



## MODEL 16MS MICROSCANNER

- High Accuracy, Digital Temperature Compensation
- Low Voltage System Compatible

The 16MS MicroScanner is an evolution of Pressure Systems' ESP Scanners to provide pressure scanning capability in previously inaccessible locations. The 16MS is available in a standard manifold-mount version and a direct-mount version, which benefits those desiring to mount the scanner directly into the model surface for a flusher mounted configuration.

Utilizing proprietary Digital Temperature Compensation (DTC) technology, each MicroScanner is factory calibrated to compensate for non-linearity and temperature errors. The result is a highly accurate measurement with minimal thermal sensitivity. An optional dual range calibration provides two ranges of operation to increase measurement sensitivity, expand testing conditions and reduce user inventory management.

The MicroScanner is automatically identified at power up and is compatible with existing data systems such as Inition, Optimus, 8400, and FDS Flight Data System. Numerous third party integrators also provide compatible data systems.

An option for calibrating and operating with  $\pm 5$ -volt power instead of  $\pm 12$ -volt is available for use with low voltage systems.

### Features

- Small Size
- High Scan Rate
- DTC Interface

### Applications

- Wind Tunnel Models
- Dynamic Pressures
- F1 and Automotive

### Theory of Operation

The MicroScanner is a pressure scanner with silicon pressure sensors that receives pneumatic pressure signals applied via direct connection to the test object or via flexible tubing into bulged tube connections on the associated manifold. The pressure signals are multiplexed and amplified to provide high level DC analog signals to an associated data system. The data system can be a Pressure Systems Optimus, Initium, FDS or 8400. Alternatively, third party integrators with DTC compatible data systems can also be used.

For standard manifold-mount MicroScanners, Pressure Systems' standard electric manifolds are attached to the MicroScanner with six screws. Electric manifolds incorporate O-rings to provide the pneumatic interface and spring loaded pogo-pins to provide the electrical interface. During normal operation the run manifold is used, providing 16 dedicated pressure input connections and one common reference connection. The reference connection can be left open to atmosphere for gauge pressure measurements or connected to a specific point for differential pressure measurements. The reference pressure connection can also be used to provide a verification pressure from an external pressure source to confirm proper operation before test. Measurement accuracy is maintained using the re-zero calibration, which is accomplished through the data system when the scanner is in a 'wind-off' condition.

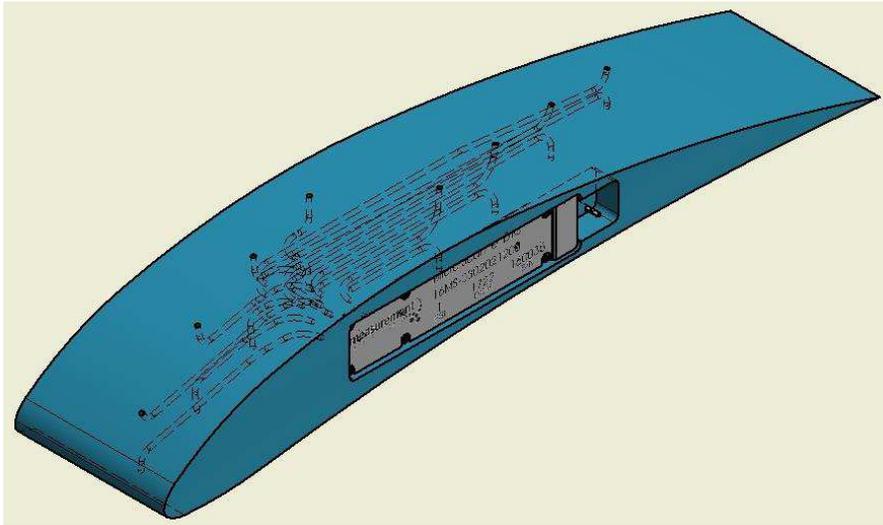
For direct-mount MicroScanners, use of a manifold is optional, as the MicroScanner can be mounted directly into the wind tunnel model's surface, thus minimizing pneumatic tubing lengths. This arrangement can be beneficial for those desiring dynamic measurements with minimal tubing attenuation and distortion. A gasket is available to accomplish pneumatic seals between the scanner and model interface.

At six month intervals, a span calibration is required to maintain stated accuracy. For this purpose, a calibration version of the available manifolds can be used. This calibration manifold has one pressure connection which reaches all sixteen measurement ports and one reference connection. Span calibration uses one or more pressures to update the span coefficients of each pressure sensor. The span calibration can be performed with atmospheric pressure on the reference port, or at an elevated reference pressure to simulate conditions within pressurized wind tunnels.

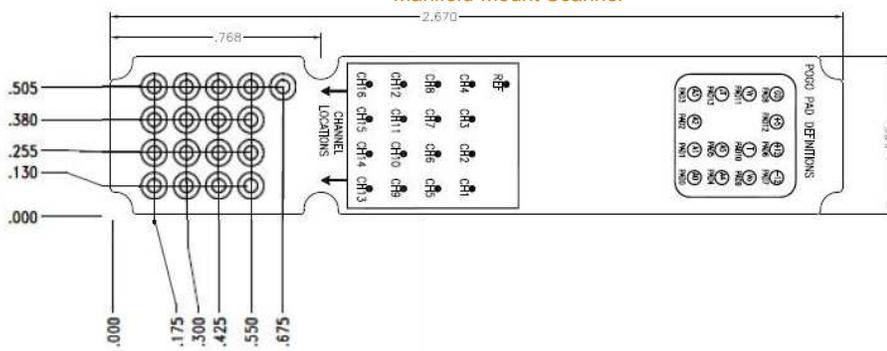
The MicroScanner uses the unique Pressure Systems DTC (Digital Temperature Compensation) technology. DTC technology is widely employed within the ESP family of pressure scanners. Factory calibration over the full pressure and temperature operating range generates a 24-coefficient correction for each of the measurement ports. The coefficients are stored in non-volatile memory within the pressure scanner. Compatible data systems extract and utilize these coefficients to provide highly accurate data by automatically correcting for the non-linearity and temperature sensitivity of each pressure sensor. For compatibility with older "non-DTC" data systems, the MicroScanner can also be operated as a conventional scanner. There is a reduction in accuracy and temperature correction, so such operation should be restricted to thermally stable test conditions.

Dual Range Calibration is an optional feature that utilizes the factory calibration of both normal range operation and sensitive range operation. For dual range operation the scanner is commanded to increase the gain of the amplifier while using separate calibration information to accurately measure a reduced pressure range. This feature is often used for multiple test configurations and to perform separate tests without needing to change the pressure scanner. Dual Range pressure scanners can also reduce inventory management by providing one scanner capable of performing all the testing at specific facilities.

**Direct-Mount Microscanner Application**  
Direct-Mount Scanner



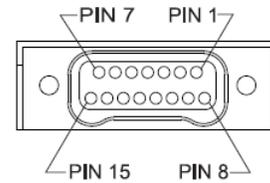
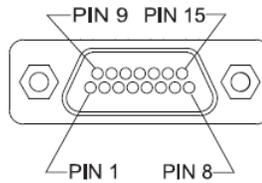
**Electrical and Pneumatic Connection**  
Manifold-Mount Scanner



Manifold Connector

Direct-Mount Scanner Connector

PINOUT	Function
1	A0_IN
2	A1_IN
3	A2_IN
4	A3_IN
5	A4_IN
6	+12 (+5) VDC
7	-12 (-5) VDC
8	+5 VDC
9	Reserved (connect to GND)
10	GND
11	VOUT
12	A5_IN
13	GND
14	Vref
15	VTEMP



**Performance Specifications**

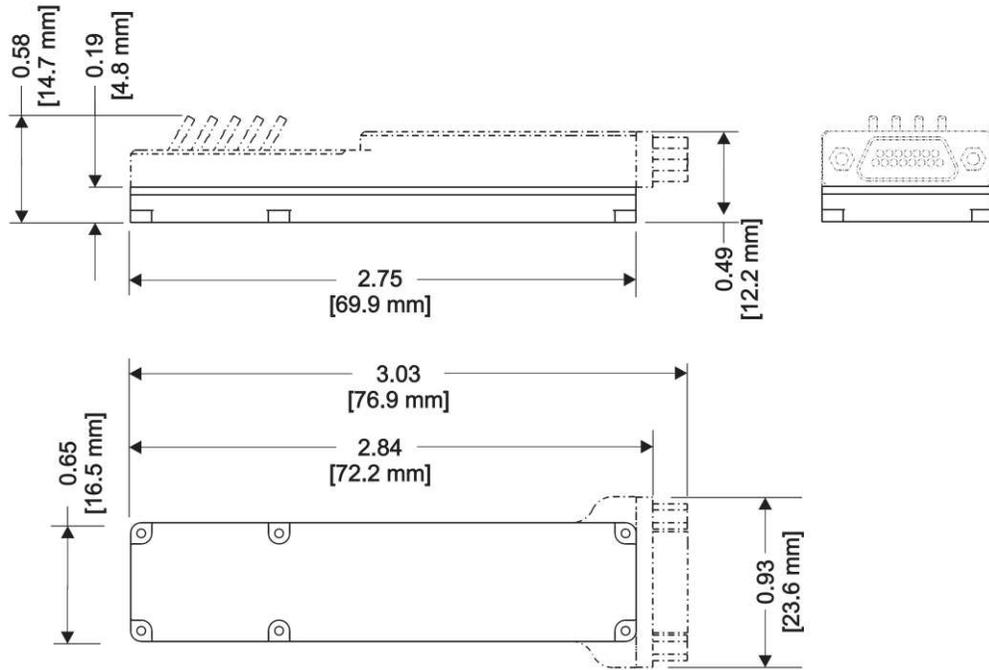
PERFORMANCE SPECIFICATIONS - MICRO SCANNER				
PARAMETER	MICROSCANNER 16	MICROSCANNER 16	UNITS	COMMENTS
	DTC OPERATION	CONVENTIONAL OPERATION		
Number of Pressure Inputs	16	16	Ports	
Scan Rate	100,000	100,000	Hz	Port to Port
Resolution	0.003	0.003	% FS	Noise Floor Analysis
Static Accuracy				
-12 to +Full-scale psid <sup>1</sup>	±0.05	±0.10	% FS	32 averages, Ranges > 5
-Full-scale to + Full-scale	±0.10	±0.20		32 averages, Ranges ≤ 5
Static Accuracy at 33% Range	±2x rated-spec	N/A	% FS	32 averages
Thermal Stability Full Range	±0.002 ±0.004	±0.25 ±0.25	% FS	Per °C, Ranges > 5 Per °C, Ranges ≤ 5
Proof Pressure	4x	4x	FS	100 psid maximum
Maximum Reference Pressure	50	50	psid	
Line Pressure Effect	±0.001	±0.001	% FS	Per psi
Media Pressure Port				Non Corrosive Gas up to 100% Humidity Non Condensing
Media Reference Port				Non Corrosive Gas
Pneumatic Connection				0.040" bulged tubes <sup>2</sup>
Power <sup>3</sup>	+12 (+5) VDC -12 (-5) VDC +5 VDC	+12 (+5) VDC -12 (-5) VDC +5 VDC		at 30 mA at 10 mA at 10 mA
Pressure Max Full Scale Output Standard Interface	±4	±4	VDC	Nominal
Pressure Max Full Scale Output ±5 V-option	±3	±3	VDC	Nominal
Electrical Connection				15 pin Socket <sup>4</sup>
Compensated Temp Range	0-100	0-100	°C	
Operating Temp Range	-20 to +100	-20 to +100	°C	
Storage Temp Range	-25 to +100	-25 to +100	°C	
Vibration	10	10	g	15-2000 Hz
Weight	2	2	Ounces	Scanner and Manifold
Dimensions				
Standard MicroScanner	2.75 x 0.650 x 0.190	same	Inches	L x W x H
Direct Mount MicroScanner	3.12 x 0.650 x 0.190			
Electric Manifold	3.03 x 0.930 x 0.580			

Notes:

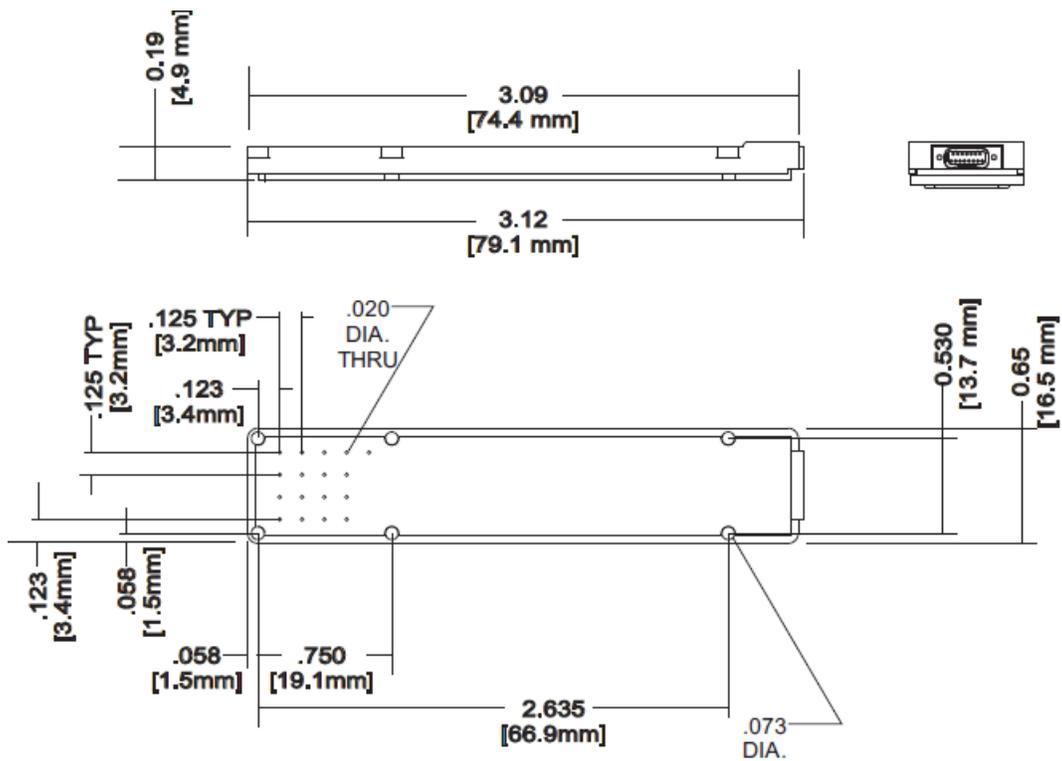
1. Negative full-scale for 5 psi range and below is equal to its positive full-scale range
2. If used with Run or Calibration Electric Manifold
3. Absolute maximum power without damage is +15VDC, -15VDC and +5.25VDC respectively
4. Mil-C-83513 Style Micro miniature D Connector installed on Electronic Manifold. Direct Mount MicroScanner has integrated Duallobe Nano miniature D Connector.

Drawings

Standard



Direct Mount



## MODEL 16MS MICROSCANNER

### Ordering Information

#### 16MS-AABBCCDDEE

Example 16MS-0702001100 MicroScanner,  $\pm 15$  psid, No Connector, Single Range Cal, Standard

AA = Pressure Range	BB = Scanner Type	CC = Voltage Option	DD = Calibration Option	EE = 00
03, $\pm 1$ psi	01, Standard	00, Standard	11, Single Range	
04, $\pm 2.5$ psi	02, Direct Mount	02, $\pm 5$ Volt	12, Dual Range	
05, $\pm 5$ psi			28, DAQ Operation	
07, $\pm 15$ psi				
09, $\pm 45$ psi				

### Manifolds

#### Standard

**16MS-EMC0000000**, Electric Manifold, Calibration, 0.040" 60 degree tubes, 15 pin mdm-shell connector

**16MS-EMR0000000**, Electric Manifold, Run, 0.040" 60 degree tubes, 15 pin mdm-shell connector

#### Direct Mount

**16DM-EMC0000000**, Manifold, Calibration, 0.040" 60 degree tubes

**16DM-EMR0000000**, Manifold, Run, 0.040" 60 degree tubes

**24-28-16110**, Pneumatic Gasket

### Cables

**MSCB-1240000006**, Direct Mount to PSCB/OSCB adapter cable, 6"

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