Scanivalve
MPS 4000
MADE IN USA

Model MPS4264
Miniature Pressure Scanner

Features

- Integral processor for direct Ethernet connection
- New valve design provides "isolate-purge"
- Dynamic zero correction for unmatched sensor stability
- Standard or "Normal Px" valve control
- 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

*MPS4264 Ethernet
Pressure Scanner*

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 (patent pending) 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 (patent pending). 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. Not only is the valve design an improvement over

legacy products, but two different valve actuation options are available. The "standard" actuation uses opposing 65psi control pressures to shift the valve into whichever state is desired. The new "normal Px" option uses a spring to default the valve into measurement mode and 90psi to shift it into calibrate mode.

The electronics are designed around a high performance DSP processor to produce 64 channel data in excess of 850 Hz (readings per channel per second). "Fast mode" can achieve rates of 2500 Hz. The onboard flash 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 allow a wide power supply range and minimize module self-heating.

The MPS makes communication simple by including an integrated web server and supporting a wide variety of protocols. The MPS also supports IEEE-1588v2 Precision Time Protocol. Leveraging this technology allows the user to synchronize multiple MPS units and any other devices supporting IEEE-1588 sub-microsecond resolve. While IEEE-1588 support essentially eliminates the need for an external trigger, the MPS still retains support for both a frame trigger and a scan trigger.

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

Removable input headers (available with 0.031" and 0.042" tubes)
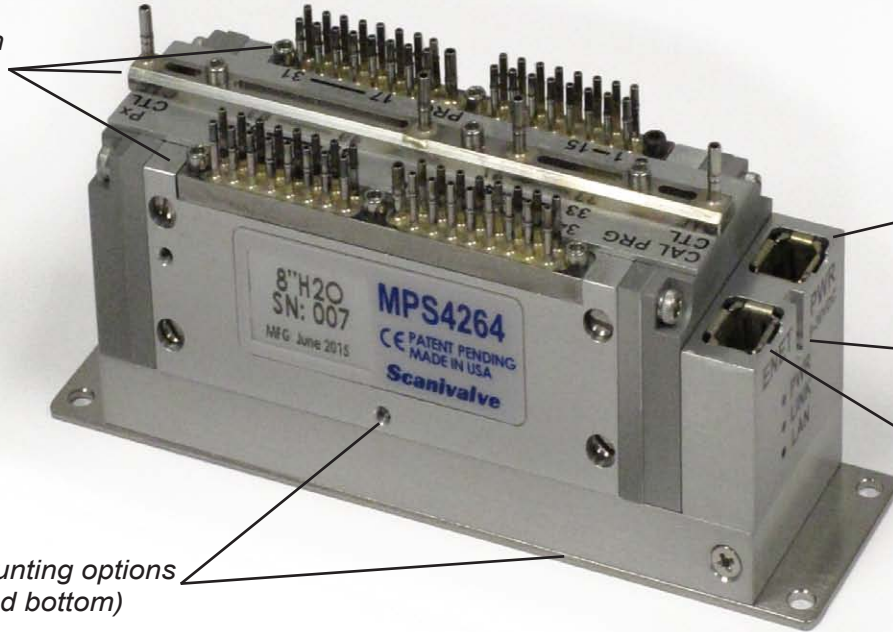
Power Connection (9-36 Vdc)

Power, Link & LAN activity lights

Ethernet Connection

Multiple mounting options (side and bottom)

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 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.

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.

Supporting Accessories

To make integration of the MPS4264 simple, Scanivalve has a full line of supporting accessories including:

- Desktop power supply, supporting 5 units
- Thermal Control Unit for extreme environments
- Miniature 4 and 8 port Ethernet Switch
- Custom Ethernet and power cables

Communications

Communication to the MPS is through a miniature Ethernet connection with an impressive array of protocols. The user can connect to the MPS using a Web Browser. This graphical interface allows the operator to change settings, scan data to the screen or scan binary or ASCII data to a file on the host machine with a click of a mouse. The MPS can also stream data to an FTP server. ASCII commands may be issued via a 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 (IEEE-1588v2) standard to time correlate data. This exciting protocol allows any 1588 slave device to synchronize its time to sub microsecond accuracy without the use of external trigger signals. PTP can synchronize any IEEE-1588 compliant physical measurement device or a computer to a common Grand Master time.

LabVIEW® is a registered trademark of National Instruments.

Scanivalve

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.

MPS4264 Sensor Pack
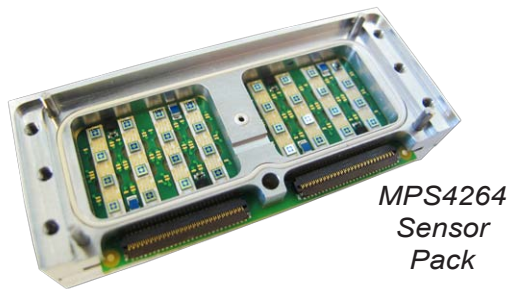
Along with the pressure sensors, all components in the measurement circuit are effected by temperature and drift over time. Scanivalve designed a patent-pending architecture which continuously corrects for these changes over time, while the unit is scanning. This technique of "Dynamic Zero Correction" 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.

*Exploded view of the valve*
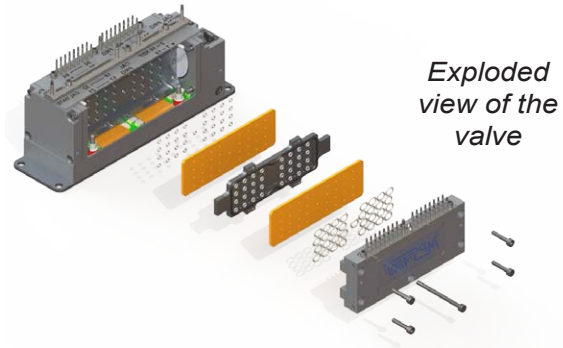
Pneumatic Calibration Valve

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 MPS4264 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 MPS4264 simplifies system architecture.

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

Removable pressure input headers are standard
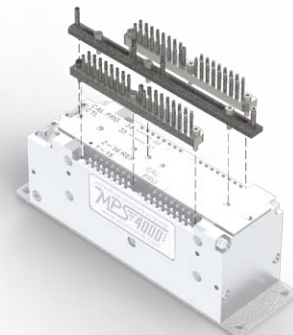
Specifications (for MPS4264 version)

Inputs (Px):	0.042" [1.067mm] OD (standard)	
	0.031" [.787mm] OD (optional)	
Inputs (Cal, Ref, CTL, Prg):	0.063" [1.600mm] OD	
Full Scale Ranges:	4 inH$_2$O, 8 inH$_2$O, 1psid, 5psid, 15psid	
	[995.4Pa, 1990.7Pa, 6.89kPa, 34.5kPa, 103.4kPa]	
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
Overpressure Capability:	4 inH$_2$O:	25x
	8 inH$_2$O:	15x
	1psid:	15x
	5psid:	10x
	15psid:	5x
A/D Resolution:	24bit	
Media Compatibility:	Gases compatible with silicon, silicone, aluminum, and Buna-N	

Maximum Reference Pressure:	50 psig (345kPa)
Maximum Environment Pressure:	100 psia (690kPa absolute)
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
Control Pressure Requirements:	65psi min. (standard)
	90psi min. (normal Px version)
Mating Connectors:	
Ethernet:	TE Connectivity PLG 8P8C Mini2
Power:	TE Connectivity PLG 8P8C Mini1
Weight:	6.59oz [186.9g]
Operating Temperature:	0° to 70°C
	-50°C to 60°C with TCU
Storage Temperature:	0° to 80°C

Dimensions (for MPS4264 version) Inches [mm]
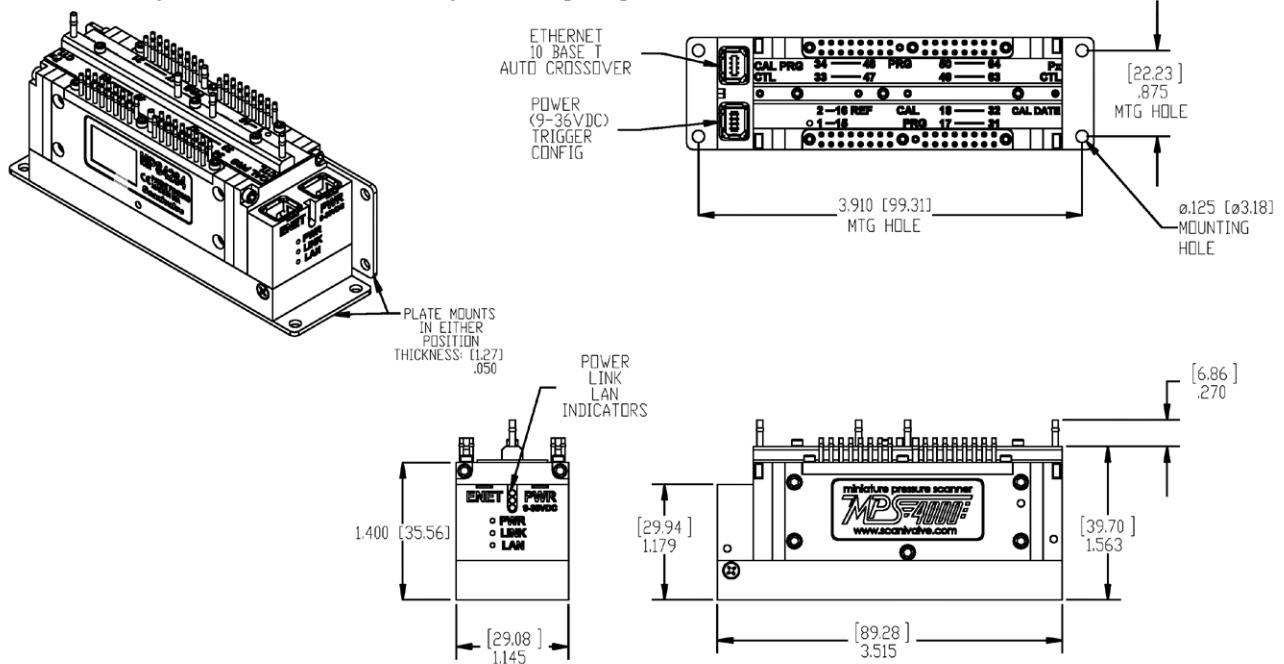
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