

# Ten reasons to choose a ScopeCorder as your next measuring instrument

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ScopeCorders & High Speed Data Acquisition

A ScopeCorder is a powerful portable data acquisition recorder that combines features of a multi-channel digital oscilloscope and a high-performance oscillographic recorder. As such, it can capture and analyse both short-term transient events and long-term trends for periods up to 200 days.

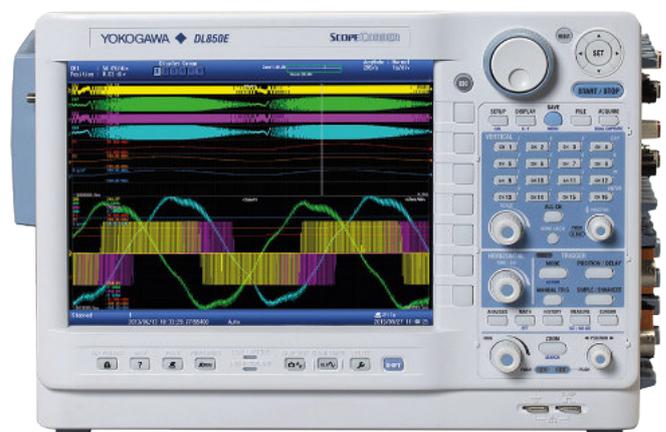
Using flexible modular inputs it combines measurements of electrical signals, physical (sensor) parameters and CAN/LIN serial bus signals, as well as being able to trigger on electrical power related events and carry out calculations in real-time.

A ScopeCorder is often perceived by users as one of the most powerful portable data-acquisition instruments available on the market today. It has several unique features that offer users of other types of measuring instruments - such as recorders, data loggers, oscilloscopes and power measuring devices - an alternative measuring method to consider for their applications.

Whether the measurement signals are derived from the smallest electric drives incorporated in a precision watch, a large turbine found in a power generating facility, sensors and electronics found in a modern electric vehicle or coming from household appliances, the features and

flexibility that come with the ScopeCorder offer value to all these applications.

This White Paper presents ten key features of the ScopeCorder, along with the reasons why users should consider choosing a ScopeCorder as the optimum instrument for their next measurement application.



## 1 Flexible and swappable input modules

The ScopeCorder's modular design allows users to choose from a range of 17 types of input modules, each with built-in signal conditioning, and install up to eight of these modules in the instrument at any time.



This setup allows measurements 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/LIN bus signals
- sensor outputs (using scaling functions)

The flexibility of this modular platform enables the 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.

## 2 Isolated and shielded measurement channels

The majority of engineers using a ScopeCorder for their applications claim that input channel isolation is a key benefit to their measurements. Channel isolation allows measurements to be carried out on floating signals or to measure at different points of a circuit, where the grounds of those points are at different potentials, without having to use any special differential probes.

The housing for the input modules includes both

shielding for the single input channel and extra shielding for the housing of the input module. Using this double shielding method with the input channels inside the input modules results in high noise rejection.

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 16 bits), and provides the performance needed for precise measurement of fast switching signals even in the harshest environments.



**isoPRO™**

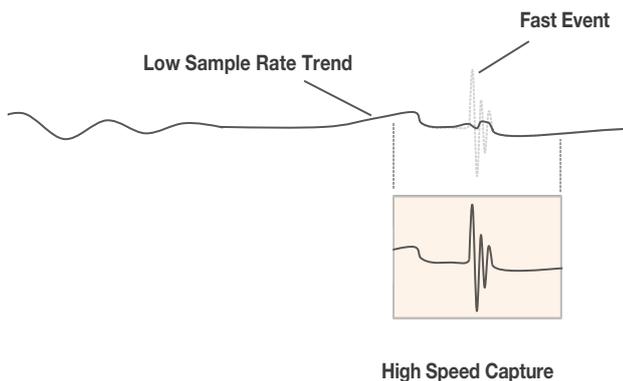
## 3 Capture detailed waveforms from milliseconds up to months

A ScopeCorder is equipped with a large and fast acquisition memory of up to 2 GPoint capacity, which enables high sample rates (up to 100 MS/s) on multiple channels simultaneously. This high sample rate, in combination

## Test&Measurement

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



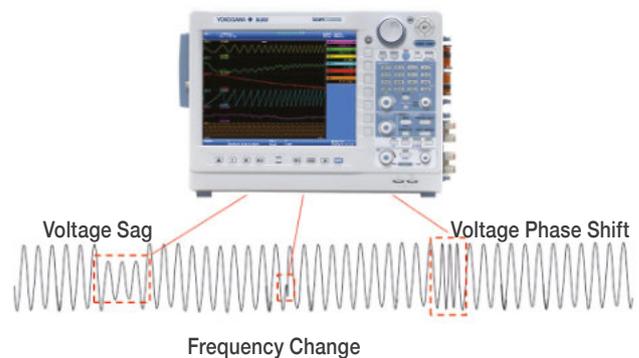
As an example, it is possible to set waveform triggers and capture 5000 high-speed transient events at 100 MS/s while at the same time continuously recording a trend measurement at 10 kS/s for 10 hours.

### 4 Powerful trigger functions

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

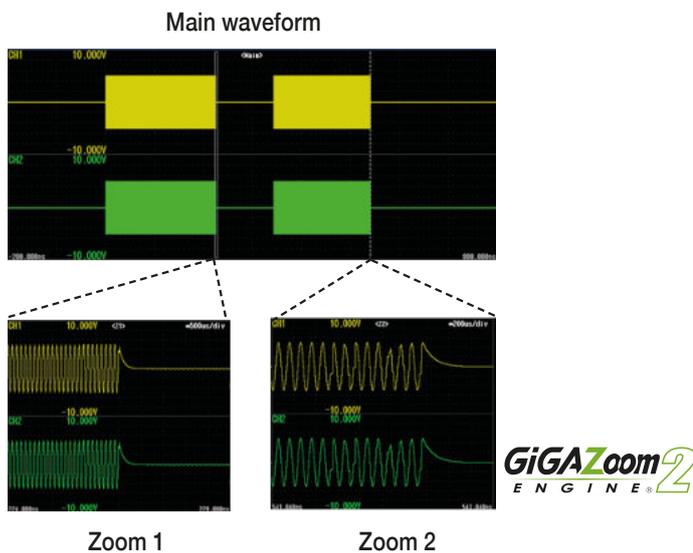
what causes a particular transient event. Moreover, the availability of the ScopeCorder's large acquisition memory, and thus the ability to measure over longer time periods, helps the analysis of the effect of such an event on other parts of the application by investigating other measurement channels' 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.

### 5 Giga Zoom Engine II

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 practically usable when the user can seamlessly zoom into these 200 days of recorded waveforms. With the ScopeCorder, it is possible to zoom into two billion samples in just a blink of the eye. Each ScopeCorder is equipped with the revolutionary Giga Zoom Engine II, a powerful processor designed for optimising access to data seamlessly. It is possible to activate two zoom windows while 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 instance, to observe and analyse transient events.



## 6 Convenient analysis functions

Analysis after the measurement 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 so-called automatic waveform parameter measurement. The parameter measure function is the most precise method for automatically calculating any or all of the 28 different waveform parameters such as amplitude, peak-to-peak values, RMS, risetime, frequency and more.

### 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 easily be 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.

## 7 Unique real-time mathematical computations and digital filtering

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 ScopeCorder 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 new 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 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.



## Example | 3Phase Measurement

Voltage Signals  
*3 Phase Inverter Output*

Current Signals  
*3 Phase Inverter Output*

Power Calculations  
*Real power & kWh Trend*

Harmonic Analysis  
*Bargraph, Vector or List*

Trigger  
*Trigger on Voltage, Current, Power Calculation or Harmonic content*

### 8 “Good to go” right out of the box

Sometimes prototype devices which are developed in a laboratory environment have to be tested in practice outside the development lab. The ScopeCorder has the appearance and portability of a data-acquisition recorder, but “under the hood” there is advanced measurement and analysis functionality that is also found in laboratory measuring equipment or PC-based DAQ systems. The advantage of a ScopeCorder here is that the instrument can be used immediately without any programming required to access all the functions on board. It can also be easily taken from the laboratory environment into another location for measurement.

This offers a much more convenient approach than, for instance, a PC-based system which needs a lot of programming time and effort to get it running and has a high operating cost. The ScopeCorder can save most common measurement setups in its internal memory or can be loaded easily from a USB stick to start measurements at a convenient location without delays.

### 9 Supports integration with automated test systems

Nowadays engineers are increasingly incorporating measuring instruments into integrated test systems to automate measurement processes for time-efficient testing. The ScopeCorder is equipped with Ethernet, USB and GPIB interfaces, 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, a dedicated MATLAB tool kit can be used to control instruments from within MATLAB or to transfer data from the instrument to MATLAB.

## LABVIEW

By utilising the LabVIEW driver written for the instrument, a developer can dramatically reduce the amount of work required to enable a PC to control the instrument from within the LabVIEW environment.

### 10 Quality first

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.

**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.**

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