

# Solid State Sensors

## Glossary of Terms

### Absolute Maximum Ratings

**Supply Voltage:** Range of voltage which may be applied to the positive terminal of a sensor without damage.

**Voltage Externally Applied to Output:** Refers to the breakdown voltage of the output transistor between the collector and emitter when transistor is OFF. Voltage measured at the output terminals of an inactivated sensor must never exceed 30 VDC, or sensor may be damaged.

**Output Current:** Maximum output current which may flow through an actuated sensor without damaging the sensor.

**Temperature:** Range over which the sensor will operate without damage. This is **not** the actual rated temperature range over which the sensor will meet the specified operational characteristics.

**Magnetic Flux:** Hall effect sensors cannot be damaged by excessively large magnetic field density.

**Bipolar sensor, magnetic** — A Hall effect sensor that has a plus (South pole) maximum operate point, and a minus (North pole) minimum release point. Operate and release points can also be both positive or both negative. Therefore, **latching cannot be guaranteed**. Ring magnets are usually used with bipolar sensors.

**Bipolar-latching sensor, magnetic** — A true latching device. Guaranteed to switch on with positive gauss only and switch off with negative gauss only.

**Capillary Tube Flow Design** — Examines differences in two self-heated RTDs held at equal temperature or equal input.

**Current sinking output (NPN)** — Load is connected between power supply and sensor. Current flows from the load through the sensor to ground (open collector).

**Current sourcing output (PNP)** — Load is connected between sensor and ground. Current flows from the sensor through the load to ground (open emitter).

**Dew Point** — Point at which a given sample of air is saturated. Related standards of measurement include Frost Point, and Ice Point.

**Differential travel (D.T.)** — Plunger or actuator travel from point where contacts “snap-over” to point where they “snap-back.”

**Enthalpy** — A thermodynamic function of a system, equivalent to the sum of the internal energy of the system plus the product of its volume multiplied by the pressure exerted on it by its surroundings.

**Flux concentrator** — Any ferrous material positioned so as to concentrate magnetic flux in the sensing area, thereby increasing the flux density as seen by the Hall effect sensor.

**Frost Point** — If measurements are made below freezing point of water (if indicated dew point is below freezing point of water), then equilibrium occurs at vapor pressure of ice (not water). Vapor pressure of ice is less than that of water. The frost point is slightly higher than dew point. Often used when dryness of the gas is an important determination.

**Gauss** — The CGS unit of flux density (magnetic induction).

**Hall effect** — The description given to the following phenomena: When a conductor through which a current is flowing is placed in a magnetic field, a difference in potential (Hall voltage) is generated between the two opposed edges of the conductor in the direction perpendicular to both the field and the current.

**Hysteresis** — The property of a digital Hall effect sensor where its operate point is different in value from its release point.

**IAQ** — Indoor Air Quality: calculated using CO<sub>2</sub> levels found in indoor air; high levels of CO<sub>2</sub> create an awareness of volatile organic compounds (VOCs) and bacteria.

**Ice Point** — Equal to 0°C (32°F), is the temperature at which pure water at 1 atm of pressure freezes. It is the physical phenomenon upon which the centigrade temperature scale was originally based:

0°C = pure water, at 1 atm pressure, freezes

100°C = pure water, at 1 atm pressure, boils.

**Linearity** — The closeness of an actual curve to a specified straightline. The degree to which the output of a linear device deviates from ideal performance.

**Linear output** — An output which changes in proportion to the input.

**Magnetoresistive effect** — The change in the resistance of a semiconductor device in which the electrical resistance is a function of the applied magnetic field. A magnetoresistive element will respond to any magnetic fields (North or South pole) which are **parallel** to it.

**Moisture Measurements** — Mix of ratios, volume percent, and specific humidity — used when water vapor is an impurity or a defined component of a process gas mixture used in manufacturing.

**North pole (magnetic)** — The pole that is attracted to the geographical north pole, thereby repelling the north seeking pole of a compass. Lines of flux are directed away from this pole.

**Omnipolar sensor, magnetic** — A sensor that operates with any magnetic field (North or South pole).

**Operating force (O.F.)** — Amount of force applied to switch plunger or actuator to cause contact “snap-over.” Note in the case of adjustable actuators, the force is measured from the maximum length position of the lever.

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**Operating position (O.P.)** — Position of switch plunger or actuator at which point contacts snap from normal to operated position. Note that in the case of flexible or adjustable actuators, the operating position is measured from the end of the lever or its maximum length. Location of operating position measurement shown on mounting dimension drawings.

**Overtravel (O.T.)** — Plunger or actuator travel safely available beyond operating position.

**Pretravel (P.T.)** — Distance or angle traveled in moving plunger or actuator from free position to operating position.

**Psychrometrics** — The study of water vapor concentration in air as a function of temperature and pressure. This field of study includes numerous moisture terms and units.

**Rankine Scale** — A scale of absolute temperature using Fahrenheit degrees, in which the freezing point of water is 491.69° and the boiling point of water is 671.69°, measure of thermodynamic temperature.

### Rated Electrical Characteristics

**Supply Voltage:** Range of voltage over which the sensor is guaranteed to operate within performance specifications.

**Supply Current:** Corresponds to current drain on the Vs terminal. Supply current is dependent upon the supply voltage.

**Output Voltage:** Saturation voltage (VSAT) of the output transistor. Voltage which appears at the output due to inherent voltage drop of the output transistor in the ON condition.

**Output Current:** Maximum output current at which the sensor is guaranteed to operate within performance specifications.

**Output Leakage Current:** Maximum current which remains flowing through the output transistor when it is turned OFF.

**Output Switching Time:** Time required by the output transistor to change from one logic state to the other after a change has been initiated. This specification applies only to conditions specified on the product drawing.

**Ratiometric** — The output voltage is proportional to the supply voltage in some set ratio.

**Regulated Voltage** — Desired output voltage is maintained regardless of normal change to input or output load.

**South pole (magnetic)** — The pole that is repelled by the geographical north pole, and therefore attracts the north seeking pole of a compass. Lines of flux are directed toward this pole.

**Temperature calibrations** — Single Point: calibration at 0°C (Ice Point); Two Point: calibration at 0°C and 100°C; Three Point: calibration at 0°C, 100°C, and 250°C.

**Thermodynamic Temperature Scale** — Varies slightly from Fahrenheit: 211.95° vs. 212°F.

**Unipolar sensor, magnetic** — A Hall effect sensor that has a plus maximum operate point, and a plus minimum release point. One magnetic pole (South) is required to operate and release a unipolar sensor.

**VOCs-Volatile Organic Compounds** — bioeffluents (bacterial and organic compounds) found in indoor air as CO<sub>2</sub> levels rise.