

Main Unit Specifications

Basic Specifications

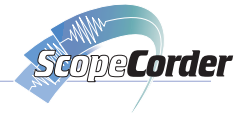
● Input Type	Plug-in module (Each unit has a build-in A/D converter)
Slots	8
Logic inputs	16 (8 bits × 2)
● Horizontal Maximum record length	2.5 MW/CH, 50 MW total (standard) 10 MW/CH, 250 MW total (with /M1 option) 25 MW/CH, 500 MW total (with /M2 option) 50 MW/CH, 1 GW total (with /M3 option)
Time axis accuracy ¹	±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
Zoom	Single, dual, triad, quad, octal Main, Main & Z1, Main & Z1 & Z2, Main & Z2, Z1 Only, Z2 Only, Z1 & Z2 (Z1 and Z2 are

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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)
 PERSIST Overlays in one color.
 Accumulation
 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 701919	9in 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: ±(0.2% of reading + 1.5°C)
J	–200°C to 1100°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 μ STR (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 μ STR)
Measurement range/measurable range	
Measurement range (FS)	Measurable range (-FS to +FS)
500 μ STR	-500 μ STR to 500 μ STR
1000 μ STR	-1000 μ STR to 1000 μ STR
2000 μ STR	-2000 μ STR to 2000 μ STR
5000 μ STR	-5000 μ STR to 5000 μ STR
10,000 μ STR	-10,000 μ STR to 10,000 μ STR
20,000 μ STR	-20,000 μ STR to 20,000 μ STR
mV/V range support	mV/V range = $0.5 \times (\mu$ STR 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 μ STR/ $^{\circ}$ C (typical value)
Gain	±(0.02% of FS)/ $^{\circ}$ 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)

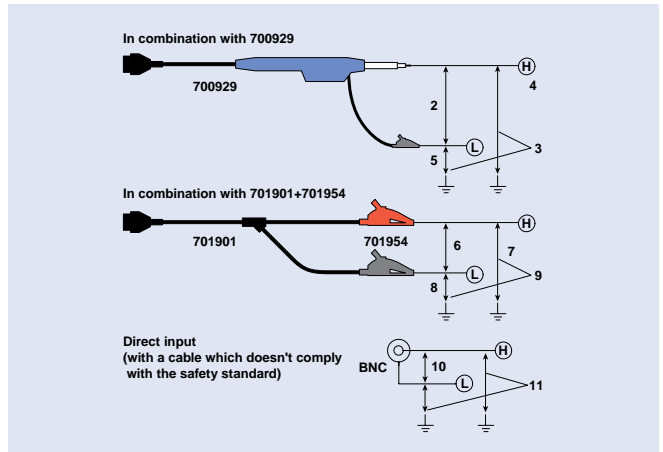
High-Speed Logic Probe (700986)

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 μ s or less
Input impedance	Approximately 100 k Ω
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) \times 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 \pm 50% AC input 50 V AC \pm 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 k Ω

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

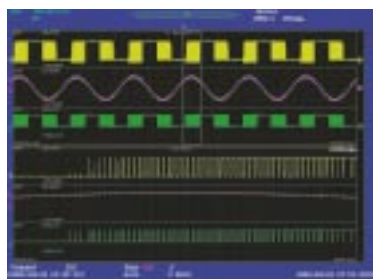


Warning

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: \pm 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
50 MHz bandwidth current probe (700937) Input range: 15 Apeak	10 MHz bandwidth current probe (701930) Input range: 150 Arms			



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.

701280 Frequency Module

■ Frequency Measurement Section

Input channels	2
Data update rate	25 kHz (40 μs)
Measurement range (frequency)	0.01 Hz–200 kHz 0.1 Hz/div–50 kHz/div 50 ns (20 MHz)
Highest measurement resolution	50 ns (20 MHz)

■ Input Section

Compatible input signals	Encoder pulse input of up to ±42 V, Electromagnetic pickup input ⁶ AC power input up to 300 Vrms (700929 Isolation Probe required) Isolated, unbalanced AC, DC
Input type	AC, DC
Input coupling	±1 V–±50 V (6 ranges, 1-2-5 steps)
Input voltage (1:1) (10:1)	±10 V–±500 V (6 ranges, 1-2-5 steps)
Max input voltage (1 kHz or less)	420 V (DC+ACpeak)
When combined with 700929 (10:1) ²	42 V (DC+ACpeak)
Direct input (1:1) ¹⁰	42 V (DC+ACpeak)
Max allowable common mode voltage	300 Vrms (CAT II)
When combined with 700929 (10:1) ³	42 V (DC+ACpeak) 30 Vrms (CAT II)
Direct input (1:1) ¹¹	1 MΩ±1%, approx. 35 pF
Input impedance:	Isolated BNC connector
Connector type	OFF/100 Hz/1 kHz/10 kHz/100 kHz
Input filters	Supports open collector, mechanical contact output, 4.7 KΩ(+5 V)
Input pullup function (ON/OFF)	Setting range 1 ms–1000 ms
Input chatter suppression (ON/OFF)	Logic (5 V/3 V/12 V/24 V), electromagnetic pickup, zero-cross, pull-up (5 V), AC100 V, AC200 V, user-defined
Comparator section	Presets ±FS range, resolution in units of 1% ±1%, ±2.5%, or ±5% of FS

Threshold range	Hysteresis
LED display (each CH)	ACT (green) OVER (red)
Compatible probes/cables	Operational status (illuminates during pulse input) Overdrive status (illuminates during an input overrange) (10:1 probe) 700929/701940 (1:1 cable) 366926

■ Measurement Function Details

Measurable items	Frequency (Hz), rpm, rps, Period (sec), Duty (%), Power supply freq. (Hz), Pulse width (sec), Pulse integration, Velocity
Effective measurement range	20 div (10 div display range)
Resolution of measured data	16 bit (2400 LSB/div)
Measurement items and ranges	

Measured Item	Measurement Range	Range
Frequency (Hz)	0.01 Hz–200 kHz	0.1 Hz/div–50 kHz/div
rpm	0.01 rpm–100,000 rpm	0.1 rpm/div–10,000 rpm/div
rps	0.001 rps–2000 rps	0.01 rps/div–200 rps/div
Period (sec)	5 μs–50 s	10 μs/div–5 s/div
Duty (%)	0%–100%	1%–20%/div
Power supply freq (Hz)	(50 Hz, 60 Hz, 400 Hz)±20 Hz	0.1 Hz/div–2 Hz/div
Pulse width (sec)	2 μs–50 s	10 μs/div–5 s/div
Pulse integration	up to 2×10 ⁹ count	100×10 ⁻²¹ /div–500×10 ⁻¹⁹ /div
Velocity	Same as freq. (can be converted to km/h and other units)	

Auxiliary Measurement Functions

■ Smoothing Filter (moving average)	Apply moving average to smooth stair step shaped waveforms. Moving average constant is specified from 0.2 ms to 1000 msec (moving average constant=specified time +40 μs) This reduces jitter and increases the resolution.
■ Pulse Average Function	Measure the specified number of pulses at once, and specify 1 to 4096 pulses for the average value output mode. This has the exact same effect as the smoothing filter, but averaging can be performed at the pulse interval. Even if encoder gaps are unequal, you can measure pulses together and average them.
■ Deceleration Prediction (Braking Applications)	A measuring function that automatically compensates for the lack of encoder pulse information during deceleration and hypothesizes a deceleration curve.
■ Stop Prediction (Braking Applications)	Predicts stop from a specified time after pulse stop (set up to 10 stages).
■ Offset Observation Function	Set an observational center, then zoom and display surrounding area (for fluctuation observation) Offset setting range = (1 div × 1000)

■ Measurement Accuracy¹⁻⁵

■ Frequency/Revolution/Velocity Measurements	
Measurement accuracy	±(0.05% of 10 div + accuracy depending on the input frequency)
Accuracy depending on the input frequency	1 Hz–2 kHz: 0.05% of input waveform freq +1 mHz 2 kHz–10 kHz: 0.1% of input waveform freq 10 kHz–20 kHz 0.3% of input waveform freq 20 kHz–200 kHz 0.5% of input waveform freq
■ Period Measurement	
Measurement accuracy	±(0.05% of 10 div + accuracy depending on the input period)
Accuracy depending on the input period	500 μs–50 s 0.05% of input waveform interval 100 μs–500 μs 0.1% of input waveform interval 50 μs–100 μs 0.3% of input waveform interval 5 μs–50 μs 0.5% of input waveform interval + 0.1 μs

■ Duty Measurement

Accuracy depending on the input frequency	0.1 Hz–1 kHz ±0.1% of 100%
	1 kHz–10 kHz ±0.2% of 100%
	10 kHz–50 kHz ±1.0% of 100%
	50 kHz–100 kHz ±2.0% of 100%
	100 kHz–200 kHz ±4.0% of 100%

■ Pulse Width Measurement

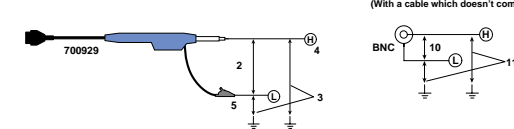
Measurement accuracy	±(0.05% of 10 div + accuracy depending on the input pulse width)
Accuracy depending on the input pulse width	500 μs–100 s 0.05% of input waveform pulse width 100 μs–500 μs 0.1% of input waveform pulse width 50 μs–100 μs 0.3% of input waveform pulse width 2 μs–50 μs 0.5% of input waveform pulse width + 0.1 μs

■ Power Supply Frequency Measurement

Measurement accuracy	Center freq. at 50, 60 Hz, accuracy of ±0.03 Hz, resolution of 0.01 Hz Center freq. at 400 Hz, accuracy of ±0.3 Hz, resolution of 0.01 Hz
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- Under standard operating conditions: (temperature 23°C±5°C, humidity 55%±10% RH, warmup of at least 30 minutes, and after calibration.)
- During a minimum input of 0.2 Vpp. Measurement conditions:
■ During freq./Period measurement: 1 Vpp/1 μs square wave input (range=±10 V, bandwidth=FULL, hysteresis=±1%)
■ During Duty/pulse width measurement: 1 Vpp/5 ns square wave input (range=±10 V, bandwidth=FULL, hysteresis=±1%)
■ During power supply frequency measurement: 90 Vrms sine wave input (range=AC100 V, BW=100 kHz)
- Electromagnetic pickup; given output within 0.2 Vpp–42 Vpp. Minimum sensitivity=0.2 V (at 1:1), connected with 1:1 cable. For types that requires a power supply or terminal resistance, apply it to the sensor side

In combination with 700929



Direct input
(With a cable which doesn't comply with the safety standard)

701275 Acceleration/Voltage Module (with AAF)

Input channels	2
Input format	Switchable between acceleration and voltage input AAF (anti-aliasing filter) supports both acceleration and voltage (AC coupling for acceleration) ACCL, (voltage) AC,DC,GND
Input coupling	Max sampling rate
Max sampling rate	100 ks/s
A/D conversion resolution	16-bit (2400 LSB/div)
Input type	Isolated, unbalanced
Frequency band (-3 dB) ¹	(acceleration) 0.4 Hz–40 kHz (voltage) DC–40 kHz
AC coupling (-3 dB point) acceleration/voltage	0.4 Hz or less
Input range	For acceleration (±5 V=X1 range) X0.1–X1–X100 (1-2-5 steps) For voltage (10:1) 50 mV/div–100 V/div (1-2-5 steps) ¹² For voltage (1:1) 5 mV/div–10 V/div (1-2-5 steps) ¹² 20 div (10 div display range)
Effective measuring range	±5 div
DC offset	42 V (DC+ACpeak)
Max input voltage (1 kHz or less) ¹²	42 V (DC+ACpeak) 30 Vrms (CAT II)
Max allowable common mode voltage ¹¹	42 V (DC+ACpeak)
Accuracy ¹ For voltage (DC accuracy)	±(0.25% of 10 div)
For acceleration (AC accuracy)	±(0.5% of 10 div) (at 1 kHz)
Input impedance	1 MΩ±1%, approx. 35 pF
Connector type	Metal BNC connector
Input filters	OFF/Auto (AAF)/4 kHz/400 Hz/40 Hz
Anti-aliasing filter (AAF)	Cutoff frequency ¹³
Cutoff frequency ¹³	fc (cutoff frequency)=fs (sampling frequency) × 40% fc automatically moves to the sampling frequency. -65dB at 2Xfc (Typical)
Cutoff characteristics	Zero point
Temperature coefficient (for voltage) ¹⁴	Gain
Acceleration sensor bias	±(0.02% of 10 div) / °C (Typical) ±(0.02% of 10 div) / °C (Typical)
Example of compatible acceleration sensor: ¹⁵	constant current drive=4 mA±10%, voltage < 22 V Built-in amp type: Kistler Piezotron™, PCB ICP™, Endevco: Isotron2™

Sensor usage Notes:

Something that supports acceleration sensor and bias is 4 mA/22 V
The sensor is highly sensitive to heat and shocks. If changes in temperature or shocks occur that are outside of the standard operating conditions, measurement may not be possible for several minutes.
Compatible probes/cables for voltage (10:1 probe) 701940/700929 (1:1 cable) 366926

- Under standard operating conditions: (temperature 23°C±5°C, humidity 55%±10%RH, warmup of at least 30 minutes, and after Calibration.)
- The module's insulation is functional insulation. Even when using a probe, input above 42 V is not considered safe.
- when fs=50 Hz–100 kHz, (when fs <=50 Hz, fc is fixed to 20 Hz)
- 14 excludes AUTO Filter
- Piezotron is a registered trademark of Kistler Instrument Corp., ICP is a registered trademark of PCB Piezotronics Inc., ISOTRON2 is a registered trademark of ENDEVCO Corp..

Universal (Voltage/Temperature) Modules (701261/701262)

Input channels	2																																				
Input signals	Voltage or temperature (thermocouple)																																				
AAF (anti-aliasing filter)	701261: none, 701262: included																																				
Input couplings	TC (thermocouple), DC, AC, GND																																				
Input types ¹	Isolated unbalanced																																				
Maximum sampling rate	Voltage 100 kS/s																																				
Data updating rate	Temperature 500 Hz																																				
A/D conversion resolution	Voltage: 16 bits (2400 LSB/div); temperature: 0.1°C																																				
Frequency range (-3 dB) ¹	Voltage DC to 40 kHz Temperature DC to 100 Hz																																				
Input range	Voltage (1:1) 5 mV/div to 20 V/div (10 div display, in steps of 1-2.5) Temperature K, E, J, T, L, U, N, R, S, B, W, iron-doped gold/chromel																																				
Effective measurement range (voltage)	20 div (display range 10 div)																																				
DC offset (voltage)	±5 div																																				
DC accuracy ¹ (voltage)	±(0.25% of 10 div)																																				
Temp. measured range/accuracy ^{1,2}	<table border="1"> <thead> <tr> <th>Type</th> <th>Measured Range</th> <th>Accuracy</th> </tr> </thead> <tbody> <tr> <td>K</td> <td>-200°C to 1300°C</td> <td>±(0.1% of reading + 1.5°C)</td> </tr> <tr> <td>E</td> <td>-200°C to 800°C</td> <td>However, for -200°C to 0°C, ±0.2% of reading + 1.5°C</td> </tr> <tr> <td>J</td> <td>-200°C to 1100°C</td> <td>±0.2% of reading + 1.5°C</td> </tr> <tr> <td>T</td> <td>-200°C to 400°C</td> <td></td> </tr> <tr> <td>L</td> <td>-200°C to 900°C</td> <td></td> </tr> <tr> <td>U</td> <td>-200°C to 400°C</td> <td></td> </tr> <tr> <td>N</td> <td>0°C to 1300°C</td> <td></td> </tr> <tr> <td>R, S</td> <td>0°C to 1700°C</td> <td>±(0.1% of reading + 3°C) However, 0°C for 200°C: ±8°C 200°C for 800°C: ±5°C</td> </tr> <tr> <td>B</td> <td>0°C to 1800°C</td> <td>±(0.1% of reading + 2°C) However, 400°C to 700°C: ±8°C Effective range.: 400°C to 1800°C</td> </tr> <tr> <td>W</td> <td>0°C to 2300°C</td> <td>±(0.1% of reading + 3°C)</td> </tr> <tr> <td>Gold/chromel</td> <td>0 K to 300 K 0 to 50 K: ±4 K 50 to 300 K: ±2.5 K</td> <td></td> </tr> </tbody> </table>	Type	Measured Range	Accuracy	K	-200°C to 1300°C	±(0.1% of reading + 1.5°C)	E	-200°C to 800°C	However, for -200°C to 0°C, ±0.2% of reading + 1.5°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) However, 0°C for 200°C: ±8°C 200°C for 800°C: ±5°C	B	0°C to 1800°C	±(0.1% of reading + 2°C) However, 400°C to 700°C: ±8°C Effective range.: 400°C to 1800°C	W	0°C to 2300°C	±(0.1% of reading + 3°C)	Gold/chromel	0 K to 300 K 0 to 50 K: ±4 K 50 to 300 K: ±2.5 K	
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Max. input voltage (1 kHz or less)	42 V (DC+ACpeak) for satisfying safety standards ³ 150 V (DC+ACpeak); allowable maximum ⁴																																				
Max. allowable common mode volt. (1 kHz or less)	42 V (DC+ACpeak) (CAT I & CAT II, 30 Vrms)																																				
Input connector	Binding post																																				
Input impedance	Approximately 1 MΩ																																				
Input filters	Voltage OFF, AUTO (AAF), 4 kHz, 400 Hz, 40 Hz (-12 dB/oct except AUTO) Temperature OFF, 30 Hz, 8 Hz, 2 Hz																																				
AAF (anti-aliasing filter) ⁵	701262 only Cutoff frequency $f_c = f_s$ (sampling frequency) × 40% f_c automatically linked with the sampling frequency. Cutoff characteristics: -65 dB at 2 X f_c (typical value)																																				
Temp. coefficient (for voltage) ⁶	Zeropoint ±(0.01% of 10 div)/°C (typical value)																																				
Gain	±(0.02% of 10 div)/°C (typical value)																																				
Compatible cable	366961 (banana-to-alligator 1:1)																																				

- Under reference operating conditions (ambient temp. of 23°C ±5°C, ambient humidity of 55% ±10%RH, after 30-minute warmup period and calibration).
- Does not include reference junction/temperature compensation accuracy.
- Since the input connector is of a binding post type, it is possible to touch the metal part of the connector. Therefore, for safety reasons, the maximum value is 42 V (DC+ACpeak).
- Maximum value at which the input circuit will not be damaged.
- When $f_s = 50$ Hz to 100 KHz. When $f_{s\max} = 50$ Hz, $f_c = 20$ Hz (fixed).
- Except when filters set to AUTO.

DL750/DL750P Model Numbers and Suffix Codes

Model	Suffix Code	Description
701210		"DL750 main unit (16 isolated channels + 16-bit logic)" 112 mm width A6 thermal printer built-in"
701230		"DL750P main unit (16 isolated channels + 16-bit logic)" 210 mm width A4 thermal printer built-in"
Power cable	-D	UL/CSA standard
	-F	VDE standard
	-R	AS standard
	-Q	BS standard
	-H	GB standard(Complied with CCC)
Internal media drive ²	-J1	Floppy drive
	-J2	Zip [®] drive (available for the DL750 only) ³
	-J3	PC card drive
Default Help language	-HE	English online help
	-HJ	Japanese online help
	-HC	Chinese online help
	-HG	German online help
	-HF	French online help
	-HL	Italian online help
	-HK	Korean online help
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
Other specifications	/CB	Internal 30 GB hard drive (FAT32)
	/C10	Ethernet interface
	/G2	User-defined math function
	/G3	DSP channel function
	/P4	Probe power (4-output)
/DC	DC12 V power (DC10-18 V) (DL750 only) ³	

- Plug-in modules are not included.
- Choose only one.
- Zip drive and DC12V power supply cannot be specified together with the DL750P.
- Cannot be specified together.

Standard Accessories

Product	Order Qty.	
Power cable	1	
User's manuals (one set)	1	
Transparent front cover	1	
Printer roll paper	DL750 (A6 10 m/roll)	3
	DL750P (A4 20 m/roll)	1
Cover panel (for blank module slots)	8	
Rubber feet (four per set)	1	
Soft case (for storing accessories)	1	

Zip is a registered trademark of Omega Corporation in the United States and/or other countries. Other company names and product names appearing in this document are trademarks or registered trademarks of their respective companies.

Plug-in Module Model Numbers⁵

Model No.	Description	Firmware
701250	High-speed 10 MS/s 12-bit isolation module (2 CH)	1.07 or later
701251	High-speed 1 MS/s 16-bit isolation module (2 CH)	1.07 or later
701255	High-speed 10 MS/s 12-bit non-isolation module (2 CH)	2.02 or later
701260	High-voltage 100 kS/s 16-bit isolation module (2 CH, with RMS)	2.02 or later
701261	Universal Module (2 CH)	5.01 or later ⁷
701262	Universal Module (with AAF 2 CH)	5.01 or later ⁷
701265	Temperature/high-precision voltage module (2 CH)	1.07 or later
701270	Strain module (NDIS, 2 CH)	2.02 or later
701271	Strain module (DSUB, Shunt-CAL, 2 CH)	2.02 or later
701275	Acceleration/voltage module (with AAF, 2 CH)	3.01 or later
701280	Frequency module (2 CH)	3.01 or later

- Probes are not included with any modules.
- The latest firmware for the DL750 series is available on our Web site.
<http://www.yokogawa.com/inf/DL750/>
- Only supported by the initially-released DL750P (ver. 5.01 or later).
DL750 support to be offered by 3rd quarter 2005 (ver. 6.01 or later)



DL750/DL750P Accessories

Product	Model No.	Description ¹
Isolated probe	700929	1000 Vrms-CATII for 701250, -51, and -60 (10:1)
"1:1 BNC safety adapter lead (in combination with the following)"	701901	1000 Vrms-CATII for 701250, -51, and -60
Safety mini clip (hook type)	701959	1000 Vrms-CATII, 1 set each of red and black
Large Alligator clip (dolphin type)	701954	1000 Vrms-CATII, 1 set each of red and black
Alligator adapter (rated volt.: 1000 V)	758929	1000 Vrms-CATII, 1 set each of red and black
Alligator adapter (rated volt.: 300 V)	758922	300 Vrms-CATII, 1 set each of red and black
Fork terminal adapter	758921	1000 Vrms-CATII, 1 set each of red and black
Passive probe for DL750/750P ²	701940	Non-isolated 600 Vpk (701255) 42 V or less (other) (10:1)
1:1 BNC-alligator cable	366926	Non-isolated 42 V or less, for 701250, -51, -55, 1 m
1:1 Banana-alligator cable	366961	Non-isolated 42 V or less, for 701261, -62, -65, 1.2 m
Current probe ³	701933	30 Arms, DC to 50 MHz, supports probe power
Current probe ³	701930	150 Arms, DC to 10 MHz, supports probe power
Current probe ³	701931	500 Arms, DC to 2 MHz, supports probe power
Probe power ⁴	701934	Large current output, external probe power supply (4 outputs)
Differential probe	700924	1400V 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	For GO/NO-GO I/O and start input
Safety BNC-banana adapter	758924	500 Vrms-CATII, for 701250, -51, -55, -60
Printer roll paper	B9988AE	DL750, A6 size (120 mm wide × 10m), include 10 rolls
Printer roll paper	701966	DL750P, A4 size (210 mm wide × 20m), include 6 rolls
High-speed logic probe ⁵	700986	8-bit, non-isolated, response speed: 1 μs
Isolated logic probe ⁶	700987	8-bit, each channel isolated, response speed: 20 ms (for AC)
Isolated logic measurement leads	758917	"Isolated logic measurement leads (2 per set) Alligator clip required separately. "
Conversion adaptor	366928	BNC (jack)-RCA (plug) conversion
Safety BNC cable (1 meter)	701902	1000 Vrms-CATII (BNC-BNC)
Safety BNC cable (2 meters)	701903	1000 Vrms-CATII (BNC-BNC)
Soft carrying case	701963	For DL750, with 3 storage pockets
Soft carrying case	701967	For DL750P, with 3 storage pockets

- Actual allowable voltage is the lower of the voltages specified for the main unit and the cable. 42 V is safe when using the 701940 with a Non isolated type BNC input.
- The number of current probes that can be powered from the main unit probe power is limited. See the following for details. <http://www.yokogawa.com/inf/probe/>
- There is no limit to the number of externally powered probes that can be used.
- One of each connection lead (B9879PX and B9879KX) is included.
- 758917, and either 758922 or 758929 is required for measurement.

Exterior Dimensions

