OHIO SEMITRONICS, INC.

INSTALLATION & CALIBRATION MANUAL

VT, AVT, 3VT, 3AVT, UD, AND MVT VOLTAGE TRANSDUCERS

OHIO SEMITRONICS, INCORPORATED

VT, MVT, & 3VT SHOWN ABOVE

OHIO SEMITRONICS, INC.
4242 Reynolds Drive
Hilliard, Ohio 43026
Phone: 614-777-1005
Fax: 614-777-4511
E-mail: sales@ohiosemitronics.com
http://www.ohiosemitronics.com

VT FAMILY MANUAL
7004-29, Rev. A 12/1/2004

PREFACE TO THE VT FAMILY MANUAL

The VT Family includes the following model series:

- VT
- 3VT
- AVT (UL and CUL Listed, CE)
- 3AVT (UL and CUL Listed, CE)
- MVT (DIN Rail Mount Version of the VT)
- UD (Utility grade version of the VT)

All of the above voltage transducers are absolute average measuring, rms calibrated (or mean value measuring, rms calibrated).

These inexpensive transducers simply convert the AC input to DC and have the output calibrated to represent the root mean square (RMS) value for sine wave input. This type is very adequate for situations in which the voltage wave shape is not distorted. Any odd harmonic or discontinuity will introduce large error. Use the true RMS measuring type such as the VT8 or VTR series of voltage transducers when distortion of a sine wave is present.

When calibrating these transducers you must use a voltage source that provides a pure sine wave.

David W. Miller and Jack Warnock designed the transducers in the above series.

David W. Miller is Vice President of Ohio Semitronics, Inc. He has been with the company since its founding in 1964. Mr. Miller personally designed most of the transducers that Ohio Semitronics, Inc. is presently manufacturing.

Jack Warnock is a design engineer at Ohio Semitronics, Inc. Jack has been with Ohio Semitronics, Inc. since December 1994 and has designed a number of new transducers for us.

Lewis Miller worked to obtain the UL and CUL Listings and the CE rating for the AVT series. Lewis Miller has been with OSI since 1976. He has designed many of the instruments manufactured by Ohio Semitronics, Inc.

CALIBRATION MANUAL FOR

VT, AVT, 3VT, 3AVT, UD, AND MVT VOLTAGE TRANSDUDERS

SUBJECT

Calibration of the following models:

- **VT-090 through VT-3940** with options A, E, or E2.
- **AVT-090 through AVT-600** with options A, C, CX5, E, or E2. (All are UL and CUL Listed, and CE rated.)
- **3VT-090 through 3VT-3940** with options A, E, or E2.
- **3AVT-090 through 3AVT-600**with options A, C, CX5, E, or E2. (All are UL and CUL Listed, and CE rated.)
- **UD080001** (Single) or **UD0800401** (Triple)
- **MVT-150, MVT-300 or MVT-600** with options A , E, or E2

DECRIPTION

All of the above voltage transducers are absolute average measuring, rms calibrated (or mean value measuring, rms calibrated).

These inexpensive transducers simply convert the AC input to DC and have the output calibrated to represent the root mean square (RMS) value for sine wave input. This type is very adequate for situations in which the voltage wave shape is not distorted. Any odd harmonic or discontinuity will introduce large error. Use the true RMS measuring type when distortion of a sine wave is present.

The suffix letter indicates the type analog output that these transducers have. The letter designations are:

Option	Output	Instrument power
A	0 to 1 mADC	none required
C	0 to 10 volts DC	none required
CX5	0 to 5 volts DC	none required
E	4 to 20 mADC	120 VAC
E2	4 to 20 mADC	15 to 35 volts DC in External loop.

Please note that not all models series are available with all the above output options.

Models that have the prefix 2 or 3 are double or triple models (2 or 3 elements in the same can). Each element requires the same calibration as individual transducers.

All of these models have essentially the same circuit.

Ohio Semitronics, Inc. recommends checking calibration for critical applications annually.

TEST EQUIPMENT REQUIRED

1) AC sine wave voltage source capable of supplying 60 hertz (or desired frequency 50 to 400 hertz) at the full scale specified voltage. Note: Voltage source must produce sine wave voltage.

2) Ammeter to measure the input voltage with an accuracy of 0.05% or better.

3) DC milliampere meter or voltmeter with an input impedance of 5 megohms or more to measure the output with an accuracy of 0.05% or better. A precision resistor may be substituted to measure transducers with a milliampere output. Recommended values are:

   For 0 to 1mADC use a 1000-ohm resistor.

   For 4 to 20 mADC use a 250 ohm resistor.

   Tolerances must be 0.05% or better.

Please note that all MVT and with voltage ratings of 600 volts are supplied with voltage transformers and were factory calibrated with the transformer supplied. To maintain the factory accuracy rating, these models must be calibrated with the voltage transformer supplied.

Calibrate at the frequency at which the transducer will be used.

CONNECTIONS AND ADJUSTMENTS

Make the connections as shown on page 5 & 6 for your model. All adjustments are made through the lid. Remove the plastic caps and use a 1/8 inch wide screwdriver to make the adjustments to the trimpots.

Zero Adjust

No zero adjustment is required for models except the 4 to 20 mADC output option E or E2.

Option E or E2

Apply instrument power and allow the transducer to "warm up" for 15 minutes. With no voltage applied to the input terminals, adjust the zero trimpot for 4.000 mADC. (If you are using a 250 ohm load resistor, set the trimpot for 1.000 volt DC.)

Calibration Adjust

The "Cal" adjustment sets the output for the full-scale input voltage.

Option A:

1) Adjust the input voltage for the full scale rating of the transducer being calibrated.
2) If you are using a milliampere meter adjust the "Cal" trimpot for an output of 1.000 mADC.
3) If you are using a voltmeter and 1000 ohm resistor to load the output, adjust the "Cal" trimpot for 1 .000 volt.

Option C:

1) Adjust the input voltage for the full scale rating of the transducer being calibrated.
2) Adjust the "Cal" trimpot for an output of 10 volts.

Option CX5:

1) Adjust the input voltage for the full scale rating of the transducer being calibrated.
2) Adjust the "Cal" trimpot for an output of 5 volts.

Option E:

1) Perform the zero adjust first.

2) Adjust the "Cal" trimpot for an output of 20 mADC
3) If you are using a 250 ohm load resistor and a voltmeter, adjust the "Cal" trimpot for an output of 5 volts.

Option E2:

This is the same, as E above except you must have a 24-volt DC supply in the output circuit as shown on page 7.

If this is a 2 or 3 element model, repeat the above for each element.

UD Models

UD models must be checked from 0 to 150 volts for linearity. UD0800001 and UD0800401 have a full scale rating of 150 volts. Adjust the input voltage for the full scale rating of 150 volts at 60 hertz.

1) If you are using a milliampere meter adjust the "Cal" trimpot for an output of 1.000 mADC.
2) If you are using a voltmeter and 1000 ohm resistor to load the output, adjust the "Cal" trimpot for 1 .000 volts.
3) If you are calibrating a model UD0800401, repeat above for each element.

LINEARITY CHECK

Starting at 100% of the full-scale voltage and measuring the analog output of the transducer one may check linearity of the voltage transducers.

Reduce the voltage in steps of 20% from full scale to 0 measuring the analog output at each step. Please refer to Table 1 on the next page.

Should a transducer fail to meet the linearity check, try adjusting the full scale output slightly up or down to bring the entire output range into the specified accuracy for the transducer. If this does not bring the linearity into specification, consider returning the transducer to Ohio Semitronics, Inc. for linearization.

Calibration Equipment

Ohio Semitronics, Inc. recommends calibration equipment that sources the voltage. We suggest the following:

Rotek Model 8000 or 800
Rotek Instrument Corp.
390 Main Street
PO Box 504
Waltham, MA 02254-0504
617-899-4611
sales@rotek.com

Arbiter Model 931A Power Analyzer for a standard meter.
Arbiter Model 1040C Meter Calibrator.
Both Arbiter units are available for purchase from Ohio Semitronics, Inc.
Sales@ohiosemi.com.

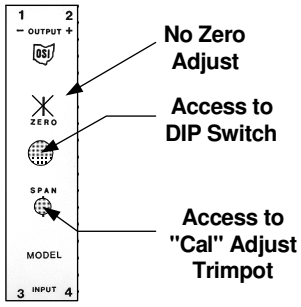
	OUTPUT FROM TRANSDUCER.					
Rated Full Scale	1 mADC	1 volt DC	5 volt DC	10 volt DC	4 to 20 mADC	1 to 5 volt DC
Per Cent of Full Scale						
100%	1.0 mADC	1.0 volts DC	5.0 volts DC	10.0 volts DC	20.0 mA	5.0 volts
80%	0.8 mADC	0.8 volts DC	4.0 volts DC	8.0 volts DC	16.8 mA	4.2 volts
60%	0.6 mADC	0.6 volts DC	3.0 volts DC	6.0 volts DC	13.6 mA	3.4 volts
40%	0.4 mADC	0.4 volts DC	2.0 volts DC	4.0 volts DC	10.4 mA	2.6 volts
20%	0.2 mADC	0.2 volts DC	1.0 volts DC	2.0 volts DC	7.2 mA	1.8 volts
0%	0.0 mADC	0.0 volts DC	0.0 volts DC	0.0 volts DC	4.0 mA	1.0 volts
Allowed error 0.25% Units	±0.0025 mA	±0.0025 volts	±0.0125 volts	±0.025 volts	±0.04 mA	±0.01 volts
Allowed error 0.5% Units	±0.005 mA	±0.005 volts	±0.025 volts	±0.05 volts	±0.08 mA	±0.02 volts

Table 1 For Checking Linearity of Voltage Transducers at 60 Hertz

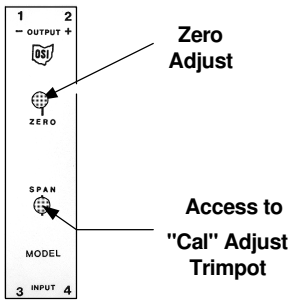
---

Location of Trimpots on the MVT series of voltage transducers.

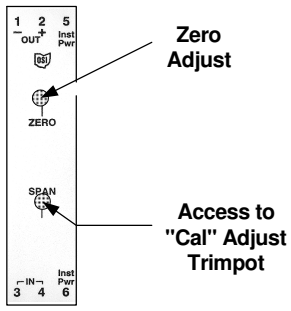
MVT-150A
MVT-300A
MVT-600A



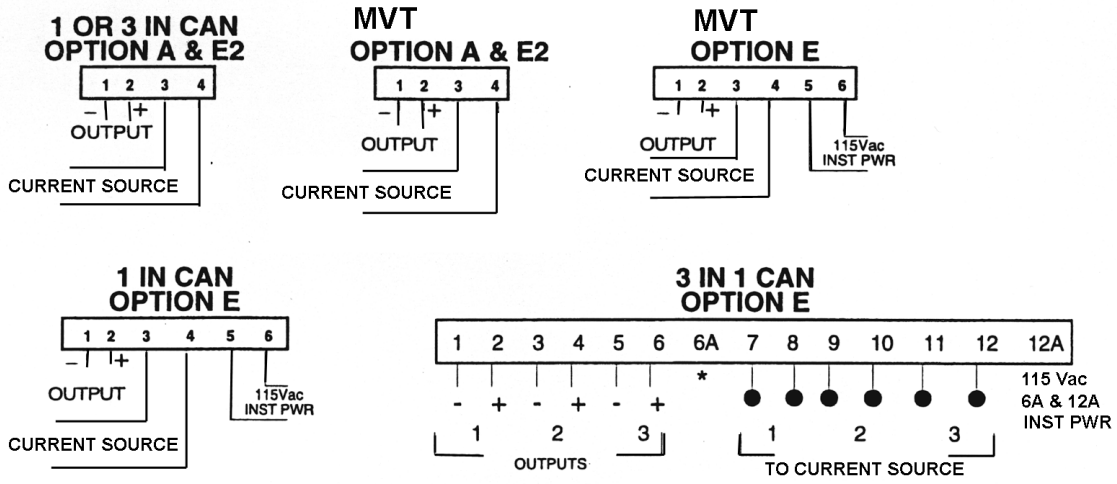
MVT-120E2
MVT-300E2
MVT-600E2

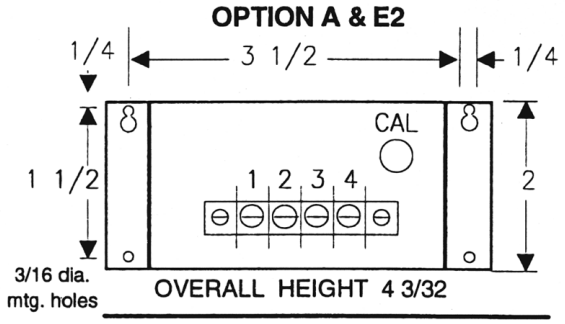


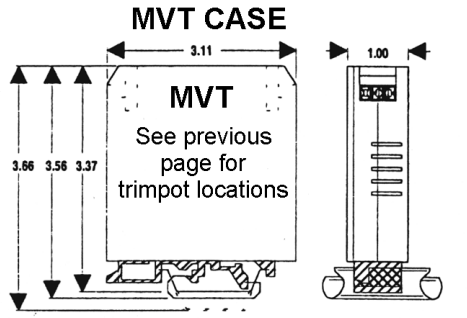
MVT-150E
MVT-300E
MVT-600E

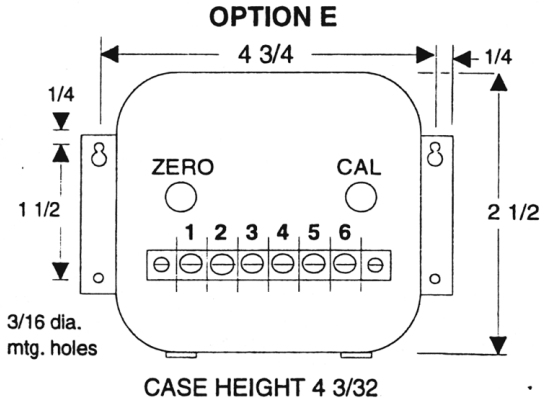


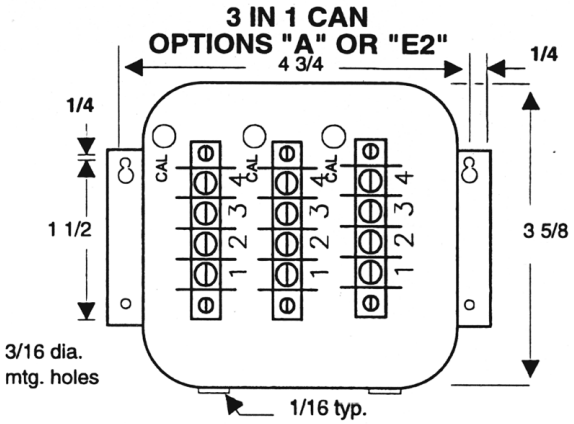
CONNECTIONS & DIMENSIONS

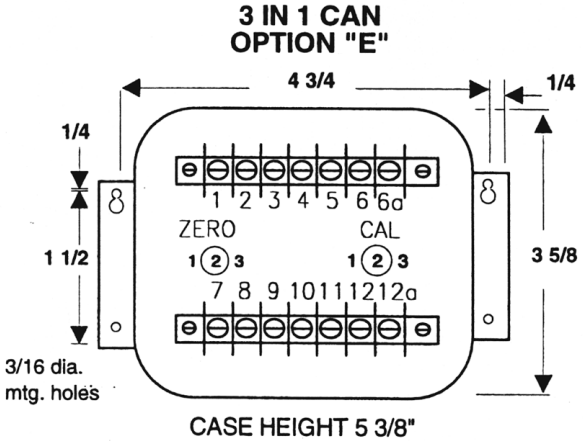












TEST SETUP FOR VOLTAGE TRANSDUCERS WITH OPTION E2 -- THE LOOP POWERED 4 TO 20 mADC OUTPUT.

Voltage source must be in the loop as shown.