



## **MV2A Thermocouple Controller Instruction Manual**



The Fredericks Company - Televac  
2400 Philmont Avenue  
Huntingdon Valley, PA 19006

web: [www.frederickscompany.com](http://www.frederickscompany.com)  
email: [sales@frederickscompany.com](mailto:sales@frederickscompany.com)  
tel: +1 215 947 2500  
fax: +1 215 947 7464

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# 1 Introduction

## 1.1 Disclaimer

All information in this manual is subject to change without notice. The Fredericks Company assumes no responsibility for inaccuracies in product specifications or any liability arising from product use. Please contact Televac at [sales@televac.com](mailto:sales@televac.com) or call 215-947-2500 with comments or questions.

## 1.2 Description

The MV2A is a thermocouple vacuum sensor controller with a range of  $1 \times 10^{-3}$  Torr to 20 Torr. It utilizes a Televac thermocouple vacuum sensor, part number 2-2100-10 or 2-2126-0YY. It has a red, three-digit, seven segment LED display that displays pressure in units of mTorr and Torr. The MV2A has 2 set points relays, and a 0-5 Volt analog output.

## 1.3 Operating Specifications

Table 1: Operating Specifications

<b>Operating Range</b>	$1 \times 10^{-3}$ to 20 Torr
<b>Communications</b>	N/A
<b>Programmable Set Points</b>	2
<b>Set Point 1</b>	Relay
<b>Set Point 2</b>	Relay
<b>Analog Output</b>	0 to 5 V Linear
<b>Supply Voltage</b>	90 V to 135 V AC, 60 Hz
<b>Calibration Medium</b>	Dry air or nitrogen
<b>Overpressure</b>	Sensor-dependent
<b>Analog Output Resolution</b>	12 bits
<b>Operating Temperature</b>	0° C to 50° C
<b>Storage Temperature</b>	-20° C to 60° C
<b>Bakeout Temperature</b>	Sensor-dependent
<b>Response Time</b>	$\leq 1$ second
<b>Accuracy</b>	
	<b>1 mTorr to 10 mTorr</b> $\pm 1$ mTorr
	<b>10 mTorr to 500 mTorr</b> $\pm 10\%$
	<b>500 mTorr to 1 Torr</b> $\pm 20\%$
	<b>Analog Output</b> $\pm 10$ mV
<b>Standard Resolution</b>	
	<b>1 mTorr to 500 mTorr</b> 1 mTorr
	<b>500 mTorr to 1 Torr</b> 10 mTorr
	<b>1 Torr to 20 Torr</b> 1 Torr
<b>Display Readable Distance</b>	8 m (26 feet)

## 1.4 Safety Information

### START BY READING THESE IMPORTANT SAFETY INSTRUCTIONS AND NOTES

In these instructions the word “product” refers to the MV2A and all of its approved parts and accessories. NOTE: These instructions do not and cannot provide for every contingency that may arise in connection with the installation, operation, or maintenance of this product. Should you require further assistance, please contact Televac at the email address found in the footer of this manual.

This product has been designed and tested to offer reasonably safe service provided in it is installed, operated and serviced in strict accordance with these safety instructions.

These safety precautions must be observed during all phases of operation, installation, and service of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Televac disclaims all liability for the customer’s failure to comply with these requirements.

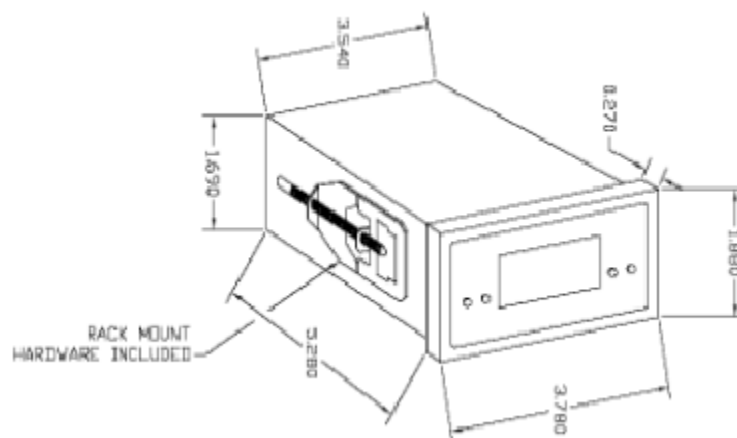
- READ instructions – Read all safety and operating instructions before operating the product.
- RETAIN instructions – Retain the Safety and Operating Instructions for future reference.
- HEED warnings – Adhere to all warnings on the product and in the operating instructions.
- FOLLOW instructions – Follow all operating and maintenance instructions.
- ACCESSORIES – Do not use accessories not recommended in this manual as they may require a technician to restore the product to its normal operation.

The MV2A qualifies as a Safety Extra-Low Voltage (SELV) device. As such, it represents little to no hazard concerning electrical shock or burns.

**Do not substitute parts or modify instrument. Because of the danger on introducing additional hazards, do not install substitute parts or perform any unauthorized modifications to the product. Return the product to Televac for service and repair to ensure that safety features are maintained. Do not use this product if it has unauthorized modifications**

## 1.5 Dimensions

Figure 1: MV2A Dimensional Drawing



## 2 Setup

### 2.1 Installation

Each MV2A is designed to be used in conjunction with a 2A sensor. The 2A sensor can be mounted in any orientation. The sensor should be mounted close to the area where vacuum measurement is desired. Each 2A sensor has a key that only allows the octal end of the MV2A cable to mate with the sensor in the proper orientation. Rotate the octal end of the MV2A cable until the correct alignment is obtained and the MV2A cable is able to slide onto the 2A sensor. Connect the RJ14 end of the MV2A cable into the port on the back of the MV2A labeled "input". It is recommended that the ground connector on the cable is also connected to the port on the back of the MV2A labeled with the universal earth ground symbol.

Try to avoid connecting the 2A sensor to the vacuum chamber by long or narrow piping as this may affect the accuracy and response time of the unit. Avoid mounting the unit near a heater within the chamber as this may affect the measurement accuracy. Excessive vibration of the sensor may affect accuracy and decrease the life of the sensor. Exposure to oils and other contaminants will decrease the accuracy and decrease the life of the sensor. Do not expose the sensor to corrosive gases.

### 2.2 Electrical Information

The MV2A has several connectors located on the rear of the unit. A connection diagram is provided for convenience.

Figure 2: MV2A Electrical Connection Information

Label	Description
1	AC Input
2	SP1 C
3	SP1 NC
4	SP1 NO
5	SP2 C
6	SP2 NC
7	SP2 NO
8	Analog Output + (0 to 5 V)
9	Analog Output - (0 to 5 V)
10	Earth Ground
11	Sensor Input



### 2.3 Set Points

The instrument is equipped with dual set points which are adjustable from the front panel. These two set points are control relays, which can be found on the rear of the controller. These can be wired to be normally open or normally closed.

To adjust the set point values, hold either **SP1** or **SP2** while toggling the **UP** or **DOWN** buttons to the desired value on the screen.

Note: the factory settings for set points are 100 mTorr and 200 mTorr for SP1 and SP2, respectively. To restore these default values, hold **SP1**, **SP2**, **UP**, and **DOWN** simultaneously.

## 2.4 Calibration

The MV2A controller provides two calibration points to maximize the accuracy of each sensor. These should be set at 1 mTorr and 1 Torr. Maximum accuracy will utilize a 2A sensor and a NIST traceable reference gauge co-located on a vacuum chamber. A controlled leak of dry nitrogen is necessary for calibration.

### 2.4.1 Setting 1 mTorr Calibration Point

Pump the vacuum chamber down to below  $1 \times 10^{-4}$  Torr. Using the leak control on the vacuum system, adjust the pressure in the chamber until the reference gauge reads 1 mTorr. Then press and hold the **SP1** and **SP2** buttons on the MV2A. While holding the set point buttons, press the **Up** and **Down** arrows until the MV2A reads 1 mTorr.

### 2.4.2 Setting 1 Torr Calibration Point

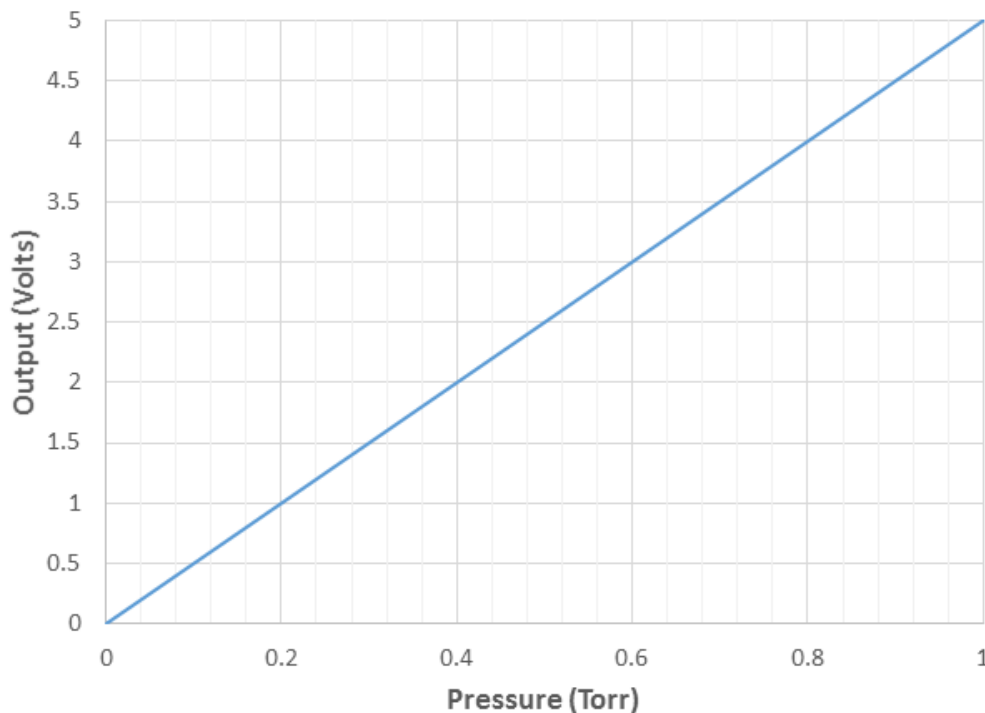
After setting the 1 mTorr calibration, use the leak control on the vacuum system to adjust the pressure in the chamber until the reference gauge reads 1 Torr. Then press and hold the **SP1** and **SP2** buttons on the MV2A. While holding the set point buttons, press the **Up** and **Down** arrows until the MV2A reads 1 Torr.

## 2.5 Analog Output

The MV2A contains a 0-5 V linear analog output for use with voltmeters, programmable logic controllers or other data acquisition devices. To convert the analog output signal to a pressure, follow the equation below.

$$\text{Pressure (Torr)} = \text{Voltage} \times .02$$

Figure 3: MV2A Analog Output



### 3 Part Numbers

Table 2: Controller, Cable, and Sensor Part Numbers

<b>MV2A Controller</b>	2-7900-071
<b>2A Sensor 1/8" NPT Nickel-Plated Brass</b>	2-2100-10
<b>2A Sensor Stainless Steel 1/8" NPT</b>	2-2126-001
<b>2A Sensor Stainless Steel NW16 (DN16 ISO-KF)</b>	2-2126-030
<b>2A Sensor Stainless Steel NW25 (DN25 ISO-KF)</b>	2-2126-031
<b>2A Sensor Stainless Steel 8-VCO Male</b>	2-2126-040
<b>2A Sensor Stainless Steel 8-VCO Female</b>	2-2126-041
<b>2A Sensor Stainless Steel 8-VCR Male</b>	2-2126-042
<b>2A Sensor Stainless Steel 8-VCR Female</b>	2-2126-043
<b>2A Sensor Stainless Steel 4-VCR Male</b>	2-2126-044
<b>2A Sensor Stainless Steel 4-VCR Female</b>	2-2126-045
<b>2A Sensor Stainless Steel 1.33" CF (DN16 ISO-CF-F)</b>	2-2126-050
<b>2A Sensor Stainless Steel 2.75" CF (DN40 ISO-CF-F)</b>	2-2126-052
<b>3 ft Cable</b>	2-9800-076
<b>10 ft Cable</b>	2-9800-077
<b>20 ft Cable</b>	2-9800-078
<b>35 ft Cable</b>	2-9800-079
<b>50 ft Cable</b>	2-9800-080
<b>VacuMini 2A Sensor</b>	2-2100-102
<b>NASA 2A Miniature Sensor</b>	2-2100-31

Contact Fredericks Company for further sensor flange types and cable lengths.