e-max

DIRECTOR DII

Digital Fault Recorder

16 Bit DFR with Sigma Delta Conversion

Complete Transient Fault Recording and Analysis

Long Term Phasor Recording

Power Quality Monitoring

Continuous Recording
Complies with
NERC - PRC-002-1
NERC - PRC-018-1

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General Description

Using the Microsoft Windows 7® 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 7® 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

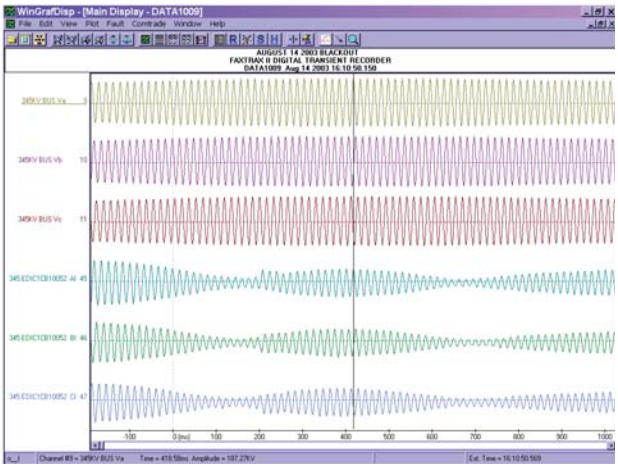
2500 Volts rms, Channel-to-Channel and Channel-to-Ground

Frequency Response

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

Sigma Delta

DC - 3000 Hz



Sampling Method

Individual 16 bit Sigma Delta Conversion

Sample Rate

5760 samples/channel/second with

11,520, 2880, 1440, 720 samples/channel/second (software selectable)

Digital Channel Capacity: 16 to 256 inputs

Input Configuration

Normally Open or Normally Closed (software selectable)

Input 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, fax, 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 16 per Remote, up to 4 Remote Units.
Analog Input Range:	Voltage: 0 to 500 Vac rms or Current: 0 to 200 Amp.
Accuracy:	1 %, calibrated to .5%
Analog Isolation:	2500 Volts rms
Sampling Rate:	Standard Base Sample Rate — 5760 samples/channel/second with 2880, 1440, 720 Hz, samples/channel/second software programmable. 11520 samples/channel/second available.
Digital/Event Inputs:	16 to 32 inputs per Remote, up to 4 Remote Units.
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
Sensors:	Auto-resetting standard
1. Analog Sensors	Over-, Under- limits and rate software sensors on each channels 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-002-1 and NERC PRC-018-1, PRC-002-2(draft). Records up to 99 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 (optional)
High Speed Transient Recording:	
Prefault Period:	Up to 10 seconds. Default setting: 10 cycles.
Postfault Period:	Minimum Record Length can be set with System Parameter file (0.5 sec default). Maximum Postfault Time - Can be set for continuous data streaming to disk capacity. (Longest Postfault captured to date: 31 minutes)
Record Storage:	Nonvolatile data storage on local SATA drive. Optional solid state drive. Capacity determined by disk size and scan frequency.
Resolution:	16 bit
Power Supply:	DC/DC Converter: 48 - 125 Vdc / 120 Vac. 250 Vdc Available. Current Limited / Overvoltage protected.
Controller:	Atom N270 CPU. 2 Gb RAM standard 2 USB 2.0 Ports, 1 Parallel Port, PCI Hard Disk Controller.
Graphic Output:	Supports color inkjet, laser or dot matrix printers Graphics display on optional monitor.
Data Storage:	SATA Hard Disk. Solid State Disk (optional)
Clock Options:	GPS Timing - GPS Receiver or IRIG B Decoder Internal (1 kHz or TTL), External GPS Clock, or Internal GPS
Clock Decoder	Accuracy: Better than 20 µs.
Communications Capability:	Data/Fax Modem and Network cards available.
1. To Master Stations	Automatic transmission of data files. Functions with multiple-Master system. Complete Remote Control
2. To Fax Machines	Up to 24 locations. (Up to 8 Fax numbers in each of three outputs.)
3. LAN and WAN	Software supports communication via TCP/IP
Software Supplied:	
1. Master Station & Recorder	Microsoft Windows 7® (Windows 10® available 4th quarter 2015). 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. Communications	Remote Control Computing Program - Communication Software Network control and data transmission (Ethernet)
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
Quality Certification:	ISO 9001:2008

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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