Scanivalve

MPS4000 MADE IN USA

Model MPS4264
Miniature Pressure Scanner

Patented

Features

- Integral processor for direct Ethernet connection
- IEEE1588-2008v2 PTP compatible
- Up to 2,500 samples/channel/second*
- Simple LabVIEW® integration
- Removable input headers
- Wide operating voltage (9-36Vdc)
- Integral web server
- 24-bit Analog-to-Digital Converters
- Integrated "Isolate-purge" valve with multiple control options
- Dynamic Zero-Correction for unmatched sensor stability

MPS4264/EPx (top) and MPS4264/CPx (bottom)

General Description

The MPS4264 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 64 pressure channels, small footprint, TCP/IP Ethernet connectivity, and a wealth of other innovative features.

The MPS4264 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 (patented) 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.

A brand new valve has been designed that fully isolates the sensors from purge pressure and provides long term, maintenance free operation. This valve allows for on-condition calibrations and purging options. Three different valve actuation options are available - two pneumatically driven options (Normal Px "NPx" or Bidirectional "CPx") and one electric ("EPx").

The electronics are designed around a high performance DSP processor to produce 64 channel data in excess of 850 Hz (samples per channel per second). The feature “Fast mode” can be enabled to achieve rates of 2500 Hz. Onboard flash memory holds the calibration tables that convert raw A/D sensor counts to precise engineering unit data over a wide range of temperatures, with 24-bit resolution. The power conditioning circuit allows for a wide power supply range and minimizes module self-heating.

All communications with the MPS module is handled through an Ethernet connection. Protocols supported include TCP, UDP, FTP, as well as HTTP through an integrated Web Server, and IEEE1588 PTP for synchronization. The MPS modules also support multiple external triggering methods including hardware frame triggering, scan triggering, and software triggering.

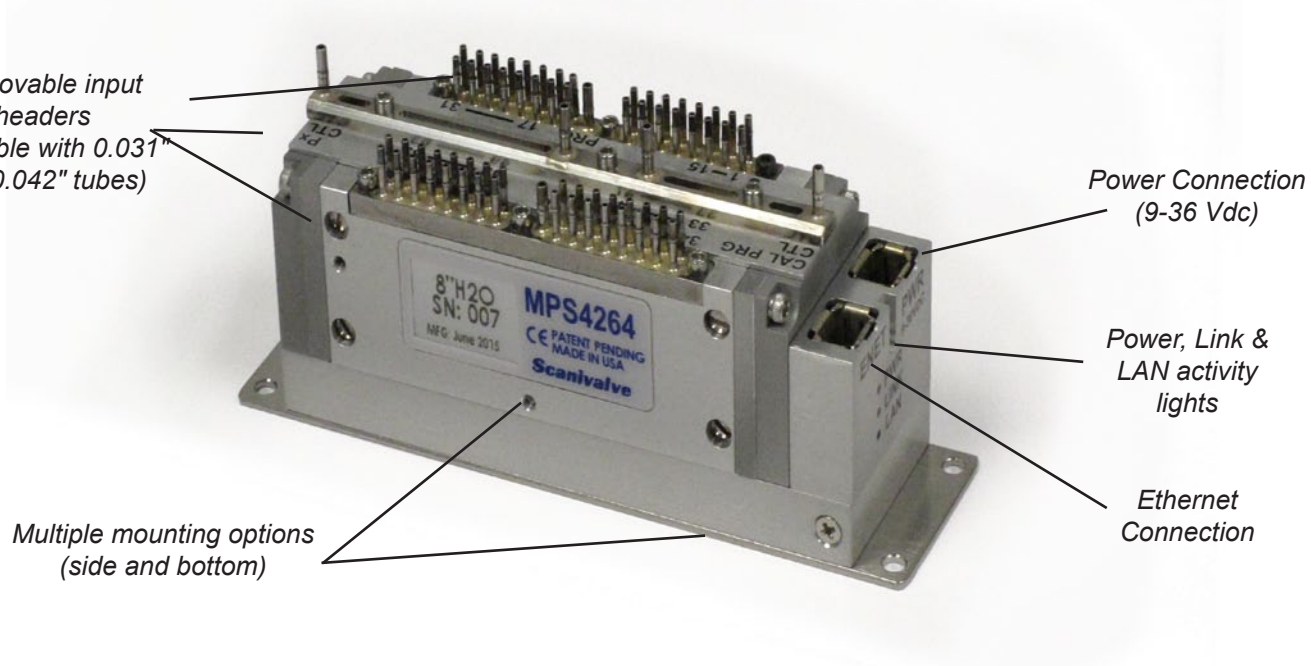
Applications

The MPS4264 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 wind tunnel models and on-vehicle testing 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.

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.

When the MPS4264 is used for flight test, it must be installed in a Thermal Control Unit (TCU). This allows the unit to be operated in high vibration environments down to -50°C.

* When limiting the channel scan list to 16 channels using the "Fast Scan" feature



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 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 MPS4264 offers three unique valve control options. Normal Px, or NPx, is a pneumatically driven valve that defaults to measurement mode when no control pressure is active. Control pressure is only needed to change the valve logic to another state. Control Px, or CPx, offers directional movement where short bursts or constant pressure can be used to shuttle the valve from one position to the other. Electric Px, or EPx, is an electric valve control that utilizes a gear and motor to change the valve logic, eliminating the need for pneumatic control pressure for on-condition purging and calibrations. The gear and motor are controlled via software.

An optical valve position sensor is integrated into the MPS, allowing the current valve state of the MPS to be queried using a simple software command.

Improved sensors, Improved Accuracy

The primary focus of the MPS4264 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 digital temperature chips 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 chips allow us 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.

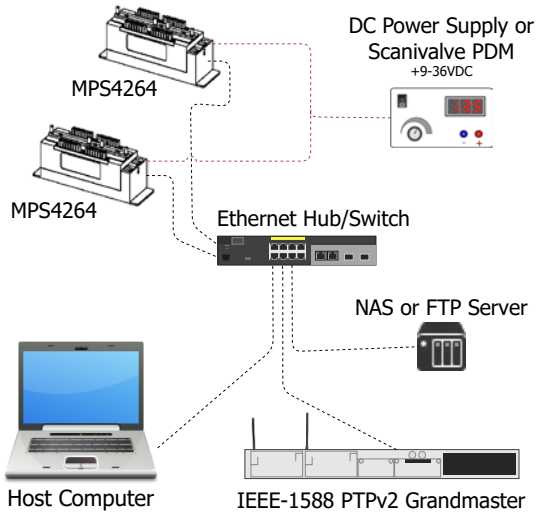
Communications

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.



Supporting Accessories

The MPS4264 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 (9-36Vdc) so many DC power sources are suitable to power the MPS4264.

MPS4264 & Supplied Accessories*

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 Px Input headers or blanking covers

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.

LabVIEW® is a registered trademark of National Instruments.

* Supplied accessories may differ in color or appearance.

Ordering Information

MPS4264 / CPx - 1psid

Model
42 - Ethernet

No. of Channels
64

Valve
CPx - (65psi)
NPx - (90psi)
EPx - (NA)

Full Scale Range
Please see pressure ranges on next page

Other MPS4000 Series Modules Available! Ask us for more information.

Specifications

Inputs

Px	0.042" [1.067mm] OD (standard) 0.031" [.787mm] OD (optional)
Cal, Ref, CTL, Prg	0.063" [1.600mm] OD
Full Scale Ranges:	4 inH_2O, 8 inH_2O, 1psid, 5psid, 15psid, 50psid [995.4Pa, 1990.7Pa, 6.89kPa, 34.5kPa, 103.4kPa, 344.7kPa]

Accuracy*:

4 inH_2O:	0.20%FS
8 inH_2O:	0.15%FS
1psid:	0.06%FS
5psid:	0.06%FS
15psid:	0.06%FS
50psid:	0.06%FS

Overpressure Capability:

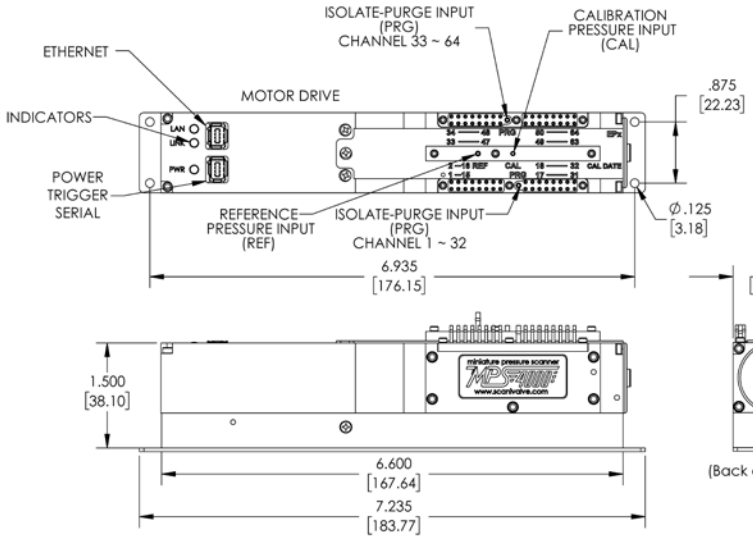
4 inH_2O:	25x
8 inH_2O:	15x
1psid:	15x
5psid:	10x
15psid:	5x
50psid:	2x

A/D Resolution:	24-bit
Media Compatibility:	Gases compatible with silicon, silicone, aluminum, and Buna-N
Ethernet Connection:	100baseT, MDIX auto-crossing
External Trigger:	5-15Vdc, 6.5mA
Data Output Rate: (samples/channel/second)	TCP/IP Binary: 850Hz "Fast Mode": 2500Hz
Power Requirements:	9-36Vdc, 3.5W
For EPx valve:	18-26Vdc, 5.5W
Control Pressure Requirements:	CPx - 65psi min / 120psi max NPx - 90psi min / 120psi max EPx - N/A
Mating Connectors	
Ethernet:	TE Connectivity PLG 8P8C Mini2
Power:	TE Connectivity PLG 8P8C Mini1
Weight:	CPx/NPx - 6.59oz [186.9g] EPx - 12.88oz [365g]
Maximum Reference Pressure:	50 psig (345kPa)
Environment Pressure:	0.5 to 100 psia (3.4 to 690kPa abs)
Operating Temperature:	0° to 70°C -50°C to 125°C with TCU
Storage Temperature:	0° to 80°C
Humidity:	5 to 95% RH, Non-Condensing
Standards:	MIL-STD-810G, Cat 24 CE RoHSv3

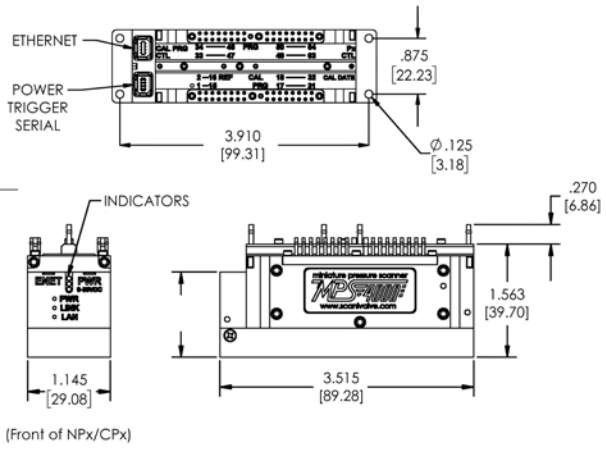
** Non-standard pressure ranges may result in a reduction of accuracy. Please contact Scanivalve for more information.*

Dimensions Inches [mm]

Electric Valve (EPx)



Pneumatic Valve (NPx / CPx)



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