



# INSTALLATION INSTRUCTIONS

## SELF-CONTAINED CYLINDRICAL PROXIMITY SWITCHES WITH CABLE

### Bulletin 871C • 24-250 Volts AC • Series A

### 18-mm, 30-mm, And 77-mm

**CAUTION:** Solid state devices can be susceptible to radio frequency (RF) interference depending on the power and the frequency of the transmitting source. If RF transmitting equipment is to be used in the vicinity of the solid state devices, thorough testing should be performed to assure that transmitter operation is restricted to a safe operating distance from the control equipment and its wiring.

**IMPORTANT** - Save these instructions for future use. For additional information, refer to Publication 871C-2.1.1 Product Data.

**WARNING** - If a hazardous condition can result from unintended energization of this device, access to the sensing area should be guarded.

**SPECIFICATIONS -**

**Operating Voltage Range:**

- 24-250 Volts AC 50/60Hz

**Sensing Distance,  $S_n$ :** refer to MOUNTING DIMENSIONS TABLE

**Protection:**

- Against transient electrical noise
- Against false pulse on power-up. (No target present)

**Load Current:**

- **Maximum Continuous:**
  - 18mm: 180 milliamps
  - 30mm: 300 milliamps
  - 77mm: 300 milliamps
- **Maximum Inrush:**
  - 18mm: 1.0 amp for 1 cycle
  - 30mm: 3.0 amps for 1 cycle
  - 77mm: 2.0 amps for 1 cycle

- **Minimum:** 4 milliamps

**Maximum Voltage Drop (Load On):**

- 11 Volts

**Maximum Leakage Current (Load Off):**

- 18mm: 1.7 Milliamps @ 132V  
2.0 Milliamps @ 250V
- 30mm: 1.7 Milliamps @ 132V  
2.3 Milliamps @ 250V
- 77mm: 1.7 Milliamps @ 132V  
2.3 Milliamps @ 250V

**Operating Temperature Range:**

- Metal: -25°C to + 70°C (-13°F to + 158°F)
- Polymer: -25°C to + 55°C (-13°F to + 131°F)

**Enclosure Rating:**

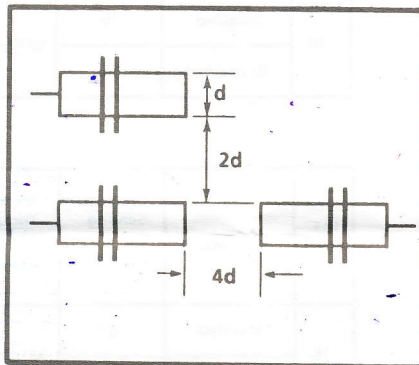
- 18mm: NEMA 4, 13 - IP67
- 30mm: NEMA 4, 13 - IP67
- 77mm: NEMA 4, 13 - IP65

**SENSING DISTANCE** - The standard target is a square of mild steel (ST37), 1mm thick. The side of the square is equal to the diameter of the sensor. Targets smaller than standard size will shorten sensing range.

**CORRECTION FACTORS** - To determine the sensing distance for materials other than the standard mild steel, multiply the sensing distance by the factor given below.

Target Materials	Correction Factor
Steel	1.0
Stainless Steel	0.7 to 0.8
Brass	0.4 to 0.5
Aluminum	0.3 to 0.4
Copper	0.3 to 0.4

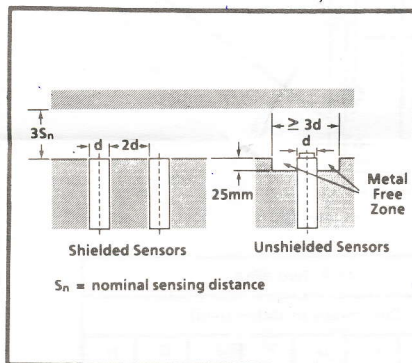
**SPACING BETWEEN THE SWITCHES** - When installed side-by-side or face to face, the minimum spacing distance should be maintained as shown in Figure 1.



**FIGURE 1** Spacing between switches.

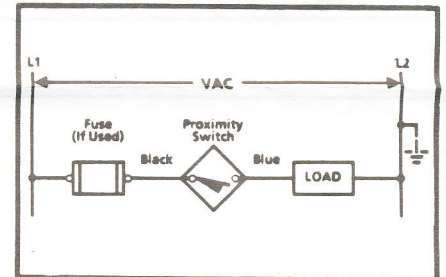
**EFFECTS OF NEARBY METAL SURFACES** - Shielded sensors can be surrounded by any metal flush with its sensing surface. Figure 2.

Unshielded sensors require a metal-free zone around the detecting face. Metals immediately opposite the sensing face should be no closer than 3 times the rated sensing distance of the sensor. Figure 2.



**FIGURE 2** Spacing distances from nearby metal surfaces.

**WIRING** - Connect the proximity switch and the LOAD as shown in Figure 3. To ground switch, connect the metal case to earth ground before power is applied. The LED indicator is ON when the proximity switch output is conducting current.



**FIGURE 3** Connection diagram.

**SERIES CONNECTED SWITCHES** - Switches can be connected in series with a load. For proper operation, the operating load voltage must be less than or equal to the minimum supply voltage minus the voltage drops across the series connected proximity switches. The load will be energized when the LED's of all proximity switches are ON.

**PARALLEL CONNECTED SWITCHES** - Switches can be connected in parallel with a load. To determine the maximum number of switches for an application, the sum of the maximum leakage current of the switches connected in parallel must be less than the maximum OFF-state current of the load device.

**NOTE** - Parallel operation of switches does not provide higher load current capability.

**PROGRAMMABLE CONTROLLER APPLICATION.** The Bulletin 871C Proximity Switches interface directly with the AC input modules of most Programmable Controllers (PCs). External resistors are not needed.

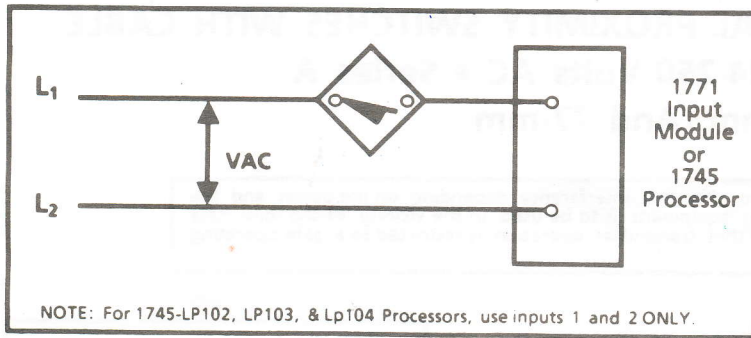
Allen-Bradley's 1771 System of Universal I/O can be used with these switches. The following table describes several Allen-Bradley modules, including the SLC100 Processor (Bul. 1745) that directly interface with these proximity switches.

**Discrete Input Modules and Processors**

Catalog Number	Type	Inputs
1771-1A	120 VAC/VDC	Any
1771-1A2	120 VAC/VDC	Any
1771-1AD	120 VAC	Any
1745-LP101	85-132 VAC	Any
1745-LP102	170-265 VAC	1 and 2 ONLY
1745-LP103	10-30 VAC/VDC	1 and 2 ONLY
1745-LP104	10-30 VAC/VDC	1 and 2 ONLY

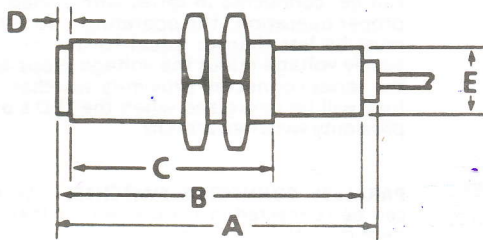
Connect the proximity switch to Direct Input Module or Processor as shown in Figure 4.

FIGURE 4 PC connection diagram.



NOTE: High impedance loads with low OFF-state leakage currents may operate erratically if cable capacitance adds to the proximity switch leakage current.

MOUNTING DIMENSIONS  
DIMENSIONS SHOWN IN PARENTHESIS ARE IN MILLIMETERS

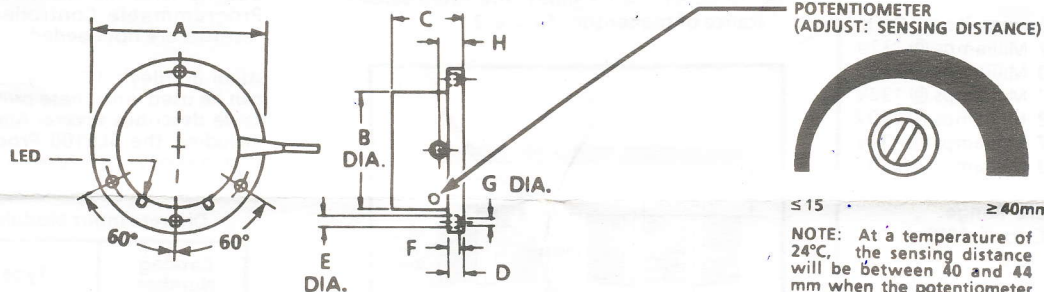


METAL

Tube Dia. (mm)	Construction	Nominal Sensing Distance $S_n$ (mm)	Thread Size	AC • Two Wire					
				Dimensions in Inches (mm)					
				A	B	C	D	E	
18	Shielded	5	M18 X 1	mm	(89)	(81)	(61)	—	(16.7)
				Inch	3.50	3.19	2.40	—	0.66
	Unshielded	8		mm	(88)	(80)	(53)	(7)	(16.7)
				Inch	3.46	3.15	2.09	0.28	0.66
30	Shielded	10	M30 X 1.5	mm	(88)	(81)	(61)	—	(28)
				Inch	3.46	3.19	2.40	—	1.10
	Unshielded	15		mm	(87)	(80)	(50)	(10)	(28)
				Inch	3.42	3.15	1.97	0.39	1.10

POLYMERIC

Tube Dia. (mm)	Construction	Nominal Sensing Distance $S_n$ (mm)	Thread Size	AC • Two Wire					
				Dimensions in Inches (mm)					
				A	B	C	D	E	
18	Shielded	5	M18 X 1	mm	(88.5)	(80.5)	(60)	—	(16.7)
				Inch	3.48	3.17	2.36	—	0.66
	Unshielded	8		mm	(88.5)	(80.5)	(60)	—	(16.7)
				Inch	3.48	3.17	2.36	—	0.66
30	Shielded	10	M30 X 1.5	mm	(87)	(80)	(60)	—	(28)
				Inch	3.42	3.15	2.36	—	1.10
	Unshielded	15		mm	(87)	(80)	(60)	—	(28)
				Inch	3.42	3.15	2.36	—	1.10



Dia. (mm)	Construction	Nominal Sensing Distance $S_n$ (mm)	AC • Two Wire								
			Dimensions in Inches (mm)								
			A	B	C	D	E	F	G	H	
77	Unshielded	40	mm	(105)	(77)	(50)	(10)	(11)	(7)	(6.4)	(17)
			Inch	4.14	3.03	1.97	0.39	0.43	0.27	0.25	0.66

NOTE: At a temperature of 24°C, the sensing distance will be between 40 and 44 mm when the potentiometer is set at the maximum clockwise position and between 10 and 15mm when set at the extreme counter-clockwise position.