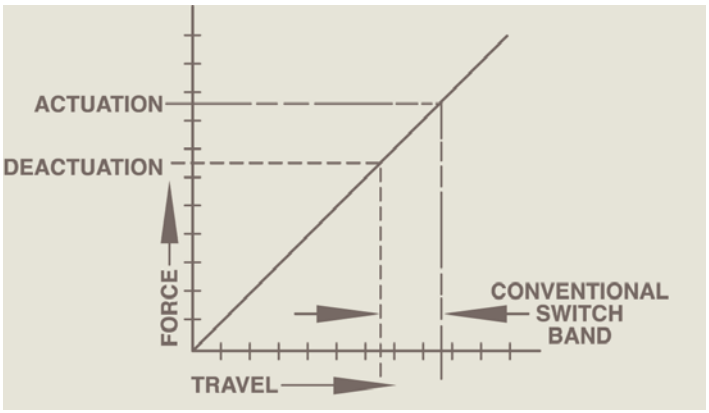
ITT
ENGINEERED FOR LIFE

Conventional Pressure Switch Design

Constant Rate Spring

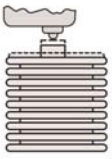
A constant rate type pressure switch, i.e., a bellows, diaphragm, bourdon tube and spring loaded piston, are linear devices—for a certain pressure change the pressure element moves a given distance. For additional movement more pressure (force) is applied. The position of the electrical switch, therefore, influences and/or dictates the pressure switch set point.



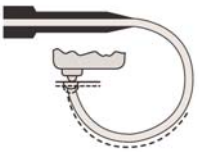
DIAPHRAGM

SPRING LOADED PISTON

BELLOWS



BOURDON TUBE



Disadvantages of the "Constant Rate" Switches

NON-STABLE SET POINTS - "Requires Constant Recalibration"

BECAUSE:

- Sensor mechanism follows the system pressure—subject to fatigue.
- Set point influenced by snap acting electrical—variations in snap switch differential affects deadband of pressure switch.
- Ambient temperature sensitive—relocation of electrical switch causes change in set points.
- Linkage used to adjust electrical switch—linkage wear relocates electrical, causing set point change.

VIBRATION SENSITIVE - "Causes Contact Chatter"

BECAUSE:

- Constant rate device "mimics" dynamic input—intermittent electrical signal if vibration occurs when switch is near actuation.
- Larger mass associated with constant rate sensor mechanisms—more mass means less vibration resistance.
- Spring mounted electricals or linkages—resonance frequency can cause spring or linkage to "take off" causing electrical contacts to chatter.

OVER-PRESSURE SENSITIVE - "Affects Set Point Accuracy"

BECAUSE:

- Motion transfer device must contain pressure—bellows, bourdon tubes, and welded diaphragms contain pressure as well as actuate the electrical.
- Limited sensor support—sensors with limited overpressure support are subject to set point drift.

LIMITED CYCLE LIFE - "Dependent on Set Point"

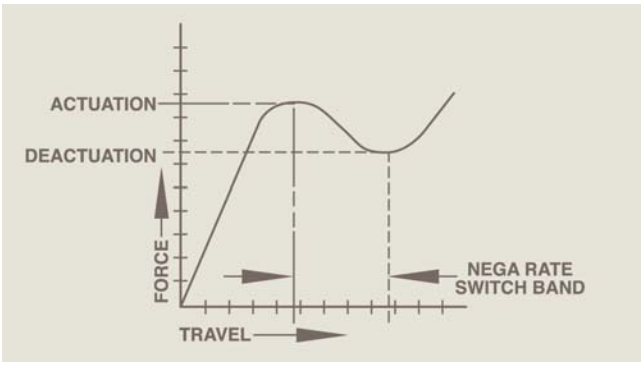
BECAUSE:

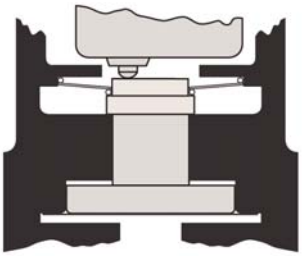
- Longer stroke—repositioning the electrical for set point changes requires greater movement.
- Shorter electrical life—"sneaking up" on the electrical can cause an electrical arc.

Neo-Dyn® Pressure Switch Design

Nega-Rate® Belleville Spring

A negative rate type pressure switch (i.e., a Belleville spring) is a snap acting device. At a certain pressure (apex of the spring curve) the spring snaps over center. At this point, it takes less pressure (force) to continue its movement. The pressure switch set point is a function of the Belleville spring. The electrical switch is in a fixed position and is synchronized to the movement of the Belleville.

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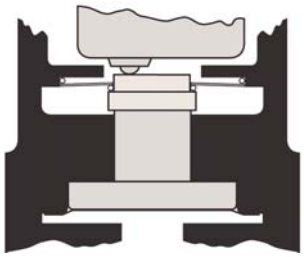
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Advantages of the Nega-Rate® Belleville Disc Spring Switches

STABLE SET POINTS - "Eliminates Constant Recalibration"

BECAUSE:

- No moving parts except during actuation—no spring fatigue or wear.
- Set point is mostly a function of the negative rate Belleville spring—variables in snap action electrical have little effect on the set point.
- Total movement of the Belleville spring compensates for any relocation of the electrical due to case growth—consistent set point over temperature change.
- No linkage utilized—no wear which can affect accuracy.

VIBRATION RESISTANT - "Eliminates Contact Chatter"

BECAUSE:

- Belleville spring does not preload the electrical prior to actuation—snap action electrical maintains its vibration resistant characteristic.
- Small mass and inherent stability of the Belleville spring resists chatter caused by vibration.
- Snap action electrical is ruggedly mounted with minimal bracketry—no spring mounted electricals or linkages.

HIGH OVER-PRESSURE CAPABILITY - "No Affect on Set Point Accuracy"

BECAUSE:

- Belleville spring does not contain the pressure—no affect on system or proof pressure capability.
- The pressure sensing portion bottoms out after actuation and is fully supported—pressure sensing parts are designed for high pressure conditions.
- Limited movement of spring mechanism—no overtravel of the snap action electrical due to high pressure.

HIGH CYCLE LIFE - "Millions of Cycles"

BECAUSE:

- Short stroke minimizes wear—Belleville spring mechanism is exercised less than .020".
- Snap action of Belleville spring reduces electrical arc—prolongs contact life.

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