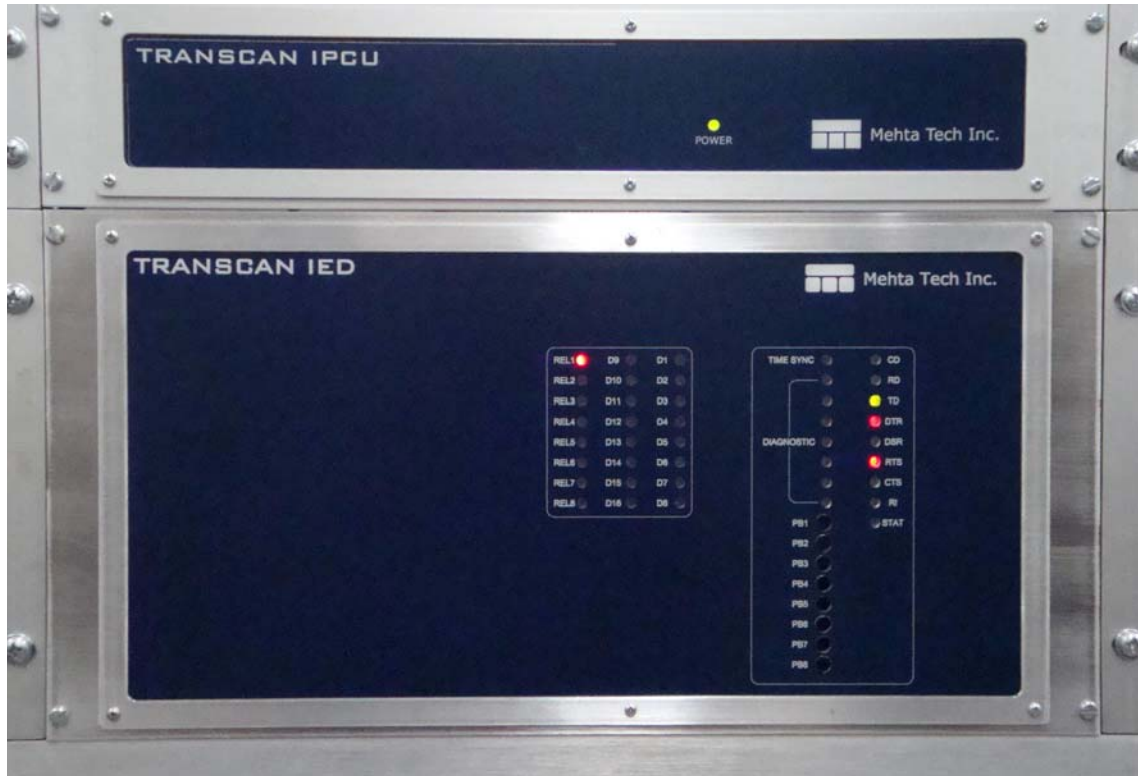


# Mehta Tech, Inc. TRANSCAN IED

## For Multi-Function, Multi-Speed Recording



- ◆ Two independent, simultaneously operating recorders in one package
- ◆ Triggering on input quantities and calculated values, such as Frequency, Symmetrical Components, Real and Reactive Power
- ◆ Graphical analysis of calculated values in addition to the standard wave forms
- ◆ Versatile packaging: portable configuration, multi-IED recorders, linked together via a single Ethernet coaxial cable and distributed throughout the substation, or assembled in a rack or standard 90 inch cabinet which is centrally located
- ◆ Easy to use Master Station Software
- ◆ Analysis software to calculate quantities such as apparent line impedance, fault distance, harmonics, phasors, and symmetrical components.

## Introduction to TRANSCAN IED

The TRANSCAN IED provides a single solution to acquiring, processing and recording data needed to monitor your power system. A single set of hardware and a one-time installation of field wiring can give you the multiple analog recording functions which traditionally required duplication of hardware and installation.

The basic building block of a TRANSCAN IED system is a compact unit which supports eight analog inputs, up to sixteen event inputs, and up to eight alarm or status outputs. This modularity will serve a single power line, including three phases of current inputs, three phases of potential inputs, and their respective neutrals.

TRANSCAN IEDs are ideal for:

- Electric utilities' generation, transmission, and distribution departments
- Wind Farm connection to Grid
- Independent power producers
- Co-generation organizations
- Large industrial power users

## Multiple Recording Applications

The base unit of the TRANSCAN IED allows you to monitor power system reliability and power quality by selecting from among the following data retention (recording) functions:

- Digital fault recording - Short, high-speed records of analog waveforms (typically about 1 second at 5,760 samples/sec)
- Low-speed Waveform Capture - Long-term, low-speed waveform of input signals and calculated data (typically 30 seconds at 720 samples/sec)
- Swing recording - Low-speed, long-term records of envelope (typically 5-10 minutes at 1 sample/cycle)

## Storage of Inputs and Calculated Values

In addition to recording any or all input signals being monitored, the TRANSCAN IED will perform a variety of calculations for triggering and analysis purposes including the following:

- Phasors
- Frequency
- Power (real and reactive)
- Symmetrical Components
- Harmonic Distortion
- Fundamental RMS

## Modular Architecture for Distributed or Centralized Installations

### *Distributed Applications*

The TRANSCAN IED is ideally sized to monitor one power line. Each unit can be mounted in its associated equipment bay or switchboard panel, thus minimizing installation and wiring costs. Its small size allows for ease of mounting in an available 19-inch or 24-inch relay rack. Each TRANSCAN IED occupies 8.75 vertical inches. Each IED provides its functions locally and a group of IEDs can be linked to one IPCU which occupies 3.5 vertical inches. For more information on the IPCU, see page three.



Up to ten IEDs (80 analog inputs) can be linked together in a network (via Ethernet) to form an integrated system, allowing them to share a single modem and phone line or Ethernet connection.

### *Centralized Installation*

Centralized installations can be configured in a variety of sizes by mounting multiple TRANSCAN IED units in a rack, cabinet, or switchboard.

The scope is limited only by the size of the cabinet and the number and kind of options and peripherals. At 8-3/4 (vertical) inches per IED, a 90-inch cabinet can accommodate seven IEDs (up to 56 analog/112 digital inputs). Mehta Tech also provides customized cabinet systems which may include customer specific terminal blocks, test switches, and wiring. The customized system can optionally include peripherals such as GPS clock, modem, etc., as required for a specific installation.

## Information Processor and Communication Unit (IPCU)

The IPCU for the TRANSCAN IED provides firmware and hardware for support of local and/or remote communication.

After the data is recorded in the IED, it is automatically transferred via Ethernet to an IPCU which provides the following:

- Flash memory for non-volatile solid-state storage of records
- Two Ethernet ports for 10/100Mbps network communication
- Internal modem & RS232 ports
- Industry standard protocols and data formats

The communications media can include switched, unconditioned telephone lines, leased lines, microwave links, and fiber optics.

Up to ten IEDs (80 analog inputs) can be linked together through the IPCU to form an integrated system, allowing them to share a single modem and phone line or Ethernet connection.

## TRANSCAN IED Functions

Each IED provides the capability for independent triggering, calculation, and storage for each of the recorder function implemented. To achieve this, each IED incorporates Digital Signal Processor technology. Below is a list of calculations and triggers:

### *Analog Calculations and Triggers*

- Over current
- Over/under voltage
- Over/under frequency
- Negative, zero, and positive sequence
- Real power
- Reactive power
- Total harmonic distortion
- Phasors
- Programmable trigger blocking to minimize undesirable undervoltage and frequency triggers

### *Digital triggers*

- Change-of-state to abnormal
- Any change-of-state
- While (during) abnormal

### *Manual triggers*

- A front panel push button
- A contact connected to a digital input

## Memory and Data Storage Parameters

Each TRANSCAN IED can be configured to independently capture two types of recordings simultaneously based on the configuration parameters predetermined by the user. These recordings can be used to record fault, swing, and/or other types of system abnormalities.

Each IED has solid-state memory capable of storing 30 seconds of 5,760 data and 30 minutes of 1 Hz data.

The user can define the following parameters affecting record length:

- Pre-trigger (fault, swing, etc.) period
- Post-trigger period
- Maximum in-trigger length

Each parameter may be set through software, either locally or remotely, in the following increments of scans, milliseconds, cycles, seconds and minutes.

The IED record length is not predetermined. The total length of the record is dictated by the duration of the abnormality through the trigger algorithms in each IED.

## Recording Rate and Resolution

The TRANSCAN IED provides one 16-bit analog-to-digital (A/D) converter for each analog channel. This provides greater rangeability to cover fault conditions as well as greater accuracy at nominal operating levels.

The storage rates of each IED are programmable by the user. Each function of the IED can have its own independent storage rate. The following rates are selectable through the IED configuration software:

Storage Rate	Samples per Cycle per Channel
5,760 Hz	96
720 Hz	12
60 Hz	1
1Hz	1/60

### **Relay Output for Alarm and Status**

The IED produces a number of alarm and status indicators which are displayed by front-panel LEDs and presented as relay contacts to an RTU or local annunciator. These include: Power Failure/Restart Alarm, Memory Warning Alarm, Recorder Operated, Memory Full, Recorder Function #2 In-trigger Notification, and Recorder Function #1 In-trigger Notification.

### **Time Stamping and Synchronization**

The IED accepts an IRIG-B time code signal from a GPS clock. The sampling clock of the IED is synchronized to the IRIG-B signal. This allows synchronization of multiple IEDs in one or many substations.

### **Isolation for Any Application**

The TRANSCAN IED system includes input isolation/signal-conditioning hardware for the variety of signals to be monitored in the power system.

#### ***AC Current and Voltage Isolation***

Transformer Isolation Modules provide AC coupled isolation/signal conditioning for signals from VT's and CT's. Transformer isolation results in high reliability, low burden, and an excellent signal-to-noise ratio. Its passive design also minimizes the need for re-calibration during service.

#### ***Remote Isolation of Current Inputs***

For temporary installation of portable recorders, clamp-on transformers can be connected to current inputs, without the need to open the CT circuit.

If a recorder must be installed at a long distance from the current circuits to be monitored, a Transig remote current isolator may be used. Its transformer produces a low-level current loop and may be located several hundred feet from the recorder.

#### ***Digital (Event) Isolation Module (DIM)***

Each Digital Isolation Module (DIM) optically isolates each digital (event) input. An LED displays the status of each DIM. Each input accepts a wetted contact, and can accept a voltage of 5 to 250 volts.

## Master Station Software

Easy-to-use master station software is provided to help the user set up the recorder, retrieve records, view and analyze the data. This software is available for the Windows environment. The basic program functions include the following:

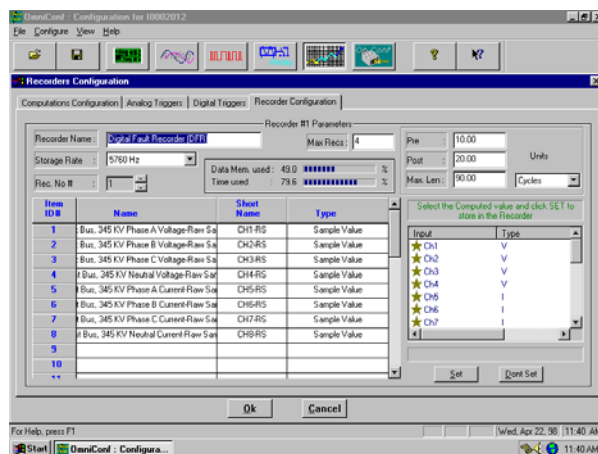
- Configuration and Calibration
- Graphical Display and Printing
- Communications between IEDs and local or remote master station computer.

### Configuration and Calibration Software

This software unlocks the power of the IED architecture by allowing the users to configure independent recorder functions and triggers within each IED. TRANSCAN IED recording parameters may be modified by software, either from a local computer, or remotely from the Master Station via a modem.

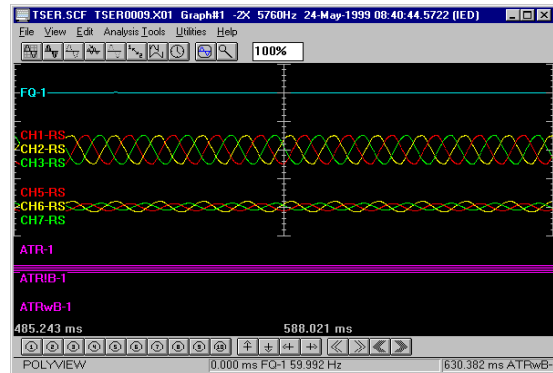
The software allows the functions of the recorder to be configured, including defining inputs, recording rate, pre- and post-abnormality period, maximum record length, record content, etc.

Trigger types and levels may be independently set for each channel. Trigger blocking (based on the value of an analog input) is implemented to avoid continuous triggering of voltage and frequency on a dead line.



## Graphical Display and Printing

After retrieval of stored data, the graphical display program is an invaluable tool in analyzing system disturbances. This software allows eleven user definable display formats which can be saved for each IED. The display and analysis software is also the launching point for the various analysis tools listed below:



## Communication Software

The communication software developed by Mehta Tech allows the user to communicate between a local computer, remote master station and the IEDs in the substation, via the IPCU.

The transmitted records, from either of the two independent recording functions, contain the data which the user has specified for the record. This data can include analog signal values, calculated values, and digital input status. The data files also include station and IED identification, file number, date and time.

## Optional Analysis Software

Mehta Tech has developed a number of optional software tools to help the user to analyze records. These include the following:

- Calculate symmetrical components (Negative, zero, and positive sequence)
- Calculate deviation from base frequency
- Calculate total harmonics (up to 48<sup>th</sup>)
- Calculate amplitude values of currents and voltages
- Calculate real and reactive power
- Calculate phase angle
- Calculate apparent line impedance
- Calculate distance to fault
- Import/export IEEE COMTRADE format

# TRANSCAN IED Specification Summary

## Recording Capabilities

### Recording Functions

High-speed waveform capture  
Low-speed waveform capture

### Recording Storage Rates (samples per second)

Waveform	5,760
Calculations	720
Amplitude	60
Amplitude	1

### Memory

Non-volatile configuration memory  
Data Record memory – 32MB RAM

### A/D Resolution

Individual 16-bit A/D converter, including sign

### Record Length Parameters

Pre-trigger and post-trigger periods,  
maximum in-trigger length

### Time Reference

IRIG-B synchronization (AM or TTL); internal battery-backed clock. This allows synchronization of multiple IEDs in one or many substations

### Software Settable Triggers

Digital – Change to abnormal; any change of input state; and while abnormal  
Analog – Over/under voltage; over current; negative, zero & positive sequence; frequency deviation; watts & vars; harmonic distortion

## Input/Output Specifications

### AC Current Input Transformer (CTs)

5A nominal; 12A continuous; 63A one minute; core saturation @ 60Hz = 140A. CT signal is reproduced within 3dB from 0.7Hz to 10kHz. Less than 1VA burden at 5A nominal; 80VA at 100A fault

### AC Potential Input Range (VTs)

60 to 120Vac nominal; 100% over range. VT signal is reproduced within 3dB from 4Hz to 10kHz. Less than 0.25VA burden

### Digital (Event) Input Isolator

Optically isolated scaleable for 4 to 298Vdc (direct input of wet; dry contacts externally wetted)

### Digital Output Isolator (Alarm or status)

Eight outputs; 8A @240Vac or 0.1A @ 220Vdc; configurable as NO or NC

### Anti-aliasing Filter

8-pole anti-aliasing low pass filters with a 3dB point at 2.6kHz.

### Operating Power Requirements

Designed for Vac or Vdc operation without component change.

- 105-300Vdc or 85-264Vac

### Electrical Tests

I/O: 2500Vrms

Dielectric: 2500Vdc per IEEE C37.90

SWC: Meets IEEE C37.90.1-198X

Power supply: 1500Vrms

## Physical and Environmental Information

### Physical Characteristics of IED

Width: 17.5 inches (19 or 24 with mounting)

Depth: 8 inches (including connectors)

Height: 8.75 inches (5-U)

Weight: Base unit 25 lbs.

### Physical Characteristics of IPCU

Width: 17.5 inches (19 or 24 with mounting)

Depth: 8 inches

Height: 3.5 inches (2-U)

Weight: 10 lbs.

### Ambient Temperature

0°C to +50°C

### Storage Temperature

0°C to +70°C

### Relative Humidity

0 to 90% relative humidity, non-condensing

### IPCU Summary

High speed Ethernet to IEDs; Ethernet or modem for remote communications; Flash memory

### Five Year Warranty

*Specifications are subject to change without notice*



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