SURVEYOR

Digital Fault Recorder
Dynamic Disturbance Recorder
for Local and Distrubuted Systems

E-MAX Director Software
- Transient 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

SURVEYOR

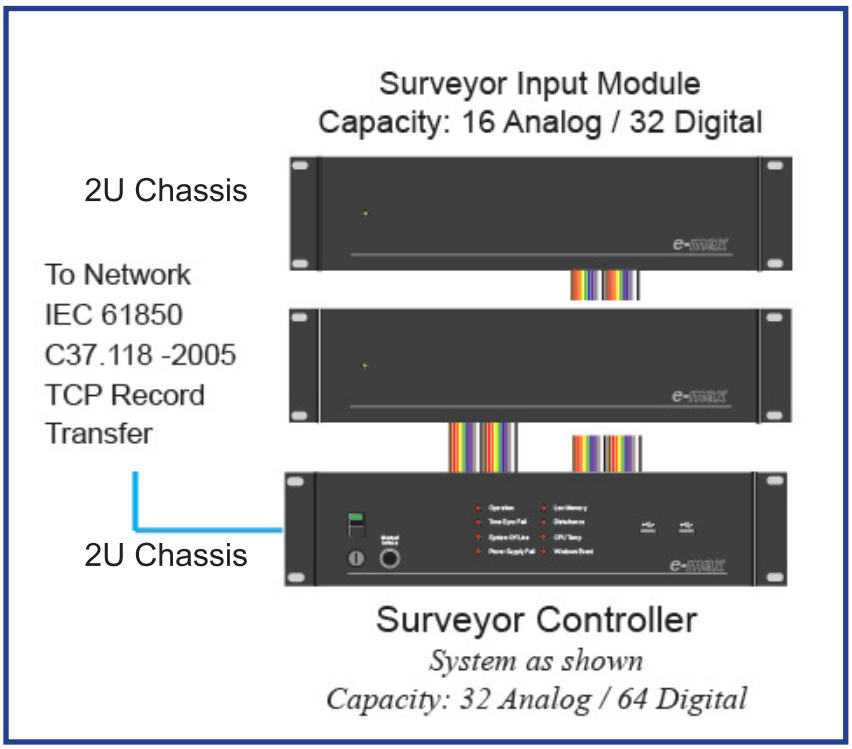
The Surveyor Recording System is a DFR/DDR with local Input Modules connected to a Controller. The Input Modules are connected to the Controller by multiconductor cables. The Controller contains a single board computer running 64-bit Microsoft Windows 10® and the E-MAX Director program, for recording, storing and transferring data.

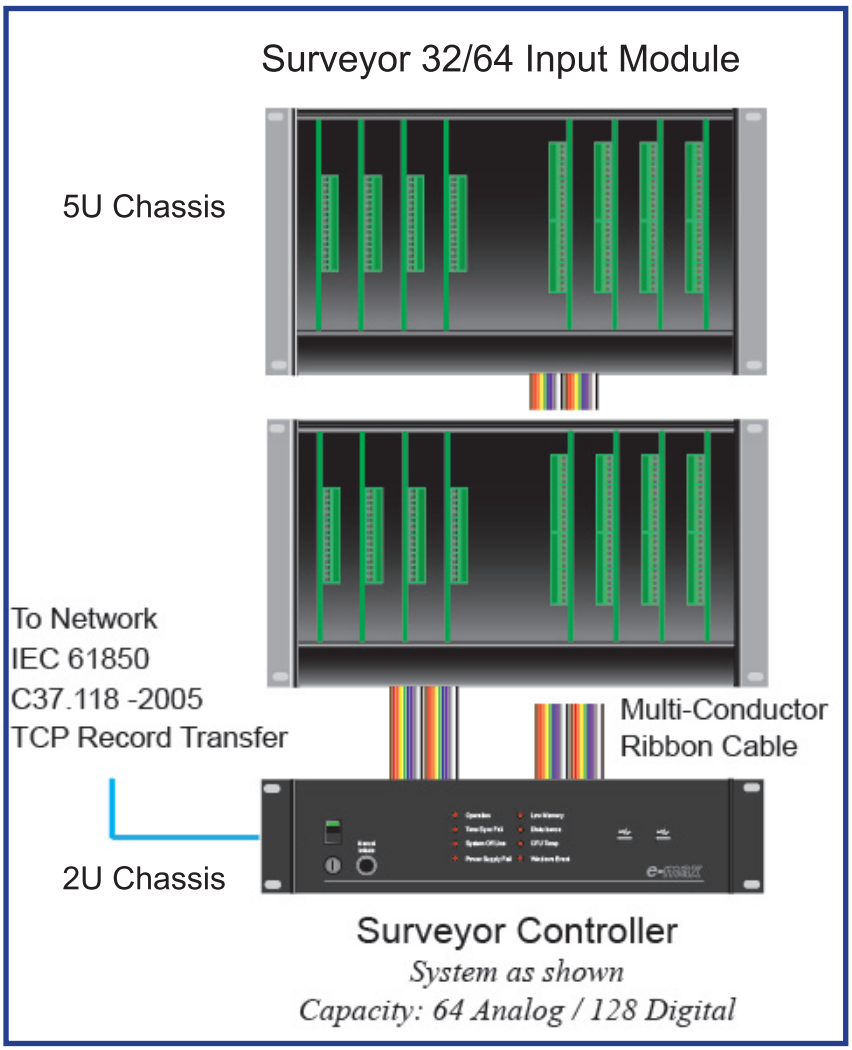
SURVEYOR DISTRIBUTED

The Surveyor Distributed Recording System is a DFR/DDR with an array of Remote Input Modules connected to a Digital Receiver Module and Controller. The Remotes are connected to the Receiver by pairs of optical fibers and may be installed as much as 500 meters away (multi-mode version). Single-mode versions are available, increasing the maximum separation distance to 10 kilometers. The Digital Receiver Module sends control and clock signals to the Remotes and receives measurement data from the Remotes. Each Remote Input Module can monitor up to 16 analog inputs and 32 digital inputs. Each Digital Receiver Module can collect data from up to four Remotes; one Controller can support two Receivers.

Each Digital Receiver Module is connected to a Controller by a multiconductor cable. The Controller interfaces the Receiver to an internal computer running a Microsoft Windows operating system and the E-MAX Director recording program, for recording, storing and transferring data.

Surveyor Modules





Input Characteristics

Analog Channel Capacity: 8 - 64 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 Frerquency

Sampling Method

Individual 16 bit Sigma Delta Conversion

Maximum Sample Rate

15,360 samples/channel/second
(256 samples/cycle)

Standard Base Sample Rate

5760 samples/channel/second
(96 samples/channel/cycle)

Digital Channel Capacity: 16 to 128 inputs

Input Configuration

Normally Open or Normally Closed

(software selectable)

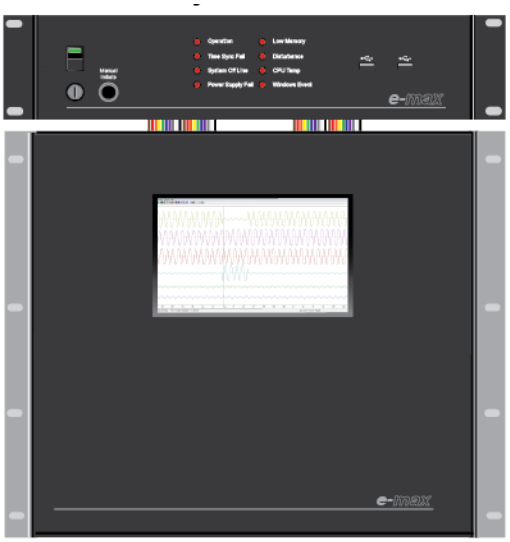
Wetting Voltage

60 - 185 Vdc / 120 Vac standard

Other supply voltages available

Isolation

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

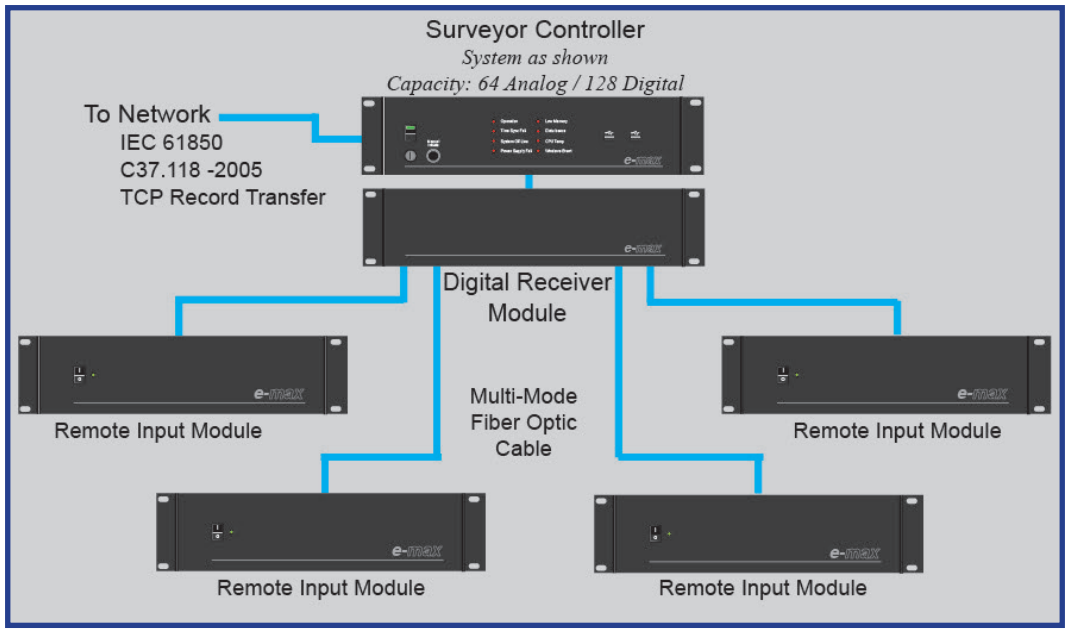


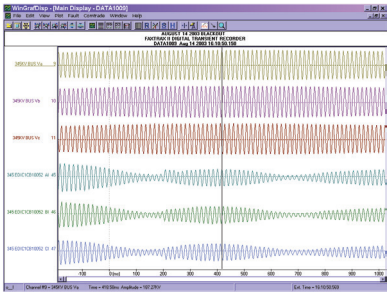
Accessories

The 7 inch, high resolution touchscreen assists as a local user interface. The touchscreen may be used for all of the functions of a large monitor and keyboard including:

- System Settings
- System Control
- Calibration
- System Tests and Diagnostics
- Display/Analysis of Recorded Data

Surveyor Distributed Modules





A single Controller and Local Interface connects 1-4 Remote Input Units.
Each Remote Input Unit can be configured with 8 or 16 Analog Input Channels
and 16 or 32 Event Input Channels.

Data Recording

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

Surveyor can record waveform data and/or phasor data continuously, simultaneously with triggered recording. Continuous recording features separate user selectable rates.

Communication

Remote to Local Fiber Optic; Proprietary high speed serial fiber optic tranceivers
Local Interface to Controller; Proprietary parallel interface
Controller to Master Station; 10/100/1000 Mb Ethernet

Analog Inputs	8 to 64 Inputs - Surveyor: up to 2 Input Chassis. Surveyor Distributed: Up to 4 Remote Units
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 Sample Rate	5760 samples/channel/second
Digital/Event Inputs	16 to 128 Inputs - Surveyor: up to 2 Input Chassis. Surveyor Distributed: Up to 4 Remote Units *Digital Inputs are sampled at the same rate as Analog Channels*
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-of-Change software sensors on each channels Symmetrical component, harmonic, frequency, swing, power sensors
2. Operation Limiters	Individual Channel: Software Settable up to 15 minutes per fault with auto reset
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 solid state drive
Resolution	16 bit
Power Supply	DC/DC Converter: 120-370 Vdc / 120 Vac. 28-48 Vdc and 250 Vdc Available. Current Limited / Overvoltage protected
Controller	Intel 64 bit Quad Core CPU. 8 Gb RAM standard 2-USB 3.0 Port, 4-USB 2.0 Ports, HDMI 2-10/100/1000 Mbps Ethernet Port
Graphic Output	Supports color inkjet or laser printers Graphics display on optional monitor.
Data Storage	500 Gb or larger SATA Solid State Drive
Clock Options	GPS Timing - IRIG-B time code (1KHz or TTL) Accuracy: Better than 20 µ NTP via Ethernet Port Internal Crystal Oscillator Backup
Communications Capability	
1. To Master Stations	Transfer of data files through Windows FTP Service Functions with multiple-Master system Windows Remote Desktop Remote Control
2. Email	Automatic reporting to multiple 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° To 60° C
Storage	-20° to 65° C
Relative Humidity	0 to 95% R.H. non-condensing
Surge Withstand Capability	ANSI C37.90.1 1989
Quality Certification:	ISO 9001:2015

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