

## Application Note

# Remote monitoring of waveform data and power values

## IS8000 Integrated Software Platform



### 1. Introduction

In the motor/inverter evaluation test, data may be collected by actually operating the waveform measurement instrument and power meter in the test room. Actual operators are often familiar with the operation. They change the waveform measurement instrument's settings, such as sampling rate, memory length, T/div, filter, or average, and carry out measurement work while comparing the actual screen display with the measurement conditions. Similarly, they decide on the power meter data they want, such as DC voltage/current/power on the input side and three-phase voltage/current/power, frequency, power factor, inverter efficiency, and motor efficiency on the output side, and change the data update rate, cycle detection filter, waveform display, and other settings to start the measurement work.

### 2. Challenges

A waveform measurement instrument and power meter in the test room can be operated by a worker who is familiar with their operations, but the worker is often not allowed to enter the test room while motors and inverters are actually in operation. Unexpectedly, there are many cases in which the setting conditions temporarily set before measurement are insufficient in actual measurement.

In such cases, the worker temporarily stops the motors and inverters to ensure safety to re-enter the test room and then goes to where the waveform measurement

instrument and power meter are located and configure waveform or numerical settings. This may take several minutes. Consequently, the motors and inverters are repeatedly started and stopped, leading to extremely poor work efficiency.

On the other hand, data can be easily collected via communication using PC software. However, the oscilloscope PC software and power meter PC software are separate software tools, so the two pieces of software need to be started and operated. In general, setting items on an oscilloscope is mainly for waveform measurement and those on a power meter are mainly for numerical measurement (numerical display), requiring different operating procedures.

Furthermore, the setting procedure and operation on the oscilloscope or power meter main unit and those from the PC software are often different because of the difference in the design mechanism between hardware and software. Operators may have difficulty in improving work efficiency due to the difference in operability between the product main unit and the PC software.

### 3. IS8000 Solution

- Data checking and operation by online monitor
- Integration of DL software and WT software
- IEEE1588 WT/DL time-synchronized display
- Integrated file management by project file
- Utilization of reliable power data with guaranteed accuracy
- Automatic report creation using waveform and power meter data



## 4. IS8000 Solution (Detailed descriptions)

### 4.1 Data checking and operation by online monitor

The online monitor operation allows measurement instruments to be controlled remotely from a PC via a communication interface.

The touch panel screen (control screen) of the DL950 ScopeCorder or WT5000 Power Analyzer main unit is displayed on the PC screen. A user can freely change the settings or check the measured waveform and power meter data from a PC at a remote location in the same manner as operating the measurement instrument.

There is no need to newly learn the operations of software that are different from those of the instrument main unit. The user can simply check the settings and waveform display to make sure there is no problem, then begin collecting the waveform or power meter data.

The waveform on the DL950 located away from the control room can be checked on the PC, which enables efficient data collection without the trouble of going back and forth between the test room and control room to save the waveform data or change the setting conditions.

### 4.2 Integration of DL software and WT software

Conventionally, the oscilloscope software and power meter software have different file formats and it is necessary to collect data using different software tools. The newly developed integrated measurement platform IS8000 can be used as one integrated measurement software to meet the measurement needs for synchronous measurement of waveform data and power meter data. By integrating the data collection software tools, it has become possible to significantly reduce the work of organizing and managing files, compared to the way of collecting data by separately performing measurements with an oscilloscope and a power meter and saving the measured data.

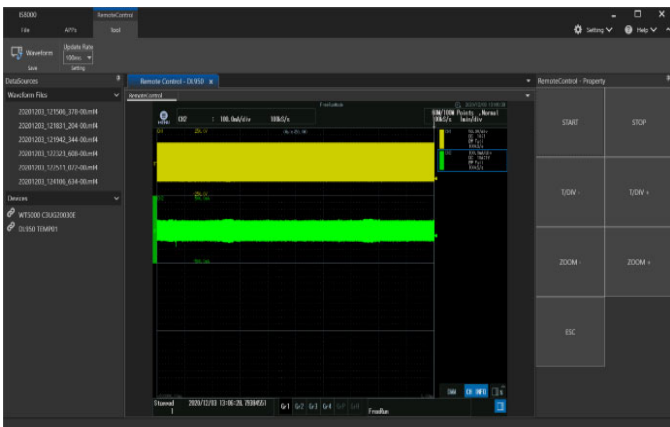


Figure 1. DL950 remote control screen

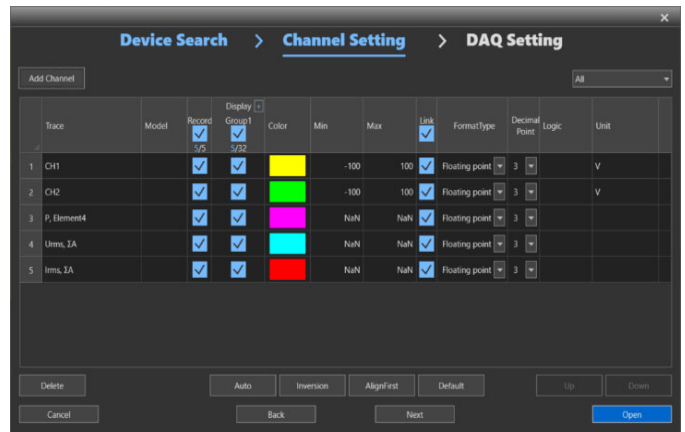


Figure 3. Startup screen of IS8000 integrated measurement platform



Figure 2. WT5000 remote control screen

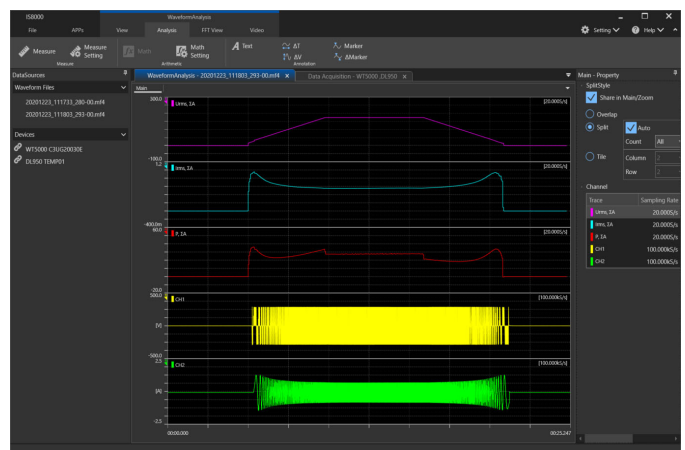


Figure 4. Integrating a project file and divided files

### 4.3 IEEE1588 WT/DL time-synchronized display

There are cases where power values are verified by displaying them using the waveform calculation function of a waveform measurement instrument, but a highly accurate power value with traceability with a measured waveform cannot be obtained. The IS8000 integrated measurement software platform enables easy synchronized measurement by connecting\* the DL950 and WT5000 at the same time using IEEE 1588-time synchronization. The synchronization error of DL950 and WT5000 is approximately 10 micro-seconds.

The power parameters of the WT5000 can be displayed on the same time axis on a PC along with the continuous waveform data of eight ch simultaneously acquired at up to 20 MS/s by the DL950. This makes it possible to display the trend of power meter data in time series together with the waveform data, allowing slight fluctuations in power to be checked. It, therefore, becomes possible to check the waveform abnormality data occurring at a certain time from the power fluctuations and find the problem.

- \* IEEE1588 standard: a precision time protocol (PTP) used to synchronize time between devices connected on a network. PTP=Precision Time Protocol
- \* DL950 IEEE1588 master function(/C40 option) is required.
- \* 2 units synchronization error of DL950 is within 150 ns.
- \* DL950 10 Gbps Ethernet (/C60 option) is required.
- \* IS8000 multi-unit synchronization option (/SY1) is required for synchronized measurement of two or more units.

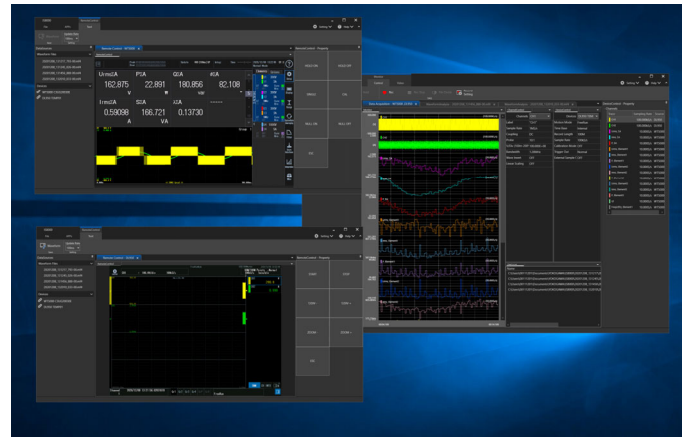


Figure 6. WT5000 and DL950 monitor display on the PC screen

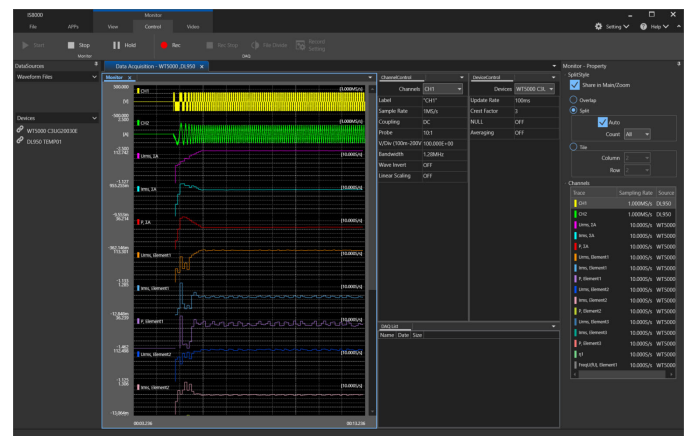


Figure 7. Power data and waveform data sync screen

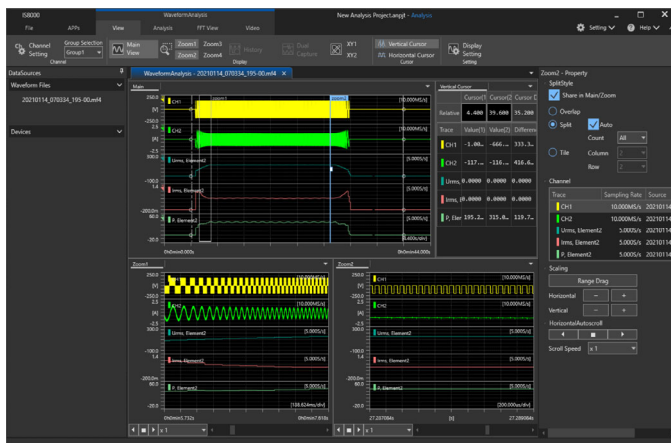


Figure 5. post analysis of waveform data

### 4.4 Integrated file management by project file saving

The IS8000 integrated measurement platform can manage individual files as one project file. This eliminates the need to save a waveform data file and a power data file with the same name in order to associate them with each other or the need to manage files by creating a folder for each measurement data and storing a waveform file and a power data file in that folder. A data file can be divided into segments by specifying the length of time. The data for an entire measurement period and the date of the period to be analyzed during the measurement can be saved as separate files. For example, when measuring for 24 hours, the user can divide the file into one-hour segments and analyze the data of the segments where the measuring process is finished while continuing the measurement.

After the measurement is completed, the file for the entire measurement period and the divided files can be managed as a project file. Measurement using two DL950s or measurement using the DL950 and WT5000 can also be managed as one project file. There is no need to associate file names even in the measurement with the DL950 and WT5000 which strongly supports the improvement of development efficiency.

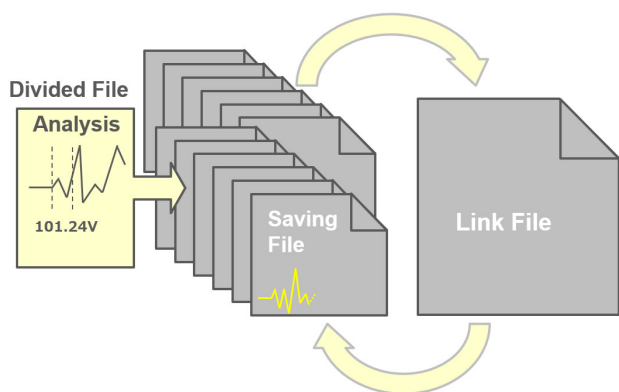


Figure 8. Integrating a project file and divided files

### 4.5 Utilization of reliable power data with guaranteed accuracy

The number of products that incorporate a function to calculate power values into waveform measurement instruments is increasing. It is very useful to calculate power values using a waveform measurement instrument because the simultaneity of data can be ensured even in a transient phenomenon. However, the user should pay attention to the assurance of the accuracy of power data traceable to national standards. The main purpose of waveform measurement instruments is to capture the shape of a measured signal more accurately with the high bandwidth and high sample rate by using a voltage probe and current probe. In other words, unlike a power meter, the result of a power calculation by a waveform measurement instrument has no guarantee of accuracy, and it is necessary to carefully verify the reliability. Yokogawa's power analyzers ensure highly precise measurement standards and traceability that are linked to national standards and provide highly reliable measurements of voltage, current, phase, and frequency.

On the IS8000 integrated measurement software platform, power measurement by the WT5000, which ensures power traceability, and eight-channel data transfer at 20 MS/s by the DL950 are available. Reliable power values and waveform data can be displayed on the same time axis at the same time.

### 4.6 Automatic report creation using waveform and power meter data

The automatic report creation option (/SY1) allows report creation and output on a PC. A user can easily create a report by setting the report layout (with image display) using the report creation wizard function. From the files measured or saved by the DL950 ScopeCorder or the WT5000 Precision Power Analyzer, the user can choose measurement conditions, waveform output, measurement results, or other data. The report can be output to PDF or EXCEL.

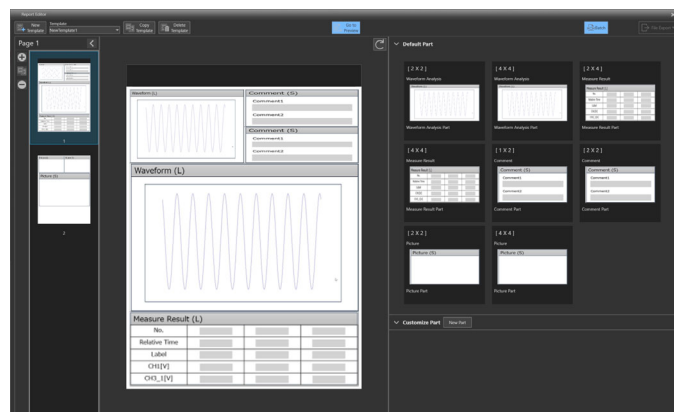


Figure 9. Report template edit screen

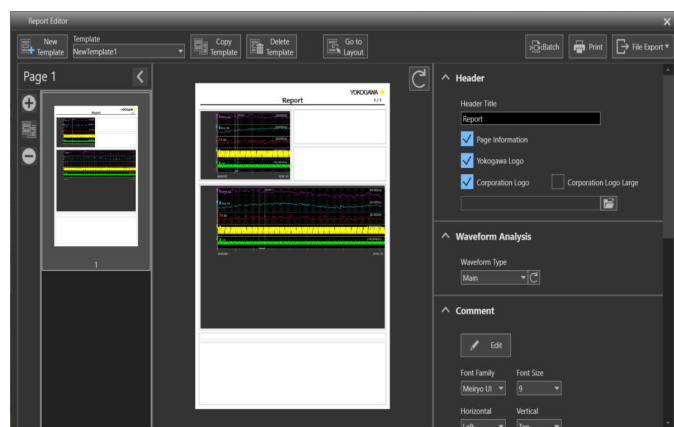


Figure 10. Report creation screen



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