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Test & Measurement

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- disposal

Complimentary Reference Material

This PDF has been made available as a complimentary service for you to assist in evaluating this model for your testing requirements.

TMG offers a wide range of test equipment solutions, from renting short to long term, buying refurbished and purchasing new. Financing options, such as Financial Rental, and Leasing are also available on application.

TMG will assist if you are unsure whether this model will suit your requirements.

Call TMG if you need to organise repair and/or calibrate your unit.

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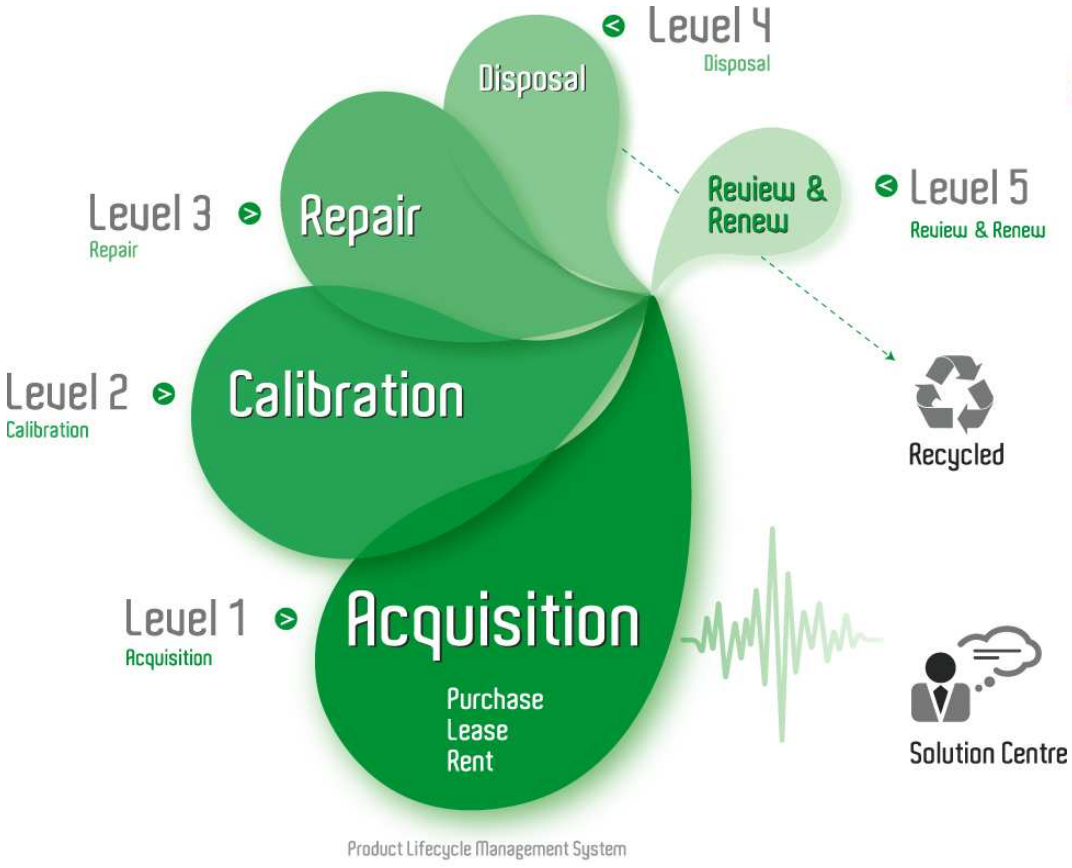
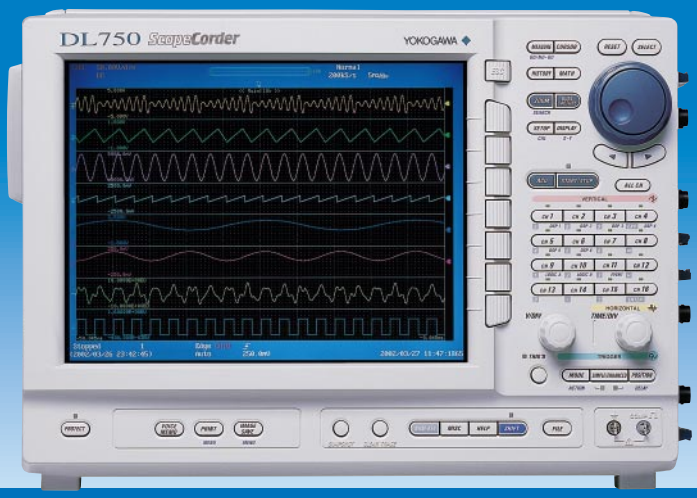


YOKOGAWA

ScopeCorder

ScopeCorder

DL750



3-Year Warranty

- Up to 16 analog channels and 16-bit logic input
- Up to 1 GigaWord total memory
- GIGAZoom function
- DualCapture function
- 10.4-inch SVGA color TFT liquid crystal display
- 10 MS/s, 12-bit A/D resolution, 2-channel isolation module
- Floppy disk, ZIP® disk and PC card drives available
- 20-GB internal hard drive (optional)

New Functions/New Modules

- DSP math function (optional)
- Voice memo function
- Wave window trigger
- High-speed 10 MS/s 12-bit non-isolation module (2 CH)
- Strain modules (2 CH)
- High-voltage 100 kS/s 16-bit isolation module (with RMS) (2 CH)

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ScopeCorder: A new measurement tool combining the functions of an oscilloscope for capturing instantaneous phenomena, and a data recorder for monitoring long-term trends

ScopeCorder

GIGAZoom

Mixed Signal

DualCapture

- **High-Speed 10 MS/s 12-Bit Isolation Module (701250)**
  Broad bandwidth (3 MHz) and high accuracy (0.5%) inputs
- **High-Speed 1 MS/s 16-Bit Isolation Module (701251)**
  High resolution inputs combined with high-sensitivity (1 mV/div)
- **Temperature/High-Precision Voltage Module (701265)**
  100 Hz frequency range, high-accuracy (0.08%) voltage measurements, and an ultra high-sensitivity range value (100 µV/div)

Modules

Leading-Edge Mounting Technology and ASICs Reduce the Size of 2-Channel Modules

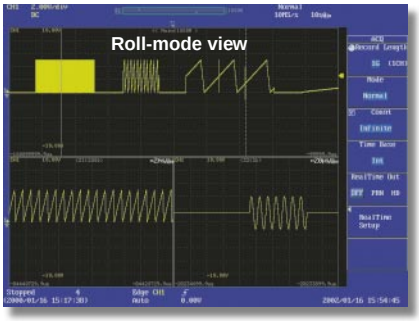
4 new modules for a variety of applications

- **High-Speed 10 MS/s 12-Bit Non-Isolation Module (701255)** NEW
  Non-isolated model with the same performance as the model 701250
- **High-Voltage 100 kS/s 16-Bit Isolation Module (with RMS) (701260)** NEW
  850 V (DC+ACpeak) direct input, RMS mode
  Accuracy of 0.25%
- **Strain Modules (701270 & 701271)** NEW
  NDIS-type (701270) and DSUB-type (701271)
  Wide range of bridge voltages (2 V, 5 V, & 10 V)
  Accuracy of 0.5%

GIGAZoom Function for Instantaneous Full-Length Display of 1 GW of Data

A large-scale, high speed ASIC was created to give the DL750 the ability to show the entire 1 GW of data on the display in real time

Two zoom windows are available for displaying up to 500 MW of data. Zooming can be done in real-time or after data recording has stopped.



1 GW memory for full-length display and instantaneous zooming (to user-specified size)

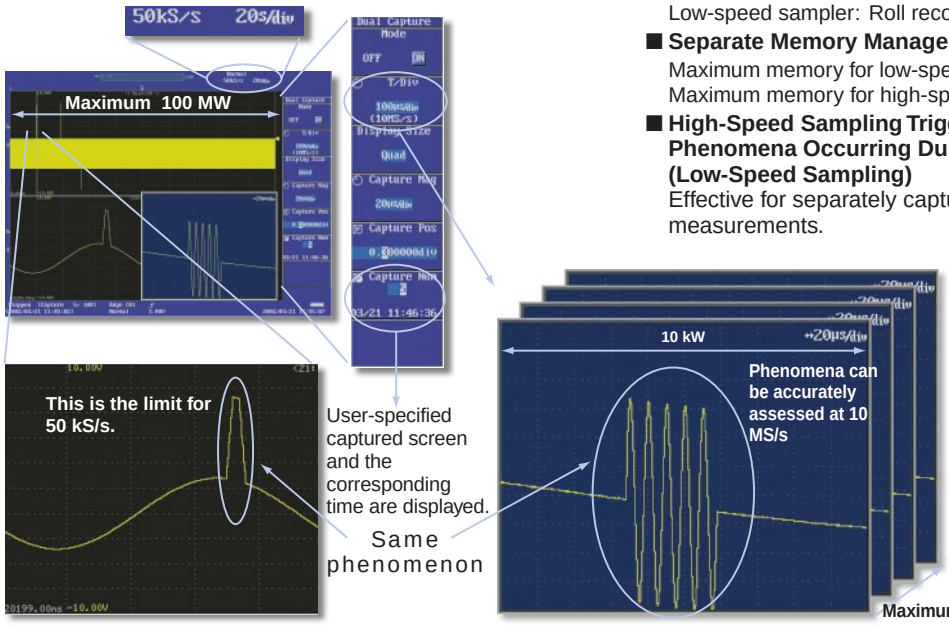
	Maximum Recording Time			
Sample Rate	Seconds	Minutes	Hours	Days
10 MS/s	**100 seconds**	1.67	0.028	0.001
1 MS/s	600	**10 minutes**	0.167	0.007
100 kS/s	9000	**150 minutes**	**2.5 hours**	0.10
10 kS/s	72000	1200	**20 hours**	**0.83 day**
1 kS/s	864000	14400	240.0	**10 days**
200 S/s	2592000	43200	720.0	**30 days**

■ Amount of time data can be recorded with 1 GW memory

DualCapture: A Powerful Tool for Durability Test Data Analysis

Simultaneous High-Speed and Low-Speed Recording Using DualCapture

During durability testing, it is necessary to monitor the long-term trends of your data as well as capture the high speed transients that might occur. This presents a challenge as trend data is usually recorded at a slower sampling speed that might miss the transient phenomena. To meet this challenge, the DL750 offers the DualCapture function.



Using DualCapture, you can now record your trend data with a slow sampling speed and still be able to capture the transient phenomena with a faster sampling speed.

■ **Integration of a High-Speed Sampler (Oscilloscope) and Low-Speed Sampler (Recorder) in a Single Unit**
High-speed sampler: Trigger on abnormal high-speed phenomena
Low-speed sampler: Roll recording (trend recording)

■ **Separate Memory Management for Each Sampler**
Maximum memory for low-speed sampler: 100 MW
Maximum memory for high-speed sampler: 10 kW × 100 screens

■ **High-Speed Sampling Triggered Only by Abnormal Phenomena Occurring During Long-Term Observation (Low-Speed Sampling)**
Effective for separately capturing data at high speed during measurements.

■ **Long Memory Equivalent to 1 Teraword**
To acquire many hours of data at the higher sampling rate (10 MS/s) would require Terawords of memory
(8 hr-240 hr) × 60 min × 60 sec × 10 MS/s × 16 channels
= 4.6-138 TW

The waveform shown above was captured at a sampling rate of 50 kS/s. The occurrence of noise can be confirmed in the graph, but the time resolution is too low to capture the waveform accurately.

With DualCapture, the user sets triggers for capturing sudden phenomena. Up to 100 phenomena can be collected in a memory length of 10 kW at a maximum sampling rate of 10 MS/s.

Voice Memo Function: Save Audio Comments along with Waveform Data and Images

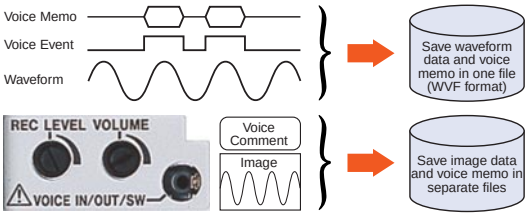
NEW VOICE MEMO

Enables You to Record and Playback 2 Types of Voice Data

■ **Voice Memo**
Simply press a switch to record your voice while simultaneously recording waveforms. Make multiple recordings per waveform (100 seconds total, min. 3 seconds per recording).

■ **Voice Comment**
Record and save an explanatory comment (approx. 3-10 seconds) together with your image files.

The 701951 Earphone-Mic (with PUSH switch) is required to record voice memos and to listen to recorded voice memos.



Capturing Signals Using the Longest Memory Capacity Ever

For Accurately Capturing Complex Signals or Long Waveforms

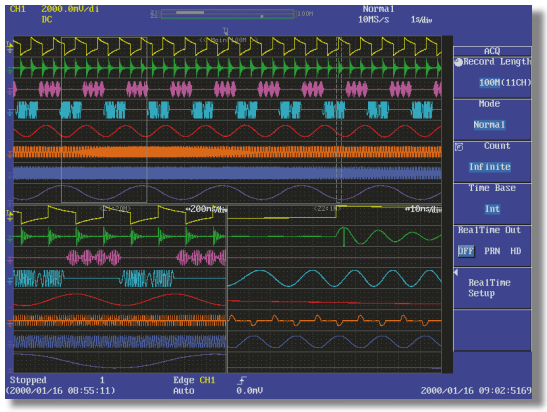
The DL750's standard memory capacity is 50 MW (2.5 MW per channel). This can be expanded (optional) to as much as 1 GW (50 MW per channel).

■ **Benefits of GigaWord Recording**

You can record data for 10 days (1 day/div) on the main screen, while displaying 1-second recordings (100 ms/div) in real time on the zoom screen. The large memory capacity lets you capture all of your data while still maintaining a sample rate fast enough to see any abnormal phenomena.

■ **Efficient Memory Use**

Sufficient memory length is available even when 16 channels are used, so you can conduct extended observations on multiple channels (2.5 MW per channel with standard memory, 50 MW per channel with maximum memory).



Multi-Channel 2-Location Zoom Function

A Wide Range of Trigger Functions for Accurately Capturing a Variety of Waveforms

Having a wide range of triggers is of course very useful for obtaining stable observations of variety of different waveforms. In addition, the GUI menu makes setting trigger conditions easy and intuitive.

Simple and Enhanced Triggers

SIMPLE/ENHANCED

Edge trigger:	Set a regular edge trigger
A → B (N):	Triggers the n-th time that condition B goes true after condition A has gone true.
A Delay B:	Triggers if condition B goes true after condition A has gone true and an interval at least equal to the delay setting has elapsed.
Edge on A:	Activates an edge trigger on another input during the interval when trigger condition A is true.
OR:	Triggers when any one of the individual channel conditions set with the patterns goes true.
B > TIME:	Triggers when the pulse width is longer than the set time
B < TIME:	Triggers when the pulse width is less than the time
B TIME OUT:	Triggers when a preset time-out time is reached
Period:	Triggers when a preset waveform frequency condition goes true.
Window:	Triggers when a trigger source enters or leaves a level set by two points
Wave Window:	Triggers when a signal leaves an automatically-defined "wave window" that surrounds the waveform

Action-On Trigger

Automatically Save Measured Data

When this trigger is activated, the DL750 performs a specified action each time a waveform is captured and displayed on the screen. This feature is useful for saving data automatically and reliably (e.g., for data collection in automated, continuous tests).

Manual Trigger

A Trigger Can Be Activated with Press of a Button.

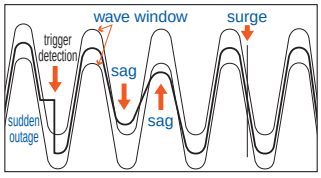
With this feature, a trigger can be executed whenever you like, separate from the preset trigger conditions.

MANUAL TRIG

Wave Window Trigger NEW

Automatically Triggers on Abnormalities in Power Supply Waveforms

This function comes standard with the DL750 to allow observation power supply waveforms. In addition to traditional power supply troubles, such as sudden outages, sags, and surges, you can make efficient real time observations of frequency fluctuations and voltage drops. This trigger activates when a signal exceeds the allowable values determined by comparing a defined waveform (wave window) with an actual waveform in real time. Comparative waveforms can be automatically produced in real time based on measured waveforms. Detection on all 16 analog channels is available (with OR conditions).

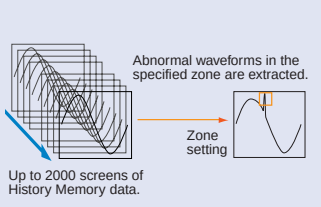


History Memory and Smart Search for Effective Access to Large Amounts of Captured Data

History Memory and History Search (Zone Search)

HISTORY

Occasionally, you may capture an abnormal waveform and then have it quickly disappear from the display as new data is acquired. It is not always possible to manually Start and Stop data acquisition to catch the abnormal waveform and have it displayed.
The History Memory function was designed for such situations. It divides long memory into a number of blocks and automatically stores up to 2000 previously captured waveforms. This means you can reliably save displayed waveforms to memory even when there are phenomena for which trigger conditions cannot be set.
The Zone Search function lets you define zones on the screen, and find all previously captured waveforms that either pass or don't pass through the user-defined zone. Up to four zones can be defined.



Search (Edge Search) and Zoom

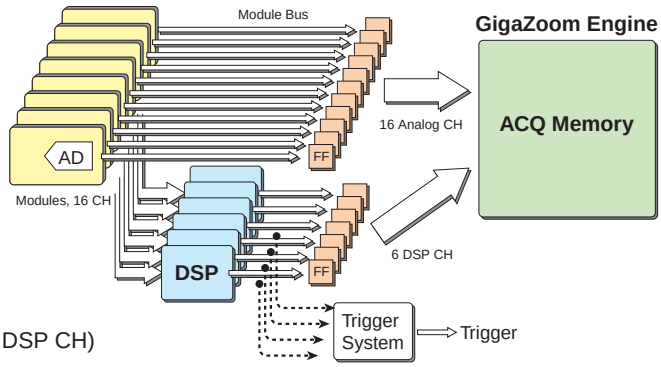
The Edge Search counts rising and falling edges in the captured data. It automatically searches for the desired edges and displays them on a zoom screen.

ZOOM SEARCH

DSP Channel Real-Time Math Function (with the /G3 Option) NEW

New functions are now available with the DL750.
Six digital signal processing (DSP) channels have been added. The DSP channels enable you to perform math and digital filtering in real time while acquiring waveforms. Each DSP channel can perform up to four arithmetic operations and filtering at high speed, without slowing down waveform acquisitions.

Architecture of DSP-CH



Features:

- Real-time display of calculated waveforms in roll mode
- Triggers on calculated waveforms
- Calculated parameters such as cutoff of digital filtering and frequency can be changed in real time
- Simultaneously display up to 16 channels (16 analog CH + 6 DSP CH)
- Provides the same memory length as with analog channels
- Arithmetic calculations between channels (addition, subtraction, multiplication, division), digital filtering (LPF, BFP, HPF), differentiation, and integration

Automatically Measure Waveform Parameters

Easily Find and Display Waveform Frequency, Rise Time, and Other Parameters

Waveform parameters such as voltage, frequency, and RMS are measured automatically. In addition to general parameter measurement function, the DL750 comes standard with functions such as the following:

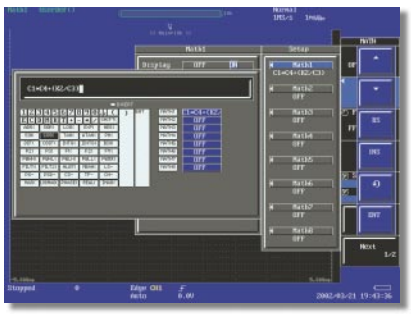
Cycle Statistical Calculation NEW

This function calculates statistical information about the waveform. Maximum value, minimum value, average value, and standard deviations are calculated automatically for each waveform parameter. In addition, you can instantaneously search for the cycle containing the maximum value and display it on the zoom screen. This cycle statistical calculation greatly improves your insight enabling you to analyze transient phenomena captured using the long recording memory.

User-Defined Math Function (with the /G2 Option)

Perform Complex Calculations

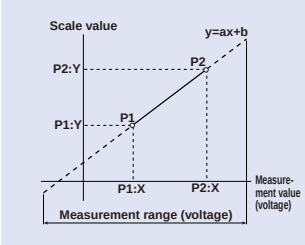
The DL750 comes standard with basic arithmetic operations (addition, subtraction, multiplication, division), FFT (power spectrum), and phase shifting (calculating a phase shift between channels). For more flexible and complex calculations, an optional user-defined math function package is available. With this option, you can define up to eight different formulas using a wide range of functions, including a triangle function, differentiation, integration, square root, digital filter, and seven different FFT functions. You can also specify the results of a calculation as a parameter in another formula. With these capabilities, the DL750 makes it easy to perform complex calculations that, in the past, could only have been done by loading data onto a PC.



Linear Scaling

Convert Measured Voltage Values to Physical Values for Direct Reading

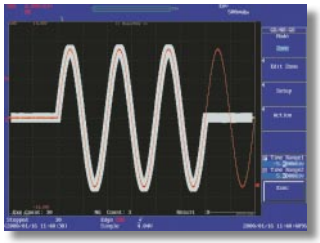
This function automatically performs the following calculation based on a scaling coefficient A and offset B: Y = AX + B (X is a measured value and Y is the scale value)
The results of this calculation are reflected in cursor measurement values and waveform parameter measurement values. In addition, user-determined scale values can be defined for any two measurement, P1 and P2.



GO/NO-GO Judgment

Automatic Waveform Determinations

With this function, the user specifies a zone or waveform parameter for a measured waveform. The measurement signal is evaluated and a specified action is performed automatically based on the evaluation. Available actions include outputting a screenshot to a specified destination, saving waveform data to a specified storage medium, sounding a buzzer, and sending email.



Real-Time Hard Drive Recording (with the /C8 Option)

Recorder-Like Real-Time Data Recording over Extended Periods

With the optional internal hard drive, you can record measurements to the hard drive in real time. This makes it easier to manage and analyze data using PCs and other tools.
Maximum data capacity: 1 GW
Maximum sampling rate: 100 kS/s
(using 1 channel only)

Memory Backup Function

Protects Your Data Even If the Power Supply Goes Out

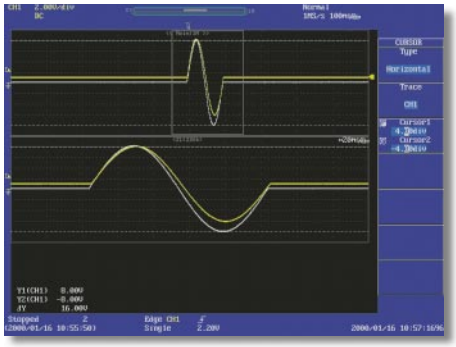
This function backs up about 10 hours of data saved to the acquisition memory immediately prior to power loss. Memory backup helps you avoid losing important data even if the power supply is unstable and gets cut off. (Backup time varies according to the usage environment. Four AA batteries are required for memory backup.)

Snapshot Function

SNAPSHOT

Enables On-Screen Waveform Comparisons

Using the snapshot function, you can keep the currently displayed waveform with the touch of a button. Snapshots are useful for comparing a reference waveform with an input waveform. In addition, snapshots can be saved to and loaded from the storage media.



X-Y Display Function

DISPLAY
X-Y

Display an Overlay of up to Four X-Y Displays

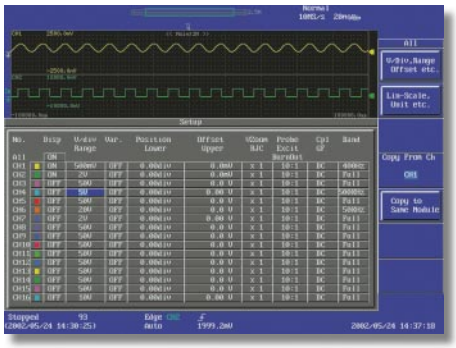
This function lets you display multiple X-Y plots together, making relative phase comparisons easy. The X-Y display function is a powerful tool for applications such as evaluating DC motors based on a Lissajous waveform.

All-Channel Setup Menu

ALL CH

Quickly View the Setup of All Channels

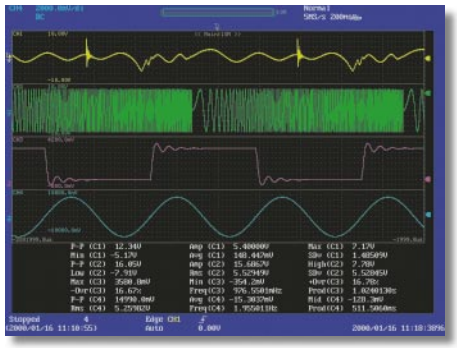
This menu lets you review and modify all of the channel setups from a single screen display. Parameters such as voltage axis sensitivity, screen scale settings, and linear scaling can be configured for each channel.

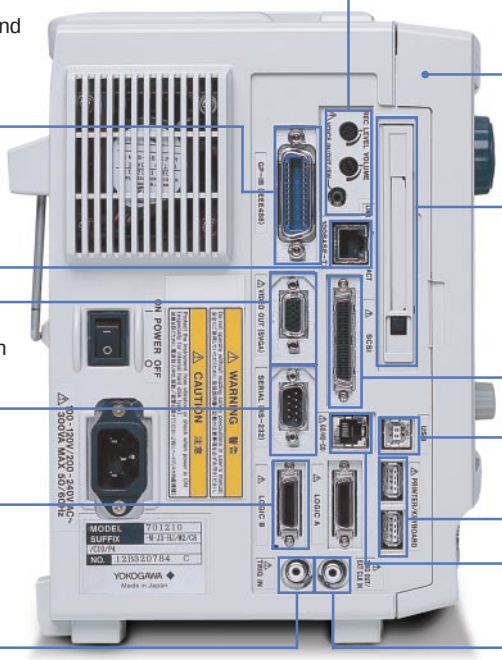


Wide Waveform Display

Increase the Viewing Area of Display

With the SVGA color TFT liquid crystal display, the number of display pixels has been greatly increased. For wide waveform display, set the resolution to 750 × 512 pixels.





1. Ask for information on compatible products.

USB

• Connecting to a PC

(Supported operating systems: Windows 98 SE, Windows 2000 Pro, Windows Me)

Just as for RS232 and GB-IB, you can write your own custom programs in Visual C++ 6.0 or Visual Basic 6.0 to control the DL750 through a USB interface.
PC communications are made easy with the Waveform Viewer and Wirepuller software programs.

• Connecting USB Peripheral Equipment

USB keyboards, USB mouse and USB printers can be directly connected to the DL750.

Ethernet (Optional)

• Connecting to a PC

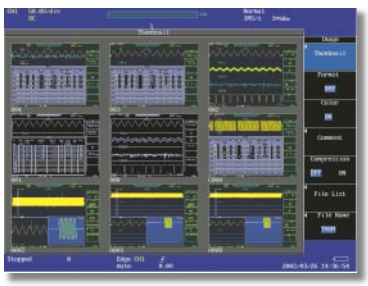
■ Web Server and FTP Server

The DL750 has a variety of server functions that let you perform remote controls or download waveform data and screen images onto a PC. You can also access the DL750 through the Internet Explorer. Just as for RS232 and GB-IB, you can write your own custom programs in Visual C++ 6.0 or Visual Basic 6.0 to control the DL750 through a USB interface.

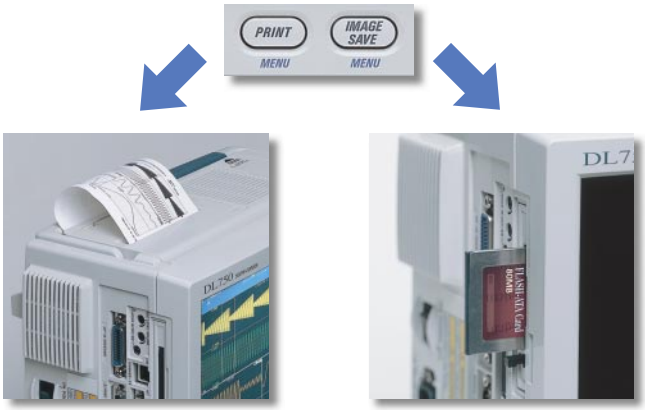
IMAGE SAVE Key and Thumbnail Screen Images

Simply press the IMAGE SAVE key to save image data to a CompactFlash card or other storage media. The saved image data (PNG, JPEG, BMP, or PostScript format) can then be displayed on the DL750's screen as thumbnails.

The PRINT key lets you output images to the DL750's build-in printer, a USB printer, or a network printer.



Thumbnail display



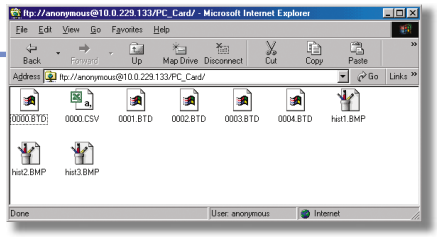
Advanced Networking and PC Connectivity

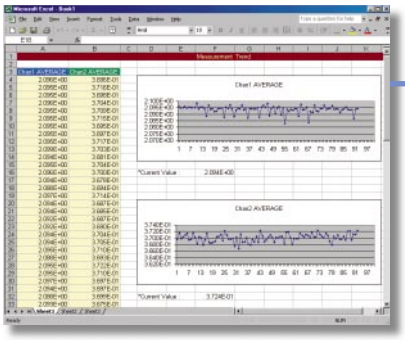
Web Server Functions

Connect the DL750 to your PC through the Ethernet connection. This allows for easy remote operation using Internet Explorer.

FTP

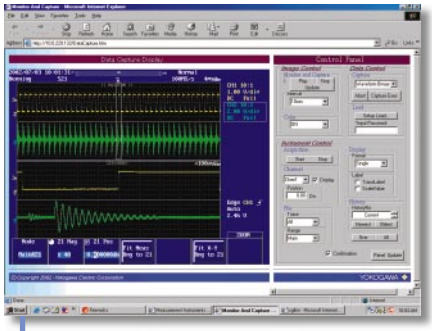
You can easily copy and paste files to and from a PC and the instrument's flash memory or other storage media.





Measurement Trend

Using Internet Explorer, you can periodically or manually download screen images to a PC for remote waveform monitoring. You can also download waveform data, start or stop a measurement, or setup a split display all from a PC.



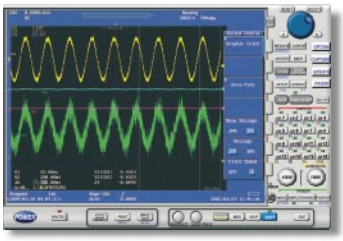
Data Capture

This function downloads values of waveform parameters periodically, launches MS Excel and graphs the parameters on a spreadsheet values. This enables you to check the parameter trends at a glance.

Software for Waveform Measurement on a PC

Software for Remotely Controlling the DL Series

Wirepuller

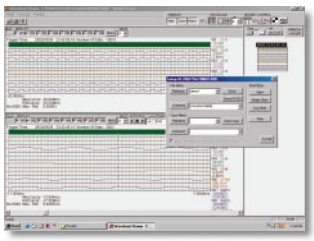


The Wirepuller software program displays a screen image of the DL's front panel on your PC so that you can monitor waveform signals. In addition, you can use the PC's mouse and keyboard to control the DL. The DL can be controlled via an Ethernet, USB, or GP-IB.

This software program can be downloaded from the following URL (requires registration):
http://www.yokogawa.com/tm/Bu/DLsoft/wire/
Further details are available at the YOKOGAWA web site.

Software for Using Your PC to Check Waveform Data Captured in Long Memory

Waveform Viewer for DL Series



The Waveform Viewer software program lets you view waveform signals on your PC just as they appear on the DL screen. This includes zoom display, X-Y display and the history memory thumbnail displays. In addition, data can be converted to CSV format for use in programs like Excel.

A trial version of this software program can be downloaded from the following URL:
http://www.yokogawa.com/tm/Bu/700919/
Further details are available at the YOKOGAWA web site.

Main Unit Specifications

Basic Specifications

- Input
  - Type: Plug-in module (Each unit has a build-in A/D converter)
  - Slots: 8
  - Logic inputs: 16 (8 bits × 2)
- Horizontal
  - Maximum record length: 2.5 MW/CH, 50 MW total (standard)
    10 MW/CH, 250 MW total (with /M1 option)
    25 MW/CH, 500 MW total (with /M2 option)
    50 MW/CH, 1 GW total (with /M3 option)
  - Time axis accuracy1: ±0.005%
  - Sweep time: 500 ns to 5 sec/div (in steps of 1, 2, or 5), 10 sec/div, 20 sec/div, 30 sec/div
    3, 4, 6, 8, 10, 20, 30 sec/div
    1 to 10 min/div (1 min steps), 12 min/div, 15 min/div, 30 min/div
    1 to 10 h/div (1 h steps), 12 h/div
    1 day/div, 2 days/div, 3 days/div
- Acquisition modes
  - Normal: Maximum sampling rate: 10 MS/s
  - Envelope: Holds peak value at maximum sampling rate, regardless of time/div setting
  - Box average: Increases A/D resolution up to 4 bits (up to 16 bits)
  - Averaging: Number of averaging: 2 to 65,536 (2^n steps)
  - Roll: 100 msec/div or less
- Triggers
  - Modes: AUTO, AUTO LEVEL, NORMAL, SINGLE, SINGLE (N), LOG
  - Pretrigger: 0 to 100% (in 0.1% step)
  - Simple trigger source: CH1 to CH16, DSP1 to DSP6, LINE, EXT, LOGIC_A, LOGIC_B, TIME
  - Slope selection: CH1 to CH16, DSP1 to DSP6: Rise, fall, rise-fall
    EXT (external trigger input), LOGIC_A, LOGIC_B: Rise, fall
    Time: Date (year/month/date), hour (hours/minutes), time interval (1 minute to 24 hours)
  - Enhanced trigger source: CH1 to CH16, LOGIC_A, LOGIC_B
  - Enhanced trigger type: A → B (N), A delay B, B > Time, B < Time, B Time Out, Period, Window, OR, Edge On A, Wave Window
- Screen updating rate: Maximum 30 screens/sec for a single waveform

1. Typical operating conditions: Ambient temperature of 23°C ± 5°C, ambient humidity (RH) of 55 ± 10%

Display

- Display: 10.4-inch color TFT liquid crystal display
- Effective screen size: 211.2 mm × 158.4 mm
- Resolution: 800 × 600[1]
- Waveform display pixels: 650 × 512 (in normal waveform display mode)
  750 × 512 (in wide waveform display mode)
- Display modes
  - Split: Single, dual, triad, quad, octal
  - Zoom: Main, Main & Z1, Main & Z1 & Z2, Main & Z2, Z1 Only, Z2 Only, Z1 & Z2 (Z1 and Z2 are

abbreviations for zoom area 1 and zoom 2, respectively)
XY Single Mode (X is fixed, Y is set by user), Quad Mode (XY1, XY2, XY3, XY4)
Accumulation PERSIST Overlays in one color.

1. The LCD may contain some pixels that are always off or always on. In addition, brightness may vary due to the characteristics of the liquid crystal display. This is not an indication of any problem with the display.

Recorder

● Built-in printer
Printing method Thermal line-dot printing
Paper width 112 mm
Effective recording width 104 mm
Functions Screen printing, long printing
● Real-time hard drive recording (with /C8 option)
Data capacity 1 GW (for one time record)
Maximum sampling rate 100 kS/s (using 1 channel)

DualCapture

This function captures the same waveform data at two different sampling rates.
Main (low-speed) maximum sampling rate
Roll mode area at 100 kS/s
Sub (high-speed) maximum sampling rate
10 MS/s
Main maximum memory length
100 MW (with /M3 option)
Sub memory length 10 kW (fixed)
Sub maximum number of captured screens
100

Analysis Functions

● Channel-to-channel calculation function
Definable math waveforms 8
Calculable record length 800 kW (using MATH1 only)
100 kW (using MATH1 through MATH8)
Standard operators Addition, subtraction, multiplication, division, binary conversion, phase shifting, FFT
FFT type PS (Power Spectrum)
Number of points 1000, 2000, 10,000
Window functions Rectangular, Hanning, Flat-Top
User-defined math function (with /G2 option)
Operators ABS, SQR, LOG, EXP, NEG, SIN, COS, TAN, ATAN, PH, DIF, DDIF, INTG, BIN, P2, P3, F1, F2, FV, PWHH, PWHL, PWLH, PWLL, PWXX, FILT1, FILT2, HLBT, MEAN, MAG, LOGMAG, PHASE, REAL, IMAG
FFT types LS, PS, PSD, CS, TF, CH
Number of points 1000, 2000, 10,000
Window functions Rectangular, Hanning, Flat-Top

DSP Channel Function (with the /G3 option)

DSP channels 6
Maximum sampling rate[1] 100 kS/s (when exceeding 100 kS/s, the sampling rate is resampled at 100 kS/s)
Operators Calculation between channels (addition, subtraction, multiplication, division), differentiation (w/ LPF), integration, digital filtering (LPF/HPF/BPF, FIR type, IIR type, variable cutoff frequency)
Digital filtering cutoff setting range
IIR type: 0.2 to 30% of sampling frequency
FIR type: 2 to 30% of sampling frequency
Calculation delay 4 sampling + digital filtering calculation delay

1. When the DSP channel is ON, the maximum sampling rate of the analog channel is 5 MS/s.

Waveform Measurement Functions

● Cursors
Types Horizontal Two cursors
Vertical Two cursors
Marker Four markers
Degree Cursor measurement on the horizontal axis is displayed in a degree. (for TY display only)
H&V (for XY display only)
● Automatic measurement of waveform parameters
Maximum number of measured parameters
24
Measured parameters P-P, Max, Min, High, Low, Avg, Rms, Amp, StdDev, +Oshot, –Oshot, Rise, Fall, Freq, Period, +Duty, +Width, –Width, Pulse Burst1, Burst2, Avg Freq, Avg Period, Delay, Int1TY, Int2TY, Int1XY, Int2XY
● Cycle statistical process
Maximum number of cycles 24,000 (for one parameter)
Maximum total number of parameters
24,000 (total measured results)
Statistical values Maximum/minimum/average/standard deviations/number of samples
Maximum measurement range 10 MW
● Search function Edge, voice, auto scroll
● History search function Zone
● GO/NO-GO Judgment
Parameter: Make judgments using combinations of 16 waveform parameters.
Zone: Make judgments using combination of up to 6 waveform zones (AND, OR)
Actions: One or more of the followings: outputs screen image data, saves waveform data, sounds a buzzer, sends email

Screen Data Output (Printer)

Destinations Select built-in printer, external USB printer, or network printer (with /C10 option)
Formats Normal Outputs hard copy of screen shot
Long Zooms displayed waveform along time axis and outputs (The zoom factor differs depending on the time/div.)

Screen Data Output (Image Saving)

Destinations Installed drive (floppy drive, Zip® drive, or PC card), external SCSI drive, internal hard drive (with /C8 option), network drive (with /C10 option)
Formats PNG, JPEG, BMP, PostScript

External I/O

● LOGIC input specifications
Input points 8 bits × 2
Maximum sampling rate 10 MS/s
Compatible probes 8-bit non-isolated (700986), 8-bit isolated (700987)
● EXT TRIG IN/EXT TRIG OUT
Connector RCA pin jack
Input/output level TTL (0 to 5 V)
● EXT Clock IN
Connector RCA pin jack
Input level TTL (0 to 5 V)
Input frequency Up to 1 MHz (for module 701250/701251/701255), up to 100 kHz (for module 701260/701270/701271, DSP-CH), up to 500 Hz (for module 701265)
● Communication interfaces
GP-IB, USB peripheral equipment jacks (USB keyboards and USB printers), USB (complies with Rev. 1.1, for connection to PC), Ethernet (complies with 100BASE-TX and 10BASE-T; with /C10 option), serial (RS232), and SCSI
● GO/NO-GO I/O
Connector type Modular jack (RJ12)
I/O level TTL (0 to 5 V)
● Probe power terminal (with /P4 option)
Maximum number of probes powered 4
Compatible probes Current probes 700937 (15 Apeak) and 701930 (150 Arms)
Maximum number of current probes that can be used at one time
4 (for module 700937), 2 (for module 701930)

Voice Memo Function

● Voice memo
Record (roll mode)
Flexible: Multiple recording (min. 3 sec up to 100 sec, total 100 sec)
Fixed: Select from 5 sec × 20, 10 sec × 10, 20 sec × 5, 25 sec × 4, 50 sec 2, 100 sec × 1
Save Save together with waveform data (binary, same file)
Playback Voice data loaded on the main unit is outputted from microphone terminal and speaker output terminal (GO/NO-GO)
● Voice comment
Record 3 to 100 sec
Save When image saving is executed (separate file)
Playback Playback from microphone terminal and speaker output terminal (GO/NO-GO)

Acquisition Memory Backup

Batteries Four AA alkaline dry cells (AA/R6) (JIS and IEC type name: LR6) or four nickel metal-hydride rechargeable batteries
Backed up data Acquisition memory, waveform data, voice data
Backup duration (reference value)[2]
Approximately 10 hours (with /M3 option)

2. Actual backup duration will vary according to the usage conditions.

Media Drives

Internal media drives Floppy drive, Zip® drive, or PC card (choose one), and 20 GB hard drive (with /C8 option)

General Specifications

Rated supply voltage 100 to 120 VAC/200 to 240 VAC (automatically switched)
Rated supply frequency 50/60 Hz
Power consumed Approximately 200 VA-MAX
Maximum voltage 1500 VAC for one minute across power supply and ground
Insulating resistance 10 MΩ or greater at 500 VDC across power supply and ground
Exterior 355 × 250 × 180 mm (WHD), excluding knobs and protrusions
Weight Approx. 6.6 kg (main unit with full options, including M3, C8, C10, and P4)
Approx. 9 kg (main unit and eight 701250 modules)
Operating temperature range
5 to 40°C

For detailed specifications, go to the following URL: http://www.yokogawa.com/tm/Bu/DL750/

Plug-In Module Specifications

High-Speed 10 MS/s 12-Bit Isolation Module (701250)

Input channels	2
Input couplings	AC, DC, GND
Maximum sampling rate	10 MS/s
A/D conversion resolution	12 bits (150 LSB/div)
Input type	Isolated unbalanced
Frequency range(–3 dB)[1]	DC, up to 3 MHz
Input range (10:1)	50 mV/div to 200 V/div (in steps of 1, 2, or 5),
(1:1)	5 mV/div to 20 V/div (in steps of 1, 2, or 5)
Effective measurement range	20 div (display range: 10 div)
DC offset	±5 div
Maximum input voltage (1 kHz or less)	
In combination with 700929 (10:1) [2]	600 V (DC + ACpeak)
Direct input (1:1) [6, 10]	250 V (DC + ACpeak)
Maximum allowable in-phase voltage	
In combination with 700929 (10:1) [3]	400 Vrms (CAT I), 300 Vrms (CAT II)
In combination with 7019in steps of 1, 2, or 5+701954 (1:1) [9]	400 Vrms (CAT I), 300 Vrms (CAT II)
Main unit only (1:1) [11]	42 V (DC + ACpeak) (CAT I and CAT II, 30 Vrms)
DC accuracy[1]	±(0.5% of 10 div)
Input impedance	1 MΩ ± 1%, approx. 35 pF
Connector type	Isolation type BNC connector
Input filter	OFF, 500 Hz, 5 kHz, 50 kHz, 500 kHz
Temperature coefficient	
Zero point	±(0.05% of 10 div)/°C (typical value)
Gain	±(0.02% of 10 div)/°C (typical value)

High-Speed 1 MS/s 16-Bit Isolation Module (701251)

Input channels	2
Input couplings	AC, DC, GND
Maximum sampling rate	1 MS/s
A/D conversion resolution	16 bits (2400 LSB/div)
Input type	Isolated unbalanced
Frequency range (–3 dB)[1]	DC, up to 300 kHz (20 V/div to 5 mV/div)
Input range	
(10:1)	10 mV/div to 200 V/div (in steps of 1, 2, or 5)
(1:1)	1 mV/div to 20 V/div (in steps of 1, 2, or 5)
Maximum input voltage (1 kHz or less)	
In combination with 700929 (10:1) [2]	600 V (DC + ACpeak)
Direct input (1:1) [6, 10]	140 V (DC + ACpeak)
Maximum allowable in-phase voltage	
In combination with 700929 (10:1) [3]	400 Vrms (CAT I), 300 Vrms (CAT II)
In combination with 701901+701954 (1:1) [9]	400 Vrms (CAT I), 300 Vrms (CAT II)
Main unit only (1:1) [11]	42 V (DC + ACpeak) (CAT I and CAT II, 30 Vrms)
DC accuracy[1]	
5 mV/div to 20 V/div	±(0.25% of 10 div)
2 mV/div	±(0.3% of 10 div)
1 mV/div	±(0.5% of 10 div)
Input impedance	1 MΩ ± 1%, approx. 35 pF
Connector type	Isolated type BNC connector
Input filter	OFF, 400 Hz, 4 kHz, 40 kHz
Temperature coefficient	
Zero point	5 mV/div to 20 V/div: ±(0.02% of 10 div)/°C (typical value)
	2 mV/div: ±(0.05% of 10 div)/°C (typical value)
	1 mV/div: ±(0.10% of 10 div)/°C (typical value)
Gain	1 mV/div to 20 V/div: ±(0.02% of 10 div)/°C (typical value)

High-Speed 10 MS/s 12-Bit Non-Isolation Module (701255)

Input channels	2
Input couplings	AC, DC, GND
Maximum sampling rate	10 MS/s
A/D conversion resolution	12 bits (150 LSB/div)
Input type	Non-isolated unbalanced
Frequency range (–3 dB)[1]	DC, up to 3 MHz
Input range (10:1)	50 mV/div to 200 V/div (in steps of 1, 2, or 5)
(1:1)	5 mV/div to 20 V/div (in steps of 1, 2, or 5)
Effective measurement range	20 div (display range 10 div)
DC offset	±5 div
Maximum input voltage (1 kHz or less)	
In combination with 701940 (10:1)	600 V (DC + ACpeak)
Direct input (1:1)	250 V (DC + ACpeak)
DC accuracy[1]	±(0.5% of 10 div)
Input impedance	1 MΩ ± 1%, approx. 35 pF
Connector type	Metal type BNC connector
Input filter	OFF, 500 Hz, 5 kHz, 50 kHz, 500 kHz
Temperature coefficient	
Zero point	±(0.05% of 10 div)/°C (typical value)
Gain	±(0.02% of 10 div)/°C (typical value)
Adaptive passive probe (10:1)	701940

High-Voltage 100 kS/s 16-Bit Isolation Module (with RMS) (701260)

Input channels	2
Input couplings	AC, DC, GND, AC-RMS, DC-RMS
Maximum sampling rate	100 kS/s
A/D conversion resolution	16 bits (2400 LSB/div)
Input type	Isolated unbalanced
Frequency range (–3 dB)[1]	
Waveform measurement mode	DC, up to 40 kHz
RMS measurement mode	DC, 40 Hz to 10 kHz
Input range (10:1)	200 mV/div to 2000 V/div (in steps of 1, 2, or 5)
(1:1)	20 mV/div to 200 V/div (in steps of 1, 2, or 5)
Effective measurement range	20 div (display range 10 div)
DC offset	±5 div
Maximum input voltage (1 kHz or less)	
In combination with 700929 (10:1) [2]	1000 V (DC + ACpeak)
In combination with 701901+701954 (1:1) [6]	850 V (DC + ACpeak)
Maximum allowable in-phase voltage	
In combination with 700929 (10:1)	H side: 1000 Vrms (CAT II) [4], L side: 400 Vrms (CAT II) [5]
In combination with 701901+701954 (1:1)	H side: 700 Vrms (CAT II) [7], L side: 400 Vrms (CAT II) [8]
Direct input (when using a cable which doesn't comply with the safety standard)	H/L sides: 30 Vrms (42 V DC + ACpeak)[11]
DC accuracy (waveform measurement mode)[1]	±(0.25% of 10 div)
DC accuracy (RMS measurement mode)[1]	±(1.0% of 10 div)
AC accuracy (RMS measurement mode)[1]	
Sine wave input	±(1.5% of 10 div)
Crest factor of 2 or less	±(2.0% of 10 div)
Crest factor of 3 or less	±(3.0% of 10 div)
Input impedance	1 MΩ ± 1%, approx. 35 pF
Connector type	Isolated type BNC connector
Input filter	OFF, 100 Hz, 1 kHz, 10 kHz
Temperature coefficient (waveform measurement mode)	
Zero point	±(0.02% of 10 div)/°C (typical value)
Gain	±(0.02% of 10 div)/°C (typical value)
Response time (RMS mode)	
Rise (0 to 90% of 10 div)	100 ms (typical)
Fall (100 to 10% of 10 div)	250 ms (typical)
Crest factor (only at RMS measurement)	3 or less

* Please use 701901 (1:1 safety adaptor lead) or 700929 (10:1 safety probe), which complies with the safety standard, for high-voltage input.
* It is very dangerous to use cables that do not comply with the safety standard.

Temperature/High-Precision Voltage Module (701265)

Input channels	2
Input couplings	TC (thermocouple), DC, GND
Input type	Isolated unbalanced
Applicable sensors (input coupling: TC)	K, E, J, T, L, U, N, R, S, B, W, iron-doped gold/chromel
Data updating rate	500 Hz
Frequency range (-3 dB)[1]	DC, up to 100 Hz
Voltage accuracy[1] (at voltage mode)	±(0.08% of 10 div + 2 µV)
Temperature measurement accuracy [1, 12]	

Type	Measured range	Accuracy
K	–200°C to 1300°C	±(0.1% of reading + 1.5°C)
E	–200°C to 800°C	except –200 to 0°C:
J	–200°C to 1100°C	±(0.2% of reading + 1.5°C)
T	–200°C to 400°C	
L	–200°C to 900°C	
U	–200°C to 400°C	
N	0°C to 1300°C	
R, S	0°C to 1700°C	±(0.1% of reading + 3°C) except 0 to 200°C: ±8°C, 200 to 800°C: ±5°C
B	0°C to 1800°C	±(0.1% of reading + 2°C), except 400 to 700°C: ±8°C, Effective range: 400 to 1800°C
W	0°C to 2300°C	±(0.1% of reading + 3°C)
Iron-doped gold/chromel	0 to 300 K	0 to 50 K: ±4 K, 50 to 300 K: ±2.5 K

Maximum input voltage (1 kHz or less)	42 V (DC + ACpeak) (CAT I and CAT II, 30 Vrms)
Input range (for 10 div display)	100 µV/div to 10 V/div (in steps of 1, 2, or 5)
Input connector	Binding post
Input impedance	Approx. 1 MΩ
Input filter	OFF, 2 Hz, 8 Hz, 30 Hz
Temperature coefficient (for voltage)	
Zero point	±((0.01% of 10 div)/°C + 0.05 µV)/°C (typical value)
Gain	±(0.02% of 10 div)/°C (typical value)

Strain Module (NDIS) (701270)

Input channels	2
Input types	DC bridge input (automatic balancing), balanced differential input, DC amplifier (floating)
Automatic balancing method	Electronic auto-balance
Automatic balancing range	±10,000 µSTR (1 gauge method)
Bridge voltages	Select from 2 V, 5 V, or 10 V
Gauge resistances	120 to 1000 Ω (bridge voltage of 2 V)
	350 to 1000 Ω (bridge voltage of 2/5/10 V)
Gauge rate	1.90 to 2.20 (variable in steps of 0.01)
A/D resolution	16 bits (4800 LSB/div: Upper=+FS, Lower=–FS)
Maximum sampling rate	100 kS/s
Frequency range (–3 dB)[1]	DC, up to 20 kHz
DC accuracy[1]	±(0.5% of FS + 5 µSTR)
Measurement range/measurable range	

Measurement range (FS)	Measurable range (–FS to +FS)
500 µSTR	–500 µSTR to 500 µSTR
1000 µSTR	–1000 µSTR to 1000 µSTR
2000 µSTR	–2000 µSTR to 2000 µSTR
5000 µSTR	–5000 µSTR to 5000 µSTR
10,000 µSTR	–10,000 µSTR to 10,000 µSTR
20,000 µSTR	–20,000 µSTR to 20,000 µSTR

mV/V range support	mV/V range = 0.5 × (µSTR range/1000)
Maximum allowable input voltage (1 kHz or less)	10 V (DC + ACpeak)
Maximum allowable in-phase voltage	42 V (DC + ACpeak) (CAT I and CAT II, 30 Vrms)
Temperature coefficient	
Zero point	±5 µSTR/°C (typical value)
Gain	±(0.02% of FS)/°C (typical value)
Internal filter	OFF, 1 kHz, 100 Hz, 10 Hz
Input connector	NDIS standard
Accessory (a set of connector shell for solder connection)	2 NDIS connectors (A1002JC)
Recommended bridge head (NDIS type) (sold separately)	701955 (bridge resistance of 120 Ω) (w/ 5 m cable)
	701956 (bridge resistance of 350 Ω) (w/ 5 m cable)

Plug-In Module Specifications

Strain Module (DSUB, Shunt-cal) (701271)

Input channels	2
Input types	DC bridge input (automatic balancing), balanced differential input, DC amplifier (floating)
Automatic balancing method	Electronic auto-balance
Automatic balancing range	±10,000 µSTR (1 gauge method)
Bridge voltages	Select from 2 V, 5 V, or 10 V
Gauge resistances	120 to 1000 Ω (bridge voltage of 2 V) 350 to 1000 Ω (bridge voltage of 2/5/10 V)
Gauge rate	1.90 to 2.20 (variable in steps of 0.01)
A/D resolution	16 bits (4800 LSB/div: Upper=+FS, Lower=–FS)
Maximum sampling rate	100 kS/s
Frequency range (–3 dB)[1]	DC, up to 20 kHz
DC accuracy[1]	±(0.5% of FS + 5 µSTR)

Measurement range/measurable range

Measurement range (FS)	Measurable range (–FS to +FS)
500 µSTR	–500 µSTR to 500 µSTR
1000 µSTR	–1000 µSTR to 1000 µSTR
2000 µSTR	–2000 µSTR to 2000 µSTR
5000 µSTR	–5000 µSTR to 5000 µSTR
10,000 µSTR	–10,000 µSTR to 10,000 µSTR
20,000 µSTR	–20,000 µSTR to 20,000 µSTR

mV/V range support	mV/V range = 0.5 × (µSTR range/1000)
Maximum allowable input voltage (1 kHz or less)	10 V (DC + ACpeak)
Maximum allowable in-phase voltage	42 V (DC + ACpeak) (CAT I and CAT II, 30 Vrms)
Temperature coefficient	
Zero point	±5 µSTR/°C (typical value)
Gain	±(0.02% of FS)/°C (typical value)
Internal filter	OFF, 1 kHz, 100 Hz, 10 Hz
Input connector	DSUB
Accessory (a set of connector shell for solder connection)	2 DSUB connectors
Recommended bridge head (DSUB, Shunt-cal) (sold separately)	701957 (bridge resistance of 120 Ω) (w/ 5 m cable) 701958 (bridge resistance of 350 Ω) (w/ 5 m cable)

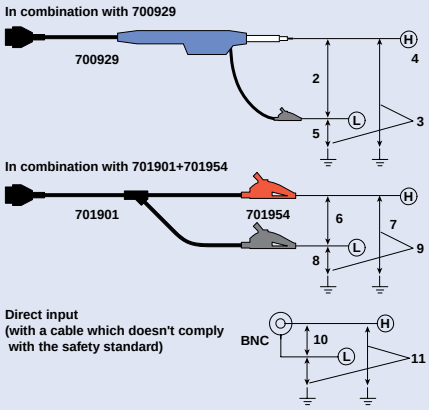
High-Speed Logic Probe (700986)

Number of inputs	8
Input types	Non-isolated (common ground for all bits; logic module and bits share common ground)
Maximum input voltage (1 kHz or less) (between probe tip and case ground)	42 V (DC +ACpeak) (CAT I and II, 30 Vrms)
Response time	1 µS or less
Input impedance	Approximately 100 kΩ
Threshold level	Approximately 1.4 V

Isolated Logic Probe (700987)

Number of inputs	8
Input types	Isolated (all individual bits are isolated)
Input connector	Safety connector (banana plug) × 8
Input switching capability	AC/DC input switching for each bit
Applicable input ranges	
DC input	H/L detection for 10 V DC to 250 V DC
AC input	H/L detection (50/60 Hz) for 80 V AC to 250 V AC
Threshold levels	
DC input	6 V DC ± 50%
AC input	50 V AC ± 50%
Response times	
DC input	1 ms or less
AC input	20 ms or less
Maximum input voltage (1 kHz or less)	(between H and L of each bit) 250 Vrms (CAT I and II)
Maximum allowable in-phase voltage	250 Vrms (CAT I and II)
Maximum allowable voltage between bits	250 Vrms (CAT I and II)
Input impedance	Approximately 100 kΩ

1. Under reference operating conditions (ambient temperature of 23°C ± 5°C, ambient humidity (RH) of 55% ± 10%; after calibration following 30- minute warmup period)
12. Does not include reference contact compensation accuracy.

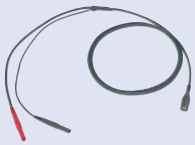


⚠Warning
Do not exceed the maximum input voltage, withstand voltage, or surge current. In order to prevent electric shock, be sure to ground the main unit. In order to prevent electric shock, be sure to tighten the module's screws. Electrical protective functions and mechanical protective functions will not be effective.

Accessories


Isolated probe (700929)


Passive probe for DL750 (701940)


Safety adaptor lead (701901)


Alligator clip (701954)
Dolphin type, red/black


Differential probe (700924)
ratio: 1/100, 1/1000 (variable)
Max. differential allowable voltage: ±1400 V

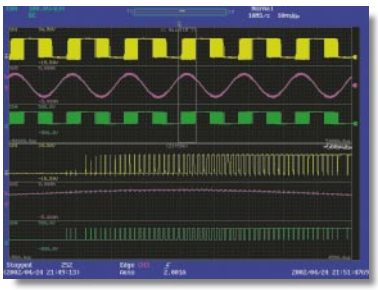

High-speed logic probe (700986)


Isolated logic probe (700987)


Bridge head (701955 & 701956)
NDIS-120 Ω/350 Ω, Enhanced Shield


Conversion adaptor (366928)
For external trigger and external clock


Earphone Mic (w/ PUSH switch) (701951)
For the voice memo function



Measuring inverter I/O signals and control signals using the 10 MS/s high-speed 12-bit isolated module, current probe 700937 and isolated probe 700929
The model 700937 can be powered when the /P4 option is selected.


50 MHz bandwidth current probe (700937)
Input range: 15 Apeak


10 MHz bandwidth current probe (701930)
Input range: 150 Arms

DL750 Model Number and Suffix Codes

Model/Options	Suffix Code	Description
701210		DL750 ScopeCorder[1]
Power cable	-D	UL and CSA standard
	-F	VDE standard
	-Q	BS standard
	-R	SAA standard
Internal media drive	-J1	Floppy drive[2]
	-J2	Zip® drive[2]
	-J3	PC card interface[2]
Help language	-HE	English and Japanese online help[3]
	-HJ	Japanese and English online help[3]
Memory expansion	/M1	Memory expansion to 10 MW/CH[4]
	/M2	Memory expansion to 25 MW/CH[4]
	/M3	Memory expansion to 50 MW/CH[4]
Others	/C8	Internal 20 GB hard drive (FAT32)
	/C10	Ethernet interface
	/G2	User-defined math function
	/G3	DSP channel function
	/P4	Probe power (4-output)

1. Plug-in modules are not included. 2. Choose one. 3. Choose one. 4. Choose one.

Standard Accessories

Product	Order Q'ty
Power cable	1
User's manuals (one set)	1
Transparent front cover	1
Printer roll paper (10 meters)	3
Cover panels (for blank module slots)	8
Rubber feet (four per set)	1
Soft case (for storing accessories)	1

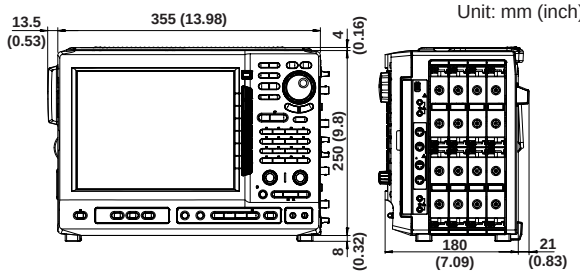
Plug-In Module Model Numbers[1]

Model No.	Description
701250	High-speed 10 MS/s 12-bit isolation module (2 CH)
701251	High-speed 1 MS/s 16-bit isolation module (2 CH)
701255	High-speed 10 MS/s 12-bit non-isolation module (2 CH)
701260	High-voltage 100 kS/s 16-bit isolation module (with RMS) (2 CH)
701265	Temperature/high-precision voltage module (2 CH)
701270	Strain module (NDIS, 2 CH)
701271	Strain module (DSUB, Shunt-cal, 2 CH)

1. Probes are not included with any modules. Probes must be purchased separately as accessories if required.

Exterior Dimensions

Unit: mm (inch)



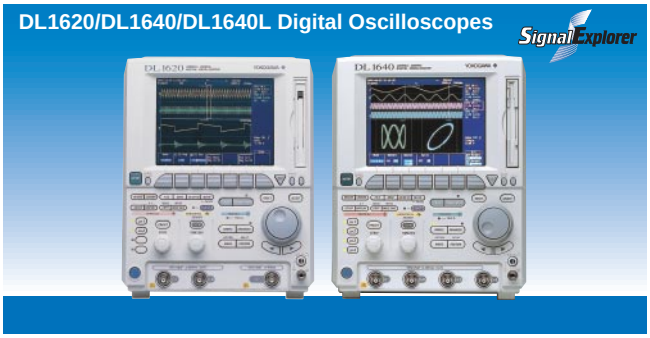
Probes, Cables, and Converters

Product	Model No.	Description
Isolated probe	700929	10000 Vrms-CAT II for 701250, 701251, and 701260 (10:1)
1:1 BNC safety adapter lead (with combination with followings)	701901	1000 Vrms-CAT II for 701250, 701251, 701260 (10:1)
Large alligator clip (dolphin type)	701954	1000 Vrms-CAT II (2 per set)
Alligator adapter (rated voltage: 1000 V)	758929	1000 Vrms-CAT II (2 per set)
Alligator adapter (rated voltage: 300 V)	758922	300 Vrms-CAT II (2 per set)
Folk terminal adaptor set	758921	1000 Vrms-CATII (2 per set) (for 4-mm screw terminal)
Passive probe for DL750 (10:1)	701940	Non-isolated 600 Vpk (701255) 42 V or less (others)
BNC alligator clip	366926	Non-isolated 42 V or less for 701250/51/55 (1:1)
Current probe	700937	15 Apeak, DC to 50 MHz, support probe power
Current probe	701930	150 Arms, DC to 10 MHz, support probe power
Differential probe	700924	1400 pk, 1000 Vrms-CAT II
Bridge head (NDIS 120 Ω/350 Ω)	701955/56	With 5 m cable
Bridge head (DSUB shunt-CAL 120 Ω/350 Ω)	701957/58	With 5 m cable
GO/NO-GO cable	366973	GO/NO-GO input/output, start input
Earphone-Mic (w/ PUSH switch)	701951	For voice memo function
Speaker cable (for voice memo)	701952	For connection to external speakers
BNC adaptor	758924	500 Vrms-CAT II, BNC-banana conversion
Printer roll paper	B9988AE	10-meter roll × 10
High-speed logic probe	700986	8-bit, non-isolated, response speed: 1 µs
Isolated logic probe	700987	8-bit, each channel isolated, response speed: 20 ms (for AC)
Measurement lead set (75 cm)	758917	Isolated logic measurement lead (2 per set) Alligator clip is required separately.
Conversion adaptor	366928	BNC (jack)-RCA (plug) conversion
Safety BNC cable (1 meter)	701902	1000 Vrms-CAT II (BNC-BNC)
Safety BNC cable (2 meters)	701903	1000 Vrms-CAT II (BNC-BNC)

Related Products

DL7440/DL7480 Digital Oscilloscopes

DL1620/DL1640/DL1640L Digital Oscilloscopes



Yokogawa's Approach to Preserving the Global Environment

- Yokogawa's products are developed and produced in facilities that have received ISO14001 approval.
- In order to protect the global environment, Yokogawa's electrical products are designed in accordance with Yokogawa's Environmentally Friendly Product Design Guidelines and Product Design Assessment Criteria.

NOTICE

- Before operating the product, read the user's manual thoroughly for proper and safe operation.
- If this product is for use with a system requiring safeguards that directly involve personnel safety, please contact the Yokogawa sales offices.

YOKOGAWA

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Printed in Japan, 302(YG)
MS-12E