HIOKI

PRECISION DC VOLTMETER
DM7275, DM7276

7 1/2 Digit

Precision DC Voltmeter

9 ppm DC Voltmeter for R&D to Production Lines

CE 3 year Warranty

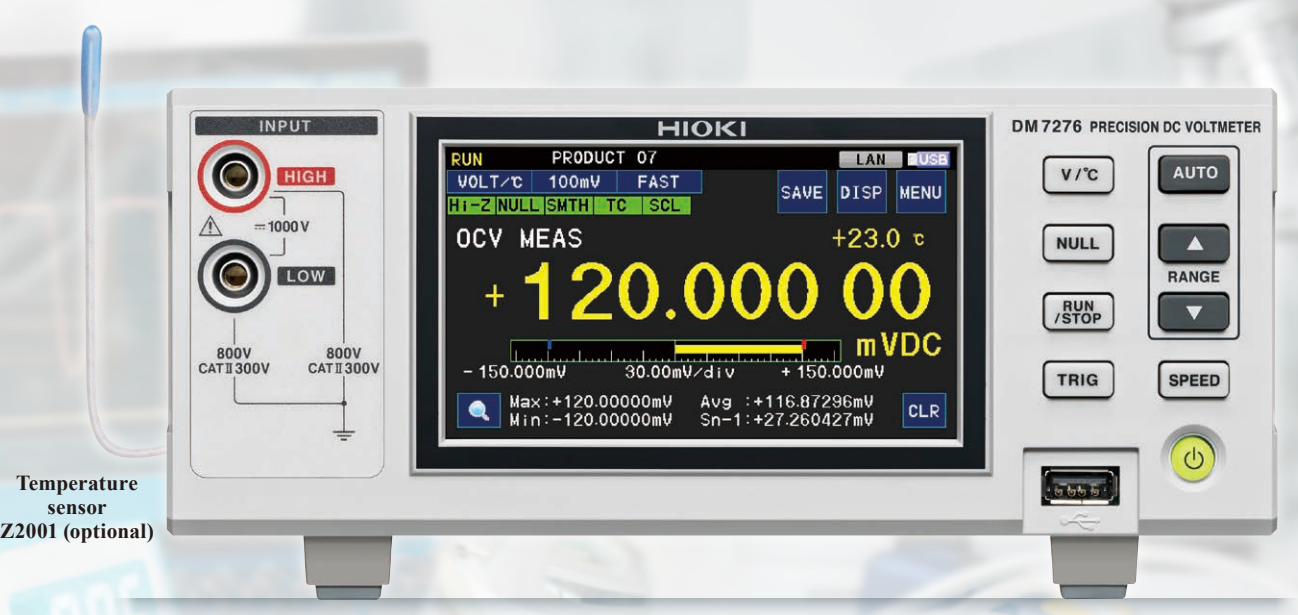
High-Accuracy Measurement Approaching the Precision of Reference Instruments

Outstanding Long-term Stability and Temperature Characteristics

1-year long-term guarantee for high accuracy equivalent to an 8-½ digit DMM.
A DC voltmeter boasting the long-term stability and ease of use that only Hioki's field measuring expertise can deliver.

Measure 7-½ digit DC voltage and temperature simultaneously

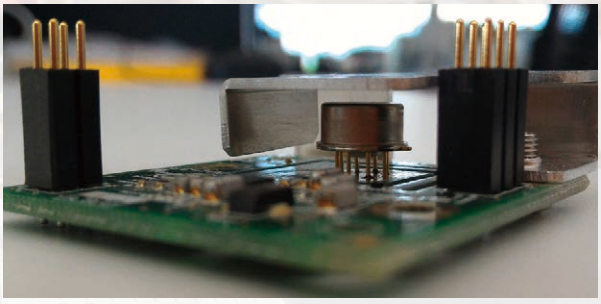
1-year 9 ppm* Accuracy : DM7276
1-year 20 ppm* Accuracy : DM7275 *10 V range



Temperature sensor Z2001 (optional)

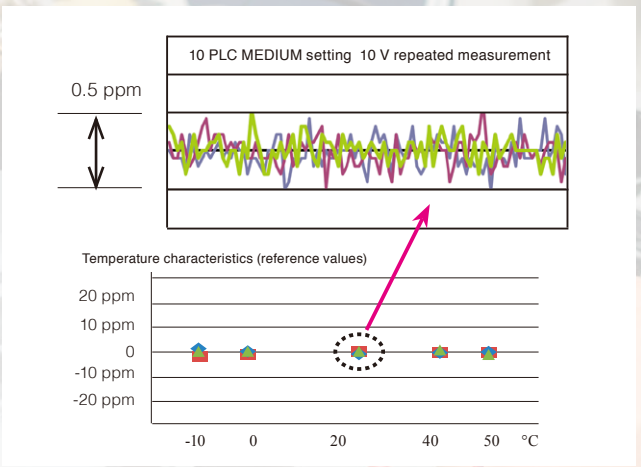
Fully-Automatic Self-Calibration and Highly-Stable Voltage Reference

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 8-½ digit DMM.

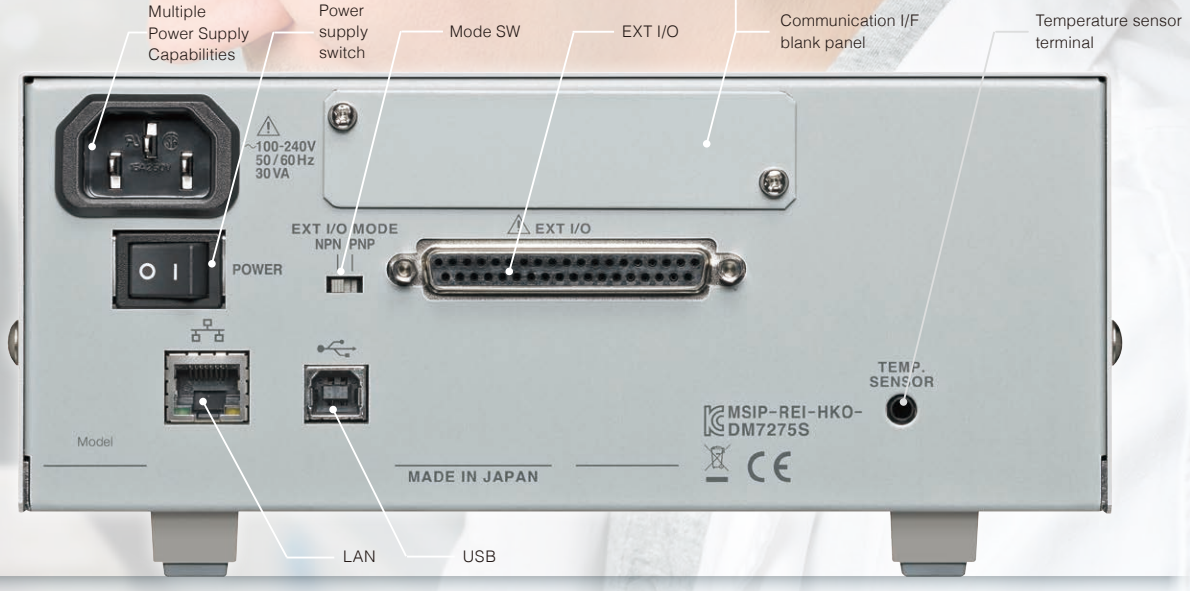
Specifications ideal for everything from R&D to production lines at 1/4 the conventional costs

Capacitance Contact Check (using built-in C-monitor)

Supports Global Production with Multiple Power Supply Capabilities (100 V to 240 V)

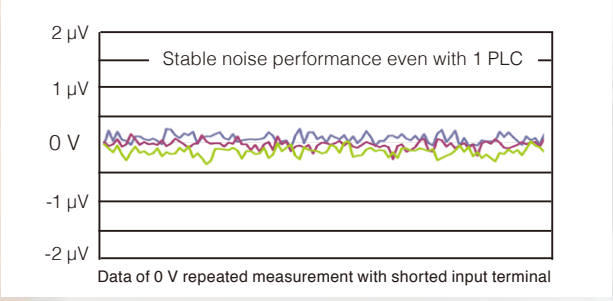
Built-in EXT I/O, LAN, and USB

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



Noise Performance Approaching an 8-½ Digit DMM and Noise Immunity thanks to Floating Design

Achieving noise performance that approaches reference instruments for calibration



Data of 0 V repeated measurement with shorted input terminal

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	
	Integration time for 10 PLC, 120 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.

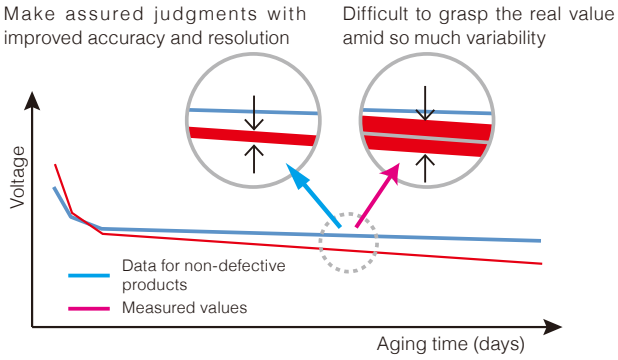
Guarantees Broadened by High Accuracy Measurement

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.

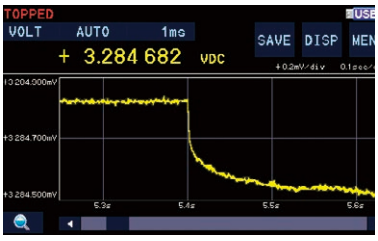


[Transient Characteristics Monitor]

DC Voltage Measurement Resistant to Noise + High-speed Sampling Mode Up to 1 msec × 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)

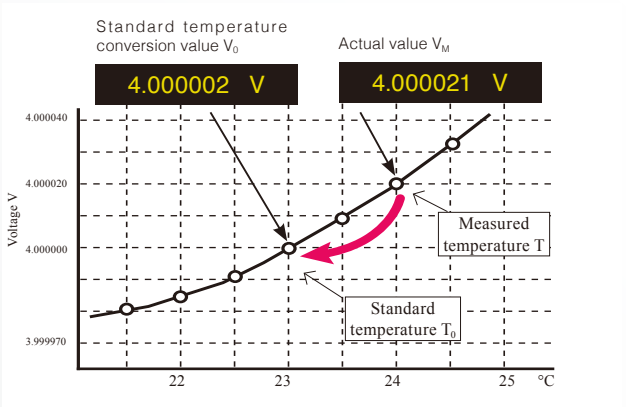
Integration time	Acquisition time	
	50 Hz	60 Hz
1 ms	5 s	5 s
100 ms	8 min 20 s	8 min 20 s
FAST (1PLC)	1 min 40 s	1 min 23 s
MED (10PLC)	16 min 40 s	13 min 53 s

[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



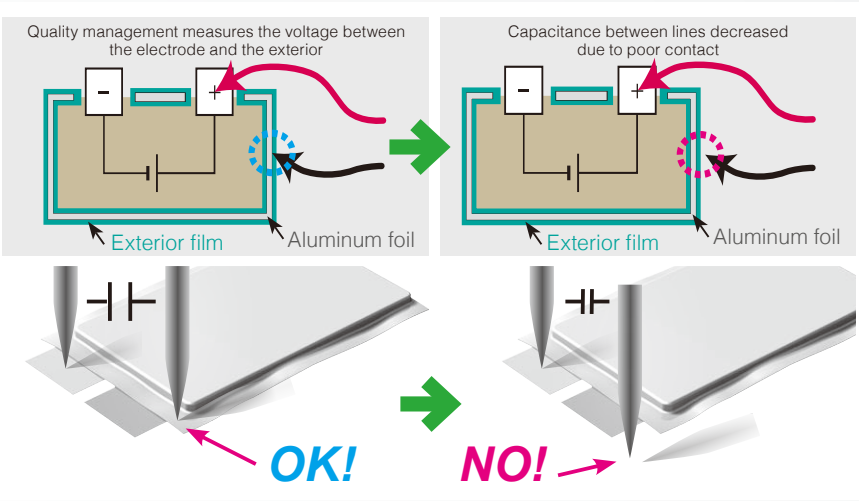
"7-½ digit DC voltage measurement" or "9 ppm high accuracy DC voltage measurement"

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



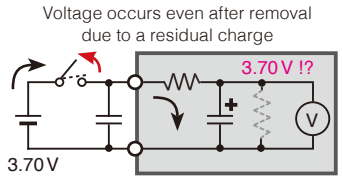
External potential measurement is effective for detecting poor insulation in the external film of lithium-ion batteries. For measuring devices such as a lithium-ion battery with a molded exterior, not only accuracy but probe contact reliability is vital.

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

- Automatically determine the current waveform during welding
- Perform 4-terminal resistance measuring on TAB welds for post-welding pass/fail judgments

Memory HiCorder MR8848

- Waveform judgment function
- High-speed sampling up to 20 MS/s with fully isolated imputs
- Max. 64logic + 20 analog channels
- 6-½ DC Voltmeter unit MR8990

Resistance Meter RM3545A

- 1000 µΩ to 1000 MΩ range
- Testing source current: DC, 1 A Max.
- Finest resolution: 1 nΩ
- Multi-point measurement: 20 locations

Vacuum Dry Sealing

- Evaluation of insulation resistance and dielectric withstand voltage between electrodes or between an electrode and the exterior after vacuum drying or sealing

Insulation Tester ST5520

- 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

Automatic Insulation/ Withstanding HiTester 3153

- Insulation resistance test: up to 9999 MΩ
- Withstanding voltage test: up to 5 kV AC/DC
- Full remote control

Screening Characteristics Evaluation

- High-speed screening using AC-IR measurement
- Impedance measurement for electronic-chemical components such as Cole-Cole plots and equivalent circuit analysis

Chemical Impedance Analyzer IM3590

- |Z|, L, C, R, σ (conductivity), ε (dielectric constant) testing
- Battery measurement
- Testing source frequency: 1 mHz to 200 kHz
- Measuring time: 2 ms

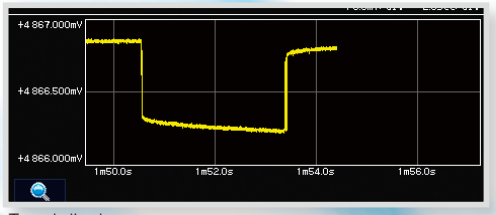
Battery Impedance Meter BT4560

- EIS measuring instrument for Li-ion batteries
- Measurement of R, X, Z, V, θ, T
- Test frequency: 0.01 Hz and above
- Voltage measurement resolution: 10 µV

From R&D to Production Lines

Rich Interface to Support Diverse Situations

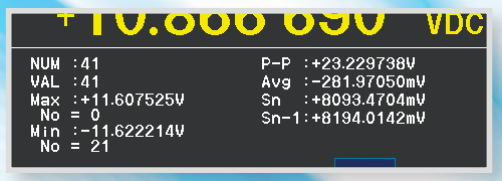
The DM7275 and DM7276 are DC Voltmeters that deliver not only measurement accuracy but also polished operability and extensive versatility.
In addition to the user interface which uses a resistive touch panel that's useful on-site, they also feature a complete communication interface for linking with external devices.



Trend display

[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.



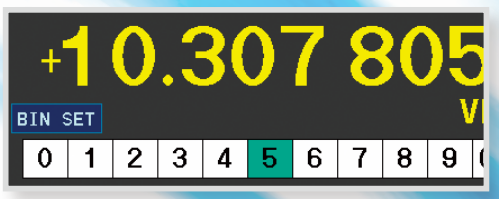
Statistics display

[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]

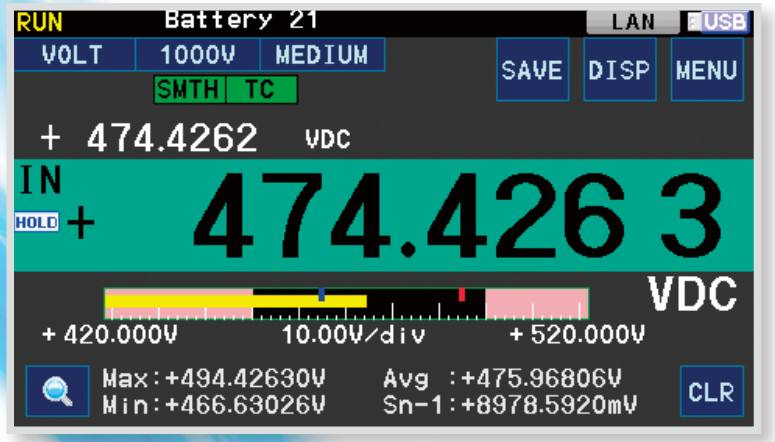
As soon as the measured value stabilizes, it is automatically maintained.



BIN function

[Comparator, BIN]

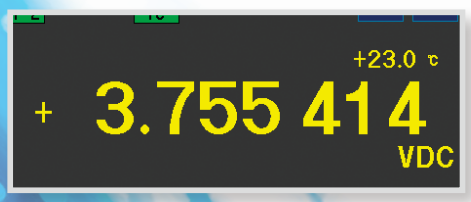
This digital voltmeter includes a comparator, which sets upper and lower limit values, and a BIN function, which categorizes ten pairs of upper and lower limit values. The screen changes color depending on the results, so you can rest assured even when checking results visually.



Auto-hold, comparator, bar graph, smoothing

[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).



Voltage and temperature simple display

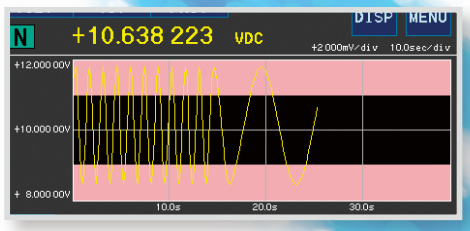
[Customized Display and Panel Saving]

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)

Customized display

[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.



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

EXT I/O Interface

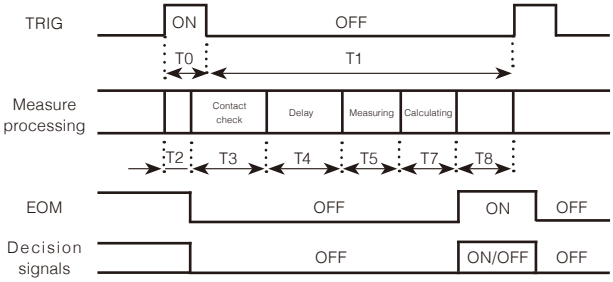
You can use the rear panel's switch to select either the NPN type (which supports sink output) or the PNP type (which supports source output) for the input signal polarity to match the programmable controller's common polarity.

NPN/PNP Switch

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 (1PLC)	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

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)

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)

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

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

1 PLC ≤ Ti < 10 PLC: ±0.0001% of the range ±0.5 μV, 0.2 PLC ≤ Ti < 1 PLC: ±0.0003% of the range ±1 μV, 0.02 PLC ≤ Ti < 0.2 PLC: ±0.001% of the range ±2 μV

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

Test lead combination 1		
Test lead	Contact section	
L9207-10 10 μV	CONTACT PIN L4933	10 μV
	SMALL ALLIGATOR CLIP L4934	7 μV

Test lead combination 2					
Connection cable	Extension cable	Contact section			
L4930 2 μV	L4931 3 μV	TEST PIN L4932	10 μV	BUS BAR CLIP L4936	5 μV
		ALLIGATOR CLIP L4935	7 μV	GRABBER CLIP L9243	5 μV

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

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)	±0.5°C (±0.9°F) (5.0°C to 35°C,41°F to 95°F) / ±0.7°C (±1.3°F) (-10°C to 50°C,14°F to 122°F excluding the previous range)/ ±0.9°C (±1.6°F) (50.1°C to 60.0°C,122.2°F to 140.0°F)	200 ms ± 20 ms

Specifications

Measurement parameters	DC voltage (ΣΔ conversion method), Temperature (when using the Z2001 thermistor sensor)
Accuracy guarantee temperature and humidity range	23°C ±5°C (73°C ±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), 10^5 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 × 88 mm (3.46 in) H × 232 mm (9.13 in) D (excluding protrusions)
Mass	DM7275-01/DM7276-01: 2.3 kg (81.1 oz), DM7275-02/-03/DM7276-02/-03: 2.4 kg (84.7 oz)
Accessories	Instruction manual x 1, power cord x 1, application disk (CD-R) x 1

9 ppm voltage measurement accuracy
Model : PRECISION DC VOLTMETER 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 VOLTMETER 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

Cord length: 90 cm
Includes caps (red and black × 1 ea.)
TEST LEAD L9207-10

DC 60 V / AC 30 V
CONTACT PIN SET L4933

Cord length: 1.75 m
(5.74 ft)
TEMPERATURE SENSOR Z2001

CAT II 600 V
CAT III 300 V
SMALL ALLIGATOR CLIP SET L4934

Combination 2

Cord length: 1.2 m (3.94 ft)
CONNECTION CABLE SET L4930

CAT III 1000 V
CAT IV 600 V
ALLIGATOR CLIP SET L4935

30 mm (1.18 in)
CAT III 600 V
BUS BAR CLIP SET L4936

CAT III 1000 V
CAT IV 600 V
Cord length: 1.5 m (4.92 ft)
With connection connector
EXTENSION CABLE SET L4931

CAT III 1000 V, CAT IV 600 V
Includes caps (red and black × 1 ea.)
TEST PIN SET L4932

GRABBER CLIP L9243

Note: company names and product names appearing in this brochure are trademarks or registered trademarks of various companies.

DISTRIBUTED BY

HIOKI
HIOKI E.E. CORPORATION

HEADQUARTERS
81 Koizumi,
Ueda, Nagano 386-1192 Japan
https://www.hioki.com/

Scan for all regional contact information