e-max

DIRECTOR DII Digital Fault Recorder / DDR

16 Bit DFR

features

Sigma Delta Conversion and IEC 61850 Compliance

Transient Fault Recording and Analysis

Long Term Disturbance Recording

Continuous Waveform Recording

Continuous Phasor Recording

Power Quality Monitoring

E-MAX Display/Analysis Software included

Sampled Data Streaming Compliant

IEEE - C37.118-2005

IEC 61850

NERC Compliant

NERC - PRC-002-2

IEEE C37.232

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General Description

Using the Microsoft Windows 10® operating system, DII features complete Transient and Long-Term Phasor Data Recording, Analysis, and Transmission. E-MAX DII has a maximum capacity of 128 Analog and 256 Digital directly connected channels.

The networking capabilities of DII combined with Windows 10® provides the power and capacity to monitor and collect data from other substation equipment. The TCP/IP addressing and data handling also allow communications with a Master Station and other devices. The DII system includes complete remote control of both the DII and any connected E-MAX DFRs.

Input Characteristics

Analog Channel Capacity: 8 - 128 inputs

Analog Input Range

Voltage Channels: 0 to 500 Vac rms

Current Channels; 0 to 200 Amps (E-MAX shunts or CTs)

Analog Isolation

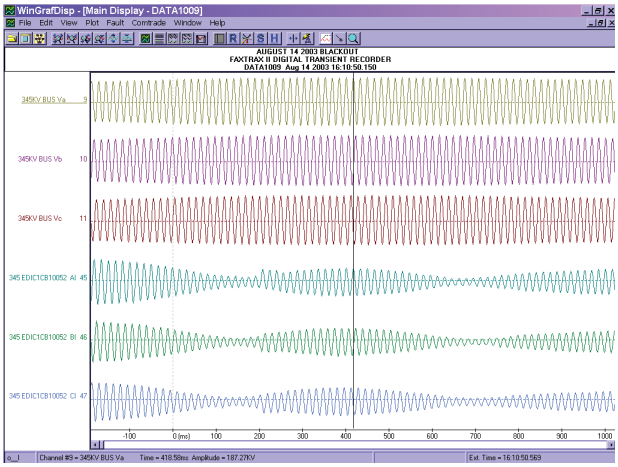
2500 Volts rms, Channel-to-Channel and Channel-to-Ground

Frequency Response

DC-coupled w/6th order anti-aliasing filter

Sigma Delta

DC - Nyquist Frequency



Sampling Method

Individual 16 bit Sigma Delta Conversion

Maximum Sample Rate

5760 samples/channel/second with

11,520, 2880 samples/channel/second (software selectable)

Digital Channel Capacity: 16 to 256 inputs

Input Configuration

Normally Open or Normally Closed (software selectable)

Wetting Voltage

60 - 185 Vdc / 120 Vac standard. Other supply voltages available.

Isolation

2500 Volts rms, Channel-to-Channel and Channel-to-Ground

Sensors

Software triggers (sensors) are standard for E-MAX Director DII DFRs. Each DFR locally stores the trigger information. All trigger information is user-settable — locally or remotely.

Analog Sensors: Over-, Under- limit and rate software sensors on each channel
Symmetrical component, harmonic, frequency, swing and power sensors.
Operation Limiters Individual Channel: Software Settable up to 15 minutes per fault

Event Sensors: Trigger on ALARM (operate) and/or RTN (return-to-normal) for each channel.

Processing of Record Data

The DII Recording System continuously monitors all channels. If triggered, the DII will record data to memory and process according to user settings. This System automatically identifies fault type and calculates distance to fault. All E-MAX DFR systems can print, display, transmit and e-mail recorded and calculated data automatically or upon operator request. Conversion of record data to COMTRADE and PQDIF formats may be done automatically or upon operator request.

DFR and Power Quality Sensors

Single Phase - One Per Channel	
Under Limit Sensors - rms setting	10 - 100 percent
with Hysteresis	up to 5 %
Rate of Change	up to 10 %
Over Limit Sensors - rms setting	95 - 300
with Hysteresis	up to 5%
with Time Delay (selectable)	30 msecs
Rate of Change	up to 50% per cycle
Frequency Over and Under	56 - 64 Hz
Frequency Delta Trigger	0.5 - 4 Hz
Three Phase Triggers	
Positive Sequence	0 - 150%
Negative Sequence	0 - 30%
Zero Sequence	0 - 30 %
Real Power	Threshold and Step Change
Reactive Power	Threshold and Step Change
Apparent Power	Threshold and Step Change
Extended Triggers	
Frequency and Delta Frequency	56 - 64 Hz
Power Triggers	3 Phase, Real, Reactive, Apparent
Sequence Triggers	3 Phase, Positive, Negative and Zero
Total Harmonic Distortion	5 - 50%
Swing Triggers	specified by crest to valley percentage 5 - 30 % setting and time swing of 0.5 to 4 cycles/second

Analog Inputs:	8 to 128 Inputs
Analog Input Range:	Voltage: 0 to 500 Vac rms or Current: 0 to 200 Amp
Accuracy:	Better than 0.1% of full scale
Analog Isolation:	2500 Volts rms Channel to Channel and Channel to Ground
Maximum Sampling Rate:	15,360 samples/channel/second (256 samples/cycle)
Standard Base Sample Rate	5760 samples/channel/second
Digital/Event Inputs:	16 to 256 Inputs
1. Input Configuration	N.O. or N.C. (Software Selected)
2. Input Voltage	125 Vdc Nominal standard —24, 48, 250 Vdc available
3. Isolation	2500 VDC (To Ground) and between inputs
4. Resolution	1/Analog Sample Rate
Sensors	
1. Analog Sensors	Over-, Under- limits and rate software sensors on each channel Symmetrical component, harmonic, frequency swing sensors
2. Operation Limiters	Individual Channel: Software Settable up to 15 minutes per fault
3. Event Sensors	Individual Programmable (N.O., N.C., Trigger on ALARM and/or RETURN)
4. External Sensors	Contact or voltage input
Continuous Recording	Complies with NERC PRC-002-2 and IEEE C37.232. Default: Records up to 10 Days.
Long term Recording	Phasor recording - simultaneous with Transient recording Sample rate is software selectable: 1 sample/cycle, 1/2 sample/cycle, 1/4 sample/cycle, 1/8 sample/cycle Programmable Record Length - 90 days maximum length Logs of signals, power and frequency
High Speed Transient Recording	
Prefault Period	Up to 99 cycles. Default setting: 10 cycles
Postfault Period	Up to 999 cycles. Default setting: 12 cycles.
Record Storage	Nonvolatile data storage on local SATA drive
Resolution:	16 bit
Power Supply:	DC/DC Converter: 90 - 320 Vdc / 120 Vac. 28-48 Vdc and 250 Vdc Available Current Limited / Overvoltage protected
Controller:	Intel Quad Core 64 bit CPU. 8 Gb RAM standard 1 USB 3.0 Port, 5 USB 2.0 Ports, Gb Ethernet Port
Graphic Output	Supports color inkjet, laser or dot matrix printers Graphics display on optional monitor
Data Storage	500 Gb or larger SATA Solid State Drive.
Clock Options	GPS Timing - IRIG B Decoder Internal (1 kHz or TTL), External GPS Clock
Accuracy	Better than 20 µs.
Communications Capability	
1. To Master Stations	Transfer of data files through Windows FTP Service Functions with multiple-Master system Windows Remote Control Desktop
2. Email	Automatic reporting to multiple user selected email addresses
3. LAN and WAN	Software supports communication via TCP/IP
Software Supplied:	
1. Master Station & Recorder	Microsoft Windows 10® Complete remote control, test and data retrieval, display and screen manipulation Remote setting of program and system parameters Complete data analysis software for Recorder and Master Station included
2. Display/Analysis Software	E-MAX WinGrafDisp (Waveform Data) E-MAX Phasorview (Phasor Data)
Environmental Characteristics:	
Operating Temperature	0^{O} To 60^{O} Centigrade
Storage	-20^{O} to 65^{O} Centigrade
Relative Humidity	0 to 95% R.H. non-condensing
Surge Withstand Capability:	ANSI C37.90.1 1989

INTERNATIONAL STANDARDS COMPLIANCE

Safety	*Immunity*
IEC 60255-2	IEC 61000-4-2
IEC 60255-4	IEC 61000-4-3
IEC 60255-5	IEC 61000-4-4
	IEC 61000-4-6

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