

# Instruction Manual

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## Pressure Relay PR-0048



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rev101206sr

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## Important Notices

***NOTES, CAUTIONS AND WARNINGS!*** contained in the text provide important information. Please give them your attention to protect yourself, others and your equipment.

### *NOTE*

A *NOTE* provides additional or special information to assist operation and/or maintenance personnel. Disregarding a note may cause inconvenience but will *generally* not result in personal injury or equipment damage.

### **CAUTION**

A **CAUTION** is provided in a procedure whenever mechanical or electrical damage may occur. Failure to heed a caution will result in some form of damage to the equipment; however, personal injury is unlikely.

### **WARNING!**

A **WARNING!** Is provided in a procedure where personal injury may occur if the **WARNING!** is not heeded Mechanical or electrical damage *may also occur.*

## I Description

### A. General Considerations

The Pressure Relay, Model PR-0048, is a pressure-sensitive switching device which responds to the pressure output signal (0-100mV) of a sputter-ion pump control unit (such as the VacIon<sup>®</sup> pump control units.) The PR-0048 responds by turning off the bakeout control unit at a preset pressure limit.

The sputter-ion pump control unit converts vacuum pressure levels in a chamber to corresponding voltage output signals and transmits these signals via a cable to the pressure relay. The pressure relay unit compares the input signal from the sputter-ion pump control unit with a manually preset internal voltage reference. When the input signal exceeds the preset limit, the relay opens, turning off the bakeout control unit. This action maintains the vacuum in the system to a predetermined range during the bakeout cycle.

The pressure relay is compatible with the Varian control units 921-0062 and 921-0066; and the compatible Duniway Stockroom Corporation control units such as IPC-0062 and IPC-0066.

### B. Specifications

Input Power	115 VAC, 50/60 Hz, provided through the cable from the pump control unit.
Input Resistance	Greater than 100Kohm.
Power	2 Watts (approximately)
Signal Input Range	0-100 mV DC
Control Relay Contact Rating	5 Amps
Reference Voltage Test Points	Marked TP1 and TP2 on the rear panel. Adjustable from 0-100mV ( $10^{-8}$ to $10^{-4}$ torr range.)
Rear Panel Switch	Allows the use of this unit with diode and triode sputter-ion pumps.
Overpressure Indication	Front Panel Light (Red)
Cables	Two cable to connect from the sputter-ion pump control unit to the pressure relay and from the pressure relay to the bakeout unit.
Dimensions	7" (178mm) high, 2.75" (70mm) wide, 18" (460mm) deep.
Weight	6 pounds (3Kg) approximately.



**Figure I-1: Pressure Relay Front Panel**



**Figure I-2: Pressure Relay Rear Panel**

## II Installation and Setup

### A. Installation

The recommended installation of this unit is in a 19" rack mount and requires support strips top and bottom. Mounting holes are provided in the top and bottom of the front panel. (See Figure I-1).

The relay actuation point is pre-set before delivery to a nominal pressure of  $1 \times 10^{-5}$  torr. This can be verified before using by checking test points TP1 and TP2 (see Figure I-2) with a voltmeter. The correct indication should be  $70 \pm 5$  mV. See Figure II, page 7 for the calibration curve of recorder (control) output voltage versus pressure for typical control units.

If the relay actuation point is incorrectly set, or if a different actuation point is desired, the procedure for checking and resetting the relay actuation point is described in Section IV, Maintenance.

### B. Electrical Connections

Power and control signal from the ion pump control unit are provided by connecting the 8 foot input cable from connector J1 on the Pressure Relay to the appropriate connector on the pump control unit.

Control for switching off the bakeout control unit is provided by connecting the 7 foot relay output cable from J2 on the Pressure Relay to the bakeout unit (pins B and C).

When the above connections have been completed, switch the Pressure Relay unit to "TRIODE" or "DIODE" to correspond to the sputter-ion pump being used. The switch for this function is on the top of the rear panel of the Pressure Relay. (See figure I-2) and Section II: Installation and Setup

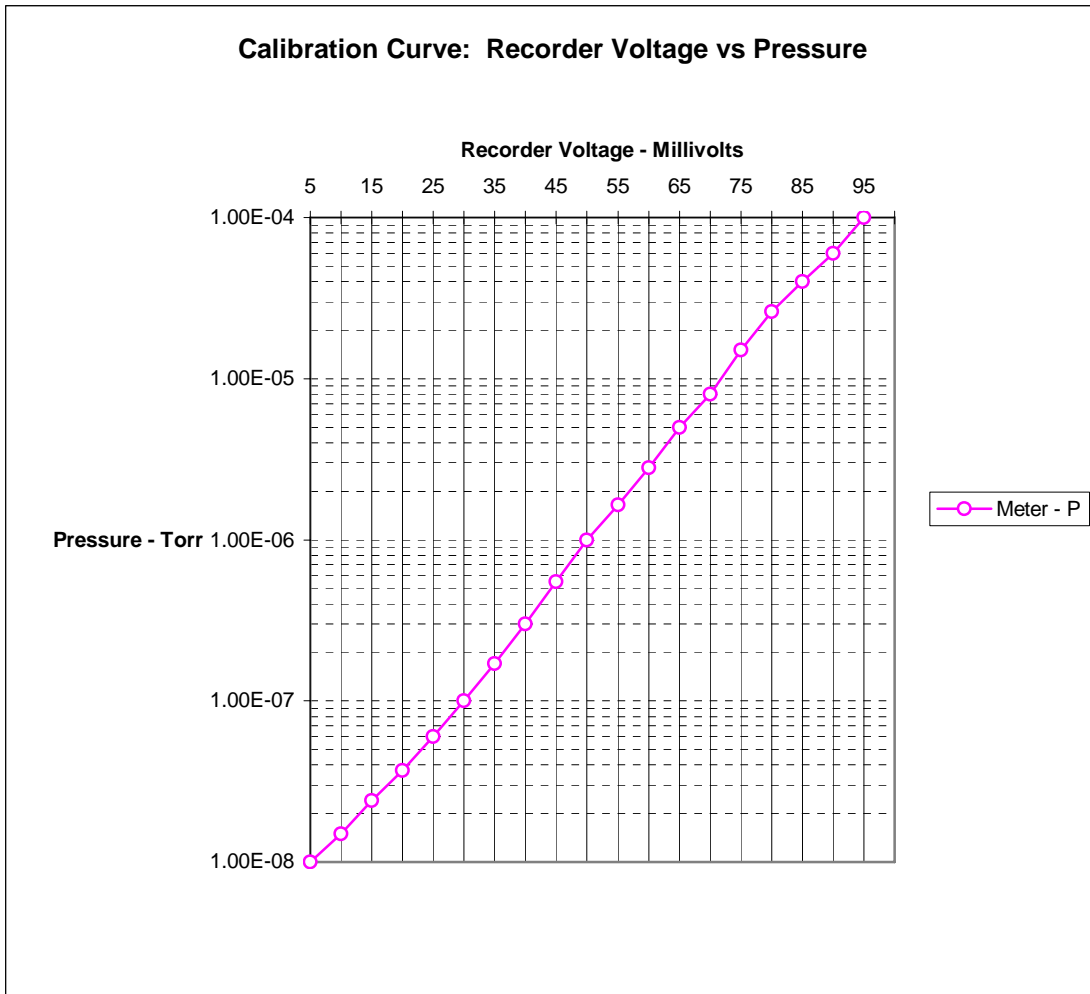
The Pressure Relay operates as a voltage comparator circuit, which compares the pressure indication signal (0-100mV DC) from the pump control unit with an internal reference voltage. When the incoming signal approaches that of the reference, the comparator changes state, causing the overpressure relay K1 to de-energize; applying power to the "overpressure" lamp on the front panel of the Pressure Relay; and switching off the bakeout control unit.

Upon a decrease in pressure, the pressure indication signal decreases, and after dropping below the internal reference voltage, causes the voltage comparator circuit to return to its initial state, which in turn causes the relay K1 to energize, thus switching the bakeout unit on again. The input signal difference for the comparator "ON" and "OFF" points for relay K1 are approximately 14 mV apart, by intentional design.

### III Maintenance

#### A. Resetting Reference Voltage

It may be necessary to reset the reference voltage for specific applications in the vacuum system. Please refer to the Recorder Voltage (mV) versus Pressure (torr) curve shown below for the appropriate reference voltage setting. Using a voltmeter to read the voltage between TP1 and TP2, adjust the “Pressure Set” potentiometer on the front panel to read the voltage level corresponding to the desired pressure setting.



**Figure II: Recorder Output versus Pressure Plot Chart**



## B. Set-Point Offset Check Procedure

1. Disconnect the Pressure Relay unit from the pump control unit and remove the cover.

**WARNING!**

**A WARNING! In the following steps take the proper precautions in handling and connecting 115VAC line voltage leads to the equipment. Electrical shock hazard for personnel and equipment damage could result from improper handling**

2. Identify Connector J1 on the schematic and the unit. Using a test cable, initially disconnected from the power source, apply 115VAC power connections to terminals E and F of Connector J1 and Ground to terminal G of Connector J1. Then connect the test cable to the 115VAC power source. Now, using a voltmeter, check the voltages between terminal J3-5 and ground and terminal J3-4 and ground. The respective readings should be +15 Volts DC and -15 Volts DC; +/- 10%.
3. Set S1 to TRIODE or DIODE as applicable to the pump and pump control unit to be monitored.
4. Connect a variable low voltage source (0 - 100 mV DC) to pins C and B of J1.  
With S1 set to TRIODE, pin C must be on the (+) and pin B to the (-) terminals of the source.  
With S1 set to DIODE, pin B must be on the (+) and pin C to the (-) terminals of the source.
5. Adjust the variable voltage source to the voltage level corresponding to the pressure level at which it is desired for relay K1 to open for bakeout switch off. (See Figure IV-1 for voltage vs pressure relationship).
6. Adjust Pressure Set potentiometer R4 (see schematic and figure I-1) so that relay K1 is energized and Overpressure lamp DS1 is OFF; then back off on potentiometer R4 until relay K1 opens and Overpressure lamp DS1 is ON. At this point, there should be an open circuit between terminals B and C of Connector J1.
7. Note and record the voltage reading value of the variable voltage source at this point.
8. Decrease the voltage from the variable voltage source until relay K1 energizes.  
Note and record the voltage reading value of the variable voltage source at this new point.
9. The voltage difference between steps 7 and 8 should be in the range of 12 to 16 mV.
10. Disconnect the 115 VAC line voltage power source and the variable voltage source.  
Re-install the cover and Re-connect the Pressure Relay unit to the Pump Control unit.



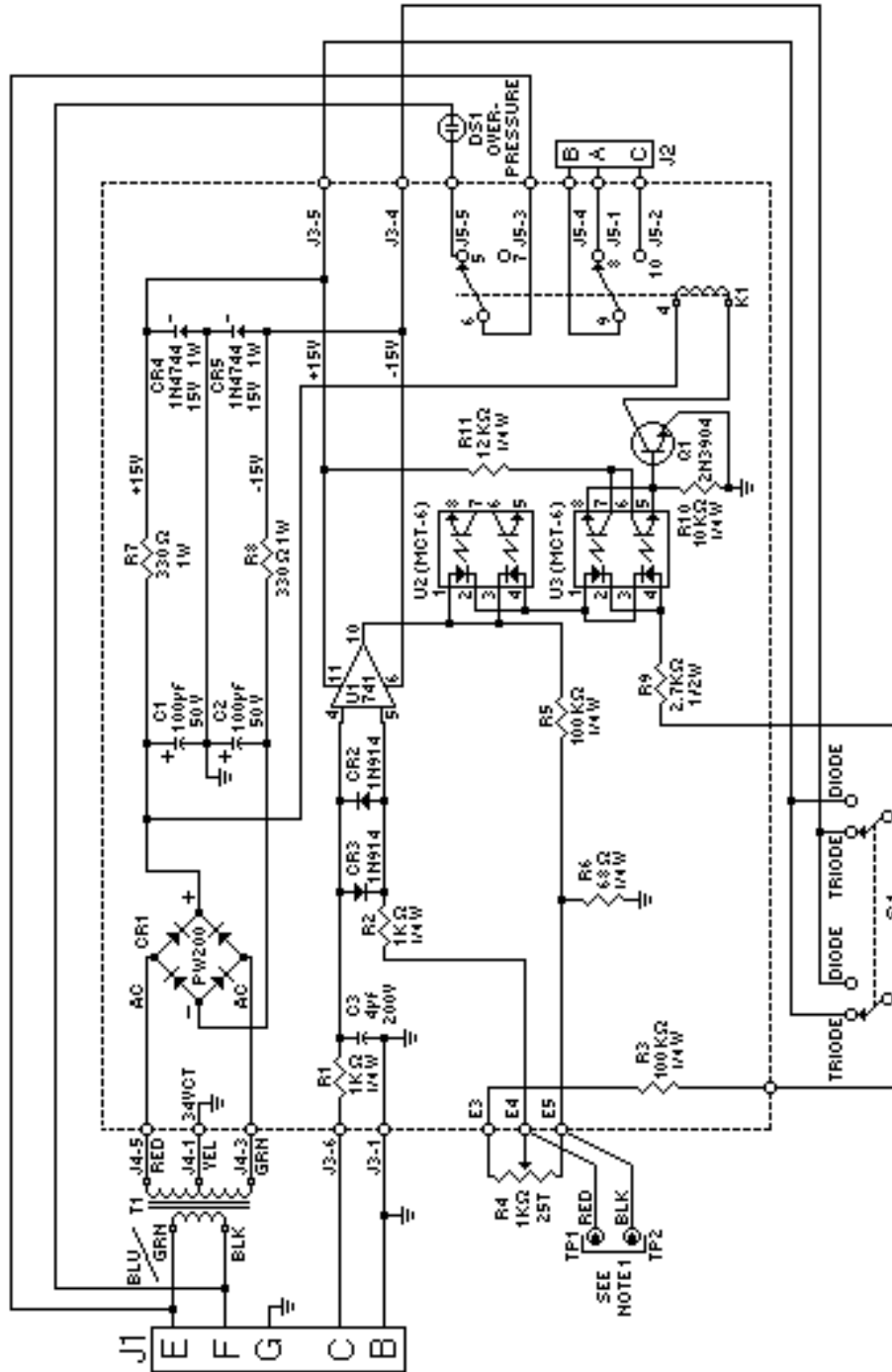
## IV Spare Parts List & Schematic Diagram

### A. Spare Parts List

This spare parts list is keyed to the schematic diagram for the PR-0048 Pressure Relay Unit and includes only those parts which are not commonly available through normal commercial sources.

<u>Description</u>	<u>Drawing reference</u>	<u>Part Number</u>
Transformer	T1	48-T1
Overpressure Lamp	DS1	62-DS2
Relay - 24 VDC	K1	48-K1
Switch	S1	48-S1
Resistor, Variable	R4	48-R1
Cable Ass'y, Relay Output	J2 CABLE	48-CABLE2
Cable Ass'y, Ion Pump CU	J1 CABLE	48-CABLE1

B. Schematic Diagram



**PRESSURE RELAY  
SCHEMATIC  
PR-0048**

REV 08/17/98 G.D.

2. Select proper position (S1) for pump control
1. Using VTVM on 0-100 MV scale calibrate pressure set point according to recorder output (MV) VS pressure (TORR) curve in appropriate vacuum control unit instruction manual