

#### FEATURES

- $\pm 0.01\%$  FS Measurement and Control Accuracy
- $\pm 0.001\%/^{\circ}\text{C}$  Thermal Stability
- 10 BaseT Ethernet, TCP and UDP Protocol
- Pressure Ranges from  $\pm 1$  psid to 500 psia ( $\pm 7$  kPa to 3.5 Mpa)

#### APPLICATIONS

- Barometric Measurement
- Pressure Scanner Verification Testing
- Pressure Scanner Span Calibration



Model 9032 and 9033 are precision pressure standards capable of measuring dry non-corrosive gases to an accuracy of  $\pm 0.01\%$  FS. The Model 9032 Barometer offers an excellent solution for precision measurement of atmospheric pressures to complement differential electronic pressure scanners used in the acquisition of multiple pressures.

Models 9034 and 9038 are pressure calibrators with set-point control accuracy of up to  $\pm 0.01\%$  FS that are also capable of extraneous pressure measurement. The calibrators provide a pre-engineered solution for applying known stable pressures to the electronic pressure scanners, or any pressure measurement device, for periodic calibration or verification.

Available in absolute and differential versions, both products also provide digital I/O for electronic control of remotely located valves for use in routing measurement and control pressures as desired.

The units communicate with the host computer via a 10 BaseT Ethernet interface supporting both TCP and UDP protocols. Pressure data is output in user-selectable engineering units. An internal 32-bit microprocessor in each unit corrects for zero, span and non-linearity errors of the internal precision pressure standard. It also performs digital temperature compensation of the standard to reduce thermal errors to less than  $\pm 0.001\%$  FS/ $^{\circ}\text{C}$ .

The pressure standards and pressure controllers are components of the NetScanner™ System. Multiple NetScanner components measuring a variety of pressures and sharing the same command set can be networked to form a distributed intelligent data acquisition system.

**Presented By :**

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After 1 hour warmup @ 25°C with atmospheric reference pressure unless otherwise stated / FS = Full Scale

Parameter	9032/33	9034/38	Units	Comments
<b>PNEUMATICS</b>				
<b>Pressure Ranges</b> Absolute (Model 9032 and 9034)	11-16 15 23 30 45 65 100 200 300 500	(76-110) (103) (159) (207) (310) (448) (689) (1379) (2068) (3447)	psi (kPa) psia (kPa)	Barometer Only
Differential (Model 9033 and 9038)	±1 ±2	(7) (14)	psid (kPa)	
<b>Media</b>	Dry, non-corrosive gas			
<b>Output Range<sup>1</sup></b>	N.A.	5 to 100 -100 to 100	% FS % FS	9034 9038, see reference pressure
<b>Source Gas<sup>2</sup></b> Min	N.A.	FS + 10 (69) 1.1	psi (kPa) x FS	9034 ≤ 100 psi (689 kPa) 9038 < 100 psi (689 kPa) 9034 > 100 psi (689 kPa) 9038 = 100 psi (689 kPa)
Max		250 (1724) 1.5	psi (kPa) x FS	9034 ≤ 100 psi (689 kPa) 9038 ≤ 100 psi (689 kPa) 9034 > 100 psi (689 kPa)
<b>Vacuum</b>	N.A.	60	lpm	Required for control of subatmospheric pressure, recommended for control near zero psig.
<b>Output Flow Capacity</b>	N.A.	0.1 (3)	scfm (lpm)	Min
<b>Overpressure<sup>3</sup></b> (input/output/ref ports)	1.3		x FS max	
<b>Reference Pressure<sup>4,5</sup></b>	Atmospheric - standard			9032=N/A 9034=Full Scale 9033=10 x FS, 200 psig max (1380kPa) 9038=Contact factory
<b>STATIC PERFORMANCE</b>				
<b>Measurement Resolution</b> Differential Absolute	±0.003 ±0.0005		% FS % FS	9033/9038 9032/9034
<b>Relative Accuracy<sup>6</sup></b> Absolute	±0.01		% FS	9032/9034
Differential	±0.02 ±0.025		% FS % FS	9033/9038 ≤ 5 psid (34 kPa) 9033/9038 < 5 psid (34 kPa)

**Notes:**

- 1 Control of subatmospheric pressures requires vacuum pump.
- 2 Gas should be pre-filtered to 10 microns, free of oil and have dew point of -25°C.
- 3 Overpressure is defined for absolute reference units (9032 & 9034) as the maximum absolute pressure which may be applied to the unit without damage. For differential units (9033 & 9038) overpressure is defined as the maximum pressure differential between the pressure standard input and reference.
- 4 Do not exceed maximum differential pressure for 9033 & 9038.
- 5 9034 operating with reference pressure: usable range = full scale - reference pressure
- 6 Relative accuracy includes the combined errors due to non linearity, hysteresis and non-repeatability.

**Specifications subject to change without notice.**

Parameter	9032/33	9034/38	Units	Comments
<b>STATIC PERFORMANCE (continued)</b>				
<b>Long Term Stability</b> Absolute Differential <sup>7</sup>	±0.01 ±0.03 ±0.05		% FS/6 mos % FS/6 mos % FS/6 mos	9032/9034 9033/9038 ≥ 5 psid (34 kPa) 9033/9038 < 5 psid (34 kPa)
<b>Thermal Stability<sup>8</sup></b>	±0.001		% FS/°C	From 25°C
<b>Measurement Rate<sup>9</sup></b>	10	10	readings/sec	
<b>Controller Setpoint Resolution</b>	NA	0.003	% FS	
<b>Output Setting Time<sup>10</sup></b>	NA	5	sec	±0.01% of final value
<b>DIGITAL INPUTS/OUTPUTS</b>				
<b>Input Voltage</b>	18 - 36		VDC	unregulated
<b>Input Current</b>	250		mA	@ 24 VDC
<b>Hardware Trigger Threshold</b>	2.5		VDC	TTL compatible differential input +5 VDC
<b>Communication</b>	10BaseT Ethernet			
<b>Protocol</b>	TCP			software configurable RARP
<b>ENVIRONMENTAL/PHYSICAL</b>				
<b>Calibrated Temp Range</b>	0 to 50		°C	See factory for extended temperature range
<b>Operating Temp Range</b>	-10 to 60		°C	Up to 95% non-condensing humidity
<b>Storage Temp</b>	-20 to 80		°C	
<b>Size</b>	9.5 x 3.5 x 3.75 (24 x 8.9 x 9.5)		inches (cm)	L x W x H
<b>Weight</b>	4.0 (1.8)	6.0 (2.7)	lb (kg)	

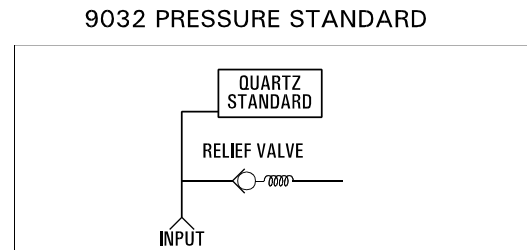
**Notes:**

- 7 After internal rezero
- 8 Includes effects of zero and span.
- 9 Measurement rate to host computer depends on host computer software throughput rate. Consult users manual for more information.
- 10 Settling rate depends on pneumatic volume of tubing and unit under test connected to instrument.
- 11 Maximum sink/source current for all external control outputs.

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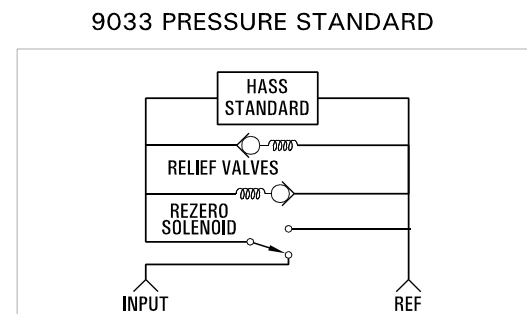
## 9032

The absolute reference 9032 is designed to measure a single absolute pressure. The quartz standard is connected directly to the input port. The relief valve is set to vent at 110% of the instruments full scale pressure. The 9032 is most commonly used as a barometer, where the range is specifically calibrated for use at 11-16 psia (770-1100 mbar).



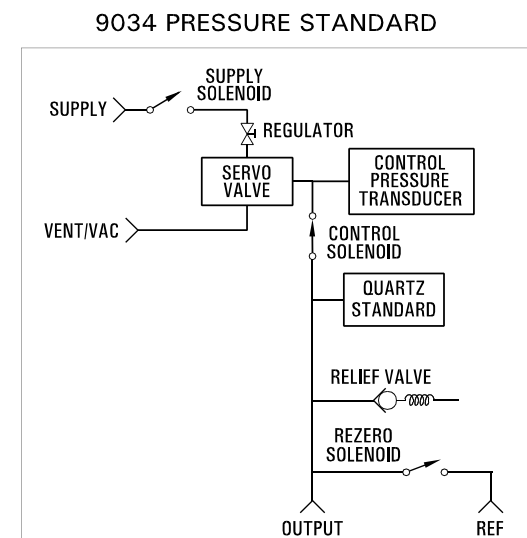
## 9033

The differential reference 9033 is designed to measure a single differential pressure. Normally the high side is connected to the input port while the low side would be connected to the reference input. The instrument is designed to measure differential pressure at a maximum common mode (line) pressure of 200 psia (1380 kPa). The bi-directional relief valves vent if either input exceeds the other by 110% of the instruments full scale pressure. The rezero solenoid allows the user to minimize zero error due to line pressure, temperature and drift with time on the pressure standard.



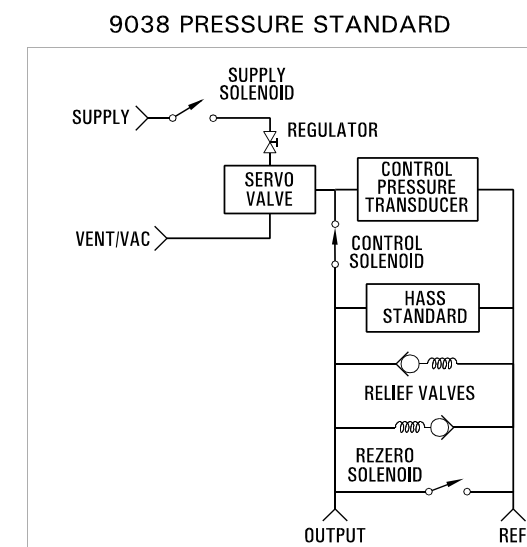
## 9034

The absolute reference 9034 is designed to control pressure between 5%-100% of the instruments full scale pressure range. A digitally controlled pneumatic servo valve modulates the mix of supply/vent pressure to its output allowing pressures to be controlled from near vacuum to the full scale of the instrument. A quartz pressure standard measures the servo valve output. The microprocessor adjusts this valve to set the requested pressure. The instrument may also be used in a measurement mode by applying the pressure to be measured at the output port. The pressure relief valve is designed to vent at 110% of the instruments full scale pressure.



## 9038

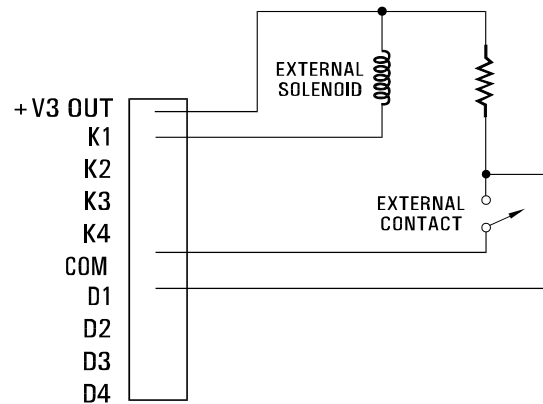
The differential reference 9038 is designed to control pressures between vacuum and +100 % of the instruments full scale pressure range. The instrument will control pressures at elevated reference (line) pressures. As an example, if the applied reference pressure was 10 psi (69 kPa) and the requested control pressure was 5.0 psi (35 kPa), the instrument would output 15 psi (105 kPa) on the output port. Standard units are manufactured for atmospheric reference. Elevated reference pressure requires factory modifications. The HASS pressure standard is measured under microprocessor control to maintain the desired control pressure. The rezero solenoid allows the user to execute pneumatic rezero of the HASS pressure standard on demand. The instrument may also be used in a measurement mode by applying the pressure to be measured to the output port. The instrument is protected by bi-directional relief valves designed to vent whenever either the output or reference port exceeds the other by 110% of the full scale pressure.



## Digital I/O

Digital I/O is available on the front panel for user applications. A software command allows each of the outputs, K1 - K4, to be independently set or reset. The open-collector output drivers can operate external solenoids or external pull-up resistors can be connected to provide logic outputs. Up to 1A of 24 VDC power is available for external use. 24 VDC solenoids, requiring less than 0.5A, may be directly connected to the I/O connector. The output current for each driver should not exceed 0.5A and the total current, for all four outputs, should not exceed 1A.

A software command is used to read the four digital inputs, D1 - D4. These inputs can be used to sense TTL signals or external pull-up resistors may be added to sense contact closures. Up to 50 V may be applied without damage.



**External Digital I/O**

## Networking and Software

The 9032/9033/9034/9038 are part of a networked solution for pressure measurement and pressure control. These modules are networked via Ethernet 10 Base-T using commonly available networking hardware. Interface can be direct to a host computer using a standard Ethernet card, with PSI networking hardware or via an appropriate local area network (LAN).

The internal microprocessor performs the more complex tasks like engineering unit calculation and pressure control. A standard command set allows the user to send simple commands to read pressures and set pressures.

### READ PRESSURE

The 9032 and 9034 can be used to accurately measure an absolute pressure. Barometric pressure is the most common measurement pressure. The 9033 and 9038 can be used to accurately measure a differential pressure applied to the input ports of the unit. One simple command is sent to request current pressure readings. Data may be returned in several user selected output formats.

### REZERO PRESSURE STANDARD

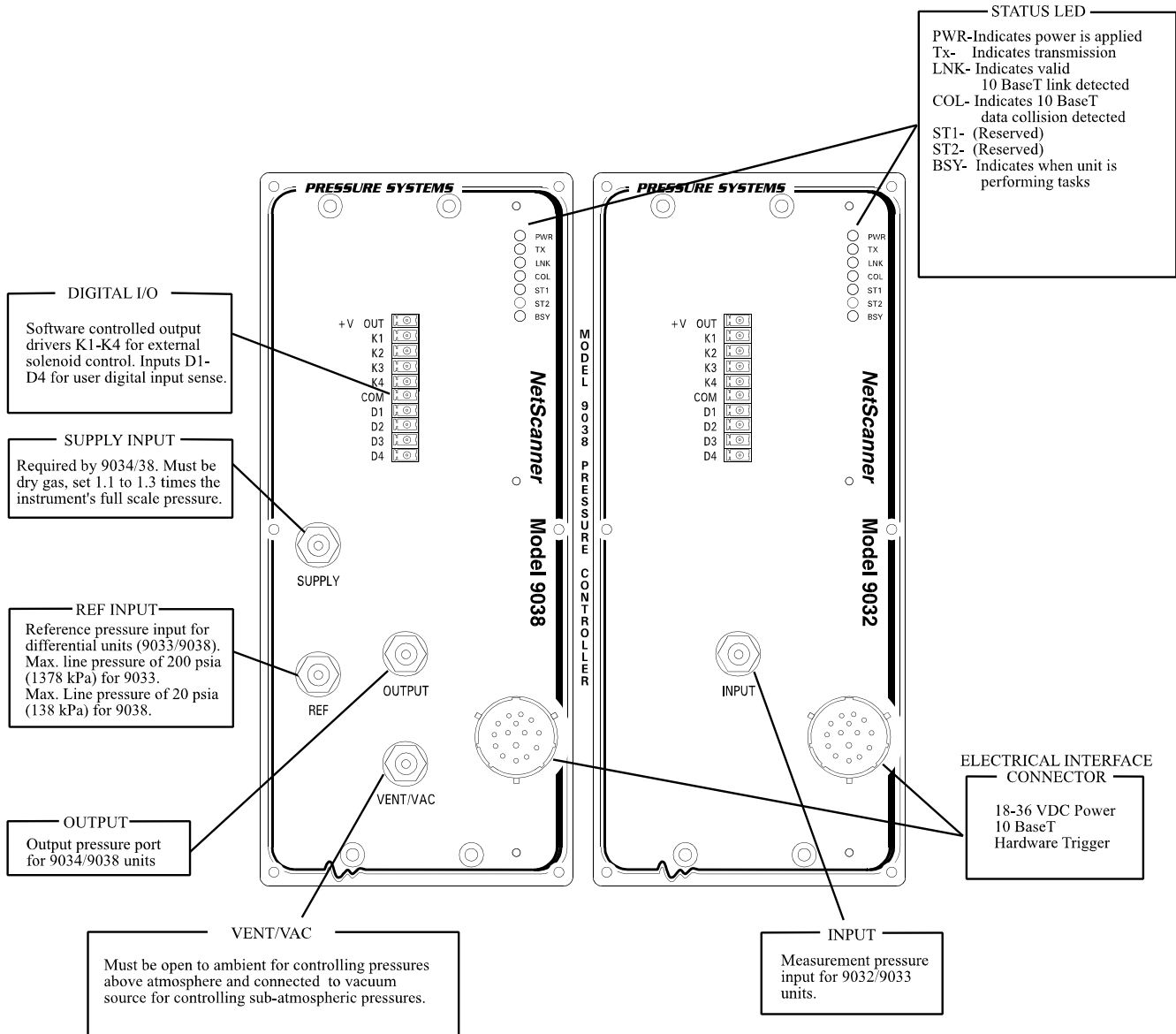
From time to time, the user may rezero the differential HASS sensor of the 9033/9038 by commanding the unit to perform an on-line pneumatic rezero. This causes the instrument to shunt the HASS input and the reference sides together. The transducer is then read and the offset is used to remove any thermal or long term drift which has occurred since the calibration. The rezero term may be stored in instrument nonvolatile memory for later use.

### SET PRESSURE

The 9034 and 9038 may be used to accurately control a pressure by one or more commands. Single point pressures may be generated by a single command. A sequence of pressures may be generated which the user has stored within the instrument. The 9034/9038 can automatically set a predefined sequence of pressures, holding each set point for a user defined period of time. The instrument may also advance through the sequence of pressures in response to host computer commands.

## Front Panel Layout

The instruments front panel contains all pneumatic and electrical connections necessary to operate the device. The unit is supplied with standard english or optional metric pneumatic fittings. Mating electrical connector or combined networking/power/trigger cable are specified separately. Maximum cable length is 328 ft (100 m).



9032 / 9034  
9033 / 9038

# Pneumatic/Electrical Interface Example

This example depicts the electrical/pneumatic connection and required cables and support equipment necessary to interface a 9034/38 to a host computer. Shop air may be used for the supply if it is free of moisture, oil and contaminants. The 9032/9033 pressure standards are measurement only devices and do not require supply and vent/VAC connections.

