Elmo
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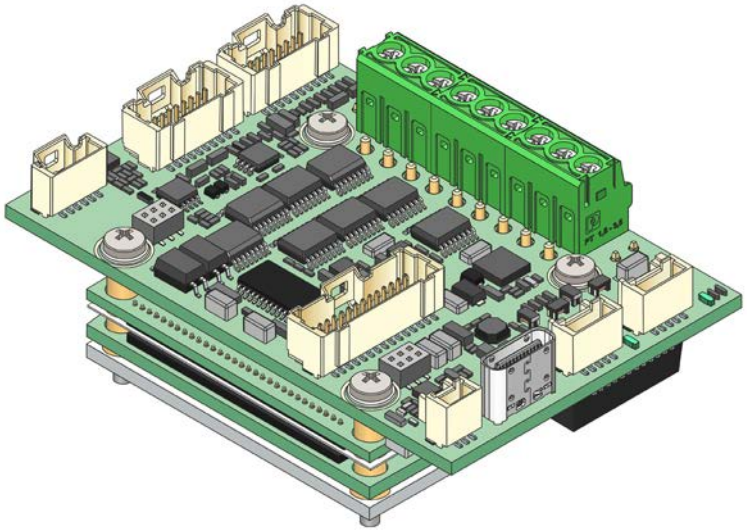
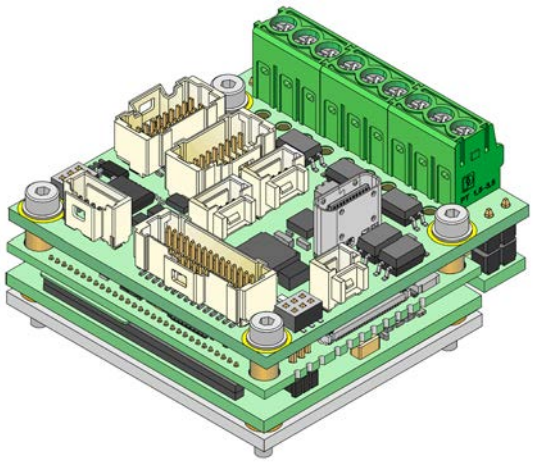
Titanium Solo Lizard
Digital Servo Drive Installation Guide

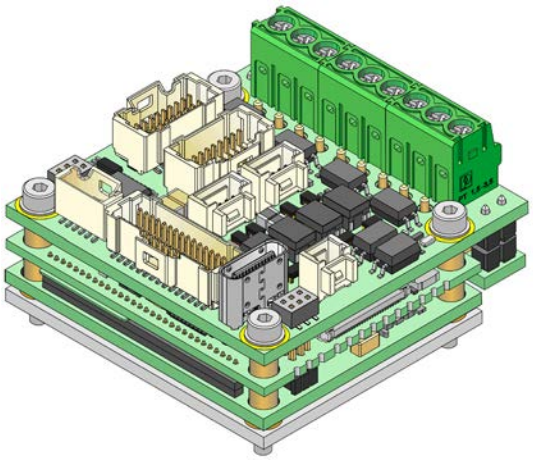
Functional Safety

Safety Capabilities: F, S, O

EtherCAT, CAN







June 2025 (Ver. 3.003)

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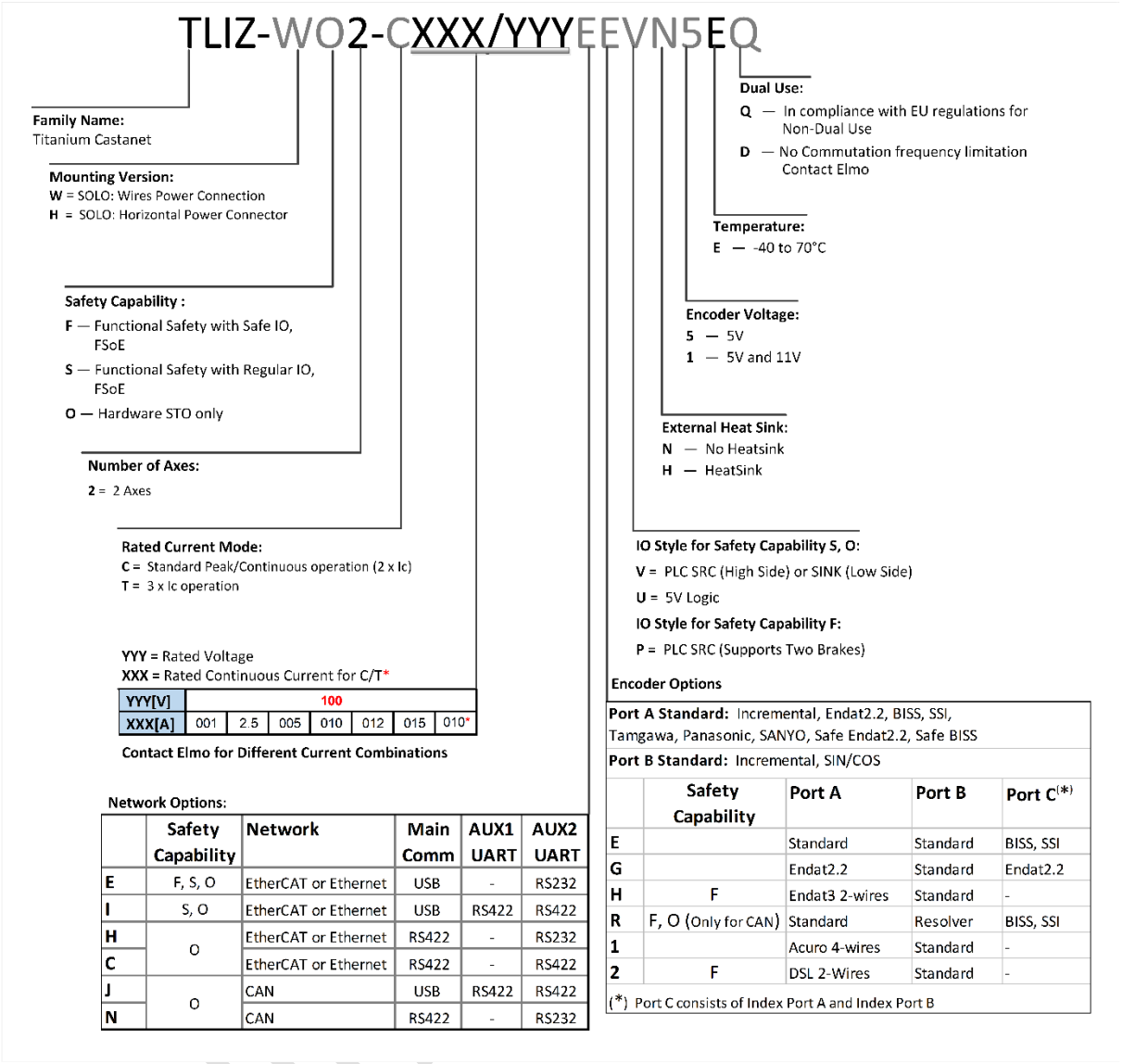
Catalog Number



Revision History

Version	Date	Details
Ver. 3.000	Mar 2025	Initial Release
Ver. 3.001	Mar 2025	Updated section 8.10.5 and relevant drawing
Ver. 3.002	May 2025	Updated P/N. Removed: • Vertical connector option (removed from chapters 5.1, 7.1, 7.2, 7.3, 8.4.1, 8.4.2, chapter 10) • SIL3, Ple, CAT3 from Safety Capability O (removed from chapter 4) • Network M (CAN+RS422+RS232) (updated in chapters 5.4.4, 8.2.3, 8.10.2, 8.10.5) Updated table in chapter 8.8 and I/O diagrams in chapters 8.8.1 and 8.8.3.
Ver. 3.003	Jun 2025	Updated pollution degree in 5.5.2

Chapter 1 This Installation Guide

This installation Guide details the technical data, pinouts, and power connectivity of the Titanium Solo Lizard.

For a comprehensive specification and detailed description of the functions, refer to the Titanium Drive Manual.

The Titanium Drive and Titanium Safety Drive Manuals are currently unavailable.

Chapter 2 Functional Safety

The Titanium Solo Lizard servo drives support Functional Safety. It is necessary to implement the instructions in the Titanium Safety Drive Manual regarding using STO, Feedbacks, IOs and Power supplies with Functional Safety.

Chapter 3 Safety Information

In order to achieve the optimum, safe operation of the Titanium Solo Lizard, it is imperative that you implement the safety procedures included in this installation guide. This information is provided to protect you and to keep your work area safe when operating the Titanium Solo Lizard and accompanying equipment.

Please read this chapter carefully before you begin the installation process.

Before you start, ensure that all system components are connected to earth ground. Electrical safety is provided through a low-resistance earth connection.

Only qualified personnel may install, adjust, maintain and repair the servo drive. A qualified person has the knowledge and authorization to perform tasks such as transporting, assembling, installing, commissioning and operating motors.

The Titanium Solo Lizard contains electrostatic-sensitive components that can be damaged if handled incorrectly. To prevent any electrostatic damage, avoid contact with highly insulating materials, such as plastic film and synthetic fabrics. Place the product on a conductive surface and ground yourself in order to discharge any possible static electricity build-up.

To avoid any potential hazards that may cause severe personal injury or damage to the product during operation, keep all covers and cabinet doors shut.

The following safety symbols are used in this and all Elmo Motion Control manuals:

Warning: This information is needed to avoid a safety hazard, which might cause bodily injury or death as a result of incorrect operation.

Hot Surface Warning:
To alert against surfaces that may reach high temperatures. The heatsink and wires may reach high temperatures.

Caution: This information is necessary to prevent bodily injury, damage to the product or to other equipment.

Important: Identifies information that is critical for successful application and understanding of the product.

The following symbols are used in this document:

Note: Information critical to the understanding and\or operating the feature.

Tip: Information that helps understanding a feature, is good practice or a possible different way of action.

3.1 Warnings

- To avoid electric arcing and hazards to personnel and electrical contacts, never connect/disconnect the servo drive while the power source is on.
- Power cables can carry a high voltage, even when the motor is not in motion. Disconnect the Titanium Solo Lizard from all voltage sources before servicing.
- The high voltage products within the Titanium Line range contain grounding conduits for electric current protection. Any disruption to these conduits may cause the instrument to become hot (live) and dangerous.
- STO, Safe I/O (Safety Capability "F") and EtherCAT (Safety Capability "F", "S") circuits are separated from power circuits by basic insulation and can be supplied by SELV power supply. Other Control and communication level circuits are separated from power circuits by functional insulation. These circuits shall have insulation to their surroundings and other control, or communication circuits based on the Working Voltage and requirements of the end use application.

Capacitance Discharge
After shutting off the power and removing the power source from your equipment, wait at least 2 seconds before touching or disconnecting parts of the equipment that are normally loaded with electrical charges (such as capacitors or contacts). Measuring the electrical contact points with a meter, before touching the equipment, is recommended.

3.2 Cautions

- The maximum DC power supply connected to the instrument must comply with the parameters outlined in this guide.
- When connecting the Titanium Solo Lizard to an approved control supply, connect it through a line that is separated from hazardous live voltages using reinforced or double insulation in accordance with approved safety standards.
- Before switching on the Titanium Solo Lizard, verify that all safety precautions have been observed and that the installation procedures in this manual have been followed.
- Make sure that the Safe Torque Off is operational.

3.3 CE Marking Conformance

The Titanium Solo Lizard is intended for incorporation in a machine or end product. The actual end product must comply with all safety aspects of the relevant requirements of the European Safety of Machinery Directive 2006/42/EC as amended, and with those of the most recent versions of standards EN 60204-1 and EN ISO 12100 at the least, and in accordance with 2006/95/EC.
Concerning electrical equipment designed for use within certain voltage limits, the Titanium Solo Lizard meets the provisions outlined in 2006/95/EC. The party responsible for ensuring that the equipment meets the limits required by EMC regulations is the manufacturer of the end product.

3.4 Warranty Information

The products covered in this manual are warranted to be free of defects in material and workmanship and conform to the specifications stated either within this document or in the product catalog description. All Elmo drives are warranted for a period of 12 months from the date of shipment. No other warranties expressed or implied — and including a warranty of merchantability and fitness for a particular purpose — extend beyond this warranty.

Chapter 4 Product Description

The Titanium Solo Lizard is a “ready to use Titanium Lizard”, double axes advanced high power density, highly intelligent servo drive operational within a few minutes, delivering up to **1.6 kW of continuous power or 4.8 kW** of peak power in an average 36.6 cm^3 (2.22 in^3) compact package. A cable kit is available for easy and fast operation of the Titanium Solo Lizard.

This dual axes, advanced, high power density servo drive provides top performance, Functional Safety, advanced networking as well as a fully featured motion controller and local intelligence.

The Titanium Solo Lizard is provided in three safety configurations:

- **Functional Safety with Safe IO (TLIZ-zF2-zXXX/YYYEzPzzIz):** Servo drive with Function Safety and Safe IO – This configuration of Servo drives includes safe Digital IO which support Safe Digital Inputs and Outputs including Brakes. This configuration supports the operation of the safety function either via FSOE or via the Safe I/O.
- **Functional Safety without Safe IO (TLIZ-zS2-zXXX/YYYzzzzzIz):** Servo drive with Function Safety excluding Safe IO – This configuration of Servo drives includes regular Digital IO. This configuration permits operation of safety functions only via FSOE (Fail Safe Over EtherCAT).
- **STO Only (TLIZ-zO2-zXXX/YYYzzzzzIz):** Servo drive with STO – The servo drive supports only STO.

The Titanium Solo Lizard requires two isolated Power supplies from the Mains, Main Power and Control supply.

The drive can operate as a stand-alone device or as part of a multi-axis system in a distributed configuration on a real-time network.

The Titanium Solo Lizard drive is easily set up and tuned using the Elmo Application Studio (EAS III) software tools. As part of the Titanium product line, it is fully programmable with the Elmo motion control languages. For more information about software, tools refer to the Elmo Application Studio (EAS III) User Guide.

4.1 Accessories

The following cable kits may be ordered with the Titanium Solo Lizard:

Catalog numbers:

- Cable kit: Catalog number CBL-TSOLCASKIT02 for Safe IO and Regular IO EtherCAT with USB
- Connectors and Pins: Catalog number CBL-TSOLCASKIT03
- Cable kit: Catalog number CBL-TSOLCASKIT04 for Regular IO CAN with USB
- Cable kit: Catalog number CBL-TSOLCASKIT05 for Regular IO EtherCAT with RS422
- Cable kit: Catalog number CBL-TSOLCASKIT06 for Regular IO CAN with RS422

Chapter 5 Technical Information

5.1 Physical Specifications

Feature	Data	
Mounting Method	Panel mounting	
Degrees of Protection	IP00	
Part Number	**Weight (g (oz))**	**Dimensions (mm (in))**
TLIZ-**W**z2-zXXX/YYYzzz**N**zIz	41 g (1.446 oz)	41.0 x 40.0 x 19.4 mm (1.61” x 1.57” x 0.76”)
TLIZ-**H**z2-zXXX/YYYzzz**N**zIz		41.0 x 40.0 x 22.1 mm (1.61” x 1.57” x 0.87”)
TLIZ-**W**z2-zXXX/YYYzzz**H**zIz	69.5 g (2.452 oz)	41.0 x 54.0 x 23.4 mm (1.61” x 2.13” x 0.92”)
TLIZ-**H**z2-zXXX/YYYzzz**H**zIz		41.0 x 54.0 x 26.1 mm (1.61” x 2.13” x 1.03”)
TLIZ-**WF**2-zXXX/YYYEzP**N**zIz	50.5 g (1.781 oz)	41.0 x 63.0 x 19.4 mm (1.61” x 2.48” x 0.76”)
TLIZ-**HF**2-zXXX/YYYEzP**N**zIz		41.0 x 63.0 x 22.1 mm (1.61” x 2.48” x 0.87”)
TLIZ-**WF**2-zXXX/YYYEzP**H**zIz	86.5 g (3.061 oz)	53.0 x 63.0 x 23.4 mm (2.09” x 2.48” x 0.92”)
TLIZ-**HF**2-zXXX/YYYEzP**H**zIz		53.0 x 63.0 x 26.1 mm (2.09” x 2.48” x 1.03”)

Table 1: Physical Specifications

5.2 Technical Data

5.2.1 100V Models

Feature	Units	1/100	2.5/100	5/100	10/100	12/100	15/100
Minimum supply voltage	VDC	10					
Nominal supply voltage	VDC	80					
Maximum supply voltage	VDC	90					
Maximum continuous power output	W	80W per axis. 160W in total	200W per axis. 400W in total	400W per axis. 800W in total	800W per axis. 1600W in total	960W per axis. 1920W in total	1200W per axis. 2400W in total
Efficiency at rated power (at nominal conditions)	%	> 99					
Maximum output voltage		Up to 96% of DC bus voltage					
Ic, Amplitude sinusoidal/DC continuous current	A	1	2.5	5	10	12	15[1]
Sinusoidal continuous RMS current limit (Ic)	A	0.7	1.8	3.5	7.07	8.48	10.6[1]
Peak current limit	A	2 x Ic					

Table 2: 100V Models Technical Data

[1] Max Continuous Current for this model may be limited in peak time duration and the Total Sum of current for both axes. Please contact ELMO for further information.

5.2.2 T Models

Feature	Units	10/100
Minimum supply voltage	VDC	10
Nominal supply voltage	VDC	80
Maximum supply voltage	VDC	90
Maximum continuous power output	W	800W per axis. 1600W in total
Efficiency at rated power (at nominal conditions)	%	> 99
Maximum output voltage		Up to 96% of DC bus voltage
Ic, Amplitude sinusoidal/DC continuous current	A	10
Sinusoidal continuous RMS current limit (Ic)	A	7.07
Peak current limit	A	3 x Ic

Table 3: T Models Technical Data

Note (on current ratings):
The current ratings of the Titanium Solo Lizard are given in units of DC amperes (ratings that are used for trapezoidal commutation or DC motors). The RMS (sinusoidal continuous) value is the DC value divided by 1.41.

5.3 Control Supply

Feature	Details
Control supply input voltage for Safety	**Isolated DC Source: 14V ÷ 60 V**
Control supply input power	≤4 W without external loading ≤8 W with full external loading

Table 4: Control Supply

5.4 Product Features

5.4.1 Number of Axes

Feature	Details
Two axes	**X1** and **X2**

Table 5: Number of Axes

5.4.2 Feedback

Feature	Details	Presence and No.
Feedback	Standard Ports A: Incremental Encoder, Absolute Encoders Standard Port B: Incremental Encoder, Sin/COS, option for Resolver. Additional feedbacks: HALL, Auxiliary Absolute Encoder	**2 Axes**

Table 6: Feedback

5.4.3 Encoder Supply

Feature	Presence	Details
5V supply	√	3 Watt max
11V supply	Part Number: Encoder Voltage = 1	

Table 7: Encoder Supply

5.4.4 Communication

Communication Type	Presence and No.		Network options
EtherCAT/Ethernet	**√**		E, I, H, and C
CAN	**√**		J, N
USB	**√**		E, I, and J
RS-422 (Differential RS-232) Serial Communication	**√**	Main + AUX	I, C, H, J, N, and M
RS-232 Serial Communication	**√**	AUX	E, H, and N

Table 8: Communication

5.4.5 Analog Input

Feature	Details	Resolution	Presence and No.
Analog Input	Differential ±10V	12-bits	**2**

Table 9: Analog Input

5.4.6 STO

Feature	Details	Presence and No.
2 x STO per axis	5V Logic, Opto Isolated, for IO TYPE = U	√
	PLC source, Opto Isolated, for IO TYPE = V and P	

Table 10: STO

5.4.7 Digital Input

I/O Style	Part Number: I/O Style = P Safe IO	Part Number: I/O Style = U Regular IO – TTL	Part Number: I/O Style = V Regular IO – PLC
Logic/Mode	PLC Source, Isolated	5V Logic	PLC Source *or* PLC Sink isolated
Input	IN1, IN2, IN3, IN4	IN1, IN2, IN3, IN4, IN5, IN6	

Table 11: Digital Inputs

5.4.8 Digital Output

I/O Style	Part Number: I/O Style = P Safe IO	Part Number: I/O Style = U Regular IO – TTL	Part Number: I/O Style = V Regular IO – PLC
I/O Type	Safe IO PLC	Regular IO 5V Logic	Regular IO PLC
Absolute Maximum Voltage	60V	30V	60V
Recommended VDD	24 ÷ 48V ±10%	4 to 30V	24 ÷ 48V ±10%
OUT1	250mA	15mA	1000mA
OUT2	250mA	15mA	1000mA
OUT3	1000mA	N/A	N/A
OUT4	1000mA	N/A	N/A
OUT7	1000mA	15mA	1000mA
OUT8	1000mA	15mA	1000mA
Total Current[2]	1500mA		1500mA

Table 12: Digital Output and Current

[2] **NOTE:** The total output current of the six digital outputs must not exceed the values shown in this table.

5.5 Environmental Conditions

You can guarantee the safe operation of the Titanium Solo Lizard by ensuring that it is installed in an appropriate environment. Section 5.5.1 describes the extended environmental conditions. However, the Functional Safety for STO and/or Regular I/O of the ExtrIQ series servo drives are certified according to the environmental conditions in section 5.5.2.

Warning:
During operation the Titanium Solo Lizard becomes hot to the touch (the heatsink and wires may heat up to 92 °C). Care should be taken when handling it.

5.5.1 ExtrIQ Conditions

Feature	Operating Conditions	Range
Operating ambient temperature	Operating conditions	-40 °C to +70 °C (-40 °F to 158 °F)
Temperature Shock	Non-operating conditions	-40 °C to +70 °C (-40 °F to 158 °F) within 3 min
Storage temperature	Non-operating conditions	-40 °C to +85 °C (-40 °F to +185 °F)
Altitude	Non-operating conditions	Unlimited
	Operating conditions	-400 m to 12,000 m (-1312 to 39370 feet)
Maximum Humidity	Non-operating conditions	Up to 95% relative humidity non-condensing at 35 °C (95 °F)
	Operating conditions	Up to 95% relative humidity non-condensing at 25 °C (77 °F), up to 90% relative humidity non-condensing at 42 °C (108 °F)
Vibration	Operating conditions	20 Hz to 2,000 Hz, 14.6 g

Table 13: ExtrIQ Conditions

5.5.2 Functional Safety

Functional Safety of the ExtrIQ series servo drives is certified according to the following environmental conditions:

Feature	Details
Operating ambient temperature in compliance with IEC60068-2-2	-40 °C to 55 °C (-40 °F to 131 °F)
Storage temperature	-40 °C to +85 °C (-40 °F to +185 °F)
Maximum non-condensing humidity in compliance with IEC60068-2-78	95%
Maximum Operating Altitude	2,000 m (6562 feet) It should be noted that servo drives capable of higher operating altitudes are available on request.
Mechanical Shock in compliance with IEC60068-2-27	15g / 11ms Half Sine
Vibration in compliance with IEC60068-2-6	5 Hz ≤ f ≤ 10 Hz: ±10mm 10 Hz ≤ f ≤ 57 Hz: 4G 57 Hz ≤ f ≤ 500 Hz:5G
Pollution Degree	TBD

Table 14: Functional Safety Environmental Conditions

5.6 Standards and Certifications

Standards and Certifications are currently unavailable.

The following sections describe the Main Standards of the Titanium Solo Lizard servo drive.

5.6.1 Functional Safety

Standard	Item
IEC 61800-5-2:2017	Adjustable speed electrical power drive systems – Safety requirements – Functional
EN ISO 13849-1:2015	Safety of machinery — Safety-related parts of control systems.
EN 61508-1:2010	Functional safety of electrical/electronic/ programmable electronic safety-related systems
EN 61508-2:2010	Functional safety of electrical/electronic/ programmable electronic safety-related systems
EN 61508-3:2010	Functional safety of electrical/electronic/ programmable electronic safety-related systems
IEC 61784-3:2016	Functional Safety Filed Bus - FSOE

Table 15: Functional Safety

5.6.2 Electrical Safety

Specification	Details
IEC/EN 61800-5-1:2007	Adjustable speed electrical power drive systems Part 5-1: Safety requirements – Electrical, thermal and energy
UL 61800-5-1	Adjustable speed electrical power drive systems: Safety requirements – Electrical, thermal and energy
CSA C22.2 NO. 274-17	Adjustable speed drives

Table 16: Electrical Safety

5.6.3 Electromagnetic Compatibility

Specification	Details
EN 61800-3:2004/A1:2011	Adjustable speed electrical power drive systems Part 3: EMC requirements and specific test methods
EN 61800-5-2: 2017 Annex E	Adjustable speed electrical power drive systems Part 5-2: Safety requirements – Functional

Table 17: Electromagnetic Compatibility

5.6.4 Environmental

Specification	Details
IEC60068-2-78	Damp heat, steady state
IEC60068-2-6	Vibration (sinusoidal)
IEC60068-2-2	Dry heat
IEC60068-2-27	Shock
IEC60068-2-1	Cold Test

Table 18: Environmental

5.6.5 Dual Use

No export license is required for the Titanium Line products signified with the suffix Q in the Part Number.

The operating frequency of the Titanium Line products is “factory limited” to ≤ 599 Hz and therefore complies with the EU Dual Use Regulation 428/2009, 3A225, and the US Dual Use regulation EAR ECCN# 3A225.

This statement applies to all identical specimens and will become invalid if a change is made in the firmware.

Chapter 6 Installation

6.1 Unpacking the Servo Drive Components

Before you begin working with the Titanium Solo Lizard, verify that you have all of its components, as follows:

- Titanium Solo Lizard servo drive
- Elmo Application Studio (EAS III) software

The Titanium Solo Lizard is shipped in a cardboard box with Styrofoam protection.

To unpack the Titanium Solo Lizard:

1. Carefully remove the servo drive from the box and the Styrofoam.
2. Check the drive to ensure that there is no visible damage to the instrument. If any damage has occurred, report it immediately to the carrier that delivered your drive.
3. To ensure that the Titanium Solo Lizard you have unpacked is the appropriate type for your requirements, locate the part number sticker on the top of the Titanium Solo Lizard. It looks like this:

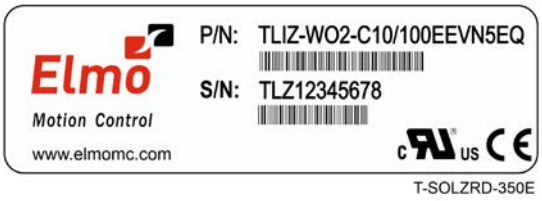


Figure 1: Label

4. Verify that the Titanium Solo Lizard type is the one that you ordered and ensure that the voltage meets your specific requirements.
   The part number at the top provides the type designation. Refer to the appropriate part number in the Catalog Number section at the beginning of the installation guide.

6.2 Over-Current and Short-Circuit Protection

A serial fuse or circuit breaker should be installed Rated for drive's continuous current rating.

TLIZ-zz2-zXXX/YYYzzzzzIz	Fuse	Circuit Breaker
TBD	TBD	TBD
TBD	TBD	TBD

Table 19: Continuous Current Rating

PL/CL protection: Peak and Continues Limitation

The peak current of servo drive limit for a given application is programmed to the parameter **PL[1]** amperes.
PL[1]: Value for peak current limit protection.

6.3 Mounting the Titanium Solo Lizard to a Heat Sink

The selected heat sink must be screwed to the lower surface of the Titanium Solo Lizard.

1. Mount the heat sink under the base of the Titanium Solo Lizard.
2. Place a Thermally conductive phase change material (for example HALA: TPC-W-PC-E) between the lower surface of the servo drive, and the upper surface of the heat sink.
3. Use four M2 head cup Allen screws to secure the heat sink under the servo drive.
4. Tighten the screws to the relevant torque force (recommended 0.1 Nm) applicable to an M2 stainless steel A2 screw.

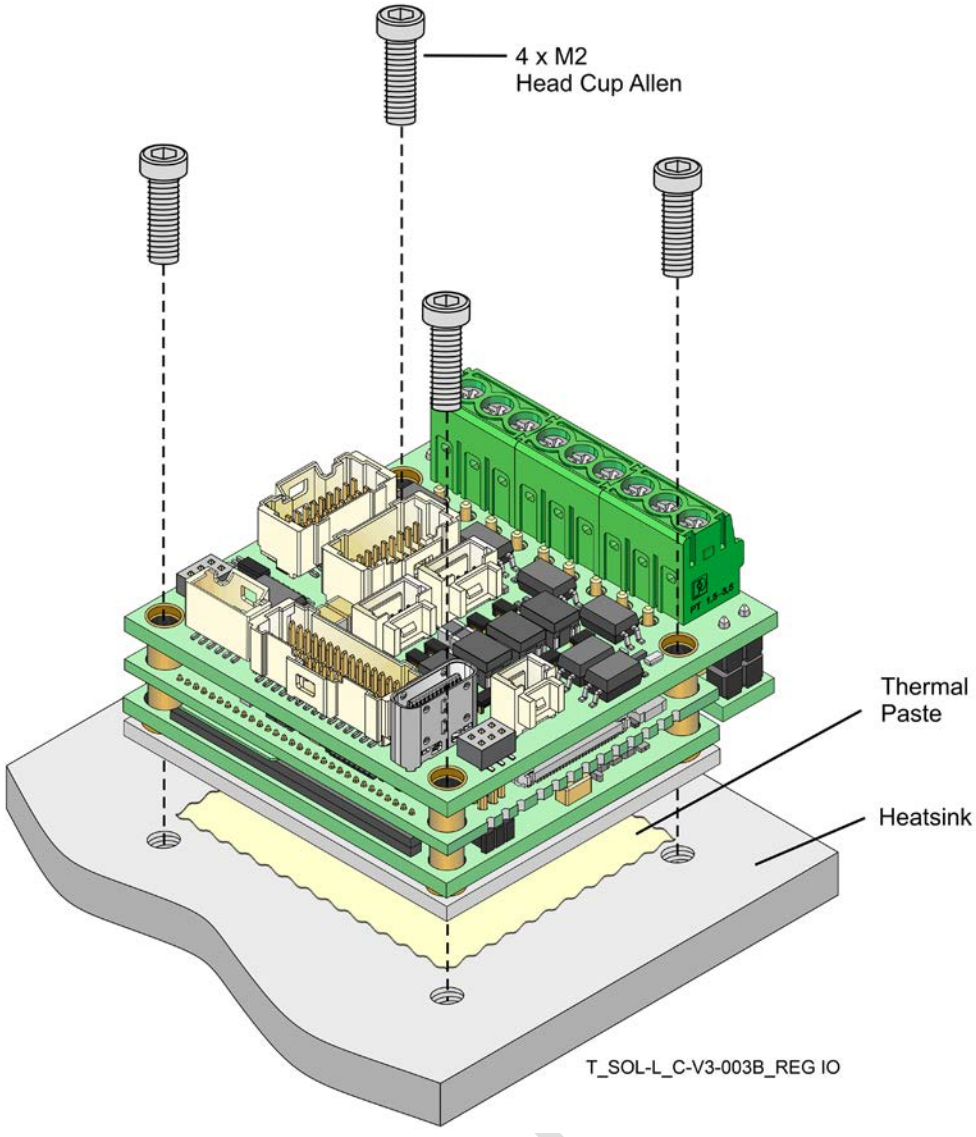
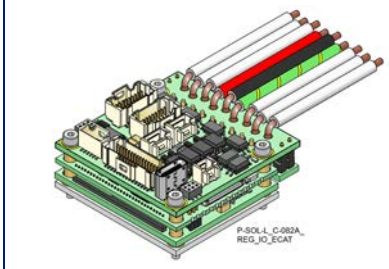
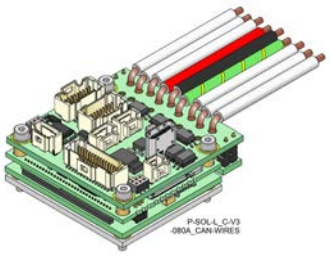
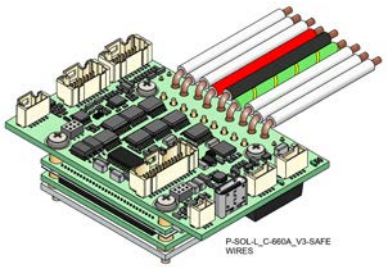
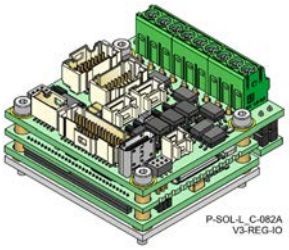
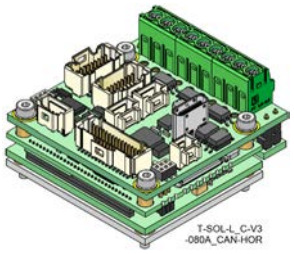
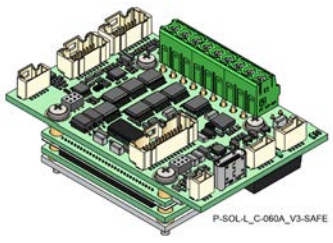


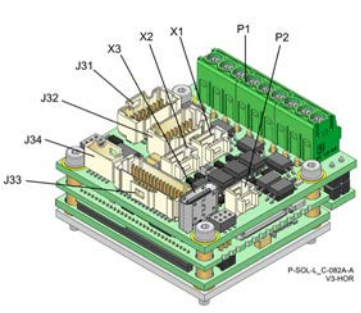
Figure 2: Mounting the Titanium Solo Lizard (Regular I/O EtherCAT version) to the Heat Sink

Chapter 7 Connector Types

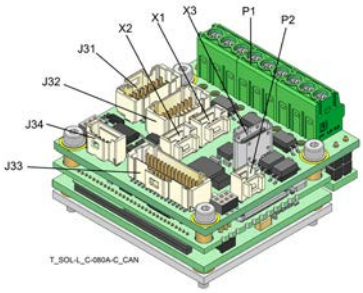
7.1 Connectors

Port		# Pins	On Board Connector Type	Function
Power Connectors				
P1: X1_M1, X1_M2, X1_M3, X2_M1, X2_M2, X2_M3. VP, PR, and PE	  	9	Wires. VP, PR, and PE: <=5A Motor 20 AWG >5A Motor 16 AWG	Power / Motor
P1: X1_M1, X1_M2, X1_M3, X2_M1, X2_M2, X2_M3, VP, PR, and PE	  		Horizontal Phoenix connector. PCB Terminal Block 3.5 mm pitch Conductor cross-section is 26 up to 16 AWG	

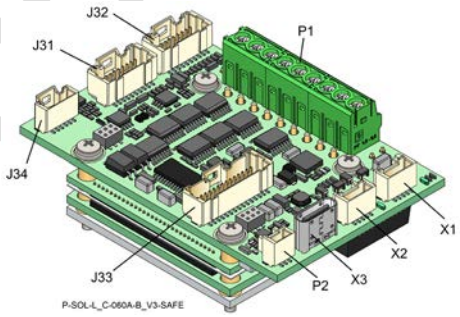
Port	# Pins	On Board Connector Type	Function
P2: VL+ and VL-	3	1x3 pins, 1 mm pitch Conductor cross-section is 32 up to 28 AWG	VL Control Power
Other Connectors			
J31	20	2 rows x 10 Pins 1 mm pitch Conductor cross-section is 32 up to 28 AWG	Feedback, Port AB and C for Axis 1
J32	20	2 rows x 10 Pins 1 mm pitch Conductor cross-section is 32 up to 28 AWG	Feedback, Port AB and C for Axis 2
J33	30	2 rows x 15 Pins 1 mm pitch Conductor cross-section is 32 up to 28 AWG	Digital I/O, RS-422 (Regular IO)/ RS-232, Analog Input
J34	6	1x6 pins, 1 mm pitch Conductor cross-section is 32 up to 28 AWG	STO
EtherCAT			
X1	5	1 x 5 Pins 1 mm pitch Conductor cross-section is 32 up to 28 AWG	EtherCAT IN
X2	5	1 x 5 Pins 1 mm pitch Conductor cross-section is 32 up to 28 AWG	EtherCAT OUT
CAN (For Safety Capability O Only)			
X1	5	1 x 5 Pins 1 mm pitch Conductor cross-section is 32 up to 28 AWG	CAN
X2	5	1 x 5 Pins 1 mm pitch Conductor cross-section is 32 up to 28 AWG	CAN
USB			
X3	24	USB Type C	USB
Connector Locations			



Regular IO EtherCAT Version



Regular IO CAN Version



SAFE IO Version

Table 20: Connectors

7.2 Mating Connectors

Connector	Type	Mating Connector Type	Mating Connector Elmo P/N	Mating Crimp Terminal	Mating Crimp Terminal Elmo P/N
Control Supply					
P2 - VL	CON PICO-CLASP HOUSING FE 3PIN(1X3) P=1MM	MOLEX 501939-0300	JCW-132103F	MOLEX 501193-7000	JCB-131001F2
Other Connectors					
J31 – Port AB and C for Axis 1	CON PICO-CLASP HOUSING FE 20PIN(2X10) P=1MM	MOLEX 501189-2010	JCW-131020F	MOLEX 501193-7000	JCB-131001F2
J32 – Port AB and C for Axis 2	CON PICO-CLASP HOUSING FE 20PIN(2X10) P=1MM	MOLEX 501189-2010	JCW-131020F	MOLEX 501193-7000	JCB-131001F2
J33 – I/O, RS422 (Regular IO)/RS-232	CON PICO-CLASP HOUSING FE 30PIN(2X15) P=1MM	MOLEX 501189-3010	JCW-131030F	MOLEX 501193-7000	JCB-131001F2
J34 – STO	CON PICO-CLASP HOUSING FE 6PIN(1X6) P=1MM	MOLEX 501330-0600	JCW-131006F	MOLEX 501193-7000	JCB-131001F2
EtherCAT and CAN					
X1 – ECAT IN or CAN	CON PICO-CLASP HOUSING FE 5PIN(1X5) P=1MM	MOLEX 501939-0500	JCW-132105F	MOLEX 501193-7000	JCB-131001F2
X2 – ECAT OUT or CAN	CON PICO-CLASP HOUSING FE 5PIN(1X5) P=1MM	MOLEX 501939-0500	JCW-132105F	MOLEX 501193-7000	JCB-131001F2
USB					
X3 - USB	USB Type C connector	Use a standard cable			

Table 21: Mating Connectors

7.2.1 Mating Connector Locations

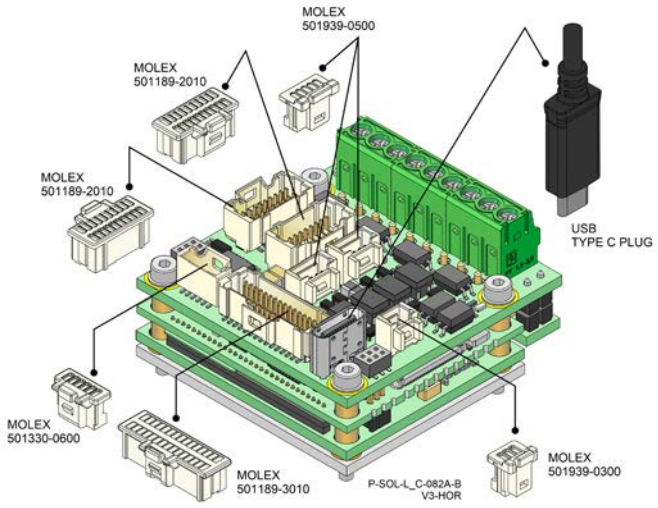


Figure 3: Mating connector locations for Safety Capabilities S and O – EtherCAT version

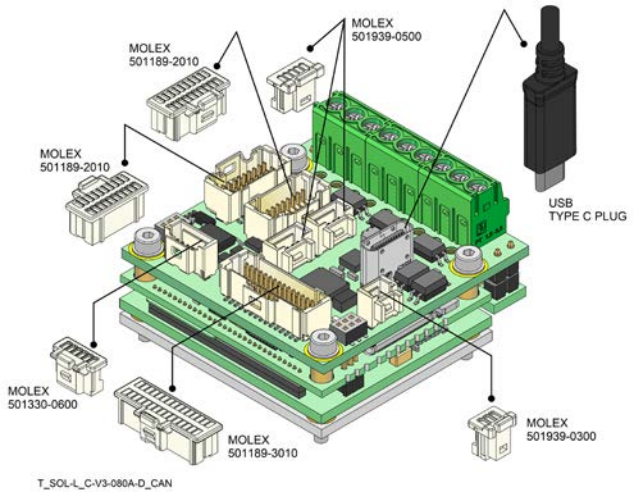


Figure 4: Mating connector locations for Safety Capability O – CAN version

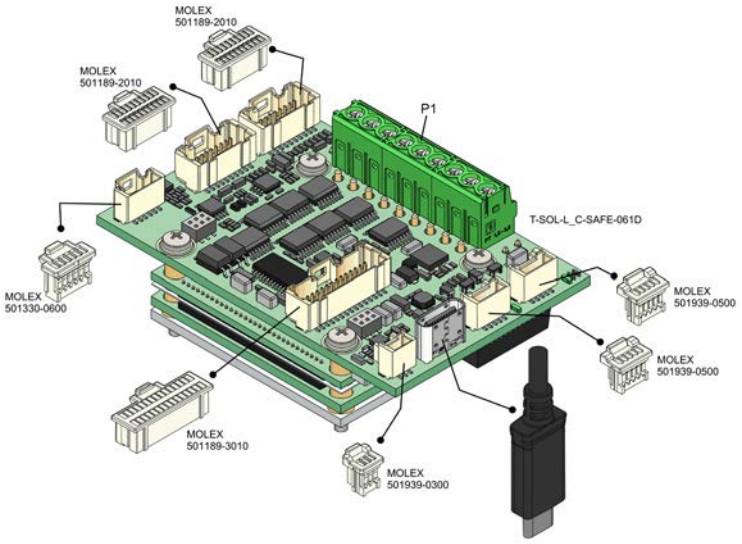


Figure 5:Mating connector locations for Safety Capability F

7.3 Motor and Main Power Connector (P1)

The following table describes the power and motor pinouts in the Titanium Solo Lizard connector.

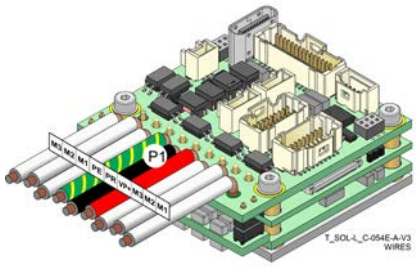
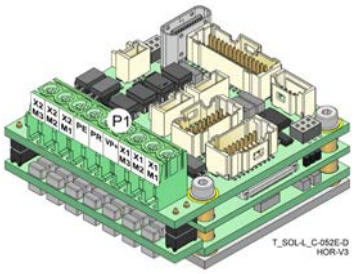
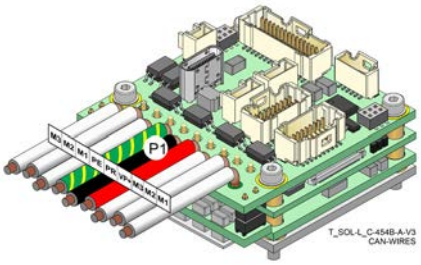
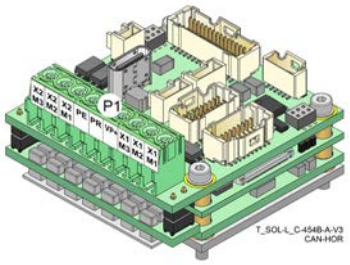
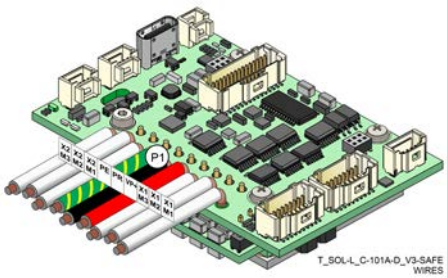
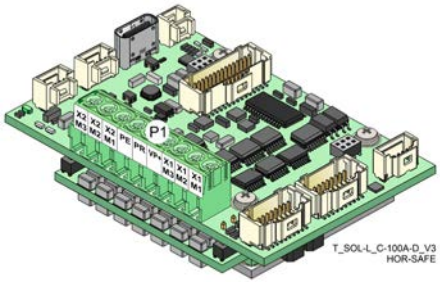
Pin No. (P1)	Signal	Type	Function
1	X1_M1	Output	Motor Phase
2	X1_M2	Output	Motor Phase
3	X1_M3	Output	Motor Phase
4	VP	Supply, Input	DC+ Power IN
5	PR	Supply, Input	DC- Power IN
6	PE		Protective Earth
7	X2_M1	Output	Motor Phase
8	X2_M2	Output	Motor Phase
9	X2_M3	Output	Motor Phase
Pin Positions for Safety Capability S and O – EtherCAT Version			
 			
Pin Positions for Safety Capability O – CAN Version			
 			
Pin Positions for Safety Capability F			
 			

Table 22: Power and Motor Connector Pinouts (P1)

7.4 V Logic Connector (P2)

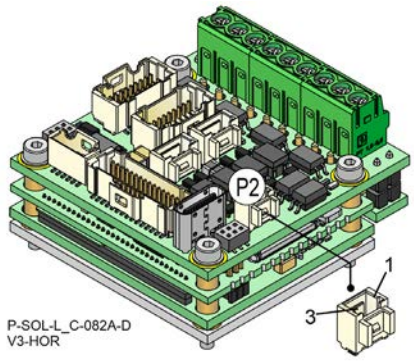
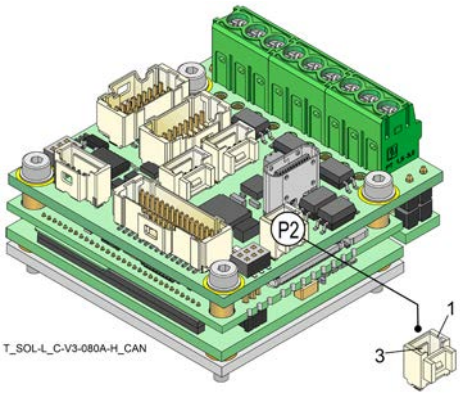
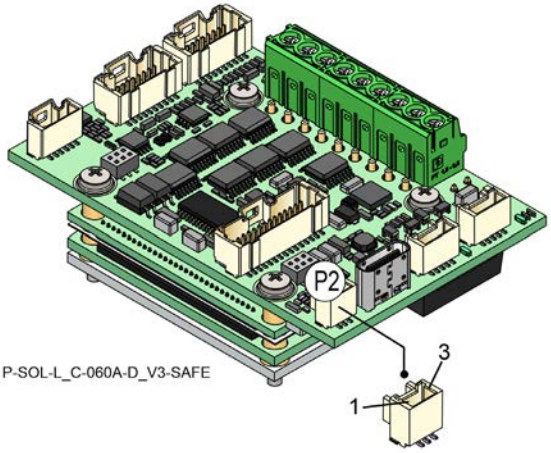
Pin No.	Signal	Type	Function
1	VL-	Supply, Input	Logic Power RET
2	Spare		
3	VL+	Supply, Input	Logic + Power IN
Pin Positions for Safety Capabilities S and O			**Pin Positions for Safety Capability F**
 **EtherCAT version**  **CAN version**			

Table 23: V Logic Connector Pinouts (P2)

7.5 Drive Status Indicator

Figure 6, Figure 7, and Figure 8 show the position of the red/green dual LED, which is used for immediate indication of the Initiation and Working states.

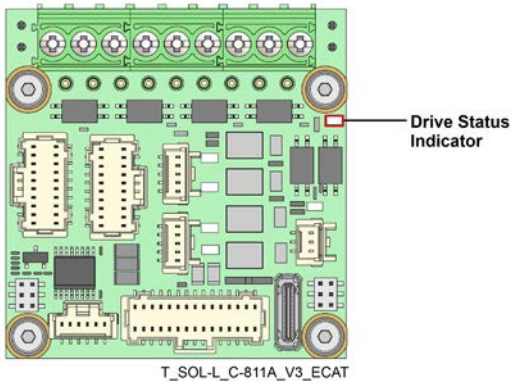


Figure 6: Drive Status Indicator for Safety Capability S and O ECAT version

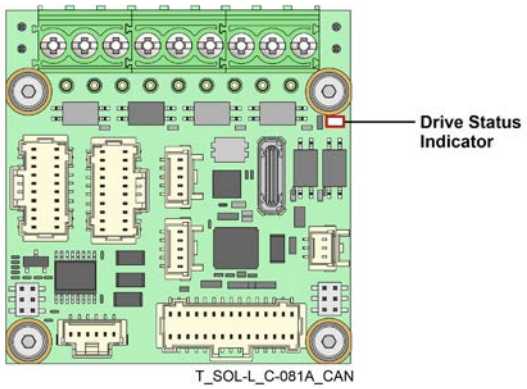


Figure 7: Drive Status Indicator for Safety Capability O CAN version

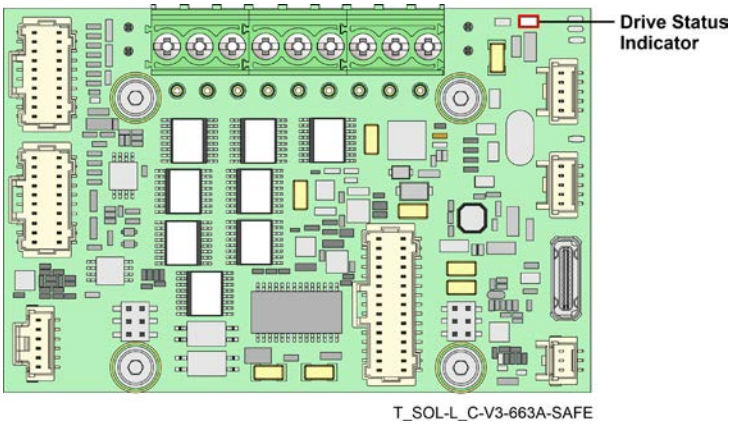


Figure 8: Drive Status Indicator for Safety Capability F

The red/green dual LED is used for immediate indication of the following states:

STATES	LED \ Time [msec]	Explanation
INITIATION STATE	Blinking: Red 200, Off: 200	If flashing RED ON/OFF, then drive error. Parameter process failed during power up (CD command).
	Blinking: Red 600, Off 200	If slow flashing RED ON/OFF, then drive Safety error. Drive in Safety error (BZ[2]\BZ[3])
WORKING STATE	Steady Green	Power stage ready to enable the motor.
	Steady Red	Drive is in an amplifier failure state Power state error: over\under voltage, over temperature etc.
FIRMWARE DOWNLOAD STATE	Blinking: Red 200, Green 200 Red 600, Green 200	Flashing RED/GREEN during burn Slow flashing RED/GREEN indicates stages of Firmware burn-in or validation. Frequency depends on the stage of burning/validation and the CPLD/FPGA that is been burned.

Table 24:States of the Drive Status Indicator

7.6 STO Connector (J34)

The following table describes the STO connections to the 1x6 pins connector.

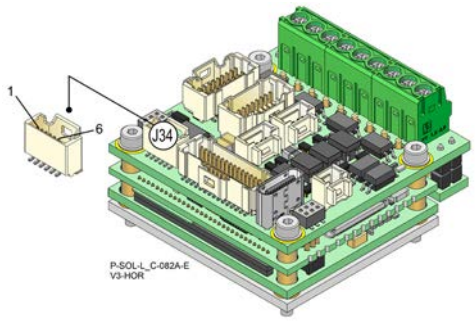
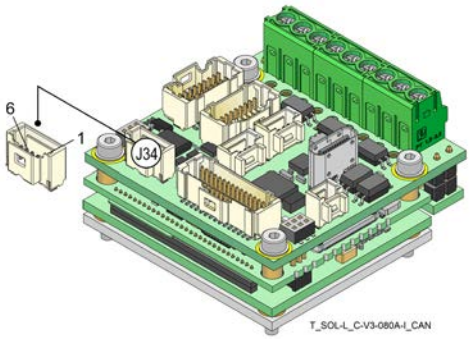
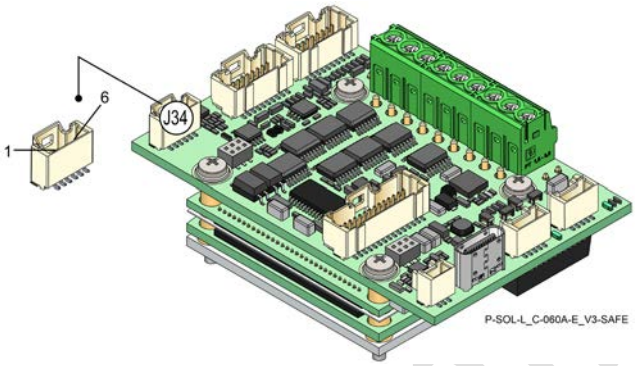
Pin No. (J34)	Signal	Function
1	X1_STO1	X1 STO1 input opto isolated
2	X1_STO2	X1 STO2 input opto isolated
3	X1_STO_RET	X1 STO signal return
4	X2_STO1	X2 STO1 input opto isolated
5	X2_STO2	X2 STO2 input opto isolated
6	X2_STO_RET	X2 STO signal return
Pin Positions for Safety Capabilities S and O		**Pin Positions for Safety Capability F**
 **EtherCAT version**  **CAN version**		

Table 25: STO Connector pinouts - J34

7.7 Feedback for Ports A and B Connectors (J31, J32)

The following tables describe the Ports A and Port B connections for Axis 1 and 2 to the 2x10 pins connectors.

Note:

There is also a Port "C" which consists of Index Port A and Index Port B. For details, see 8.5.4.

7.7.1 Encoder Power Supply Pins

Pin No.	Signal	Encoder Voltage 1	Encoder Voltage 5
1	+11V Encoder/+5V Encoder	Encoder +11V supply	Encoder +5V supply
2	+5V Encoder	Encoder +5V supply	
3	COMRET	Common Return	
4	COMRET	Common Return	
20	COMRET	Common Return	

Table 26: Power Pins for Feedback - Connectors J31 for Axis 1 and J32 for Axis 2

7.7.2 Port A

Port A – Pin# and Signal			Function	
Pin#	J31 for Axis 1	J32 for Axis 2	General or Incremental Encoder	Main Absolute Encoder
5	X1_PortA_A+	X2_PortA_A+	Differential I/O A+	Differential Output CLK+
7	X1_PortA_A-	X2_PortA_A-	Differential I/O A-	Differential Output CLK-
9	X1_PortA_B+	X2_PortA_B+	Differential I/O B+	Differential In/Out DATA+
11	X1_PortA_B-	X2_PortA_B-	Differential I/O B-	Differential In/Out DATA-
				Auxiliary Absolute Encoder
13	X1_PortA_I+	X2_PortA_I+	Differential I/O Index+	Differential Output CLK+
15	X1_PortA_I-	X2_PortA_I-	Differential I/O Index-	Differential Output CLK-

Table 27: Feedback Port A - Connectors J31 for Axis 1 and J32 for Axis 2

7.7.3 Port B

Port B – Pin# and Signal			Function			
Pin	J31 for Axis 1	J32 for Axis 2	Incremental Encoder	Interpolated Analog Encoder	Auxiliary Absolute Encoder	Resolver
			TLIZ-zz2-zXXX/YYYzzzz5Iz			TLIZ-zz2-zXXX/YYYz**R**zz5Iz
6	X1_PortB_A+	X2_PortB_A+	Differential Input A+	Sine+		Sine+
8	X1_PortB_A-	X2_PortB_A-	Differential Input A-	Sine-		Sine-
10	X1_PortB_B+	X2_PortB_B+	Differential Input B+	Cosine+		Cosine+
12	X1_PortB_B-	X2_PortB_B-	Differential Input B-	Cosine-		Cosine-
14	X1_PortB_I+	X2_PortB_I+	Differential I/O Index+		Differential I/O Data+	RESOLVER_OUT+
16	X1_PortB_I-	X2_PortB_I-	Differential I/O Index-		Differential I/O Data-	RESOLVER_OUT-

Table 28: Feedback Port B - Connectors J31 for Axis 1 and J32 for Axis 2

7.7.4 Hall Sensors

Pin No.	Signal		Function
Pin#	J31 for Axis 1	J32 for Axis 2	Function
17	X1_HA	X2_HA	Hall A
18	X1_HB	X2_HB	Hall B
19	X1_HC	X2_HC	Hall C

Table 29: Hall Sensors - Connector J31 for Axis 1 and J32 for Axis 2

7.7.5 Pin Positions

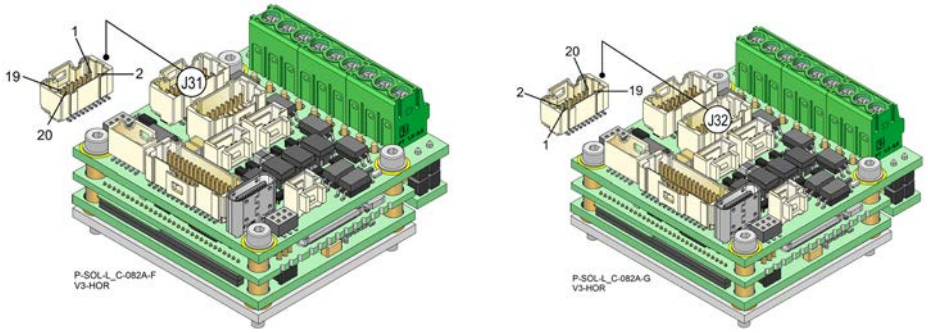


Figure 9: Pin Positions for J31 (Axis 1) and J32 (Axis 2) for Safety Capabilities S and O – EtherCAT version

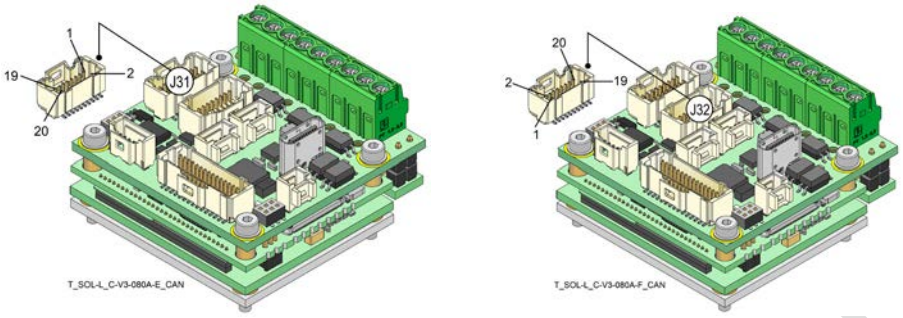


Figure 10: Pin Positions for J31 (Axis 1) and J32 (Axis 2) for Safety Capability O – CAN version

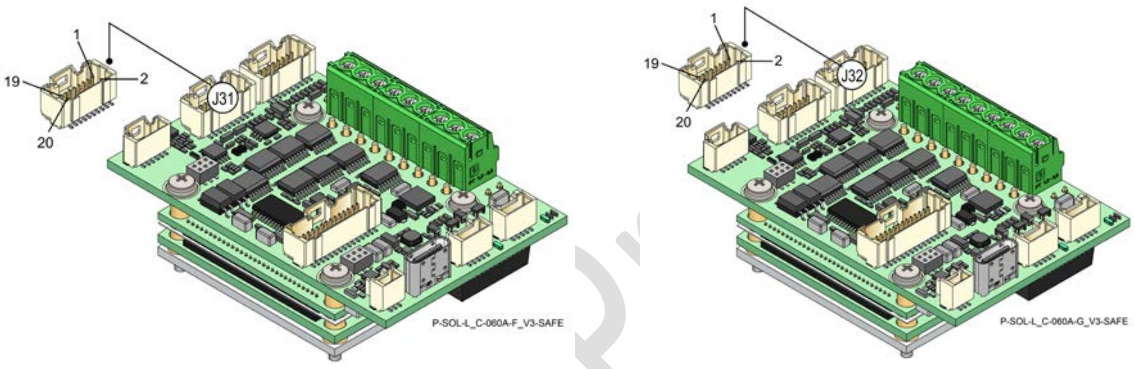


Figure 11: Pin Positions for J31 (Axis 1) and J32 (Axis 2) for Safety Capability F

7.8 Digital IOs, Analog Input, and RS-422 Connector (J33)

The following table describes the I/O, Analog Input, and RS-422 connections to the 2x15 pins connector.

Note:
For Communication pins, check the communication table in the Catalog Number, and the tables in sections 8.108.10.4 and 8.10.5.

Pin # J33	Signal	Function
1	VDD	IO Type U: 4V to 30V IO Type V, P: 24 ÷ 48V ±10%
2	ANALOG_IN1+	Analog input 1+
3	VDD	IO Type U: 4V to 30V IO Type V, P: 24 ÷ 48V ±10%
4	ANALOG_IN1-	Analog input 1-
5	VDD_RET	Supply, Power Return
6	COMRET	Common Return
7	VDD_RET	Supply, Power Return
8	MAIN_RS422_TX- / AUX1_RS422_TX-	Differential RS-232 TX-
9	OUTPUT1	Output 1
10	MAIN_RS422_TX+ / AUX1_RS422_TX+	Differential RS-232 TX+
11	OUTPUT2	Output 2
12	MAIN_RS422_RX- / AUX1_RS422_RX-	Differential RS-232 RX-
13	OUTPUT7	Output 7
14	MAIN_RS422_RX+ / AUX1_RS422_RX+ / COMRET	Differential RS-232 RX+ / Common Return
15	OUTPUT8	Output 8
16	COMRET	Common Return
17	INPUT1	Input 1
18	AUX2_RS422_TX-	Differential RS-232 TX-
19	INPUT2	Input 2
20	AUX2_RS422_TX+	Differential RS-232 TX+
21	INPUT3	Input 3
22	AUX2_RS422_RX- / AUX2_RS232_RX	Differential RS-232 RX- / RS-232 Receive
23	INPUT4	Input 4
24	AUX2_RS422_RX+ / AUX2_RS232_TX	Differential RS-232 RX+ / RS-232 Transmit
25	INPUT5/OUTPUT3	IO Type U, V: Input 5 IO Type P: Output 3
26	COMRET	Common Return
27	INPUT6/OUTPUT4_SNK	IO Type: U, V: Input 6 IO Type: P: Output 4 Sink

Pin # J33	Signal	Function
28	ANALOG_IN2+	Analog input 2+
29	IN_COM / PLC_SEL OUTPUT4_SRC	IO Type U: Power Return IO Type V: For Input: Power Return For Output: Source: Connect Power Return Sink: Connect VDD IO TYPE P: Output 4 Source
30	ANALOG_IN2-	Analog input 2-

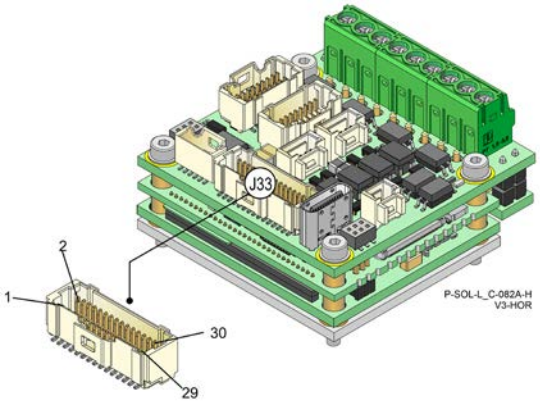
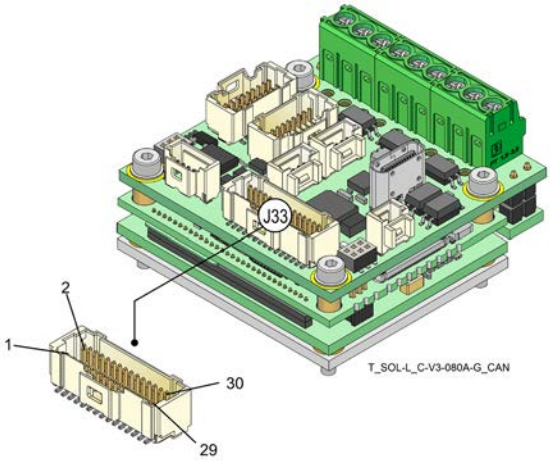
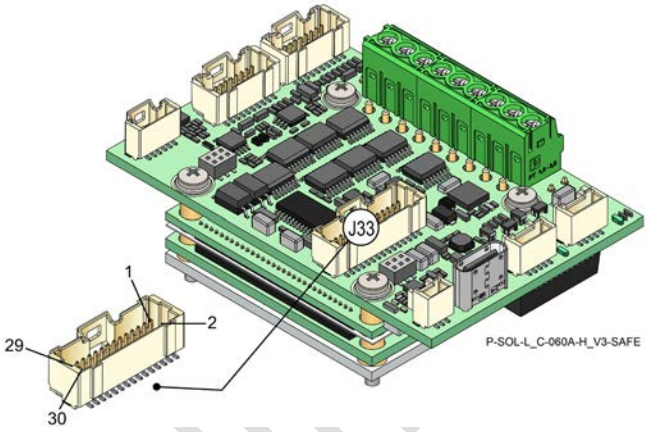
Pin Positions for Safety Capabilities S and O	Pin Positions for Safety Capability F
 **EtherCAT version**  **CAN version**	

Table 30: Digital IOs, Analog Input, and RS-422 Connector pinouts - J33

7.9 EtherCAT IN/OUT Connector (X1, X2)

The following tables describe the EtherCAT connections to the 1x5 pins connectors.

7.9.1 EtherCAT IN Connector (X1)

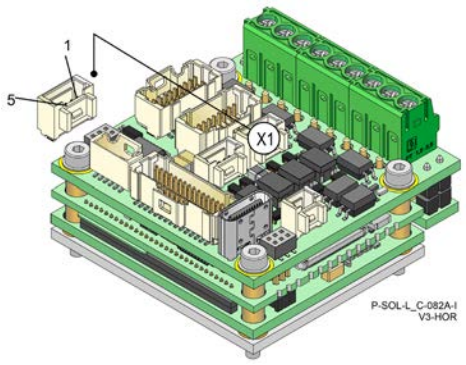
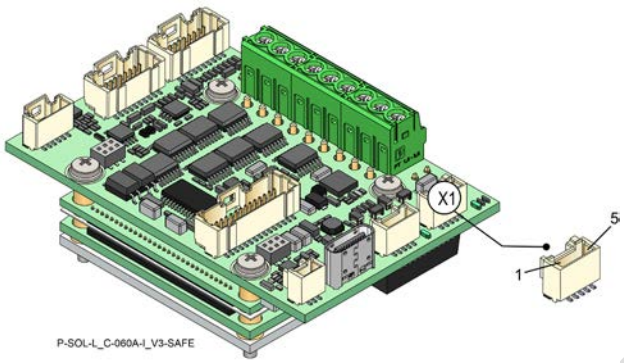
Pin No.	Signal	Function
1	EtherCAT_IN_TX+	EtherCAT IN Transmit+/Ethernet Transmit +
2	EtherCAT_IN_TX-	EtherCAT IN Transmit-/Ethernet Transmit -
3	EtherCAT_IN_RX+	EtherCAT IN Receive+/Ethernet Receive +
4	EtherCAT_IN_RX-	EtherCAT IN Receive-/Ethernet Receive -
5	SHLD_IN	Shield IN drain wire
Pin Positions for Safety Capabilities S and O		**Pin Positions for Safety Capability F**
		

Table 31: EtherCAT IN connector pinouts - X1

7.9.2 EtherCAT OUT Connector (X2)

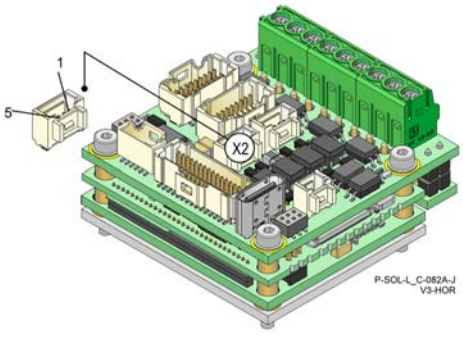
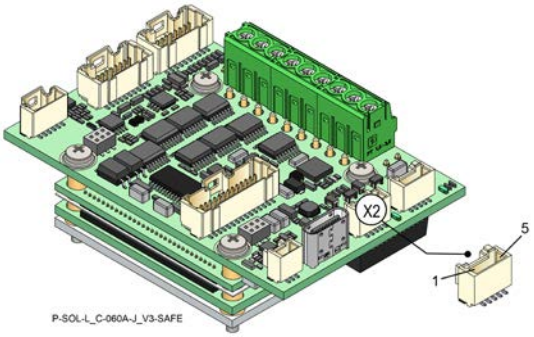
Pin No.	Signal	Function
1	EtherCAT_OUT_TX+	EtherCAT out Transmit+
2	EtherCAT_OUT_TX-	EtherCAT out Transmit-
3	EtherCAT_OUT_RX+	EtherCAT out Receive+
4	EtherCAT_OUT_RX-	EtherCAT out Receive-
5	SHLD_OUT	Shield IN drain wire
Pin Positions for Safety Capabilities S and O		**Pin Positions for Safety Capability F**
		

Table 32: EtherCAT OUT connector pinouts - X2

7.10 CAN Connector (X1, X2)

The following table describes the CAN connections to the 1x5 pins connectors.

The CANopen option is only available for Safety Capability O and this Regular IO version also has a USB.

Pin No.	Signal	Function
1	Not Connected	
2	CAN_RET	Isolation GND for CAN
3	CAN_H	Bidirectional, CAN BUS
4	CAN_L	Bidirectional, CAN BUS
5	PE	Shield IN drain wire
Pin Positions for CAN connectors		

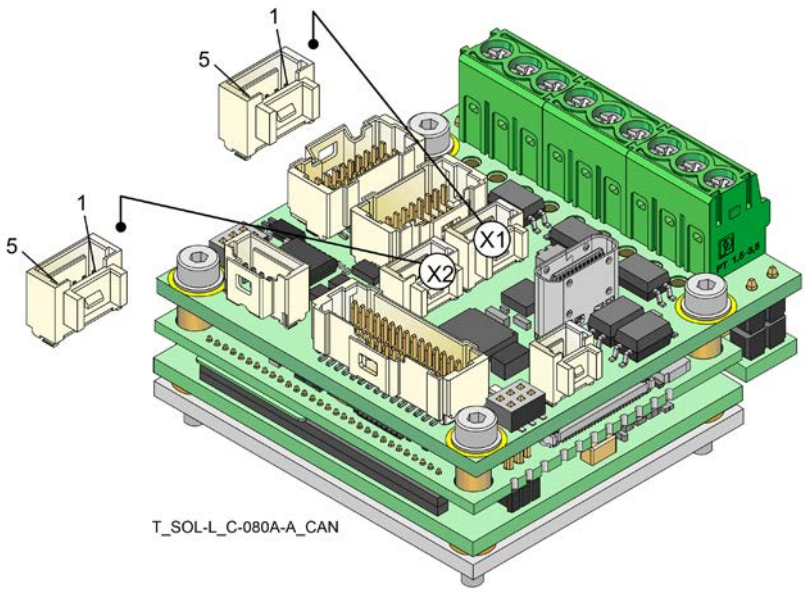


Table 33: CAN connector pinouts - X1 and X2

7.11 USB Connector (X3)

Refer to section 17.1 USB in the Platinum Safety Drive Manual for full details.

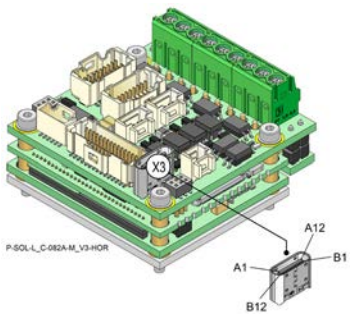
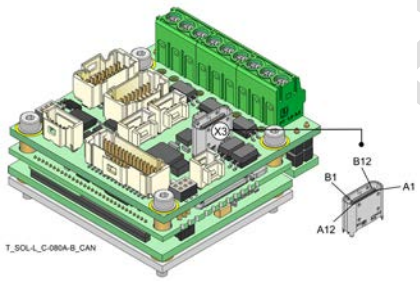
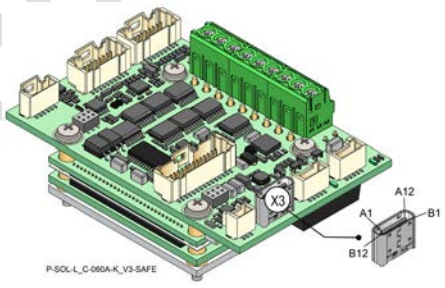
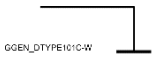
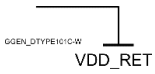
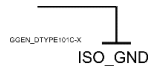
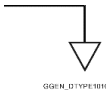
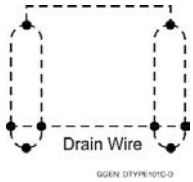
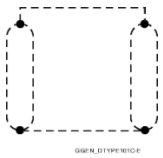
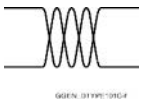
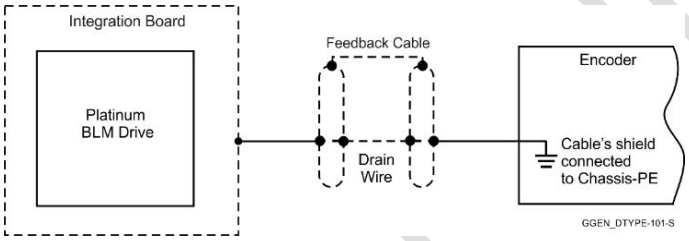
Pin (X3)	Signal	Function
A1	COMRET	Common return
A2	Not Connected	
A3	Not Connected	
A4	USB_VBUS	USB VBUS 5 V
A5	Reserved	
A6	USBD+	USB _P
A7	USBD-	USB _N
A8	Not Connected	
A9	USB_VBUS	USB VBUS 5 V
A10	Not Connected	
A11	Not Connected	
A12	COMRET	Common return
B1	COMRET	Common return
B2	Not Connected	
B3	Not Connected	
B4	USB_VBUS	USB VBUS 5 V
B5	Reserved	
B6	USBD+	USB _P
B7	USBD-	USB _N
B8	Not Connected	
B9	USB_VBUS	USB VBUS 5 V
B10	Not Connected	
B11	Not Connected	
B12	COMRET	Common return
	COMRET	Supply, Connector body
Pin Positions for Regular IO EtherCAT version	**Pin Positions for Regular IO CAN version**	**Pin Positions for Safe IO version**
		

Table 34: USB Connector pinouts - X3

Chapter 8 Wiring

8.1 Wiring Legend

The following table legend describes the wiring symbols detailed in all installation guides.

Wiring Symbol	Description
	Earth connection (PE).
	**User Side:** This symbol signifies that any type of grounding may be used on the user side.
	VDD Return.
	Isolated Ground.
	Power Return.
	COMRET Common at the Drive.
	Shielded cable with drain wire. The drain wire is a non-insulated wire that is in direct contact with the braid (shielding). Shielded cable with drain wire significantly simplifies the wiring and earthing.
	Shielded cable braid only, without drain wire.
	Twisted-pair wires.
	Encoder Earthing. The cable`s shield is connected to the chassis (PE) in the connector. The servo drive shield is connected to Earth.

8.2 The Titanium Solo Lizard Connection Diagram

8.2.1 Connections Diagram for ECAT Safety Capability F

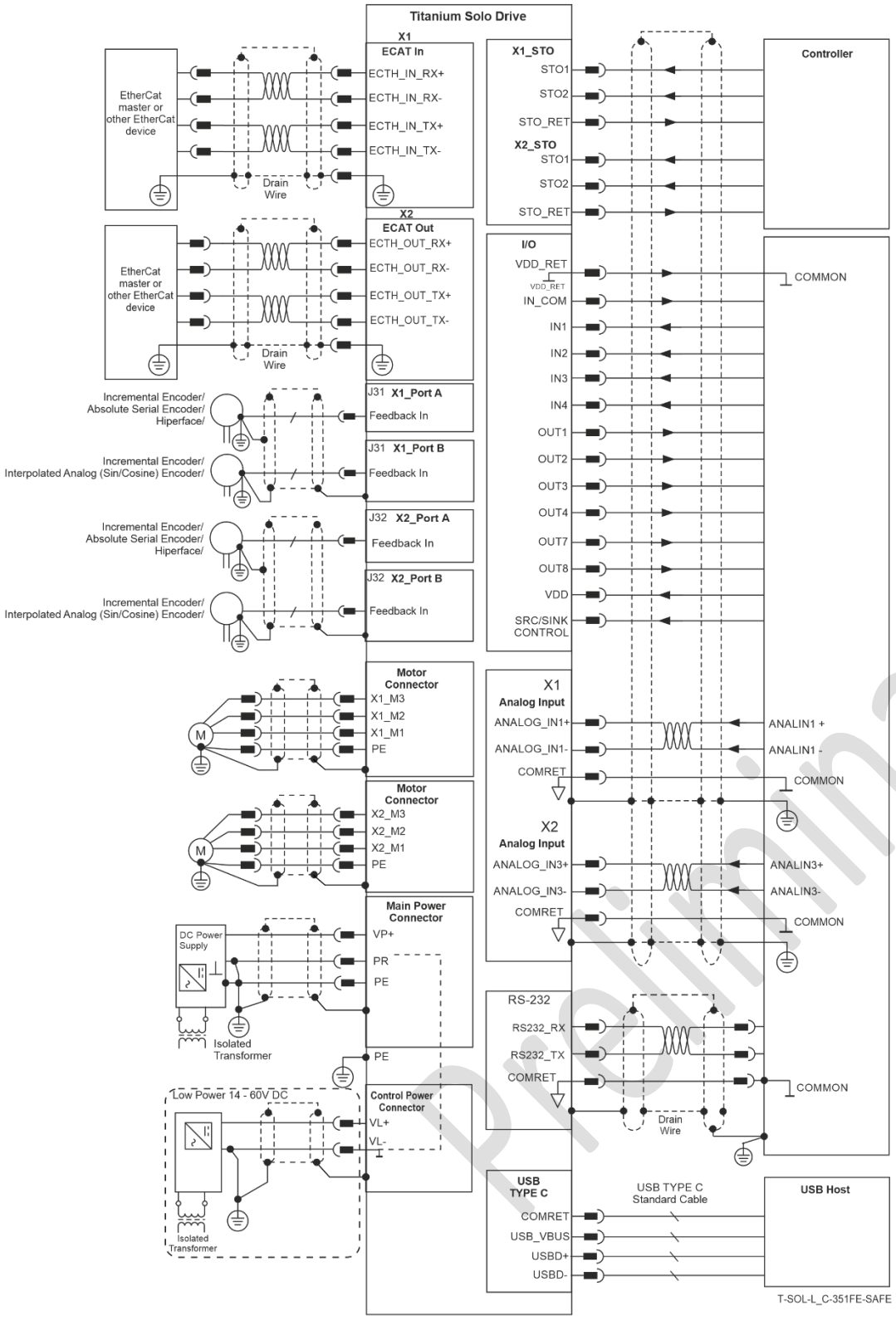


Figure 12: The Titanium Solo Lizard connections diagram for EtherCAT version Safety Capability F

8.2.2 Connections Diagram for ECAT Safety Capability S and O

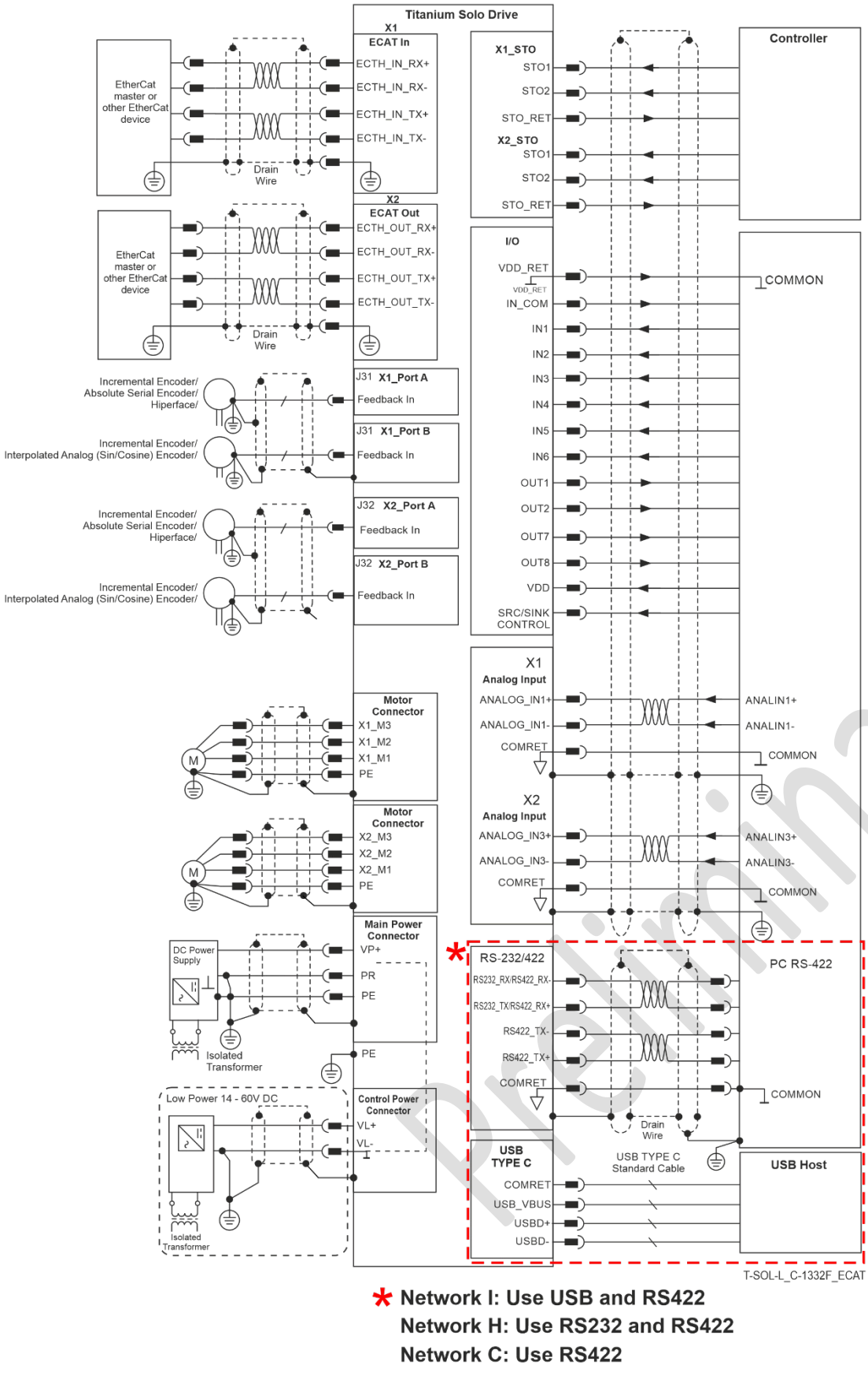


Figure 13: The Titanium Solo Lizard connections diagram for EtherCAT version Safety Capability S and O

8.2.3 Connections Diagram for CAN Safety Capability O

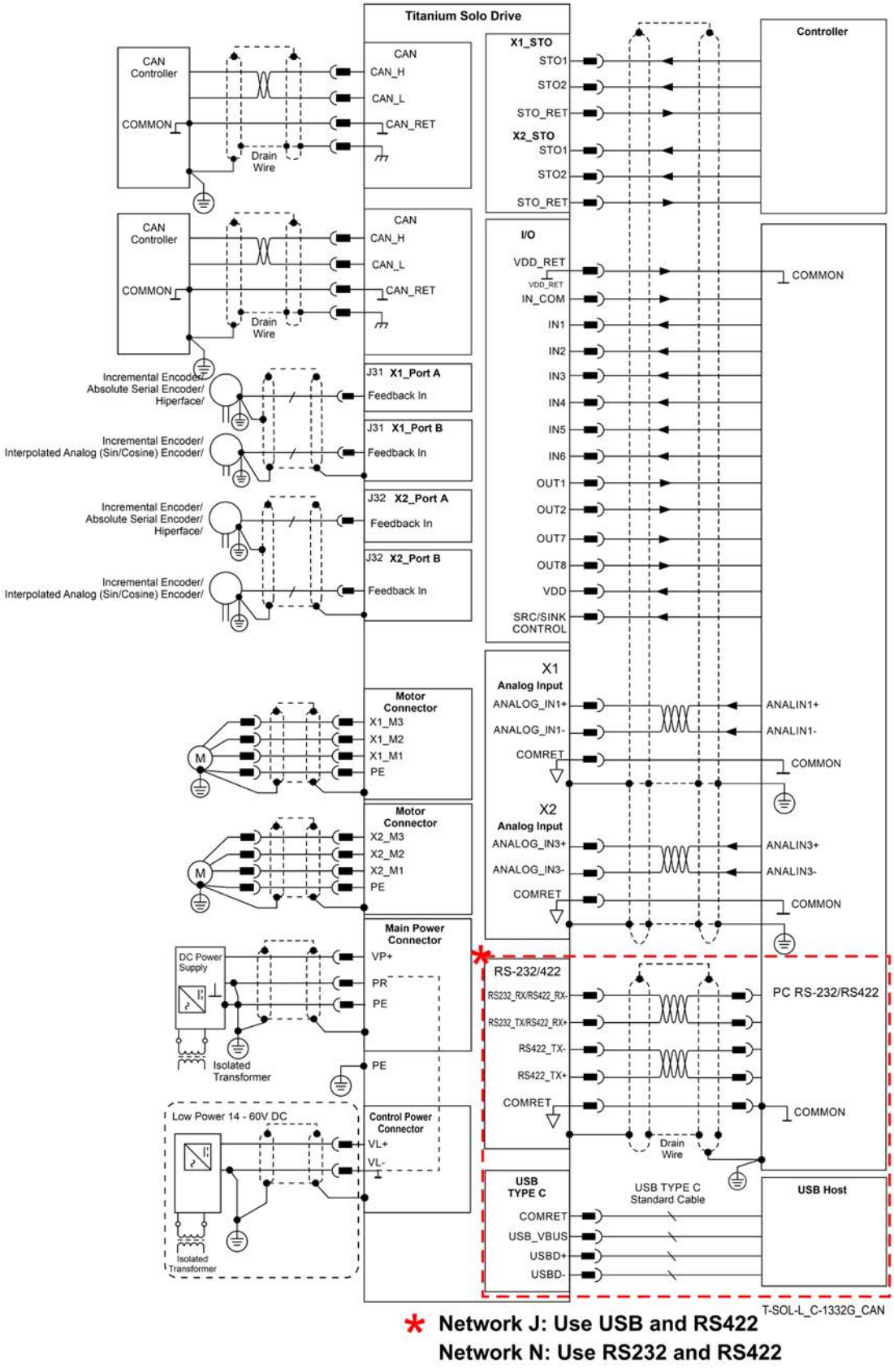


Figure 14: The Titanium Solo Lizard connections diagram for CAN version Safety Capability O

8.3 Wiring the Female Connectors

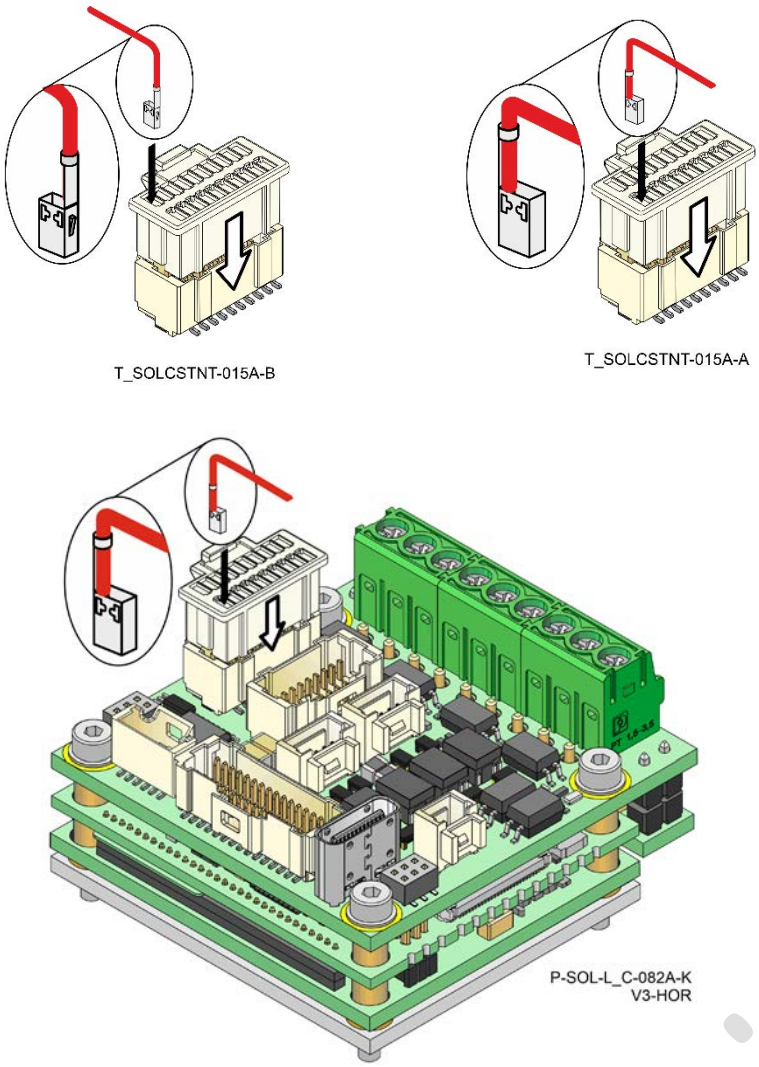


Figure 15: Inserting a wire/pin to the Female Connector

To insert a wire/pin to the female connectors P2, J31, J32, J33, J34, X1, and X2 do the following:

1. Select the relevantly colored wire to insert to a specific rectangular compartment on the female connector.
2. Use the appropriate Molex crimping plier (Molex P/N 63819-1500) to fasten a pin connector to the end of the wire.
3. Place the connector on a flat surface, in the orientation as shown in Figure 15.
   Notice that the rectangular slot has a niche at the bottom of the slot.
4. Insert the wire connector to the slot as shown in Figure 15. Make sure that the connector protrusion is inserted to the bottom of the rectangular slot.
   When inserting the wire connector to a slot in the second row, make sure to rotate the connector in the opposite orientation.
5. Repeat the same procedure for any other wire connections.

8.4 Main, Control, and Motor Power

8.4.1 Motor Power Per Axis (P1)

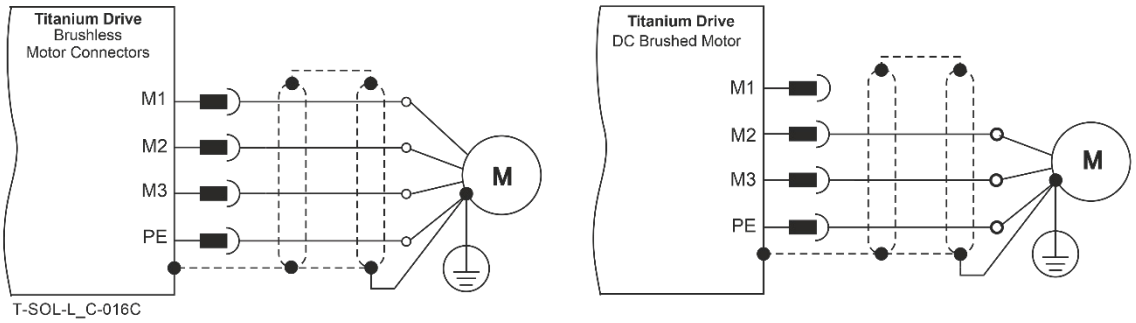


Figure 16: Brushless and Brushed Motor Power Connection Diagram

To connect the motor power:

1. Ensure that the motor chassis is properly earthed.
2. Connect the appropriate wire from the Motor Power cables to the M1, M2, M3, and PE terminals on the Titanium Solo Lizard.

   The phase connection is arbitrary, as Elmo Application Studio (EAS III) will establish the proper commutation automatically during setup. When tuning a number of drives, you can copy the setup file to the other drives and thus avoid tuning each drive separately. In this case, the motor-phase order must be the same as on the first drive.

Note: The PE terminal is combined, hence used by both cables.

3. For high EMI environment, it is highly recommended to use a 4-wire shielded (not twisted) cable for each axis (the PE terminal is used by both) in the motor connection. The gauge is determined by the actual RMS current consumption of the motor.
   Connect the cable shield to the closest ground connection at the motor end.

   For better EMI performance, the shield should be connected to Earth Connection (heat sink mounting holes).
4. To connect two wires to the PE terminal, use a dual wire twin ferrule. Make sure not to bundle the wires.
   Figure 17 shows the terminals on the Titanium Solo Lizard for the Safety Capabilities S and O – EtherCAT version.
   Figure 18 shows the terminals on the Titanium Solo Lizard for the Safety Capability O – CAN version.
   Figure 19 shows the terminals on the Titanium Solo Lizard for the Safety Capability F.

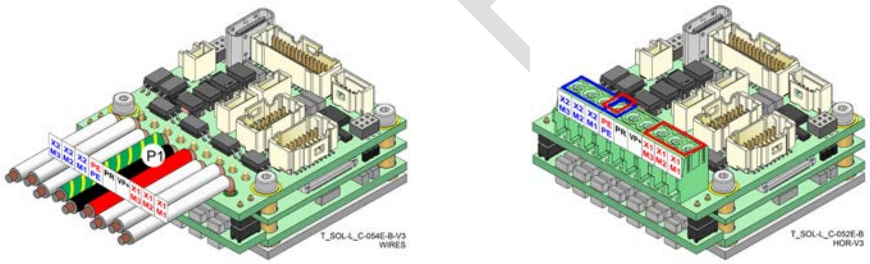


Figure 17: Connecting to the Motor Power for Safety Capabilities S and O for the EtherCAT Version

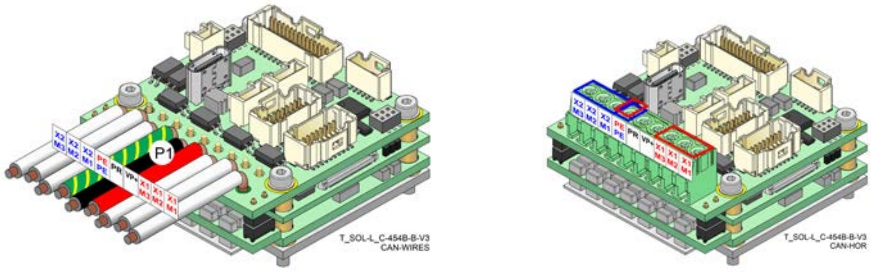


Figure 18: Connecting to the Motor Power for Safety Capability O for the CAN Version

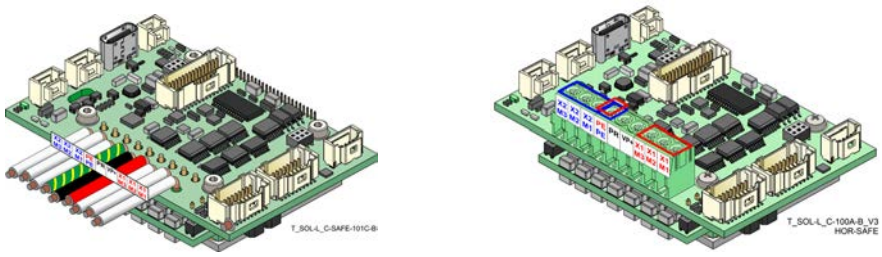


Figure 19: Connecting to the Motor Power for Safety Capability F

8.4.2 Main Power (P1)

The isolated DC power source is not included with the Titanium Solo Lizard.

Connect the DC power cable to the VP and PR terminals on the main power connector.

To connect the Titanium Solo Lizard to the DC power source:

1. The source of the VDC power supply must be isolated from the Mains.
2. Verify that the rectified VDC is indeed within the range of the drive.
3. Connect the VP and PR wires to the terminals on the servo-drive, marked in red:
   Figure 20 for the Safety Capabilities S and O – EtherCAT version
   Figure 21 for Safety Capability O – CAN version
   Figure 22 for Safety Capability F
   It is highly recommended to twist the two DC main power cables at intervals of 10 cm.

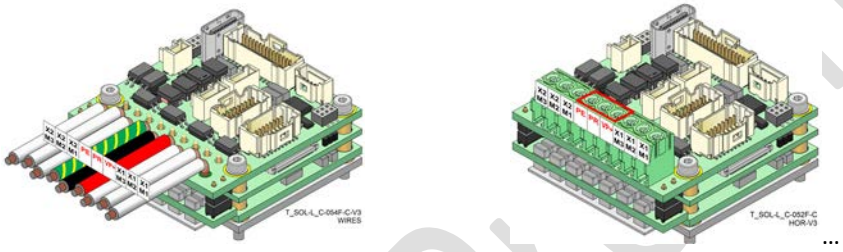


Figure 20: Connecting the Main Power Wires for Safety Capabilities S and O – EtherCAT Version

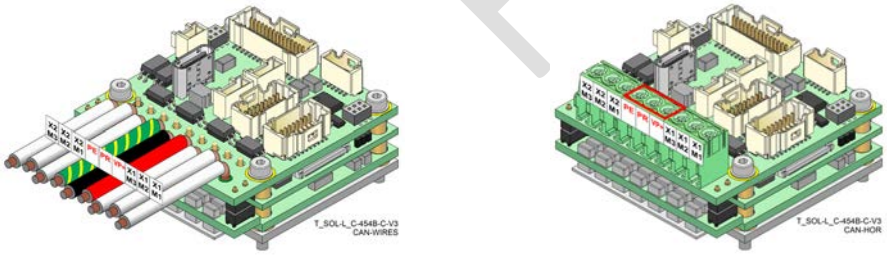


Figure 21: Connecting the Main Power Wires for Safety Capability O – CAN Version

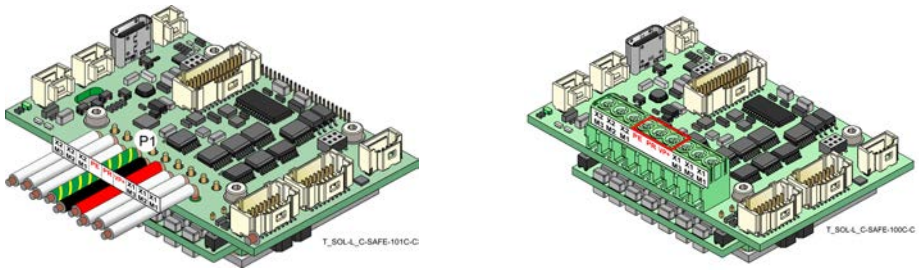


Figure 22: Connecting the Main Power Wires for Safety Capability F

4. Connect the PE to the closest earth connection near the power supply.
5. Connect the PR to the closest earth connection near the power supply.
6. Before applying power, first verify the polarity of the connection.

8.4.3 Control Supply Connections (P2)

Connect the VL+ and VL- terminals to the power supply Control Connector.

To connect the VL+ and VL- to the control supply:

1. The source of the control supply must be isolated from the Mains.
2. Connect the return (common) of the control supply source to the closest earth connection near the control supply source.
3. Connect the VL+ and VL- wires to the terminals on the servo-drive as shown in **Figure 23**, **Figure 24**, and **Figure 25**.
4. Before applying power, first verify the polarity of the connection.

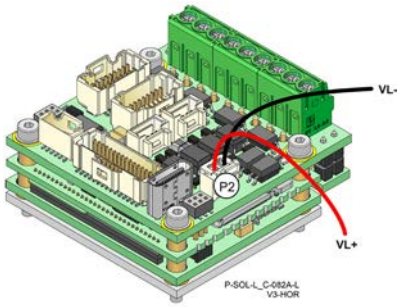


Figure 23: Connecting the Control Supply Wires for Safety Capabilities S and O – ECAT version

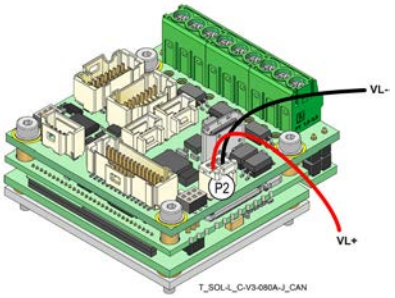


Figure 24: Connecting the Control Supply Wires for Safety Capability O – CAN version

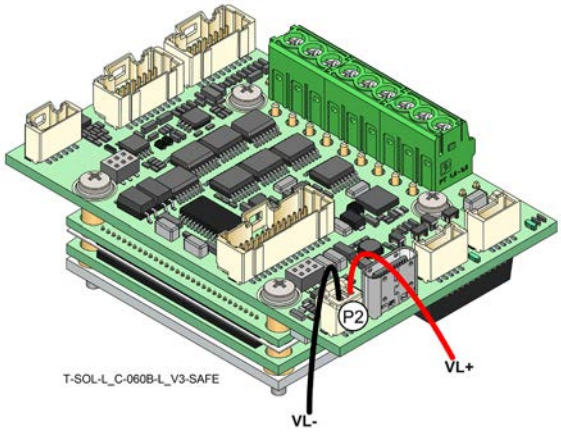


Figure 25: Connecting the Control Supply Wires for Safety Capability F

8.4.4 Dual Power Supply

Two DC power sources are required for Functional Safety. To implement Functional Safety, refer to the Titanium Safety Drive Manual.

Main Power isolated from the Mains:

- 10 to 90VDC for 100V models.
- Control Power Supply: **14V - 60V** for the logic, isolated DC Source.

Both the Power and Logic supplies are required to be isolated-from-the-mains:

- A battery or main DC power source rectified from the Mains, according to specification.
- A control supply for the logic (VL+, VL-)

The following figure describes an ordinary power supply for Servo drives with sufficient internal capacitance and shunt regulator to manage power flow in both directions to-and-from the motor.

Note:
The PR, COMRET, and VL- are connected internally in the Titanium Solo Lizard.

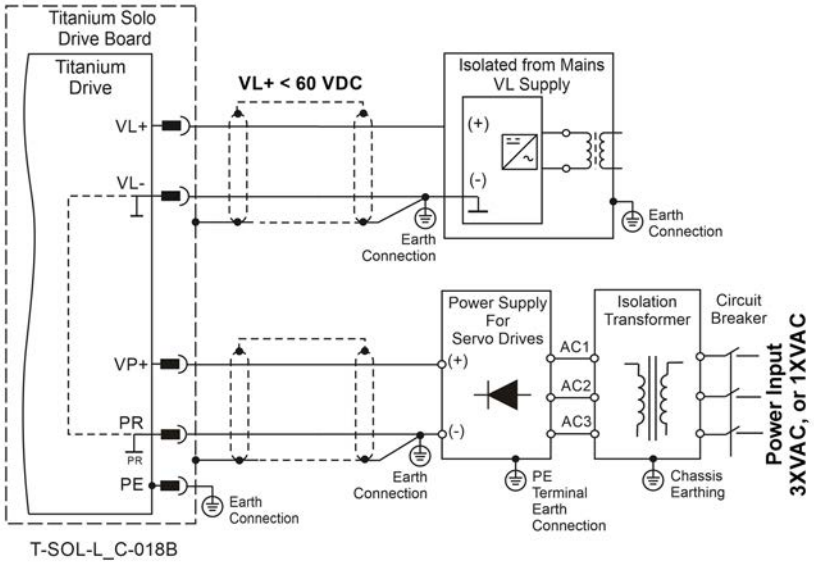


Figure 26: Separate VP and VL Power Supplies Connection Diagram

Note:

- Make sure to connect the PR to the closest earth connection near the power supply.
- VL and VP can be connected when VL < 60 is guaranteed, including the consideration of back EMF.

8.5 Feedback (J31, J32)

The Feedback for Axis 1 Port A and B sensors' pinouts are found in the 2x10 pins connector **J31**.

The Feedback for Axis 2 Port A and B sensors' pinouts are found in the 2x10 pins connector **J32**.

Port "C" consists of Index Port A and Index Port B.

The following table describes the pin positions for Port A & B connectors for Axes 1 and 2.

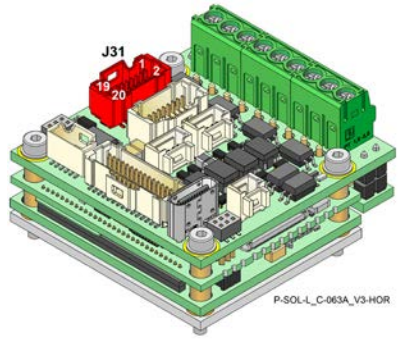
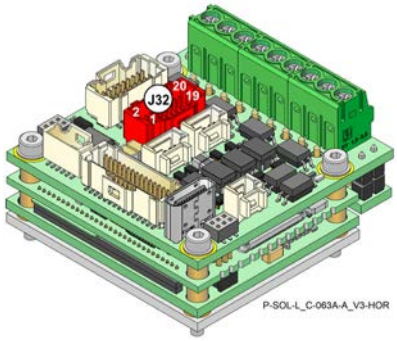
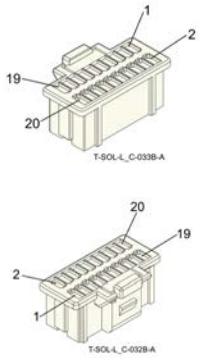
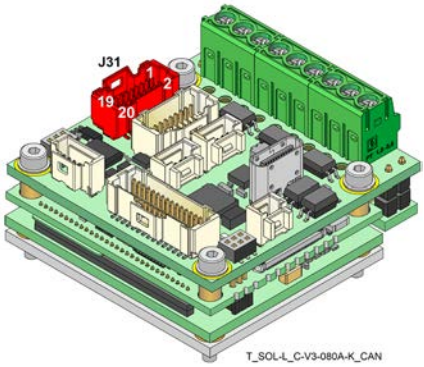
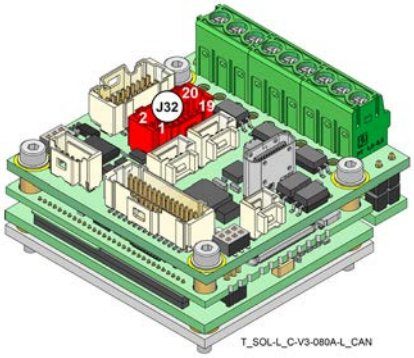
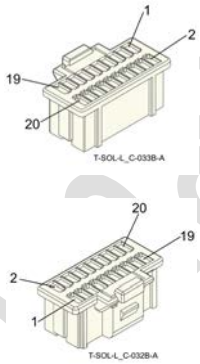
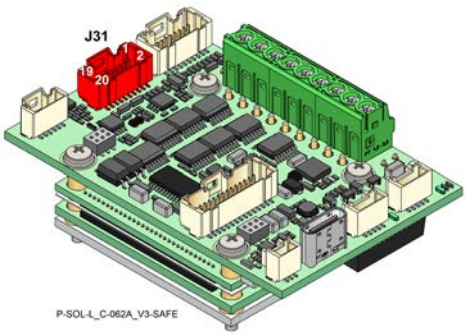
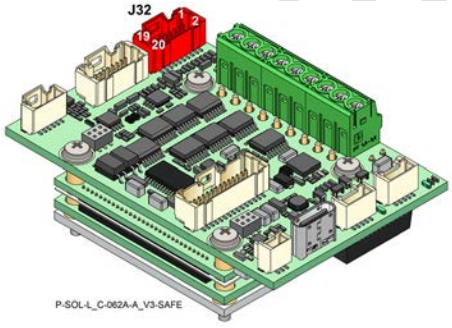
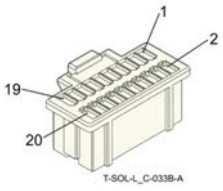
Port A & B Connector (J31) and Pin Positions for Axis 1 – Regular I/O EtherCAT Version	Port A & B Connector (J32) and Pin Positions for Axis 2 – Regular I/O EtherCAT Version	Cable Connector
		
Port A & B Connector (J31) and Pin Positions for Axis 1 – Regular I/O CAN Version	**Port A & B Connector (J32) and Pin Positions for Axis 2 – Regular I/O CAN Version**	**Cable Connector**
		
Port A & B Connector (J31) and Pin Positions for Axis 1 – Safe I/O Version	**Port A & B Connector (J32) and Pin Positions for Axis 2 – Safe I/O Version**	**Cable Connector**
		

Table 35: Port A & B Connectors (J31 and J32) and Pin Positions for Axes 1 & 2

The details of the Feedback for Axes 1 and 2 Port A, B, and "C" sensor pinouts are described in the following subsections.

8.5.1 Feedback Port A for Axes 1 & 2

Port A supports the following sensor inputs:

- Incremental Encoder – see 8.5.1.2.
- Main Absolute Encoder – see 8.5.1.3.
- Auxiliary Absolute Encoder – see 8.5.4.
- Hiperface Encoder – see 8.5.3.
- Pulse-width modulation (PWM) signal input
- Pulse & Direction signal inputs
- Emulated Encoder output – see 8.5.5.
- Capture input from Index channel of Port A
- Output Compare selected channel according to the firmware

The signals and functions are described in the following tables:

Port A	J31 for Axis 1	Incremental Encoder	Absolute Serial Encoder
Pin#	Signal	Function	Function
5	X1_PortA_A+	Channel A+	Main Absolute encoder clock+
7	X1_PortA_A-	Channel A-	Main Absolute encoder clock-
9	X1_PortA_B+	Channel B+	Main Absolute encoder data+
11	X1_PortA_B-	Channel B-	Main Absolute encoder data-
13	X1_PortA_I+	Channel Index+	Auxiliary Absolute encoder clock+
15	X1_PortA_I-	Channel Index-	Auxiliary Absolute encoder clock-

Table 36: Feedback for Axis 1 Port A

Port A	J32 for Axis 2	Incremental Encoder	Absolute Serial Encoder
Pin#	Signal	Function	Function
5	X2_PortA_A+	Channel A+	Main Absolute encoder clock+
7	X2_PortA_A-	Channel A-	Main Absolute encoder clock-
9	X2_PortA_B+	Channel B+	Main Absolute encoder data+
11	X2_PortA_B-	Channel B-	Main Absolute encoder data-
13	X2_PortA_I+	Channel Index+	Auxiliary Absolute encoder clock+
15	X2_PortA_I-	Channel Index-	Auxiliary Absolute encoder clock-

Table 37: Feedback for Axis 2 Port A

8.5.1.1 Power Signals and Control Supply

Pin#	Signal		Function
Pin#	J31 for Axis 1	J32 for Axis 2	
1	+11V Encoder/ +5V Encoder	+11V Encoder / +5V Encoder	For Encoder type 1: +11V supply For Encoder type 5: +5V supply
2	+5V Encoder	+5V Encoder	Encoder +5V supply
3, 4, 20	COMRET	COMRET	Common Return

Table 38: Feedback for Axes 1 & 2 Port A

8.5.1.2 Incremental Encoder

The following figure describes the Incremental Encoder connection diagram.

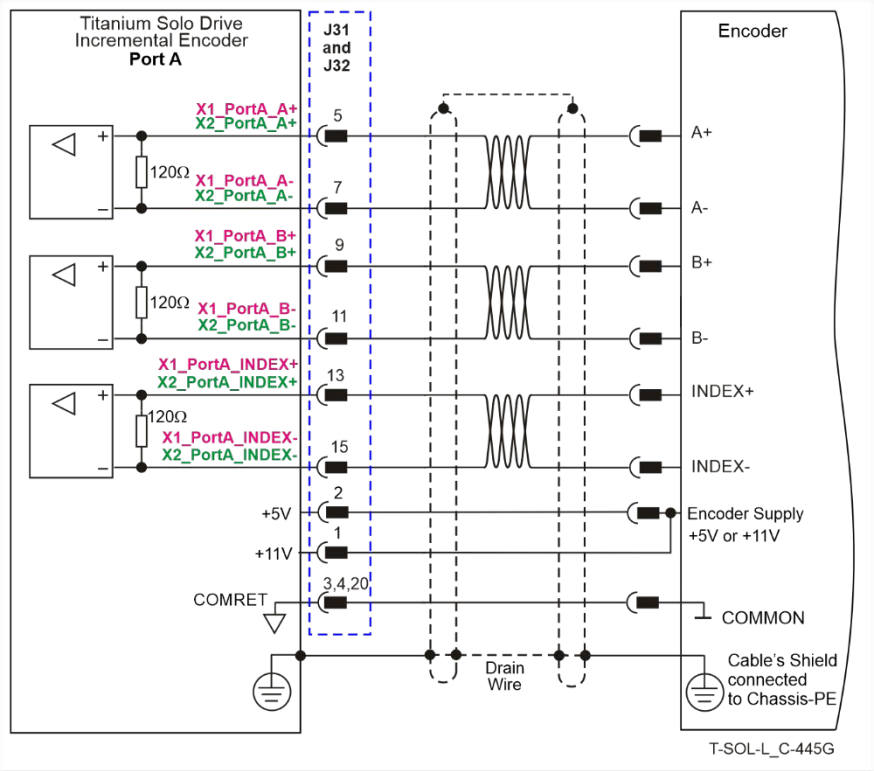


Figure 27: Port A Incremental Encoder Input – Recommended Connection Diagram

8.5.1.3 Main Absolute Serial Encoder

The Port A ABS encoder supports the following encoder types:

- Encoder 6-Wires (for Safety Capabilities F, S, and O)
- Encoder 4-Wires (for Safety Capabilities F, S, and O)
- Encoder 2-Wires (for Safety Capability F)

8.5.1.3.1 6-Wire Encoders

The 6-wire encoder includes Differential Absolute Clock, Differential Absolute DATA, Encoder Power, and GND.

The following Absolute Encoder types are supported:

- EnDat 2.2
- Biss C and Biss B, Safe BISS
- SSI

The following is the connection diagram 6-wires encoder for the Main Absolute Serial Encoder:

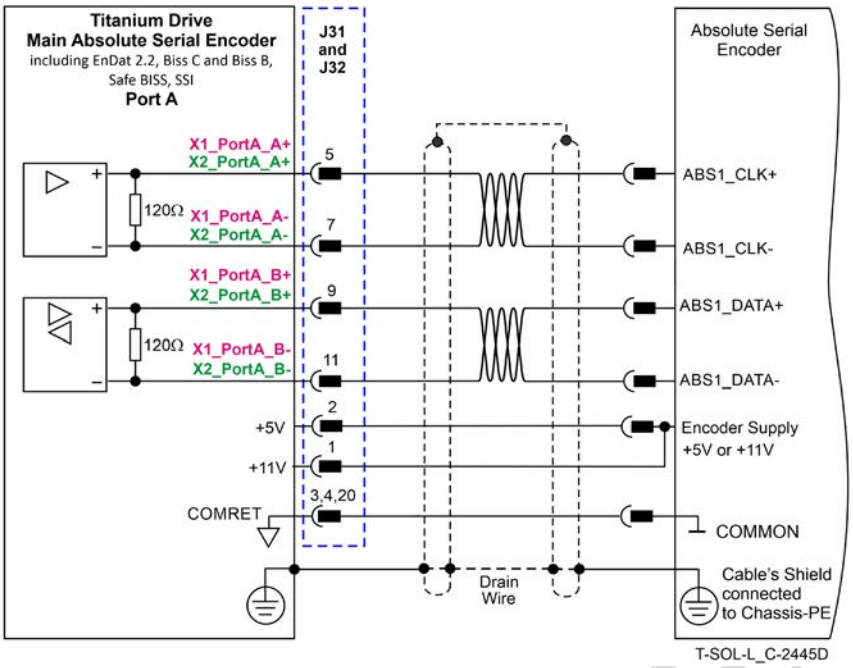


Figure 28: Port A Main Absolute Serial Encoder – Recommended Connection Diagram for EnDat, Biss, SSI

8.5.1.3.2 4-Wire Encoders

The 4-wire encoder includes Differential Absolute Data, Encoder Power, and GND.

The following Absolute Encoder types are supported:

- Panasonic (Encoder Option E)
- Tamagawa (Encoder Option E)
- Sanyo-Danki (Encoder Option E)
- Acuro Link (Encoder Option 1)
- SCS (Encoder Option 2)

The following is the connection diagram 4-wire encoder:

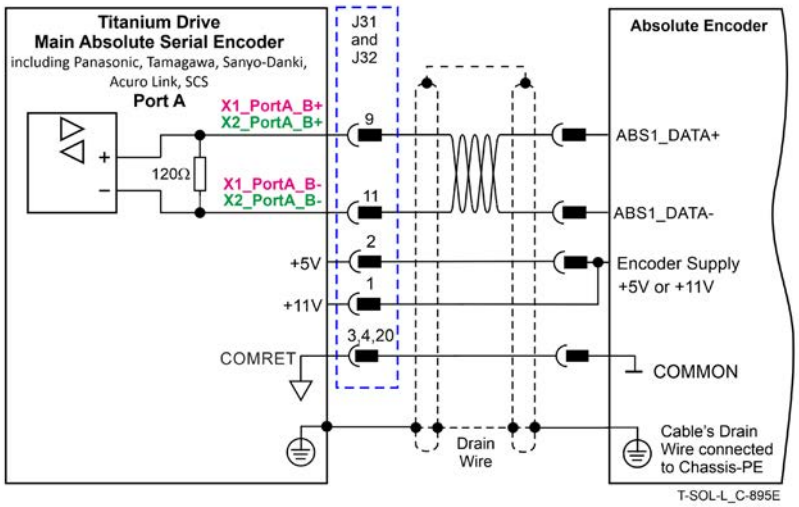


Figure 29: Port A Main Absolute Serial Encoder – Recommended Connection Diagram for Panasonic, Tamagawa, Sanyo

8.5.1.3.3 Encoder 2-Wires

For Safety Capability F: The 2-wire encoder includes Differential DATA with power.

The following Absolute Encoder types are supported:

- Endat3, Safe Endat3 (Safety Capability F and Encoder Option H)
- SCS Open link (Safety Capability F and Encoder Option 2)
- Hiperface DSL (Safety Capability F and Encoder Option 2)

The following is the feedback connection diagram:

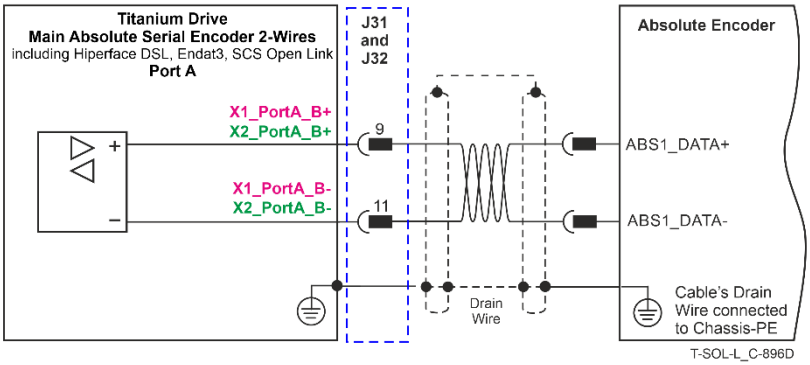


Figure 30: Absolute Serial Encoder - 2 Wires Connection Diagram (example) for Safety Capability F

8.5.2 Feedback Port B for Axes 1 & 2

Port B supports any of the following sensor inputs:

- Incremental Encoder, interpolated analog Encoder **or** Resolver (separate hardware option)
- Hiperface Encoder – see 8.5.3.
- Emulated Encoder output – see 8.5.5.

The signals and functions are described in the following tables.

Port B (J31) for Axis 1		Incremental Encoder	ABS Encoder	SIN/COS Encoder	Resolver
Pin#	**Signal**	**Function**	**Function**	**Function**	**Function**
6	X1_PortB_A+	Channel A+		Sine+	Sine+
8	X1_PortB_A-	Channel A-		Sine-	Sine-
10	X1_PortB_B+	Channel B+		Cosine+	Cosine+
12	X1_PortB_B-	Channel B -		Cosine-	Cosine-
14	X1_PortB_I+	Channel Index+	Auxiliary Absolute encoder data+	Index+	RESOLVER_OUT+ Vref complement f=1/TS, 50mA Maximum
16	X1_PortB_I-	Channel Index-	Auxiliary Absolute encoder data-	Index-	RESOLVER_OUT- Vref complement f=1/TS, 50mA Maximum

Table 39: Feedback for Axis 1 Port B

Port B (J32) for Axis 2		Incremental Encoder	ABS Encoder	SIN/COS Encoder	Resolver
Pin#	**Signal**	**Function**	**Function**	**Function**	**Function**
6	X2_PortB_A+	Channel A+		Sine+	Sine+
8	X2_PortB_A-	Channel A-		Sine-	Sine-
10	X2_PortB_B+	Channel B+		Cosine+	Cosine+
12	X2_PortB_B-	Channel B -		Cosine-	Cosine-
14	X2_PortB_I+	Channel Index+	Auxiliary Absolute encoder data+	Index+	RESOLVER_OUT+ Vref complement f=1/TS, 50mA Maximum
16	X2_PortB_I-	Channel Index-	Auxiliary Absolute encoder data-	Index-	RESOLVER_OUT- Vref complement f=1/TS, 50mA Maximum

Table 40: Feedback for Axis 2 Port B

8.5.2.1 Power Signals and Control Supply

Port B	J31 for Axis 1	J32 for Axis 2	Function
Pin#	**Signal**	**Signal**	**Function**
1	+11V Encoder/ +5V Encoder	+11V Encoder / +5V Encoder	For Encoder type 1: +11V supply For Encoder type 5: +5V supply
2	+5V Encoder	+5V Encoder	Encoder +5V supply
3, 4, 20	COMRET	COMRET	Common Return

Table 41: Feedback Port B Power Signals and Control Supply

8.5.2.2 Incremental Encoder

The following figure describes the connection diagram.

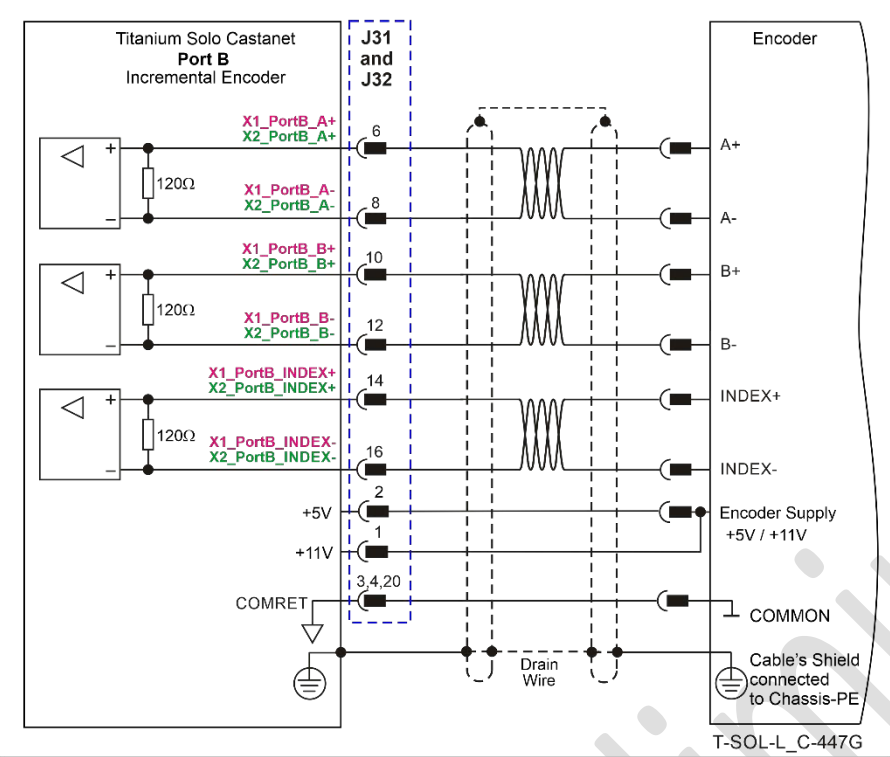


Figure 31: Port B Incremental Encoder Input – Recommended Connection Diagram

8.5.2.3 Interpolated Analog (Sine/Cosine) Encoder

The following figure describes the connection diagram.

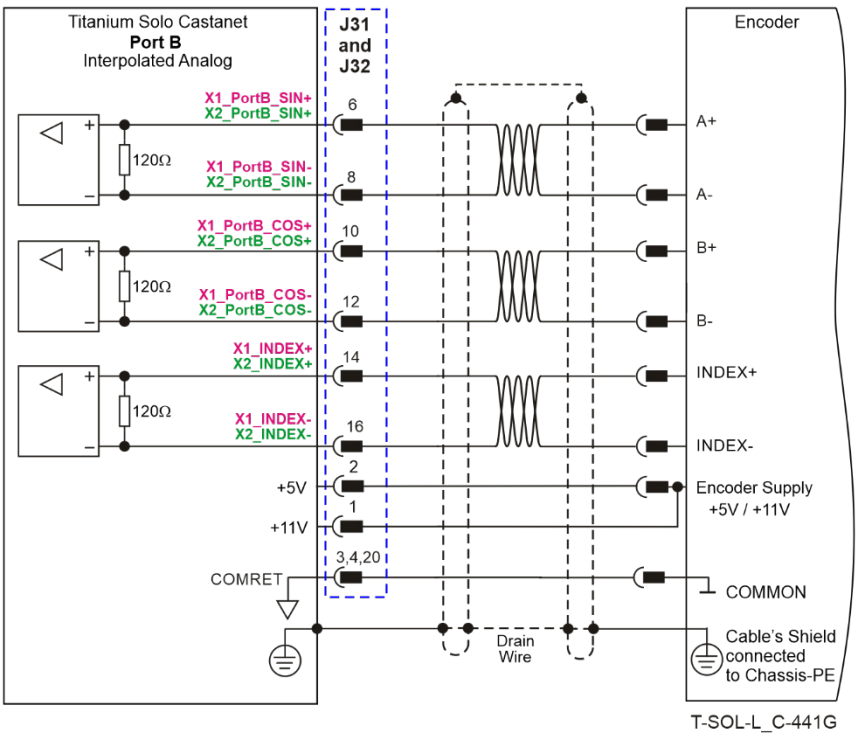


Figure 32: Port B - Interpolated Analog Encoder Connection Diagram

8.5.2.4 Resolver

For Safety Capability F and CAN with Safety Capability O:

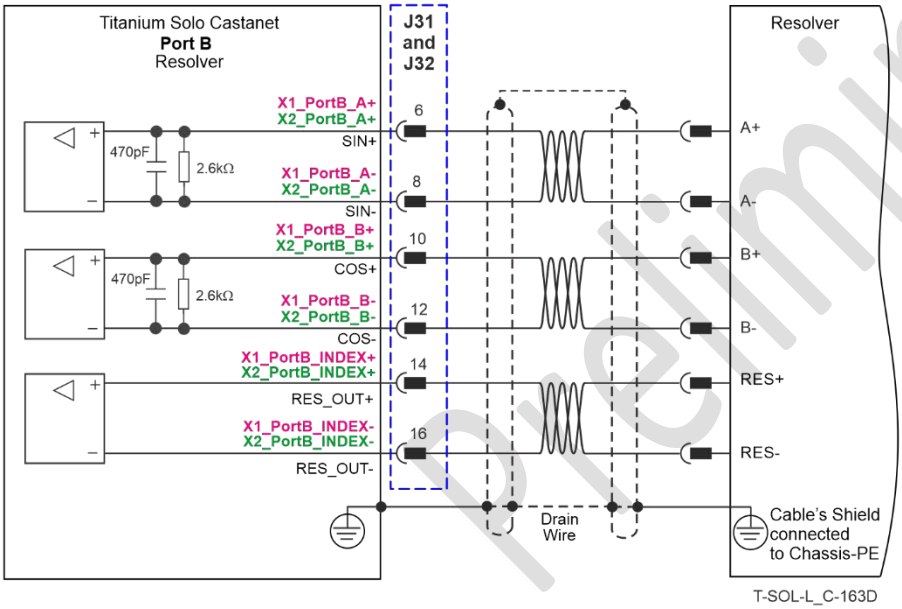


Figure 33: Port B - Resolver Connections Diagram – for Safety Capability F

8.5.3 Hiperface

The following is the connection diagram for Hyperface.

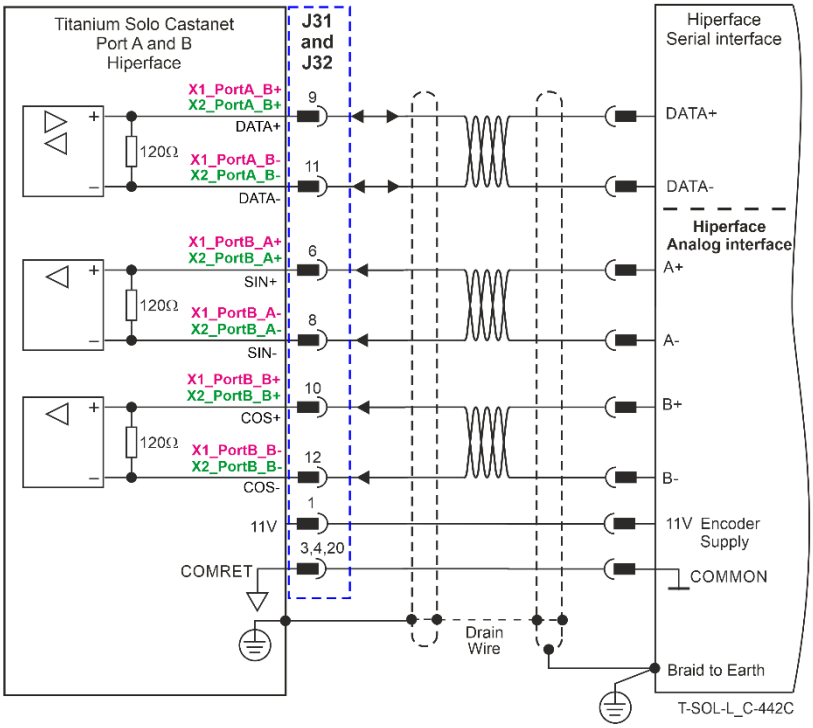


Figure 34: Absolute Serial Encoder – Recommended Connection Diagram for Stegmann Hiperface

8.5.4 Auxiliary Absolute Serial Encoder

The Auxiliary Absolute encoder is derived from the Port A Index channels and the Port B Index channels.

The Auxiliary Absolute encoder supports the 4-wire encoder types:

- EnDat 2.2
- Biss C and Biss B, Safe BISS
- SSI

The Port "C" describes the Auxiliary Absolute Encoder consisting of PortA_I and PortB_I.

Port A, B	J31 for Axis 1	Absolute Serial Encoder
Pin#	**Signal**	**Function**
13	X1_PortA_I+	Auxiliary Absolute encoder clock+
15	X1_PortA_I-	Auxiliary Absolute encoder clock-
14	X1_PortB_I+	Auxiliary Absolute encoder data+
16	X1_PortB_I-	Auxiliary Absolute encoder data-

Table 42: Feedback for Port A and B (Port "C"), Axis 1

Port A, B	J32 for Axis 2	Absolute Serial Encoder
Pin#	**Signal**	**Function**
13	X2_PortA_I+	Auxiliary Absolute encoder clock+
15	X2_PortA_I-	Auxiliary Absolute encoder clock-
14	X2_PortB_I+	Auxiliary Absolute encoder data+
16	X2_PortB_I-	Auxiliary Absolute encoder data-

Table 43: Feedback for Port A and B (Port "C"), Axis 2

Port A, B	J31 for Axis 1	J32 for Axis 2	Function
Pin#	**Signal**	**Signal**	**Function**
1	+11V Encoder/ +5V Encoder	+11V Encoder / +5V Encoder	For Encoder type 1: +11V supply
1, 2	+5V Encoder	+5V Encoder	Encoder +5V supply
3, 4, 20	COMRET	COMRET	Common Return

Table 44: Feedback for Port A and B (Port "C"), Axes 1 & 2

The following is the connection diagram for EnDat, Biss, and SSI:

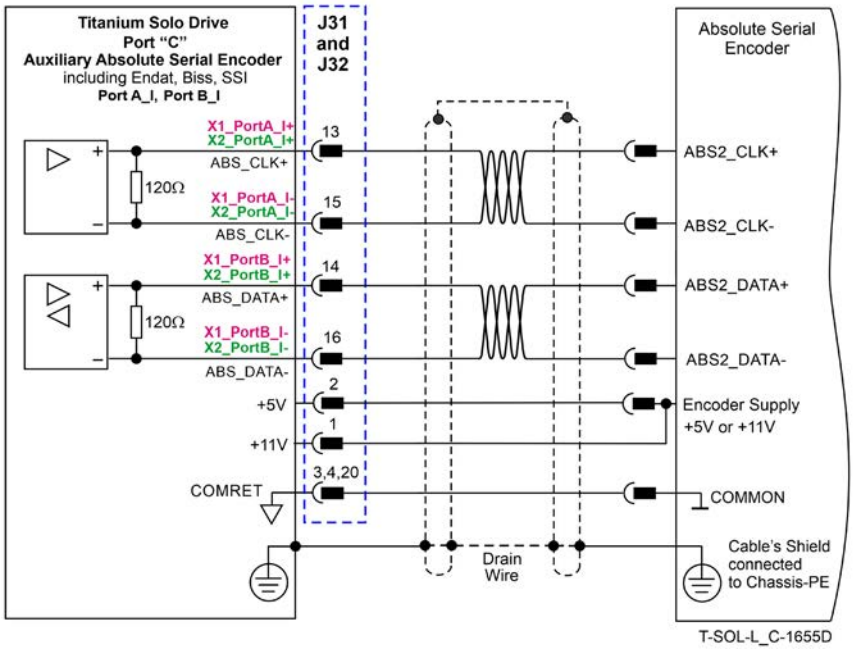


Figure 35: Auxiliary Absolute Serial Encoder for Port "C" – Recommended Connection Diagram for EnDat, Biss, SSI

8.5.5 Emulated Encoder Output

The Emulated Encoder output includes two channels, Channel A and Channel B. Each of the following signals may be used for Emulation Output: PortA_A, PortA_B, Port A_I, PortB_I, depending on which pin is available. The pin selection can be set using the EAS application.

In Figure 36, **X** =

- PortA_A
- PortA_B
- PortA_I
- PortB_I

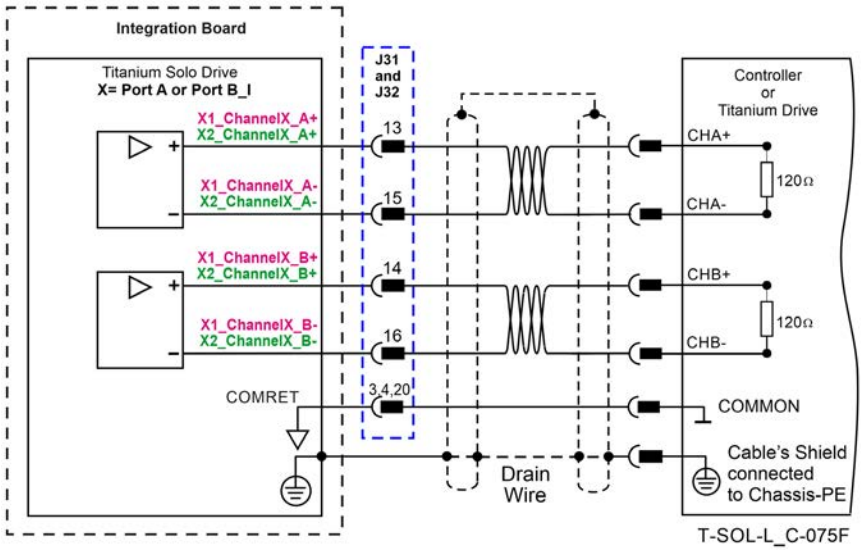


Figure 36: Emulated Encoder Output Options

8.5.6 Hall Sensors

The following tables describe the Hall Sensor functions for axes 1 and 2, for connectors J31 and J32.

Pin No. (J31) for Axis 1		Function
Pin #	**Signal**	**Function**
17	X1_HA	Hall A
18	X1_HB	Hall B
19	X1_HC	Hall C
3, 4, 20	COMRET	Common Return

Table 45: Hall Sensors for Axis 1

Pin No. (J32) for Axis 2		Function
Pin #	**Signal**	**Function**
17	X2_HA	Hall A
18	X2_HB	Hall B
19	X2_HC	Hall C
3, 4, 20	COMRET	Common Return

Table 46: Hall Sensors for Axis 2

The following figure describes the Hall Sensors Port A and Port B connection diagram for Axes 1 and 2, connectors J31 and J32.

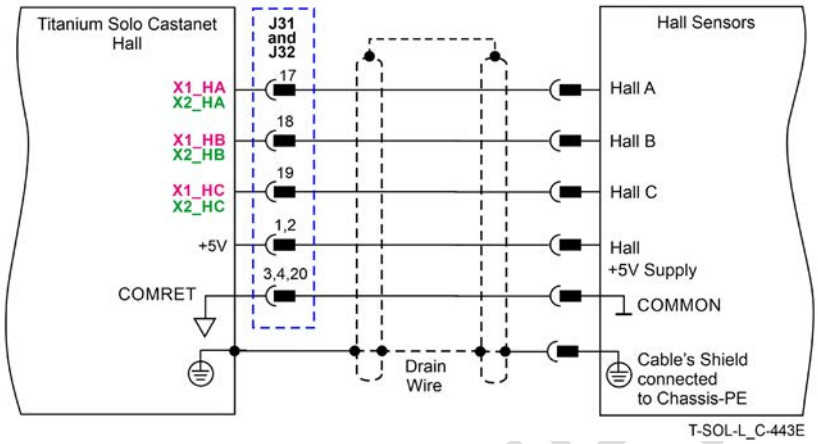


Figure 37: Hall Sensors Connection Diagram - J31 & J32

8.6 Analog Input (J33)

The following table describes the Analog Input pins.

Pin No. J33	Signal	Function
2	ANALOG_IN1+	Analog input 1+
4	ANALOG_IN1-	Analog input 1-
6	COMRET	Common Return
26	COMRET	Common Return
28	ANALOG_IN2+	Analog input 2+
30	ANALOG_IN2-	Analog input 2-

Table 47: Analog Input pins

The Analog Inputs are of type Differential ±10 V.

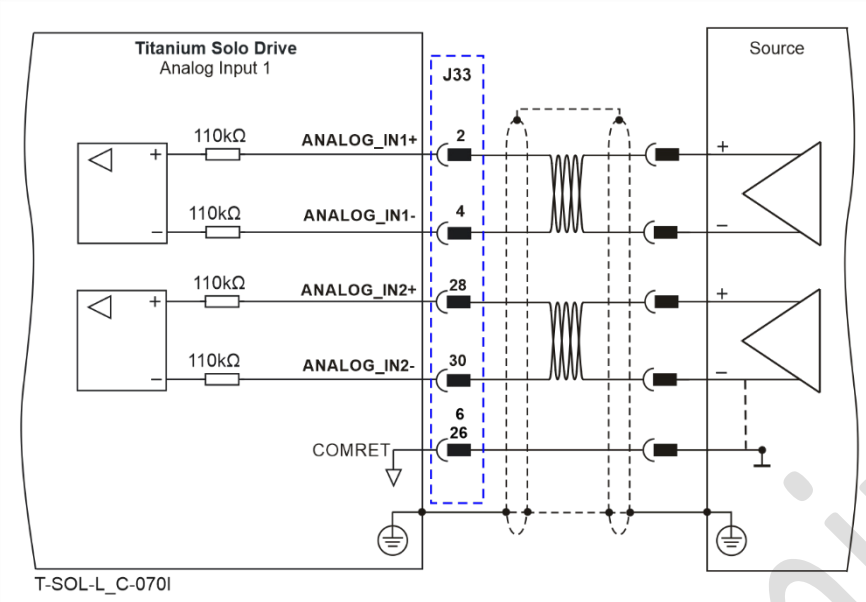


Figure 38: Analog Input

8.7 STO (Safe Torque Off) (J34)

The following table describes the STO pins.

Pin No. (J34)	Signal	Function
1	X1_STO1	X1 STO1 input opto isolated
2	X1_STO2	X1 STO2 input opto isolated
3	X1_STO_RET	X1 STO signal return
4	X2_STO1	X2 STO1 input opto isolated
5	X2_STO2	X2 STO2 input opto isolated
6	X2_STO_RET	X2 STO signal return

Table 48: STO pins

8.7.1 PLC Source Mode

The PLC Source option is available for IO-type V and P.

Refer to the diagram below for the PLC Source connection:

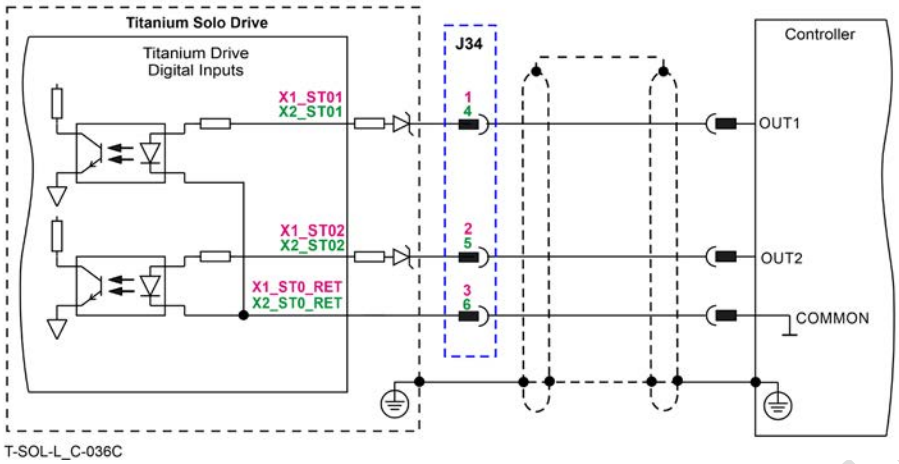


Figure 39: STO Input Connection - PLC Source Mode

8.7.2 5V Logic

The 5V Logic option is available for IO-type U.

Refer to the diagram below for the 5V Logic connection:

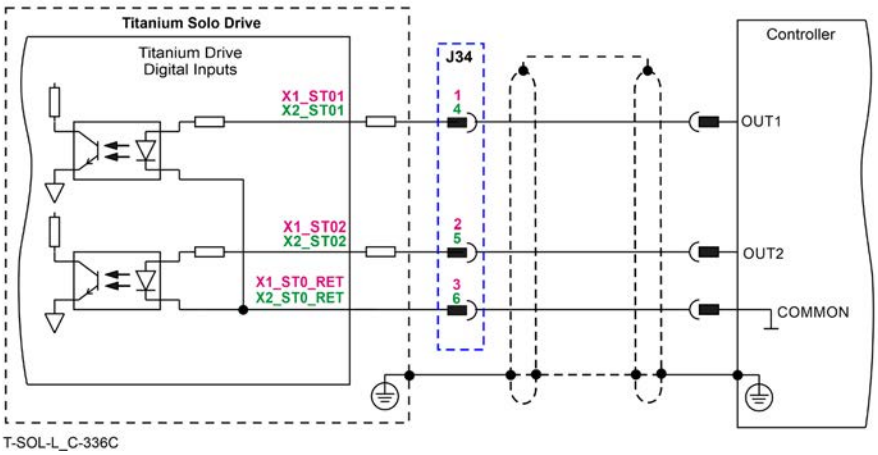


Figure 40: STO Input Connection - 5V Logic

8.8 Safe Digital I/Os (SAFE IO TYPE: P) (J33)

Refer to the Safe Digital IO section, in the Titanium Safety Drive Manual for details, specification and connection of IO for Safety.

The following table describes the Safe Digital I/O pins:

Pin No. J33	Signal	Function
9	OUTPUT1	Output 1
11	OUTPUT2	Output 2
13	OUTPUT7	Output 7
15	OUTPUT8	Output 8
17	INPUT1	Input 1
19	INPUT2	Input 2
21	INPUT3	Input 3
23	INPUT4	Input 4
25	OUTPUT3	Output 3
27	OUTPUT4_SNK	Output 4 Sink for Safe Output
29	OUTPUT4_SRC	Output 4 Source for Regular Output or Test Pulse

Table 49: Safe I/O pins

8.8.1 Digital Inputs with Test Pulse Connections

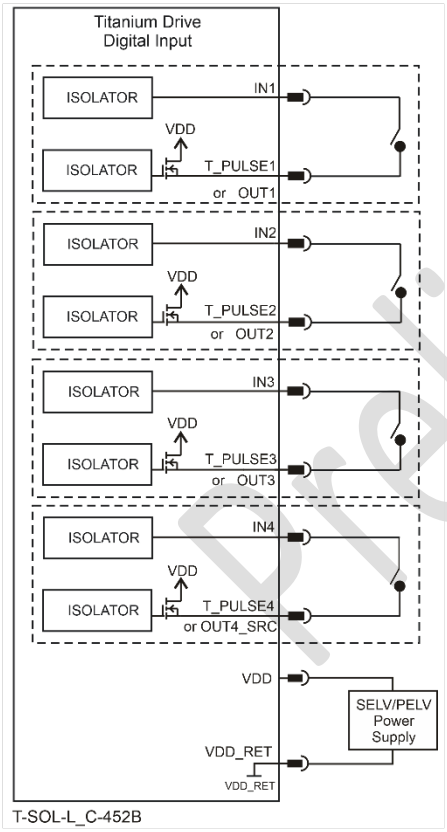


Figure 41: Digital input SIL3, PLe, CAT2 with test pulse

8.8.2 OSSD Inputs Connections

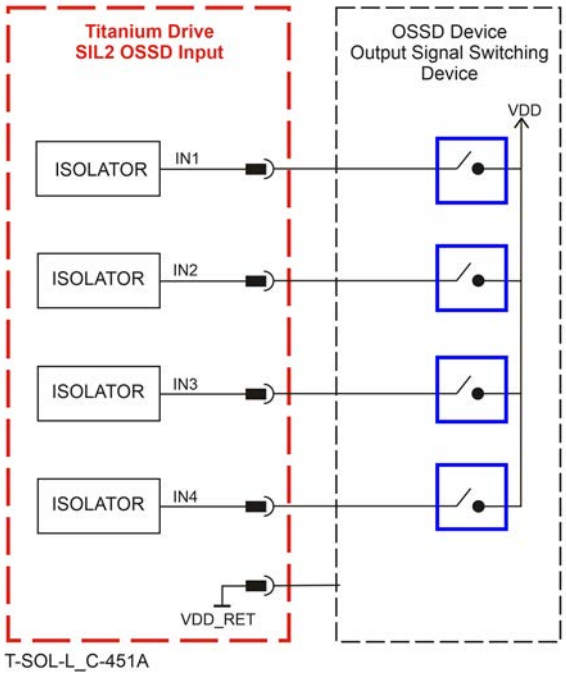


Figure 42: OSSD Input SIL2 PLd CAT2

8.8.3 Digital Outputs

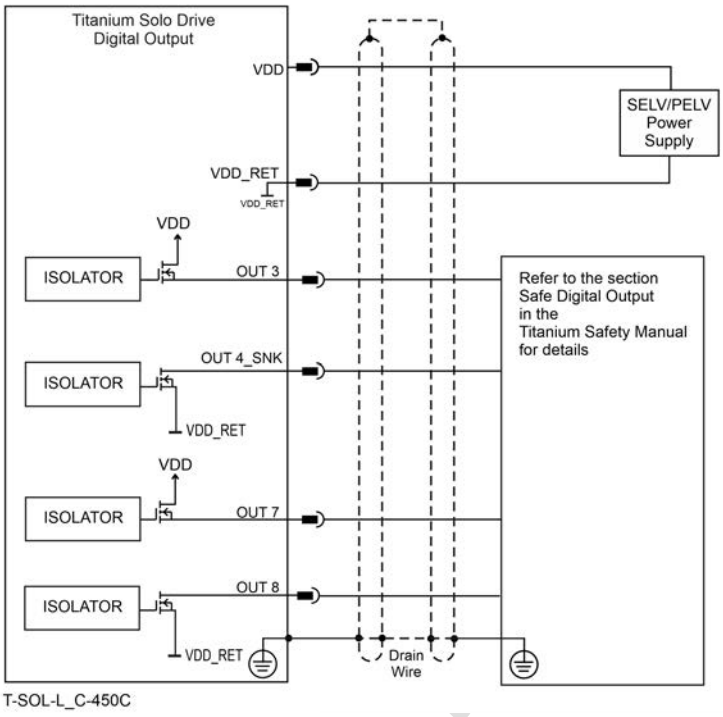


Figure 43: Safe Digital Output – IO TYPE = P

8.9 Regular Digital I/Os (J33)

The following table describes the Regular Digital I/O pins:

Pin No. J33	Signal	Function
9	OUTPUT1	Output 1
11	OUTPUT2	Output 2
13	OUTPUT7	Output 7
15	OUTPUT8	Output 8
17	INPUT1	Input 1
19	INPUT2	Input 2
21	INPUT3	Input 3
23	INPUT4	Input 4
25	INPUT5	Input 5
27	INPUT6	Input 6
29	IN_COM / PLC_SEL	IO Type U: Power Return IO Type V: For Input: Power Return For Output: Source: Connect Power Return Sink: Connect VDD

Table 50: Regular I/O pins

8.9.1 Digital IO 5V Logic Mode (IO TYPE: U)

The following figures describe the connections at the I/O Port for the Digital Input and Output 5V Logic.

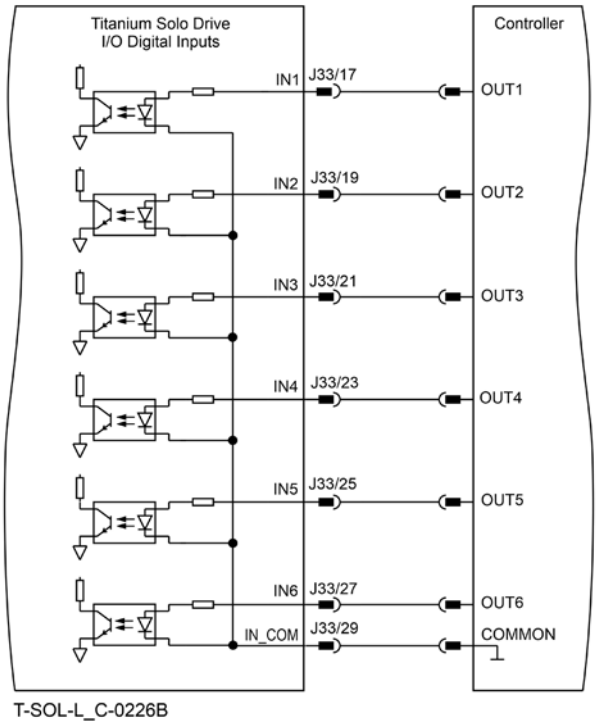


Figure 44: Regular Digital Input 5V Logic Connection Diagram

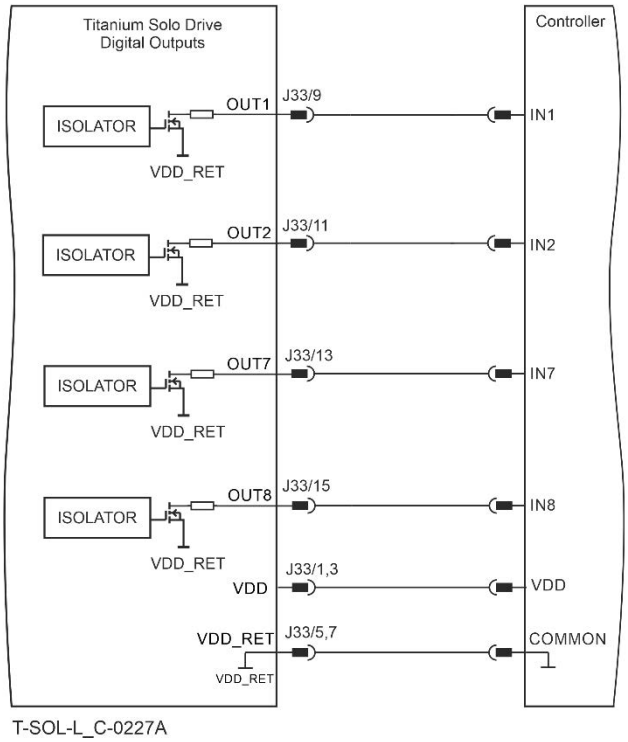


Figure 45: Regular Digital Output Connection Diagram – 5V Logic Option

8.9.2 Digital IO PLC Source and Sink Mode (IO TYPE: V)

8.9.2.1 Digital Input and Output PLC Source Mode

The following figures describe the connections at the I/O Port for the Digital Input and Output PLC Mode.

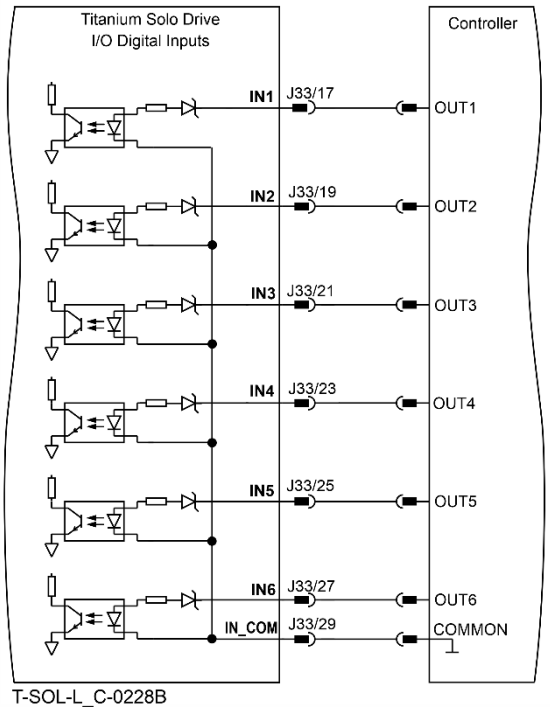


Figure 46: Regular Digital Input Connection Diagram – PLC Source Option

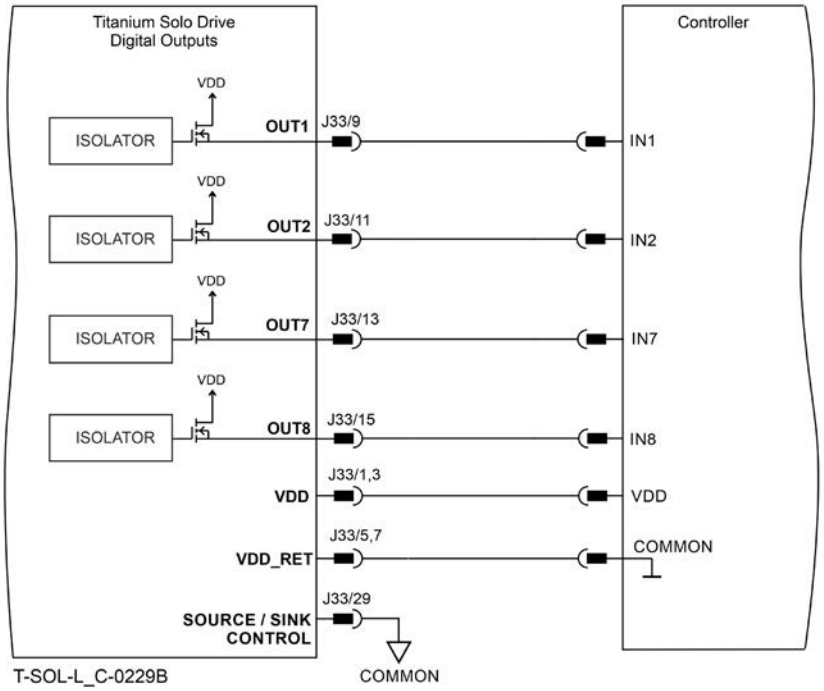


Figure 47: Regular Digital Output Connection Diagram – PLC Source Option

8.9.2.2 Digital Input and Output PLC Sink Mode

The following figures describe the connections at the I/O Port for the Digital Input and Output PLC Sink Mode.

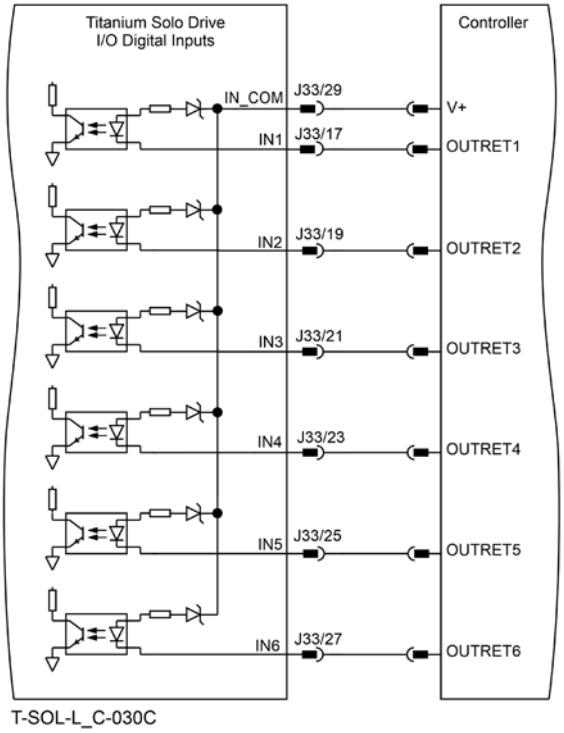


Figure 48: Regular Digital Input Connection Diagram – PLC Sink Option

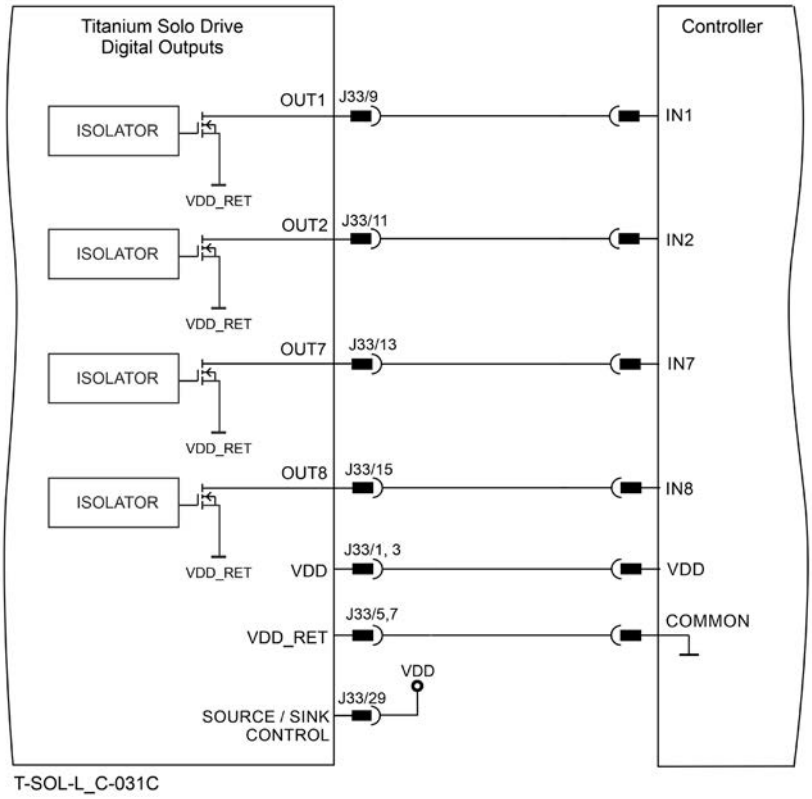


Figure 49: Regular Digital Output Connection Diagram – PLC Sink Option

8.10 Communication (J33)

8.10.1 EtherCAT (X1, X2)

The following tables describe the EtherCAT IN and OUT pins:

EtherCAT/Ethernet Network Options: E, I, H, C		
Pin No. (X1)	**Signal**	**Function**
1	EtherCAT_IN_TX+	EtherCAT IN Transmit+/Ethernet transmit +
2	EtherCAT_IN_TX-	EtherCAT IN Transmit-/Ethernet transmit -
3	EtherCAT_IN_RX+	EtherCAT IN Receive+/Ethernet receive +
4	EtherCAT_IN_RX-	EtherCAT IN Receive-/Ethernet receive -
5	SHLD_IN	Shield IN drain wire

Table 51: EtherCAT IN pins

EtherCAT Network Options: E, I, H, C		
Pin No. (X2)	**Signal**	**Function**
1	EtherCAT_OUT_TX+	EtherCAT out Transmit+
2	EtherCAT_OUT_TX-	EtherCAT out Transmit-
3	EtherCAT_OUT_RX+	EtherCAT out Receive+
4	EtherCAT_OUT_RX-	EtherCAT out Receive-
5	SHLD_OUT	Shield IN drain wire

Table 52: EtherCAT OUT pins

8.10.1.1 EtherCAT Connection

The following drawing describes the EtherCAT communication, and the pinout drawing of the connector.

The Titanium Solo Lizard can serve as an EtherCAT slave device. For this purpose, it has two Ports X1 and X2, which are designated as EtherCAT IN and EtherCAT OUT.

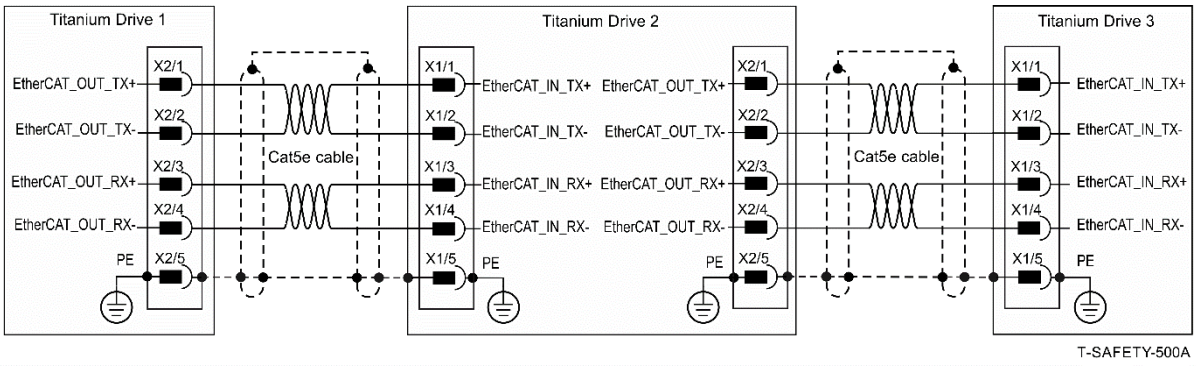


Figure 50: EtherCAT optional Connection Schematic Diagram

Note:
Always use CAT5e cables.

8.10.1.2 EtherCAT Status Indicator

The EtherCAT status indicator is a single red/green dual bi-colored LED that combines the green RUN indicator and the red ERROR indicator of the EtherCAT state machine. For further details, see the EtherCAT Application Manual.

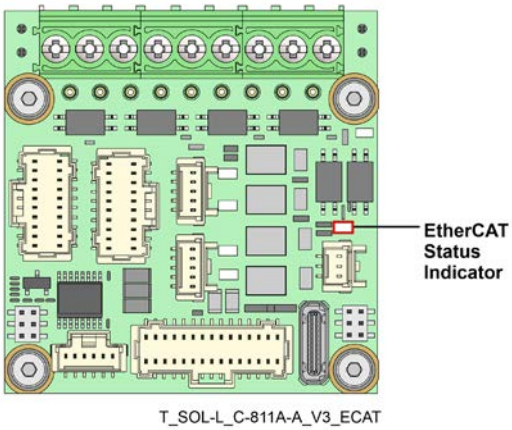


Figure 51: EtherCAT Status Indicator for Safety Capabilities S and O

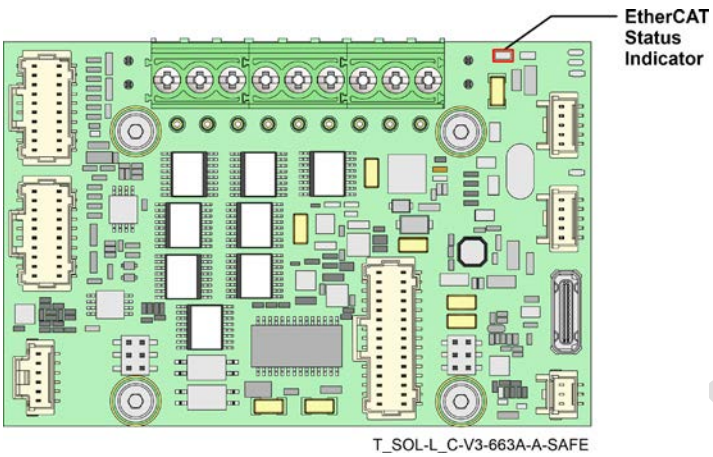


Figure 52: EtherCAT Status Indicator for Safety Capability F

8.10.1.3 EtherCAT Link Indicators

Each of the EtherCAT Ports has a single LED; EtherCAT IN and EtherCAT OUT, which are shown in Figure 53 and Figure 54.

The green LEDs are the link/activity indicators. They show the state of the applicable physical link and the activity on that link; blinking green, both for the Link Act IN, and Link Act OUT.

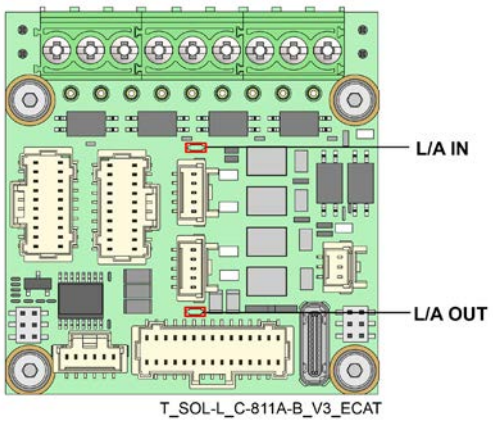


Figure 53: Ethernet Link/Activity Connector LEDs for Safety Capabilities S and O

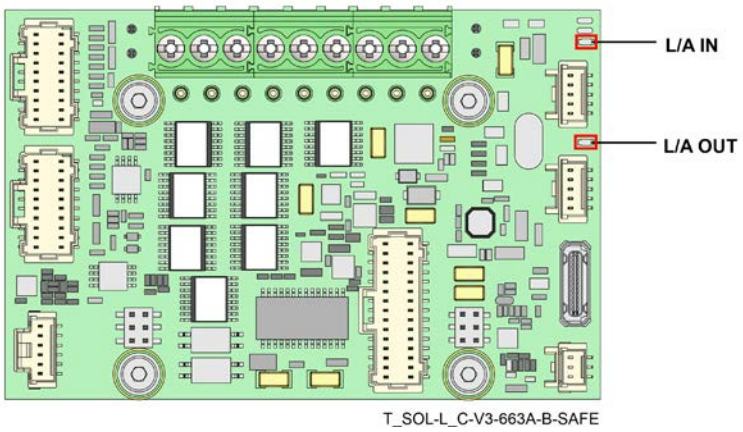


Figure 54: Ethernet Link/Activity Connector LEDs for Safety Capability F

The green LEDs are the link/activity indicators. They show the state of the applicable physical link and the activity on that link; blinking green, both for the Link Act IN, and Link Act OUT.

8.10.2 CAN (X1, X2)

The following table describes the CAN pins:

CAN Network Options: J, N		
Pin No. (X1 and X2)	**Signal**	**Function**
1	Not connected	
2	CAN_RET	Isolation GND for CAN
3	CAN_H	Bidirectional, CAN BUS
4	CAN_L	Bidirectional, CAN BUS
5	PE	Shield IN drain wire

Table 53: CAN pins

Figure 56 and Figure 55 display the CAN connectivity.

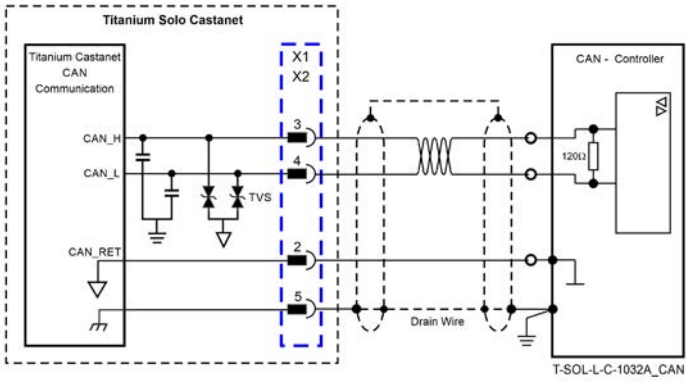


Figure 55: CAN connection diagram

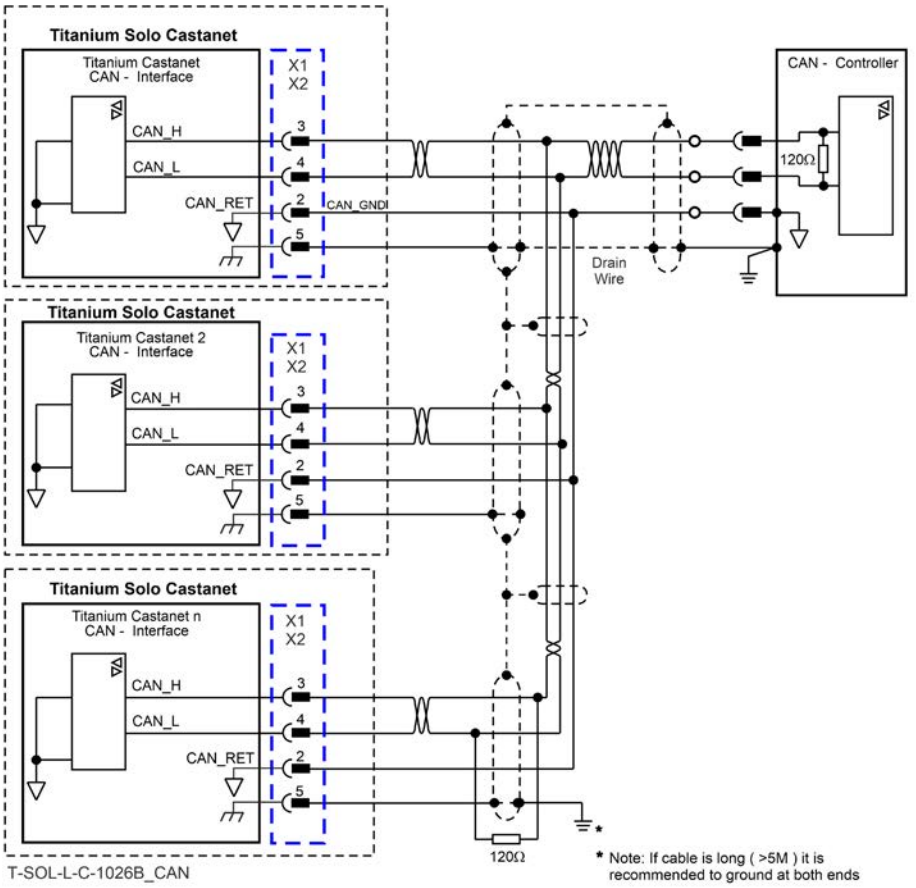


Figure 56: CAN connections

8.10.3 USB 2.0

Important:
It should be noted that throughout the USB section the following applies:
For short distances between the drive and control, 0.5 to 1.0 m wires can be used, and shielding is not required. For longer distances than 1.0 m and/or high EMI environment, shielded and twisted wires should be used. Drain wires should be connected to Elmo COMRET.

The following table describes the USB pins:

USB Network Options: E, I, J		
Pin (X3)	**Signal**	**Function**
A4, A9, B4, B9	USB_VBUS	USB VBUS 5 V
A6, B6	USBD+	USB _P
A7, B7	USBD-	USB _N

Table 54: USB pins

Use a standard USB 2.0 Type C cable and connector to connect the USB. For details, refer to section 7.11.

8.10.4 RS-232 Serial Communication

The following table describes the RS-232 pins:

RS-232 Network Options: E, H, N		
Pin No. J33	**Signal**	**Function**
22	RS232_RX	RS-232 Receive
24	RS232_TX	RS-232 Transmit
16, 26	COMRET	Common Return

Table 55: Standard RS-232 pins

The following describes the RS-232 specification.

Specification	Details
Physical layer	Signals: RS232_Rx, RS232_Tx, COMRET Full duplex, serial communications
Speed	Baud Rate of 4800 bit/sec to 3.9M bit/sec
Protocols	See Elmo Application Studio (EAS III) software and control for setup

Table 56: RS-232 Specification

The following figure describes the RS-232 Serial Communication connection diagram:

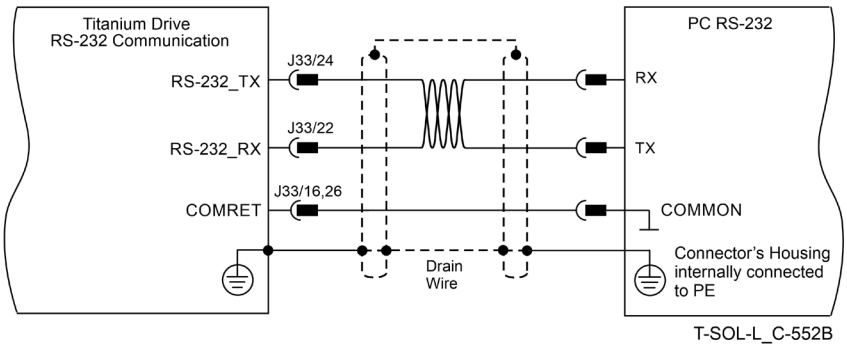


Figure 57: RS-232 Connections Diagram

8.10.5 RS-422 (Differential RS-232) Serial Communication

The following table describes the Differential RS-232 pins, and their respective Network options:

Pin No. (J33)	Signal	Function
Main RS-422 – Network Options: H, C, N		
8	MAIN_RS422_TX-	Differential RS-232 TX-
10	MAIN_RS422_TX+	Differential RS-232 TX+
12	MAIN_RS422_RX-	Differential RS-232 RX-
14	MAIN_RS422_RX+	Differential RS-232 RX+
Auxiliary1 RS-422 – Network Options: I, J		
8	AUX1_RS422_TX-	Differential RS-232 TX-
10	AUX1_RS422_TX+	Differential RS-232 TX+
12	AUX1_RS422_RX-	Differential RS-232 RX-
14	AUX1_RS422_RX+	Differential RS-232 RX+
Auxiliary2 RS-422 – Network Options: I, C, J		
18	AUX2_RS422_TX-	Differential RS-232 TX-
20	AUX2_RS422_TX+	Differential RS-232 TX+
22	AUX2_RS422_RX-	Differential RS-232 RX-
24	AUX2_RS422_RX+	Differential RS-232 RX+
Auxiliary2 RS-232 – Network Options: E, H, N		
22	AUX2_RS232_RX	Standard RS-232 Receive
24	AUX2_RS232_TX	Standard RS-232 Transmit
COMRET Signal		
6, 16	COMRET	Common Return

Table 57: RS-422 (Differential RS-232) pins

The Titanium Solo Lizard uses RS-422 (Differential RS-232) serial communication.

Th following table describes the RS-422 specification.

Specification	Details
Physical layer	Differential RS-232 Full duplex, serial communication
Interface	RS-422
Termination	120 Ohm It is required to connect termination of 120 ohm in the end of the TX signals (refer to the figure below)
Speed	Baud Rate of 0.0048 to 3.60 Mbps
Protocols	For setup and control

Table 58: RS-422 specification

The following table describes the RS-422 signals:

Signal	Function
RS-422_TX+	Differential RS-232 Transmit
RS-422_TX-	Differential RS-232 Transmit Complement
RS-422_RX+	Differential RS-232 Receive
RS-422_RX-	Differential RS-232 Receive Complement
COMRET	Common Return

Table 59: RS-422 signals

The following figure shows the RS-422 (Differential RS-232) connection diagram for the Main, Auxiliary1, and Auxiliary2 Serial Communication.

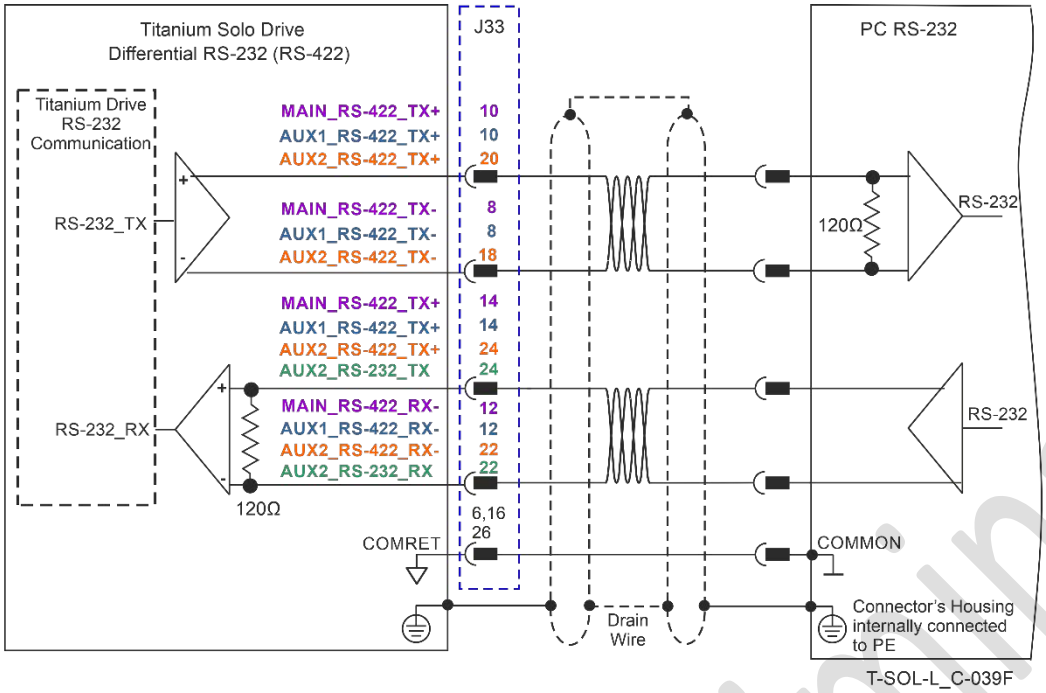


Figure 58: Main, AUX1, and Aux2 RS-422 (Differential RS-232) Serial Communication Connection Diagram

Chapter 9 Powering Up

After the Titanium Solo Lizard is connected to its device, it is ready to be powered up.

9.1 Initializing the System

After the Titanium Solo Lizard has been connected and mounted, the system must be set up and initialized. This is accomplished using the EAS III, Elmo's Windows-based software application. Install the application and then perform setup and initialization according to the directions in the EAS III User Manual.

9.2 Heat Dissipation

TBD

9.2.1 Heat Dissipation Data

TBD

9.2.2 How to Use the Chart

TBD

Chapter 10 Dimensions

This chapter provides detailed technical dimensions regarding the Titanium Solo Lizard.

10.1 Models for Safety Capability F – EtherCAT

10.1.1 Horizontal Connector Model

Part Number	Dimensions (mm (in))
TLIZ-**HF**2-zXXX/YYYEzP**N**zIz	41.0 x 63.0 x 22.1 mm (1.61” x 2.48” x 0.87”)

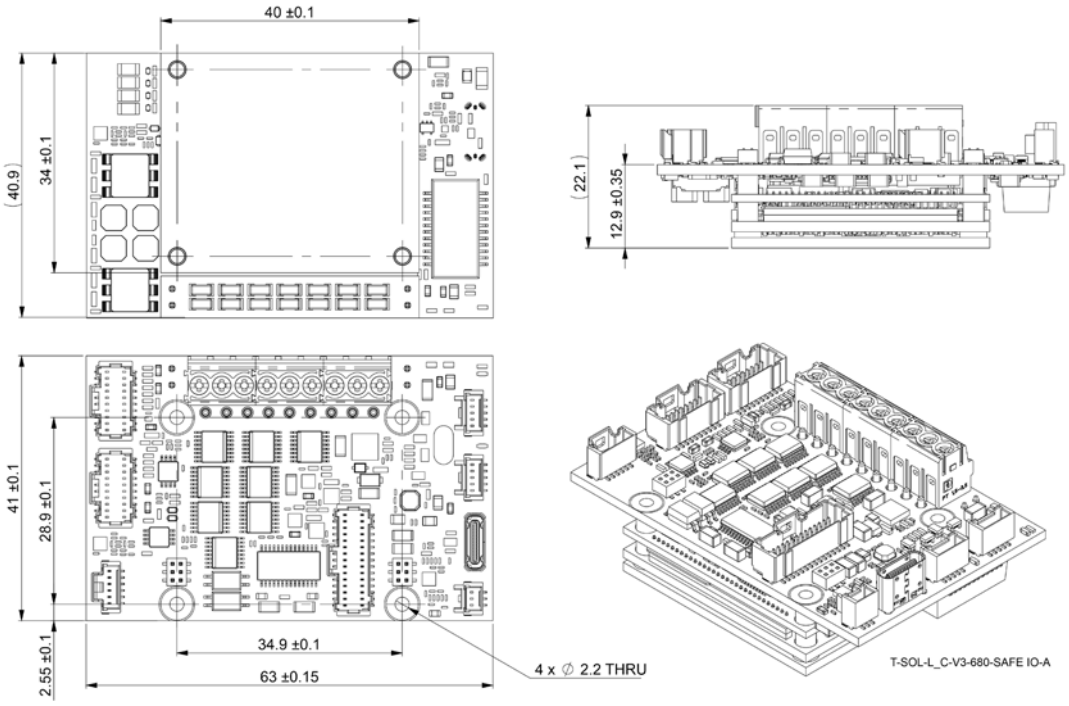


Figure 59: Titanium Solo Lizard Dimensions for Safety Capability F – Horizontal Connector Model – Without Heatsink

10.1.2 Horizontal Connector Model with Heatsink

Part Number	Dimensions (mm (in))
TLIZ-**HF**2-zXXX/YYYEzP**H**zIz	53.0 x 63.0 x 26.1 mm (2.09” x 2.48” x 1.03”)

Attaching an external heatsink to the drive adds 12 mm to the length and 4 mm to the height.

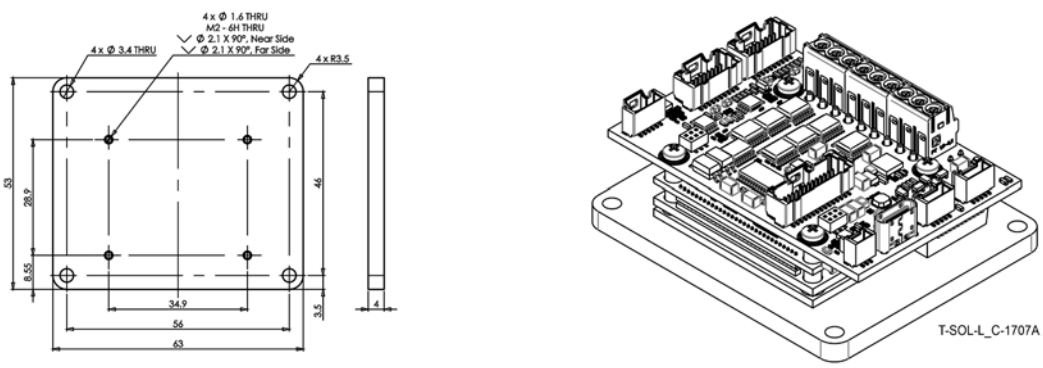


Figure 60: Titanium Solo Lizard Dimensions for Safety Capability F – Horizontal Connector Model – With Heatsink

10.1.3 Wired Model

Part Number	Dimensions (mm (in))
TLIZ-**WF**2-zXXX/YYYEzP**N**zIz	41.0 x 63.0 x 19.4 mm (1.61” x 2.48” x 0.76”)

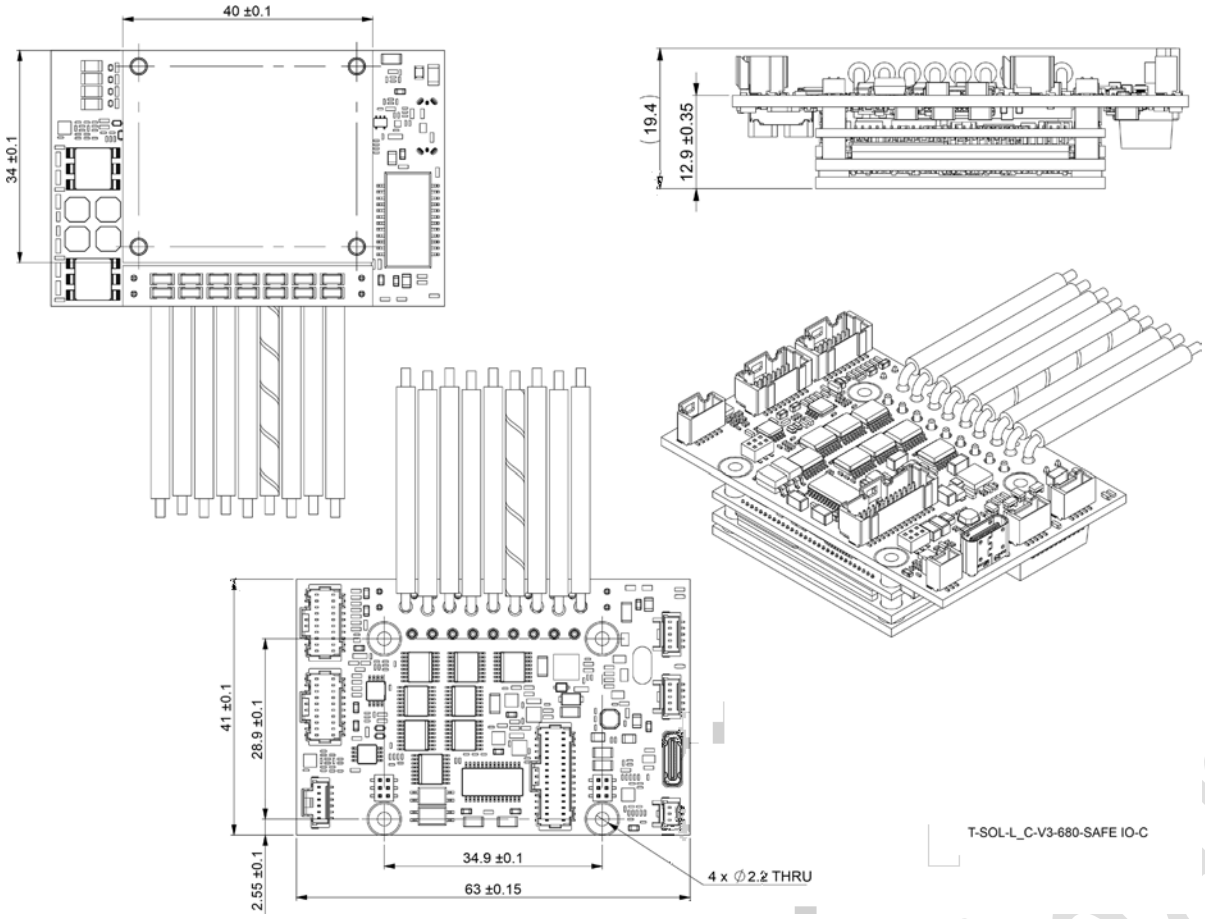


Figure 61: Titanium Solo Lizard Dimensions for Safety Capability F – Wired Model – Without Heatsink

10.1.4 Wired Model with Heatsink

Part Number	Dimensions (mm (in))
TLIZ-**WF**2-zXXX/YYYEzP**H**zIz	53.0 x 63.0 x 23.4 mm (2.09” x 2.48” x 0.92”)

Attaching an external heatsink to the drive adds 12 mm to the length and 4 mm to the height.

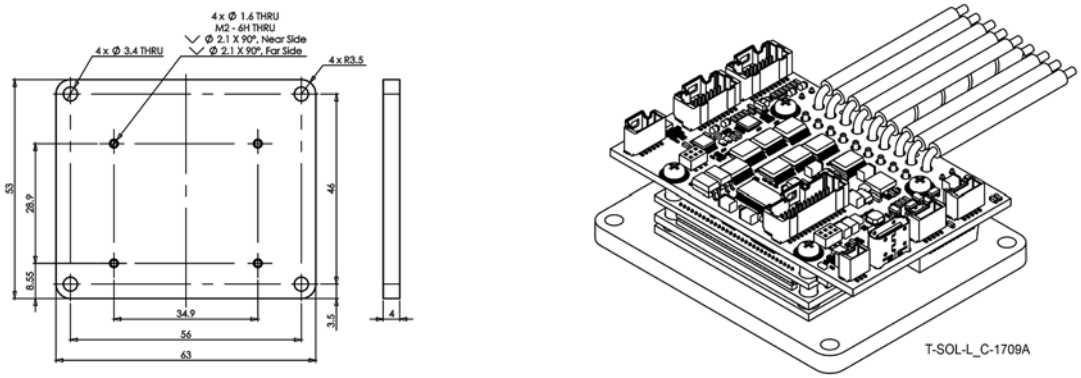


Figure 62: Titanium Solo Lizard Dimensions for Safety Capability F – Wired Model – With Heatsink

10.2 Models for Safety Capabilities S and O – EtherCAT

10.2.1 Horizontal Connector Model

Part Number	Dimensions (mm (in))
TLIZ-**H**z2-zXXX/YYYzzz**N**zIz	41.0 x 40.0 x 22.1 mm (1.61” x 1.57” x 0.87”)

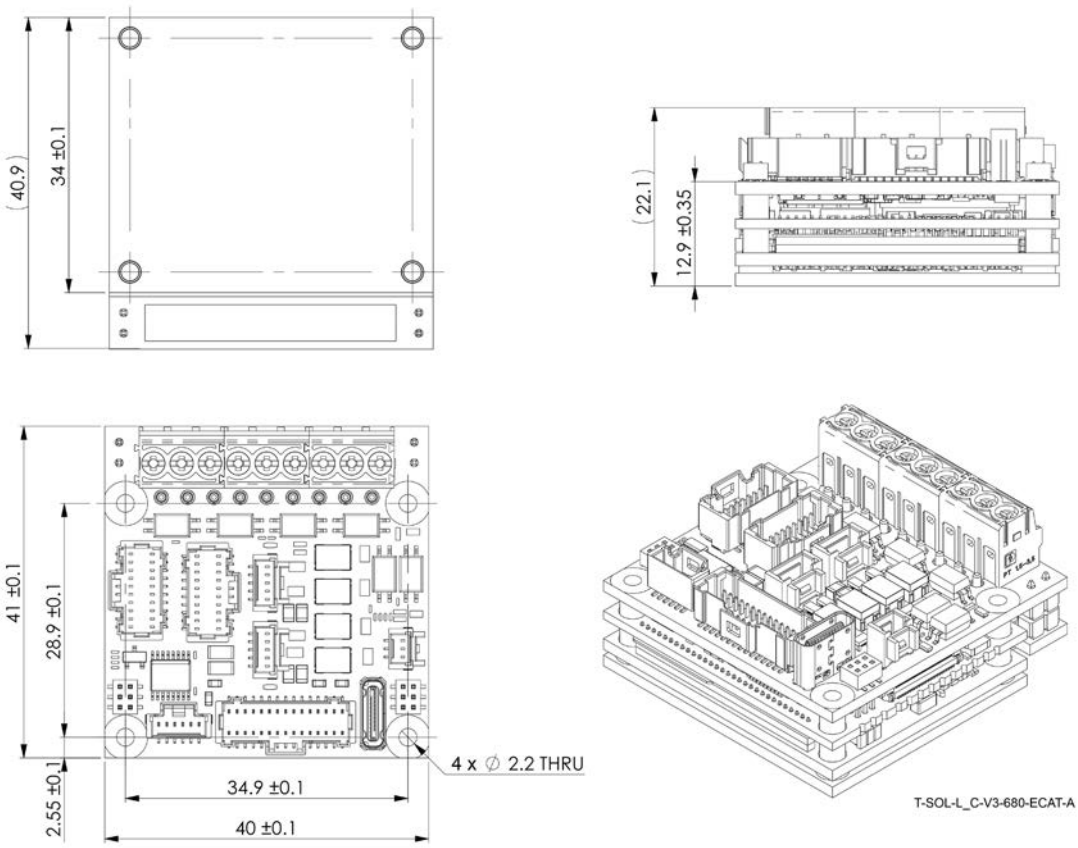


Figure 63: Titanium Solo Lizard – Safety Capability S and O, EtherCAT – Horizontal Connector – without Heatsink

10.2.2 Horizontal Connector Model with Heatsink

Part Number	Dimensions (mm (in))
TLIZ-**H**z2-zXXX/YYYzzz**H**zIz	41.0 x 54.0 x 26.1 mm (1.61” x 2.13” x 1.03”)

Attaching an external heatsink to the drive adds 14 mm to the width and 4 mm to the height.

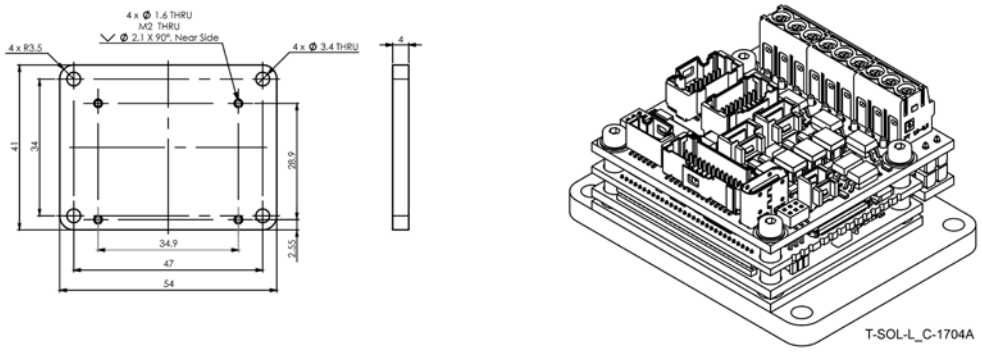


Figure 64: Titanium Solo Lizard – Safety Capability S and O, EtherCAT – Horizontal Connector – With Heatsink

10.2.3 Wired Model

Part Number	Dimensions (mm (in))
TLIZ-**W**z2-zXXX/YYYzzz**N**zIz	41.0 x 40.0 x 19.4 mm (1.61” x 1.57” x 0.76”)

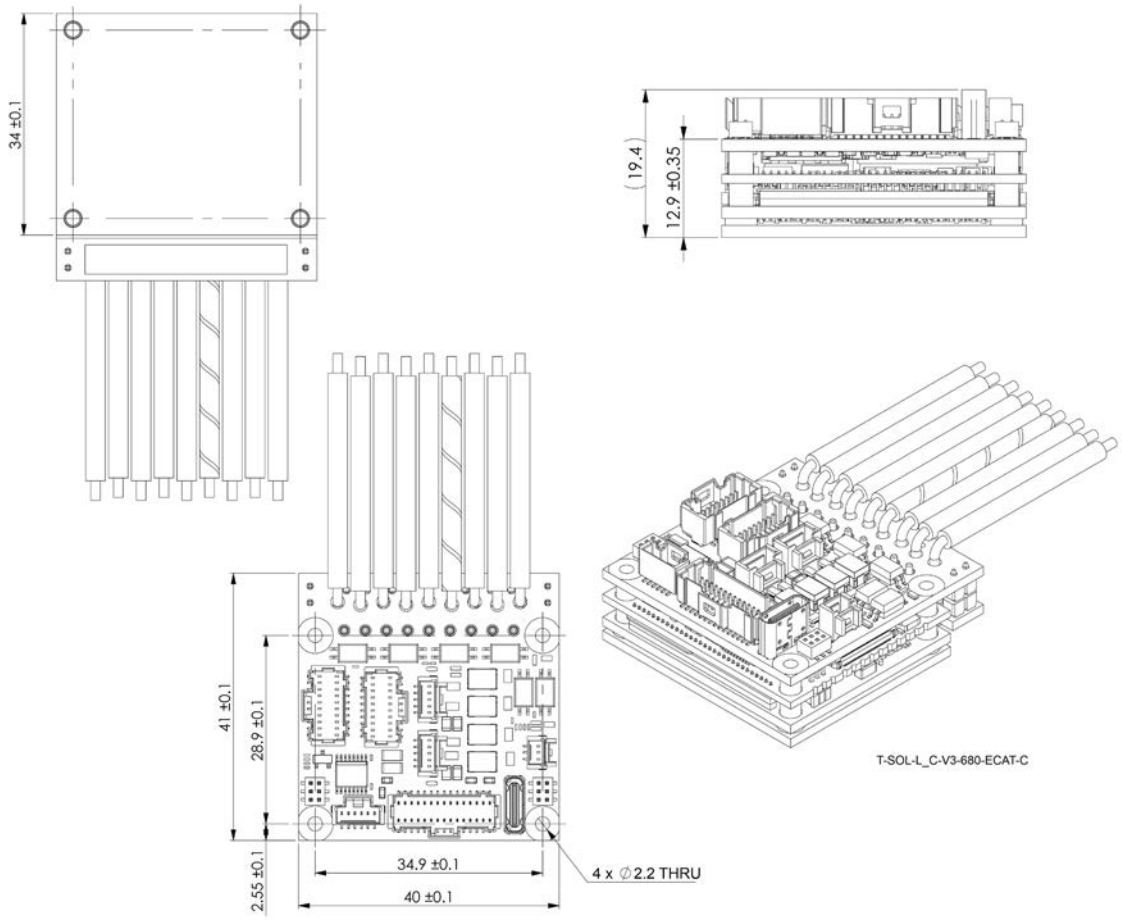


Figure 65: Titanium Solo Lizard Dimensions for Safety Capabilities S and O, EtherCAT – Wired Model

10.2.4 Wired Model with Heatsink

Part Number	Dimensions (mm (in))
TLIZ-**W**z2-zXXX/YYYzzz**H**zIz	41.0 x 54.0 x 23.4 mm (1.61” x 2.13” x 0.92”)

Attaching an external heatsink to the drive adds 14 mm to the width and 4 mm to the height.

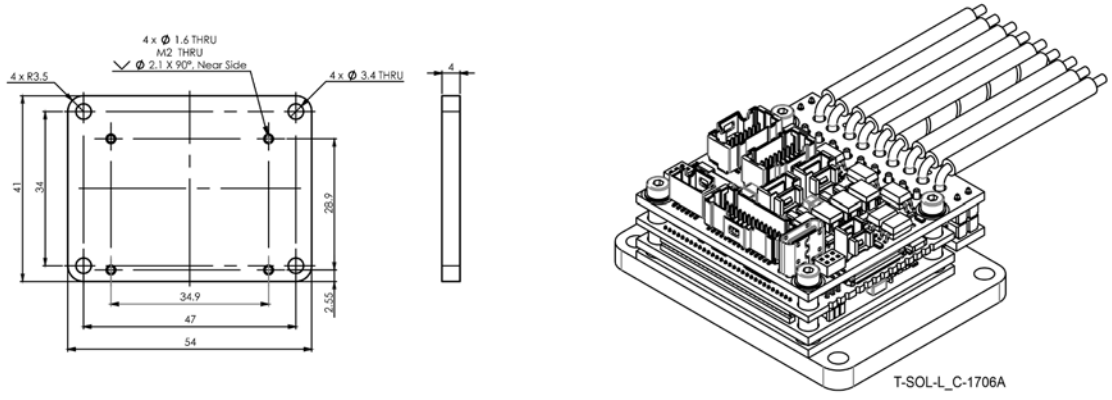


Figure 66: Titanium Solo Lizard Dimensions for Safety Capabilities S and O, EtherCAT – Wired Model with Heatsink

10.3 Models for Safety Capability O – CAN

10.3.1 Horizontal Connector Model

Part Number	Dimensions (mm (in))
TLIZ-**H**z2-zXXX/YYYzzz**N**zIz	41.0 x 40.0 x 22.1 mm (1.61” x 1.57” x 0.87”)

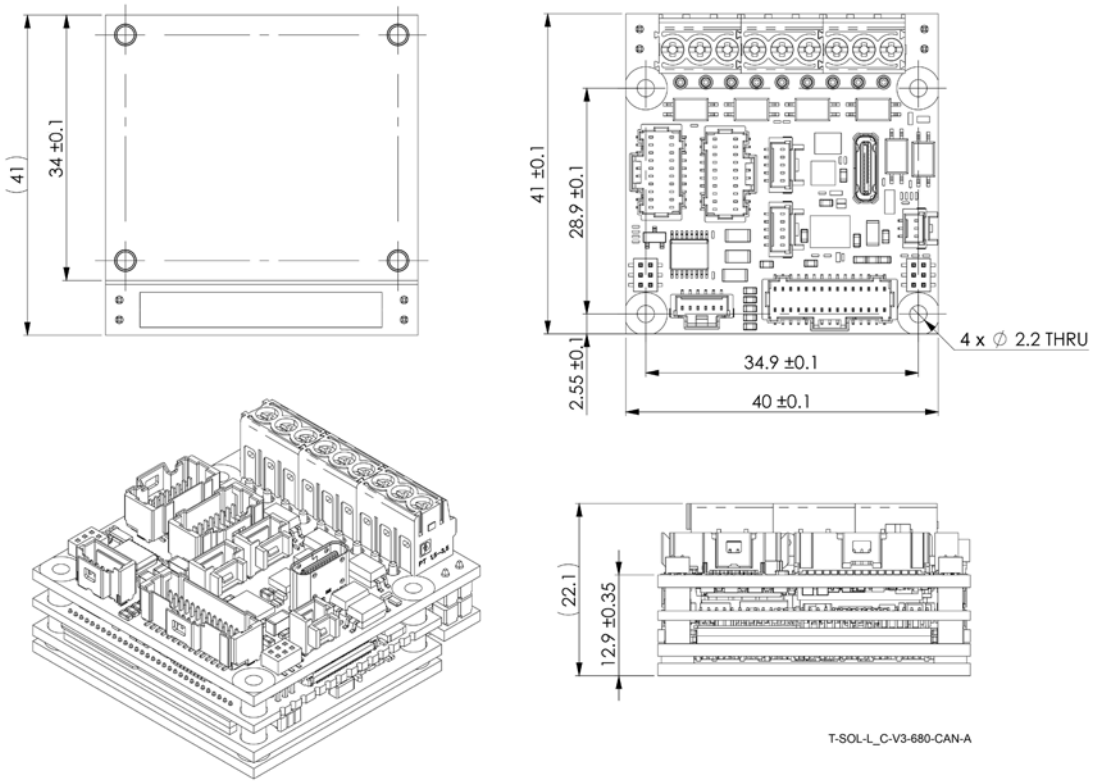


Figure 67: Titanium Solo Lizard Dimensions for Safety Capability O, CAN version – Horizontal Connector Model

10.3.2 Horizontal Connector Model with Heatsink

Part Number	Dimensions (mm (in))
TLIZ-**H**z2-zXXX/YYYzzz**H**zIz	41.0 x 54.0 x 26.1 mm (1.61” x 2.13” x 1.03”)

Attaching an external heatsink to the drive adds 14 mm to the width and 4 mm to the height.

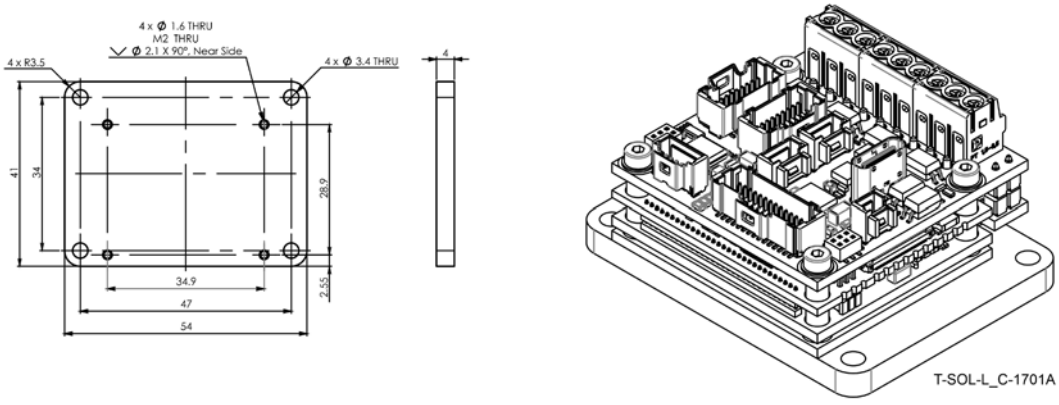


Figure 68 Titanium Solo Lizard – Safety Capability O, CAN version – Horizontal Connector Model with Heatsink

10.3.3 Wired Model

Part Number	Dimensions (mm (in))
TLIZ-**W**z2-zXXX/YYYzzz**N**zIz	41.0 x 40.0 x 19.4 mm (1.61” x 1.57” x 0.76”)

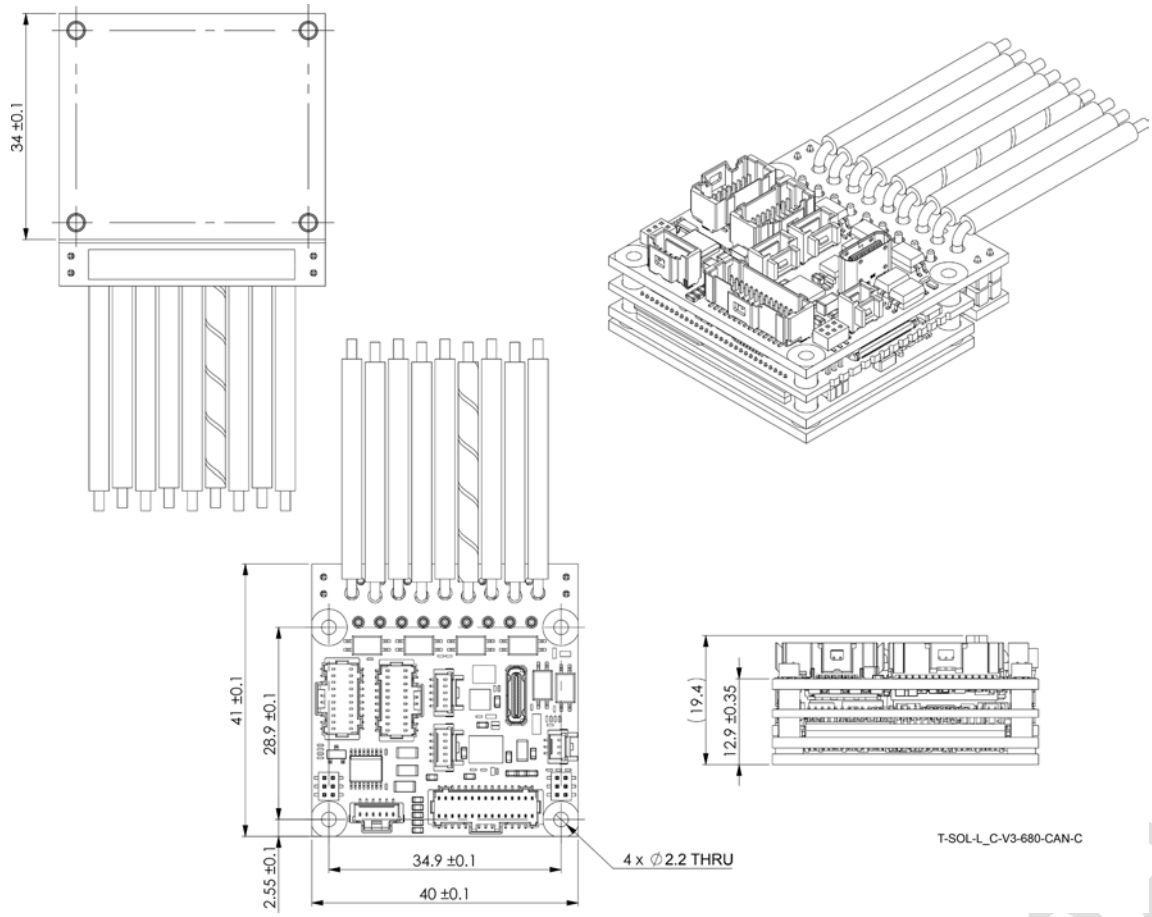


Figure 69: Titanium Solo Lizard Dimensions for Safety Capability O, CAN version – Wired Model

10.3.4 Wired Model with Heatsink

Part Number	Dimensions (mm (in))
TLIZ-**W**z2-zXXX/YYYzzz**H**zIz	41.0 x 54.0 x 23.4 mm (1.61” x 2.13” x 0.92”)

Attaching an external heatsink to the drive adds 14 mm to the width and 4 mm to the height.

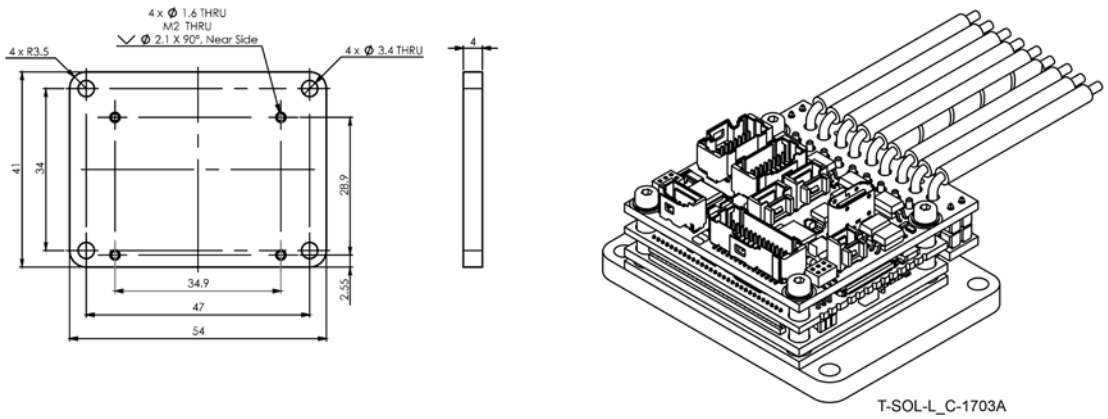


Figure 70: Titanium Solo Lizard Dimensions for Safety Capability O, CAN version – Wired Model with Heatsink

Chapter 11 Cables and Accessories

The following describes the accessory kits available for the Titanium Solo Lizard.

Part Number	Description
CBL-TSOLCASKIT02	Kit cable for Safe IO EtherCAT and Regular IO EtherCAT models with USB
CBL-TSOLCASKIT03	Connectors and Pins Kit
CBL-TSOLCASKIT04	Kit cable for Regular IO CAN model with USB
CBL-TSOLCASKIT05	Kit cable for Regular IO EtherCAT model with RS422
CBL-TSOLCASKIT06	Kit cable for Regular IO CAN model with RS422

Table 60: Cable Kits

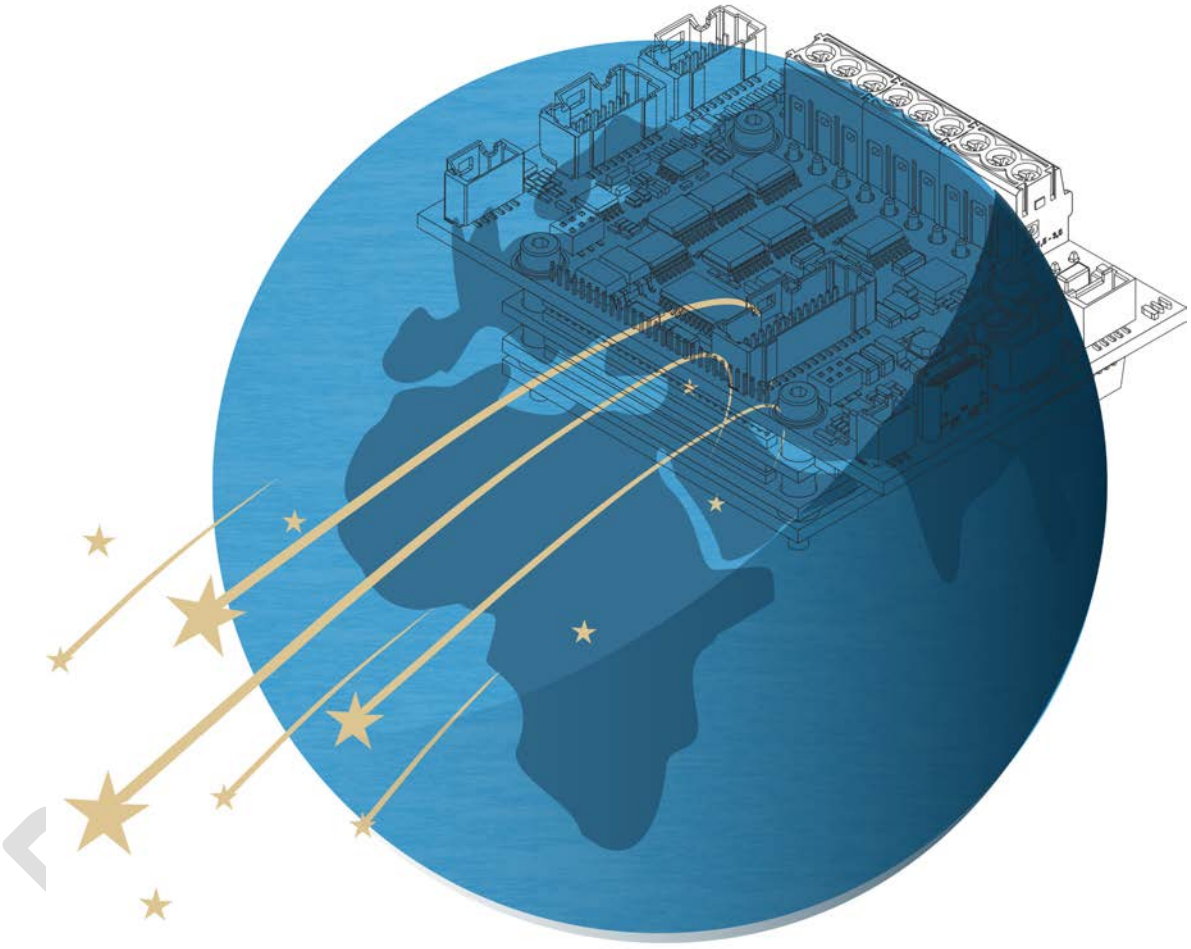
A specific Crimping Tool (available for purchase from Elmo) is required to mount extra connecting pins on the wires. A number of wires are provided in the kit as pre-crimped for convenience:

Tool	Pins
	
Crimping Tool Molex P/N 63819-1500	**Pins for Single Row Connector:** MOLEX P/N 501334-0100
Elmo P/N TOOL-P000040	**Pins for Dual Row Connector:** MOLEX P/N 501193-7000

Table 61: Crimping Tool and Pins

Elmo

Dedicated To Excel



For a list of Elmo's branches and your local area office, refer to the Elmo site www.elmomc.com