

# Neo-Dyn® Pressure, Flow & Temperature Switch Definitions & Terminology

## Introduction

The following definitions and terminology describe the operating characteristics, specifications and other details relative to pressure, flow, and temperature switches. We hope this data provides the

answers to questions which may arise and helps you in selecting a switch.

## Types of Switches

**ABSOLUTE PRESSURE SWITCH:** A switch that compares the pressure being sensed to that of a perfect vacuum. Construction requires the reference chamber to be evacuated.

**DIFFERENTIAL PRESSURE SWITCH:** A switch having both a high and low pressure port. Actuation occurs when pressure to the high port exceeds pressure to the low port by a predetermined value.

**FLOW SWITCH:** A Neo-Dyn® flow switch senses differential pressure generated by flow through a venturi to actuate an electrical switch at a predetermined flow level.

**GAUGE PRESSURE (AND VACUUM) SWITCH:** A switch that compares the pressure being sensed to that of atmospheric pressure. Positive pressure switches sense monitored pressure above atmospheric pressure while vacuum switches sense pressure below atmospheric.

**TEMPERATURE SWITCH:** A Neo-Dyn® temperature switch is identical to a pressure switch with the addition of a fluid-vapor charged sensing probe. The fluid-vapor charge is exposed to the "basic sensor" and since probe pressure varies with temperature, discrete temperature settings can be accomplished.

## Definitions

**Absolute Pressure** - The difference between zero pressure (which exists only in a perfect vacuum) and some known pressure. Absolute pressure may be determined by adding gauge pressure to atmospheric pressure (14.7 psi at sea level).

**Actuation Point** - The point at which electrical switching element is operated on increasing or decreasing pressure. Neo-Dyn considers this point the *increasing set point*.

**Ambient Pressure (or Temperature)** - Pressure (or temperature) immediately surrounding the switch.

**Atmospheric Pressure** - The pressure caused by the weight of air. Atmospheric pressure at sea level is considered to be 14.7 psia (or 29.9 inches of mercury or 407 inches of water absolute.)

**Burst Pressure** - Burst pressure is the maximum pressure which may be applied to a switch without causing leakage. Permanent degradation may occur or the unit may become inoperable if burst pressure is applied. Burst pressure is normally 2Z|x to 3 times maximum system pressure.

**Charge Media** - The fluid or gas with which the temperature sensing probe is filled.

**Critical Set Point** - The critical set point is the most important set point of the unit and is held to the closest tolerance. It can be either the actuation (increasing) or deactuation (decreasing) set point.

**Deactuation Point** - The point at which the electrical switching element is operated on increasing or decreasing pressure. Neo-Dyn considers this point the *decreasing set point*.

**Deadband** - The deadband, sometimes referred to as "differential" value, is the change in value between actuation and deactuation set points.

**Differential Pressure** - The difference between the two pressures being measured.

**Direct Mount** - A phrase used to refer to the mounting of an instrument directly at the source of the process variable (pressure or temperature) being sensed.

**Electrical Form** - Industry standards have established letter designations for the various electrical arrangements. They are 'C' for SPDT, 'CC' for DPDT and 'Z' for double break.

**Form 'C': Single Pole Double Throw (SPDT) Switching Element** - An SPDT switching element has one normally closed, one normally open, and one common terminal. Three terminals mean that the element can be wired with the circuit either normally open (N/O) or normally closed (N/C).

**Form 'CC': Double Pole Double Throw (DPDT) Switching Element** - A DPDT switching element has six electrical terminals, two normally closed, two normally open and two common. Neo-Dyn uses two independent SPDT switching elements. Some units are designed for simultaneous operation whereas, others are for separate operation at different set points.

**Form 'Z': Double Break Switching Element** - A double break switching has two isolated circuits. Four terminals facilitate wiring one circuit normally open and the other normally closed.

# Neo-Dyn<sup>®</sup> Pressure, Flow & Temperature Switch

## Definitions & Terminology

**Electrical Switching Element** - The electrical switching element opens or closes an electrical circuit in response to movement by the pressure/temperature sensor. Most Neo-Dyn<sup>®</sup> products are available in SPST, SPDT and DPDT.

**Enclosure (Housing)** - That part of the instrument which, in varying degrees, protects the mechanism from ambient conditions.

**Explosion Proof** - An enclosure which is capable of withstanding an explosion which may occur within, and capable of preventing the ignition of an explosive atmosphere which may surround it.

**Gauge Pressure** - Gauge pressure is the difference between atmospheric pressure and a variable pressure.

**Hermetically Sealed** - An enclosure completely sealed from the environment. Neo-Dyn<sup>®</sup> hermetically sealed electrical assemblies are all metal with a glass header. All joints are soldered or welded to insure sealing integrity.

**Mass Rate of Flow** - An expression of flow by weight in a given time, such as pounds per hour (PPH).

**Media** - The liquid or gas being sensed by the instrument.

### NEMA Classifications

Ref: NEMA Standards Publication, Pub. No. ICS6-1988

NEMA Type 1	- General Purpose - Indoor
Type 2	- Dripproof - Indoor
Type 3	- Dusttight, Raintight and Sleet (Ice) Resistant - Outdoor
Type 3R	- Rainproof and Sleet (Ice) Resistant - Outdoor
Type 3S	- Dusttight, Raintight and Sleet (Ice) Proof - Outdoor
Type 4	- Watertight and Dusttight - Indoor and Outdoor
Type 4X	- Watertight, Dusttight and Corrosion Resistant - Indoor and Outdoor
Type 5	- Superseded by Type 12 for Control Apparatus
Type 6	- Submersible, Watertight, Dusttight and Sleet Resistant - Indoor and Outdoor
Type 7	- Class I, Group A, B, C or D Hazardous Locations; Airbreak Equipment - Indoor
Type 8	- Class I, Group A, B, C or D Hazardous Locations; Oil-Immersed Equipment - Indoor
Type 9	- Class II, Group E, F or G Hazardous Locations; Airbreak Equipment - Indoor
Type 10	- Bureau of Mines
Type 11	- Corrosion Resistant and Dripproof; Oil-Immersed - Indoor
Type 12	- Industrial Use, Dusttight and Driptight - Indoor
Type 13	- Oiltight and Dusttight - Indoor

**Non-Critical Set Point** - The non-critical set point is the least important setting and the tolerances are not held as close as the critical set point. It can be either the actuation or deactuation point.

**Polyimide** - An engineering thermoplastic polymer characterized by high tensile strength, excellent wear resistance, chemical and radiation inertness, and good dielectric properties over a wide temperature range. Neo-Dyn<sup>®</sup> uses DuPont Kapton<sup>®</sup> Type F teflon coated flexible polyimide film as a diaphragm material.

**Note:** Although excellent for most applications, polyimide is subject to cracking after prolonged exposure to water above 140°F.

**Pressure** - Force per unit of area.

**Pressure Sensing Element** - The pressure sensing element is that component part which moves as pressure increases or decreases, operating an electrical switching element at a predetermined point. Neo-Dyn "Nega-Rate<sup>®</sup>" pressure switches utilize a diaphragm or piston as a media seal with a Belleville negative-rate disc spring system.

**Pressure Switch** - A pressure switch is an instrument designed to convert pressure into motion to operate an electrical switching element—thereby making or breaking an electrical circuit.

**Proof Pressure (or Temperature)** - Normally 1½x to 2 times system, it is the maximum momentary pressure (or temperature) including surges, which may be applied to any switch without causing permanent degradation.

**Remote Mount** - A phrase used to refer to the mounting of an instrument away from the source of the process variable being sensed (usually via a capillary tube).

**Repeatability** - Repeatability is the maximum set point deviation of a single pressure switch under one given set of environmental and operational conditions.

**Special Switch** - A unit which is modified outside the limits of a standard catalog item.

**System (Working) Pressure** - System pressure is the operating pressure of any hydraulic or pneumatic system.

**Tolerance** - Tolerance is the maximum allowable setting deviation between two or more production units under all specified environmental and operational conditions. Tolerance represents the sum total of setting deviations due to calibration and manufacturing variations, temperature changes, etc.

**Variable Pressure** - Changing pressure, generally the pressure which is being measured or controlled.

**Volume Rate of Flow** - An expression of flow by volume in a given time, such as gallons per minute (GPM).

**Wetted Materials** - That portion of the unit which comes in contact with the pressure media.

