



Pressure Standard Pressure Controller

ISO-9001 Certified

9030/31
9035/36

FEATURES

- ! Ranges: ± 1 psid to 500 psia
 ± 7 kPa to 3.5 MPa
- ! Up to $\pm 0.01\%$ FS Pressure Measurement and Control Accuracy
- ! $\pm 0.001\%/^{\circ}\text{C}$ Thermal Stability
- ! RS-232/422/485 Digital Interfaces
- ! Small, Rugged Design

APPLICATIONS

- ! Calibration Test Stands
- ! Portable Calibrators
- ! Accurate Process Control
- ! Barometric Monitoring



Models 9030 and 9031 are single point high accuracy pressure measurement standards. Models 9035 and 9036 are high accuracy pressure controllers. Available in absolute or differential reference configurations, these instruments provide accurate measurement and/or stable control of dry non-corrosive gases. Models 9030 and 9035 employ resonant quartz standards for absolute measurements; while Models 9031 and 9036 employ High Accuracy Silicon Sensors (HASS) for differential measurements. These units interface directly to a host computer to form a compact, low cost pressure measurement and calibration system.

An internal 32-bit microprocessor corrects for zero, span and nonlinearity errors of the internal pressure standard. It also performs digital temperature compensation of the standard to reduce thermal errors to less than $\pm 0.001\%$ FS/ $^{\circ}\text{C}$ for operational temperatures from 0 - 50 $^{\circ}\text{C}$.

Pressure data in engineering units is output through a multidrop serial interface using the Optomux[®] industry standard protocol for compatibility with many third party vendors. These instruments are easily interfaced to the RS-232 serial port on any host computer, using an RS-232 to RS-422/RS-485 converter. The standards and controllers are supplied with free software for PC compatible computers. An RS-232 diagnostic port is included on these instruments to enable field use with a laptop computer.

The Models 9030/9031 and 9035/9036 are components of a networked data acquisition concept called System 9000. Up to 31 System 9000 and protocol-compatible third party modules can be connected in a daisy-chained fashion on one network over a distance of 5000 feet (1500m).

Pressure Systems, Inc.
Represented by:
A-Tech Instruments Ltd.
Phone: 416 754 7008
Toll Free: 888 754 7008
Fax: 416 754 7008
E-Mail: sales@a-tech.ca
Website: www.@a-tech.ca

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

Parameter	9030/31	9035/36	Units	Comments
PNEUMATICS				
Pressure Ranges Absolute (Model 9030 and 9035)	15 / 105 30 / 210 50 / 350 100 / 690 200 / 1380 300 / 2070 500 / 3500		psia/kPa	Resonating Quartz Transducer
Differential (Model 9031 and 9036)	±1 / 7 ±2 / 14 ±5 / 35 ±10 / 70 ±15 / 105 ±30 / 210 ±50 / 350 ±75 / 525 ±100 / 700		psid/kPa	High Accuracy Silicon Sensor
Media	Dry, non-corrosive gas			
Output Range¹	N.A.	5 to 100 -100 to 100	% F.S. % F.S.	9035 9036, see reference pressure
Source Gas² Min	N.A.	F.S. + 10/70	psi/kPa	9035 ≤ 100 psi 9036 < 100 psi 9035 > 100 psi 9036 = 100 psi 9035 ≤ 100 psi 9036 < 100 psi 9035 > 100 psi
Max		1.1 250/1750	x F.S. psi/kPa	
Vacuum	N.A.	60	lpm	Required for control of subatmospheric pressure, recommended for control near zero psig.
Output Flow Capacity	N.A.	0.1 / 3	scfm/lpm	Min
Overpressure³ (input/output/ref ports)	1.3		x F.S. max	
Reference Pressure^{4,5}	Atmospheric - standard Elevated - contact factory			9030 = N/A 9035 = Full Scale 9031 = 10 x FS, 200 psig max 9036 = Contact factory
STATIC PERFORMANCE				
Measurement Resolution Differential Absolute	±0.003 ±0.0005		% F.S. % F.S.	9031/9036 9030/9035
Relative Accuracy⁶ Differential Absolute	±0.025 ±0.02 ±0.01		% F.S. % F.S. % F.S.	9031/9036 < 5 psid 9031/9036 ≥ 5 psid 9030/9035

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 (9030 & 9035) as the maximum absolute pressure which may be applied to the unit without damage. For differential units (9031 & 9036) overpressure is defined as the maximum pressure differential between the pressure standard input and reference. Be sure not to exceed maximum differential pressure for 9031 & 9036.
- 4 9030 and 9035 operating with reference pressure; usable range = full scale - reference pressure
- 5 9030 and 9035 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.

Specifications

9030/31
9035/36

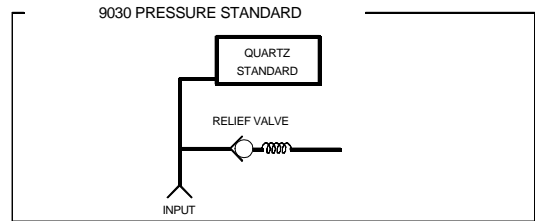
Parameter	9030/31	9035/36	Units	Comments
STATIC PERFORMANCE (continued)				
Long Term Stability Differential ⁷ Absolute		±0.05 ±0.03 ±0.01	% F.S./6 mos % F.S./6 mos % F.S./6 mos	9031/9036 < 5 psid 9031/9036 ≥ 5 psid 9030/9035
Thermal Stability ⁸		±0.001	% F.S./°C	From 25°C
Measurement Rate ⁹	10	10	readings/sec	
Controller Setpoint Resolution	NA	0.003	% F.S.	
Output Setting Time ¹⁰	NA	5	sec	±0.01% of final value
DIGITAL INPUTS/OUTPUTS				
RS-422/485 Interface Input High Voltage Input Low Voltage		+0.2 -0.2	V min V max	-7 to +12 V Common Mode Logic 1 Logic 0
Differential Output Min Voltage Max Voltage		+1.5 to +5.0 -1.5 to -5.0	V V	Logic 1 Logic 0
Baud Rate Optomux®		300 to 38.4 K	Baud	
Digital Outputs Output Voltage Sink Current per Output Max Source Current (+24) ¹¹	30 500 1000	30 500 1000	VDC mA mA	Max Max Max
POWER REQUIREMENTS				
V1	15 ±1	15 ±1	VDC	
+V2	+15 ±1	+15 ±1	VDC	
+V3	24 ±2	24 ±2	VDC	
I1	75	75	mA	
+I2	500	500	mA	
+I3	250	500	mA	
ENVIRONMENTAL/PHYSICAL				
Calibrated Temp Range	0 to 50		°C	See factory for extended temperature range
Operating Temp Range	-10 to 60		°C	Up to 95% non-condensing humidity
Storage Temp	-20 to 80		°C	
Size	9.5 x 3.5 x 3.75 24 x 8.9 x 9.5		inches cm	L x W x H
Weight	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 interface baud rate, number of units on network and 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.

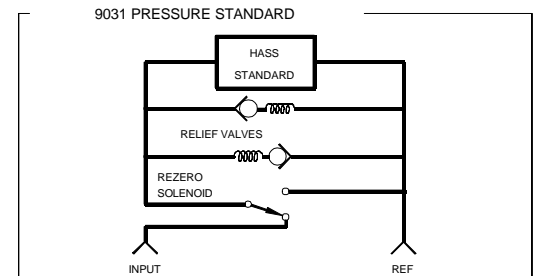
9030

The absolute reference 9030 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.



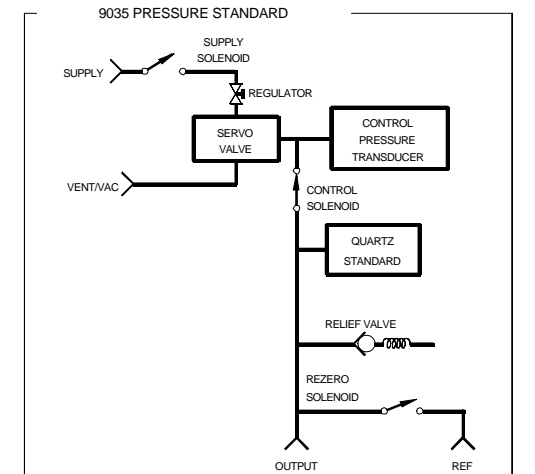
9031

The differential reference 9031 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.



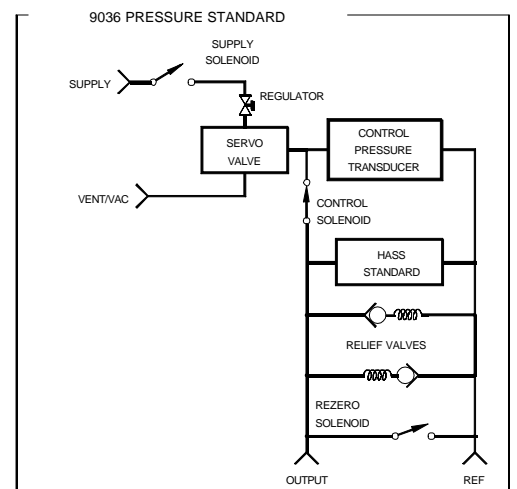
9035

The absolute reference 9035 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.



9036

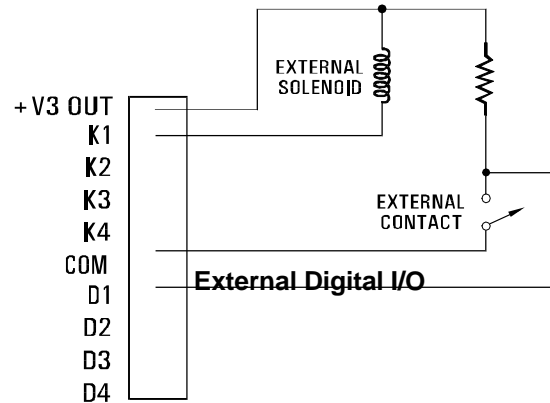
The differential reference 9036 is designed to control pressures between vacuum and +100 % of the instruments full scale pressure range. The instrument will control pressures at elevated reference (line) pressures. As an example, if the applied reference pressure was 10 psi (69 kPa) and the requested 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, performed at no charge. 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.



Software Commands

The 9030/9031/9035/9036 are connected to host computers via RS-232 or RS-422/485 serial interfaces. The RS-422/485 interfaces support multidrop configurations using Optomux® protocol. The RS-232 interface may be used to interface to a single instrument using Optomux® protocol only.

The command set allows the user to interrogate the internal module status, set operating options, generate output pressures, measure pressures, read calibration coefficients, and update calibration coefficients. Although a desired pressure can be generated by sending one simple command, operating options provide additional versatility.

A list of desired pressures, slew rates and times to remain at a sequence of pressures can be stored within the unit. These pressures can be generated by command or a pressure cycle can be generated by advancing through the list automatically.

READ PRESSURE

The 9030 and 9035 can be used to accurately measure an absolute pressure. The 9031 and 9036 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. The units can acquire accurate pressure data at up to 10 readings per second as paced by the host computer.

REZERO PRESSURE STANDARD

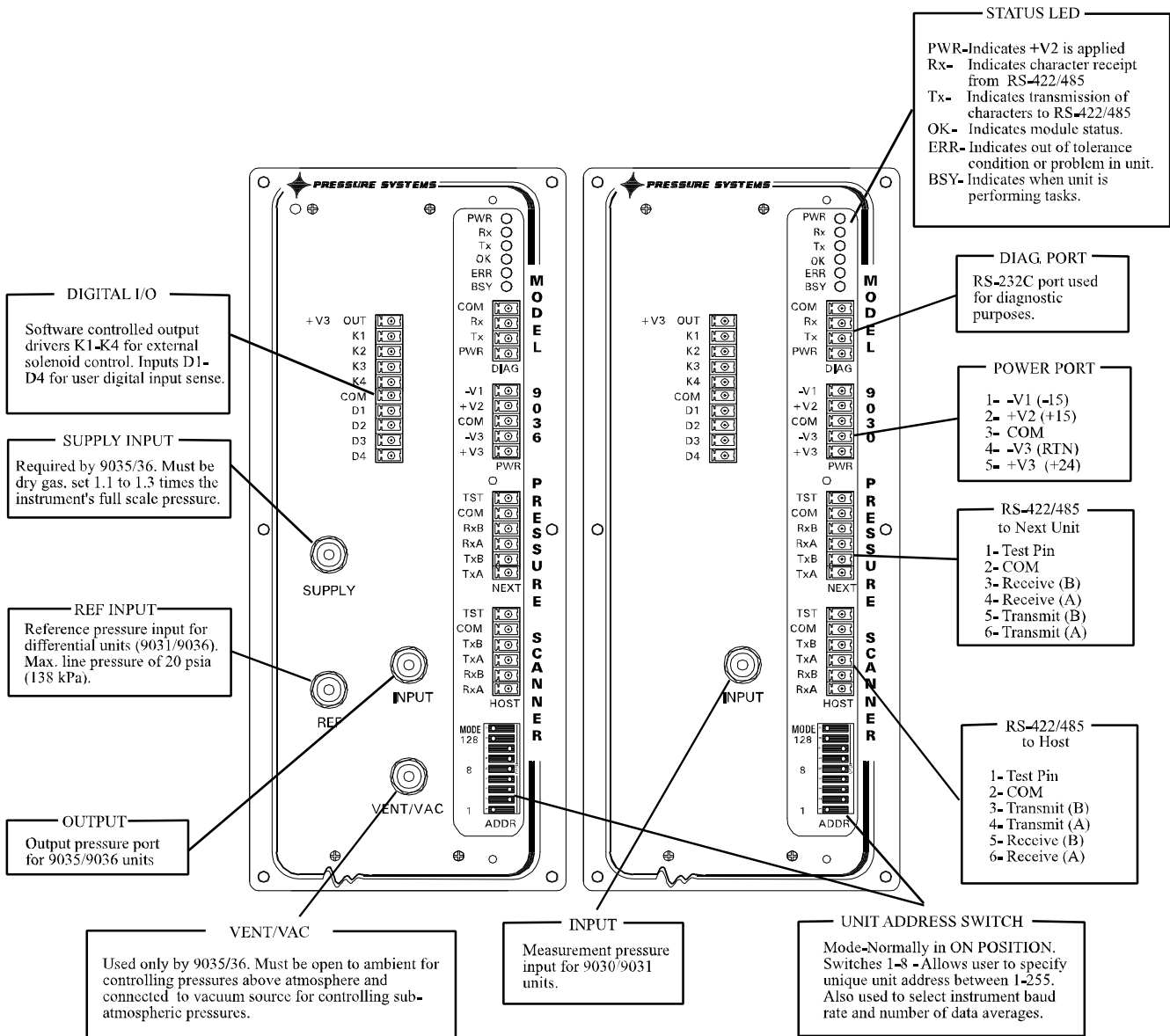
From time to time, the user may rezero the differential HASS sensor by commanding the unit to perform an on-line pneumatic rezero. This causes the instrument to shunt the HASS input and the reference sides together. The transducer is then read and the offset is used to remove any thermal or long term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

SET PRESSURE

The 9035 and 9036 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 9035/9036 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

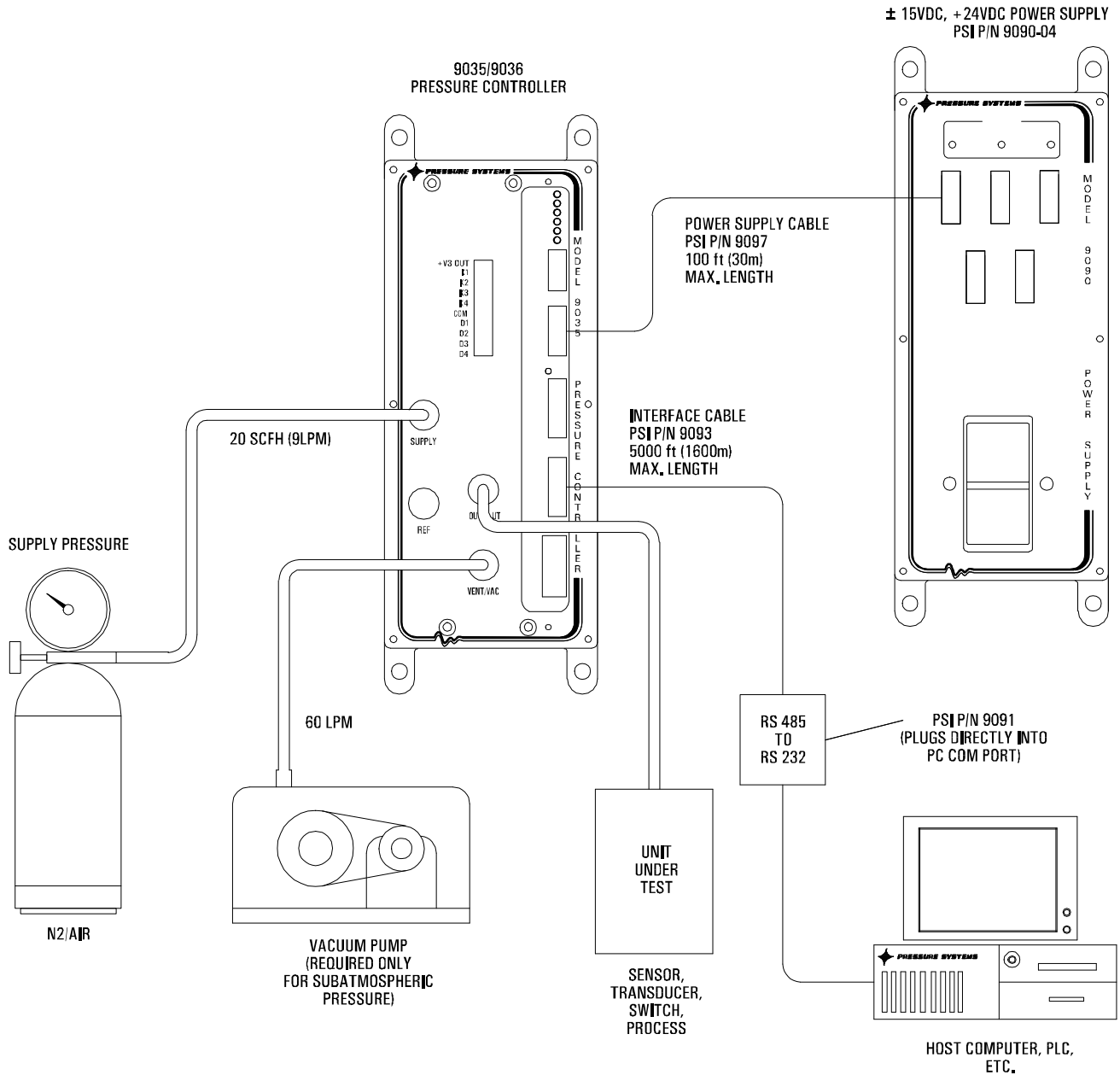
The instruments front panel contains all pneumatic and electrical connections necessary to operate the device. The unit is supplied with english or metric pneumatic fittings and mating electrical connectors.



Pneumatic/Electrical Interface Example

9030/31
9035/36

This example depicts the electrical/pneumatic connection and required cables and support equipment necessary to interface a 9035/36 to a host computer. Shop air may be used for the supply if it is free of moisture, oil and contaminants.



9030/31
9035/36

Ordering/Part Number Information

Ordering Information:

PN: **9030-AA00CCDDEE** Absolute Pressure Standard
9035-AA00CCDDEE Absolute Pressure Controller

AA = Input Configuration

01,	15 psia (105 kPa)	20,	200 psia (1.38 MPa)
03,	30 psia (210 kPa)	30,	300 psia (2.07 MPa)
05,	50 psia (350 kPa)	50,	500 psia (3.50 MPa)
10,	100 psia (690 kPa)		

BB = Reference Pressure

00, Standard

CC = Pressure Fitting

01, 1/4" Tube - Swagelok™
02, C" Tube - Swagelok™
03, 4 mm Tube - Swagelok™
04, 6 mm Tube - Swagelok™

DD = Interface

01, Optomux®
02, Bitbus™

EE = Calibrated Temperature

00, 0-50°C
01, Special

PN: **9031-AA00CCDDEE**
9036-AA00CCDDEE

Differential Pressure Standard
Differential Pressure Controller

AA = Input Configuration

01,	±1 psid (7 kPa)	30,	±30 psid (210 kPa)
02,	±2 psid (14 kPa)	50,	±50 psid (350 kPa)
05,	±5 psid (35 kPa)	75,	±75 psid (525 kPa)
10,	±10 psid (70 kPa)	99,	+100 psid (700 kPa)
15,	±15 psid (105 kPa)		

BB = Reference Pressure

Atmospheric is standard.
Contact factory
for reference pressure
options.

CC = Pressure Fitting

01, 1/4" Tube - Swagelok™
02, C" Tube - Swagelok™
03, 4 mm Tube - Swagelok™
04, 6 mm Tube - Swagelok™

DD = Interface

01, Optomux®

EE = Calibrated Temperature

00, 0-50°C
01, Special

