

HIOKI

PRECISION DC VOLTMETER
DM7275, DM7276

7¹/₂ Digit

Precision DC Voltmeter



**9 ppm DC Voltmeter
for R&D to Production Lines**

CE

3 year
Warranty

High-Accuracy Measurement Approaching the Precision of Reference Instruments

Outstanding Long-term Stability and Temperature Characteristics

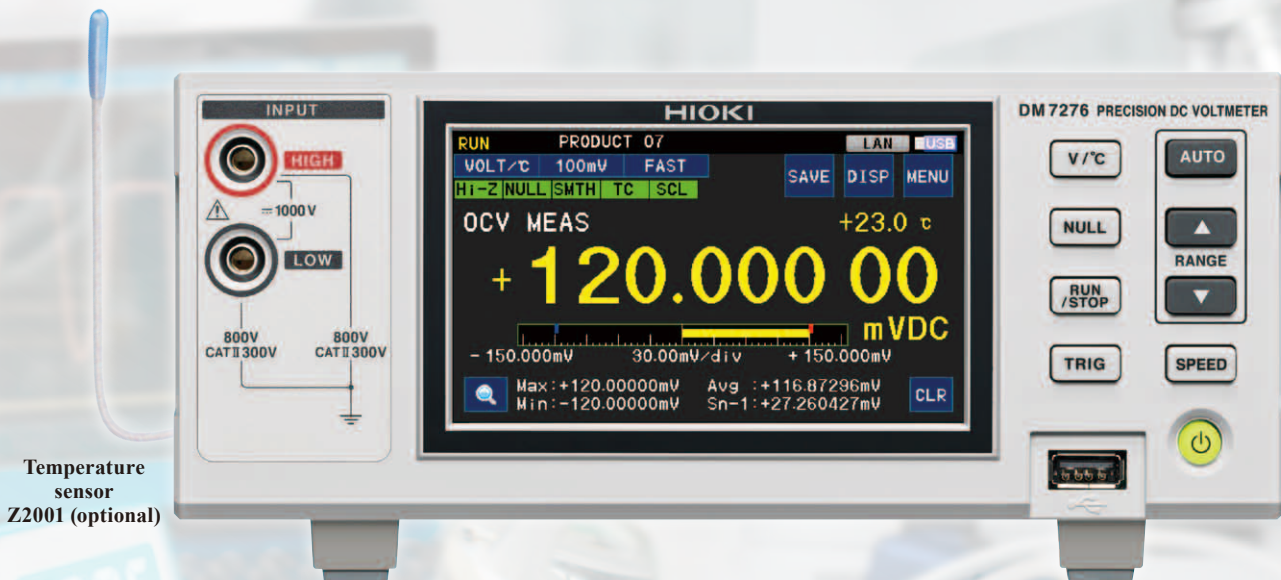
1-year long-term guarantee for high accuracy equivalent to an 8-1/2 digit DMM.

A DC voltmeter boasting the long-term stability and ease of use that only Hioki's field measuring expertise can deliver.

Measure 7-1/2 digit DC voltage and temperature simultaneously

1-year 9 ppm* Accuracy : DM7276

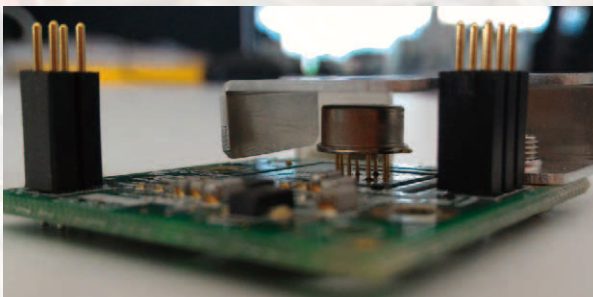
1-year 20 ppm* Accuracy : DM7275 *10 V range



Temperature sensor Z2001 (optional)

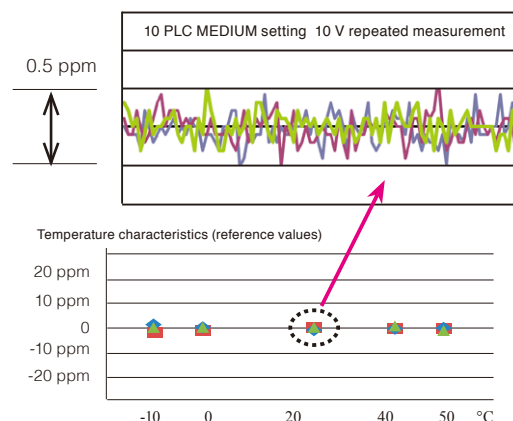
Fully-Automatic Self-Calibration and Highly-Stable Voltage Reference

Equipped with a newly-developed high-stability voltage reference



The voltage reference in the core represents screened components that have passed our special in-house tests and undergone long-term evaluation before being embedded in the system. Combining this with HIOKI's original fully automatic "Self-calibration" technology, we are able to offer a 1-year guaranteed 9ppm accuracy (DM7276).

Measuring performance resistant to temperature changes with high repeatability



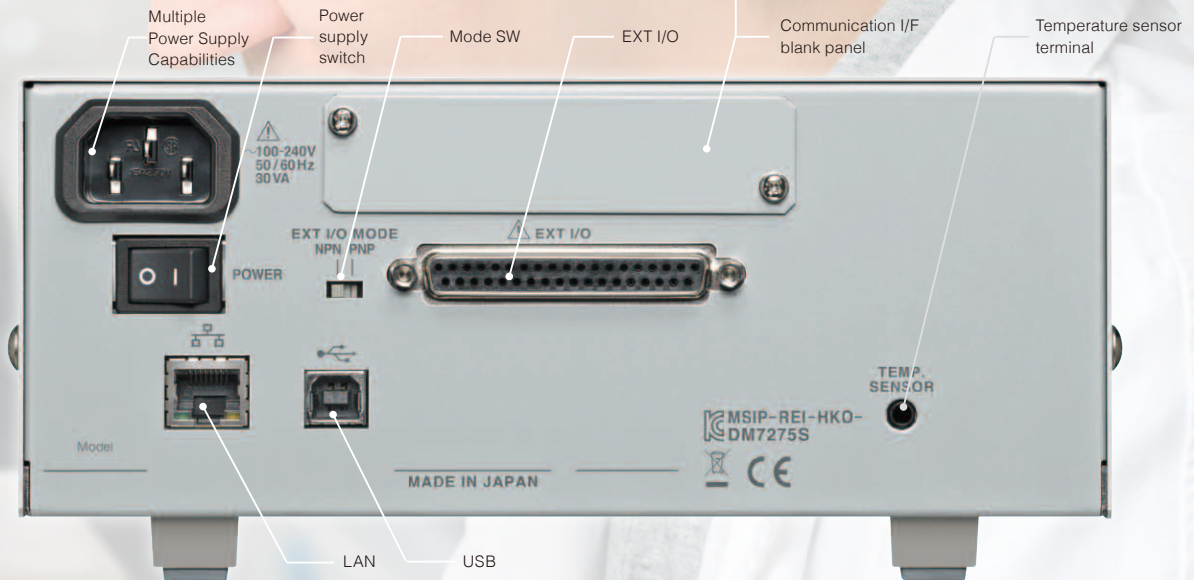
Equipped with a measurement engine resistant to extreme temperature changes even outside product specifications



Excellent noise performance approaching an 8-1/2 digit DMM.
 Specifications ideal for everything from R&D to production lines at 1/4 the conventional costs

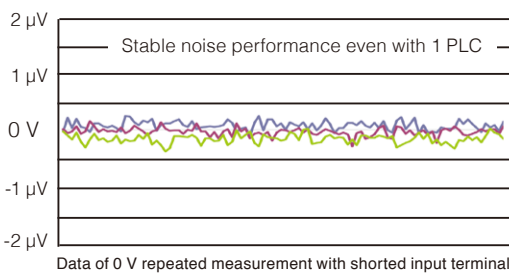
Capacitance Contact Check (using built-in C-monitor)
 Supports Global Production with Multiple Power Supply Capabilities (100 V to 240 V)
 Built-in EXT I/O, LAN, and USB

Base models DM7275-01, DM7276-01
 With GP-IB DM7275-02, DM7276-02
 With RS-232C DM7275-03, DM7276-03



Noise Performance Approaching an 8-1/2 Digit DMM and Noise Immunity thanks to Floating Design

Achieving noise performance that approaches reference instruments for calibration



Circuit designs which minimize the effect temperature changes have on sensitive receiving components and Self-Calibration provide stable measurement.

Noise performance represented by the highly-sensitive 100 mV range shows the real proficiency of reference instruments used in calibration. This high-spec machine achieves that performance at 1/4 the conventional costs.

*PLC = Power Line Cycle

Noise immunity suitable for field work

| | | |
|---|--|------------|
| Noise rejection ratio (Voltage measurement) | CMRR signal source resistance of 1 kΩ | |
| | DC CMRR: 140 dB or more | |
| | AC CMRR: 100 dB or more | |
| | NMRR power supply frequency setting of ±0.1% | |
| | Integration time for 1 PLC, 55 dB or more | |
| Input bias current | 100 mV/1 V range | 30 pA max. |
| | 10 V range | 50 pA max. |
| Common mode current | 10 nA (reference value) | |

Noise resistance is vital for performing stable measurement over long periods of time without external interference. Hioki has achieved basic performance, such as the noise rejection ratio and input bias current, in the reference instruments class.

Guarantees Broadened by High Accuracy Measurement

Advanced Applications

[Aging Test]

Precision for measuring a 4 V battery at 48 μV accuracy

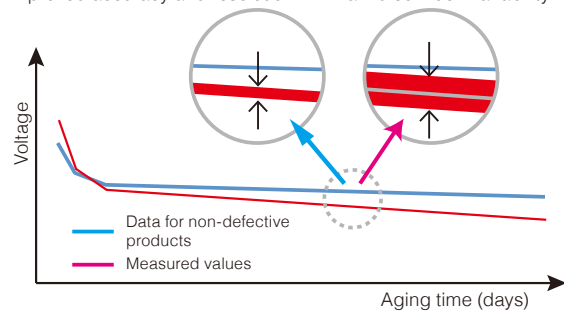
+ Increased efficiency using stable measurements with 1-year accuracy

For tests like OCV (Open Circuit Voltage) aging tests for batteries, where minute voltage changes are monitored over a long time to make a pass/fail judgment, the accuracy and long-term stability of the measuring instrument are essential. The DM7275 and DM7276 are unprecedented DC Voltmeters that ensure accuracy on the calibration device class for one year.

Since you don't need a complex system that considers calibration timing even for long-term data acquisition such as for aging tests, you can easily use it in laboratories. In production work, these devices simplify assembly line design and improve system reliability.

Make assured judgments with improved accuracy and resolution

Difficult to grasp the real value amid so much variability



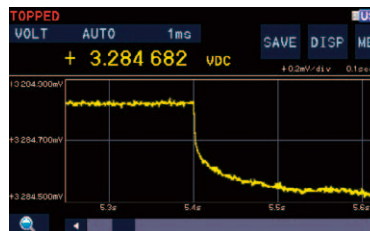
[Transient Characteristics Monitor]

DC Voltage Measurement Resistant to Noise + High-speed Sampling Mode Up to 1 msec \times 5000 times

The high-speed sampling mode (measurement count setting function) can measure continuously up to 5000 times per trigger. You can also change the integration time from the fastest setting of 1 msec.

This makes it easy to acquire data for measurements which noise made difficult for waveform recording from a Hioki Memory HiCorder or oscilloscope, such as battery charge/discharge properties.

Example DC-IR trend display



Example acquisition time using measurement count setting function (5000 times)

| Integration time | Acquisition time | |
|------------------|------------------|-------------|
| | 50 Hz | 60 Hz |
| 1 ms | 5 s | 5 s |
| 100 ms | 8 min 20 s | 8 min 20 s |
| FAST (1PLC) | 1 min 40 s | 1 min 23 s |
| MED (10PLC) | 16 min 40 s | 13 min 53 s |

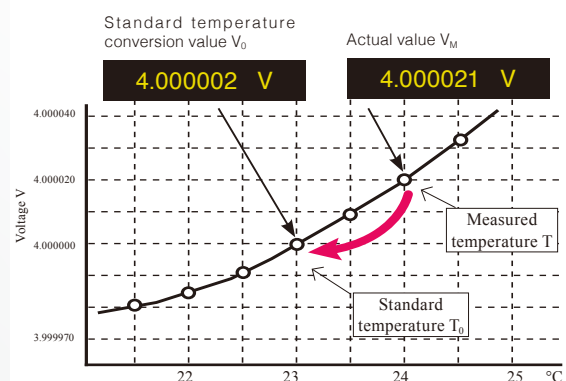
[Temperature Compensation Function]

Simultaneous Temperature Measurement + Display Converted Voltage in Standard Temperature

The OCV for lithium-ion batteries can fluctuate by several dozen μV if the ambient temperature fluctuates by even 1°C (1.8°F). For measured objects with this kind of temperature characteristic, you can use the temperature compensation function to display a value converted into a standard temperature voltage from the registered temperature coefficient. This is a new approach made possible by the DC voltmeter DM Series, which can measure both temperature and voltage simultaneously.

Temperature Compensation formula: $V_0 = V_M / (1 + \alpha(T - T_0))$

V_M : Voltage measurement after NULL calculation, T: Measured temperature, T_0 : Standard temperature



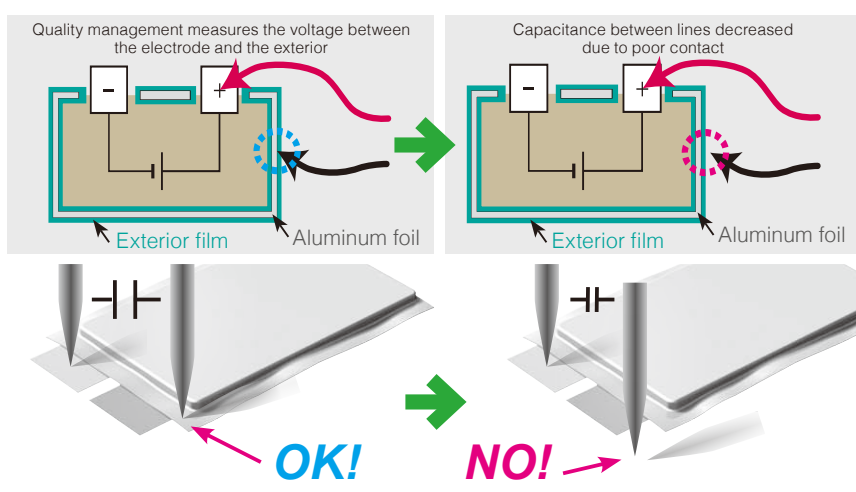
"7-½ digit DC voltage measurement" or "9 ppm high accuracy DC voltage measurement"

High resolution and high accuracy broaden measurement scopes and improve quality assurance.

[External potential measurement for lithium-ion batteries]

Measuring accuracy equivalent to 8-½ digit DMM

+ Measurement reliability of capacitance contact check



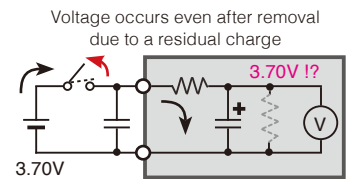
External potential measurement is effective for detecting poor insulation in the external film of lithium-ion batteries. For measuring devices such as a lithium-ion battery with a molded exterior, not only accuracy but probe contact reliability is vital.

The DM Series uses a faint 10 mVrms signal which doesn't stress the measurement target to measure the capacitance between measurement probes and check contact. A capacitance monitor is built-in for setting the threshold, so you can perform settings while checking the measured value.

[Guaranteed Contact for Scanner Measurement]

Input Resistance 10 GΩ Setting + Preventing False Judgments Using the Contact Check







When measuring DC voltage using an instrument with high input resistance (10 GΩ or more) such as a DMM, one cannot ignore the influence from capacitance in the voltmeter interior or external wiring. Particularly with high-speed switching measurement using a scanner, you need countermeasures to prevent defective products from being released due to poor tester contact. The DM7275 and DM7276 come with a contact check function as standard equipment, so you can easily construct an automated production line.



[Battery Measurement Lineup]

Combine with a DC voltmeter to expand HIOKI's battery measurement applications



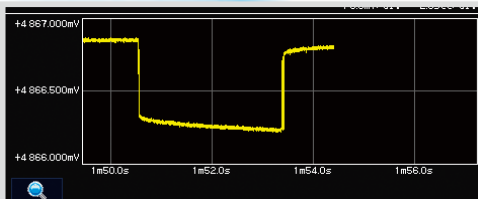
| TAB Welding | Vacuum Dry Sealing | Screening Characteristics Evaluation |
|--|---|---|
| <ul style="list-style-type: none"> Automatically determine the current waveform during welding Perform 4-terminal resistance measuring on TAB welds for post-welding pass/fail judgments <div style="display: flex; justify-content: space-around;"> <div data-bbox="175 1787 335 1960"> <p>Memory HiCorder MR8847A</p>  </div> <div data-bbox="375 1787 550 1960"> <p>Resistance Meter RM3545</p>  </div> </div> <ul style="list-style-type: none"> Waveform judgment function High-speed sampling up to 20MS/s with fully isolated inputs Max. 64logic + 10 analog channels 6-½ DC Voltmeter unit MR8990 Ultra-high accuracy with multi-channel support DC and max. 1A measurement current Up to 2.2ms measurement speed 0.01 μΩ best resolution | <ul style="list-style-type: none"> Evaluation of insulation resistance and dielectric withstand voltage between electrodes or between an electrode and the exterior after vacuum drying or sealing <div style="display: flex; justify-content: space-around;"> <div data-bbox="622 1787 782 1960"> <p>Insulation Tester ST5520</p>  </div> <div data-bbox="821 1787 1013 1960"> <p>Automatic Insulation/Withstanding HiTester 3153</p>  </div> </div> <ul style="list-style-type: none"> Judgment in as quick as 50 ms Test voltage: Set from 25 to 1000 V (1 V resolution) Insulation resistance: Up to 9990 MΩ (when test voltage is 500 to 1000 V) Memory/comparator/timer functions Insulation resistance test: up to 9999 MΩ Withstanding voltage test: up to 5 kV AC/DC Full remote control | <ul style="list-style-type: none"> High-speed screening using AC-IR measurement Impedance measurement for electronic-chemical components such as Cole-Cole plots and equivalent circuit analysis <div style="display: flex; justify-content: space-around;"> <div data-bbox="1061 1787 1252 1960"> <p>Chemical Impedance Analyzer IM3590</p>  </div> <div data-bbox="1276 1787 1452 1960"> <p>Battery Impedance Meter BT4560</p>  </div> </div> <ul style="list-style-type: none"> Determines Li-ion battery reliability Low-frequency AC-IR measurement without charging/discharging R, X, Z, θ measurement Test frequency from 0.1 Hz • Z , L, C, R, σ (conductivity), ε (dielectric constant) testing • Battery measurement • Testing source frequency: 1 mHz to 200 kHz • Measuring time: 2 ms |

From R&D to Production Lines

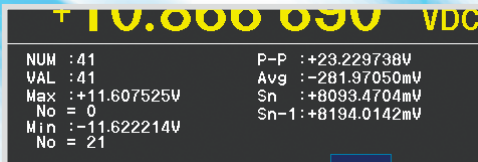
Rich Interface to Support Diverse Situations

The DM7275 and DM7276 are DC Voltmeters that deliver not only measurement accuracy but also polished operability and extensive versatility.

In addition to the user interface which uses a resistive touch panel that's useful on-site, they also feature a complete communication interface for linking with external devices.



Trend display



Statistics display



BIN function

[Comparator, BIN]

This digital voltmeter includes a comparator, which sets upper and lower limit values, and a BIN function, which categorizes ten pairs of upper and lower limit values. The screen changes color depending on the results, so you can rest assured even when checking results visually.

[Bar Graph, Smoothing]

You can display a bar graph like an analog meter to match the standard measured value display. Smoothing displays the measured value's moving average (2 to 100 times).

[Customized Display and Panel Saving]

You can change the number of displayed digits (3 to 7 digits) and the date to match the situation and region of use. Change to a simple display that shows only the voltage and temperature, or change the display to match numerical displays of countries that use periods (.) or commas (,) for the decimal point.

Each setting is saved internally as panel data. (Up to 30)

[PC Application]

Hioki provides a free application that uses USB communication to acquire data, measure intervals, test communication, load acquired data into Excel, and output acquired data into a CSV file. A multi-function software application, it can also link with external triggers.

Download it for free from the Hioki website at www.hioki.com.

[Voltage Trend Display]

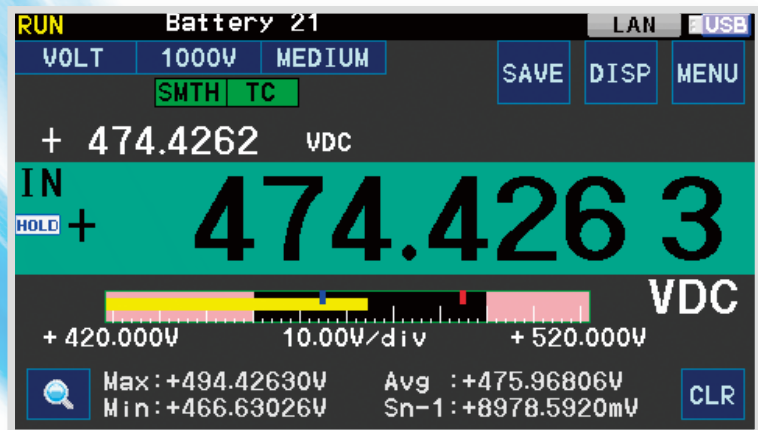
Displays up to 5000 data items with an integration time from 1 msec to 9999 msec. You can also use the trend display to easily check data including long-term data or data with abrupt changes such as transient properties.

[Statistics Display]

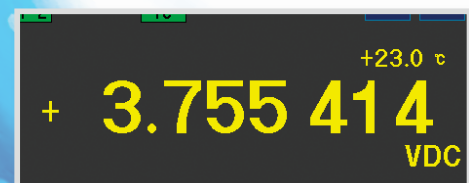
In addition to basic information such as the maximum, minimum, and average values, you can also display information vital to production, such as standard deviation or process capability indices.

[Auto Hold]

As soon as the measured value stabilizes, it is automatically maintained.



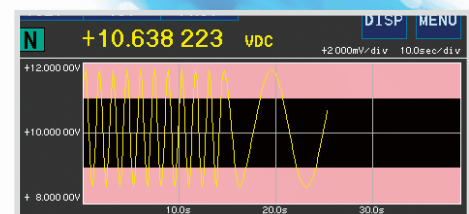
Auto-hold, comparator, bar graph, smoothing



Voltage and temperature simple display



Customized display





Resistive touch panel ensures operability even when wearing gloves

Flexibly Supports Connections to Computers or Controllers

Communication Monitor + Log Function

Monitor the LAN, USB, RS-232C, and GP-IB transmission contents on the panel. Communication commands support SCPI programming, so you can easily replace a generic multimeter.

This device supports system construction with its built-in log function, which saves communication content to USB memory.

GP-IB interface

(DM7275-02 and DM7276-02 only)

| | |
|----------------------|---|
| Communication method | IEEE-488.2 compliant Interface function SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0 |
| Addresses | 01 to 30 |

RS-232C interface

(DM7275-03 and DM7276-03 only)

| | |
|----------------------|--|
| Connector | 9-pin D-sub male connector with #4-40 inch screws |
| Communication method | Full duplex, start stop synchronization, stop bit of 1 (fixed), data length of 8 (fixed), no parity, no flow control |
| Communications speed | 9600 bps/19200 bps/38400 bps |

LAN interface

| | |
|---------------------------|--|
| Connector | RJ-45 connector × 1 |
| Electrical specifications | IEEE 802.3 compliant |
| Transmission method | 10Base-T/100Base-TX (automatic detection) |
| Protocol | TCP/IP |
| Functions | Setting and measurement using communication commands |

USB Device

| | |
|---------------------------|---|
| Connector | Series B receptacle |
| Electrical specifications | USB2.0 (Full-speed) |
| Class | CDC class (COM mode) HID class (USB keyboard mode) |

USB host (Flash drive)

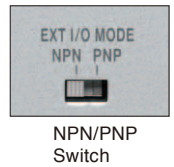
| | |
|----------------------------|---|
| Connector | Type A connector |
| Saving measured values | Saves the current measured value by pressing the system's SAVE button and saves a screen capture Saves all data of the measured value memory from the File Operations Screen |
| File operation | Save/load settings, Delete, Change name, Display capacitance |
| Supported USB flash drives | Mass Storage Class (VFAT not supported), up to 128 GB |

Options (Communication cable)

| | | |
|-----------------------|---------|------------------------------------|
| RS-232C Cable | 9637 | 9pin-9 pin, cross, 1.8 m (5.91 ft) |
| GP-IB Connector Cable | 9151-02 | Cord length: 2 m (6.56 ft) |
| USB Cable (A-B) | L1002 | Cord length: 1 m (3.28 ft) |
| LAN Cable | 9642 | Cord length: 5 m (16.40 ft) |

EXT I/O Interface

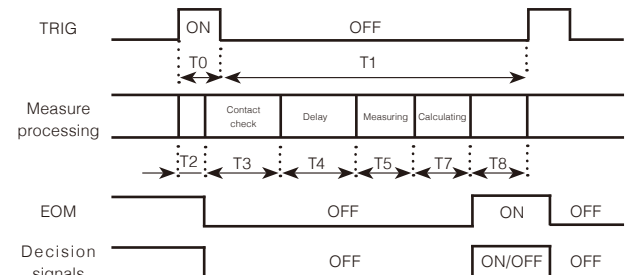
You can use the rear panel's switch to select either the NPN type (which supports sink output) or the PNP type (which supports source output) for the input signal polarity to match the programmable controller's common polarity.



EXT I/O Signal List (Supports I/O Test Functions)

| | |
|------------|---|
| Connector: | 37-pin D-sub female connector with #4-40 inch screws |
| Input: | Photocoupler isolated non-voltage contact input TRIG, KEY_LOCK, PRINT, LOAD0 to LOAD4 |
| Output: | Photocoupler isolated open drain output EOM, ERR [With BIN function ON] BIN0 to BIN9, OB [With BIN function OFF] OUT0 to OUT10, HI, IN, LO |

EXT I/O timing (External trigger, EOM output HOLD)



| Acquisition time T5 | Power supply frequency | |
|--------------------------|---------------------------|---------|
| Integration time setting | 50 Hz | 60 Hz |
| FAST (IPLC) | 27.2 ms | 23.8 ms |
| MED (10PLC) | 245 ms | 205 ms |
| SLOW (100PLC) | 3.92 s | 3.37 s |
| Other | Integration time + 5.3 ms | |

T0: 0.1 ms or more, T1: 1 ms or more
T2: 0.1 ms or less (Trigger detection time)
T3: Contact check integration time + 2 ms
T4: Trigger delay time
T5: Acquisition time (See Chart on left.)
T7: Calculating time 0.1 ms, T8: 1 ms or more

Printer 9442 Connection (DM7275-03 and DM7276-03 only)



| | | |
|---------------------|--|--|
| Printing method | : Thermal serial dot method | |
| Paper width | : 112 mm | |
| Printing speed | : 52.5 cps | |
| Power supply | : AC ADAPTER 9443-01, or the included nickel hydride batteries (Charged using the 9443-01. Can print approx. 3000 lines when fully charged.) | |
| Dimensions and mass | Approx. 160 mm (6.30 in) W × 66.5 mm (2.62 in) H × 170 mm (6.69 in) D, 580 g (20.5 oz) | |

Options (Printer)

| | | |
|------------------|---------|-------------------------------|
| Printer | 9442 | |
| AC Adapter | 9443-01 | For use in Japan |
| AC Adapter | 9443-02 | For use in the EU |
| Recording Paper | 1196 | 25 m (82.02 ft)/10 roll |
| Connection Cable | 9444 | Cable length: 1.5 m (4.92 ft) |

When designing a control system using an external interface, be sure to read the instruction manual and check the technical information.

Voltage measurement accuracy specifications (Accuracy guaranteed for 1 year; Post-adjustment accuracy guaranteed for 1 year)

| Using low thermal test lead, Integration time T_i : 10 PLC (Power Line Cycles) or more | | | | DM7275 | DM7276 |
|--|----------------------|-----------------|---|--------------------------------------|--------------------------------------|
| Range | Display range | Max. resolution | Input resistance | Measurement accuracy | Measurement accuracy |
| 100 mV | $\pm 120.000\ 00$ mV | 10 nV | 10 G Ω or more/10 M Ω $\pm 1\%$ | $\pm 0.0030\%$ rdg. ± 2 μ V | $\pm 0.0015\%$ rdg. ± 2 μ V |
| 1000 mV | $\pm 1200.000\ 0$ mV | 100 nV | 10 G Ω or more/10 M Ω $\pm 1\%$ | $\pm 0.0020\%$ rdg. ± 3 μ V | $\pm 0.0011\%$ rdg. ± 3 μ V |
| 10 V | $\pm 12.000\ 000$ V | 1 μ V | 10 G Ω or more/10 M Ω $\pm 1\%$ | $\pm 0.0020\%$ rdg. ± 12 μ V | $\pm 0.0009\%$ rdg. ± 12 μ V |
| 100 V | $\pm 120.000\ 00$ V | 10 μ V | 10 M Ω $\pm 1\%$ | $\pm 0.0030\%$ rdg. ± 0.8 mV | $\pm 0.0020\%$ rdg. ± 0.8 mV |
| 1000 V | $\pm 1000.000\ 0$ V | 100 μ V | 10 M Ω $\pm 1\%$ | $\pm 0.0035\%$ rdg. ± 2 mV | $\pm 0.0025\%$ rdg. ± 2 mV |

• Noise error (Additional error due to the integration time T_i)

1 PLC $\leq T_i < 10$ PLC: $\pm 0.0001\%$ of the range ± 0.5 μ V, 0.2 PLC $\leq T_i < 1$ PLC: $\pm 0.0003\%$ of the range ± 1 μ V, 0.02 PLC $\leq T_i < 0.2$ PLC: $\pm 0.001\%$ of the range ± 2 μ V

• Cable error (Additional error for measuring using a cable other than the low thermal test lead)

| Test lead combination 1 | | | Test lead combination 2 | | | | | |
|-------------------------|----------------------------|------------|-------------------------|--------------------|----------------------|------------|--------------------|-----------|
| Test lead | Contact section | | Connection cable | Extension cable | Contact section | | | |
| L9207-10 10 μ V | CONTACT PIN L4933 | 10 μ V | L4930 2 μ V | L4931 3 μ V | TEST PIN L4932 | 10 μ V | BUS BAR CLIP L4936 | 5 μ V |
| | SMALL ALLIGATOR CLIP L4934 | 7 μ V | | | ALLIGATOR CLIP L4935 | 7 μ V | GRABBER CLIP 9243 | 5 μ V |

Example addition: If using only the L9207-10 to perform measurement, add 10 μ V to the accuracy. If combining the L4930 and L4932, add (3+10) μ V.

Temperature Measurement Accuracy Specification (When using the TEMPERATURE SENSOR Z2001)

| Measurement range | Measurement accuracy | Measurement time |
|-------------------------------------|--|--------------------|
| -10.0°C to 60.0°C (14.0°F to 140°F) | $\pm 0.5^\circ\text{C}$ ($\pm 0.9^\circ\text{F}$) (5.0°C to 35°C, 41°F to 95°F) / $\pm 0.7^\circ\text{C}$ ($\pm 1.3^\circ\text{F}$) (-10°C to 50°C, 14°F to 122°F excluding the previous range) / $\pm 0.9^\circ\text{C}$ ($\pm 1.6^\circ\text{F}$) (50.1°C to 60.0°C, 122.2°F to 140.0°F) | 200 ms \pm 20 ms |

Specifications

| | | |
|---|---|--|
| Measurement parameters | DC voltage ($\Sigma\Delta$ conversion method), Temperature (when using the Z2001 thermistor sensor) | |
| Accuracy guarantee temperature and humidity range | 23°C \pm 5°C (73°C \pm 9°F), 80% RH or less (1 hour warm-up) | |
| Measurement support functions | Smoothing function, Null, temperature compensation, scaling, over-range display, self-calibration, auto-hold, contact check | |
| Management support functions | Comparator, BIN, absolute value judgment, label display, statistics, measurement information, communication monitor, EXT I/O TEST | |
| Integration time | Integration time unit: PLC/ms (PLC setting: 0.02/0.2/1/10/100, ms setting: 1 ms to 9999 ms) | |
| Contact check | Check signal: 10 mVrms, threshold value: 0.5 nF to 50 nF (Cannot use in the 100 V/1000 V ranges), Contact check integration time: 1 ms to 100 ms | |
| Internal memory | 5000 data points (voltage, temperature, elapsed time), 30 panel data points | |
| Statistics | Max. of 1000000 data points: Maximum value, minimum value, average value, sample standard deviation, population standard deviation, total data count, effective data count, process capability index, each BIN number count | |
| Maximum input voltage | Voltage measurement terminal: 1000 V DC (between HIGH - LOW terminals), 10 ³ VHz AC, 1500 Vpk *However, if measuring voltage in excess of 800 V, the measurement target must be isolated from ground. | |
| Maximum rated voltage to ground | Voltage measurement terminal: 800 V, Measurement category II: 300 V (Anticipated transient overvoltage: 2500 V to ground) | |
| Display | 4.3-inch, TFT color LCD resistive touch panel | |
| Standards | Safety: EN61010 EMC: EN61326, EN61000 | |
| Power supply/Dimensions | 100 V to 240 V AC, 50/60 Hz, 30 VA, 215 mm (8.46 in) W \times 88 mm (3.46 in) H \times 232 mm (9.13 in) D (excluding protrusions) | |
| Mass | DM7275-01/DM7276-01: 2.3 kg (8.1 oz), DM7275-02/-03/DM7276-02/-03: 2.4 kg (8.47 oz) | |
| Accessories | Instruction manual x 1, power cord x 1, application disk (CD-R) x 1 | |



9 ppm voltage measurement accuracy
Model : PRECISION DC VOLT METER DM7276

Model No. (Order Code) (Note)

DM7276-01
DM7276-02 (Built-in GP-IB)
DM7276-03 (Built-in RS-232C)

Measurement probes are not included. Purchase the probes appropriate for your application separately:

20 ppm voltage measurement accuracy
Model : PRECISION DC VOLT METER DM7275

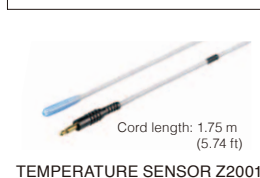
Model No. (Order Code) (Note)

DM7275-01
DM7275-02 (Built-in GP-IB)
DM7275-03 (Built-in RS-232C)

Measurement probes are not included. Purchase the probes appropriate for your application separately:

Options (Test Leads, Sensors)

Combination 1



Combination 2



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