



Absolute Process Instruments, Inc.

Manufacturer of Quality Signal Conditioners Transmitters & Isolators

Application Notes

- **General Info**
- **Temperature**
- **Pressure**
- **Flow**
- **Speed**
- **Weighing**
- **Process**

Terms and Definitions

Accuracy: The closeness of an indication or reading of a measurement device to the actual value of the quantity being measured. Accuracy calculations are based on the linearity, hysteresis, and repeatability characteristics of the transducer/sensor and supporting electronics, the range of the transducer/sensor, as well as the resolution being displayed. It is usually expressed as a $\pm\%$ of full scale output of the transducer/sensor/system.

A/D (Analog to Digital): Conversion of a continuously varying signal (analog) to discrete binary numbered values (digital).

Alarm Condition: The input (process signal) has crossed the set (trip) point and the relay has changed states into the alarm condition. The relay will remain in this state until the input signal returns to the normal condition.

Background Noise: The total amount of noise from all sources of interference in a process loop, independent of the presence of a data/control signal.

Chatter: Describes a condition where the input signal hovers near the set (trip) point, causing the relay to trip off, then back on in short bursts. Generally solved by adding or expanding the deadband.

Clipping: A phenomena which occurs when an output signal is limited in some way (usually in amplitude) by the full range of an amplifier/unit.

Common-Mode Rejection (CMR): The ability of a device to eliminate the effect of AC or DC noise between the input signal and ground. Normally expressed in dB at DC to 60 Hz.

D/A (Digital to Analog): Conversion of a discrete binary numbered values (digital) to a continuously varying signal (analog).

Deadband: The range through which an input can be varied without initiating an observable response. Deadband is usually expressed in percent of span.

Dual Alarm Trip: A unit that accepts one input signal, has two set (trip) points, and one output relay per set point. Each set point is independent of the other and can be set between 0-100% of the input range.

Electrical Interference: Electrical noise induced upon the signal wires that obscures (interferes with) the wanted information signal.

Fail-Safe: Relay coil is energized when the input signal is in the normal operating condition. In the alarm condition, the relay coil de-energizes. Considered a safety measure because, in the event of a loss of power to the unit or other failure, the unit "fails" to an alarm condition.

Gain: The amount of amplification used in an electrical circuit.

High Alarm: The relay changes state when the input signal reaches or exceeds the set (trip) point.

Hysteresis: The difference in output from a transducer/sensor when a measured value is first approached with increasing and then decreasing values.

Input Impedance: The total opposition, both resistive and reactive, that the unit presents to the input signal loop.

Linearity: The closeness of a calibration curve to a specified straight line. Linearity is expressed as the maximum absolute deviation of any calibration point on a specified straight line during any one calibration cycle.

Loop Resistance: The total resistance in a circuit to current flow caused by the resistance of all components.

Loop Impedance: The total opposition (resistive plus reactive) to current flow in a circuit.

Low Alarm: The relay changes state when the input signal falls to or below the set (trip) point

MOV (Metal Oxide Varistor): A voltage dependent resistor whose resistance predictably changes with voltage, often used as transient protectors.

Negative Temperature Coefficient: A decrease in resistance with an increase in temperature.

Noise: An unwanted electrical signal on any signal wires.

Non-Fail-safe (Reverse Acting): Relay coil is de-energized when the input signal is in the normal condition. In the alarm condition, the relay coil energizes. There is no alarm when there is a loss of power.

Normal (Non-Alarm) Condition: The process signal has not crossed the set (trip) point.

Normally Closed: Describes a set of relay contacts that in the unpowered state have continuity across them.

Normally Open: Describes a set of relay contacts which in the unpowered state have no continuity across them.

Optical Isolation: Two circuits which are connected only through an LED transmitter and photoelectric receiver with no electrical continuity between them.

Positive Temperature Coefficient: An increase in resistance with an increase in temperature.

Relay (Mechanical): An electromechanical device that completes or interrupts a circuit by physically moving electrical contacts.

Relay (Solid State): A solid state switching device which completes or interrupts a circuit electrically with no moving parts. Commonly called an SSR.

Repeatability: The ability of a transducer/sensor to reproduce output readings when the same measured value is applied to it consecutively.

Reset: The action of returning to the normal (non-alarm) condition.

Resistance: Opposition to current flow offered by a purely resistive component, measured in ohms.

Response Time: The time required by a sensor to reach 63.2% of its final value in response to a step-change input. This is typically called "one time constant". Five time constants are required for the sensor to stabilize at 100% of the step change value.

Root Mean Square (RMS): Square root of the mean of the square of the signal taken during one full cycle.

Sensitivity: The minimum change in input signal to which an instrument/sensor can respond.

Set Point: The point at which an alarm/controller is set to control a system.

Single Alarm Trip: A unit that accepts one input signal, has one set (trip) point, and one output relay. The set point can be set between 0-100% of the input range.

Span: The difference between the upper and lower limits of a range expressed in the same units as the range.

Span Adjustment: The ability to adjust the gain of a sensor/unit so that the output signal corresponds to the maximum input signal. The adjustment range is normally expressed in counts or percentage.

Transducer: A device that converts energy from one form to another. This term is generally applied to devices that take physical phenomenon (pressure, temperature, humidity, flow, etc.) and convert it to an electrical signal.

Triac: A solid state switching device used to control alternating current.

Trip Point: Value at which the alarm relays change to the alarm condition.

True RMS: The true root-mean-square value of an AC or AC-plus-DC signal, for a perfect sine wave the RMS value is 1.11072 times the rectified average value. This value is often used to determine the power of a signal. For significantly non-sinusoidal signals a true RMS converter is required.

Volt: The unit of potential difference and electromotive force. One volt will send a current of one ampere through a resistance of one ohm.

Voltage: The electrical potential difference that exists between two points and is capable of producing a flow of current when a closed circuit is connected between the two points.

Zero Adjustment: The ability to adjust the output from a sensor/unit so that the minimum output corresponds to the minimum input. The adjustment range is normally expressed in counts or percentage.