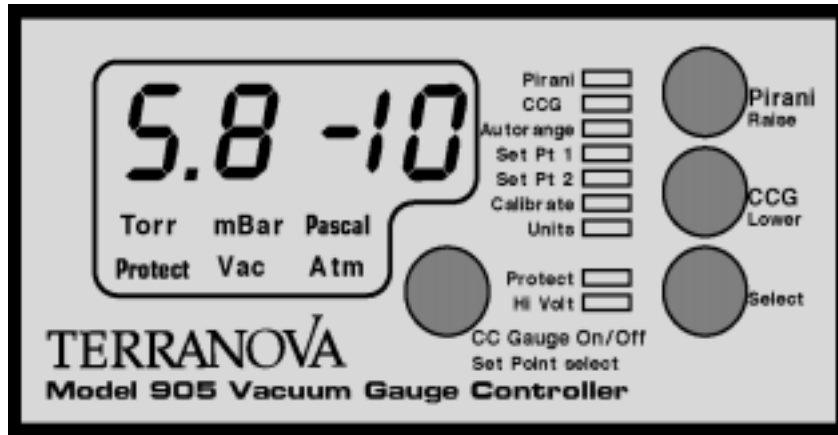


Instruction Manual

Terranova Model 905

Dual Modular Gauge Control/Display

For Use With MKS/HPS Modular Transducers:
Series 903 Cold Cathode Ionization Vacuum Sensor
Series 907 Analog Convection Vacuum Sensor



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I Technical Specifications

A. Description

The Terranova Model 905 Dual Modular Vacuum Gauge Controller displays pressure from 3×10^{-10} Torr to 1000 Torr, as measured from the MKS/HPS Series 907 Analog Convection Vacuum Sensor and the Terranova 903 Cold Cathode Ionization Vacuum Sensor. The Model 905 precisely measures the analog signal from either transducer to determine pressure. When autoranging, the Model 905 automatically smooths the pressure reading over the range of overlapping pressures. The Model 905 operates in two modes, a Set-Up Mode and a Measurement Mode.

The Terranova Model 905 is a programmable, microprocessor controlled unit, which gives it great versatility in operation, display, control and data communication. Some major features include:

- Operates either MKS/HPS Series 903 or Series 907 transducer or both.
- Model 905 automatically detects transducer configuration at start-up.
- Autoranging display of 14 decades of pressure when used with both transducers.

1×10^{-3} Torr to $1 \times 10^{+3}$ Torr with Series 907 Convection transducers.
 1×10^{-10} Torr to 5×10^{-3} Torr with series 903 Cold Cathode transducer.
 3×10^{-10} Torr to $1 \times 10^{+3}$ Torr with both transducers.

- User Selectable Pressure Units: Torr, mBar, Pascal.
- 2 Programmable Process Control Set Points.
- RS 232 Serial I/O for Data Collection and Computer Control
- Analog Logarithmic Output for Monitoring Pressure
- CE Conformance for EMI, EMC and Safety
- Universal Power Supply: 90-265 Volts; 47-65 Hz or DC
- Compact, 1/8 DIN Packaging

B. Specifications

Measuring Range

903	3.0x10 ⁻¹⁰ to 5.0x10 ⁻³ Torr
907	1.0x10 ⁻³ to 1.0x10 ⁺³ Torr
907 and 903	3.0x10 ⁻¹⁰ to 1.0x10 ⁺³ Torr (dual sensor operation)

The controller can be used to read pressure from a 907, a 903, or both gauges can be plugged in simultaneously.

Set Point Range 903 3.0x10⁻¹⁰ to 1.0x10⁻³ Torr

Set Point Range 907 1.0x10⁻² to 1.0x10⁺³ Torr

Display Range 3x10⁻¹⁰ to 1000 Torr,
 HI indicates overrange
 LO indicates underrange

Display Resolution 2 digits with an exponent

Input to the 905 Analog signals from the MKS 907 and/or MKS 903

Units of Display Torr, mBar, Pascal: user selectable

Calibration Adjust The appropriate calibration routines are provided, depending upon which sensors are connected at power up.

907 Vacuum and Atmosphere adjustments

903 Sensitivity Adjustment 0.5 - 2.0

Operating Temperature 0 to +40 degrees Celsius

Process Control Set Points	Two. These relays may be independently assigned to either gauge when used with both the 907 and 903. Alternatively, both relays may be assigned to one gauge. Two relays; contacts rated at 60 VDC or 30 VAC at 2 amp; the relays are internally fused with 2 amp fuses.
Nonvolatile Memory	For all user specified parameters
Analog Output	Logarithmic, 0.5 volts / decade
Output Power	+15 volts at 0.35 amp, sufficient to operate the MKS 907 and 903 RS-232 Input/Output
Mounting	The Model 905 may be used as a bench-top instrument or it may be mounted in an instrument panel with clips provided.
RS-232 Output	Allows user to read pressure and set points; 9600 baud, 8-N-1; available through the accessory connector
Power Requirement	90 - 265 Volts; 47 - 65 Hz or DC
Weight	0.9 lb. /0.4 kg
Repeatability	Approximately + 5%
Relative Humidity	0 -80%, non-condensing
Altitude	0-2000 m (6561 ft.) maximum



Figure 1: MKS/HPS Series 903 Top View and Side View



Figure 2: MKS/HPS Series 907 Side View and End View

Terranova Model 905 Dual Modular Gauge Controller and MKS/HPS Modular Vacuum Sensors are available from:

MKS/HPS Modular Vacuum Sensors are available from:

Duniway Stockroom Corp.
1305 Space Park Way
Mountain View, CA 94043 USA
Phone: 650-969-8811 or 800-446-8811
FAX: 650-965-0764
Internet: www.duniway.com

HPS Division of MKS Instruments, Inc.
5330 Sterling Drive
Boulder, CO, 80301 USA
Phone: 303-449-9861 or 800-345-1967
FAX: 303-442-6880
Internet: www.mksinst.com

C. Front Panel Controls

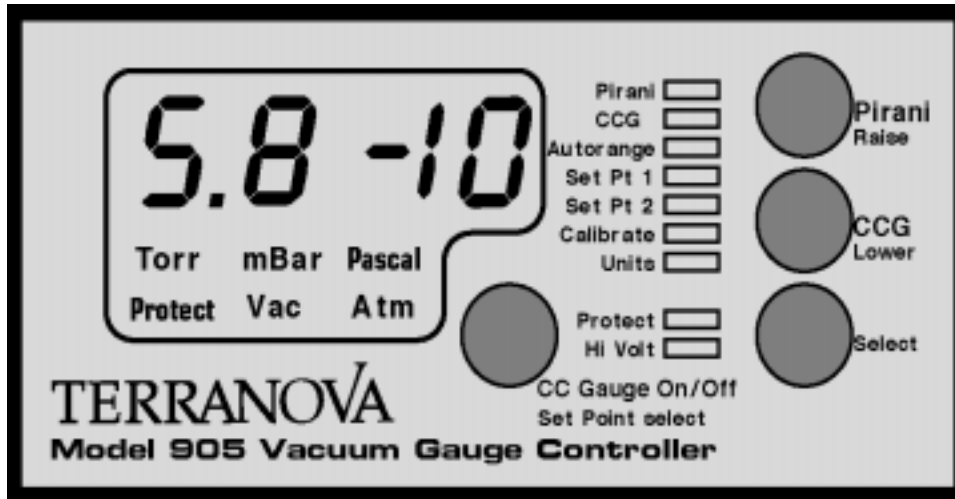


Figure 3: Model 905 Front Panel

Front Panel Controls

Normal Text describes Measurement Mode operation.

Italicized Text indicates Setup Mode operation.

CC Gauge On/Off (*Set Point Select*): Button

Turns On and Off the High Voltage to the 903.

Allows user to assign set points to either gauge in Setup Mode when used with the 907 and the 903.

Select: Button

Places the controller in setup mode.

Allows the user to scroll through the setup parameters that can be adjusted, e.g. Set Points.

Pirani (Raise): Button

Selects the pressure from the MKS 907 to be displayed when the controller is used with both sensors.

Increments parameter values in the Setup Mode.

CCG (Lower): Button

Selects the pressure from the MKS 903 to be displayed when the controller is used with both sensors.

Decrements parameter values in the Setup Mode.

Front Panel Displays

Pressure Display

MSD, LSD and sign with exponent using 7-segment bright red LED, 10mm high. The display is steady state when indicating pressure measurements.

The display flashes on and off with parameter values in Setup Mode.

LED Indicators

Bright red individual LEDs for miscellaneous indicators

D. Rear Panel & Accessory Connections

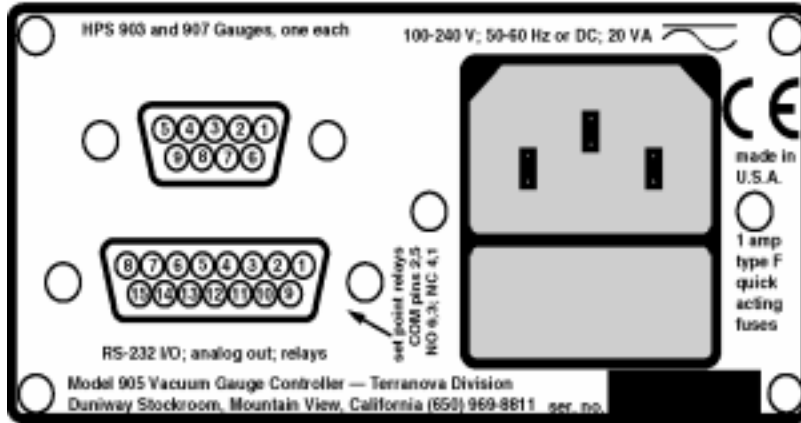


Figure 4: Model 905 Rear Panel

1. Power Input Module

The Power Input socket is a standard IEC 320 instrument power input receptacle. Replacement fuses are 2 amp type F quick acting fuses. The Model 741 has a universal power supply which accepts 100 - 240 Volts, 50-60 Hz or DC.

2. Figure 5: Transducer Connector - 9-pin D-sub Connector

<u>Pin</u>	<u>Function</u>
pin 1	Analog input voltage (+) from transducer, Channel 1
pin 2	Analog input voltage (+) from transducer, Channel 2
pin 3	Analog input voltage (-) from transducer, Channel 2
pin 4	HV Enable, Channel 2 (cold cathode module only)
pin 5	+15 Volt, 0.35 amp Power supply to both transducer modules
pin 6	HV Enable, Channel 1 (cold cathode module only)
pin 7	No Connection
pin 8	Analog input voltage (-) from transducer, Channel 1
pin 9	-15 Volt, 0.35 amp Power supply to both transducer modules

3. Figure 6: RS-232, Analog Out, Relays - 15-pin D-sub Accessory Connector

The 15-pin D-sub Accessory Connector is on the rear panel of the Model 905, see Figure 4. The connector has female pins; the mating connector must have male pins. Mating D-sub 15 connectors are available from many of the normal electronic sources. If you need help identifying a source, please contact us

The following are the pin assignments for the 15 Pin Accessory Connector:

<u>Pin</u>	<u>Function</u>
pin 1	set point #1 relay, normally closed
pin 2	set point #1 relay, common
pin 3	set point #1 relay, normally open
pin 4	set point #2 relay, normally closed
pin 5	set point #2 relay, common
pin 6	set point #2 relay, normally open
pin 7	Tx, RS-232; 9600-N-8-1
pin 8	Rx, RS-232
pin 9	Ground, RS-232 and processed analog ground
pin 10	Channel 2 buffered analog ground
pin 11	Channel 2 buffered analog signal; 1K output
pin 12	Channel 1 buffered analog ground
pin 13	Processed analog output, 1K output, 0.5 volts/decade
pin 14	High Voltage Disable (903) - low disables HV; hi enables HV
pin 15	Channel 1 buffered analog signal; 1K output

II Installation

A. Unpacking the Controller

Carefully unpack the Model 905 Controller. The shipment includes these components:

- controller unit
- power cord
- dual sensor cable (8100-900-10)
- mounting clips
- D-sub 15 accessory connector
- this instruction manual

If your controller does not have all of these items, contact Duniway Stockroom Corp.

If anything appears to have been damaged in shipment, contact the shipper.

Transducers are sold separately.

Do not plug the power cord in yet.

B. Mounting the Controller

You can rest the controller unit on a bench, table top, or shelf, or you can mount it in a rack or cabinet. The controller unit is housed in a standard 1/8 DIN box. If you are mounting the unit in a panel, the cutout dimensions are 1.78 inch by 3.60 inch (45.2 mm by 91.4mm). One mounting clip attaches to each of the sides of the controller unit. To attach the clip, slide the beveled surfaces of the clip under the cutout on the side of the box and push the clip toward the back of the unit. Be sure to leave enough clearance at the back of the controller unit for easy access to cable connections.

C. Connecting the Vacuum Sensors

Make sure the transducer is securely connected to the vacuum system, using good vacuum practice. The set point adjustments on the transducer should be set to the minimum possible value. If necessary, refer to the 907 or 903 User's manual.

D. Attaching the Sensor Cable

The cable has a 9-pin D-sub connector on one end, which plugs into the Model 905. Connect the 9-pin D-sub plug of the gauge cable to the 9-pin connector on the back of the Model 905 controller unit. Push the plug onto the connector until it is firmly in place. Tighten the retaining screws to make certain the connector remains in place. Loose connections can cause faulty readings.

The Series 903 Cold Cathode Sensor has a male, 9-pin D-sub Connector. See the Series 903 Manual or Figure 7 below for pin assignments.

The Series 907 Convection Sensor comes in two configurations. The Model 905 supports only the single set point configuration. The single set point model has a male, 9-pin D-sub Connector. See the Series 907 Manual or Figure 7 for pin assignments.

(The dual set point model has a male, 15-pin HD D-sub Connector. This configuration is not supported by the Model 905).

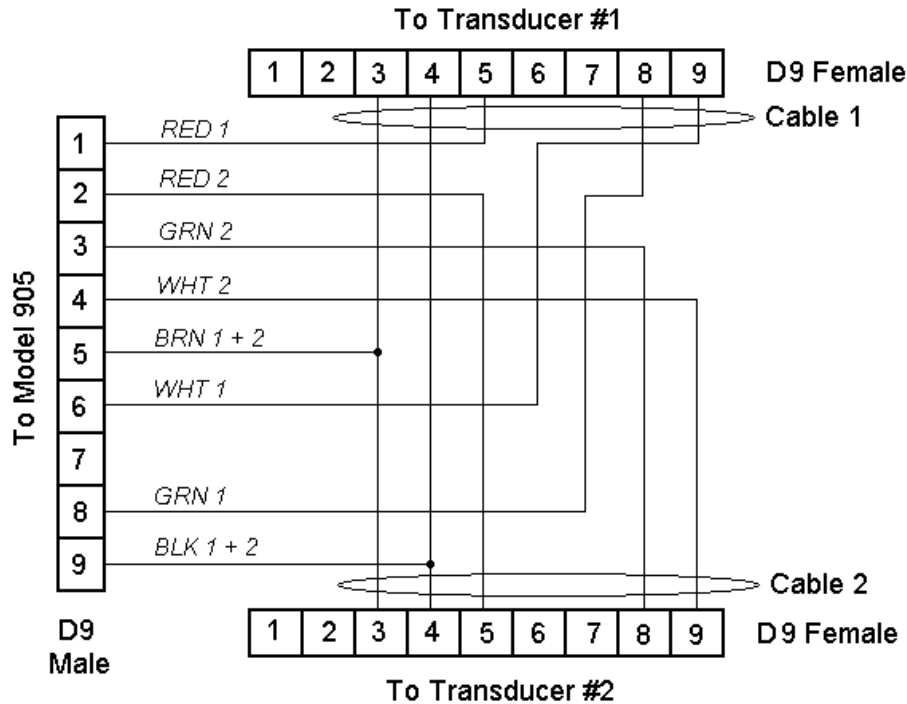


Fig. 7. Schematic for the Model 905 Sensor Cable (8100-900-10)

D. Checking the Supply Voltage

The Model 905 incorporates a universal power supply. This allows controller to operate on any input voltage from 90 VAC to 265 VAC, 47 to 65 Hz.

E. Attaching the Power Cord

Plug the power cord into the receptacle in the power module on the rear of the Model 905.

F. Set-Up Mode

In Set-Up mode, the user configures the operation of the controller. For example, in Set-Up Mode the user assigns set point values, calibrates the unit for specific gasses or selects autoranging for dual transducers. The user cycles through the set up parameters by pressing the Select button. The user adjusts the parameter values by pressing the Raise and Lower buttons. The parameter values flash on and off on the digital display, indicating the controller is in the set up mode. WHITE silk screening identifies the Set-Up parameter indicators and controls on the Model 905 front panel.

G. Measurement Mode

In Measurement Mode, the controller displays the current pressure measurement as a steady state (non-flashing) value on the digital display. When two non-autoranging transducers are being controlled, the user can select which transducer pressure reading is displayed by pressing the Pirani or CCG button. YELLOW silk screening indicates the Measurement Mode indicators and controls on the Model 905 front panel.

III Operation/Protection

A. Turn Power On

Plug the AC power end of the power cord into an electrical outlet. The loudspeaker will “beep” and test all indicators while the controller executes its self test. After being turned on, the instrument will go through the following sequence:

“beeper”

indicators for TORR, MBAR, PASCAL, PROTECT, VAC, ATM

9 LED indicators for set points and other functions

all digit segments will light, including decimal points

display shows the model number of the instrument, **905**.

display shows software version, e.g. **1.00**

The Model 905 will go into normal operation and begin measuring pressure.

B. Error Indicators

If neither transducer is connected, the display will show **E01**. The 905 can not operate two transducers of the same type. The display will show **E02** indicating two transducers of the same type are plugged in.

C. Restarting the Model 905 Controller

The Model 905 can be restarted with power applied by holding down the Select button while simultaneously pressing both the Raise and Lower buttons while the device is in Measurement Mode. This operation saves all the current set up parameters, such as Set Points and the Protect voltage.

D. Front Panel Controls

The Model 905 allows flexible configuration of operation using simple entry from the front panel buttons labeled SELECT, RAISE and LOWER. Parameters which you may adjust are selected by scrolling through a list. Only the parameters applicable to the transducers installed will be displayed. Each time the SELECT button is pushed, the LED indicator advances to the next parameter. The LED indicators will be lit to indicate which parameter is being adjusted, and the digital display will flash to indicate the value of the parameter being adjusted. Each push of a button will give a short “beep” from the loudspeaker to confirm the button was pushed. If you have reached the limit of adjustment or if the button push is not allowed, the loudspeaker will give a long “beep”. Following is detailed description of the parameter selection and adjustment:

1. CC Gauge On/Off

This button allows the user to turn the CCG on and off from the front panel. This is the only way to turn on high voltage to the cold cathode transducer when not in autorange mode.

2. Hi Voltage LED

The Hi Volt LED is lit when the 903 high voltage is on. When the sensor is off, OFF is displayed and the Hi Volt LED is extinguished.

3. Autorange

This parameter is available only when the MKS 907 and MKS 903 are both installed. When Autorange is turned OFF (default value), the transducers operate independently and the pressure from either transducer is displayed by pressing either the PIRANI or CCG push-button.

When Autorange is turned ON, the Autorange LED on the front panel will be illuminated and the pressure display is automatically ranged between the two transducers. A special smoothing algorithm is used in the overlap region to allow continuous measurement from 3×10^{-10} Torr to 1000 Torr. The smoothing algorithm operates between the pressures of 1×10^{-2} Torr to 8.5×10^{-5} Torr. The digital display always indicates the smoothed pressure. The smoothed pressure reading is only valid for an Air/Nitrogen gas species and if both transducers are monitoring the same pressure.

In Autorange mode, the cold cathode gauge is controlled by the pressure measured by the Pirani. The high voltage is applied to the CCG when the pressure drops below 1×10^{-2} Torr. High voltage is removed when pressure rises above 1×10^{-2} Torr. The user programmed protect pressure is not applicable in Autorange mode.

The Autorange operation is intended for those applications that require automatic on/off switching of the cold cathode transducer. Care must be taken to ensure that the cold cathode is not exposed to a high pressure that is not monitored by the Pirani.

4. Set Pt 1

This sets the pressure at which the set point relay 1 will be energized. The minimum value is OFF; this shuts the set point off. Use RAISE and LOWER to set to the desired value.

5. Set point Range

903 3.0x10⁻¹⁰ Torr to 1.0x10⁻³ Torr
 3.9x10⁻¹⁰ mBar to 1.3x10⁻³ mBar
 3.9x10⁻⁸ Pascal to 1.3x10⁻¹ Pascal

907 1.0x10⁻² Torr to 1.0x10⁺³ Torr
 1.3x10⁻² mBar to 1.3x10⁺³ mBar
 1.3x10⁰ Pascal to 1.3x10⁺⁵ Pascal

Set points will not operate while the Model 905 is in Set-Up Mode.

6. Set Pt 2

This operates in the same manner as SET PT 1 described above.

ATTENTION: When operated with the 907 and 903, the set point can be assigned to either sensor by using the Set Point select push-button while the desired set point is selected. The selected transducer LED will light indicating which transducer the set point is assigned. The unit can store up to 4 set point assignments, one for each sensor for each set point. The set point value used in Measurement Mode is the set point assigned to the transducer (Pirani or CCG) which is selected when the Select button is pressed to scroll to the next parameter setting.

7. Units

This allows selection of the displayed units. Press either the RAISE or LOWER buttons scroll through Torr, mBar and Pascal. The indicators will be alternately lit as you scroll through the options. All numerics displayed will be in the units selected. When the units are changed, the numeric values will be changed leaving the actual pressure value unchanged.

8. Protect

This parameter adjusts the value at which the CCG will turn itself off. It should be used to prevent the CCG from operating at pressures above 5×10^{-3} Torr. Operation above this pressure can result in false low pressure readings due to roll back. The range for the parameter is between 1×10^{-5} Torr to 5×10^{-3} Torr. This function only works in non-autoranging mode.

9. Initial zero

When installing a transducer(s) for the first time, it is good practice to reset the Model 905 internal settings (See section 10 below). This will prevent errors in set up, e.g. if the 907 has not had its internal zero properly adjusted.

The 907 should be calibrated in accordance with the 907 User's manual before corrections are made using the Model 905. To adjust zero on the Model 905, reduce the pressure in the sensor to well below its minimum range (1×10^{-3} Torr) and use the SELECT button to choose PIRANI, CALIBRATE and VAC. Use the RAISE or LOWER buttons to set the display to a value of 0.0. If zero can not be attained in this manner, it may be necessary to adjust the "ADJUST VACUUM" control on the 907 sensor.

The 903 has no user adjustments.

10. Reset of Stored Values

This allows you to recover the factory settings for all stored values and resets the set points and protect pressure to off. For a system that is far out of calibration, the factory settings provide a good starting point for re-calibrating or adjusting the gauge controller. To recover the factory settings, power up the Model 905 while simultaneously pressing the Raise and Lower push buttons. You will hear a few short 'chirps' from the loudspeaker confirming the factory settings have been entered. The digital display will show 'rST' to confirm the reset has been entered. After a reset, the Model 905 is in the following state:

- Set Points are OFF.
- Protect Voltage is OFF.
- Autorange is OFF.
- Units set to Torr.
- CCG calibration set to 1.0.
- Pirani is uncorrected.

11. Reading Pressure

907 Condition

Display

Disconnect
or broken filament

OFF

$<7 \times 10^{-4}$ Torr

LO

7×10^{-4} Torr to 1100 Torr

MSD.LSDsignEXP

e.g.: 3.5-2 equals 3.5×10^{-2} Torr

7.5+2 equals 750 Torr

>1100 Torr

HI

903 Condition

Display

$< 3 \times 10^{-10}$ Torr
not started,
gauge not connected

OP

3×10^{-10} Torr to 5×10^{-3} Torr

MSD.LSDsignEXP

e.g.: 3.5-7 equals 3.5×10^{-7} torr

$>5 \times 10^{-3}$ Torr

OFF

The Series 903 CCG turns itself off at pressures greater than 5×10^{-3} Torr or at the user programmed protect pressure in non-autoranging mode. In autoranging mode, the Pirani turns the CCG on and off.

F. Analog Output

The Processed Analog Output is calculated from the value of the digital display. The output is logarithmic, 0.5 volt/decade; the source impedance for the output is 1 K ohm. The signal appears on pin 13 of the Accessory Connector. It is only valid during Measurement Mode. In Setup Mode, it remains at the last measured pressure value. The output voltage is calculated from:

$$\mathbf{V=0.50*(\log 10 (Pressure)+12)}$$

where V is the Analog Output in volts; P is the pressure in Torr.

The pressure as a function of the Analog Output voltage is:

$$\mathbf{P=10 (2V-12)}$$

where P is pressure in Torr.

The units selected does not affect this output.

Some examples follow; because of normal tolerances in the electronics, there may be minor differences in the values you observe compared to those shown:

Figure 8: Analog Output vs. Displayed Pressure

<u>Display Information</u>	<u>Analog Output - volts</u>
OFF/OPEN/LO/EO1/EO2	0.0
1x10 ⁻¹⁰	1.0
1x10 ⁻⁹	1.5
1x10 ⁻⁸	2.0
1x10 ⁻⁷	2.5
1x10 ⁻⁶	3.0
1x10 ⁻⁵	3.5
1x10 ⁻⁴	4.0
1x10 ⁻³	4.5
1x10 ⁻²	5.0
1x10 ⁻¹	5.5
1x10 ⁰	6.0
1x10 ⁺¹	6.5
1x10 ⁺²	7.0
1x10 ⁺³	7.5
HI	8.5

NOTE: If two transducers are used and Autoranging is OFF, the processed output will indicate the pressure from the same sensor that is currently selected on the front panel display. If Autoranging is ON, the processed output will provide a continues output from 1 to 7.5V.

G. Serial Interface

The RS-232 serial port provides pressure readings when requested by the terminal. The interface is standard RS-232 format; 9600 BPS, 8-bits, noparity, 1 stop bit. The interface is through the 15-pin D-sub accessory connector.

The serial port allows reading pressure and other parameters of the Model 905; it is not possible to modify stored parameters over the serial port.

The serial port is only active in Measurement Mode.

Figure 9: Serial Interface Parameters, Syntax and Response

<u>Parameter</u>	<u>Command</u>	<u>Response Syntax</u>	<u>Response Values</u>
pressure	"p"	907_val,903_val, smooth_val<cr>	msd.lsdE+/-exp nogauge; LO,HI OFF, PROT, OPEN
sensor	"s"	CH1_xdcer, CH2_xdcer<cr>	907 903 nogauge
units of measurement	"u"	Units<cr>	Torr, mBar, Pascal
relay 1 status	"1"	SP1_val,status,xdcer 1 indicates relay energized	msd.lsdE+/-exp,0,907 msd.lsdE+/-exp,1,907 msd.lsdE+/-exp,0,903 msd.lsdE+/-exp,1,903
relay 2 status	"2"	SP2_val,status,xdcer 1 indicates relay energized	msd.lsdE+/-exp,0,907 msd.lsdE+/-exp,1,907 msd.lsdE+/-exp,0,903 msd.lsdE+/-exp,1,903
version	"v"	model, version	905,verx.xx

NOTE: The commands are a single character. There is no carriage return after the command character. The Model 905 returns "%Error" when an invalid (e.g. incorrect syntax) or unrecognized (e.g. wrong parity or baud rate) command is received.

H. Using the Model 905 with Other Gases

1. Calibrate

The parameters available will depend upon the transducers installed

2. Pirani ATM

The PIRANI LED, CALIBRATE LED and ATM indicator will light. This parameter allows the atmospheric reading of the 907 to be adjusted to a reference pressure. Use RAISE and LOWER to set to the desired value.

Do not use the ATM adjustment on the 907 unless the controller is unable to set the correct pressure. Refer to the 907 manual before making any these adjustments.

NOTE: In order to support the widest range of gases, the Model 905 does not limit the upper range of atmospheric calibration.

3. Pirani VAC

The PIRANI LED, CALIBRATE LED and VAC indicator will light. This parameter allows the vacuum reading of 907 to be adjusted. The adjustment should be made by pumping the transducer to below 1×10^{-5} Torr and adjusting the reading to 0.0×10^{-3} Torr. Use RAISE and LOWER to set to the desired value.

Do not use the VAC adjustment on the 907 unless the controller is unable to set the correct pressure. Refer to the 907 manual before making this adjustment.

4. CCG

The CCG LED, AND CALIBRATE LED indicators will light. This parameter is a multiplier between 0.5-2.0. Use RAISE and LOWER to set to the desired value. It may be used to correct for small variations between sensors or changes in sensitivity due to variations in the gas type.

IV Maintenance

A. Trouble shooting

If the self-test fails, run the self-test again by turning the power off and then on again. If it fails again, call Duniway Stockroom Corp.

If fuses burn out, check to see that the proper voltage has been supplied to the power input module.

If fuses burn out repeatedly call Duniway Stockroom Corp.

If the digital display consistently shows LO, OFF or HI, it may be that one of the internal power supply protection devices has removed power to the transducer. You may check this by measuring the voltage at the connector or cable for the unaffected gauge. Since power for both gauges use the same protection device, either connector will show the power supply voltages. Normal range for the voltages are 14.5 to 15.5 volts. +15 may be measured on the red wire; power return is on the black wire. If the power supply protection has shut the power off, you will typically measure less than 4 volts on the affected supply.

If you verify that either power supply is shut off, remove power from the transducer for a few minutes to allow the protection device to reset itself. The protection device does not need to be replaced; it is a reusable thermal fuse.

You may wish to determine the cause for the loss of power supply voltage before applying power again. The Model 905 will protect itself if it finds excessive power draw again.

It is normal for the Model 905 to feel warm to touch along the left side of the case.

If the trouble appears to be related to either the MKS 907 Convection Enhanced Pirani or MKS 903 Cold Cathode Gauge, please refer to the appropriate users manual which is included with the transducer.

B. Accessories / Part Replacement

If you need to return the gauge controller to Duniway Stockroom Corp. for service, first contact Customer Service at Duniway Stockroom Corp. to obtain an RMA number. Then pack the instrument securely and place the RMA number on the outside of the package where it is easily seen. Use the original packaging if it is available. If you do not have appropriate packing materials, a commercial packing and shipping firm can provide them.

C. Changing Fuses

The controller contains two fuses. Both fuses are held in the fuse assembly that is part of the power module located on the back panel of the controller. To change fuses, unplug the line cord from the power entry module at the rear of the Model 905; locate the fuse block immediately below the line cord socket. Press the tab of the fuse assembly and withdraw the fuse assembly from the power module.

Turn the fuse assembly around so that the fuses are facing you. Check both fuses; replace the burnt-out fuse with a fuse of the appropriate rating. Reinsert the fuse assembly into the power module; push it in until the ears click into place.

Replacement fuse type: 5 mm x 20 mm, Fast-blow 1 amp

<u>Manufacturer</u>	<u>Fuse Type</u>
Bussman	GDB-1A
Little fuse	217 001

D. Schematic Diagrams

Because of the proprietary nature of our products, we do not supply schematic diagrams or software listings. If you have any problem with operation or interface to any of our products, please contact us; we will do everything we can to serve your needs.

V Warranty & CE Declaration

Terranova products of Duniway Stockroom Corp. are warranted to be free of defects in material and workmanship for a period of one year from the date of shipment. At our option, we will repair or replace products which prove to be defective during the warranty period. Liability under this warranty is limited to repair or replacement of the defective items. Shipping damage is excluded from the scope of this warranty. Gauge tubes of all types are excluded from this warranty.

Terranova products are warranted not to fail to execute programming instructions due to defects in materials and workmanship. If Duniway Stockroom receives notice of such defects during the warranty period, Duniway Stockroom will repair or replace firmware that does not execute its programming instruction due to such defects. Duniway Stockroom does not warrant that the operation of the firmware or hardware will be uninterrupted or error-free.

If this product is returned to Duniway Stockroom for warranty service, Buyer will pre-pay shipping charges and will pay all duties and taxes for products returned to Duniway Stockroom. Duniway Stockroom will pay for return of products to Buyer, except for products returned to a Buyer from a country other than the United States.

LIMITATION OF WARRANTY: The foregoing warranty does not apply to the defects resulting from:

- 1. Improper or inadequate maintenance by Buyer;*
- 2. Buyer-supplied interfacing;*
- 3. Unauthorized modification or misuse;*
- 4. Operation outside of the environmental specifications of the product; or*
- 5. Improper site preparation and maintenance.*

THE WARRANTY SET FORTH ABOVE IS EXCLUSIVE AND NO OTHER WARRANTY, WHETHER WRITTEN OR ORAL, IS EXPRESSED OR IMPLIED. DUNIWAY STOCKROOM DISCLAIMS ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

EXCLUSIVE REMEDIES: The remedies provided herein are Buyer's sole and exclusive remedies. In no event will Duniway Stockroom be liable for direct, indirect, special, incidental, or consequential damages, including loss of profits, whether based on contract, tort, or any other legal theory.

DECLARATION OF CONFORMITY



We, Duniway Stockroom Corp., declare under our sole responsibility, that the following products, displaying the CE mark on the rear panel:

Model 905 Dual Modular Gauge Control/Display
Model 906 Convection Gauge Controller
Model 908 Dual Capacitance Diaphragm Gauge Controller
Model 721 Small Ion Pump Power Supply
Model 921 Cold Cathode Gauge Controller
Model 924 Thermocouple Vacuum Gauge
Model 926 Dual Convection Gauge Controller
Model 741 Ion Pump Power Supply

to which this declaration relates, are in conformity with the following standards or normal documents

EMC Directive (89/336/EEC//93/68/EEC)
Electromagnetic Compatibility
Standards: EN 50081-1: 1992, EN 50082-1: 1993

Low Voltage Directive (73/23/EEC//93/68/EEC)
Electrical/Technical Safety
Standard: EN 61010-1: 1993/A2: 1995

following the provisions of the EMC directive (89/336/EEC)

October, 1999

by: Sherman Rutherford
Compliance Manager

Duniway Stockroom Corp.
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