NEO-DYN®

# MODEL 182P,

## ADJUSTABLE VACUUM SWITCHES,

## ENCLOSURE 6N FOR EXPLOSIVE ATMOSPHERES AND

## ENCLOSURE 3X FOR WEATHER PROOF APPLICATIONS

# INSTALLATION AND OPERATION MANUAL


PN 610-0021
Rev. C

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## Important Information

The product warranty applicable to this ITT Neo-Dyn® instrument is as stated on page 13 of this manual.

Should any after-delivery problems arise, please contact ITT Neo-Dyn's Customer Service using the information above. Our normal business hours are weekdays, 7:00 am to 3:30 PM, Pacific Time.

Before installing this Vacuum Switch, become familiar with the installation and adjustment instructions in Chapters 2 and 3.

*WARNING* **Indicates a hazard which can cause severe personal injury, death, or substantial property damage if the warning is ignored.**

*CAUTION* Indicates a hazard which will or can cause minor personal injury or property damage if the caution is ignored.

*SPECIAL CONDITIONS FOR SAFE USE* The Electrical Snap Switch Assemblies shall be installed such that the equipment wiring is protected from mechanical damage by the use of metal conduit or a method providing equivalent protection. The equipment wiring must not be subjected to tension or torque. If it is to be terminated within a potentially explosive atmosphere, a suitably certified termination facility must be used.

*NOTE* Indicates additional information about a particular item necessary to the operation of the unit.

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# CHAPTER

# 1

# INTRODUCTION

The Neo-Dyn® Switches described in this manual are weather - proof, electromechanical sensing devices designed for a wide range of applications in pneumatic and hydraulic systems up to 150 psig. The Enclosure 6N Switches are for use in Zone 1 Potentially Explosive Atmospheres (Division 1 hazardous locations).
The wetted material for these Vacuum Switches include a polyimide (Kapton) sensing diaphragm, nitrile O-ring, corrosion resistant steel (CRES) helical spring and aluminum alloy or CRES pressure port. Viton or EPR O-rings are also available.

Set points are easily adjusted by turning an adjustment screw located inside the pressure port. This is discussed further in Chapter 3.

The standard configuration of these switches will switch up to 11 amp at 125 or 250 VAC, 5 amp resistive at 28 VDC, or 0.5 amp resistive at 125 VDC. When ordered with M Option, the switch is rated for currents to 1 amp, but its bifurcated gold contacts will reliably switch currents in the milliampere and microampere ranges.

These switches have CE Mark, with weatherproof enclosure, IP 66 ingress protection that meet the requirements of NEMA 3. 3R, 3S, 4, 4X and 13.
The Enclosure 6 electrical subassemblies are approved by Underwriters Laboratories, CSA International and Factory Mutual as well as having SIRA approval for ATEX certification.

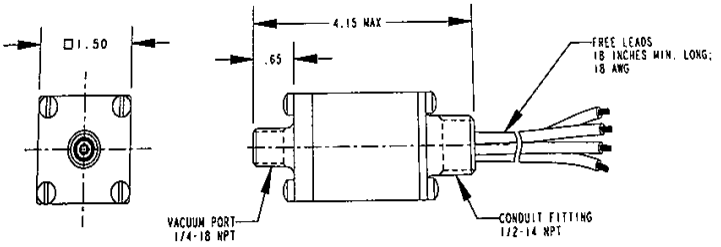


Figure 1
182P Vacuum Switch

## CUSTOMER SERVICE

If you have any questions about these Vacuum Switches that are not covered in this manual, you can contact Neo-Dyn or our representatives in several ways.

The Neo-Dyn customer service phone number is (661) 295-4000. Our customer service department is open from 7:00 am to 3:30 p.m. Pacific Time.

Our Internet site is www.neodyn.com; it includes lists of sales representatives and distributors.

## OTHER CONFIGURATIONS

*WARNING* The models described in this manual are also available in special and factory-set configurations. For these units, follow the installation and operating instructions herein, except **adhere to the pressure and electrical limits marked on the units.**

# CHAPTER

# 2

# INSTALLATION

Installation of these Neo-Dyn® Vacuum Switches is straightforward. However, they must be installed by a qualified electrician, in compliance with all local and national electrical codes.

*WARNING* **Electrical Hazard**

*WARNING* **Do not make electrical connections while power is on.**

*WARNING* **Always check for multiple circuits.**

*WARNING* **Always make sure grounding is adequate.**

## MOUNTING AND PROCESS CONNECTION

The switch is mounted directly to the process connection.

The switch's process connection is ¼" - 18 NPT male.

When installing the Vacuum Switch, always:

- Make sure that the unit and your system have matching threads.
- Use the wrench flats provided.
- Seal all joints with pipe-joint sealing compound.

*CAUTION* Avoid excessive torque on all threaded connections.

*WARNING* **Do not exceed the marked Maximum Operating Pressure in normal operation.**

The marked Proof Pressure is provided to give the maximum allowable pressure without causing permanent damage to the pressure switch in the event of an over-pressure condition. Set pressure relief/safety valves below this setting.

## PROCESS MEDIA

Process media must be compatible with the wetted materials listed in Chapter 5 on page 10. Compatibility is defined by an “A” rating in the Chemical Resistance Guide for Metals and Alloys, the Chemical Resistance Guide for Plastics, and the Chemical Resistance Guide for Elastomers, all published by Compass Publications, and available from the National Association of Corrosion Engineers (NACE), Houston, Texas; telephone (281) 228-6200.

## POTENTIALLY EXPLOSIVE ATMOSPHERES (HAZARDOUS LOCATIONS) ENCLOSURE 6N ONLY

Suitable for Zone 1, Ex d IIC explosive atmospheres, in accordance with Potentially Explosive Atmospheres Directive 94/9/EC.

Suitable for Division 1; Class 1, Groups A, B, C and D; Class II, Groups E, F and G hazardous locations, in accordance with the National Electric Code (NEC), and applicable UL, FM and CSA specifications.

## ELECTRICAL CONNECTIONS

18 AWG free leads 18 in (46 cm) long are standard, with a green wire grounded to the case. 72 inch (183 cm) leads are available as R Option, and other lead lengths may be ordered as special configurations. The leads are intended for installation in conduit capable of withstanding possible explosion pressures, and the leads are factory sealed. See Figure 2 below for color codes.

*WARNING* **All field wiring must comply with requirements of the NEC or applicable local or national electrical codes, including wire gauges and insulation temperature ratings.** Conduit seals may be required.

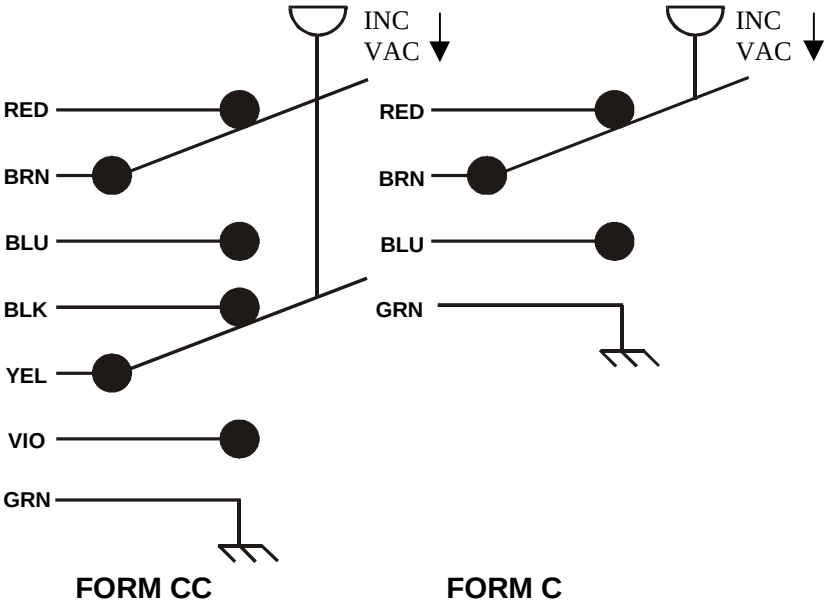


Figure 2.

Pressure Switch Schematics Shown above Zero PSIG

# CHAPTER 3

# ADJUSTMENTS

## SET POINT ADJUSTMENT

The factory-set set point or adjustable set point range is marked on the face of the switch. This section describes the adjustments needed after an Adjustable Vacuum Switch has been properly installed.

1. Disconnect the electrical power. Check for multiple circuits.
2. Remove the pressure connection to allow access to the adjustment nut inside the pressure port.
3. To change the set point use a 3/32 Allen wrench to rotate the adjustment nut clockwise to increase the vacuum set point, and counterclockwise to decrease it. It takes approximately 3 to 5 turns to move from one end of the adjustable range to the other. Check the set points per paragraphs 4 and 5 below for precise adjustments.
4. To check the increasing vacuum set point, connect a vacuum source and a calibrated pressure gauge or transducer to the pressure port and slowly apply increasing vacuum until the switch actuates. Actuation can be noted by listening to the audible snap of the Belleville spring, or with an ohmmeter across the appropriate free leads.
5. If you want to check the decreasing vacuum set point, slowly decrease the vacuum after the switch has actuated and note the value at which the audible snap or an ohmmeter indicates deactuation. Deadband may be calculated if desired by subtracting the increasing set point reading from the decreasing set point reading.

# 4

# TROUBLESHOOTING

## TROUBLESHOOTING

In-service problems are unlikely, but the following paragraphs suggest ways to verify any problems that might arise:

1. Vacuum Switch Leaks

   If a leak is suspected, isolate the Vacuum Switch from the rest of the system. Connect the switch and a calibrated pressure gauge downstream from a pressure source and shutoff valve. Apply normal system pressure, isolate the gauge and Vacuum Switch from the pressure source with the shutoff valve for at least one minute, and check for leaks as evidenced by a drop in the gauge reading.

   If a leak is verified, return the unit for repair. Contact ITT directly, or your local sales representative or distributor (see www.neodyn.com for a contact list).

2. Failure to Switch

   If application of vacuum 10% greater than the adjusted set point fails to produce actuation, first check for contamination in the process connection, and verify that the expected pressure is reaching the sensing diaphragm or piston.

   If the Belleville spring can be heard to audibly snap, but an ohmmeter indicates no electrical switching, the cause is probably stuck or burned switch contacts, or the switch element has moved away from the position where it was synchronized with the snap action. Return the unit for repair.

If application of vacuum 10% greater than the adjusted set point fails to produce an audible snap of the Belleville spring, there is probably a mechanical failure or binding due to contamination. Return the unit for repair.

3. Calibration Shifts

If it is suspected that the set points have shifted, recheck them per paragraphs 4 and 5 of Chapter 3. If you verify unstable or drifting set points, return the unit for repair.

# CHAPTER 5

# SPECIFICATIONS

This section shows standard specifications and available options.

**STANDARD**

**Interfaces**

Shipping weight is approximately 13 ounces (0.34 kg) each with an aluminum-alloy body.

Conduit Connection: ½" - 14 NPT male

Standard Pressure Port: ¼" - 18 NPT Male

**Part Number**

The part number contains information about which configurations and options are included in your Adjustable Pressure Switch. To determine this, compare the part number of your unit with the part number structure below and the information in the following tables.

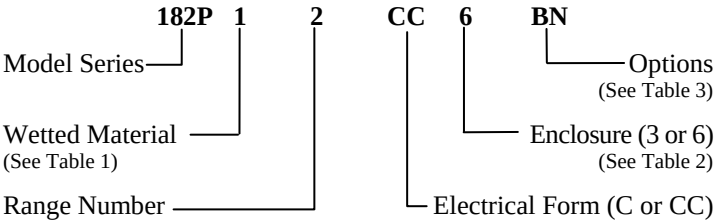


Figure 3. Part Number Breakdown

*NOTE* Part number format varies for specials.

**Wetted Materials**

| Table 1 | |
|---|---|
| No | Description |
| 1 | Aluminum alloy port, teflon-coated polyimide (Kapton) diaphragm, nitrile O-ring and CRES internal parts. |
| 4 | UNS S31600 CRES port and internal components, teflon coated polyimide diaphragm and nitrile O-ring. |

**Enclosure**

| Table 2 | |
|---|---|
| No | Description |
| 3 | Weather Proof Housing |
| 6 | Explosion Proof Electrical Assembly with Weather Proof Housing |

**OPTIONS**

The available options for standard switches are listed below. These options can be combined; every included option will be indicated in the part number of the unit.

| Table 3 | |
|---|---|
| Option | Description |
| A | Epoxy-painted exterior |
| B | Viton O-Ring - Refer to Wetted Materials |
| C | EPR O-Ring - Refer to Wetted Materials |
| H | 316 CRES Body |
| I | Conduit Junction Box **(Not approved for Class A or B hazardous locations)** |
| M | Gold Electrical Contacts For Extremely Low Current Applications |
| N | CE Mark |
| R | 72 inch (183 cm) electrical free leads |

## Listing Agency Approvals

CE Mark

Enclosure 3: Internal switching elements are recognized components by both UL, FM and CSA.
CE Mark;
Conforms with Council Directive 97/23/EC;
Conforms with IEC 60947-1 Low Voltage Directive

Enclosure 6: Switch Subassemblies are UL, CSA, FM, IECEx and ATEX certified.
CE Mark;
Conforms with Council Directives 94/9/EC and 97/23/EC.

## Pressure Ratings

Maximum Operating Pressure 150 psig (10.34 bar)

Proof Pressure 250 psig (17.24 bar)

## Weather Proof Ratings:

Ingress protection IP66

Enclosure type 3, 3R, 3S, 4, 4X, 13 (NEMA)

## Temperature Ranges for Pressure Media

Standard (Nitrile O-rings) and C Option (EPR O-rings):
-40°C (-40°F) to +121°C (+250°F)

B Option (Viton O-rings): -26°C (-15°F) to +121°C (+250°F)

## Electrical and Ambient Temperature Ratings

Minimum ambient temperature is -40 °C (-40 °F), except with B Option which is -26°C (-15°F)

Form C3X and CC3X are suitable to 82 °C (180 °F)
11 amp @ 125 or 250 VAC; 5 amp @ 125 or 250 VAC;
5 amp resistive , 3 amp inductive @ 28 VDC;
0.5 amp resistive @ 125 VDC

Form C3MX or CC3MX (M Option) suitable to 82 °C (180 °F):
1 amp @ 125 VAC

Form C6N (SPDT):
11 amp @ 125 or 250 VAC to +75 °C (+167 °F) max, T5;

11 amp @ 125 or 250 VAC to +60 °C (+140 °F) max, T6;

5 amp @ 125 or 250 VAC, 5 amp resistive , 3 amp inductive @ 28 VDC; 0.5 amp resistive @ 125 VDC to +70 °C (+158 °F) max, T6.

Form CC6N (DPDT):

11 amp @ 125 or 250 VAC to +65 °C (+176 °F) max, T4;

11 amp @ 125 or 250 VAC to +45 °C (+116 °F) max, T6;

5 amp @ 125 or 250 VAC; 5 amp resistive , 3 amp inductive @ 28 VDC; 0.5 amp resistive, @ 125 VDC to +70 °C (+158 °F) max, T6.

Form C6MN or CC6MN (SPDT or DPDT with M Option):

1 amp @ 125 VAC to +70 °C (+158 °F) max. T6

# WARRANTY INFORMATION

**A. Warranty**:

ITT Industries (ITT) warrants that at the time of shipment, the products manufactured by ITT Neo-Dyn and sold hereunder, will be free from defects in material and workmanship and will conform to the specifications furnished or approved by ITT.

**B. Warranty Adjustment**:

If any defect within this warranty appears, the Buyer shall notify ITT immediately.

ITT agrees to repair or furnish a replacement for, but not install, any product which, within one (1) year from the date of shipment by ITT shall, upon test and examination by ITT, prove defective within the above warranty.

No product will be accepted for return or replacement without the written authorization of ITT. Upon such authorization, and in accordance with instructions by ITT, the product will be returned with shipping charges prepaid by the Buyer. Replacements made under this warranty will be shipped prepaid.

**C. Exclusion from Warranty**:

THE FOREGOING WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER EXPRESSED OR IMPLIED WARRANTIES OF MERCHANTABILITY, OR FITNESS, OR OTHERWISE.

Components manufactured by any supplier other than ITT shall bear only the warranty made by the manufacturer of that product, and ITT assumes no responsibility for the performance or reliability of the unit as a whole.

In no event shall ITT be liable for indirect, incidental or consequential damages nor shall the liability of ITT arising in connection with any products sold hereunder (whether such liability arises from a claim based on contract, warranty, tort or otherwise) exceed the actual amount paid by Buyer to ITT for the products delivered hereunder.

The warranty does not extend to any product manufactured by ITT, which has been subject to misuse, neglect, accident, improper installation, or to use in violation of instructions furnished by ITT.

The warranty does not extend to or apply to any unit, which has been repaired or altered at any place other than at ITT’s factory or service locations, by persons not expressly approved by ITT.