Scanivalve

Model DSM4000
Ethernet Pressure Measurement System

FEATURES

- DSP Technology
- Scan Rates up to 625 Hz/Channel
- Accepts up to Eight MPS or ZOC Analog Pressure Scanners
- Max Channel Count of 512 Channels
- Ethernet 100BaseT
- Data Transfers TCP, UDP, or FTP
- IEEE1588-2008v2 PTP compatible
- ARINC429 (optional)
- Digital Input and Output capability

GENERAL DESCRIPTION

The Digital Service Module, DSM4000, is designed to interface up to eight Scanivalve MPS or ZOC analog 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 engineering unit conversions, configurations and communication tasks for the analog MPS or ZOC modules. The DSM also provides the user with five programmable 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 mathematical 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 analog pressure scanner. This three dimensional pressure/temperature characterization allows for accurate pressure measurements across the full 0-60°C temperature range of the ZOC modules, or 0-70°C of the MPS modules, minimizing errors due to temperature changes. The DSM4000 module can also perform zero offset correction calibrations on connected analog pressure scanners. This feature, along with Scanivalve's unique calibration procedures allow accuracy specifications to be maintained for up to 6 months on most MPS and ZOC modules.

The DSM4000 is 70% smaller and 55% lighter than its predecessor, the DSM3400. All moving components have been removed, the entire system simplified, and many features have been added. The DSM4000 boots significantly faster than the DSM3400 and is completely independent of previous Windows® operating system.

DSM4000-ARINC429 shown

CONFIGURATIONS

DSM4000 - Ethernet *(General, Wind Tunnel)*

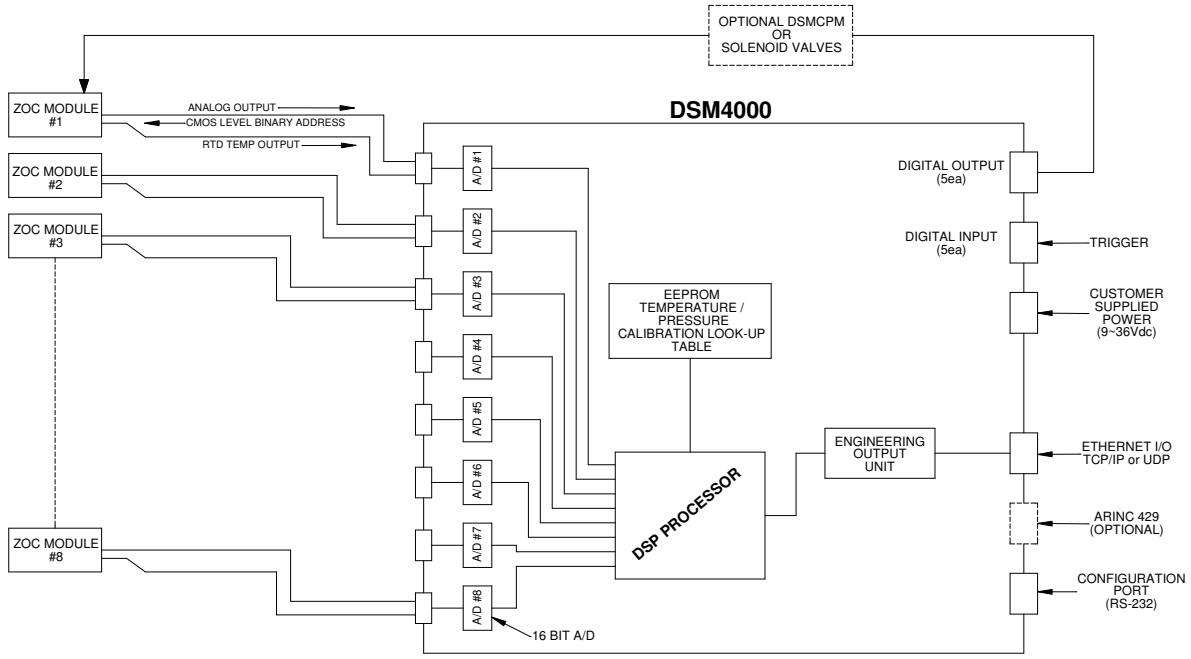
The DSM4000's rugged construction, digital input and output capabilities, and fast data throughput rates are ideally suited for many applications including wind tunnel and gas turbine testing. One DSM4000 can support up to eight MPS or ZOC analog pressure scanners and output all data, converted to a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

DSM4000 - ARINC429 *(Flight Test)*

The ARINC429 version of the DSM4000 maintains all of the features and functionality of the Ethernet version, but includes 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.

ISO 9001:2015 CERTIFIED

Instrumentation Devices Srl
Via Acquanera 29 - 22100 COMO (Italy)
ph +39 031 525 391- fax +39 031 507 984
info@instrumentation.it - www.instrumentation.it



DSM4000 SCHEMATIC

DSM4000 HARDWARE

The DSM4000 is built around a DSP processor for fast EU conversion and throughput. There is one internal A/D for each analog module, plus internal memory storage for DSM settings and information, along with analog module calibration tables. Ethernet 100BaseT, Serial RS232, and ARINC429 communication interfaces are available. Also incorporated in the DSM module is 5 digital I/O circuitd and power on/off switch.

Up to eight MPS or ZOC analog modules can be 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

Typical communication with the DSM is either Ethernet TCP/IP, 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 a basic DSM Configuration Utility.

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

All scan and calibration variables can be programmed via software by the user. This includes data rate, data format, and more.

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

In addition to the NAS/FTP support, the DSM4000 further takes advantage of it's networking capabilities by including NTP (Network Time Protocol) and IEEE1588-2008v2 PTP support for high-accuracy time synchronization.

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.

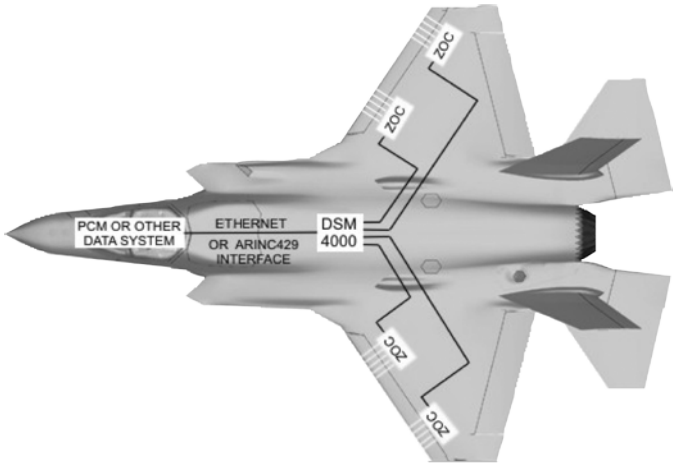
ON-LINE SENSOR COMPENSATION AND CALIBRATION

When the system includes remote solenoid valves (MSCP or DSMCPM sold separately), zero-offset calibrations can be performed taking advantage of the DSM4000's built in digital outputs. No pressure calibrator is required to perform zero-offset 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 MPS or ZOC pressure scanner are recorded, then the zero-offset files are updated and saved to the DSM module.

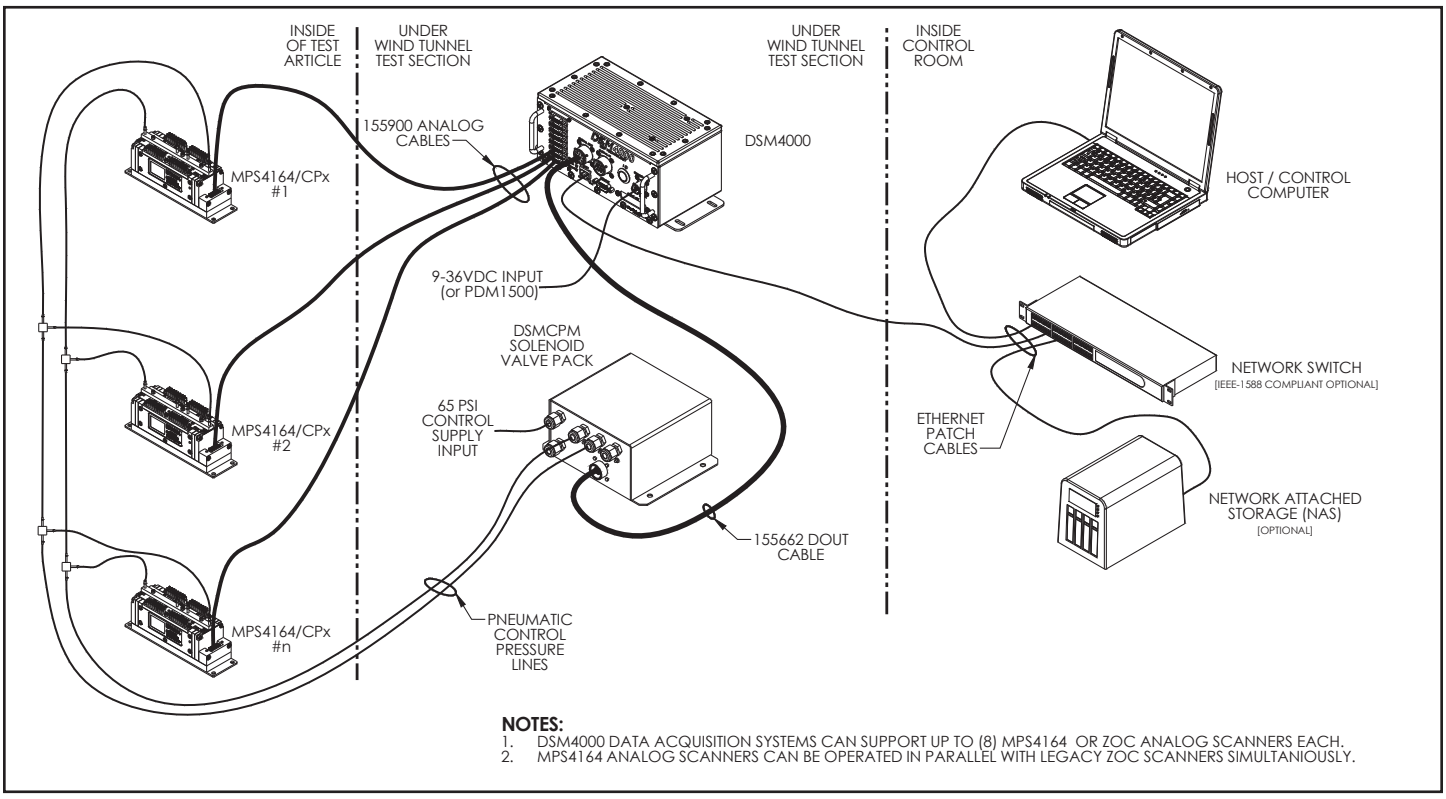
The MPS and ZOC scanners used with the DSM4000 series are factory calibrated over their full pressure and temperature ranges. The resulting calibration data is stored in a 280 plane pressure temperature look-up table in the DSM module.

Each MPS and 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 pressure readings based on the modules temperature. 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 MPS or ZOC modules.

For automated field calibrations of MPS or ZOC modules connected to the DSM, Scanivalve has an accurate pressure calibrator: The SPC4050. Included with the calibrator is Scanivalve's calibration utility software, PressCal. This allows for automated calibrations with the SPC4050 calibrator. Alternatively, manual calibrations can be performed using a high-accuracy, third party pressure calibrator/controller or dead weight tester. PressCal updates the module calibration coefficient tables and files, and generates "As Received" and "Calibration/Validation" reports.



Flight Test Example Architecture



DSM4000 Typical System Architecture

SPECIFICATIONS

No. of MPS or ZOC Pressure Scanners:	1 to 8 (512 channels max)
Operating Temperature Range:	0 to 60° C for ZOC 0 to 70° C for MPS
Power Requirements:	9-36Vdc, 44VA
Power Mating Connector:	Bendix PT06A-8-3S-SR
Digital In Mating Connector:	Bendix PT06A-12-10S-SR
Digital Out Mating Connector:	Bendix PT06A-12-10P-SR
A/D Mating Connector:	MDM-15SH003P
Config Port Mating Connector:	Cannon DE9S
Ethernet Connector:	RJ-45
Communication Protocol:	Ethernet 10/100BaseT IEEE802.3, TCP/IP, UDP, FTP IEEE1588v2 PTP ARINC429 (optional)

Max Scan Rates:	50 Hz/channel - ASCII 625 Hz/channel - Binary**
Dimensions (WxHxD):	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

DSM4000 - ENET

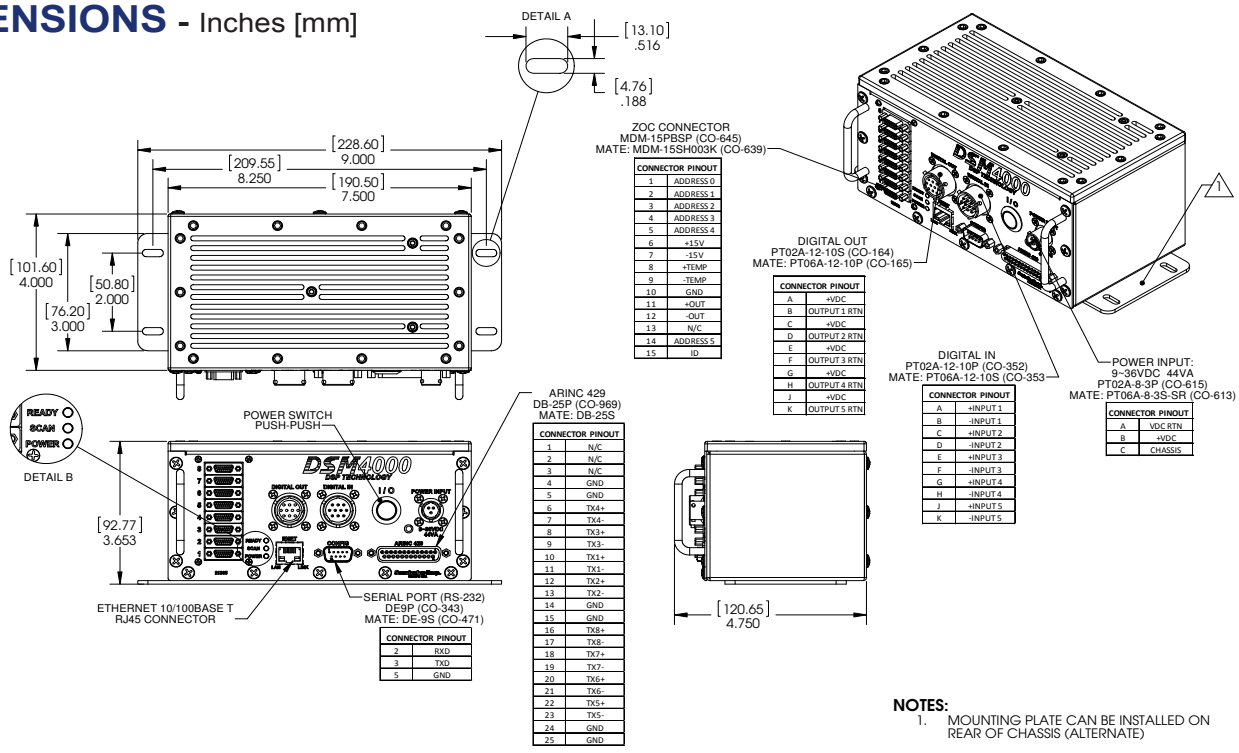
Model & Series
DSM4000

Config
ENET - Ethernet Only
ARINC - Ethernet and ARINC429

Each DSM4000 is shipped with a PDM1500 (power supply) and 10ft cable, mating connectors for the power, digital input, and digital output connections, 10ft null modem cable (DB9), and a mating connector for ARINC if an ARINC config is chosen.

*** Binary data rates vary and can be limited by network or host.*

DIMENSIONS - Inches [mm]



CONNECTOR PINOUT	
1	ADDRESS 0
2	ADDRESS 1
3	ADDRESS 2
4	ADDRESS 3
5	ADDRESS 4
6	+15V
7	-15V
8	+TEMP
9	-TEMP
10	GND
11	+OUT
12	-OUT
13	N/C
14	ADDRESS 5
15	ID

CONNECTOR PINOUT	
A	+VDC
B	OUTPUT 1 RTN
C	+VDC
D	OUTPUT 2 RTN
E	+VDC
F	OUTPUT 3 RTN
G	+VDC
H	OUTPUT 4 RTN
J	+VDC
K	OUTPUT 5 RTN

CONNECTOR PINOUT	
A	+INPUT 1
B	-INPUT 1
C	+INPUT 2
D	-INPUT 2
E	+INPUT 3
F	-INPUT 3
G	+INPUT 4
H	-INPUT 4
J	+INPUT 5
K	-INPUT 5

CONNECTOR PINOUT	
A	VDC RTN
B	+VDC
C	CHASSIS

CONNECTOR PINOUT	
2	RXD
3	TXD
5	GND

CONNECTOR PINOUT	
1	N/C
2	N/C
3	N/C
4	GND
5	GND
6	TX4+
7	TX4-
8	TX3+
9	TX3-
10	TX1+
11	TX1-
12	TX2+
13	TX2-
14	GND
15	GND
16	TX8+
17	TX8-
18	TX7+
19	TX7-
20	TX6+
21	TX6-
22	TX5+
23	TX5-
24	GND
25	GND

NOTES:
1. MOUNTING PLATE CAN BE INSTALLED ON REAR OF CHASSIS (ALTERNATE)

Scanivalve Headquarters
1722 N. Madson Street
Liberty Lake, WA 99019
Tel: 509-891-9970
800-935-5151
Fax: 509-891-9481
e-mail: scanco@scanivalve.com

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Scanivalve