

Electric Vehicle Television

EVTV Motor Verks

Presents

Four-Range Control Voltmeter



OPERATION MANUAL

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INTRODUCTION

This Operations Manual describes the use and configuration of the Four Range Control Voltmeter.

The voltmeter allows reasonably accurate measurement DC voltage to 0.8% and AC voltages at accuracy of 1.0% in four voltage ranges:

-0.1999 to + 0.9999 vdc
-1.999 to +9.999 vdc
-19.99 to + 99.99 vdc
-100.0 to 500.0 vdc

These ranges, without the negative values, are available for AC voltage measurement as well.

Additionally, the Four-Range voltmeter can perform any number of control functions via two control relays, J1 and J2, which each can be activated/deactivated at TWO separate values.

Finally, this meter supports the 4-20 ma current output representing any range of voltage. You can use this value with the careful selection of a load resistor to feed the voltage reading into an analog/digital converter for use in multiprocessor environments.

PACKING LIST

1. 5740 Four Range Digital Panel Meter
2. This manual

SPECIFICATIONS

The Four Range Digital Control Voltmeter offers the following features/specifications:

DC Voltage Inputs: 500v, 100v, 10v, 1v

AC Voltage Inputs: 500v, 100v, 10v, 1v

Display Range: -1999 to 9999

3 level programmable filtration.
0-20 ma current output

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Input Mode: common ground

Sampling Rate: 3 times per second

DC Accuracy: 0.8%

AC Accuracy: 1.0%

Meter Operating Power: 9-30 vdc 2 watts.

Relays: AC220/3A or DC30V/3A.

Relay Life: 10^5

Dimensions: 79*43*58 mm

Panel Cutout: 76*39.5 mm

LED Display: 0.56 inch

Overload Display: EEEE or -EEE

CONTROLS AND INDICATORS

JLD5740TV DIGITAL VOLTMETER



WIRING INSTRUCTIONS



1. Connect the + (pin 1) to a 12vdc power source (9-30vdc)
2. Connect – (pin2) to frame ground.
3. Connect the **COM** (pin 8) of meter to the negative terminal of the battery or voltage to be measured.
4. Connect the positive voltage terminal to the 500V, 100V, 10V, or 1V terminal as necessary for the range desired.
5. See section on control relays for J1/J2 wiring instructions.

INPUT MODE

To use the Four Range Digital Control Voltmeter you must designate an input mode corresponding to the AC or DC voltage range you want to measure. To select the input mode:

To access the menu enter the menu passcode **0089** as follows:

1. Press SET key on front panel. LED display should indicate **0000**.
2. Use right arrow key > to move cursor to the third digit from the left.
3. Use DOWN arrow key to increment this digit to **8**.
4. Use right arrow key > to move cursor to last digit
5. Use DOWN arrow key to decrement this value to **9**.
6. Press **SET**.
7. Use UP or DOWN keys to select an input mode range code per the table below:

0	-100vdc to +500 vdc
1	-20vdc to +100vdc
2	-2vdc to +10vdc
3	-0.2vdc to +1.0vdc
4	0-500vac
5	0-100vac
6	0-10vac
7	0-1.0vac

Ensure the value entered corresponds to the input pin (4 to 7) wired to measure voltage.

Press **SET** to return to normal display mode.

GENERAL CONFIGURATION MENU

To use the Four Range Digital Control Voltmeter a series of configuration parameters must be set before your first use. These are accessed via a menu with the display window showing one menu item at a time. This can be awkward until you become accustomed to it.

To access the menu enter the menu passcode **0036** as follows:

1. Press SET key on front panel. Display should indicate **0000**.
2. Use right arrow key > to move cursor to the third digit from the left.
3. Use UP arrow key to increment this digit to **3**.
4. Use right arrow key > to move cursor to last digit

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5. Use DOWN arrow key to decrement this value to **6**.
6. Press **SET**.

You have entered the menu access code **0036** on the LED display to bring up the main configuration menu.

This menu lists 5 elements. You can use the up and down arrow keys to cycle between them and the SET key to select any item for review. Cycling to **End** and pressing SET exits the menu and puts you back in normal operating mode.

PvL	Zero offset amps display
PvH	Full Scale value of amps display
dot	Decimal Point position for display
FILt	Filter Value
End	Escape main configuration menu

PvL Zero offset volts display. This entry allows you to enter the voltage value corresponding to 0 volts. As such, it serves as kind of a calibration value offset. Connect the meter to a battery or other source and measure the value. Then measure with a known accurate handheld voltmeter and compare the two. You can enter values here to “correct” the measured value so that it matches the known good handheld voltmeter.

PvH Full Scale value of volts display. Allows entry of digits using up and down arrow keys in values **-1999** to **9999**. This is the value that will be displayed when full scale voltage is measured on your voltage input. For a **100v** input on pin **5**, for example enter **0100**. For a **500** volt input on pin **4** enter **0500**. Press **SET** to confirm and return to main configuration menu.

dot Decimal Point position for volts display. This simply sets the number of digits possible to the right of the decimal point as **0, 1, 2, or 3**. Up or down arrow cycles and SET confirms to select. Select 1 or as desired.

FILt Filter Value. This is a rarely used but interesting feature of the meter. The menu samples at 3 samples per second but on some changing voltages this can lead to an erratic display that is hard to follow. This menu item has four choices, **0, 1, 2 and 3**. These represent levels of filtering that can be applied to the input. These integration filters smooth the input to remove noise elements that may be present. **0** represents NO filtering with **3** representing the maximum filtering level. Increment/decrement with up/down arrows and SEL to select.

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End Escape main configuration menu. Use up/down arrow keys to cycle to **End** and press SET to return meter to normal operation.

CONTROL RELAY OPERATION

The defining function of the Four Range Digital Control Voltmeter is its ability to control things. The meter actually provides TWO control relays, J1 and J2 that can be energized or ACTIVATED by the measured voltage level.

Each relay provides access to the common pin **C**, the normally open contact **NO** and the normally closed contact **NC**. These relays can carry AC voltages up to 220vac and 3 amperes or DC voltages of up to 30v and 3 amperes. They are rated for a cycle life of 100,000 operations.

These relays are accessed from the meter rear panel with J2 available on pins 11,12 and 13 and J1 available on pins 14, 15, and 16 as shown below.

For example, relay J2 provides a constant connection between pins 11 and 12 as they are normally connected. In the event the relay is energized (latched) the connection between 11 and 12 is broken and the connection from 12 to 13 is made.

More peculiarly, these relays operate in a kind of thermostat mode with TWO threshold levels - lower and an upper. Since these are reversible, this becomes a bit confusing. But in the simplest case, the relay energizes at the AL level and remains energized until it reaches the AH level. At that point it de-energizes until the level falls back down to the upper limit AH, and it then energizes until it falls further to the lower limit AL.

Note that this is the UPPER LIMITED CONFIGURATION and is selected by entering an AH value that is HIGHER than AL.

You can actually reverse this process for cooling for example by setting AH to a lower or more negative value than AL. This results in the Lower Limited action in figure 2 above.

IF you set AH equal to AL, the relay is DISABLED entirely.

To configure your relays enter menu passcode **0001** as follows:

1. Press SET on meter front panel. **0000** is displayed.
2. Use arrow keys to enter the menu passcode value **0001**.
3. Press SET to enter the menu passcode.

This will select a menu with 7 items as follows:

AH1 Upper activation level for J1

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AL1 Lower activation level for J1
AH2 Upper Activation Level for J2
AL2 Lower Activation Level for J2
End Exit menu to normal operation.

AH1/AL1/AH2/AL2 Upper and lower limits for relays J1 and J2 as previously described. Values describe specific values of the voltage selected for that relay.

By way of example, let's connect 12 volts to the common pin of J1 – pin 15. We'll take this 12 v out at the normally closed contact of pin 14 and use it to energize a large current contactor to connect a charger to our battery pack.

If we set AH1 to 126v, and AL1 to 118v, then as the pack voltage rises during charging, when it reaches a measured value of 126vdc, the relay will close, connecting pin 15 to 16 and removing the 12v from pin 14. This will de-energize our contactor, thus disconnecting the charger from the pack.

At the point where the voltage decreases later to 118v, J1 will energize, again connecting 12 v to the contactor and applying charge to the cells. Normally after charging to 126 volts, a 36 cell battery bank would return to about 120v – above this value.

For another example, we could connect a load to a single 3.300v cell and use this meter on the 10v range. We would set the relay up the same way, but the contactor would then connect the cell to a load instead of a charger.

In this case we set AH1 to 2.50v and AL1 to 2.75volts. Now, relay J1 remains de-energized as the battery cell drains, applying 12v to the contactor. Once the cell voltage DECREASES to 2.50 v, relay J1 energizes, DE-energizing the contactor and removing the load. The cell voltage will then creep up with the load removed. If it reaches 2.75v, relay J1 again energizes, closing the contactor and reapplying the load. At 2.50 volts, it again energizes, disconnecting the contactor. This may happen several times until the resting voltage of the cell remains just below 2.75vdc.

The voltages you can set and the option of using a normally closed circuit of the relay, or otherwise the normally OPEN circuit of the relay, provides an array of multiple options for using this meter for different enable/disable logic. While this is initially confusing, after a bit of use, you will find this remarkably flexible in the number of things you can control based on voltage.

And that is why we refer to this as a four range digital CONTROL meter. You can use it to monitor voltages and take action in the event a certain voltage is reached either as a maximum or as a minimum.