DIRECTOR DII

DIGITAL FAULT RECORDER

16 BIT DFR WITH SIGMA DELTA CONVERSION

Low Power

No Cooling Fans

SATA Drive Interface

Complete Transient Fault Recording and Analysis

Long Term Phasor Recording

Power Quality Monitoring

Substation Data Warehousing

Continuous Recording

Complies with

NERC - PRC-002-1

NERC - PRC-018-1

Using the Microsoft Windows XP™ operating system,the E-MAX DII DFR 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 and the Windows XP™ operating system provide the power and capacity to monitor and collect data from other substation equipment.. The TCP/IP addressing and data handling also allow pass-through of communications from a Master Station to other devices. The Director and DII system includes complete remote control of the Director, DII, and any connected E-MAX DFRs.

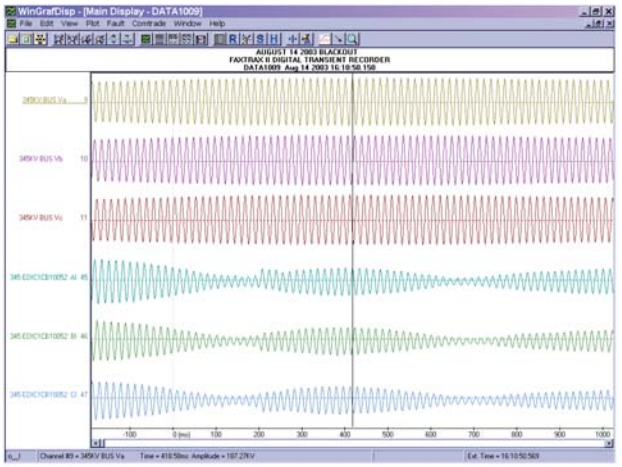
e-max

Complete Line of E-MAX Accessories Available

General Description

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

The networking capabilities of Director and the Windows XPTM operating system provide the power and capacity to monitor and collect data from other substation equipment and . The TCP/IP addressing and data handling also allow pass-through of communications from a Master Station to other devices. The Director system includes complete remote control of both the Director and any connected E-MAX DFRs.



Input Characteristics

Analog Channel Capacity

Director: 8 to 128 inputs
Faxtrax DFR: 8 to 64 inputs

Analog Input Range

Voltage Channels: 0 to 500 Vac rms
Current Channels: 0 to 200 Amps

Analog Isolation

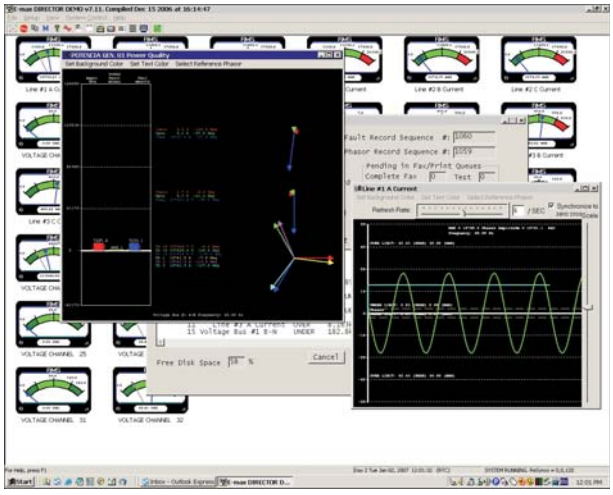
2500 Volts rms, Channel-to-channel and Channel-to-ground

Frequency Response

Standard 12 or 16 bit Inputs
DC to 1600 Hz standard (Other response ranges available)
DC-coupled w/6th order anti-aliasing filter
Sigma Delta
DC - 3000 Hz (Other Ranges Available)

Sampling Method

Simultaneous Sample and Hold
16 or 12-bit A/D Converter Resolution



Sampling Rate

Standard Base Sample Rate: 5760 samples/channel/second with 2880, 1440, 720 samples/channel/second software selectable
11520 & 23040 samples/channel/second available.

Digital Channel Capacity

Director: 16 to 512 inputs

Input Configuration

Normally Open or Normally Closed (Software Selectable)

Input Voltage

60-185 Vdc (standard). Other supply voltage ranges available

Isolation

2500 Volts rms, Channel-to-channel and Channel-to-ground

Sensors

Software triggers (sensors) are standard for E-MAX Director DFRs. Each Director 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

Processing of Data

Director continuously monitors all channels. If triggered, Director will record data to memory and process according to user settings. Director automatically identifies fault type, and calculates distance to fault. Director can print, display, fax, transmit and e-mail recorded and calculated data automatically or upon operator request. Director can convert record data to COMTRADE and PQDIF formats automatically or upon operator request.

Communications

Director includes ethernet, and serial (RS-232 or RS-485) ports. Director can also be equipped with a high speed modem and 10/100 Base-FL fiber-optic ethernet ports.

Director can be controlled remotely using communication software from any PC connected to it by any of the above ports.

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 56 - 64 Hz
- Rate of Frequency Change (selectable) 0.5 - 4 Hz

Single Or Three-phase Triggers

Power Scalable Number
- Rate of Change of Power 10 - 50% /second
- Directional Power Relay Reverse Power Flow

Reactive Power Scalable Number

Apparent Power Scalable Number

Phase Angle - Rate of Change settable -90 to +90 degrees/sec

Three Phase Triggers

Positive Sequence 50 - 150%

Negative Sequence 0 - 30%

Zero Sequence 0 - 30 %

Power Quality Triggers

Total Harmonic Distortion 5 - 50%

Individual Harmonic 3 - 50%

Voltage Sag / Surge 1 - 50 V/second

Flicker 3 - 15 %

Swing Triggers

specified by crest to valley percentage 5 - 30 % setting and time swing of 0.5 to 4 cycles /second

Hardware Triggers

Frequency and Rate of Frequency 56 - 64 Hz

Ground Detector R< 5 k

SPECIFICATIONS

Analog Inputs:	8 to 128 inputs local
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 and 23040 samples/channel/second available.
Digital/Event Inputs:	16 to 512 inputs local
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 Fault 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 IDE drive. Optional solid state drive up to 140 Mb. 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:	Intel Pentium IV or Atom N270 CPU. 1 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:	Minimum 160 Gb Hard Disk. Solid State Disk to 1 Gb(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	Auto-dial, auto 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. Operating System	For Digital Transient Recorder, operating with setting, recording, communications and display capabilities. Microsoft Windows XP.
2. Master Station & Recorder	2000/XP/Vista compatible data display and analysis software. Complete remote control, test and data retrieval, display and screen manipulation. Remote setting of program and system parameters. Full data analysis program at recorder and Master Station
3. Communications	Remote Control Computing Program - Communication Software Network control and data transmission (Ethernet)
Environmental Characteristics:	
Operating Temperature	0° To 60° Centigrade
Storage	-20° to 65° Centigrade
Relative Humidity	0 to 95% R.H. non-condensing
Surge Withstand Capability:	ANSI C37.90.1 2002
Quality Certification:	ISO 9001:2008

INTERNATIONAL STANDARDS COMPLIANCE

Relay 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