



DIRECTOR DFR/DDR

THE POWERFUL, FLEXIBLE SOLUTION FOR DATA ACQUISITION AND ANALYSIS



The Director Digital Recorder is a powerful multi-function data acquisition and analysis system. Using Microsoft Windows XP™, this revolutionary system not only features complete Transient Data Recording and Analysis, but also functions as a Substation Computer. It includes the power and capacity to monitor and collect data from other substation equipment and IEDs.

The Director provides full network and Internet control and reporting. On-screen displays include Real Time channel and line groups, updated at one second intervals. High performance and accurate fault location define E-MAX Recorders.

THE DIRECTOR SYSTEM FEATURES:

- ◆ Complete Transient Fault Recording and Analysis
- ◆ Automatic Fault Location
- ◆ Long Term and Synchrophasor Recording
- ◆ Continuous Recording Complies with
 - NERC - PRC-002-1
 - PRC-018-1
 - PRC-002-2 (draft)
- ◆ IEEE Compliant - PC-37.232
- ◆ Power Quality Monitoring
- ◆ Substation Data Warehousing
- ◆ GPS Timing - GPS Receiver or IRIG B Decoder
- ◆ Real Time Channel Displays, V, I Waveforms

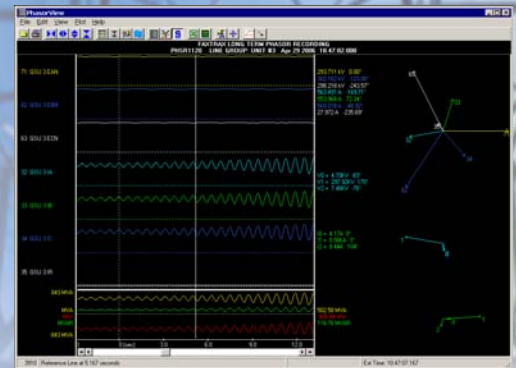
THE DIRECTOR CONTROL UNIT CAPACITY:

Local Analog Inputs: 8 - 128
Local Digital Inputs: 16 - 512

DIRECTOR REMOTE TRANSDUCER / TRANSMITTER

- ◆ Clocked by same sample clock as the local DFR channels.
- ◆ Input circuitry same as local inputs
- ◆ No time skew

- ◆ LAN / WAN Connectivity
- ◆ Full Remote Control via Ethernet or modem
- ◆ Real Time Displays
- ◆ The Control Unit of a distributed system
- ◆ Low Noise Operation
- ◆ Microsoft™ Windows XP™ Operating System
- ◆ Available Fax Reporting



Director Delivers Simultaneous Transient Fault Data & Continuous Recording



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 XP™ 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

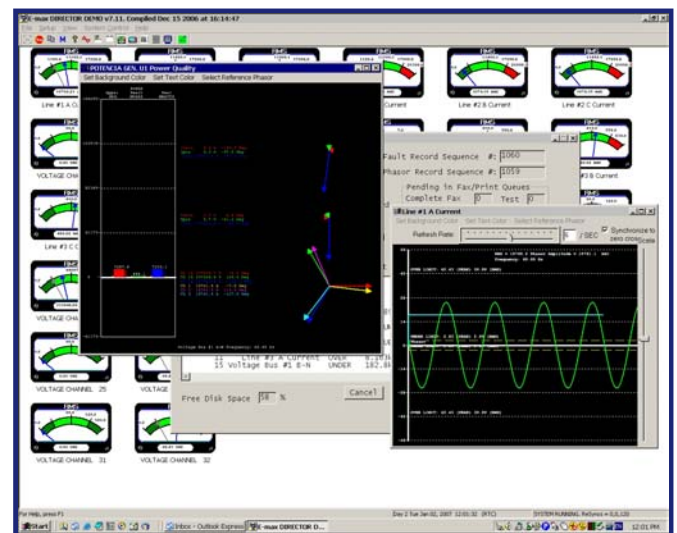
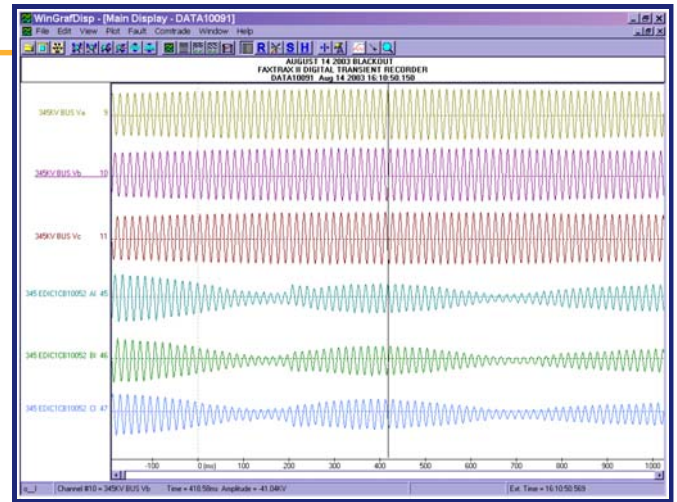
Normally Open or Normally Closed (Software Selectable)

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 **Director** and E-MAX DFRs. Each **Director** and DFR locally store the trigger information. All trigger information is user-settable ó 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 DATA

Director features the ability to monitor local 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 msec
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
Quad (Under/Over Limit Sensor)	10 - 100% or 100 - 300 %



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 ó 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 ó24, 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. <i>(Longest Postfault captured to date: 31 minutes)</i>
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:	12 bit standard, 16 bit available
Power Supply:	DC/DC Converter: 48 - 125 Vdc / 120 Vac. 250 Vdc Available. Current Limited / Overvoltage protected.
Controller:	Intel Pentium III, AMD K6, or Intel Pentium IV CPU. 256 Mb RAM standard 2 USB 2.0 Ports, 1 Parallel Port, PCI Hard Disk Controller.
Graphic Output:	Parallel Port: supports 9- or 24-pin impact dot matrix, color inkjet and laser printers Graphics display on optional monitor.
Data Storage:	Minimum 80.0 Gb Hard Disk. Solid State Disk to 1 Gb(optional)
Clock Options:	GPS Timing - GPS Receiver or IRIG B Decoder Internal (1000 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 1999
Quality Certification:	ISO 9001:2000

INTERNATIONAL STANDARDS COMPLIANCE	
<i>Relay Safety</i>	<i>Immunity</i>
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

