



Series PSC/PSI Proximity Sensors

Specifications – Installation and Operating Instructions

INTRODUCTION - Proximity Sensors

The Proximity Controls range of proximity sensors includes inductive and Capacitive proximity switches and a Test unit. These are listed and stocked in our catalog for fast service. Should you need a non-listed variant please contact the sales office.

Inductive (PSI) switches will detect all metals. Capacitive (PSC) switches will detect nearly all solids, powders and liquids. The A-800 Test Unit will give a functionality test to all versions stocked in the catalog and will test most three wire DC proximity switches from other manufacturers.

SENSING DISTANCE

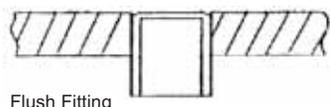
Sensing ranges refer to a 1 mm thick square target of earthed mild steel with sides of 3 x the nominal sensing distance. If the target is a different material, or of another size, there will be a variation in the sensing distance.

MATERIAL	MATERIAL FACTORS	
	INDUCTIVE	CAPACITIVE
Mild Steel	1.0	1.0
Cast Iron	1.1	1.0
Aluminum Foil	0.9	1.0
Stainless Steel	0.7	1.0
Brass	0.4	1.0
Aluminum	0.35	1.0
Copper	0.3	1.0
Water	0.0	0.9
PVC	0.0	0.9
Glass	0.0	0.5
Ceramics	0.0	0.4
Wood	0.0	from 0.2
Beer	0.0	0.9
Coca Cola	0.0	0.9
Lubricating Oil	0.0	0.1

INSTALLATION (MECHANICAL)

Flush Mounting

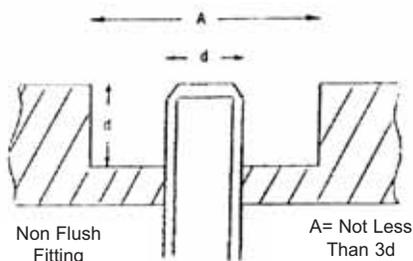
Units designed for flush mounting, including all inductives listed in the catalog, may be fitted in surrounding metal as shown.



Flush Fitting

Non-Flush Mounting

Units designed for non-flush mounting, including Capacitive switches, must be separated from the surrounding metal as shown.



Non Flush Fitting

A= Not Less Than 3d

NOTE: Capacitive switches can, if required, be tuned down to be fitted flush in metal. See section on sensitivity adjustment.

INSTALLATION (ELECTRICAL)

Single Units

DC units have transistor output, and normally have three wires, but NAMUR standard DC sensors have only two wires.

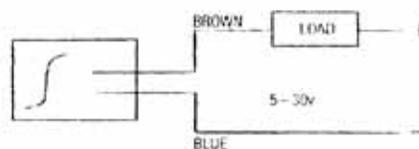


NORMALLY OPEN, NPN (SWITCHING NEGATIVE)



NORMALLY OPEN, NPN (SWITCHING POSITIVE)

3 Wire DC Switch



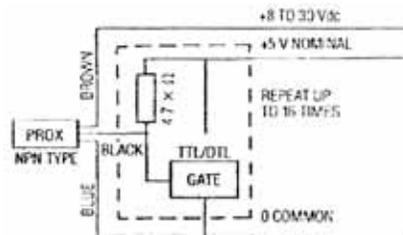
NAMUR DEVICE USED AS DC SENSOR

2 Wire DC Sensor

Note that units with two wires must be connected to their power supply with a load in series, or they will be damaged. Consult catalog for load rating.

Logic Interface

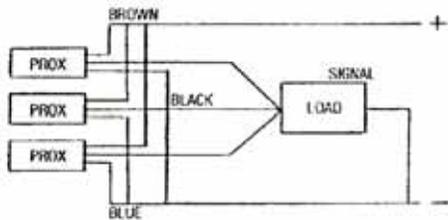
Proximity sensors may be interfaced with most types of industrial logic. Most DC units are open collector type and therefore require an external pull up resistor when used with TTL as shown.



Note that 3 wire DC-Compact V3 bodied switches are designed for use directly with TTL and have a built-in pull up resistor.

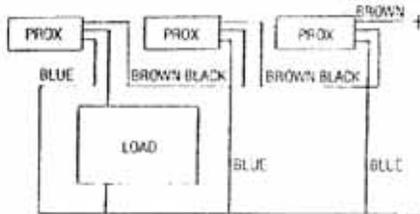
Multiple Units: Parallel

DC sensors may be connected directly in parallel as in shown. The number (N) of switches is usually only limited by the availability of sufficient supply current. Note that the compact V bodied switches have an internal pull-up resistor with a resistance of 12 kilohms. The maximum number of compact switches in parallel is: $N = \text{Rating Load Current (mA)} \times 12 \text{ Kilohm} / V \text{ supply}$.



Multiple Units: Series

The maximum number of DC sensors connected in series is limited by the supply voltage (V supply), the voltage drop across a closed switch (V switch) and either the minimum working voltage of the switch or minimum working voltage of the load, whichever is greater (V min).



The diagram above shows a typical series configuration of PNP sensors. For NPN types, swap the blue for brown wire and reconnect.

SENSITIVITY ADJUSTMENT

Inductive Switches

Inductive PSI sensors are not adjustable.

Capacitive Switches

Install the capacitive PSC sensor in its final position. Remove the black cover screw to gain access to the adjustment potentiometer. Turn the adjusting potentiometer clockwise to increase sensitivity or counterclockwise to reduce sensitivity. For example, the range and sensitivity of capacitive sensors can be adjusted to tune out the sidewall of a plastic container or glass window of a sight glass such that the level of liquid, granules or powders on the other side of the plastic or glass can be detected.

For this application tune out the sight glass or wall with the container empty, detune the sensor so it cannot see the window or wall. Then test the settings by introducing the target material inside the container. Caution should be taken with materials that leave a residue inside the container as this may be sensed.

NOTE: To maintain the IP65 rating on capacitive sensors, it is imperative that the black cover screw be replaced after adjustment.

GENERAL INFORMATION

LED Indicators

Most Proximity sensors are fitted with indicator lights (LED's) at the cable end. The LED indicates the state of the switch output.

Maximum Voltage

The maximum voltage of DC proximity sensors is 30 V. It is sometimes forgotten that a rectified 24 VAC supply has a peak value of 1.4 X the AC RMS value (34V).

NOTE: These switches should be installed by competent personnel only. Please check wiring and supply voltages before switching on. If there are any technical questions regarding installation or application of Proximity sensors please contact the technical sales department.

A-800 DC Proximity Switch Test Unit

The A-800 is fitted with two PP3 batteries ready for use. This unit will test most 3 wire DC proximity switches PSI (metal sensing), PSC (most materials), the magnet sensing Detector (DT), photo-electrics or ultrasonics.

Standard color coding for 3 wire Proximity switches is Brown=Positive (+), Black=Load, Blue=Negative (-). Note: Some universal DC switches can vary. Follow the manufacturer's wiring instructions.

Testing Instructions

Connect the switch to the A-800. Place a suitable target in front of the switch. If it is functioning correctly, the test unit will give audio and visual indication showing that the switch operates and indicating functionality of the switch according to the chart below.

SWITCH TYPE	BUZZER & LED ON WHEN	LED
PNP N.O.	Target in range	PNP
PNP N.C.	Target not in range	PNP
NPN N.O.	Target in range	NPN
NPN N.C.	Target not in range	NPN

A-800 DC TEST UNIT

If the Proximity switch does not give such feedback when correctly connected to the tester, it has probably failed. NOTE: The A-800 will not test 2 wire AC or DC switches.

LED Functions

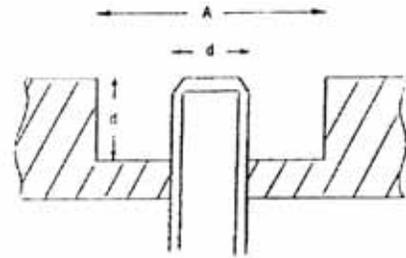
Green I/O LED	Switch connected and unit on
Red (Battery) LED	Battery low indicator
PNP or NPN LED	Indicated switch type

Further Information:

Proximity is a Division of Dwyer Instruments, Inc. For further information, a copy of our latest catalog, other products or details concerning our nearest distributor please call our sales office.



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INSTALLATION AND WIRING INSTRUCTIONS

- INDUCTIVES
- CAPACITIVES
- TEST UNIT

INTRODUCTION

The Proximity range includes inductive and Capacitive proximity switches and a Test unit. These are listed and stocked in our catalog for fast service. Should you need a non listed variant please contact the sales office.

Inductive switches will detect all metals. Capacitive switches will detect nearly all solids, powders and liquids, and the A-800 test unit will give a functionality test to all versions stocked in the catalog and will test most three wire DC proximity switches from other manufacturers.

This range covers many industrial applications.

SENSING DISTANCE

Inductive and Capacitive

Sensing ranges refer to a 1 mm thick square target of earthed mild steel with sides of 3X the nominal sensing distance. If the target is of other material, or a different size, there will be variation in the sensing distance.

MATERIAL	MATERIAL FACTORS	
	INDUCTIVE	CAPACITIVE
Mild Steel	1.0	1.0
Cast Iron	1.1	1.0
Aluminum Foil	0.9	1.0
Stainless Steel	0.7	1.0
Brass	0.4	1.0
Aluminum	0.35	1.0
Copper	0.3	1.0
Water	0.0	0.9
PVC	0.0	0.9
Glass	0.0	0.5
Ceramics	0.0	0.4
Wood	0.0	from 0.2
Beer	0.0	0.9
Coca Cola	0.0	0.9
Lubricating Oil	0.0	0.1

INSTALLATION

Flush Mounting

Units designed for flush mounting which include all inductives listed in the catalog may be fitted in surrounding metal (or other material) as shown.



Non-Flush Mounting

Units designed for non-flush mounting which includes the Capacitive switches must be separated from surrounding metal as shown overleaf.

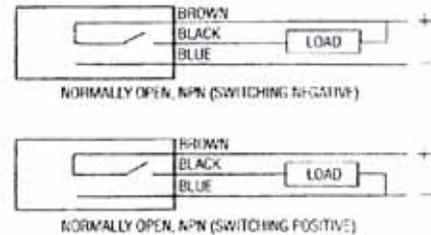
NOTE: Capacitive switches can, if required, be tuned down to be fitted flush in metal. See section on sensitivity adjustment.

INSTALLATION (ELECTRICAL)

Single Units

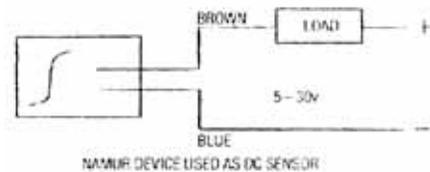
DC units have transistor output, and normally have three wires, but NAMUR standard DC sensors have only two wires.

3 Wire DC Switch



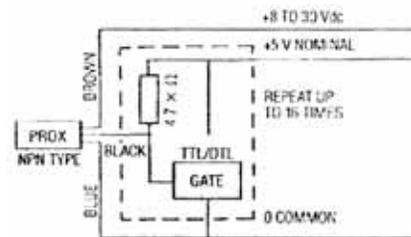
2 Wire DC Sensor

Note that units with two wires must be connected to their power supply with a load in series, or they will be damaged. Consult catalog for load rating.



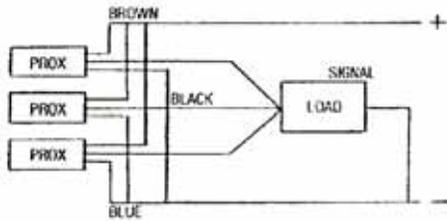
Logic Interface

Proximity sensors may be interfaced with most types of industrial logic. Most DC units are open collector type and therefore require an external pull up resistor when used with TTL as shown. Note that 3 wire DC-Compact V3 bodied switches are designed for use directly with TTL and have a built-in pull up resistor.



Multiple Units: Parallel

DC sensors may be connected directly in parallel as in shown. The number (N) of switches is usually only limited by the availability of sufficient supply current. Note that the compact V bodied switches have an internal pull-up resistor with a resistance of 12 kilohms. The maximum number of compact switches in parallel is: $N = \text{Rating Load Current (mA)} \times 12 \text{ Kilohm} / V \text{ supply}$.



IMPORTANT

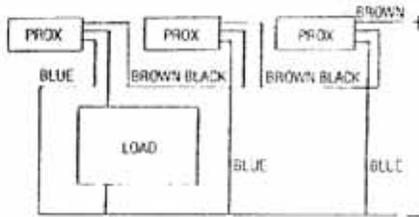
These switches should be installed by competent personnel only. Please check wiring and supply voltages before switching on.

TECHNICAL INFORMATION

If there are any technical inquiries regarding the installation or application of Proximity sensors please contact the Technical Sales Department.

Multiple Units: Series

DC the maximum number of DC sensors in series is limited by the supply voltage (V supply) the voltage drop across a closed switch (V switch), and either the minimum working voltage of the switch or the minimum working voltage of the load, whichever is greater (V min).



The diagram shows a typical series configuration of PNP sensors. For NPN types swap the blue for the brown wire and reconnect.

SENSITIVITY ADJUSTMENT

Inductive sensors are not adjustable.

Capacitive Switches

Install the capacitive sensor in its final position. Remove the black cover screw to gain access to the adjustment potentiometer. Turn the adjusting potentiometer clockwise to increase sensitivity or anticlockwise to reduce sensitivity.

For example, the range and sensitivity of capacitive sensors can be adjusted to tune out the sidewall of a plastic container or the glass window of a sight glass such that the level of liquid, granules or powders on the other side of the container wall or sight glass can be detected.

For this applications tune out the sight glass or wall with the container empty, detune the sensor until it cannot see the window or wall, and test your settings by introducing the target material inside the container. Caution should be taken with materials that leave a residue inside the container.

Replace cover over adjusting potentiometer

To maintain the IP65 rating on capacitive sensors it is imperative the black cover screw is replaced after adjustment.

GENERAL INFORMATION

Most Proximity sensors are fitted with indicator lights (LED's) at the cable end. The LED indicates the state of the switch output. The maximum voltage of d.c. Proximity sensors is 30V. It is sometimes forgotten that a rectified 24V a.c. supply has peak value of 1.4 x the a.c. RMS value (34V).

A-800 DC PROXIMITY SWITCH TEST UNIT

The A-800 is fitted with 2 PP3 batteries ready for use. This unit will test most 3 wire DC proximity switches, inductives (metal sensing) or capacitives photoelectrics or ultrasonics (which sense most materials).

Standard color coding for 3 wire proximity switches is Brown=Positive (+), Black=Load, Blue=Negative (-). [Note: some universal DC switches can vary, try to follow makers wiring instructions]

TESTING INSTRUCTIONS

Connect the switch to the A-800 Place a suitable target in front of the switch. If the switch is functioning correctly, the unit will give audio and visual indication showing the switch operates and indicating the functionality of the switch according to the chart below.

SWITCH TYPE	BUZZER & LED ON WHEN	LED
PNP N.O.	Target in range	PNP
PNP N.C.	Target not in range	PNP
NPN N.O.	Target in range	NPN
NPN N.C.	Target not in range	NPN

If the proximity switch does not give such feedback when correctly connected to the tester it has probably failed.

[Note: The A-800 will not test 2 wire AC or DC switches]

LED Functions

Green I/O LED	Switch connected and unit on
Red (Battery) LED	Battery low indicator
PNP or NPN LED	Indicated switch type

Further Information:

Proximity is a Division of Dwyer Instruments, Inc. For further information, a copy of our latest catalog, other products or details concerning our nearest distributor please call our sales office.