DSA3217-PTP/3218-PTP
Series Pressure Scanner

Digital Sensor Array

Operation and Service Manual

Software Version 2.01

Scanivalve

PREFACE

WARNINGS, CAUTIONS AND NOTES

The WARNING! symbol indicates that danger of injury for persons and the environment and/or considerable damage (mortal danger, danger of injury) will occur if the respective safety precautions are not taken.

The CAUTION ! symbol indicates danger for the system and material if the respective safety precautions are not taken.

The ESD note symbol indicates that proper precautions for handling Electrostatic Sensitive Devices needs to be taken when performing the related operation. This includes the use of grounded work surfaces and personal wrist straps to prevent damage to sensitive electronic components.

WARRANTY

Scanivalve Corporation, Liberty Lake, Washington, hereafter referred to as Seller, warrants to the Buyer and the first end user that its products will be free from defects in workmanship and material for a period of twelve (12) months from date of delivery. Written notice of any claimed defect must be received by Seller within thirty (30) days after such defect is first discovered. The claimed defective product must be returned by prepaid transportation to Seller within ninety (90) days after the defect is first discovered. Seller's obligations under this Warranty are limited to repairing or replacing, at its option, any product or component part thereof that is proven to be other than as herein warranted.

Surface transportation charges covering any repaired or replacement product or component part shall be at Seller's expense; however, inspection, testing and return transportation charges covering any product or component part returned and redelivered, which proves not to be defective, shall be at the expense of Buyer or the end user, whichever has returned such product or component part.

This Warranty does not extend to any Seller product or component part thereof which has been subjected to misuse, accident or improper installation, maintenance or application; or to any product or component part thereof which has been repaired or altered outside of Seller's facilities unless authorized in writing by Seller, or unless such installation, repair or alteration is performed by Seller; or to any labor charges whatsoever, whether for removal and/or reinstallation of the defective product or component part or otherwise, except for Seller's labor charges for repair or replacement in accordance with the Warranty. Any repaired or replacement product or component part thereof provided by Seller under this Warranty shall, upon redelivery to Buyer, be warranted for the unexpired portion of the original product warranty.

THIS WARRANTY IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND IN NO EVENT SHALL SELLER BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

In the event of a failure:

1) Notify Scanivalve Corporation, Customer Service Department. Include model number and serial number. On receipt of this information, service data or shipping instructions will be forwarded. This may be transacted by telephone or e-mail.

2) On receipt of shipping instructions, forward the product, transportation prepaid. Repairs will be made and the product returned.

3) All shipments should be made via "Best Way". The product should be shipped in the original packing container or wrapped in protective material and surrounded by a minimum of four (4) inches of a shock absorbing material.

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All other brand and product names are trademarks or registered trademarks of their respective companies.

Packaging for Shipment

If the product must be shipped, whether being returned to Scanivalve or relocated to another location it must be packaged properly to minimize the risk of damage. The recommended method of packing is to place the instrument in a container, surrounded on all sides with at lease four inches of shock attenuating material such as Styrofoam peanuts.

Important Notice

Please note that the product specifications and other information contained in this manual are subject to change without notice. Scanivalve Corporation makes an effort and strives to provide complete and current information for the proper use of the equipment. If there are any questions regarding this manual or the proper use of the equipment, contact Scanivalve Corporation.

Contact Information

If there are any questions or concerns regarding any Scanivalve product please do not hesitate to contact us at the following:

Scanivalve Corp.
1722 N. Madson Street
Liberty Lake, WA 99019
Telephone: (800)935-5151 (509)891-9970
Fax: (509)891-9481
scanco@scanivalve.com
www.scanivalve.com

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SECTION 1: SPECIFICATIONS

DSA3217-PTP

Size (WxHxD)	2.86” x 3.40” x 7.08” (7.26cm x 8.64cm x 17.98cm)
Weight	6.4lbs (2.91kg)
Pressure Inputs:	16 (Standard) 8 (True Differential)
Input Fittings:	
Pressure Inputs	.063” tubulations
Control Inputs	.063” tubulations
Full Scale Ranges (standard)	
Differential	±5”WC, ±10”WC, ±20”WC, 1 , 2.5, 5, 15, 30, 50, 100, 250, 500, 750 psid (1.25, 2.5, 5, 7, 17, 35, 100, 210, 345, 700, 1725, 3500, 5170 kPa)
Absolute	15, 30, 50, 100 and 250 psia (100, 210, 345, 700 and 1725 kPa)

Accuracy (after calibration)*

Differential	
5 inH_2O	±0.40% FS
10 inH_2O	±0.20% FS
20 inH_2O	±0.20% FS
1.0 psid	±0.12% FS
2.5 psid	±0.08% FS
5 to 500 psid	±0.05% FS
501 to 750 psid	±0.08% FS
Absolute (With CALB performed)	
15 psia	±0.05% FS
30 psia	±0.05% FS
50 psia	±0.05% FS
100 psia	±0.05% FS
250 psia	±0.05% FS

*Some combinations of pressure ranges in dual-range modules may dictate a reduction in accuracy

Overpressure Capacity (No damage)

5 inH_2O	2 psi
10 inH_2O	2 psi
20 inH_2O	2 psi
1 psid	5 psi
2.5 to 499 psid	200%
500 psid	150%
750 psid	113%

Maximum Reference Pressure	250 psid (1750 kPa) or sensor overpressure, which ever is less
Power Requirements	20 to 36 Vdc at 8 W
I/O and mating connectors	
Ethernet 100Base-T	RJ45
Trigger (bulkhead)	PT02A-8-2P
Trigger (mating)	PT06A-8-2S-SR
Trigger (bulkhead)	JTP02RE8-6P
Trigger (mating)	JTO1RE8-6S-SR
Power (bulkhead)	PTO2A-8-3P
Power (mating)	PTO6A-8-3S-SR
Communications Protocol	Ethernet IEEE802.3
Typical Data Acquisition Rate*	
TCP/IP ASCII	50 samples/chan/sec
UDP Binary	850 samples/chan/sec

*Maximum data output depends on network

Typical Communications Rate	
Ethernet	100 Mbits/sec
RS232	9600 BAUD (Configuration only)
Operating Temperature	0 to 60 °C
Compensated Range	0 to 72 °C
Total Thermal Error	Less than ±0.001% FS
Humidity	
Operation	5 to 95% RH, Non-Condensing
Storage	5 to 95% RH, Non-Condensing
Shock & Vibration	MIL-STD-810D Curve H
Shock	10G
Vibration	10G
Acceleration	10G
Media	Gasses compatible with Silicon, Silicone, Aluminum and Stainless Steel
Precision Time Protocol	IEEE-1588 PTPv2

DSA3218-PTP

Size (WxHxD)	4.08” x 6.97” x 9.0” (10.36 cm x 17.70 cm x 22.86 cm)
Weight	9.78 lbs (4.45 kg)
Pressure Inputs:	16 (Standard) 8 (True Differential)
Input Fittings:	
Pressure Inputs	1/8” SwageLok® (1/16” and 1/4” optional)
Control Inputs	1/8” SwageLok® (1/16” and 1/4” optional)
Full Scale Ranges	
Differential	±5”WC, ±10”WC, ±20”WC, 1 , 2.5, 5, 15, 30, 50, 100, 250, 500, 750 psid (1.25, 2.5, 5, 7, 17, 35, 100, 210, 345, 700, 1725, 3500, 5170 kPa)
Absolute	15, 30, 50, 100 and 250 psia (100, 210, 345, 700 and 1725 kPa)

Accuracy (after calibration)*

Differential	
5 inH_2O	±0.40% FS
10 inH_2O	±0.20% FS
20 inH_2O	±0.20% FS
1.0 psid	±0.12% FS
2.5 psid	±0.08% FS
5 to 500 psid	±0.05% FS
501 to 750 psid	±0.08% FS
Absolute (With CALB performed)	
15 psia	±0.05% FS
30 psia	±0.05% FS
50 psia	±0.05% FS
100 psia	±0.05% FS
250 psia	±0.05% FS

*Some combinations of pressure ranges in dual-range modules may dictate a reduction in accuracy

Overpressure Capacity (No damage)

5 inH_2O	2psi
10 inH_2O	2psi
20 inH_2O	2psi
1.0 psid	5psi
2.5 to 499 psid	200%
500 psid	150%
750 psid	113%

Maximum Reference Pressure	250 psid (1750 kPa) or sensor overpressure, which ever is less
Power Requirements	
No Heater	20 to 36 Vdc at 8 W
With Heater	20 to 36 Vdc at 40 W (Drops to 8 W after module has reached temperature)
I/O and mating connectors	
Ethernet 100Base-T	D-Code M12
Trigger (bulkhead)	PT02A-8-2P
Trigger (mating)	PT06A-8-2S-SR
Trigger (bulkhead)	JTP02RE8-6P
Trigger (mating)	JTO1RE8-6S-SR
Power (bulkhead)	PTO2A-8-3P
Power (mating)	PTO6A-8-3S-SR
Communications Protocol	Ethernet IEEE802.3
Typical Data Acquisition Rate*	
TCP/IP ASCII	50 samples/chan/sec
UDP Binary	850 samples/chan/sec
*Maximum data output depends on network	
Typical Communications Rate	
Ethernet	100 Mbits/sec
RS232	9600 BAUD (Configuration only
Operating Temperature	
Without Heater	0 to 60 °C
With Heater	-55 to 60 °C
(Cooling kit recommended above 55 °C)	
Compensated Range	0 to 72 °C
Total Thermal Error	Less than ±0.001% FS
Humidity	
Operation	5 to 95% RH, Non-Condensing
Storage	5 to 95% RH, Non-Condensing
Shock & Vibration	MIL-STD-810D Curve H
Shock	10G
Vibration	10G
Acceleration	10G
Media	Gasses compatible with Silicon, Silicone, Aluminum and Stainless Steel
Precision Time Protocol	IEEE-1588PTP v2

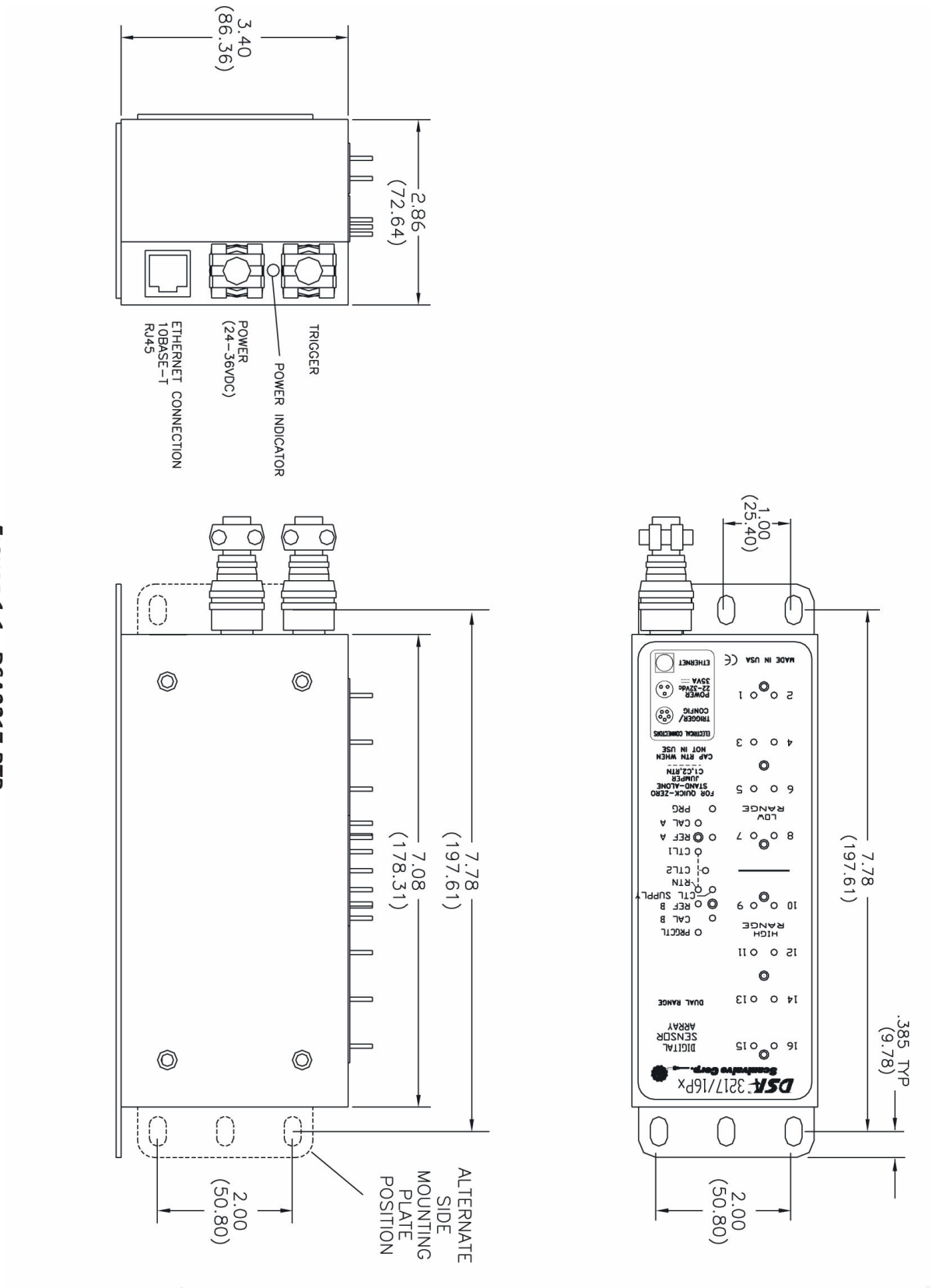

FIGURE 1.1 - DSA3217-PTP

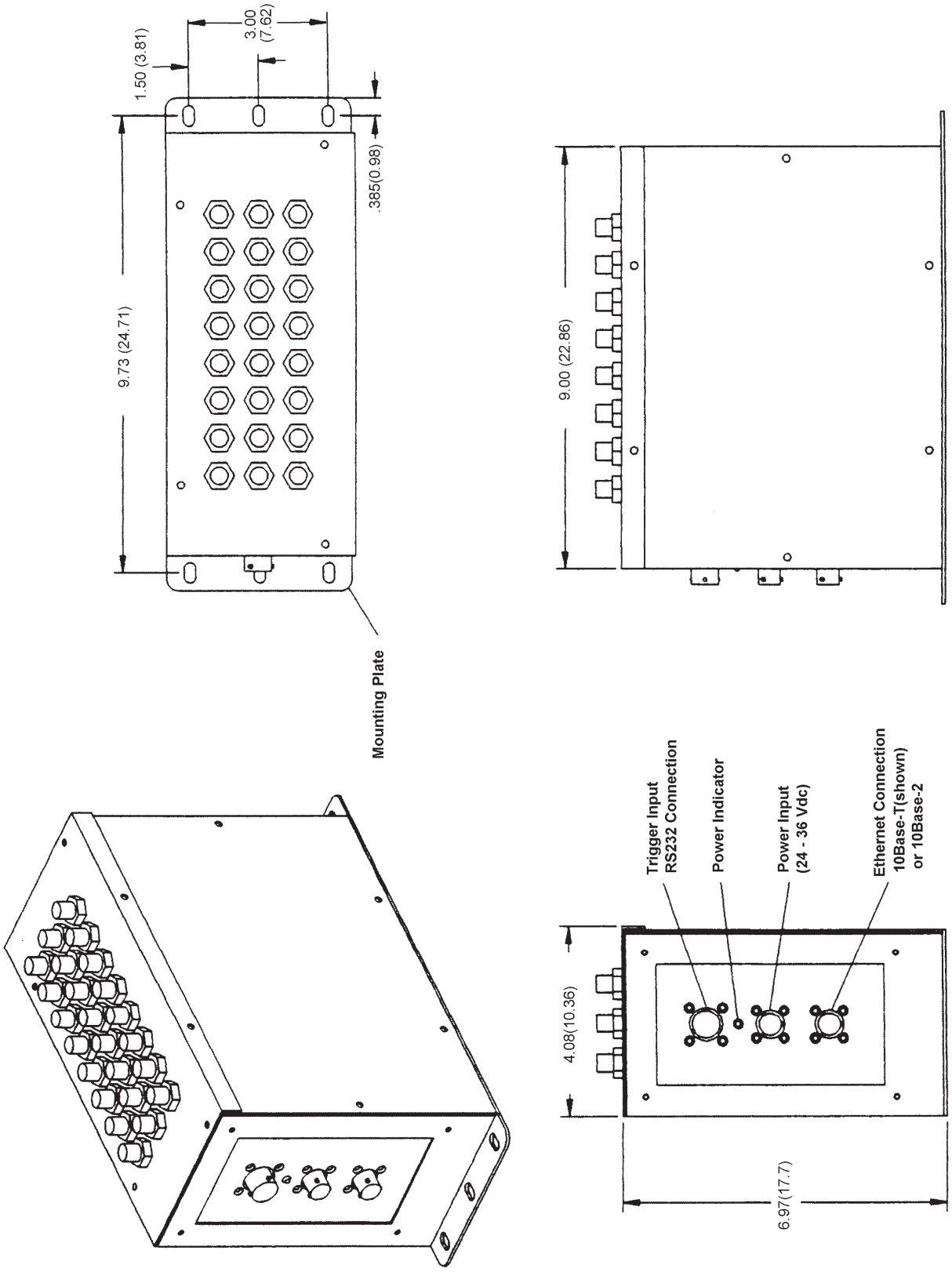

FIGURE 1.2 - DSA3218-PTP

SECTION 2: INTRODUCTION

General Description

The Digital Sensor Array (DSA) is a stand-alone electronic pressure scanner which can accept up to 16 pneumatic inputs. The module is specifically designed for use in applications where long calibration intervals, simple operation and high accuracy are required. Each DSA-PTP incorporates 16 individual, temperature compensated, piezoresistive pressure sensors, an A/D converter and a microprocessor. Each pressure sensor is characterized over pressure and temperature. This information is stored in EEPROM memory and enables the module to directly output corrected data in engineering units.

The sensors within each DSA3200-PTP series module are arranged in groups of eight (8). Each block of eight (8) sensors has its own calibration valve. This calibration valve has four (4) modes of operation and allows the DSA-PTP module to perform measurement, calibration and purge functions. The four (4) modes are:

- Measure
- Calibrate
- Isolate
- Purge

The calibration valve mode is selected by applying 90-120 psi control pressure configurations unique for each operation mode. The DSA-PTP calibration valve utilizes "Normally Px" valve logic where the valve defaults to the measurement mode when no control pressures are applied.

Module Overview

The DSA3200-PTP series is available in two basic configurations; the DSA3217-PTP and the DSA3218-PTP. Both configurations offer 16 pressure inputs, both operate using the same software commands and both offer corrected data output directly in engineering units. The difference between the modules is the packaging and the intended applications. The DSA3217-PTP is enclosed in a stainless steel, splash resistant enclosure intended for most laboratory, educational or controlled environments. The DSA3218-PTP however, is enclosed in a stainless steel, splash resistant, shock mounted enclosure with Swagelok® fittings on all pneumatic connections. It is intended for applications such as gas turbine testing, flight testing, industrial applications and other more rugged environments.

In addition to the more rugged casing on the DSA3218-PTP modules, additional options of a heater or a cooling kit are offered. The heater option allows the module to be operated below the 0 °C temperature compensation range of the standard DSA3218-PTP or DSA3217-PTP modules. The cooling kit is recommended for applications where the ambient environment temperatures are likely to exceed 55 °C.

Both DSA3217-PTP and DSA3218-PTP modules are available with a variety of sensor configurations. The standard configuration is 16 channels of the same pressure range, however modules can be configured as dual-range units with 8 channels of one pressure range and 8 channels of another pressure range, 'True-Differential' measurement modules which provide 8 channels of differential pressure measurement, absolute pressure measurement modules or units with individual reference ports for each sensor (DSA3217-PTP only).

DAS3217-PTP Configurations

The DSA3217-PTP is available in 5 basic configurations.

DSA3217-PTP/16Px

The basic DSA3217-PTP/16Px module provides 16 channels of the same 'gauge' pressure range sensors. These 16 pressure transducers are configured into two (2) groups of eight (8) each. Each group of eight (8) transducers shares a common calibration valve and a common reference manifold. Single range modules tie the two reference manifolds together and the two calibration valves to provide the user with a single reference and a single calibration port to connect to. Figure 2.1 depicts the top panel of a standard DSA3217-PTP/16Px.

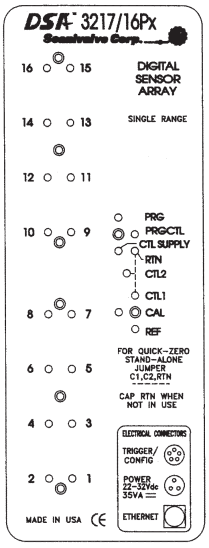

Figure 2.1 - DSA3217-PTP/16Px top panel

DSA3217-PTP/16Px - Dual Range

The DSA3217-PTP/16Px module is available as a dual-range module, offering eight (8) channels of one pressure range and eight (8) channels of a different pressure range. Like a standard DSA3217-PTP, each group of eight (8) transducers share a common calibration valve and a common reference manifold. However, in dual range modules the reference manifolds and the calibration valves are not tied together and separate reference and calibration ports are provided on the top of the module. They are labeled CAL, CAL B, REF and REF B. Figure 2.2 depicts the top panel of a dual range DSA3217-PTP/16Px module.

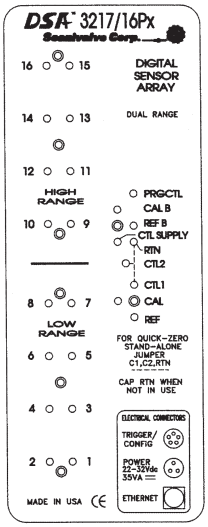

FIGURE 2.2 - DSA3217-PTP/16Px DUAL RANGE TOP PANEL

DSA3217-PTP/8DPx - Differential

For differential pressure measurement applications, the DSA3217-PTP can be configured with eight (8) differential pressure transducers. They are arranged into two (2) groups of four (4) transducers. Like the DSA3217-PTP/16Px, each group of transducers has a dedicated calibration valve that allows the input pressures to be blocked off during any calibration, including a zero offset calibration (CALZ). Figure 2.3 depicts the top panel of a DSA3217-PTP/8DPx module.

DSA3217-PTP/16Px - Absolute

The DSA3217-PTP/16Px module can be used for absolute pressure measurement when equipped with absolute pressure transducers. A calibration valve is provided for each group of eight (8) sensors. All sixteen (16) transducers are tied a single calibration port, except in the cases of dual-range absolute modules. Figure 2.4 depicts the top panel of a DSA3217-PTP/16Px absolute pressure module.

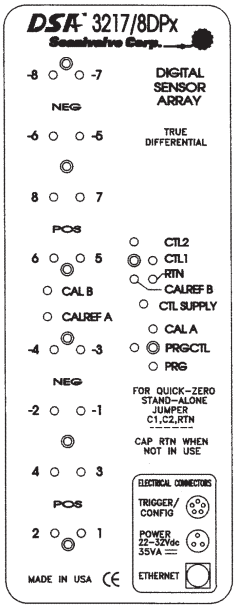

FIGURE 2.3 - DSA3217-PTP/8DPx DIFFERENTIAL TOP PANEL

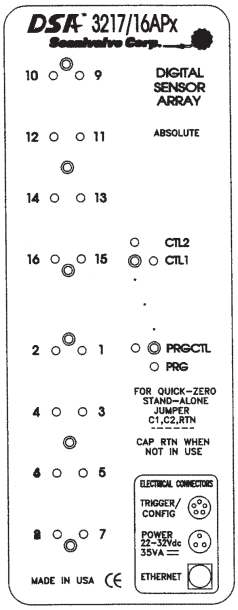

FIGURE 2.4 - DSA3217-PTP/16Px ABSOLUTE TOP PANEL

DSA3217-PTP/16Px - INDIVIDUAL REFERENCE

Both the standard DSA3217-PTP/16Px and Dual Range DSA3217-PTP/16Px are available with individual reference ports for each sensor. A calibration valve is provided for each group of eight (8) sensors, however unlike the standard DSA3217-PTP/16Px modules a separate reference port is provided for all sixteen (16) transducers. These individual reference ports are not controlled by the calibration valve.

This means that any calibration, including a zero offset calibration (CALZ) will have to be done with no pressure applied to the module. The individual reference modification is depicted in Figure 2.5 below.

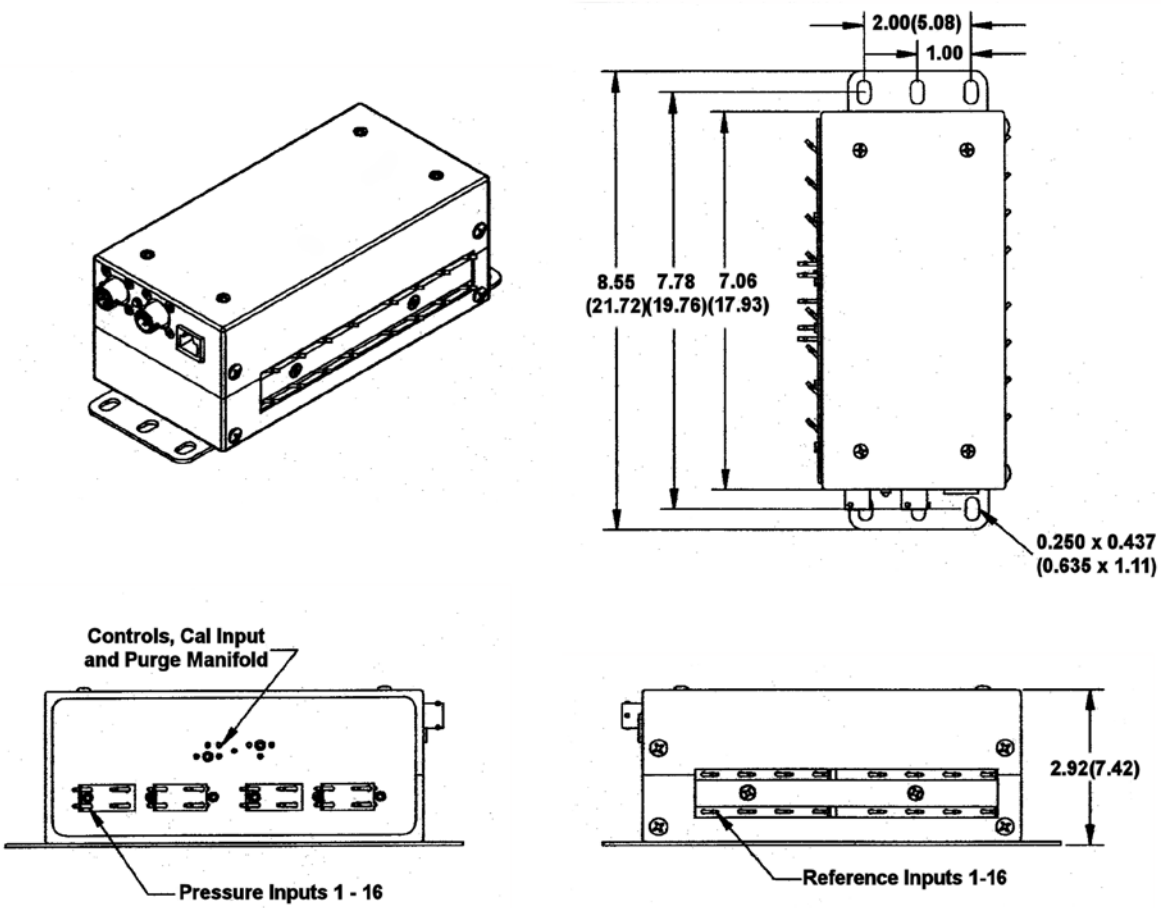

FIGURE 2.5 - DSA3217-PTP/16Px INDIVIDUAL REFERENCE

DSA3218-PTP CONFIGURATIONS

The DSA3218-PTP is available in 4 basic pressure configurations and has 2 optional hardware configurations.

DSA3218-PTP/16Px

The basic DSA3218-PTP/16Px module provides 16 channels of the same 'gauge' pressure range sensors. These 16 pressure transducers are configured into two (2) groups of eight (8) each. Each group of eight (8) transducers shares a common calibration valve and a common reference manifold. Single range modules tie the two reference manifolds together and the two calibration valves to provide the user with a single reference and a single calibration port to connect to. Figure 2.8 depicts the top panel of a standard DSA3217-PTP/16Px.

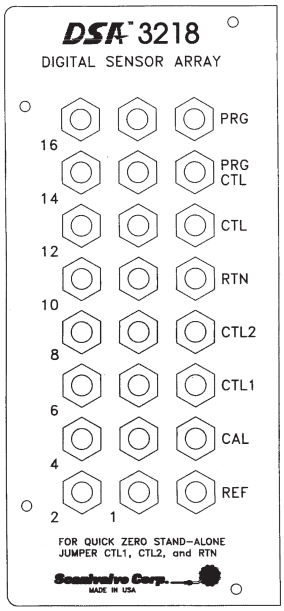

FIGURE 2.8 - DSA3218-PTP/16PX TOP PANEL

DSA3218-PTP/16Px - Dual Range

The DSA3218-PTP/16Px module is available as a dual-range module, offering eight (8) channels of one pressure range and eight (8) channels of a different pressure range. Like a standard DSA3218-PTP, each group of eight (8) transducers share a common calibration valve and a common reference manifold. However, in dual range modules the reference manifolds and the calibration valves are not tied together and separate reference and calibration ports are provided on the top of the module. They are labeled CAL A, CAL B, REF A and REF B. Figure 2.9 depicts the top panel of a dual range DSA3218-PTP/16Px module.

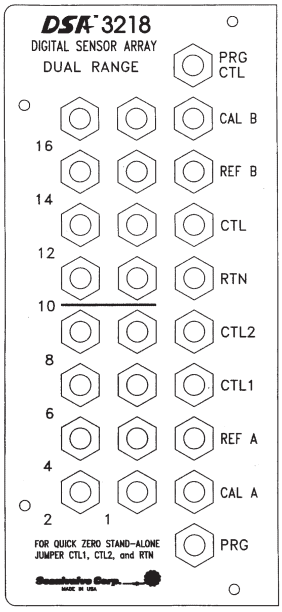

FIGURE 2.9 - DSA3218-PTP/16PX DUAL RANGE TOP PANEL

DSA3218-PTP/8DPx - Differential

For differential pressure measurement applications, the DSA3218-PTP can be configured with eight (8) differential pressure transducers. They are arranged into two (2) groups of four (4) transducers. Like the DSA3218-PTP/16Px, each group of transducers has a dedicated calibration valve. Figure 2.10 depicts the top panel of a DSA3218-PTP/8DPx module.

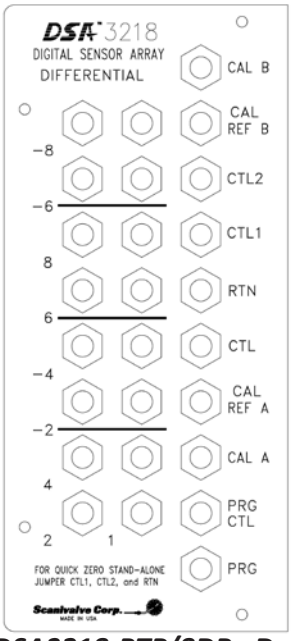

FIGURE 2.10 - DSA3218-PTP/8DPX DIFFERENTIAL TOP PANEL

DSA3218-PTP/16Px - Absolute

The DSA3218-PTP/16Px module can be used for absolute pressure measurement when equipped with absolute pressure transducers. A calibration valve is provided for each group of eight (8) sensors. All sixteen (16) transducers are tied a single calibration port, except in the cases of dual-range absolute modules. Figure 2.11 depicts the top panel of a DSA3218-PTP/16Px absolute pressure module.

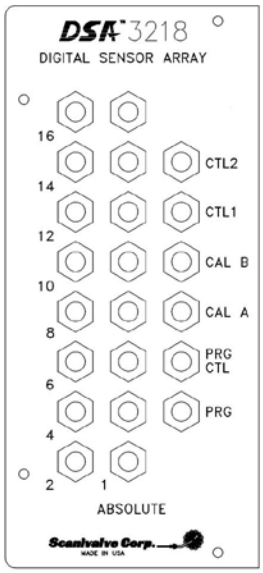

Figure 2.11 - DSA3218-PTP/16Px Absolute top panel

DSA3218-PTP Heater Option

The DSA3218-PTP series module can be equipped with an internal heater for cold environment applications. The heater kit option increases the DSA3218-PTP's operational ambient temperature range to -55°C to 60°C by maintaining the internal temperature of the module at approximately +20°C. With a heater installed, the power requirements for the DSA3218-PTP module increase to: 20-36Vdc @ 40W (28Vdc nominal). The power consumption of the module will decrease once the temperature of the module has stabilized.

DSA3218-PTP Cooling Kit Option

For applications where the DSA3218-PTP module must operate in ambient temperatures above the specified operating range, a cooling kit option is available. The cooling kit provides two (2) 3/8" Swagelok® fittings on the outside of the case and internal baffling to allow cool Nitrogen (or clean, dry air) to be circulated through the unit. The exact cooling flow requirements and the maximum operating temperature are different for each application, but for most applications the DSA3218-PTP can be operated up to 80°C ambient temperature if sufficient cooling flow is provided. For most cases, 2-3 SCFM of 25°C should be supplied into the module.

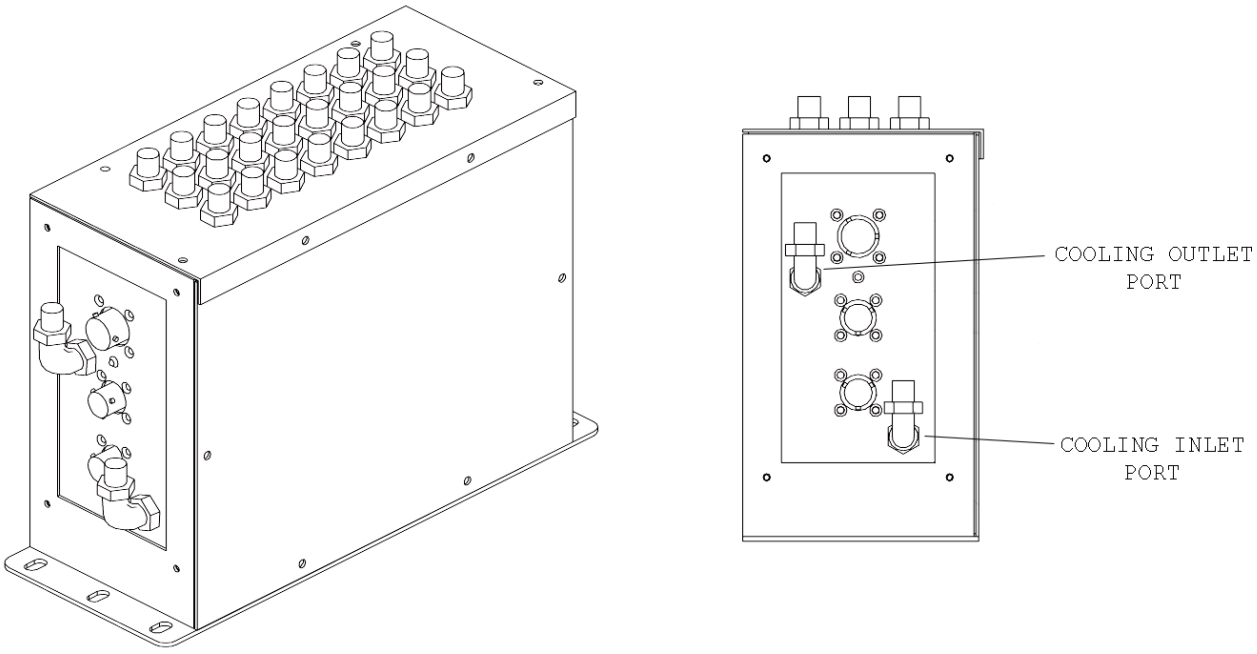

Figure 2.12 - DSA3218-PTP Cooling Kit Option

ENVIRONMENTAL CONSIDERATIONS

Both the DSA3217-PTP and DSA3218-PTP modules are constructed with a rugged, corrosion resistant stainless steel case. This case is designed with withstand normal industrial, flight test, educational, wind tunnel or similar environments. The case is splash resistant but not water proof. If any moisture gets spilled or splashed on the DSA-PTP module, wipe it dry immediately to prevent damage to the module. The DSA-PTP module should not be mounted outdoors.

The DSA3218-PTP module is designed for more rugged applications and incorporates internal shock mounts for vibration isolation, Swagelok® compression fittings on all pneumatic connections and robust, Bendix/Amphenol connectors for power, serial and Ethernet connections.

Both DSA-PTP modules include a heavy-duty mounting plate and can be mounted in any orientation. Once mounted, a zero offset calibration (CALZ) can be performed to remove any offset caused by the module orientation.

The DSA-PTP module should not be mounted in a location where it may be subjected to extreme temperature shifts or ambient temperatures outside of the specified operating range of the module. Keep in mind that the internal temperature of the module will run several degrees warmer than ambient temperature.

SECTION 3: OPERATION

UNPACK & INVENTORY

When you first unpack the DSA-PTP module, begin by inspecting and inventorying the contents of the package. If any visible damage is immediately noticed or if any contents are missing, contact Scanivalve before proceeding. Standard modules are shipped with the following contents as a minimum:

1. DSA3217-PTP or DSA3218-PTP module
2. Certificate of calibration
3. Full calibration report
4. DSA-PTP resource Drive
5. Quick-zero jumper
6. Trigger/configuration cable connector
7. Power cable connector
8. Ethernet cable connector (DSA3218-PTP only)

MOUNTING

The DSA-PTP module comes with a 3/32" (2.4mm) mounting plate attached to the bottom. This accepts mounting hardware up to 1/4" (6.4mm) in diameter. For added flexibility, the mounting plate on DSA3217-PTP modules can be removed from the bottom of the module and mounted on the side of the module. The DSA-PTP module can be mounted in any orientation as any offsets caused by gravity will be removed by a zero offset calibration (CALZ). Ensure that the DSA-PTP module is mounted in an environment that conforms to the requirements described in ***"Environmental Considerations" on page 10***.

CAUTION! Mounting the DSA-PTP module inadequately or in an environment that does not conform to the recommendations can results in permanent damage to the module.

WARM-UP

After applying power to the DSA-PTP module, a minimum of 30 minutes before collecting data is required to allow the module temperature to become stable. It is recommended that if time allows, the warm-up period should be extended to one hour for most applications.

COMMUNICATIONS

The DSA-PTP module is designed primarily for Ethernet communications. This provides a means to configure the DSA-PTP module as well as scan and collect data from the module.

A serial RS-232 port is also provided. The serial connection is designed to be used to configure the module, upload operating system upgrades and provide emergency communications. Several important module variables can be configured through the serial port, but possibly the most important is the Ethernet IP address.

SERIAL COMMUNICATIONS

Every DSA3200-PTP module has an RS-232 serial output. It is available through the 'Serial Communications/Trigger' connector on the front face of the module. For both DSA3217-PTP and DSA3218-PTP modules, the bulkhead connector on the module is an Amphenol JTP02RE8-6P (or PT02A-8-2P on serial numbers pre 180). All DSA-PTP modules are shipped with a mating connector (Amphenol JT06RE8-6S-SR) that can be used to fabricate a Serial Communications/Trigger cable. Alternately, a Serial Communication/Trigger cable can be ordered from Scanivalve using the Scanivalve part number 155829.

The wiring diagram for the RS-232 output is shown below. The cable wiring must connect the Tx output from the host computer to the Rx input of the DSA-PTP module. Also, the RX input of the host computer must connect to the Tx output of the DSA-PTP module.

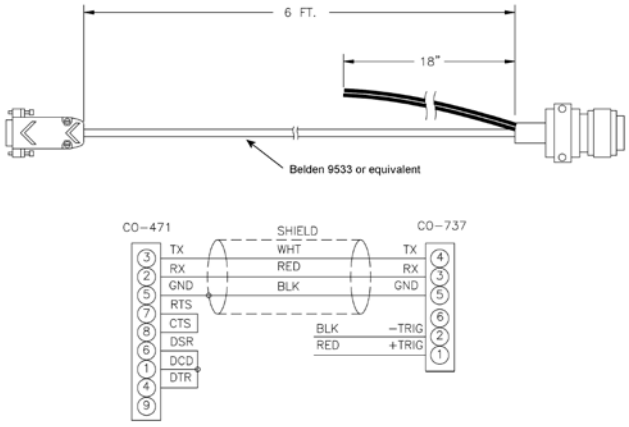

FIGURE 3.1 - SERIAL COMMUNICATION/TRIGGER CABLE

Settings for establishing a serial connection to the DSA-PTP module are as follows:

Bits per second: 9600 BAUD
Data bits: 8
Parity: none
Stop bits: 1
Flow control: none

The Serial Communications port also serves as the input for the external scan trigger. For more information on externally triggering scans, see "Scanning With An External Trigger" on page 14.

For information on changing the boot parameters including the module's Etherenet IP address, see "Changing Boot Parameters (including IP address)" on page 60.

ETHERNET COMMUNICATIONS

The primary means of communication with the DSA3217-PTP and DSA3218-PTP module is the 100Base-T Ethernet port with MDIX auto-crossing. All DSA3217-PTP modules use a standard RJ-45 Ethernet port. For added ruggedness, all DSA3218-PTP modules use a M12 D Code connector for the Ethernet connection instead of a standard RJ-45. Shielded Category 5 cable or better is recommended for all Ethernet connections.

Ethernet cables for the DSA3218-PTP modules can be ordered from Scanivalve in any length up to 100 feet (30 meters).

In the event that you are replacing a legacy DSA3218 with a DSA-PTP module, an adapter can be purchased to connect the M12 D Code connector to the legacy Mil Spec connector (Scanivalve PN 156120-01).

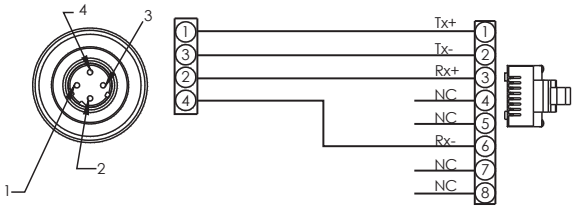

FIGURE 3.2 - 100BASE-T ETHERNET CABLES

Before an Ethernet connection can be established the IP address need to be configured. In order to be compatible, the IP address of the module and host computer must share the first two octets. The third and fourth octets of the IP address is variable, although it is recommended that the third octet also be shared between the host computer and the module.

Example of matching the first three octets (recommended):
Host computer: 191.30.80.100
DSA-PTP module: 191.30.80.125
Example of matching the first two octets:
Host computer: 191.30.1.100
DSA-PTP module: 191.30.80.125
The IP address of a Windows host computer can be changed under:
Control Panel -> Network Connections -> Local Area Network -> Properties -> Internet Protocol (TCP/IP) -> Properties.
For information on changing the DSA-PTP module's IP address, see "Changing Boot Parameters (including IP address)" on page 60.

CLIENT/HOST OPTIONS

Once the module has been connected and the IP address has been configured, communications can be established with the DSA-PTP module. Communications can be made through several software packages including:

- PC - TCP/IP
- PC - UDP
- PC - ScanTel (Scanivalve PN: 155406-01)
- PC - LabVIEW Configuration Utility (Scanivalve PN: 155384-01)
- PC - LabVIEW Development Kit (Scanivalve PN: 155385-01)
- PC- DSALink4
- PC - Windows HyperTerminal

PC - TCP/IP

The user may write their own TCP/IP interface using the software specification portion of this manual. This interface should allow the user to:

- Issue commands to any or all DSA-PTP modules on the network.
- Display returned information or scan data from the DSA-PTP module(s).
- Write returned information or scan data to the client/host in TCP/IP format.
- Determine the addresses of DSA-PTP module(s) on the network.

PC - UDP

The user may write their own UDP interface using the software specification portion of this manual. This interface should allow the user to:

- Issue commands to any or all DSA-PTP modules on the network.
- Display returned information or scan data from the DSA-PTP module(s).
- Write returned information or scan data to the client/host in UPD format (no handshaking).
- Determine the addresses of DSA-PTP module(s) on the network.

PC - ScanTel

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

PC - LabVIEW Configuration Utility

The Scanivalve LabVIEW Configuration Utility is software package that offers a very intuitive and simple way to connect to and modify all of the DSA-PTP module's configuration variables. It also allows the user the ability to upload a configuration file and scan and collect data. The scanning and data collection is limited to 5Hz due to the graphic nature of the program. The LabVIEW Configuration Utility is based on a LabVIEW 2009 runtime which is include with the installation disk.

PC - LabVIEW Development Kit

The Scanivalve LabVIEW Development Kit is for users desiring to customize a LabVIEW driver for DSA-PTP modules. The Development Kit is compatible with LabVIEW 8.2, 8.6 and 2009. The LabVIEW Configuration Utility is included with the Development Kit.

PC - 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 DSA-PTP 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.

Zero Offset Calibration

The DSA's internal calibration valve incorporates a zero offset correction feature (Quick Zero). This feature provides a simple and quick means to correct for the minor zero drift problem inherent to piezoresistive sensors. Even with pressure applied to the Px ports, the calibration valve can be configured into the 'Quick Zero' calibration mode which pneumatically shorts the positive and the negative side of the reference together. At that point, with the sensor at its natural zero state the offset can be read and recorded. This can then be factored into the engineering units and mathematically removed. All this is done in under 10 seconds with the simple command 'CALZ'. In order for the calibration valve to successfully switch, 90-120 psi of control pressure must be supplied to the 'CTL SUPPLY' port (or just 'CTL' on some DSA3218-PTP modules) and the quick zero jumper must be installed.

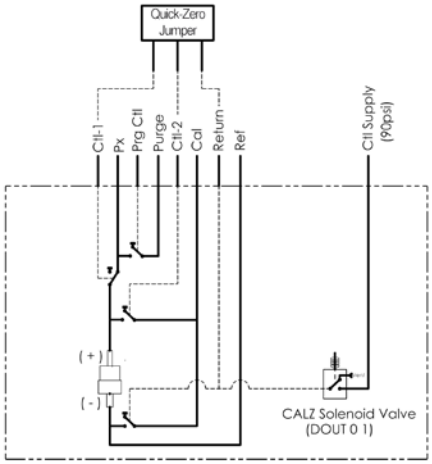

FIGURE 3.3 - QUICK ZERO LOGIC

Absolute pressure modules have a similar zero offset correction feature. The command 'CALB' can be entered followed by the current known barometric pressure to perform a zero offset calibration of absolute pressure modules. More information on both the 'CALZ' and the 'CALB' software commands can be found in "Calibrate Zero" on page 22 and "Calibrate Barometric Pressure" on page 21 respectively.

Due to the nature of the piezoresistive sensors used in the DSA-PTP modules, it is recommended that a 'Quick Zero' be performed at least daily. Performing a 'Quick Zero' more often will not cause any problems and is encouraged. Keep in mind, if the temperature of the module changes more than 3 °C a fresh 'Quick Zero' should be performed.

Zero offset corrections becomes obsolete after several hours or after the module has changed temperatures so all zero offset calibration data is stored in volatile memory and is lost whenever the module power is cycled.

QUICK ZERO JUMPER

In order to perform a zero offset calibration 90-120 psi of control pressure must be individually applied to the CTL1 and the CTL2 control ports. In order to simplify the process, all DSA-PTP modules are shipped with a quick zero jumper. Installing the quick zero jumper to the 'RTN', 'CTL1' and 'CTL2' ports allows the internal calibration valves to be placed into the 'Quick Zero' configuration automatically. By simply applying 90-120 psi of control pressure to the 'CTL SUPPLY' (or 'CTL' on some DSA3218-PTP modules) and calling the 'CALZ' command, the DSA-PTP module automatically vents control pressure out of the 'RTN' port and to the 'CTL1' and 'CTL2' ports.

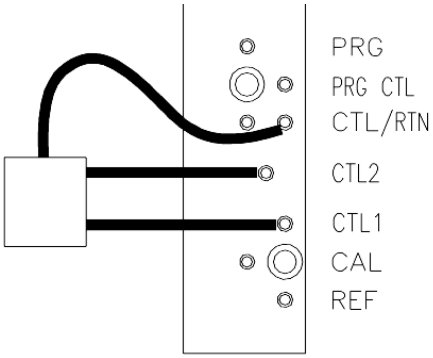

FIGURE 3.4 - QUICK ZERO JUMPER INSTALLATION

SCANNING

Once the DSA-PTP module has been installed, powered up and allowed to thermally stabilize data can be collected. There are several configuration variables that effect how the DSA-PTP module scans and how the data is output. The scan rate is controlled by two variables: 'period' and 'average' variables, the length of the scan sample is determined by the 'frames per scan' (FPS) variable and the data output format is determined by the 'format' variable. The DSA-PTP can be configured for 'free run' mode where after the 'SCAN' command is send the DSA-PTP module will scan continuously until the frames per scan (FPS) term is met, or it can be triggered to scan and output data upon receipt of a scan trigger (either external or a software trigger). The following is a list of commands that effect how the DSA-PTP collects data.

AVG	PAGE
BIN	PERIOD
CVTUNIT	TIME
EU	UNITSCAN
FORMAT	XSCANTRIG
FPS	ZC

More information on all of these configuration variables can be found in "Section 5: Software" on page 20.

To initiate scanning, simply send the command: 'SCAN'. If a scan trigger is not being used, data will begin to be output from the DSA-PTP module over the Ethernet connection. This data can be collected and recorded using one of the described in "Client/Host Options" on page 12. If a scan trigger is being used, after the 'SCAN' command is sent one frame of data will be output each time a scan trigger is received.

SCANNING WITH AN EXTERNAL TRIGGER

The DSA-PTP module can be triggered to scan with either a hardware or a software trigger.

HARDWARE TRIGGER

The external trigger input is optically isolated to prevent grounding problems. It is a TTL level, edge sensing device. It requires a minimum signal of 4.5Vdc @ 6.5mA. It will accept voltages as high as 15Vdc. The external trigger will only be active if the XSCANTRIG variable is set to 1. When a 'SCAN' command is issued through the Ethernet connection, the module enters the scan mode and waits for a trigger. This module will return an averaged frame of data for each trigger pulse received. This will continue until the Frames Per Scan (FPS) term is met or until a 'STOP' command is issued. Trigger pulses are received through pins 1 (+Trig) and 2 (-Trig) of the 'Serial Communications/Trigger' connector on the front of the DSA-PTP module. More information on the 'Serial Communications/Trigger' connection can be found in "Serial Communications" on page 11.

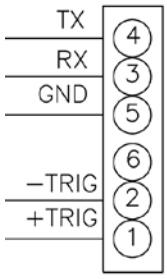

FIGURE 3.5 - TRIGGER WIRING

SOFTWARE TRIGGER

The software trigger will only be active if the software variable XSCANTRIG is set to 1. When a SCAN command is issued through the Ethernet connection, the module will enter the SCAN mode and wait for a trigger. An averaged frame of data will be output as soon as the TRIG command or a <TAB> character (9 HEX or Control I) is received. Data will be output with each successive trigger command. This will continue until the Frames Per Scan (FPS) variable value is met, or until a STOP command is issued.

PURGING

All DSA-PTP modules incorporate an internal calibration valve. One of the configurations of this valve allows for an 'isolate-purge' feature. This permits the pressure measurement (Px) lines to be purged with pressures 50psi over the full scale module pressure up to 500psi during test. If the module range is greater than 500psi it is not recommended to purge during test. It is not recommended to purge at greater than 100psi when purging to atmosphere. This is a very useful feature when the DSA-PTP module is used in applications where corrosive gasses or moisture may be present in the input lines. By isolating the pressure sensors from the purge pressure, even low pressure DSA-PTP modules can be purged safely with high purge pressures.

In order to configure the DSA-PTP module for purge mode 90-120 psi of control pressure must be applied to the 'CTL1' 'CTL2' and 'PRG' ports. **The purge mode must be established in a set order in order to protect the sensor and calibration modules from damage.**

Configuring for purging:

1. Set the calibration valve for calibration mode by applying 90-120 psi of control pressure to both the 'CTL1' and 'CTL2' ports.
2. Apply 90-120 psi of control pressure to the 'CTLPRG' port.
3. Apply the purge pressure to the 'PRG' port.

Re-configuring after a purge:

1. Shut off the purge pressure feeding the 'PRG' port. Make sure to allow sufficient time for the input lines to stabilize. The specific time required will depend upon the physical layout and characteristics of the system.
2. Remove 90-120 psi control pressure from the 'CTLPRG' port.
3. Remove the 90-120 psi control pressure from the 'CTL1 and 'CTL2' ports.

CAUTION! Failing to follow the above procedure while entering or exiting the purge mode could allow the sensor to see the high purge pressure and could seriously damage the DSA-PTP module

FREON APPLICATION OPERATIONS

When using DSA3218-PTP modules in Freon Applications special considerations must be taken. In order to prevent premature deformation of the seals within the DSA3218-PTP's valve, it is important to leave the module in the following 'dormant' state.

- Apply CTL2 and PRGCTL pressures
- Ensure no Px pressures are applied
- Freon present must be vaporized

Any time the module will be left inactive for a significant period of time it should be left in this state. Adhering to this procedure will help ensure long life and prevent any premature maintenance requirements.

SECTION 4: HARDWARE

PNEUMATIC CONNECTIONS

The DSA-PTP module has several different pneumatic connections on the top of the module. There are two basic types of pneumatic connections on each module: pressure measurement connections (Px) and configuration pressure connections (Control). The pressure measurement ports are the 16 ports labeled 1-16 (or 1 through 8 and (-)1 through (-)8 on differential pressure modules) on the top of the module. These ports are connected to the pressure transducers within the module. Also included in the pressure measurement ports are the CAL and REF ports. Dual range modules will have CAL A and CAL B, and REF A and REF B ports. These ports are used for applying known pressures during calibration, and reference pressures during normal data collection and calibrations. It is very important that all pressure measurement connects are completely leak tight. Any minor leak will cause an error in the measured pressure.

The control ports are the remaining ports on the top of the DSA-PTP module. These ports are used for configuring the module and for purging clean air through the module. All air supplied to the control ports needs to be instrument grade, clean dry air. Nitrogen is a very good alternative for when instrument grade air is not available.

All pneumatic connections on the DSA3217-PTP module are 1/16" (1.6mm) stainless steel bulged tubulations. All pneumatic connection on the DSA3218-PTP are 1/8" Swagelok® compression fittings. As an option, 1/16" or 1/4" Swagelok® are available.

MAKING 1/16" TUBULATION CONNECTIONS

Begin by applying a small amount of Scanivalve brown pipe sealant to the outside of the tubulation. Carefully slide the tubing over the outside of the stainless steel tubulation (Scanivalve's tubing push-on tool TPOTL-XXX makes this job easy). Ensure that the end of the Urethane, Nylon or Teflon tubing extends at least 1/16" beyond the bulge on the tubulation. Finally, slide the helical spring clamp over the outside of the tubing, ensuring that the spring clamp ends up over the bulge. Helical spring clamps are required for all pressure ports that will see over 50psi and they are highly recommended for all tubulation style pneumatic connections. When using Teflon tubing, spring clamps are required on all connections no matter what the measurement pressure is.

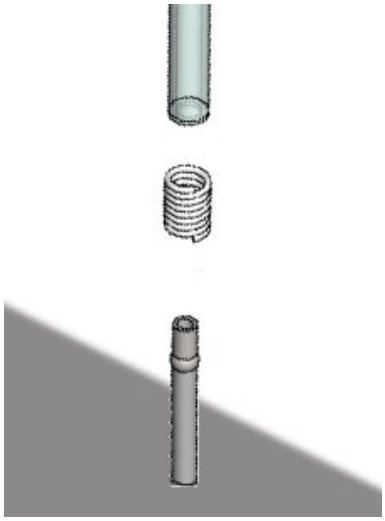

FIGURE 4.1 - TUBULATION PNEUMATIC CONNECTIONS

MAKING SWAGELOK® COMPRESSION CONNECTIONS

Each Swagelok® compression fitting includes 4 parts: the nut, the front ferrule, the back ferrule and the body. Squarely cut the end of the nylon or Teflon tubing being used. Slide the nut and both ferrules up on the tubing, then insert it all of the way into the Swagelok® body. Tighten the nut finger tight, to the point where the tube cannot be removed by hand. Finally, with a wrench tighten the nut 3/4 to 1 1/4 more turns. There is no need to tighten the nut any more than this.

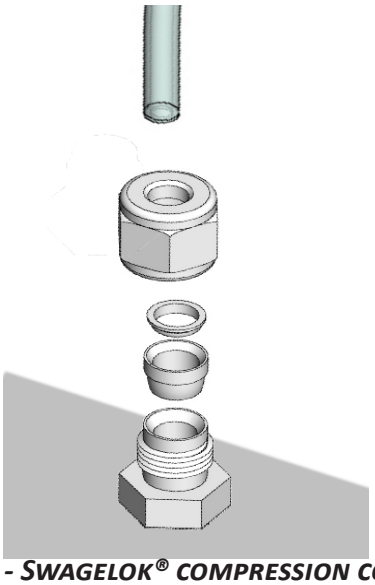

FIGURE 4.2 - SWAGELOK® COMPRESSION CONNECTIONS

PRESSURE MEASUREMENT (PX) PORTS

Each DSA-PTP module has 16 pressure measurement ports, or Px ports. They will be labeled 1-16, or for dual range units ± 1-8. Each of these ports are connected to a discrete pressure transducer. If any Px ports are not being used, it is recommended that they be plugged to prevent dust or debris from clogging the port or contaminating the internal calibration valve.

CALIBRATION (CAL) PORT

For each pressure range the DSA-PTP module has, there will be a 'CAL' port. Most modules will only have one 'CAL' port, but dual range modules will have two (labeled 'CAL' and 'CAL B'). The 'CAL' port provides a means to apply a known calibration pressure to a single port and have it manifolded to all of the transducers of the related pressure range. During normal operations, with no control pressures applied this port in internally blocked off. Any pressure applied to the 'CAL' port will not reach the transducers unless the internal calibration valve has been configured to direct the calibration pressure to the transducers. For low pressure modules (below 5 psi) the 'CAL' port should be routed to a known, stable static location when not being used to apply calibration pressures. This ensures that when a zero offset calibration (CALZ) is performed no unwanted offsets are introduced.

REFERENCE (REF) PORT

For each pressure range the DSA-PTP module has, there will be a 'REF' port. Most modules will only have one 'REF' port, but dual range modules will have two (labeled 'REF' and 'REF B'). On differential pressure modules, the 'REF' port is labeled 'CAL REF.' There is no 'REF' port on absolute or individual reference pressure modules. The 'REF' port ties into a manifold that connects the back side (or negative side) or all transducers of the same pressure range together. During most applications, the 'REF' port of low pressure modules (below 5 psi) should be routed to a known, stable static location. This ensures that when a zero offset calibration (CALZ) is performed no unwanted offsets are introduced. During a calibration, positive pressures will be applied through the 'REF' port to perform the negative portion of the calibration.

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. CTL1 controls both internal calibration valves simultaneously, they cannot be operated separately. Ensure that any control air applied to CTL1 is clean, dry instrument grade air or nitrogen.

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 configured the internal calibration valve into calibration mode, meaning that pressures applied to the 'CAL' port(s) will reach the transducers. CTL2 controls both internal calibration valves simultaneously, they cannot be operated separately. Ensure that any control air applied to CTL2 is clean, dry instrument grade air or nitrogen.

CONTROL SUPPLY (CTL SUPPLY OR CTL)

The Control Supply port (CTL SUPPLY on DSA3217-PTP, CTL on DSA3218-PTP) is only required when the quick zero jumper is being used. In this case, 90-120 psi is applied to the CTL Supply port and through the quick zero jumper is directed to the CTL1 and CTL2 ports to put the DSA-PTP module into zero offset calibration (CALZ) mode. This allows the user to remotely perform zero offset calibration (CALZ) as long as 90-120 psi is supplied to the CTL Supply port. For more information on the quick zero jumper, reference "Quick Zero Jumper" on page 14.

RETURN (RTN) PORT

Like the Control Supply port, the Return (RTN) port is only required when using the quick zero jumper. 90-120 psi control air that is supplied through the Control Supply port is switched internally within the module, and when commanded returned out of the Return port to be used to put the module into zero offset calibration (CALZ) mode. For this to function correctly, the quick zero jumper must be installed between the Return (RTN), Control 1 (CTL1) and Control 2 (CLT2) ports. For more detailed information on the quick zero jumper, reference "Quick Zero Jumper" on page 14

PURGE CONTROL (PRGCTL) PORT

For applications where the pressure measurement ports (Px ports) may become plugged or contaminated, the DSA-PTP module is equipped with a purge function. 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. Like the other control pressures, ensure that any control air applied is clean, dry instrument grade air or nitrogen.

CAUTION! Applying PRGCTL after or without CTL1 applied can allow sensors to see the purge pressure potentially causing serious damage to the module.

PURGE SUPPLY (PRG) PORT

The purge supply (PRG) port is the input for the pressure that will be used to purge the pressure measurement (Px) lines. The supplied purge pressure can be up to 750 psi, and must always be clean, dry instrument grade air or nitrogen.

POWER REQUIREMENTS

The DSA3217-PTP requires 28 ±8Vdc at approximately 8 W. This will remain constant while the module is operating normally. The DSA3218-PTP requires 28 ±8Vdc at approximately 8 W. The power requirements for these modules increase to 28 ±8Vdc at approximately 40W if the optional heater is installed. The power requirements will drop when the module reaches the normal operating temperature. If the module is used in an environment where the ambient temperature is 0°C or less, power requirements could remain high.

The power connection is made through a three pin Amphenol PTO2A-8-3P connector located on the end of the module.

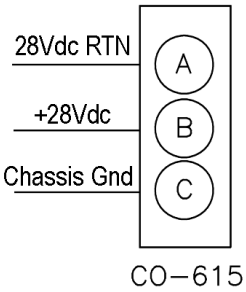

FIGURE 4.3 - POWER WIRING

CALIBRATION VALVE

Each DSA-PTP module has two internal calibration valves. The calibration valves can be configured using the three control pressure inputs on the DSA-PTP module (CTL1, CTL2 and CLTPRG). The two calibration valves cannot be operated independently. The calibration valves are configured such that no control pressures are required for normal measurement operations. The following tables outline the required control pressure input for each calibration valve configuration.

Standard DSA-PTP Calibration Valve configurations:

MODE	CTL1	CTL2	CLT*	PRGCTL
OPERATE				
CALIBRATE	90-120 psi	90-120 psi		
QUICK ZERO	90-120 psi	90-120 psi	90-120 psi	
PURGE	90-120 psi	90-120 psi		90-120 psi
ISOLATE	90-120 psi			

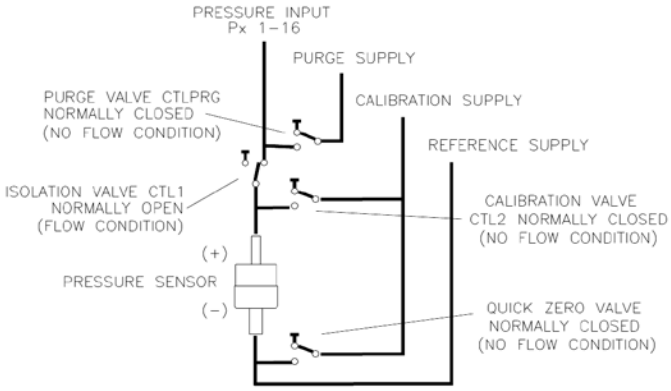

FIGURE 4.4 - STANDARD VALVE LOGIC

Absolute DSA-PTP Calibration Valve configurations:

MODE	CTL1	CTL2	PRGCTL
OPERATE			
CALIBRATE	90-120 psi	90-120 psi	
PURGE	90-120 psi	90-120 psi	90-120 psi
ISOLATE	90-120 psi		

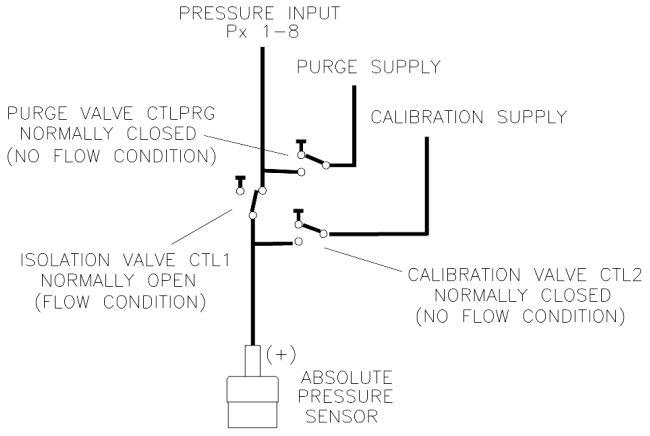

FIGURE 4.5 - ABSOLUTE VALVE LOGIC

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SECTION 5: SOFTWARE

DSA-PTP CONTROL AND CONFIGURATION

The operation of a DSA-PTP module is controlled by sending commands to units selected by network addressing via the network. The DSA-PTP returns any data or information over the network to the requesting client/host.

The section on DSA-PTP Commands lists each command and explains its function.

DSA-PTP COMMANDS

The DSA-PTP software must run as embedded software on the DSA-PTP pressure scanner hardware. It performs the following general tasks:

1. Read and filter the raw A/D counts that represent pressure and temperature.
2. Convert the pressure A/D counts to user chosen pressure units.
3. Receive and execute commands from the Ethernet Link.
4. Allow the configuration to be saved through power down.
5. Output converted data, status, setup and calibration data over the Ethernet Link.
6. Set the DSA-PTP Physical Ethernet Address(MAC Address).
7. Protocol to be TCP/IP or User Defined Protocol.
8. Support the user in troubleshooting the DSA-PTP hardware and system.

TCP/IP does not guarantee that packet boundaries will be maintained between a host and a DSA-PTP module. Therefore, all commands from a host must be terminated properly with one of four options. The DSA-PTP will detect and adjust to the termination option being used by a host.

The four options are:

- CR (ASCII 13)
- LF (ASCII 10)
- LF-CR (ASCII 10 - ASCII 13)
- CR-LF (ASCII 13 - ASCII 10)

When a DSA-PTP module is in a “not ready” mode, all commands are disabled except STATUS and STOP. Examples of when the DSA-PTP module may be in a “not ready” state could be:

- During CALZ
- During SAVE
- While Scanning

COMMAND LIST

CALIBRATE BAROMETRIC PRESSURE

Command	CALIBRATE BAROMETRIC PRESSURE
Command Syntax	CALB <press> [period] [average]
Arguments	<press> - is a real number that represents the local barometric pressure. [period] - optional: sets the period for the CALB routine. If this value is not entered, the default period will be 300 microseconds. [average] - optional: sets the average for the CALB routine. If this value is not entered, the default average will be 64.
Description	Commands the DSA-PTP to perform the following: 1. Read the current counts and enter them in the zero array (list z) 2. Lookup the counts for the pressure entered at the current temperature 3. Subtract the pressure from the zero pressure and enter the difference in the delta array (LIST D) NOTE: In order for the correction to be active, ZC must be set to 1. The CALB function only uses the entered pressure for channels that are defined as absolute sensors (ABS(x) = 1). If a channel is not defined as an absolute channel, the software will not perform a CALB on that channel. The pressure entered as the barometric pressure must be in the units defined in CVTUNIT (i.e.: PSI, kPa, etc) NOTE: The optional period may be the only optional parameter entered. If the optional average is entered, the optional period must be entered.
Returns	<nl> - end of line
Example	To correct all absolute sensors to read the local barometric pressure: Disconnect all inputs. Enter the command: CALB <press> (Where <press> is the local barometric pressure in the current engineering units.) If CVTUNIT is set to psi, and the local barometric pressure is 14.696 psia,, Enter the command: CALB 14.696 If CVTUNIT is set to kPa, and the local barometric pressure is 101.3254, Enter the command: CALB 101.3254

CLEAR

Command	CLEAR
Command Syntax	CLEAR
Arguments	None
Description	Commands the DSA-PTP to clear any errors that have occurred. The errors are sent to the client in an ASCII Packet. ASCII Packets are described in a subsequent sections.
Returns	<nl> <nl> - end of line.

Command	CLEAR
Example	To clear any errors listed in the ERROR Buffer, the following command would be issued: CLEAR <CR> The ERROR buffer will be cleared

CALIBRATE ZERO

Command	CALIBRATE ZERO
Command Syntax	CALZ [period] [average] [delay]
Arguments	[period] - (optional) sets the period for the CALZ routine. If this value is not entered, the default period will be 300 microseconds. The value entered must be within the limits set for period. [average] - (optional) sets the average for the CALZ routine. If this value is not entered, the default average will be 64. The value entered must be within the limits set for average [delay] - (optional) sets the delay for the CALZ routine. If this value is not entered, the default delay will be 5 seconds. The limits are 5 to 60 seconds
Description	Commands the DSA-PTP to perform a quick zero calibration. This operation produces A/D count values for each pressure channel that is subtracted from the raw pressure counts before converting to the chosen pressure units. The data is stored in the ZERO(0-15) and DELTA(0-15) Configuration Variable Array. CALZ requires approximately 15 seconds to complete if the optional parameters are not entered. The CALZ function only zero's channels that are defined as non-absolute sensors (ABS(x) = 0). If a channel is defined as an absolute channel, the software will not perform a CALZ on that channel. NOTE: To enter any of the optional parameters, the parameters in the string preceding it must also be entered. For example: To enter a value for average, a value for period must be entered, but not delay. To enter a value for delay, values for both period and average must also be entered.
Returns	<nl> <nl> - end of line
Example	To update the current ZERO file and correct for any zero drift of the transducers: Enter the command: CALZ The DSA-PTP will measure the zero counts for each channel and update the Zero and Delta Arrays. To update the current ZERO file and correct for any zero drift of the transducers using a period of 500 microseconds and an average of 32: Enter the command: CALZ 500 32 The DSA-PTP will measure the zero counts for each channel and update the Zero and Delta Arrays. To update the current ZERO file and correct for any zero drift of the transducers using a calz delay of 30 seconds and the nominal settings for period and average: Enter the command: CALZ 300 64 30 The DSA-PTP will measure the zero counts for each channel and update the Zero and Delta Arrays.

DELETE

Command	DELETE
Command Syntax	DELETE <start temp> <end temp> [<channel>]
Arguments	<start temp> - an integer from 0 to 79 that represents the low point of the temperature planes to be deleted. <end temp> - an integer from 0 to 79 that represents the high point of the temperature planes to be deleted. <channel> - (optional) the channel to be deleted.
Description	Converts all pressure points within temperature planes between the low and high temperature range.
Returns	<nl> <nl> - end of line.
Example	To delete the master points for all modules in a system using eight 32 channel modules, the following command would be issued: DELETE 0 79<CR> To delete the master points for channel 4, the following command would be issued: DELETE 0 79 4<CR> To delete the master points for channel 16, the following command would be issued: DELETE 0 79 16<CR>

DIGITAL OUT

Command	DOUT
Command Syntax	DOUT 1 <1 or 0>
Arguments	None
Description	Manual control of the Quick-Zero solenoid. A “1” will activate the solenoid and allow air to flow from CTL SUPPLY to RTN. A “0” will deactivate the solenoid and stop the flow.
Returns	<nl> <nl> - end of line
Example	To manually open the Quick-Zero solenoid: DOUT 1 1 To manually close the Quick- Zero solenoid: DOUT 1 0

ERROR

Command	ERROR
Command Syntax	ERROR
Arguments	None
Description	
Returns	The return format is: ERROR: error

Command	ERROR
Example	To read the contents of the Error Buffer: Type: ERROR<Enter> The DSA-PTP will return the last 30 errors in the format: ERROR: Port not found ERROR: List MI no group number ERROR: Group not between 1 and 8 If no errors have been logged, the DSA-PTP will return: ERROR: No errors

INSERT

Command	INSERT
Command Syntax	INSERT <temp> <chan> <press> <press counts> [M]
Arguments	<temp> - an integer from 0 to 79 that represents the temperature in degrees Celsius. <chan> - an integer from 0 to 15 identifying the channel. <press> - a real number that represents the calibration pressure point. <press counts> - a signed integer from 32767 to -32768 that represents the current pressure counts from the sensor. [M] - optional switch that designates the entry as a master conversion point.
Description	Inserts one pressure-pressure counts entry into the Conversion Table. If the M option is used this point is entered as a MASTER point. The LIST MASTER and LIST ALL commands download the contents of the conversion table in the format required by this INSERT command.
Returns	<nl> <nl> - End of line.
Example	Although INSERT commands are most often entered from a Module Profile File, they may be entered from a keyboard. The following command will insert a master point at 30 °C for channel 1. The applied pressure is 11.9998 psi, the measured counts are 26376: INSERT 30 1 11.9998 26376 M The following command will insert a master point at 48 °C for channel 16. The applied pressure is 10.9998 psi, the measured counts are 20254: INSERT 48 16 10.9998 20254 M

LIST ALL

Command	LIST ALL
Command Syntax	LIST A <Start Temp> <End Temp> [Channel]
Arguments	<Start Temp> - The lowest temp plane to be returned. <End Temp> - The highest temp plane to be returned. [Channel] - (Optional) may be 0 through 15.
Description	Lists all of the master and calculated points in the temperature-pressure correction matrix. The return format is: INSERT <temp> <chan> <press> <pressure counts> <M>
Returns	INSERT <temp> <channel> <press> <press counts> <M><nl> INSERT <temp> <channel> <press> <press counts> <M><nl> : : : : INSERT <temp> <channel> <press> <press counts> <M><nl> <temp> - the temperature plane <channel> - the channel in port notation <press> - the pressure in EU <press counts> - the A/D counts of pressure <nl> - end of line.
Example	To list all of the coefficients from 16 °C to 20 °C for channel 1 in a module calibrated from 17 °C to 40 °C type: LIST A 17 20 1<CR> The DSA-PTP will return a list of INSERT commands showing the temperature, channel, applied pressure, counts and the type of plane. INSERT 17 1 -45.949100 -26184 M INSERT 17 1 -31.250000 -17763 M INSERT 17 1 -19.969601 -11302 M INSERT 17 1 -6.250000 -3425 M INSERT 17 1 0.000000 162 M INSERT 17 1 19.984600 11636 M INSERT 17 1 25.000000 14523 M INSERT 17 1 35.000000 20281 M INSERT 17 1 45.949100 26586 M :: :: :: :: :: :: INSERT 20 1 -45.949100 -26166 M INSERT 20 1 -31.250000 -17750 M INSERT 20 1 -19.969601 -11292 M INSERT 20 1-1 -6.250000 -3424 M INSERT 20 1-1 0.000000 160 M INSERT 20 1-1 19.984600 11629 M INSERT 20 1-1 25.000000 14514 M INSERT 20 1-1 35.000000 20267 M INSERT 20 1-1 45.949100 26567 M

LIST ALL RANGES

Command	LIST ALL RANGES
Command Syntax	LIST B
Arguments	None
Description	Lists the 16 Absolute/Gauge Settings from the ABSn variable. NOTE: These values will determine the action when issuing a CALZ or CALB command.
Returns	SET ABS0 <1 or 0> SET ABS1 <1 or 0> SET ABS2 <1 or 0> SET ABS3 <1 or 0> SET ABS4 <1 or 0> SET ABS5 <1 or 0> SET ABS6 <1 or 0> SET ABS7 <1 or 0> SET ABS8 <1 or 0> SET ABS9 <1 or 0> SET ABS10 <1 or 0> SET ABS11 <1 or 0> SET ABS12 <1 or 0> SET ABS13 <1 or 0> SET ABS14 <1 or 0> SET ABS15 <1 or 0>
Example	The DSA3207 could contain both Absolute and Gauge Transducers. The setting of ABSx defines the transducer type to the software. To display the transducer type defined for each channel in a DSA3207 with Absolute transducers installed in channels 1 - 6 and 13 - 16, and Gauge Transducers installed in channels 7 - 12, type: LIST B<CR> The DSA-PTP module will return the following SET ABS0 1 SET ABS1 1 SET ABS2 1 SET ABS3 1 SET ABS4 1 SET ABS5 1 SET ABS6 0 SET ABS7 0 SET ABS8 0 SET ABS9 0 SET ABS10 0 SET ABS11 0 SET ABS12 1 SET ABS13 1 SET ABS14 1 SET ABS15 1

LIST CALIBRATE

Command	LIST CALIBRATE
Command Syntax	LIST C
Arguments	None
Description	Lists the CALIBRATION configuration variables.
Returns	SET PMAXL<press> SET PMAXH <press> SET PMINL <press> SET PMINH <press> SET NEGPTSL <num points> SET NEGPTSH <num points>
Example	To view the current conversion variable settings, type: LIST C<CR> The DSA-PTP will return the current conversion settings. They could appear as follows. SET PMAXL 18.09 SET PMAXH 18.09 SET PMINL -18.09 SET PMINH -18.09 SET NEGPTSL 4 SET NEGPTSH 4 SET ABS 0

LIST DELTA

Command	LIST DELTA
Command Syntax	LIST D
Arguments	None
Description	Lists the 16 delta zero correction values. These are used in the conversion of raw counts to Engineering Units(EU).
Returns	SET DELTA0 <delta> SET DELTA1 <delta> :: :: :: SET DELTA14 <delta> SET DELTA15 <delta>
Example	To view the current delta zero correction values, type: LIST D<CR> The DSA-PTP will return the delta zero correction values. They could appear as follows: SET DELTA0 0.00000 SET DELTA1 -0.00243 SET DELTA2 0.00019 SET DELTA3 0.00000 :: :: :: SET DELTA12 -0.00005 SET DELTA13 0.00000 SET DELTA14 0.00009 SET DELTA15 0.00042 NOTE: The delta values will vary as the module ages. These values are the difference between the current zero offset value obtained in the most recent CALZ and the zero value in the coefficient table.

LIST FTP SETTINGS (LIST FTP)

Command	LIST FTP Variables
Command Syntax	Returns all of the FTP settings
Arguments	LIST FTP
Description	All of the FTP setting followed by the prompt.
Returns	**LIST FTP** *SET USERFTP Scanivalve* *SET PASSFTP password* *SET PATHFTP C:/FTPDIR* *SET IPFTP 10.0.1.222* *SET FILEFTP Scan*

LIST GAIN

Command	LIST GAIN
Command Syntax	LIST G
Arguments	None
Description	This list is no longer used in the DSA-PTP series. The command will still generate information, however be padded with 0's. This temperature conversion was replaced with TEMP. *Lists the 16 temperature gains. These are used to convert temperature counts to degrees Celsius. This is the "M" term in the characterization equation:* $EC' \frac{Counts\&TempB}{TempM}$
Returns	SET TEMPM0 <term> SET TEMPM1 <term> SET TEMPM2 <term> :: :: :: SET TEMPM13 <term> SET TEMPM14 <term> SET TEMPM15 <term>
Example	To view the temperature gain settings, type: LIST G<CR> SET TEMPM0 0 SET TEMPM1 0 SET TEMPM2 0 :: :: :: SET TEMPM13 0 SET TEMPM14 0 SET TEMPM15 0

LIST IDENTIFICATION

Command	LIST IDENTIFICATION
Command Syntax	LIST I
Arguments	None
Description	Lists the IDENTIFICATION configuration variables.
Returns	SET ECHO <term> SET MODEL <term> SET PORT <term> SET HOST <term>
Example	To verify the general module configuration settings of, type: LIST i<CR> The DSA3217-PTP may return: SET ECHO 0 SET MODEL 3217 SET PORT 23 SET HOST 0.0.0.0 0 T NOTE: A user must be very careful when modifying one of these variables. An incorrect value in one of these variables could have a detrimental affect on the operation of the module.

LIST IP SETTINGS (LIST IP)

Command	LIST IP Variables
Command Syntax	Returns all of the IP settings
Arguments	LIST IP
Description	All of the IP setting followed by the prompt.
Returns	**LIST IP** *SET IPADD 191.30.82.100* *SET SUBNET 255.255.0.0* *SET MAC 000.096.093.082.000.100* *SET LOGIN Scanivalve* *SET PASSWORD Scanner* *SET LOGIN1 Scanivalve1* *SET PASSWORD1 Scanner1* *SET ALLOWANON 1* *SET APP Dsaptp.hex* *SET GW 0.0.0.0* *NOTE1: Modifications to the variables in this group may result in one or more of the following conditions:* *1. Unstable network operation.* *2. Problems completing FTP file transfers.* *3. DSA operational problems* *NOTE2: The variables in this group are not saved when a SAVE command is issued. They may* only be saved by using the command: SAVEIP via Serial connection SAVE IP via Ethernet connection

LIST MASTER

Command	LIST MASTER
Command Syntax	LIST M <Start Temp> <End Temp> [Channel]
Arguments	<Start Temp> - The lowest temp plane to be returned. <End Temp> - The highest temp plane to be returned. [Channel] - (Optional) may be 0 through 15.
Description	Lists all of the MASTER POINTS in the temperature-pressure correction matrix. The return format is: INSERT <temp> <clear> <pressure> <pressure counts> M
Returns	INSERT <temp> <channel> <press> <press counts> M<nl> : : : : INSERT <temp> <channel> <press> <press counts> M<nl> <temp> - the temperature plane <channel> - The channel in module-port or serial number-port notation <press> - the pressure in EU <press counts> - the A/D counts of pressure <nl> - end of line
Example	To view the Master Points between 10 °C and 40 °C for channel 1 of the module, type: List m 10 40 1<CR> The DSA-PTP will return: INSERT 14 1 -5.958100 -21594 M INSERT 14 1 -4.476100 -15127 M INSERT 14 1 -2.994200 -8646 M INSERT 14 1 -1.470100 -1973 M INSERT 14 1 0.000000 4467 M INSERT 14 1 1.470100 10917 M INSERT 14 1 2.994200 17594 M INSERT 14 1 4.476100 24098 M INSERT 14 1 5.958100 30603 M INSERT 23 1 -5.958100 -21601 M INSERT 23 1 -4.476100 -15161 M INSERT 23 1 -2.994300 -8714 M INSERT 23 1 -1.470100 -2077 M INSERT 23 1 0.000000 4332 M INSERT 23 1 1.470100 10746 M INSERT 23 1 2.994200 17397 M INSERT 23 1 4.476100 23863 M INSERT 23 1 5.958100 30333 M INSERT 32 1 -5.958100 -21636 M INSERT 32 1 -4.476100 -15214 M INSERT 32 1 -2.994200 -8784 M INSERT 32 1 -1.470100 -2162 M INSERT 32 1 0.000000 4228 M INSERT 32 1 1.470100 10615 M INSERT 32 1 2.994200 17246 M INSERT 32 1 4.476100 23691 M INSERT 32 1 5.958100 30136 M

LIST MAXN PRESSURES

Command	LIST MAXn PRESSURES
Command Syntax	LIST H
Arguments	None
Description	Lists the 16 maximum pressures stored in the MAXn Variable. NOTE: This is active only when MODEL is set to 3207.
Returns	SET MAX0 <term> SET MAX1 <term> :: :: :: SET MAX14 <term> SET MAX15 <term>
Example	To view the maximum pressure settings for the module in the example of List Ranges type: LIST H<CR> The DSA-PTP will return the maximum pressure settings. They could appear as follows: SET MAX0 6.000000 SET MAX1 6.000000 :: :: :: SET MAX14 120.000000 SET MAX15 120.000000 NOTE: Generally, the maximum pressure setting is 20% greater than the full scale of the sensor to allow a user some over range indication.

LIST MINN PRESSURES

Command	LIST MAXn PRESSURES
Command Syntax	LIST L
Arguments	None
Description	Lists the 16 maximum pressures stored in the MINn Variable. NOTE: This is active only when MODEL is set to 3207.
Returns	SET MIN0 <term> SET MIN1 <term> :: :: :: SET MIN14 <term> SET MIN15 <term>
Example	To view the minimum pressure settings for the module in the example of List Ranges type: LIST L<CR> The DSA-PTP will return the minimum pressure settings. They could appear as follows: SET MIN0 -6.000000 SET MIN1 -6.000000 :: :: :: SET MIN13 -120.000000 SET MIN14 -120.000000 NOTE: Generally, the maximum pressure setting is 20% greater than the full scale of the sensor to allow a user some over range indication.

LIST NEGATIVE POINTS

Command	LIST NEGATIVE POINTS
Command Syntax	LIST N
Arguments	None
Description	Lists the Negative Points settings for each of the 16 channels in a DSA3207. NOTE: This is active only when MODEL is set to 3207.
Returns	SET NEGPTS0 <term> SET NEGPTS1 <term> SET NEGPTS2 <term> :: :: :: SET NEGPTS13 <term> SET NEGPTS14 <term> SET NEGPTS15 <term>
Example	To view the negative points set for the module in the example of List Ranges type: LIST L<CR> The DSA-PTP will return the negative points settings. They could appear as follows. SET NEGPTS0 4 SET NEGPTS1 4 SET NEGPTS2 4 :: :: :: SET NEGPTS13 4 SET NEGPTS14 4 SET NEGPTS15 4

LIST OFFSET

Command	LIST OFFSET
Command Syntax	LIST O
Arguments	None
Description	This list is no longer used in the DSA-PTP series. The command will still generate information, however be padded with 0's. This temperature conversion was replaced with TEMP. *Lists the 16 temperature offsets. These are used in the conversion of temperature counts to degrees Celsius. This is the "B" term in the correction equation:* $EC' \frac{Counts\&TempB}{TempM}$
Returns	SET TEMPB0 <term> SET TEMPB1 <term> :: :: :: SET TEMPB14 <term> SET TEMPB15 <term>
Example	To view the temperature offset settings. type: LIST O<CR> SET TEMPB0 0 SET TEMPB1 0 :: :: :: SET TEMPB14 0 SET TEMPB15 0

LIST PTP VARIABLES

Command	LIST PTP VARIABLES
Command Syntax	**LIST PTP**<CR>
Arguments	None
Description	Lists the PTP configuration variables from Group PTP.
Returns	SET <variable> <value> <nl> SET <variable> <value> <nl> : : : : SET <variable> <value> <nl> variable - the configuration variable name value - the current setting nl - end of line
Example	This command is used to verify the general PTP settings of the DSM4000, type: LIST PTP<CR> The DSM4000 will return: SET PTPEN 0 SET STAT 0 SET SST 0:0:0.00000 SET SSD 1971/1/1 SET UTCOFFSET 00:00:00

LIST SCAN

Command	LIST SCAN
Command Syntax	LIST S
Arguments	None
Description	Lists the SCAN configuration variables
Example	This command is used to verify the general scan settings of the DSA, type: LIST S<CR> The DSA-PTP will return: SET PERIOD 200 SET AVG 32 SET FPS 1 SET XSCANTRIG 0 SET FORMAT 0 SET TIME 0 SET EU 1 SET ZC 1 SET BIN 0 SET SIM 0 SET QPKTS 0 SET UNITSCAN PSI SET CVTUNIT 1.000000 SET PAGE 0

LIST TEMPERATURE

Command	LIST TEMPn
Command Syntax	LIST TEMP <channel>
Arguments	<channel> - channel number 0 through 15
Description	Lists the 11 temperature coefficient terms for a specified channel
Example	To view the current temperature coefficients for a channel, type: LIST TEMP <chan><CR> The DSA-PTP will return the temperature coefficients for the channel.. They could appear as follows. SET TEMP 2 0 0.100000 -17381 SET TEMP 2 1 9.100000 -13551 SET TEMP 2 2 17.900000 -9535 SET TEMP 2 3 27.000000 -5355 SET TEMP 2 4 35.900002 -1040 SET TEMP 2 5 45.099998 3403 SET TEMP 2 6 54.099998 7990 SET TEMP 2 7 63.000000 12625 SET TEMP 2 8 72.000000 17358 SET TEMP 2 9 100.000000 0 SET TEMP 2 10 100.000000 0 SET TEMP 2 11 100.000000 0 NOTE: any temperature value of 100 degrees or greater is discarded and not used. If All channels are 100 0, the temperature will be shown as 25.00.

LIST ZERO

Command	LIST ZERO
Command Syntax	LIST Z
Arguments	None
Description	Lists the 16 zero correction values. These are used in the conversion of raw counts to zero corrected counts.
Example	To view the current zero correction values, type: LIST Z<CR> The DSA-PTP will return the zero correction values. They could appear as follows. SET ZERO0 261 SET ZERO1 -86 SET ZERO2 -49 SET ZERO3 -6 SET ZERO4 -20 SET ZERO5 47 SET ZERO6 44 SET ZERO7 23 SET ZERO8 -51 SET ZERO9 47 SET ZERO10 6 SET ZERO11 26 SET ZERO12 53 SET ZERO13 37 SET ZERO14 -57 SET ZERO15 -20 NOTE: The zero values will be updated after a CALZ.

SAVE

Command	SAVE
Command Syntax	SAVE
Arguments	None
Description	Commands the DSA-PTP to save 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.
Returns	<nl> <nl> - End of line.
Example	To save the current configuration variable settings and conversion coefficients, Type: SAVE<CR>

SCAN

Command	SCAN
Command Syntax	SCAN
Arguments	None
Description	Commands the DSA-PTP to scan the pressure sensors and send Scan packets to the client.
Example	A scan command is executed with EU set to 1, BIN set to 0, and FORMAT set to 0. Data are scrolled and will be displayed as follows: Frame # <number> Time <time> <µs or ms> <chan> <press eu> <temp eu> “ ” “ ” “ ” <chan> <press eu> <temp eu> A scan command is executed with EU set to 0, BIN set to 0, and FORMAT set to 0. Data are scrolled and will be displayed as follows: Frame # <number> Time <time> <µs or ms> <chan> <press counts> <temp counts> “ ” “ ” “ ” <chan> <press counts> <temp counts> A scan command is executed with EU set to 1, BIN set to 0, and FORMAT set to 1. Data are scrolled and will be displayed as follows: Frame = <number> Time = <time> <µs or ms> <chan> <press eu> <chan><press eu> <chan> <press eu> <chan> <press eu> <chan> <press eu> <chan><press eu> <chan> <press eu> <chan> <press eu> <chan> <press eu> <chan><press eu> <chan> <press eu> <chan> <press eu> <chan> <press eu> <chan><press eu> <chan> <press eu> <chan> <press eu> A scan command is executed with EU set to 0, BIN set to 0, and FORMAT set to 1. Data are scrolled and will be displayed as follows: Frame = <number> Time = <time> <µs or ms> <chan> <press cts> <chan><press cts> <chan> <press cts> <chan> <press cts> <chan> <press cts> <chan><press cts> <chan> <press cts> <chan> <press cts> <chan> <press cts> <chan><press cts> <chan> <press cts> <chan> <press cts> <chan> <press cts> <chan><press cts> <chan> <press cts> <chan> <press cts>

SCAN TRIGGER

Command	SCAN TRIGGER
Command Syntax	TRIG or <tab>
Arguments	None
Description	This command acts as a software trigger to the DSA. When XSCANTRIG is set to 1, an averaged frame of data will be output when the DSA-PTP receives the TRIG command or a <TAB> character code (9 HEX or Control I). This will continue until a STOP command is issued or the Frames Per Scan (FPS) variable is met. The data format will depend upon the setting of EU, BIN and FORMAT.
Example	A scan command is executed with EU set to 1, BIN set to 0, XSCANTRIG set to 1, and FORMAT set to 0. The DSA-PTP will wait for a Hardware trigger, the TRIG command or a <TAB> character (9 HEX or Control I). When one of the Data are scrolled and will be displayed as follows: Frame # <number> Time <time> <µs or ms> <chan> <temp eu> " " " " <chan> <temp eu> For information on other formats, refer to the SCAN command .

SET

Command	SET
Command Syntax	SET <name> <value>
Arguments	<name> - the Configuration Variable to be set or modified. <value> - the value of that Configuration Variable
Description	Commands the DSA-PTP to set one of the many Configuration Variables. Configuration Variables are described in a subsequent section. NOTE: Listing the Configuration Variables with the LIST command outputs the data in the format required by the SET command. This enables the user to upload data from a file that has been created by a LIST download.
Returns	<nl> <nl> - End of line.
Example	To change the variable Frames Per Scan (FPS) from 10 to 5, type: SET FPS 5 <CR> To change the variable Time (TIME) from off (0) to on (1), type: SET TIME 1 <CR>

STATUS

Command	STATUS
Command Syntax	STATUS
Arguments	None
Description	Commands the DSA-PTP to send a Status Packet to the client. The Status Packet is described in a subsequent section. The STATUS command may be entered at any time. This is one of the commands that will not generate an error if entered while the DSA-PTP is not READY.

Command	STATUS
Returns	One of the following: STATUS: READY STATUS: CALZ STATUS: SAVE
Example	If the STATUS command is entered while the DSA-PTP is on, but inactive, the DSA-PTP will return: STATUS: READY If the STATUS command is entered while the DSA-PTP is executing a Calibrate Zero command, the DSA-PTP will return: STATUS CALZ

STOP

Command	STOP
Command Syntax	STOP or <esc>
Arguments	None
Description	Commands the DSA-PTP to abort the current operation.
Returns	<nl> <nl> - end of line.
Example	To abort any function or operation, type: STOP<CR>

VERSION

Command	VERSION
Command Syntax	VER
Arguments	None
Description	Outputs the current software version number.
Returns	VERSION: <ver number>
Example	To read the current software version, type: VER<CR> The DSA-PTP returns: VERSION: 1.01

SET PTP TIME

Command	SETTIME
Command Syntax	SETTIME YYYY/MM/DD hh:mm:ss.ffff
Arguments	YYYY- Year MM- Month DD- Day hh- hour mm- minute ss- seconds ffff- fractions of a second
Description	Programs the curent time to the DSA
Returns	<nl> <nl> - end of line.

Command	SETTIME
Notes	SETTIME must not be used if SET PTPEN 1 and a PTP grandmaster is present.

GET PTP TIME

Command	GETTIME
Command Syntax	GETTIME
Arguments	None
Description	Commands the DSA-PTP to get the PTP time. If no grandmaster is present or time programed, the DSA-PTP will return the default time. Time is adjusted by UTCOFFSET
Returns	Current Time YYYY/MM/DD hh:mm:ss.ffff sec XXXX ns YYYYYYYYY

GET UTC OFFSET

Command	GETUTCO
Command Syntax	GETUTCO
Arguments	None
Description	Commands the DSA-PTP to get the UTC offset from the grandmaster
Returns	- The current difference between TAI time and UTC time, in seconds, as supplied by the local grandmaster. - UTC updated flag - Set when UTC offset is valid. Current UTC Offset 0 0 0

CONFIGURATION VARIABLES

Configuration Variables control the way the DSA-PTP functions. The variables are assigned to one of several groups: SCAN (LIST S), CALIBRATION (LIST B, LIST C, LIST H, LIST L, LIST N, LIST LIMIT), IDENTIFICATION (LIST I), IP (LIST IP), FTP (LIST FTP), PTP (LIST PTP) or PRESSURE (LIST D, LIST O, LIST G, and LIST Z). Each variable is assigned a "data type" description.

SCAN VARIABLES (LIST S)

AVERAGE (AVG)

Variable	AVG
Valid Values	1 to 240
Default Value	32
Data Type	integer
Group	Scan variables (List S)
Description	This sets the number of raw samples to acquire before producing a averaged output.

BINARY DATA (BIN)

Variable	BIN
Valid Values	0 or 1
Default Value	0
Data Type	integer
Group	Scan variables (List S)
Description	Sets the format of the data packet output. 1 = Binary 0 = ASCII

UNIT CONVERSION FACTOR (CVTUNIT)

Variable	CVTUNIT
Valid Values	any real number
Default Value	1.0
Data Type	float
Group	Scan variables (List S)
Description	Unit conversion factor. This converts the calibrated units to the requested scan units. This value can be set directly or by setting the UNITSCAN variable to the desired unit. CVTUNIT will be set whenever UNITSCAN is set. It may be set independently without setting UNITSCAN. If a user wants to have CVTUNIT set to a different variable from UNITSCAN, UNITSCAN must be set first.

ENGINEERING UNITS (EU)

Variable	EU
Valid Values	0 or 1
Default Value	1
Data Type	string
Group	Scan variables (List S)
Description	Sets the output format for temperature and pressure units. 0 = raw units 1 = Engineering units 2 = Engineering units with floating point temperature (see DSA-PTP packet definitions) NOTE: The module will output 999999 when one or more of the following conditions exist: 1. The EU conversion exceeds the setting of PMAXL or PMAXH 2. The calculated temperature of any sensor is greater than 69 degrees C. The module will output -999999 when one or more of the following conditions exist: 1. The EU conversion exceeds the setting of PMINL or PMINH 2. The calculated temperature of any sensor is greater than 69 degrees C. When SET EU 2, time stamp data will not be possible.

DATA FORMAT (FORMAT)

Variable	FORMAT
Valid Values	0, 1, or 2
Default Value	0
Data Type	integer
Group	Scan variables (List S)
Description	Determines if data are to be scrolled on the display. ASCII Output only 0 - data is scrolled 1 - data is displayed in place, formatted for a VT100 terminal. 2 - data is displayed in CSV format

FRAMES PER SCAN (FPS)

Variable	FPS
Valid Values	0 to 2147483648
Default Value	1
Data Type	long integer
Group	Scan variables (List S)
Description	Frames Per Scan (FPS) sets the number of averaged frames to send to the host computer when a scan command is issued. Averaged frames will be sent to the host computer until the value of FPS is met. At that time the DSA-PTP will exit the scan mode and wait for another command. If a 0 is entered, the scan will continue until a STOP command is received.

PAGE (PAGE)

Variable	PAGE
Valid Values	0 or 1
Default Value	0
Data Type	integer
Group	Scan variables (List S)
Description	When set to 1, the DSA-PTP will accumulate 10 frames of data before the data is sent over the network. If FPS is set to a number less than 10, the data will be sent over the network when FPS is completed. When a STOP command is issued, the frame acquisition will stop on a 10 frame boundary. NOTE: This variable is active in UDP mode only.

PERIOD (PERIOD)

Variable	PERIOD
Valid Values	73 to 65535
Default Value	500
Data Type	integer
Group	Scan variables (List S)
Description	Sets the interval between channel samples, in microseconds (µs). Period is related to the scan rate, or frequency by the formula: Data Rate = 1÷(Period* × 16 × Average) *where period is in seconds

QPKTS

Variable	QPKTS
Valid Values	0 or 1
Default Value	0
Data Type	integer
Group	Scan variables (List S)
Description	This variable no longer functions and was left in place for legacy compatibility. Setting this will not change behavior or cause an error.

DATA SAMPLE SOURCE (SIM)

Variable	SIM
Valid Values	0 or 1
Default Value	1
Data Type	integer
Group	Scan variables (List S)
Description	This variable no longer functions and was left in place for legacy compatibility. Setting this will not change behavior or cause an error.

TIME STAMP (TIME)

Variable	TIME
Valid Values	0, 1, 2, or 3
Default Value	0
Data Type	integer
Group	Scan variables (List S)
Description	Determines the format of the Time Stamp. 0 - No Time Stamp 1 - Time stamp data are in microseconds 2 - Time stamp data are in milliseconds 3 - Time stamp data are in PTP time

SCAN UNIT (UNITSCAN)

Variable	UNITSCAN
Valid Values	See list in description
Default Value	PSI
Data Type	string
Group	Scan variables (List S)
Description	Unit scan factor. This sets the scan units for the DSA. Setting this value will also set CVTUNITS. CVTUNITS may be set to a different value, however UNITSCAN must be set first. The following are the list of units supported ATM FTH2O KGM2 MH2O OZFT2 BAR GCM2 KIPIN2 MMHG OZIN2 CMHG INHG KNM2 MPA PA CMH2O INH2O KPA NCM2 PSF DECIBAR KGCM2 MBAR NM2 PSI TORR If a value other than those listed is entered, PSI will be used. It is best to use uppercase when entering these units.

ENABLE EXTERNAL TRIGGER (XSCANTRIG)

Variable	XSCANTRIG
Valid Values	0 or 1
Default Value	0
Data Type	integer
Group	Scan variables (List S)
Description	Sets the External Trigger as the Frame Trigger. 0 - the internal clock is the frame trigger 1 - the external trigger is the frame trigger

ZERO CORRECTION (ZC)

Variable	ZC
Valid Values	0 or 1
Default Value	1
Data Type	integer
Group	Scan variables (List S)
Description	Sets zero correction on or off. 0 - no correction 1 - zero correction NOTE 1: ZC must be set to 0 for the following conditions: 1. Model is set to 3207 2. The module has gauge transducers installed. NOTE 2: ZC must be set to 0 for the following conditions: 1. Model is set to 3207 2. Absolute sensors are installed and the CALB command will not be used. NOTE 3: ZC must be set to 1 for the following conditions: 1. Model is set to 3217 or 3218 2. Differential transducers are installed NOTE 4: ZC must be set to 1 for the following conditions: 1. Model is set to 3207 2. Absolute sensors are installed and the CALB command will be used.

IP VARIABLES (LIST IP)

IP ADDRESS (IPADD)

Variable	IPADD <IP Address>
Valid Values	Any valid IP Address
Default Value	determined by module type
Data Type	integer
Group	IP variables (List IP)
Description	The IP Address of the module.

SUBNET MASK (SUBNET)

Variable	SUBNET <Subnet Mask>
Valid Values	Any valid Subnet Mask
Default Value	255.255.0.0
Data Type	integer
Group	IP variables (List IP)
Description	The Subnet mask for the module. The subnet mask must be configured for the network- where the DSA will be connected.

MAC ADDRESS (MAC)

Variable	MAC <MAC Address>
Valid Values	000.096.093.xxx.yyy.zzz
Default Value	000.096.093.040.000.xxx Where xxx is the serial number of the enclosure
Data Type	integer
Group	IP variables (List IP)
Description	The MAC address of the module. The last three octets may be modified by a user, but it is recommended that they not be modified. The first three octets MUST NOT be modified. These octets represent a setting registered to Scanivalve Corp.

LOGIN (LOGIN)

Variable	LOGIN <User Name>
Valid Values	Any valid string
Default Value	Scanivalve
Data Type	string
Group	IP variables (List IP)
Description	The User name for the FTP login

PASSWORD (PASSWORD)

Variable	PASSWORD <Password>
Valid Values	any valid character string
Default Value	Scanner
Data Type	string
Group	IP variables (List IP)
Description	The password associated with the user name for the FTP login

LOGIN 1(LOGIN1)

Variable	LOGIN1 <User Name>
Valid Values	any valid character string
Default Value	Scanivalve1
Data Type	string
Group	IP variables (List IP)
Description	The User name for the FTP login

PASSWORD 1(PASSWORD1)

Variable	PASSWORD1 <Password>
Valid Values	any valid character string
Default Value	Scanner1
Data Type	string
Group	IP variables (List IP)
Description	The password associated with the user name for the FTP login

ANONYMOUS LOGON (ALLOWANON)

Variable	ALLOWANON <code>
Valid Values	0 or 1
Default Value	1
Data Type	integer
Group	IP variables (List IP)
Description	Allows anonymous users to access DSA memory for firmware and coefficient upload. 0 - Do not allow anonymous FTP logins 1 - Allow anonymous FTP logins (recommended)

APPLICATION (APP)

Variable	APP <application name>
Valid Values	any valid application name
Default Value	Dsaptp.hex
Data Type	string
Group	IP variables (List IP)
Description	The file name of the application to run. This is the file name that is used when automatically running the application from the boot loader. It is also the file name used when using the RUN command. If this file is not found, an error is returned.

SET GATEWAY (GW)

Variable	GW <IP Address>
Valid Values	any valid IP address
Default Value	0.0.0.0
Data Type	integer
Group	IP variables (List IP)
Description	This IP Address will be used to access the server if the server IP address is an IP Address outside the DSM subnet.

PTP VARIABLES (LIST PTP)

PTP ENABLE (PTPEN)

Variable	PTPEN <code>
Valid Values	0-disabled, 1-enable, 2-enable as master
Default Value	0
Data Type	integer
Group	PTP variables (List PTP)
Description	Enables the precision time protocol engine in the DSA-PTP. When PTPEN is set to 2, the DSA-PTP will serve as a PTP master. NOTE: Only one unit may be set to a master. Having multiple masters on the same network may cause some to be ignored. NOTE: Changing from 0 or to 0 will reinitialize the internal clock.

PTP STATISTICS (STAT)

Variable	STAT <code>
Valid Values	0- disable, 1- serial, 2- network
Default Value	0
Data Type	integer
Group	PTP variables (List PTP)
Description	Sets the destination of PTP statistical output. The statistical data is output in the following format: <ofm>, <msd>, <smd>, <mpd> ofm- Offset From Master. Time that slave and master differ in units of microseconds msd - Master to Slave Delay. Filtered packet delivery time from master to slave smd - Slave to Master Delay. Filtered packet delivery time from slave to master mpd - Mean Path Delay. Filtered mean path delay time

SCAN START TIME (SST)

Variable	SST <code>
Valid Values	hhh:mmm:ss.fff
Default Value	0:0:0.000
Data Type	integer
Group	PTP variables (LIST PTP)
Description	Sets the time to start scanning as referenced to the grandmaster or PTP master. The DSA-PTP will use the current PTP time as the scan start time under two conditions: 1) When the PTP system is disabled via the SET PTPEN 0 command. 2) When the current time has not been received from the PTP server since the DSA-PTP was powered up. Under this condition the DSA-PTP time will start at Jan 1 2014, 0:00:00.000 hours,or epoch 0 time. This most likely will happen when there is no PTP server on the network. If the DSA-PTP was enabled and then disabled after receiving a time set from the PTP time server, the DSA-PTP will keep time from the last clock setting from the PTP server. When these two cases are not met, the DSA-PTPuses the start time set via the SET SST <time> and SET SSD <date> setting in the PTP group.

SCAN START DATE (SSD)

Variable	SSD <code>
Valid Values	yyyy/mm/dd Where: yyyy-Year, mm-Month, dd-Day
Default Value	2014/1/1
Data Type	integer
Group	PTP variables (LIST PTP)
Description	Sets the date to start scanning as referenced to the grandmaster.

UTC OFFSET (UTCOFFSET)

Variable	UTCOFFSET <code>
Valid Values	hh:mm:ss Where: hh- Hours, mm- Minutes, ss- Seconds
Default Value	00:00:00
Data Type	integer
Group	PTP variables (List PTP)
Description	Sets the offset to be added or subtracted from network time.

FTP VARIABLES (LIST FTP)

FTP USER NAME (UESRFTP)

Variable	USERFTP <user name>
Valid Values	any valid string
Default Value	admin
Data Type	string
Group	FTP variables (List FTP)
Description	Sets the name of the user login on the FTP server or NAS

FTP PASSWORD (PASSFTP)

Variable	PASSFTP <password>
Valid Values	any valid string
Default Value	password
Data Type	string
Group	FTP variables (List FTP)
Description	Sets the name of the user password for login on the FTP server or NAS

ENABLE FTP (ENFTP)

Variable	ENFTP <code>
Valid Values	0- disabled or 1- enabled
Default Value	0
Data Type	integer
Group	FTP variables (List FTP)
Description	Enables data output via FTP. Note: If FTP is enabled, it will take priority for data transfer.

FTP FILE PATH (PATHFTP)

Variable	PATHFTP <directory path>
Valid Values	any valid path
Default Value	/disk1/share
Data Type	string
Group	FTP variables (List FTP)
Description	Set the directory path of the scan data file on the user's computer.

FTP IP ADDRESS(IPFTP)

Variable	IPFTP <IP Address>
Valid Values	any valid IP Address
Default Value	10.0.0.1
Data Type	integer
Group	FTP variables (List FTP)
Description	Set the IP address of the users FTP server.

FTP FILE NAME(FILEFTP)

Variable	FILEFTP <name>
Valid Values	any valid string
Default Value	SCAN
Data Type	string
Group	FTP variables (List FTP)
Description	Set the base name for the scan data on the user's computer. The actual name will have the time and date appended to the file. It will have a file extension based on the data format.

PRESSURE VARIABLES (LIST B, LIST H, LIST L AND LIST N)

ABSOLUTE ENABLE (ABSN)

Variable	ABSn (where n = 0-15 for channels 1-16)
Valid Values	0 or 1
Default Value	determined by module type
Data Type	integer
Group	Calibration variables (List B)
Description	Sets the mode of operation of the module. . 0 = gauge or differential 1 = absolute *Note: This value will determine the action of a CALZ or CALB being initiated. CALZ will only initiate on channels with a value of 0. CALB will only initiate on channels with a value of 1.*

MAXIMUM PRESSURE (MAXN)

Variable	MAXn (where n = 0-15 for channels 1-16)
Valid Values	0 through 500
Default Value	15
Data Type	integer
Group	Calibration variables (List H)
Description	Sets the maximum pressure for channel n. This must be set to zero or to a positive number if the module is an absolute module. *NOTE: This variable is only used if MODEL is set to 3207.*

MINIMUM PRESSURE (MINN)

Variable	MINn (where n = 0-15 for channels 1-16)
Valid Values	0 through 500
Default Value	0
Data Type	integer
Group	Calibration variables (List L)
Description	Sets the maximum pressure for channel n. This must be set to zero or to a positive number if the module is an absolute module. *NOTE: This variable is only used if MODEL is set to 3207.*

NEGATIVE CALIBRATION POINTS (NEGPTSN)

Variable	NEGPTSn (where n = 0-15 for channels 1-16)
Valid Values	0 to 8
Default Value	4
Data Type	integer
Group	Calibration variables (List N)
Description	Sets the number of negative calibration points for channel n. This must be set to zero or to a positive number if the module is an absolute module. *NOTE: This variable is only used if MODEL is set to 3207.*

CALIBRATION VARIABLES (LIST C)

CHANNEL 1-8 NUMBER OF NEGATIVE CALIBRATION POINTS (NEGPTSL)

Variable	NEGPTSL
Valid Values	0 through 8
Default Value	4
Data Type	integer
Group	Calibration variables (List C)
Description	Sets the number of negative calibration points for channels 1 - 8. This must be set to zero or to a positive number if the module is an absolute module.

CHANNEL 9-16 NUMBER OF NEGATIVE CALIBRATION POINTS (NEGTPSH)

Variable	NEGPTSH
Valid Values	0 through 8
Default Value	4
Data Type	integer
Group	Calibration Variables (List C)
Description	Sets the number of negative calibration points for channels 9 - 16. This must be set to zero or to a positive number if the module is an absolute module.

CHANNEL 1-8 MAXIMUM PRESSURE (PMAXL)

Variable	PMAXL
Valid Values	any real number
Default Value	determined by module type
Data Type	float
Group	Calibration variables (List C)
Description	Sets the maximum pressure for channels 1 - 8. NOTE: The module will output 999999 if the measured pressure exceeds this value.

CHANNEL 9-16 MAXIMUM PRESSURE (PMAXH)

Variable	PMAXH
Valid Values	any real number
Default Value	determined by module type
Data Type	float
Group	Calibration variables (List C)
Description	Sets the maximum pressure for channels 9 - 16. NOTE: The module will output 999999 if the measured pressure exceeds this value.

CHANNEL 1-8 MINIMUM PRESSURE (PMINL)

Variable	PMINL
Valid Values	any real number
Default Value	determined by module type
Data Type	float
Group	Calibration Variables (List C)
Description	Sets the minimum pressure for channels 1 - 8. This must be set to zero or to a positive number if the module is an absolute module. NOTE: The module will output -999999 if the measured pressure exceeds this value.

CHANNEL 9-16 MINIMUM PRESSURE (PMINH)

Variable	PMINH
Valid Values	any real number
Default Value	determined by module type
Data Type	float
Group	Calibration Variables (List C)
Description	Sets the minimum pressure for channels 9 -16. This must be set to zero or to a positive number if the module is an absolute module. NOTE: The module will output -999999 if the measured pressure exceeds this value.

ERROR LIMIT VARIABLES (LIST LIMIT)

CAUTION! Changes to the LIST LIMIT variables can produce scan readings that exceed the safe working max temperature and max pressure ranges of the scanner and its sensors. This could ultimately lead to damage in the unit. It is not recommended to alter these variables unless advised.

HIGH TEMPERATURE ERROR LIMIT (THI)

Variable	THI <degrees C>
Valid Values	any integer (see caution above)
Default Value	0
Data Type	integer
Group	Limit Settings (List Limit)
Description	Sets the amount of degrees (in Celsius) above high temperature allowed during a scan, before returning with 999999 error.

LOW TEMPERATURE ERROR LIMIT (TLOW)

Variable	TLOW <degrees C>
Valid Values	any integer (see caution above)
Default Value	-10
Data Type	integer
Group	Limit Settings (List Limit)
Description	Sets the amount of degrees (in Celsius) below low temperature allowed during a scan, before returning with -999999 error.

HIGH PRESSURE ERROR LIMIT (PHI)

Variable	PHI <percent of max pressure>
Valid Values	any integer (See caution above)
Default Value	0
Data Type	integer
Group	Limit Settings (List Limit)
Description	Sets the percent above the maximum high pressure allowed during a scan before returning with 999999 error.

LOW PRESSURE ERROR LIMIT (PLOW)

Variable	PLOW <percent of max pressure>
Valid Values	any integer (see caution above)
Default Value	0
Data Type	integer
Group	Limit Settings (List Limit)
Description	Sets the precent below the maximum low pressure allowed during a scan before returning with -999999 error.

IDENTIFICATION VARIABLES (LIST I)

SERIAL ECHO (ECHO)

Variable	ECHO
Valid Values	0 or 1
Default Value	0
Data Type	integer
Group	Identification variables (List I)
Description	Determines if characters received from a serial host will be echoed back to the host. 0 - the DSA-PTP will not echo characters 1 - the DSA-PTP will echo characters back to the host

MODEL (MODEL)

Variable	MODEL
Valid Values	3207, 3217, 3218
Default Value	3217
Data Type	string
Group	Identification variables (List I)
Description	Determines the module type. When set to 3207, special variables are enabled to permit up to eight(8) ranges in a module. The recommended setting of ZC depends on the setting of MODEL. Please refer to the description of ZC for more information. NOTE: MODEL must be set to 3207 in a 3217 or 3218 with absolute sensors installed if the CALB function will be used.

ETHERNET PORT (PORT)

Variable	PORT
Valid Values	any valid port other than 0
Default Value	23
Data Type	integer
Group	Identification variables (List I)
Description	Sets the Ethernet port. The default value is 23 which is the TelNet port. A change to this variable does not take effect until the module has been rebooted. If PORT is set to zero, communications in Ethernet will be impossible.

ETHERNET HOST (HOST)

Variable	HOST <IP Address> <Port> <Protocol>
Valid Values	IP Address - Any valid IP Address Port - Any valid port number other than 0 Protocol - U for UDP T for TCP
Default Value	IP Address - 0 Port - 0 Protocol - T
Data Type	varies
Group	Identification variables (List I)
Description	Sets the parameters for binary transmission to a host computer. The default port value is 23 which is the TelNet port. A change to this variable does not take effect until the module has been rebooted. If PORT is set to zero, communications in Ethernet will be impossible.

PRESSURE DELTAS (LIST D)

DELTAS (DELTAN)

Variable	DELTAn <value> (where n = 0-15 for channels 1-16)
Valid Values	+/- Full Scale Pressure Range
Default Value	none
Data Type	float
Group	Pressure variables (List D)
Description	Delta zero corrections for channels 1 - 16. These values are set when a CALZ is executed.

ZERO OFFSETS (LIST Z)

ZERO OFFSET (ZERON)

Variable	ZERONn (where n = 0-15 for channels 1-16)
Valid Values	-32768 to 32768
Default Value	none
Data Type	integer
Group	Pressure variables (List Z)
Description	The zero correction for channels 0 - 15. These values are set during the original calibration and fill.

DSA-PTP PACKET DEFINITIONS

When requested the DSA-PTP sends an application packet to the client. Each packet sent to the client starts with a Packet Type Word. This word defines the packet type. All packet data will be received as signed.

PACKET TYPES

Packet Name	Packet ID	Bytes	Notes
Scan	1Hex	304	Legacy binary scan packet (NOT USED)
Status	3Hex	180	Long status packet
Scan Raw	4Hex	72	Transmits pressure and temperature data in binary, raw counts
Scan EU	5Hex	104	Transmits pressure and temperature data in binary, engineering units
Scan Raw - Time	6Hex	80	Transmits pressure data in binary, raw counts with a time stamp
Scan EU - Time	7Hex	112	Transmits pressure data in binary, engineering units with a time stamp
Scan EU - FPT (Floating Point Temp)	9Hex	136	Transmits pressure data in binary, engineering units with temperature data type as floating point (time stamp non-configurable)
Scan Raw/EU - PTP	AHex	188	Transmits pressure data in binary, raw units or engineering units with a PTP time stamp (SET TIME 3)
ASCII	20Hex	Variable	Text packet may be formatted or un-formatted. The format is determined by the setting of FORMAT configuration variable. NOTE: When the first integer of the packet is 20Hex or greater, the packet is assumed to be in ASCII format.

HOST TO DSA-PTP COMMAND PACKET

Function Description	Bytes	Data Type	Values
ASCII command data (refer to the command section of this manual for more information)	1 to 512	String	Unique to packet. Each line must be terminated with a <CR>, <LR>, <CR-LF> or <LF-CR>

STATUS PACKET

Function Description	Bytes	Data Type	Value/Notes
Packet Type	2	Integer	3Hex
Pad bytes (forces quad byte alignment)	78	Integer	unidentified
Status	20	char[20]	Current DSA-PTP Status
Pad bytes (forces quad byte alignment)	80	Integer	(not used)

SCAN RAW PACKET

Function Description	Bytes	Data Type	Value/Notes
Packet Type	2	Integer	4Hex
Pad bytes (forces quad byte alignment)	2	Integer	unidentified
Frame Number	4	Integer	Current Frame Number
Channels 1-16 Pressure	32	Integer	2 bytes per channel
Channels 1-16 Temperature	32	Integer	2 bytes per channel

SCAN EU PACKET

Function Description	Bytes	Data Type	Value/Notes
Packet Type	2	Integer	5Hex
Pad bytes (forces quad byte alignment)	2	Integer	unidentified
Frame Number	4	Integer	Current Frame Number
Channels 1-16 Pressure	64	Float	4 bytes per channel
Channels 1-16 Temperature	32	Integer	2 bytes per channel

SCAN RAW WITH TIME PACKET

Function Description	Bytes	Data Type	Value/Notes
Packet Type	2	Integer	6Hex
Pad bytes (forces quad byte alignment)	2	Integer	unidentified
Frame Number	4	Integer	Current Frame Number
Channels 1-16 Pressure	32	Integer	2 bytes per channel
Channels 1-16 Temperature	32	Integer	2 bytes per channel
Time in milliseconds or microseconds	4	Integer	2 bytes
Time Units	4	Integer	1 = microseconds 2 = milliseconds

SCAN EU WITH TIME PACKET

Function Description	Bytes	Data Type	Value/Notes
Packet Type	2	Integer	7Hex
Pad bytes (forces quad byte alignment)	2	Integer	unidentified
Frame Number	4	Integer	Current Frame Number
Channels 1-16 Pressure	64	Float	4 bytes per channel
Channels 1-16 Temperature	32	Integer	2 bytes per channel
Time in milliseconds or microseconds	4	Integer	2 bytes
Time Units	4	Integer	1 = microseconds 2 = milliseconds

SCAN EU PACKET WITH FPT - FLOATING POINT TEMPERATURE (SET EU 2)

Function Description	Bytes	Data Type	Value/Notes
Packet Type	2	Integer	9Hex
Pad bytes (forces quad byte alignment)	2	Integer	unidentified
Frame Number	4	Integer	Current Frame Number
Channels 1-16 Pressure	64	Float	4 bytes per channel
Channels 1-16 Temperature	64	Float	2 bytes per channel

SCAN RAW/EU WITH PTP TIME (SET TIME 3)

Function Description	Bytes	Data Type	Value/Notes
Packet Type	4	Integer	AHex (10 dec)
Packet Size	4	Integer	Size of packet in bytes
Frame Number	4	Integer	Current frame number
Scan Average	4	Integer	Number of samples averaged
Frame Rate	4	Float	Scan Rate in Hz
Spare	4	Integer	0 (not used)
Units Index	4	Integer	Units conversion index
Units Conversion Factor	4	Float	Conversion Factor (PSI to selected units)
Scan Start Time (s)	4	Integer	Scan start time in seconds
Scan Start Time (ns)	4	Integer	Scan start time in nanoseconds
PTP Last Update (ms)	4	Integer	Time since last update in milliseconds
Temperatures	32	Integer	4 bytes per channel
Pressures (RAW/EU)	32/64	Integer/Float	2/4 bytes per channel
Frame Time (s)	4	Integer	Time the frame occurred in seconds
Frame Time (ns)	4	Integer	Time the frame occurred in nanoseconds
External Trigger Time (s)	4	Integer	0 (not used)
External Trigger Time (ns)	4	Integer	0 (not used)

ASCII PACKET

Function Description	Bytes	Data Type	Value/Notes
ASCII data (the first two bytes must NOT be 1Hex through 1FHex). Refer to the Command Section of this manual for the proper Command return formats.	1 to 1492	String	Unique to packet. Each line must be terminated with a <CR>, <LR>, <CR-LF> or <LF-CR>

This packet will be transmitted when the host issues one of the following commands:

1. SCAN with BIN set to 0
2. LIST n
3. ERROR
4. STATUS

ASCII PACKET EXAMPLES

The following shows the format of the ASCII DATA portion of the List Packet in response to a LIST MASTER (LIST M):

INSERT <temp> <chan> <press> <press counts> /M
INSERT <temp> <chan> <press> <press counts> /M
: : : :
INSERT <temp> <chan> <press> <press counts> /M

When a LIST ALL is commanded, Master and Calculated planes are listed. The Master items will have a /M suffix. The following is an example of a LIST ALL (LIST A) command:

INSERT <temp> <chan> <press> <press counts>/M
INSERT <temp> <chan> <press> <press counts>/M
: : : :
INSERT <temp> <chan> <press> <press counts>/M

For examples of the ASCII Packets returned from a SCAN command, refer to the SCAN command.

NETWORK PROTOCOLS SUPPORTED

Physical Layer : 100Base-T IEEE 802.3
Link Layer: INTERNET Protocol (IP)
Transport Layer: Transmission Control Protocol (TCP)
User Datagram Protocol (UDP)

DSA3200-PTP BOOT PARAMETERS

To view the DSA3200-PTP module's boot parameters:

1. De-energize the DSA3200-PTP. Connect the DSA3200-PTP trigger/serial test cable (Scanivalve part #155829) from the DSA3200-PTP to a host PC.
2. Start HyperTerminal, or an equivalent communication program. Connect the DSA3200-PTP to a COM port on the PC Host. Set the serial parameters to 9600 BAUD, no parity, 8 data bits and 1 stop bit.
3. Energize the DSA3200-PTP.
4. Type: LIST IP<ENTER>
   The IP Address and boot parameters should now be displayed

CHANGING BOOT PARAMETERS (INCLUDING IP ADDRESS)

To change any of the boot parameters:

1. De-energize the DSA3200-PTP. Connect the DSA3200-PTP trigger/serial test cable (Scanco part #155829) from the DSA3200-PTP to a host PC.
2. Start HyperTerminal, or an equivalent communication program. Connect the DSA3200-PTP to a COM port on the PC Host. Set the serial parameters to 9600 BAUD, no parity, 8 data bits and 1 stop bit, no flow control.
3. Energize the DSA3200-PTP.
4. Once booted up, type: LIST IP<ENTER>
5. To change the IP Address, type:
   SET IPADD XXX.XXX.XXX.XXX<ENTER> where XXX.XXX.XXX.XXX is the IP Address of the DSA-PTP
6. After all changes have been made they must be saved. to save the changes, type:
   SAVEIP <ENTER>
7. The DSA-PTP will respond with "Saving group ip".
8. Power cycle the DSA to use the new IP Address

Alternatively, the DSA-PTP IP address can be changed by connecting to the scanner via Ethernet and changing the IPADD variable in LIST IP, issuing a "SAVE IP" command, and rebooting the DSA.

DSA3200-PTP Buffer Description

The DSA3200-PTP buffer is a software buffer. It is set up as a FIFO. It is factory set to hold 10000 averaged frames of data. Each frame uses 292 bytes of memory.

The buffer is the liaison between the scan task and the scan output task. The scan output task has a higher priority than the scan task. Under initial conditions, when the buffer is empty, the scan task places one frame of data in the buffer. It then signals the scan output task to read the buffer until it is empty. However, when multiple frames of data are in the buffer, the output task continues until the buffer is empty. Multiple frames of data will accumulate if the scan output task is blocked by the network while outputting data.

DSA-PTP Network Configurations

The DSA-PTP may be configured in three basic network arrangements:

Isolated Network

The isolated DSA-PTP network provides the fastest possible data throughput because other network traffic has been eliminated. DSA-PTP commands are issued from the network client/host and data is directed to the network client/host in UDP format. Data is removed from the client/host via disk or tape. This configuration is ideal for high speed data transfer with data reduction that is handled by the network client/host.

Integrated with System Network

The integrated DSA-PTP provides the most accessible data to all network clients. Any client/host on the network may control any or all of the DSA's. Network throughput (TCP/IP) may be reduced because of other network traffic. This configuration is ideal for systems that can tolerate slower data transfer rates but require easy access by multiple client/hosts to each DSA-PTP unit.

Sub-Network with Gateway

The DSA-PTP sub-network allows high speed data transfer of the sub-network while allowing access by a larger network. The gateway is most effective as a multi homed client/host that can store the DSA-PTP data for later access by client/hosts on the main system network.

DSA-PTP Network Addressing

Each DSA-PTP module has the capability to accept commands in Unicast (only one DSA-PTP accepts command)

Each DSA-PTP module has a unique, factory set, 48 bit physical Ethernet address. When running TCP/IP protocol the DSA-PTP modules support ARP (address resolution protocol) to enable the client/host to determine the relationship between the IP address and the Ethernet address. The IP address is user assignable.

SECTION 6: MAINTENANCE

CALIBRATION

The DSA3200-PTP series uses a well proven, very stable, temperature compensated TO-8 style piezoelectric pressure sensor. The use of this series of sensors, along with the ability to perform frequent, online zero offset calibrations allows the DSA-PTP to hold published accuracy for up to 6 months. Scanivalve recommend validating the DSA-PTP with a high-accuracy pressure standard on 6 month intervals and recalibrating the unit as required.

Every DSA-PTP module is calibrated from the factory over a series of 9 temperatures between 0°C and 72°C. At each temperature, 9 pressures are applied. This calibration creates a matrix of discrete temperatures and pressures, called Master Calibration Coefficients. The DSA-PTP then interpolates between each of these points to create a complete matrix of "calculated" coefficients.

When recalibrating a DSA-PTP module, there are three types of calibrations that can be performed:

FULL CALIBRATIONS

A full calibration deletes all calibration coefficients and re-applies known pressures over a series of temperatures. This duplicated exactly what is done at the factory during the module's original manufacture and calibration. This calibration requires an environmental chamber capable of reaching the entire 0°C and 72°C range and a suitable pressure standard. It is recommended that for a full calibration the module be returned to Scanivalve or a certified Scanivalve Representative.

FIELD CALIBRATIONS

As an alternative to Full Calibrations, Scanivalve offers a free program called "PressCal" that allows any metrology lab with a suitable pressure standard to perform a "Field Calibration." During a field calibration, a series of pressures are applied to the module at a single temperature. The temperature of the module does ***not*** have to be controlled to a specific temperature. PressCal calculates a new set of coefficients for that given temperature, then applies a correction to the pressure coefficients across all temperatures. This technique is suitable for maintaining modules long term and has been proven to be just as good as a new full calibration when done properly. More information on PressCal can be found on the Scanivalve website or by contacting Scanivalve.

ZERO OFFSET CALIBRATION

In all piezoelectric pressure sensors, zero drift is the single largest contributor to long term errors. Because of this, all DSA3217-PTP and 3218-PTP modules have internal calibration valves and a software command (CALZ) that allow for a zero offset calibration to be performed easily and frequently. More information on the Zero Offset Correction calibrations can be found in "Zero Offset Calibration" on page 13, and information on the CALB and CALZ commands can be found in "Calibrate Barometric Pressure" on page 21 and "Calibrate Zero" on page 22 respectively.

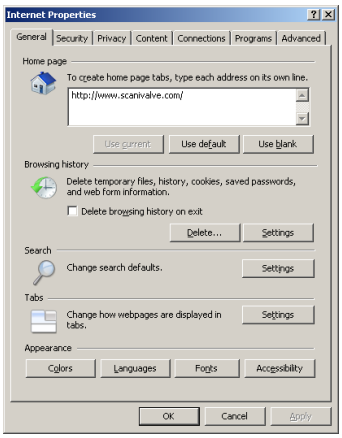
SPECIAL PROCEDURES

This section contains the procedures to update the firmware, add calibration coefficients to memory. The DSA-PTP should be in the READY mode while these changes are being made. This will have no effect on the operation. The procedures described in this section are written for use in a Windows 7 operating system.

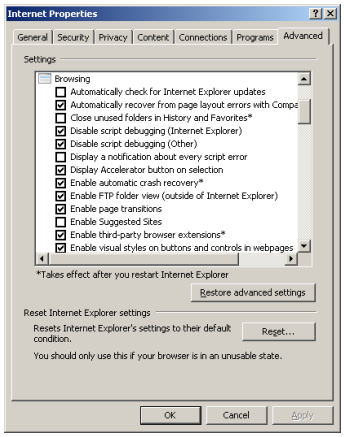
The firmware and coefficient procedures that follow may not function correctly if Windows Internet Explorer is not set up correctly. A user should verify these settings before attempting these procedures.

INTERNET EXPLORER SETUP

1. Open Internet Explorer.
2. Click on Tools
3. Select Internet Options from the drop down menu. The Internet Options window will open.
4. Click on the Advanced Tab to show the Advanced Settings.



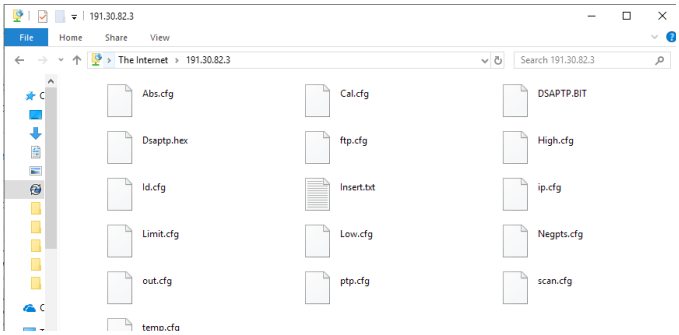
5. Scroll down to the Heading marked “Browsing”
6. Make sure that the line “ Enable FTP Folder View (Outside of Internet Explorer)” is checked. If this is not enabled, Internet Explorer will block FTP file transfers.
7. Click OK to accept the settings.



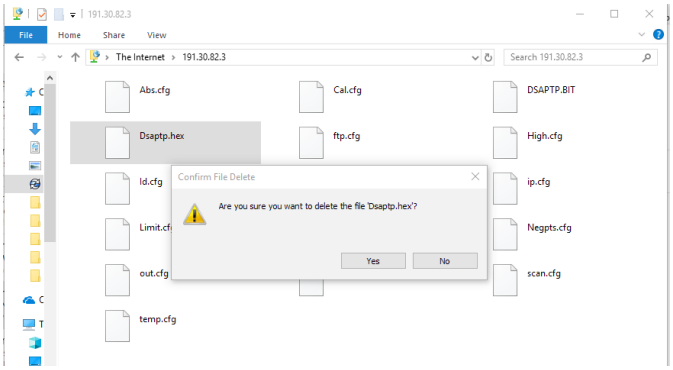
DSA-PTP FIRMWARE INSTALLATION (WINDOWS 7 & 10)

NOTE: Some firewalls may block file transfers. We recommend that firewalls be shut down for the procedures in this section.

1. Connect a host computer to the Ethernet port.
2. Install the disk with the New or updated firmware (Dsaptp.Hex & Dsaptp.Bit) into a drive.
3. Open My Computer or File Explorer.
4. In the Address Bar, type:
ftp://<IPAddress><Enter>
Where: <IPAddress> is the IP Address of the DSA-PTP.
5. The host computer should connect, If the connection is successful, the contents of the DSA-PTP memory will be displayed in a folder format.



6. Highlight the existing Dsaptp.Hex and Dsaptp.Bit files. Right Click on it and select Delete. A window will open to confirm the delete. Click Yes to delete the file.



7. Open Windows Explorer in another window. Find the directory where the new Dsaptp.Hex and Dsaptp.bit files are stored. Highlight the file and
Click: Edit
Click: Copy
8. Select the DSA-PTP window and,
Click: Edit
Click: Paste
The files will be copied to the DSA-PTP. A progress window will provide progress information.

9. When the copy function is complete, the DSA-PTP window will show the new file. The time and date will

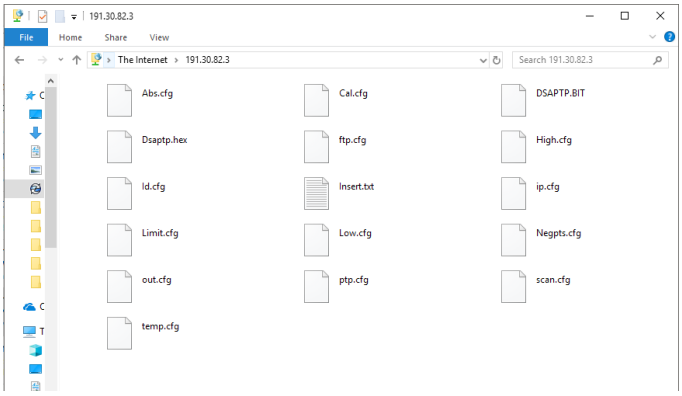
show the Time and Date of the transfer. This is the only time this date will be shown and will change to the default after power cycle.

10. Cycle the AC power or execute a Reboot command to complete the process.

DSA-PTP COEFFICIENT UPLOAD

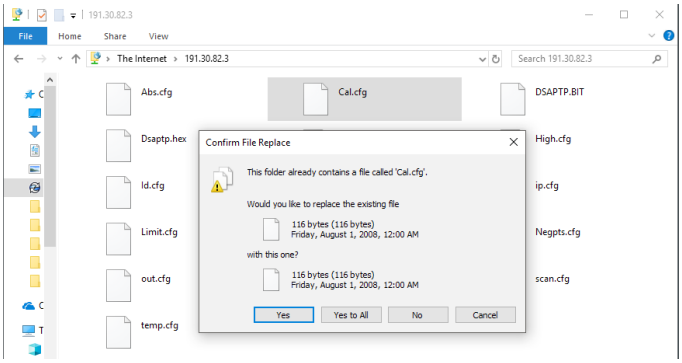
NOTE: Some firewalls may block file transfers. We recommend that firewalls be shut down for the procedures in this section.

1. Connect a host computer to the Ethernet port of the DSA-PTP.
2. Make an Ethernet connection to the scanner using ScanTel (see ScanTel manual for connection information).
3. After making a successful connection to the DSA-PTP, type the commands:
   DELETE 0 72<ENTER>
   STATUS<ENTER>
   Wait for the DSA-PTP to respond with STATUS: READY (may only take a few seconds)
   SAVE<ENTER>
   STATUS<ENTER>
   Wait for the DSA-PTP to respond with STATUS: READY (may only take a few seconds)
4. Once completed, disconnect from ScanTel and power cycle the module.
5. Open My Computer
6. In the Address Bar, type:
   ftp://<IPAddress><ENTER>
   Where: <IPAddress> is the IP Address of the DSA-PTP.
7. The host computer should connect. If the connection is successful, the contents of the DSA-PTP memory will be displayed in a folder format.



8. Open Windows Explorer in another window. Find the directory where the last known, good Cal.cfg file is stored for the DSA-PTP you are working with. Highlight the file to be copied to the DSA-PTP and:
   Click: Edit
   Click: Copy
9. Select the DSA-PTP window and,
   Click: Edit
   Click: Paste

The files will be copied to the DSA-PTP. A progress window will provide progress information.



10. When the copy function is complete, the DSA-PTP window will show the new files. The time and date will show the Time and Date of the transfer. This is the only time this date will be shown and will change to the default after power cycle.
11. Cycle the power to the DSA-PTP.
12. Once the module is booted, make another connection in ScanTel.
13. Issue the command:
    SAVE<ENTER>

Your modules coefficients have now been replaced. If you experience any troubles, please contact techsupport@scanivalve.com

DSA3200-PTP SENSOR REPLACEMENT

The piezoelectric pressure sensors in the DSA-PTP module are field replaceable. If a sensor needs to be replaced, contact Scanivalve Technical Support before attempting to change a sensor. New sensors can be obtained from Scanivalve or any official Scanivalve Representative. Extreme caution should be taken when changing a sensor.

CAUTION! ESD protection is required for this procedure. Failing to follow ESD protection guidelines could cause permanent damage to the DSA-PTP electronics.

The procedure shows a DSA3217-PTP module, but the procedure is very similar for a DSA3218-PTP. Simply remove the top and side of the DSA3218-PTP enclosure, remove the "core" assembly and pick up the procedure at step 4.

The following equipment is required:

- ESD protection
- #1 phillips screw driver
- #2 phillips screw driver
- 5/64" allen wrench
- 3/32" allen wrench

Step 1: Remove the bottom mounting plate

Using a #2 phillips screwdriver, remove the 4 screws that attach the bottom mounting plate.

FIGURE 6.11: REMOVE BOTTOM MOUNTING PLATE

Step 2: Remove the top plate

Using a 3/32" allen wrench, remove the 8 allen screws holding the top plate on. These are "captive" screws so they do not have to be completely removed.

FIGURE 6.12: REMOVE TOP PLATE

Step 3: Remove the case half screws

Using a #2 phillips screwdriver, remove the two remaining screws that are securing the two case halves together.

FIGURE 6.13: REMOVE THE CASE HALVE SCREWS

Step 4: Separate the case halves

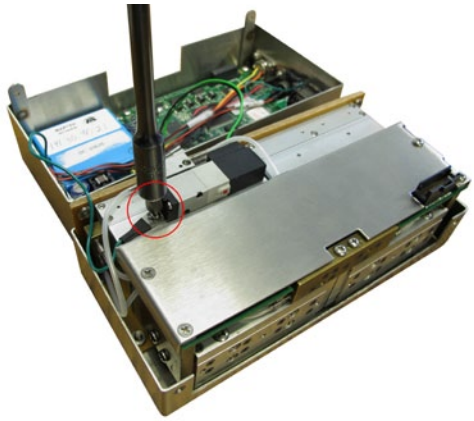
Gently separate the two case halves from each other. Make sure to pull squarely to prevent damage to the A/D board interface connector.

FIGURE 6.14: SEPARATE THE CASE HALVE SCREWS

Step 5: Disconnect the ground wire

Using a #1 phillips screwdriver, disconnect the ground wire.

FIGURE 6.15: REMOVE THE GROUND WIRE



Step 6: Disconnect the Quick Zero solenoid

Carefully disconnect the quick zero solenoid from the processor board.

FIGURE 6.16: DISCONNECT THE QUICK ZERO SOLENOID

Step 7: Remove the "core" from the case half

Using a #2 phillips screwdriver, remove the 4 screws that hold the core into the case half. Carefully remove the core from the case half.

FIGURE 6.17: REMOVE THE CORE

Step 8: Remove the insulators

Using a #2 phillips screwdriver, remove the 8 counter sunk screws that hold the insulators in place.

FIGURE 6.18: REMOVE THE INSULATORS

Step 9: Remove the Quick Zero Solenoid and manifold

Using a 5/64" allen wrench, remove the quick zero solenoid and the manifold from the end of the core.

*NOTE: Only the manifold from the related sensor pack needs to be removed. If changing a sensor in position 1-8, the quick zero solenoid can be left in place.

FIGURE 6.19: REMOVE THE MANIFOLD

Step 10: Remove the reference manifold

Using a #2 phillips screwdriver, remove the reference manifold from the appropriate sensor pack. Gently and squarely pull the reference manifold from the sensor housing.

FIGURE 6.20: REMOVE THE REFERENCE MANIFOLD

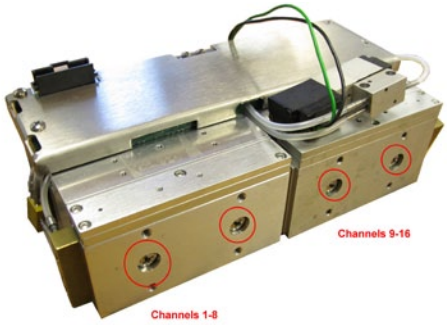
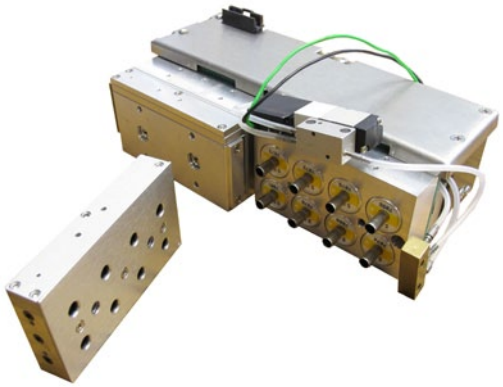


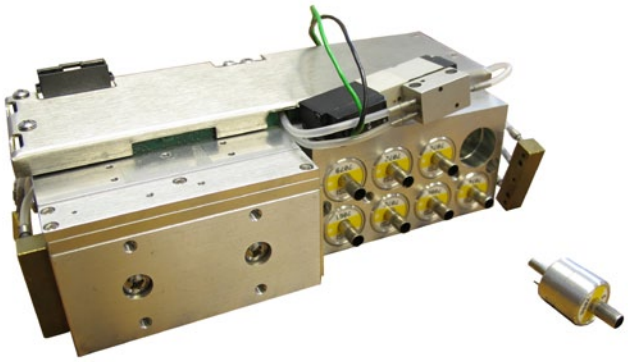
FIGURE 6.21: REMOVE THE REFERENCE MANIFOLD



Step 11: Replace the sensor

Gently pull the sensor out that needs to be replaced. Note the position of the alignment pin when installing the new sensor. The sensor shown removed in this image is from position #15.

FIGURE 6.22: REMOVE THE SENSOR



Reassemble the module in the reverse order as the disassembly process. After replacing a sensor, the new calibration coefficients for that sensor will need to be uploaded to the module in order for it to work properly. Scanivalve provides a free utility program called the "Sensor Replacement Utility" that makes this task very simple. The Sensor Replacement Utility can be downloaded for free from the Scanivalve website at http://www.scanivalve.com/support/software-downloads/.

DSA3200-PTP GENERAL CHECKOUT PROCEDURE

The following is a high-level checkout procedure for the DSA3200-PTP series modules. This can be used as a verification that the module is fully functional before implementing it into a system, or as a diagnostic check if it is suspected that the module is not functioning correctly. Ensure that the module has been warmed up for at least 1 hour before beginning this procedure. This procedure does not verify the accuracy of the module. If the module fails this procedure in any way, contact Scanivalve for additional support.

Begin by configuring the module for the test, with the following settings:

SET FORMAT 0 **SET FPS 2**
SET AVG 32 **SET XSCANTRIG 0**
SET PERIOD 500 **SET BIN 0**

Verify that the unit is not configured for UDP data by sending the command:

LIST I

Check the setting of the HOST variable. If the last character is a "U" then the unit needs to be reconfigured before beginning this checkout. Change the last character to "T", then type SAVE. Once the save is complete, cycle power on the module.

1. Check raw pressure and temperature readings
   Send the following commands:
   SET EU 0
   SET ZC 0
   SCAN

   -The raw pressure readings should all be ±500 counts
   -The raw temperature readings (at room temp) should be between -15,000 and +10,000 counts

2. Verify the CALZ function
   Send the following commands:
   SET ZC 1
   CALZ (wait 10-15 seconds for the CALZ to complete)
   SCAN

   - The raw pressure readings should all be ±5 counts

3. Verify the Engineering Unit Conversion
   Send the following commands:
   SET EU 1
   SCAN

   - The pressure readings should be extremely close to 0.0psi
   - The temperature readings should be between 0°C and 15°C above the ambient temperature, depending on how long it has been powered up.

4. Verify the reference response
   Send the following commands:
   SET FORMAT 1
   SET FPS 0
   SCAN

   With the unit scanning, apply between 75% and 100% of full scale pressure (or 15 psi maximum) to the reference port(s) on the module.

   - This should result in a negative reading on all channels.

5. Check for leaks in the reference plumbing
   With the unit still scanning, trap the pressure on the reference port(s).

   - Monitor the pressures for 60 seconds, a pressure drop of up to 0.1% of full scale is acceptable.

   Vent the pressure off of the reference port(s).

6. Verify individual Px response
   With the unit still scanning, apply between 75 and 100% of full scale pressure individually to all 16 Px inputs.

   - This should result in a believable positive pressure on only the one channel with pressure applied.

7. Verify the calibration input (CAL) response
   Apply 90-120 psi to the CTL1 and CTL2 ports to put the DSA-PTP module into calibration mode.
   With the unit still scanning, apply between 75 and 100% of full scale pressure to the CAL port(s)

   - This should result in a believable positive pressure on all 16 channels.

8. Check for leaks in the calibration plumbing
   With the unit still scanning, trap the pressure on the calibration port(s).

   - Monitor the pressures for 60 seconds, a pressure drop of up to 0.1% of full scale is acceptable.

   Vent the pressure off of the calibration port(s).
   Vent the pressure off the CTL1 and CTL2 ports.
   STOP the scan.

9. Check for drifting/unstable sensors
   Send the following commands:
   SET EU 0
   CALZ (wait for the CALZ to complete)
   SCAN

   Monitor all 16 channels

   - All sensor readings should stay stable within 4 counts for 1 minute.

   STOP the scan.

10. Check for noisy output
    Send the following commands:
    SET AVG 4
    SCAN

    Monitor all 16 channels for 1 minute, watching for any “spiking” data.

    - All readings should stay within ±20 counts from the original reading for the duration of the 1 minute test.

11. OPTIONAL Purge test
    Apply 90-120 psi to the CTL1 and CTL2 ports
    Apply 90-120 psi to the PRGCTL port
    Apply the desired purge pressure to the PRG port

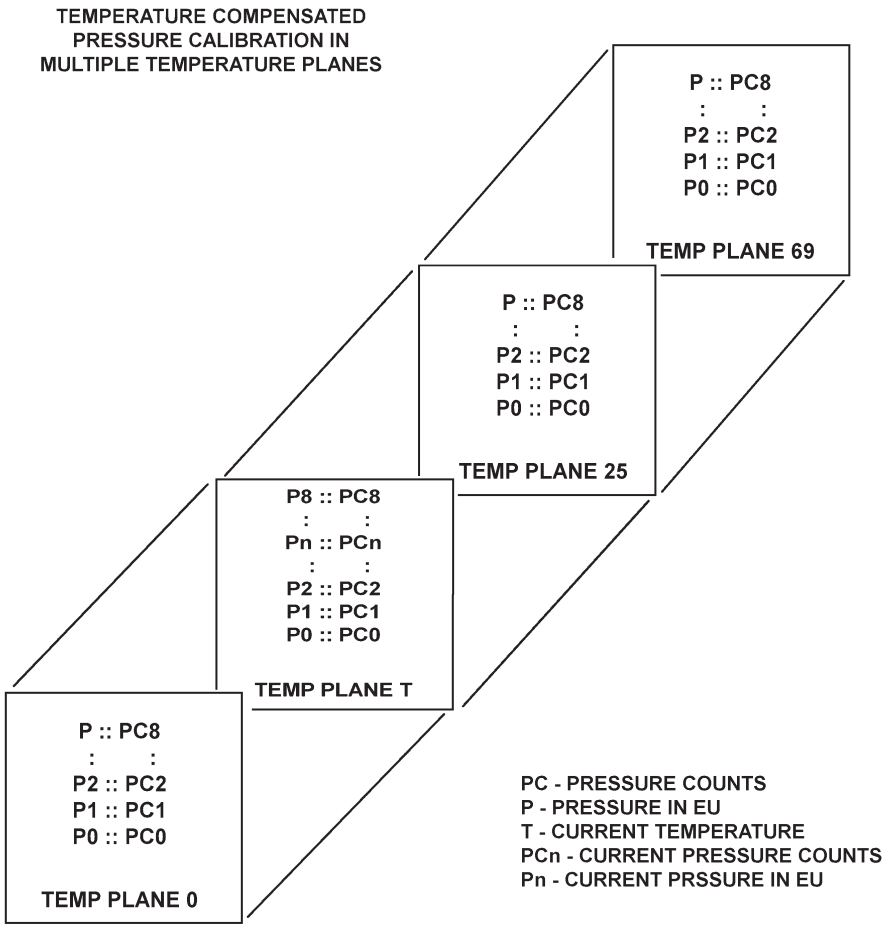
    - Verify that purge pressure is flowing out of all 16 Px input ports
    - Verify that there is no purge pressure flowing out of any other port

    At the completion of the test, step the unit out of purge mode:
    Remove the purge pressure from the PRG port
    Remove the 90-120 psi from the PRGCTL port
    Remove 90-120 psi from the CTL1 and CTL2 ports

[INTENTIONALLY LEFT BLANK]

APPENDIX

APPENDIX A: TEMPERATURE COMPENSATED PRESSURE CONVERSION



Formulas:

Pressure interpolation within current temperature plane:

$$P_{nt} = \frac{1}{PC_{1t} - PC_{0t}}((PC_{1t} - PC_{nt})P_{0t} - (PC_{0t} - PC_{nt})P_{1t})$$

Calculation of entries in current temperature plane:

$$P_t = \frac{1}{T_{25} - T_0} \quad ((T_{25} - T)P_{00} - (T_0 - T)P_{0\,25})$$

APPENDIX B: ENGINEERING UNIT CONVERSION CONSTANTS

UNITSCAN Setting	Engineering Unit	PSI to EU 1 psi =	EU to PSI 1 EU =
ATM	Atmospheres	0.068046 A	14.6960 psi
BAR	Bars	0.068947 b	14.5039 psi
CMHG	Centimeters of Mercury	5.17149 cmHg	0.193368 psi
CMH20	Centimeters of Water	70.308 cmH_2O	0.014223 psi
DECIBAR	Decibar	0.68947 db	1.4504 psi
FTH2O	Feet of Water	2.3067 ftH_2O	0.43352 psi
GCM2	Gram per square Centimeter	70.306 g/cm^2	0.014224 psi
INHG	Inch of Mercury @ 0°C	2.0360 inHg	0.491159 psi
INH2O	Inch of Water @ 4°C	27.0680 inH_2O	0.36127 psi
KGCM2	Kilogram per square Centimeter	0.703070 kg/cm^2	14.2235 psi
KGM2	Kilogram per square Meter	703.069 kg/m^2	0.0014223 psi
KIPIN2	kips per square inch (ksi)	0.001kip/in^2	1000.0 psi
KNM2	Kilonewton per square Meter	6.89476 kN/m^2	0.145038 psi
KPA	Kilopascal	6.89476 kPa	0.145038 psi
MBAR	Millibar	68.947 mb	0.014504 psi
MH20	Meter of Water	0.70309 mH_2O	1.42229 psi
MMHG	Millimeter of Mercury	51.7149 mmHg	0.0193368 psi
MPA	Megapascal	0.00689476 MPa	145.039 psi
NCM2	Newton per square Centimeter	0.689476 N/cm^2	1.45038 psi
NM2	Newton per square Meter	6894.76 N/m^2	0.000145038 psi
OZFT2	Once per square Foot	2304.00 oz/ft^2	0.000434028 psi
OZIN2	Ounce per square Inch	16.00 in/ft^2	0.062500 psi
PA	Pascal	6894.76 Pa	0.000145038 psi
PSF	Pound per square Foot	144.00 lb/ft^2	0.00694444 psi
TORR	Torr	51.7149 T	0.0193368 psi

APPENDIX C: DSA3200-PTP ERROR LIST

BOOT/INITIALIZATION ERRORS

ERROR: Could not create a socket
Fatal Error - The DSA-PTP Module has a hardware problem.
ERROR: Could not bind a socket
Fatal Error - The DSA-PTP Module has a hardware problem.
ERROR: Could not listen on a socket
Fatal Error - The DSA-PTP Module has a hardware problem.
ERROR: accept slave socket
Fatal Error - The DSA-PTP Module has a hardware problem.

SET CONFIGURATION VARIABLE ERRORS

ERROR: Model value not valid
The model value is not 3207, 3217 or 3218
ERROR: PORT value not valid
Port is not a valid Windows Port number
ERROR: HOST value not found
ERROR: HOST server port value not valid
The host port was not entered or is an invalid or reserved port number
ERROR: HOST IP address value not valid
The host IP address entered is not a valid address
ERROR: PMaxH value not valid
ERROR: PMaxL value not valid
The value for the variable was not entered or is not numeric.
ERROR: PMinH value not found
ERROR: PMinH value not valid
The value for the variable was not entered or is not numeric.
ERROR: PMinL value not found
ERROR: PMinL value not valid
The value for the variable was not entered or is not numeric.
ERROR: NegPts value not valid
ERROR: NegPts channel value invalid
The value for the variable was not entered or is not numeric.
ERROR: NegPts channel not between 0 and 15
The number entered was negative or greater than 15
ERROR: NegPtsH value not found
ERROR: NegPtsH value not valid
The value for the variable was not entered or is not numeric.
ERROR: NegPtsL value not found
ERROR: NegPtsL value not valid
The value for the variable was not entered or is not numeric.
ERROR: NegPtsH not between 0 and 8
ERROR: NegPtsL not between 0 and 8
The number entered was negative or greater than 8
ERROR: Abs value not found
ERROR: Abs value not valid
ERROR: Abs channel value invalid
The number entered was negative or greater than 15
ERROR: Abs channel not between 0 and 15
The number entered was negative or greater than 15
ERROR: Max value not valid
ERROR: Max channel value invalid
The value for the variable was not entered or is not numeric.

ERROR: Max channel not between 0 and 15
The number entered was negative or greater than 15
ERROR: Min value not valid
ERROR: Min channel value invalid
The value for the variable was not entered or is not numeric.
ERROR: Min channel not between 0 and 15
The number entered was negative or greater than 15
ERROR: Period value not valid
The value for the variable was not entered or is not numeric.
ERROR: Period value below range
ERROR: Period value above range
The value entered was less than 125 or greater than 65535
ERROR: FPS value not valid
The value for the variable was not entered or is not numeric.
ERROR: EU value not valid
ERROR: QPKTS value not valid
ERROR: ZC value not valid
ERROR: BIN value not valid
ERROR: FORMAT value not valid
ERROR: XSCANTRIG value not valid
ERROR: PAGE value not valid
ERROR: ECHO value not valid
The value for the variable was not 0 or 1.
ERROR: TIME value not valid
The value for the variable was not 0, 1 or 2.
ERROR: AVG value not valid
The value for the variable was not entered or is not numeric.
ERROR: Average value below range
ERROR: Average value above range
The value entered was less than 1 or greater than 240
ERROR: UnitScan value not valid
The value for the variable was not entered.
ERROR: UnitScan did not find unit name in table
The value for the variable is not on the master list. Refer to the software specification for a list of valid names.
ERROR: CvtUnit value not valid
The value for the variable was not entered or is not numeric.
ERROR: Tempb value not valid
ERROR: TempB channel value invalid
The value for the variable was not entered or is not numeric.
ERROR: TempB channel not between 0 and 15
The number entered was negative or greater than 15
ERROR: Tempm value not valid
ERROR: TempM channel value invalid
The value for the variable was not entered or is not numeric.
ERROR: TempM channel not between 0 and 15
The number entered was negative or greater than 15
ERROR: SerNum value not valid
The value entered is not numeric
ERROR: Npr value not valid
The value entered is not numeric
ERROR: DEF channel not valid
The channel value entered is negative or not numeric
ERROR: DEF channel not between 0 to 15
The number entered was negative or greater than 15

ERROR: CALB baro value not valid
The value was not entered, negative, or not numeric
ERROR: CALB period value not valid
The value entered was outside the range of the PERIOD variable.
ERROR: CALB average value not valid
The value entered was less than 1 or greater than 240.
ERROR: Calb data error
Fatal hardware error - The module did not enter or complete the scan.
ERROR: CALZ period value not valid
The value entered was outside the range of the PERIOD variable.
ERROR: CALZ average value not valid
The value entered was less than 1 or greater than 240.
ERROR: Calz data error
Fatal hardware error - The module did not enter or complete the scan.
ERROR: Zero value not valid
ERROR: Zero channel value invalid
The value for the variable was not entered or is not numeric
ERROR: Zero channel not between 0 and 15
The number entered was negative or greater than 15
ERROR: Delta value not valid
ERROR: Delta channel value invalid
The value for the variable was not entered or is not numeric
ERROR: Delta channel not between 0 and 15
The number entered was negative or greater than 15
ERROR: Dout channel not present
The DOUT channel and condition was not entered
ERROR: Dout channel invalid
The DOUT channel number entered less than 1, greater than 5, or not numeric.
ERROR: Dout data missing
The DOUT condition was not entered
ERROR: Dout data value not valid
The DOUT condition was not 0 or 1

COMMAND ERRORS

ERROR: Mode ready, invalid command
ERROR: Invalid command
The command entered was not a DSA-PTP command
ERROR: Invalid set parameter
The configuration variable entered was not a DSA-PTP variable
ERROR: Invalid list parameter
The list parameter was not A, B, C, D, G, H, I, L, M, N, O, S, or Z.
ERROR: UPLOAD <S or C> value not found
S or C was not entered or was lower case
ERROR: UPLOAD file name not found
The file name was not entered, does not exist, or has an invalid path
ERROR: Insert's temp value not valid
The temperature values were either not entered, negative, or not numeric
ERROR: Insert's temp above <max temp>
The temperature value entered was greater than 69
ERROR: Insert's chan value not valid
The channel value was not entered or not numeric.
ERROR: Insert's chan above 15
The channel value entered was greater than 15
ERROR: Insert's pressure value not valid

The pressure value entered was not numeric
ERROR: Insert's type not valid
ERROR: Insert's type must be M
The insert type must be M
ERROR: LIST M start temp not valid
The start temp entered was less than 0, greater than 69, or not numeric
ERROR: List M start temp above <max temp>
The start temp entered was greater than 69
ERROR: LIST M stop temp not valid
The stop temp entered was less than start temp, not numeric, or greater than 69
ERROR: List M stop temp above <max temp>
The stop temp entered was greater than 69
ERROR: LIST A start temp not valid
The start temp entered was less than 0, greater than 69, or not numeric
ERROR: List A start temp above <max temp>
The start temp entered was greater than 69
ERROR: LIST A stop temp not valid
The stop temp entered was less than start temp, not numeric, or greater than 69
ERROR: List A stop temp above <max temp>
The stop temp entered was greater than 69
ERROR: DELETE start temp value not found
The start temp was not entered or was not numeric
ERROR: DELETE start temp not valid
The start temp entered was less than 0, greater than 69, or not numeric
ERROR: DELETE stop temp value not found
The stop temp was not entered or was not numeric
ERROR: DELETE stop temp not valid
The stop temp entered was less than 0, greater than 69, or not numeric
ERROR: Delete start temp above <max temp>
The start temp entered was greater than 69
ERROR: Delete stop temp above <max temp>
The stop temp entered was greater than 69
ERROR: Max errors exceeded
The error buffer is full - more than 15 errors have been detected
ERROR: No Errors
No errors have been detected - this is the normal response to the error command

COMMUNICATION ERRORS

ERROR: Closing slave socket with read error
Fatal Error - The DSA-PTP Module has a hardware problem.
ERROR: Could not spawn Tcp Server
Fatal Error - The DSA-PTP Module has a hardware problem.
ERROR: Could not spawn Udp Id Server
Fatal Error - The DSA-PTP Module has a hardware problem.
ERROR: Could not spawn Udp Server
Fatal Error - The DSA-PTP Module has a hardware problem.
ERROR: Could not create a UDP socket
Fatal Error - The DSA-PTP Module has a hardware problem.
ERROR: Could not bind a UDP socket
Fatal Error - The DSA-PTP Module has a hardware problem.
ERROR: sending UDP bytes
Fatal Error - The DSA-PTP Module has a hardware problem.
ERROR: Alignment error
Fatal Error - The DSA-PTP Module has a hardware problem parsing the data

ERROR: Allignment rb%lu f%1lX lbx%1lX lb%1lX px%1lX p%1lX cx%1lX c%1lX",
Fatal Error - The DSA-PTP Module has a hardware problem parsing the data.
ERROR: Data buffer overflow
The data buffer is full - The TCP/IP connection may be disconnected
ERROR: Send message queue
The TCP/IP connection may be disconnected or the scan speed os too fast for the network.
ERROR: Send queue is full
The TCP/IP connection may be disconnected or the scan speed os too fast for the network.
ERROR: Receive message queue
The command received is too long, or too many commands have been sent before the DSA-PTP Module can process them.

APPENDIX D: SOFTWARE CHANGE LOG

Version 1.00 - Initial Release (April 2018)
Verison 1.01 - Corrected a socket issue pertaining to data transfer. (August 2018)
Version 1.02 - Added limit settings under LIST LIMIT. LIST B now determines the actions of CALZ and CALB. (September 2018)
Version 1.03 - Fixed a bug involving CALZ command. (October 2018)
Version 1.04 - Improved high scan rate reliability. Corrected a bug when using Scan Start Time and Scan Start Date. Changed PTP control to prevent clock from reinitializing when PTPEN is already enabled. (January 2019)
Version 1.05 - Increased receive buffer size. Altered scan start delay time. (March 2019)
Version 1.06 - Resolved an issue with time stamps in ASCII data output. Added DOUT command. (March 2020)
Version 1.07 - Altered the PERIOD setting in the FPGA to improve data rate consistency. (May 2020)
Version 1.08 - Resolved issue with PTP timestamp when TIME == 3. Changed PTP flag in transport packet. Changed PERIOD variable to allow 4 decimal places. (March 2021)
Version 1.09 - Resolved issue when setting the scan rate. (June 2021)
Version 2.00 - Support new FPGA chip. This version requires new firmware (.HEX) and FPGA (.BIT) file, and is not backward compatible with older firmware versions. It is compatible with all DSA-PTP hardware. (April 2022)
Version 2.01 - Resolved issue with PTP synchronization when the Grandmaster time was in the past compared to the DSA-PTP's current time. Randomized PTP Sequence ID value in delay request packets. Resolved an intermittent interrupt reentry issue in certain scan configurations. (June 2022)

Scanivalve

1722 N. Madson St.
Liberty Lake, WA 99019

Phone: 1-800-935-5151
1-509-891-9970
Fax: 1-509-891-9481

scanco@scanivalve.com
www.scanivalve.com