



## PRODUCT OVERVIEW

The DMR35-DCV1 digital panel meter performs precision DC voltage measurements and is available in two models, both offering full-scale dipswitch selectable ranges spanning 5V to 50V. These meters feature a highly visible, 3-1/2 digit display and a fast-acting 21 segment bar-graph to provide helpful indication of quickly changing measured values.

Dipswitches are provided for display brightness and also selection of up to eight (8) measurement ranges.

The meter is powered from an external 9-32VDC power supply and typically requires only 37 mA when operated at 12V. The measurement inputs provide +/-48V of common-mode input range, simplifying the meter's use in a wide range of applications.

The DMR35 family features a rugged polycarbonate housing that is mountable in a round hole using supplied screws, and is designed as a mechanical drop-in replacement for many commonly available analog movement meters, making it ideal for use in laboratory instrumentation, factory automation, and other applications requiring precise DC voltage monitoring.

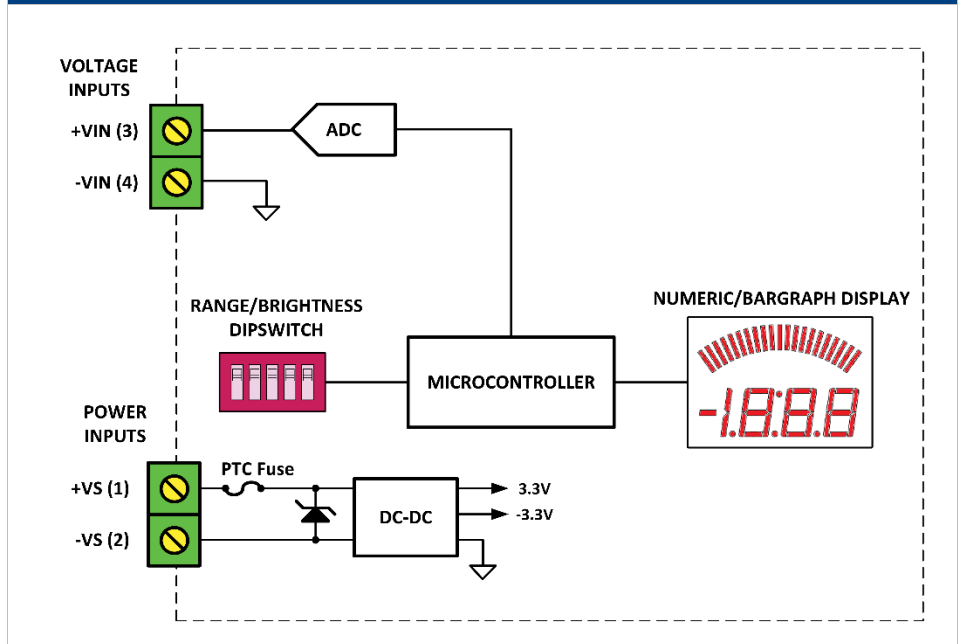
## Features

- Bright, easily readable LED display
- Up to 3-1/2 digit measurements
- Bar-graph display scale
- 0.8% measurement accuracy
- 1 Megohm input impedance
- Selectable voltage measurement ranges
- Unipolar/ Bipolar measurement options
- User-adjustable display brightness
- Mechanical drop-in replacement for common analog-movement meters
- Operates from 9 to 32 VDC
- Low current consumption, 37 mA typical at 12VDC
- Two year warranty

## ORDERING INFORMATION:

MODEL NUMBER	DESCRIPTION
DMR35-DCV1-DC-R-C	DC Voltmeter, 0-5 to 0-50 V ranges, 9-32VDC powered, red display
DMR35-DCV2-DC1-R-C	DC Voltmeter, ±5 to ±50 V ranges, 9-32VDC powered, red display

## SIMPLIFIED BLOCK DIAGRAM



For full details go to  
[www.murata-ps.com/rohs](http://www.murata-ps.com/rohs)

**SPECIFICATIONS:**

Measurement Performance	Min	Typ.	Max	Units
<b>Measurement Ranges</b>				
DMR35-DCV1		0-5, 0-8, 0-10, 0-15, 0-20, 0-25, 0-30, 0-50		V
DMR35-DCV2		±5, ±8, ±10, ±15, ±20, , ±25, ±30, ±50		V
Accuracy (25 °C)			0.8% Reading + 2 counts	
Temperature Stability		0.01		% F.S. /°C
Input Impedance		1		MΩ
Absolute Maximum input voltage (+VIN to –VIN, applied for 1 minute max.)	-100		100	V
Absolute Maximum voltage differential (either +VIN or –VIN to –VS) <sup>(2)</sup>	-48		+48	V

**Notes:**

- 1) Exceeding Absolute Maximum ratings may result in permanent damage to the meter.

Power Supply Characteristics	Min	Typ.	Max	Units
Operating Supply Voltage	9		32	V
Absolute Maximum Supply Voltage	-1		34	V
Operating Supply Current				
12V supply		37		mA
24V supply		25		mA

**Display & User Interface**

Display Type & Size	3-1/2 digit 7-segment, 11.4mm (0.45 in.) high 21 segment curved bar-graph			
Display Color	Red (625nm)			
Decimal Point Selection	Automatic			
Out-of-range Indication	Flashing display			
Measurement Range Selection	Dipswitch selectable (8 ranges)			
Display Intensity Control	Dipswitch selectable (4 ranges)			
<b>Terminal Blocks</b>				
Wire Size	14-24 AWG			
Insulation Strip Length	6mm (0.24 in.)			
Screw Tightening Torque	0.4 N-m (3.5 lb.-in)			

**Mechanical/Environmental**

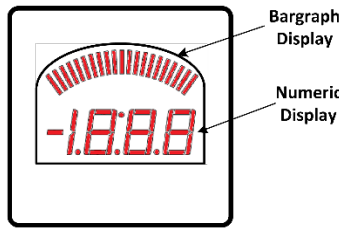
Parameter	Min	Typ.	Max	Units
Operating Temperature	0		50	°C
Storage Temperature	-40		70	°C
Humidity (non-condensing)	0		85	%RH
Sealing (front face, when installed with included gasket)	Splash and dust resistant			
Mounting screws (4 included)	#4-20 0.5" thread forming			
Screw Tightening Torque	9 in-lb (1 N-m)			
Panel thickness when used with included mounting screws	0.062 in. (1.6mm)		0.25 in. (6.3mm)	
Dimensions	See Mechanical Specifications figure for details			
Weight	2.3 (65)			
				oz. (g)

**OPERATION:**

**Measurement Type and Capabilities**

The DMR35 series of digital voltmeters employ a precision ADC and a low-power microcontroller to measure DC voltage. These meters provide full-scale measurement ranges spanning 5 volts to 50 volts for the DCV1 model, and  $\pm 5V$  to  $\pm 50 V$  for the DCV2 model. Both models present a  $1M\Omega$  input impedance. These meters' measurement systems supports a common-mode input voltage range of up to  $\pm 48V$  with respect to the power supply return (-VS connection), simplifying their application in a wide variety of systems

**FRONT PANEL & FRONT PANEL LAYOUT AND FUNCTION**



**Bar-graph Display:** The 21 segment bar-graph display responds quickly and smoothly like an analog meter movement to aid in reading rapidly changing measurements.

**Numeric Display:** The 3-1/2 digit display provides precise measurements for steady-state and slowly changing measurement values.

**REAR PANEL LAYOUT AND SCREW TERMINAL CONNECTIONS**

DMR35 meters provide four screw terminals for power and measurement connections, as well as a 5-position DIP switch for meter configuration, as described below.

Terminal #	Name	Function
1	+VS	Power supply input terminals (9-32 VDC)
2	-VS	
3	+VIN	Voltage measurement input terminals
4	-VIN	

**DIP Switch:** Five individual switches support display intensity settings (SW1-SW2) and measurement range selection (SW3-SW5)

**Note:** It is important to tighten all screw-terminals to their torque specifications. Proper tightening will help ensure reliable operation. Applications subject to vibration should use stranded wire.

**POWER SUPPLY CONNECTIONS**

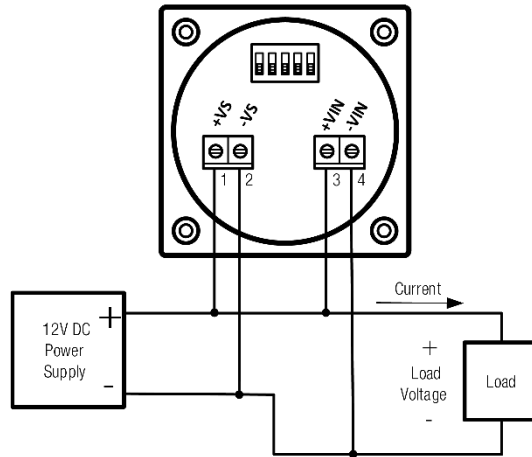
The meter is powered through the +VS and -VS terminals and requires a DC power supply that may range from 9VDC to 32VDC. This supply is electrically isolated from the meter's measurement electronics, so that the meter's measurement input terminals (+VIN, -VIN) do not need to be connected to the meter's power return terminal (-VS), and may vary as much as  $\pm 48V$  from this connection. Please note that the meter's isolation barrier is intended only to simplify measurements, and not for safety purposes – the maximum voltage between the power supply terminals (+VS or -VS) and the measurement input terminals (+VIN, -VIN) must be limited to  $\pm 48VDC$ . The DMR35 series of meters incorporates protection against momentary applications of both overvoltage and reverse polarity to the power supply(+VS, -VS) terminals. Depending on regulatory and application requirements it may also be necessary for the user to add external fusing.

**MEASUREMENT INPUTS**

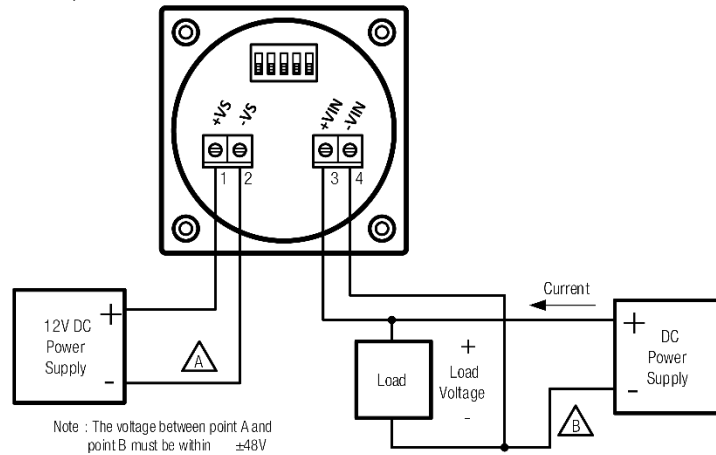
Voltage to be measured by the DMR35 is applied to the +VIN and -VIN terminals. Unlike many panel meters, the DMR35 series' measurement inputs are electrically isolated from the power supply terminals, which allows for fully differential measurements over a common-mode range of  $\pm 48V$  with respect to the power supply terminals +VS or -VS. The input impedance between the -VIN to +VIN terminals is nominally  $1 M\Omega$ .

## CONNECTION EXAMPLES

The schematic below shows how a DMR35 DC voltmeter can be used to perform a simple voltage measurement, where the  $-VIN$  and  $-VS$  terminals are tied to a common point. In this example, the meter is powered from the same power source powering the load, and the meter's  $+VIN$  and  $-VIN$  terminals are connected across the load.



It is also possible to use the meter to monitor voltage in a circuit that is independent of the meter's power supply circuit, as shown in the schematic below. When used in this way, the meter's current measuring terminals may electrically float with respect to its power supply terminals, as long as the voltage difference between the two terminal pairs remains within  $\pm 48V$  of each other.

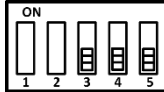
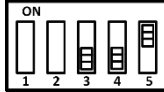
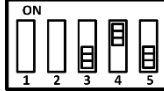
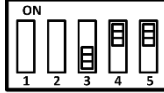
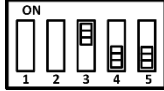
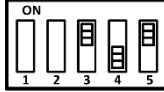
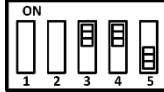
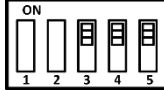


## METER CONFIGURATION

### Meter Range Settings

DMR35 meter configuration is controlled through a 5-position dipswitch (SW1-SW5) on the rear of the meter. The individual switches are labelled 1 through 5 on the dipswitch, and the ON position of the switches is also labelled. These switches are used to select both the meter's measurement range and the display intensity (brightness).

Switches SW3 through SW5 select the meter's measurement range, as shown in the table below.

Switch Setting			DMR35 Model		
SW3	SW4	SW5	Dipswitch	-DCV1 <sup>1</sup>	-DCV2 <sup>2</sup>
OFF	OFF	OFF		0-5 V	±5 V
OFF	OFF	ON		0-8 V	±8 V
OFF	ON	OFF		0-10 V	±10 V
OFF	ON	ON		0-15 V	±15 V
ON	OFF	OFF		0-20V	±20 V
ON	OFF	ON		0-25 V	±25 V
ON	ON	OFF		0-30 V	±30 V
ON	ON	ON		0-50 V	±50 V

<sup>1</sup>DMR35-DCV1 provides unipolar measurement capability, meaning that the meter will only measure positive values of input voltage. The bar-graph will indicate a measurement of zero or less by illuminating the leftmost LED, and increasingly positive input values will illuminate the bar-graph to the rightmost LED until all LEDs are illuminated at positive full-scale. Negative input values will result in an underflow condition of a flashing zero reading. Positive input values exceeding the maximum range will result in a flashing overflow condition.

<sup>2</sup>DMR35-DCV2 provides bipolar measuring capability, meaning that it will measure both positive and negative input voltages. A zero-value input voltage will illuminate a single center LED. Increasingly negative input values will illuminate the bar-graph from center to the leftmost LED until all left-side LEDs are illuminated at negative full-scale, and increasingly positive input values will illuminate the bar-graph from center to the rightmost LED until all right-side LEDs are illuminated at positive full-scale. If the input voltage exceeds the meter's currently selected range, the display will flash to indicate overflow or underflow conditions.

### Display Intensity Settings

Set the display intensity by setting the switches as follows:

SW1	SW2	Dipswitch	Display Intensity
OFF	OFF		Low
OFF	ON		Medium
ON	OFF		High
ON	ON		High2 <sup>3</sup>

<sup>3</sup> Provides only slightly higher intensity than 'High' setting

**TECHNICAL NOTES****1. Calibration**

The DMR35-DCV1 is calibrated at the factory at the time of manufacture. There are no user or field-adjustable calibration features.

**2. Wiring:**

Power supply and input wiring must be rated for the electrical and environmental conditions under which the meter will be operated. They must also comply with any regulatory or application-mandated requirements pertaining to the user's installation. The terminal blocks can accommodate wire gauges ranging from #14 to #24 AWG. Wiring Insulation should be stripped to 6mm (0.24"). All wires must be inserted into the terminal block openings such that the screw terminal does not pinch any insulation. It is important to tighten all screw-terminals to their torque specification of 3.5 lb.-in (0.4Nm). Proper tightening will help ensure reliable operation. Applications subject to vibration should use stranded wire. After final assembly, inspect all terminal block connections for shorts between adjacent conductors; this step is especially important when using stranded wire.

**3. Protection and Fusing:**

DMR35 meters' power supply leads (+VS, -VS) are protected against momentary overvoltage and reverse polarity conditions. Input terminals +VIN and -VIN are protected against noise and brief transients. Protection, however, is not provided against sustained conditions exceeding the limits listed in the Performance & Functional Specifications Table. External fusing must be supplied by the user in accordance to applicable safety and regulatory requirements for the system in which the DMR35 is installed.

**4. Noisy Power Supplies**

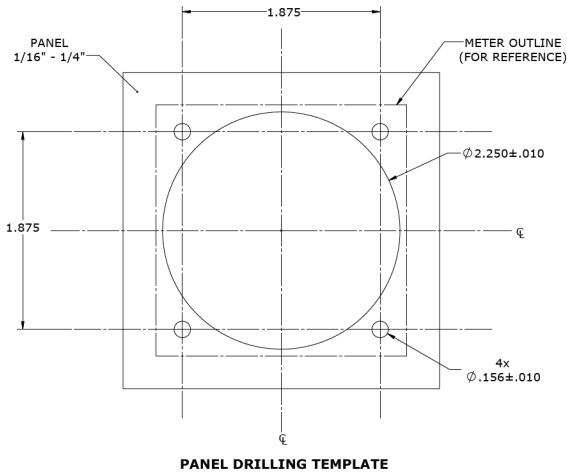
Some power supplies contain high-frequency switching devices that may conduct and/or radiate significant noise onto the low-level signal developed across the measurement inputs. Even though the DMR35 incorporates built-in input filtering, some portion of this noise may be amplified and subsequently measured by its sensitive input circuitry. Limiting runs of wire to less than 3 meters (10 ft.) is strongly recommended. Also, in systems with noisy power supplies, connecting an external, non-polarized capacitor across the +VS and -VS inputs can help reduce measurement errors. In certain situations, the use of twisted pair or shield wiring may be required.

**5. Self-Diagnostics**

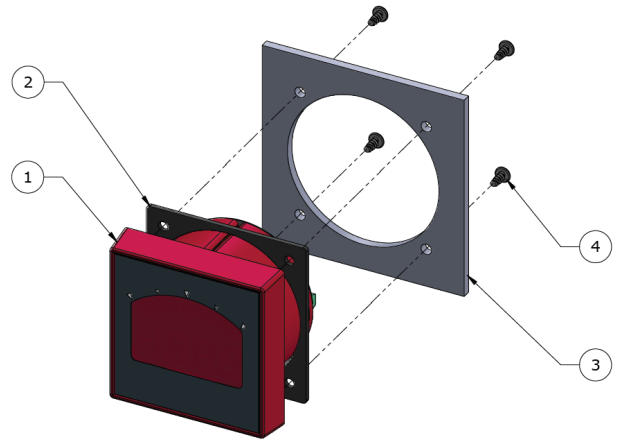
On power-on the meter performs a self-test and checks the integrity of calibration data stored in internal non-volatile memory. If the factory calibration data has been corrupted, the meter will display 'CAL' on power-on and approximately once a minute thereafter to indicate that the meter is relying on default calibration factors and that displayed measurements may have more than the datasheet-specified amount of error. If the meter detects other internal fault conditions, it will attempt to reset itself. Repeated restarts, which appear in the form of a highly intermittent display, are indicative of a hardware fault that cannot be cleared through a reset operation, in which case the meter should no longer be used.

## PANEL INSTALLATION

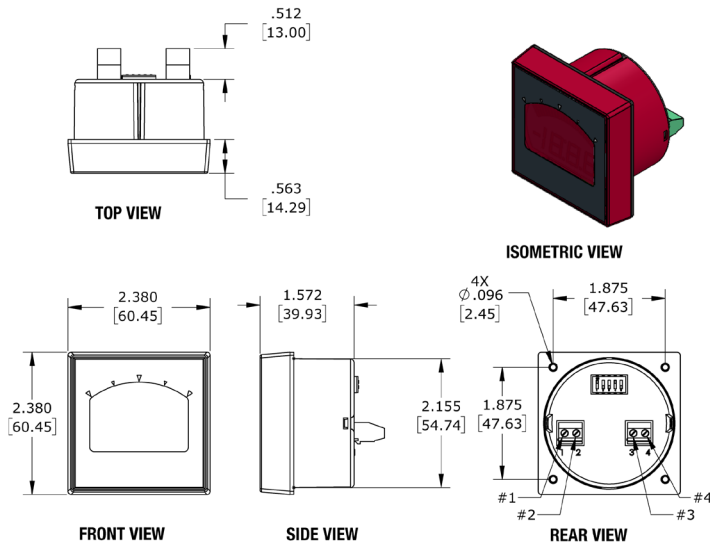
### Panel Drill Template



### Panel Mounting



## MECHANICAL SPECIFICATIONS



DIMENSIONS ARE IN INCHES [mm]

TOLERANCES:  
 2 PLACE ± .01      ANGLES: ± 0.5°  
 3 PLACE ± .005

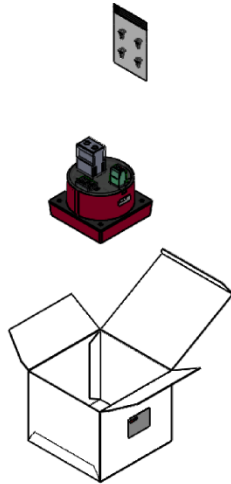
COMPONENTS SHOWN ARE FOR REFERENCE ONLY

MATERIAL:  
 HOUSING: POLYCARBONATE  
 GASKET: EPDM RUBBER

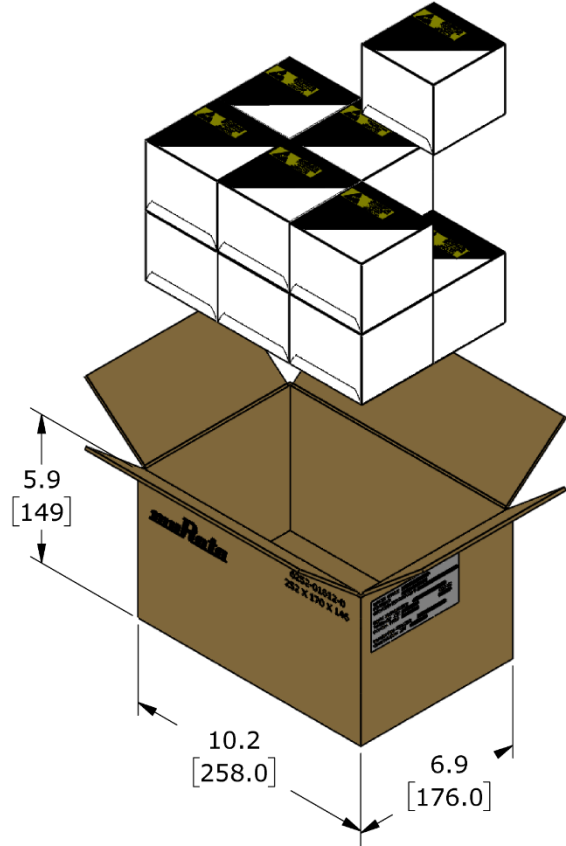


STANDARD PACKAGING

**INDIVIDUAL PACKAGING  
(SHOWN FOR REFERENCE ONLY)**



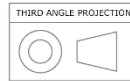
**MOQ PACKAGING (12 UP)**



DIMENSIONS ARE IN INCHES [mm]

TOLERANCES:  
 2 PLACE  $\pm .01$       ANGLES:  $\pm 0.5^\circ$   
 3 PLACE  $\pm .005$

COMPONENTS SHOWN ARE FOR REFERENCE ONLY.



SCALE: 1:12

Murata Power Solutions, Inc.  
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 ISO 9001 and 14001 REGISTERED



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