Scanivalve
MPS4000 MADE IN USA

Features

- Integral processor for direct Ethernet connection
- Dual-core processor
- IEEE1588-2008 PTPv2 compatible
- Data rates up to 1000Hz (samples/channel/second)
- Removable input header
- Wide operating voltage (5-36Vdc)
- Integral web server
- Dynamic zero correction for unmatched sensor stability
- One 24 bit A/D per channel for synchronous scanning
- Simple LabVIEW® integration

MPS4232 (left) and MPS4216 (right)

General Description

The MPS4200 miniature pressure scanner represents the forefront of pressure measurement technology. It has been designed from the ground up with size, accuracy, and functionality in mind. It boasts multiple discrete pressure channels, small footprint, TCP/IP Ethernet connectivity, and a wealth of other innovative features.

The MPS4200 is designed around a core sensor layout that uses a custom packaged, ultra-stable sensor. Scanivalve engineers evaluated known causes of non-repeatability in piezoresistive pressure transducers and designed a double isolation method of bonding the sensors to the base substrates (patented) that minimizes the mechanical influences of assembly and thermal expansion. This process dramatically improves the stability and the resulting accuracy of the sensors.

Scanivalve engineers also developed a proprietary means of maximizing sensor stability for span and offset. This technique of "Dynamic Zero Correction" greatly improved the sensor's stability over time and temperature (patented). The increase in overall sensor stability reduces the need for zero offset and span calibrations, resulting in significantly reduced test interruptions and down time.

The electronics are designed around a high performance dual-core processor which can produce engineering unit data for all channels in excess of 850 Hz (samples per channel per second). The onboard flash memory holds the pressure-temperature matrix that converts raw A/D counts to precise engineering unit data over a wide range of temperatures. The power conditioning circuit allows for a wide power supply range and minimizes module self-heating.

The MPS makes communications simple by including an integral web server and supporting a wide variety of standard protocols. The MPS also supports IEEE1588v2 Precision Time Protocol: an Ethernet based, time synchronization method. Leveraging this technology allows the user to synchronize multiple MPS units, or other devices that support IEEE1588v2, to sub-microsecond resolve. While IEEE1588v2 support essentially eliminates the need for external triggering, the MPS still retains the support for an external frame or scan trigger.

Applications

The MPS4200 electronic pressure scanning module is specifically designed for use in wind tunnel and flight test applications where operational conditions are very space constrained and pressures do not exceed 100 psi. It is ideal for use inside small supersonic wind tunnel models. The available low pressure ranges and small size also make it an ideal fit for wind engineering applications where the measurement pressures are very low.

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ISO 9001:2015 CERTIFIED

MPS4216

Small Package, Big Features

The goal of the MPS4200 was to provide a high-channel, Ethernet intelligent pressure scanner in a small package that could be used in applications where the scanner may be mounted inside of test articles, wind tunnel models, or as close to the measurement ports as possible. In dynamic pressure measurement applications, the ability to mount the MPS4200 near the measurement ports helps alleviate the concerns regarding pneumatic frequency response.

While the package may be small, the MPS4200 boasts many instrumental and favorable features:

• All electronics in the MPS4200 are contained to a single board.
• Dual-core processor, which yields faster EU conversions and scanner operations with low overhead.
• Each channel has a discrete sensor and each sensor has a dedicated 24 bit Analog-to-Digtal converter, providing synchronous data collection across all channels with high resolution.
• Wide operating voltage. As little as +5Vdc from a USB port needed to power the MPS.
• No moving parts which nearly eliminates any maintenance.
• Removable input header (PX and REF) which can be used as a quick-connect point for different test areas, module change-out, or plumbing harnesses.

Improved Sensors, Improved Accuracy

The primary focus of the MPS4200 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 scanner. 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. These RTDs allow the MPS to accurately correct for any change in the sensor's behavior due to temperature.

Along with the pressure sensors, all components in the measurement circuit are effected by temperature and drift over time. Scanivalve designed a patented architecture which continuously corrects for these changes over time, while the unit is scanning. This technique of "Dynamic Zero Correction" greatly improves the stability of the entire system over time and temperature. This is accomplished completely "behind the scenes," does not affect performance and requires nothing of the user.

The advanced sensor technology, careful packaging and innovative "Dynamic Zero Correction" function greatly improve the stability and repeatability of the system. With these improvements the need for zero offset calibrations (CALZ) and span calibrations is dramatically reduced. This results in fewer test interruptions, less down time and increased overall efficiency.
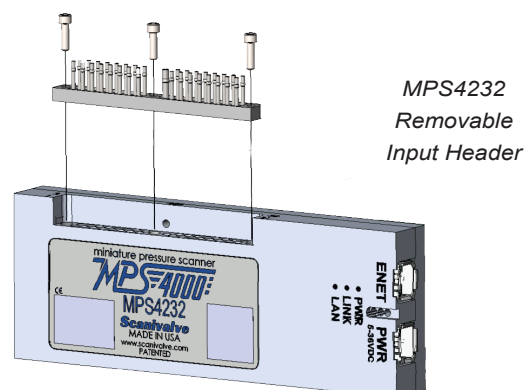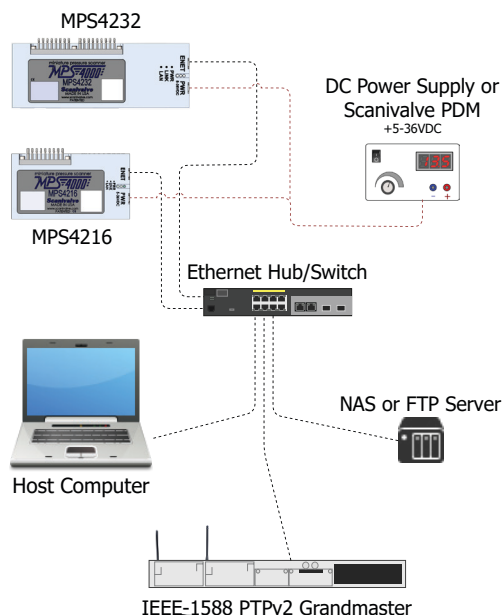

*MPS4232
Removable
Input Header*

Communications

Communication to the MPS is established through a latching miniature Ethernet connection, and offers an impressive array of available protocols.

The MPS is built with a integral web server that can be accessed using a web browser. This provides an easy-to-use graphical interface that allows the operator to change settings, scan data to the screen, or scan and collect binary or ASCII data to a file that can be saved to the host machine - all with the click of a mouse.

The MPS can stream data to an FTP server or Network Attached Storage device (NAS), a TCP/IP client, or a UDP client. ASCII commands may be issued via a TCP/IP Telnet client connected to the MPS Telnet server. A Multicast protocol is employed that allows multiple MPS devices to all start scanning in concert by sending a command to a single device. The MPS also supports a binary server that is optimized for a LabVIEW® interface. Example LabVIEW® VIs are available.

The MPS uses the latest Precision Time Protocol (IEEE1588 PTPv2) standard to time correlate data. This protocol allows any 1588 slave device to synchronize its time to sub-microsecond accuracy without the use of external trigger signals. Precision Time Protocol can synchronize any IEEE1588v2 compliant physical measurement device or a computer to a common Grand Master time.

MPS4232

MPS4216

DC Power Supply or
Scanivalve PDM
+5-36VDC

Ethernet Hub/Switch

Host Computer

NAS or FTP Server

IEEE-1588 PTPv2 Grandmaster

Supporting Accessories

The MPS4200 is shipped with most accessories required for operation: a 3ft long cable with flying leads (1) is provided for the power and external trigger connections, a 3ft long Ethernet extender cable (2) is provided for Ethernet communications. Power requirements are wide (5-36Vdc) so many DC power sources are suitable to power the MPS4200.

MPS4200 & Supplied Accessories*
MPS4232 Shown

In addition to the standard accessories provided, Scanivalve offers several other supporting accessories including:

- PDM1500 - Single power supply
- MPSPDM4500 - 5 port power supply
- Power cables in lengths up to 150 ft (46m)
- Power cables with trigger and serial connections in lengths up to 150ft (46m)
- Ethernet cables in lengths up to 100 ft (30m)
- ES4000 series miniature Ethernet switches (4 or 8 port)
- Spare standard Px Input or 90° MPS Input Header
- Calibration Header

These accessories can be purchased from Scanivalve to enable quick and easy setup of the system. Please see the Module Accessory Catalog for a complete selection of all available MPS accessories and part numbers.

Specifications

Inputs (Px): 0.042" [1.067mm] OD (standard)
0.031" [.787mm] OD (optional)

Reference Input (REF): 0.063" [1.600mm] OD

Full Scale Ranges: 4 inH$_2$O, 8 inH$_2$O, 1psid, 5psid, 15psid, 50psid, 100psid

[995.4Pa, 1990.7Pa, 6.89kPa, 34.5kPa, 103.4kPa, 344.7kPa, 689.5kPa]

Accuracy*:

4 inH$_2$O:	0.20%FS
8 inH$_2$O:	0.15%FS
1psid:	0.06%FS
5psid:	0.06%FS
15psid:	0.06%FS
50psid:	0.06%FS
100psid:	0.06%FS

Overpressure Capability:

4 inH$_2$O	25x
8 inH$_2$O	15x
1psid:	15x
5psid:	10x
15psid:	5x
50psid:	2x
100psid:	1.5x

A/D Resolution: 24-bit

Maximum Reference Pressure: 50 psig (344.7kPa)

Maximum Environment Pressure: 100psia (690kPa absolute)

Ethernet Connection: 100baseT, MDIX auto-crossing

External Trigger: 5-15Vdc, 6.5mA

Data Output Rate:

(samples/channel/second)
Binary: 1000Hz
ASCII: 100Hz

Power Requirements: 5-36Vdc, 3.5W

Mating Connectors:
Ethernet: TE Connectivity PLG 8P8C Mini2
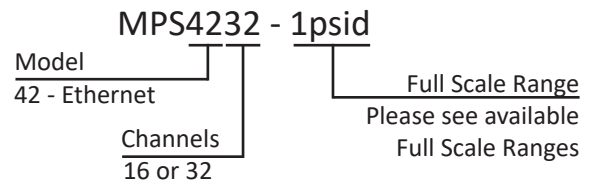Power: TE Connectivity PLG 8P8C Mini1

Weight: 0.19lbs [86.2g]

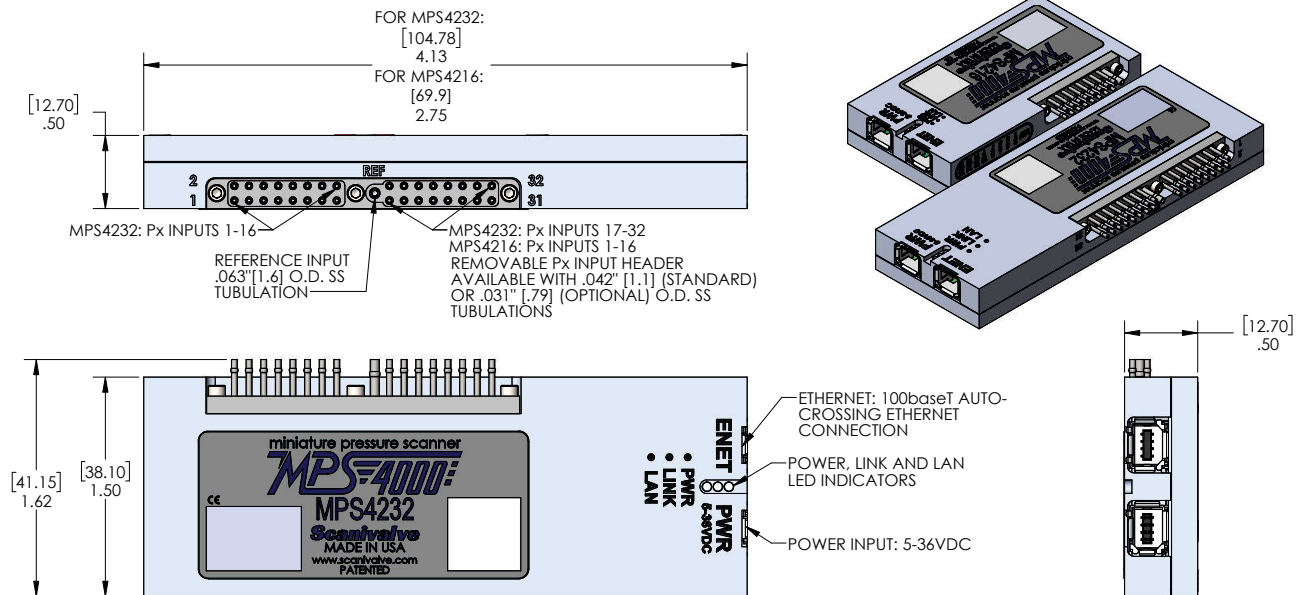**Operating Temperature:** 0° to 70°C

Storage Temperature: 0° to 80°C

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

Ordering Information

MPS4232 - 1psid

Model
42 - Ethernet

Channels
16 or 32

Full Scale Range
Please see available
Full Scale Ranges

* Non-standard pressure ranges may result in a reduction of accuracy. Please contact Scanivalve for more information.

Dimensions Inches [mm]

FOR MPS4232:
[104.78]
4.13

FOR MPS4216:
[69.9]
2.75

[12.70]
.50

REF

2 1 32 31

MPS4232: Px INPUTS 1-16

REFERENCE INPUT .063"[1.6] O.D. SS TUBULATION

MPS4232: Px INPUTS 17-32
MPS4216: Px INPUTS 1-16
REMOVABLE Px INPUT HEADER AVAILABLE WITH .042" [1.1] (STANDARD) OR .031" [.79] (OPTIONAL) O.D. SS TUBULATIONS

miniature pressure scanner

MPS4232

Scanivalve
MADE IN USA
www.scanivalve.com
PATENTED

[41.15] 1.62
[38.10] 1.50

ENET
PWR
LINK
LAN
PWR 5-36VDC

ETHERNET: 100baseT AUTO-CROSSING ETHERNET CONNECTION

POWER, LINK AND LAN LED INDICATORS

POWER INPUT: 5-36VDC

[12.70]
.50