# *Scanivalve*

## DSA3000/DTS4050/SPC4050

Digital Pressure and Temperature Scanner
Pressure Calibrator



# Your expert partner in sensors & controls

**ALTHEN**
SENSORS & CONTROLS

## ÜBER ALTHEN SENSORS & CONTROLS

Althen Sensors & Controls steht für wegweisende Mess- und Senso-
riklösungen. Wir stellen uns jeder messtechnischen Herausforderung.
Immer auf der Suche nach Innovationen geben wir uns erst zufrieden,
wenn wir die perfekte Lösung für Ihre Messaufgabe gefunden haben.
In unserer hauseigenen Fertigung entstehen so kundenspezifische
Systemlösungen. Althen ist Partner vieler anerkannter Universitäten
und führender Konzerne. Wir stehen in einem intensiven Wissenstransfer
und entwickeln gemeinsam die Technologien der Zukunft. Als eines
der ersten Unternehmen in unserer Branche wurde Althen gemäß
TÜV PROFICERT-Verfahren von der Zertifizierungsstelle des TÜV
Hessen nach DIN EN ISO 9001:2015 zertifiziert.

## UNSERE DIENSTLEISTUNGEN FÜR SIE

Sie stehen vor einer messtechnischen Herausforderung oder benötigen
ein passendes Ersatzteil für Ihre Anwendung? Unsere Spezialisten
beraten Sie – ausführlich und fachgerecht. Dabei behalten wir Ihre
Kosten im Blick und entwickeln bei Bedarf kundenspezifische Son-
derlösungen. Profitieren Sie von unserer langjährigen Erfahrung auf
dem Gebiet der Messtechnik und Sensorik:

**A** Hochwertige Fertigung

**A** Messung und Vermietung

**A** Kalibrierung von Messgeräten

**A** Schulungen

ALTHEN
SENSORS & CONTROLS



## INHALT

**ALTHEN**
SENSORS & CONTROLS

# bar DSA® SERIES / DSA® PTP SERIES

## ■ OVERVIEW

The DSA3000 series pressure scanner has been popular throughout pressure scanning applications since its original release in 1995. The new features of the DSA3200-PTP series scanners include:

- IEEE 1588-2008 v2 PTP compatible
- Drop in replacement feature for legacy DSA scanners
- Improved scan rate (now up to 850Hz)
- Improved method to modify IP address
- New 100Base-T Ethernet cable for DSA3218/3207/3307-PTP scanners
- Legacy compatible Serial/Trigger and Power cables
- User-friendly firmware and coefficient update procedure



*DSA3217-PTP/16Px* (shown above)





## ■ DSA3200 (DSA3218 SHOWN)

- Maximum scan rate: 500Hz
- Available in differential, absolute, dual-range, true differential, and indivudal reference.
- Requires serial connection to change IP
- Is not IEEE 1588-2008 v2 PTP compatible
- DSA3218/3207/3307 utilizes Mil-Spec style 10Base-T Ethernet connector
- Firmware and coefficient upload through software

## ■ DSA-PTP (DSA3218-PTP SHOWN)

- Maximum scan rate: 850Hz
- Available in differential, absolute, dual-range, true differential, and indivudal reference
- IP address change through serial or Ethernet
- IEEE 1588-2008 v2 PTP compatible
- DSA3218/3207/3307-PTP utilizes an M-12 style 100Base-T Ethernet connector
- Firmware and coefficient upload via FTP
- Compatible with Legacy DSA3200 scanners

DSA® is a registered trademark of Scanivalve Corp.
Swagelok® is a registered trademark of Swagelok Corp.

**ISO 9001:2015 CERTIFIED**

## ■ COMPARISONS / DSA3200-PTP SERIES UPGRADES

### Replacing a Legacy

The DSA3200-PTP series was developed to provide users with a drop in replacement for the legacy DSA3200 series scanners. The size, shape, and durability was maintained from the DSA3200 series, but with more advanced functionality. If a user is required to upgrade to the new DSA-PTP scanner, replacing the legacy scanner would allow for a simple replacement process.

The most important external change made to the DSA-PTP line of scanners is the Ethernet connection on the DSA3218/3207/3307-PTP scanners. The connector for these DSA-PTP scanners is a D Code M-12 connector rated for 100Base-T Ethernet communication to allow for the new PTP functionality. The legacy Mil-spec style connector on the legacy DSA's are only rated for 10Base-T. In the event that you would like to replace a legacy DSA3218 with a new PTP version, we do offer an adapter cable (PN: 156120-01) which will allow you to connect the Mil-spec style connector to the M-12 connector. The DSA3217-PTP is still manufactured with an RJ45 Ethernet port to allow for a standard Ethernet RJ45 cable.

### Precision Time Protocol Features

Integrating Precision Time Protocol (IEEE 1588-2008v2) into our scanners has given the DSA line of scanners a robust technological upgrade. In applications with multiple scanners and equipment, it is often desired that all instrumentation is working to gather and transfer data at the same time. PTP allows communications to be synchronized with very high precision.

This process is achieved in a master-slave hierarchy system. For example: a grandmaster clock will send out sync commands to all slave devices. These commands are time and date stamped. This allows all slave devices to read Bendixthe time and date stamp and offset their own internal clock to achieve synchrony with the grandmaster. Alternatively, a single DSA-PTP scanner can be programmatically configured to act as a PTP master. This will allow other Scanivalve PTP scanners to be programmed as slaves without the use of a grandmaster clock. Other compatible scanners include the MPS4264, DTS4050, and DSM4000. The PTP communication's settings in the scanner can be accessed using a LIST PTP command.

### Software Upgrades

Like the DSA-PTP's predecessor, the DSA3200-PTP scanners will communicate with the host computer by the same means: Serial and Ethernet connection. While the DSA-PTP is meant to primarily communicate over Ethernet, a serial connection is still available to access the DSA-PTP through the "back door". This allows an alternative connection to change boot parameters, scan settings, and access other information.

An improved feature for the DSA-PTP is the ease of changing boot parameters. With the DSA-PTP you will no longer have to interrupt the boot process to access the boot parameters. When connected to a DSA-PTP with a serial cable, the boot parameters are accessible anytime after the scanner has booted.



New Ethernet Cable
*Blue - New D Code M-12*
*Grey - legacy Bendix*



New Ethernet connector (*DSA3218-PTP shown*)

### New Configuration Methods

Configuring the DSA-PTP scanner's IP address can now be achieved using either a serial or Ethernet connection. When connected via Ethernet, the scanner will now include

a LIST IP variable set in order to change the IP settings of the scanner without having to access this configuration via serial connection.

This new upgrade has also integrated FTP file transfer into the DSA-PTP software. This provides a user-friendly procedure to upload new coefficient files, along with updating the firmware on the DSA-PTP. Now, you can simply drag-and-drop these files onto the DSA-PTP memory.

**Software Packages**

Communications can be made through several software packages including:

- PC - TCP / IP
- PC - UDP
- PC - FTP
- 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 - OPC Server
- PC - Windows HyperTerminal®

## DSA®3217/3218-PTP
Digital Sensor Array

### FEATURES

- Intelligent pressure scanner
- "Network Ready" Ethernet TCP/IP, FTP & UDP
- 850 samples/channel/second EU
- ±.05% full scale long term accuracy*
- 0 - 750 psi pressure range
- Temperature compensated pressure sensors
- Dual pressure ranges available
- IEEE1588-2008v2 PTP compliant
- Drop-in replacement for DSA3200 series scanners

### GENERAL DESCRIPTION

The DSA3200-PTP series pressure scanners are versatile, all-in-one data acquisition systems. Each DSA3217/3218-PTP is built on a pressure sensor per measurement channel architecture. Every pressure sensor is uniquely calibrated over a wide temperature range. All data acquisition, data conversion and communications tasks are handled by the integrated A/D converters and processor. This combination provides easy setup, simple operation and long term reliability.

In addition to the electronics, internal calibration valves are included to provide maximum functionality. The valves allow for several logic states including measurement, isolate, calibrate and purge. In the calibration configuration, either a known pressure can be applied for a span verification/correction, or the sensors can each be pneumatically shorted together allowing for a quick zero offset calibration. This zero offset calibration feature, in conjunction with the sensor's natural stability and repeatability combine to provide maximum long term accuracy.

Once processed, the DSA-PTP outputs the data in either ASCII or Binary format over the Ethernet network TCP/IP or UDP. The DSA-PTP can be setup and all configuration variables can be set over the same Ethernet connection.

The result of the DSA-PTP's careful design is a complete package that makes multi-point pressure acquisition tasks simple. The DSA-PTP's functionality and flexibility make it an excellent fit for a wide range of applications.

### APPLICATIONS

The DSA3200-PTP series is available in two basic configurations; the DSA3217-PTP and the DSA3218-PTP. Both configurations offer the same functionality, but differ in packaging and intended applications. The DSA3217-PTP is enclosed in a stainless steel, splash resistant enclosure intended for most laboratory, educational or other 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.

Additionally, the DSA3218-PTP series offers an optional heater or cooling kit, allowing the DSA-PTP to operate in a much wider temperature range. This allows for year-round operations in open test cells, close-coupled mounting to gas turbine tests, elevated temperatures for Freon testing or any other environment where temperature extremes will be seen or rapid temperature changes are expected.

Again, the DSA3200-PTP's features and options offers support for a wide range of applications and uses. The all-in-one packaging makes configuration easy and operations simple.

DSA® is a registered trademark of Scanivalve Corp.
Windows® is a registered trademark of Microsoft Corp.
LabVIEW® is a registered trademark of National Instruments.
Swagelok® is a registered trademark of Swagelok Corp.

*Some ranges, see page 3 for complete accuracy specifications

**ISO 9001:2015 CERTIFIED**

## ■ DSA3217/3218-PTP FEATURES

### Calibration Valve

The DSA3217/3218-PTP calibration valve is "Normally Px" where no control pressures or a loss of control pressure defaults the valve to the operate (measure) mode. 90 psi control pressure is required to switch the DSA-PTP calibration valve into purge, calibrate or isolate mode. Each of these states can be established during a test with measurement pressure applied. This flexibility allows the DSA-PTP to be calibrated online with either a zero or multi-point calibration.

An internal solenoid valve is utilized for performing quick zero calibrations without the use of a pressure calibrator. When actuated, the positive side of the pressure sensor is pneumatically shorted to the reference manifold, creating a zero differential. The sensor offsets are then updated and saved in EEPROM.



**DIGITAL SENSOR ARRAY**
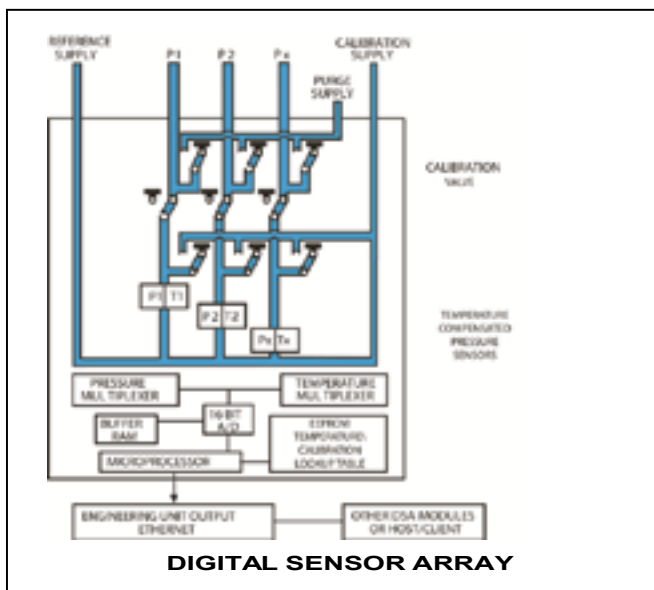
### Sensors - High Accuracy, Long Term Stability

Each DSA3217/3218-PTP silicon pressure sensor is thermally compensated and packaged in its own rugged field-replaceable housing. The transducers are factory calibrated over their full pressure and temperature ranges. The resultant calibration data are stored in a 72 plane pressure/temperature look-up table in EEPROM.

As the sensed sensor bridge temperature changes, the microprocessor selects the appropriate temperature plane -PTP Moduleor interpolates between planes to correct the pressure reading. This on-line temperature correction

and quick zero calibration corrects for inherent zero drift and temperature sensitivity, thus assuring a long-term 6 month accuracy of ±.05%FS (typical).

## ■ CONFIGURATIONS

DSA3217-PTP and DSA3218-PTP modules can be configured to specifically fit each unique application. A wide variety of pneumatic configurations as well as interface options and environmental options are offered.

### Pneumatic Configurations

Standard DSA-PTP modules come with the reference side of all 16 transducers manifolded to a single reference port. If the DSA is ordered as a dual-range unit, a reference is provide for each range. As an option, the DSA can be configured with individual reference ports for all 16 channels. For more flexibility when differential measurements are required, both DSA3217-PTP and DSA3218-PTP modules can be offered in 8 channel "True Differential" configurations which provides inputs and calibration valves on both sides of each individual transducer.
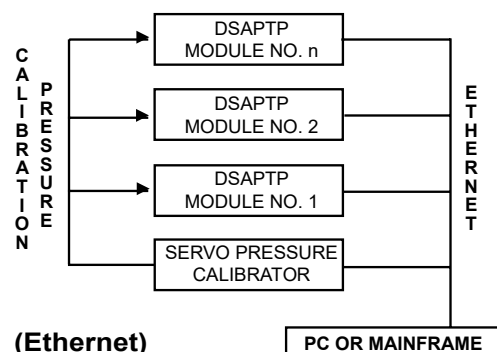
### Interface Options

DSA3218-PTP modules come standard with 1/8" Swagelok® fittings. These can easily be substituted with 1/16", 1/4" or 6mm Swagelok® fittings.

### Environmental Options

The DSA3218-PTP is designed for rugged environments, but to supplement this capability the DSA3218-PTP can be offered with a self-controlled internal heater, or input and exhaust ports for cooling. Depending on the environment, DSA-PTP modules with heaters can be operated in ambient temperatures down to -55°C. DSA-PTP modules with cooling kits can be operated to ambient temperatures of 80°C, provided sufficient cooling air flow is provided.

**Digital Sensor Array System**



(Ethernet)

## COMMUNICATIONS DSA®3200-PTP System

The DSA3217/3218-PTP module interfaces directly to a host via an Ethernet connection. Scanivalve's free Configuration Utility software for LabVIEW® Runtime is designed to assist a user in establishing communications and configuring the DSA-PTP module.

Additionally available is a Software Development Kit for users who want to write their own detailed data acquisition program in LabVIEW®. This Development Kit includes the Configuration Utility software and examples to assist a user in the setup of the system. An OPC driver is also available.

## SPECIFICATIONS

**Inputs (Px):**

| | |
|---|---|
| DSA3217-PTP: | Standard: 16 each .063 inch (1.6mm) O.D. tubulations |
| DSA3218-PTP: | Standard: 1/8 inch Swagelok® fittings |
| | Optional: 1/16 and 1/4 inch Swagelok®  fittings |

**Full Scale Ranges:**

Differential: ±5 inch $H_2O$,10 inch $H_2O$, 1, 2.5, 5, 15, 30, 50, 100, 250, 500, 600, 750 psid (±1.25, 2.5, 7, 17, 35,100, 205, 345, 690,1725, 3450, 4125, 5175kPa)

Absolute: 15, 30, 50, 100 and 250 psia

**Accuracy*:**

| SENSOR PRESSURE RANGE | STATIC ACCURACY (%F.S.) |
|---|---|
| ±5 inch $H_2O$ | ±.40% |
| ±10 inch $H_2O$ | ±.20% |
| ±1 psid | ±.12% |
| ±2.5 psid | ±.08% |
| ±5 to 500 psid | ±.05% |
| ±501 to 750 psid | ±.08% |
| 15 psia to 250 psia | ±.05% (with CALB performed) |
| 15 psia to 250 psia | ±.10% (without CALB performed) |

(Including linearity, hysteresis, and repeatability)

| | |
|---|---|
| **Resolution:** | 16 bit |
| **Scan Rate:** | 850 Hz/Channel EU |
| **Communication:** | Ethernet 100baseT |
| **Communication Protocol:** | TCP/IP or UDP |
| **PTP:** | IEEE 1588-2008v2 PTP |

**Operating Temperature:**
DSA3217-PTP: 0°C to 60°C
DSA3218-PTP: 0°C to 55°C
below 0°C, specify heater
above +55°C, specify cooling kit

**Temperature Compensated Range:** 0°C to 72°C standard

**Mating Connector Type:**
I/O: RJ-45 (DSA 3217-PTP)
I/O: D-Code M12(DSA 3218-PTP)
Power: Bendix PTO6A-8-3S-SR, 3 pin female
Trigger: Bendix JTO1RE8-6S-SR, 6 pin female

**Power Requirements:**

| | |
|---|---|
| DSA3217: | 28Vdc nominal @ 400mA (20-36Vdc) |
| DSA3218: (w/Heater) | 28Vdc nominal @ 1.25A (24-36Vdc) |
| DSA3218: (w/o Heater) | 28Vdc nominal @ 400mA |

**External Trigger:** 6.5 mA at 4.5 Vdc minimum edge sensing

**Overpressure Capacity: (**with no damage)
5 inch $H_2O$= 2 psi (13.79 kPa)
10 inch $H_2O$ = 2 psi (13.79 kPa)
1 psid = 5 psi (35kPa)
2.5 to 499 psid (3440 kPa) = 2.0x
500 psid (3450 kPa) = 1.5x
750 psid (5175 kPa) = 850psi (5860kPa)

**Maximum Reference Pressure:** 250 psig (1725 kPa)

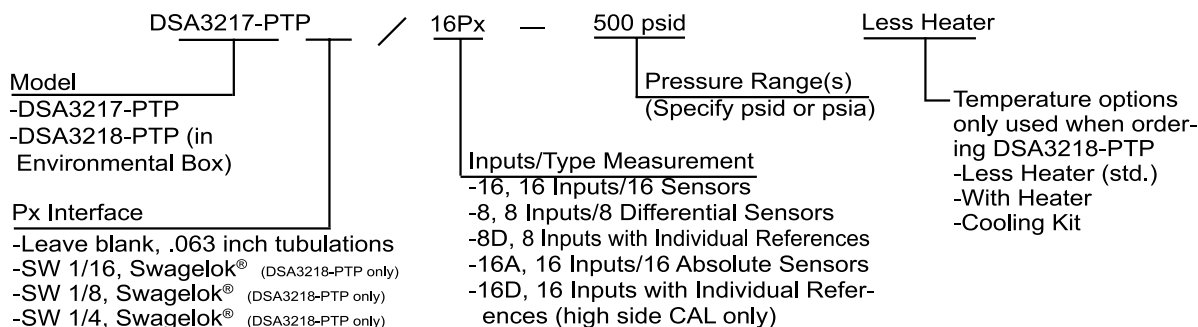**Media Compatibility:** Gases compatible with silicon, silicone, aluminum, and Buna-N

**Weight:**
DSA3217-PTP: 6.4 lbs. (2.9 kg)
DSA3218-PTP: 9.8 lbs. (4.45 kg)
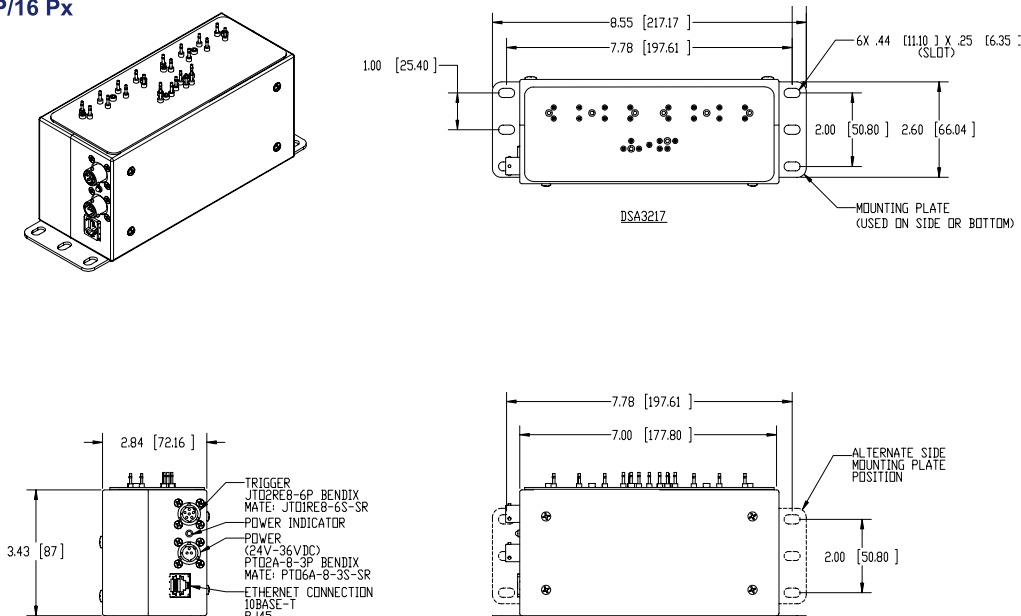
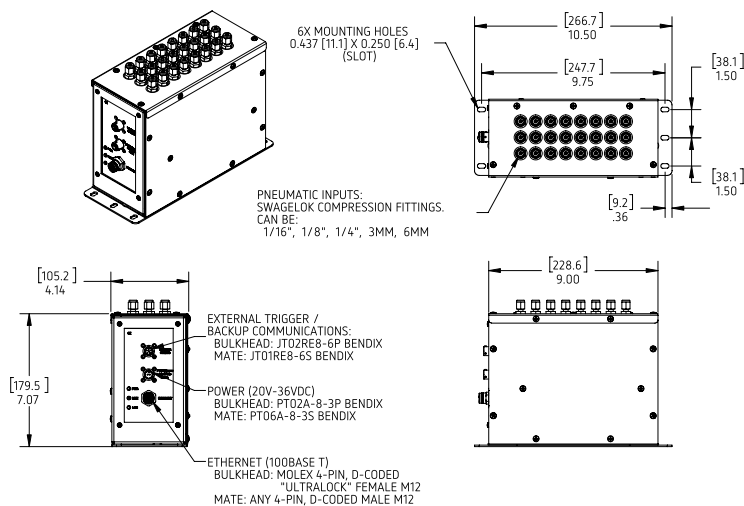**Total Thermal Error over  0 - 60°C Range:** ±.001% F.S./°C

## ORDERING INFORMATION

DSA3217-PTP / 16Px — 500 psid     Less Heater

**Model**
-DSA3217-PTP
-DSA3218-PTP (in Environmental Box)

**Px Interface**
-Leave blank, .063 inch tubulations
-SW 1/16, Swagelok® (DSA3218-PTP only)
-SW 1/8, Swagelok® (DSA3218-PTP only)
-SW 1/4, Swagelok® (DSA3218-PTP only)

**Inputs/Type Measurement**
-16, 16 Inputs/16 Sensors
-8, 8 Inputs/8 Differential Sensors
-8D, 8 Inputs with Individual References
-16A, 16 Inputs/16 Absolute Sensors
-16D, 16 Inputs with Individual References (high side CAL only)

**Pressure Range(s)**
(Specify psid or psia)

**Temperature options** only used when ordering DSA3218-PTP
-Less Heater (std.)
-With Heater
-Cooling Kit

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

## DIMENSIONS INCHES [mm]

### DSA3217-PTP/16 Px



8.55 [217.17]
7.78 [197.61]
1.00 [25.40]
6X .44 [11.10] X .25 [6.35] (SLOT)
2.00 [50.80]   2.60 [66.04]
DSA3217
MOUNTING PLATE (USED ON SIDE OR BOTTOM)

2.84 [72.16]
3.43 [87]

TRIGGER
JT02RE8-6P BENDIX
MATE: JT01RE8-6S-SR
POWER INDICATOR
POWER
(24V–36VDC)
PT02A-8-3P BENDIX
MATE: PT06A-8-3S-SR
ETHERNET CONNECTION
10BASE-T
RJ45

7.78 [197.61]
7.00 [177.80]
ALTERNATE SIDE MOUNTING PLATE POSITION
2.00 [50.80]

### DSA3218-PTP/16Px



6X MOUNTING HOLES
0.437 [11.1] X 0.250 [6.4] (SLOT)

[266.7] 10.50
[247.7] 9.75
[38.1] 1.50
[38.1] 1.50
[9.2] .36

PNEUMATIC INPUTS:
SWAGELOK COMPRESSION FITTINGS.
CAN BE:
1/16", 1/8", 1/4", 3MM, 6MM

[105.2] 4.14
[179.5] 7.07

EXTERNAL TRIGGER / BACKUP COMMUNICATIONS:
BULKHEAD: JT02RE8-6P BENDIX
MATE: JT01RE8-6S BENDIX
POWER (20V-36VDC)
BULKHEAD: PT02A-8-3P BENDIX
MATE: PT06A-8-3S BENDIX
ETHERNET (100BASE T)
BULKHEAD: MOLEX 4-PIN, D-CODED
"ULTRALOCK" FEMALE M12
MATE: ANY 4-PIN, D-CODED MALE M12

[228.6] 9.00

*Each DSA-PTP module comes with the mating trigger and power connector. 3ft Ethernet cable comes with DSA3218-PTP module only.

## bar DSA®3207/3307-PTP
### Liquid Digital Sensor Array

### ■ FEATURES

- Intelligent pressure modules
- "Network Ready" Ethernet TCP/IP, FTP, & UDP
- 850 samples/channel/second EU
- 0 – 1500 psi pressure range
- Temperature compensated sensors
- Liquid pressure measurement (psid, psig, psia)
- IEEE1588-2008v2 PTP compliant
- "All Media" compatibility

### ■ GENERAL DESCRIPTION

The DSA3200/3300-PTP series pressure acquisition systems represent the next generation of multi-point electronic pressure scanning. Model DSA3207/3307-PTP Digital Sensor Array, incorporates 2 to 16 temperature compensated media isolated piezoresistive pressure sensors.

All data acquisition, data conversion and communications tasks are handled by the integrated A/D converters and processor. This combination provides easy setup, simple operation and long term reliability. The result is a network ready intelligent pressure scanning module for "all media" service.

The microprocessor compensates for environmental temperature changes and performs engineering unit conversion. Pressure data outputs the data in either ASCII or Binary format over the Ethernet network TCP/IP or UDP. The DSA-PTP can be setup by the user and all configuration variables can be set over the same Ethernet connection.

### ■ APPLICATIONS

The DSA3207/3307PTP Digital Sensor Array is a rugged design for use with turbine and diesel engine test applications or any liquid measurement application. It is ideal for industrial pressure measurement where long calibration intervals are required and temperatures can vary greatly. An optional heater kit is available for temperatures down to -20° C.

*DSA3207PTP/Base with
8 ea. Sensor packs*

DSA firmware allows for liquid head correction and online rezeroing of the pressure sensors. There are 3 configurations listed below available for measuring liquids:

- Gauge measurement (wet/dry)
- Absolute measurement (wet)
- Differential measurement (wet/wet)

### DSA3207-PTP - Gauge & Absolute (wet/dry)

This model contains a stainless steel diaphragm isolating the measurement side of each pressure transducer from the media. The back side of the gauge transducer must be dry. This design also contains a bleed valve per transducer for venting gas bubbles from the input lines. These individual bleed valves also allow for back filling the DSA input lines.

### DSA3307-PTP - Differential (wet/wet)

This model contains 2 to 16 single sensing element pressure transducers that are isolated from the media on both sides by a 316L stainless steel diaphragm.

It is used in applications for measuring flow or when measuring high line low differential liquid measurements.

**ISO 9001:2015 CERTIFIED**

## ▪ DSA MODULE
### ON-LINE SENSOR COMPENSATION CALIBRATION

Each DSA3207/3307-PTP piezoresistive pressure sensor is isolated from the media to be measured by a stainless steel diaphragm and body. This pressure sensor package is rugged and field replaceable.



**DIGITAL SENSOR ARRAY 3207PTP**
**GAUGE & ABSOLUTE (shown)**
**WET / DRY**
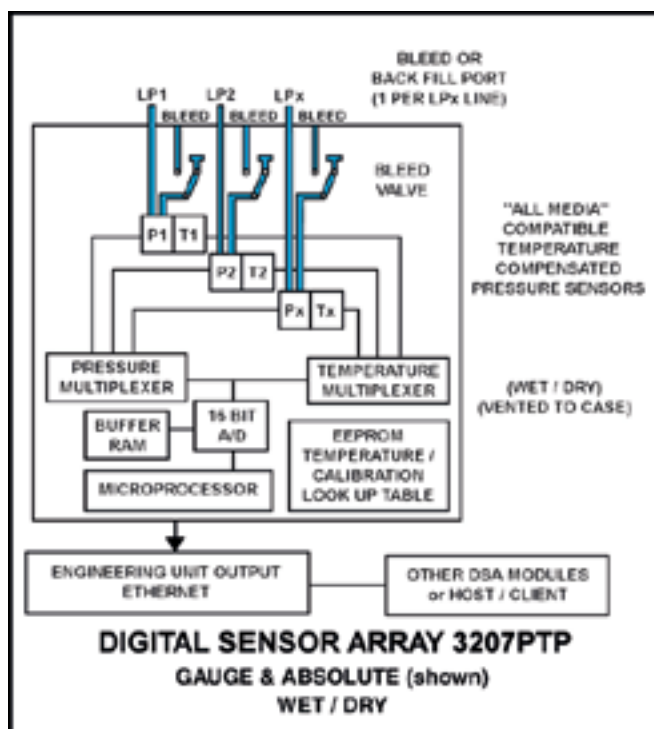
The pressure sensors are factory calibrated over their full pressure and temperature ranges. The calibration result data is stored in a 60 plane pressure/temperature look-up table in memory. A re-zero calibration can be performed on demand. Each pressure sensor's offset is then updated and saved in flash memory.

As the sensor bridge temperature changes, the microprocessor selects the appropriate temperature plane or interpolates between planes to correct the pressure reading. This on-line calibration corrects for zero drift and liquid head pressure, thus assuring a long term 6 month accuracy.

Each pressure input channel is isolated and independent. Up to 8 pressure ranges can be incorporated into one module. In addition, each pressure input channel can be a different fluid.

### Gauge & Absolute (wet/dry)

Model DSA3207-PTP contains a stainless steel diaphragm isolating only the measurement side of the pressure transducer, the backside must be dry. This design also contains a bleed valve per sensor.
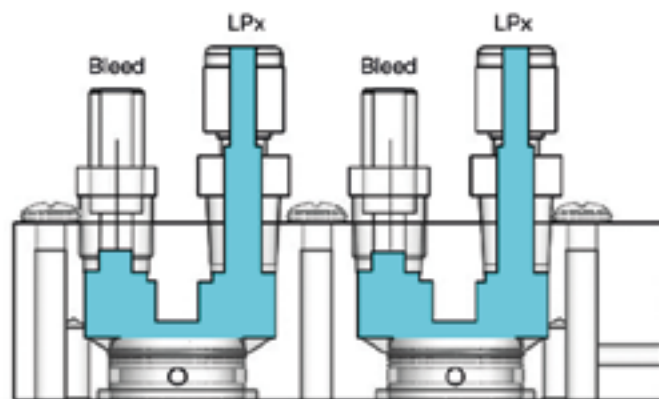


### Differential (wet/wet)

Model DSA3307-PTP contains a single sensing element pressure transducer that is isolated from the media on both sides by a 316L stainless steel diaphragm. A shunt-purge valve is installed to provide flow between the positive and negative pressure inputs and allow gas bubbles to be purged from the system.
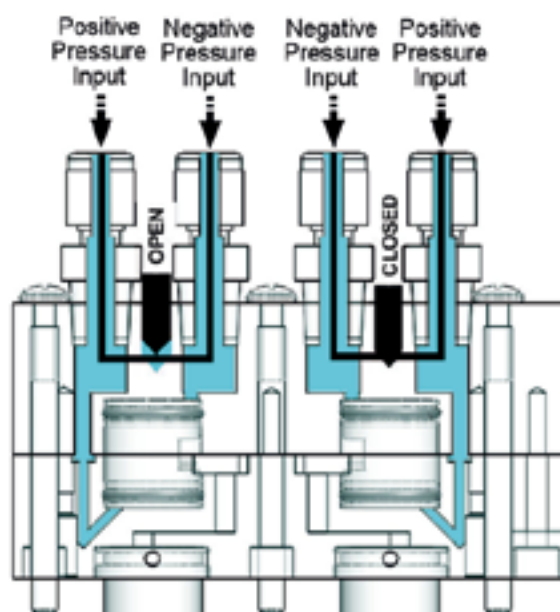


Each DSA-PTP module has a unique, factory set, MAC address. The IP address of the DSA-PTP module is user configurable.

## ■ COMMUNICATIONS

The DSA3207/3307-PTP module interfaces directly to a host via Ethernet connection. Scanivalve's free configuration utility software for LabVIEW® Runtime is designed to assist a user in establishing communications and configuring the DSA-PTP module. Additionally, a Software Development Kit is available for users who want to write their own detailed data acquisition program in LabVIEW®. This Development Kit includes the Configuration Utility software and examples to assist a user in the setup of the system. An OPC driver is also available.

## ■ SPECIFICATIONS

**Inputs (Px):**  2 up to 32 1/8 inch Swagelok® stainless steel fittings

| PRESSURE RANGES (psi) | GAUGE | ABSOLUTE* | DIFFERENTIAL |
|---|---|---|---|
| 1 | N/A | N/A | Contact Factory |
| 2.5 | ±0.20% | N/A | N/A |
| 5 | ±0.20% | N/A | ±0.50% |
| 15 | ±0.12% | ±0.12% | ±0.50% |
| 30 | ±0.12% | ±0.12% | ±0.50% |
| 50 | N/A | N/A | ±0.50% |
| 100 | ±0.12% | ±0.12% | ±0.50% |
| 250 | ±0.12% | ±0.12% | N/A |
| 300 | N/A | N/A | ±0.50% |
| 500 | ±0.15% | N/A | N/A |
| 1000-1500 | ±0.30% | N/A | N/A |

(ACCURACY (%F.S.))

*\* Accuracy is dependent upon performing CALB*

**Resolution:**  16 bit

**Scan Rate:**  850 samples/channel/sec EU

**Communication:**  Ethernet 100baseT

**Protocol:**  TCP/IP or UDP

**Operating Temperature:**  0 – 60° C
**With heater**  -20 to 60° C

**Temperature Compensated Range:**  0 – 69° C

**Mating Connector Type:**  I/O:  D-Code M12
Power: Bendix PTO6A-8-3S, 3 pin female

Trigger: Bendix JT06RE8-6S-SR, 6 pin female

**Power Requirements:**  28Vdc nominal @ 400 mA (20-36 Vdc)

**External Trigger:**  6.5 mA at 9-15Vdc minimum edge sensing

### Maximum overload sensor pressures without damage

| | DSA3307-PTP | | DSA3207-PTP |
|---|---|---|---|
| sensor pressure range (psi) | maximum line pressure applied equally both sides (psi) | maximum overload pressure applied to one side only (psi) | maximum overload pressure (psi) |
| 1 | 50 | 5 | 2 |
| 2.5 | N/A | N/A | 5 |
| 5 | 100 | 15 | 10 |
| 15 | 100 | 45 | 30 |
| 30 | 100 | 90 | 60 |
| 50 | 250 | 150 | N/A |
| 100 | 250 | 250 | 200 |
| 250 | N/A | N/A | 500 |
| 300 | 500 | 500 | N/A |
| 500 | N/A | N/A | 1000 |
| 1000 | NA | N/A | 2000 |
| 1500 | N/A | N/A | 2000 |

**Media Compatibility:**  Water, fuel oil, lubricating oils on sense side only of transducers

Wetted parts are constructed from 300 series stainless steel. Note: Standard internal O-rings are BUNA-N. Consult factory for optional internal o-ring materials such as Viton or Neoprene®.

**Weight:**  **DSA3207-PTP:** 9.5 lbs. (4.31 kg) With 8 ea. DSA3007/2LPx installed.

**DSA3307-PTP:** 15.5 lbs. (7.03 kg) With 8 ea. DSA3307/2DLPx installed.

**Total Thermal Error Over 0-60° C Range:**  +/- .003% F.S./° C

## ORDERING INFORMATION/DIMENSIONS

Ordering DSA3207-PTP or DSA3307-PTP is done in two parts:

**1. Base**—The base contains all of the electronics, connectors, firmware, and up to 8 blanking plates filling up unused spaces.

Scanco No. DSA3207-PTP/Base (gauge or absolute)

Scanco No. DSA3307-PTP/Base (differential)

***(Transducers ordered separately - see below)***

**2. Pressure Transducer Two Pack**—The transducer package contains 2 each isolated pressure transducers of the same pressure range. Order up to 8 sensor packs for each DSA3207/3307-PTP Base. Up to 8 different pressure ranges can be connected on one base.

| Scanco No. | DSA3307 | / | 2LPx | – | xxpsig | | BUNA-N |
|---|---|---|---|---|---|---|---|

DSA3007 (psig, psia)
DSA3307 (psid only)

pressure range
psig, psia, psid
(specify)

-2LPx Liquid, gauge
-2LAPx Liquid, absolute
-2DLPx Liquid, differential (DSA3307 only)

Elastomer
-BUNA-N (standard)
-Neoprene®
-Viton

## DSA3207-PTP/16LPx and DSA3307-PTP/16DLPx Inches [mm]
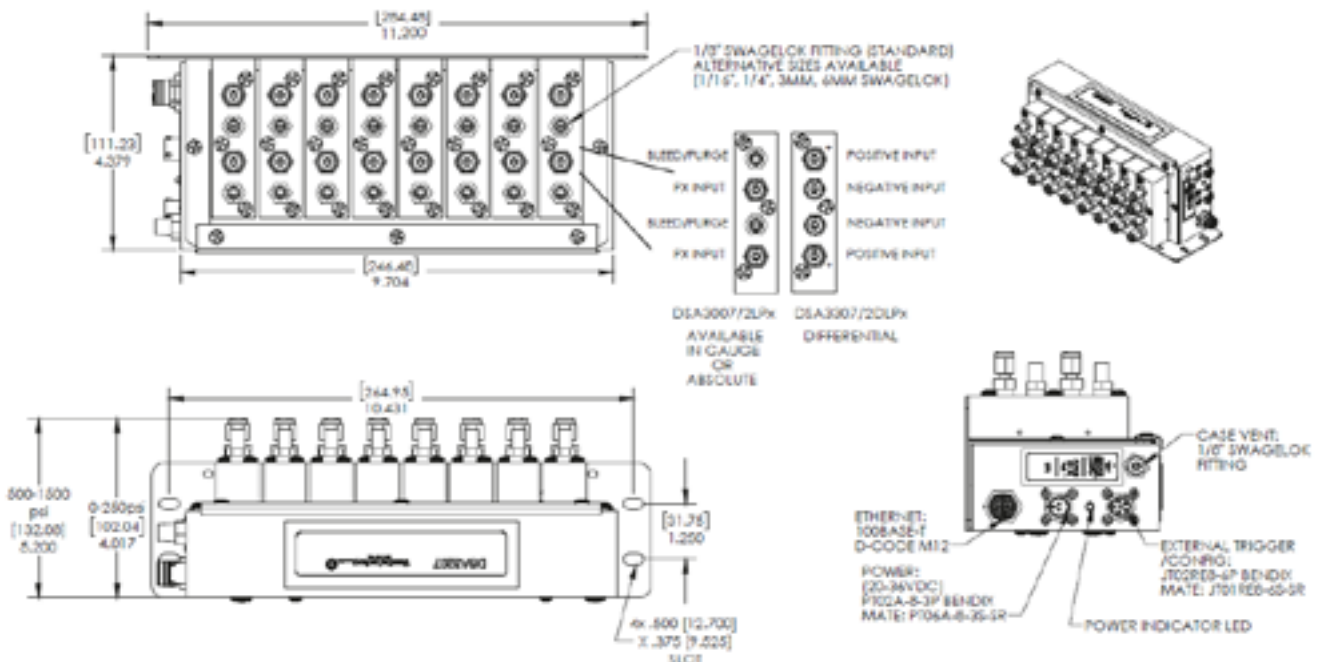


*Each DSA-PTP module comes with the mating trigger and power connector, as well as a 3ft Ethernet cable.*
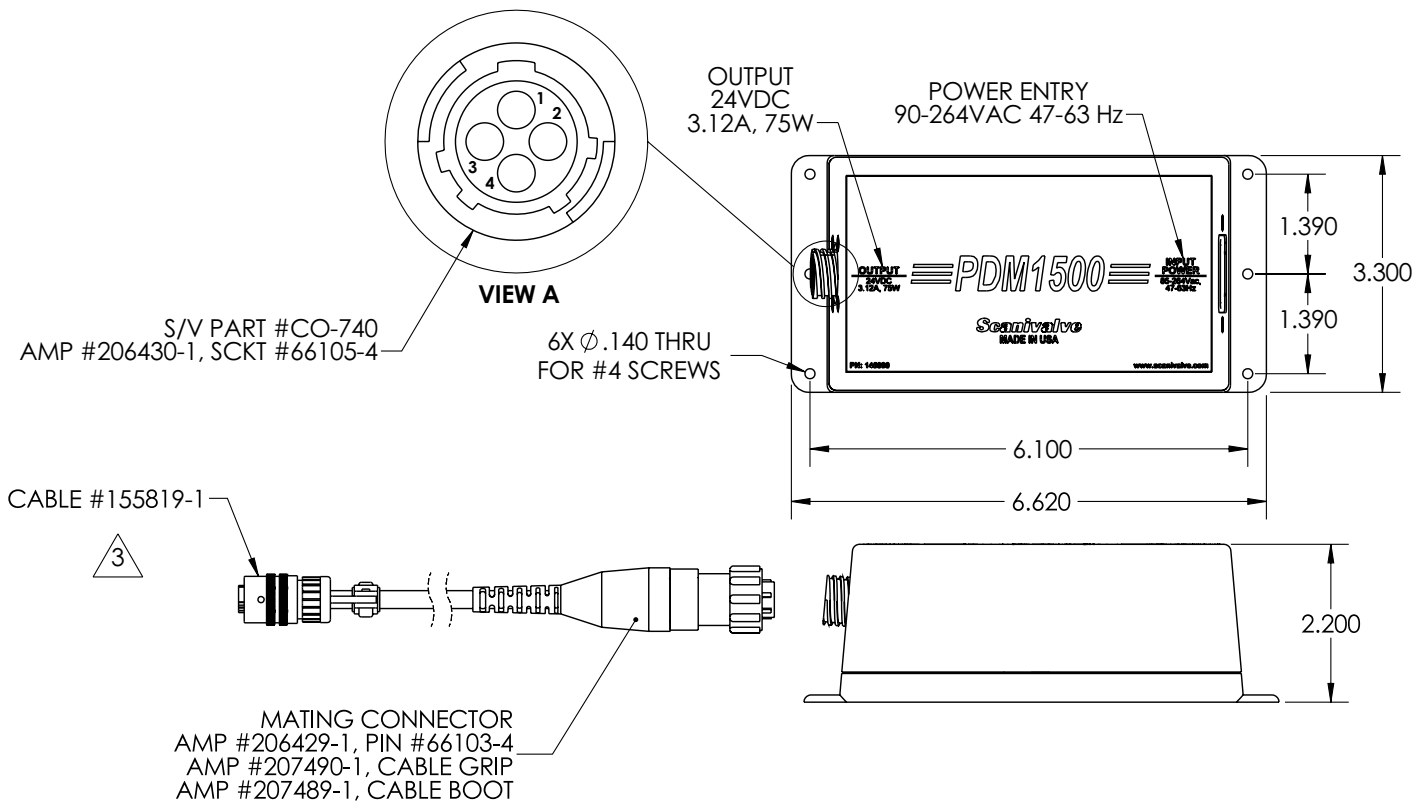
**bar** **PDM1500**
Power distribution module / Outline drawing

## NOTES:
1. REFER TO PRODUCT #145090-1
2. WEIGHT: 12.16 oz. (345 g)
3. CABLE SUPPLIED WITH PDM1500
4. DIMENSIONS IN INCHES

| CO-740 | | |
|--------|--------|-----|
| P1 | +VDC | RED |
| P2 | RTN | BLK |
| P3 | GROUND | GRN |
| P4 | UNUSED | |



VIEW A

S/V PART #CO-740
AMP #206430-1, SCKT #66105-4

OUTPUT
24VDC
3.12A, 75W

POWER ENTRY
90-264VAC 47-63 Hz

6X ⌀ .140 THRU
FOR #4 SCREWS

1.390
1.390
3.300

6.100
6.620

2.200

CABLE #155819-1

⚠3

MATING CONNECTOR
AMP #206429-1, PIN #66103-4
AMP #207490-1, CABLE GRIP
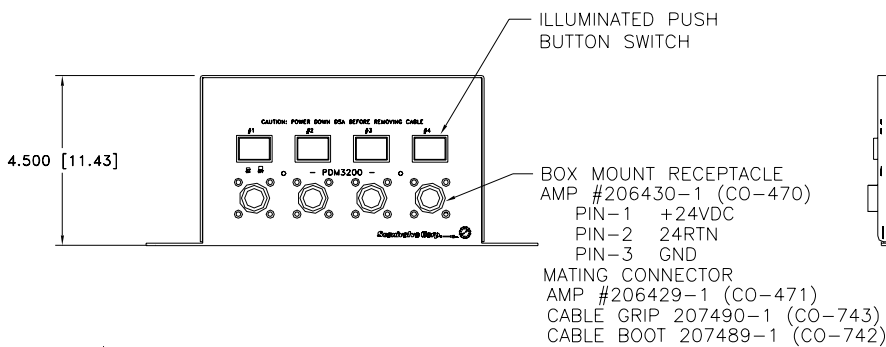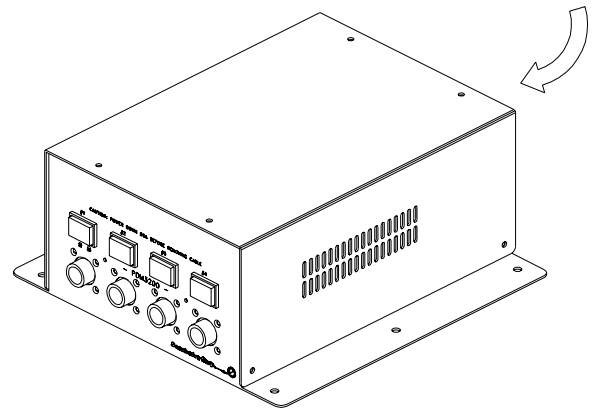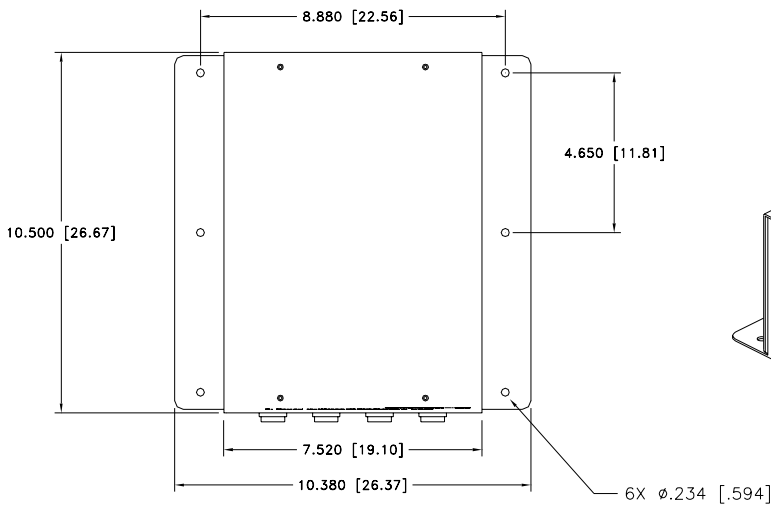AMP #207489-1, CABLE BOOT

ALTHEN
SENSORS & CONTROLS

bar **PDM3200**
Power distribution module

NOTES:
1. DIMENSIONS IN INCHES, [.xx]cm
2. REF PRODUCT #21080-1
3. USE SCANIVALVE CABLE #155819 FOR STANDARD PRODUCTS
   (DSA, DTS, DSM − 3000 SERIES)

—POWER ENTRY MODULE—
INPUT: 88~264VAC, 47~63Hz
OUTPUT: 24VDC±10%, 480W
FUSES: 5x20mm, 125V 10A

8.880 [22.56]

4.650 [11.81]

10.500 [26.67]

7.520 [19.10]

10.380 [26.37]

6X Ø.234 [.594]

ILLUMINATED PUSH
BUTTON SWITCH

4.500 [11.43]

CAUTION: POWER DOWN DSA BEFORE REMOVING CABLE

− PDM3200 −

BOX MOUNT RECEPTACLE
AMP #206430-1 (CO-470)
    PIN-1   +24VDC
    PIN-2   24RTN
    PIN-3   GND
MATING CONNECTOR
AMP #206429-1 (CO-471)
CABLE GRIP 207490-1 (CO-743)
CABLE BOOT 207489-1 (CO-742)
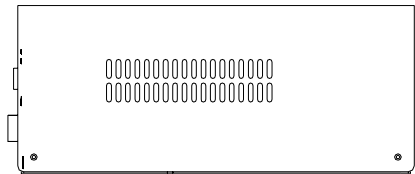
UNLESS
    OTHERWISE
        SPECIFIED

DIMENSIONS
ARE IN INCHES

TOLERANCES ON:
DECIMALS
.XX = ±.015
.XXX = ±.005
DO NOT SCALE
DRAWING

DIM AND TOL
PER ANSI Y14.5M

## DSA®3016
Rack Mounted Digital Sensor Array

### FEATURES

- DSP technology
- 0 - 750 psid pressure range
- Intelligent pressure modules
- Dual pressure ranges available
- ±.05% full scale accuracy (most ranges)
- 625 samples/channel/second
- Temperature compensated pressure sensors

*DSA3016/16Px*
*Digital Sensor Array*

### GENERAL DESCRIPTION

Model DSA3016, Digital Sensor Array, is a rack mounted module designed for multiple pressure measurements. Each DSA3016 module incorporates 16 temperature compensated piezoresistive pressure sensors, along with a pneumatic calibration valve. Field replaceable sensors assure that downtime is minimized in the unlikely event of sensor damage. Up to 8 DSA3016 Digital Sensor Array modules can be used in a 19 inch rack enclosure, Model DSAENCL4000.

The DSAENCL4000 pressure acquisition system represents the next generation of intelligent electronic pressure scanning.

The state-of-the-art DSP technology is at the heart of our new 19 inch rack mounted DSAENCL4000 enclosure. Located on the backplane of the enclosure, the Digital Signal Processor (DSP) is a programmable device capable of extremely fast math functions that operate on the data stream in real time. All measurements are converted into Engineering Units.

Advantages of DSP technology:
· Boots up quickly
· Real Time Operating System
· Low Data Latency

The DSAENCL4000 uses a micro SD card to store all configuration and module data. The SD card is easily removed if needed for security reasons. The enclosure utilizes a pressure temperature look-up table to compensate the pressure sensors for temperature changes, effectively negating any thermal errors.

The DSP processor also controls the actuation of an internal calibration valve to perform on-line zero calibrations. Long term system accuracy is achieved for up to 6 months.

All DSA3016 modules manufactured after first quarter 2004 have an ID chip installed. The DSAENCL4000 DSP processor reads the serial number, pressure range, etc. of each DSA3016 module and its location in the enclosure from the DSA module ID chip.

### APPLICATIONS

The DSA3016 (Digital Sensor Array) is ideal for measuring pressures on turbomachinery, turbine engines, compressors, and other applications where precision pressure measurements are required. The DSA temperature compensated pressure sensors are over ten times more stable over the entire temperature range than typical piezoresistive pressure sensors. Up to 8 DSA3016 pressure modules are supported by a DSAENCL4000 enclosure, totalling 128 pressure inputs per enclosure.

DSA3016 modules have a front panel power cutoff switch that allows them to be "Hot Swappable" without having to power down the system. They also have an illuminated power switch that blinks when scanning. The DSAENCL4000 enclosure has an Ethernet link and activity LED on the front. DSA3016 pressure modules will work with all DSAENCL3000, 3200, and 4000 series enclosures.

**ISO 9001:2015 CERTIFIED**

■ **DSA3016 FEATURES AND OPTIONS
ON-LINE SENSOR COMPENSATION CALIBRATION**

The DSA3016 incorporates individual pressure sensors are each uniquely thermally compensated and individually packaged in rugged, field-replaceable housings. Additionally, the transducers are factory calibrated over their full pressure and temperature ranges. The resultant calibration data are stored in a look-up table in FLASH memory. The design includes integral pneumatic calibration valves, which allows for "quick zero" correction. When actuated, the positive side of the pressure sensors are pneumatically shorted to the reference manifold, creating a zero pressure differential. The sensor offsets are then recorded.

### DSA Calibration Valve Control Pressure

The DSA3016 calibration valves are "Normally Px" where no control pressure, or a loss of control pressure, defaults the DSA calibration valve to the operate (sense) mode. 90 psi control pressure is required to switch the DSA calibration valve into purge, calibrate or isolate mode.

### Dual Range

Each group of 8Px (pressure inputs) contains its own calibration valving and reference connector, thus a single DSA3016 module can incorporate up two unique pressure ranges for maximum flexibility.

### Isolate Purge Feature

A manifold purge feature is incorporated in the DSA calibration valve. This purge method isolates all of the pressure sensors from the purge pressure. It is an ideal method for eliminating condensation, oil, dust or other contaminants in the pressure input tubing. This technique permits the safe use of high purge pressures without damaging the pressure sensors due to overpressure.

### Common vs. Individual Reference

DSA3016 Digital Sensor Arrays are available in two basic model types, common and individual reference. Common reference configurations are standard and allow the user access to each individual sensor's positive side, while the reference (or negative) sides are manifolded in groups of eight. Individual reference versions are available with each sensor having an individual reference input.

### High-Line Low Delta P Measurements

An optional rack mounted pressure module is available that incorporates a special pneumatic design, which allows for a higher accuracy reading of a low differential pressure measurement under high-line (reference) conditions. Safe zero calibrations can be performed under high-line pressures.
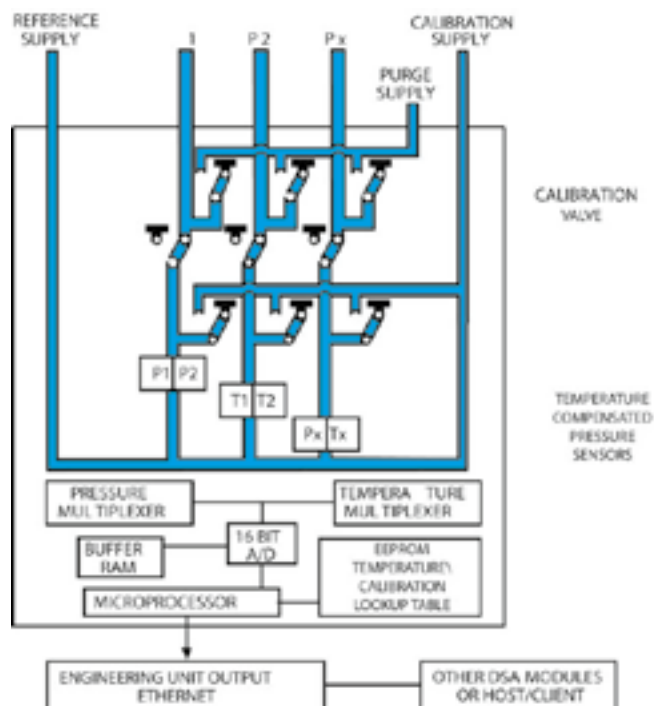


**DIGITAL SENSOR ARRAY**

## DSAENCL4000 / RACK MOUNT ENCLOSURE

Up to 8 DSA3016 Digital Sensor Array modules are desig-
ned to fit in Scanivalve's 19 inch rack mounted enclosures.
Each enclosure incorporates a power supply, DSP processor,
and multiple 16 bit A/D's to convert all analog pressures
to Engineering Units. Communication interface is Ethernet
TCP/IP or RS-232. Only 1 IP address is required for each
rack mount enclosure (up to 128 pressures).

*DSAENCL4000*

## DSA4000 SYSTEM NETWORK

The DSAENCL4000 enclosure interfaces directly to a PC,
host computer or Ethernet network via TCP/IP or RS-232.
Scanivalve's optional Configuration Utility software for Lab-
VIEW® Runtime is designed to assist a user in establishing
communications and configuring the DSA enclosure.

Additionally available is a Software Development Kit for
users who want to write their own detailed data acquisition
program in LabVIEW®. This Development Kit includes the
Configuration Utility software and examples to assist a user
in the setup of the system.

## DSA3016 SPECIFICATIONS

**Inputs (Px):** Rear Access: 1/16 inch brass Swagelok® fittings (16 ea.)
Front Access: 1/8 inch brass Swagelok® fittings (16 ea.)

**Full Scale Ranges:** $\pm5$ inch $H_2O$, $\pm10$ inch $H_2O$, 1, 2.5, 5, 15, 30, 50,100, 250, 500, 600, 750 psid ($\pm1.25$, $\pm2.5$, 7, 17, 35,100, 205, 345, 690,1725, 3450, 4125, 5175 kPa)

**Accuracy:**
(Including linearity, hysteresis, and repeatability)

| Sensor Pressure Range | Static Accuracy After Rezero (% F.S.) |
|---|---|
| 5 inch $H_2O$ | $\pm0.4\%$ |
| 10 inch $H_2O$ | $\pm0.2\%$ |
| 1 psid, 2.5 psid | $\pm0.12\%$ |
| 5 to 500 psid | $\pm0.05\%$ |
| 501 to 750 psid | $\pm0.08\%$ |

**Resolution:** 16 bit A/D

**Scan Rate Maximum:** 625 samples/channel/second (user configurable)

**Operating Temperature:** 0°C to 55°C standard

**Overpressure Capacity**
(with no damage)
5 inch $H_2O$=2 psi (13.79 kPa)
10 inch $H_2O$ = 2 psi (13.79 kPa)
1 psid = 5 psi (35kPa)
2.5 to 499 psid (3440 kPa) = 2.0x
500 psid (3450 kPa) = 1.5x
750 psid (5175 kPa) = 850psi (5860kPa)

**Maximum Reference Pressure:** 250 psig (1725 kPa)

**Media Compatibility:** Gases compatible with silicon, silicone, aluminum and BUNA-N

**Weight:** DSA3016/16Px: 4 lbs. 12 oz. (2.15 kgm)

## DSAENCL4000 Enclosure Specifications

**Communication**

**Protocol:** TCP/IP or UDP

**Connector Type:** I/O: RJ-45
Trigger: Bendix PTO6A-12-10S, 10 pin female

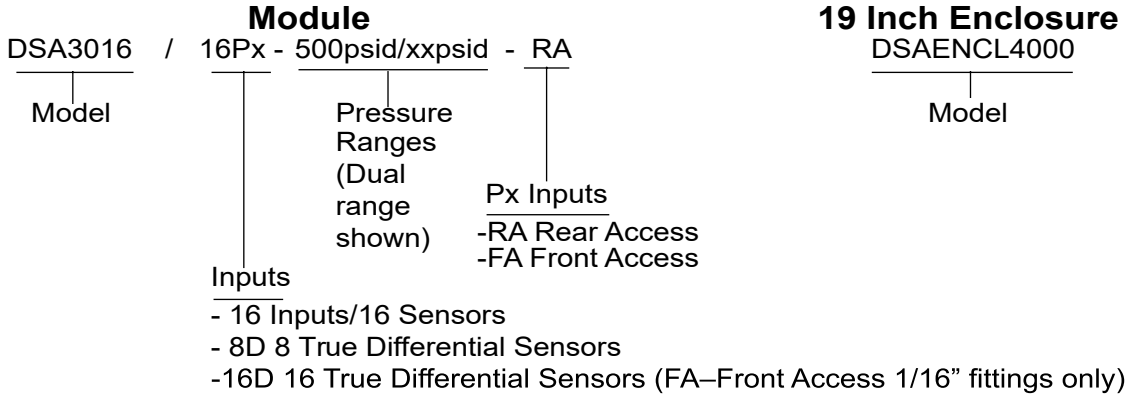**Interface:** Ethernet 10/100 BaseT (auto crossover feature)
RS-232 (9600 Baud)

**Power Requirements:** 115Vac @ .87 Amp (100 VA)
230Vac @ .44 Amp (100 VA)

**Weight:** DSAENCL4000:19.5 lbs (8.85kg)
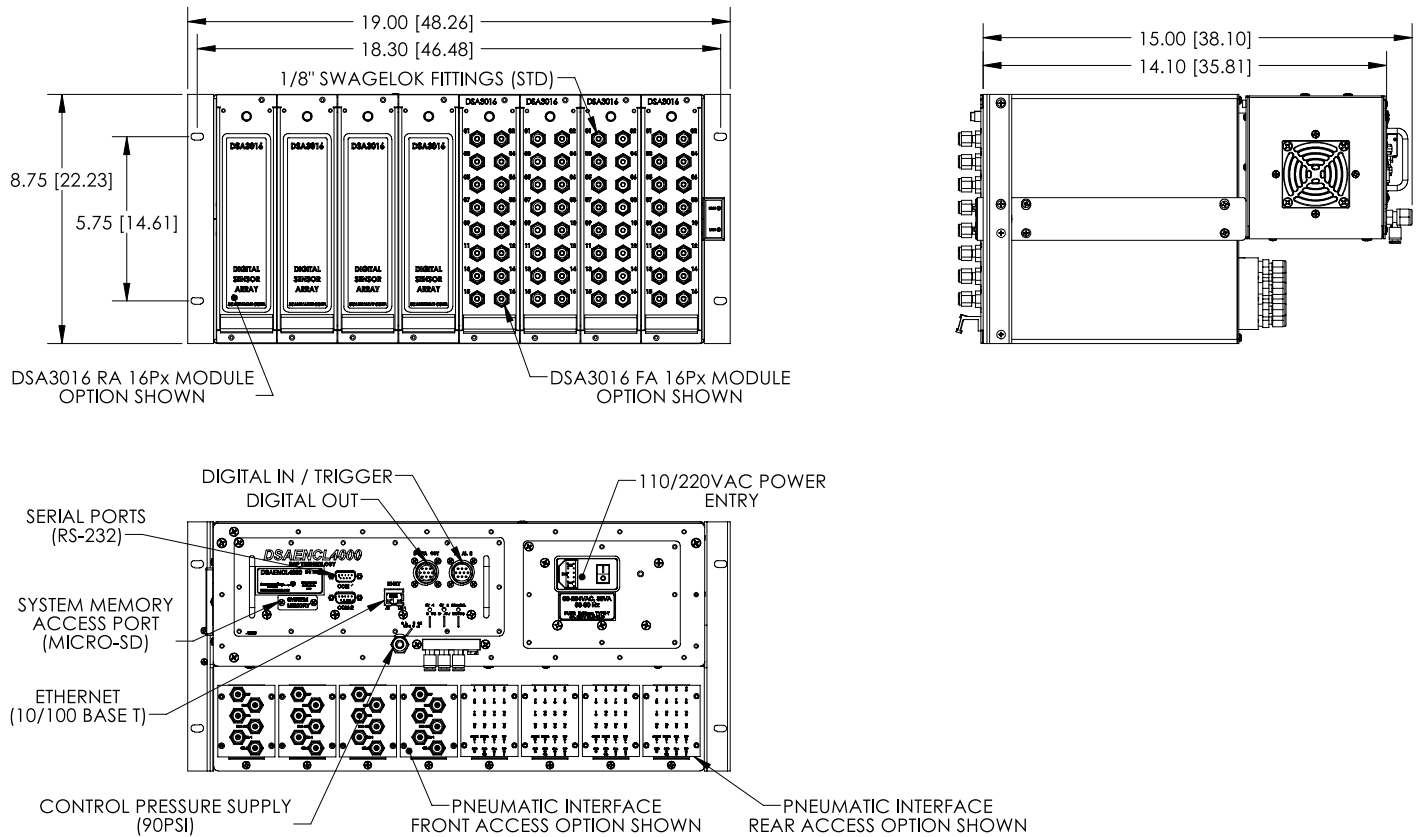With 8 DSA3016 modules:
51.5 lbs (23.4kg)

*LabVIEW® is a registered trademark of National Instruments.*
*Swagelok® is a registered trademark of Swagelok*

■ ORDERING INFORMATION

**Module**

DSA3016 / 16Px - 500psid/xxpsid - RA

Model

Inputs

Pressure Ranges (Dual range shown)

Px Inputs
-RA Rear Access
-FA Front Access

Inputs
- 16 Inputs/16 Sensors
- 8D 8 True Differential Sensors
-16D 16 True Differential Sensors (FA–Front Access 1/16" fittings only)

**19 Inch Enclosure**

DSAENCL4000

Model

■ DIMENSIONS INCHES (cm)



19.00 [48.26]
18.30 [46.48]
1/8" SWAGELOK FITTINGS (STD)
8.75 [22.23]
5.75 [14.61]
DSA3016 RA 16Px MODULE OPTION SHOWN
DSA3016 FA 16Px MODULE OPTION SHOWN

15.00 [38.10]
14.10 [35.81]



DIGITAL IN / TRIGGER
DIGITAL OUT
110/220VAC POWER ENTRY
SERIAL PORTS (RS-232)
SYSTEM MEMORY ACCESS PORT (MICRO-SD)
ETHERNET (10/100 BASE T)
CONTROL PRESSURE SUPPLY (90PSI)
PNEUMATIC INTERFACE FRONT ACCESS OPTION SHOWN
PNEUMATIC INTERFACE REAR ACCESS OPTION SHOWN

## bar DSA®16EIM
### Rack Mounted Electrical Input Module

### FEATURES

- Scans 16 electrical channels
- ±20mV up to 5Vdc inputs
- Scans electrical signals at 625Hz/channel/sec.
- Compatible with all DSA and ZOC components and systems

DSA16EIM
Electrical Input Module

### GENERAL DESCRIPTION

The DSA16EIM is designed to multiplex, amplify,and filter up to 16 differential analog inputs. Thechannels are selected by a 4 bit binary CMOSlevel address and can be multiplexed up to 625Hz/channel/sec.

This unit is dimensionally the same as theDSA3016 pressure scanning module and it mountsin a standard 19 inch DSAEN-CL4000 enclosure.Sixteen input connectors are included with eachDSA16EIM. These connectors are four pin soldertype connectors, that accept 28 gauge or smallerwire. It accepts input signals from signal conditionedthermocouples, RTD, strain gauges, andfrom individual transducers for pressure, rpm, etc.

The DSA16EIM contains two user adjustments; amplifier gain and amplifier zero.

Amplifier zero may be trimmed by adjusting aR16 resistor that is accessible by removing the side panel.

Amplifier gain may be switched to one of 3pre-programmed gains (1, 10, and 100) or a userspecified gain.

### APPLICATIONS

The DSA16EIM is designed to be used inconjunction with our DSAENCL4000 pressuremeasurement system. It is also compatible with ourZOCENCL2000 enclosure. The DSA16EIM may bemixed with other DSA3016 pressure scanning moduleswithin one system.

### OPTIONAL FEATURES

An additional circuit may be factory installed toprovide an excitation voltage for strain gauges,RTDs, or pressure transducers. This circuit willprovide +5Vdc at 50 mA. Other excitation voltagesare available. The user may specify non-standardgains, special input filtering, or 4-20 mA inputs.
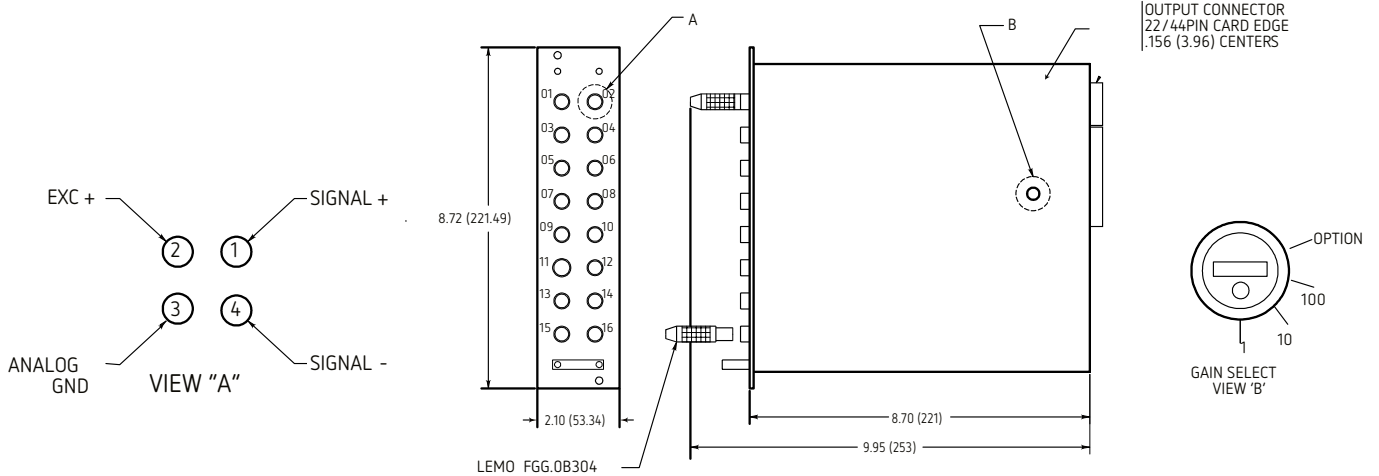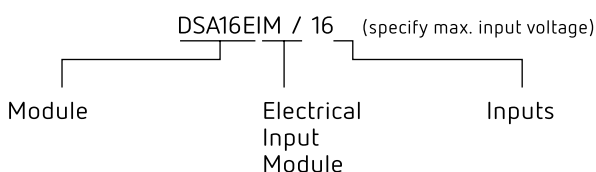
**ISO 9001:2015 CERTIFIED**

## SPECIFICATIONS

| | |
|---|---|
| Inputs (Px): | 16 |
| Input Signals: | ±20mV up to ±5Vdc differential (specify max. input at time of order) |
| Channel Addressing: | 4 bit binary, CMOS level |
| Full Scale Output: | Maximum ± 3.5Vdc |
| Scan Rate: | 625Hz / channel / sec. |
| Operating Temperature: | 0° to 70°C |
| Gain Setting: | Gain is normally set at 1.0 unless specified otherwise. (Selectable 1, 10, 100) |
| Repeatability: | ±.05% FS |
| Linearity and Hysteresis: | ±.05% FS |

*ESD Electrostatic Discharge

| Optional | |
|---|---|
| Excitation Circuit: | Standard 5Vdc @ 50mA |
| ESD* Resistance: | 4000 volts |
| Power Requirements: | +15Vdc @ 100mA - 15Vdc @ 50mA |
| Over Voltage: | 70 volts peak to peak |
| Module Connector: | Card Edge 22/44pm |
| Signal Input Connectors Supplied: | Lemo FGG.OB.304.CNAD42 (16 EA.) |
| Weight: | 2 lb. 1 oz. (930 gm) |

## DIMENSIONS INCHES (mm)



EXC +    SIGNAL +
②  ①
③  ④
ANALOG    SIGNAL -
GND    VIEW "A"

8.72 (221.49)

01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16

2.10 (53.34)

LEMO FGG.0B304

A    B

OUTPUT CONNECTOR
22/44PIN CARD EDGE
.156 (3.96) CENTERS

8.70 (221)
9.95 (253)

OPTION
100
10
1
GAIN SELECT
VIEW 'B'

## ORDERING INFORMATION

DSA16EIM / 16    (specify max. input voltage)

Module    Electrical    Inputs
Input
Module

## bar SPC4050
### Scanivalve Pressure Calibrator

### FEATURES

- 0.01% F.S. accuracy
- Up to 4 calibration ranges, 0.36 to 750 psig, 0 to 750psia.
- Based on Mensor CPC6050 automated pressure calibrator
- Removable / interchangeable transducers
- Color touch screen
- Automated DSA, ZOC, and MPS calibrations
- Bench or rack mount
- Direct replacement for SPC4050 calibrators



*SPC4050 System*

### SYSTEM OVERVIEW

The SPC4050 pressure calibrator is designed to provide automated calibration of Scanivalve DSA, ZOC, and MPS series pressure scanners. The calibration system consists of 3 components:

1. The heart of the calibration system is the Scanivalve pressure calibrator, model SPC4050. The SPC4050 calibrator has up to two independent precision pressure regulators. Each regulator can have up to two gauge or absolute transducers; thus up to 4 transducers per calibrator. Transducers can be quickly removed for calibration or service.

The transducers are Gauge (psig) or Absolute (psia). Full Scale Gauge pressure ranges are available between 0.36 psig and 750 psig.

2. Scanivalve's Pneumatic Logic Unit (SPCPLU) is required for automated DSA, ZOC, and MPS calibrations. This unit contains the pneumatic solenoid valves and manifolds required to perform single or multi-range calibrations, as well as zero offset corrections.

3. A utility program, PressCal is included with the SPC4050. It performs automated or manual calibrations on all DSA and ZOC pressure scanners by controlling the pressure calibrator and SPCPLU. The PressCal program is hosted in a Windows® environment. PressCal updates the

module calibration coefficient files and generates "as received" and calibration validation reports.

### APPLICATIONS

This SPC4050 pressure calibrator is based on the Mensor Corp. model CPC6050 pressure calibrator with specific changes made to work with Scanivalve products. These changes include additional digital outputs to control the SPCPLU as well as modified OEM firmware to accept Scanivalve commands.

In order to perform multipoint calibrations and zero offset corrections on demand to DSA, ZOC, and MPS pressure scanners, the calibrator must be used with the SPCPLU. The reference side of the gauge transducers can be connected to an alternate remote location (tunnel static, elevated line pressure, static basket, etc).

The calibration system can be used for many applications including multi-point calibration of DSA ZOC, and MPS pressure scanners, zero offset correction, and leak testing.

The calibrator can also be used in the local / manual mode utilizing the front panel touch screen or remotely via Ethernet. It would be used in this standalone mode to regulate and measure pressures to calibrate individual pressure transducers. It could be used to send known pressures to all of the DSA, ZOC, and MPS sensors to ensure they are reading correctly (System Validation).

**ISO 9001:2015 CERTIFIED**

### MODULAR CALIBRATOR DESIGN

The SPC4050 brings a high degree of flexibility by having a variety of configurations available. It can have one or two independent pressure regulators providing two pressure outputs.

Each regulator can have up to two transducers. Each transducer module contains all of the calibration, characterization, communication functions and information needed to communicate the pressure reading to the system electrical module.

Transducer modules can be easily removed or replaced. Compatible spare transducers of the same or different range can be interchanged to increase utilization.



*Calibrator Chasis*



*Regulator*



*Transducers*

### THE REGULATOR

The SPC4050 has four unique pressure regulators available depending on transducer ranges selected. The Pump Regulator utilizes a pump to both generate and regulate pressure. It can generate pressures as low as 0.5 psia and is generally used when extreme precision is needed at very low gauge pressures or when an external pressure source

is not available. The other 3 regulators are determined by the range of calibrator transducers selected. The appropriate regulators will be matched for the specific transducer pressure ranges. These regulators require an external pressure source that is approximately 10% above the full scale range of the highest internal pressure range.

### Gauge (psig)

| Available Regulators | Min | Max |
|---|---|---|
| *Pump-Very low pressure* | 0-0.36 | 0-15 |
| *Low Pressure* | 0-1 | 0-50 |
| *Medium Pressure* | 0-10 | 0-150 |
| *High Pressure* | 0-75 | 0-750 |

All regulators can be tuned in the field to meet a specific customer external volume requirement. Specific control requirements, such as control speed, overshoot, and external volume, are just a few of the variables the regulator is able to accommodate.

### CALIBRATOR TRANSDUCER

The transducers are configured in a proprietary process characterizing each pressure range over temperatures from 15 to 45° C. This process has been optimized to provide the greatest accuracy, stability, and reliability. Each range is calibrated with NIST traceable primary standards and provided with a calibration certificate.

**Transducers 15 psi and above** have an uncertainty of +/- .01% F.S. with a one year calibration interval.
**Transducers 14.9 psi to 1 psi** have an uncertainty of +/- .01% F.S. with a one year calibration interval.
**Transducers less than 1 psi** have an uncertainty of +/- .03% F.S. with a one year calibration interval.

### Standard Transducer Ranges

| Gauge Transducer | Gauge Transducer |
|---|---|
| 0.36 psig | 100 psig |
| 1 psig | 200 psig |
| 5 psig | 300 psig |
| 15 psig | 500 psig |
| 30 psig | 750 psig |
| 50 psig | |

## STANDALONE / MANUAL CALIBRATION

Manual calibrations can be performed with the SPC4050 by using either the color touch screen or remote commands via Ethernet. This manual mode using remote commands can be used with Scanivalve's DSA, ZOC and MPS pressure scanners. When calibrating individual pressure transducers, the touch screen or remote commands may be used.



The color touch screen provides an intuitive user interface that can be configured in 17 different languages.

## SPCPLU AUTOMATED CALIBRATION / FEATURES

· Contains leak tight pneumatic valves
· Works with 1 to 4 pressure ranges
· Works in conjunction with Scanivalve's SPC4050 pressure calibrator
· Facilitates automated and manual DSA, ZOC, and MPS calibrations

## GENERAL DESCRIPTION

The calibrator system consists of 3 components:

1.  SPC4050 calibrator
2.  The Pneumatic Logic Unit (SPCPLU) is a box that contains pneumatic solenoid valves and manifolds required to perform single or multi-range DSA & ZOC calibrations, as well as zero offset corrections. It also switches the DSA or ZOC calibration valve into sense, calibrate, purge, and leak test modes.
3.  Scanivalve's PressCal software program orchestrates the pressure calibrator and SPCPLU to perform automated and manual calibrations.
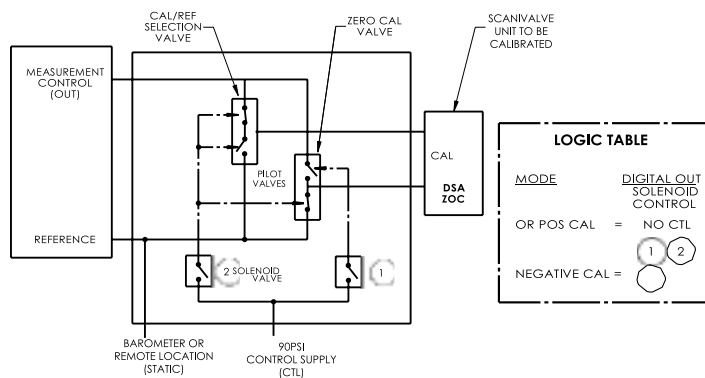


## APPLICATIONS

The SPCPLU is controlled by the SPC4050 pressure calibrator. The unit incorporates piloted high flow pneumatic valves that support:

· Multi-point calibrations of DSA and ZOC pressure scanners for up to 4 pressure ranges
· Positive or below atmospheric (vacuum) calibrations
· Zero offset correction on demand
· Leak testing of system, DSA, ZOC, or MPS pressure scanners



*SPCPLU shown*

Solenoid valves direct the pressure for the piloted valves when digital output commands are issued. The SPCPLU is designed to work in conjunction with the SPC4050 cali- brator to auto calibrate DSA, ZOC, and MPSpressure scanners.

**Models:** SPCPLU-1 supports 1-2 pressure ranges, SPCPLU-2 supports1-4 pressure ranges
**Power:** SPCPLU receives power from SPC4050
**Weight:** SPCPLU-1 6.9 lbs. (3.13kg) SPCPLU-2 11.5 lbs. (5.22kg)
**Communication:** SPC4050- Ethernet TCP / IP
SPCPLU- Controlled by SPC4050 digital outputs
**Pneumatic**
**Connectors:** 1/4 inch Swagelok® fittings
**Solenoid Supply**
**Pressure:** 90-120 psi (user suppplied, 65 psi optional)
**Pressure range:** 750 psi maximum
**Dimensions:** 19" wide X 3.5" tall X 13" deep
(48.3cm wide X 8.9cm tall X 33cm deep)

## ■ SPC4050 CALIBRATOR SPECIFICATIONS

**Measurement Units:** psi, inHg, inH2O, ftH2O, ATM, bar, mbar, mmH2O, cmH2O, cmHg, Torr, kPa, Pa, Mpa, PSF, C. Other units and 2 user-defined units are also available.

**Resolution:** 4 to 6 significant digits, user selectable

**Communications:** Ethernet

**Warm-up:** Approximately 30 minutes to achieve full accuracy depending on the environment

**Local User Interface-Display:** 8.9" color LCD display with a resistive touch screen

**Case Dimensions:** 16.86" wide x 6.97" high x 16.37" deep (42.8 cm x 17.7 cm x 41.6 cm)

**Weight:** 36 lbs. (16.33 kg) with all internal options

**Pressure Media:** Clean, dry, non-corrosive, non-combustible, non-oxidizing gases—not suitable for oxygen use

**Operating Temperature Range:** 0°C to 50°C. Note: The compensated temperature range is 15°C to 45°C

**Pneumatic Interface:** 1/4 inch Swagelok® fittings

**Power Requirement:** 100-240 VAC, 47-63 Hz, 75 VA

**Compliance:** The SPC4050 (Mensor CPC6050) complies with RoHS, EN61326-1:A1:1998, EN61326-1:A2:2001, EN55024:1998, and EN61010-1-1

## ■ CALIBRATION INTERVAL

Recommended SPC4050 calibration intervals are: 14.9 psi and below every 6 months. 15 psi and above once per year. The calibrator has firmware for field calibration. A dead weight tester is required for field calibration or the SPC4050 may be returned to Scanivalve's factory for calibration.

## ■ ORDERING INFORMATION

Scanivalve's technical sales staff is available to guide you in the selection of an appropriate regulator and transducers to meet your test calibration requirements. This process involves optimizing the mix of ranges to allow calibration of all of your DSA, ZOC, and MPS pressure scanners.

Choose the calibrator transducer ranges needed to calibrate your transducers or pressure scanners. Standard ranges (gauge) are shown in the table below.

| 0.36 psig | 1 psig | 5 psig | 15 psig | 50 psig |
|-----------|--------|--------|---------|---------|
| 100 psig | 200 psig | 300 psig | 750 psig | |

## ■ COMPLETE ORDERING DESCRIPTION (EXAMPLE)

Scanivalve model SPC4050/50, 100, 300, 500 psig plus note if you want optional internal barometer.

**SPC4050 Options:**

**1. Additional/Spare Transducers**
Additional transducers can be purchased. Although transducers will work in any regulator, the range of the regulator must be considered to insure optimum performance.

**2. Barometric Reference Transducer**
The barometric reference transducer is an absolute pressure device used to accurately measure local atmospheric pressure. The barometric reference has an uncertainty of 0.01% of full scale with a recommended calibration interval of 6 months. It can be specified with any SPC4050 configuration.

**3. Pneumatic Distribution Panel**
This product incorporates up to 5 pressure regulators for applying and setting pressures manually on large pressure measurement systems. It manages the pressures that are fed into the SPC4050. This unit is rack mounted.

## DTS4050
### Digital Temperature Scanner

### FEATURES

- Accepts type E, J, K, N, R, S, T, and B
- Engineering Unit output, °C, °F, °R, or K
- Ethernet TCP/IP & UDP protocol
- 1000Vdc channel-to-channel isolation
- 600Vdc Input isolation
- 160dB 0-60Hz Common Mode Rejection (CMRR)
- 50 - 60 Hz noise rejection
- Open thermocouple test
- IEEE1588 PTPv2 synchronization
- 16, 32, and 64 channel



*DTS4050/32 Channel*
*(shown)*

### GENERAL DESCRIPTION

The DTS4050 series temperature acquisition system represents the next generation of intelligent thermocouple scanning. The DTS4050 is a direct replacement for its predecessor, the DTS3250. The DTS4050, Digital Thermocouple Scanner, accepts 16, 32, or 64 thermocouple inputs. It incorporates integral low pass filters, 22 bit A/D converters, and a DSP microprocessor. The DTS module is specifically designed for high-noise environments and as such can withstand unmatched common mode noise.

An isothermal block is incorporated for the Uniform Temperature Reference (UTR) for each 16 channel input. NIST thermocouple tables for standard thermocouple types are stored in flash memory. The microprocessor uses these look-up tables to convert mV inputs to Engineering Units. Temperature data are output in °C, °F, °R, K, millivolts and counts.

The DTS4050 accuracy for types E, J, K, N, and T is ± .25°C to ±0.5°C depending on the thermocouple type and the useful temperature range. (Refer to accuracy table for a complete listing of supported thermocouples and associated accuracies) Multiple standard thermocouple types may be used with one DTS4050.

### APPLICATIONS

The DTS4050 Digital Temperature Scanner is ideal for use in turbine engine, diesel engine, and compressor test cells, as well as other industrial environments such as boiler and oven temperature monitoring. The module has a corrosion resistant, stainless steel enclosure with a locking lid for input terminal access. The standard DTS is insulated, rugged, and splash resistant and incorporates shock mounts for vibration isolation.

The DTS4050's electronics were specifically designed to endure punishing high EMI noise environments while still being able to provide accurate engineering data.

The DTS4050 is typically mounted in close proximity to the test article, thus minimizing thermocouple wire lengths. Shorter thermocouple wires not only reduce errors, but also lower costs due to the elimination of extension cables. Field calibrations can be used to modify coefficients which can also improve overall system accuracy.

The standard DTS4050 module accepts two wire or three wire shielded thermocouples.

LabView® is a registered trademark of National Instruments.

## IEEE1588 PTP

The DTS4050 has a hardware supported slave implementation of the Precision Time Protocol defined by IEEE 1588-2008, otherwise known as PTP V2. This protocol is used to synchronize the DTS4050 internal clock over the Ethernet network.

The primary function of the PTP is to accurately schedule the DTS4050 acquisition and timestamp the data it transmits. It can also be used to timestamp an external trigger, such as an IRIG-B pulse rate signal.

The DTS4050 may be configured to start an acquisition at a future date and time. When a SCAN command is received, the DTS4050 schedules an event for the first frame and calculates the times of the subsequent frames of data based on the RATE setting. By configuring them identically, a number of DTS4050 units may be configured to start acquiring data synchronously. The DTS4050's support for IEEE 1588 not only allows for synchronization between multiple DTS4050 units, but also make it simple to correlate data with any other IEEE 1588 devices on the network.

## TEMPERATURE MEASUREMENT

There are a number of standardized thermocouple types available on the market. Each has different properties, which makes them suitable for specific temperature ranges and environmental conditions.

Accuracy of a thermocouple measurement is highly dependent upon the reference junction connection, its material, installation techniques, and temperature.

The DTS4050 intelligent temperature scanner measures the mV signal from the thermocouples and compensates for the temperature of the cold junction.

NIST mV-temperature tables for each type thermocouple listed in this brochure are stored in the DTS4050 flash memory. This table is broken down into increments of 0.1°C. The DTS4050 microprocessor utilizes the compensated EMF and the NIST look-up table for conversion to engineering units. Temperature data are then output via Ethernet with TCP/IP or UDP protocol.

## LEGACY COMPATIBILITY

The DTS4050 software is backward compatible to existing Scanivalve DTS data systems. Therefore, DTS3250 and DTS4050 modules can operate in parallel on a single network, communicating with the same controlling software.

## COMMON MODE REJECTION

The DTS4050 product line was specifically designed to operate in environments with high levels of EMI. The DTS' unique architecture allows it to precisely read microvolt signals even amongst hundreds of volts of common mode noise. Supporting this capability, the DTS is built around a robust front end. Every thermocouple input channel has its own dedicated 22-bit A/D circuit providing a huge, 1000Vdc channel-to-channel isolation buffer. It is this unique parallel front end architecture that provides the DTS' unmatched common mode rejection ratio.

The specific common mode rejection ratio will vary between installations depending on the voltage, frequency, scan rate and thermocouple type used, but the graph below can be used to roughly determine the MicroVolt offset caused by various common voltages across the frequency spectrum. In addition to the 1000Vdc channel-to-channel isolation, the DTS is built to endure a sustained 600Vdc per channel of input isolation, while still providing accurate engineering unit data output.

In order to take advantage of the DTS's high common mode rejection capability, the DTS was also designed to endure the physical stresses that can be associated with high-noise environments. The DTS is mounted on Mil-Spec rated shock mounts and enclosed in a rugged stainless steel chassis. The integrated UTR block and included insulation cover provide a stable, accurate reference point for all incoming thermocouple junctions.



**MicroVolts offset per Frequency**
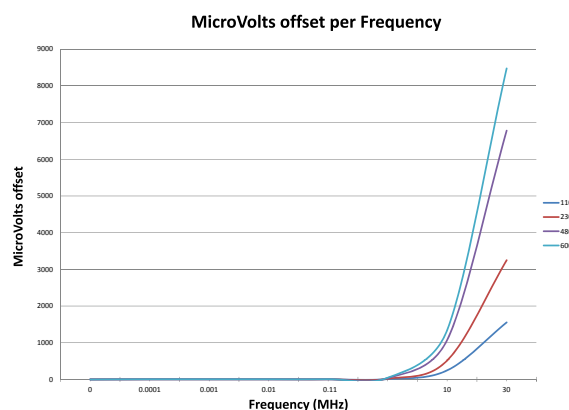
## DTS4050 COMMUNICATIONS

The DTS4050 module interfaces directly to a host via an Ethernet connection. Scanivalve's free ScanTel communications program is designed to assist a user in establishing communications and data collection, as well as configuring the DTS module. Additionally available is a Software Development Kit for users who want to write their own detailed data acquisition program in LabVIEW®. This Development Kit includes the Configuration Utility software and examples to assist a user in the setup of the system. An OPC driver is also available (16Tx only).

## SPECIFICATIONS

**Inputs (Px):** 16, 32, or 64 pairs of 6-32 brass screw terminals plus shields or optional panel jack connectors

**Thermocouple Types:**
screw terminal: E, J, K, N, R, S, T, and B
panel jack option: E, J, K, S and T

**DTS4050 Accuracy:**

| Accuracy Table* | | |
|---|---|---|
| Thermocouple Type | Accuracy over Full Operating Range | Accuracy at Constant Ambient |
| E,J,K,N, and T | ±0.5°C | ±0.25°C |
| R and S | ±2.0°C | ±1.0°C |
| B | ±4.0°C | ±2.0°C |

**UTR Accuracy:** ±0.1°C

**A/D Resolution:** 22 bit

**Scan Rate:** 64Tx: 10 Hz/channel
32Tx: 20 Hz/channel
16Tx: 40 Hz/channel

**Operating Temperature:**

| | Std unit | with optional heater |
|---|---|---|
| 16Tx | -10 to 60°C | -20 to 60°C |
| 32Tx | -5 to 60°C | -20 to 60°C |
| 64Tx | -5 to 60°C | N/A |

**Communication:** Ethernet 100baseT
RS-232 (configuration only)

**Output:** °C, °F, °R, K, mVolts, or Counts

**Communication Protocol:** TCP/IP or UDP

**Mating Connector Type:**
100BaseT   RJ-45
  -Conec 17-101794 shell optional
Power:   Bendix PTO6A-8-3S-SR, 3 pin female
RS232/Trigger:   Amphenol MS27473T8F6S, 6 pin female

**Power:** (18–36Vdc)
Standard—No heater:
16Tx:   .58 Amps @ 28Vdc
32Tx:   .83 Amps @ 28Vdc
64Tx:   1.45 Amps @ 28Vdc
With Optional Heater:
16Tx:   1.6 Amps @ 28Vdc
32Tx:   4.8 Amps @ 28Vdc

**External Trigger:** 6.5 mA at 5-15 Vdc minimum leading edge sensing

**Weight:**
Screw terminal-16 Tx:   13.00 lbs (5.9 kg)
Panel jack option-16 Tx:   12.00 lbs (5.45 kg)
Screw terminal-32 Tx:   15.5 lbs (7.03 kg)
Panel jack option-32 Tx:   15.0 lbs (6.80 kg)
Screw terminal-64 Tx:   25.0 lbs (11.35 kg)
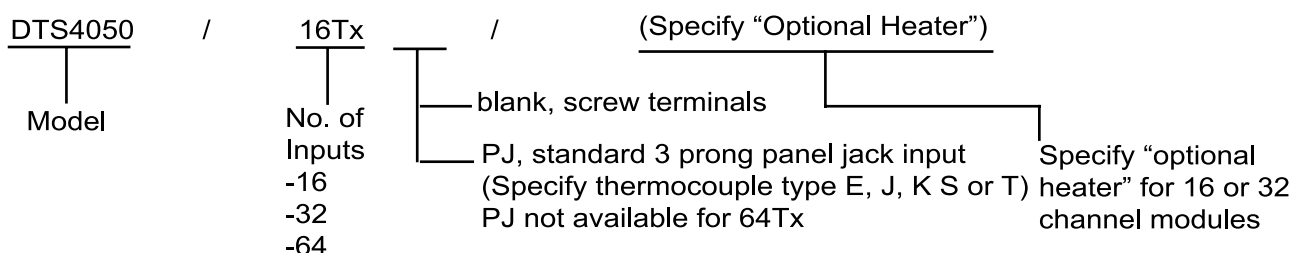
**Input/Output Isolation:** 600 Vdc

**CMRR:** 160dB, 0-60Hz

**Channel-Channel Isolation:** 1000 Vdc

**CE Mark Standards:** Class A EN61326-1 v2006

*System accuracy specifications are valid after a three hour warm up period. Accuracy does not include Thermocouples, Thermocouple Extension Wire. The Panel Jack option reduces overall accuracy by a factor of two.

## ORDERING INFORMATION

DTS4050   /   16Tx   /   (Specify "Optional Heater")

Model

No. of Inputs
-16
-32
-64

blank, screw terminals

PJ, standard 3 prong panel jack input
(Specify thermocouple type E, J, K S or T)
PJ not available for 64Tx

Specify "optional heater" for 16 or 32 channel modules

For 32 channel rack mount kit, order 21195-4
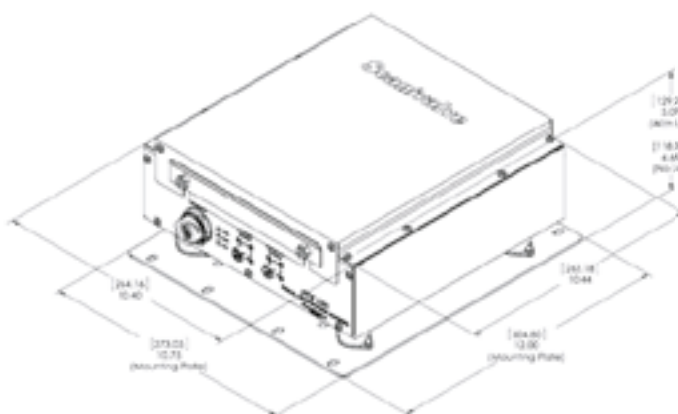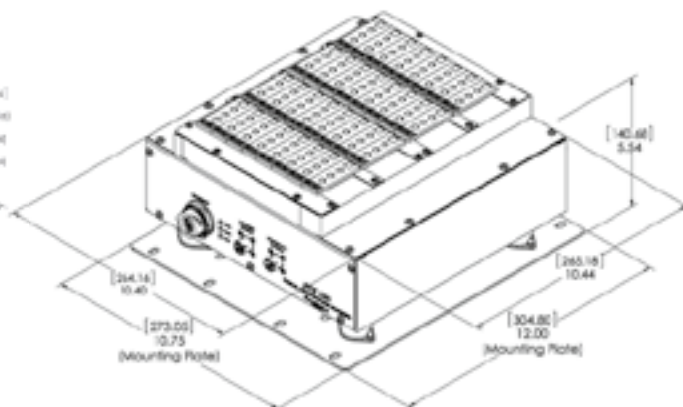For 64 channel rack mount kit, order 21195-3.

■ DTS4050 DIMENSIONS
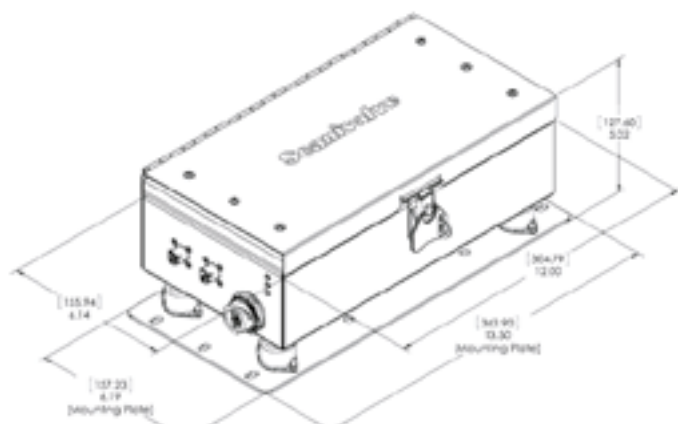
**16Tx Screw Terminal Inputs**
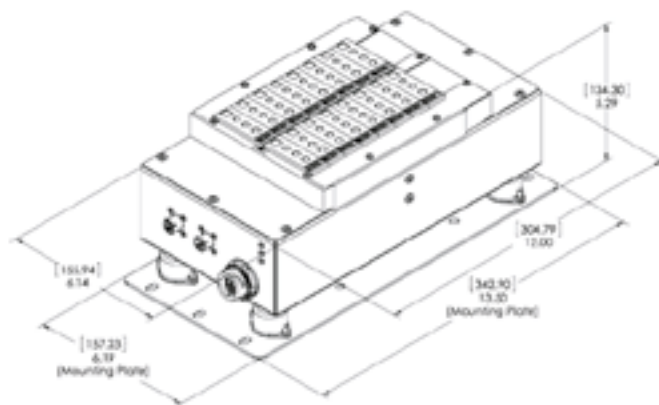
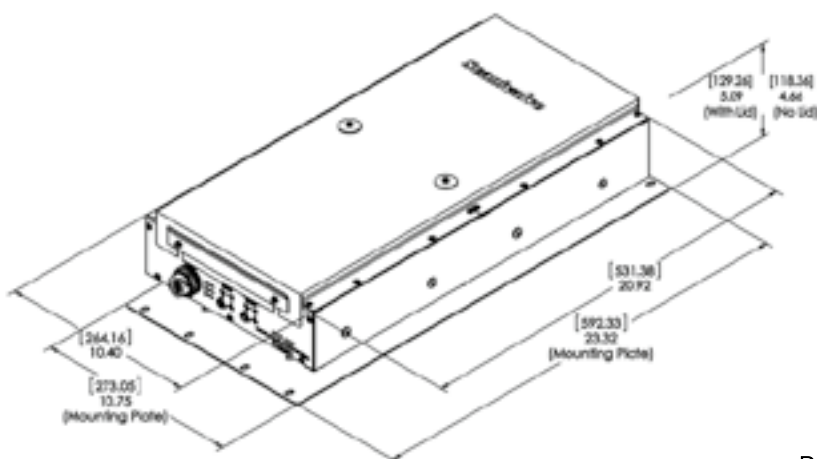**16Tx Panel Jack Connector Inputs**

**32Tx Screw Terminal Inputs**

**32Tx Panel Jack Connector Inputs**

**64Tx Screw Terminal Inputs**

Dimension in inches [mm]

*Specifications are subject to change without notice.

## THE RIGHT SOLUTION FOR YOUR REQUIREMENTS

Due to our decades of experience, we at Althen can supply our customers with developments ranging from standard and customer-specific sensors to complete measuring systems.

All physical parameters are represented in our product range, using different technologies so that you always get the best solution for your measurement requirements. Thanks to our many years of experience, our technical know-how, our strong team of engineers with different professional backgrounds and our broad product range, we can offer the most efficient solutions for almost all applications in all branches of industry.

Our team will be happy to advise you. You can reach us by phone at **+49 6195 70060** or by e-mail to **sales@althen**.

## OUR PRODUCT SCOPE

| | | | |
|---|---|---|---|
| **bar** Pressure | **mm** Displacement | **g** Acceleration | Amplifier |
| **N** Force | **α** Rotation | **m/s²** Vibration | **1010** Data Logger |
| **Nm** Torque | Joystick | **%/s** Angular Rate | Automation |
| **ε** Strain | Inclination | **°C** Temperature | **A** Measurement Solutions |

# ALTHEN SENSORS & CONTROLS

■ **Germany | Switzerland | Austria**

ALTHEN GmbH Mess- und Sensortechnik
Dieselstraße 2
65779 Kelkheim
Germany
Phone: +49 6195 7 00 60
Email: info@althen.de

■ **Netherlands | Belgium | Luxembourg**

ALTHEN bv Sensors & Controls
Vlietweg 17a
2266 KA Leidschendam
Nederlands
Phone: +31 70 3 92 44 21
Email: sales@althen.nl

■ **France**

ALTHEN / DB Innovation
26, avenue de la Méditerranée
34110 Frontignan
France
Phone: +33 4 67 78 61 66
Email: info@althensensors.fr

■ **USA**

ALTHEN Sensors & Controls Inc
2531 Bradley Street
Oceanside CA 92054
USA
Phone: +1 858 6 33 35 72
Email: info@althensensors.com

■ **Sweden**

ALTHEN Sensors & Controls AB
Gjuterivägen 10
76140 Norrtälje
Sweden
Phone: +46 8 7 95 24 90
Email: info@althensensors.se

Further information can be found at **althen.de**