Technical Data

Original Instructions

875 Capacitive Proximity Sensors

Bulletin Number 875F, 875L

Summary of Changes

This publication contains the following new or updated information. This list includes substantive updates only and is not intended to reflect all changes.

Topic	Page
Added product photos and updated 875L DC Tubular IO-Link Capacitive Proximity Sensors specification table	2
Added product photos to 875L AC Tubular Capacitive Proximity Sensors specification table	6
Updated Product Selection table	7
Added product photos to 875F DC Rectangular Capacitive Proximity Sensors specification table	9

875L DC Tubular IO-Link Capacitive Proximity Sensors

DC Micro Quick Disconnect Style
18 mm and 30 mm
Shielded and Unshielded

DC Cable Style
18 mm and 30 mm
Shielded and Unshielded

Specifications

Attribute	Value
Housing material	Plastic PBT
Rated operating distance (Sn)	• 875L-M8*xx*18 (flush type): 0…8 mm (0…0.31 in.); adjustable distance 2…10 mm (0.08…0.39 in.) • 875L-N12*xx*18 (non-flush type): 0…12 mm (0…0.47 in.); adjustable distance 3…15 mm (0.12…0.59 in.) • 875L-M16*xx*30 (flush type): 0…16 mm (0…0.63 in.); adjustable distance 2…20 mm (0.08…0.79 in.) • 875L-N25*xx*30 (non-flush type): 0…25 mm (0…0.98 in.); adjustable distance 4…30 mm (0.16…1.18 in.)
Sensitivity	Adjustable by potentiometer, external teach or by IO-Link settings • Potentiometer disabled • Potentiometer enabled • External teach Factory settings: Potentiometer enabled
Effective operation distance (Sr)	0.9 x Sn ≤ Sr ≤ 1.1 x Sn
Usable operation distance (Su)	0.85 x Sr ≤ Su ≤ 1.15 x Sr
Switching frequency	50 Hz
Repeat accuracy (R)	≤5%
Hysteresis (H)	Adjustable by IO-Link (1…100%) • 875L-M8*xx*18 factory settings: Typical 6% • 875L-N12*xx*18 factory settings: Typical 15% • 875L-M16*xx*30 factory settings: Typical 7% • 875L-N12*xx*18 factory settings: Typical 15%
Rated operational volt (UB)	10…40V DC (ripple included)
Ripple	≤10%
Rated operating current (Ie)	≤200 mA (continuous)
No load supply current (Io)	≤20 mA
Rated insulation voltage (UI)	50V DC
Power-ON delay (tv)	≤300 ms
Operational current (Im), min	>0.5 mA
Voltage drop (Ud)	≤1.0V DC @ 200 mA DC
Protection	• Short circuit • Reverse polarity • Transients
Power ON delay	≤300 ms
Degree of protection	• IP67 • IP68/60 min • IP69K (NEMA 1, 2, 4, 4X, 5, 6, 6P, 12) • ECOLAB
Temperature	• Operating: -30…+85 °C (-22…+185 °F) • Storage: -40…+85 °C (-40…+185 °F)
Humidity range	Operating and storage: 35…95%

875L DC 18 mm (0.71 in.) Diameter Sensors

Product Selection

Cat. No. (1)	Barrel Diameter	Shielded	Output	Polarity	Connection	Wiring Diagram	Dimensions
875L-M8NP18-A2	18 mm (0.71 in.)	Yes	N.O.	PNP	2 m (6.6 ft) PVC cable	Figure 10 on page 5	Figure 1
875L-M8NN18-A2				NPN		Figure 12 on page 5	
875L-M8CP18-A2			N.C.	PNP		Figure 9 on page 5	
875L-M8CN18-A2				NPN		Figure 11 on page 5	
875L-M8NP18-D4			N.O.	PNP	M12 Micro QD	Figure 10 on page 5	Figure 2
875L-M8NN18-D4				NPN		Figure 12 on page 5	
875L-M8CP18-D4			N.C.	PNP		Figure 9 on page 5	
875L-M8CN18-D4				NPN		Figure 11 on page 5	
875L-N12NP18-A2		No	N.O.	PNP	2 m (6.6 ft) PVC cable	Figure 10 on page 5	Figure 3
875L-N12NN18-A2				NPN		Figure 12 on page 5	
875L-N12CP18-A2			N.C.	PNP		Figure 9 on page 5	
875L-N12CN18-A2				NPN		Figure 11 on page 5	
875L-N12NP18-D4			N.O.	PNP	M12 Micro QD	Figure 10 on page 5	Figure 4
875L-N12NN18-D4				NPN		Figure 12 on page 5	
875L-N12CP18-D4			N.C.	PNP		Figure 9 on page 5	
875L-N12CN18-D4				NPN		Figure 11 on page 5	

(1) All units come with two nuts to secure the unit on the mounting bracket.

Approximate Dimensions

Dimensions are shown in mm (in.). Dimensions are not intended to be used for manufacturing purposes.

Figure 1 - Shielded 18 mm (0.71 in.) with Cable [mm (in.)]

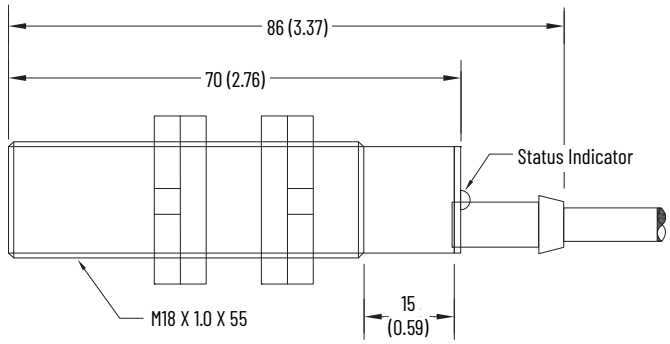


Figure 2 - Shielded 18 mm (0.71 in.) with M12 Micro QD [mm (in.)]

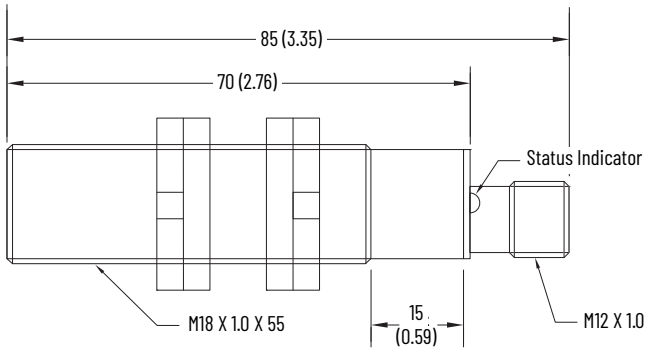


Figure 3 - Unshielded 18 mm (0.71 in.) with Cable [mm (in.)]

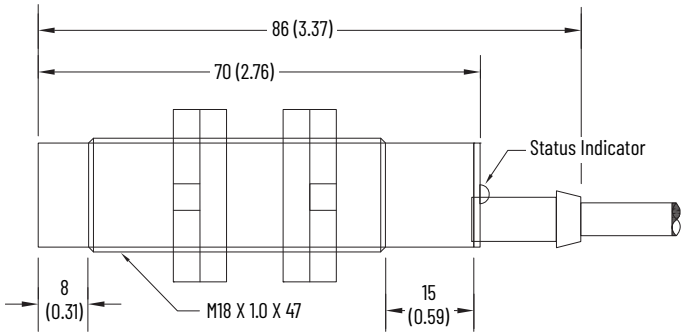
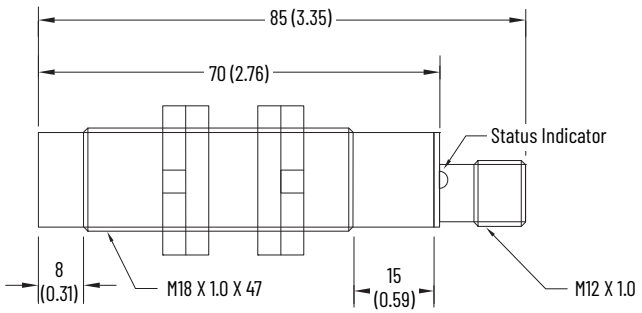


Figure 4 - Unshielded M18 18 mm (0.71 in.) with M12 Micro QD [mm (in.)]



875L DC 30 mm (1.81 in.) Diameter Sensors

Product Selection

Cat. No. (1)	Barrel Diameter	Shielded	Output	Polarity	Connection	Wiring Diagram	Dimensions
875L-M16NP3O-A2	30 mm (1.81 in.)	Yes	N.O.	PNP	2 m (6.6 ft) PVC cable	Figure 10 on page 5	Figure 5
875L-M16NN3O-A2				NPN		Figure 12 on page 5	
875L-M16CP3O-A2			N.C.	PNP		Figure 9 on page 5	
875L-M16CN3O-A2				NPN		Figure 11 on page 5	
875L-M16NP3O-D4			N.O.	PNP	M12 Micro QD	Figure 10 on page 5	Figure 6
875L-M16NN3O-D4				NPN		Figure 12 on page 5	
875L-M16CP3O-D4			N.C.	PNP		Figure 9 on page 5	
875L-M16CN3O-D4				NPN		Figure 11 on page 5	
875L-N25NP3O-A2		No	N.O.	PNP	2 m (6.6 ft) PVC cable	Figure 10 on page 5	Figure 7
875L-N25NN3O-A2				NPN		Figure 12 on page 5	
875L-N25CP3O-A2			N.C.	PNP		Figure 9 on page 5	
875L-N25CN3O-A2				NPN		Figure 11 on page 5	
875L-N25NP3O-D4			N.O.	PNP	M12 Micro QD	Figure 10 on page 5	Figure 8
875L-N25NN3O-D4				NPN		Figure 12 on page 5	
875L-N25CP3O-D4			N.C.	PNP		Figure 9 on page 5	
875L-N25CN3O-D4				NPN		Figure 11 on page 5	

(1) All units come with two nuts to secure the unit on the mounting bracket.

Approximate Dimensions

Dimensions are shown in mm (in.). Dimensions are not intended to be used for manufacturing purposes.

Figure 5 - Shielded 30 mm (1.81 in.) with Cable [mm (in.)]

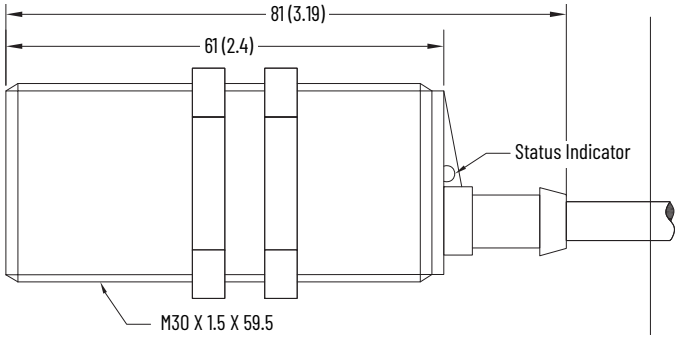


Figure 6 - Shielded 30 mm (1.81 in.) with M12 Micro QD [mm (in.)]

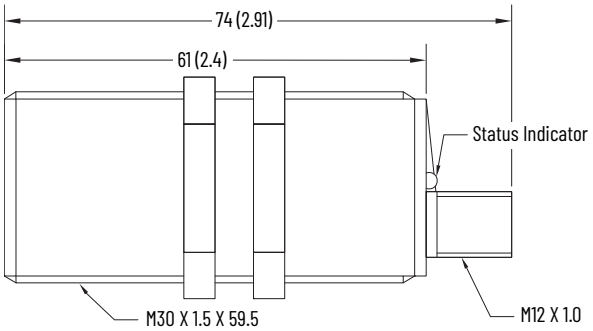


Figure 7 - Unshielded 30 mm (1.81 in.) with Cable [mm (in.)]

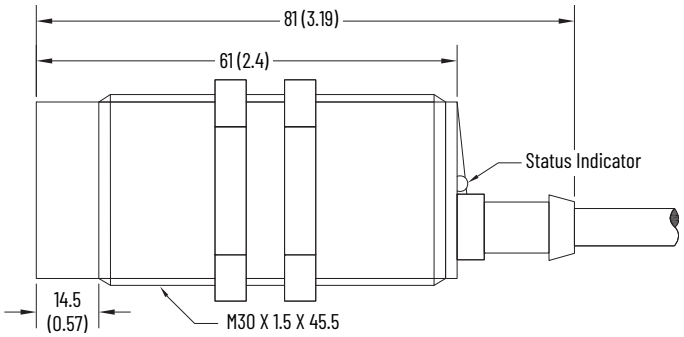
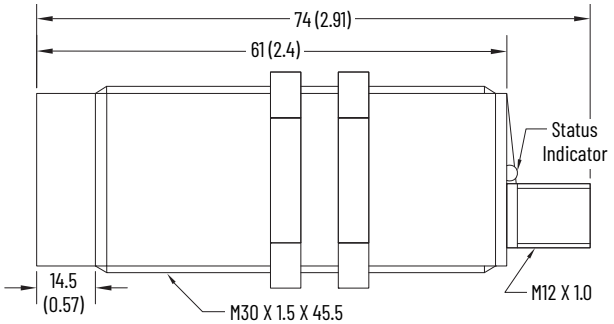


Figure 8 - Unshielded 30 mm (1.81 in.) with M12 Micro QD [mm (in.)]



875L DC Wiring Diagrams

Figure 9 - Sourcing N.C.

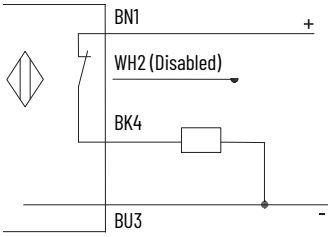


Figure 10 - Sourcing N.O.

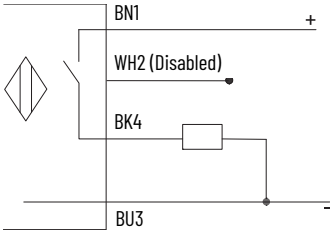


Figure 11 - Sinking N.C.

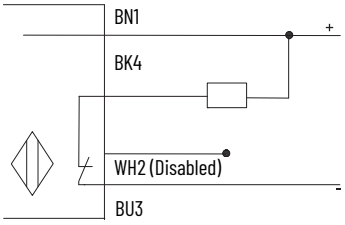
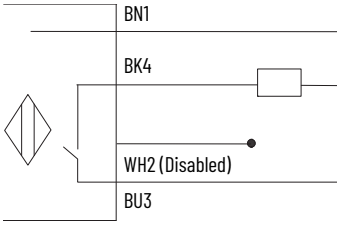


Figure 12 - Sinking N.O.



875L AC Tubular Capacitive Proximity Sensors

AC Micro Quick Disconnect Style
18 mm and 30 mm
Shielded and Unshielded

AC Cable Style
18 mm and 30 mm
Shielded and Unshielded

Specifications

Attribute	Value
Housing material	Plastic PBT
Rated operating dist. (Sn)	• 875L-F8x18: 3...8 mm (0.12...0.31 in.) - factory set at 8 mm (0.31 in.) • 875L-G12x18: 3...12 mm (0.12...0.47 in.) - factory set at 12 mm (0.47 in) • 875L-F16x30: 2...16 mm (0.08...0.63 in.) - factory set at 16 mm (0.63 in.) • 875L-G25x30: 4...25 mm (0.16...0.98 in.) - factory set at 25 mm (0.98 in.)
Sensitivity	270° turn potentiometer (adjustable)
Effective operation distance (Sr)	0.9 x Sn ≤ Sr ≤ 1.1 x Sn
Usable operation distance (Su)	0.8 x Sr ≤ Su ≤ 1.2 x Sr
Switching frequency	10 Hz
Repeat accuracy (R)	≤5%
Hysteresis (H)	4...20% of sensing distance
Rated operational volt (UB)	20...250V AC (ripple included)
Ripple	≤10%
Rated operating current (Ie)	• Continuous: ≤500 mA • Short-time: <2.5 A (20 ms, max)
Load current, min	10 mA
Voltage drop (Ud)	≤10V AC (at loads ≥20 mA)
Protection	Transients
Power ON delay	≤100 ms
Frequency of operating cycles (f)	10 Hz
Indication for output ON	Yellow status indicator
Degree of protection	IP67 (NEMA 1, 3, 4, 6, 13)
Temperature	• Operating: -25...+80 °C (-13...+176 °F) • Storage: -40...+85 °C (-40...+185 °F)

875L 2-wire AC 18 mm (0.71 in.) and 30 mm (1.81 in.) Diameter Sensors

Product Selection

Cat. No. (1)	Barrel Diameter	Shielded	Output	Connection	Wiring Diagram	Dimensions
875L-F8N18-A2	18 mm (0.71 in.)	Yes	N.O.	2 m (6.6 ft) PVC cable	Figure 21 on page 8	Figure 13
875L-F8C18-A2			N.C.		Figure 22 on page 8	
875L-F8N18-R3			N.O.	AC Micro QD	Figure 21 on page 8	Figure 14
875L-F8C18-R3			N.C.		Figure 22 on page 8	
875L-G12N18-A2		No	N.O.	2 m (6.6 ft) PVC cable	Figure 21 on page 8	Figure 15
875L-G12C18-A2			N.C.		Figure 22 on page 8	
875L-G12N18-R3			N.O.	AC Micro QD	Figure 21 on page 8	Figure 16
875L-G12C18-R3			N.C.		Figure 22 on page 8	
875L-F16B30-A2	30 mm (1.81 in.)	Yes	N.O. or N.C.	2 m (6.6 ft) PVC cable	Figure 23 on page 8	Figure 17 on page 8
875L-F16B30-R3				AC Micro QD	Figure 23 on page 8	Figure 18 on page 8
875L-G25B30-A2		No	N.O. or N.C.	2 m (6.6 ft) PVC cable	Figure 23 on page 8	Figure 19 on page 8
875L-G25B30-R3				AC Micro QD	Figure 23 on page 8	Figure 20 on page 8

(1) All units come with two nuts to secure the unit on the mounting bracket.

Approximate Dimensions

Dimensions are shown in mm (in.). Dimensions are not intended to be used for manufacturing purposes.

Figure 13 - AC Shielded 18 mm (0.71 in.) with Cable [mm (in.)]

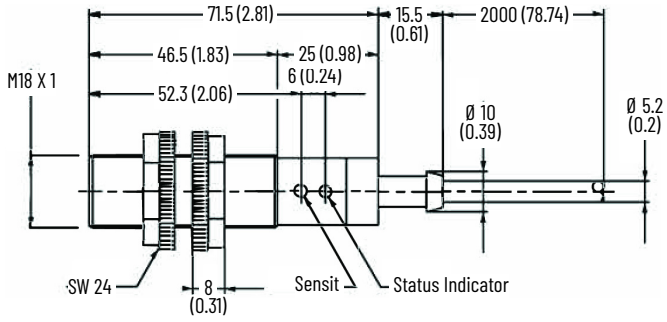


Figure 14 - AC Shielded 18 mm (0.71 in.) with AC Micro QD [mm (in.)]

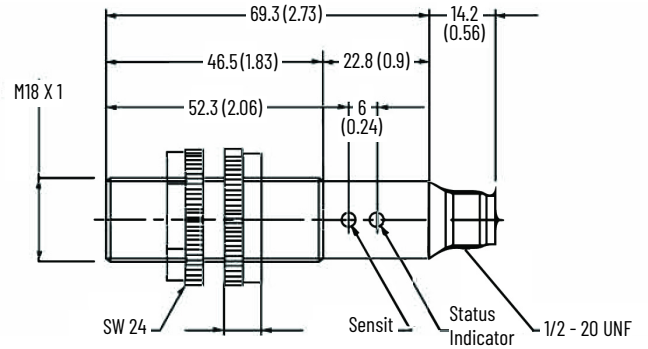


Figure 15 - AC Unshielded 18 mm (0.71 in.) with Cable [mm (in.)]

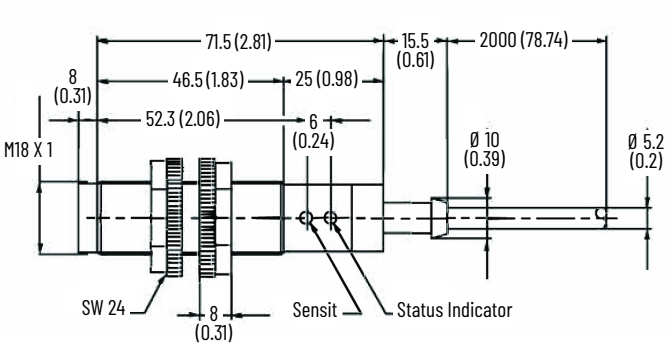
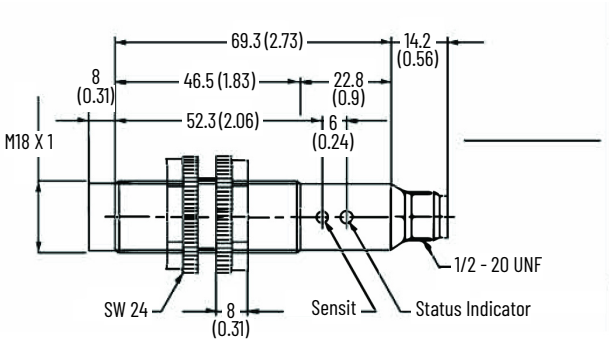


Figure 16 - AC Unshielded 18 mm (0.71 in.) with AC Micro QD [mm (in.)]



Approximate Dimensions

Dimensions are shown in mm (in.). Dimensions are not intended to be used for manufacturing purposes.

Figure 17 - AC Shielded 30 mm (1.81 in.) with Cable [mm (in.)]

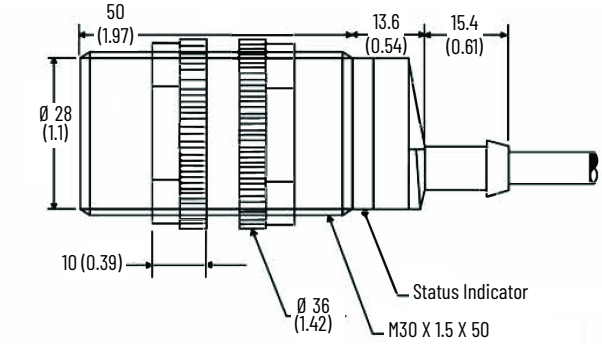


Figure 18 - AC Shielded 30 mm (1.81 in.) with AC Micro QD [mm (in.)]

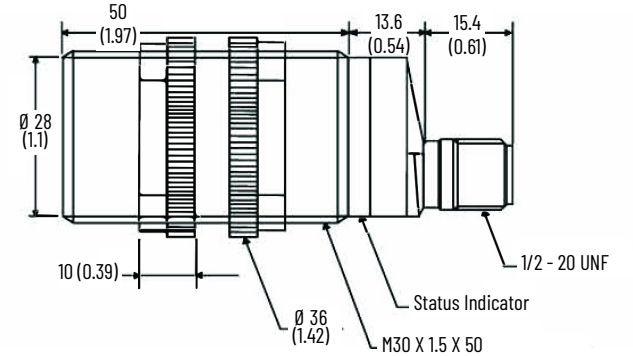


Figure 19 - AC Unshielded 30 mm (1.81 in.) with Cable [mm (in.)]

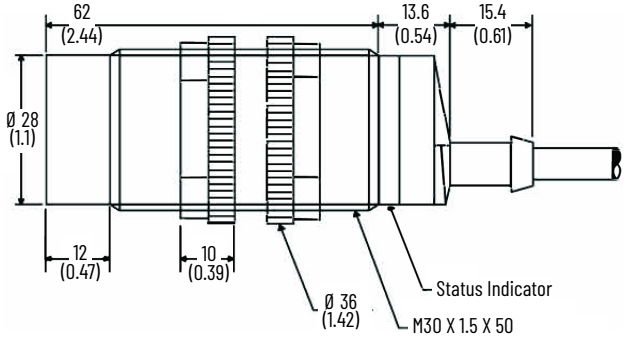
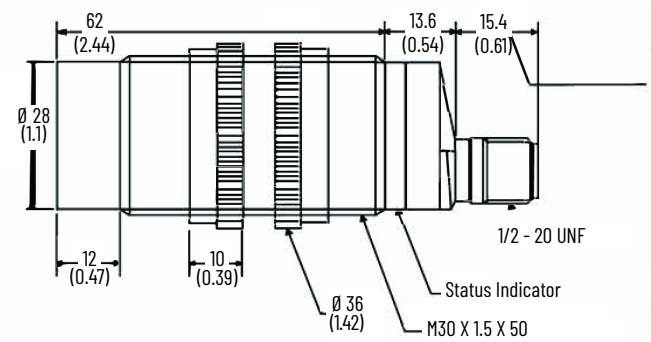


Figure 20 - AC Unshielded 30 mm (1.81 in.) with AC Micro QD [mm (in.)]



875L 2-wire AC Wiring Diagrams

Figure 21 - Wiring Diagram - Sourcing N.O.

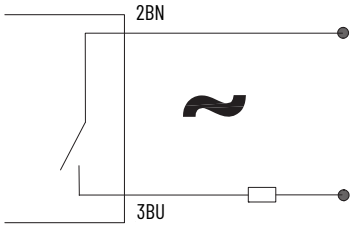


Figure 22 - Wiring Diagram - Sourcing N.C.

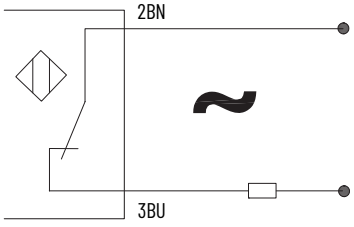
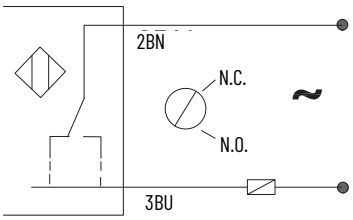


Figure 23 - Wiring Diagram - N.C. or N.O. Selectable



875F DC Rectangular Capacitive Proximity Sensors

Pigtail cable with Integral Micro QD Connector Style
34 x 16 x 8 mm
Shielded

DC Cable Style
34 x 16 x 8 mm
Shielded

875F Capacitive Proximity Sensor in Universal Mounting Bracket

Mounting Bracket and Adhesive Pads
(Supplied with Sensor)

Specifications

Attribute	Value
Housing material	Plastic PBT
Detection	• Pipes diameter: Ø8 mm (0.31 in.), minimum • Wall thickness (factory settings): – Plastic (non-conductive plastic wall): 0.5…6 mm (0.02…0.24 in.) – Glass (non-conductive glass wall): 0.5…4 mm (0.02…0.16 in.) • Wall thickness (manual setup): ≤10 mm (0.39 in.) plastic wall (best case) ≤10 mm (0.39 in.) glass wall (best case) • Liquids: Water-based liquids such as water, milk, syrup, honey, milkshakes, lubricates, acids, alkaline fluids, body fluids, and other high-conductive liquids (≤50 ms)
Effective operation distance (Sr)	0.9 x Sn ≤ Sr ≤ 1.1 x Sn
Usable operation distance (Su)	0.85 x Sr ≤ Su ≤ 1.15 x Sr
Switching frequency	≤10 Hz
Repeat accuracy (R)	≤5%
Hysteresis (H)	Adjustable by IO-Link (1… 100%) • 875L-M8*xx*18 factory settings: Typical 6% • 875L-N12*xx*18 factory settings: Typical 15% • 875L-M16*xx*30 factory settings: Typical 7% • 875L-N12*xx*18 factory settings: Typical 15%
Rated operational volt (UB)	10…30V DC (ripple included)
Ripple	≤10%
Output functions	NPN or PNP by sensor type
Output switching function	N.O. and N.C by sensor type
Rated operating current (Ie)	≤100 mA
No load supply current (Io)	≤13 mA
Rated insulation voltage (UI)	75V DC
Power-ON delay (tv)	≤300 ms
Voltage drop (Ud)	≤1.5V
Protection	• Short circuit • Reverse polarity • Transients
Degree of protection	• IP65 • IP66 • IP67 • IP68 @ 1.3 m (4.27 ft) and 24 hr • IP69K (NEMA 1, 2, 4, 4x, 5, 12) • ECOLAB
Temperature	• Operating: -25…+80 °C (-13…+176 °F) • Storage: -40…+85 °C (-40…+185 °F)
Humidity range	Operating and storage: 35…95%

875F DC Flat Cap Sensors

Product Selection

Cat. No.	Sensing Distance	Shielded	Output Configuration		Connection	Wiring Diagram	Dimensions
875F-M10NP34-A2	Out of box wall thickness: Plastic 0.5...6 mm (0.02...0.24 in.) Glass 0.5...4 mm (0.02...0.16 in.) Best Case (Taught) 10 mm (0.39 in.)	Yes	N.O.	PNP	2 m (6.6 ft.) PVC cable	Figure 27	Figure 24
875F-M10NN34-A2				NPN		Figure 29	
875F-M10CP34-A2			N.C.	PNP		Figure 26	
875F-M10CN34-A2				NPN		Figure 28	
875F-M10NP34-FP02			N.O.	PNP	152 mm (6 in.) PVC cable with M8 pico quick disconnect	Figure 27	
875F-M10NN34-FP02				NPN		Figure 29	
875F-M10CP34-FP02			N.C.	PNP		Figure 26	
875F-M10CN34-FP02				NPN		Figure 28	

Approximate Dimensions

Dimensions are shown in mm (in.). Dimensions are not intended to be used for manufacturing purposes.

Figure 24 - Sensor

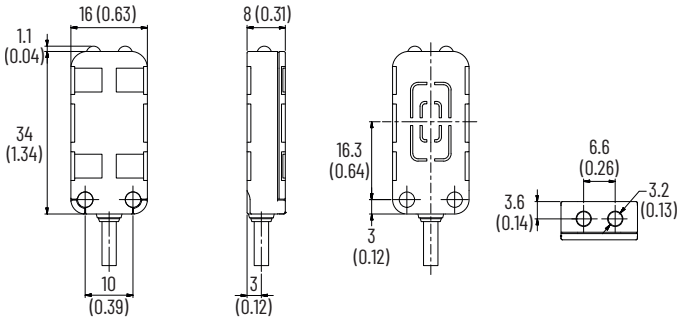
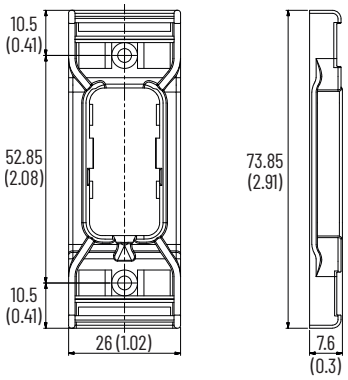


Figure 25 - Mounting Bracket



875F DC Wiring Diagrams

Figure 26 - Sourcing N.C.

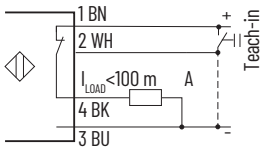


Figure 27 - Sourcing N.O.

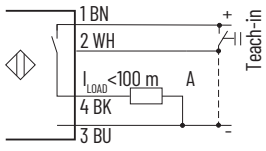


Figure 28 - Sinking N.C.

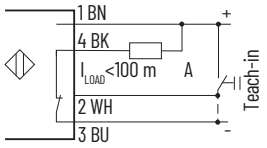
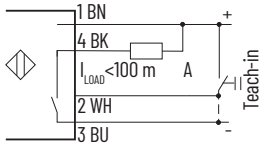


Figure 29 - Sinking N.O.



Pin	Color	Description
1	BN (Brown)	Supply (V+)
2	WH (White)	Teach input
3	BU (Blue)	Supply (V-)
4	BK (Black)	Output

IMPORTANT When not used, permanently connect the teach wire to V-.

Additional Resources

These documents contain additional information concerning related products from Rockwell Automation.

Resource	Description
Capacitive Sensors User Manual, publication 875-UM001	Provides guidance on installation, configuration, and use for Bulletin 875F and 875L capacitive proximity sensors with IO-Link.
Rectangular Capacitive Sensors Installation Instructions, publication 875F-IN001	Describes how to install a rectangular capacitive sensor.
System Security Design Guidelines Reference Manual, SECURE-RM001	Provides guidance on how to conduct security assessments, implement Rockwell Automation products in a secure system, harden the control system, manage user access, and dispose of equipment.
UL Standards Listing for Industrial Control Products, publication CMPNTS-SR002	Assists original equipment manufacturers (OEMs) with construction of panels, to help ensure that they conform to the requirements of Underwriters Laboratories.
American Standards, Configurations, and Ratings: Introduction to Motor Circuit Design, publication IC-AT001	Provides an overview of American motor circuit design based on methods that are outlined in the NEC.
Industrial Components Preventive Maintenance, Enclosures, and Contact Ratings Specifications, publication IC-TD002	Provides a quick reference tool for Allen-Bradley industrial automation controls and assemblies.
Safety Guidelines for the Application, Installation, and Maintenance of Solid-state Control, publication SGI-1.1	Designed to harmonize with NEMA Standards Publication No. ICS 1.1-1987 and provides general guidelines for the application, installation, and maintenance of solid-state control in the form of individual devices or packaged assemblies incorporating solid-state components.
Industrial Automation Wiring and Grounding Guidelines, publication 1770-4.1	Provides general guidelines for installing a Rockwell Automation industrial system.
Product Certifications website, rok.auto/certifications.	Provides declarations of conformity, certificates, and other certification details.

You can view or download publications at rok.auto/literature.

Rockwell Automation Support

Use these resources to access support information.

Technical Support Center	Find help with how-to videos, FAQs, chat, user forums, Knowledgebase, and product notification updates.	rok.auto/support
Local Technical Support Phone Numbers	Locate the telephone number for your country.	rok.auto/phonesupport
Technical Documentation Center	Quickly access and download technical specifications, installation instructions, and user manuals.	rok.auto/techdocs
Literature Library	Find installation instructions, manuals, brochures, and technical data publications.	rok.auto/literature
Product Compatibility and Download Center (PCDC)	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	rok.auto/pcdc

Documentation Feedback

Your comments help us serve your documentation needs better. If you have any suggestions on how to improve our content, complete the form at rok.auto/docfeedback.

Rockwell Automation maintains current product environmental compliance information on its website at rok.auto/pec.

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Publication 875-TD001C-EN-P - October 2022
Supersedes Publication 875-TD001B-EN-P - September 2022