



SCOPECORDER

**Complete measurements
Complete portability**

**DL350
ScopeCorder**

Precision Making

Bulletin DL350-01EN



A stringent measurement condition requires a high performance and flexible solution. This is the design philosophy of the DL350 ScopeCorder. With the ability to use the same 18 types of plug-in module as other ScopeCorders, the battery portable DL350 is easier to carry and easier to use in confined spaces.

Offering channel counts up to 8 analog and 16 digital, sample rates up to 100 MS/s, Isolation up to 1 KV and resolution up to 16-bit, the range of modules enables the DL350 to be configured for a multitude of long and short term measurement applications.

Rechargeable battery operation can be used for testing in remote areas or as a UPS when combined with mains power.

The DL350 delivers:

Portability – The light weight, battery operation and compact size makes the DL350 the all-round instrument-of-choice in the vehicle and in the field.

Functionality – The built-in memory provides long term recording and transient capture. An SD card provides long term storage. Advanced triggering ensures that the data is captured during the most critical of tests.

Operability – Use it like a recorder or an oscilloscope. The touch screen and choice of operating modes mean that the DL350 is as useful for simple maintenance tasks as it is for advanced measurement and analysis needs.



Maximum 8-CH high-speed isolated recording in a battery-operated compact chassis

- A4-sized compact chassis
- Simultaneous isolated inputs maximum 8-ch (1 MS/s) or 4-ch (100 MS/s)
Scanning inputs maximum 32-ch (10 kS/s) or 16 channels (20 kS/s)
- AC/DC/Battery operated



Superior noise and vibration-proof Flexible recording in a single portable tool

- Choose from 18 types of input module, which are compatible with other ScopeCorders.
- Vibration-resistant design
- Superior immunity
- Secure reliable data recording in harsh environment

ScopeCorder DL350

 UP TO
100Mpoints
/Module

 UP TO
5Gpoints
/Module

High-speed and long-term recording using large memory and direct recording onto an SD card

- Up to 100 Mpoints per module memory
- Up to 50 days continuous recording onto SD card



Ease of use in the field

- Intuitive operation using 8.4-inch touch screen
- A choice of two operating modes provides greater flexibility
- “DL350 assistant software” helps to configure settings and to back-up data on-the-spot



More than a test tool

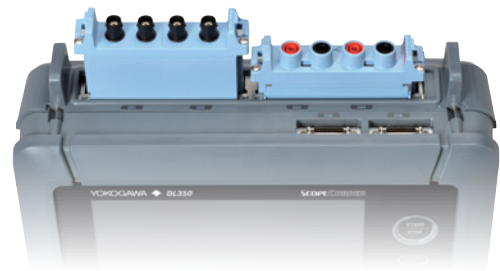
The DL350 ScopeCorder combines in one compact instrument all the measurement and recording capabilities you need when you are away from your office or lab. High-speed signals or long-term recording, ‘quick and simple’ or sophisticated operation, the DL350 provides the flexibility you need when you need it.

Complete self-contained signal conditioning






Whether it is straightforward high precision voltage measurements or a blend of signals coming from such things as current probes, temperature sensors, strain gauges, accelerometers and serial buses, the DL350 can handle them all without extra boxes or cables.



This extraordinary input capability is achieved by providing 2 slots, which can be populated with any of 18 different types of user swappable input modules. This means, for example, that user-swappable 4 isolated 16-bit voltage inputs can be measured at 1 MS/s, alongside 16 temperatures or 2 separate CAN or LIN buses each containing 30 signals. Swap a module and measure at 100 MS/s with 12-bit and 1 kV of isolation. Meanwhile there are 16 built-in logic inputs; swap in a digital input module to add even more. Make AC measurements like a DMM with an RMS module in real-time or use a math channel after the recording is finished.



Examples of complex measurements

| Field | Application purpose | Measurement item | | User advantages |
|--|---|--|--------------------------------|--|
| | | Slot 1 | Slot 2 | |
| EV (electric vehicle)  | Evaluation of battery voltage fluctuation while driving | Battery voltage | CAN communication data | Small size, battery drive, synchronization with GPS* position and time data |
| Power tool  | Evaluation of practical behavior | Battery voltage, motor rotation pulse | Tool vibration | Small size, battery drive, complex measurement of voltage and vibration |
| Field device  | Maintenance of ultrasonic-type vortex flow meter | Sensor receiving wave, receiving pulse | Gate signal | Small size, 2-way power source, long-term monitoring with long memory |
| Factory/plant  | Power quality monitoring | AC power, voltage, current | Auxiliary power source monitor | Small, portable, window trigger (instantaneous power failure, sag detection) |
| Steel making Paper making  | Rolling process monitoring | Thickness gauge monitor | Temperature | High noise immunity, external clock (roller) synchronization |

*The GPS unit can only be supplied to countries where it is not prohibited by local radio laws.

Use it like a data acquisition system or a long memory oscilloscope

Up to 5 Gpoints of data per module can be recorded directly to an SD card. This means that the DL350 can be used for continuous recording for up to 50 days. For high speed signals, up to 100 M points per module of internal memory is available to capture fast transients. This is up to 10000 times more than other portable oscilloscopes or test tools and thus signals can be captured with higher sample rates or for much longer periods.

Accurate measurement of fast-switching waveforms

Unique amongst portable measuring instruments, there is a high-resolution high-speed sampling module available for the DL350. This provides individually isolated 12-bit, 100 MS/s inputs, which can precisely measure and record transient waveforms superimposed on slower signals. For example, transients occurring on inverter outputs, or the edges of control signals, which are beyond the reach of traditional handheld test tools.



Gate signal waveforms of inverter (20 kHz)
The picture on the left shows a waveforms measured with 100 MS/s (by 720211 module) that is sufficiently high sample rate to accurately reconstruct the signal, which will result in more accurate measurements than the one on the right that measured with 1 MS/s

Measurement examples to built-in memory

Scope mode

| Sample Rate | For 1 ch ¹ | For 4 ch ² | For 8 ch ³ |
|-------------|-----------------------|-----------------------|-----------------------|
| 100 MS/s | 1 sec. | 0.5 sec. | — |
| 10 MS/s | 10 sec. | 5 sec. | — |
| 1 MS/s | 1 min. 40 sec. | 50 sec. | 20 sec. |
| 100 kS/s | 10 min. | 5 min. | 3 min. 20 sec. |
| 10 kS/s | 2 hours | 1 hour | 40 min. |
| 1 kS/s | 20 hours | 10 hours | 5 hours |
| 100 S/s | 10 days | 5 days | 60 hours |
| 10 S/s | 50 days | 50 days | 20 days |
| 5 S/s | 50 days | 50 days | 50 days |

Recorder mode

| Sampling interval | For 1 ch ¹ | For 4 ch ² | For 8 ch ³ |
|-------------------|-----------------------|-----------------------|-----------------------|
| — | — | — | — |
| 1 μs | 20 sec. | 20 sec. | 10 sec. |
| 10 μs | 3 min. 20 sec. | 3 min. 20 sec. | 1 min. 40 sec. |
| 100 μs | 40 min. | 40 min. | 10 min. |
| 1 ms | 5 hours | 5 hours | 2 hours |
| 10 ms | 60 hours | 60 hours | 20 hours |
| 100 ms | 20 days | 20 days | 10 days |
| 200 ms | 20 days | 20 days | 20 days |

Measurement examples to SD memory card

Scope mode

| Sample Rate | For 1 ch ¹ | For 4 ch ² | For 8 ch ³ |
|-------------|-----------------------|-----------------------|-----------------------|
| 1 MS/s | 60 min. | — | — |
| 100 kS/s | 10 hours | 5 hours | 2 hours |
| 10 kS/s | 120 hours | 50 hours | 20 hours |
| 1 kS/s | 50 days | 20 days | 10 days |
| 100 S/s | 50 days | 50 days | 50 days |
| 10 S/s | 50 days | 50 days | 50 days |
| 5 S/s | 50 days | 50 days | 50 days |

Recorder mode

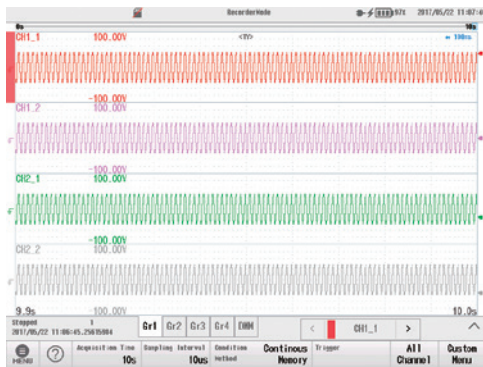
| Sampling interval | For 1 ch ¹ | For 4 ch ² | For 8 ch ³ |
|-------------------|-----------------------|-----------------------|-----------------------|
| 1 μs | 10 min. | — | — |
| 10 μs | 2 hours | 2 hours | 1 hour |
| 100 μs | 20 hours | 20 hours | 10 hours |
| 1 ms | 10 days | 10 days | 5 days |
| 10 ms | 50 days | 50 days | 50 days |
| 100 ms | 50 days | 50 days | 50 days |
| 200 ms | 50 days | 50 days | 50 days |

*1: When using one module of 720211 *2: When using two modules of 720211 *3: When using two modules of 720254

Comprehensive testing made easy

Full recording flexibility

For users who are more familiar with chart recorders than with long memory oscilloscopes, the DL350 offers a choice of operating modes. Recorder mode is suitable for long-term continuous recording for a specific duration and where the sampling interval is specified. A setup wizard can be used in this mode to quickly guide the operator through the entire setup process.



Scope mode enables the DL350 to be used just like an oscilloscope with all the associated benefits, like comprehensive triggering and flexible memory use. Using the history memory enables up to 1000 separate triggered acquisitions to be captured to the internal memory and viewed afterwards. Thus the causes and effects of abnormalities can be carefully analyzed as easily as paging through a photo album.

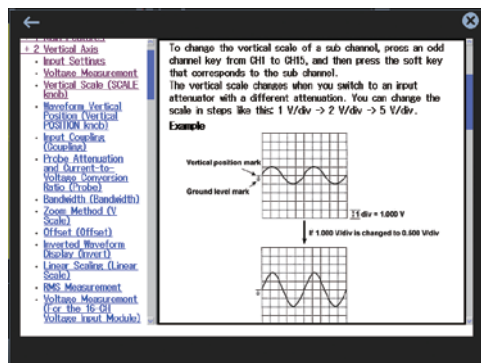


Intuitive operation

An 8.4 inch resistive touch screen has been adopted in order to deliver superior noise free performance. In environments with the highest levels of electrical noise such as motors and inverters, measurement precision is maintained whilst enabling the unit to be operated by using (gloved) fingers or stylus.



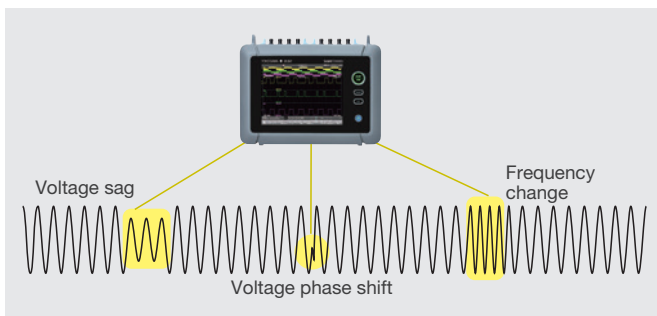
Even when the backlight is switched off and the touch screen is inactive the user still has access to the START/STOP, manual trigger and data saving keys. For users unfamiliar with state-of-the-art measuring instruments, there is also help at hand via the built-in digital manual.



A wealth of triggers for fault finding

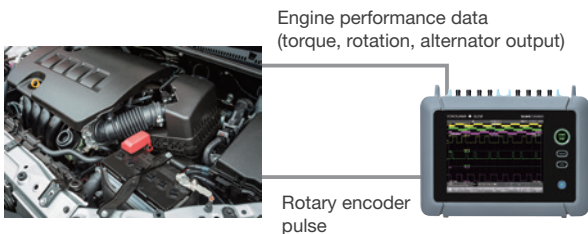
The user has a choice of a simple level trigger or can use enhanced triggers such things as pulse width, waveform period and across multiple channels. For example, the wave window trigger is ideal for AC power line monitoring which enables voltage sags, surges, spikes, phase shifts or drop outs to be easily captured (available for 40 to 1000 Hz waveforms).

Leave a DL350 unattended and automatically save the waveform to a file, or send a notification email, if and when it triggers.



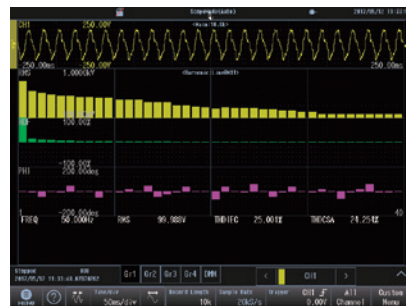
External sampling clock and triggers

The DL350 is first and foremost a field tool however it still provides the functionality you expect in a bench instrument. The sampling clock, trigger and start/stop controls are all available as external signals, thus, for example, a rotary angle encoder or degree wheel can be used as the sample clock to analyze engine rotation and performance.

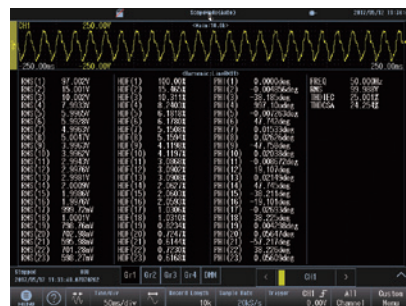


Verify power line quality using harmonic, power or FFT analysis

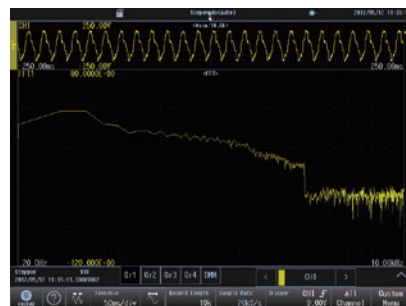
The power in single and 3 phase systems can be evaluated. Additionally for fundamental waveforms of 50 or 60 Hz, up to 40 harmonic orders can be analyzed. Alternatively use the suite of FFT functions to perform full frequency analysis.



Harmonics analysis (bar graph)



Harmonics analysis (listed)



FFT analysis

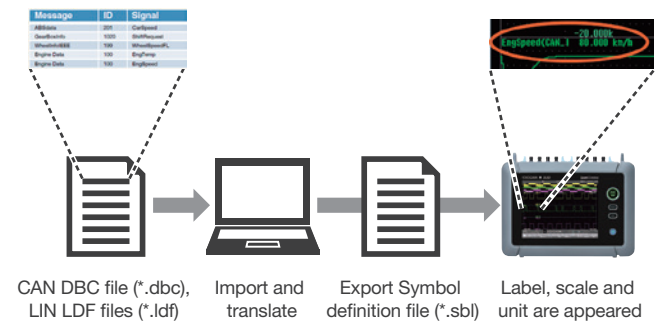
Advanced features to support in-vehicle testing

CAN bus, LIN bus and SENT monitoring

Use the DL350 with /VE option and bus monitor module to decode CAN bus, LIN bus or SENT signals and display information such as engine temperature, vehicle speed and brake pedal position as trend waveforms and compare this with the analog data coming from the actual sensors. This enables automotive engineers to gain an insight into the dynamic behavior of the complete electromechanical system.



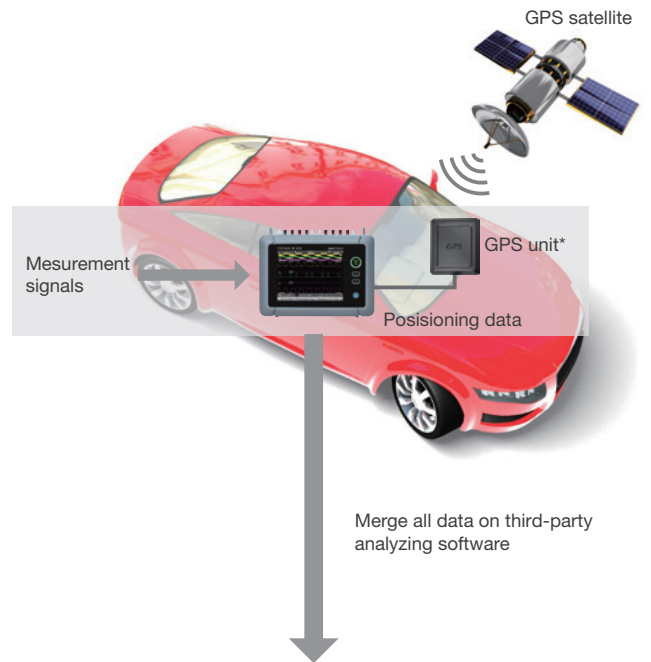
The symbol editor is a software tool that makes it possible to define which physical values from the CAN or LIN bus data frame will be trended as waveform data on the display of the DL350. The Symbol Editor can accept vehicle installed definition files (CAN DBC, LIN LDF)



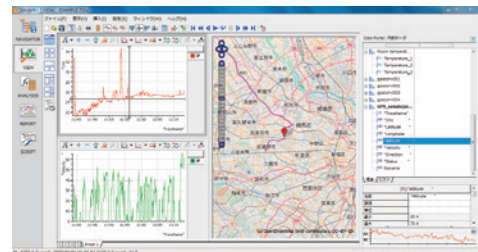
Position and global timing using GPS

An optional GPS unit* enables latitude, longitude, altitude, speed and motion direction data to be synchronized with the waveform data, perfect for drive testing, mobile testing, or distributed field recordings.

*The GPS unit can only be supplied to countries where it is not prohibited by local radio laws.



Merge all data on third-party analyzing software



NI DIAdem is the trademark of National Instruments Ireland Resources Limited.

Mains, DC or rechargeable battery power

The built-in rechargeable battery provides 3 hours of continuous operation for mobile measurements or can serve as a backup power supply if the main DC power is disconnected. This makes the DL350 a highly reliable ScopeCorder for tests which are difficult or expensive to repeat.



Operates in freezing temperatures

Even when used with the rechargeable battery, the DL350 will operate in temperatures from 0 to 45 degrees. The DL350 brings high-quality laboratory measurements into the harsh environments of the field.



Wide Temp. Operation
0 to 45°C
 (with Battery/DC power)

Vibration resistant

Instruments used for in-vehicle driving tests or field maintenance must be able to make reliable measurements. The DL350 has an aluminum inner frame and an external rubber bumper and conforms to the Japanese JIS D1601 standard for resisting in-vehicle shock and vibration.



Rubber bumper



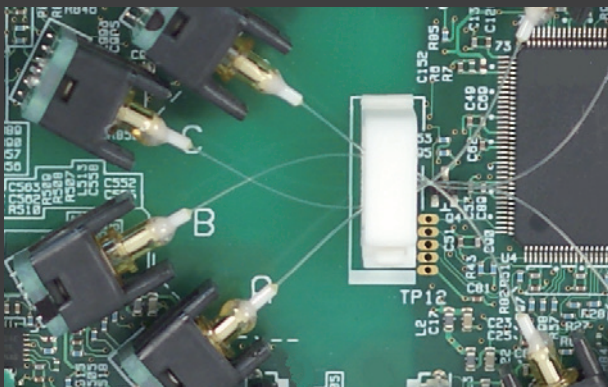
Technology Story

Input modules used in the DL350 ScopeCorder are compatible with the DL850E and DL850EV ScopeCorders, and the SL1000. The DL350 inherits the technological developments of more than 30 years of commitment to the measurement needs of electromechanical systems.

isoPRO™ – pioneering measurement technology



Input modules are powered by YOKOGAWA's isoPRO™ technology, which offers industry-leading isolation performance at the highest speeds. isoPRO™ core technology, designed with energy-saving applications in mind, delivers the performance needed to develop high-efficiency inverters that operate at high voltages, large currents and high frequency. The use of optical fibers enables the achievement of high speed data transmission and high voltage isolation.



Higher voltage registration and better CMRR



720268 High Voltage Input Module

The new high-Voltage, high-resolution, 1 MS/s 16 bit Isolation Module (model 720268), which is also capable of direct RMS measurements, has an improved sample rate (1 MS/s) and an improved maximum input voltage (1000 Vrms).

Normally, to realize high insulation performance in a small package, it is necessary to raise the input impedance and lower the voltage of the internal circuit. However the increase in input impedance causes a reduction in the common-mode rejection ratio (CMRR) and measurement accuracy.

Thanks to the new digital isolator in this module, high voltage input signals can be acquired without an increase in size. High insulation performance is maintained without compromising the CMRR.



Flexible operation



- | | |
|--|--|
| <p>1 START/STOP key LED indicates the DL350 measuring status.</p> <p>2 TRIGGER key Used for triggering the DL350 manually</p> <p>3 SAVE key A pre-programmable button that saves data to SD card or network storage</p> <p>4 Power switch</p> <p>5 8.4-inch touch screen</p> <p>6 Input module slots (2 slots)</p> <p>7 Logic input terminals</p> | <p>8 GPS* input terminal</p> <p>9 EXT I/O Multifunctional port used for external start/stop input, trigger I/O, external clock input and other functions</p> <p>10 SD memory card slot</p> <p>11 USB ports for peripherals and storage devices</p> <p>12 Ethernet (100BASE-TX/10BASE-T)</p> <p>13 USB port (PC)</p> <p>14 Battery pack (/EB option)</p> |
|--|--|

*The GPS unit can only be supplied to countries where it is not prohibited by local radio laws.

The application solver

Using different modules and accessories, the DL350 ScopeCorder addresses the complex measurement and analysis needs of widely diverse applications in the field.

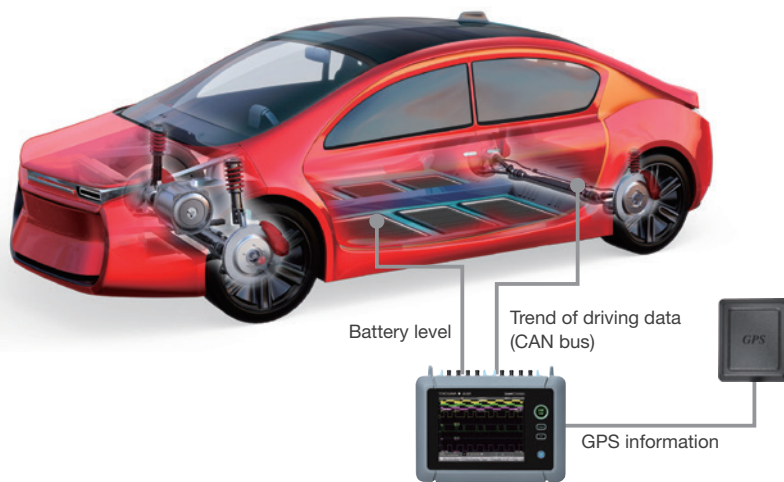
Electric vehicle inverter voltage evaluation




The voltage fluctuations of the input and output of the inverter can be measured alongside the trends of speed, acceleration and braking from the data on the CAN bus.

Up to 2.5-hours of continuous data can be directly recorded to the SD card with sample rates up to 200 kS/s.

The optional rechargeable battery pack enables the DL350 to be continuously operated without burdening the in-vehicle power supply.

The optional GPS unit* adds coordinate information to the recording data to enable the measurements to be correlated with the location of the vehicle in a drive test.



| Recommended modules | | Recommended accessory | |
|---------------------------------------|---|--|---|
| High-speed isolated module (100 MS/s) |  | CAN bus monitor module (/VE option required) |  |
| | | GPS unit* |  |

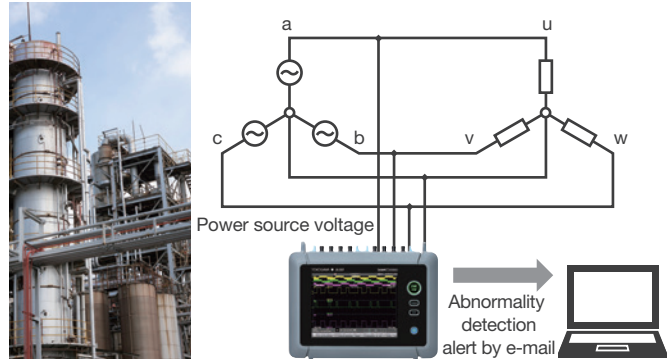
*The GPS unit can only be supplied to countries where it is not prohibited by local radio laws.

Power line monitoring in plants and factories

By using a wave-window trigger, voltage sags, surges, spikes and dropouts can be detected and captured.

Multi-phase voltages up to 1 kVrms and 1.4 kV peak can be recorded using 720268 high-voltage isolation modules.

In the case of unattended operation, waveforms can be saved, or an e-mail sent, when the DL350 is triggered.



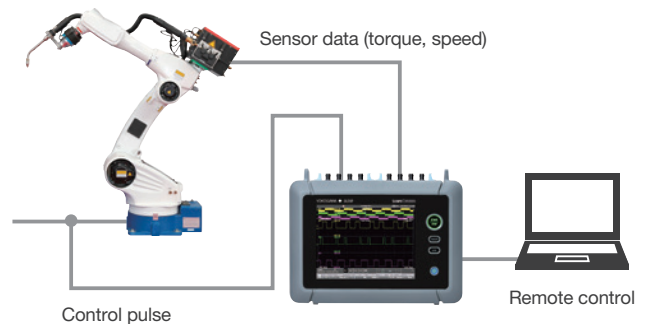
| Recommended modules | | Recommended functions |
|--|--|--|
| High-voltage isolated module (1 kVrms) | | Wave-window trigger, Action-on-trigger |
| High-voltage isolated module (1 kVrms) | | |

Industrial robot maintenance

It is possible to monitor and record the control signals to the servomotors and their speed and torque at the same time.

For condition monitoring, FFT analysis can be used on the vibration signals from accelerometers to help identify potential failures in machines or components.

Remote operation is available using the 'assistant software' or the input/output terminals making it potentially safer to use.



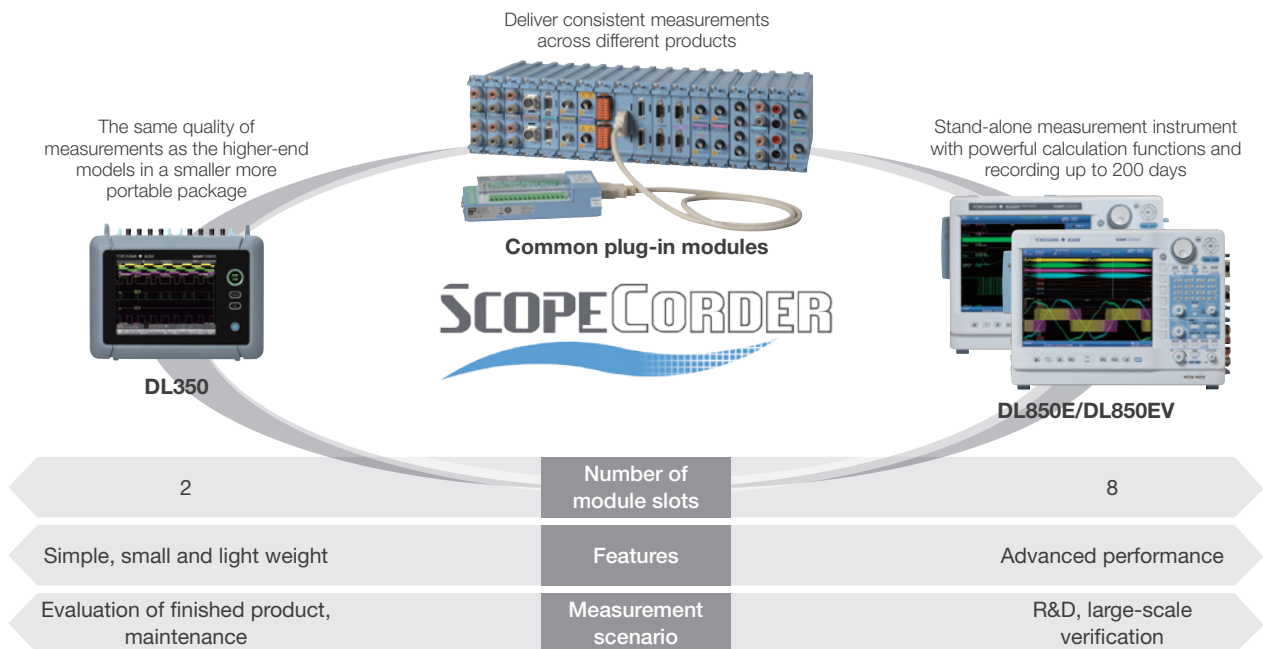
| Recommended modules | | Recommended functions |
|-----------------------------|--|------------------------------|
| 4-ch input isolated module | | FFT analysis, Remote control |
| Acceleration/Voltage module | | |

Consistent measurement results in R&D and maintenance




Traditionally different measuring instruments of various sizes and capabilities are used in the R&D lab and in the field. Since the accuracy, noise immunity and other characteristics are not the same, engineers struggle to correlate measurements.

The plug-in modules of the DL350 are common* to those of the DL850E and DL850EV, the higher-end ScopeCorder models. By using common* modules for product design, validation and on-site maintenance, the high quality of the measurements is consistent.

*With some exceptions



Extensive line-up: high-speed, high voltage, analog and digital

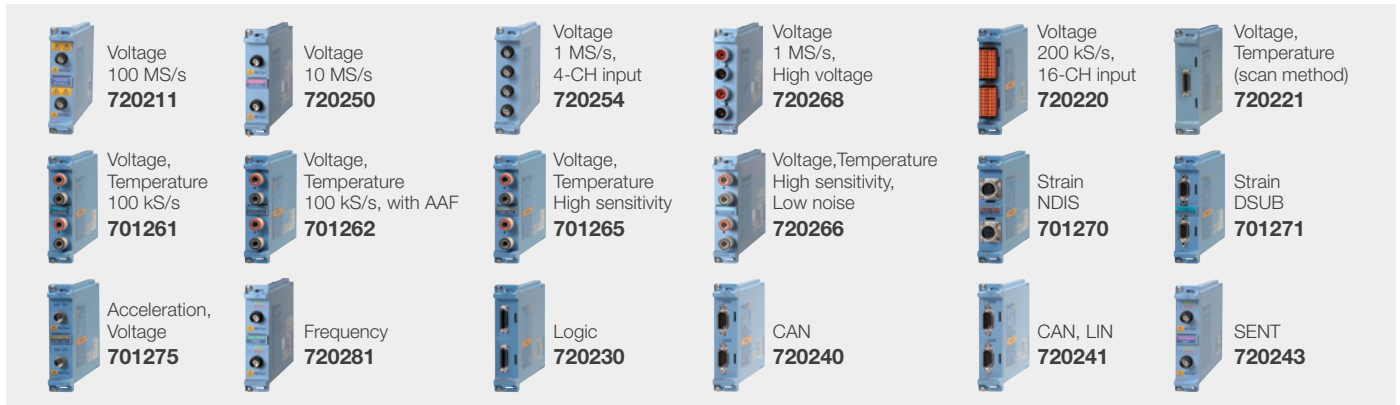
| | | |
|---|--|--|
| <p>Fast Sampling</p>  <p>100 MS/s Input Module 720211</p> <p>100 MS/s Sampling 12 bit Resolution 1 kV isolated input</p> | <p>High Voltage</p>  <p>High Voltage Input Module 720268</p> <p>Conforms to 1000 Vrms CAT II and 600 Vrms CAT III Great for maintenance of power distribution equipment</p> | <p>In-vehicle Comm.</p>  <p>CAN Bus Monitor Module 720240</p> <p>Decode CAN bus messages and display them as trends on-screen</p> |
|---|--|--|

The High-Speed 100 MS/s, 12-Bit Isolation Module (model: 720211) uses an Internal laser light source.



Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No.50, dated June 24, 2007
2-9-32 Nakacho, Musashino-shi, Tokyo 180-8750, Japan

Input module lineup for DL350



Notes: The following modules are not available on DL350
701250, 701251, 701255, 701267, 701281, 702010, 701260, 701280

Module selection

| Input | Model No. | Sample rate | Resolution | Bandwidth | Number of channels | Isolation | Maximum measurement voltage ^{*10} (DC+ACpeak) | DC accuracy | Note |
|------------------------------|----------------------|--|--|---|---------------------|---|--|--|---|
| Analog Voltage | 720211 ^{*5} | 100 MS/s | 12-Bit | 20 MHz | 2 | Isolated | 1000 V ² , 200 V ³ | ±0.5% | High speed · High voltage · Isolated |
| | 720250 | 10 MS/s | 12-Bit | 3 MHz | 2 | Isolated | 800 V ² , 200 V ³ | ±0.5% | high noise immunity |
| | 720254 | 1 MS/s | 16-Bit | 300 kHz | 4 | Isolated | 600 V ² , 200 V ³ | ±0.25% | 4-CH BNC input, low noise, high noise immunity |
| | 720268 | 1 MS/s | 16-Bit | 300 kHz | 2 | Isolated | 1000V ⁹ *11 | ±0.25% | with AAF, RMS, and high noise immunity |
| | 720220 | 200 kS/s | 16-Bit | 5 kHz | 16 | Isolated (GND-terminal) non-isolated (CH-CH) | 20 V ³ | ±0.3% | 16-CH voltage measurement (Scan-type) |
| Analog Voltage & Temperature | 720221 ^{*7} | 10 S/s | 16-Bit | 600 Hz | 16 | Isolated | 20 V | ±0.15% (Voltage) | 16-CH voltage or temperature measurement (scan method) Thermocouple (K, E, J, T, L, U, N, R, S, B, W, KP/AuFe) |
| | 701261 | 100 kS/s (Voltage), 500 S/s (Temperature) | 16-Bit (Voltage), 0.1°C (Temperature) | 40 kHz (Voltage), 100 Hz (Temperature) | 2 | Isolated | 42 V | ±0.25% (Voltage) | thermocouple (K, E, J, T, L, U, N, R, S, B, W, KP/AuFe) |
| | 701262 | 100 kS/s (Voltage), 500 S/s (Temperature) | 16-Bit (Voltage), 0.1°C (Temperature) | 40 kHz (Voltage), 100 Hz (Temperature) | 2 | Isolated | 42 V | ±0.25% (Voltage) | thermocouple (K, E, J, T, L, U, N, R, S, B, W, KP/AuFe), with AAF |
| | 701265 | 500 S/s (Voltage), 500 S/s (Temperature) | 16-Bit (Voltage), 0.1°C (Temperature) | 100 Hz | 2 | Isolated | 42 V | ±0.08 (Voltage) | thermocouple (K, E, J, T, L, U, N, R, S, B, W, KP/AuFe), high sensitivity range (0.1 mV/div) |
| | 720266 | 125 S/s (Voltage), 125 S/s (Temperature) | 16-Bit (Voltage), 0.1°C (Temperature) | 15 Hz | 2 | Isolated | 42 V | ±0.08 (Voltage) | thermocouple (K, E, J, T, L, U, N, R, S, B, W, KP/AuFe), high sensitivity range (0.1 mV/div), and low noise (±4 µVtyp.) |
| Strain | 701270 | 100 kS/s | 16-Bit | 20 kHz | 2 | Isolated | 10 V | ±0.5% (Strain) | Supports strain NDIS, 2, 5, 10 V built-in bridge power supply |
| | 701271 | 100 kS/s | 16-Bit | 20 kHz | 2 | Isolated | 10 V | ±0.5% (Strain) | Supports strain DSUB, 2, 5, 10 V built-in bridge power supply, and shunt CAL |
| Analog Voltage, Acceleration | 701275 | 100 kS/s | 16-Bit | 40 kHz | 2 | Isolated | 42 V | ±0.25% (Voltage) ±0.5% (Acceleration) | built-in anti-aliasing filter, Supports built-in amp type acceleration sensors (4 mA/22 V) |
| Frequency | 720281 | 1 MS/s | 16-Bit | resolution 625 ps | 2 | Isolated | 420 V ² , 42 V ³ | ±0.1% (Frequency) | Measurement frequency of 0.01 Hz to 500 kHz, Measured parameters (frequency, rpm, period, duty, power supply frequency, distance, speed) |
| Logic | 720230 | 10 MS/s | — | — | 8-bit × 2 ports | non-isolated | depend on logic probe used. | — | (8-bit/port) × 2, compatible with four-type of logic probe (sold separately) |
| CAN | 720240 | 100 kS/s | — | — | 60 signals × 2 port | Isolated | 10 V | — | CAN Data of maximum 32-bit allowable It is available for DL850EV and DL350 /VE option. In the DL850EV, maximum two (2) modules can be installed in a main unit. ^{*5 *6} |
| CAN, LIN | 720241 | 100 kS/s | — | — | 60 signals × 2 port | Isolated | 10 V (CAN port) 18 V (LIN port) | — | CAN port × 1, LIN port × 1 Available for DL850EV and DL350 /VE option. In the DL850EV, maximum two (2) modules can be installed in a main unit. ^{*5 *6} |
| SENT | 720243 | 100 kS/s | — | — | 11 data × 2 ports | Isolated | 42 V | — | Supported protocol: SAE J2716. Available for DL850EV and DL350 /VE option. In the DL850EV, maximum four (4) modules can be installed in a main unit. ^{*5 *6} |

*1: Probes are not included with any modules. *2: In combination with 700929, 702902 or 701947 probe. *3: Direct input *4: In combination with 10:1 probe model 701940
*5: Any other modules can be installed in the remaining slots. *6: In the DL850EV, up to four CAN Bus Monitor Modules (720240), CAN & LIN Bus Monitor Modules (720241) or SENT Monitor Module (720243) in total can be used on a single main unit. In the DL850EV, for the CAN Bus Monitor Modules (720240) and CAN & LIN Bus Monitor Modules (720241), up to two in total can be used on a single main unit.
*7: The 16-CH Scanner Box (701953) is required for measurement. *8: Class 1 Laser Product, IEC/EN60825-1:2007, GB7247.1-2012 *9: In combination with 758933 and 701954 or 701904 and 701954.
*10: See bulletin DL850E-01EN for voltage-axis sensitivity setting and measurement range. *11: 1000 Vrms (1000 VDC or 1414 Vpeak maximum) However, when using with DL850E/EV and SL1000, 850V (DC + AC peak)

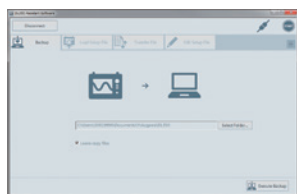
Accessories and software

PC data and setup file management

DL350 Assistant Software — Free Software —

Data files or setup configuration files stored in the DL350 SD card can be backed up with the press of a button.

Remote setting, start-stop control and setup file editing can also be easily done on the connected PC.



Remote waveform monitoring and instrument control

XWirepuller — Free Software —

Remote control and waveform display monitoring of a DL350 via USB or Ethernet.



Display and analysis of recorded waveforms

Xviewer LITE — Free Software —

Load waveforms captured by the DL350 and display, zoom, and export the data to the popular CSV format.



Xviewer — Advanced Software —

In addition to the features of Xviewer LITE, parameter measurement, statistical analysis, FFT and filtering on downloaded DL350 Data can be performed.

Free Xviewer trial

Get the free 30 day trial version of Xviewer at tmi.yokogawa.com.

Software Control <http://tmi.yokogawa.com/ea/products/oscilloscopes/oscilloscopes-application-software/>

| | Free Software | Advanced Software Trial version available |
|--|--|--|
| Off-line waveform display and analysis | <p>XviewerLITE—Basic check— Zoom, V-cursor, conversion to CSV format</p> <p>NI DIAdem DataPlugin^{*1 *4}</p> | <p>Xviewer—Advanced Analysis— Advanced and useful functions are supported. Good for precise, off-line waveform analysis.</p> <ul style="list-style-type: none"> • Waveform observation and analysis • Cursor, Parametric Measure • Statistical Analysis • Multiple file display • Advanced waveform operations • Comment, marking, printing and making report • Optional Math computation feature • Remote monitor • Instruments communication function • Transferring waveform & image files |
| Waveform monitoring on a PC | <p>XWirepuller Remote monitor and operation, transfer image files</p> | |
| Data transfer to a PC | <p>DL350 Assistant Software</p> | |
| Command control Custom software development | <p>Control library “TMCTL” For Visual Studio</p> <p>LabVIEW^{*3 *4} Instrument Driver</p> <p>WDF File Access Library Access to waveform data (WDF) file</p> <p>MATLAB^{*2} WDF Access Toolbox^{*4} Transfer data file to MATLAB</p> | |

^{*1}: The DataPlugin software can be downloaded from the National Instruments (NI) web site. ^{*2}: MathWorks’s product. ^{*3}: Program development environment provided by National Instruments (NI) ^{*4}: Coming soon. Refer to our web site.

| | | | | | | | |
|--|--|---|---|---|--|---|--|
|  | AC adapter 720921 |  | DC power cable 720922 |  | Battery Pack: 739883 Battery Pack Cover: 720923 |  | 10:1 Probe 702902 |
|  | 100:1 Probe 701947 |  | Safety BNC cable 1 m: 701902 2 m: 701903 |  | 1:1 Safety BNC adapter lead 701901 |  | 1:1 Safety Adapter Lead For 720268 701904 |
|  | Alligator clip adaptor set 758929 |  | Clamp-on probe AC 50 A: 720930 AC 200 A: 720931 40 Hz to 3.5 kHz |  | Scanner box 701953 |  | Logic probe (TTL level/contact input) 1 m: 702911 3 m: 702912 |
|  | Bridge head (NDIS) 120 Ω: 701955 350 Ω: 701956 |  | Bridge head (DSUB) 120 Ω: 701957 350 Ω: 701958 |  | Carrying case 93050 |  | GPS unit* 720940 |

*The GPS unit can only be supplied to countries where it is not prohibited by local radio laws.

Specifications (Main unit)

*For the plug-in modules specifications, see the "Bulletin DL850E-01EN".

| Main Specifications (Main Unit) | |
|------------------------------------|--|
| Type | Plug-in input unit |
| Number of slots | 2 |
| Maximum number of input channels | 8 channels (when a 4-CH module is installed in the both slots) + the unit standard logic is 16 bit 32 channels (when a 16-CH module is installed in the both slots) + the unit standard logic is 16 bit 240 channels (when the 720240 or 720241 module is installed in the both slots) + the unit standard logic is 16 bit |
| Memory capacity | Total 200 Mpoint (100 Mpoint per module) |
| Recorder Mode Function | |
| Waveform acquisition and display | |
| Recording conditions | Recording for a specified time Records data from start for a specified time. Continuous recording Records data until stopped. Start at trigger Records data from a trigger for a specified time. Finish with trigger Records data for a specified time until a trigger. |
| Acquisition mode | Normal Normal waveform acquisition Envelope The peak values are held at the maximum sample rate regardless of the time axis setting. |
| Recording time | 10 seconds to 50 days |
| Sampling interval | 1 μs to 200 ms (1-2-5 system) |
| Action when recording is finished | Saves display image data, saves waveform data, sounds a notification buzzer and transfers an e-mail. |
| Real-time SD card recording | |
| Binary format | Sampling interval Depends on the number of channels being used. Minimum: 10 μs (when 10 channels are used) *1 Maximum number of recording points 1 Gpoint (There are limits based on a module being used.) Operation overview Stores data in the binary format when acquisition occurs. |
| ASCII format | Recording interval 1, 2, 5, 10, 15, 20, 30 sec, 1, 2, 5, 10, 15, 20, 30, 60 min. Capacity 2 GByte Operation overview Stores data in the text format at specified intervals |
| Event recording | Able to record up to 100 events through the event input terminal. |
| Display time length | 1 ms to 10 s (1-2-5 steps), 20 s, 30 s, 40 s, 50 s, 60 s, 100 s, 200 s, 300 s 10 to 60 min (10-min steps), 100 min 2 hours, 5 hours, 10 to 60 hours (10-hour steps), 80 hours, 100 hours 5 days, 10 days, 20 days, 30 days ² , 40 days ² , 50days ² |
| Zoom | 1 window |
| Display format | 1, 2, 3, 4, 5, 6, 8, 12, 16 TY display windows |
| Maximum number of displayed traces | 32 (standard logic: 16 bit, including Math) |
| X-Y display | The X and Y axes can be selected from analog input waveforms and MATH waveforms (up to 2 traces and 1 window). |

| Vertical Axis | |
|---|--|
| Vertical axis setting | It can be set in the measurement range. |
| Channel on/off | CHn, CHn_m and MATHn can be turned on and off separately. |
| Vertical axis zooming | You set the scale using upper and lower limits. |
| Linear scaling | It can be set to AX+B or P1-P2. (only for voltage, stress, and frequency). |
| Triggering Section | |
| Selectable trigger level range | 0 ± measurement range |
| Trigger hysteresis | When measuring voltage: Select form ±1%/±5%/±10% of the range. When measuring temperature: Select form ±0.5°C, ±1.0°C, and ±2.0°C. When measuring strain: Select form ±2.5%/±12.5%/25% of the range. When measuring acceleration: Select form ±1%/±5%/±10% of the range. When measuring frequency: Select form ±0.1%/±5%/±10% of the range. CAN/LIN/SENT: Select form ±0.1%/±5%/±10% of the span width. |
| Manual trigger | Dedicated key operation |
| Trigger source | CHn, CHn_m (select an input channel and specify bit for logic), external trigger Time |
| Trigger type | Edge Rising, falling, or rising or falling. (Rising or falling is unavailable for logic.) Time Date (year, month, and day), time (hour, minute and second) OR The DL350 triggers on the OR of multiple trigger source edges (including a Windows trigger). AND The DL350 triggers on the AND of multiple state conditions (including a Windows trigger). |
| Analysis | |
| Cursors T-Y waveform Horizontal, Vertical, H&V, Marker and Degree X-Y waveform Horizontal, Vertical, H&V and Marker FFT waveform Marker and Peak | |
| Automated measurement of waveform parameters | |
| Parameters | Analog waveform and Math PP, Amp, Max, Min, High, Low, Avg, Mid, Rms, Sdev, +Over, -Over Rise, Fall, Freq, Period, +Width, -Width, Duty, Pulse, Burst1, Burst2, Avg.Freq, Avg.Period, Int1TY, Int2TY, Int1XY, Int2XY, Delay 1 cycle mode Logic waveform Freq, Period, Pulse, Duty, Avg.Freq, Delay |
| Statistical processing | Statistical items: Max, Min, Avg, Sdv, and Cnt Maximum number of cycles: 10000 Maximum measurement range: 100 Mpoint |
| Cyclic statistical processing | The DL350 automatically measures the waveform parameters of the data and performs statistical processing on the parameters once per period. |
| Waveform computation | Operators: +, -, ×, ÷, binary computation, frequency, period, moving average (10 points) and RMS Computation length: up to 2 Mpoint (when 1 waveform is used). |
| FFT | Type: LS, RS, PS, PSD Time windows: Hanning, Hamming, FlatTop, and Rectangle |

| | |
|--|--|
| Harmonic analysis | |
| Maximum number of simultaneous analysis | Line: 8 channels, power: 1 system |
| Fundamental wave | 50 Hz, 60 Hz or auto setting |
| FFT points | 2048 |
| Analysis order | Fundamental wave to 40th |
| Window width | 10 periods (for 50 Hz), 12 periods (for 60 Hz) or 8 periods (auto) |
| Types of harmonic analysis | Harmonic RMS value, percentage of content, phase angle, distortion factor (IEC or CSA) and total RMS value |
| Power analysis | It can be selected from 1P2W (single-phase, two-wire), 1P3W (single-phase, three-wire) or 3P3W (three-phase, three-wire) |
| Analysis result display | Displays one item selected from 8 line channels and 1 power system Display form: List or bar graph |
| Analysis result recording | All analysis results can be stored in a media. Data format: CSV |
| *1 Sometimes 10 μs or more can be stored depending on the capacity of the SD card. *2 Only during real-time recording | |

Scope Mode Function

Waveform Acquisition and Display

| | |
|---|--|
| Acquisition mode | Normal Normal waveform acquisition |
| Envelope | The peak values are held at the maximum sample rate regardless of time axis setting. |
| | Averaging The number of times to average: 2 to 65536 in 2 nd steps or Infinite (attenuation constant 2 to 256 in 2 nd step). |
| Record length | 10 k, 25 k, 50 k, 100 k, 250 k, 500 k, 1 M, 2.5 M, 5 M, 10 M, 25 M, 50 M, 100 M |
| Selectable time scale range | 1 μs/div to 1 s/div (in 1-2-5 steps), 2 s/div, 3 s/div, 4 s/div, 5 s/div, 6 s/div, 8 s/div, 10 s/div, 20 s/div, 30 s/div 1 min/div to 6 min/div (in 1 min steps), 8 min/div, 10 min/div, 12 min/div, 30 min/div 1 h/div to 6 h/div (in 1 h steps), 8 h/div, 10 h/div, 12 h/div 1 day/div to 5 days/div (in 1 day steps) |
| Action when recording is finished | Saves display image data, saves waveform data, sounds a notification buzzer and transfers an e-mail. |
| Real-time SD card recording (binary format) | Sampling interval Depends on the number of channels being used. Maximum: 100 kS/s (when 10 channels are used)* Maximum number of recording points 5 Gpoint (There are limits based on a module being used.) Operation overview Stores data in the binary format when acquisition occurs. |
| Event recording | Able to record up to 100 events through the event input terminal. |
| Zoom | 2 windows |
| Display format | 1, 2, 3, 4, 5, 6, 8, 12, 16 TY display windows |
| Maximum number of displayed traces | 32 (standard logic: 16 bit, including Math) |
| X-Y display | The X and Y axes can be selected from analog input waveforms and MATH waveforms (up to 2 traces and 1 window). |
| History feature | Up to 1000 histories |
| Accumulation | Waveform overlay (The number of times is limitless.) |

Vertical and Horizontal Control

| | |
|---------------------------|---|
| Vertical axis setting | Scale/div |
| Channel on/off | CHn, CHn_m and Mathn can be turned on and off separately. |
| Vertical axis zooming | ×0.1 to ×100 (varies depending on the module) You set the scale using upper and lower limits or switch between different scales. |
| Vertical position setting | Waveforms can be moved in the range of ±5 div. |
| Linear scaling | It can be set to AX + B or P1-P2 (only for voltage, stress, and frequency). |
| Roll mode display | Roll mode is enabled when the trigger mode is set to Auto, Single, or On Start, and the time axis setting is greater than or equal to 100 ms/div. |

Triggering Section

| | |
|-----------------------------------|--|
| Trigger mode | Auto, Normal (repeat), Single (one-off), or On Start |
| Selectable trigger level range | 0 ±10 div |
| Trigger hysteresis | When measuring voltage: Select from ±0.1 div, ±0.5 div and ±1 div. When measuring temperature: Select from ±0.5°C, ±1.0°C and ±2.0°C. When measuring strain: Select from ±2.5%, ±12.5% and 25%. When measuring acceleration: Select from ±0.1 div, ±0.5 div and ±1 div. When measuring frequency: Select from ±0.01 div, ±0.5 div and ±1 div. CAN/LIN/SENT: Select from ±0.01 div, ±0.5 div and ±1 div of the span width. |
| Selectable trigger position range | 0 to 100% (of the display record length: resolution: 0.1%) |
| Selectable trigger delay range | 0 to 10 s (resolution: 10 ns) |
| Manual trigger | Dedicated key operation |
| Simple trigger | Trigger source CHn and CHn_m (select an input channel and specify bit for logic), EXT, or Time |
| | Trigger slope Rising, falling, or rising or falling. (Rising or falling is unavailable for logic.) |
| Time trigger | Date (year, month, and day), time (hour, minute and second), and time interval (10 seconds to 24 hours) |
| Enhanced trigger | Trigger source CHn, CHn_m (select an input channel and specify bit for logic), EXT |
| | Trigger type OR / AND / Wave Window / Edge On A / Period / Pulse Width |

Analysis

| | |
|---|--|
| Cursors | T-Y waveform Horizontal, Vertical, H&V, Marker and Degree X-Y waveform Horizontal, Vertical, H&V and Marker FFT waveform Marker and Peak |
| Automated measurement of waveform parameters | |
| Parameters | Analog waveform and Math PP, Amp, Max, Min, High, Low, Avg, Mid, Rms, Sdev, +Over, -Over Rise, Fall, Freq, Period, +Width, -Width, Duty, Pulse, Burst1, Burst2, Avg.Freq, Avg.Period, Int1TY, Int2TY, Int1XY, Int2XY, Delay, 1 cycle mode Logic waveform Freq, Period, Pulse, Duty, Avg.Freq, Delay |
| Statistical processing | Statistical items: Max, Min, Avg, Sdev, and Crnt Maximum number of cycles: 10000 Maximum measurement range: There is no restriction on the data in the memory. For SD recording waveforms, up to 100 Mpoint. |
| Continuous statistical processing | Statistical processing is performed while waveforms are acquired. |
| History statistical processing | The DL350 automatically measures the waveform parameters of each history waveform and performs statistical processing on the parameters. |
| Cyclic statistical processing | The DL350 automatically measures the waveform parameters of the data and performs statistical processing on the parameters once per period. |
| Waveform computation | |
| Operators: +, -, ×, ÷, binary computation, shift, frequency, period, moving average (10 points) and RMS | Computation length: Up to 2 Mpoint (when 1 waveform is used). |
| FFT | |
| Type: LS, RS, PS, PSD | Time windows: Hanning, Hamming, FlatTop, and Rectangle Average: Time axis and frequency axis |
| GO/NO-GO determination: Specified actions are performed on acquired waveforms. | |
| Zone determination | Determination zone: Up to 6, the number of target waveforms: up to 8, AND or OR determination. |
| Parameter determination | Determines by the combination of parameters (waveform parameters or harmonic analysis results) up to 8. |
| Action at the time of determination | Saves display image data, saves waveform data, sounds a notification buzzer and transfers an e-mail. |
| Harmonic analysis | |
| Maximum number of simultaneous analysis | Line: 8 channels, power: 1 system |
| Fundamental wave | 50 Hz, 60 Hz or auto setting |
| FFT points | 2048 |
| Analysis order | Fundamental wave to 40th |
| Window width | 10 periods (for 50 Hz), 12 periods (for 60 Hz) or 8 periods (auto) |
| Types of harmonic analysis | Harmonic RMS value, percentage of content, phase angle, distortion factor (IEC or CSA) and total RMS value |
| Power analysis | It can be selected from 1P2W (single-phase, two-wire), 1P3W (single-phase, three-wire) or 3P3W (three-phase, three-wire) |
| Analysis result display | Displays one item selected from 8 line channels and 1 power system Display form: List or bar graph |
| Analysis result recording | All analysis results can be stored in a media. Data format: CSV |
| *1 Sometimes only 100 kS/s or less can be stored depending on the capacity of the SD card. | |

Time Axis

| | |
|----------------------|---|
| Time accuracy | ±0.001% |
| External clock input | Clock input is available through the external-clock input terminal. |

Display

| | |
|------------------|---|
| Display | 8.4-inch color TFT LCD (resistive touch panel) Display resolution: 800 (horizontal) × 600 (vertical) |
| Display format | T-Y (up to 16 divisions with zoom feature), X-Y, FFT and harmonic analysis |
| Defective pixels | Within 10 ppm over the total number of pixels including RGB |

Main Unit Standard Logic Input

| | |
|---------------------|---|
| Input format | Non-isolated (common to main unit GND) Dedicated probes required (automatic detection) |
| Compatible probes | 700986, 700987, 702911, 702912 |
| Maximum sample rate | 10 MS/s |
| Number of inputs | 8 bit × 2 |
| Chatter suppression | Off, 5 ms, 10 ms, 20 ms, 50 ms, 100 ms |

Data Storage

| | |
|------------------------------------|---|
| Data Storage | |
| Type of storage data | Measurement data, analysis results, setting values, display images |
| Storage format of measurement data | Binary format (WDF), MATLAB format (MAT) and text format (.CSV) Maximum file size (MAT and CSV formats): 2 GByte |
| Storage destination | SD card, USB storage and network drive |

Display Image Storage

| | |
|------------------------------|--|
| Storage format of image data | PNG, JPEG, BMP, monochrome or color |
| Storage destination | SD card, USB storage and network drive |

Storage

| | |
|------------------|------------------------------------|
| SD Memory Card | |
| Number of slots | 1 |
| Maximum capacity | 32 GB |
| Supported cards | SD and SDHC compliant memory cards |

| USB Storage | |
|--------------------------------|--|
| Compatible USB storage devices | Mass storage devices that are compliant with USB Mass Storage Class Ver. 1.1 |
| Available space | Up to 2 TB Partition style: MBR, format: FAT16 and FAT32 |

USB Ports for Peripherals

| | |
|--|--|
| Connector type | USB type A (receptacle) |
| Electrical and mechanical specifications | USB Rev. 2.0 compliant |
| Supported transfer mode | HS (High Speed: 480 Mbps), FS (Full Speed: 12 Mbps), LS (Low Speed: 1.5 Mbps) |
| Compatible devices | Mass storage devices that are compliant with USB Mass Storage Class Ver. 1.1 104 or 109 keyboards that are compliant with USB HID Class Ver. 1.1 Mouse devices that are compliant with USB HID Class Ver. 1.1 HP ink-jet printers or BrotherPocketJET printers that are compliant with USB Printer Class Ver. 1.0 |
| Number of ports | 2 |
| Power supply | 5 V, 500 mA (total of the 2 ports) |

External Printer Output

| | |
|-------------------|---|
| Compatible models | Mobile printer PocketJET 300 dpi of Brother Industries, Ltd. Ink-jet printer (single-function product) of Hewlett-Packard Company ¹ |
| Output format | Screen hard copy, Detailed waveform print ² |

¹: Refer to their catalogs or home page ²: Available only with the Brother's printer

Auxiliary I/O Section

External Clock Input Terminal

| | |
|-------------------------------|--|
| Connector type | Screwless terminal block |
| Maximum voltage to the ground | Non-isolated (common to main unit GND) |
| Input level | TTL (0 to 5 V) |
| Maximum frequency | 1 MHz |
| Minimum pulse width | 300 ns |
| Detected edge | Rising |

Trigger Input Terminal

| | |
|-------------------------------|--|
| Connector type | Screwless terminal block |
| Maximum voltage to the ground | Non-isolated (common to main unit GND) |
| Input level | TTL (0 to 5 V) |
| Minimum pulse width | 1 μ s |
| Detected edge | Rising or falling |
| Trigger delay time | Within 1 μ s + 1 sample period |

Trigger Output Terminal

| | | |
|-------------------------------|--|--|
| Connector type | Screwless terminal block | |
| Maximum voltage to the ground | Non-isolated (common to main unit GND) | |
| Output level | 5 V CMOS | |
| Output formats | | |
| Normal format | Logic | Low when a trigger occurs and high after acquisition is completed. |
| | Output delay | Within 1 μ s + 1 sample period |
| | Output hold time | 1 μ s |
| Pulse format | Logic | Transmits a pulse when a trigger occurs |
| | Output delay | Within 1 μ s + 1 sample period |
| | Pulse width | 1 ms, 50 ms, 100 ms, 500 ms |
| Sample pulse format | Logic | Transmits pulses at a given frequency during waveform acquisition |
| | Frequency range | 5 Hz to 200 kHz (1-2-5 steps) |
| Start/Stop | Logic | High level output during waveform acquisition |

GO/NO-GO Determination Output

| | |
|-------------------------------|--|
| Connector type | Screwless terminal block |
| Maximum voltage to the ground | Non-isolated (common to main unit GND) |
| Output level | 5 V CMOS |

External Start/Stop Input

| | |
|-------------------------------|--|
| Connector type | Screwless terminal block |
| Maximum voltage to the ground | Non-isolated (common to main unit GND) |
| Input level | TTL (0 to 5 V) or contact |

Event Input

| | |
|-------------------------------|--|
| Connector type | Screwless terminal block |
| Maximum voltage to the ground | Non-isolated (common to main unit GND) |
| Input level | TTL (0 to 5 V) or contact |

COMP Output (Probe-compensation-signal output terminal)

| | |
|-------------------------|------------------------------|
| Output signal frequency | 1 kHz \pm 1% |
| Output amplitude | 1 V _{p-p} \pm 10% |

GPS Interface

| | |
|---------------------|---|
| Input connector | Mini DIN 9-pin |
| Compatible GPS unit | 720940 optional accessories (sold separately) |

Computer Interface

USB-PC Connection

| | |
|--|---|
| Connector type | USB type B (mini) |
| Electrical and mechanical specifications | USB Rev. 2.0 compliant |
| Supported transfer mode | HS (High Speed: 480 Mbps) and FS (Full Speed: 12 Mbps) |
| Supported protocols | USBTMC-USB488 (USB Test and Measurement Class Ver. 1.0) ¹ Mass Storage Class Ver. 1.1 (target: SD card) |
| PC system requirements | Windows 7, 8.1, 10 |

Ethernet

| | |
|--|---|
| Connector type | RJ-45 modular jack |
| Ports | 1 |
| Electrical and mechanical specifications | IEEE802.3 |
| Transmission system | Ethernet (100BASE-TX, 10BASE-T) |
| Communication protocol | TCP/IP |
| Supported services | DHCP, DNS, SNMP client, SMTP client, FTP client, VXI-11, and Web server |

¹: A separate driver is required.

General Specifications

| | |
|---|--|
| Standard operating conditions | Ambient Temperature: 23 \pm 5°C Ambient humidity: 20 to 80% RH After the DL350 has been warmed up for 30 minutes and then calibration has been performed |
| Recommended calibration period | 1 year |
| Warm-up time | At least 30 minutes |
| Operating environment | Temperature: 0 to 45°C (While an AC adapter is working: 0 to 40°C, while a battery is being charged: 0 to 35°C) Humidity: 20 to 85% RH (no condensation) Altitude: 2000 m or less |
| Storage environment | Temperature: -20 to 60°C Humidity: 20 to 85% RH (no condensation) |
| Power supply | The DL350 operates on the AC adapter (720921), DC power input (720922) or the battery pack (739883). ^{1,2} |
| AC adapter (720921) | |
| Rated supply voltage | 100 to 240 VAC |
| Permitted supply voltage range | 90 to 264 VAC |
| Rated supply frequency | 50 or 60 Hz |
| Permitted supply voltage frequency range | 47 to 63 Hz |
| Maximum power consumption | 120 VA |
| Withstand voltage | 3 kV (between the main unit and AC adapter power line) |
| Insulation resistance | 10 M Ω (between the main unit and AC adapter power line) |
| DC power input (720922) | |
| Rated supply voltage | 10 to 30 VDC (at the DL350 connector end) |
| Maximum power consumption | 45 W |
| Withstand voltage (when the power is turned off or charging is stopped) | 0.6 Wtyp |
| DC power cable | Cigarette lighter plug Type, length: 2.5 m |
| Battery pack (739883) | |
| Type | Lithium-ion |
| Operation time | Approx. 3 hours |
| Charge time | Approx. 6 hours (When the DL350 is turned off.) |
| Installation position | Vertical orientation installation, horizontal orientation installation or inclined installation |
| External dimensions | Approx. 305 mm (W) \times 217 mm (H) \times 92 mm (D) (not including the protrusions) |
| Weight | Approx. 3.9 kg (when the DL350 equipped with the battery and 2 pieces of 720254.) |
| Instrument cooling method | Forced air cooling (exhaust) |
| Battery backup | The settings and clock are backed up with an internal lithium battery. Life: Approx. 5 years (at an ambient temperature of 23°C) |
| Safety standard | Compliant standards EN61010-1, EN61010-2-030, EN61010-031, EN60825-1 Pollution degree 2 Measurement Category: See the specifications of each module. |
| Emissions | Compliant standards EN61326-1 Class A, EN61326-2-1, EN55011: Class A, Group 1 EMC Regulatory Arrangement in Australia and New Zealand EN55011 Class A, Group 1 Korea Electromagnetic Conformity Standard |
| Immunity | Compliant standards EN61326-1 Table 2 (for use in industrial locations), EN61326-2-1 |
| Environmental standard | Compliant standards EN50581 Monitoring and control instruments including industrial monitoring and control instruments. |
| Standard of resistance against vibration | JIS D 1601:1995 5.2 5.3 (1) Type 1: Type A compliant |

¹: Operation of the battery pack requires the battery pack cover (720923).

²: AC adapter or DC input has priority if those input and battery are available

GPS unit (720940) Specifications

| | |
|-----------------------------------|---|
| Receiver type | GPS/GLONASS/QZSS/SBAS (MSAS/WAAS/EGNOS/GAGAN) |
| Function | GPS data acquisition (latitude, longitude, altitude, speed, moving direction and GPS information), DL350 time synchronization |
| Measurement accuracy ¹ | Horizontal position: 15 m or less (GPS information/SA=OFF/PDOP \leq 3) Speed: 1 m/s (GPS information/SA=OFF/PDOP \leq 3) |
| Following performance | Altitude: -500 to +18000 m Speed: 1800 km/h or less Acceleration: 2 G or less |
| Measurement resolution | Latitude and longitude: 1 μ " Altitude: 0.1 m, 1 m Speed: 0.01 km/h, 0.1 km/h Direction: 0.01° |

¹: The specification values may not be attained depending on the measurement location, environment and measurement time.

Model and suffix code

| Model | Suffix Code | Description |
|------------|-------------|---|
| DL350 | | DL350 ScopeCorder (Plug-in modules and AC adapter are not included.) |
| Languages | -HJ | Japanese menu |
| | -HE | English menu |
| | -HC | Chinese menu |
| | -HK | Korean menu |
| | -HG | German menu |
| | -HF | French menu |
| | -HL | Italian menu |
| | -HS | Spanish menu |
| | -HR | Russian menu |
| Options | /VE | Vehicle Edition |
| | /EB | Battery pack + Battery pack cover |
| 720921 | | 60 W AC Adapter AC adapter (Separate purchase) is required to charge the battery and operate the main unit. |
| Power code | -D | UL/CSA Standard |
| | -F | VDE/Korean Standard |
| | -Q | BS/Singapore Standard |
| | -H | GB Standard |
| | -T | BSMI Certification |
| | -N | NBR Standard |
| | -Y | No Power Cord |

Standard accessories: Hand strap, Slot cover panel (2), User's manual

DC power cable and Battery Pack Accessories

| Model | Suffix Code | Description |
|--------|-------------|--|
| 720922 | | DC power cable (Cigarette lighter plug Type) |
| 739883 | | Battery Pack ^{1,2,3} |
| 720923 | | Battery Pack Cover ³ |

¹: AC adapter (720921) is required for charging battery.

²: Operation of the battery pack (739883) requires the battery pack cover (720923)

³: Included in the /EB option.

Plug-in module model numbers

| Model | Description |
|-----------|---|
| 720211 | High-speed 100 MS/s 12-Bit Isolation Module (2 ch) |
| 720250 | High-speed 10 MS/s 12-Bit Isolation Module (2 ch) |
| 720254 | 4-CH 1 MS/s 16-Bit Isolation Module |
| 720268 | High-Voltage 1 MS/s 16-Bit Isolation Module (with AAF, RMS) |
| 720220 | Voltage Input Module (16 ch) |
| 701261 | Universal Module (2 ch) |
| 701262 | Universal Module (with Anti-Aliasing Filter, 2 ch) |
| 701265 | Temperature/High-Precision Voltage Module (2 ch) |
| 720266 | Temperature/High-Precision Voltage Isolation Module (Low noise) |
| 720221 | 16-CH Temperature/Voltage Input Module |
| 701953-L1 | 16-CH Scanner Box (provided with 1 m cable) |
| 701953-L3 | 16-CH Scanner Box (provided with 3 m cable) |
| 701270 | Strain Module (NDIS, 2 ch) |
| 701271 | Strain Module (DSUB, Shunt-CAL, 2 ch) |
| 701275 | Acceleration/Voltage Module (with Anti-Aliasing Filter, 2 ch) |
| 720281 | Frequency Module (2 ch) |
| 720230 | Logic Input Module (16 ch) |
| 720240 | CAN Bus Monitor Module |
| 720241 | CAN & LIN Bus Monitor Module |
| 720243 | SENT Monitor Module |

¹Probes are not included with any modules.

²The /VE option is required when using the 720240, 720241 or 720243 module.

³The use of a 720221 module always requires the External Scanner Box (model 701953).

Xviewer model numbers and suffix codes

| Model | Suffix Codes | Description |
|--------|--------------|--------------------------------------|
| 701992 | -SP01 | Xviewer Standard Edition (1 license) |
| | -GP01 | Xviewer Math Edition (1 license) |

¹Some volume license packs are available. Please contact our sales representative.

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Additional Option License^{*1}

| Model | Suffix Code | Description |
|--------|-------------|-----------------|
| 709830 | -VE | Vehicle Edition |

^{*1}: Separately sold license product (customer-installable).

Probes, cables, and converters

| Model | Product | Description ¹ |
|---------|---|---|
| 702902 | 10:1 Probe (for isolated BNC input) | Operating temp. range: -40 to 85°C, length 2.5 m |
| 701947 | 100:1 Probe (for isolated BNC input) | 1000 V (DC+ACpeak) CAT II |
| 700929 | 10:1 Probe (for isolated BNC input) | 1000 V (DC+ACpeak) CAT II, length 1.5 m |
| 701901 | 1:1 Safety BNC adapter lead | 1000 Vrms-CAT II |
| 701904 | 1:1 Safety Adapter Lead (in combination with followings) | 1000 Vrms-CAT II, 600 Vrms-CAT III |
| B9852MM | Pinchers tip (Hook type) | 1000 Vrms-CAT III black |
| B9852MN | Pinchers tip (Hook type) | 1000 Vrms-CAT III red |
| 701954 | Large alligator-clip (Dolphin type) | 1000 Vrms-CAT II, 1 set each of red and black |
| 758929 | Alligator clip adaptor set (Rated voltage 1000 V) | 1000 Vrms-CAT II, 1 set each of red and black |
| 758922 | Alligator clip adaptor set (Rated voltage 300 V) | 300 Vrms-CAT II, 1 set each of red and black |
| 758921 | Fork terminal adapter set | 1000 Vrms-CAT II, 1 set each of red and black |
| 701940 | Passive probe ² | Non-isolated 600 Vpk (10:1) |
| 366926 | 1:1 BNC-alligator cable | 8-Bit, 3 m, non-Isolated, TTL level/Contact Input |
| 366961 | 1:1 Banana-alligator cable | Non-isolated 42 V or less, 1.2 m |
| 720930 | Clamp-on probe | AC 50 A, 40 Hz to 3.5 kHz |
| 720931 | Clamp-on probe | AC 200 A, 40 Hz to 3.5 kHz |
| 701955 | Bridge head (NDIS, 120 Ω) | With 5 m cable |
| 701956 | Bridge head (NDIS, 350 Ω) | With 5 m cable |
| 701957 | Bridge head (DSUB, 120 Ω) | Shunt-CAL with 5 m cable |
| 701958 | Bridge head (DSUB, 350 Ω) | Shunt-CAL with 5 m cable |
| 702911 | Logic probe ³ | 8-Bit, 1 m, non-Isolated, TTL level/Contact Input |
| 702912 | Logic probe ³ | 8-Bit, 3 m, non-Isolated, TTL level/Contact Input |
| 700986 | High-speed logic probe ³ | 8-Bit, non-Isolated, response speed: 1 μs (typ.) |
| 700987 | Isolated logic probe ⁴ | 8-Bit, each channel isolated |
| 701902 | Safety BNC-BNC cable (1 m) | 1000 Vrms-CAT II (BNC-BNC) |
| 701903 | Safety BNC-BNC cable (2 m) | 1000 Vrms-CAT II (BNC-BNC) |
| 720940 | GPS unit ⁵ | For DL350 |
| 705926 | Connecting cables | Connecting cable for 701953 (1 m) |
| 705927 | Connecting cables | Connecting cable for 701953 (3 m) |
| 93050 | Carrying Case | |

^{*1}: Actual allowable voltage is the lower of the voltages specified for the main unit and cable.

^{*2}: 30 Vrms is safe when using the 701940 with an isolated type BNC input.

^{*3}: Includes one each of the B9879PX and B9879KX connection leads.

^{*4}: Additionally, 758917 and either the 758922 or 758929 are required for measurement.

^{*5}: The GPS unit can only be supplied to countries where it is not prohibited by local radio laws.

This is a Class A instrument based on Emission standards EN61326-1 and EN55011, and is designed for an industrial environment. Operation of this equipment in a residential area may cause radio interference, in which case users will be responsible for any interference which they cause.

NOTICE

- Before operating the product, read the user's manual thoroughly for proper and safe operation.

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^{*1}Any company's names and product names mentioned in this document are trade names, trademarks or registered trademarks of their respective companies.

The User's Manuals of this product are provided by CD-ROM.

Yokogawa's approach to preserving the global environment

- Yokogawa's electrical 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.

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