

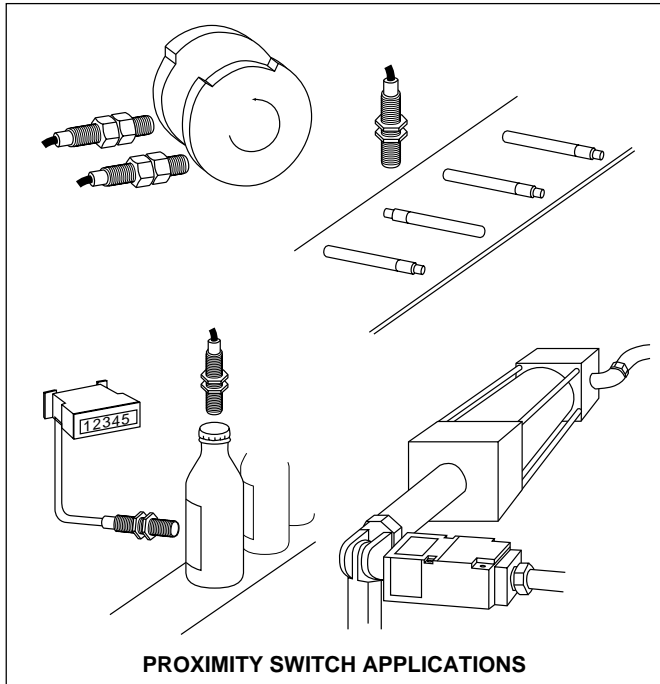
A proximity switch is a solid-state sensor that will detect the presence of any suitable material (referred to as the "target"), and produce an electrical output while the target is within its sensing field.

Veeder-Root brand provides the two popular technologies used in the design of proximity switches: Inductive and capacitive – each having its own unique applications and advantages.

INDUCTIVE PROXIMITY SWITCHES

Inductive proximity switches generate a sensing field that can detect the presence of any metal target. In many applications, inductive proximity switches are used to replace the function of a mechanical switch – without need for physical contact with the cams, levers, or actuators required for mechanical devices.

Another primary application for these versatile sensors is material handling. Various metallic parts or items can be detected as they are moved about manufacturing or assembly operations. The proximity switch can be used to confirm their presence or location, and provide signals used for counting, sorting, diverting, inspection or other automatic processes.



CAPACITIVE PROXIMITY SWITCHES

Like the inductive proximity switch, the capacitive switch is also a simple, trouble free sensor, for the detection of objects at short distances.

Capacitive proximity switches sense a change in dielectric mass rather than the presence of a metal object. Therefore they can detect many materials; liquids, metal, glass, plastic, porcelain, ceramic, wood, leather, rubber, food, water, oil, etc.

The ability to discriminate changes in mass allows their use in unique applications that would otherwise be very difficult to resolve. For example, they can "see" through a container or vessel and determine the presence of the contents inside – great for checking the fill level of powdered material in a box, or liquid in a bottle.

SELECTING A PROXIMITY SWITCH

To fit a specific application, a proximity switch must be considered for its technology (inductive or capacitive), enclosure size, mounting requirements, and electrical output characteristics.

Inductive vs. Capacitive: The inductive switch is generally the choice when replacing mechanical switches that sequence or synchronize machinery. They can sense, without contacting, the cam, rod, or other metal actuator that would have operated a mechanical switch. Inductive switches are also frequently used to sense the production flow, or feed, of metal parts or items.

The capacitive switch can sense the presence or location of objects made of almost any material. However, it is especially useful when the material is non-metallic, or in determining additional information about the object, such as: is a box properly filled? is the material wet or dry?

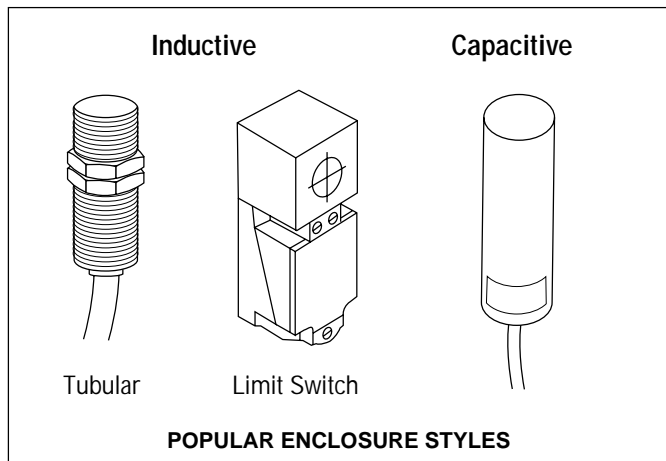
Enclosure Size and Shape: We offer inductive proximity switches in a wide variety of enclosure styles and sizes:

■ Tubular Styles:

- Most space efficient body style
- Available in six diameters
- Threaded mounts permit easy installation and adjustment
- Stainless steel or nickel-brass bodies endure harsh environments
- Include captive cable; quick disconnect (with integral connector) also available

■ Limit Switch Styles:

- Directly mount in place of mechanical limit switches
- Screw terminal connections and conduit fittings



Power Requirement and Outputs: Proximity switches must be selected for compatibility with the AC or DC power source and external load that they will control. Our designs are specialized for operation with either AC or DC circuits, and the proper type must be selected for the application.

■ DC Types:

- Operate over wide range of popular voltages
- Compatible with DC inputs of programmable controllers, counters, and other equipment
- Available with NPN or PNP output circuits
- Output can directly switch DC relays, solenoids, etc.

■ **AC Types:**

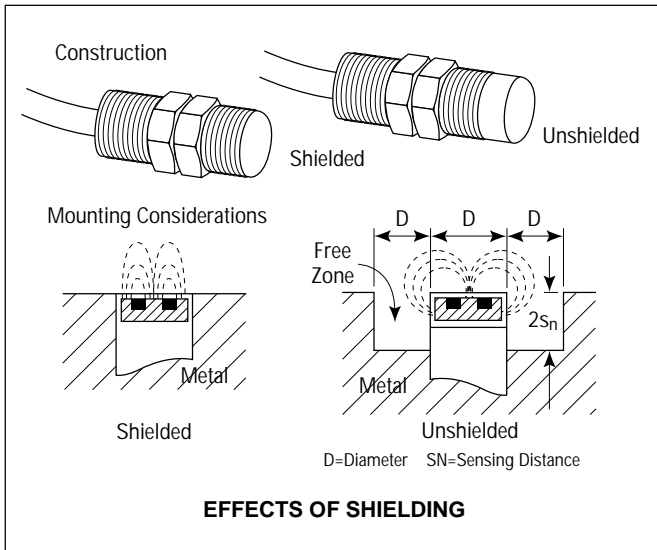
- Popular models operate over 90 to 220 VAC range
- Special high impedance models for direct connection to programmable controller's 20 to 250 VAC inputs
- Simple two-wire series connection with external load
- Can directly switch AC relays, solenoids, etc.

ADDITIONAL CONSIDERATIONS

Familiarity with a few of the specifications for Inductive Proximity Switches that are provided in the following catalog pages will help in their selection.

Shielded and Unshielded Types: Unshielded inductive proximity switches can be recognized by their plastic sensing tip extending beyond the surrounding metal tube. Unshielded types have the advantage of maximum sensing for a given size switch, usually at least 50% greater than shielded designs. However, they must not be mounted in a manner that places metallic surfaces near the extended tip.

Shielded types have their sensing face flush with the front of their metal tube. They can be mounted without regard to surrounding metal surfaces, other than in the front focused sensing field.



Sensing Distance: Represents the maximum working distance between the sensor and the target, and is somewhat proportional to the physical size of the unit – larger proximity switches have greater sensing distance than smaller ones. The specification is based on target material being mild steel, and of equal, or greater size than the proximity switches sensing face. Non-ferrous metals, or smaller targets will reduce the practical sensing distance.

Speed: A proximity switch's speed specification is related to its ability to detect repetitive target cycles, or acknowledge a target that is within its sensing field for a short duration. Generally, DC powered types are considerably faster than AC versions.

MOTION DETECTOR PROXIMITY SWITCH

A unique inductive proximity switch that will produce its output only when the time between targets exceeds a set adjustable duration. Among its many applications are: protecting motors from burn-out due

to binding or jammed mechanical parts, warning of backed up or bound conveyor systems, and confirmation of proper rotation of fans, pumps, etc. Its output will occur within one underspeed revolution of the monitored target.

TYPICAL APPLICATIONS

Every day, there are new and creative applications for inductive and capacitive proximity switches being discovered by people like you. Here are just a few:

Inductive Proximity:

- Sorting & counting metallic parts
- Missing Parts Control
- Robotics
- Broken Tool Detection
- Valve Position Confirmation
- Jam Detection

Capacitive Proximity:

- Non-Metallic parts
- Liquid or Powder Level Control
- Confirming Contents of Sealed Package
- Web Detection
- Bottling Overspill/Underfill Control
- End of Roll Alarm

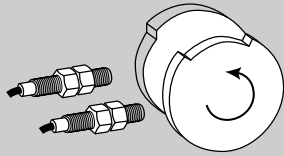
ULTRA-PRECISION SWITCH

Although the devices in this catalog section are primarily non-contact sensors, there is an exception to the rule. Our Ultra-Precision Switch (UPS) products although similar in appearance to tubular proximity switches, are actually highly accurate mechanically actuated switches.

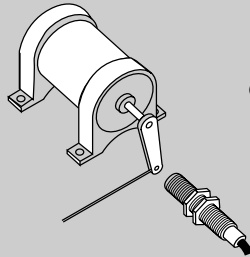
The UPS can be used for measurement and control tasks such as gauging, positioning, and measuring in industrial machinery or robotics applications. All have repeatability to 0.00004 inch (.001 mm), very low actuating force, and mechanical life of 10,000,000 operations.



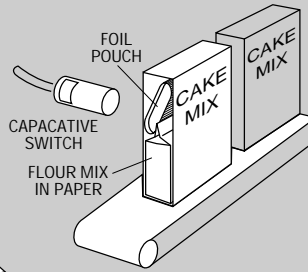
Noncontact sensing of metals and other materials



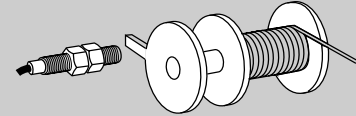
CAM TIMING



POSITION CONFIRMATION



LEVEL CHECKING



TURN COUNTING

VEEDER-ROOT brand

GENERAL PURPOSE

Advantages

- Low cost
- Many diameters

VEEDER-ROOT brand

SHORT TUBE

Advantages

- 40% shorter size
- Many diameters

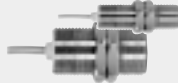
VEEDER-ROOT brand

EXTENDED RANGE

Advantages

- Most sensitivity
- Short tube

Series 6508-6530, General Purpose DC
See page 11.04



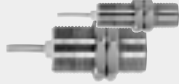
- 8 to 30 mm diameters
- Shielded and unshielded

Series 6504-6512, Short Tube, DC Powered
See page 11.06



- Fits tight areas
- No sacrifice of range

Series 6512-6530, General Purpose AC
See page 11.05



- 2 wire connection
- Shielded and unshielded

Series 6512 Ring LED, DC Powered
See page 11.08



- 360° visible indicator
- Quick disconnect cable

Series 6508/6512, Short Tube, DC Powered, Extended Range
See page 11.07



- Up to 100% extra range
- Shielded design

Series 6600, Limit Switch
See page 11.09

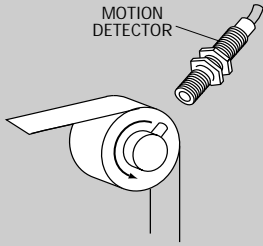


- Universal sensing head
- Replaces mechanical switch

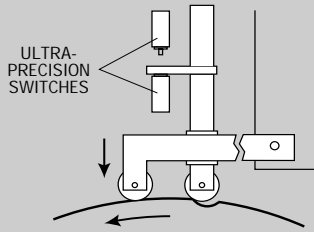
Series 6725, Capacitive Proximity Switches
See page 11.10



- Detects all materials
- Low cost



**MOTION
DETECTION**



**SURFACE
IRREGULARITY CHECKING**

ACCESSORIES

For Proximity and
Ultra-Precision
Switches

VEEDER-ROOT brand

MOTION DETECTORS

Advantages

- Protects machinery
- Economical

VEEDER-ROOT brand

ULTRA-PRECISION SWITCH

Advantages

- Precise to .00004"
- Rugged construction

Series 109888, AC/DC Motion Detectors
See page 11.11



- Simple 2 wire connection
- Protects in one revolution

Series 669220, Quick Disconnect S12 Cable
See page 11.13



- For ring-LED proximity
- 2 or 5 foot versions

Series 7483-7486, Ultra Precision Switches
See page 11.12

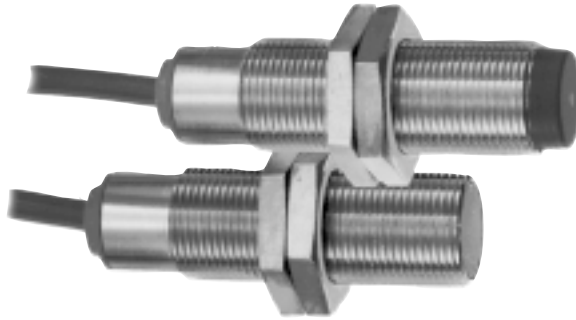


- Contact or transistor output
- Precise, in-touch sensing

Series 669010, Remote Power Supply
See page 11.13



- For ultra-precision switch
- Relay support



Popular tubular designs available with shielded and unshielded construction . . . sizes from 8 mm to 30 mm diameter

Detects the presence of ferrous and nonferrous metals by producing a switched transistor output. Threaded tubular housing for easy mounting to machine structures or brackets. An LED indicator confirms proper alignment and operation. *Shielded* types are not influenced by metallic material surrounding their face-circumference, therefore can be flush-mounted in a metal surface. *Unshielded* types have a sensing face that extends beyond their metal housing, gaining about 50% extra sensing distance over equivalent shielded units, but can not be flush-mounted in metal. Models are offered with output circuits combining NPN or PNP transistors, and normally open configurations.

- Quality construction and materials – NEMA-4/IP67 rated
- Replaces mechanical switches – does the job without contact or wear
- Operates over -13° to +167°F (-24° to +75°C) temperature range
- Reverse polarity and transient protected
- Wide operating voltage range – 5 to 24, or 10 to 50 VDC
- Fast 1 kHz switching speed capability
- Can switch load currents to 200 mA, such as DC relays or solenoids
- NPN or PNP output circuits
- LED indicator confirms proper target alignment

They provide a long-life, noncontact, alternative to mechanical limit-switches in many machine control and object sensing applications.

For power supply, see page 13.14
For capacitive operation, see Capacitive Proximity Switches

For typical applications, see Proximity Switch Introduction and Selection Guide, pages 11.00-11.03

SPECIFICATIONS

Electrical Characteristics:

Operating Voltage Range: 5-24 VDC, diameter < 18 mm; 10-50 VDC, diameter ≥ 18 mm

Maximum Voltage Ripple: 10%

Load Current: Maximum Continuous Load: 200 mA; Minimum Continuous Load: 0.30 mA; Leakage Current: Supply Current (excluding load): 12 mA; On-State Voltage Drop: <2V; Output Transistor Type: NPN current sinking, PNP current sourcing

Operating Characteristics:

Sensing Distance Tolerance: ±20% @ 5-9 VDC, ±15% @ 10-50 VDC

Switching Frequency: 8 mm = 5 kHz; 12 mm = 2 kHz; 18 mm = 1 kHz; 30 mm = 500 Hz

Hysteresis: 30% max. @ 5-9 V, 20% max. @ 10-50 V

Operating Temperature: -13° to +167°F (-25° to +75°C)

Repeatability: 5%

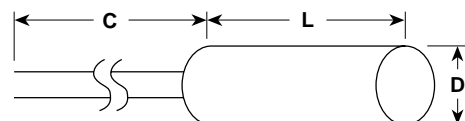
Standard Protections: Reverse polarity, transient

Enclosure Ratings: NEMA-4, -13 (IP67)

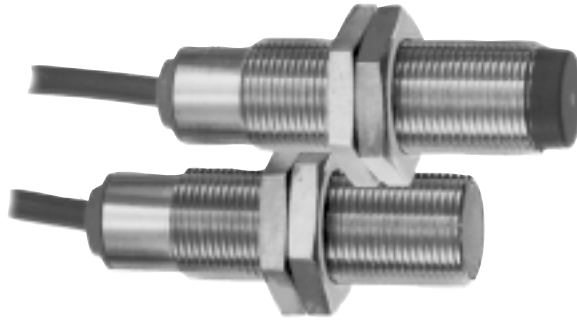
200 mA Maximum Load Current									
Model Number		LED	Shld.	Sens. Dist. (mm)	Voltage Range DC	Dimensions			Tube Matr.
NPN	PNP					D	L	C	
0650800-010	0650802-010	Yes	Yes	1.5	10 to 30	8 mm	30 mm	2M	Metal
0650800-030	0650802-030	Yes	Yes	2.0	10 to 30	8 mm	30 mm	2M	Metal
0651210-010	0651212-010	Yes	Yes	2.0	5 to 24	12 mm	50 mm	2M	Metal
0651210-030	0651212-030	Yes	No	4.0	5 to 24	12 mm	54 mm	2M	Metal
0651200-708	0651200-718	Yes	No	4.0	5 to 24	12mm	54mm	4M*	Metal
0651810-010	0651812-010	Yes	Yes	5.0	10 to 50	18 mm	50 mm	2M	Metal
0651810-030	0651812-030	Yes	No	8.0	10 to 50	18 mm	58 mm	2M	Metal
0651820-030		Yes	No	8.0	10 to 50	18 mm	80 mm	2M	Plastic
0653010-010		Yes	Yes	10.0	10 to 50	30 mm	60 mm	2M	Metal

*Shielded Cable

Dimensions:



See ordering table for dimensions.



Just two wires – connects like a conventional switch . . . delivers repeatable, wear-free operation

Detects the presence of ferrous and nonferrous metals and produces a control output to switch AC circuits. Completely self-contained, they provide a long-life, noncontact, alternative to mechanical limit-switches in many machine control and object sensing applications. Threaded tubular housing for easy mounting to machine structures or brackets. *Shielded* types are not influenced by metallic material surrounding their face-circumference, therefore can be flush-mounted in a metal surface. *Unshielded* types have a sensing face that extends beyond their metal housing, gaining about 50% extra sensing distance over equivalent shielded units, but can not be flush-mounted in metal. Several models feature an LED indicator that confirms proper alignment and operation.

- Quality construction and materials – NEMA-4/IP67 rated
- Replaces mechanical switches – does the job without contact or wear
- Noncontact sensing – does not touch detected object
- Operation at -13° to +167°F (-25° to +75°C) temperature range
- Suited for solid-state as well as conventional loads
- Wide operating voltage and power frequency range
- Can directly switch moderate loads, such as AC relays or solenoids
- Available diameters: 12 mm, 18 mm, 30 mm; shielded and unshielded
- LED indicator confirms proper target alignment

Using just two wires, they simply connect in series with the AC load to be controlled – relay, light, valve, solenoid, etc. Many high impedance loads, such as PLC AC-input modules, solid-state relays, and electronic counters can be switched, generally not requiring an external load resistor.

SPECIFICATIONS

Electrical Characteristics:

Operating Voltage Range: 90-250 (±10%) VAC, 50/60 Hz

Configuration: Normally Open

Load Current:

Maximum Continuous at 50°C (linearly derated above 50°C):

12mm Types: 150mA; 18mm & 30mm Types: 200mA

Minimum Continuous: 5mA

Leakage Current: <1.5mA @ 110V; <3.0mA @ 220V

On-State Voltage Drop: <8V

Operating Characteristics (all devices):

Sensing Distance Tolerance: ±10%

Min./Max. Hysteresis (% of nom.): 3/20

Operating Temperature: -13° to +167°F (-25° to +75°C)

Switching Frequency: 10 Hz Max.

Enclosure Material: Nickel plated brass

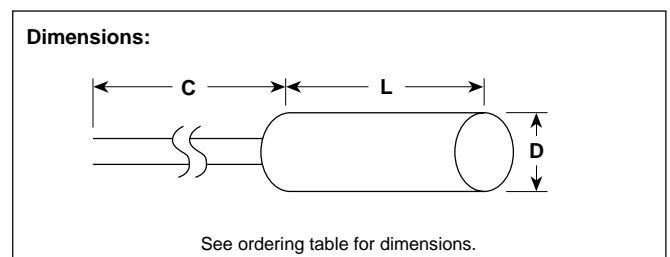
Enclosure Ratings: NEMA-4, -13 (IP67)

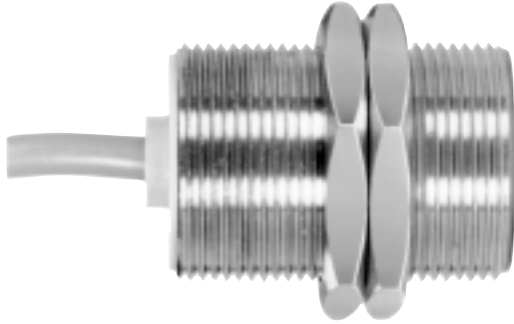
Termination Type: 2-conductor, 2-meter cable

For limit switch housing, see Series 6600

For typical applications, see Proximity Switch Introduction and Selection Guide, pages 11.00-11.03

Model Number	LED	Shld.	Sens. Dist. (mm)	Load Current		Dimensions		
				Minimum	Maximum	D	L	C
2-Wire AC, Normally Open, 90 to 250 VAC Operation								
0651210-700	Yes	Yes	2.0	5 mA	150 mA	12 mm	60 mm	2M
0651210-701	Yes	No	4.0	5 mA	150 mA	12 mm	64 mm	2M
0651810-600	Yes	Yes	5.0	5 mA	200 mA	18 mm	65 mm	2M
0651810-601	Yes	No	8.0	5 mA	200 mA	18 mm	73 mm	2M
0653010-700	Yes	Yes	10.0	5 mA	200 mA	30 mm	60 mm	2M
0653010-701	Yes	No	15.0	5 mA	200 mA	30 mm	70 mm	2M





Space efficient – 40 percent shorter than conventional types without sacrifice of performance . . . diameters from 4 mm to 12 mm, with shielded and unshielded construction

Detects the presence of ferrous and nonferrous metals and produces a switched transistor output. Short length, threaded tubular housing for easy mounting to machine structures or brackets. Completely self-contained, they offer a long-life, high-speed, noncontact alternative to mechanical limit-switches in many machine control and object sensing applications. *Shielded* types are not influenced by metallic material surrounding their face-circumference, therefore can be flush-mounted in a metal surface. *Unshielded* types have a sensing face that extends beyond their metal housing, gaining about 50% extra sensing distance over equivalent shielded units, but can not be flush-mounted in metal. Models are offered with NPN (current sinking) or PNP (current sourcing) transistor output circuits.

- Quality construction and materials – NEMA-4/IP67 rated
- Short length fits limited space areas that restrict use of longer models
- Replaces mechanical switches – does the job without contact or wear
- Operation at -13° to +167°F (-24° to +75°C) temperature range
- Reverse polarity and transient protected
- Wide operating voltage range: 5 to 24, or 10 to 50 VDC
- Fast 1 kHz switching speed capability
- Can switch load currents to 200 mA, such as DC relays or solenoids
- NPN or PNP, normally open output circuits
- Requires less than 10 mA supply current

Many short tube switches are short-circuit protected and some feature an LED indicator for easy setup.

For extended sensing range, see page 11.07

For typical applications, see Proximity Switch Introduction and Selection Guide, pages 11.00-11.03

SPECIFICATIONS

Electrical Characteristics:

Operating Voltage Range: ≤12 mm dia.: 5-24 VDC, 10-30 VDC;
≥18 mm dia.: 10-50 VDC

Maximum Voltage Ripple: 10%

Maximum Continuous Load Current: 75, 200, 250 mA

Supply Current: ≤10 mA

On-State Voltage Drop: ≤2.5 VDC

Output Transistor Type: Current Sinking: NPN; Current Sourcing: PNP

Termination: 2m (6.6') PVC cable

Number of Connecting Wires: 3

Operating Characteristics:

Switching Frequency: 4 mm and 5 mm = 2 kHz; 8 mm = 5 kHz;
12 mm = 2 kHz

Hysteresis (max. % of nominal): 20

Repeatability: 5%

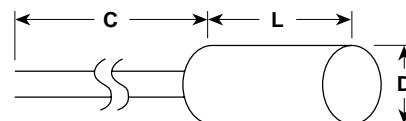
Operating Temperature: -13° to 167°F (-25° to 75°C)

Standard Protections: Reverse polarity, transient, many devices short circuit protected

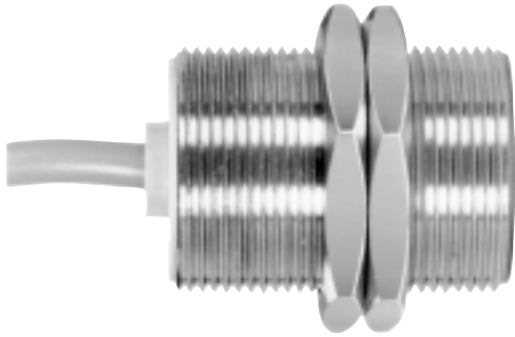
Enclosure Ratings: NEMA-4, -13 (IP 67)

Model Number		LED	Shld.	Sens. Dist. (mm)	Load Current (mA)	Dimensions			Tube Matr.
NPN	PNP					D	L	C	
5 to 24 VDC (SCP = Short Circuit Protected)									
0650800-050	0650802-050	Yes	Yes	1.5	200	8 mm	30 mm	2M	INOX
	0650802-070	Yes	No	2.0	200	8 mm	32 mm	2M	INOX
0651210-050	0651212-050	Yes	Yes	2.0	200	12 mm	30 mm	2M	MS
0651210-070	0651212-070	Yes	No	4.0	200	12 mm	34 mm	2M	MS
10 to 30 VDC (Short Circuit Protected)									
	0650802-450	Yes	Yes	1.5	200 (SCP)	8 mm	30 mm	2M	INOX
0651210-450		Yes	Yes	2.0	250 (SCP)	12 mm	30 mm	2M	INOX
0650430-400		No	Yes	0.8	75 (SCP)	4 mm	27 mm	2M	INOX
	0650502-400	No	Yes	0.8	75 (SCP)	5 mm	27 mm	2M	INOX

Dimensions:



See ordering table for dimensions.



40 percent shorter than conventional types with up to 100 percent greater sensing range . . . shielded construction in 8 mm and 12 mm diameters

Detects the presence of ferrous and nonferrous metals and produces a switched transistor output. Short length, threaded tubular housing for easy mounting to machine structures or brackets – plus shielded construction, but with equivalent sensing range to unshielded units. *Shielded* types are not influenced by metallic material surrounding their face-circumference, therefore can be flush-mounted in a metal surface. Completely self contained, they offer a long-life, high-speed, noncontact alternative to mechanical limit-switches in many machine control and object sensing applications. Models are offered with NPN (current sinking) or PNP (current sourcing) transistor output circuits.

- Quality construction and materials – NEMA-4/IP67 rated
- Same sensing range as larger, more expensive models
- Short length fits limited space that restricts use of conventional models
- Replaces mechanical switches – does the job without contact or wear
- Operation at -13° to +167° F (-25° to +75° C) temperature range
- Reverse polarity and transient protected
- Wide operating voltage range: 12 to 30 VDC
- Fast 1 kHz switching speed capability
- Can switch load currents to 200 mA, such as DC relays or solenoids
- Requires less than 10 mA supply current

Many models are short-circuit protected and some feature an LED indicator for easy setup.

For power supply, see page 13.14

SPECIFICATIONS

Electrical Characteristics:

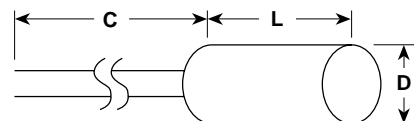
- Operating Voltage Range:** 12-30 VDC
- Voltage Range Tolerance:** 0%
- Max. Continuous Load Current:** 200 mA
- Supply Current (Excluding Load):** 10 mA
- On-State Voltage Drop:** <2.5 VDC
- Output Transistor Type:** NPN Current Sinking; PNP Current Sourcing
- Number of Conductors:** 3

Operating Characteristics:

- Switching Frequency:** 8mm = 5 kHz, 12mm = 2 kHz
- Hysteresis: (Max. % of Nominal):** 20
- Repeatability :** 5%
- Operating Temperature:** -13° to +167°F (-25° to +75°C)
- Enclosure Rating:** NEMA-4, -13 (IP67).

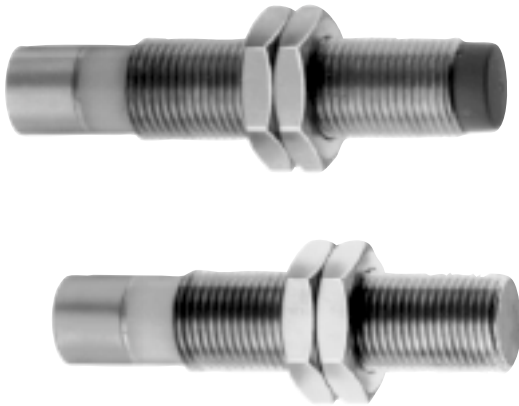
12 to 30 VDC; Short Circuit Protection								
Model Number		LED	Shld.	Sens. Dist. (mm)	Load Current (mA)	Dimensions		
NPN	PNP					D	L	C
0650890-450	0650892-450	Yes	Yes	2.0	200 mA	8 mm	30 mm	2M
0651290-450		Yes	Yes	4.0	200 mA	12 mm	30 mm	2M

Dimensions:



See ordering table for dimensions.

For typical applications, see Proximity Switch Introduction and Selection Guide, pages 11.00-11.03



Quick-disconnect cable and 360° visibility Ring-LED indicator . . . for quick, easy, installation and alignment

Detects the presence of ferrous and nonferrous metals by producing a switched transistor output. Available in 12 mm diameter, with threaded housing for easy mounting to machine structures or brackets. An easy-to-see Ring-LED indicator confirms proper alignment and operation. They provide a long-life, noncontact alternative to mechanical limit-switches in many machine control and object sensing applications.

- Quality construction and materials
- Ring-LED indicator confirms proper target alignment
- Replaces mechanical switches – does the job without contact or wear
- Operation at -13° to +167° F (-25° to +75° C) temperature range
- Reverse polarity and transient protected
- Wide operating voltage range: 5 to 24 VDC
- Fast 2 kHz switching speed capability
- Can switch load currents to 200 mA, such as DC relays or solenoids
- NPN or PNP, normally open or closed, output circuits
- Requires less than 10 mA supply current

Shielded types are not influenced by metallic material surrounding their face-circumference, therefore can be flush-mounted in a metal surface. *Unshielded* types have a sensing face that extends beyond their metal housing, gaining extra sensing distance over equivalent shielded units, but can not be flush-mounted in metal. Models are offered with output circuits combining NPN or PNP transistors, and normally open or normally closed configurations.

**For power supply, see page 13.14
For cable, see page 11.13**

SPECIFICATIONS

Electrical Characteristics:

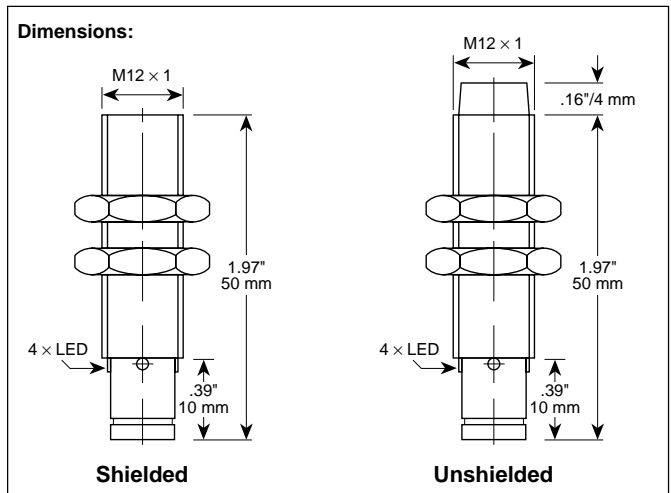
- Operating Voltage Range:** 5-24 VDC
- Voltage Range Tolerance (%):** -0,24V + 20%
- Max. Continuous Load Current:** 200 mA
- Supply Current (Excluding Load):** 10 mA
- On-State Voltage Drop:** 1 VDC
- Number of Connecting Wires:** 3

Operating Characteristics:

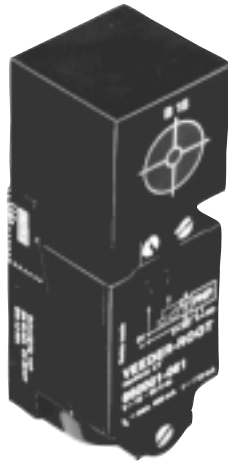
- Switching Frequency:** 2 kHz
- Hysteresis (max. % of Nominal):** 20@10-24v; 30@5-9v
- Repeatability:** 5%
- Operating Temperature:** -13° to +167°F (-25° to +75°C)
- Standard Protections:** Transient

Model No.	Sensing Distance (mm)	Enclosure Dimensions (mm)	Operating Voltage Range (volts)	Termination Type	Enclosure Material
Shielded, 3- & 4-Wire DC, Current Sinking					
0651210-015	2.0	(M12 x 1) x 55	5-24	S12	MS
Shielded, 3- & 4-Wire DC, Current Sourcing					
0651212-015	2.0	(M12 x 1) x 55	5-24	S12	MS
Unshielded, 3- & 4-Wire DC, Current Sinking					
0651220-035	4.0	(M12 x 1) x 59	5-24	S12	Plastic

MS = Nickel-Plated Brass



For typical applications see Proximity Switch Introduction and Selection Guide, pages 11.00-11.03



Direct non-contact replacement for mechanical industrial limit switch package . . . long-life, reliable operation

For heavy-duty use to detect ferrous and nonferrous metals in many industrial machinery applications. It features modular design allowing the sensing face to be precisely positioned left, right, front, rear, or top, even after installation. Water-, dust-, and oil-tight construction with conduit fitting and sealed wiring box. Wide range solid-state, 2-wire, AC control output, with normally-open or normally-closed wiring option.

- Rugged, industrial package – NEMA-4/IP65 rated
- Five-position, universal-sensing head
- Easy-to-install, 2-wire AC connection – 25 to 250 volts
- Selectable, normally-open, or normally-closed switching
- Convenient screw-terminal wiring box with conduit fitting
- Reliable operation over wide temperature range
- Noncontact, no-wear, replacement for industrial limit switch units
- LED indicators for power and output status
- Long-life, reliable, no-moving-parts design

Wiring is the same as with conventional switches – simply connect it in series with the controlled load, but the Series 6600 has no mechanical contacts to deteriorate or arc.

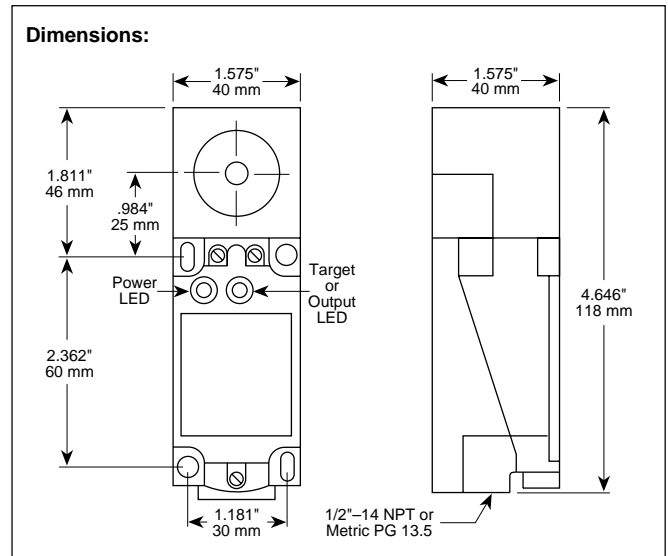
SPECIFICATIONS

- Threaded Conduit Entry:** 1/2"-14 NPT
- Operating Temperature:** -13° to 167°F (-25° to +75°C)
- Voltage Range:** 25-250 VAC
- Supply Current, Maximum Continuous Load:** 500 mA
- Current, Minimum Continuous Load:** 5 mA
- Current, Leakage Current:** 2 mA
- On-State Voltage Drop:** 9V nominal
- Operating Speed:** 20 Hz
- Output Configuration:** Selectable
- Enclosure Ratings:** NEMA-4, -13, IP65 (IEC 144)
- Short Circuit and Reverse Polarity:** No

2-Wire AC with Selectable Output						
Model Number	Sensing Distance (mm)	Shielded	Termination	Maximum Continuous Current (mA)	Sensing Face Location	Output Config. Current Type
0660001-041	15	Yes	Screw Term.	500	Universal	Selectable

For tubular AC switches, see page 11.05

For typical applications, see Proximity Switch Introduction and Selection Guide, pages 11.00-11.03





The proximity sensor that detects all materials – liquids, powders, solids . . . can even “see” a substance within a container

Non-contact sensing of wood, rubber, glass, leather, plastic, water, foods, and just about any other material. Capacitive proximity sensors can also be used to check an item for moisture, or to control fill-level of material in a cardboard container. They are equally compatible with simple control devices or sophisticated systems, such as: programmable controllers, counters, relay-logic, and computer-based test equipment.

- Detects virtually any material
- Sensitivity adjustment and LED target indicator make setup easy
- Highly accurate and stable – repeatable to ± 1 percent
- Reliable performance over wide temperature range
- Broad operating voltage tolerance – 10 to 30 volts DC
- Front connection allows extra or remote sensing area
- Sensing distance to 0.5" (12.7 mm), further with extra surface attached
- Available with NPN output – normally-open, or normally-closed
- Sensing unaffected by object's color or reflectance
- Non-corrosive ABS cast epoxy enclosure, extra long cable

Series 6725 can resolve the presence of liquid, or powder behind a nonmetallic barrier – ideal for level or fill sensing applications. A unique front connection allows attachment of an extra sensing surface for detection of low density materials, or remote location of the sensing area.

SPECIFICATIONS

Electrical Characteristics:

- Operating Voltage:** 10-30 VDC
- Maximum Ripple on Operating Voltage:** $\leq 10\%$
- Power Consumption:** ≤ 20 mA @ 30 VDC
- Leakage Current:** ≤ 1 mA @ 30 VAC @ 55°C
- Maximum Load Current:** 100 mA
- On-State Voltage Drop:** ≤ 0.5 V @ 100 mA
- Output Transistor Type:** NPN
- Output Action:** N.O. or N.C.

Operating Characteristics:

- Sensor Construction:** Unshielded
- Maximum Sensing Distance:** 0.5" (12.7 mm); extended distance possible
- Hysteresis (% of nominal):** 3-15%
- Repeatability:** $\pm 1\%$
- Target Indicator:** LED
- Sensitivity Adjustment:** 20-turn potentiometer
- Switching Frequency:** 20 Hz
- Transient Protection:** Yes
- Operating Temperature:** 0°F to +130°F (-20°C to +55°C)
- Humidity:** 0 to 95%
- Enclosure Ratings:** Cable Entry: NEMA 3 and 12

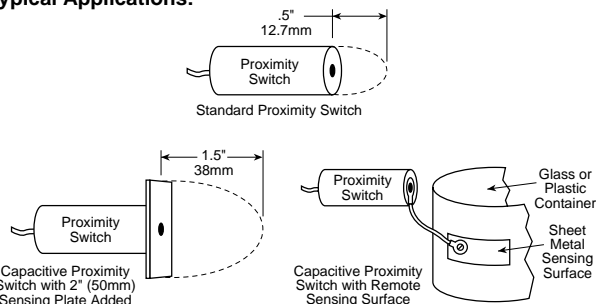
General Characteristics:

- Construction:** Cast epoxy in ABS housing
- Cable:** 3 conductor, 3 meter length
- Weight:** 6 oz. (17 Kg)
- Accessory Mounting Brackets:** Part number 669221-125

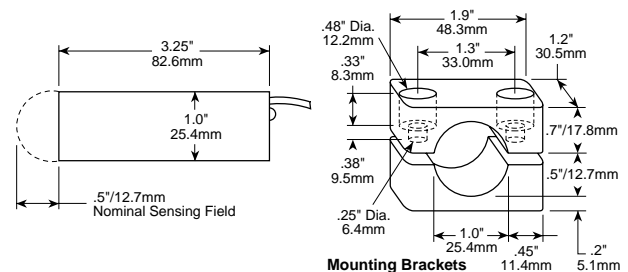
Model Number	Description	Tube Dia. x Length (mm)
0672550-530	NPN current sinking, normally open	25.4 x 82.6
0672551-530	NPN current sinking, normally closed	25.4 x 82.6

11 PRECISION AND SWITCHES

Typical Applications:



Dimensions:





Combined speed sensor and controller . . . stops jammed or overloaded motors and machines before damage occurs



Detects under-speed conditions in conveyor lines, machine tools, ventilating systems, or any other rotating shaft where a minimum speed requirement exists. Typically, a "flat", keyway, or bolt-head, is detected, precisely timed, and compared during each revolution to a set-point adjustment made at "minimum" speed. Any drop in speed immediately produces an output which may be used for emergency stop or other control function. The Motion Detectors operate as AC or DC switches and are available with high- and low-speed ranges.

- Economical protection of equipment – can easily pay for itself
- Detects under-speed in one shaft revolution
- Self-contained tubular design is easy to install and adjust
- AC or DC operation within same model
- Power-up delay timer bypasses control during start up
- High- and low-range types for 6 to 3000 RPM operation
- Accurate and repeatable to 5% of nominal speed
- Reliable operation over wide temperature range
- 25 turn potentiometer and LED indicator simplifies precise set-point adjustment

Use of these protective devices in many applications throughout a plant can save many times their cost in reduced downtime and equipment repairs.

SPECIFICATIONS

Electrical Characteristics:

- Operating Voltage Range:** 20-264 AC/DC
- Operating Line Frequency (Hz):** DC: 0; AC: 45-65
- On-State Voltage Drop (volts):** 5.7 Max.
- Load Current:**
- Maximum Continuous (mA):** DC: 200; AC: 350
- Minimum Continuous (mA):** 5
- Inrush (A):** 2

Leakage Current (mA): 1.5

Output State: Speed above set-point: Closed, below set-point: Open

Termination: 2-wire cable, 20 AWG, PVC Jacket, 2 meters long

Operating Characteristics:

Nominal Sensing Distance (mm): 0 to 8

Power-Up Time Delay (seconds): 9, fixed

Adjustable Frequency Range (set-point):

- 109888-0001: 6 to 150 pulses-per-minute
- 109888-0002: 120 to 3000 pulses-per-minute

Maximum Operating Frequency:

- 109888-0001: 6000 pulses-per-minute
- 109888-0002: 48,000 pulses-per-minute

Hysteresis (% of nominal): 5 to 15

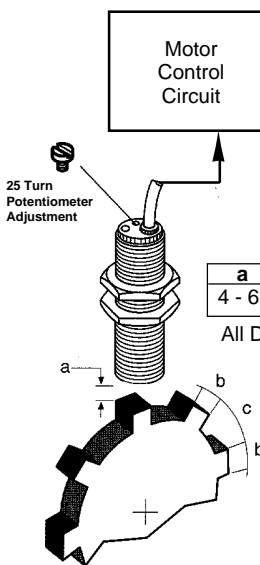
Repeatability (% of nominal): 3

Operating Temperature Range: -13° to +158°F (-25° to +70°C)

Enclosure Ratings: NEMA type: 1, 3, 4, 6, 12, 13, 13; CENELEC type: IP67

Enclosure Material: Nickel-plated brass

Application:



a	b	c
4 - 6	30 x 30	60

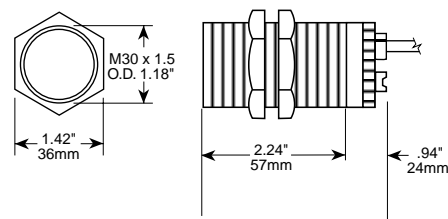
All Dimensions in mm

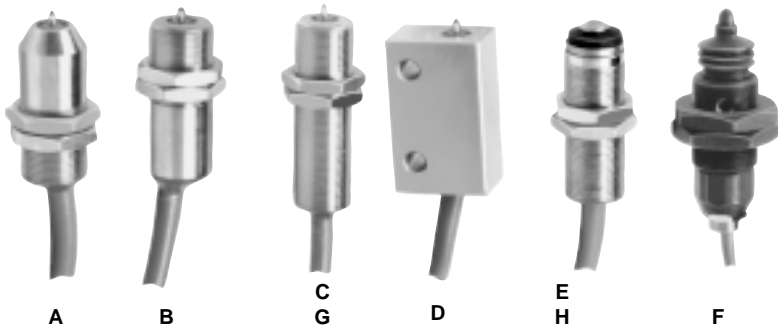
Setpoint adjustment: A 25 turn potentiometer is used to set the speed threshold (pulses per minute) to the normal operating speed. The output circuit will remain closed unless the speed falls below the setpoint at which time it will open. At power up, a 9 second delay overrides under-speed detection to allow the equipment to reach normal operating speed.

A single or multiple targets may be used (even numbers are recommended to maintain mechanical balance). The more targets, the faster the response to an underspeed condition. The number of targets is limited by the maximum operating frequency stated in Specifications.

Model No.	Adjustable Speed Detection Range (Targets/Minute)	Operating Voltage Range	Power-Up Time Delay (Seconds)	Program-mable Controller Compatible	LED	Output Func.	Max. Sens. Dist. (mm)
109888-0001	6-150 (0.1-2.5 Hz)	20-264 VAC/DC	9 ±20%	Yes	Yes	N.O.	8
109888-0002	120-3000 (2-50 Hz)	20-264 VAC/DC	9 ±20%	Yes	Yes	N.O.	8

Dimensions:





Extremely precise control switches . . . combines rugged construction with repeatability to 0.00004" (0.001 mm)

Ultra-Precision Switches provide very accurate control for measuring, gauging, robotics, positioning, and other automated equipment. Operation is by physical contact with the switch's sensing-stylus, which produces a contact or solid-state output. One rectangular and nine cylindrical models accommodate a variety of mounting requirements and space limitations. For severe applications, where dust, dirt, oils, or coolants are a problem, extra-heavy-duty Series 7486 features a special housing with a flexible rubber sealing-boot.

- -0.00004 inch (0.001 mm) repeatability and accuracy
- Mechanical life of 10,000,000 operations
- Models with contact-closure or transistor outputs
- Contact output models switch AC or DC, need no operating power
- Transistor output models with NPN or PNP configuration
- Extra-heavy-duty and water-tight models
- Wide, -4° to +167°F (-20° to +75°C) operating temperature range
- Hardened steel or precious mineral stylus materials
- Captive, sealed-egress cable
- Accessory power supply/relay module available

Precision switches are ideal for use as positioning control stops in drilling, milling, grinding, and turning operations. In addition they can measure slight expansion due to temperature and pressure changes.

For power supply/amplifier, see page 11.13

SPECIFICATIONS

Mechanical Characteristics:

- Repeatability:** ±0.001 mm
- Hysteresis:** ≤0.002 mm
- Mechanical Life:** 10,000,000 operations
- Switching Frequency:** 10 Hz
- Operating Temperature:** -4° to +167°F (-20° to +75°C)
- Cable Length:** 31.5" (80 cm)

Electrical Characteristics:

Contact Closure Output (Normally Closed):

- Maximum Alternating Voltage: 24 VAC
- Maximum AC Load Current: 50 mA
- Maximum DC Voltage: 15 VDC
- Maximum DC Load Current: 2 mA

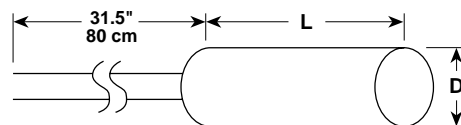
Transistor Output (Normally Open):

- Supply Voltage Range: 5-36 VDC
- Maximum Switching Current @ 24 V: 50 mA
- Minimum Load Resistance: 480Ω

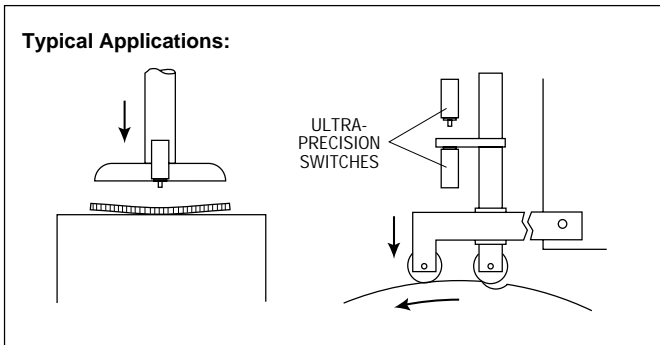
Model Number	Picture	Stylus	Activating Force (gr)	Special Features	Output	Dimensions	
						D	L
0748310-005	A	Sapphire	50		Contact	8 mm	20 mm
0748300-003	B	Sapphire	30		Contact	8 mm	20 mm
0748320-007	C	Sapphire	75		Contact	8 mm	27 mm
0748430-010	D	Sapphire	100		Contact	*	*
0748520-007	E	Ruby	75	Watertight	Contact	8 mm	25 mm
0748620-025	F	Hard Steel	250	HD + Water	Contact	16 mm	56 mm
0748321-107	G	Sapphire	75		Transistor NPN	8 mm	27 mm
0748322-107	G	Sapphire	75		Transistor PNP	8 mm	27 mm
0748521-107	H	Ruby	75	Watertight	Transistor NPN	8 mm	34 mm
0748522-107	H	Ruby	75	Watertight	Transistor PNP	8 mm	34 mm

*Rectangular: .79" x .47" x .31" (20 x 12 x 8 mm)

Dimensions:



Tubular: See ordering table for dimensions.





(Plug socket optional
— see below)

**REMOTE POWER SUPPLY
RELAY OUTPUT**

Power supply for use with Veeder-Root Series 7483, 7484, 7485 and 7486 Ultra-Precision Switches.

SPECIFICATIONS:

Supply Voltage: 110 VAC \pm 10%, 50-60 Hz, max. 3, 5 VA

Control Circuit: 8.2 VDC \pm 10%

Internal Resistance: 1 k Ω

Relay Output:

Contacts: DPDT

Contact Material: Hard silver

Switching Voltage: 250 V max.

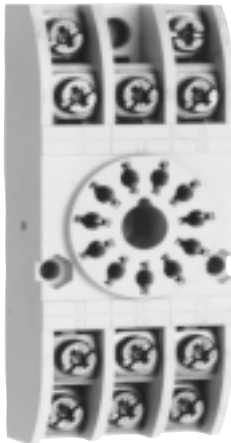
Switching Current: 4 A ohmic

Test Voltage: 2.5 kV eff.

Standard: LED indicator

Accessories: Plug socket 669140-100 (see below)

Model No.	Description
0669010-100	Remote Power Supply



PLUG SOCKET

For use with 0669010-100 Remote Power Supply.

Model No.	Description
60SR3P05	Plug Socket



**QUICK-DISCONNECT
S12 TERMINATION**

For use with Veeder-Root Ring-LED proximity switches. Quick-disconnect feature makes installation simpler and eliminates the need for re-wiring when a switch is replaced.

Model No. Number	Termination Type	Output Configuration	Cable Length Meters (Ft.)
0669220-212	S12	NO or NC	2 (6.6)
0669220-512	S12	NO or NC	5 (16.4)