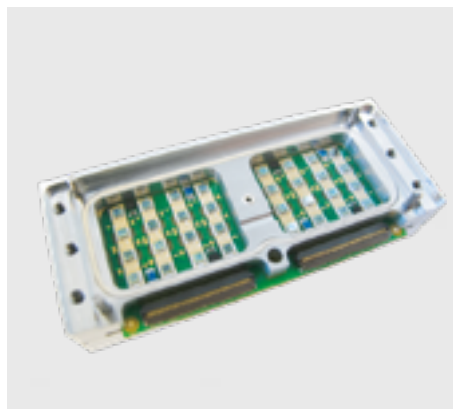




Scanivalve

**ANALOG MINIATURE
PRESSURE SCANNER**



Your expert partner in sensors & controls

althensensors.com

ALTHEN
SENSORS & CONTROLS

ÜBER ALTHEN SENSORS & CONTROLS

Althen Sensors & Controls steht für wegweisende Mess- und Sensoriklösungen. 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 Sonderlösungen. Profitieren Sie von unserer langjährigen Erfahrung auf dem Gebiet der Messtechnik und Sensorik:

-  **Hochwertige Fertigung**
-  **Messung und Vermietung**
-  **Kalibrierung von Messgeräten**
-  **Schulungen**

INHALT

E-RAD4000 Ethernet Pressure Measurement System	3-8
DSM4000 Series Digital Service Module	9-12
RDS3200 Remote Digital Swich	13
MPS4164 Miniature Analog Pressure Scanner	14-17
MPS4164TCU Thermal Control Unit.....	18-19
ZOC17 Electronic Pressure Scanning Module.....	20-23
ZOC22B Electronic Pressure Scanning Module	24-25
ZOC23B Electronic Pressure Scanning Module	26-27
ZOC® TCU Thermal Control Unit	28-29
ZOCeim Electrical Input Module	30-31
MSCP320 (MINIATURE SOLENOID CONTROL PACK)	32
RPM4000-DC-DC RAD POWER MODULE ASSEMBLY	33
RPM4000-AC-DC RAD POWER MODULE ASSEMBLY	34



bar **E-RAD4000**
Ethernet Pressure Measurement System

FEATURES

- DSP technology
- 625 Hz/channel/second throughput
- Modular design: 1-8 A/D sections per RADBASE
- Compact base: 1.75 x 1.75 x 2.68 inches (44.45 x 44.45 x 68.07 mm)
- Engineering Unit output
- Support up to 2048 measurement channels
- Ethernet TCP/IP & UDP protocol, "Network Ready"

GENERAL DESCRIPTION

The state-of-the-art DSP technology is at the heart of our new E-RAD4000 pressure measurement system. Located inside the RADBASE is a programmable device, (Digital Signal Processor, DSP) 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 RADBASE DSP processor utilizes a pressure temperature look-up table to compensate the pressure sensors for temperature changes, thus reducing thermal errors. It also can control the actuation of an external calibration valve via the RDS3200 module to perform on-line zero offset corrections. Long term accuracy is achieved for up to 6 months before recalibration is required.

This new Ethernet remote A/D system is a turnkey pressure measurement system that combines the field proven RAD3200 with Ethernet TCP/IP. E-RAD4000 system is capable of maintaining its performance even as computer technology and operating systems upgrade. E-RAD will work on any hardware platform that has an Ethernet port, thus minimizing the user's future interface risks.



RADBASE shown with 2 and with 8 A/D's

The E-RAD system is modular and allows up to 8 each A/D (16 bit) modules to be plugged into one RADBASE. Each A/D supports one 16, 32, or 64 channel ZOC pressure scanner or one ZOCEIM.

The output of the RADBASE is Engineering units via a small diameter Standard CAT5 Ethernet cable. The RADBASE has the pressure sensor calibration data stored in memory and converts the digital data to temperature compensated Engineering units.

Data are then output Ethernet TCP/IP 100 baseT to a host computer.

APPLICATIONS

Typically, the RADBASE would be located inside a wind tunnel model or other space limited location in close proximity to the ZOC pressure scanners.

For small models with low number of pressure channel requirements, the RADBASE can be minimal size to fit into the model. For large systems the E-RAD system can be expanded with modular A/D modules or multiple RADBASES for up to 2048 pressure channel system.

A feature of the system is that each A/D and each ZOC pressure scanner has an ID chip installed. During power up or on demand, the RAD can read the ZOC ID chip information - model, pressure range, serial number, number of channels, date of manufacture and calibration date.



E-RAD4000 REMOTE A/D OPERATION

The E-RAD4000 is a complete pressure measurement system consisting of a RADBASE4000 base unit, 1 to 8 A/D's, and ZOC pressure scanners. It is designed to be installed inside or in close proximity to a wind tunnel model. By digitizing the transducer analog signals in the model, potential noise errors due to long cable lengths are eliminated.

1) RADBASE4000 is the base unit that incorporates the communication and power connectors, and real time DSP operating system. Communication and data throughput are via a small diameter Ethernet cable. Power required is +/-15Vdc and +5Vdc. Multiple RAD bases can be part of one E-RAD system.

2) RAD A/D 3200 is the modular A/D portion of the E-RAD system. The RAD A/D's are temperature compensated. Each 16 bit A/D module supports one ZOC pressure scanner or one Electrical Input Module (ZOCEIM). Additional A/D modules can be plugged into the RADBASE to easily expand from 1 to 8 A/D's (512 channel system).

Each A/D has an ID chip to identify itself with its serial number, date of manufacture, date of last calibration, and temperature coefficients. The analog cable between the RAD A/D and a ZOC pressure scanner may be up to 15 feet (4.61m) maximum in order to maintain maximum scanning speed. Contact Scanivalve for longer cable lengths.

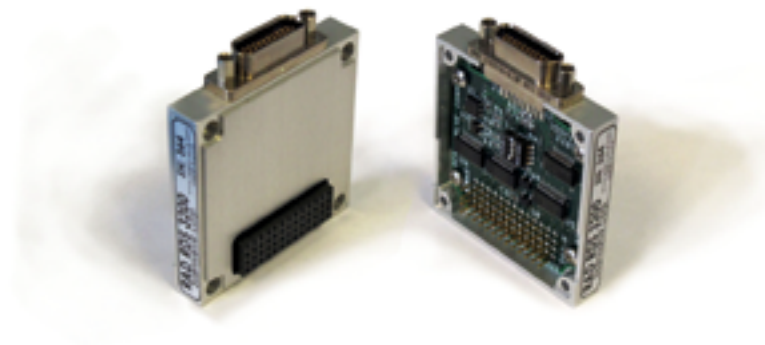
3) RDS3200 (Remote Digital Switch) is a plug in module that incorporates 8 software controlled switches. These switches can open or close relays that operate solenoid valves or other devices. Scanivalve's model MSCP3200 miniature solenoid control pack contains 3 solenoid valves. It can be operated by the RDS3200 and is small enough to fit inside a wind tunnel model. User supplied power is required for this feature (24Vdc std, 5 & 12Vdc optional and must be specified at time of order). Up to 8 RDS modules can be used on one RADBASE.



RADBASE4000 with 8 RAD A/D3200s



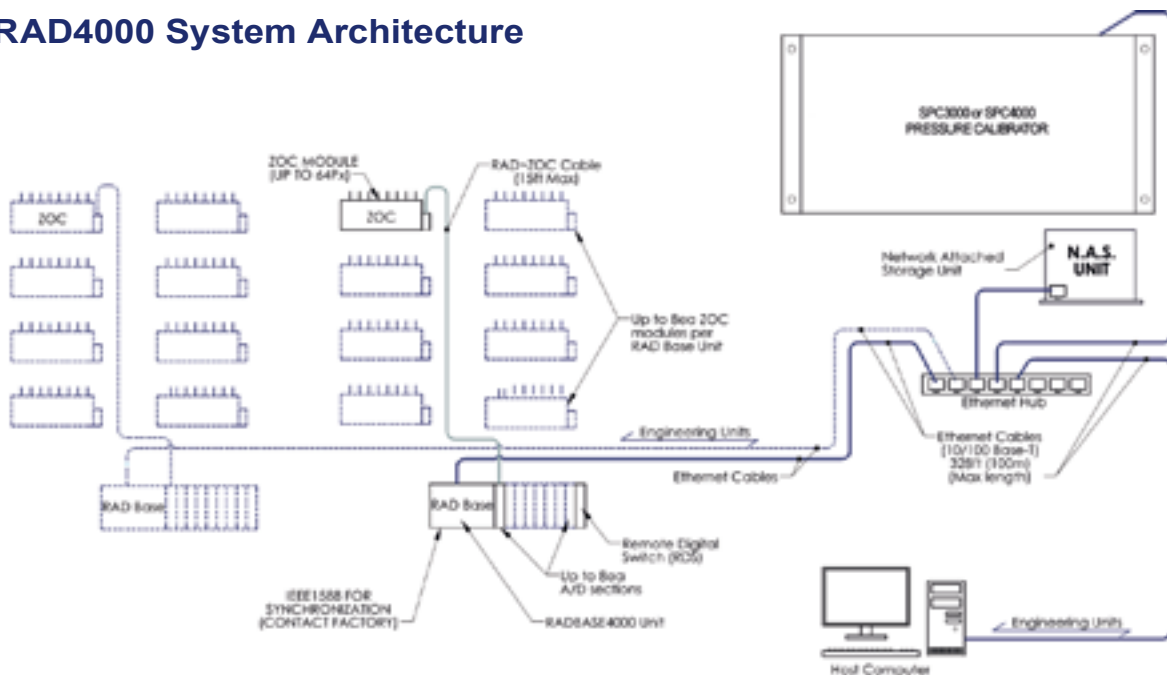
RAD A/D3200 MODULE



RDS3200 MODULE



ERAD4000 System Architecture



E-RAD SYSTEM

The E-RAD Ethernet pressure measuring system consists of:

- 1 RADBASE4000 (for each 512Px)
- 1 to 8 each RAD A/D per RADBASE
- 1 ZOC pressure scanner per RAD A/D
- Cables, power supplies, & accessories
- Optional SPC pressure calibrators
- Optional NAS network data storage (user supplied)

The E-RAD system allows for the RADBASE, A/D's and ZOC pressure scanners to be mounted inside a wind tunnel model. Data are converted to EU in the RADBASE and exit the model and sting via a small diameter standard CAT5 Ethernet cable connecting to the user's host computer or network.

The E-RAD robust turnkey pressure measurement system will operate with any hardware platform that can communicate Ethernet TCP/IP. This would include PC's, MAC's, VXI systems, or any user host or network

Large and expensive data systems are no longer required for fast accurate data measurement and acquisition. The cost involved to buy into this technology is now relatively low and affordable by universities and small research facilities.

E-RAD COMMAND SET

E-RAD firmware contains user commands and configuration variables that are installed in the RAD-BASE4000. The commands permit a user to control all functions of the RAD, including control of external devices when the RDS3200 digital switch is connected. The configuration variables permit a user to define communications, RAD module setup, identification, scanning EU conversion, and data output. Because the pressure calibration files for the ZOC pressure scanners are stored in memory, all Engineering Unit conversion occurs in the RADBASE4000. Variables for any test configuration may be saved to a file for future use.

Scanning may be initiated through a software or hardware trigger for synchronization with other data systems. An option for the E-RAD4000 system is a Configuration utility (includes LabVIEW® 2009 runtime engine) and a Scanivalve Software Development Kit for LabVIEW® 2009 for users who want to write their own detailed data acquisition program in LabVIEW®.

Direct communication to the RADBASE can also be made using ASCII commands via Telnet, Windows HyperTerminal or Scanivalve's ScanTel utility.

A free program for performing on-line calibration of the ZOC pressure scanners can be downloaded from the Scanivalve website (PressCal).



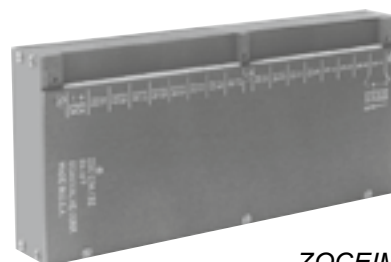
ZOC PRESSURE SCANNERS



ZOC22B/32Px
Pressure Scanner



MPS4164
Miniature Analog Pressure Scanner



ZOCEIM
Electrical Input Module

GENERAL DESCRIPTION

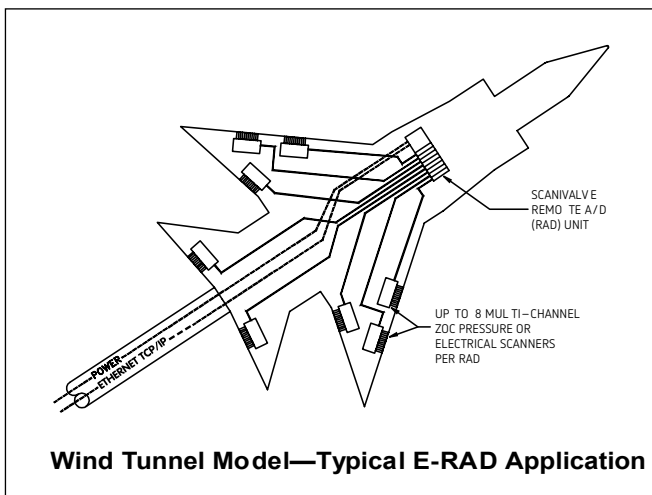
The ZOC (Zero, Operate, and Calibrate) pressure scanners contain piezoresistive pressure sensors in arrays of 16, 32, and 64. An RTD is factory installed to sense the ZOC pressure scanner's temperature. The analog pressure sensor and the RTD data are digi-tized in the RAD and data converted to temperature corrected Engineering Units.

Also incorporated into each ZOC pressure scanner is a pneumatic calibration valve that allows for sen-sor rezero or multipoint calibrations on demand. This calibration valve also permits purging of the pressure input lines of condensation and contaminants. Avail-able ZOC pressure ranges are 5 inches H2O up to 750 psi full scale.

Upon power up, the RADBASE automatically inter-rogates the ZOC ID chip and auto selects the appro-priate ZOC calibration coefficients for each module connected on the system.

ZOC PRESSURE SCANNER UPGRADES

All ZOC pressure scanners (ZOC22B, ZOC17, ZOCEIM, MPS4146) are manufactured with an ID chip installed. Legacy ZOC pressure scanners may be upgraded with an ID chip at Scanivalve's facto-ry. ZOC pressure scanners may also be used without an ID chip installed, but will lose the auto configuration capability.



ZOC Models

ZOC17/16Px	16 pressure inputs	(data sheet G447)
ZOC22B/32Px	32 pressure inputs	(data sheet G436)
ZOC22B/32PxX2 *	64 pressure inputs	(data sheet G436)
MPS4146	64 pressure inputs	
ZOCEIM	16 or 32 analog inputs	(data sheet G466)

* Models available with Duplexing function. Duplexing shares two pressure inputs (Px) with one pressure sensor.



SYSTEM NETWORK

E-RAD4000 System Network

Data are transmitted via Ethernet TCP/IP or UDP 100baseT in Engineering Units using ASCII or binary format. Data are transmitted at 625 Hz/channel maximum. This unloads the user's host from making these calculations. This architecture design enhancement allows for universal operation on all hardware platforms and operating systems that have an Ethernet port.

Scanivalve's optional Configuration Utility (includes LabVIEW® 2009 runtime engine) is designed to assist a user in configuring the RADBASE. Also available is a Scanivalve Software Development Kit for LabVIEW® 2009 for users who want to write their own detailed data acquisition program in LabVIEW®. Examples are provided. This Development kit includes the Configuration utility.



RADBASE4000 with 1 RAD A/D3200

E-RAD SPECIFICATIONS

Power Requirements:

RADBASE:	+15Vdc @ 41mA
	- 15Vdc @ 4mA
	+ 5Vdc @ 610mA
A/D (each):	+15Vdc @ 105mA
	- 15Vdc @ 5.5mA
ZOC (each):	+15Vdc @ 120mA
	- 15Vdc @ 16mA

No. of RAD A/D Modules Supported on one RAD base:

1 to 8

No. of ZOC Modules Supported by one RAD base:

1 to 8

Type of ZOC Modules Supported:

ZOC17, ZOC22B, MPS4146
ZOCEIM

Accuracy:

10 inch	H ₂ O	±0.15%F.S.
20 inch	H ₂ O	±0.12%F.S.
1 to 2.5	psid	±0.10%F.S.
5 to 50	psid	±0.08%F.S.
51 to 500	psid	±0.05%F.S.
	(ZOC17)	
501 to 750	psid	±0.08%F.S.
	(ZOC17)	

A/D Module

Mating Connector: Cannon 15 pin MDM15SL2P

RADBASE Mating Communication Connector:

RJ-45

A/D Resolution: 16 bits

Sample Throughput Rates*:

625/Hz/channel binary UDP for 512Px channel system

RAD Operating Temperature Range:

5°C to 60°C

Humidity:

up to 95% non-condensing

Dimensions:

RADBASE:	1.75 in. x 1.75 in. x 2.68 in. (44.45mm x 44.45mm x 68.07mm)
RAD A/D 3200:	1.75 in. x 1.75 in. x 0.31 in. (44.45mm x 44.45mm x 7.87mm)
RDS3200:	1.75 in. x 1.75 in. x .45 in. (44.45mm x 44.45mm x 11.43mm)

Weight:

RADBASE:	0.31 lbs. (141gms)
RAD A/D3200:	0.05 lbs. (23gms)
RDS3200	0.05 lbs. (23gms)

*Actual rates may vary depending on host computer memory and speed. Contact factory for ASCII data throughput via TCP/IP.

LabVIEW® is a registered trademark of National Instruments.



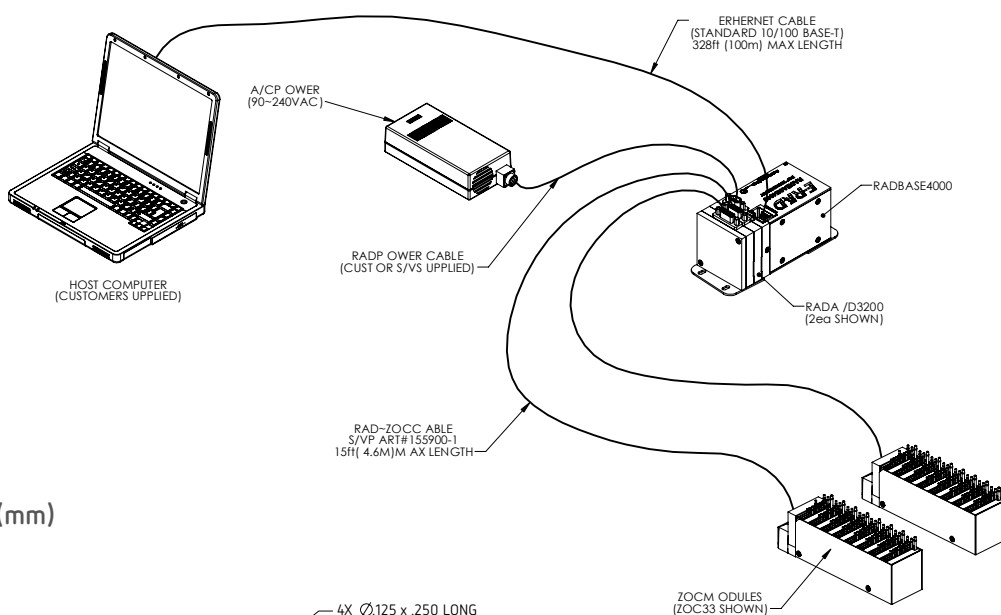
SYSTEM NETWORK

Ordering information for E-RAD system with 2 ZOC pressure scanners shown below:

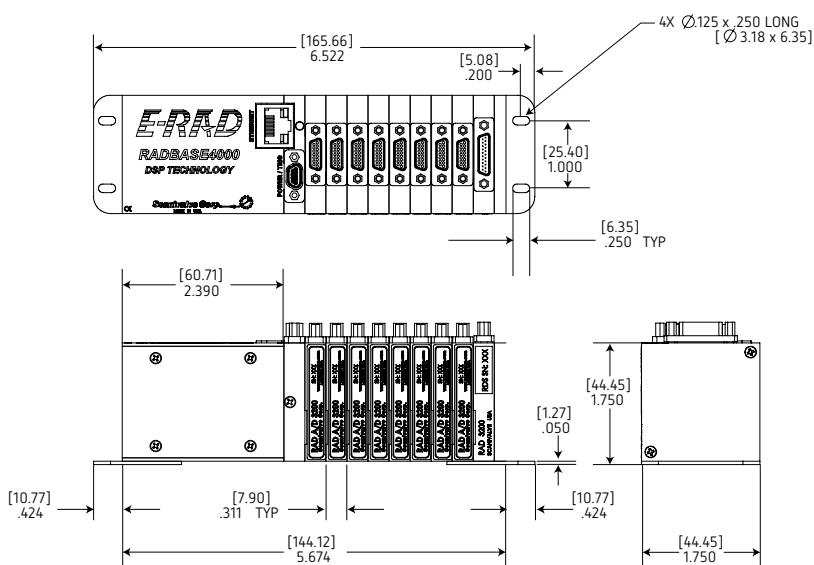
- 1 each RADBASE4000
- 2 each RAD A/D3200 plug-in modules
- 1 each RPM4000 RAD power module with mating RADBASE connector or user supplied power & cable
- 1 each 155909 Power Cable (10,25,& 35 foot std lengths)
- 2 each ZOC pressure scanners (specify ZOC model, pressure range, and standard or duplex feature)
- 2 each Temperature Calibration Data for ZOC pressure modules
- 2 each 155900-1 cabling-RAD A/D to ZOC module (max 15 feet/4.61m)

Optional:

- Online pressure calibration systems are available, model SPC pressure calibrator
- 1 each RDS3200 Remote Digital Switch
- 1 each MSCP3200 miniature solenoid control pack for switching control pressures (24Vdc standard)
- 1 each 155384-1 Configuration Utility (includes LabVIEW® 2009 runtime engine)
- 1 each 155385-1 Scanivalve Software Development Kit for LabVIEW® 2009 (ver 8.2 & up)



DIMENSIONS INCHES (mm)



*Total length is determined by number of A/D modules (8 A/D's shown.)



bar

DSM4000 SERIES

Digital Service Module

FEATURES

- IEEE1588-2008v2 PTP compatible
- DSP Technology
- Sample rates up to 625 Hz/channel
- Accepts up to 8 ZOC electronic pressure scanners (512 channels max)
- Ethernet 100baseT
- ARINC429 (optional)
- Digital Input and Output capability

GENERAL DESCRIPTION

The Digital Service Module, DSM4000, is designed to interface up to eight Scanivalve ZOC pressure scanners or EIM (Electrical Input Module) units to an Ethernet network. The DSM4000 is a complete data acquisition system built in a rugged, stainless steel enclosure. The DSM4000 performs all of the engineering unit conversion, configuration and communication tasks for the analog ZOC modules and also gives the user 5 digital inputs and outputs. These outputs may be used to drive solenoid valves such as Scanivalve's DSMCPM or MSCP.

The DSM4000 utilizes advanced DSP (Digital Signal Processor) architecture. This processor is specifically designed for extremely fast math functions and is able to rapidly convert and output engineering unit data. The DSM4000 references pressure-temperature lookup tables that are uniquely created for every ZOC scanner. This pressure/temperature characterization allows for accurate pressure measurements across the full 0-60°C temperature range of the ZOC modules, minimizing errors due to temperature changes. The DSM4000 module can also perform zero offset correction calibrations on the ZOC modules. This feature, along with Scanivalve's unique calibration procedures allow accuracy specifications to be maintained for up to 6 months on most ZOC modules.

The DSM4000 is 70% smaller and 55% lighter than its



DSM4000-ARINC429 shown

predecessor, the DSM3400. Additionally, all moving components have been removed, the entire system is simpler and many features have been added. The DSM4000 boots significantly faster than the DSM3400 and is completely independent of Windows® operating system.

CONFIGURATIONS

DSM4000/Ethernet (General, Wind Tunnel)

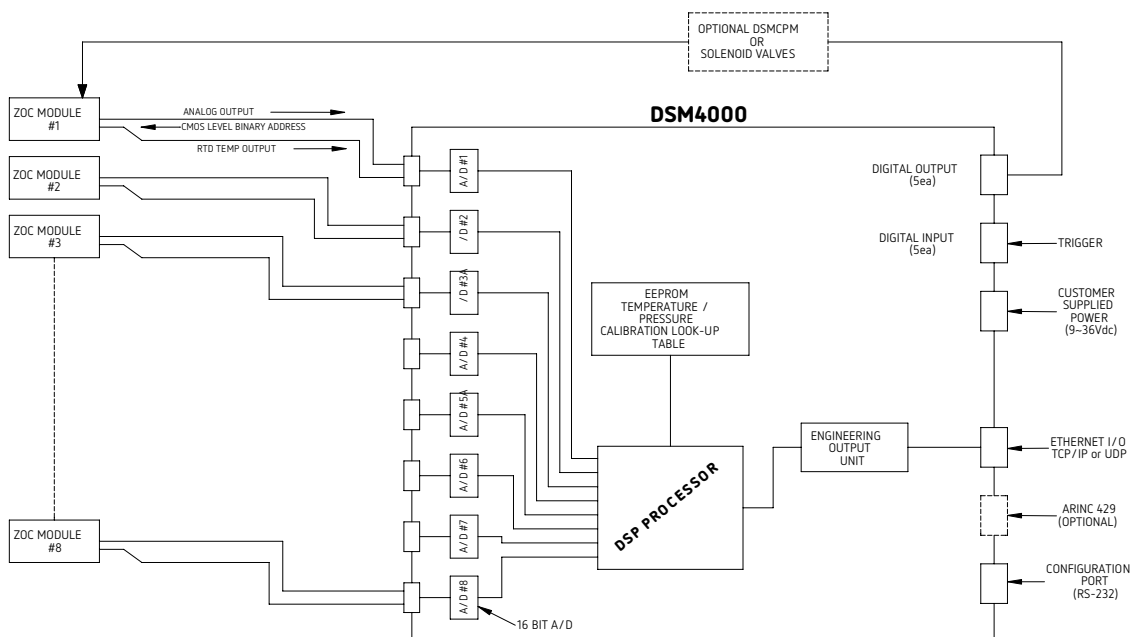
The DSM4000's rugged construction, digital input and output capabilities and fast data throughput rates are ideally suited for many applications including wind tunnel and gas turbine testing. One DSM4000 can support up to eight ZOC pressure scanners and output all data, converted to engineering units at up to 625 Hz/channel. All communications are through the single Ethernet 100baseT connection. For applications where the DSM4000 is too large, Scanivalve's ERAD4000 may be a good alternative.

DSM4000/ARINC429 (Flight Test)

The ARINC429 version of the DSM4000 maintains all of the features and functionality of the Ethernet version except it has eight transmit-only ARINC429 channels in addition to the 100baseT Ethernet port. The DSM4000's power supply was specifically designed around the demanding requirements of a flight test application and can operate over a wide voltage input range. The Ethernet port remains fully functional for communication, data acquisition, setup, and diagnostics.



■ DSM4000



DSM4000 SCHEMATIC

■ DSM4000 HARDWARE

The DSM4000 is built around a DSP processor for fast EU conversion and throughput. There is an internal A/D for each ZOC module, plus internal memory for DSM and ZOC module information storage. Ethernet 100BaseT or ARINC429 interfaces are available. Also incorporated in the DSM module is a single serial configuration port and 5 digital I/O circuits.

Up to eight ZOC modules are connected through small diameter cables that can be up to 50 feet (15 meters) long.

There are no moving parts in the DSM4000. As a result, the number of failure points has been dramatically reduced and reliability increased.

■ DSM COMMUNICATION

Communication with the DSM is either Ethernet TCP/IP or UDP, FTP or ARINC429. The network can be set up and variables configured via Windows HyperTerminal, a Telnet session, or through either Scanivalve’s LabVIEW Configuration Utility

or ScanTel communications utility. A Scanivalve LabVIEW Development Kit is also optionally available for LabVIEW 2009 (ver 8.2 and up) that includes the DSM Configuration Utility.

The IP address is user assignable and the DSM4000 is auto crossing, allowing either crossed or straight-through Ethernet cables to be used.

All scan and calibration variables are software configurable by the user. This includes data rate, data format, etc.

The DSM4000 includes configuration variables to support a NAS (Network Attached Storage) device allowing simple, high speed data collection.

In addition to the NAS support, the DSM4000 further takes advantage of it’s networking capabilities by including NTP (Network Time Protocol) and IEEE1588-2008v2 PTP support.

In addition to the Ethernet and ARINC429 connections, the DSM4000 also has an RS-232 Configuration port. This can be used to verify and configure the DSM4000’s communication and configuration variables.



ON-LINE SENSOR COMPENSATION AND CALIBRATION

When the system includes remote solenoid valves, taking advantage of the DSM4000's built in digital outputs, zero-offset calibrations can be performed. No pressure calibrator is required to perform zerooffset calibration. When actuated, the positive side of the pressure sensor is pneumatically shorted to the reference manifold, creating zero pressure differential across the transducer. The sensor zero offsets from each ZOC pressure scanner are recorded, then the zero-offset files are updated and saved to the DSM module.

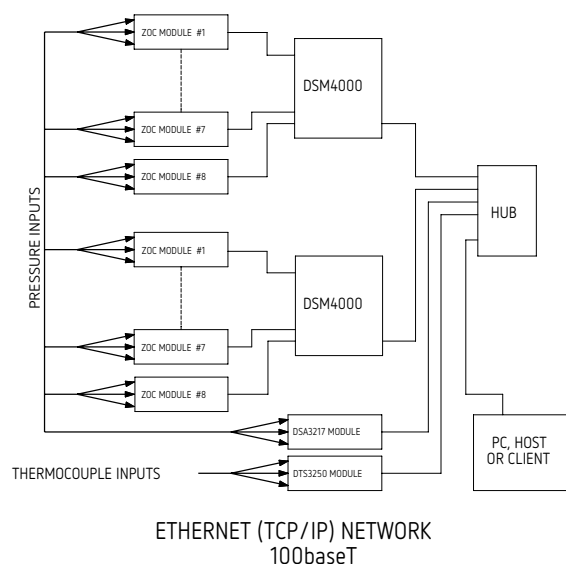
The ZOC scanners used with the DSM4000 series are factory calibrated over their full pressure and temperature ranges. The resulting calibration data is stored in a 280 plane pressure temperature look-up table in the DSM module.

Each ZOC pressure scanner has a factory installed RTD temperature sensor. As the temperature changes, the DSP processor selects the appropriate temperature plane, or interpolates between planes, to correct the pressure reading. This on-line temperature correction and quick zero calibration correct for inherent zero drift and temperature sensitivity allowing for long-term 6 month accuracy specifications on most ZOC modules.

For field calibrations of ZOC modules connected to the DSM, Scanivalve has an accurate pressure calibrator, model SPC4050. Included with the calibrator is Scanivalve's calibration utility software, PressCAL. This allows for automated calibrations with the SPC4050 calibrator, or manual calibrations with the users own pressure calibrator or dead weight tester. PressCAL updates the module calibration coefficient files and generates "as received" and "calibration validation" reports.



FLIGHT TEST



System Architecture



SPECIFICATIONS

No. of ZOC Pressure Scanners: 1 to 8

Operating Temperature Range: 0–60° C

Power Requirements: 9-36Vdc, 44VA
115/230Vac with PDM1500 power supply

Power Mating Connector: Bendix PTO6A-8-3S-SR

Digital In Mating Connector: Bendix PTO6A-12-10S-SR

Digital Out Mating Connector: Bendix PTO6A-12-10P-SR

ZOC Mating Connector: MDM-15SH003P

Config Port Mating Connector: Cannon DE9S

Ethernet Connector: RJ-45

Communication Protocol: Ethernet 10/100BaseT
IEEE-802.3, TCP/IP or UDP, FTP, ARINC429 (optional)

Sample/Throughput Rate: 15 Hz/channel: TCP/IP ASCII
500 Hz/channel: TCP/IP Binary**
625 Hz/channel: UDP Binary

Dimensions (w×H×D): 9.00" x 3.653" x 4.00"
(228.6 mm) X (92.77 mm) X (101.6 mm)

Weight:
DSM4000: 4.1 lbs. (1.86 kg)
PDM1500: 0.9 lbs. (0.4 kg)

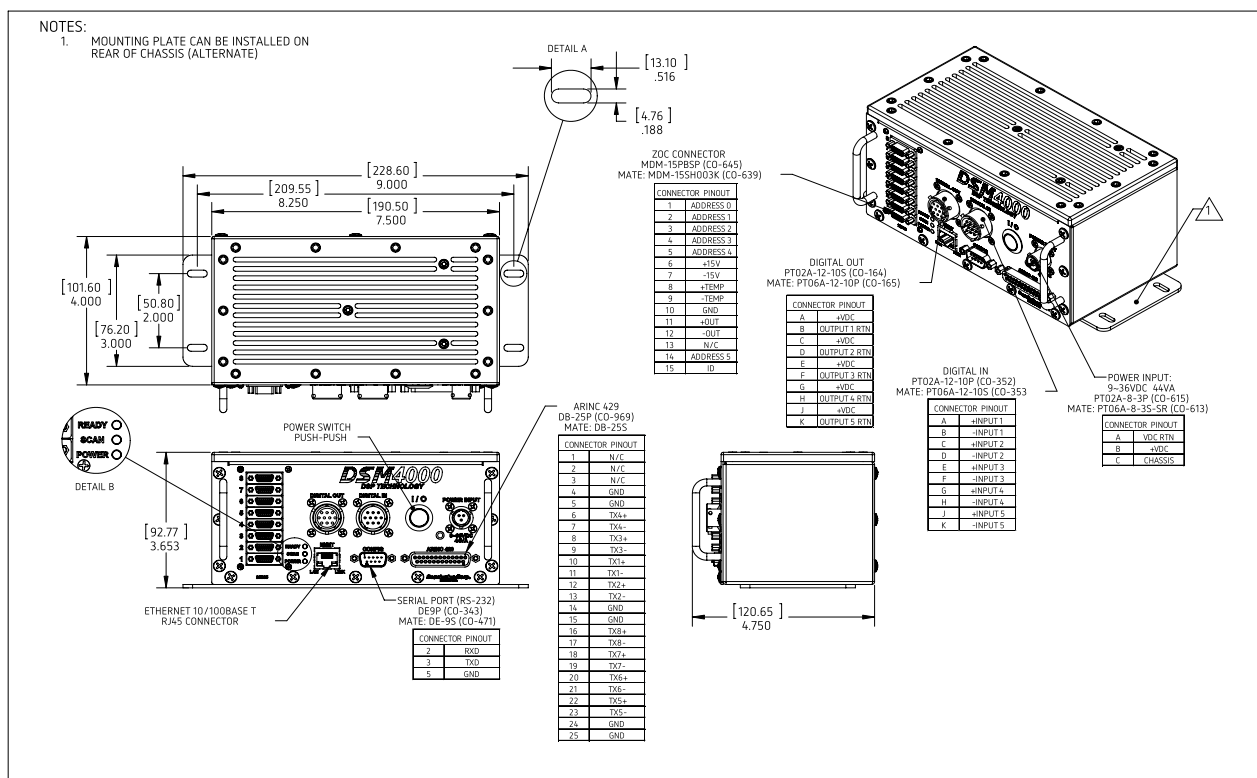
ORDERING INFORMATION

<u>DSM4000</u>	<u>Ethernet</u>
<u>Model</u>	<u>Interface</u>
	-Ethernet
	-ARINC429

Note: When ARINC429 option is ordered, an Ethernet port is also included.

** 500 Hz/channel is typical. TCP/IP binary data rates vary depending on specific network and host.

DIMENSIONS INCHES (mm)





RDS3200 Remote Digital Switch

FEATURES

- 24Vdc standard, 12 Vdc optional specified at time of order
- Incorporates 8 software controlled digital switches
- Up to 8 RDS3200 modules can be used on one RADBASE4000



APPLICATION

The RDS3200 Remote Digital Switch connects to the end of the RADBASE4000. User supplied 24Vdc power is required for this feature (12Vdc optional). Software controls 8 digital switches on the RDS3200. It is typically used to switch solenoid valves in the model MSCP to facilitate ZOC calibration. These digital switches can also be used to operate relays or other devices.

OVERVIEW

The RDS3200 module connects onto the RADBASE4000 Remote A/D. The RDS3200 incorporates 8 software controlled switches that can open or close relays that operate solenoid valves or other devices. The RDS3200 is typically used in conjunction with Scanivalve's model MSCP Miniature Solenoid Control Pack to facilitate calibration of ZOC pressure scanners



bar

MPS4164 Miniature Analog Pressure Scanner

FEATURES

- New valve design provides „isolate-purge“
- On board sensor excitation
- 40kHz data output
- Double-isolated, ultra-stable pressure sensors
- Direct legacy compatibility with ZOC series scanners
- Removable input headers
- Upgradable to Ethernet MPS4264 standard

GENERAL DESCRIPTION

The MPS4164 analog miniature pressure scanner is an extremely compact 64 channel pressure scanner. It has been designed from the ground up with size, accuracy and functionality in mind. Each MPS4164 module incorporates 64 individual silicon pressure sensors, calibration valving, a high-speed multiplexer (45kHz) and an instrumentation amplifier. Simply, it accepts up to 64 individual pneumatic pressure inputs and converts them to high level electronic signals. It boasts a small footprint, a rugged isolate-purge calibration valve, extremely stable and repeatable pressure sensors and a wealth of other innovative features.

The MPS4164 is designed around a core sensor pack that uses a custom packaged, ultra-stable sensor. Scanivalve engineers evaluated known causes of non-repeatability in piezoresistive pressure transducers. Designing a double isolation method of bonding the sensors to the base substrates (patent pending) minimizes the mechanical influences of assembly and thermal expansion. This process dramatically improves the stability and the resulting accuracy of the sensors.

A brand new valve has been designed that fully isolates the sensors from purge pressure and provides long term, maintenance free operation. Not only is the valve design an improvement over legacy products, but two different valve actuation options are available. The „standard“ (CPx) actuation uses opposing 65psi control pressures to shift the valve into whichever state is desired.



The new „Normal Px“ (NPx) option uses a spring to default the valve into measurement mode and 120psi to shift it into calibrate mode.

APPLICATIONS

The MPS4164 electronic pressure scanning module is specifically designed for use in wind tunnel and flight tests where operational conditions are very space constrained and pressures do not exceed 50 psi. It is ideal for use inside small supersonic wind tunnel models.

The very low pressure ranges offered and small size also make it an ideal fit for wind engineering applications where the measurement pressures are very low. In high channel count systems, the lower cost-per channel makes it an affordable solution.

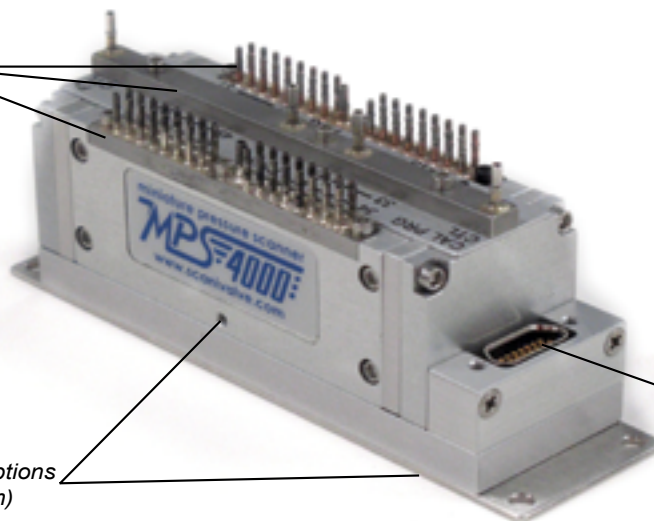
It may be mounted in any position so the pressure sensors may be close coupled to the pressure sources to be measured. Removable headers allow for easy installation and removal without breaking the pneumatic lines.

The MPS4164 module is designed to be used in conjunction with Scanivalve model ERAD4000 Re-mote A/D or model DSM4000 Digital Service Mod-ule. Each MPS4164 pressure scanner incorporates an embedded RTD to monitor the temperature of the pressure sensors. The ERAD4000 communicates via Ethernet. The DSM4000 communicates via Ethernet, RS-232, or ARINC 429.



*Removable input headers
(available with
0.031" and
0.042" tubes)*

*Multiple mounting options
(side and bottom)*



*Analog
Interface
Connection*

LEGACY COMPATIBILITY

The MPS4164 was designed specifically to replace the legacy ZOC series of pressure scanners. This MPS can directly replace a ZOC33 64-channel analog scanner. It can be a drop-in replacement for the ZOC33 or can be used to expand an existing ZOC33 system.

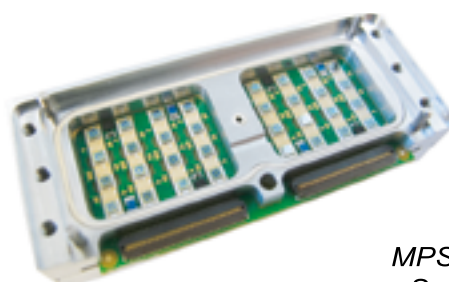
The electrical interface of the MPS4164 is exactly the same as a ZOC scanner. The electrical connector is the same meaning it operates using existing cabling and hardware infrastructure. Firmware in the DSM4000 and the ERAD4000 can be easily field-updated to support the MPS4164*. An integrated TEDs ID chip in the MPS4164 supports automatic system configuration at system power-up.

The pneumatic interface and valve logic of the MPS4164 is also the same as a ZOC scanner. In the „CPx“ configuration, the MPS4164 operates 65psi control pressures with the same control logic as a ZOC33. This allows single logic operation in mixed ZOC/MPS4164 system.

While directly legacy compatible with the ZOC scanners, the MPS4164 offers many feature upgrades. Overall sensor performance is improved, the operating temperature is extended, the scanner is physically smaller and the MPS valve includes full „isolate-purge“ functionality.

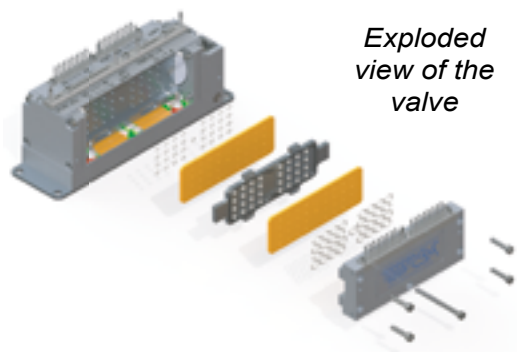
IMPROVED SENSORS, IMPROVED ACCURACY

The primary focus of the MPS4164 was to improve the unit’s overall accuracy across the entire temperature range. Scanivalve worked directly with a leading sensor designer to create a custom sensor package specifically for the MPS series of scanners. This design uses two layers of RTV to isolate the pressure sensor from mechanical influences like those caused by thermal expansion or assembly. Piezoresistive sensors also change greatly in span and zero over temperature so we placed eight individual RTDs in very close proximity to the sensors. Combined with the design placing the sensors in an aluminum housing in the center of the module to prevent rapid temperature changes, these RTDs allow us to accurately correct for any change in the sensor’s behavior due to temperature.

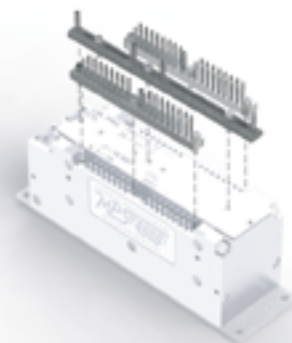


**MPS4164
Sensor
Pack**

*DSM4000 firmware V2.16 and ERAD4000 firmware V2.19 and later fully support MPS4164



Exploded view of the valve



Removable pressure input headers are standard

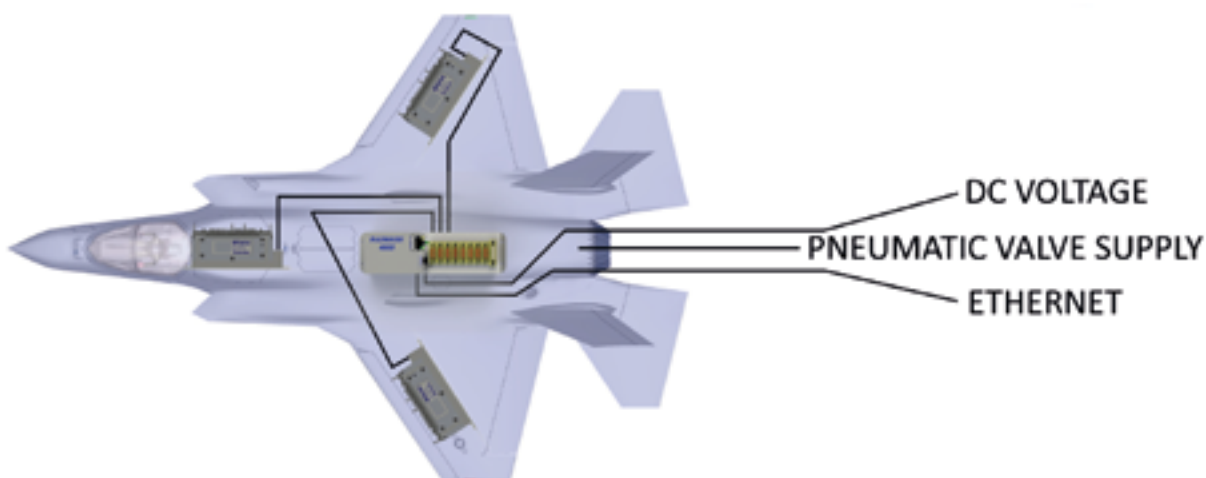
PNEUMATIC CALIBRATION VALVE

The valve design is a sliding-type valve. An aluminum shuttle, populated with self-lubricating O-rings cycles back and forth between two positions to achieve each of the pneumatic states. The „bearing plate“ between the sliding O-rings and the aluminum stationary portion of the valve is a proprietary compound that is extremely low friction. The O-rings are supported completely to prevent any deformation during a state change. The valve shuttle is supported on ball bearings to provide minimal friction and maximum support. This design allows for low actuation force and minimal “stiction” - meaning the actuation force does not noticeably increase after long periods of dormancy. Samples of the valve design were tested to over 1,000,000 cycles without maintenance.

Existing pressure scanners require outside pneumatic pressure as a force to switch the valve logic. In most applications, this „control pressure“ must be continuously supplied to the scanner to maintain the desired valve state. The MPS4164 offers a unique option with a valve that defaults to the „measurement“ mode, allowing sample pressures to be read without any outside pneumatic control pressure. This option, called „Normal Px,“ is another way the MPS4164 simplifies system architecture.

An optical valve position sensor has been integrated allowing the valve state to be queried with a simple software command.

EXAMPLE WIND TUNNEL SYSTEM ARCHITECTURE



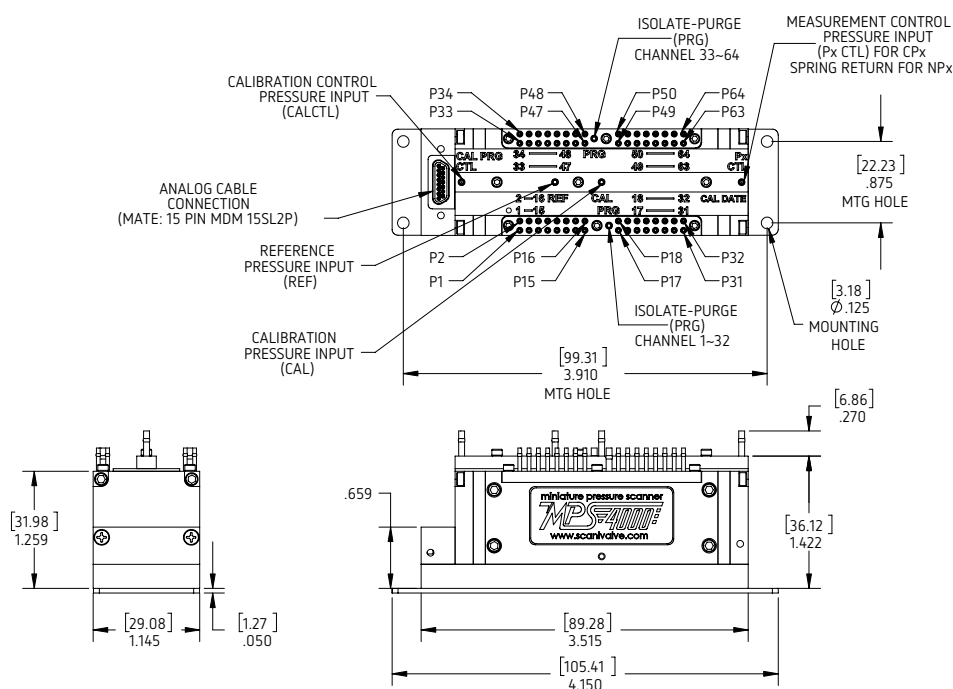
Shown using ERAD4000 mounted in the test article. Alternate system configuration uses DSM4000 installed under the test section or in the control room.



SPECIFICATIONS (FOR MPS4164 VERSION)

<p>Inputs (Px): 0.042" [1.067mm] OD (standard) 0.031" [.787mm] OD (optional)</p> <p>Inputs (Cal, Ref, CTL, Prg): 0.063" [1.600mm] OD</p> <p>Full Scale Ranges: 4 inH₂O, 8 inH₂O, 1psid, 5psid, 15psid [995.4Pa, 1990.7Pa, 6.89kPa, 34.5kPa, 103.4kPa]</p> <p>Accuracy: 4 inH₂O: 0.20%FS 8 inH₂O: 0.15%FS 1psid: 0.08%FS 5psid: 0.08%FS 15psid: 0.08%FS</p> <p>Overpressure Capability: 4 inH₂O: 25x 8 inH₂O: 15x 1psid: 10x 5psid: 10x 15psid: 5x</p> <p>Media Compatibility: Gases compatible with silicon, silicone, aluminum, and Buna-N</p>	<p>Maximum Reference Pressure: 50 psig (345kPa)</p> <p>Maximum Environment Pressure: 100 psia (690kPa absolute)</p> <p>Minimum Environment Pressure: 0.5 psia (3.45kPa absolute)</p> <p>Shock & Vibration: MIL-STD-810G, Category 24</p> <p>Scan Rate: 40kHz (standalone)</p> <p>Power Requirements: +15Vdc @ 120mA -15Vdc @ 30mA</p> <p>Control Pressure Requirements: 65psi (CPx) 120psi (NPx)</p> <p>Electrical Connector: 15 pin MDM 15SL2P</p> <p>Weight: 6.59oz [186.9g]</p> <p>Operating Temperature: 0° to 70°C</p> <p>Storage Temperature: 0° to 80°C</p>
---	---

DIMENSIONS (FOR MPS4164 VERSION) INCHES [mm]





bar

MPS4164TCU Thermal Control Unit

FEATURES

- Maintains a stable temperature environment for MPS4000 series pressure scanners
- Quick disconnects for electrical and pneumatic I/O
- Rugged IP-54 rated aluminum case
- Available for:
MPS4164 Analog Scanner - NPx or CPx



GENERAL DESCRIPTION

The MPS (Miniature Pressure Scanner) line of Thermal Control Units is designed to provide a controlled temperature environment for MPS4164 analog pressure scanners. The MPS4000 series pressure scanners incorporate temperature compensated piezoresistive pressure sensors which must remain in a controlled temperature environment to provide the most accurate pressure measurement. All MPSTCU's include a rugged anodized aluminum enclosure, single pneumatic connector, mating pneumatic connector, a single electrical/data connector, and breakout cable with flying leads.

For higher temperature applications (60-125°C) the Cooling Kit variant of the MPSTCU is required. The cooling kit variant contains the same heater circuit as the heater only MPSTCU variant. With the addition of the cooling kit, the MPSTCU can keep the MPS in the compensated range while the environmental temperatures range from -60°C to 125°C. Approximately 3.0 CFM of 23°C cooling air is required to properly cool the MPS while subject to the 125°C environment.

The electrical connector on the MPS4164TCU (analog) is a 19 contact Bendix PT series connector which provides module power, heater power, and analog addressing.

The pneumatic connector on all MPSTCU's is a Scanivalve 70MPS series connector. These features make for easy use and adaptability when implementing the MPSTCU into a complex system.

APPLICATIONS

Thermal Control Units are most commonly utilized in flight test, automotive, wind turbine, wind tunnel, and engine test applications where temperatures tend to vary and are often extreme.

Thermal Control Units may also be used anywhere a stable temperature environment is not available for MPS pressure scanners. Although the environmental temperatures are within the compensated range of the scanner, a Thermal Control Unit can be used to improve measurement accuracy and limit any effects from temperature.

Thermal Control Units also provide a ruggedized enclosure to protect the scanner's components from moisture, dust, debris, and other contaminants that could harm the scanner.



SPECIFICATIONS (MPS4164TCU FOR NPX OR CPX)

Mechanical Capacity:	MPS4164/64CPx MPS4164/64NPx	Ingress Protection:	IP-54 rating
Case Material:	6063 Anodized Aluminum	Shock and Vibration:	MIL-STD-810G Category 24
Operating Temperature Range:	-60°C to +125°C*	Weight:	(Including MPS Scanner and connector) MPS4164TCU-1 1.97 lbs (.89 kg) MPS4164TCU-2 1.77 lbs (.80 kg) MPS4164TCU-3 1.62 lbs (.73 kg)
Pneumatic I/O:	70 Port connector with 0.063" tubulations (standard) or 70 Port connector with 0.040" tubulations** (optional)	Minimum Environmental Pressure:	MPS4164TCU 0.5psia
Electrical I/O:	PT06A-14-19P		
Heater Rating:	Two 20 watt heaters		
Power Required:			
Without heater:	±15Vdc @120mA		
With heater option:	20-30Vdc, 45W		
Cooling Air Required (125°C Environment):	3.0 CFM		
Temperature Sense:	4 wire RTD		
Mounting Position:	Any		

ORDERING INFORMATION

MPS4164TCU-X_____

Where X is:

- 1 MPS4164TCU with Cooling Kit and Heater
- 2 MPS4164TCU with Heater Only
- 3 MPS4164TCU no Heater or Cooling Kit

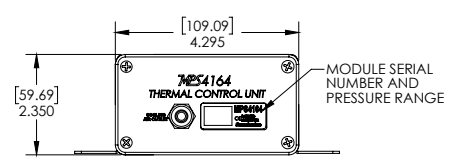
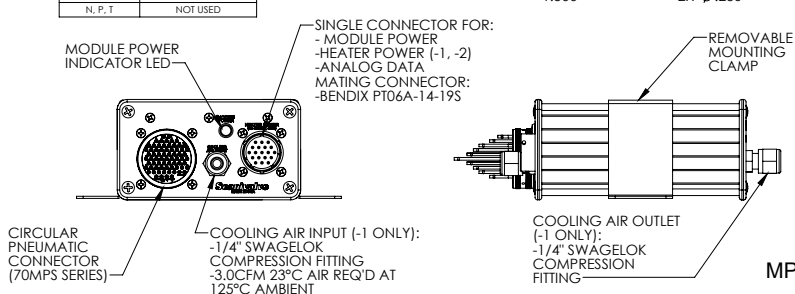
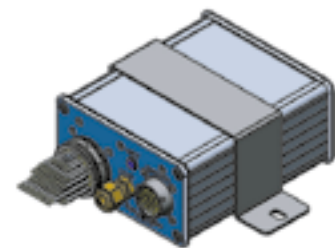
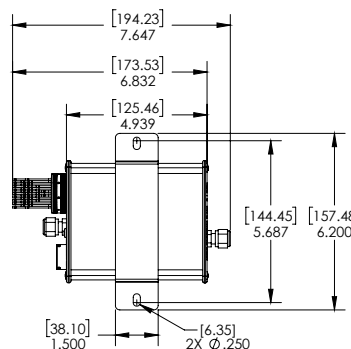
*Scanivalve recommends use of the MPS4164TCU with Cooling Kit in environments above 60°C. 3.0 CFM of 23°C cooling air is required at 125°C.

**Px inputs are 0.040" tubulations. CAL, REF, CALCTL, PXCTL and PURGE are 0.063" tubulations

DIMENSIONS INCHES [mm]

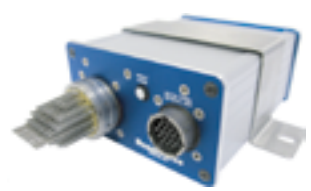
CONNECTOR PINOUT:

A	ADDRESS 0
B	ADDRESS 1
C	ADDRESS 2
D	ADDRESS 3
E	ADDRESS 4
F	+15 VDC
G	15 VDC
H	+ TEMP
J	TEMP
K	GND
L	+ OUTPUT
M	- OUTPUT
R	ID
S	ADDRESS 5
U	+20-30 VDC
V	20-30 VDC RTN
N, P, T	NOT USED



MPS4164TCU-1 with Cooling Kit and Heater shown

- 1 MPS4164TCU THERMAL CONTROL UNIT, HEATER AND COOLING KIT (SHOWN)
- 2 MPS4164TCU THERMAL CONTROL UNIT, HEATER ONLY
- 3 MPS4164TCU THERMAL CONTROL UNIT, NO HEATER/COOLING



MPS4164TCU-2
Thermal Control Unit





ZOC17 Electronic Pressure Scanning Module

FEATURES

- 0 - 750 psid pressure range
- Temperature compensated pressure sensors
- Dual pressure ranges available
- $\pm 0.08\%$ full scale accuracy
- Scan rates up to 50kHz
- On board constant current sensor excitation
- Isolate-Purge feature standard

GENERAL DESCRIPTION

The Model ZOC17 is a cable-serviced electronic pressure scanner that accepts 8 or 16 pneumatic inputs. Each ZOC17 module incorporates 8 or 16 piezoresistive, temperature-compensated pressure sensors. These pressure sensors are manufactured in a vibration resistant housing which makes for easy field replacement, minimizing downtime in the event of sensor damage. The ZOC17 electronic pressure scanner also contains a pneumatic calibration valve, a high speed multiplexer (50kHz), and an instrumentation grade amplifier.

The integral calibration valve allows the ZOC pressure sensors to be automatically calibrated on-line. The ZOC17 calibration valve utilizes "Normally Px" valve logic where no control pressure defaults the valve to the operate mode.

The ZOC17 can be use as an analog scanner integrated into a data system, or it can be used in conjunction with a Scanivalve ERAD4000 or DSM4000 pressure data system. National instruments LabVIEW VI's are available for both the ERAD4000 and the DSM4000 to make integration simple.



*ZOC17IP/8Px Muxless
Pressure Scanner (shown)*

APPLICATIONS

The ZOC17 electronic pressure scanner is ideal for flight and turbine engine testing applications where ambient temperatures vary. It is also ideal for other industrial pressure measurement situations where high measurement pressures may be encountered (750 psi max.). The ZOC temperature compensated pressure sensors are more than ten times less sensitive to temperature than typical piezoresistive pressure sensors. They may be mounted in any position and orientation, so the units may be installed close to the pressure sources to be measured.

When further temperature stability is required, as well as for use below 0°C, it is recommended that the ZOC17 pressure scanner be placed in a thermostatically controlled heater jacket, Model ZOC17TCU.

For those users that want a complete pressure measurement system, The ZOC17/16Px pressure scanner can be used with either or DSM4000 or RAD4000 pressure data system. These systems convert the ZOC17 analog signals to temperature-corrected Engineering Units. The data are then output via Ethernet TCP/IP or UDP.

For those users that want to integrate the ZOC17 with their own A/D and data system, both multiplexed and non-multiplexed modules are available.



ZOC17 FEATURES AND OPTIONS

ZOC Calibration Valve Control Pressure

The ZOC17 calibration valves are “Normally Px” where no control pressure or a loss of control pressure defaults the ZOC calibration valve to the operate (sense) mode. 90 psi (120 psi for high pressures) control pressure is required to switch the ZOC calibration valve into purge, calibrate or isolate mode. This calibration valve allows the ZOC sensors to be automatically calibrated on-line.

Purge Feature

Isolate Purge valve is standard with all ZOC17 calibration valves. This valving isolates the pressure sensors from the applied purge pressures. This technique permits the safe use of high purge pressures without damaging the pressure sensors due to high over-pressure. The ISO purge valve logic also allows a pressure calibration to be performed during the purge process.

Dual Range

Each group of 8Px (pressure inputs) contains its own calibration valving and reference, thus a single ZOC17/16Px pressure scanner can incorporate up to two pressure ranges for maximum flexibility.

ZOC17 Sensors

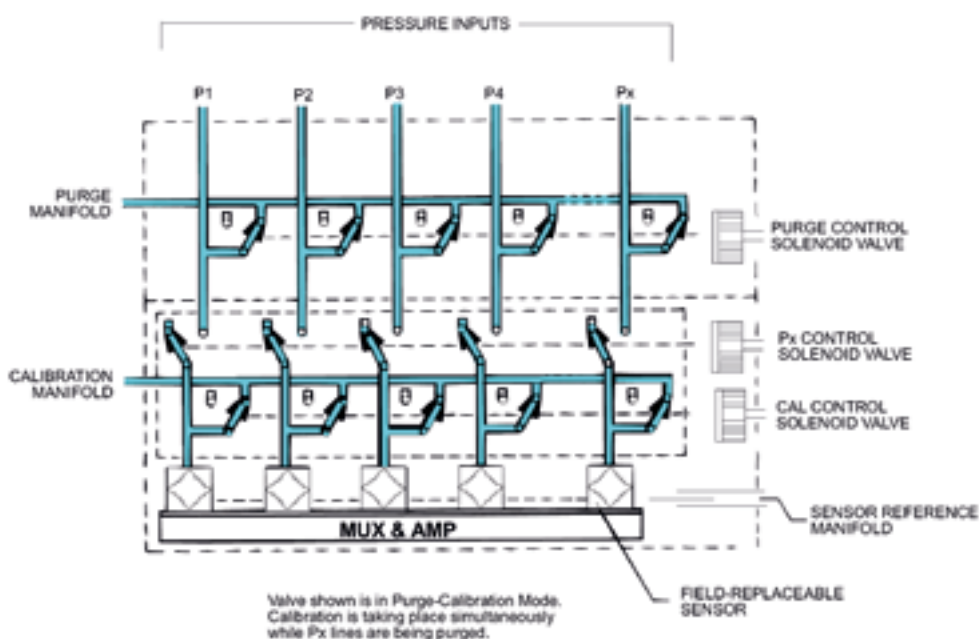
The ZOC17 pressure sensors are manufactured in a vibration resistant can with each pressure sensor having temperature compensating circuits. A constant current excitation is regulated on board the ZOC17 module, rather than a constant voltage, thus adding to the long term stability of the pressure sensors. No special tools are required for access to the sensors or for field replacement.

Muxless - The ZOC17 is available in an 8 channel muxless version (less amplifier and multiplexer). Each pressure sensor has its own 30-120mV F.S. analog output that is accessible through the electrical I/O connector.

Muxless - Amplifier Per Channel (APC) — The ZOC17 is available in an 8 channel muxless version (less multiplexer). Each pressure sensor has its own amplifier per channel with nominal ±2.5Vdc output per channel. 3.0Vdc and 5.0Vdc available upon request.

Muxed - The ZOC17 is available in a 16 channel muxed version that includes a multiplexer and amplifier. A CMOS level binary address is required to select the appropriate channel. The corresponding channel is then amplified and output at ±0 - 2.5Vdc F.S. or 0 - 5.0Vdc and 0 - 10.0Vdc F.S. outputs also optionally available.

ZOC PRESSURE SENSOR MODULE SCHEMATIC





SPECIFICATIONS

Inputs (Px): 8 or 16 each .063 inch (1.6mm) O.D. tubulations. Optional 1/16 inch Swagelok fittings.

Full Scale Ranges: ±10 inch H₂O, 1, 2.5, 5, 15, 30, 50, 100, 250, 500, 600, 750 psid (±2.5, 7, 17, 35, 100, 205, 350, 700, 1725, 3500, 4200, 5250kPa)

Accuracy: 10 inch H₂O* = ±.20 % F.S. (Including linearity, hysteresis, and repeatability)
1 psid = ±.15% F.S.
2.5 psid = ±.10% F.S.
3 psid to 500 psid = ±.08% F.S.
600 to 750 psid = ±.12% F.S.

Sensor Addressing: 4 bit binary, CMOS level (Muxed only)

Full Scale Output: Standard: ±2.5Vdc nominal (Muxed)
Optional: ±5Vdc, ±10Vdc

Full Scale Output: (Muxless)
(Muxless APC) ±30-120mV per sensor
2.5Vdc per channel (nominal)
3.0 Vdc or 5.0Vdc optional

Resolution: Infinite

Scan Rate: 50kHz

Operating Temperature: 0° to 70°C standard

Temperature Compensated Range: 0° to 50°C (Higher compensated ranges available.)

Temperature Sensitivity:

Range	Zero	Span
10 inch H ₂ O	.009% FS/°C	.007% FS/°C
1 to 750 psid	.009% FS/°C	.007% FS/°C

Connector Type: Muxed
Canon 15 pin MDM-15SL2P
Muxless
Canon 21 pin MDM-21SL2P
APC - DB25P

Power Requirements: ±15Vdc @ 100mA Nominal Muxed
±15Vdc @ 25mA Nominal Muxless
±15Vdc @ 200mA APC

Overpressure Capability: (With no damage)
10 inch H₂O = 2 psi (13.79kPa)
1 psid = 5 psi (35kPa)
2.5 - 499 psid (3493kPa) = 200%
500 psid (3500kPa) = 150%
600 psid (4200kPa) = 125%
750 psid (5250kPa) = 100%

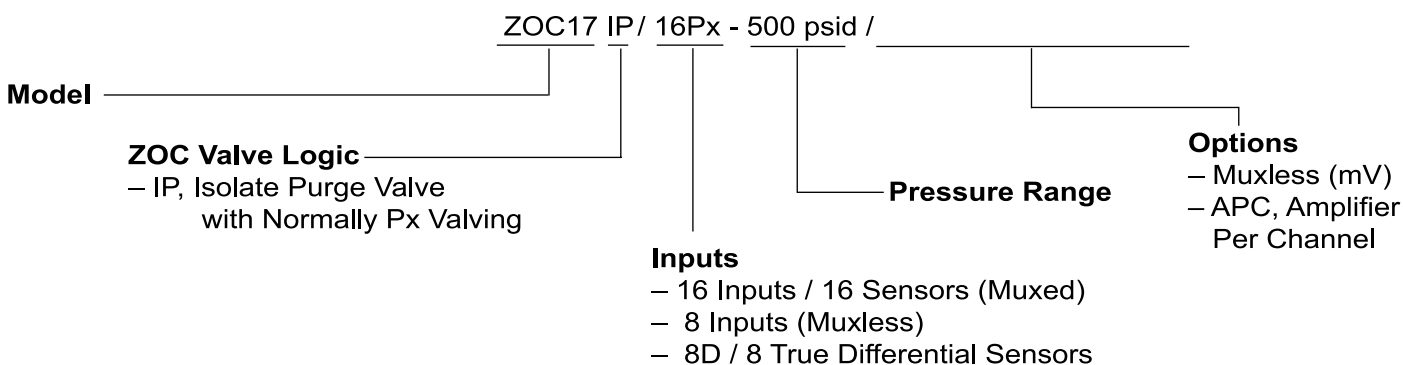
Maximum Reference Pressure: 250 psig (1725kPa)

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

Weight: ZOC17IP/8Px (Muxless): 1.5 lbs.
ZOC17IP/16Px (Muxed): 3.2 lbs.
ZOC17IP/8Px (APC): 1.75 lbs.

*10 inch H₂O = 25.4 cm H₂O = .36127 psi

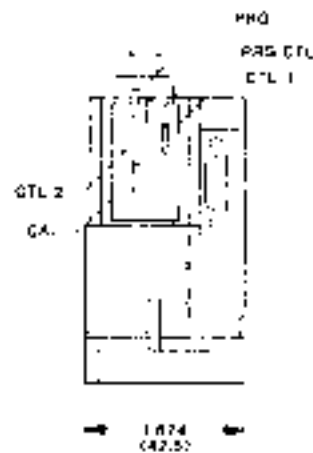
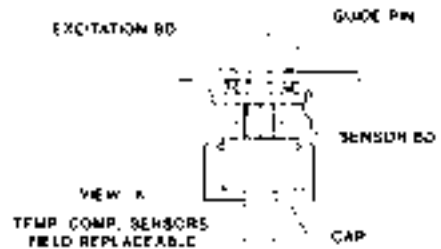
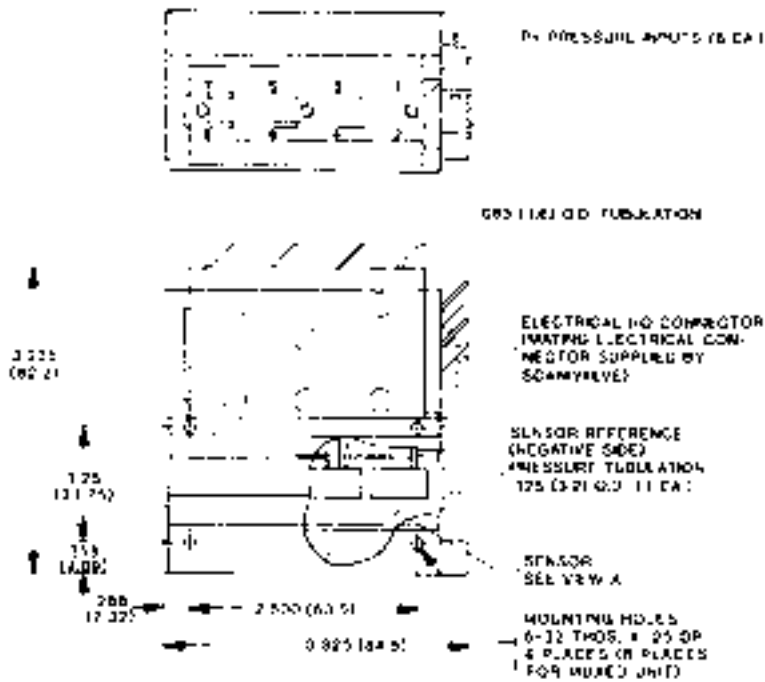
ORDERING INFORMATION



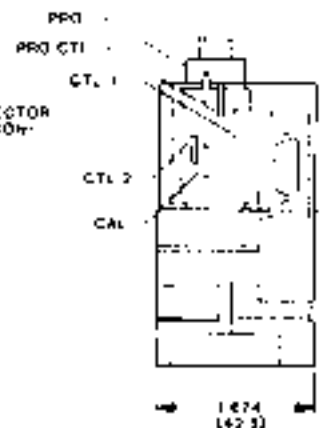
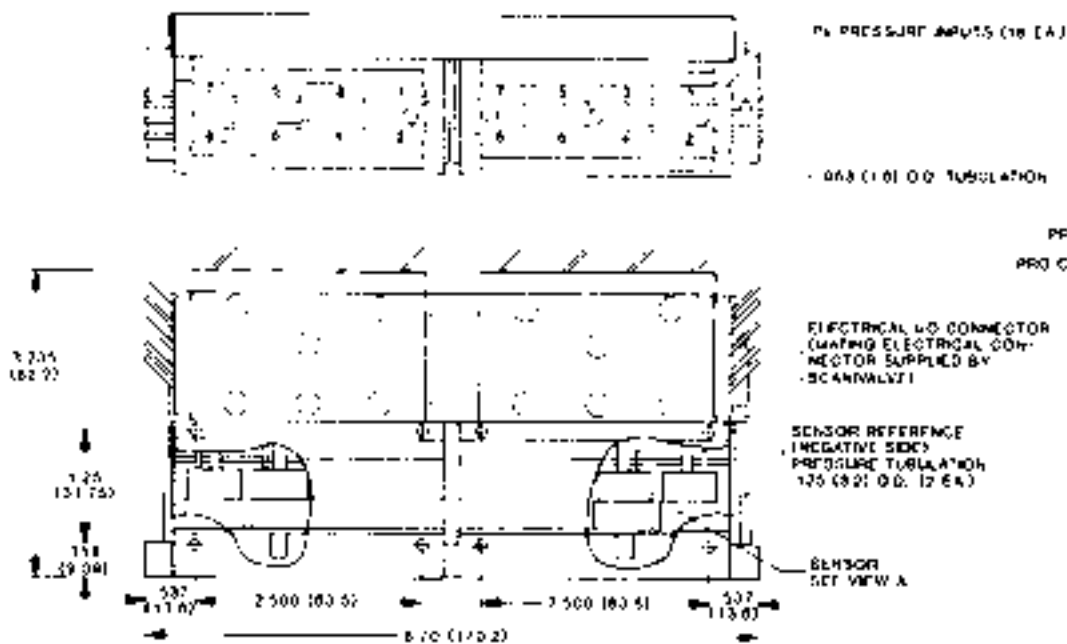


DIMENSIONS INCHES (mm)

ZOC17IP/0Px-XX PSID MUXLESS



ZOC17IP/18Px-XX PSID MUXED





bar ZOC22B
Electronic Pressure Scanning Module

FEATURES

- 0 - 50 psid pressure range
- Field replaceable pressure sensors
- 20kHz scan rate
- Duplex 64 pressure inputs with 32 pressure sensors
- On board sensor excitation regulator

GENERAL DESCRIPTION

The Model ZOC22B electronic pressure scanning module is an extremely compact, multi-pressure scanner which accepts up to 64 pneumatic inputs and converts them to computer compatible electronic signals. Each ZOC22B module incorporates 32 individual silicon pressure sensors, calibration valving, a high speed multiplexer (20kHz), and an instrumentation amplifier.

An integral „duplexing“ valve is available to allow the ZOC22B’s 32 sensors to service up to 64 input pressures. The integral calibration valve has four modes of operation: operate, calibrate, purge, and leak test; each activated by applying the appropriate pneumatic control pressure. Each group of 16 pressure sensors contains its own calibration valving which allows the ZOC22B module to incorporate dual pressure ranges. This calibration valve allows the ZOC sensors to be automatically calibrated on-line. The ZOC22B’s extremely compact design (approx. 0.08 cu. in. per channel) permits installation within the very confined spaces typically available in wind tunnel models.

Three versions are available:

ZOC22B/32Px - 32 Px inputs each with its own dedicated sensors

ZOC22B/32PxX2 - 64 Px inputs duplexed

* between 32 sensors.

ZOC22B/32Px Valveless (No Calibration Valve)



ZOC22B/32Px *Patented*
Pressure Scanner (shown)

APPLICATIONS

The ZOC22B electronic pressure scanning module is specifically designed for use in wind tunnel tests and flight tests where operational conditions are very space-constrained and pressures do not exceed 50 psi. It is ideal for use inside small supersonic wind tunnel models.

The ZOC22B may be mounted in any position so the units may be close coupled to the pressure sources to be measured. When the ZOC22B is used for flight test, it must be installed in a thermostatically controlled heater jacket.

The ZOC22B module is designed to be used in conjunction with our Model ERAD4000 Remote A/D or our Model DSM3400 Digital Service Module. Each ZOC22B pressure scanner incorporates an embedded RTD to monitor the temperature of the pressure sensors. Optional temperature calibration data is available on disk. The ERAD4000 communicates via Ethernet. The DSM4400 communicates via Ethernet, RS-232, or ARINC 429.

*Duplexing shares 2Px inputs with one pressure sensor. This doubles the usefulness of a ZOC22B module without increasing the cost or the space needed for module installation.

Px = Pressure Input



SPECIFICATIONS

Inputs (Px): 64 or 32 .042 inch (1.067mm) O.D. tubulations

Full Scale Ranges: ±10, ±20 inch H₂O, ±1, ±2.5, ±5, ±15, 50 psid (2.5, 5, 7, 17, 35, 100, 350 kPa)

Accuracy:¹
10 to 20 in. H₂O ±0.15% F.S.
1 psid ±0.12% F.S.
2.5 psid ±0.10% F.S.
5 to 50 psid ±0.08% F.S.

Sensor Addressing: 5 bit binary, CMOS level

Full Scale Output: Standard: ±2.5Vdc
Optional: ±5Vdc, ±10Vdc

Resolution: Infinite

Scan Rate: 20kHz

Operating Temperature: 0° to 60°C

Temperature Sensitivity:

Range	Zero	Span
10 inch H ₂ O	0.25% FS/°C	0.10% FS/°C
20 inch H ₂ O	0.20% FS/°C	0.08% FS/°C
1 to 50 psid	0.10% FS/°C	0.05% FS/°C

Connector Type: Cannon 15 pin MDM 15SL2P

Power Requirements: ± 15Vdc @ 45mA

Control Pressure Requirements: 65 psi instrument grade air

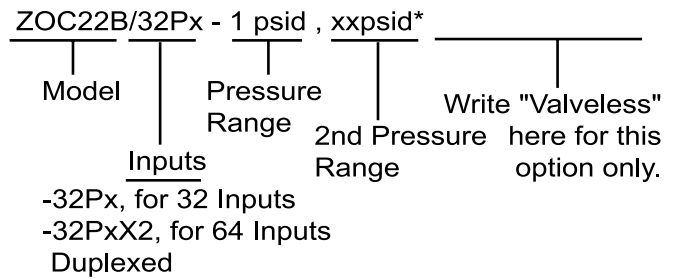
Overpressure Capability: (With no damage)
10 inch H₂O, 20 inch H₂O,
1 psid = 10 psi (70kPa)
2.5-50 psid = 400% or 75 psi (517kPa) (whichever is less)

Maximum Reference Pressure: 50 psig (345kPa)

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

Weight: ZOC22B/32Px or ZOC22B/32PxX2: 3ozs (80 gm)

ORDERING INFORMATION



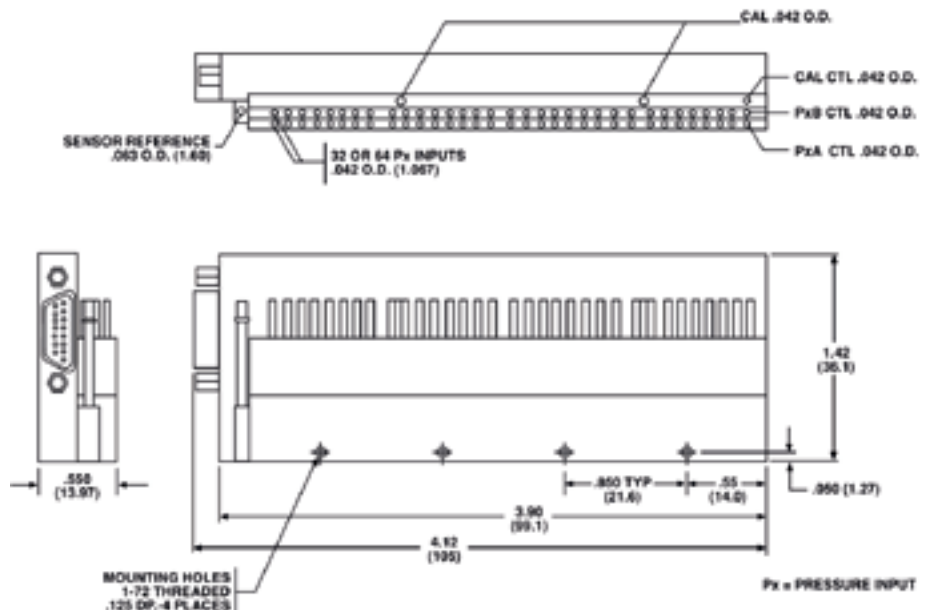
* Only list if 2nd 16 channel pressure range is different than the 1st 16 channel pressure range.

¹ Note: Accuracies are following a calibration with Scanivalve DSM or RAD data systems.

† 10 inch H₂O = 25.4 cm H₂O = .36127 psi

‡ 20 inch H₂O = 50.8 cm H₂O = .72254 psi

DIMENSIONS INCHES (mm)





ZOC23B
Electronic Pressure Scanning Module

FEATURES

- 0 - 50 psid pressure range
- Field replaceable pressure sensors
- Patented microvalves make this miniature module possible(0.3 cu. in.)
- 20kHz scan rate
- Duplex 64 pressure inputs with 32 pressure sensors
- On board sensor excitation regulator

GENERAL DESCRIPTION

The Model ZOC23B is similar to Scanivalve’s model ZOC22B electronic pressure scanner. The pressure sensor and calibrator microvalves package has been divided into 4 remote modules, each containing 8 pressure sensors which may be duplexed* to read 16Px (pressure inputs). The 4 remote pressure sensor modules are on umbilicals which connect into the amplifier multiplexer unit. Each module has its own reference pressure, calibration tubulations, and calibration valving. This allows the remote pressure sensor modules to be multi-ranged.

An integral „duplexing“ valve is available to allow the ZOC23B’s 32 sensors to service up to 64 input pressures. The integral calibration valve has four modes of operation: operate, calibrate, purge, and leak test; each activated by applying the appropriate pneumatic control pressure. This calibration valve allows the ZOC sensors to be automatically calibrated while on-line.

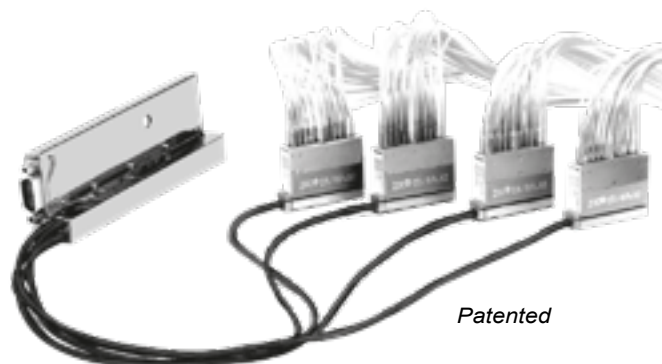
Three versions are available:

ZOC23B/32Px - 32 Px inputs each with its own dedicated sensors

ZOC23B/32PxX2 - 64 Px inputs duplexed

* between 32 sensors.

ZOC23B/32Px - Valveless (No calibration valve)



Patented

ZOC23B/32Px
Pressure Scanner

APPLICATIONS

The ZOC23B electronic pressure scanner is specifically designed for space-constrained use, such as inside very small supersonic wind tunnel models. The remote pressure sensor modules can be mounted in any position to fit where no other pressure scanners can be used. They can be used inside flaps and control surfaces of flight test airplanes, where it is important to measure high frequency turbulent flow. The small size makes it possible to locate the remote modules very close to the pressure orifices to maximize frequency response. This is the same reason that makes the ZOC23B useful in oscillating model research. When the ZOC23B is used for flight test it must be installed in a thermostatically controlled heater jacket.

The ZOC23B module is designed to be used with a customer’s „in-house“ data system or contact Scanivalve for use with RAD3200 Remote A/D or DSM3400 Digital Service Module.

*Duplexing shares 2Px inputs with one pressure sensor. This doubles the usefulness of a ZOC23B module without increasing the space needed for module installation.

Px = Pressure Input



SPECIFICATIONS

Inputs (Px): 64 or 32 .042 inch (1.067mm) O.D. tubulations

Full Scale Ranges: ±10, 20 inch H₂O, 1, 2.5, 5, 15, 50 psid (±2.5, 5, 7, 17, 35, 100, 350 kPa)

Accuracy:¹ 10 inch H₂O † ±0.25% F.S.
20 inch H₂O ‡ ±0.25% F.S.
1 to 2.5 psid ±0.15% F.S.
5 to 50 psid ±0.10% F.S.

Sensor Addressing: 5 bit binary, CMOS level

Full Scale Output: Standard: ±2.5Vdc
Optional: ±5Vdc, ±10Vdc

Resolution: Infinite

Scan Rate: 20kHz

Temperature: 0° to 60°C

Temperature Sensitivity:

Range	Zero	Span
10 inch H ₂ O	0.25% FS/°C	0.1% FS/°C
20 inch H ₂ O	0.20% FS/°C	0.1% FS/°C
1 to 50 psid	0.10% FS/°C	0.1% FS/°C

Connector Type: Cannon 15 pin MDM 15SL2P

Power Requirements: ± 15Vdc @ 45mA

Overpressure Capability:

(With no damage) 10 inch H₂O, 20 inch H₂O,
1 psid = 10 psi (70kPa)
2.5-50 psid = 400% or 75 psi (517kPa) (whichever is less)

Maximum Reference Pressure: 50 psig (345kPa)

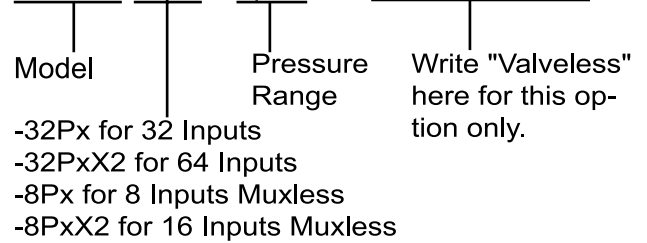
Media Compatibility:

Gases compatible with silicon, silicone, aluminum, and Buna-N

Weight: ZOC23B/32Px: 6.00 ozs. (170 gm)
ZOC23B/32PxX2: 6.13 ozs. (174 gm)
ZOC23B/8Px muxless: .93 ozs. (27 gm)

ORDERING INFORMATION

ZOC23B/32Px - 1 psid

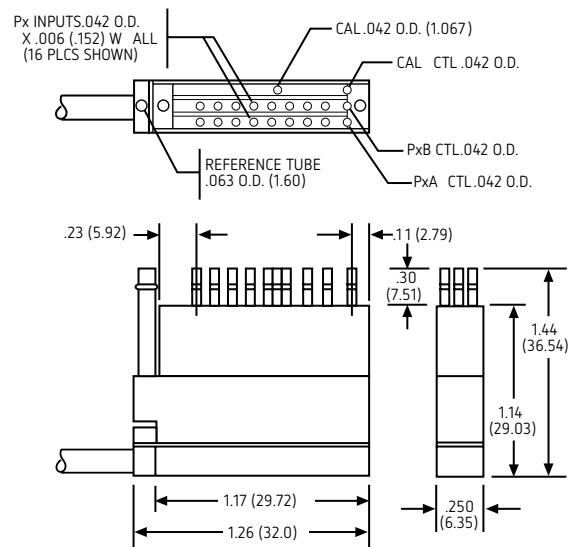
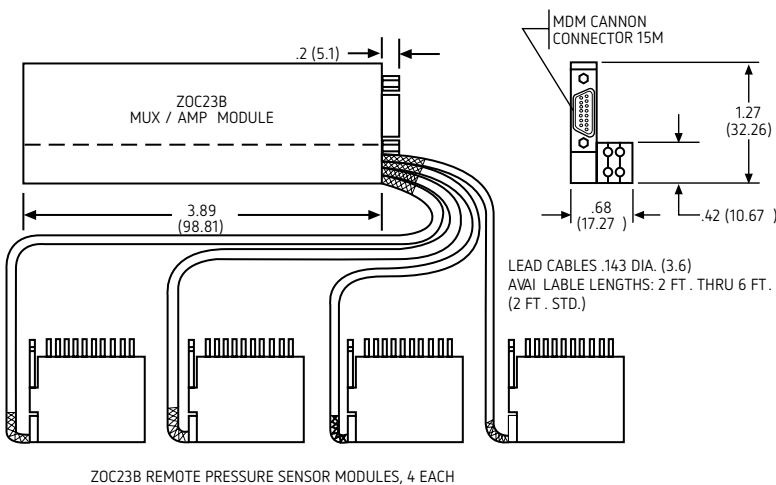


¹ Note: Accuracies are following a calibration with Scanivalve DSM or RAD data systems, in a thermally stable environment.

† 10 inch H₂O = 25.4 cm H₂O = .36127 psi

‡ 20 inch H₂O = 50.8 cm H₂O = .72254 psi

DIMENSIONS INCHES (mm)



Px=PRESSURE INPUT



bar ZOC® TCU
Thermal Control Unit

FEATURES

- Maintains a stable temperature environment for ZOC pressure sensors
- For use with ZOC17, 22, and 33
- Quick disconnects for electrical and pneumatic I/O
- Rugged stainless steel case



*ZOC22/32Tx
Thermal Control Unit*

GENERAL DESCRIPTION

The ZOC (Zero, Operate and Calibrate) line of Thermal Control Units is designed to provide a constant temperature environment for ZOC17, ZOC22B, and ZOC33 electronic pressure scanners. These pressure scanners incorporate piezoresistive pressure sensors. The ZOCTCU minimizes the need to frequently recalibrate ZOC electronic pressure scanners exposed to varying ambient temperatures. All ZOCTCU's include a rugged stainless steel enclosure, insulation, electrical and pneumatic connectors, and a proportionally controlled heating element.

The ZOCTCU proportional heater circuit has a user adjustable set point that is stable within $\pm 0.2^\circ\text{C}$ of set point. The thermal rejection rate of the ZOCTCU is 15 to 1 within its operating range. The sensors will see a 1°C temperature increase for every 15°C of ambient temperature change.

The ZOCTCU not only provides a controlled temperature environment, but also an easy method of breaking connections. The electrical connector is a heavy duty mil-spec bayonet connector. The pneumatic connector is a Scanivalve quick disconnect. These features make for easy use and changeout of ZOC pressure scanners.

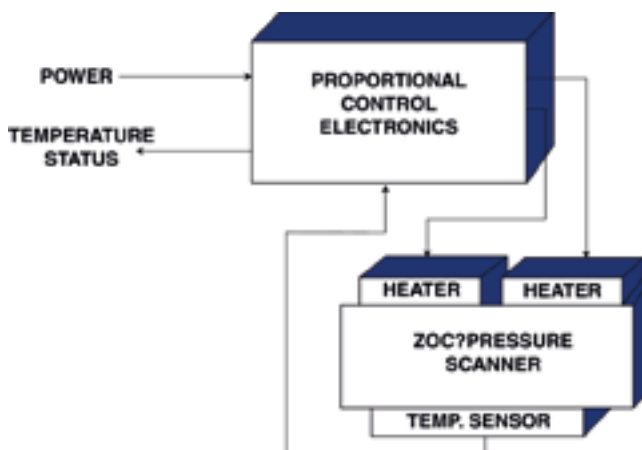
The ZOCTCU is typically purchased at the same time the ZOC electronic pressure scanners are purchased. Scanivalve can then assemble and test the two as one unit.

APPLICATIONS

Thermal Control Units are most commonly utilized in flight test, wind tunnel, and engine test applications where temperatures tend to vary.

They may be used anywhere a stable temperature environment is not available for ZOC pressure scanner installation or anytime ambient temperatures will be below 0°C . This will prevent moisture from freezing inside the ZOC calibration valving.

TCU Functional Diagram





SPECIFICATIONS

Mechanical Capacity: ZOC22/32Px or 32PxX2
ZOC17/16Px or 2 ea. 8Px
Muxless
ZOC33/64Px or 64PxX2

Case Material: 303 stainless steel

Operating Temperature Range: -45 to +65°C*

Oven Stability: ±0.2°C of set point
(Constant Environment)

Pneumatic I/O: 24, 48, 64, or 73 port connector,
.063 inch diameter bulged
tubulations

Electrical I/O: MS3100A type, size 20

Heater Rating: 16Px – 24 watts
32Px – 24 watts
64Px – 24 watts

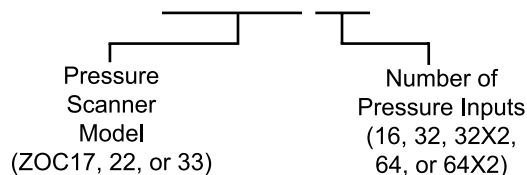
Power Required: 16Px: 24Vdc @ 1.0 amp max.
32Px: 24Vdc @ 1.0 amp max.
64Px: 24Vdc @ 1.0 amp max.

Temperature Sense: 4 wire RTD

Mounting Position: Any

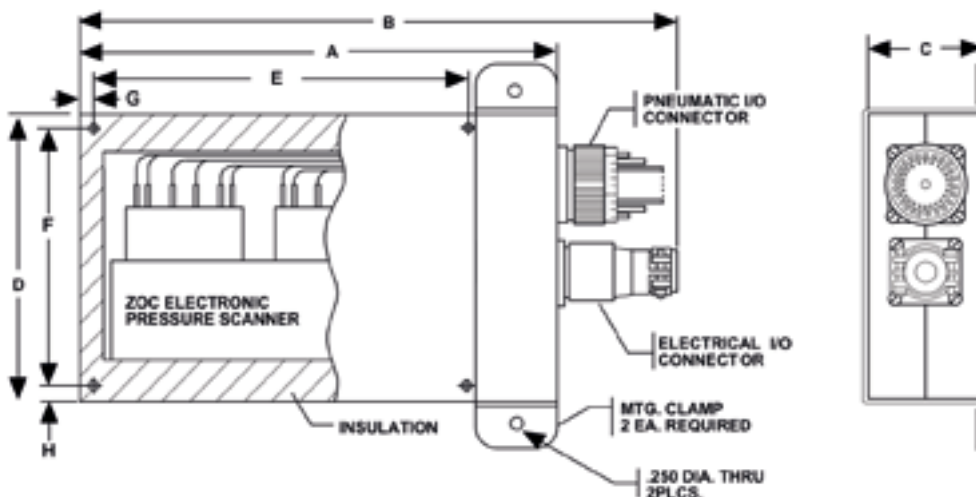
Weight:
(Including ZOC Scanner)
ZOC22TCU 1.8 lbs. (.82 kgm)
ZOC 17TCU/16Px 6.3 lbs. (2.86 kgm)
ZOC33TCU/64Px 3.8 lbs. (1.73 kgm)
ZOC33TCU/64Px X2 4.0 lbs. (1.81 kgm)

ORDERING INFORMATION



*Scanivalve manufactures a ZOCEB Environmental Box for operating temperature ranges up to 176°C. Consult factory for more information.

DIMENSIONS INCHES (mm)



ZOC Scanner to be used in ZOCTCU	A	B	C	D	E	F	G	H	Mating Connector	Mounting Method
ZOC22/32Px or ZOC22/32PxX2	7.0 (177.8)	9.0 (228.6)	1.5 (38.1)	3.0 (76.2)	N/A	N/A	N/A	N/A	6550-2	17053-1 strap
ZOC17/16Px	9.0 (228.6)	11.0 (279.4)	3.0 (76.2)	6.1 (154.9)	10.4 (264.2)	5.0 (127.0)	0.3 (7.6)	0.55 (14.0)	6530-1	19193-1 strap
ZOC33/64Px	7.3 (185.4)	9.65 (245.1)	2.4 (60.9)	4.2 (106.7)	6.7 (170.2)	3.44 (87.4)	0.3 (7.6)	0.38 (9.7)	6570-2 (1ea.)	Threaded elastic stop nuts
ZOC33/64PxX2	7.3 (185.4)	9.65 (245.1)	2.4 (60.9)	4.2 (106.7)	6.7 (170.2)	3.44 (87.4)	0.3 (7.6)	0.38 (9.7)	6570-2 (2 ea.)	Threaded elastic stop nuts

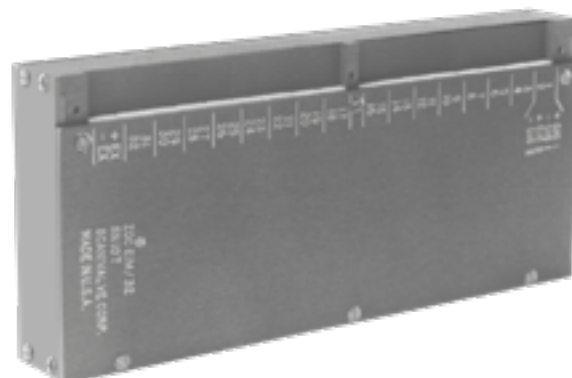


bar

ZOCEIM Electrical Input Module

FEATURES

- Scans 16 or 32 electrical channels
- Scans electrical signals at 20kHz
- Compatible with all ZOC, DSM and E-RAD series components and systems



ZOCEIM
Electrical Input Module

GENERAL DESCRIPTION

The ZOCEIM is designed to multiplex and amplify up to 16 or 32 differential analog inputs. The analog input signals go directly to the 4 eight channel multiplexers. The outputs from these multiplexers are bussed together and then fed directly into an instrument amplifier. The amplifier selectable gain is factory set at 1, 10, 100, or 1000 but can be user set in the field. The multiplexed signal is selected by a 4 or 5 bit binary CMOS level address. The ZOCEIM can be multiplexed up to 20kHz and is available in 2 versions: 16 channel or 32 channel cable serviced units.

The ZOCEIM is similar to our cable serviced ZOC pressure scanners, in that it utilizes the same 15 pin electrical connector. It accepts input signals from signal conditioned thermocouples, RTD, strain gages, or individual transducers for pressure, rpm, etc. It may be mixed with other ZOC pressure scanning modules within a system.

APPLICATIONS

The ZOCEIM is designed to be used in the confined space in wind tunnel models. It is small in size and comes with a mounting bracket that makes it easy to install.

The ZOCEIM is designed to be used in conjunction with our Ethernet based DSM3400 or E-RAD4000 series data systems. When customers choose to use their „in-house“ data system instead of one of Scanivalve’s data acquisition systems, they will need to supply the $\pm 15\text{Vdc}$ power as well as the CMOS level binary address.

OPTIONAL FEATURES

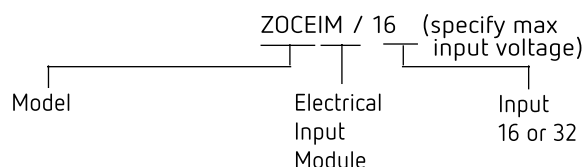
An additional circuit may be factory installed to provide an excitation voltage for strain gages, RTD’s, or pressure transducers. This feature is only available on 32 channel ZOCEIM. In addition, this circuit will provide a stable +5 Vdc at 50mA. Optional excitation voltages of 7 and 10 volts are available on special order. The user may also specify non-standard gains.



SPECIFICATIONS

Inputs:	16 or 32	Resolution:	.005% FS
Input Signals:	±20mV up to ±10Vdc differential	Non-Linearity:	.003% FS
Output Signal:	Nominal ±2.5Vdc Maximum ±10Vdc (only available with customer (A/D))	Input Offset Voltage:	50µV referred to input
Channel Addressing:	4 or 5 bit binary, CMOS level	Excitation Circuit: (Ground Referenced)	Standard +5Vdc @ 50mA Max. Optional 7Vdc, 10Vdc
Scan Rate:	20kHz standalone 625Hz/channel/sec. when used with DSM or ERAD4000	Power Requirements:	+15Vdc @ 100mA -15Vdc @ 50mA
Operating Temperature:	0° to 70°C	Common Mode Rejection:	±10Vdc greater than 100dB
Maximum Storage Temperature:	85°C	Over Voltage:	30 volts peak to peak
Gain Settings:	Specified at time of order* 1 ±0.03% 5 ppm/°C 10 ±0.15% 10 ppm/°C 100 ±0.35% 25 ppm/°C 1000 ±1.00% 50 ppm/°C		

ORDERING INFORMATION



DIMENSIONS INCHES (mm)

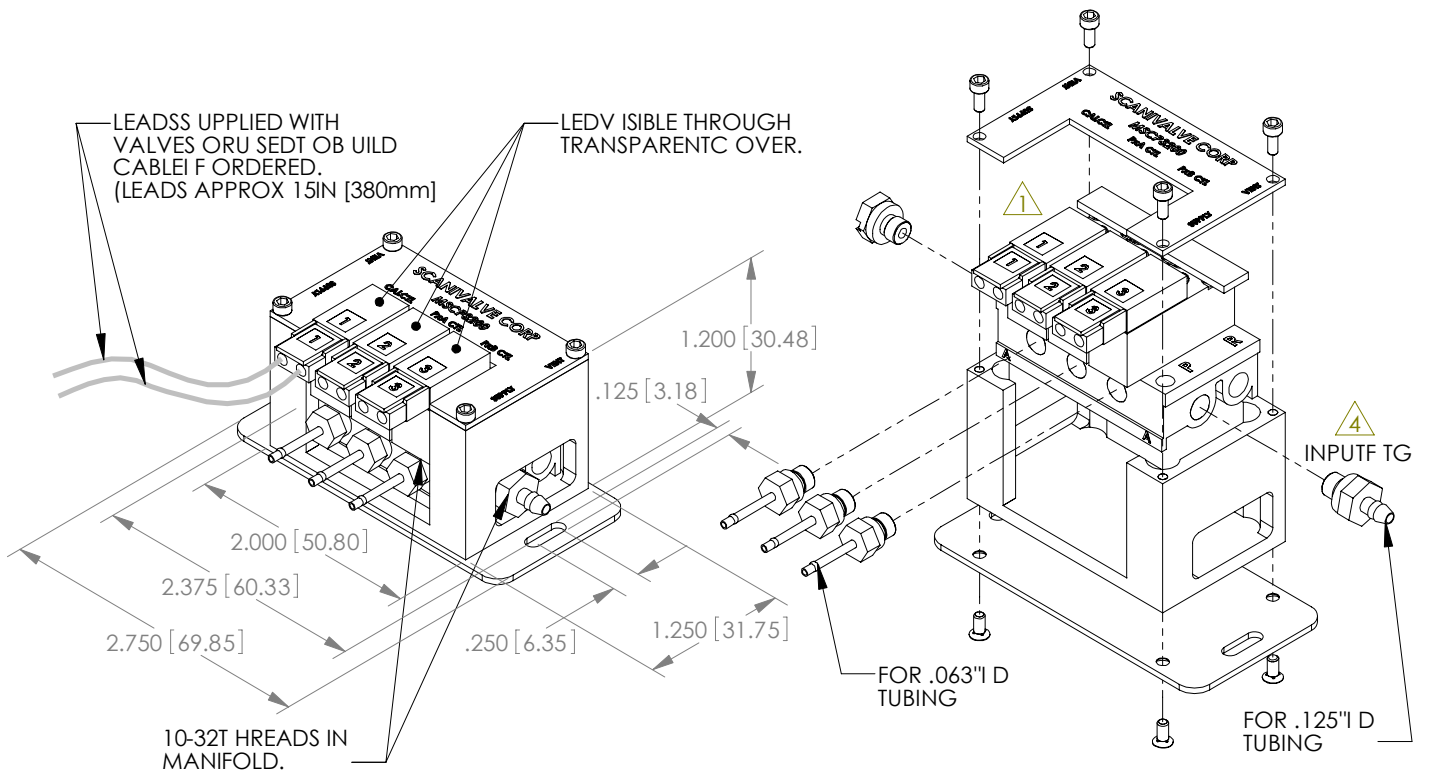




MSCP3200
(Miniature solenoid control pack)

NOTES:

1. SOLENOID VALVES REQUIRE 2 4Vdc (12 & 5Vdc OPTIONAL).
(.8W PER VALVE AT RATED VOLTAGE)
2. DIMENSIONS IN INCHES [MM]
3. REFER TO PRODUCT 21225-1
4. INPUT PRESSURE 100PSI MAX



DIMENSIONS ARE IN INCHES

TOLERANCES:

FRACTIONAL ±

ANGULAR: MACH ± .1 BEND ±

TWO PLACE DECIMAL ± .015

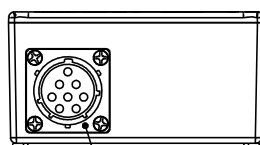
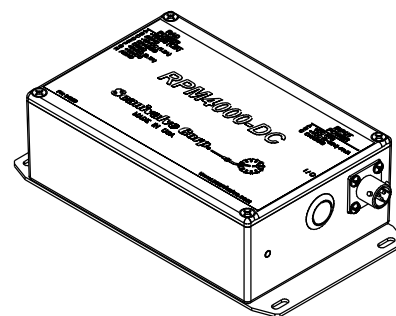
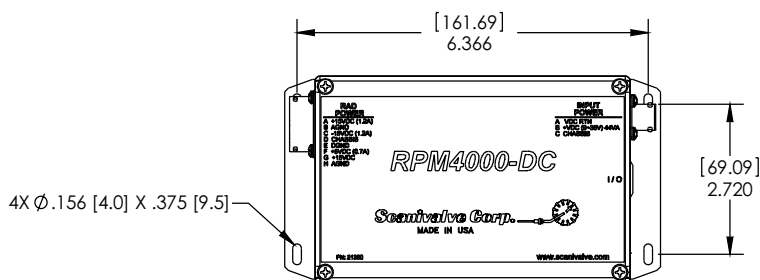
THREE PLACE DECIMAL ± .005



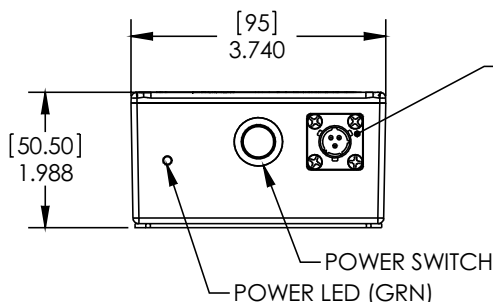
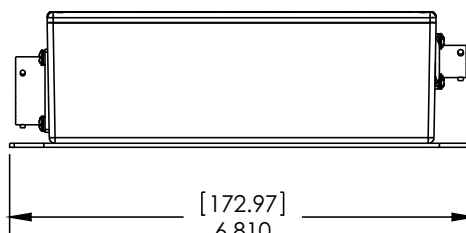
bar RPM4000-DC-DC RAD
Power module assembly

NOTES:

1. REFER TO SCANIVALVE PRODUCT NUMBER 21380
2. DIMENSIONS IN INCHES [mm]



RAD POWER:
BENDIX PT02A-16-8S
MATE: BENDIX PT06A-16-8S (SR)
(CO-860)
A +15VDC
B AGND
C -15VDC
D CHASSIS
E DGND
F +5VDC
G +15VDC
H AGND



INPUT POWER:
BENDIX PT02A-8-3P
MATE: BENDIX PTO6A-8-3S (SR)
(CO-613)
A VDC RTN
B +VDC (9~36V), 44VA
C CHASSIS

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
TWO PLACE DECIMAL ± .015
THREE PLACE DECIMAL ± .005

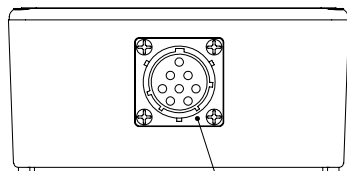
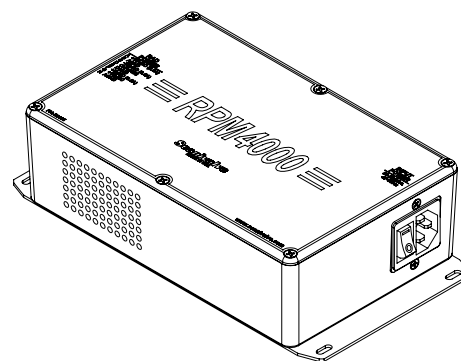
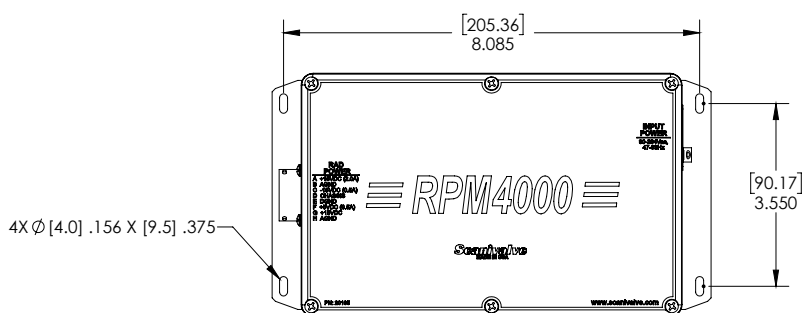
SHEETMETAL PARTS ± .010



bar RPM4000-AC-DC RAD
Power module assembly

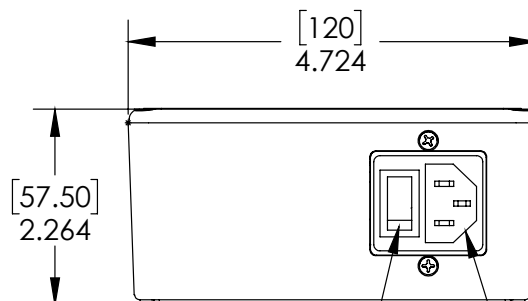
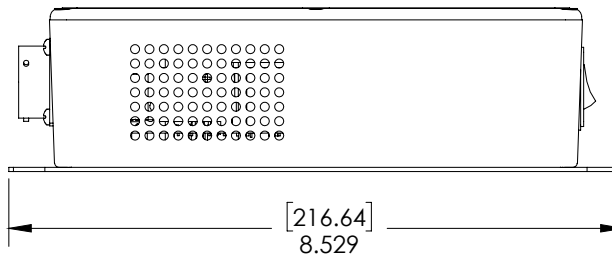
NOTES:

1. REFER TO SCANIVALVE PRODUCT NUMBER 20195
2. DIMENSIONS IN INCHES [mm]
3. TOTAL WEIGHT: 2.2 LBS



RAD POWER:
BENDIX PT02A-16-8S
MATE: BENDIX PT06A-16-8S (SR)
(CO-860)

- A +15VDC
- B AGND
- C -15VDC
- D CHASSIS
- E DGND
- F +5VDC
- G +15VDC
- H AGND



POWER SWITCH

INPUT POWER
90-264Vac,
47-63Hz

UNLESS OTHERWISE SPECIFIED:
DIMENSIONS ARE IN INCHES
TOLERANCES:
TWO PLACE DECIMAL ± .015
THREE PLACE DECIMAL ± .005

SHEETMETAL PARTS ± .010
BEND RADIUS .06 MAX
ANGULARITY ±1.5°

















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/s^2	Vibration		Data Logger
 Nm	Torque		Joystick	 $\%/s$	Angular Rate		Automation
 ϵ	Strain		Inclination	 $^{\circ}C$	Temperature		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

Version: 07.2019



Further information can be found at althen.de