

Ten reasons why users choose ScopeCorders for their measurement tasks.

ScopeCorders are powerful portable data acquisition recorders that combine features of a multi-channel digital oscilloscope and a high-performance oscillographic recorder. As such, they can capture and analyse both short term transient events and long-term trends for periods up to 200 days.



By Clive Davis, European Marketing Manager, Yokogawa Test and Measurement Europe

Using flexible and isolated modular inputs they combine measurements of electrical signals, physical (sensor) parameters and CAN/CAN-FD/LIN/SENT serial bus signals, as well as being able to trigger on electrical power related events and carry out calculations in real-time.

Users consistently regard the ScopeCorder as one of the most powerful and versatile data-acquisition instruments available on the market. By using combinations of various unique features, it offers users of other types of measuring instruments - such as recorders, data loggers, oscilloscopes and power measuring devices - an alternative one-stop measuring method to meet the needs of their applications.

Whether precision measurements need to be made in the laboratory or in the field, a ScopeCorder delivers value in diverse applications from measurements on the smallest electric drives incorporated in a precision watch and the sensors and electronics found in a modern electric vehicle to comprehensive tests on large turbines used for power generation and household appliances.

This White Paper presents ten key requirements which, users say, are more than satisfied with a ScopeCorder.

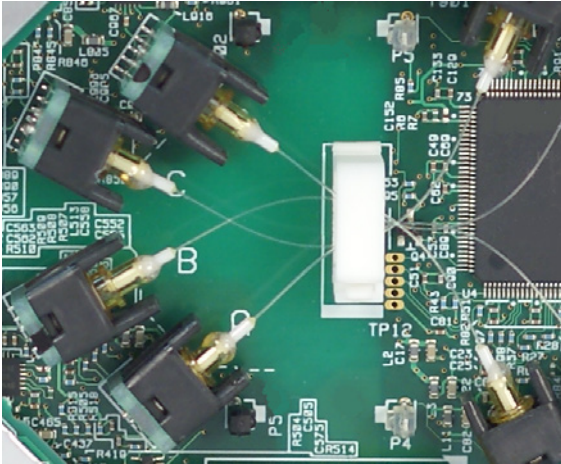
User need 1 – Enough channels and the right signal conditioning

The ScopeCorder's modular design allows users to choose from a range of 20 types of swappable input module, each with built-in signal conditioning, and install up to eight modules at a time in the DL850E/EV and two in the battery portable DL350. This enables measurements to be made on up to 128 channels with a mixed selection of data-acquisition cards to measure parameters such as:

- voltage and current
- temperature, vibration/acceleration, strain and frequency
- logic signals and CAN/CAN-FD/LIN/SENT bus signals
- sensor outputs (using scaling functions)

The flexibility of this modular platform enables a ScopeCorder to be configured to perfectly suit the requirements of the application. Moreover, the measurements on the input channels are time-synchronised, which allows the user to easily find relationships between different measurements.





User need 2 – Voltage isolation between channels and high noise immunity

Engineers frequently choose a ScopeCorder for their applications as they need to carry out measurements on floating signals or to measure at different points of a circuit, where the grounds of those points are at different potentials. Channel isolation allows these measurements to be carried out without having to use any special differential probes.

The housing for the input modules includes both shielding for each input channel and extra shielding for the complete input module. The double shielding method around the input channels results in very high noise rejection, which means that the displayed signals are cleaner and authentic.

Many applications include measurement signals coming from frequency inverters, possibly in combination with temperature measurement. In order to develop these high-efficiency inverters, which employ high voltages, large currents, and ever-increasing switching speeds, a special input module incorporating Yokogawa's iso- PRO™ core technology is used. Using internal high speed optical fibre-based transmission, this module achieves high sample rates (up to 100 MS/s) and high resolution (up to 12 bits), and provides the performance needed for precise measurement of fast switching signals even in the harshest environments.

User need 3 – Record data for possibly months but also catch the details of faults and transients

A ScopeCorder is equipped with a large and fast acquisition memory of up to 2 GPoints in a DL850E/EV, which enables high sample rates (up to 100 MS/s) on multiple channels simultaneously. This high sample rate, in combination with a high vertical resolution of the A/D converter (either 12 or 16 bits), is ideal for precisely capturing waveform details.

However, when involved with durability testing over longer periods of time – for example, days or weeks - data is typically acquired at lower sample rates. Allowing a lower sample rate does not increase the size of the measurement files unnecessarily, and is sufficient to visualise long-term trends. On the other hand, suddenly occurring transitional phenomena have to be captured at high sample rates in order to view the detail and to be able to investigate the particular event.

The DL850E's "dual capture" function uniquely resolves these conflicting requirements by being able to record at two different sampling rates.

As an example, it is possible to set waveform triggers and capture 5000 high-speed transient events at 100 MS/s while at the same time continuously recording a trend measurement at 10 kS/s for 10 hours.

User need 4 – Capture anything and everything

For engineers, it is possible to reduce time spent on fault-finding or transient analysis when it is possible to easily visualise the disturbing event on a signal. The key question here is how to determine whether there is a transient event.

Having the possibility to set all different kinds of triggers on multiple channels provides the power to investigate what causes a particular transient event. Moreover, the availability of the ScopeCorder's large acquisition memory, and thus the ability to measure over longer time periods, helps the analysis of the effect of such an event on other parts of the application by investigating other measurement channels' behaviour after the trigger event.

A ScopeCorder is sometimes referred to as "the ultimate trigger machine", and is packed with basic and enhanced triggers. A feature called "action on trigger" allows the user to leave a ScopeCorder unattended and automatically save the waveform to a file or send an email for notification of a trigger event.

User need 5 – Quickly see the details

Having a data acquisition recorder with a large and fast acquisition memory, which can display up to 200 days of recording on its screen, is only usable in practice when it is possible to seamlessly zoom into this volume of data. With the DL850E/EV, it is possible to zoom into two billion samples in just a blink of the eye as it is equipped with the revolutionary Giga Zoom Engine II, a powerful processor designed for effortless access to data. ScopeCorders are also equipped with the possibility to activate two independent zoom windows while also potentially displaying the entire original signal. In this way, an engineer can observe long-term recordings while also zooming into every detail of the waveforms, for example, to see the fine details of the cause and effect of a fault when they are separated by a long period of time.

User need 6 – Rapidly analyse the data and not just capture it

Post-measurement analysis can be done on the instrument itself, in the Yokogawa Xviewer waveform analysis software or in third-party analysis software. Whichever procedure is used, a quick reading of values such as amplitude, peak values or frequency is often required on the instrument itself. In this case, the ScopeCorder offers a range of convenient analysis functions including parameter measurements and cycle statistics:

Parameter measurements

Horizontal or vertical cursors provide a quick and easy method to measure waveform parameters on the screen. However, the ScopeCorder offers another faster way to automatically display the measured values after the measurement has been completed. This feature is the automatic waveform parameter measurement. This function is the most precise method to automatically calculate any or all of the 28 different waveform parameters such as amplitude, peak-to-peak values, RMS, risetime, frequency etc.

Cycle statistics

Sometimes when observing a waveform with multiple events or periods, such as a sine wave, pulse train or PWM signal, statistical calculations are required to check, for instance, which period has the highest amplitude or contains the most energy. The ScopeCorder has a powerful cycle statistical function that automatically measures selected parameters individually for each waveform cycle and provides statistical information which can be easily saved to a file. By selecting maximum or minimum values from the results, the instrument can also automatically zoom into the selected waveform cycle for further analysis, potentially saving additional data analysis time.

User need 7 – Display maths calculations in real time and/or use them to trigger the instrument

What makes the ScopeCorder truly best in its class is having access to one of the real-time measurement functions. Armed with a dedicated digital signal processor option, the DL850E/ EV can perform mathematical calculations such as arithmetic operators with coefficients, integrals and differentials, as well as higher-order equations on acquired measurement data.

The results of these calculations are displayed during waveform capture in real time. In addition to mathematical operators, steep digital filters can also be selected to isolate or trigger on the amplitude of certain frequency components.

Another digital signal processor option enables the user to trend calculations such as active power, power factor, integrated power and harmonics, and is able to calculate and display up to 125 types of electrical power-related parameters also in real time. This enables the user to display raw waveform signals such as voltages and currents along with power calculated parameters and also the capability to trigger on all of them. Trend waveforms of each order of harmonics, bar-graphs and vector displays can be displayed.

User need 8 – Complete portability with laboratory performance



Although weighing just 4 kg when populated with a rechargeable battery and 2 swappable, input modules, the DL350 is capable of delivering the same precision and advanced measurement and analysis capabilities typically found in laboratory measuring instruments. To make drive testing complete, the optional GPS unit enables position information to be saved alongside measurement data. The instrument can record directly to SD card for long term recording, for up to 50 days, or use the 100 Mpoints internal memory (per module) to capture fast transients.

The built-in rechargeable battery provides three hours of continuous operation which, when combined with either mains or 10 -30 V DC power, provides the ScopeCorder with a highly reliable power supply making it worry free. The broad capabilities and intuitive operation via the 8.4 inch touch screen also means that if a user needs to go on-site in a hurry and can take just one instrument to solve an unknown problem, the DL350 becomes a natural choice.

User need 9 – Integration into automated test systems

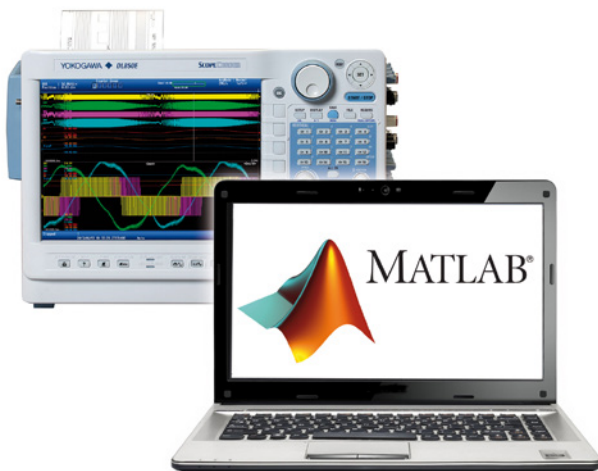
Nowadays engineers are increasingly incorporating measuring instruments into test systems to automate measurement processes. ScopeCorders are equipped with Ethernet and USB interfaces (DL850E/EV also supports GPIB), which allows easy interfacing and integration within an automated test system. Moreover, software options allow the use of third-party software to control the ScopeCorder and transfer measurement results. A few examples are:

Visual C++/Visual Basic

TMTCL is a DLL (Dynamic Link Library) which enables engineers to easily develop Microsoft Visual C++ and Microsoft Visual Basic programs to communicate between the PC and the ScopeCorder.

MATLAB

For users of MATLAB, ScopeCorders are supported in the MathWorks Instrument Control Toolbox for instrument control and data transfer to MATLAB.



LABVIEW, DIAdem, FAMOS and DADiSP

By utilising the LabVIEW driver written for the instrument, for example, a developer can dramatically reduce the amount of work required to enable a PC to control the instrument from within the LabVIEW environment. Drivers and data plug-ins for each software are available and downloadable on each web site.

User need 10 – Reliability

To ensure continuity in delivering the quality and performance of new developments, measurement results must be reliable. This continuity can only be provided when the measurement instrument used is reliable, accurate and of high quality. “Quality first” is an integral element in Yokogawa’s development philosophy, and that is why the reliability of a ScopeCorder is supported by a standard 3-year warranty.

About Yokogawa Test & Measurement

Yokogawa Test & Measurement are the ‘Precision Makers’, and the company’s instruments are renowned for maintaining high levels of precision and for continuing to deliver value for far longer than other instruments. Yokogawa believes that precise and effective measurement lies at the heart of successful innovation – and has focused its own R&D on providing the tools that researchers and engineers need to address challenges great and small.

Meet the Precision Makers at
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