

velleman®

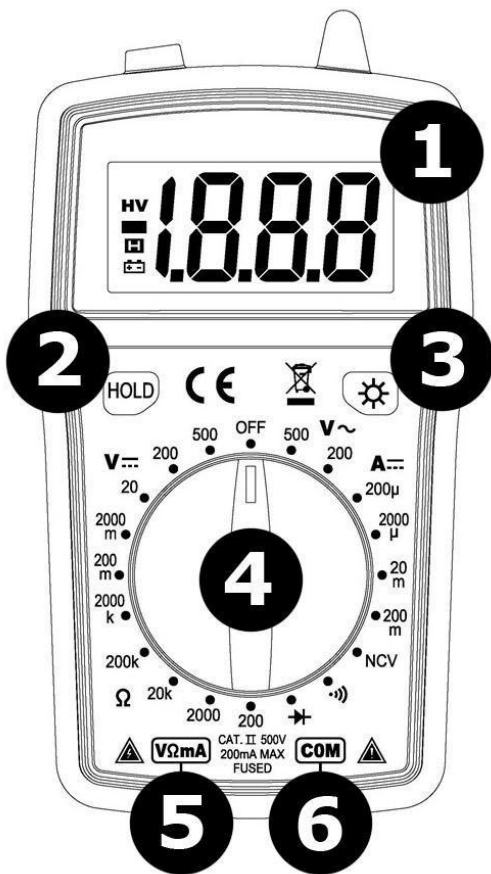
DVM856



CAT III 300 V / CAT II 500 V

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USER MANUAL


1. Introduction

To all residents of the European Union

Important environmental information about this product














This symbol on the device or the package indicates that disposal of the device after its lifecycle could harm the environment. Do not dispose of the unit (or batteries) as unsorted municipal waste; it should be taken to a specialized company for recycling.

 This device should be returned to your distributor or to a local recycling service. Respect the local environmental rules.

If in doubt, contact your local waste disposal authorities.















Thank you for choosing Velleman! Please read the manual thoroughly before bringing this device into service. If the device was damaged in transit, do not install or use it and contact your dealer.





2. Used Symbols

	AC (Alternating Current)
	DC (Direct Current)
	Both AC and DC
	Risk of Electric shock. A potentially hazardous voltage is possible.
	Caution: risk of danger, refer to the user manual for safety information. Warning: a hazardous condition or action that may result in injury or death Caution: condition or action that may result in damage to the meter or equipment under test
	Double insulation (class 2-protection)
	Earth
	Fuse
	Capacitor
	Diode
	Continuity


3. General Guidelines

Refer to the Velleman® Service and Quality Warranty on the last pages of this manual.

	This symbol indicates: Read instructions Not reading the instructions and manual can lead to damage, injury or death.
	This symbol indicates: Danger A hazardous condition or action that may result in injury or death
	This symbol indicates: Risk of danger/damage Risk of a hazardous condition or action that may result in damage, injury or death
	This symbol indicates: Attention; important information Ignoring this information can lead to hazardous situations.
	WARNING: To avoid electrical shock always disconnect the test leads prior to opening the housing. To prevent fire hazards, only use fuses with the same ratings as specified in this manual. Remark: refer to the warning on the battery compartment
 	Avoid cold, heat and large temperature fluctuations. When the unit is moved from a cold to a warm location, leave it switched off until it has reached room temperature. This to avoid condensation and measuring errors.
 	Protect this device from shocks and abuse. Avoid brute force when operating.
 	Pollution degree 2-device. For indoor use only. Keep this device away from rain, moisture, splashing and dripping liquids. Not for industrial use. Refer to §8 Pollution degree.
	Keep the device away from children and unauthorised users.
	Risk of electric shock during operation. Be very careful when measuring live circuits.
	There are no user-serviceable parts inside the device. Refer to an authorized dealer for service and/or spare parts.

	This is an installation category CAT III measuring instrument. Refer to §7 Overvoltage/installation category.
	Read this addendum and the manual thoroughly. Familiarise yourself with the functions of the device before actually using it.
	All modifications of the device are forbidden for safety reasons. Damage caused by user modifications to the device is not covered by the warranty.
	Only use the device for its intended purpose. Using the device in an unauthorized way will void the warranty. Damage caused by disregard of certain guidelines in this manual is not covered by the warranty and the dealer will not accept responsibility for any ensuing defects or problems.

4. Maintenance

	There are no user-serviceable parts inside the device. Refer to an authorized dealer for service and/or spare parts.
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Before performing any maintenance activities, disconnect the test leads from the jacks.

For instructions on replacing battery or fuse, refer to **§11 Battery and fuse replacement.**

Do not apply abrasives or solvents to the meter. Use a damp cloth and mild detergent for cleaning purposes.

5. During Use

	Risk of electric shock during operation. Be very careful when measuring live circuits.
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- Never exceed the limit value for protection. This limit value is listed separately in the specifications for each range of measurement.
- Do not touch unused terminals when the meter is linked to a circuit which is being tested.
- Never use the meter with CAT II installations when measuring voltages that might exceed the safety margin of 500 V above earth ground. Never use the meter with CAT III installations when measuring voltages that might exceed the safety margin of 300 V above earth ground.
- Set the range selector at its highest position if the intensity of the charge to be measured is unknown beforehand.
- Disconnect the test leads from the tested circuit before rotating the range selector in order to change functions.
- When carrying out measurements on a TV set or switching power circuits, always remember that the meter may be damaged by any high amplitude voltage pulses at test points.

- Always be careful when working with voltages above 60 VDC or 30 VAC rms. Keep your fingers behind the probe barriers at all times during measurement.
- Never perform resistance, diode or continuity measurements on live circuits. Make sure all capacitors in the circuit are depleted.

6. General Description

Refer to the illustration on page 2 of this manual:

1. Display
3 ½ digits
2. Hold button
3. Backlight button
4. Selection button
5. "VΩmA" jack
Insert the red (positive) test lead in this connector to measure voltage, resistance and current.
6. "COM" jack
Insert the black (negative) test lead.

7. Overvoltage/Installation Category

DMMS are categorized depending on the risk and severity of transient overvoltage that might occur at the point of test. Transients are short-lived bursts of energy induced in a system, e.g. caused by lightning strike on a power line.

The existing categories according EN 61010-1 are:

CAT I	A CAT I-rated meter is suitable for measurements on protected electronic circuits that are not directly connected to mains power, e.g. electronics circuits, control signals...
CAT II	A CAT II-rated meter is suitable for measurements in CAT I-environments and mono-phase appliances that are connected to the mains by means of a plug and circuits in a normal domestic environment, provided that the circuit is at least 10 m apart from a CAT III- or 20 m apart from a CAT IV-environment. E.g. household appliances, portable tools...
CAT III	A CAT III-rated meter is suitable for measurements in CAT I- and CAT II-environments, as well as for measurements on (fixed) mono- or poly-phased appliances which are at least 10 m apart from of a CAT IV-environment, and for measurements in or on distribution level equipment (fuse boxes, lighting circuits, electric ovens).

CAT IV	A CAT IV-rated meter is suitable for measuring in CAT I-, CAT II- and CAT III-environments as well as on the primary supply level. Note that for all measurements on equipment for which the supply cables run outdoors (either overhead or underground) a CAT IV meter must be used.
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Warning:

This device was designed in accordance with EN 61010-1 installation category CAT II 500 V and CAT III 300 V. This implies that certain restrictions in use apply that are related to voltages and voltage peaks which can occur within the environment of use. Refer to the table above.



This device is only suitable for measurements **up to 500 V** in **CAT II** and **up to 300 V** in **CAT III**

8. Pollution Degree

IEC 61010-1 specifies different types of pollution environments, for which different protective measures are necessary to ensure safety. Harsher environments require more protection, and the protection against the pollution which is to be found in a certain environment depends mainly on the insulation and the enclosure properties. The pollution degree rating of the DVM indicates in which environment the device may be used.

Pollution degree 1	No pollution or only dry, nonconductive pollution occurs. The pollution has no influence. (only to be found in hermetically sealed enclosures)
Pollution degree 2	Only nonconductive pollution occurs. Occasionally, temporary conductivity caused by condensation is to be expected.(home and office environments fall under this category)
Pollution degree 3	Conductive pollution occurs, or dry nonconductive pollution occurs that becomes conductive due to condensation that is to be expected. (industrial environments and environments exposed to outside air - but not in contact with precipitation)
Pollution degree 4	The pollution generates persistent conductivity caused by conductive dust or by rain or snow. (exposed outdoor environments and environments where high humidity levels or high concentrations of fine particles occur)

Warning: This device was designed in accordance with EN 61010-1 **pollution degree 2**. This implies that certain restrictions in use apply that are related to pollution which can occur within the environment of use. Refer to the table above.



This device is only suitable for measurements in Pollution degree class 2 environments.

9. Specifications

This device is not calibrated when purchased!

Regulations concerning environment of use:

Use this meter only for measurements in CAT I, CAT II and CAT III environments (see §7).

Use this meter only in a pollution degree 2 environment (see §8).

Ideal working conditions include:


temperature: 0 °C to 40 °C (32 °F to 104 °F)

relative humidity: max. 80 %

accuracy: \pm (a% reading + b digit)

voltage	500 V
fuse protection	
F0.5 A/500 V, 5 x 20 mm	
power supply	2 x 1.5 V AAA/R03 (incl.)
display	LCD, 1999 counts
over-range	yes
continuity buzzer	yes
diode test	yes
low-battery indication	yes
ranging mode	manual
data hold	yes
backlight	yes
auto power-off	yes
dimensions	134 x 75 x 25 mm
weight (with battery)	110 g
storage environment	
temperature	-20 °C to 60 °C
humidity	< 90 % RH
test lead probe	RE10, CAT II 500 V, 10 A; L = 90 cm


9.1 DC VOLTAGE

	Do not measure circuits that may contain voltages > 500 VDC or > 500 VAC	
range	resolution	accuracy
200 mV	0.1 mV	\pm (1.0 % rdg + 2 digits)
2 V	1 mV	
20 V	10 mV	
200 V	100 mV	
500 V	1 V	\pm (1.2 % rdg + 2 digits)

Overload protection: 500 V DC or AC rms

Impedance: 1 M Ω

9.2 AC VOLTAGE

	Do not measure circuits that may contain voltages > 500 VDC or > 500 VAC	
range	resolution	accuracy
200 V	100 mV	± (1.5 % rdg + 3 digits)
500 V	1 V	


Average sensing, calibrated to rms of sine wave

Frequency range: 40 Hz-500 Hz

Overload protection: 500 V DC or AC rms


Impedance: 450 kΩ

9.3 DC CURRENT

	Do not measure circuits that may contain voltages > 600 VDC or > 600 VAC	
range	resolution	accuracy
200 μA	0.1 μA	± (1.5 % rdg + 2 digits)
2 mA	1 μA	
20 mA	10 μA	
200 mA	100 μA	± (2.0 % rdg + 3 digits)




Overload protection: F0.5 A/500 V fuse

9.4 RESISTANCE

	Do not conduct resistance measurements on live circuits	
range	resolution	accuracy
200 Ω	0.1 Ω	± (1.0 % rdg + 5 digits)
2 kΩ	1 Ω	
20 kΩ	10 Ω	± (1.0 % rdg + 3 digits)
200 kΩ	100 Ω	
2 MΩ	1 kΩ	± (1.5 % rdg + 3 digits)

Overload protection: F0.5 A/500 V fuse

9.5 DIODE AND CONTINUITY

	Do not conduct diode or continuity measurements on live circuits	
range	description	test condition
	display reads the approximate forward voltage of the diode	forward DC current $\pm 10 \mu\text{A}$ reversed DC voltage $\pm 1.8 \text{ V}$
	built-in buzzer sounds if resistance $< 50 \Omega$	open-circuit voltage $\pm 1.8 \text{ V}$

Overload protection: F0.5 A/500 V fuse



9.6 NON-CONTACT AC VOLTAGE DETECTION

Test voltage range: 90 V-1000 V AC rms

The built-in buzzer will sound when live voltage is detected.

10. Operation

10.1 DC VOLTAGE MEASUREMENT



	Do not measure circuits that may contain voltages $> 500 \text{ VDC}$ or $> 500 \text{ VAC}$
	Use extreme caution when measuring voltages higher than 60 VDC or 30 VAC rms. Always place your fingers behind the protective edges of the test probes while measuring!

1. Set the rotary switch in the desired " $\text{V} \overline{\text{---}}$ " position.
2. Connect the red test lead to the " $\text{V}\Omega\text{mA}$ " jack and the black lead to the "COM" jack.
3. Connect the test leads to the source being measured.
4. Read the voltage value and the polarity of the red test lead on the LCD display.

Notes

- If the range is not known beforehand, set the selector switch to a high range and lower gradually.
- An over-range is indicated by 1 or -1. Set to a higher range.
- The maximum input current is 500 V rms.

10.2 AC VOLTAGE MEASUREMENT



	Do not measure circuits that may contain voltages > 500 VDC or > 500 VAC
	Use extreme caution when measuring voltages higher than 60 VDC or 30 VAC rms. Always place your fingers behind the protective edges of the test probes while measuring!

1. Set the rotary switch in the desired " $V\sim$ " position.
2. Connect the red test lead to the " $V\Omega mA$ " jack and the black lead to the "COM" jack.
3. Connect the test leads to the source being measured.
4. Read the voltage value and the polarity of the red test lead on the LCD display.

Notes

- See DC Voltage Measurement

10.3 DC CURRENT MEASUREMENT

	Do not measure circuits that may contain voltages > 500 VDC or > 500 VAC
	Use extreme caution when measuring voltages higher than 60 VDC or 30 VAC rms. Always place your fingers behind the protective edges of the test probes while measuring!

1. Set the rotary switch in the desired " $A\text{---}$ " position.
2. Connect the red test lead to the " $V\Omega mA$ " jack and the black test lead to the "COM" jack.
3. Open the circuit in which the current is to be measured and connect the test leads to the circuit **IN SERIES**.
4. Read the current value and the polarity of the red lead connection on the LCD display.

Notes

- If the range is not known beforehand, set the selector switch to a high range and lower gradually.
- An over-range is indicated by 1 or -1. Set to a higher range.
- The maximum input current is 500 mA.

10.4 RESISTANCE MEASUREMENT



Do not conduct resistance measurements on live circuits. Make sure all capacitors in the circuit are depleted.

1. Set the rotary switch in the desired " Ω " position.
2. Connect the red test lead to the " $V\Omega mA$ " jack and the black test lead to the "COM" jack.
3. Connect the test leads to the resistor to be measured and read the LCD display.

Notes

- If the resistance being measured is connected to a circuit, turn off the power and discharge all capacitors before applying the test probes.
- An over-range is indicated by 1 or -1. Set to a higher range.

10.5 DIODE AND CONTINUITY TEST



Do not conduct diode or continuity measurements on live circuits. Make sure all capacitors in the circuit are depleted.

1. Set the rotary switch in the " \rightarrow " position for the diode measurement mode. Set the rotary switch in the " \rightarrow " position for the continuity measurement mode.
2. Connect the red test lead to the " $V\Omega mA$ " jack and the black lead to the "COM" jack.
3. For measuring the diode, connect the red test lead to the anode of the diode to be tested and the black test lead to the cathode of the diode. The approx. forward voltage drop of the diode will be displayed. For measuring continuity, connect the test leads to two points of the circuit to be tested. If continuity exists, the built-in buzzer will sound.

10.6 NON-CONTACT AC VOLTAGE DETECTION



Even without buzzing sound, voltage may still be present. Do not rely solely on non-contact voltage detection.

1. Set the rotary switch in the "NCV" position.
2. Hold the meter close to the conductor to be measured. The buzzer will sound when live voltage ≥ 90 V AC rms.




10.7 DATA HOLD

Press "HOLD" to lock the displayed value. Press again to exit.

10.8 BACKLIGHT

Hold "☼" pressed for 2 seconds to switch the backlight on or off. The backlight will also switch off automatically.

11. Battery and Fuse Replacement

	WARNING: To avoid electrical shock always disconnect the test leads prior to opening the housing. To prevent fire hazards, only use fuses with the same ratings as specified in this manual. Remark: refer to the warning on the battery compartment
	There are no user-serviceable parts inside the device. Refer to an authorized dealer for service and/or spare parts.
	Disconnect the test leads from the test points and remove the test leads from the measuring terminals before replacing the batteries or fuses.

- When "🔋" is displayed, the battery should be replaced.
- Fuses rarely need replacement and blown fuses almost always result from human error.

To replace the battery:

- Switch of the meter.
- Remove the screw at the back of the case and gently open the housing.
- Remove the old battery and insert a new one.
- Close the housing and fasten the screw.

Battery: 2x AAA/R03, make sure to respect the polarity

Fuse: F0.5 A/500 V, 5 x 20 mm

Make sure the meter is closed tight and put the protective edge back in place before using the meter.

12. Troubleshooting

If the device acts abnormal while measuring, this means that the internal fuse is defective.

Keep in mind that a low battery level could lead to incorrect measurements. Replace the battery on a regular basis.

(tip: the reduced luminosity of the backlight/LCD display indicates a low battery level)

Use this device with original accessories only. Velleman nv cannot be held responsible in the event of damage or injury resulting from (incorrect) use of this device. For more info concerning this product