TX-I/O Product Range

**Description**

TX-I/O™ is a line of I/O modules with associated power and communication modules for use within the APOGEE system. TX-I/O products include eight types of I/O modules, modular TX-I/O Power Supplies, Bus Connection Modules, and Bus Interface Modules. TX-I/O Modules provide I/O points for APOGEE based upon TX-I/O Technology. TX-I/O Technology provides flexibility of point types, tremendous flexibility of signal types and support for manual operation.

There are eight types of TX-I/O modules:

- 8 point DI module (TXM1.8D)
- 16 point DI module (TXM1.16D)
- 6 point DO with Relay module (TXM1.6R)
- 6 point DO with Relay and Manual Override module (TXM1.6R-M)
- 8 point Universal module (TXM1.8U)
- 8 point Universal with local override/identification device (LOID) module (TXM1.8U-ML)
- 8 point Super Universal module (TXM1.8X)
- 8 point Super Universal with LOID module (TXM1.8X-ML)

**Features**

The self-forming TX-I/O bus transmits power as well as communication signals. The TX-I/O bus can be extended a maximum of 160 feet (50 meters).

Hot-swappable electronic components allow powered electronics to be disconnected and even replaced without removing terminal wiring or disturbing the self-forming bus.

The removable label holder allows for customized point labels.

LEDs provide status indication and diagnostic information for the I/O module, as well as for each point on the module.

All TX-I/O modules are also:

- DIN rail mounted
- High density (point count to physical dimensions)
- Hardware addressed with address keys
- Separable into terminal base and plug-in I/O module electronics for:
  - Improved installation workflow, allowing field wiring to be terminated prior to installation of electronics.
- Optimum diagnostics - connected peripheral devices can be measured without affecting or being affected by the I/O module.
- Quick replacement of electronics for service.

Module Introduction

P1 Bus Interface Module (TXB1.P1)

The P1 Bus Interface Module (P1 BIM) provides P1 FLN communication and power for TX-I/O modules. It does not contain application or control for the TX-I/O modules.

Features

- Communication on the P1 FLN or MEC Expansion Bus
- Support for 80 TX-I/O points
- Support for 10 I/O modules
- 24 Vac input
- Generation of 24 Vdc at 600 mA to power TX-I/O modules and peripheral devices
- Transfer of 24 Vac at a maximum of 4A to power peripheral devices
- Plug-in screw terminals
- AC Fuse isolates the peripheral device supply in case of overload or short-circuit. The fuse can be accessed from an installed module.
- Separate LEDs for module operation, FLN communication activity, 24 Vdc present on the TX-I/O bus, and monitoring of the 24 Vac fuse

Digital Input Modules (TXM1.8D and TXM1.16D)

The TXM1.8D and TXM1.16D are dedicated to monitoring, respectively, 8 and 16 digital input points. They monitor status signals from normally open (NO) or normally closed (NC), latched voltage free/dry contacts. All 8 points on the TXM1.8D module as well as 8 of the 16 points on the TXM1.16D module may be used as pulse counters up to 10 Hz. Each input point has a green LED for status indication.

Digital Output Modules (TXM1.6R and TXM1.6R-M)

The Digital Output Modules provide six NO or NC (form C), maintained or pulsed, voltage free/dry contacts. The contacts are rated for a maximum of 250 Vac at 4A. Each I/O point has a green LED for status indication.

The TXM1.6R-M module is also equipped with manual override switches. An orange LED per override switch indicates override status individually per point.
Universal Modules (TXM1.8U and TXM1.8U-ML)

The TXM1.8U and TXM1.8U-ML are universal modules, allowing each of their 8 points to be individually software configured as digital input, analog input, or analog output to best meet the specific application needs.

Features

All Universal modules provide:
- AC supply voltage for peripheral devices such as valves and actuators
- Green LED status per I/O point that varies in intensity according to the voltage and current (directly proportional)

Digital input support includes:
- Voltage free/dry contacts
- Pulse counters up to 25 Hz

Analog input sensor support includes:
- 1k Nickel – Landis & Gyr curve
- 1k Platinum – 375 and 385 coefficient
- 10k and 100k Thermistor – Type II Curve

Active input and output support includes:
- Analog input voltage 0-10 Vdc
- Analog output voltage 0-10 Vdc

NOTE: Active inputs and outputs are permitted on the same module when connected sensors are powered from that module. When sensors are externally powered, active inputs and outputs should be on separate modules.

TXM1.8U-ML modules are also equipped with a local override/identification device (LOID), which includes an LCD signal display. The LCD displays the following information for each IO point:
- Configured signal type
- Symbolic display of process value
- Notification of faulty operation, short circuit, or sensor open circuit

Orange LEDs indicate override status individually per point.

Super Universal Modules (TXM1.8X and TXM1.8X-ML)

TXM1.8X and TXM1.8X-ML Super Universal modules share all of the Universal module features, and also provide:
- Analog input current 4-20 mA
- Analog output current 4-20 mA (four current outputs maximum per module on Points 5 through 8)
- 24 Vdc supply voltage for sensors at a maximum of 200 mA per module

NOTE: Active inputs and outputs are permitted on the same module when connected sensors are powered from that module. When sensors are externally powered, active inputs and outputs should be on separate modules.
Features

The TX-I/O Power Supply:
- Generates 24 Vdc at 1.2A to power TX-I/O modules and peripheral devices.
- An LED provides an indication of 24 Vdc on the TX-I/O bus.
- Up to 4 TX-I/O Power Supplies can be operated in parallel, with a maximum of two per DIN rail.
- Transfers 24 Vac at 4A to power TX-I/O modules and peripheral devices.
- Can be located within a row of TX-I/O modules or at the beginning of a new DIN rail.
- Routes CS (+24 Vdc Communication Supply) and CD (Communication Data signal) between DIN rails.
- Provides an input point for 24 Vac to power additional peripheral devices.
- Isolates the 24 Vac peripheral device supply in case of overload or short-circuit. The replaceable AC fuse can be accessed from an installed module.
- Indicates the AC fuse status (via LED) for easy diagnostics.

The Bus Connection Module:
- Transfers 24 Vac at 4A to power TX-I/O modules and peripheral devices.
- Can be located within a row of TX-I/O modules or at the beginning of a new DIN rail.
- Routes CS (+24 Vdc Communication Supply) and CD (Communication Data signal) between DIN rails.
- Provides an input point for 24 Vac to power additional peripheral devices.
- Isolates the 24 Vac peripheral device supply in case of overload or short-circuit. The replaceable AC fuse can be accessed from an installed module.
- Indicates the AC fuse status (via LED) for easy diagnostics.
# I/O Functions by Module

<table>
<thead>
<tr>
<th>TX-I/O™ function</th>
<th>Description</th>
<th>Module type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>TXM1.8D</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Maximum number of functions per module</td>
</tr>
<tr>
<td>Digital inputs</td>
<td></td>
<td>8</td>
</tr>
<tr>
<td>Binary Input</td>
<td>Status indication, voltage-free/dry contact</td>
<td>8</td>
</tr>
<tr>
<td>Counter</td>
<td>Count/accumulator, voltage-free/dry pulse contact</td>
<td>8</td>
</tr>
<tr>
<td>Analog Inputs</td>
<td>Temperature LG-Ni1000</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Temperature Pt 1000 375</td>
<td>8</td>
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<tr>
<td></td>
<td>Temperature Pt 1000 385</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Temperature (NTC) 10 K</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Temperature (NTC) 100 K</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Voltage, DC 0 ... 10V *</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>Current DC 4... 20 mA *</td>
<td>8</td>
</tr>
<tr>
<td>Digital outputs</td>
<td>BO OnOff Latched contact, AC/DC 250V, 4A</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>BO Pulse Pulse</td>
<td>6</td>
</tr>
<tr>
<td>Analog Outputs</td>
<td>DC 0..10 V *</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>DC 4 ... 20 mA *</td>
<td>4</td>
</tr>
</tbody>
</table>

* Active inputs and active outputs (0-10V and 4-20 mA) must be located on different modules if sensors are externally powered.
TX-I/O Network Architecture Examples

The following architecture picture shows TX-I/O modules connected to a P1 BIM located on:
- the Field Level Network
- the MEC Expansion Bus

TX-I/O Bus Extension

The following picture shows the TX-I/O bus extended using a Bus Connection Module and TX-I/O Power Supply. The TX-I/O bus can be a maximum of 160 feet (50 meters) and may extend outside an enclosure.
Technical Specifications:

Voltage requirements
24 Vac +/- 20% @ 50/60 Hz

Power Consumption

<table>
<thead>
<tr>
<th>Component</th>
<th>Power Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power Supply</td>
<td>20 VA</td>
</tr>
<tr>
<td>P1 BIM</td>
<td>35 VA</td>
</tr>
</tbody>
</table>

With the above power consumption, the Power Supply produces 1.2A 24VDC (28.8 W) and the BIM provides 0.6A 24VDC (14.4 W) to be used by the following:

- TXM1.8D 1.1 W
- TXM1.16D 1.4 W
- TXM1.8U 1.5 W
- TXM1.8U-ML 1.8 W
- TXM1.8X 2.2 W
- TXM1.8X-ML 2.3 W
- TXM1.6R 1.7 W
- TXM1.6R-M 1.9 W

Terminations

<table>
<thead>
<tr>
<th>Terminal Type</th>
<th>Wire Gauge</th>
</tr>
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<tbody>
<tr>
<td>I/O Terminals</td>
<td>20-12 AWG Solid</td>
</tr>
<tr>
<td></td>
<td>20-14 AWG Stranded</td>
</tr>
<tr>
<td>BIM and Power Supply</td>
<td>2 or 3 position screw terminal pluggable blocks</td>
</tr>
</tbody>
</table>

Operating Environment

+32°F to +122°F (0°C to 50°C)
5 to 95% rh (non-condensing)

Agency Listings

- UL 864 UUKL
- ULC-C100 UUKL7
- UL 916 PAZX
- CSA 22.2 No. 205 PAZX7

Agency Compliance

- FCC Compliance
- Australian EMC Framework (C-Tick)
- European EMC Directive (CE)
- European Low Voltage Directive (CE)

Dimensions

<table>
<thead>
<tr>
<th>Module Type</th>
<th>Dimensions</th>
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<tbody>
<tr>
<td>TX-I/O Modules</td>
<td>2.52” (64 mm) L x 3.54” (90 mm) W x 2.75” (70 mm) D</td>
</tr>
<tr>
<td>TX-I/O BIM, P1</td>
<td>5” (128 mm) L x 3.54” (90 mm) W x 2.75” (70 mm) D</td>
</tr>
<tr>
<td>TX-I/O Power Supply</td>
<td>3.78” (96 mm) L x 3.54” (90 mm) W x 2.75” (70 mm) D</td>
</tr>
<tr>
<td>TX-I/O Bus Connection Module</td>
<td>1.26” (32 mm) L x 3.54” (90 mm) W x 2.75” (70 mm) D</td>
</tr>
</tbody>
</table>
### TX-I/O Ordering Information

<table>
<thead>
<tr>
<th>Description</th>
<th>Product Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>TX-I/O Module, 8 DI points</td>
<td>TXM1.8D</td>
</tr>
<tr>
<td>TX-I/O Module, 16 DI points</td>
<td>TXM1.16D</td>
</tr>
<tr>
<td>TX-I/O Module, 8 Universal points</td>
<td>TXM1.8U</td>
</tr>
<tr>
<td>TX-I/O Module, 8 Universal points with LOID</td>
<td>TXM1.8U-ML</td>
</tr>
<tr>
<td>TX-I/O Module, 8 Super Universal points</td>
<td>TXM1.8X</td>
</tr>
<tr>
<td>TX-I/O Module, 8 Super Universal points with LOID</td>
<td>TXM1.8X-ML</td>
</tr>
<tr>
<td>TX-I/O Module, 6 DO with Relay points</td>
<td>TXM1.6R</td>
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<tr>
<td>TX-I/O Module, 6 DO with Relay points with manual override</td>
<td>TXM1.6R-M</td>
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<tr>
<td>TX-I/O Power Supply, 1.2 A, 4A Fuse</td>
<td>TXS1.12F4</td>
</tr>
<tr>
<td>TX-I/O Bus Connection Module, 4A Fuse</td>
<td>TXS1.EF4</td>
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<tr>
<td>TX-I/O Bus Interface Module, P1</td>
<td>TXB1.P1</td>
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<tr>
<td>2 sets, Address Keys 1-12</td>
<td>TXA1.K12</td>
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<tr>
<td>Address Keys 1-24</td>
<td>TXA1.K24</td>
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<tr>
<td>Address Keys 49-72</td>
<td>TXA1.K-72</td>
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<tr>
<td>Labels for TX-I/O 100 sheets/pack Letter format</td>
<td>TXA1.LLT-P100</td>
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<tr>
<td>Replacement Label Holders</td>
<td>TXA1.LH</td>
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</tbody>
</table>

### Regions where this Product is Sold
(US, Asia Pacific, Canada, Latin America, UK)