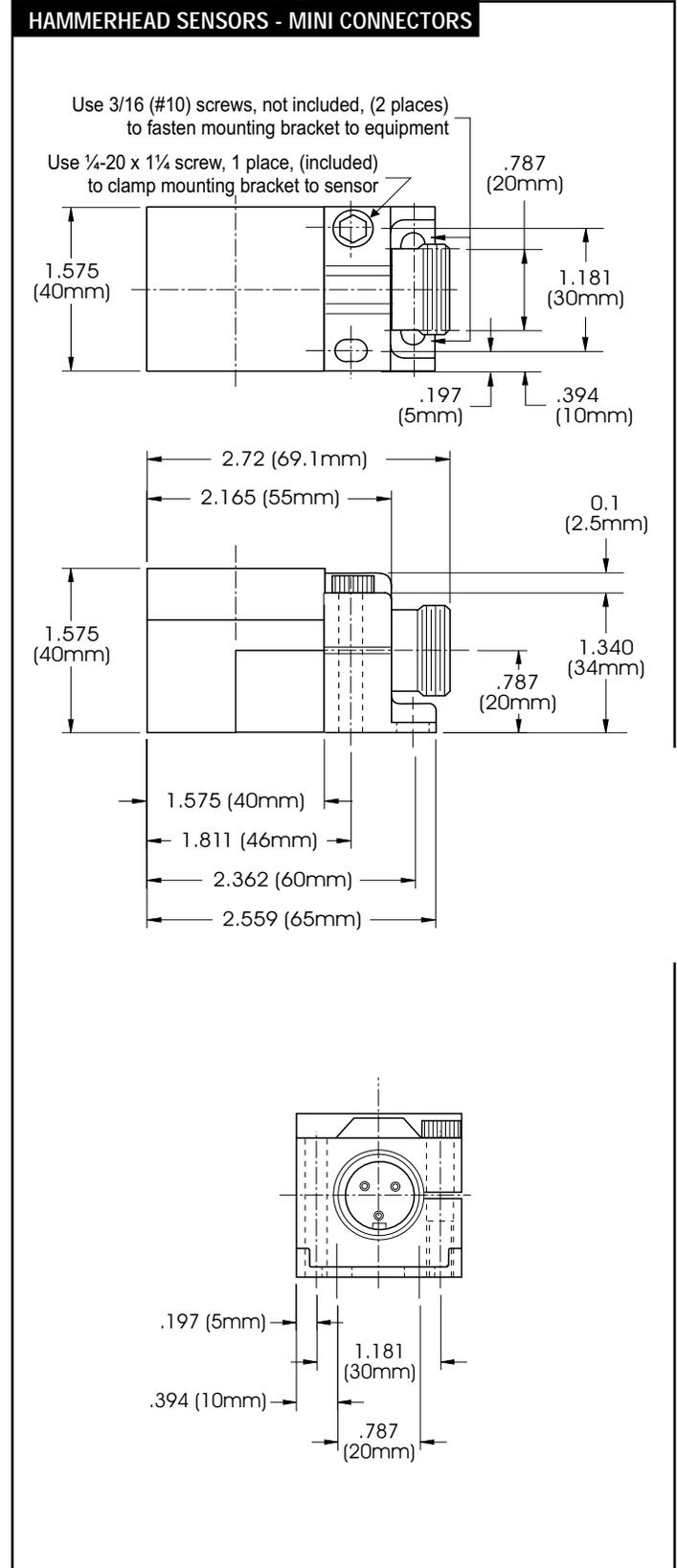
¹ Namco 2-wire AC/DC sensors are bipolar by design - they cannot be mis-wired.

² Namco 3-wire DC sensors incorporate reverse polarity protection.

Wiring Diagrams



Dimensional Drawings DC, AC/DC



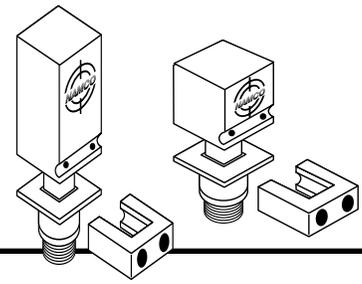
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Immune**

Inductive Rotatable Rectangular

**DC
AC/DC**



Proximity Sensors

- Weld Field and Electrical Noise Immunity
- Predictable, Consistent Performance
- 100% Tested and Burned-in
- New Ultra Long Range models in latching and non-latching

These sensors are specifically designed for extreme duty use in harsh applications such as automotive fabrication and assembly plants. The rectangular series has been the standard of the automotive industry for over 25 years. In that time several different versions, all with a common mounting, have been developed for use as part present and machine location sensors. In addition, specific accessories have been developed to make these sensors even more reliable in your application.

0.5"/1.0" Range (Unshielded) Rotatable Sensors

Connector Type	Circuit Description	Front Sense**	Top Sense	Maximum Load Current	Leakage Current	Voltage Drop*	Short Circuit Protected	Inrush Current
SHORT HOUSING DC 10-30V 0.5" Range								
4-pin Euro	3W, PNP, NO	EE510-15440	EE510-19440	200mA	10µA	2.0V @ 100mA	Latching	N/A
4-pin Euro	3W, PNP, NO	EE510-15040	EE510-19040	200mA	10µA	2.0V @ 100mA	Non-Latching	N/A
4-pin Mini	3W, PNP, NO	EE510-15400	EE510-19400	200mA	10µA	2.0V @ 100mA	Latching	N/A
4-pin Mini	3W, PNP, NO	EE510-15000	EE510-19000	200mA	10µA	2.0V @ 100mA	Non-Latching	N/A
SHORT HOUSING AC/DC 20-230V 0.5" Range								
3-pin Mini	2W, NO, LL	EE530-15400	EE530-19400	500mA	1.7mA	<10V	Latching	3A (20ms)
3-pin Micro	2W, NO, LL	EE530-15420	EE530-19420	500mA	1.7mA	<10V	Latching	3A (20ms)
LONG HOUSING DC 10-30V 0.5" Range								
4-pin Euro	3W, PNP, NO	EE510-10440	EE510-14440	200mA	10µA	2.0V @ 100mA	Latching	N/A
4-pin Euro	3W, PNP, NO	EE510-10040	EE510-14040	200mA	10µA	2.0V @ 100mA	Non-Latching	N/A
4-pin Mini	3W, PNP, NO	EE510-10400	EE510-14400	200mA	10µA	2.0V @ 100mA	Latching	N/A
4-pin Mini	3W, PNP, NO	EE510-10000	EE510-14000	200mA	10µA	2.0V @ 100mA	Non-Latching	N/A
8' Cable	3W, PNP, NO	EE510-10415	EE510-14415	200mA	10µA	2.0V @ 100mA	Latching	N/A
8' Cable	3W, PNP, NO	EE510-10015	EE510-14015	200mA	10µA	2.0V @ 100mA	Non-Latching	N/A
LONG HOUSING AC/DC 20-230V 0.5" Range								
3-pin Mini	2W, NO, LL	EE530-10400	EE530-14400	500mA	1.7mA	<10V	Latching	3A (20ms)
3-pin Micro	2W, NO, LL	EE530-10420	EE530-14420	500mA	1.7mA	<10V	Latching	3A (20ms)
LONG HOUSING DC 10-30V 1.0" Range								
4-pin Euro	3W, PNP, NO	EE510-30440	EE510-34440	200mA	10µA	2.0V @ 100mA	Latching	N/A
4-pin Euro	3W, PNP, NO	EE510-30040	EE510-34040	200mA	10µA	2.0V @ 100mA	Non-Latching	N/A
LONG HOUSING AC/DC 20-150V 1.0" Range								
3-pin Mini	2W, NO, LL	EE530-30400	EE530-34400	200mA	1.7mA	<10V	Latching	1.5A

* Across conducting sensor

** Rotate for left or right sense.

- ▶ "LL" indicates *Low Leakage*
- ▶ Consult factory for normally closed and *High Leakage* model availability.



Common Sensor Characteristics

ROTATABLE INDUCTIVE RECTANGULAR SENSORS	
Nominal Sensing Range ($\pm 10\%$)	0.5"/1.0"*
Short Circuit Protection	yes
Repeatability	$< \pm 1\%$
Hysteresis	3-10%
Temperature Drift (max.)	$\pm 10\%$
Ambient Temperature Range	-4°F to +158°F
Reverse Polarity Protected	yes
Current Consumption (3-wire DC only)	10mA
LED Indicator (AC/DC)	red = pwr, green = target
LED Indicator (DC)	green = pwr, amber = target
Housing	Weld Flash Resistant
Cable Type	PVC
Shipping Weight	Connector model: 6 oz. Cable model: 11 oz.
Maximum Switching Frequency	16Hz

* 1" range is for the Ultra Long Range models only

Circuit Drawings

EURO CONNECTOR MODELS Male view shown

MINI CONNECTOR MODELS Male views shown

CABLE MODELS

Dimensional Drawings

ROTATABLE SENSORS – SHORT HOUSING

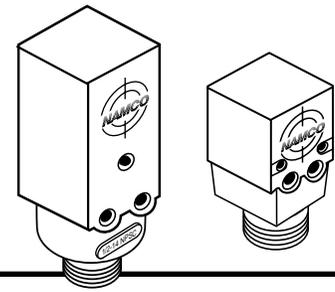
ROTATABLE SENSORS – LONG HOUSING Rectangular/Ultra Long Range models

Proximity Sensors



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- Predictable, Consistent Electrical Performance
- 100% Tested and Burned-in
- Weld Spatter Resistant Housings Will Not Support Combustion
- Standard Latching Short Circuit Protection (SCP), Non-Latching SCP Available for DC Models only

These sensors are specifically designed for extreme duty use in harsh applications such as automotive fabrication and assembly plants. The rectangular series has been the standard of the automotive industry for over 25 years. In that time several different versions, all with a common mounting, have been developed for use as part present and machine location sensors. In addition, specific accessories have been developed to make these sensors even more reliable in your application.

0.5" Range (Unshielded) Thermoset Sensors

Connector Type	Circuit Description	Front Sense Model No.	Left Sense Model No.	Right Sense Model No.	Top Sense Model No.	Maximum Load Current	Leakage Current	Voltage Drop*	Short Circuit Protected	Inrush Current
SHORT HOUSING DC 10-30V										
4-pin Euro	3W, PNP, NO	EE510-55440	EE510-56440	EE510-58440	EE510-59440	200mA	10µA	2.0V @ 100mA	Latching	N/A
4-pin Euro	3W, PNP, NO	EE510-55040	EE510-56040	EE510-58040	EE510-59040	200mA	10µA	2.0V @ 100mA	Non-Latching	N/A
SHORT HOUSING AC/DC 20-230V										
3-pin Mini	2W, NO, LL	EE530-55400	EE530-56400	EE530-58400	EE530-59400	500mA	1.7mA	<10V	Latching	3A (20ms)
3-pin Mini	2W, NO, HL	EE560-55400	EE560-56400	EE560-58400	EE560-59400	500mA	4.5mA	<10V	Latching	3A (20ms)
LONG HOUSING DC 10-30V										
4-pin Mini	3W, PNP, NO	EE510-50400	EE510-51400	EE510-53400	EE510-54400	200mA	10µA	2.0V @ 100mA	Latching	N/A
4-pin Mini	3W, PNP, NO	EE510-50000	EE510-51000	EE510-53000	EE510-54000	200mA	10µA	2.0V @ 100mA	Non-Latching	N/A
4-pin Euro	3W, PNP, NO	EE510-50440	EE510-51440	EE510-53440	EE510-54440	200mA	10µA	2.0V @ 100mA	Latching	N/A
4-pin Euro	3W, PNP, NO	EE510-50040	EE510-51040	EE510-53040	EE510-54040	200mA	10µA	2.0V @ 100mA	Non-Latching	N/A
LONG HOUSING AC/DC 20-230V										
3-pin Mini	2W, NO, LL	EE530-50400	EE530-51400	EE530-53400	EE530-54400	500mA	1.7mA	<10V	Latching	3A (20ms)
3-pin Mini	2W, NO, HL	EE560-50400	EE560-51400	EE560-53400	EE560-54400	500mA	4.5mA	<10V	Latching	3A (20ms)
8' Cable	2W, NO, HL	EE560-50415	EE560-51415	EE560-53415	EE560-54415	500mA	4.5mA	<10V	Latching	3A (20ms)
LONG HOUSING AC/DC 20-230V DUAL SENSING										
5-pin Mini	2W, NO, LL	EE530-65500	-	-	-	500mA	1.7mA	<10V	Latching	3A (20ms)
5-pin Mini	2W, NO, HL	EE560-65500	-	-	-	500mA	4.5mA	<10V	Latching	3A (20ms)

* Across conducting sensor

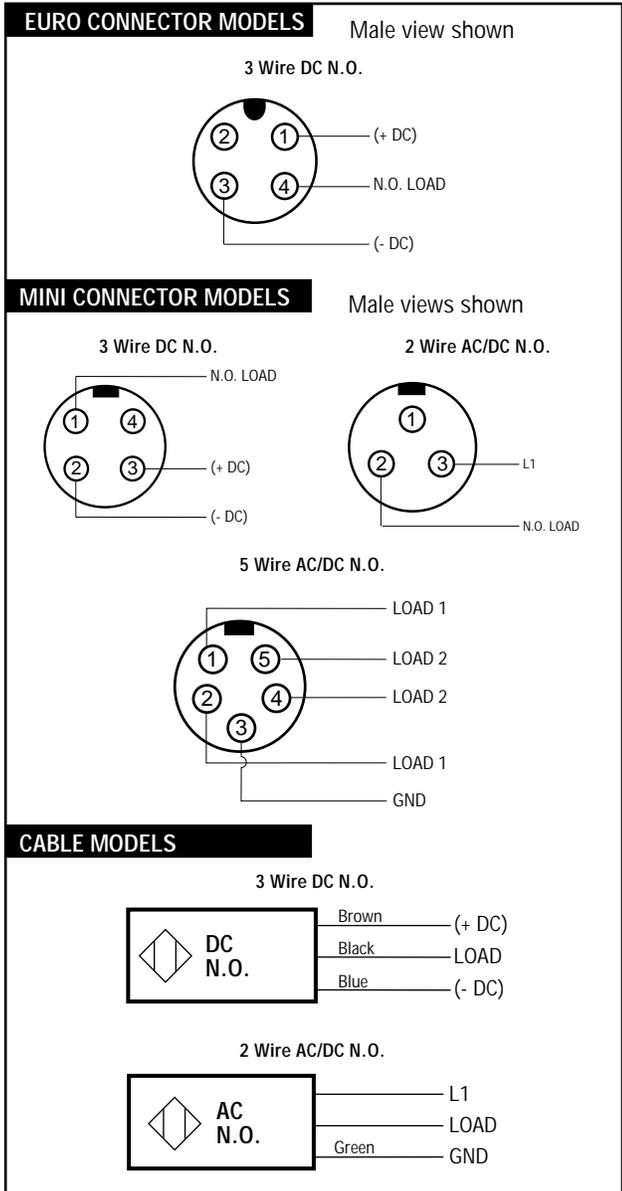
- ▶ "LL" indicates *Low Leakage* and "HL" indicates *High Leakage*.
- ▶ Consult factory for normally closed model availability.



Common Sensor Characteristics

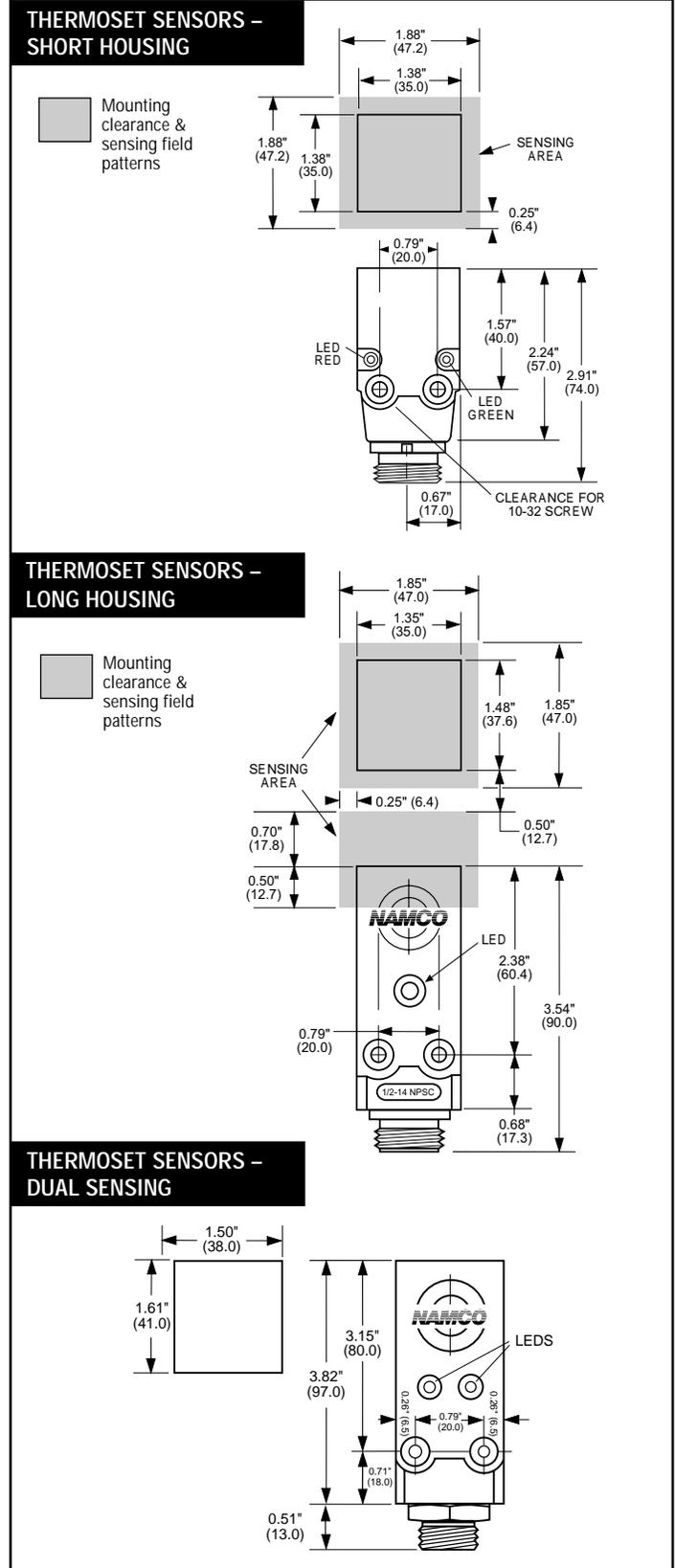
THERMOSET INDUCTIVE RECTANGULAR SENSORS	
Nominal Sensing Range ($\pm 10\%$)	0.5"
Short Circuit Protection	yes
Repeatability	$< \pm 1\%$
Hysteresis	3-10%
Temperature Drift (max.)	$\pm 10\%$
Ambient Temperature Range	-4°F to +158°F
Reverse Polarity Protected	yes
Current Consumption (3-wire DC only)	10mA
LED Indicator (AC/DC)	red = pwr, green = target
LED Indicator (DC)	green = pwr, amber = target
Housing	Weld Flash Proof
Cable Type	PVC
Shipping Weight	6 oz.
Maximum Switching Frequency	16Hz

Circuit Drawings



Dimensional Drawings

DC, AC/DC



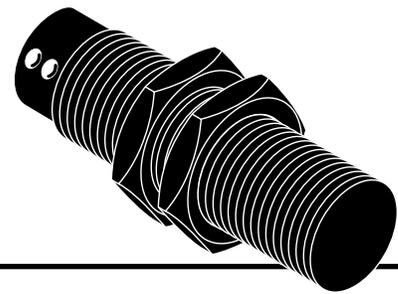
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12mm
18mm

Inductive Tubular Threaded Barrel

Weld Field Immune



Proximity Sensors

- Weld Field and Electrical Noise Immunity
- Standard Latching Short Circuit Protection (SCP), Non-Latching SCP available for DC models only
- Predictable, consistent electrical performance
- New Hardcoat housings are resistant to weld expulsion

These sensors are specifically designed for extreme duty use in harsh applications (i.e., automotive fabrication, assembly plants, etc.). The tubular series is popular as part present and machine location sensors for demanding applications such as resistance welding of body assemblies. Namco's proprietary Hardcoat housings will not allow the hot weld expulsion to adhere to the housing.

Connector Type	Circuit Description	Housing Material	Housing Length	Shielded Model No.	Unshielded Model No.	Maximum Load Current	Leakage Current	Voltage Drop*	Maximum Switching Frequency		Short Circuit Protected
									Shielded	Unshielded	
12mm WFI DC 10-30V Hardcoat, 2mm (Shielded) and 4mm (Unshielded) Sensing Ranges)											
4-pin Euro	3W, PNP, NO	Metal-HC**	76mm	EE510-78442	EE510-79442	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Latching
4-pin Euro	3W, PNP, NO	Metal-HC**	76mm	EE510-78042	EE510-79042	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Non-Latching
18mm WFI DC 10-30V Hardcoat, 5mm (Shielded) and 8mm (Unshielded) Sensing Ranges)											
4-pin Euro	3W, PNP, NO	Metal-HC**	76mm	EE510-73442	EE510-72442	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Latching
4-pin Euro	3W, PNP, NO	Metal-HC**	76mm	EE510-73042	EE510-72042	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Non-Latching
90° 4-pin Euro	3W, PNP, NO	Metal-HC**	67mm	EE510-73452	EE510-72452	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Latching
90° 4-pin Euro	3W, PNP, NO	Metal-HC**	76mm	EE510-73052	EE510-72052	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Non-Latching
4-pin Mini	3W, PNP, NO	Metal-HC**	76mm	EE510-73402	EE510-72402	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Latching
4-pin Mini	3W, PNP, NO	Metal-HC**	76mm	EE510-73002	EE510-72002	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Non-Latching
90° 4-pin Mini	3W, PNP, NO	Metal-HC**	67mm	EE510-73422	EE510-72422	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Latching
90° 4-pin Mini	3W, PNP, NO	Metal-HC**	76mm	EE510-73022	EE510-72022	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Non-Latching
18mm WFI AC/DC 20-230V Hardcoat, 5mm (Shielded) and 8mm (Unshielded) Sensing Ranges)											
3-pin Mini	2W, NO	Metal-HC**	76mm	EE530-73402	EE530-72402	500mA	1.7mA	<10V	16Hz	16Hz	Latching
3-pin Mini	2W, NO	Metal-HC**	76mm	EE560-73402	EE560-72402	500mA	4.5mA	<10V	16Hz	16Hz	Latching
3-pin Micro	2W, NO	Metal-HC**	76mm	EE530-73432	EE530-72432	500mA	1.7mA	<10V	16Hz	16Hz	Latching
90° 3-pin Mini	2W, NO	Metal-HC**	67mm	EE530-73422	EE530-72422	500mA	1.7mA	<10V	16Hz	16Hz	Latching
90° 3-pin Mini	2W, NO	Metal-HC**	67mm	EE560-73422	EE560-72422	500mA	4.5mA	<10V	16Hz	16Hz	Latching

* Across conducting sensor

** Hard Coat: Weld spatter resistant

*** Non-hardcoat versions

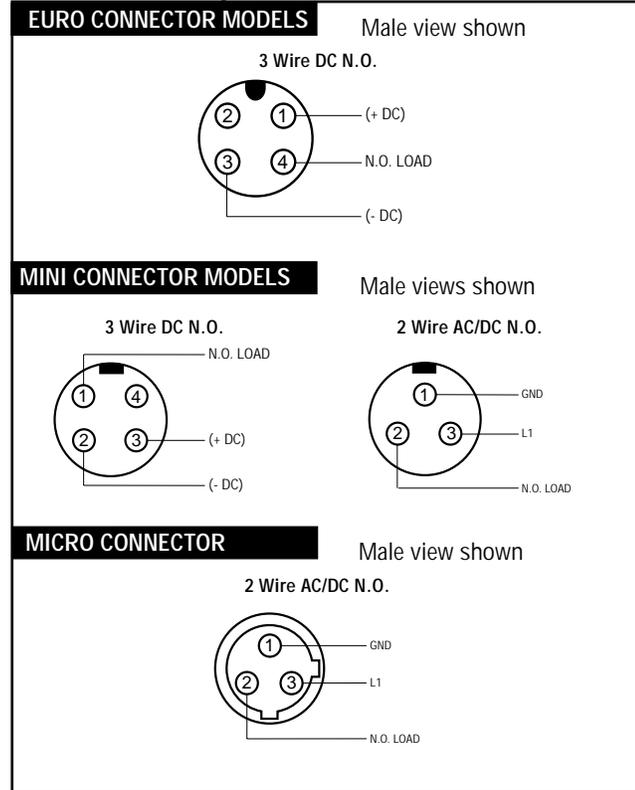
► Consult factory for normally closed model availability.



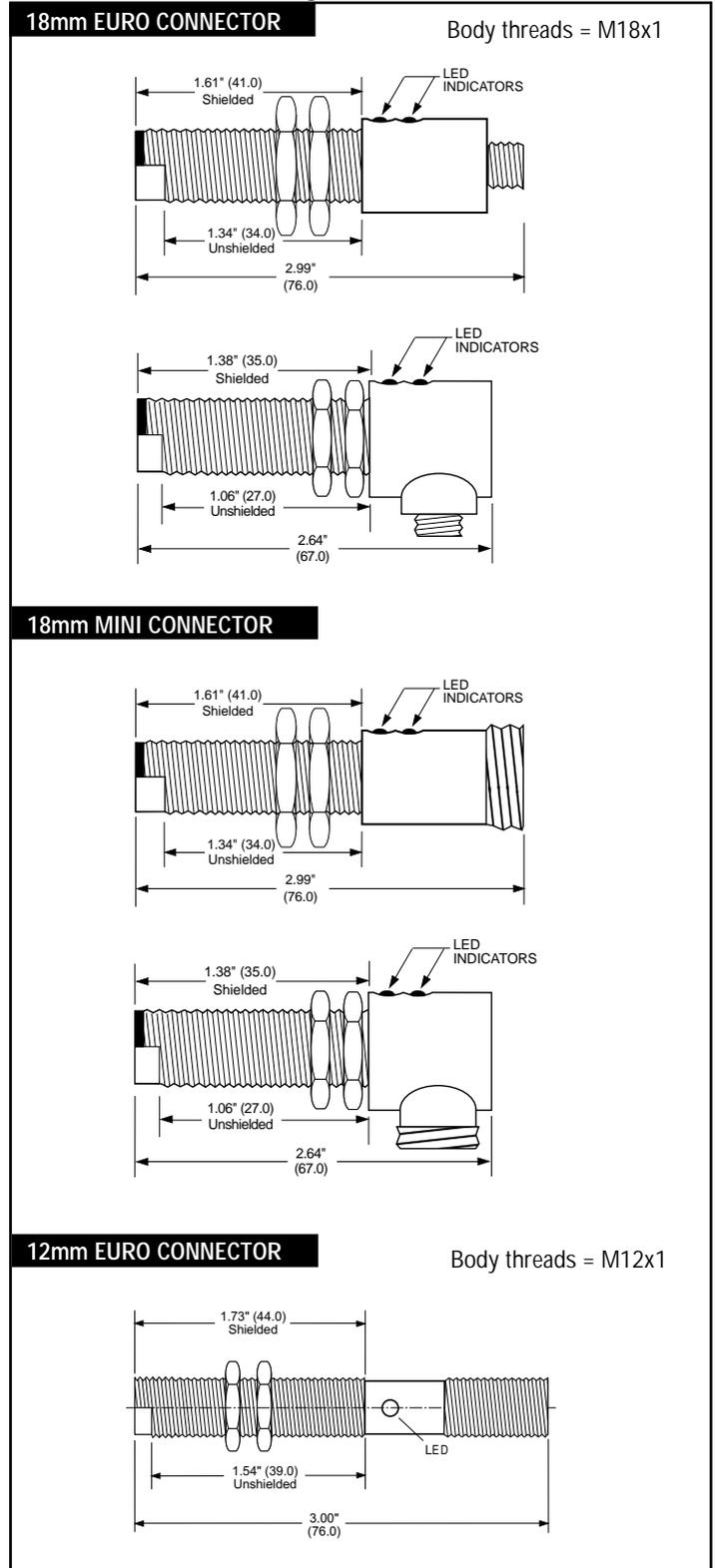
Common Sensor Characteristics

18mm DIAMETER WFI SENSORS		
	18mm	12mm
Shielded Sensing Range ($\pm 10\%$)	5mm	2mm
Unshielded Sensing Range ($\pm 10\%$)	8mm	4mm
Short Circuit Protection	yes	yes
Repeatability	$< \pm 1\%$	
Hysteresis	3-10%	
Temperature Drift (max.)	$\pm 10\%$	
Ambient Temperature Range	-4°F to +158°F	
Reverse Polarity Protected	yes	
Current Consumption (3-wire DC only)	10mA	
NEMA Enclosure Type	1, 3, 4, 6, 13	
LED Indicator (AC/DC)	red = power, grn = target	
LED Indicator (DC)	grn = pwr, Amber = target	
Metal Housings	Weld Flash Proof	
Shipping Weight	4 oz.	

Circuit Drawings



Dimensional Drawings 12/18mm-WFI



Proximity Sensors



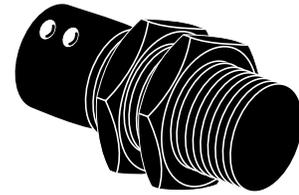
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30mm

Inductive Tubular Threaded Barrel

Weld Field Immune



Proximity Sensors

- Weld Field and Electrical Noise Immunity
- Standard Latching Short Circuit Protection (SCP), Non-Latching SCP available for DC models only.
- Dual LED indicators
- Predictable, consistent electrical performance
- 100% tested & burned-in
- New Hardcoat housings are resistant to weld expulsion

These sensors are specifically designed for extreme duty use in harsh applications (i.e., automotive fabrication, assembly plants, etc.). The tubular series is popular as part present and machine location sensors for demanding applications such as resistance welding of body assemblies. Namco's proprietary Hardcoat housings will not allow the hot weld expulsion to adhere to the housing.

10mm (Shielded) and 15mm (Unshielded) Sensing Range

Connector Type	Circuit Description	Housing Material	Housing Length	Shielded Model No.	Unshielded Model No.	Maximum Load Current	Leakage Current	Voltage Drop*	Maximum Switching Frequency		Short Circuit Protected
									Shielded	Unshielded	
WFI DC 10-30V											
4-pin Euro	3W, PNP, NO	Metal-HC	76mm	EE510-77442	EE510-76442	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Latching
4-pin Mini	3W, PNP, NO	Metal-HC	76mm	EE510-77402	EE510-76402	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Latching
4-pin Euro	3W, PNP, NO	Metal-HC	76mm	EE510-77042	EE510-76042	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Non-Latching
4-pin Mini	3W, PNP, NO	Metal-HC	76mm	EE510-77002	EE510-76002	200mA	10µA	2 VDC @ 100mA	16Hz	16Hz	Non-Latching
WFI AC/DC 20-230V											
3-pin Mini	2W, AC/DC, NO,LL	Metal-HC	76mm	EE530-77402	EE530-76402	500mA	1.7mA	<10V	16Hz	16Hz	Latching
3-pin Mini	2W, AC/DC, NO, HL	Metal-HC	76mm	EE560-77402	EE560-76402	500mA	4.5mA	<10V	16Hz	16Hz	Latching
3-pin Micro	2W, AC/DC, NO	Metal-HC	76mm	EE530-77432	EE530-76432	500mA	1.7mA	<10V	16Hz	16Hz	Latching

* Across conducting sensor

► Consult factory for normally closed model availability.



Common Sensor Characteristics

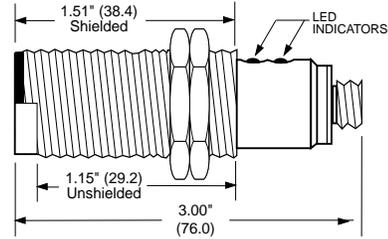
30mm DIAMETER WFI SENSORS	
Shielded Sensing Range ($\pm 10\%$)	10mm
Unshielded Sensing Range ($\pm 10\%$)	15mm
Short Circuit Protection	yes
Repeatability	$< \pm 1\%$
Hysteresis	3-10%
Range Drift over Temperature	$\pm 10\%$
Operating Temperature Range	-4°F to +158°F
Reverse Polarity Protected	yes
Current Consumption (3-wire DC only)	10mA
NEMA Enclosure Type	1, 3, 4, 6, 13
LED Indicator (AC/DC)	red = pwr, green = target
LED Indicator (DC)	green = pwr, amber = target
Metal Housings	Weld Flash Proof
Shipping Weight	5 oz.

Dimensional Drawings

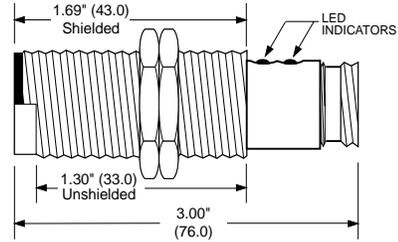
30mm-WFI

EURO/MICRO CONNECTOR MODELS

Body threads = M30x1.5



MINI CONNECTOR MODELS

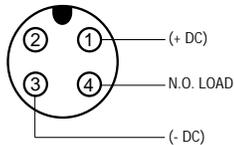


Circuit Drawings

EURO CONNECTOR MODELS

Male view shown

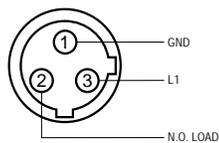
3 Wire DC N.O.



MICRO CONNECTOR MODELS

Male view shown

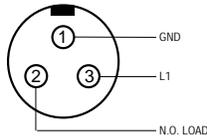
2 Wire AC/DC N.O.



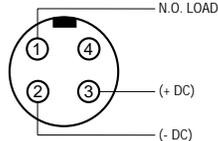
MINI CONNECTOR MODELS

Male views shown

2 Wire AC/DC N.O.



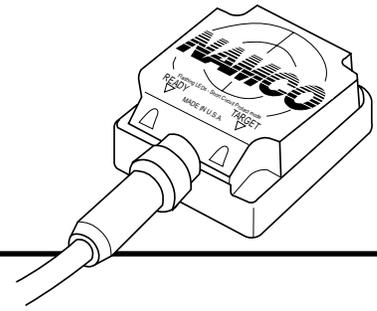
3 Wire DC N.O.



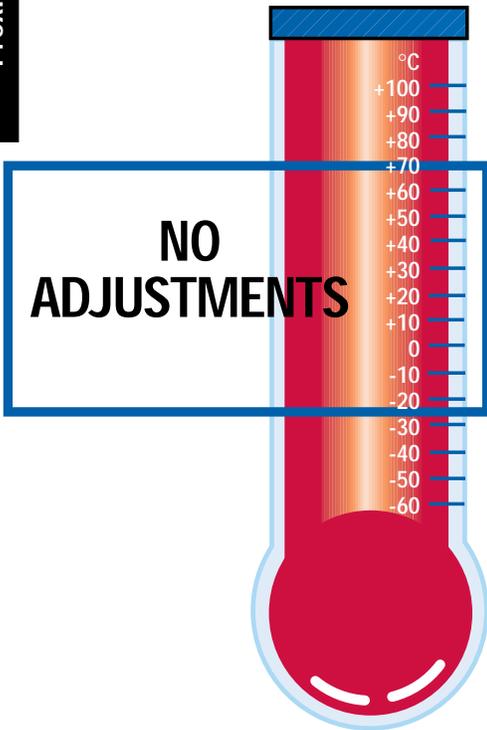
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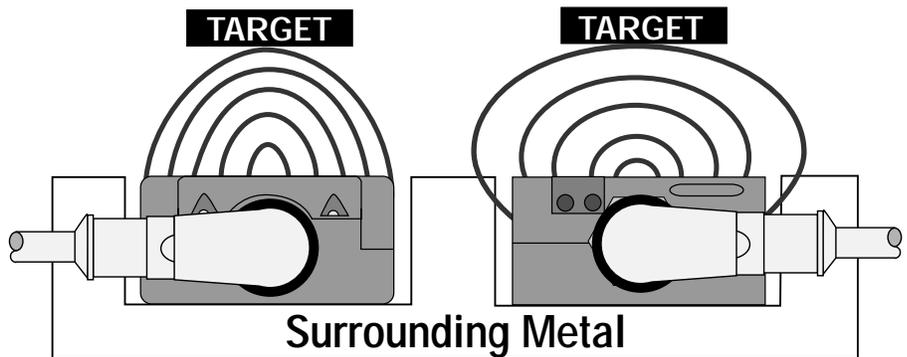
Focused Field FlatPak™ Sensor: Range Stable to 70°C, Never Needs Range Adjustments



The Namco Focused Field FlatPak™ Proximity Sensor is a Super Heavy Duty, completely encapsulated sensor designed to sense large metal objects at long ranges. It is the first sensor of this body style to offer a focused sensing field.

The focused sensing field allows this sensor to be mounted flush with surrounding metal with only a .25 inch gap between the sensor and the metal surface. This sensor will operate reliably in this setting without sensing range adjustments all year round regardless of changes in ambient temperature.

Competitive sensors have traditionally included a trim pot to enable the user to revise the sensing distance when ambient conditions changed. These sensors were susceptible to substantial growth in sensing range when ambient temperature changed from season to season. They would eventually "lock on" to surrounding metal due to this growth in range and to the un-focused nature of their sensing fields. Only a .25 inch clearance is necessary to insure that the Focused Field FlatPak will never lock on to surrounding metal.

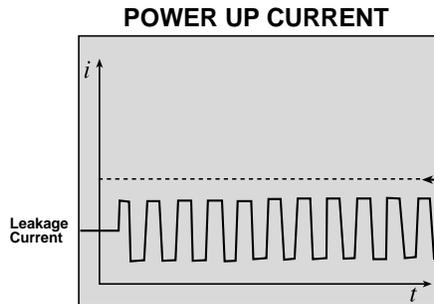


Namco FlatPak

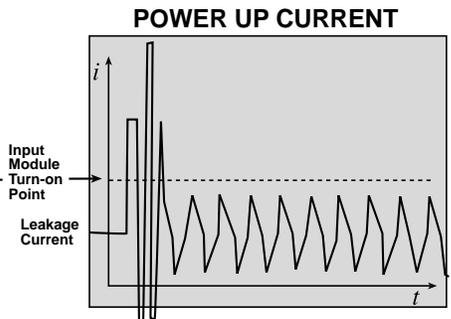
Other Extended Range Sensors

No TRANSIENTS at Power-Up

The Namco FlatPak sensor has the most noise resistant circuitry in the business, **Namco's patented Weld Field Immune (WFI) circuitry**. Not only will the sensor operate reliably in the presence of 20,000 amp weld fields, it also powers-up glitch-free and is extremely resistant to radio frequency interference and other forms of electrical noise. Problems such as "false detection" and "dropping out" are non-existent, further minimizing programming and maintenance requirements.



Namco Focused Field FlatPak Sensor. A clean wave means predictable performance.



Power-up current draw of competitive sensor will turn on PLC inputs.

An Easy Upgrade... Directly Replaces Other Extended Range Sensors

The Namco Focused Field FlatPak™ Sensor is designed to directly replace existing sensors of this format. It mounts on 65mm bolt centers and is the only sensor of this type that is made in the USA. It comes with a Lifetime Free Replacement Warranty.



Assists in Troubleshooting

Namco's WFI circuit includes latching Short Circuit Protection (SCP). If the sensor detects excessive current, it reverts to a sleep state with LEDs alternately flashing. This provides a clear indication of a problem in the circuit, simplifying the troubleshooting task. The sensor draws minimal current (2mA) and can remain in this state indefinitely.

No sensing range adjustments, ever.

Namco Weld Field Immune circuitry is designed to operate in presence of resistance welding electrodes carrying 20,000 Amperes RMS (45,000 Amperes peak).

Weld-splatter resistant housing.

Super Reliable—Covered by Namco Lifetime Replacement Program.

Built-in connector available.

Available with either 40mm or 50mm sensing range.

Namco's patented latching short circuit protection is very fast acting. Prolonged shorts will not damage electronics; latching feature aids in the diagnosis of troublesome intermittent faults.

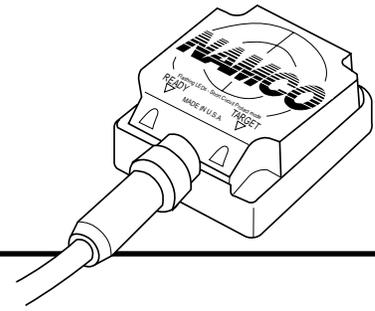
Available in either 20-150 VAC/DC or 10-30 VDC styles.

Only extended range sensor made in the USA.



You can mount flush with metal floors or within metal channel.

Focused Field Long Range Sensors



- 40mm or 50mm Sensing Range
- “No Adjustment” Sensor
- Flush Mountable - Focused Field Will not Lock on Surrounding Metal
- Easy Upgrade/Direct Replacement
- Sensing Range - Stable From -25°C to 70°C
- Namco Weld Field Immune Circuit
- Clean PowerUp - No Turn-on Transients
- Latching SCP - Simplifies Troubleshooting
- Super Reliable, Fully Epoxy-Encapsulated: Covered by Lifetime Free Replacement Program
- **ONLY SENSOR OF ITS TYPE MADE IN USA**



The NAMCO Focused Field FlatPak™ Proximity Sensor is a Super Heavy Duty, completely encapsulated sensor designed to sense large metal objects at long ranges in tough environments. It is the first sensor of this body style to offer a focused sensing field.

Competitive sensors have traditionally included a trim pot to enable the user to revise the sensing distance when ambient conditions change. These sensors are susceptible to substantial growth in sensing range when ambient temperatures change from season to season. They eventually “lock on” to surrounding metal due to this growth in range and to the unfocused nature of their sensing fields.

The Namco Focused Field FlatPak™ Sensor has two advantages over competitive products that eliminate the need for constant adjustment. **In fact, there are no sensitivity adjustments to be made, ever!!!**

The first advantage is the focused field. The shape of this field minimizes sensing of surrounding metal. When mounted in an identical setting to the competitive switch, it’s sensing range changes less than 10%, and the shape of the field stays focused forward of the switch.

The second advantage is exceptional stability over temperature. The Namco FlatPak’s range will increase a maximum of 10% even at the maximum ambient tempera-

ture, and the shape of the field will continue in a non-side-sensing focused field.

The Namco Focused Field FlatPak™ proximity sensor requires only a .25 inch clearance to surrounding metal. Once installed with this clearance, the sensor will never lock on to surrounding metal.

This Namco FlatPak also includes the most noise resistant circuitry in the business, Namco’s patented Weld Field Immune (WFI) circuitry. Not only will the sensor operate reliably in the presence of 20,000 amp weld fields, it also powers up glitch-free and is extremely resistant to radio frequency interference and other forms of electrical noise. Problems such as “false detection” and “dropping out” are non-existent, further minimizing programming and maintenance requirements.

Namco’s WFI circuit includes latching Short Circuit Protection (SCP). If the sensor detects excessive current, it reverts to a sleep state with LEDs flashing. This provides a clear indication of a problem in the circuit, simplifying the troubleshooting task. The sensor draws minimal current (2 mA) and can remain in this state indefinitely.

The Namco Focused Field FlatPak™ Sensor is designed to directly replace existing sensors of this format. It mounts on 65mm bolt centers and is **the only sensor of this type that is Made in the USA**. It comes with a Lifetime Free Replacement Warranty.

Connector Type	Circuit Description	Housing Material	Housing Dimensions	Model No.	Maximum Load Current	Leakage Current	Voltage Drop*	Maximum Switching Frequency	Short Circuit Protected
40mm SENSING RANGE DC 10-30V									
4-pin Euro	3W, PNP, NO	Fortron	79x92x40mm	EE510-86440	200mA	<10µA	<2.5V @ 200mA	15Hz	Latching
4-pin Euro	3W, PNP, NO	Fortron	79x92x40mm	EE510-86040	200mA	<10µA	<2.5V @ 200mA	15Hz	Non-latching
4-pin Mini	3W, PNP, NO	Fortron	79x92x40mm	EE510-86400	200mA	<10µA	<2.5V @ 200mA	15Hz	Latching
4-pin Mini	3W, PNP, NO	Fortron	79x92x40mm	EE510-86000	200mA	<10µA	<2.5V @ 200mA	15Hz	Non-latching
40mm SENSING RANGE AC/DC 20-150V									
3-pin Micro	2W, NO	Fortron	79x92x40mm	EE530-86420	200mA	1.7mA	≤10V	15Hz	Latching
3-pin Mini	2W, NO	Fortron	79x92x40mm	EE530-86400	200mA	1.7mA	≤10V	15Hz	Latching
50mm SENSING RANGE DC 10-30V									
4-pin Euro	3W, PNP, NO	Fortron	79x92x40mm	EE510-88440	200mA	<10µA	<2.5V @ 200mA	15Hz	Latching
4-pin Euro	3W, PNP, NO	Fortron	79x92x40mm	EE510-88040	200mA	<10µA	<2.5V @ 200mA	15Hz	Non-latching
4-pin Mini	3W, PNP, NO	Fortron	79x92x40mm	EE510-88400	200mA	<10µA	<2.5V @ 200mA	15Hz	Latching
4-pin Mini	3W, PNP, NO	Fortron	79x92x40mm	EE510-88000	200mA	<10µA	<2.5V @ 200mA	15Hz	Non-latching
50mm SENSING RANGE AC/DC 20-150V									
3-pin Micro	2W, NO	Fortron	79x92x40mm	EE530-88420	200mA	1.7mA	≤10V	15Hz	Latching
3-pin Mini	2W, NO	Fortron	79x92x40mm	EE530-88400	200mA	1.7mA	≤10V	15Hz	Latching

Note: For Minimum-On-Delay* versions of any of the part numbers above - Replace the “0” at the end of the part number with a “5”.

(i.e.: EE510-86445 is the Minimum-On-Delay version of the EE510-86440).

* Minimum-On-Delay provides an output “On” for a minimum 0.5 sec., no matter how short a period the target is present.

Common Sensor Characteristics

FLATPAK PROXIMITY SENSORS		
Supply Voltage	10-30V DC	20-150V AC/DC
Voltage Drop	≤ 2.5V @ 200mA	≤ 10V
	≤ 2.0V @ ≤ 100mA	
Max. Load Current @ 25°C	200mA	
Inrush Current (rms 1Hz)	-	1.5A
Leakage Current	10µA	1.7mA
Sensing Range	40mm/50mm	
Response Time	30ms	
Power-up Time	70ms	
Max. Switching Frequency	15Hz	
Ambient Temp. Range	-25°C to 70°C (-13°F to 158°F)	

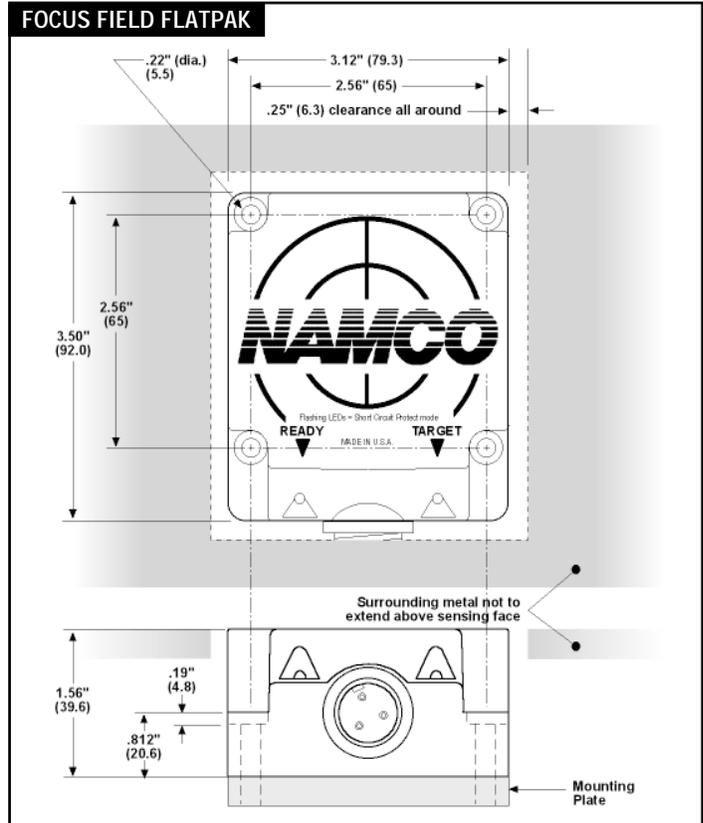
LED Functions

	10-30V DC		20-150V AC/DC	
	Green	Amber	Red	Green
Power Off	Off	Off	Off	Off
Power On Load De-energized	On	Off	On	Off
Power On Load Energized	On	On	Off	On
*SCP Mode Activated	Flashing		Flashing	

*Short Circuit Protection: If the sensor is shorted, the sensor's Short Circuit Protection (SCP) will be activated. When this occurs, both LEDs will flash and the sensor will limit current flow to about 2.0mA.

Dimensional Drawings

EE500

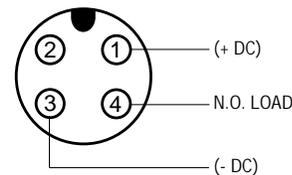


Proximity Sensors

Circuit Drawings

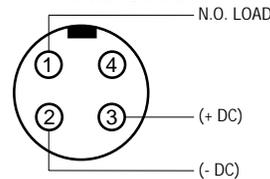
EURO CONNECTOR MODELS

3 Wire DC N.O.

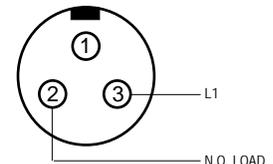


MINI CONNECTOR MODELS

3 Wire DC N.O.

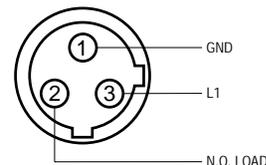


2 Wire AC/DC N.O.



MICRO CONNECTOR MODELS

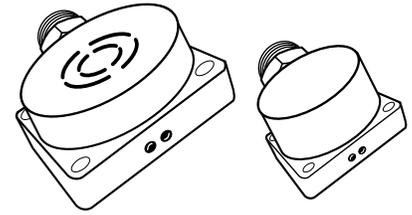
2 Wire AC N.O.



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- Weld Field and Electrical Noise Immunity
- Standard Latching Short Circuit Protection (SCP), Non-Latching SCP Available for DC Models Only
- Predictable, Consistent Electrical Performance
- 100% Tested and Burned-in

These sensors are specifically designed for extreme duty use in harsh applications such as automotive fabrication and assembly plants. Our Extended Range sensors have been designed primarily for use as part present sensors for sheet metal operations, or other applications where target to sensor relationship cannot be guaranteed during operation. For the 25mm range unit, a special cover is available to protect the thermoset housing from damage caused by extreme weld expulsion.

Connector Type	Circuit Description	Housing Material	Housing Dimensions	Model No. (Unshielded)	Maximum Load Current	Leakage Current	Voltage Drop*	Maximum Switching Frequency	Short Circuit Protected
25mm SENSING RANGE DC 10-30V									
4-pin Euro	3W, PNP, NO	Thermoset	74x50x41mm	EE510-83441	200mA	10µA	2.0V @ 100mA	16Hz	Latching
4-pin Euro	3W, PNP, NO	Thermoset	74x50x41mm	EE510-83041	200mA	10µA	2.0V @ 100mA	16Hz	Non-Latching
4-pin Mini	3W, PNP, NO	Thermoset	74x50x41mm	EE510-83401	200mA	10µA	2.0V @ 100mA	16Hz	Latching
4-pin Mini	3W, PNP, NO	Thermoset	74x50x41mm	EE510-83001	200mA	10µA	2.0V @ 100mA	16Hz	Non-Latching
8' Cable	3W, PNP, NO	Thermoset	74x50x41mm	EE510-83411	200mA	10µA	2.0V @ 100mA	16Hz	Latching
8' Cable	3W, PNP, NO	Thermoset	74x50x41mm	EE510-83011	200mA	10µA	2.0V @ 100mA	16Hz	Non-Latching
25mm SENSING RANGE AC/DC 20-230V									
3-pin Micro	2W, NO, LL	Thermoset	74x50x41mm	EE530-83421	500mA	1.7mA	<10V	16Hz	Latching
3-pin Micro	2W, NO, HL	Thermoset	74x50x41mm	EE560-83421	500mA	4.5mA	<10V	16Hz	Latching
3-pin Mini	2W, NO, LL	Thermoset	74x50x41mm	EE530-83401	500mA	1.7mA	<10V	16Hz	Latching
3-pin Mini	2W, NO, HL	Thermoset	74x50x41mm	EE560-83401	500mA	4.5mA	<10V	16Hz	Latching
8' Cable	2W, NO, HL	Thermoset	74x50x41mm	EE560-83411	500mA	4.5mA	<10V	16Hz	Latching
50mm SENSING RANGE DC 10-30V									
4-pin Euro	3W, PNP, NO	Thermoplastic	117x101x50mm	EE510-84440	200mA	10µA	2.0V @ 100mA	16Hz	Latching
4-pin Euro	3W, PNP, NO	Thermoplastic	117x101x50mm	EE510-84040	200mA	10µA	2.0V @ 100mA	16Hz	Non-Latching
4-pin Mini	3W, PNP, NO	Thermoplastic	117x101x50mm	EE510-84400	200mA	10µA	2.0V @ 100mA	16Hz	Latching
4-pin Mini	3W, PNP, NO	Thermoplastic	117x101x50mm	EE510-84000	200mA	10µA	2.0V @ 100mA	16Hz	Non-Latching
8' Cable	3W, PNP, NO	Thermoplastic	117x101x50mm	EE510-84010	200mA	10µA	2.0V @ 100mA	16Hz	Non-Latching
50mm SENSING RANGE AC/DC 20-230V									
3-pin Micro	2W, NO, LL	Thermoplastic	117x101x50mm	EE530-84420	500mA	1.7mA	<10V	16Hz	Latching
3-pin Micro	2W, NO, HL	Thermoplastic	117x101x50mm	EE560-84420	500mA	4.5mA	<10V	16Hz	Latching
3-pin Mini	2W, NO, LL	Thermoplastic	117x101x50mm	EE530-84400	500mA	1.7mA	<10V	16Hz	Latching
3-pin Mini	2W, NO, HL	Thermoplastic	117x101x50mm	EE560-84400	500mA	4.5mA	<10V	16Hz	Latching
8' Cable	2W, NO, HL	Thermoplastic	117x101x50mm	EE560-84410	500mA	4.5mA	<10V	16Hz	Latching

* Across conducting sensor

- ▶ "LL" indicates *Low Leakage* and "HL" indicates *High Leakage*.
- ▶ Consult factory for normally closed model availability.

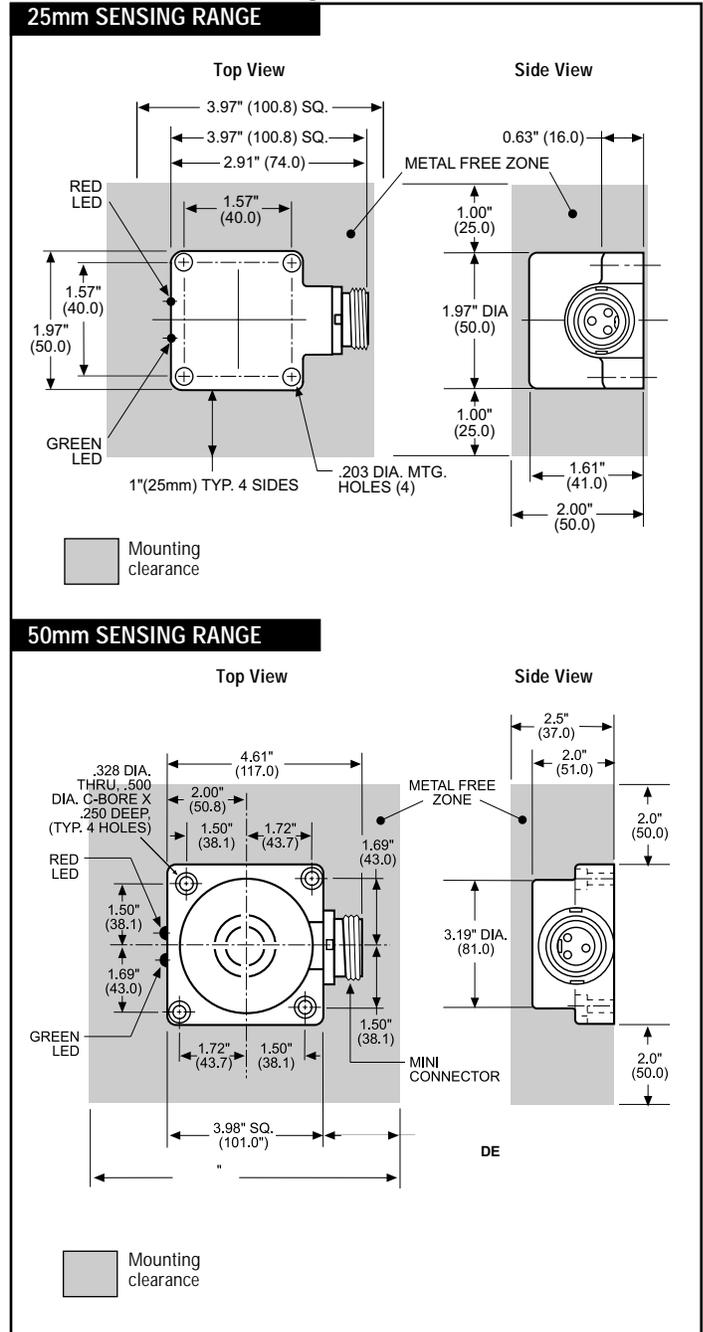


Common Sensor Characteristics

EXTENDED RANGE SENSORS		
	2W AC/DC	3W DC
Nominal Sensing Range ($\pm 10\%$)	25mm & 50mm	
Current Consumption	N/A	10mA
Short Circuit Protection	yes	
Reverse Polarity Protected	yes	
Temperature Drift (Max.)	$\pm 10\%$	
Ambient Temperature Range	25mm: -4°F to +158°F 50mm: -4°F to +122°F	
Cable Type	PVC	
Hysteresis	3-10%	
Repeatability	$< \pm 1\%$	
LED Indicator	red = power green = target	grn = power amber = target
Shipping Weight	25mm	50mm
Connector model:	10 oz.	2 lb.
Cable model:	15 oz.	2 lb. 5 oz.

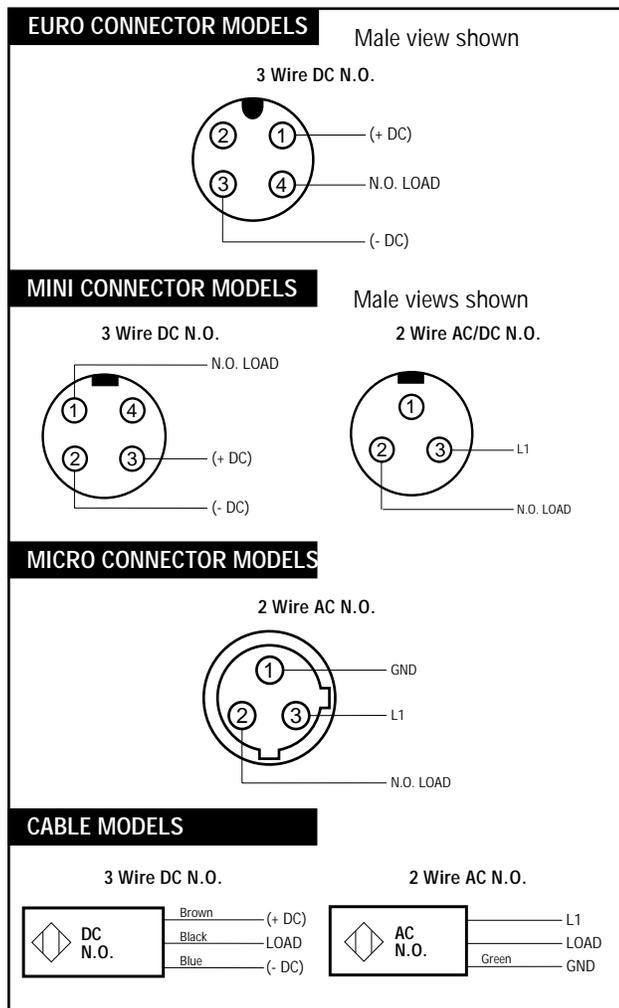
* See Proximity Reference Information Section for details on mounting clearances for extended range sensors.

Dimensional Drawings



Proximity Sensors

Circuit Drawings

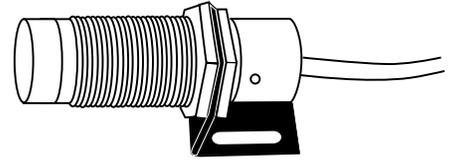


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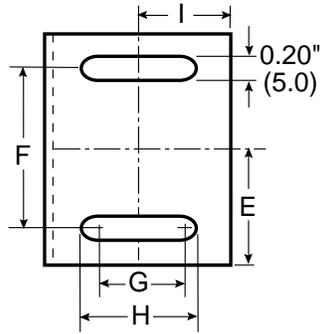
Brackets,
etc.

Proximity Sensor Accessories

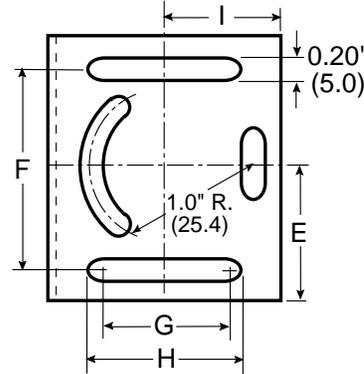


Proximity Sensors

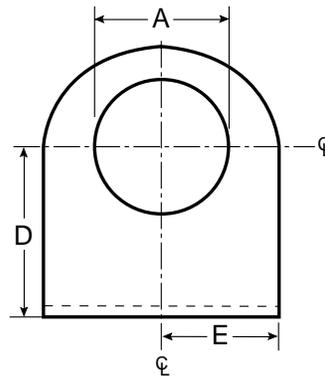
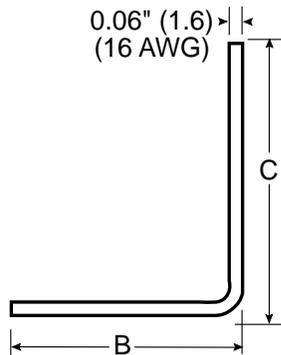
12-47mm TUBULAR MOUNTING BRACKETS



12-30mm Base



47mm Base



12-47mm Side and Front

Model No.	Sensor Diameter	Hole Diameter	Depth	Height	Height to Center	Width to Center	Slot Centers	Drill Centers	Slot Length	Depth Center	Material
		A	B	C	D	E	F	G	H	I	
EE972-01803	8mm	0.38" (9.6)	1.00" (25.4)	1.25" (31.8)	0.75" (19.1)	0.50" (12.7)	0.51" (13.0)	0.36" (9.1)	0.56" (14.2)	0.50" (12.7)	C. F. Steel
EE972-01804	12mm	0.50" (12.7)	1.00" (25.4)	1.25" (31.8)	0.75" (19.1)	0.50" (12.7)	0.51" (13.0)	0.36" (9.1)	0.56" (14.2)	0.50" (12.7)	C. F. Steel
EE972-01835	18mm	0.76" (19.5)	1.00" (25.4)	1.51" (38.2)	0.88" (22.3)	0.63" (15.8)	0.80" (20.3)	0.46" (11.6)	0.66" (16.7)	0.56" (14.2)	C. F. Steel
EE972-01807	30mm	1.25" (31.8)	1.50" (38.1)	1.92" (48.6)	1.09" (27.6)	0.83" (20.9)	1.16" (29.3)	0.80" (20.3)	1.00" (25.4)	0.75" (19.0)	C. F. Steel
EE972-02001	47mm	1.86" (47.2)	1.50" (38.1)	2.84" (72.0)	1.59" (40.3)	1.25" (31.8)	2.00" (50.8)	0.80" (20.3)	1.00" (25.4)	0.75" (19.0)	C. F. Steel

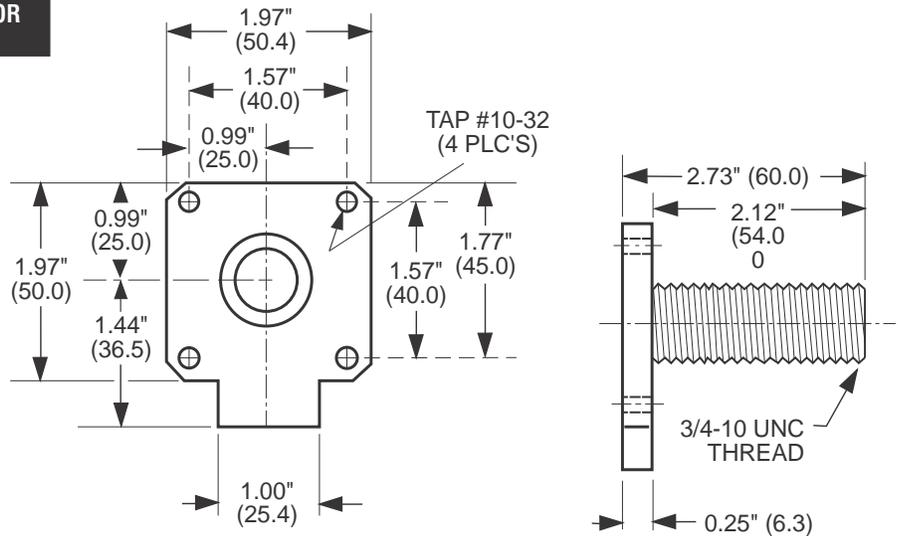
25mm ADJUSTABLE EXTENDED RANGE SENSOR MOUNTING BRACKET KIT

Part No. EE972-01860

Allows 25mm Proximity Sensors to be adjusted similarly to a standard tubular sensor. Kit includes (4) #10-32 socket head cap screws and (2) hex jam nuts.

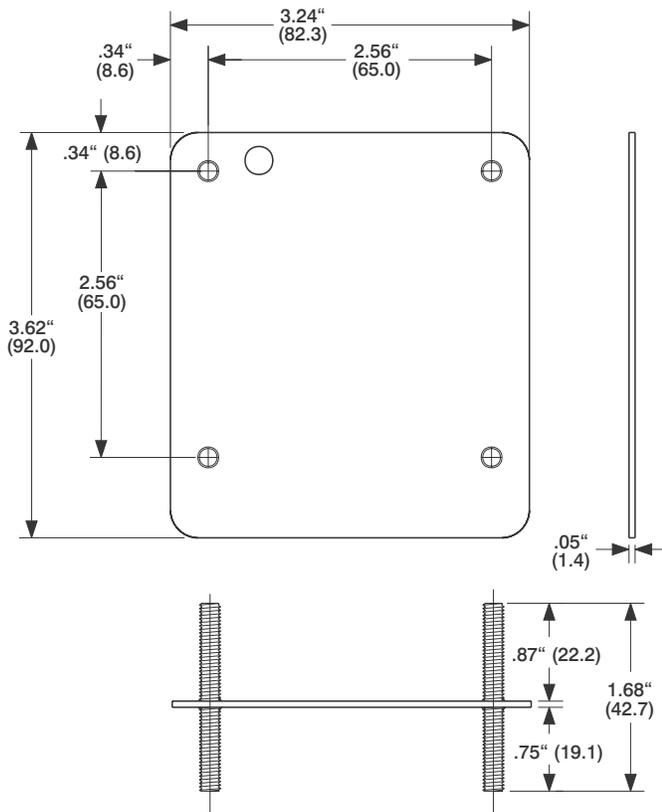
Part No. EE972-01861

Bracket only.



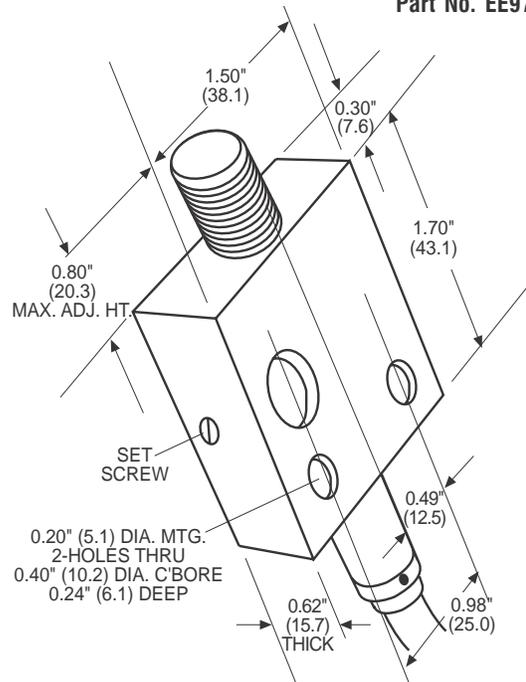
40mm FLATPAK BRACKET

Part No. EE972-01859



12mm TUBULAR BRACKET

Part No. EE972-01834



Continued on next page. →



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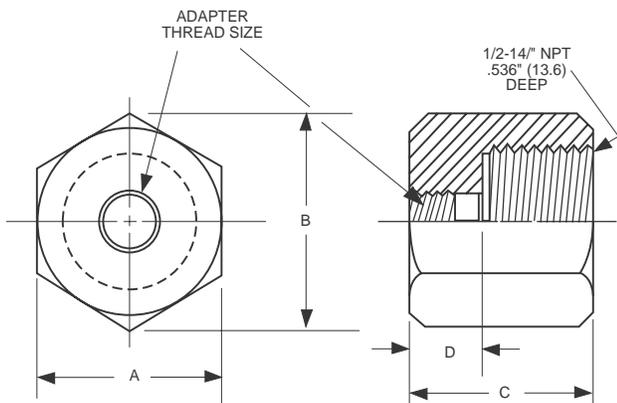
For technical assistance, call 1-800-NAMTECH

Brackets, etc.

Proximity Sensor Accessories

Proximity Sensors

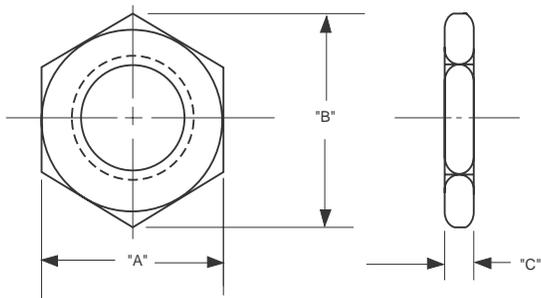
CONDUIT ADAPTERS



Material: Aluminum 2024
Stainless Steel version available on special order.
Consult factory.

Adapter Thread Size (mm)	HEX SIZE				Model No.
	Flats	Corners	Length	Depth	
	A	B	C	D	
8	1.00" (25.4)	1.15" (29.2)	1.00" (25.4)	0.25" (6.3)	EE014-20009
12	1.00" (25.4)	1.15" (29.2)	1.50" (38.1)	0.25" (6.3)	EE014-20010
18	1.00" (25.4)	1.15" (29.2)	2.00" (50.8)	0.25" (6.3)	EE014-20011
30	1.50" (38.1)	1.73" (43.9)	2.25" (57.1)	0.38" (9.6)	EE014-20012
47	2.00" (50.8)	2.31" (58.7)	2.50" (63.5)	0.38" (9.6)	EE014-20013

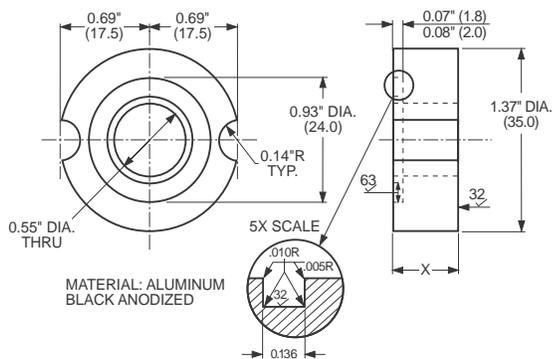
MOUNTING NUTS



I.D.	Mounting Nuts					Lock Washer
	Dimensions			Model No.		
	A	B	C	Metal	Plastic	
3/4-20	1.06" (26.9)	1.22" (30.9)	0.16" (4.1)	EE154-80001*	-	-
8mm	0.51" (13.0)	0.58" (14.7)	0.16" (4.1)	EE013-80011	EE013-80000	-
12mm	0.67" (17.0)	0.77" (19.5)	0.22" (5.6)	EE013-80003	EE013-81003	EE100-00139
18mm	0.94" (23.8)	1.06" (26.9)	0.16" (4.1)	EE013-80002*	EE013-81002	EE100-00137
30mm	1.44" (36.6)	1.66" (42.2)	0.19" (4.8)	EE013-80001*	EE013-81001	EE100-00138
47mm	2.00" (50.8)	2.20" (55.9)	0.20" (5.1)	EE013-80004	-	-

*Quantity one (1) per package; all others are shipped two (2) per package.

CYLINDRATOR® SENSOR SPACER KITS



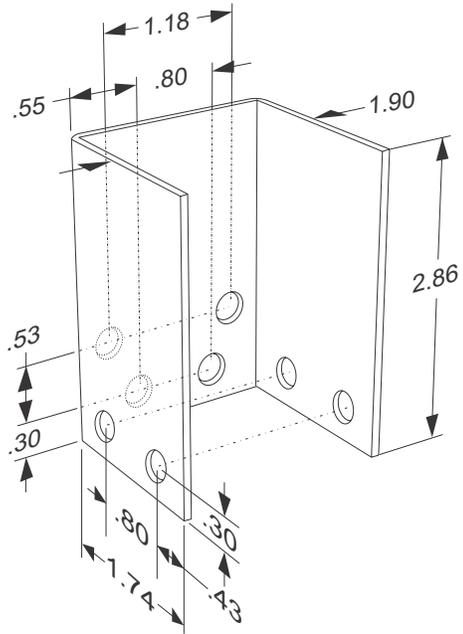
Kits include two mounting bolts and O-Ring. Replacement O-Ring is EE972-19306 (Equivalent to Parker # 2-116V709-90). Specify spacer height.

NOTE: Please consult factory before using spacer kits with LPR Cylindator® sensors.

Dimension "X"	Model No.
0.19"	EE972-01827
0.25"	EE972-01822
0.31"	EE972-01829
0.38"	EE972-01831
0.50"	EE972-01820

Stainless Steel Protective Brackets

- Protects sensor from impact damage
- 14 gauge 304 Stainless superior to painted steel — resists weld slag buildup, minimally effects sensor performance
- Ideal for load/unload stations or locations where typical part tolerances make impact with sensors unavoidable



Part No. EE972-01910

HammerHead Sensors 9-Way Configurable Proximity Sensors

Model Number	Shielded Range	Unshielded Range	Effective Range (Sensor Mounted in SS Bracket)
EE5X0-90XX0	15mm	—	12mm
EE5X0-91XX0	20mm	—	16mm
EE5X0-92XX0	—	25mm	Not Recommended
EE5X0-93XX0	25mm	—	20mm
EE5X0-94XX0	—	35mm	Not Recommended

DuraProx Sensors 9-Way Configurable Proximity Sensors

Model Number	Shielded Range	Unshielded Range	Effective Range (Sensor Mounted in SS Bracket)
EE5X0-90XX1	15mm	—	12mm
EE5X0-91XX1	20mm	—	16mm
EE5X0-92XX1	—	25mm	Not Recommended
EE5X0-93XX1	25mm	—	20mm
EE5X0-94XX1	—	25mm	Not Recommended

TEFLON® CAPS

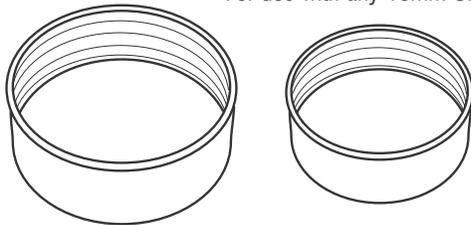
Repel weld slag;
increase sensor life.

Part No. EE505-60002

For use with any 18mm Shielded Sensor

Part No. EE505-60004

For use with any 18mm Unshielded Sensor



Part No. EE505-60003

For use with any 30mm Shielded Sensor

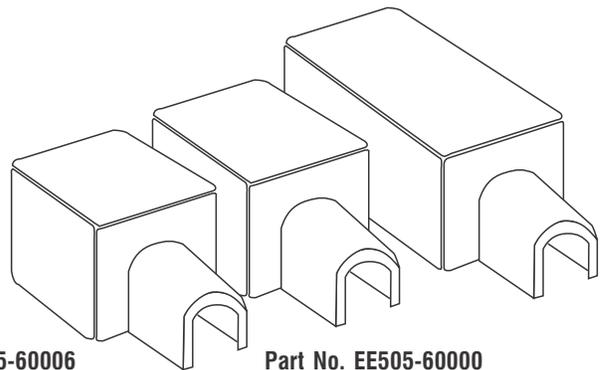
Part No. EE505-60005

For use with any 30mm Unshielded Sensor

WELD-SPLATTER RESISTANT COVERS

Part No. EE505-60001

For use with EE500-1 Rotatable Rectangular Sensors



Part No. EE505-60006

For use with EE500-9 HammerHead Sensors

Part No. EE505-60000

For use with EE500-8 25mm Extended Range Sensors

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Principles of Operation

Inductive

Proximity sensors are generally constructed with four main elements: (1) a coil and ferrite core assembly; (2) an oscillator; (3) a convertor/trigger circuit (detector) and; (4) an output device.

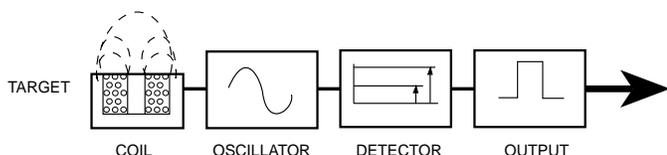


Figure 1

The oscillator creates a radio frequency field that is shaped and defined by the coil and core. As a target is placed in this field, eddy currents are set up in the surface of the target. The oscillator, being a limited power device, will lower its amplitude as the eddy currents are produced. The convertor/trigger circuit rectifies the AC sine wave signal to DC, compares the level against a preset reference, and actuates the sensor output if a target is present. Switching is clean, with none of the bounce of mechanical switches.

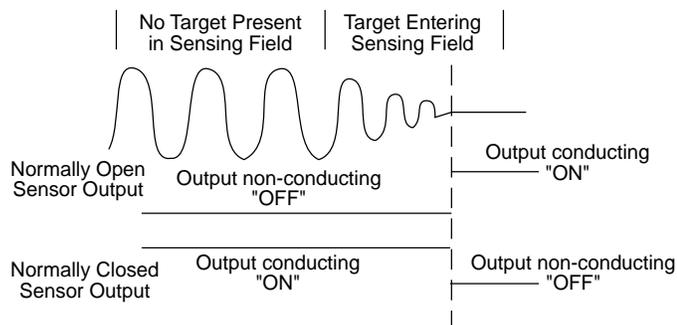


Figure 2

Capacitive

Essentially similar except that the coil is replaced by a sensing plate, and the oscillator is not running until the object to be detected is within range.

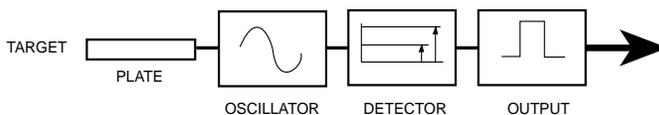


Figure 3

Capacitive sensors depend on the coupling between the sensing plate and earth ground. If a target is placed within range, the capacitance level will vary depending on target density, conductivity, and relative humidity. If the adjustment potentiometer is correctly set, the oscillator will be turned on when a target is within range.

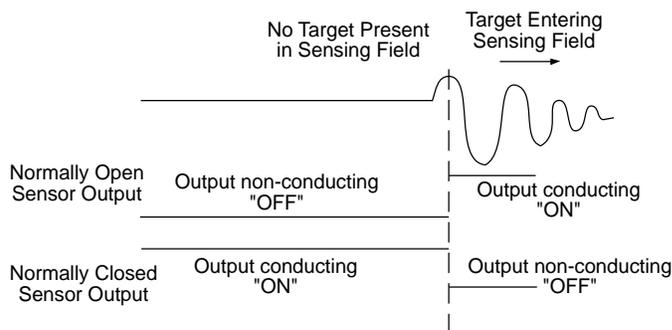


Figure 4

Important Note: Never use a metal body capacitive sensor in wet environments. Moisture between the sensing plate and the metal body will cause the sensor to "lock on." For wet environments, always use a plastic bodied sensor.

Inductive Sensor Selection

1. Target Identification

This is the most critical step in proper application of inductive and capacitive sensors. Most application problems stem from improper selection of a sensor for a particular target. This usually comes from a desire to "standardize" a design. Generally the following rules apply to all inductive sensors:

The sensor face should equal or be smaller than the target surface area. All manufacturers calibrate the range of a particular sensor with a "standard target." This standard target is always larger than the diameter of the sensor face. Although it is possible to sense targets smaller than the sensor face diameter, rated range cannot be achieved using a target that is smaller than the sensor face. The following changes in the sensing range will occur if the dimensions of the target are larger or smaller than the standard target specified.

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

Figure 5

2. Air Gap Determination

When examining your application, remember that most shielded inductive sensors (Fig. 6) will have a maximum range that is approximately one third of the diameter of the sensing face.

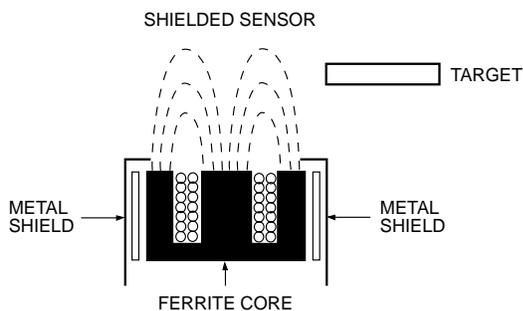


Figure 6

It is often necessary to allow a rather large air gap between the target and the sensor. When this is required, an unshielded sensor (Fig. 7) will be required. The unshielded sensor will generally have the plastic "nose" of the sensor projecting out of the metal barrel, or (plastic bodied types) it will not have a shielding ring around the core. These unshielded sensors will typically sense at ranges 3 to 50 percent greater than shielded types. A penalty is paid, however, as it is necessary to provide a metal-free area around the sensor that is much larger than the shielded types.

NONSHIELDED SENSOR

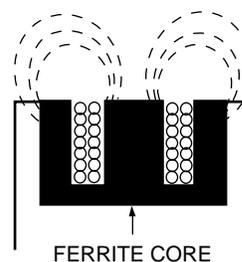


Figure 7

(See 3. Mounting Clearances)

Positioning of the sensor should allow the target to penetrate approximately 30% into the field to allow for manufacturing tolerances, resistance to vibration, and inaccuracies that are common to all initial start-ups.

When determining the air gap (sensing distance) required, it should be noted that an inductive sensor will produce its rated range only against a standard target of mild steel. Other materials will reduce the sensing range (SN) as follows:

- Mild Steel SN x 1.0
- Aluminum Foil SN x 1.0
- Stainless Steel SN x 0.85
- Brass SN x 0.5
- Copper SN x 0.46
- Aluminum SN x 0.4

Continued on next page. →



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Example: If a sensor with a 5mm sensing range is used to sense a standard target made of copper, the sensing range of the sensor is reduced as indicated below:

$$5\text{mm} (0.46) = 2.3\text{mm} (\text{maximum})$$

When mounting a sensor it is always preferred to position the target so that it "slides by" the sensor face. This type of mounting will ensure that the sensor face is not damaged by contact with the target. If your application dictates a "head on" approach, it is essential that the target does not use the sensor face as a physical stop. Failure to provide clearance in either the slide-by or head-on modes will result in damage to the sensor and possible failure of the device.

Hysteresis (Fig. 8) must be allowed for as the target must move far enough away from the sensing field so that the sensor cannot detect it. If a target is placed within the hysteresis band, vibration of the target can cause the switch to turn on and off rapidly ("chatter"). All sensor manufacturers build in a certain amount of hysteresis to minimize chatter.

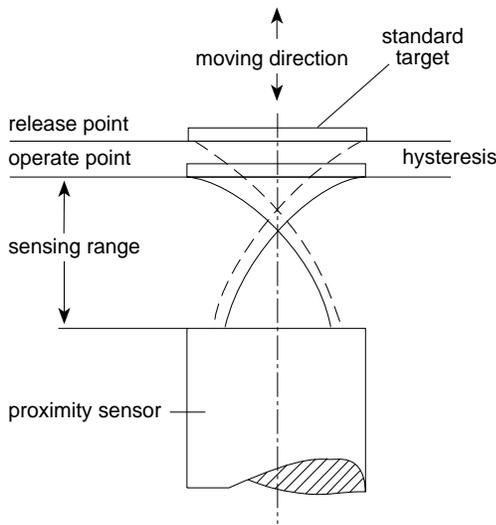
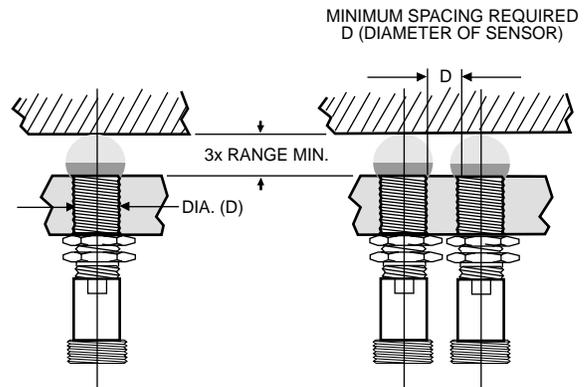


Figure 8

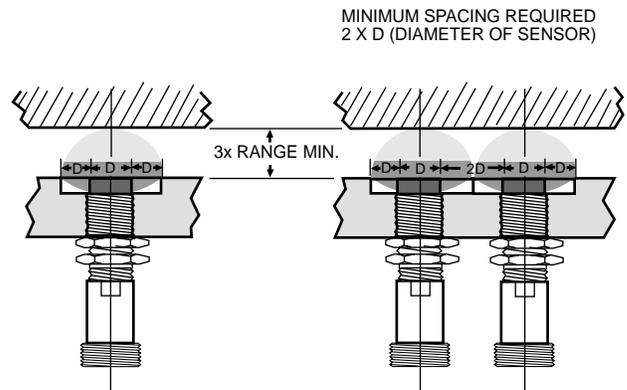
3. Mounting Clearances

Mounting of sensors should follow industry accepted practices as shown. Failure to properly position the sensor is the single largest cause of field problems.

SHIELDED SENSORS (FLUSH MOUNTABLE)



UNSHIELDED SENSORS REQUIRE METAL-FREE AREA



SENSORS MUST BE MOUNTED SUCH THAT SURROUNDING METAL IS NOT IN THE SENSING AREA.

OPPOSING SENSORS

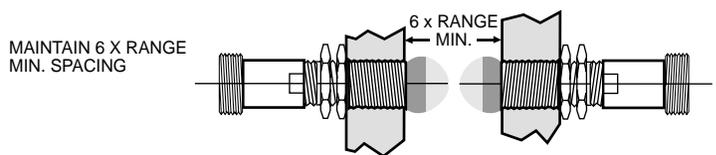


Figure 9

4. Housing Selection

After you have determined the target and air gap, it is then possible to select the style of housing for the application. Sensors are typically grouped according to range against a standard target. The most often used types are the metal barrel styles. These are great for general purpose uses but should not be used in areas where liquids are present. For wet environments, the all-plastic types are preferred. To determine your best specific type, consult the Enclosure Types below.

Various accessories are available for sealing, conduit, and mounting. Also, many sensors are available with quick disconnects. This is more expensive initially but can be justified if the sensor is placed on moving equipment where the cable is flexed often. The weak link then becomes the entry point of the cable to the housing. When failure occurs, it is necessary to replace the complete assembly because the cable failed. It's also easier to position the sensor mechanically, then complete the electrical wiring.

Industrial Control Equipment - UL 508
Table 6.1 – Enclosure Designations

Designation	Intended Use and Description	Designation	Intended Use and Description
1	Indoor use primarily to provide protection against contact with the enclosed equipment and against a limited amount of falling dirt.	4X	Either indoor or outdoor use to provide a degree of protection against falling rain, splashing water, and hose-directed water; undamaged by the formation of ice on the enclosure; resists corrosion.
2	Indoor use to provide a degree of protection against limited amounts of falling water and dirt.	6	Indoor or outdoor use to provide against the entry of water during temporary, limited submersion; undamaged by the formation of ice on the enclosure.
3	Outdoor use to provide a degree of protection against windblown dust and windblown rain; undamaged by the formation of ice on the enclosure.	6P	Indoor and outdoor use to provide a degree of protection against the entry of water during prolonged submersion at limited depths.
3R	Outdoor use to provide a degree of protection against falling rain; undamaged by the formation of ice on the enclosure.	11	Indoor use to provide by oil immersion a degree of protection of the enclosed equipment against the corrosion effects of corrosive liquids and gases.
3S	Outdoor use to provide a degree of protection against windblown dust, windblown rain, and sleet; external mechanisms remain operable while ice laden.	12, 12K	Indoor use to provide a degree of protection against dust, dirt, fiber flyings, dripping water, and external condensation of noncorrosive liquids.
4	Either indoor or outdoor use to provide a degree of protection against falling rain, splashing water, and hose-directed water; undamaged by the formation of ice on the enclosure.	13	Indoor use to provide a degree of protection against lint, dust seepage, external condensation, and spraying of water, oil, and noncorrosive liquids.

Table 6.1 revised December 5, 1986
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Continued on next page. →



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Cylindicator Sensor Installation

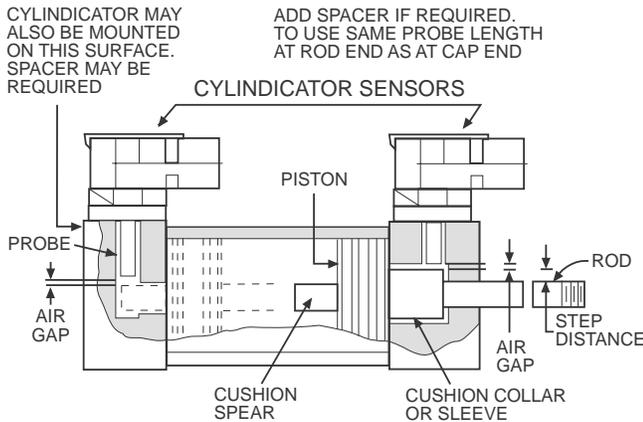


Figure 1

Proper operation of your Namco Cylindicator depends in large part on these factors:

Establishment of a proper air gap between the probe face and the target.

The air gap is the actual distance between the tip of the probe and the part of the piston which is the "target." The target can be the collar or cushion sleeve, cushion spear, or the end of the rod inside the cylinder. **This target must be close enough to actuate the Cylindicator Sensor but not so close as to actually contact the probe.**

Experience has shown an air gap of 0.025 inches to be optimum in most applications. The air gap should always be greater than 0.015 inches and less than 0.045 inches, including worst case tolerances. Gaps in excess of 0.045 inches are not recommended and could result in inconsistent operation.

Assuring a minimum "step distance" between the cushion collar and the piston rod.

Standard Namco Cylindicator Sensors have a nominal sensing range of 0.080 inches beyond the stated probe length. The minimum step distance (cushion to rod) must be greater than 0.095 inches to guarantee that the sensor will "drop out" when the target is no longer present. This minimum step distance accounts for mechanical tolerances, temperature effects, and hysteresis effects.

Sensing a known metallic target.

In all applications referred to in this publication, the target is assumed to be of a ferrous metal. Consult Namco if a different metal such as aluminum, brass, or stainless steel must be used as the sensing range is reduced.

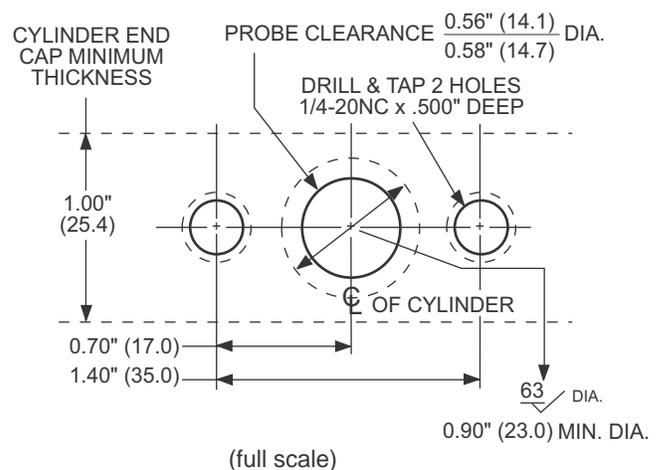
Mounting to a proper cylinder endcap.

The clearance hole for the sensing probe must be 0.560" diameter minimum/0.580" diameter maximum. The end block must be designed so that the probe tip is flush to 0.04" extended beyond surrounding metal within 0.5" of the probe side walls.

Other Tips:

- Never operate the cylinder at pressures which exceed the Cylindicator sensor's ratings.
- Do not exceed ambient temperature range.
- The Cylindicator Sensor must be positioned so that the target area (cushion spear, cushion collar, etc.) will completely cover the probe sensing face when the sensor is operated.
- Do not mount the Cylindicator Sensor on the bottom of the cylinder. Debris could accumulate around the probe which might cause damage or inconsistent operation.
- All Cylindicator Sensors are completely epoxy potted and as such contain no serviceable parts inside. Do not remove the cover or tamper with the cable or connector.
- Cylindicator Sensors must have the O-Ring probe seal that is supplied with each unit installed around the probe before mounting.
- Do not attempt to modify the probe by cutting, grinding, filing, etc.

Mounting Dimensions and Template



“Stroke To Go” vs. “Air Gap”

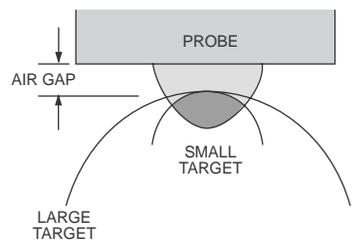
“Stroke To Go”

The amount of stroke remaining in the cylinder after the Cylindicator Sensor activates.

NOTE: If a cylinder is mechanically restrained from going full stroke — no target will be present for the switch to detect (no switch output).

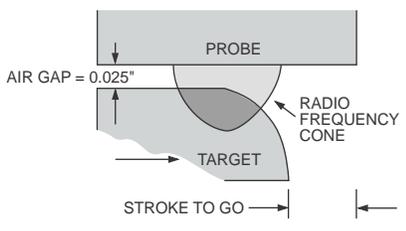
Target End View

Smaller diameter targets have less metal in the sensing field at a constant air gap. Loss of stroke-to-go is more pronounced on smaller bore cylinders as air gap increases.



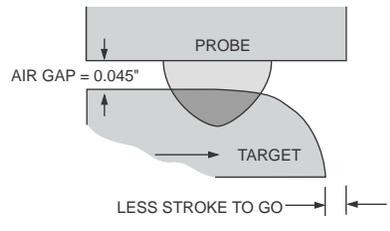
Switch Actuated

Recommended nominal air gap distance provides the stated maximum stroke to go.



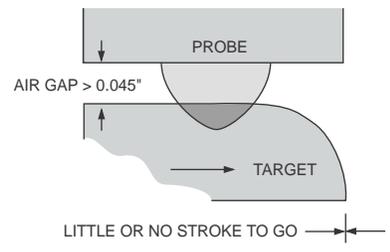
Switch Actuated

Variations from the recommended nominal air gap distance results in loss of stroke to go.



Switch Probably Not Actuated

Increased variations from the recommended nominal air gap distance results in little or no stroke to go and possible erratic operation.



**Loss of stated maximum stroke to go can prevent the proximity sensor from activating in plant equipment and tools with positive stops.*

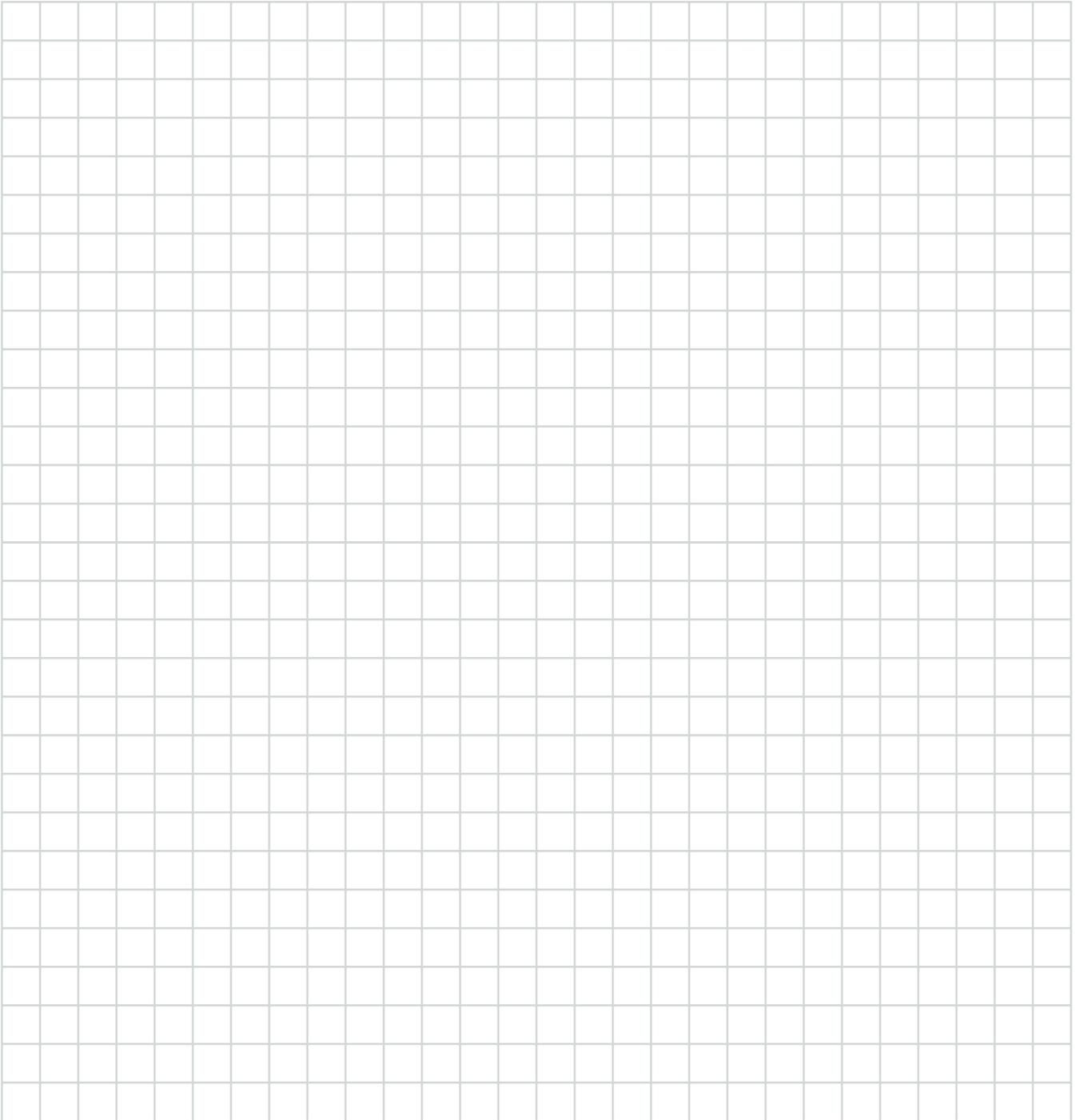


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1/4" Grid

Sensing Solutions Worksheet



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Except as may otherwise be stated in quotations, discount schedules, catalogs, or other Seller publications, freight will be allowed to the common carrier free delivery point nearest the destination on shipments within THE UNITED STATES EXCLUDING ALASKA AND HAWAII.

For shipment to ANY OTHER DESTINATION, INCLUDING ALASKA AND HAWAII, consult Seller's home office for terms that apply.

No allowance will be made in lieu of transportation if Purchaser accepts shipment at factory, warehouse, freight station, or otherwise supplies its own transportation.

Method and route of shipment will be at the discretion of Seller unless Purchaser shall specify otherwise, and any additional expense of the method or route of shipment specified by Purchaser shall be borne by Purchaser.

Seller reserves the right to make delivery in installments, unless otherwise expressly stipulated in the contract for sale; and all such installments when separately invoiced

shall be paid for when due per invoice, without regard to subsequent deliveries. Delay in delivery of any installment shall not relieve Purchaser of its obligations to accept remaining deliveries. Seller shall not be liable for any damage as a result of any delay due to any cause beyond Seller's reasonable control, including, without limitation, an act of God, an act of Purchaser or Seller's supplier, embargo or other governmental act, regulation or request; fire, accident, strike, slowdown, war, riot, delay in transportation, and inability to obtain necessary labor, materials or manufacturing facilities. In the event of any such delay, the date of delivery shall be extended for a period equal to the time lost by reason of the delay.

6. SUBSTITUTES. Seller may furnish suitable substitutes for materials unobtainable because of priorities or regulations established by governmental authority or nonavailability of materials from suppliers, and assumes no liability for deviation from published dimensions and descriptive information not essential to proper performance of the product.

7. WARRANTY. Seller warrants products manufactured by it to be free from defects in materials and workmanship for a period of one (1) year from date of shipment to Purchaser. If within this period any such products shall be proven to Seller's reasonable satisfaction to be so defective, they shall be repaired or replaced at Seller's option. This warranty shall not apply to (a) products not manufactured by Seller, (b) products which shall have been repaired or altered by others than Seller so as, in its judgment, to affect same adversely, (c) products which shall have been subjected to negligence, accident or damage by circumstances beyond seller's control, or to improper operation, maintenance or storage, or to other than normal use or service. With respect to products not manufactured by Seller, the warranty obligations of Seller shall conform to the warranty actually extended to Seller by its supplier, subject to the limitations and exclusions hereafter stated. The foregoing warranties do not cover reimbursement for transportation, removal, installation, or other expenses which may be incurred in connection with repair or replacement.

Except as may be expressly provided in the authorized writing by Seller, Seller shall not be subject to any other obligations or liabilities whatsoever with respect to products manufactured by Seller or services rendered by Seller.

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9. RETURN OF PRODUCTS. No products may be returned without first obtaining Seller's written permission and a returned material identification tag.

Products accepted for credit, not involving an error on Seller's part, shall be subject to a minimum service charge of 10% of the invoice price and all transportation charges shall be prepaid by Purchaser.

Returned products must be securely packed to reach Seller without damage; any cost incurred by Seller to put equipment in first class condition will be charged to Purchaser.

10. PATENTS. As to products proposed and furnished by Seller, Seller shall defend any suit or proceeding brought against Purchaser so far as based on a claim that said equipment constitutes an infringement of any patent of the United States, if notified promptly in writing and given authority, information and assistance at Seller's expense for the defense of the same. In event of a final award of costs and damages, Seller shall pay such award. In event the use of said product by Purchaser is enjoined in such a suit, Seller shall, at its own expense, either (a) procure for Purchaser the right to continue using said equipment, (b) modify said equipment to render it noninfringing, (c) replace said equipment with noninfringing equipment, or (d) refund the purchase price (less depreciation) and the transportation and installation costs of said equipment. Seller will not be responsible for any compromise or settlement made without its written consent.

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