

OMEGA

HHM28
Digital Multimeter



OMEGAnetSM On-Line Service
<http://www.omega.com>

Internet e-mail
info@omega.com

Servicing North America:

USA: ISO 9001 Certified
One Omega Drive, Box 4047
Stamford, CT 06907-0047
Tel: (203) 359-1660
FAX: (203)359-7700
e-mail: info@omega.com

Canada:
976 Bergar
Laval (Quebec) H7L5A1
Tel: (514) 856-6928
FAX: (514) 856-6886
e-mail: info@omega.com

For immediate technical or application assistance:

USA and Canada:
Sales Service: 1-800-826-6342 / 1-800-TC-OMEGASM
Customer Service: 1-800-622-2378 / 1-800-622-BESTSM
Engineering Service: 1-800-872-9436 / 1-800-USA-WHENSM
TELEX: 996404 EASYLINK: 62968934 CABLE: OMEGA

Mexico and Latin America:
Tel: (95) 800-TC-OMEGASM
FAX: (95) 203-359-7807
En Español: (203) 359-7803
e-mail: espanol@omega.com

Servicing Europe:

Benelux:
Postbus 8034, 1180 LA Amstelveen,
The Netherlands
Tel: (31) 20 6418405 FAX: (31) 20 6434643
Toll Free in Benelux: 06 0993344
e-mail: nl@omega.com

Czech Republic:
ul. Rude armady 1868, 733 01 Karvina-
Hranice, Czech Republic
Tel: 420 (69) 6311627 FAX: 420 (69) 6311114
e-mail: czech@omega.com

France:
9, rue Denis Papin, 78190 Trappes
Tel: (33) 130-621-400 FAX: (33)130-699-120
Toll Free in France: 0800-4-06342
e-mail: france@omega.com

Germany/Austria:
Daimlerstrasse 26, D-75392
Deckenpfronn, Germany
Tel: 49 (07056) 3017 FAX: 49 (07056) 8540
Toll Free in Germany: 0800 82 66342
e-mail: germany@omega.com

United Kingdom: ISO 9002 Certified
One Omega Drive
Riverbend Technology Centre Northbank, Irlam,
Manchester, M44 5EX, England
Tel: 44 (161) 777-6611 FAX: 44 (161) 777-6622

Toll Free in England: 0800-488-488
e-mail: sales@omega.com.uk

It is the policy of OMEGA to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification. The information contained in this document is believed to be correct but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient connected application.

SAFETY INFORMATION

The following safety information must be observed to insure maximum personal safety during the operation at this meter:

1. Do not use the meter if the meter or test leads look damaged, or if you suspect that the meter is not operating properly.
2. This meter is not recommended for high voltage industrial use; for example, not for measurements of 440 VAC or 600 VAC industrial power mains. The unit is intended for use with low energy circuits to 600VDC or AC or high energy circuit to 250 VAC or DC. Accidental misuse by connection across a high voltage, high energy power source when the meter is set up for mA measurement may be very hazardous.
3. Turn off power to the circuit under test before cutting, unsoldering, or breaking the circuit. Small amounts of current can be dangerous.
4. Use caution when working above 60V dc or 30V ac rms. Such voltages pose a shock hazard.
5. When Using the probes, keep your fingers behind the finger guards on the probes.
6. Measuring voltage which exceeds the limits of the multimeter may damage the meter and expose the operator to a shock hazard. Always recognize the meter voltage limits as stated on the front of the meter.
7. If the equipment is used in a manner not specified by the manufacturer, the protection provided the equipment may be impaired.

SPECIFICATIONS

Display: Liquid crystal display (LCD) with a maximum reading of 2500.

Polarity: Automatic, positive implied, negative polarity indication.

Overrange: "OL" or "-OL" is displayed.

Low battery indication: the "⚡" is displayed when the battery voltage drops below the operating level.

Measurement rate: 2.5 times per second, nominal.

Operating Environment: 0°C to 40°C at < 70% relative humidity.

Storage Temperature: -20°C to 60°C, 0 to 80% R.H. with battery removed from meter.

Accuracy: Stated accuracy at 23°C ± 5°C, <75% relative humidity.

Safety: According to EN61010-1 protection class II overvoltage category (CAT II 600V) pollution degree 2.

Auto Power off: 30minutes after rotary switch and push button no changes.turn the meter off then on to resume operation.

Power: single standard 9-volt battery.

Battery life: 200 hours typical.

Dimensions: 192mm (H) x 91mm (W) x 52.5mm (D).

Weight: 365g including battery.

Accessories: One pair test leads, One spare fuse installed, 9V battery and Operating Instructions.

DC VOLTS

Ranges: 250mV,2.5V,25V,250V,600V

Resolution: 100 μ V

Accuracy: $\pm(0.25\%rdg + 5dgt)$ on 250mV range
 $\pm(0.25\%rdg + 1dgt)$ on other ranges

Input impedance: >10M Ω

Overload protection: 600VDC or AC rms

AC VOLTS (50Hz - 500Hz)

Ranges: 250mV,2.5V,25V,250V,600V

Resolution: 1mV.(100 μ A on 250mV range)

Accuracy: $\pm(0.75\%$ of reading + 4dgts) on 2.5V to 600V
no specification on 250mV range

Input impedance: 10M Ω

Overload protection: 600VDC or AC rms

DC CURRENT

Ranges: 250 μ A,2.5mA,25mA,250mA,2.5A,10A

Resolution: 100nA

Accuracy: $\pm(0.75\%rdg + 10dgts)$ on 250 μ A,25mA ranges
 $\pm(0.75\%rdg + 1dgt)$ on 2.5mA,250mA ranges
 $\pm(3.0\%rdg + 5dgts)$ on A range

Burden voltage: 325mV on μ A,mA ranges
700mV on A ranges

Input protection: 0.5A / 250V fast blow ceramic fuse
10A / 600V fast blow ceramic fuse

In 250 μ A, 25mA, 2.5A range use RELD button, offset the residual reading to obtain the actual current, otherwise the measurement error would be great.

AC CURRENT (50Hz - 500Hz)

Ranges: 250 μ A, 2.5mA, 25mA, 250mA, 2.5A, 10A

Resolution: 100nA

Accuracy: $\pm(1.5\%rdg + 2dgts)$ on μ A, mA ranges
 $\pm(3.0\%rdg + 2dgts)$ on A range

Burden voltage: 325mV on μ A, mA ranges
700mV on A ranges

Input protection: 0.5A / 250V fast blow ceramic fuse
10A / 600V fast blow ceramic fuse

RESISTANCE

Ranges: 250 Ω , 2.5K Ω , 25K Ω , 250K Ω , 2500K Ω , 25M Ω

Resolution: 100m Ω

Accuracy: $\pm(0.3\%rdg + 3dgts)$ on 250 Ω range
 $\pm(0.3\%rdg + 1dgt)$ on 2.5K Ω to 2500K Ω ranges
 $\pm(3.5\%rdg + 4dgts)$ on 25M Ω range

Open circuit volts: 0.4Vdc

Overload protection: 500VDC or AC rms

CONTINUITY

Audible indication: <100 Ω

Overload protection: 500VDC or AC rms

DIODE TEST

Accuracy: $\pm(3.0\%rdg + 3dgts)$

Resolution: 1mV

Test current: 0.5 \pm 0.3mA

Test voltage: <1.6V

25 MILLI - VOLTS (DC/AC@50Hz - 500Hz)

Resolution: 10 μ V

Accuracy: $\pm(1.0\%rdg + 10dgt)$

Input impedance: >1000M ω

Overload protection: 0.5A / 250V fast blow ceramic fuse

CAPACITANCE (Autoranging)

Ranges: 2.5nF,25nF,250nF,2.5 μ F,25 μ F

Accuracy: $\pm(10\%rdg + 10dgts)$ on 2.5n Frange(use REL)

$\pm(3.0\%rdg + 10dgts)$ on other ranges

Overload protection: 500VDC or AC rms

FREQUENCY (Autoranging)

Ranges: 5Hz,50Hz,5KHz,50KHz,500KHz,5MHz

Resolution: 0.001Hz

Accuracy: $\pm(0.05\%rdg + 2dgts)$

Sensitivity: 1.0V rms min on 5.000Hz to 500.0KHz ranges

5.0V rms min on 5.000MHz range

TTL or SINE wave signal on all range

Overload protection: 500VDC or AC rms

DUTY CYCLE (2Hz to 20kHz)

Ranges: 0.1% to 99.9%

Resolution: 0.1%

Accuracy: $\pm[(0.3 \text{ multiplied by the pulse width in kHz})dgt + 2dgts]$ @ 2V rms
min.

Pulse Width: 500nS

Overload protection: 500VDC or AC rms

OPERATION

Before taking any measurements, read the Safety Information Section. Always examine the instrument for damage, contamination (excessive dirt, grease, etc.) and defects. Examine the test leads for cracked or frayed insulation. If any abnormal conditions exist do not attempt to make any measurements.

Auto Power-down mode

If unused for about 30 minutes, the tester will power-down automatically. If you should disable Auto Power-down mode, press SELECT button when you turn on the meter.

SELECT Function Button (DC/AC),() / () / ()

The SELECT Function button is Yellow in color. Press it to toggle to the alternate function (AC, Audible continuity, and Diode) shown in Yellow on the meter face.

Hz-% Function Button

Press Hz-% button toggle between frequency and duty cycle mode.

RELD Button

Press (RELD) to enter the Relative mode, zero the display, and store the displayed reading as a reference value. The relative mode annunciator(D) is displayed.

Press (RELD) again to exit the relative mode.

RANGE Button

Press (RANGE) button to select the Manual Range mode and turn off the "AUTO" annunciator.

In the Manual Range mode, each time you press (RANGE) button, the range (and the input range annunciator) increments, and a new value is displayed. To exit the Manual Range mode and return to autoranging, press and hold down (RANGE) button for 2 seconds. The "AUTO" annunciator turns back on.

RS232 Communication Button

Press (RS232) button to select the RS232 communication mode and turn on the "**RS232**" annunciator. In the this mode the automatic power-off feature is disable.

Insert the IR2's optical interface side to female connector of the meter, and the other side of this cable connect to communication port1 or 2 of the personal computer. Execute the software (for windows).

Press RS232 key again to exit the RS232 communication mode.

25 MILLI - VOLTS Measurements

1. Connect the red test lead to the " **μ AmA**" jack and the black test lead to the "COM" jack.
2. Set the Function/Range switch to the desired voltage function.
3. Connect the test leads to the device or circuit being measured.
4. For dc, a (-) sign is displayed for negative polarity; positive polarity is implied.

Back-Light and Data-Hold Switch (*>2sec),(H):

Press this button briefly to activate DATA-HOLD mode. The "H" annunciator is displayed.

Press this button for 2 seconds to turn the Back-Light on. As this also activates the DATA-HOLD mode, briefly press the button to return to normal display. The Back-Light will switch-off automatically after about 30 seconds.

Voltage Measurements

1. Connect the red test lead to the "V ω " jack and the black test lead to the "COM" jack.
2. Set the Function/Range switch to the desired voltage function.
3. Connect the test leads to the device or circuit being measured.
4. For dc, a (-) sign is displayed for negative polarity; positive polarity is implied.

Current Measurements

1. Set the Function/Range switch to the desired current range (μ A,mA,A) position.
2. To toggle between "DC" and "AC" mode, press SELECT button. The "DC" or "AC" annunciators is displayed in the upper left corner.
3. For current measurements less than 250mA, connect the red test lead to the μ mA jack and the black test lead to the COM jack.
4. For current measurements of 250mA or greater, connect the red test lead to the A jack and the black test lead to the COM jack.
5. Remove power from the circuit under test and open the normal circuit path where the measurement is to be taken. Connect the meter **in series** with the circuit.

6. Use caution when measuring 10 amps on A range for 60s, please waiting for 10 minutes for next measurement of 10 amps for safety reason.

Resistance Measurements

1. Set the Function/Range switch to $\omega/\rightarrow/\rightarrow$ position.
2. Remove power from the equipment under test.
3. Connect the red test lead to the "V ω " jack and the black test lead to the "COM" jack.
4. Touch the probes to the test points. In ohms, the value indicated in the display is the measured value of resistance.

WARNING

The accuracy of the functions might be slightly affected, when exposed to a radiated electromagnetic field environment, eg, radio, telephone or similar.

Diode Tests

1. Set the Function/Range switch to $\omega/\rightarrow/\rightarrow$ position.
2. Remove power from the equipment under test.
3. To toggle the ω /continuity/diode modes, press SELECT switch.
4. Touch probes to the diode. A forward-voltage drop is about 0.6V (typical for a silicon diode).
5. Reverse probes. If the diode is good, 1 OL is displayed. If the diode is shorted, ".000" or another number is displayed.
6. If the diode is open, 1 OL is displayed, in both directions.
7. If the junction is measured in a circuit and a low reading is obtained with both lead connections, the junction may be shunted by a resistance of less than 1k ω . In this case the diode must be disconnected from the circuit for accurate testing.

Continuity Measurements

1. Set the Function/Range switch to $\omega/\rightarrow/\rightarrow$ position.
2. Turn off power to the circuit under test. External voltage across the components causes invalid readings.
3. To toggle between the ω /continuity/diode modes, press SELECT button.
4. Connect the test leads to the two points at which continuity is to be tested. The buzzer will sound if the resistance is less than approximately 100ω .

Frequency Measurements

1. Set the Function/Range switch to the Hz position.and then press Hz-% to toggle between "Hz" and "DUTY" mode.
2. Connect the red test lead to the "V ω " jack and the black test lead to the "COM" jack.
3. Connect the test leads to the point of measurement and read the frequency from the display.

Duty Cycle Measurements

1. Set the Function/Range switch to the Hz position.and then press Hz-% to toggle between "Hz" and "DUTY" mode,
2. Connect the red test lead to the "V ω " jack and the black test lead to the "COM" jack.
3. Connect the test leads to the point of measurement . The display will indicate 0.1% to 99.9% of the frequency duty cycle.

Capacitance Measurements

1. Set the Function/Range switch to the desired "**←**" range. Press (REL_D) to zero the display.
2. Discharge capacitors before trying to measure it.
3. Connect the "+" lead to the "V_W" jack and the "-" lead to the "COM" jack.
4. Read the capacitance directly from the display.

MAINTENANCE

WARNING

Remove test leads before changing battery or fuse or performing any servicing.

Battery Replacement

Power is supplied by a 9 volt "transistor" battery. (NEDA 1604, IEC 6F22). The "🔋" appears on the LCD display when replacement is needed. To replace the battery, remove the two screws from the back of the meter and lift off the battery case. Remove the battery from battery contacts.

Fuse Replacement

If no current measurements are possible, check for a blown overload protection fuse. There are two fuses; F1 for the "mA" jack and F2 for the "A" jack. For access to fuses, remove the four screws from the back of the meter and lift off the battery cover and case. Replace F1 only with the original type 0.5A/250V, fast acting ceramic fuse. Replace F2 only with the original type 10A/600V, fast acting ceramic fuse.

Cleaning

Periodically wipe the case with a damp cloth and detergent, do not use abrasives or solvents.

WARRANTY / DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product. If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY / DISCLAIMER language, and additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. P.O. number under which the product was PURCHASED.
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. P.O. number to cover the COST of the repair.
2. Model and serial number of product , and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering. OMEGA is a registered trademark of OMEGA ENGINEERING, INC. © Copyright 1999 OMEGA ENGINEERING, INC. All rights reserved. This document may not be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form, in whole or in part, without prior written consent of OMEGA ENGINEERING, INC.

Where Do I Find Everything I Need for Process Measurement and Control? OMEGA...Of Course!

TEMPERATURE

- Thermocouple, RTD & Thermistor
Probes, Connectors, Panels & Assemblies
- Wire: Thermocouple, RTD & Thermistor
- Calibrators & Ice Point References
- Recorders, Controllers & Process Monitors
- Infrared Pyrometers

PRESSURE/STRAIN AND FORCE

- Transducers & Strain Gauges
- Load Cells & Pressure Gauges
- Displacement Transducers
- Instrumentation & Accessories

FLOW/LEVEL

- Rotameters, Gas Mass Flowmeters
& Flow Computers
- Air Velocity Indicators
- Turbine/Paddlewheel Systems
- Totalizers & Batch Controllers

pH/CONDUCTIVITY

- pH Electrodes, Testers & Accessories
- Benchtop/Laboratory Meters
- Controllers, Calibrators, Simulators
& Pumps
- Industrial pH & Conductivity Equipment

DATA ACQUISITION

- Data Acquisition &
Engineering Software
- Communications-Based
Acquisition Systems
- Plug-in Cards for Apple, IBM
& Compatibles
- Datalogging Systems
- Recorders, Printers & Plotters

HEATERS

- Heating Cable
- Cartridge & Strip Heaters
- Immersion & Band Heaters
- Flexible Heaters
- Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- Metering & Control Instrumentation
- Refractometers
- Pumps & Tubing
- Air, Soil & Water Monitors
- Industrial Water & Wastewater
Treatment
- pH, Conductivity & Dissolved Oxygen
Instruments