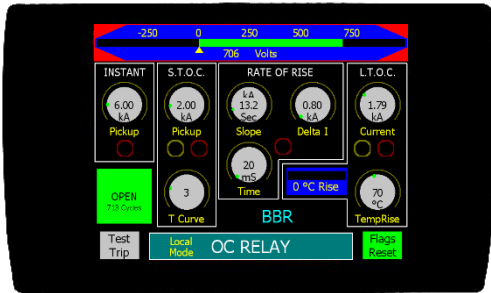


Total Power Group DC Protective Relay IMProCon FCM



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 IMProCon Traction Power Substation modules: Feeder Control Monitor (FCM) module, Direct Current Monitor (DCM); Alternating Current Monitor (ACM); AC and DC transducers; Substation Master Module (SMM).

TPG IMProCon FCM is designed as a complete feeder control unit, integrating all components and cubicle wiring required. 25 years of field 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.

PROTECTIVE FUNCTIONS

| | | | |
|----------------------------------|-------------------------|------------------------------|--------------------|
| 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 | |
| Current Rate-Of-Rise | Slope: 20kA/s - 600kA/s | Delta Current: 0.2kA – 4.8kA | Time: 10ms - 200ms |

FEATURES

- Color Touchscreen HMI for intuitive operation and configuration
- Fastest Transfer Trip of adjacent substations: **3ms**; specs available at no cost for interfacing with other TT systems
- Proprietary fault detection algorithms
- Load Measure, Reclose, Incomplete Sequence functions
- Event Log; Overcurrent Fault Graphs
- Integrated Volt meter and Amp meter
- IMProCon FCM works with all DC breakers in use in US market
- Communications: Fiberoptic Ethernet to avoid noise and interference associated with DC traction power substations
- No Software licensing required: no need to upgrade software to access and maintain your IMProCon FCM
- Custom programming is available for all your needs

SHUNT SETUP

| | |
|-------------------------------|--------------|
| Shunt Rated Current | 100A - 8000A |
| Shunt Rated Millivolts | 50mV - 200mV |
| Shunt Scale Factor | 0.5 - 2.0 |

RECLOSER SETTINGS (82/83)

| | |
|---------------------------------------|--------------|
| Attempts | 1-5 |
| Time-Since-Close | 12s - 120s |
| 83 Pickup ¹ | 200V - 800V |
| 83 Time ² | 2s - 12s |
| 82 Pickup ³ | 0.4kA - 8kA |
| 82 Time ⁴ | 1s - 2s |
| Nominal System Voltage | 400V - 1600V |
| Deionization Time ⁵ | 5s - 35s |
| Dead-Time ⁶ | 2s - 32s |
| Load Measuring Resistor | 1Ω - 100Ω |

¹ *83 Pickup*: Minimum line voltage for pickup

² *83 Time*: Time spent measuring line voltage

³ *82 Pickup*: Maximum load current for reclose

⁴ *82 Time*: Time spent measuring load current

⁵ *Deionization Time*: Initial time delay when breaker trips

⁶ *Dead-Time*: Time between reclose attempts

GENERAL

| | |
|------------------------------|--|
| Power Supply | Input: 85-264VAC 50-60 Hz 18-36VDC 36-75 VDC 120-370 VDC ⁷ Burden: ~10W |
| Operating Temperature | -40°F to +185°F (-40°C to +85°C) |
| Weight | 5.70 lbs. |

⁷ *Input*: Other power supply voltages (AC and DC) can be supplied

DIGITAL I/O

- 18 Digital Inputs⁸:
 - 11 preconfigured for feeder breaker normal operations
 - 7 spares for customer specified indications
- 6 Digital Contact Outputs:
 - 4 preconfigured for feeder breaker normal operations
 - 2 spares for customer specified functions

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

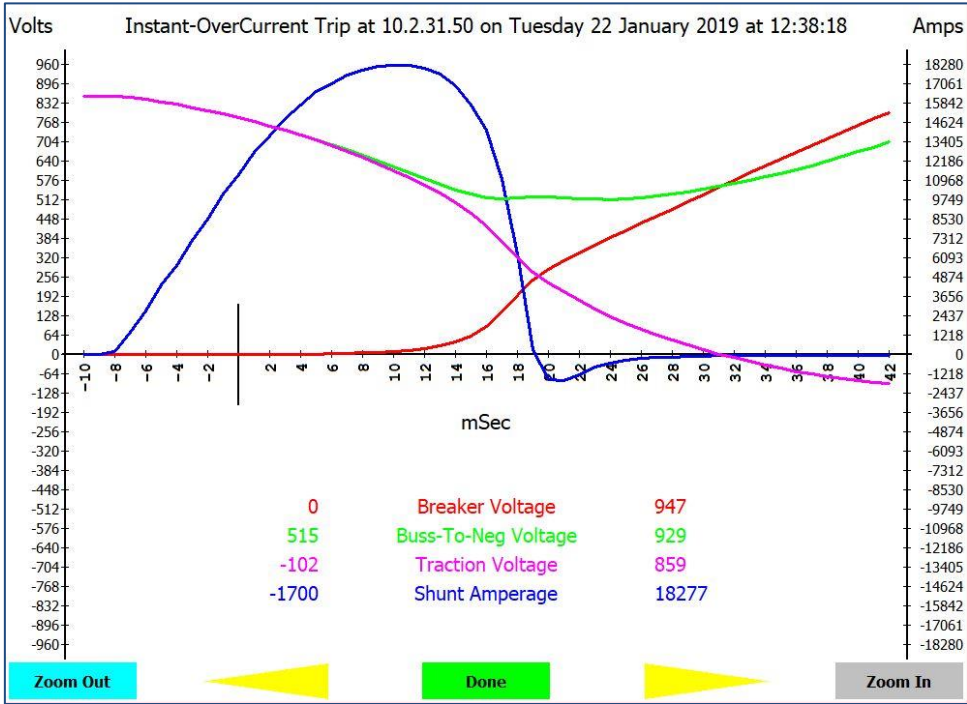
⁸ Digital I/O can be isolated



EVENT LOG AND SNAPSHOTS

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

IMProCon FCM records trigger events into Oscillographic snapshots viewable on its HMI touchscreen. Voltage and Current vs Time can be plotted for each trigger event. The graph below shows the results of a short-circuit test event.



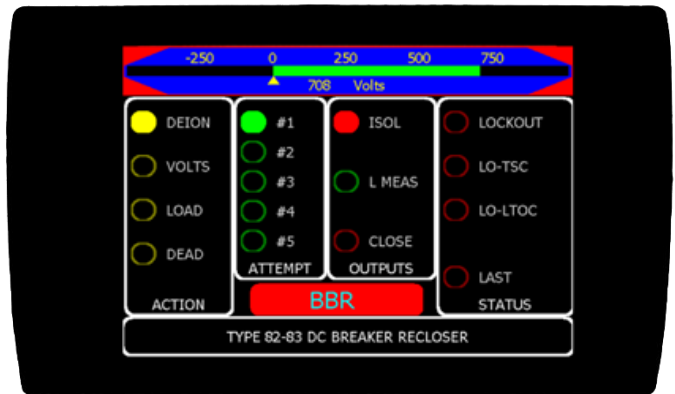
HMI

IMProCon FCM touchscreen intuitively allows setting and changing desired pickup values for both DC Overcurrent and Automatic Reclosing elements. Access to control settings is password protected by multi-level user authentication, with per level or per user passwords. Default security levels include:

- Operator – Open and Close Breaker. View indicators and information.
- Supervisor – Ability to change settings of overcurrent elements and perform Event log downloads.
- Engineer – Ability to change shunt setup, network settings, and IMProCon settings.



Overcurrent Relay Home Page



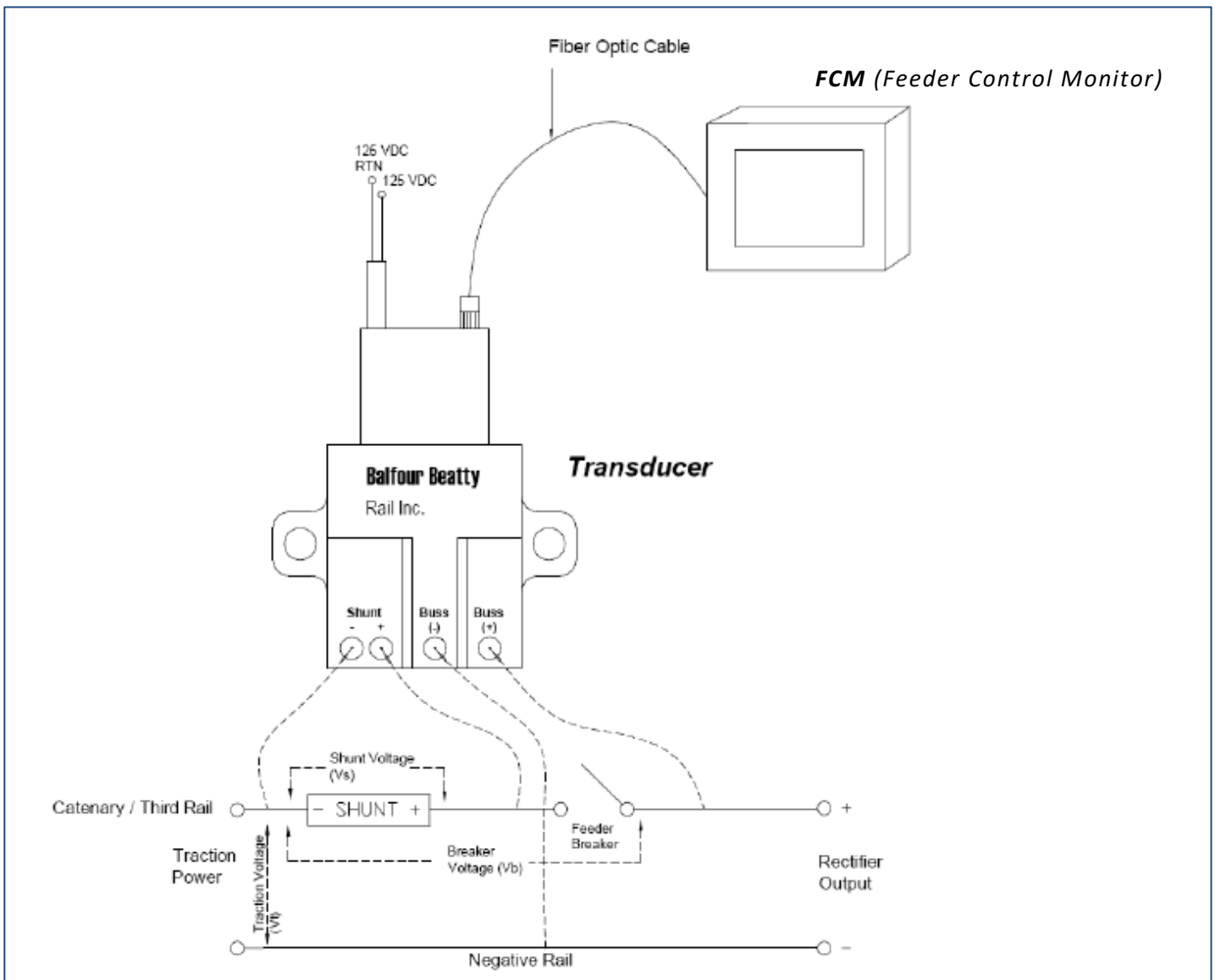
Recloser Sequence Display

TRANSDUCER

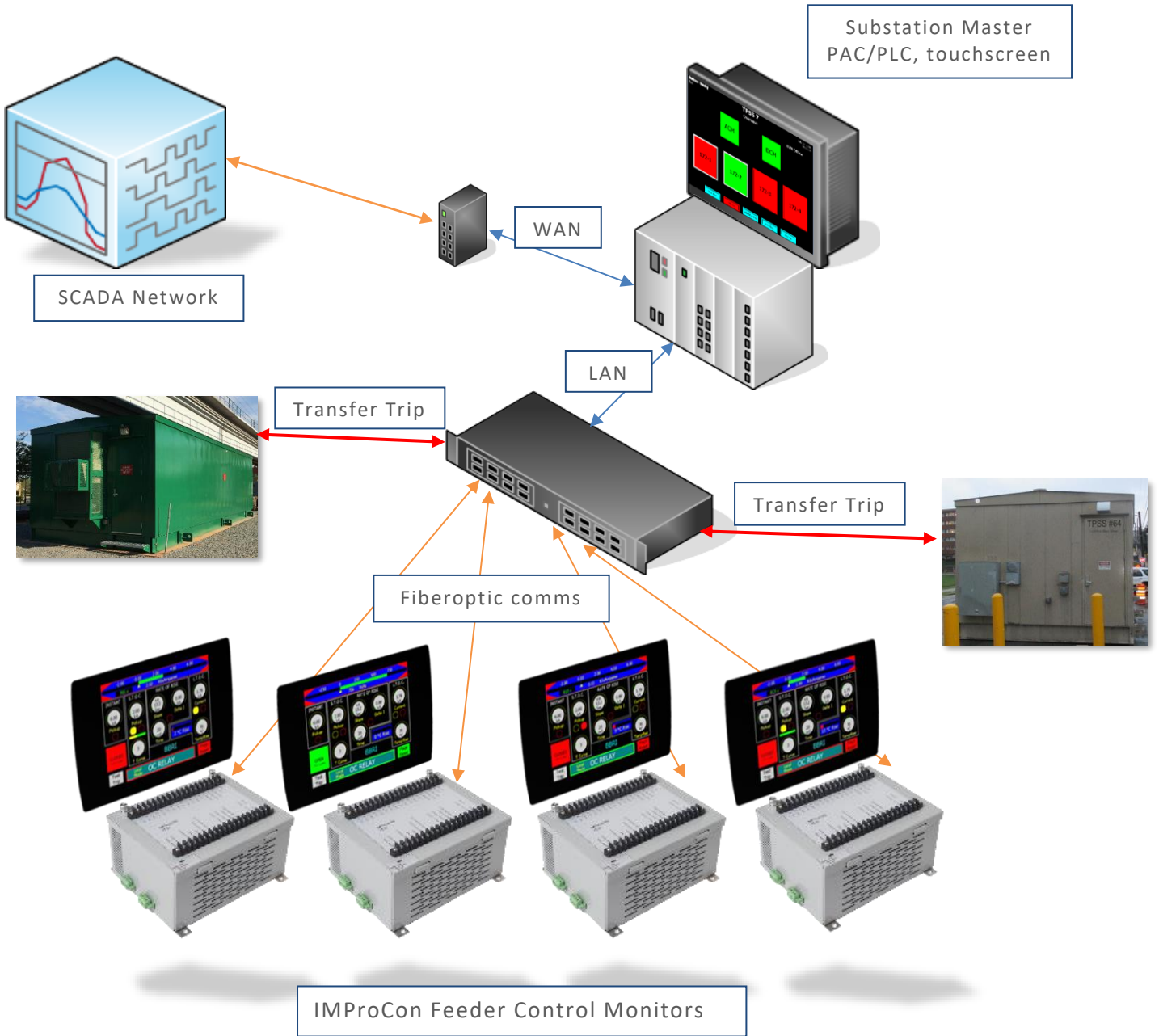
The Balfour Beatty IMProCon Transducer is a self-contained device that provides accurate, real time digitized sampling of feed-side breaker voltage, load-side traction voltage and current to the FCM module via a fiber optic link. The voltages and current are displayed on the FCM screen and used for protection, control, and monitoring. This transducer is designed with 5,000V RMS isolation at 125 VDC.

Traction-Voltage is measured from the Catenary or 3rd rail load-side positive feeder bus to the negative rail. Rectifier feed-side voltage is measured between the rectifier positive live feed bus and the negative rail. Traction load current is measured through a bus mounted shunt.

Voltages and currents are sampled 5,000 times per second. Data is converted and sent to the FCM in high resolution digital format over a fiber optic communication line.



TPG IMPROCON SUBSTATION WITH IMPROCON FCMS

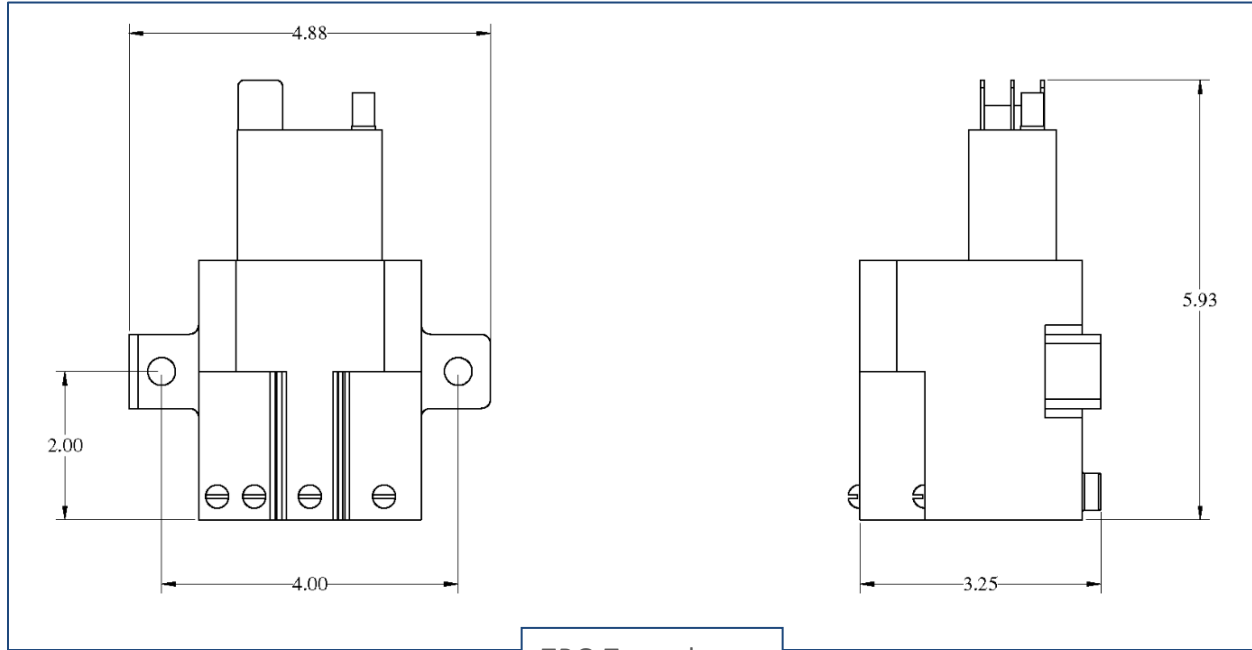


CUSTOMERS

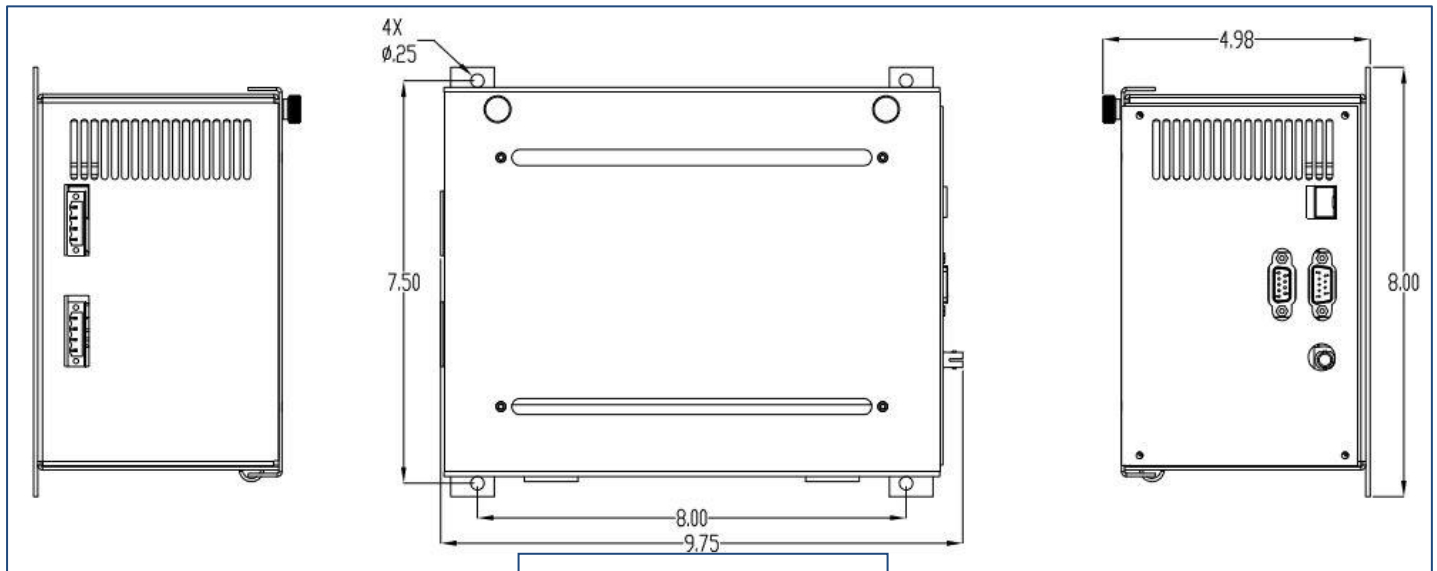
IMProCon FCM customers:

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, San Francisco BART, San Jose VTA, Seattle KCM, Tucson Sun Link

MECHANICAL DIMENSIONS



TPG Transducer



Feeder Control Monitor

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.

