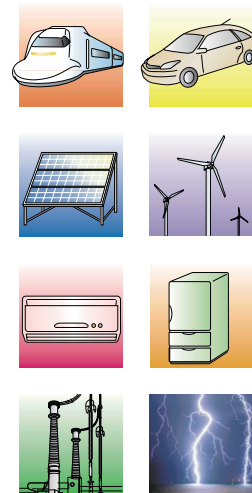


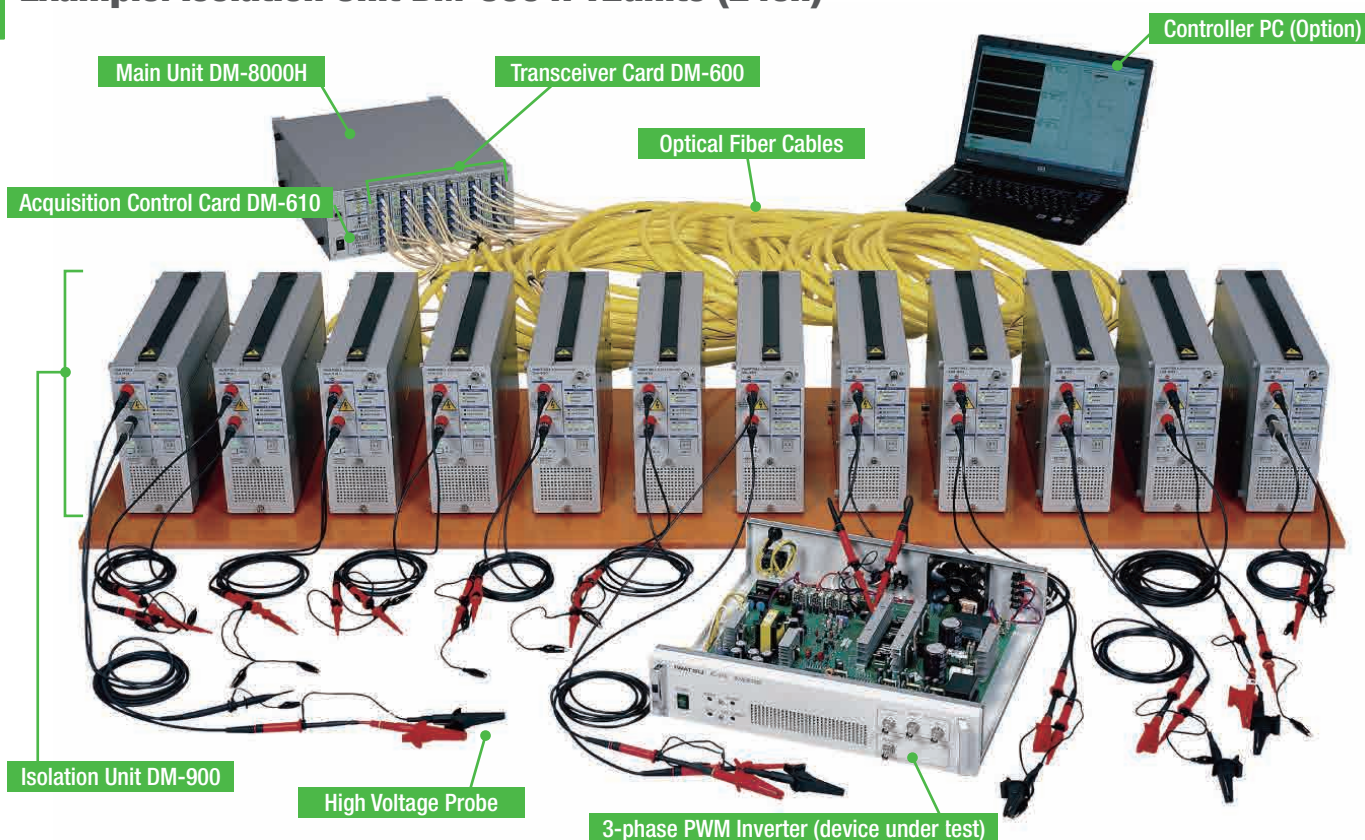
Isolation measurement system

DM-8000H

- The input block, control block and display block are isolated with optical fiber cables. (DM-900/L, DM-910/L)
- Frequency bandwidth: DC to 500MHz.
- Simultaneous multi-channel measurement of many channels of different reference potentials. (2 to 24 channels) (DM-900/L, DM-400/L)
- Long-life battery drive. (The system can be driven by three batteries for about 12 hours) (DM-900/L, DM-910/L)
- Measurement using long memory. (DM-900/L, DM-910/L, DM-400/L)
- Simultaneous measurements of the inverter's switching waveform and ON-voltage. (DM-910/L)
- Also supports synchronous measurements with the non-isolated unit. (DM-400/L)



Example: Isolation Unit DM-900 x 12units (24ch)



Lineup

Items	Model
Main unit	DM-8000H
Acquisition control card	DM-610
Transceiver card (optical x 2)	DM-600
Transceiver card (optical x 1, metal x 1)	DM-620
Transceiver card (metal x 2)	DM-630
Isolation unit (500k points) *1	DM-900
Isolation unit (16M points) *1	DM-900L
Isolation unit (high resolution, 500 k points) *2	DM-910
Isolation unit (high resolution, 16 M points) *2	DM-910L
Acquisition unit (500k points) *3	DM-400
Acquisition unit (16M points) *3	DM-400L

*1 With insulation case

*2 With insulation case. Optional probe is required for voltage measurements.

*3 Non-isolation type unit driven by AC power only.

Items	Model
Optical fiber cable S (2m) *4	DM-002
Optical fiber cable S (5m) *4	DM-004
Optical fiber cable (5m)	DM-005
Optical fiber cable (10m)	DM-006
Optical fiber cable (20m)	DM-007
Optical fiber cable (50m)	DM-008
Optical fiber cable (100m)	DM-009
Optical fiber cable (200m) [Custom Order]	DM-010
Acquisition cable (2m)	DM-105
Acquisition cable (5m)	DM-106
Battery pack	DM-551
Battery pack (set of three battery packs) *5	DM-553

*4 Optical cable set without sheath.

*5 Standard item for isolation unit.

*Distribution of DM-8000H series is limited in Japan and Asian markets.

Isolation with Optical Fiber cable (2 to 200 m)

The input block, control block and display block are isolated by an optical fiber cable. Owing to the fact that isolation units are isolated from each other by optical fiber cables, it is possible to simultaneously measure signals that have different reference potentials, such as signals from the high and low-side switch of an inverter or from the primary and secondary sides of a power converter.

DM-8000H main unit

Up to 12 isolation units and acquisition units can be connected. An acquisition control card for capture control and up to 6 specially designed transceiver cards can be installed onto the main unit. The gigabit Ethernet-enabled high-speed main unit improves the waveform update speed when using 3 or more units. The interlock control terminal is on the rear panel.

DM-600 transceiver card

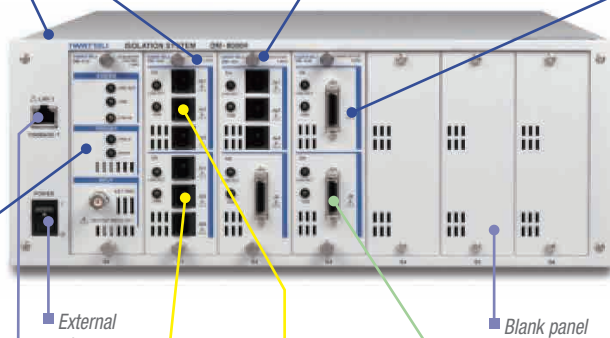
Two isolation units can be connected per card.

DM-620 optical and metal transceiver card

One isolation unit and one acquisition unit can be connected per card.

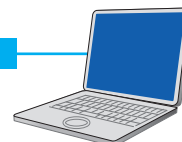
DM-630 metal transceiver card

Two acquisition units can be connected per card.



LAN cable

Control PC (optional)



DM-610

acquisition control card

This card controls waveform capture in measurement units. It also provides a non-isolated external trigger input, which can be changed to an external trigger output terminal.

External trigger terminal

LAN terminal



Interlock contact

Optical fiber cable

Optical fiber cable

Acquisition cable

DM-900 (500k)/DM-900L (16M) isolation units



The units are operated by a built-in battery to perform floating measurements. Frequency bandwidth: DC to 500MHz, highest sampling rate: 2GS/s, memory length: 500k points (DM-900), 16M points (DM-900L), input: 2channels (not isolated), interface: optical interface (set of three interfaces)



Insulation case
Withstand voltage: 10kV (Standard accessory)

DM-910 (500k)/DM-910L (16M) isolation units (high resolution)



The units are operated by a built-in battery to perform floating measurements. The high resolution enables the simultaneous measurement of switching waveforms and on-voltage. Frequency bandwidth: DC to 500MHz, highest sampling rate: 2GS/s, memory length: 500k points (DM-910), 16M points (DM-910L), input: 1channel, interface: optical interface (set of three interfaces)



Insulation case
Withstand voltage: 10kV (Standard accessory)

DM-400 (500k)/DM-400L (16M) acquisition units



The units can continuously operated with an AC power source. These units are best suited to the non-isolated measurement of grounded power probes, for example.

Frequency bandwidth: DC to 500MHz, highest sampling rate: 2GS/s, memory length: 500k points (DM-400), 16M points (DM-400L), input: 2channels (not isolated), interface: electric interface (one set)

DM-553 Li-ion battery (built-in)

The battery can be inserted or removed from the front of the isolation unit. It uses three batteries to enable the unit to continuously operate for 20hours. The battery can be charged with the use of the main unit.



The DM-900/L and DM-910/L are supplied with three batteries.

DM-002 to DM-010 optical fiber cables

The optical fiber cables are resistant to bending and external pressure.



Cable length: 2m to 200m
*1-2-5 step length
Without cover: 2m or 5 m
With cover: 5m to 200m

DM-105/DM-106 acquisition cables

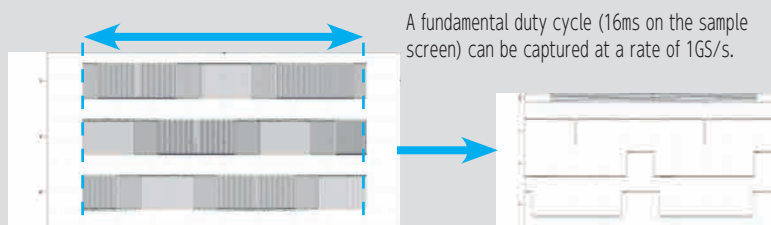
Interface cables especially designed for the acquisition unit. These cables are connected to the unit and transceiver by electrical signals from the DM-400/L.



Cable length: 2 or 5m

The DM-9xxL long memory isolation unit enables detailed analysis during a basic inverter duty cycle.

The DM-900L and DM-910L long memory isolation units enable detailed analysis of individual carrier signals while capturing a base duty cycle.



Gate driving waveform of the U, V, and W phases on the high side of a 3-phase inverter.

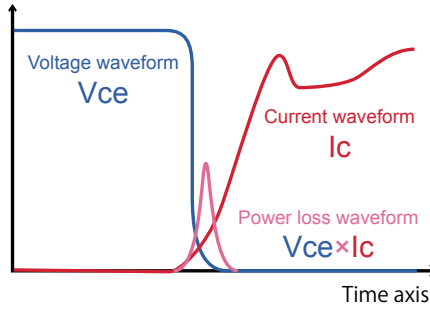
A fundamental duty cycle (16ms on the sample screen) can be captured at a rate of 1GS/s.

View with zoom display.

Up to 24 CH at a high voltage and wide bandwidth can be simultaneously measured.

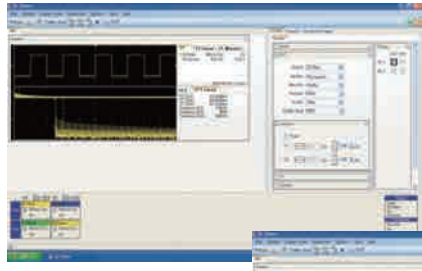
Waveform monitoring and other system operations are remotely performed using the standard IS Viewer (software). The IS Viewer can be used off-line as well, and is therefore useful for data organization at locations remote from the measurement site.

The many operation functions provided by the IS Viewer facilitate power loss and other measurement.

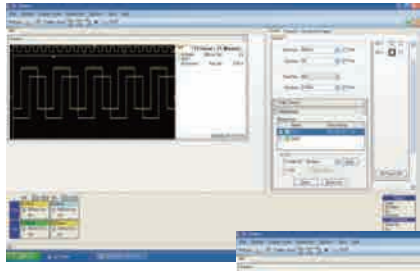


The V_{ce} , I_c , output voltage and current waveforms of the upper and lower arms of an inverter can be simultaneously measured. dv/dt , di/dt , and other parameters, such as power loss, can be easily calculated from the measurement waveforms.

Functions of the IS viewer (DM-800)

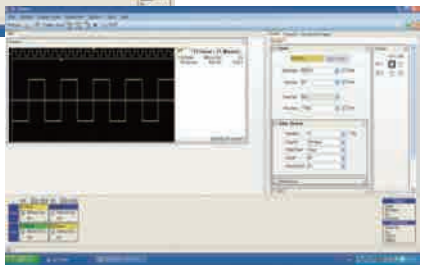


FFT function
This function is used for the frequency analysis of measured waveforms.

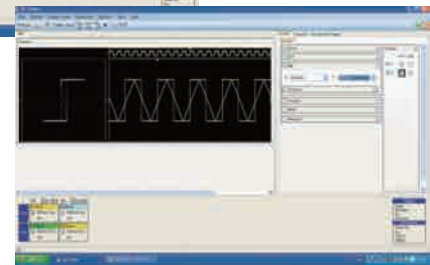


Reference display function
This function is used to compare waveforms.

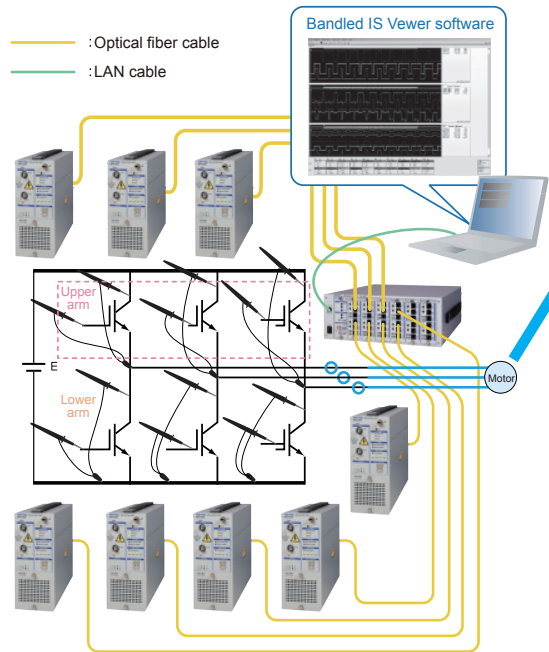
Edge search function
This function is used to automatically detect the edge of a monitored waveform and display selected edges.



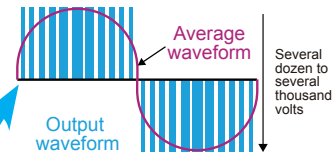
X-Y display function
This function is used to evaluate the SOA (safe operation area) and other items.



Multi-channel floating measurements (simultaneous measurement example of the upper and lower arms of a 3-phase inverter)

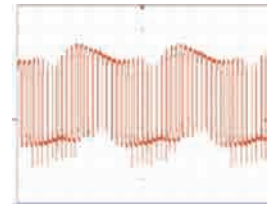
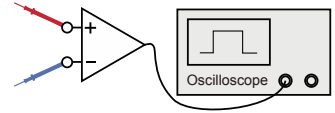


The waveform of voltage output from the 3-phase inverter that drives a motor or other device (shown in the left-hand figure) is a pulse voltage waveform, as shown in the figure below.

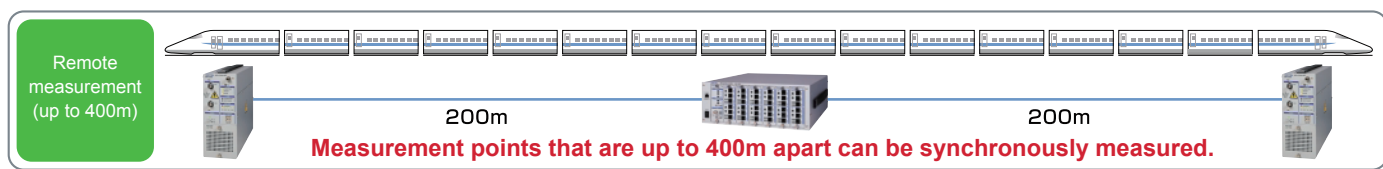
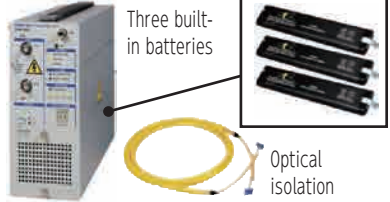


Differential probes were used for this type of measurement in the past, but this resulted in the waveform sometimes being distorted, and it was sometimes difficult to ensure sufficient measurement bandwidth due to constraints of the common mode rejection ratio or withstand common mode voltage. With optical fiber isolation, this isolation system can accurately monitor signals without being affected by these constraints.

Measuring V_{ge} of the upper arm with differential input

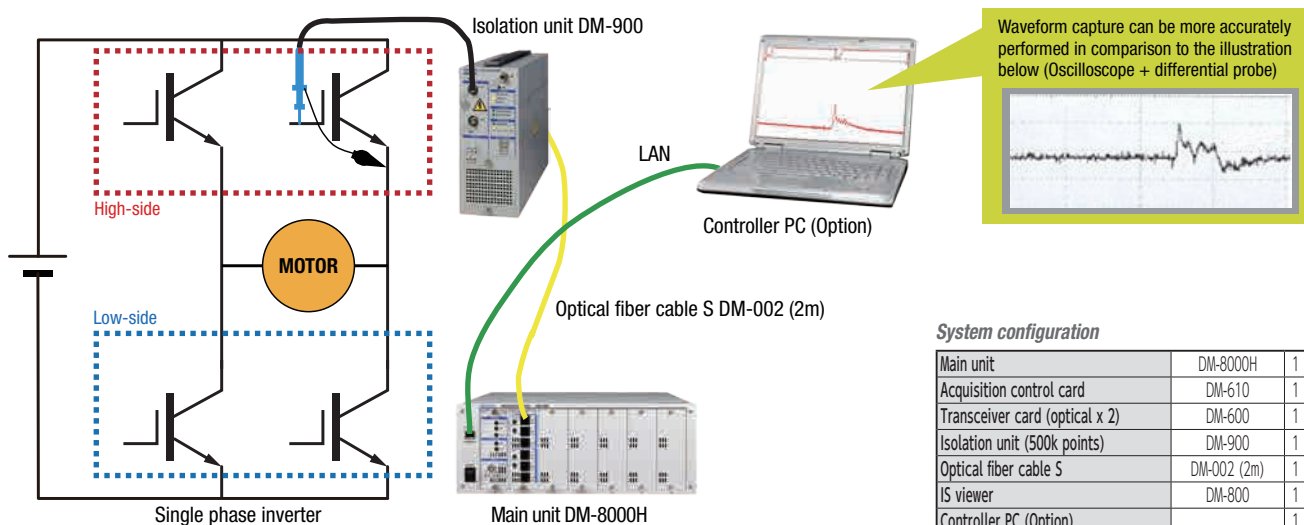


Measuring V_{ge} of the upper arm with isolation input

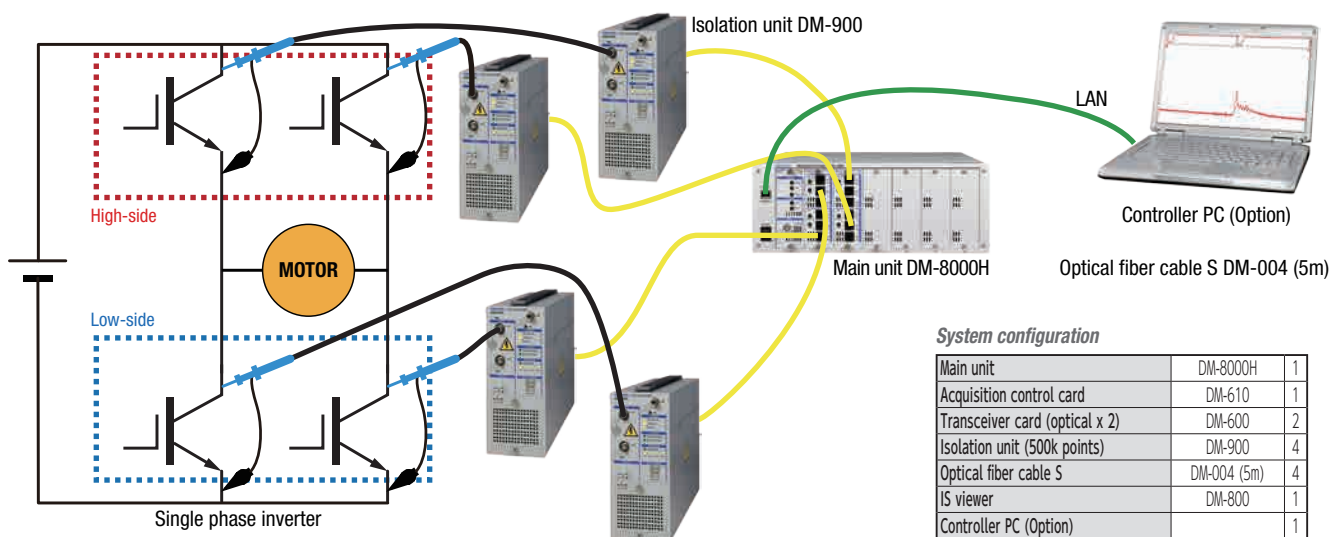


System configuration

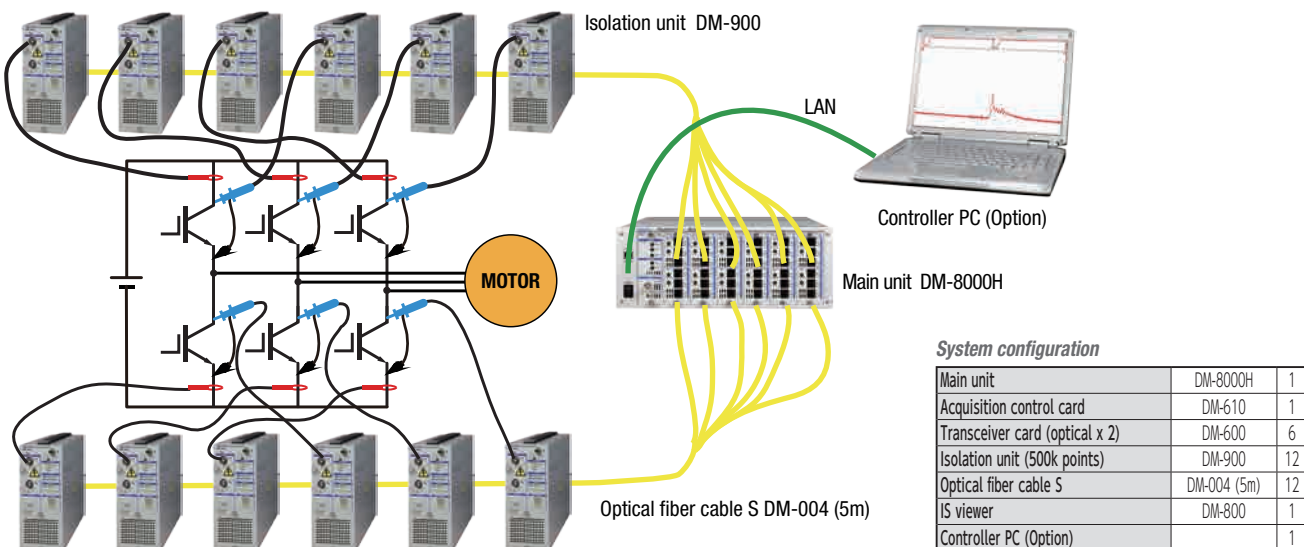
IGBT Gate voltage measurements in the high-side switch of a single phase inverter (one unit)



IGBT Vce voltage measurements in the high-side switch of single phase inverters (four units)



IGBT Vce voltage & Ic current measurements of 3-phase, 2-level inverters (twelve units)



Isolation measurement system

Isolation System DM-8000H Specifications

DM-900L/DM-910L Isolation Unit and DM-400/L Acquisition Unit

Model	DM-900	DM-900L	DM-910	DM-910L	DM-400	DM-400L
Signal input unit						
Frequency Bandwidth (-3 dB)	500MHz					
Bandwidth limiter	20MHz / 100MHz					
Input impedance	1M Ω // 16pF			1M Ω // 16pF or 50 Ω		
Maximum input voltage	400V max (DC+peakAC<=5kHz) CAT I					
Number of channels	2 (between channels are not isolated)		1		2 (Not isolated)	
Input coupling	GND, DC1M Ω , AC1M Ω		GND, DC1M Ω		GND, DC1M Ω , AC1M Ω , DC50 Ω	
Input sensitivity	2mV/div~10V/div, 1-2-5 steps		CH1-MAIN: 50mV/div~5V/div, 1-2-5 steps CH2-ZOOM: 2mV/div~1V/div, 1-2-5 steps		2mV/div~10V/div, 1-2-5 steps	
Offset range	2mV/div~50mV/div, $\pm 1V$ *1 100mV/div~500mV/div, $\pm 10V$ *2 1V/div~10V/div, $\pm 100V$ *3		CH1-MAIN: 50mV/div~500mV/div, $\pm 10V$ *2 1V/div~5V/div, $\pm 100V$ *3 CH2-ZOOM: 2mV/div~20mV/div, $\pm 2V$ *1 50mV/div~1V/div, $\pm 20V$ *2		2mV/div~50mV/div, $\pm 1V$ *1 100mV/div~500mV/div, $\pm 10V$ *2 1V/div~10V/div, $\pm 100V$ *3	
Offset accuracy	$\pm (1.0\% + 0.5\% \text{ of full-scale} + X) X$: *1 1mV, *2 10mV, *3 100mV					
DC gain accuracy	$\pm (1.5\% + 0.5\% \text{ of full-scale})$					
Probe sensitivity	10:1, 100:1, 1000:1 (Auto detection/manual settings)					
Sample rate	1GS/s (2GS/s during interleave)					
Vertical axis resolution	8bits					
Maximum memory length	500k points/ch	16M points/ch	500k points/ch	16M points/ch	500k points/ch	16M points/ch
Trigger system unit						
Trigger sources	CH1, CH2		CH1-MAIN		CH1, CH2	
Trigger slope	Positive / Negative					
Coupling	AC, DC, HFREJ, LFREJ					
Level range	125% of full-scale					
Interface						
Interface	1 set of 3 optical interfaces (optical fiber cable: 2m to 200m)			1 set of electrical interfaces (wire cable: 2 or 5m)		
Power supply and battery unit						
Internal battery	3 battery packs (unit can operate on one battery)				-	
Battery charging	Can be charged by the main unit				-	
Power consumption	120VAmx (when using AC power)				40VAmx	
Battery operation time	Approx. 12 hours of continuous operation (when using 3 batteries)				-	
Battery charging time	Approx. 6 hours				-	
AC power supply	AC100 to 240 (50/60Hz)					
Calibration signal						
Calibration signal	0.6V / 6V (selectable)					
Mechanical unit						
Dimensions (mm)	122.4 (H) X 258.4 (W) X 544 (D)			96.4 (H) X 171.6 (W) X 322.6 (D)		
Weight	Approx. 7kg (excluding battery packs and accessories) Battery pack weight: Approx. 660g per pack				2.6kg	
Operating temperature	0°C to +40°C					
Performance guaranteed temperature	+10°C to +35°C					
Accessories						
Battery pack	3		1		-	
Power supply cable						

DM-8000H Main Unit

* When the DM-610 acquisition control card is installed

Transceiver card connection

Number of slots	6 (Max. 12 isolation units and/or acquisition units can be connected.)
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Time axis

Sweep range	1ns/div to 20s/div
Clock accuracy	10ppm
Acquisition mode	Normal, peak

Trigger system

Mode	Auto, Normal, Single, Stop
Source	Up to 24 CH
Type	Edge, Pulse width
Trigger delay	Available

Interface

Ethernet port	1000BASE-T x 3
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Power supply unit

AC power supply	100V to 240V (50/60Hz)
Power consumption	130VA max

Mechanical unit

Dimensions (mm) and weight	132(H) x 351(W) x 420(D), Available. 6.9kg
Operating temperature	0°C to +40°C
Performance guaranteed temperature	+10°C to +35°C

Accessories

LAN cable	1
Power supply cable	1
Operation manual	CD-R(1)
Control software	IS Viewer DM-800 CD-R (1)

Note #1: Intel and Pentium are registered trademarks or trademarks of Intel Corporation and its subsidiary companies in the United States of America and other countries.

Note #2: Windows is a registered trademark or trademark of Microsoft Corporation in the United States of America and other countries.

DM-600/DM-620/DM-630 Transceiver Card

Number of isolation / acquisition units connected	DM-600: 2 (DM-900/L, DM-910/L)
	DM-620: 1 (DM-900/L, DM-910/L) +1 (DM-400/L)
	DM-630: 2 (DM-400/L)
Operation indicator	Status display via LED
Mechanism	Card inserted in main unit (DM-8000H)
Operating temperature	0°C to +40°C
Performance guaranteed temperature	+10°C to +35°C

IS Viewer DM-800

(supplied with the DM-8000H main unit)

* IS Viewer is installed in the controlling computer (option) and is used to operate the isolation system and to monitor waveforms.

Main function

Operations	+, -, x, \div , x , \div , \int , $\frac{dy}{dx}$
Parameter measurements	Max, Min, p-p, Top, Base, Top-Base, RMS, Cycle RMS, Mean, Cycle Mean, +/-Overshoot, Transition Time, dv/dt, Freq, Period, +/-Pulse Count, +/-Pulse Width, Duty, Integral, Integral (abs), Integral (pos), Integral (neg), Skew (%), Skew (Level)
Other functions	XY display, FFT, Cursor, smoothing, channel de-skew, re-scale, off-line viewer
Waveform storage	CSV
Saving images	BMP, PNG, Clipboard
Saving setups	with / without waveforms

Controlling computer

CPU	Intel® Pentium®4 Processor or later ^{Note #1}
RAM	2GB or larger
OS	Windows® XP Professional SP3 ^{Note #2} Windows® Vista Business SP2 ^{Note #2}
Display	At least WXGA (1,280 x 768 pixels) recommended (SXGA (1,280 x 1,024 pixels) is required for full display.)