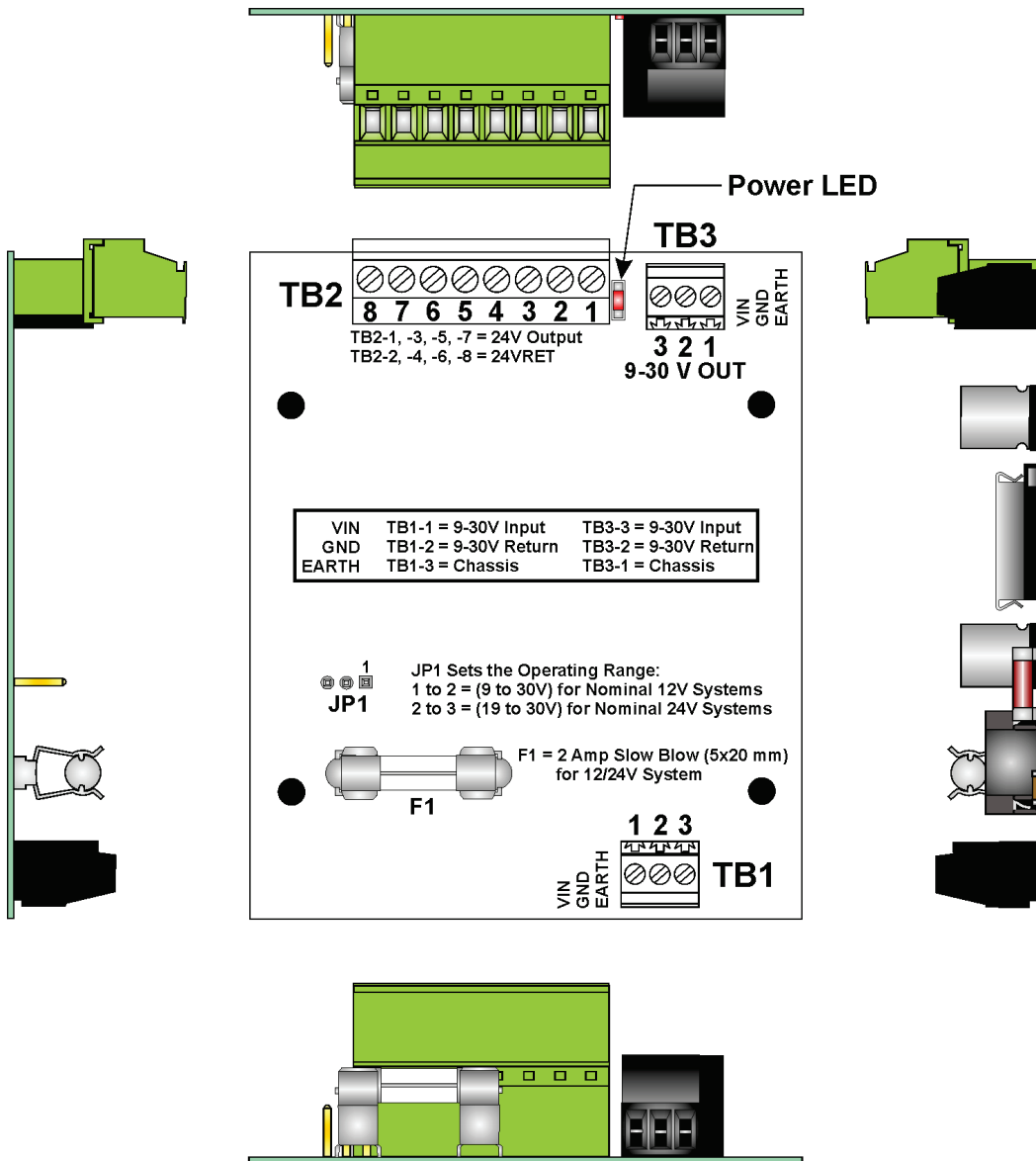


Part Number D301435X012

January 2016

# ControlWave Loop Power Supply (for ControlWave Micro, EFM, GFC, ExpressPAC)



## Revision Tracking Sheet

### January 2016

This manual may be revised periodically to incorporate new or updated information. The revision date of each page appears at the bottom of the page opposite the page number. A change in revision date to any page also changes the date of the manual that appears on the front cover. Listed below is the revision date of each page (if applicable):

<b>Page</b>	<b>Revision</b>
All pages	January-2016
Initial release	July-2006

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# Chapter 1 – Introduction

## 1.1 General Description

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Remote Automation Solution’s ControlWave Loop Power Supply (herein referred to as the “Loop Supply”) provides regulated and isolated 24Vdc power outputs that can be used to power field devices such as transmitters or non-isolated I/O circuits that are used in conjunction with ControlWave MICRO, EFM, GFC, Express or Express PAC units. Encapsulated loop Supply’s, i.e., those with the printed circuit board (PCB) secured to a Power Supply Back Plate Bracket and protected by a Power Supply Board Cover, may be mounted directly to a panel or to a 35mm DIN Rail while the PCB only version can be Snap Track mounted.

Loop Supplies provides a 24Vdc field power distribution via four pairs of wiring terminals provided on Terminal Block TB2. Additionally, Loop supplies are user configured via Jumper JP1 to operate in conjunction with either a nominal bulk 12Vdc input (with an input range of +9 to +30Vdc) or a nominal bulk 24Vdc input (with an input range of +19 to +30Vdc). Loop supplies have been designed to provide the following features:

- 4-Loop Power Terminal pairs provide field device wiring flexibility and convenience.
- 9-30 Vdc bulk power input range accommodated installation flexibility.
- Bulk power input can be applied to either of the three-terminal connectors (with one Terminal Block accommodating input wiring while the other may accommodate non-isolated power pass-through that is used to power the ControlWave Micro, ControlWave EFM, ControlWave GFC, ControlWave Express or ControlWave Express PAC.
- Direct Panel, 35mm DIN Rail or Snap Track Mounting accommodated.
- Small size minimizes panel space requirements.

## 1.2 Loop Supply Component Identification

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Loop Supplies components that the user should become familiar with are discussed herein. These components include Connectors TB1, TB2 and TB3, Configuration Jumper JP1, the Power LED, and Fuse F1.

- Terminal Blocks

Loop Supply's are provided with three Terminal Blocks which accommodate up to #16 AWG size wire. Terminal Block Connections are provided in *Tables 1-1* and *1-2*.

Terminal Block TB1 typically acts as the interface for the bulk 9 to 30 Vdc input power. In some cases, TB1 may be used as the bulk dc power pass-through interface to an associated RTU in lieu of Terminal Block TB3. It should be noted that TB1 & TB3 can be used for Input Power or Power Pass-through with one accommodating input while the other may accommodate pass-through, e.g. if TB1 was used to interface bulk Input Power, then TB3 could be used to accommodate Power Pass-through, or vice-versa.

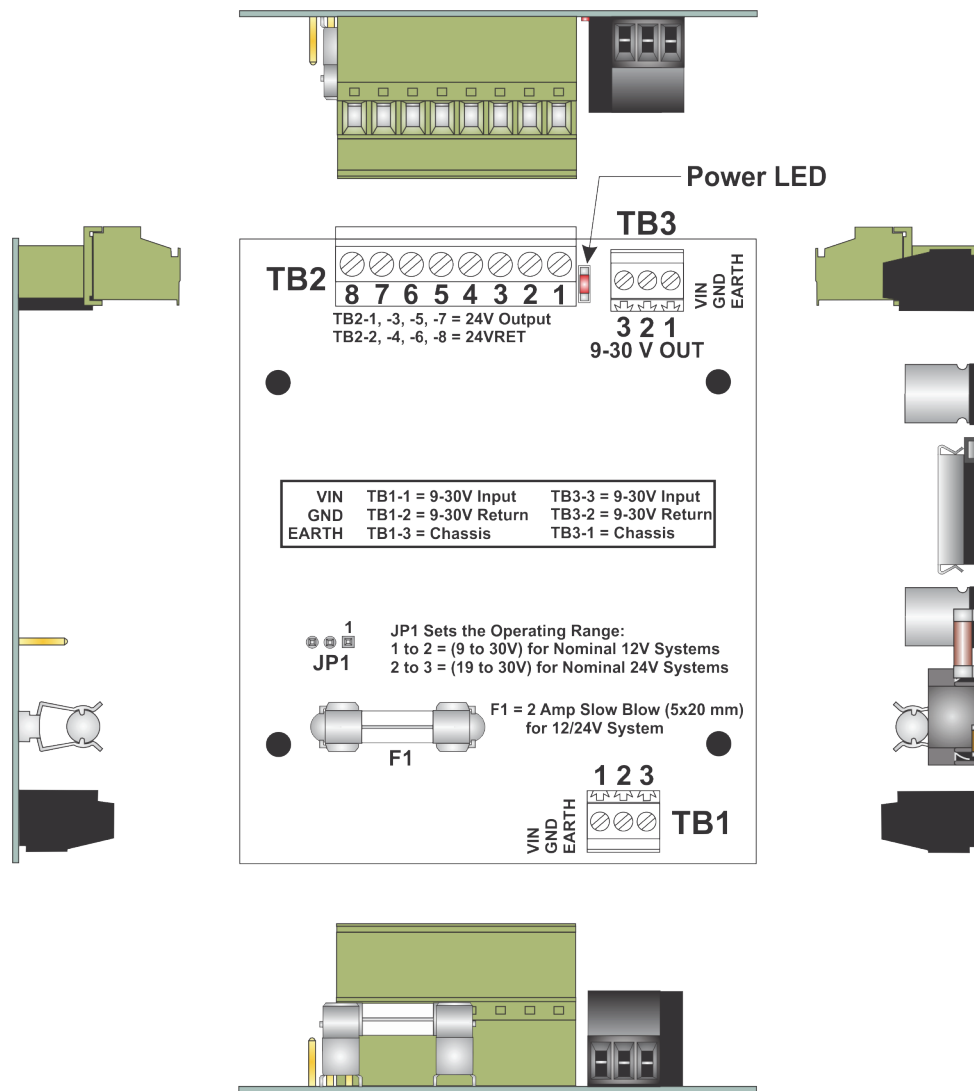


Figure 1-1. ControlWave Loop Supply Board Views & Component Identification Diagram

Table 1-1. Input/Pass-through Power Connectors – TB1 and TB3

TB1 PIN #	TB3 PIN #	SIGNAL NAME	DESCRIPTION	NOTES
1	3	VIN	9 to 30 +Vdc power	Input or Non-fused Throughput
2	2	RET	9-30 Vdc Return	Input or Non-fused Throughput
3	1	CHASSIS	Chassis Ground	

8-Pin Connector (TB2) accommodates distribution of the regulated +24V loop supplies.

Table 1-2. Regulated 24V Supply Distribution Connector TB2

TB2 PIN #	SIGNAL NAME	DESCRIPTION
1, 3, 5, 7	+24V	Regulated +24Vdc
2, 4, 6, 8	24V Return	Reg. 24V Return

- Configuration Jumper P1

Jumper JP1 is used to set the input voltage range, i.e., 9V to 30V (nominal 12V input) or 19V to 30V (nominal 24V input).

- JP1 – 1 to 2: 12V Input: ON above 8.4V, (Max. ON = 8.8V), OFF below 8.24V (Min. OFF = 7.8V) (Factory Configuration)
- JP1 – 2 to 3: 24V Input: ON above 18.8V, (Max. ON = 19.7V), OFF below 18.4V (Min. OFF = 17.4V)

- Power LED

Red LED (CR10) will be ON when regulated 24V is present. When lit, CR10 indicates that the Loop Supply is operational.

- Fuse F1

Fuse F1 (2A Slow Blow 5 x 20 mm) provides protection for the Loop Supply and the associated field I/O (powered by Loop Supply). If a short circuit should occur in I/O field wiring or circuitry within the Loop Supply, F1 will blow and the regulated 24V output will switch OFF.

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**Note:** Power Pass-through is not fused since the ControlWave GFCs/RTU provide their own fuse protection.

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## Chapter 2 – Installation

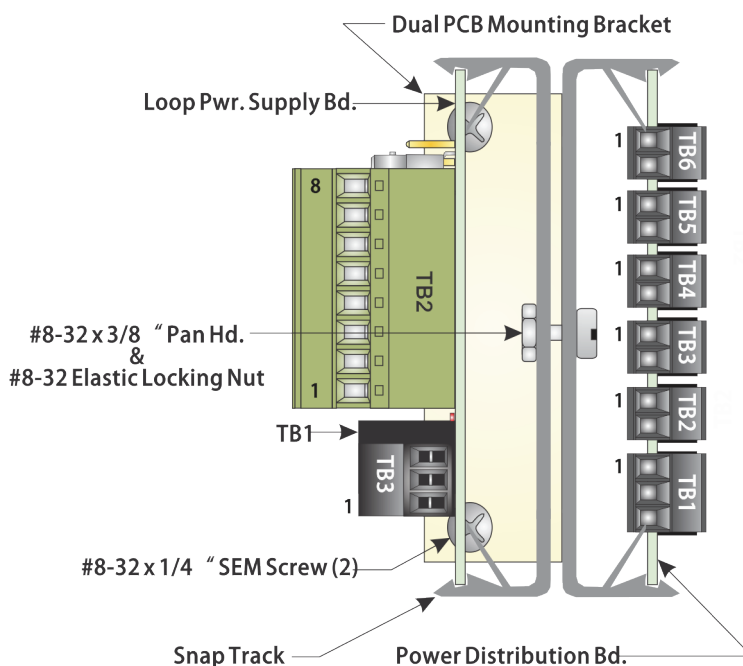
This chapter explains how to install the Loop Power Supply into the ControlWave.

### 2.1 Loop Supply Mounting

Encapsulated Loop Supply Assemblies are provided with the printed circuit board (PCB) secured to a Power Supply Back Plate Bracket and protected by a Power Supply Board Cover. These units may be mounted directly to a panel or to a 35mm DIN Rail. Board only Loop supplies are typically Snap Track mounted (as is the case with the ControlWave EFM). *Figure 2-1* shows a Snap Track Mounted unit while *Figure 2-2* provides dimensions for the “Encapsulated” Loop Supply. *Table 2-1* below provides the type of Loop Supply and mounting arrangement typically associated with the various ControlWave series RTUs.

*Table 2-1. ControlWave RTU and Loop Supply Assignments*

ControlWave Series	Loop Supply Type	Mounting Notes
ControlWave Micro	Encapsulated	Externally
ControlWave EFM	Snap Track Mounted	Internally
ControlWave GFC	Snap Track Mounted	Internally
ControlWave Express	Encapsulated	Externally
ControlWave Express PAC	Encapsulated	Externally



*Figure 2-1. Snap Track Mounted Loop Supply*  
(Typically used in Conjunction with a Power Distribution Board)  
(Shown Mounted to the ControlWave EFM Fabrication Panel)

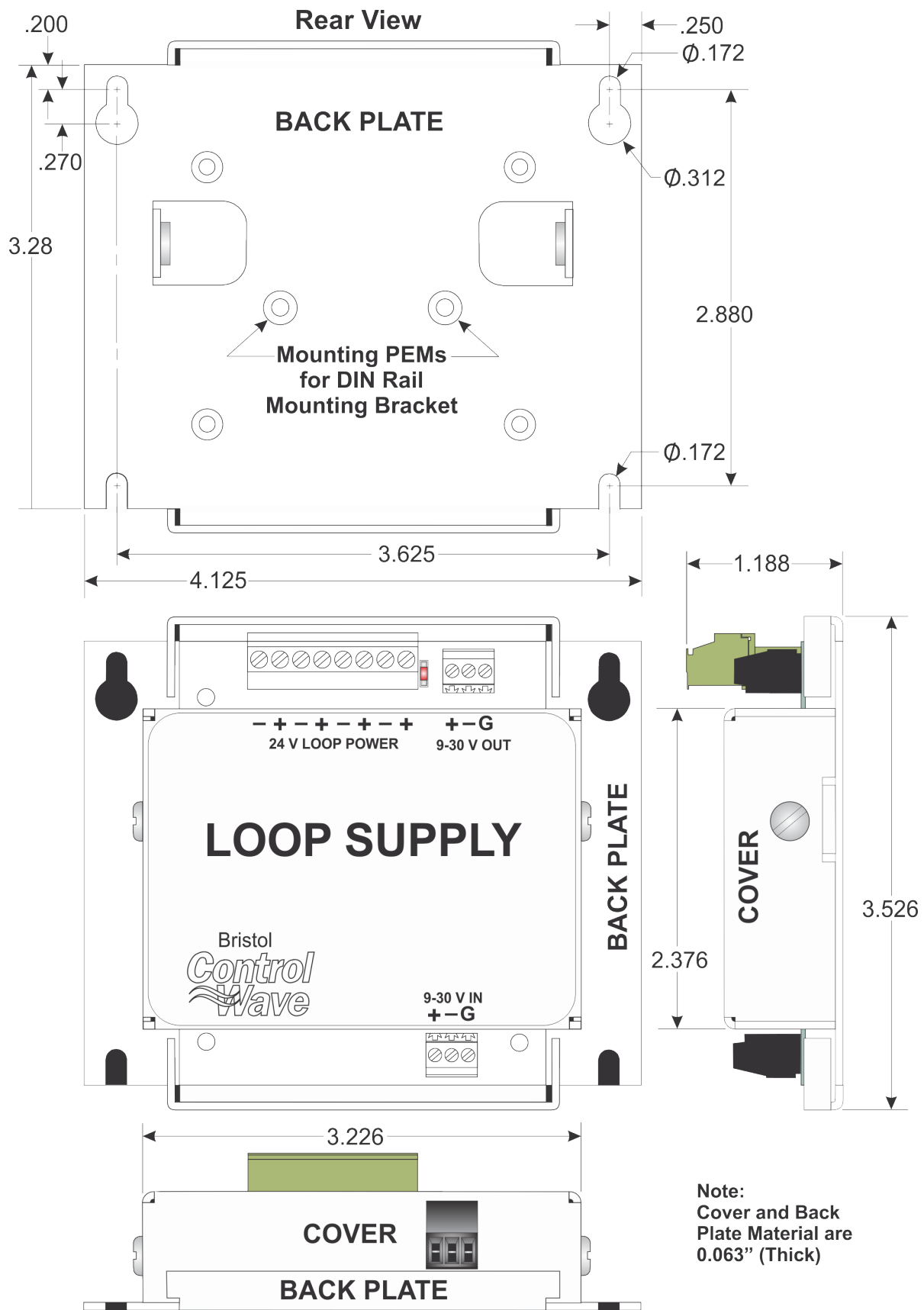


Figure 2-2. Encapsulated ControlWave Loop Supply Mounting Diagram

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## 2.2 Loop Supply Warning

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Loop Supplies utilize Terminal Blocks that are equipped with compression-type terminals which accommodate a #16 AWG size wire. A connection is made by inserting the wire's bared end (1/4" Max.) into the clamp beneath the screw and then tightening the screw. Three Loop Supply Terminal Blocks accommodate wiring as follows:

- TB1 – Typically interfaces Bulk Power Input (May be used for Bulk Power Pass-through)
  - TB1-1 – VIN (9-30V Bulk Power Input)
  - TB1-2 – GND (9-30V Bulk Power Return)
  - TB1-3 – EARTH (CHASSIS Ground)
- TB2 – 24Vdc Loop Power
  - TB2-1, 3, 5, 7 – 24V (Regulated +24V)
  - TB2-2, 4, 6, 8 – 24VRET (Regulated 24V Return)
- TB3 – Typically interfaces Bulk Power Pass-through (May be used for Bulk Power Input)
  - TB3-1 – EARTH (CHASSIS Ground)
  - TB3-2 – GND (9-30V Bulk Power Return)
  - TB3-3 – VIN (9-30V Bulk Power Input)

### 2.2.1 Field I/O Wiring Considerations

Regardless of the ControlWave RTU type in question, Loop Supply wiring will only be utilized in conjunction with non-isolated I/O. Refer to *Figure 2-3* or *Figure 2-4* for applicable RTU wiring assignments.

In the case of ControlWave Express, ExpressPAC and GFCs, non-isolated AI and AO are available but, depending on the Input Voltage type, the unit's AI/AO will be internally or externally powered. For 24Vdc powered RTUs AI/AO loop power will typically be sourced directly from the unit's associated bulk power supply input. For 6V or 12V (dc) powered RTUs, both the non-isolated AI and non-isolated AO loop power may be provided by the Loop Supply's regulated 24Vdc power output via the EXT POWER Terminal (TB7-3) and GND terminal (TB7-4) on the Process I/O Board's Analog Output Terminal Block.

### 2.2.2 Power Input and Pass-through Wiring Considerations

In some cases the same bulk supply that powers the Loop Supply Assembly may be used to power the RTU. The bulk source should be wired to TB1 of the Loop Supply and then to the RTU's power input terminal. If a Power Distribution Board is present, the bulk power source should be wired as follows:

1. First to Power Distribution Board Terminal Block TB1.
2. From TB2 of the Power Distribution Board to TB1 of the Loop Supply.

**3. From TB3 of the Loop Supply to the RTU's Input Power Terminal.**

Bulk power may be supplied from Loop Supply connector TB3 (pass-through) to one of the following RTU Input Power Terminals):

- ControlWave Micro – Power Supply/Sequencer Module (PSSM) – Connector TB1
  - TB1-1 = +VIN (from Loop Supply Connector TB3-3 = VIN)
  - TB1-2 = -VIN (from Loop Supply Connector TB3-2 = GND)

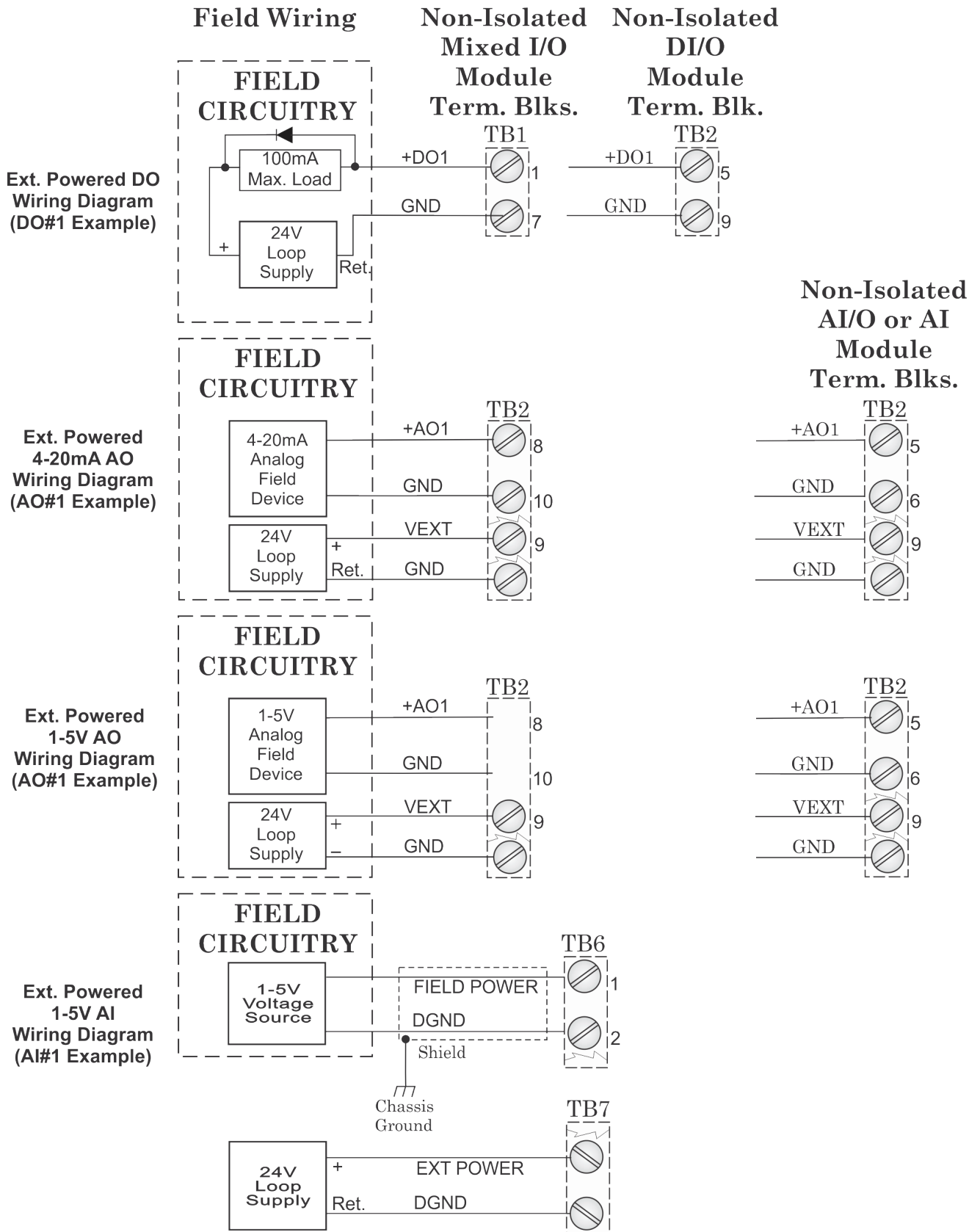


Figure 2-3. ControlWave Micro & EFM Loop Supply to I/O Module Wiring

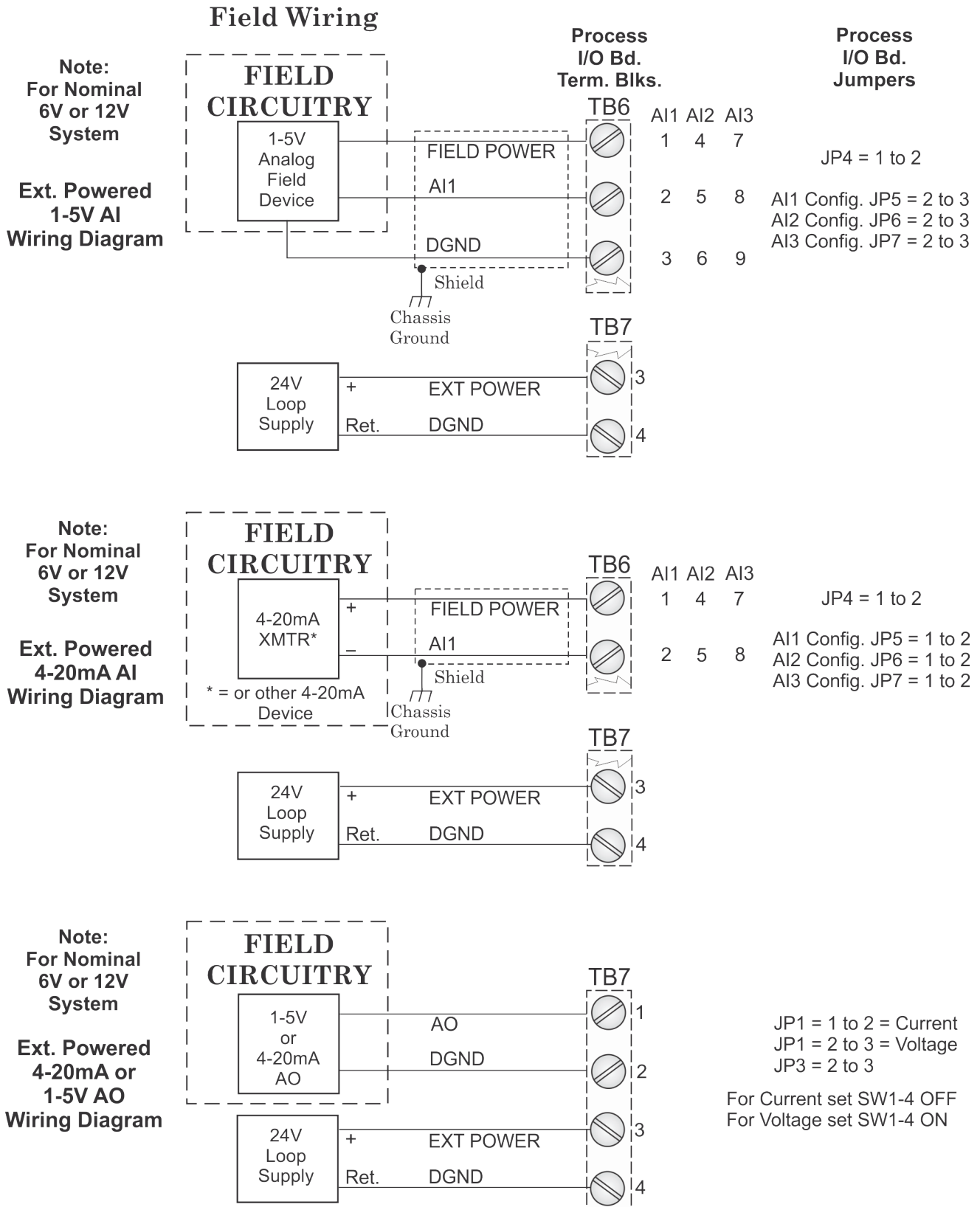


Figure 2-4. ControlWave Express, ExpressPAC and GFC Loop Supply to Process I/O Board Wiring Diagrams

- ControlWave EFM – Sytem Controller Module – Connector TB1
  - TB1-1 = +VIN (from Loop Supply Connector TB3-3 = VIN)
  - TB1-2 = -VIN (from Loop Supply Connector TB3-2 = GND)
  
- ControlWave Express – CPU/System Controller Board – Connector TB1
  - TB1-3 = POWER IN+ (from Loop Supply Connector TB3-3)
  - TB1-4 = GND (from Loop Supply Connector TB3-2)
  
- ControlWave ExpressPAC – CPU/System Controller Board – Connector TB1
  - TB1-3 = POWER IN+ (from Loop Supply Connector TB3-3)
  - TB1-4 = GND (from Loop Supply Connector TB3-2)
  
- ControlWave GFC – CPU/System Controller Board – Connector TB1
  - TB1-3 = POWER IN+ (from Loop Supply Connector TB3-3)
  - TB1-4 = GND (from Loop Supply Connector TB3-2)

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## Chapter 3 – Specifications

This chapter details the specifications for the Loop Power Supply.

### 3.1 Operating Specifications

**Function:** Provides four isolated 24Vdc power output terminal pairs to power an RTU , a Transmitter and/or a number of non-isolated I/O (associated with a particular ControlWave RTU).

**Output Voltage:** Electrically Isolated & Regulated 24 Vdc  $\pm 5\%$ , no load or full load

**Output Current:** 0.2A maximum, power limited to 150% of Max. rated power

**Supply Shutdown:** Below +9Vdc or +19Vdc (nominal) for 12V or 24V system (respectively)

- 12V System:  
Max. ON Switchpoint = 8.8V  
Max. OFF Switchpoint = 7.8V
- 24V System:  
Max. ON Switchpoint = 19.7V  
Max. OFF Switchpoint = 17.4V

**Input Voltage:** +9 to +30 Vdc

**Input Current:** Supply Loading: 24V @0.2A  
Vin @ +9V Iin Max. = .85A  
Vin @ +12V Iin Max. = .58A  
Vin @ +24 Iin Max. = .29A

**Fusing:** 2A Slow Blow (5 x 20 mm) Fuse for 12V/24V System

**Electrical Isolation:** 500 Vdc (Transformer Coupled)

**Surge Suppression:** 500 Vdc (MOV between 24V return and CHASSIS)  
30V Transient Suppressor across VIN(90-30V/GND, 24V/24V)  
Return – meets ANSI/IEEE C37.90-1978

**Terminations:** Fixed Max. wire size is 16 gauge

### 3.2 Environmental Specifications

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**Temperature:**

- **Operating Range:** -40° to +85°C (-40° to 185°F)
- **Storage Range:** -40°to +85°C (-40°to 185°F)

**Relative Humidity:** 15% to 95% (Non-condensing)

**Vibration:** 1g for 10-500 Hz on any axis per SAMA PMC-31-1 without damage or impairment.

**RFI Susceptibility:** 10V/meter – 80MHz to 100MHz

### 3.3 Connectors

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**Terminal Block TB1:**

3-Pin Terminal Block TB1 accommodates input power from the bulk DC source. TB1 could act as a power pass-through interface to an RTU (in lieu of connector TB3) (see *Table 1-1*).

**Terminal Block TB3:**

3-Pin Terminal Block TB3 typically accommodates pass-through power to the associated ControlWave RTU but could act as the Loop Supply input power interface (in lieu of connector TB1) (see *Table 1-1*).

**Terminal Block TB2:**

8-Pin Terminal Block TB2 accommodates distribution (four pairs of wiring terminals) of regulated +24Vdc loop power (see *Table 1-2*).

### 3.4 Part Numbers

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400095-01-7	Snap Track Mount
721708-01-3	Panel Mount
721708-02-1	35mm DIN Rail Mount

### 3.5 Dimensions

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Dimensions are provided in *Figure 3-1*.

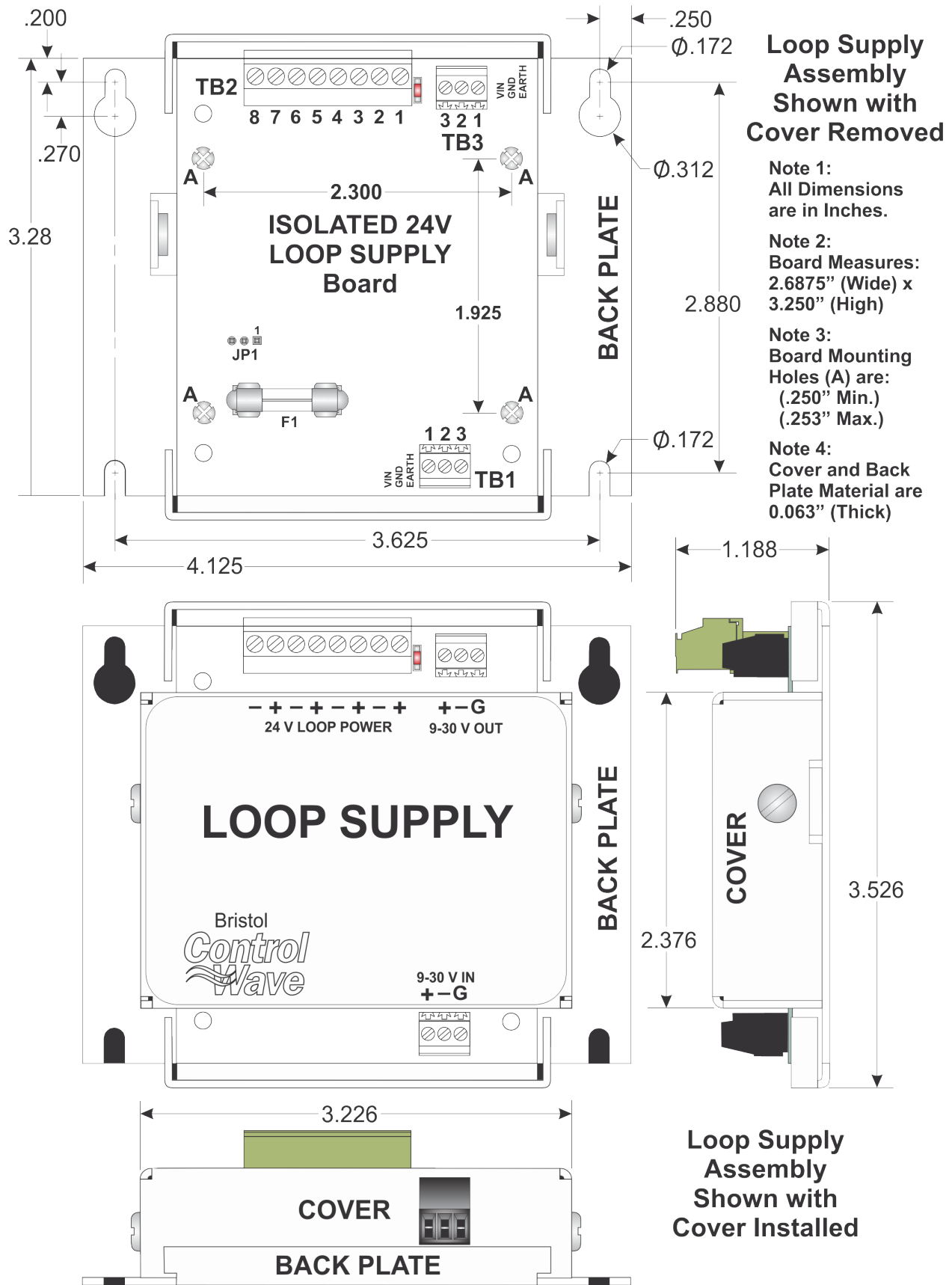


Figure 3-1. Loop Supply Dimensions Drawing

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