Scanivalve

GLOSSARY OF TERMS

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Glossary of Terms

A/D or ADC

"Analog-to-Digital Converter." This is an electronic component that reads in the analog voltage signals and converts them to digital readings in the form of "counts." Most Scanivalve equipment uses either 16-bit or 24-bit A/Ds, which provides a measuing range of ±32767 or ±8,388,608 counts. That means that when the full scale voltage of a 16-bit A/D is input into the A/D, it will output a reading 32767 counts. See "resolution" for more information.

ABSOLUTE (PSIA)

An absolute pressure transducer is sealed in a vacuum, and when open to ambient conditions will read barometric pressure. Absolute transducers do not use a reference port. All data output from these sensors will result in an absolute pressure reading.

ADDRESSING

This is the process of selecting which sensor is being read by the A/D, or output by the module (as applicable to the setup). Scanivalve analog modules have a series of five (5) "address lines" that are inputs to the analog module. These address lines are set to "high" (voltage applied) or "low" (no voltage applied) to determine which sensor is being read. The combination of the five (5) address lines and which lines are high and which lines are low determines the channel being read.

AMBIENT/BAROMETRIC

Current pressure in the area. Also known as "atmospheric pressure." Keep in mind that ambient pressure can vary slightly from room to room within a building and can be significantly influenced by seemingly small factors like a building's heat or cooling systems, doors opening and closing or people moving near where the ambient pressure is being measured.

ANALOG

This typically refers to the small voltages being output by the sensor. Scanivalve uses the term "analog scanners" to describe the ZOC series of scanners which do not digitize voltages. This also include the MPS4164 analog scanner.

APPLICATION FILE

This is the firmware or software that runs Scanivalve intelligent devices, such as the MPS4264, DTS4050, or DSA3217. Often called the "application," "application file," or "firmware file." These files will often have a unique extension, such as ".hex", ".tar", ".dsa", or ".mps".

AVG

"Average." A variable in devices that sets the number of internal averaging applied to data before it is output as a frame of data. Internal averaging happens before the data is output.

Example; if AVG is set to 1 the unit will scan all channels a single time and output the measured data. If AVG is set to 2, the unit will scan all channels once, then again and average each channel's readings together and then output the averaged value for each channel as a single frame of data. We call this an "averaged frame of data." Newer products perform averaging automatically based on the configured scan rate.

AVERAGED FRAME OF DATA

See "AVG"

BACK DOOR

This term is used by Scanivalve in reference to an alternate communication method for our products, typically via Serial (RS232). Ethernet based products typically have a configuration connection and the contacts are often included in an existing connection such as power, trigger, or configuration connection.

Example; You do not know the IP address of the unit. To query the unit for the IP address, you will need to boot the unit while monitoring the serial connection. Using this connection is considered using the 'back door' – which is simply an alternate communication method.

BIN

"Binary." A variable that determines whether the unit will output scan data as binary or ASCII data. The ASCII conversion

process takes time and processor resources, so if high speed data is required (variable, but typically greater than 50Hz) the unit must be configured to output binary data. This requires the user to convert the data from binary to ASCII as a post process. All binary data is structured and defined in each device's manual.

BOOTLOADER

This is a very low-level application file that allows Scanivalve intelligent devices to run in a limited context without the main application file. This typically runs the FTP server allowing application files to be uploaded or changed. Typically, bootloader is only used for troubleshooting or re-formatting a device back to factory defaults.

BURST PRESSURE

The maximum pressure that may be applied without physically damaging the device or sensor.

CAL

A typical provided port on a module for the calibration input. Module's can be configured using control pressure to place a module into "Calibrate mode," which will allow a single source of pressure to be applied to the CAL port, which will be sensed by all sensors.

CALIBRATION

A process or routine that applies a series of known values to a device to characterize it's behavior. These vales are collected and are used to create either a matrix of discrete temperatures and pressures called Master Calibration Coefficients, or creates a surface fit in a three-dimensional space to derive Least-Squared coefficients.

Full Calibrations

A module is calibrated applying known values across several temperatures. This involves using a known, high accuracy standard (pressure or voltage) and a controllable thermal chamber. Typical Scanivalve calibrations often start at 0°C and work up to 70°C at equal increments. At each stable temperature, known pressures voltages are applied using equal increments between positive and negative full-scale range of the device. Each device's sequence varies, but is defined on Scanivalve Calibration Certificates.

Field Calibrations

An alternative to Full Calibrations. This routine only uses an known, high accuracy standard to apply values to the device a single temperature. These collected values are then used to re-adjust or correct for any changes in the current "full calibration" coefficient table. Field calibrations are best for users to maintain accuracies in their devices without the need for a thermal chamber and eliminate long calibration routines.

Validation

The process of using a known, high accuracy standard to apply known values to a calibrated device to verify the accuracy of a device's current coefficient tables or values.

CALIBRATE MODE

As relates to Scanivalve products, this is the pneumatic configuration when the installed pressure sensors are open only to the calibration or "CAL" input, and are usually protected (isolated) from input or test pressure influence. This configuration allows a calibration pressure be applied directly to a single pressure port (CAL) and distributed to all of the pressure sensors at the same time.

CALZ

A universal command in Scanivalve intelligent pressure devices, but also used to refer to its process. The command will execute a process that produces values for each pressure channel in a short scan, and then stored in temporary ram. These values are subtracted from the raw pressure counts before converting to the chosen pressure units. A "CALZ" is used to correct for any zero offset changes that occur over time or due to temperature change.

CALIBRATION ZERO

See "CALZ."

COMPENSATED TEMPERATURE

Also referred to as “Calibrated Temperature Range,” Typically used to express the device’s compensated temperature range. The module must be within this temperature range to accurately provide data that is temperature compensated.

CONTROL PRESSURE

A regulated pressure source used to change the “mode” or valve state of a pressure device. DSA valves require 90 – 120 psi move to the valve piston between their open and closed logic states. ZOC valves require 65psi to pinch off and close the valve. MPS modules require either 65psi to move an internal shuttle, or 90-120psi to move the same shuttle against a spring (depends on valve configuration). Here are the typical ports found in modules that use the control pressure:

DSA Control 1 (CLT1) Port

Control 1 (CTL1) is the ‘isolation’ control. Applying 90-120 psi to the CTL1 port closes a normally open (flow) valve and configures the internal calibration valves into isolate mode, meaning that pressures applied to the pressure measurement ports (Px 1-16) will not reach the transducers.

DSA Control 2 (CTL2) Port

Control 2 (CTL2) is the ‘calibration’ control. Applying 90-120 psi to the CTL2 port opens a normally closed (no flow) valve and configures the internal calibration valve into calibration mode, meaning that pressures applied to the ‘CAL’ port(s) will reach the transducers. In this application it also opens the safety purge valve “Drain” manifold.

DSA Purge Control (PRGCTL) Port

Applying 90-120 psi to the purge control (PRGCTL) port and the control 1 port (CTL1) places the internal calibration valve into purge mode by opening the purge supply to the Px ports and isolating the sensors from the purge pressure.

Note: in DSA5000, a control pressure is supplied to a single CTL SUPPLY port, and then directed to the proper valve for control.

MPS CALCTL

Applying 65psi or 90-120psi to this port places the module into “calibrate” or “CAL” mode.

MPS PxCTL

Applying 65psi to this port places the module into “measurement” or “Px” mode.

ZOC PxA

Applying 65psi to the “PxA” port closes off the bank A measurement input tubes.

ZOC PxB

Applying 65pSi to the “PxB” port closes off the bank B measurement input tubes.

ZOC CALCTL

Applying 65psi to the “CALCTL” port closes off the calibration input tubes, thus putting the ZOC into “measurement” mode and allowing the sensors to read the measurement pressures.

CPM

“Control Pressure Module.” This is a module type. Example: CPM3000, DSMCPM.

DIFFERENTIAL

Most Scanivalve pressure modules are differential pressure scanners. These modules utilize a differential pressure sensor for each channel. Pressure is sensed by the positive and negative side of the same sensor, which will result in the output of a differential pressure value. There are three common differential configurations available in Scanivalve deivces:

Standard or Common Differential

Sometimes abbreviated as “Px”; In most Scanivalve pressure scanners, the reference or negative side of all pressure transducers in a scanner are manifolded to a common/single port which is typically referred to as the reference port (abbreviated as REF). For example, in a 64 channel module, the negative side of all 64 sensors will be connected to a single common reference port and measurements for each channel relate to that single port. This configuration is common in MPS, ZOC and DSA modules.

True Differential or True Delta-P

Sometimes abbreviated as “DPx”; Available in DSA modules only, this configuration provides two inputs per sensor:

a positive input for the positive side of the sensor, and a negative input for the negative side of the transducer. This type of product is used when there is a benefit to referencing a single transducer to a unique pressure point. An example is measuring either side of a single turbine stage to study the performance or efficiency of a single stage.

INDIVIDUAL REFERENCE

Sometimes abbreviated as "IR"; Available in DSA modules only, this term is sometimes used when describing a true differential pressure scanner as each individual transducer has a discrete reference port (similar to True Differential). However in these module configurations, the internal valving cannot be utilized for Calibration Mode or Purging.

DIN

"Digital Input." This refers to an input voltage used to perform a configured action. Many Scanivalve devices can use a DIN for different reasons. Most devices can use a DIN for external frame triggering or external scan triggering. Some devices allow a DIN to trigger a CALZ or PURGE sequence. In the ECM modules, a DIN can be used to execute an internal script or process.

DOUT

"Digital Output." A command used in some Scanivalve devices to control an embedded digital output, which may output a signal, turn on/off an internal solenoid, or similar. Used primarily in the ENETCPM, ECM, DSAENCL, DSM and ERAD.

DRIFT

The amount that the output of a sensor changes over time. This can be a change in the sensor's zero reading, the sensor's span output with pressure applied or both. A stable sensor's output will change very little over time, an instable sensor's output will change (or "drift") more significantly over time.

DSA

"Digital Sensor Array." This is a module family type. Example: DSA3217, DSA3016, DSA5000.

DSM

"Digital Service Module." This is a module family type. Example: DSM4000.

DTS

"Digital Temperature Scanner." This is a module family type. Example: DTS4050.

DYNAMIC ZERO CORRECTION

Unique to the MPS4200 series, this is the use of "AC excitation" (sensor excitation) to help eliminate errors introduced by noise, amplifier offsets, and parasitic thermocouple errors. AC excitation uses a square wave to alternate the polarity of the excitation signal, which effectively cancels induced DC errors and helps remove 1/f noise at low frequencies (DC to a few Hz). This function effectively nulls the zero offset of the entire analog-to-digital conversion process with every single scan and produces extremely stable sensor outputs, virtually eliminating zero drift in the system.

ECM

"Ethernet Control Module." This is a module family type. Example: ECM4000.

ENCL

Usually refers to the DSAENCL series modules. ENCL, DSAENCL, Enclosure are sometimes synonymously used.

ERAD

"Ethernet Remote A/D." This is a module family type. Example: ERAD4000.

EU

"Engineering Units." An expression or a variable (EU, UNITS, or UNITSCAN) in Scanivalve devices that determines whether the engineering unit conversion process will occur in the unit. EU 0, the unit will output data as A/D counts (see "A/D"). EU 1, the unit will take the A/D counts and convert them into the desired engineering units (PSI, kPa, Pa, BAR….) using the calibration coefficients.

EXCITATION

This is the voltage that is used to power or stimulate the sensor. The voltage or current (depending on design) of the excitation must be constant and stable as the sensor's output varies based on the excitation. If the excitation is reduced by 50%, the sensors output will be reduced by 50%.

FILE EXTENSIONS

Common file extensions used by Scanivalve:

.CFG
Typically a configuration file extension used by Scanivalve devices. Usually an ASCII file that can be opened in a text editor.

.DAT
This is the calibration coefficient file for all DSA3007, 3017, 3018, 3217, 3218, 3207 and 3307 modules. In addition to the pressure coefficients, it also contains the module's unique temperature coefficients and configuration information like pressure range and module type. This file is only used for archiving the data. The "active" data is saved locally in the DSA's permanent memory. Usually an ASCII file that can be opened in a text editor.

.DSA
Application/Firmware file unique to the DSA5000 series. The name of the file is typically the version string of the file.

.GPF
Typically a configuration file extension used by Scanivalve devices. Usually an ASCII file that can be opened in a text editor.

.HEX
This is the application or firmware file in 4000 series products, DTS4050, DSA-PTP series, and ECM4000.

.MPF
"**M**odule **P**rofile **F**ile." This is the calibration coefficient file for all analog pressure scanners (ZOC, DSA3016, and MPS4164). In addition to the pressure coefficients, it also contains the module's unique temperature coefficients and configuration information like pressure range and date of calibration. This file needs to be loaded onto the data acquisition system (ENCL, DSM, RAD) running the scanner in order for the coefficients to be used.

.MPS
Application/Firmware file unique to the MPS4232 series. The name of the file is typically the version string of the file.

.SPF
"**S**ensor Profile **F**ile" The same information as a .MPF but it is for a single sensor. This is used when changing or replacing sensors using the SRU program.

.TAR
Application/Firmware file unique to the MPS4264 series. The name of the file is typically the version string of the file. Similar to a compressed folder.

FIRMWARE FILE

See "Application File."

FPS

"**F**rames **P**er **S**can." A variable that determines the duration of a scan. This variable sets the number of "frames" to be output by the unit after a single SCAN command is sent. Example, if FPS == 10, 10 frames of data will be output by the scanner, stop, and return to ready mode. Note, this is NOT "Frames Per Second."

FREDS

See "TPOTL".

FULL SCALE

This is the "nominal" maximum pressure of the module. For example, a 15psi module the "full scale" range is 15.0psi.

GAUGE (PSIG)

This term GUAGE when used in the context of describing a pressure sensor means that the pressure transducer is simply open to local atmosphere. It differs from a differential transducer on in that it likely has no means there will not be a connection for connecting to the reference side of the transducer. An example is our liquid pressure sensors which are simply open to atmosphere – there is no reference tube connection for the DSA3207 pressure sensors. These sensors are xxPSIG pressure sensors.

HyperTerminal

HyperTerminal is a Windows program included as part of Windows 2000, XP and Vista Operating Systems. This program permits a user to connect to a single module, modify the configuration variables, upload or download coefficients and collect data. HyperTerminal provides a means for both Serial RS-232 and Ethernet connections. It is a text based command line program. It is no longer supported in the new windows operating systems, but "Putty" can be downloaded and used as an alternative.

High-Line Pressure

Sometimes also used in reference to "High Line, Low Delta-P" measurements, high-line pressure is a line pressure that is usually greater than the full scale pressure range of the sensor or device. This high-line pressure is applied to both sides of a differential transducer at the same time. These applications require measuring a low differential pressure between two ports of a single line pressure. Refer to the white paper titled "ASME High Line, Low Delta-P" that is available on the Scanivalve website.

ISOLATE MODE

As relates to Scanivalve products, this is the pneumatic configuration when the pressure transducers are protected from any input pressure influence e.g., the Px input ports are blocked.

ISOLATE PURGE

This term refers to a pneumatic configuration feature where the pressure transducers can be protected from pressure being applied during a purge process. Typically used when talking about the "valves" installed in DSA modules.

LIST

A universal command in Scanivalve devices that may display a defined group of software ware variable settings. Typically requires an argument to reveal specific groups. For example, a "LIST S" command will display the scan group variables for the device.

LEAK

A condition where trapped pressure is decaying in value when it should be holding constant. Can typical be found with a "trap and decay" test.

MEASUREMENT MODE

As relates to Scanivalve products, this is the pneumatic configuration when the pressure ports are open to allow the test pressures be open to the sensors to measure pressure.

MPS

"Miniature Pressure Scanner." This is a module family type. Example: MPS4264, MPS4164, MPS4232.

MULTIPLEXER (MUX)

The multiplexer is the "switch" that selects the channel based on the configuration of the address lines.

NOISE

Instability in the reading of a sensor that is not desirable. This can be electronic noise (the small analog signals from the sensor are being influenced or disturbed) or pneumatic noise (small changes in the pressure being read that are not intended to be measure. Noise can be reduced by increasing the number of averages used. Some noise will always be present, but excessive noise should be diagnosed.

NORMALLY OPEN

This refers to a pneumatic valve being 'open' or in a flow condition

NORMALLY CLOSED

This refers to a pneumatic valve being 'closed' or in a non-flow condition

NORMAL PX

Sometimes abbreviated "NPx", this term is used to describe a pneumatic configuration of a pressure scanner where the pressure input connections are open directly to the pressure sensors without the need for applying a control pressure or changing a valve state.

OFFSET

A change in the sensor's output that is roughly constant over the entire pressure range of the sensor.

OPERATE MODE

See "Measurement Mode."

OPERATING TEMPERATURE

Typically used to express the ambient environmental temperature at which a device can operate normally. Typically the ambient temperature where the device is installed, not the temperature at the measurement port.

PDM

"Power Distribution Module." Most commonly this is an AC/DC converter taking in 110/220 AC power and providing the DC power for a Scanivalve device. PDM1500, PDM3200, PDM3200RM, and PDM5000 are examples.

PERCENT OF FULL SCALE

This the expression of accuracy based on the full scale nominal pressure range of the module. It is used both to define a modules accuracy limit and its actual accuracy. It is always calculated using the nominal pressure range of the module.

Example calculating a module's accuracy limit:

Formula:	Accuracy = (Full Sale Pressure) X (% Full Scale Accuracy)
Full Scale Pressure Range:	15psi
% Full Scale Accuracy:	0.05%
Module Accuracy:	0.0075psi

Example calculating a module's accuracy:

Formula:	$\%\ \text{Error} = \frac{(\text{Actual Pressure}) - (\text{Read Pressure})}{\text{Nominal Pressure Range}}$
Nominal Pressure Rage:	15psi
Actual Pressure:	10.0000psi
Read Pressure:	10.00231psi
Difference:	0.00231psi
% error:	0.0154%

PERIOD

A variable that sets the inter-channel delay time in microseconds. In some scanivalve devices, Individual channels are read in series by a single A/D. There is some amount of settling time required for the electronics after switching from one channel to the next. The smaller the delay, the higher the data rate output by the module.

PLU

"Pneumatic Logic Unit." Usually prefixed with SPC, this is a pressure distribution box used to direct calibrator pressures to the CAL or REF ports on Scanivalve modules during calibration/validations using a series of solenoids.

PNEUMATIC DISTRIBUTION PANEL

This term as related to a Scanivalve system refers to a regulator panel. Many Scanivalve products have valves that are pneumatically operated and require regulated control pressure (i.e. ZOC and DSA valves). A 'Pneumatic Distribution Panel' will typically consist of regulators and gauges to set and monitor a control pressure source. Scanivalve calibrators also require a source pressure (servo supply pressure) and a 'Pneumatic Distribution Panel' often times will include regulator and gauges for this source as well.

PROOF PRESSURE

The maximum pressure that may be applied without changing the performance or characteristics of the pressure sensors.

PURGE

Many Scanivalve pressure scanners incorporate an internal calibration valve. One of the configurations of this valve allows for purging abilities. If a module is configured for Purge Mode, pressure can be applied to a module's purge port, which flows through the Px Inputs and towards the test article, exiting at the measurement port at the test article. This purge will help to remove contamination from and/or dry the measurement tubing.

PURGE MODE

As relates to Scanivalve products, this is the pneumatic configuration when the module can be purged. In most products, valving is switched to open a manifold to allow a single purge source pressure to be applied to all of the pressure input lines directly above the pressure transducers allowing a positive pressure flow back towards the test article.

Px

Typically used to refer to a single pressure input or channel. You may see this in part numbers, like the MPS4264/64Px, which means the module has 64 Px, or channel/inputs. You may also see Px used on channels, such as Px 1 (pressure channel 1) or Px 2 (pressure channel 2), or used for positive and negative channel inputs i.e., Px +1 and Px -1 would be the positive and negative inputs for channel 1.

Px MODE

See "Measurement Mode."

RAD

"Remote A/D." This is a module family type. Example: RAD3200.

RATE

The speed at which the unit samples and outputs data. Typically expressed in Hertz (Hz). May also be expressed as "Samples per Channel per Second", or "Frames per Second". This is calculated using the formula:

$$\text{Rate} = \frac{1}{(\text{Period} \times \text{NumberofChannels} \times \text{AVG})}$$

*Where PERIOD is in seconds

In newer Scanivalve devices, RATE is simply a variable to be set (in Hz) and automatically calculates the Period and Avg.

QUICK ZERO CALIBRATION

See "CALZ."

REF

A typical provided port on a differential pressure scanner that is used to connect a reference pressure. This port commonly connects the back side of differential pressure sensors in a module to atmospheric pressure, or to a controlled static location. Ref is usually the 'Zero' point of the pressure measurements.

RPM

Rad Power Module. This Power Distribution Module for the RAD series data system.

SAVE

A universal command that will save all settings into the RAM image of the Non Volatile Memory. Any change to a configuration variable must be followed by a SAVE command if the change is to be permanent.

SCAN

A universal command that will execute the scan process of collecting and transmitting data. It is also sometimes used to identify the act of sampling and outputting data. A scan is affected by many different variable configurations.

SCANTEL

ScanTel is a free communications utility designed by Scanivalve to communicate with Scanivalve products. It is a text based, command line program that allows users to connect to a single module and modify the configuration variables, upload or download coefficients and collect data in both TCP/IP and UDP format.

SEALANT/PIPE DOPE

These terms are used to describe a compound used to facilitate assembly and help seal connections. Sealant typically refers to a product we sell used primarily when making tubing connections between plastic tubing and stainless-steel bulged tubulations (refer to Scanivalve SLNT2). Pipe dope typically refers to a sealant used when assembling pipe thread connections. ****Teflon Tape is a common form of Pipe Dope but is HIGHLY discouraged for assembling products used in conjunction with Scanivalve products as it has been proven to become dislodged, become loose and migrate into pneumatic valving which causes leaks and valve failure.*

SENSOR TEMPERATURE

Some Scanivalve pressure scanners, mainly the DSA series, measure the temperature of each pressure sensor to report the sensor's temperature. Other scanners use RTDs or Temperature Chips to derive the temperature of the entire module (using a single temperature or a gradient value). The firmware in these devices uses this temperature to locate and use the correct calibration coefficients from the look up table.

SET

A common command that is used to set a configuration variable. Typically requires multiple arguments such as SET RATE 10.

SLOTS

(Linear Interpolation Only) This refers to how calibration points are distributed across the full scale range of a calibration file. When calibration points are selected and evenly distributed through the calibrated range of a module, care must be taken that the applied pressure point is selected such that it is not too close to a neighboring / existing point. This is particularly important when considering calibration points during a 're-calibration' process.

SPAN

A sensor's output with pressure applied.

SPC

"Scanivalve Pressure Calibrator." Used to be Servo Pressure Calibrator. This is a module family type Example: SPC3000, SPC4050.

STATUS

A universal commands the DSA to query the status of a device. The STATUS command may be entered at any time. This is one of the commands that will not generate an error if entered while a module is not in a ready status.

STOP

A universal command that is used to abort the current operation. The escape key can also be used to carry out a stop.

TCU

"Thermal Control Unit." An insulated enclosure used to maintain the temperature of an installed module to keep it within its operational temperature range. TCU's can be equipped with heaters for operations of modules sub-zero temperatures, and sometimes with cooing kits for operation in hot environments.

TPOTL

Tubing push on tool. These are specially made pliers manufactured by Scanivalve to assist in pushing plastic tubing onto stainless steel tubulations.

TRAP AND DECAY TEST

A test that is performed to ensure a device or certain pneumatic connections are leak tight. This typically involves a regulated pressure source, a three way valve, and a proper gauge (within the correct pressure range). In the case of a device's channel, pressure applied to a channel does not flow, but fills a volume. Pressure can be applied to a channel (with an in-line gauge) and then trapped with the three way valve. The gauge will either remain constant or drop. If pressure drops, there is a leak.

TRIGGER

A voltage signal or command that can be used to execute a function in a device. There are many different triggers:

INTERNAL TRIGGER:

A trigger that is internally generated by the device based on the device's internal clock.

EXTERNAL TRIGGER:

Any external signal that causes the device to scan or release data. Can be a voltage (hardware trigger) or software command (software trigger).

HARDWARE:

An external voltage applied to the trigger input, used to signal the device based on the triggering method (Scan or Frame). Requires the transition from low, or below the voltage level to high, or above the voltage level, which is generally 5VDC to 15VDC.

SOFTWARE:

An external software command sent to the unit.

FRAME TRIGGER:

Any incoming trigger that when received, the module will return a single frame of averaged data.

SCAN TRIGGER:

Any incoming trigger that when received, initiates a SCAN. The SCAN will continue until it is manually stopped by the user or the FPS term is met.

TUBULATION

A term used to describe a stainless steel or brass tube with a bulge used primarily for pneumatic connections. When describing a tube fitting, it is appropriate to describe the size (O.D.) of the tubulation. An example would be when describing a pneumatic manifold; "I need a 4 port manifold with .063 tubulations". Or, "The DSA3217 has .063 tubulations for the pressure input connections".

Tx

Typically used to refer to a single temperature input or channel. You may see this in part numbers, like the DTS4050/16Tx, which means the module has 16 Tx, or channel, inputs. You may also see Tx used on channels, such as Tx 1 (temperature channel 1) or Tx 2 (temperature channel 2).

UTR

"**U**niform **T**emperature **R**eference." The block in a DTS module where the thermocouples are connected. It is a large aluminum block that is thermally stable. Each UTR block as two RTDs used to measure the temperature of the UTR block and thus perform the cold junction correction on the thermocouple readings.

ZC

"**Z**ero **C**orrection." A variable that determines whether the zero offsets collected during the last CALZ will be applied to the data or not. In newer devices, ZC may be seen as the variable "CALZ."

ZERO OFFSET CALIBRATION

See "CALZ."

ZOC

"Zero Operate Calibrate." This is a module family type. Example: ZOC33, ZOC17, ZOCEIM.

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