25/27 Multimeter

OPERATOR'S MANUAL
MANUEL D'INSTRUCTION
BEDIENUNGS-Handbuch
MANUALE D'IMPIEGO
MANUAL DE INSTRUCCIONES
ユーチュアー
Operating Instructions

This meter has been designed and tested according to IEC Publication 348. Safety Requirements for Electronic Measuring Apparatus. This manual contains information and warnings which must be followed to ensure safe operation and retain the meter in safe condition.

MULTIMETER SAFETY
Read this information before using the meter. WARNINGS denote hazards to the operator. CAUTIONS denote hazards to the meter. If the meter is not used as described in this manual, the safety features of the meter might be impaired. The following safe practices and proper operation procedures should be followed when using any multimeter:

● Inspect the test leads for insulation damage or exposed metal. Damaged leads should be replaced.

● Check test lead continuity using the diode test (||| →+) mode.

● Be certain the digital multimeter (DMM) itself is in good operating condition. During the continuity test, a meter reading that goes from overload (OL) to 0 generally means the meter is working properly.

● Select the proper function and range for your measurement.

● Do not allow the meter to be used if it is damaged or if its safety is impaired.


**WARNING**

- Follow all equipment safety procedures. Disconnect the input power and discharge all high-voltage terminals.
- Electrically disconnect the live, or hot, test lead before connecting the common test lead.
- Such voltages pose a shock hazard. When working above 60V DC or 25V AC RMS.

**WARNING**

To avoid electrical shock, use caution.

---

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="https://example.com/fuse.png" alt="Fuse" /></td>
<td>Fuse Either DC or AC</td>
</tr>
<tr>
<td><img src="https://example.com/double.png" alt="Double Insulation" /></td>
<td>Double Insulation</td>
</tr>
<tr>
<td><img src="https://example.com/current.png" alt="Current" /></td>
<td>Current Direct DC</td>
</tr>
<tr>
<td><img src="https://example.com/manual.png" alt="In Manual" /></td>
<td>Current Alternating AC</td>
</tr>
<tr>
<td><img src="https://example.com/ground.png" alt="Ground" /></td>
<td>Ground Switch Position ON (power)</td>
</tr>
<tr>
<td><img src="https://example.com/dangerous.png" alt="Dangerous Voltage" /></td>
<td>Dangerous Voltage Switch Position OFF (power)</td>
</tr>
</tbody>
</table>

---

Avoid working alone.

- Avoid working alone.
- Use a protective voltmeter and circuit testing to prevent injury from high-voltage capacitors.

---

The use of make-shift fuses and the short-circuiting of fuse holders is prohibited.

Whenever it is likely that the protection has been impaired, open fuse will allow high voltage build-up, which is potentially hazardous.

Overloading a current shunt will cause excessive heat. When measuring transformer secondary or motor winding current, check the multimeter fuses first (see winding current). When measuring transformer secondary or motor winding current, check the multimeter fuses first (see winding current).
<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>INPUT TERMINALS</th>
<th>MIN DISPLAY READING</th>
<th>MAX DISPLAY READING</th>
<th>MAXIMUM INPUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>~V ~V</td>
<td>V Ω ↔ COM</td>
<td>0.001V</td>
<td>1000V</td>
<td>1000V</td>
</tr>
<tr>
<td>mV mV</td>
<td>V Ω ↔ COM</td>
<td>0.1 mV</td>
<td>320.0 mV</td>
<td>500V</td>
</tr>
<tr>
<td></td>
<td>V Ω ↔ COM</td>
<td>0.01 nS</td>
<td>32.00 nS</td>
<td>500V</td>
</tr>
<tr>
<td>Ω (nS)</td>
<td>V Ω ↔ COM</td>
<td>0.1Ω</td>
<td>32.00 MΩ</td>
<td>500V</td>
</tr>
<tr>
<td>V V</td>
<td>V Ω ↔ COM</td>
<td>0.001V</td>
<td>2.08V</td>
<td>500V</td>
</tr>
<tr>
<td>mA/A</td>
<td>A COM</td>
<td>0.01A</td>
<td>20.00A*</td>
<td>10A* 600V</td>
</tr>
<tr>
<td></td>
<td>mA μA COM</td>
<td>0.01 mA</td>
<td>320.0 mA</td>
<td>320 mA 600V</td>
</tr>
<tr>
<td>μA μA</td>
<td>mA μA COM</td>
<td>0.1 μA</td>
<td>3200 μA</td>
<td>320 mA 600V</td>
</tr>
</tbody>
</table>

*10A continuous, 20A for 30 seconds maximum
Operating Features

1. Digital Display:
   Illustration inside the front cover. The following features are keyed by number to the diagram on page 1.

2. Function Selector Rotary Switch:
   Turn to select any of 10 different functions or OFF.

3. Volt, Ohms, Diode Test Input Terminal:
   (ac or dc) ohms, or diode test position of the Input Terminal used in conjunction with the volts, my, M/A, MA/4, mA, uA Millivolt or Amperes ac

4. Common Terminal:
   Input Terminal used for current measurements up to 200 MA (ac or dc) with the function selector rotary switch in the MA or 4A position.

5. Milliammeter/Microamp Input Terminal:
   mA Milliamperes, MA Amperes, my Millivolt or microvolt ac or dc.

Reference to the specifications for available ranges and limits. Refer to Table 1 for input terminals and limits.

In nanometers (ng)

Ω Ohms (Resistance), also conductance (1/Ω)

Volt, ac

V volts ac

Volt, dc

V volts dc

V volts ac

V volts dc
A Amperes Input Terminal:
Input terminal used for current measurements up to 10A continuous (20A for 30 seconds) with the function selector rotary switch in the mA/A position (ac or dc).

RANGE Manual Range Mode Pushbutton:
Press once to enter manual range mode, press again to increment range, press and hold for 2 seconds to return to autorange. Meter returns to autorange if the function selector is switched to any other position. There is no autorange annunciator; absence of the manual range annunciator indicates the meter is in autorange. If RANGE is depressed (>1 second) while the function switch is moved from OFF to any ON position, manual ranging will be selected in all functions.

REL Relative Mode Pushbutton (Fluke 27 only):
Press momentarily to enter the Relative mode and store the displayed reading. The display will read zero. Press again to update the stored digital reading. Press and hold for 2 seconds to exit the Relative mode. The Relative mode stores a digital reading and displays the change (difference) between the stored reading and any following reading. For example, if the stored reading is 15.00V and the present reading is 14.10V, the display will indicate −0.90V. The analog bar graph continues to display the actual reading (14.10V). If the difference exceeds 3999 counts (without overloading the input), OF (overflow) is displayed. The Relative mode selects manual ranging; changing ranges automatically exits the Relative mode.

MIN/MAX Mode Pushbutton (Fluke 27 only):
Press momentarily to enter MIN/MAX mode, press again to toggle between MIN and MAX indications. Press and hold for 2 seconds to exit MIN/MAX mode. The meter stores the minimum and maximum digital readings, and will display either reading as selected by the operator. Press the HOLD/RESET button to reset the MIN/MAX readings to the present input. The MIN/MAX mode selects manual ranging; use a range that can record the maximum anticipated input. Range changes reset previously recorded MIN/MAX readings. Exiting the MIN/MAX mode does not reset the previously recorded readings unless the range or function is changed. The MIN/MAX mode overrides the Touch-Hold mode.
The appropriate annunciator (Ω, K, or M) is displayed when the resistance range is in use. Refer to item 10 for operation.

**Resistance Range Annunciators:**

- **ΩK** indicates that the meter is in the Relative mode and that the value displayed is the difference between the present measurement and the previous reading (μV). Refer to item 8 for operation.
- **ΩM** indicates that the meter is in the MAX/MIN mode. Refer to item 9 for operation.
- **ΩMAX** indicates that the meter is in the MIN/MAX recording mode, and the value displayed is the minimum value that the meter has recorded in the MIN/MAX range (μV). Refer to item 7 for operation.

**Touch-Hold Mode Annunciator (Fluke 27 only):**

- **MAX** indicates that the meter is in the MAX/MIN mode and holds the maximum value that has been recorded in the MIN/MAX range (μV).
- **MIN** indicates that the meter is in the MIN/MAX mode and holds the minimum value that has been recorded in the MIN/MAX range (μV).
- **HOLD** indicates that the meter is in the Touch-Hold mode and holds the maximum value that has been recorded in the MIN/MAX range (μV).

**Relative Annunciator (Fluke 27 only):**

- **AV** indicates that the meter is in the Relative mode and that the value displayed is the difference between the present measurement and the previous reading (μV).

**Conductance Range Annunciator (μS):**

- **μS** indicates that the meter is in the Conductance range and that the value displayed is the conductance of the circuit (μS).

**Touch-Hold Button:**

- **HOLD** indicates that the meter is in the Touch-Hold mode and holds the maximum value that has been recorded in the MIN/MAX range (μV).

**Warning:**

- **CIRCUITS WITH DANGEROUS VOLTAGESS ARE DEAD.**

**Reading:**

- Touch Hold Will Not Capture Unstable or Noisy Readings.
17 Analog Bar Graph Display:
Analog representation of input. Composed of 31 segments which illuminate starting from the left as the input increases. (See display inside rear cover.) A minus sign (–) is displayed for reverse-polarity inputs. Updated 25 times per second.

18 Decimal Point/Range Indicator:
Decimal point position and the digits (3, 30, 300) under the decimal point indicate the range in use.

19 Manual Range Annunciator:
Displayed in the Manual Range mode or if the selected function has only one range. Absence of the indicator implies autorange mode in use. The meter powers-up in autorange. In autorange, the meter automatically selects the measurement range. Refer to item 7 for operation.

20 Low Battery Annunciator:
At least 60 hours of battery life remain when first displayed. Battery voltage is tested each time the function switch is moved to a new position.

21 Negative Polarity Annunciator:
Automatically indicates negative inputs.

22 Overload Indication:
These symbols indicate the input is too large for the input circuitry. (The location of the decimal point depends on the measurement range.)

23 Overflow Indication (Fluke 27 only):
These symbols indicate the calculated difference in the Relative mode is too large to display (>3999 counts) and that the input is not overloaded.

24 Beeper (not illustrated):
The beeper can produce beeps, clicks, or a continuous tone. It is used for audible indication in the diode test mode, when operating the push buttons, and when a new reading is displayed in the Touch-Hold mode.

TILT BAIL ADJUSTMENT
To use the tilt bail as a handle, lift the bail slightly (about 1 inch or 2.5 cm), pull the ends out, and insert the ends in the alternate set of holes.
A diode or transistor voltage in the 25-megohm range does strongly forward bias the diodes or transistor junctions. For scale measurement, use the highest voltage range you can below 25 megohms. For strongly forward biased silicon some in-circuit measurements can be made.

A standard pair of test leads, 27 to 8 ohms for 27 to zero the display. The error is usually 0.1 to 0.2 ohms for normal use. For FSE mode on the Fluke measurement, use the relative (REL) mode on the Fluke measurement by subtracting the lead resistance from the measurement. Correct the leads together and read the lead resistance. Correct the test leads for a 25-ohm range. To determine the error, short the test leads together and measure their influence on measurement. Accuracy of the measurement affects the circuit resistance in the circuit before attempting in-circuit resistance measurement. Turn off circuit power and discharge all capacitance before attempting in-circuit resistance measurement.

When measuring volatges above 320V in Touch-Hold mode, 10 kilohms or less, 0.1% or less (if the measurement circuit's source resistance is negligible. However, in most cases, the error is negligible. All ranges present an input impedance of approximately 10 megohms in parallel with a source less than 100 pF. Measurement error, due to circuit loading, can result when making other measurements.
Diode Test and Continuity
In diode test, there is only one range: 0 to +2.08 volts. Voltage is developed across the component(s) under test by a test current output from the Fluke 25/27. Voltages greater than 2.08V or open test leads produce an overload (OL) condition. Negative inputs produce a negative indication (they are not suppressed). In the diode test function (|||→△), the beeper produces a continuous tone if the input is less than 0.1V, and the beeper beeps once when the input descends through a 0.7V threshold.

Audible continuity testing is also performed with the function selector switch in the diode test/continuity position. A continuous tone sounds for test resistances below approximately 150 ohms. An intermittent connection produces erratic beeps, and can be a valuable troubleshooting aid. Erratic beeps can also occur, due to environmental noise, if a test value is very close to the threshold (150 ohms). Test resistances from approximately 150 ohms to 1000 ohms produce a short tone similar to a forward biased diode. Test resistances less than approximately 20 kilohms will produce an on-scale reading.

Conductance
Conductance measurement is performed with the function selector switch in the ohms (Ω) function. The conductance range can only be entered using manual range selection; autorange cannot enter the conductance range. The conductance range can be used both to measure conductance (1/Ω, the inverse of resistance) and to measure very high resistances (greater than 32 megohms).

High value resistance measurements are susceptible to induced noise, and may require careful shielding. Conductance measurements are displayed in nanosiemens (nS). Calculate megohms by dividing 1000 by the nanosiemens displayed (1000/nS is equivalent to megohms). Example: 2 nS converts to 500 megohms (1000/2).

Leakage Testing
The conductance range effectively extends the resistance measurement capability of the Fluke 25/27 to the point where it can provide useful leakage measurements on passive components. For example, the operator can detect leaky diodes, cables, connectors, printed circuit boards, etc. In all cases, the test voltage is less than 2V dc.

Leakage testing on purely resistive components such as cables and printed circuit boards is straightforward. Select the ohms function and manually increment the range to conductance (nS). Connect the test leads to the test points
The first segment is an indication greater than
input signal. The first graphic display displayed a more negative
annunciator is displayed, and additional bar graph segments
— through zero. As the signal grows more negative, the
then — annunciator flashes as the signal level passes
bar graph segments are displayed as the signal decreases.
Now, assume that the input level is zero. From zero, a bar graph
ANNUL-L..-GRAPH APPLICATIONS
segments is displayed, and additional segments are displayed
in looking at the analog bar graph. Notice that it is composed
NOTE

High-voltage stacked dode assemblies can usually be
being applied can then be read in terms of conductance.

Diole leakage tests require that the dode junction be
the Relative mode (REL) in the Fluke 27.
reducing. This can be done automatically using
measurements. Correct subsequent measurement
open (read the residual leakage in
open test leads to the Fluke 27, and with the leads
There is normally a small residual reading with
conductance. These assemblies typically have such high
forward voltage drops that the dode test or resistance
NOTE
Note that every fifth segment of the bar graph is slightly larger than those in between, and every tenth segment is larger yet. These larger segments provide a quick reference for bar graph indications. The largest segments (every 10th segment) divide the display into thirds. Thus, if the bar graph indicates 11 segments on the 32.00V range, the input voltage is 10 to 11 volts; if the bar graph indicates 11 segments on the 320.0V range, the input voltage is 100 to 110 volts. If the input equals or exceeds 3000 counts on the range selected, the bar graph displays an arrow at the far right of the display. If the manual range annunciator (○) is not displayed, the Fluke 25/27 automatically switches to the next higher range if the input exceeds approximately 3260 counts.

**Using the Analog Bar Graph**
The analog bar graph is most useful in making adjustments and performing limited diagnostics. Bar graph response is fast and precise, so it can be used to easily reach a setting within a few percent of the final adjustment. The bar graph can be used to make rough adjustments quickly; then the 3200-count digital display can be used for final adjustment.

The analog bar graph is useful for performing limited diagnostics in applications where rapidly fluctuating signal levels cause the flashing digits of a digital display to be useless. Like the traditional VOM needle, the analog bar graph excels at displaying trends, or slowly changing signals. In addition, autoranging on the Fluke 25/27 allows monitoring the signal change through changing ranges.

Many diagnostic routines using the bar graph require practice. The operator is looking for good or bad signal patterns that occur over some span of time. Capacitance checks and noisy resistance measurements create such patterns. Therefore, familiarity with analog bar graph response and movement is necessary to accurately interpret a signal pattern. Compare the bar graph response when making measurements on a known-good unit to the bar graph response when making measurements on a faulty unit.

**Specific Applications—Nulling**
The Fluke 25/27 bar graph is ideal for nulling adjustments. As an adjustment approaches zero, fewer bar graph segments are displayed, then no bar graph segments are displayed. The − annunciator flickers when the input level is within 10 counts of zero. The flickering null indication is displayed every time the input approaches zero or swings from one polarity to the other. The operator merely watches for the − annunciator indication, then reverses the direction
Opening before they will respond.

most analog needle movements require a 5 millisecond detect contact bounce as brief as 0.2 milliseconds while
detect the moment the contact opens. The bar graph can
segment the graph bar graph, however, will display at least one
movement dampens the response.

When the contact bounce opens, its resistance value
changes momentarily from zero to infinity and back. The

As the capacitor changes, the red glow bar graph is placed across the impulses the analog bar graph
quickly shorts then rapidly down-range, depending on
the size of the capacitor. As the capacitor charges, the bar
graph slowly extends back to its full 51 segments length, up.
only when few segments are involved, the last few segments
remain if necessary. For capacitances as small as 0.2 pf, only
the 3- megohm range is involved. The need for checking smaller
capacitors increases sensitivity for checking smaller

increased sensitivity for checking smaller capacitors.
After initiating ohms position, the higher resistance ranges after
(incorporating ohms) position, the need of the needle moves back to the open
capacitor and the needle slowly moves to read the open
across the VOM input. The VOM battery charges the
capacitors in the capacitor kick test, the needle of the VOM in
the resistance mode moves quickly from open (infinity)
the resistance mode moves quickly from open (infinity)

Specific Applications -- Checking Capacitors

Specific Applications -- Contact Bounce
The Fluke 25/27 resistance measurement circuit is designed to tolerate ac noise far better than the usual DMM. Readable 2-kilohm readings can be obtained even in the presence of 1V ac noise. Readings of 1 megohm may be obtained with up to 2V ac noise. The noise appears as about 50 counts of change and an oscillating bar graph.

OPERATOR MAINTENANCE

WARNING

TO AVOID ELECTRICAL SHOCK, REMOVE THE TEST LEADS AND ANY INPUT SIGNALS BEFORE REPLACING THE BATTERY OR FUSES. CLOSE CASE AND REPLACE SCREWS BEFORE USING METER.

Battery Installation or Replacement
A single 9V battery (NEDA 1604, 6F22, or 006P) supplies power to operate the Fluke 25/27. Referring to Figure 1, use the following procedure to replace the Fluke 25/27 battery:

1. Turn the rotary switch to OFF, and remove the test leads.

Specific Applications—Noisy Resistance Measurements
Most digital multimeters are so sensitive they can not tolerate as much as 50 mV of line noise while making resistance measurements; their digital displays become unreadable due to the line noise. On the other hand, because of the mechanical inertia of the analog needle, the noise alternately pulls the needle to the left and then to the right, averaging out any movement and leaving a fairly stable resistance reading.

<table>
<thead>
<tr>
<th>Resistance Range</th>
<th>320Ω</th>
<th>3.2kΩ</th>
<th>32kΩ</th>
<th>320kΩ</th>
<th>3.2MΩ</th>
<th>32MΩ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capacitance Value</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10,000 μF</td>
<td>4 sec</td>
<td>33 sec</td>
<td>5 min</td>
<td>ext</td>
<td>ext</td>
<td>ext</td>
</tr>
<tr>
<td>1,000 μF</td>
<td>blink</td>
<td>4 sec</td>
<td>30 sec</td>
<td>ext</td>
<td>ext</td>
<td>ext</td>
</tr>
<tr>
<td>100 μF</td>
<td>nil</td>
<td>nil</td>
<td>blink</td>
<td>4 sec</td>
<td>30 sec</td>
<td>ext</td>
</tr>
<tr>
<td>10 μF</td>
<td>nil</td>
<td>nil</td>
<td>nil</td>
<td>blink</td>
<td>3 sec</td>
<td>19 sec</td>
</tr>
<tr>
<td>0.1 μF</td>
<td>nil</td>
<td>nil</td>
<td>nil</td>
<td>nil</td>
<td>blink</td>
<td>2 sec</td>
</tr>
<tr>
<td>0.02 μF</td>
<td>nil</td>
<td>nil</td>
<td>nil</td>
<td>nil</td>
<td>nil</td>
<td>blink</td>
</tr>
</tbody>
</table>

ext = extended time, nil = no indication
1. Turn the function selector switch to the 0 position.

2. Connect a test lead from the VΩ meter input terminal to the A input terminal.

Fuse Test

- Screws in a diagonal pattern.
- Tighten the battery cover while tightening the screws.
- Insert the battery holder/cover into the Fluke 25/27.
- Then start the four screws removed in step 2.
- Snap the battery connector to the terminals on the holder as shown in Figure 1.
- Disconnect the battery connector.
- Remove the battery from the battery holder.
- Drive screws from the battery cover.
- Pull the battery cover straight out from the back of the Fluke 25/27, then remove the four black, # 32 X 32, pozidriv screws from the Fluke 25/27. Then remove the four black, # 32 X 32, pozidriv screws from the Fluke 25/27.

Figure 1: Battery and Fuse Replacement
3. The display should indicate between 0.1 ohm and 0.3 ohm. This tests F3 (15A, 600V fast).

4. Move one end of the test lead from the A input terminal to the mA/μA input terminal.

5. The display should indicate between 5.3 ohms and 6.0 ohms. This tests F1 (3A, 600V fast) and F2 (630 mA, 250V fast).

6. If either of the above display indications is OL (overload), replace the appropriate fuse.

**Fuse Replacement**

**WARNING**

**THE USE OF MAKESHIFT FUSES AND THE SHORT-CIRCUITING OF FUSE HOLDERS CAN RESULT IN DAMAGE TO THE METER AND SERIOUS INJURY TO THE USER.**

Referring to Figure 1, use the following procedure to check or replace the Fluke 25/27 fuses:

1. Perform steps 1 through 3 of the battery replacement procedure.

2. Remove the defective fuse (or check continuity through the suspected fuse), and if necessary install a new fuse of the same size and rating. Remove the battery from the battery holder to gain access to a spare fuse for F2.

3. Reinstall the battery holder/cover as instructed in step 6 of the battery replacement procedure.

**General Maintenance**

Clean the case with a damp cloth and detergent; do not use abrasives or solvents.

The Fluke 25 and 27 are sealed to protect the instrument. To maintain proper sealing, open only the battery/fuse compartment.

Have the meter calibrated and the seals (part number 738112) replaced by a qualified technician once a year to ensure specified performance. Contact the nearest Fluke Service Center or refer to the Fluke Service Manual (part number 738138) for calibration or repair. Refer to the parts list at the end of this manual for operator replaceable parts.
Service Center for Information.
Service programs may vary by country. Contact the nearest:

OUT OF WARRANTY (OUTSIDE USA AND CANADA):

Instrument:
Include a check, money order, or purchase order with the
Contact the nearest Service Center for current prices.
because of abuse or accidental damage will be quoted.
will be repaired and returned for a fixed fee. (Repairs needed
OUT OF WARRANTY (USA AND CANADA): The Instrument

-card for warranty terms.
option, and return, all at no charge. See the registration
warranty will be promptly repaired or replaced, at Fluke's
IN WARRANTY: Instruments covered by the Limited

for damage in transit.
Instrument Security: Fluke shall assume no responsibility
manual), include a description of the difficulty, and pack the
Fluke Service Center (refer to the list at the back of this
If the instrument fails, forward it, postage paid, to the nearest

SERVICE

ENGLISH
<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>RANGE</th>
<th>RESOLUTION</th>
<th>ACCURACY *</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\overline{\bar{V}}$</td>
<td>3.200V</td>
<td>0.001V</td>
<td>±(0.1%+1)</td>
</tr>
<tr>
<td></td>
<td>32.00V</td>
<td>0.01V</td>
<td>±(0.1%+1)</td>
</tr>
<tr>
<td></td>
<td>320.0V</td>
<td>0.1V</td>
<td>±(0.1%+1)</td>
</tr>
<tr>
<td></td>
<td>1000V</td>
<td>1V</td>
<td>±(0.1%+1)</td>
</tr>
<tr>
<td>$\overline{\bar{mV}}$</td>
<td>320.0 mV</td>
<td>0.1 mV</td>
<td>±(0.1%+1)</td>
</tr>
<tr>
<td>$\overline{\bar{\Omega}}$</td>
<td>320.0Ω</td>
<td>0.1Ω</td>
<td>±(0.3%+2)</td>
</tr>
<tr>
<td></td>
<td>3.200 kΩ</td>
<td>0.001 kΩ</td>
<td>±(0.2%+1)</td>
</tr>
<tr>
<td></td>
<td>32.00 kΩ</td>
<td>0.01 kΩ</td>
<td>±(0.2%+1)</td>
</tr>
<tr>
<td></td>
<td>320.0 kΩ</td>
<td>0.1 kΩ</td>
<td>±(0.2%+1)</td>
</tr>
<tr>
<td></td>
<td>3.200 MΩ</td>
<td>0.001 MΩ</td>
<td>±(0.2%+1)</td>
</tr>
<tr>
<td></td>
<td>32.00 MΩ</td>
<td>0.01 MΩ</td>
<td>±(1%+1)</td>
</tr>
<tr>
<td></td>
<td>32.00 nS</td>
<td>0.01 nS</td>
<td>±(2%+10)</td>
</tr>
<tr>
<td>$\overline{\bar{\uparrow}}$</td>
<td>2.080V</td>
<td>0.001V</td>
<td>±(1%+1) typical</td>
</tr>
<tr>
<td>$\overline{\bar{V}}$</td>
<td>3.200V</td>
<td>0.001V</td>
<td>±(0.5%+3)</td>
</tr>
<tr>
<td></td>
<td>32.00V</td>
<td>0.01V</td>
<td>±(0.5%+3)</td>
</tr>
<tr>
<td></td>
<td>320.0V</td>
<td>0.1V</td>
<td>±(0.5%+3)</td>
</tr>
<tr>
<td></td>
<td>1000V</td>
<td>1V</td>
<td>±(1%+3)</td>
</tr>
<tr>
<td>$\overline{\bar{mV}}$</td>
<td>320.0 mV</td>
<td>0.1 mV</td>
<td>±(0.5%+3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>40 Hz-2 kHz</th>
<th>2 kHz-10 kHz</th>
<th>10 kHz-30 kHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\overline{\bar{V}}$</td>
<td>±(2%+3)</td>
<td>±(2%+3)</td>
<td>±(4%+10)</td>
</tr>
<tr>
<td>$\overline{\bar{mV}}$</td>
<td>±(2%+3)</td>
<td>±(2%+3)</td>
<td>±(4%+10)</td>
</tr>
<tr>
<td></td>
<td>±(4%+10)</td>
<td>Not Specified</td>
<td></td>
</tr>
</tbody>
</table>
Approximately 150Hz in the [[!!]] function produces a continuous audible tone.

Ranging is either automatic or manual in all functions with more than one range. Test resistance below value of a sine wave input.

Basic electrical accuracy is specified from 10°C to 20°C with relative humidity up to 95% for a period of one year after calibration. All ac conversions are coupled, average responding, and calibrated to read the true rms value of sine wave inputs. Accuracy is specified as ±[(% of reading + [number of least significant digits]).

<table>
<thead>
<tr>
<th>Voltage (mV/mA)</th>
<th>1 mV</th>
<th>0.1 mV</th>
<th>0.01 mV</th>
<th>0.001 mV</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5 mV/mA</td>
<td>0.5%</td>
<td>0.5%</td>
<td>0.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td>5 mV/mA</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>50 mV/mA</td>
<td>0.5%</td>
<td>0.5%</td>
<td>0.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td>0.5 mA</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.1%</td>
</tr>
<tr>
<td>5 mA</td>
<td>0.5%</td>
<td>0.5%</td>
<td>0.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td>50 mA</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.1%</td>
<td>0.1%</td>
</tr>
</tbody>
</table>

Typical Burden Voltage | Accuracy | Resolution | Range | Function
---|---|---|---|---

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>OVERLOAD PROTECTION</th>
<th>INPUT IMPEDANCE (nominal)</th>
<th>COMMON MODE REJECTION RATIO (1 kΩ unbalance)</th>
<th>NORMAL MODE REJECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>V</td>
<td>1000V rms</td>
<td>10 MΩ in // with &lt;100 pF</td>
<td>&gt;120 dB at dc, 50 Hz, or 60 Hz</td>
<td>&gt;60 dB at 50 Hz or 60 Hz</td>
</tr>
<tr>
<td>mV</td>
<td>500V rms</td>
<td>10 MΩ in // with &lt;100 pF</td>
<td>&gt;120 dB at dc, 50 Hz, or 60 Hz</td>
<td>&gt;60 dB at 50 Hz or 60 Hz</td>
</tr>
<tr>
<td>~V</td>
<td>1000V rms (10^7 V-Hz max)</td>
<td>10 MΩ in // with &lt;100 pF (ac coupled)</td>
<td>&gt;60 dB, dc to 60 Hz</td>
<td></td>
</tr>
<tr>
<td>~mV</td>
<td>500V rms (10^7 V-Hz max)</td>
<td>10 MΩ in // with &lt;100 pF (ac coupled)</td>
<td>&gt;60 dB, dc to 60 Hz</td>
<td></td>
</tr>
<tr>
<td>Ω</td>
<td>500V rms</td>
<td>OPEN CIRCUIT TEST VOLTAGE</td>
<td>FULL SCALE VOLTAGE</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;2.8V dc</td>
<td>Up to 3.2 MΩ</td>
<td>32 MΩ or nS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>&lt;420 mV dc</td>
<td>&lt;1.3V dc</td>
</tr>
</tbody>
</table>

MAXIMUM VOLTAGE BETWEEN ANY TERMINAL AND EARTH GROUND

1000V

<table>
<thead>
<tr>
<th>FUNCTION</th>
<th>FUSE PROTECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>mA or μA</td>
<td>630 mA 250V FAST, 3A 600V FAST</td>
</tr>
<tr>
<td>A</td>
<td>15A 600V FAST</td>
</tr>
</tbody>
</table>
Protection Class II per IEC 348 and ANSI C39.5

1.6 pounds (0.75 kg)

Size (HxWxL)
2.2 in x 3.75 in x 8 in (5.6 cm x 9.5 cm x 20.3 cm)

Per MIL-T-28800 for A Style A, Class 2 Instrument
1000 hrs typical

9V, NEDA 1604 or EF22 or 006P

Battery Type

0% to 70% (35°C to 55°C)
0% to 95% (0°C to 35°C)

Relative Humidity

<18°C or >28°C

Temperature Coefficient

0.1 x (specified accuracy)°C

Storage Temperature

-65°C to 85°C

Operating Temperature

-15°C to 55°C, 0°C to 40°C for 20 minutes when taken from 20°C

Analog Display

31 segments, updates 25/sec

Digital Display

3200 counts, updates 2/sec