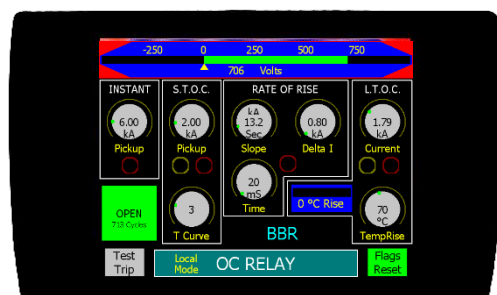


TPG

IMPROCON

Feeder Control Monitor

IMProCon FCM



GENERAL DESCRIPTION

Total Power Group (TPG) DC Protective Relay IMProCon FCM (Intelligent Machine Protection and Control Feeder Control Monitor) is a customizable distributed protection, monitoring, and management system for DC Feeder Breakers. TPG IMProCon FCM is part of the IMProCon Traction Power Substation system: Feeder Control Monitor (FCM) module, Direct Current Monitor (DCM); Alternating Current Monitor (ACM); AC and DC transducers; Substation Master Module (SMM).

IMProCon FCM is designed as a complete feeder control unit, integrating all components and cubicle wiring required. Decades of experience are behind the refining of both its design and protection algorithms. IMProCon FCM uses evolved Intelligent Electronic Devices (IED) for decentralized protection and monitoring, using fast and reliable fiberoptic Ethernet communications with both the substation master cabinet and adjacent substations for Transfer Trip functionality.

MAIN FEATURES

- Color Touchscreen HMI for intuitive operation and configuration
- Integrated Volt meter and Amp meter
- Fault Detection
- Load Measure, Reclose, Incomplete Sequence functions
- Downloadable Event Log
- Overcurrent Fault Graphs
- Automatic Reclose Function
- Input Status Screen
- Visual live feeder indication
- Fiberoptic Modbus TCP Communication
- Fast Transfer Trip of adjacent substations: **3ms**
- IMProCon FCM works with all DC breakers in use in US market
- No Software licensing required: no need to upgrade software to access and maintain your IMProCon FCM
- Optional Analog Voltage and Current output

MAIN CHARACTERISTICS

GENERAL

Power Supply	Input: 85-264VAC 50-60 Hz 18-36VDC 36-75 VDC 120-370 VDC Burden: ~10W
Operating Temperature	-40°F to +185°F (-40°C to +85°C)
Weight	5.70 lbs.

SHUNT

Shunt Rated Current	100A - 12000A
Shunt Rated Millivolts	50mV - 200mV

DIGITAL I/O

- 18 Digital Inputs¹:
 - 11 preconfigured for feeder breaker normal operations, for example: Breaker Closed, 86 Lockout, Connected Position, 69 Foot Pedal, 33 Door Switch, Disconnected Position, Blown LM Fuse, Local Mode, Manual Trip, Manual Close, Breaker Specific
 - 7 spares for customer specified indications
- 6 Digital Contact Outputs:
 - 5 preconfigured for feeder breaker normal operations, for example: Trip Command, Close Command, Load Measure, Cable Energized, Overcurrent Trip/Residual Current
 - 1 spares for customer specified functions

All I/O point names can be renamed per customer specifications.

¹Digital I/O can be isolated



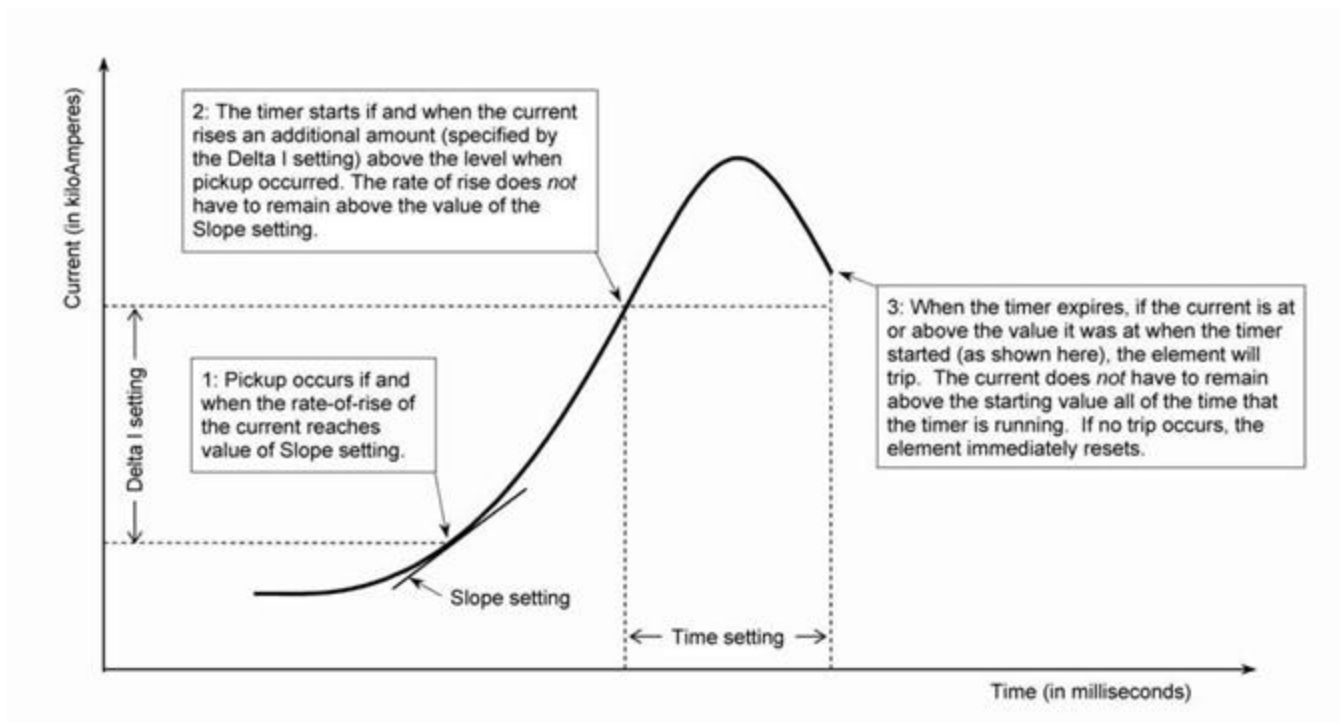
LIST OF PROTECTIVE FUNCTIONS

- Instantaneous Overcurrent
- Short-Time Overcurrent (inverse time curve)
- Long-Time Overcurrent (thermal simulation)
- Rate-of-Rise
- Live Line Indicator
- Incomplete Sequence
- Trip Coil Monitor

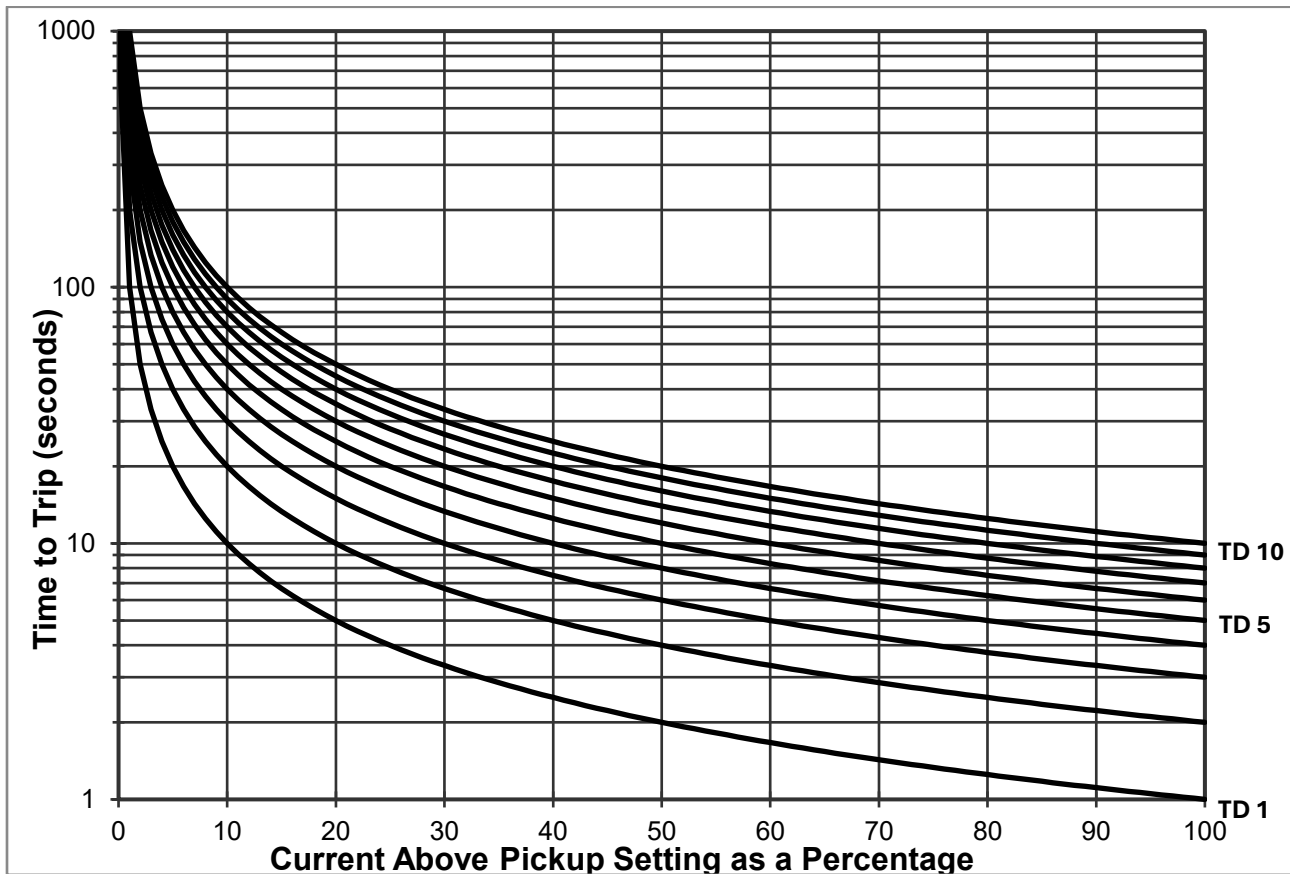
PROTECTIVE SETTINGS (50/76)

Instantaneous Overcurrent	Pickup: 0.4kA - 16kA		
Short-Time Overcurrent	Pickup: 0.2kA – 8.8kA	Time Delay Curve: 1-10	
Long-Time Overcurrent	Pickup: 0.40kA - 8kA	Temperature: 40°C - 130°C	
Rate-of-Rise	Slope: 20kA/s - 600kA/s	Delta Current: 0.2kA – 4.8kA	Time: 10ms - 200ms

RATE- OF RISE



SHORT-TIME DELAY CURVE



RECLOSER SETTINGS (82/83)

Attempts ²	0-5
Time-Since-Close	12s - 120s
83 Pickup ³	200V - 1200V
83 Time ⁴	2s - 12s
82 Pickup ⁵	0.4kA - 8kA (0.1 – 1.9Ω @ 750NSV)
82 Time ⁶	1s - 2s
Nominal System Voltage (NSV)	400V - 1600V
Deionization Time ⁷	5s - 35s
Dead-Time ⁸	2s -32s
Load Measuring Resistor	1Ω - 100Ω

² Attempts: Setting 0 attempts will prevent reclose

³ 83 Pickup: Minimum line voltage for pickup

⁴ 83 Time: Time spent measuring line voltage

⁵ 82 Pickup: Maximum load current for reclose

⁶ 82 Time: Time spent measuring load current

⁷ Deionization Time: Initial time delay when breaker trips

⁸ Dead-Time: Time between reclose attempts

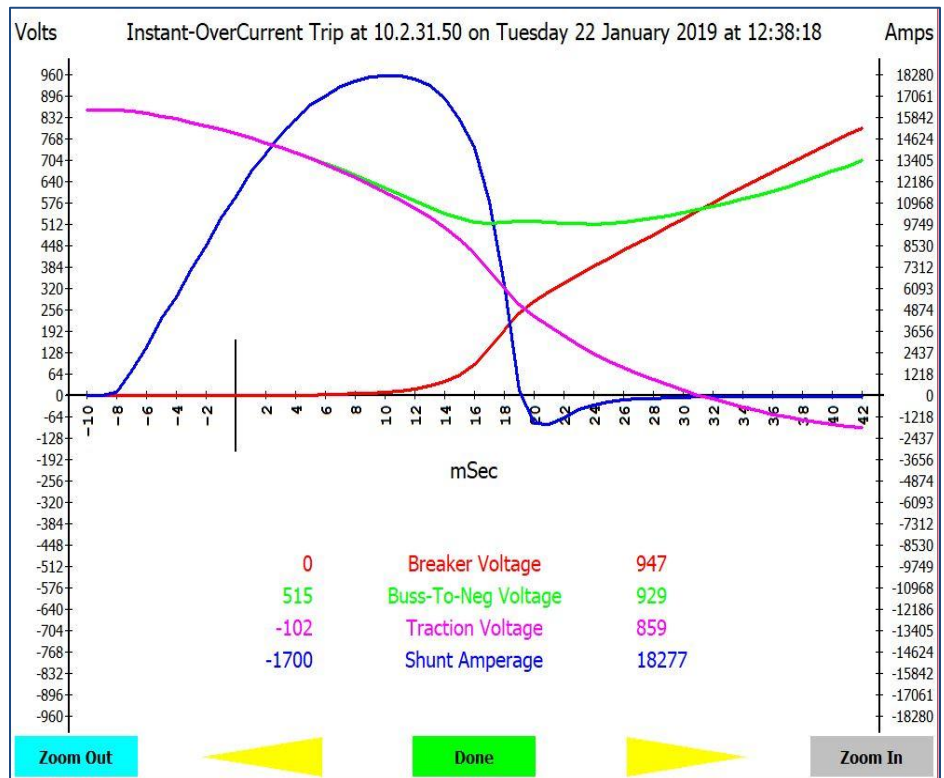
EVENT LOG AND SNAPSHOTS

FEATURES

- Stores 100+ events
- Events are stored in nonvolatile memory
- 1ms Sample Rate
- Viewable on HMI
- Downloadable to USB drive

IMProCon FCM maintains an event log that includes I/O state changes, communications information, and breaker trips with. This event log can be downloaded to a USB drive that can then be viewed to investigate any events that occurred.

IMProCon FCM records overcurrent events into oscillographic snapshots viewable on its HMI touchscreen. Voltage and Current vs Time can be plotted for each event. The type of trip, date, time and IP address of the device are included in the snapshot information. Snapshots can also be manually initiated to record test events such as train starts.



A user-friendly interface is presented through a 7" or 10" (recommended) graphic color display providing effortless and intuitive navigation.

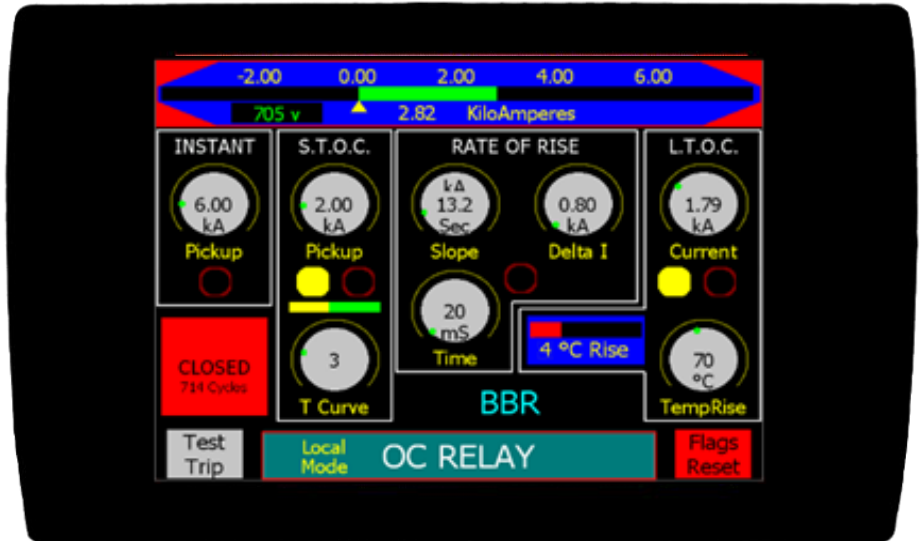
The HMI allows complete visualization, control and setting of the relay and collects the information available from the FCM (breaker status, position, fault type, input status, voltage and current, etc.).

It includes the modification of FCM parameters (command parameters, setting protections, etc.).

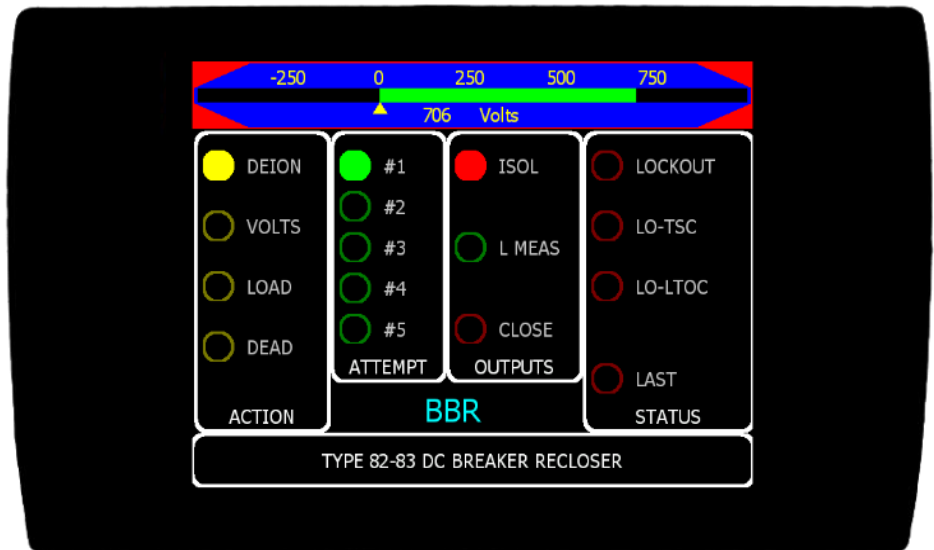
Control and configuration are password protected.

Features

- Control and configuration of equipment
- Integrated volt and amp meter
- Display of events recorded by FCM and time-stamped
- Different password levels (Operator, Supervisor and Engineer)
- Backup and export of events and log information on a USB drive



Overcurrent Relay Home Page



Recloser Sequence Display

TRANSDUCER

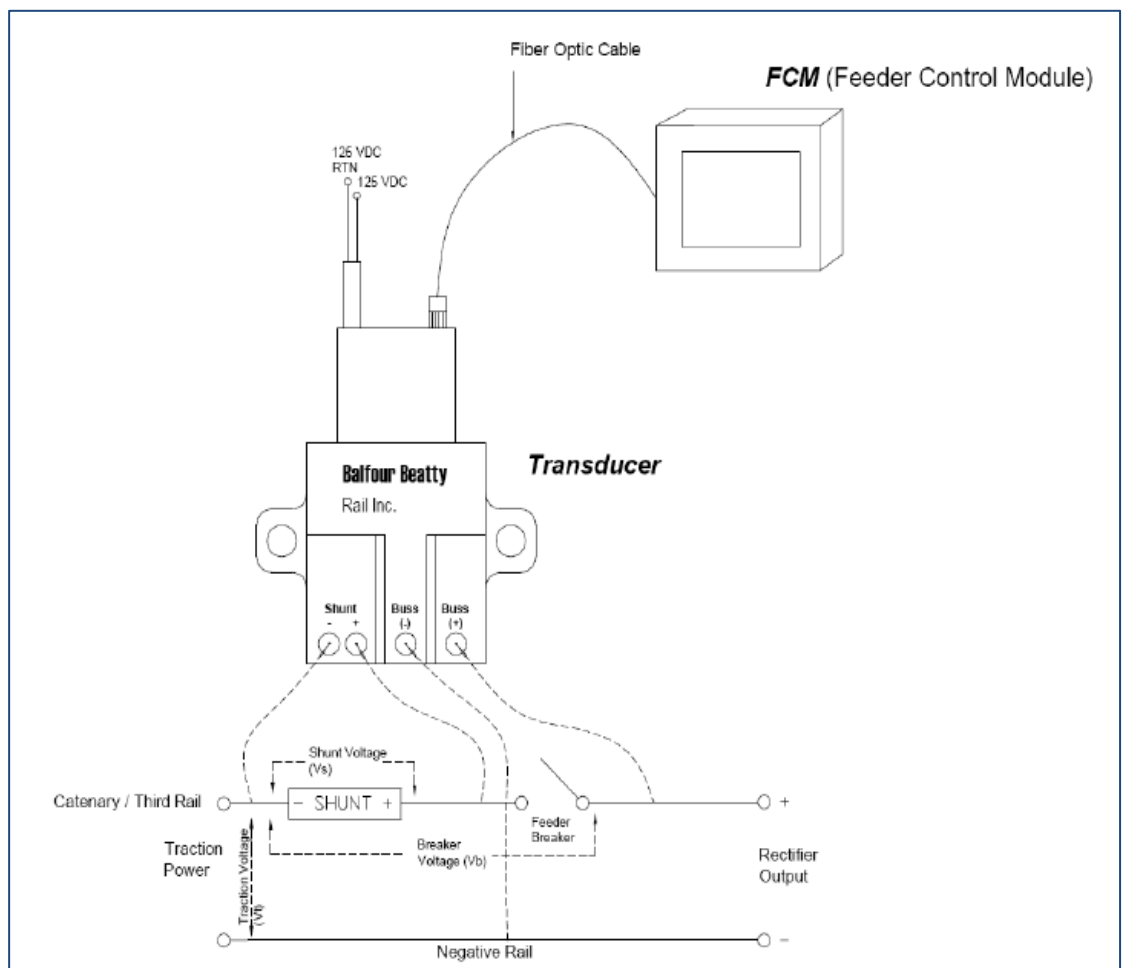
FEATURES

- 5KV RMS isolation
- Voltage and Current channels sampled 5,000 times per second
- Fiberoptic data transmission

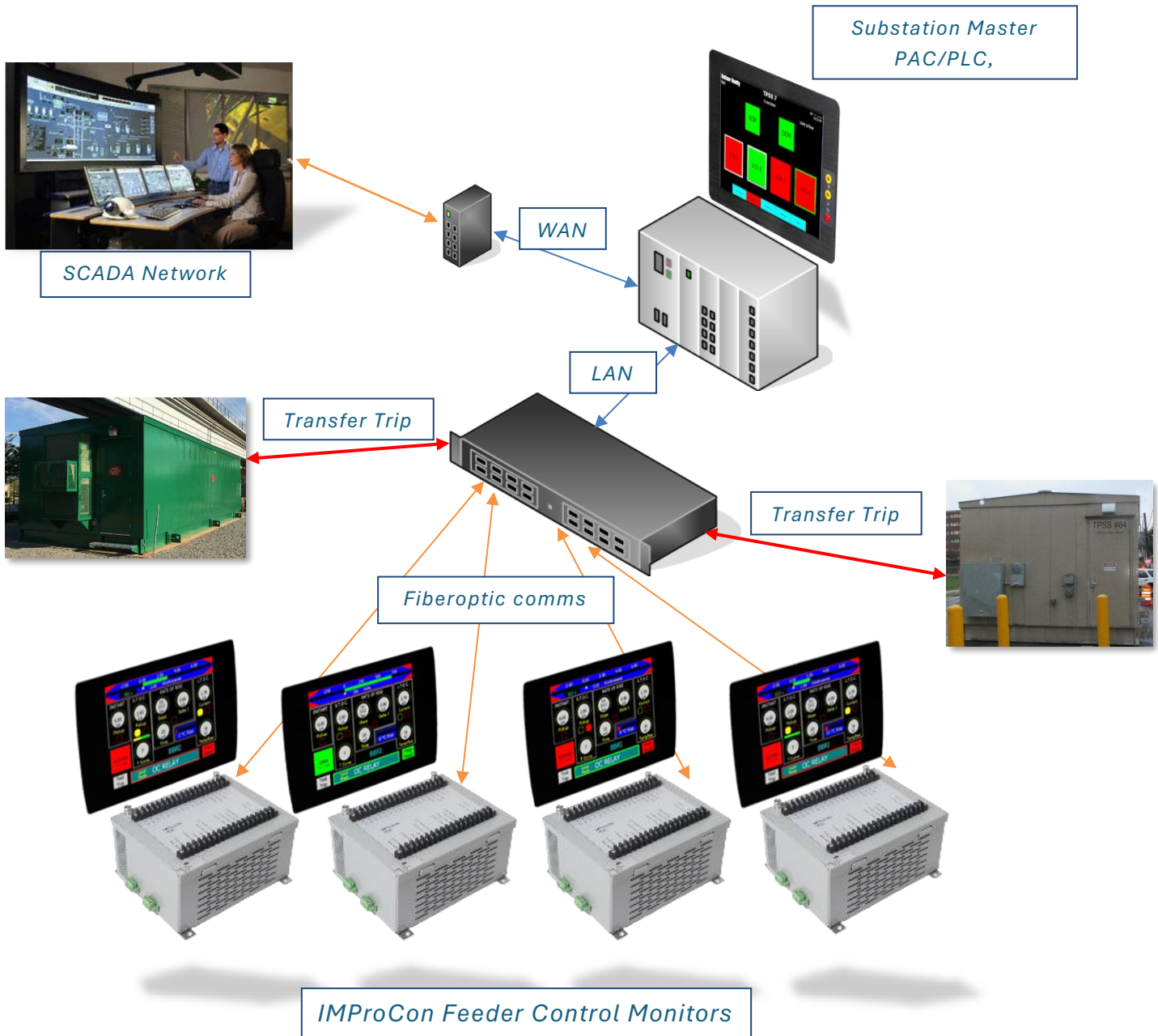
The TPG IMProCon Transducer is a self-contained device that provides accurate, real time digitized sampling of feed-side breaker voltage, load-side traction voltage and current to the FCM via a fiberoptic link. The voltages and current are displayed on the FCM screen and used for protection, control, and monitoring.

Traction-Voltage is measured from the Catenary or 3rd rail load-side positive feeder bus to the negative rail. Breaker voltage is measured from the bus to positive feeder. Rectifier bus to negative is calculated from these measurements. Traction load current is measured through a bus mounted shunt.

Data is converted and sent to the FCM in high resolution digital format over a fiber optic communication line.



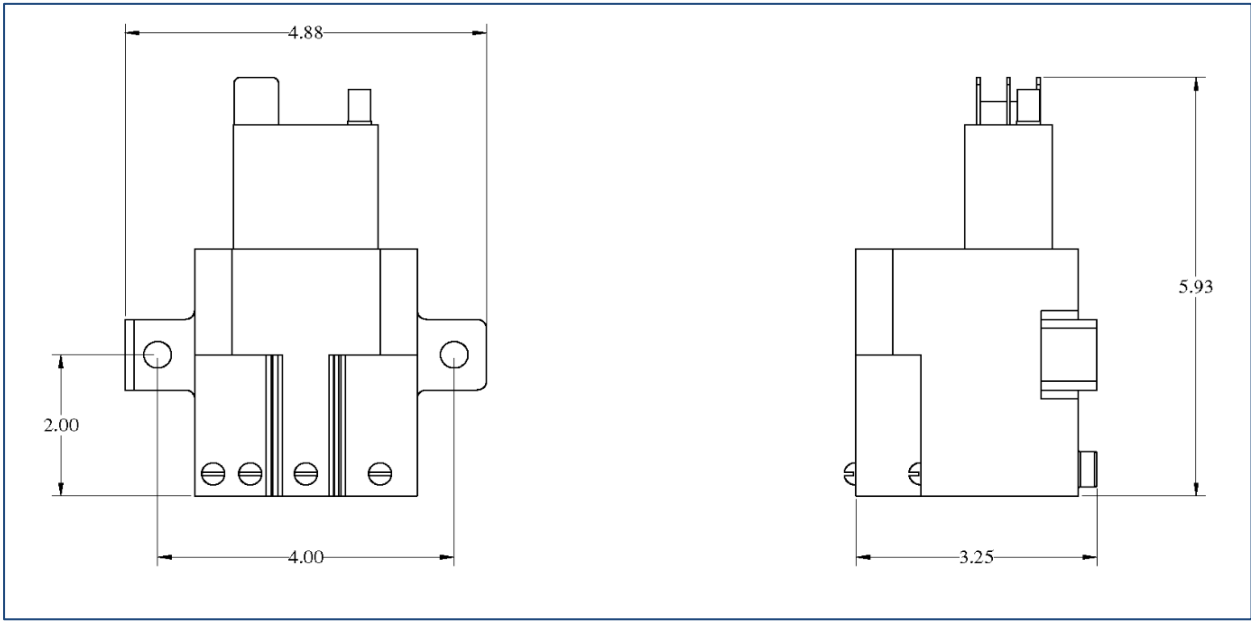
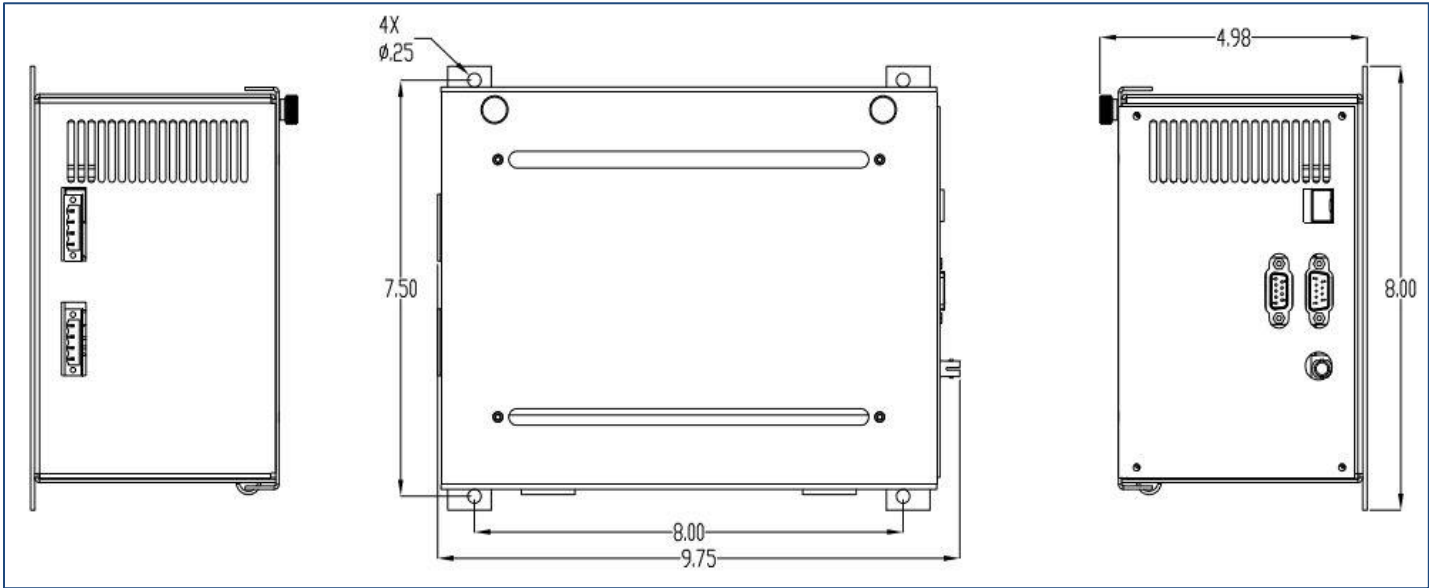
TPG SUBSTATION WITH IMProCon FCMs



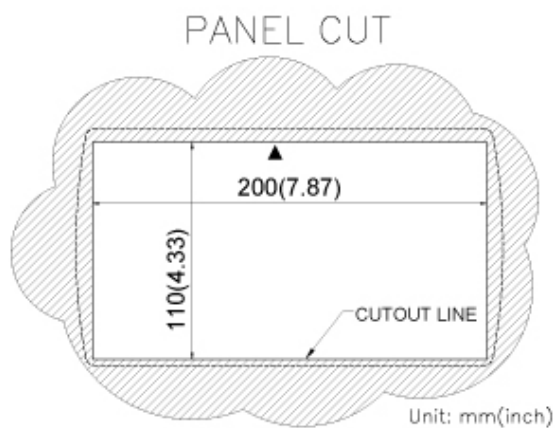
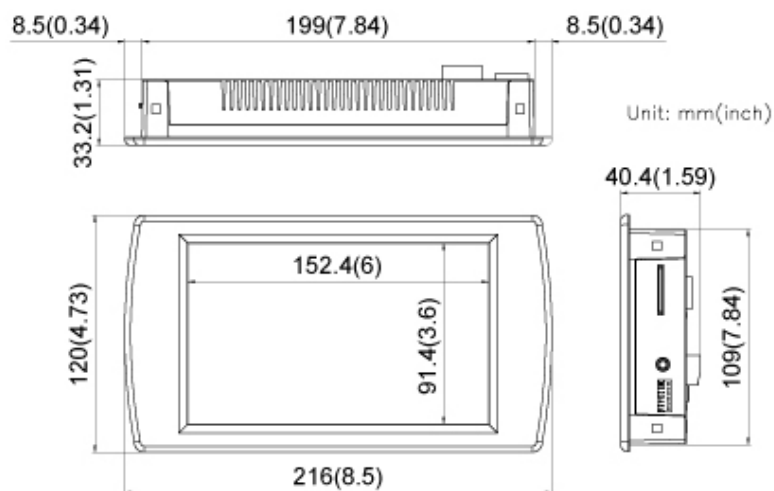
CUSTOMERS

IMProCon FCM customers:

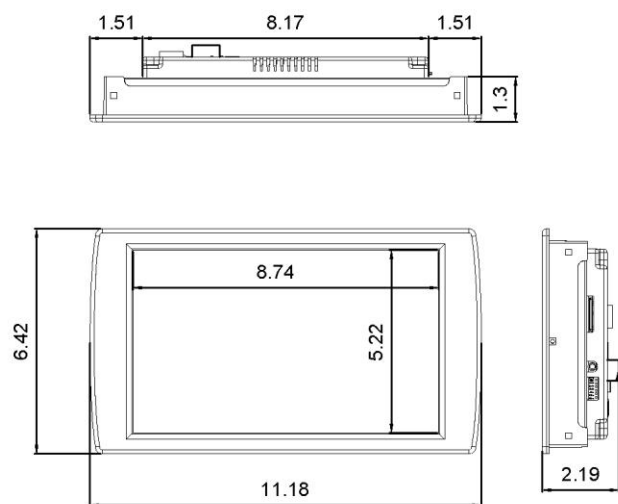
Baltimore MTA, Charlotte CATS, Dallas DART, Dallas McKinney Ave., Denver RTD, Los Angeles LA Metro, Memphis MATA, New Orleans RTA, New York NYCTA, Portland Streetcar, Boston MBTA, San Jose VTA, Seattle KCM, Tucson Sun Link



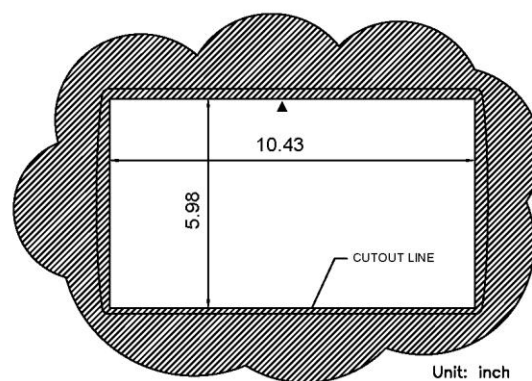
7" HMI



10" HMI



CUWIN6300 OUTLINE DIMENSIONS



CUWIN6300 PANEL CUTOUT – BACK VIEW

CONTACT US

Email Christine Poll at cpoll@tpgexperts.com or call us at **(919) 432 1810** for more information.



Manufactured in the United States of America.