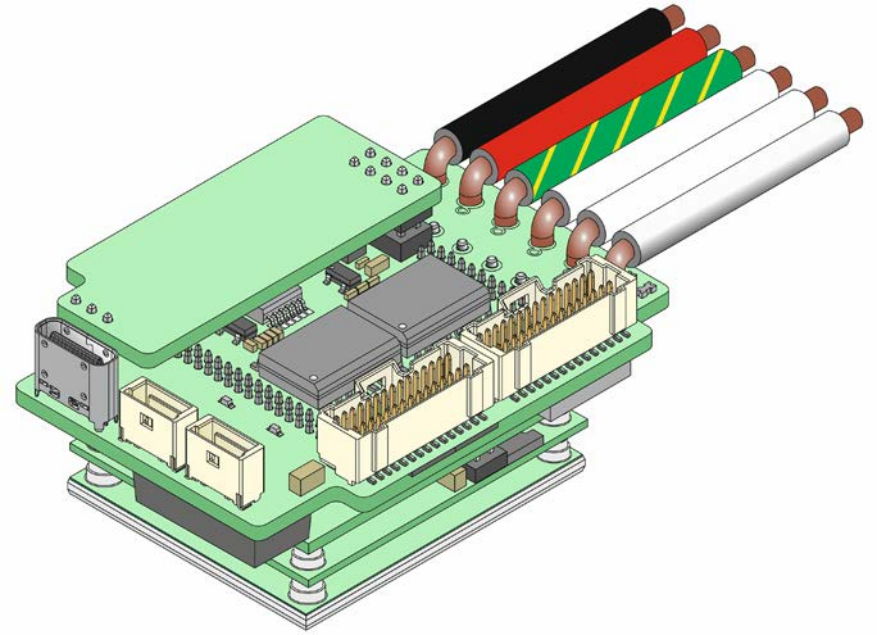
Platinum by Elmo

Go Safer, Smarter, Smaller, Simpler.
Go Platinum.

Platinum Solo Twitter Digital Servo Drive Installation Guide

EtherCAT and CAN

Safety Capability: F, S, O



September 2025 (Ver. 3.006)

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Catalog Number

PTWI-zz-zXXX/YYYzzz-zQ

Family Name:
Platinum Twitter

Mounting Version:
W – SOLO: Wires Power Connection
V – SOLO: Vertically Power Connector for drives of current ≤10A
H – SOLO: Horizontal Power Connector for drives of current ≤25A

Safety Capability :
F — Functional Safety with Safe IO
S — Functional Safety without Safe IO
O — Hardware STO only (SIL3,Ple,CAT3)

Rated Continuous Current

Rated Current Mode:
Blank — STD Ic/ Ip
R — Continuous Operation for Ti≤85C

Rated Voltage

Dual Use:
Q — Not subjected to export control according to ECCN-3A225 (US) or 428/2009 - 3A225 (EU Dual Use) Commutation frequency limited to 599Hz
Blank - Standard. No Commutation frequency limitation

External Heatsink:
H — Assembled on external Heatsink
Blank — No external Heatsink

IO Style for Regular IO:
U — 5V Logic
V — PLC SRC (High Side) or SINK (Low Side)

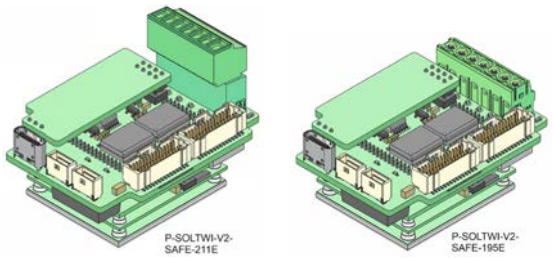
IO Style for Safe IO:
B — VDD=48V, Outputs 7,8

Encoder Options For Safety Capability F, S, and O:
E – Port A: Standard
Incremental, Endat2.2 BISS, SSI, Safe Endat2.2, Safe BISS
Port B: Standard
Incremental, SIN/COS
Port C: Standard (4-Wire)
Incremental, all regular ABS Encoder, Safe Endat2.2, Safe BISS
R – Standard **Port A & C**
Port B: Resolver

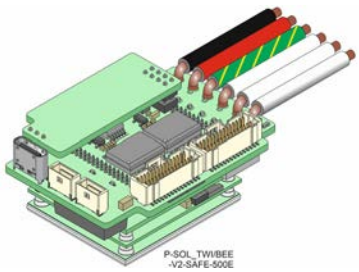
Network for Safety Capability F:
E — EtherCAT or Ethernet
USB

Network for Safety Capability S or O:
G — EtherCAT or Ethernet
USB
Differential RS-232 (RS-422) Non Isolated Serial Communication
T — CAN + Differential RS-232 (RS-422)
USB
Differential RS-232 (RS-422) Isolated Serial Communication

The Platinum Solo Twitter is provided in the **Mounting Version** optional forms shown below.



Vertical Option V (≤ 10A) or Horizontal Option H (≤ 25A) Power Connector for Output Current



Wired Power Connection Option W (recommended for >25A Output Current, but optional for ≤ 25A)

To order the accessories refer to the Chapter 11: Accessories.

Revision History

Version	Date	Details
Ver. 2.000	June 2020	Initial Release
Ver. 2.001	July 2020	Various updates
Ver. 2.002	Aug 2020	Various updates
Ver. 2.003	Aug 2020	Various updates
Ver. 2.004	Aug 2020	Various updates
Ver. 2.005	Sept 2020	Various updates
Ver. 2.006	Nov 2020	Various updates
Ver. 2.007	Mar 2021	Various updates
Ver. 2.008	Aug 2021	Various updates
Ver. 2.009	Oct 2021	Various updates
Ver. 2.010	Nov 2021	Update to Chap. 5 Technical Information
Ver. 2.011	Jan 2022	Various updates
Ver. 2.012	Jan 2022	Various updates
Ver. 2.013	Mar 2022	Various updates
Ver. 2.014	May 2022	Various updates
Ver. 2.015	Jun 2022	Small update
Ver. 2.016	Oct 2022	Small update
Ver 2.017	Jan 2023	Small update
Ver. 2.018	Jul 2023	Small update
Ver. 2.019	Jul 2023	Small update
Ver. 3.000	Sep 2023	Small update
Ver. 3.001	Nov 2023	Added CAN – new P/N, added new sections 7.9, 8.2.3, 8.11.4, 10.3, and 10.4. Updated sections 5.1, 5.4.3, 7.1, 7.2, 7.10 (previously 7.9), and 8.11.2.
Ver. 3.002	Dec 2023	Updated sections 5.4.6 and 5.4.7 to “Digital Input” and “Digital Output and Current”
Ver. 3.003	Apr 2024	Small correction to section 8.6.1.3
Ver. 3.004	May 2024	Small change to section 7.1 Connection Types.
Ver. 3.005	Sept 2024	Updates to sections 5.1, 5.4.3, 5.4.7, 6.1, 7.1, 7.6.1, 7.9, 8.2.2, 8.2.3, 8.9.2, 8.11.2, 8.11.4, 8.11.4.1, chapter 10, and chapter 11. Updated all HW drawings.
Ver. 3.006	Sept 2025	Small correction to section 5.4.3 Communication

Chapter 1: This Installation Guide

This installation Guide details the technical data, pinouts, and power connectivity of the Platinum Solo Twitter.

For a comprehensive specification and detailed description of the functions, refer to the Platinum Safety Drive**.**

Chapter 2: Functional Safety

The modules of the Platinum Solo Twitter **servo drives support Functional Safety. It is necessary to implement the instructions in the** Platinum 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 Platinum Solo Twitter, 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 Platinum Solo Twitter 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 Platinum Solo Twitter 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 Platinum Solo Twitter from all voltage sources before servicing.
- The high voltage products within the Platinum 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 reinforced 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 Platinum Solo Twitter 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 Platinum Solo Twitter, 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 Platinum Solo Twitter 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 Platinum Solo Twitter 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 Platinum Solo Twitter is a “ready to use Platinum Twitter”, advanced high power density, highly intelligent servo drive operational within a few minutes, delivering up to **5.6 kW power** in an average 48.48 cm^3 (2.96 in^3) compact package (refer to Chapter 10: Dimensions, Physical Specifications for details). A cable kit is available for easy and fast operation of the Platinum Solo Twitter.

This 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 Platinum Solo Twitter is provided in three safety configurations:

- **Functional Safety with Safe IO (PTWI-zF):** 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 with regular IO (PTWI-zS):** 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 (PTWI-zO(SIL3,Ple,CAT3)):** Servo drive with STO – The servo drive supports only STO

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

Chapter 5: Technical Information

5.1 Physical Specifications

Feature	Data	
General Mounting method	Panel mount	
Degrees of protection	IP=00	
Part Number (EtherCAT)	**Weights (g (oz))**	**Dimensions (mm (in))**
PTWI-Wz-XXX/YYYEzz PTWI-Wz-XXX/YYYGzz	~94.0g (3.3 oz)	52.0 x 37.9 x 24.6 mm (2.05" x 1.49" x 0.97")
PTWI-Hz-XXX/YYYEzz PTWI-Hz-XXX/YYYGzz		52.0 x 37.9 x 27.4 mm (2.05" x 1.49" x 1.08")
PTWI-Vz-XXX/YYYEzz PTWI-Vz-XXX/YYYGzz		52.3 x 37.9 x 36.9 mm (2.06" x 1.49" x 1.45")
PTWI-Wz-XXX/YYYEzz-H PTWI-Wz-XXX/YYYGzz-H	~117.0g (4.1 oz)	52.0 x 41.3 x 28.6 mm (2.05" x 1.63" x 1.13")
PTWI-Hz-XXX/YYYEzz-H PTWI-Hz-XXX/YYYGzz-H		52.0 x 41.3 x 31.4 mm (2.05" x 1.63" x 1.24")
PTWI-Vz-XXX/YYYEzz-H PTWI-Vz-XXX/YYYGzz-H		52.3 x 41.3 x 40.9 mm (2.06" x 1.63" x 1.61")
Part Number (CAN)	**Weights (g (oz))**	**Dimensions (mm (in))**
PTWI-Wz-XXX/YYYTzz	~94.0g (3.3 oz)	52.0 x 37.9 x 24.6 mm (2.05" x 1.49" x 0.97")
PTWI-Hz-XXX/YYYTzz		52.0 x 37.9 x 27.4 mm (2.05" x 1.49" x 1.08")
PTWI-Vz-XXX/YYYTzz		52.3 x 37.9 x 36.9 mm (2.06" x 1.49" x 1.45")
PTWI-Wz-XXX/YYYTzz-H	~117.0g (4.1 oz)	52.0 x 41.3 x 28.6 mm (2.05" x 1.63" x 1.13")
PTWI-Hz-XXX/YYYTzz-H		52.0 x 41.3 x 31.4 mm (2.05" x 1.63" x 1.24")
PTWI-Vz-XXX/YYYTzz-H		52.3 x 41.3 x 40.9 mm (2.06" x 1.63" x 1.61")

Table 1: Physical Specifications

5.2 Current/Voltage Technical Data

Note:
For all models, the Max Output current is guaranteed for $T_{Heat\text{-}Sink}$ <85°C.

5.2.1 100V Models

Feature	Units	1/100	3/100	6/100	10/100	15/100	25/100
Minimum supply voltage	VDC	10					
Nominal supply voltage	VDC	85					
Maximum supply voltage	VDC	95					
Maximum continuous power output	W	80	235	470	800	1125	2000
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	3	6	10	15	25
Sinusoidal continuous RMS current limit (Ic)	A	0.7	2.1	4.2	7.1	10	17.7
Peak current limit	A	2 x Ic					

Table 2: 100V Models Technical Data

5.2.2 200V Models

Feature	Units	3/200	6/200	10/200
Minimum supply voltage	VDC	20		
Nominal supply voltage	VDC	170		
Maximum supply voltage	VDC	195		
Maximum continuous power output	W	485	975	1650
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	3	6	10
Sinusoidal continuous RMS current limit (Ic)	A	2.1	4.2	7.1
Peak current limit	A	2 x Ic		

Table 3: 200V Models Technical Data

5.2.3 R Type

Feature	Units	R80/80	R50/100	R70/100	R45/150	R15/200	R35/200
Minimum supply voltage	VDC	10	10	10	10	20	20
Nominal supply voltage	VDC	65	85	85	115	170	170
Maximum supply voltage	VDC	75	95	95	135	195	195
Maximum continuous Electrical power output	kW	5	4	5.6	5	2.5	5.6
Efficiency at rated power (at nominal conditions)	%	> 99					
Maximum output voltage		Up to 96% of DC bus voltage					
Amplitude sinusoidal/DC continuous current	A	80	50	70	45	15	35
Sinusoidal continuous RMS current limit (Ic)	A	56.5	35.3	49.5	32	10.6	24.7

Table 4: R Type Models Technical Data

5.3 Control Supply

Feature		Units	Details
Control supply for input voltage where the Safety Capability is F, S		**V**	**Isolated DC source:** 12 to 60
Control supply for input voltage where the Safety Capability is O		**V**	**Isolated DC Source**: 12 to 95
24V Control supply input power consumption	Without Encoder	W	≤4
	With encoder up to 400mA@5V	W	≤6

5.4 Product Features

5.4.1 Feedback

Feature	Details	Presence and No.
Feedback	Standard Port A, B, & C	**√**

5.4.2 Encoder Supply

Feature	Details
5V supply	400 mA

5.4.3 Communication

Feature	Details	Presence and No.	
Communication Option	USB	**√**	
	EtherCAT ***or***	**√**	Available only for network E or G
	CAN	**√**	Available only for network T
	RS-422 (Differential RS-232) Serial Communication	**√**	Available only for network G or T

5.4.4 Analog Input

Feature	Details	Resolution	Presence and No.
Analog Input	Differential ±10V	14-bits	**1**
	Single ended ±10V	12-bits	**1**

5.4.5 STO

Feature	Details	Presence and No.
STO	5V Logic, Opto Isolated, for IO TYPE = U	**√**
	PLC source, Opto Isolated, for IO TYPE = V	
	PLC source, Opto Isolated, for IO TYPE = B	

5.4.6 Digital Input

I/O Style	Safe Input	U	V
Safety/Regular	Safe IO PLC Source, Isolated	Regular IO 5V Logic	Regular IO PLC Source or Sink
Input	IN1, IN2, IN3, IN4	IN1, IN2, IN3, IN4, IN5, IN6	

5.4.7 Digital Output

Refer to the Safety Capability in the P/N for the relevant IO capability.

I/O Style	B	U	V
Safety/Regular	Safe IO PLC	Regular IO	Regular IO
Voltage	24V – OUT1,2 48V – OUT7,8	5V Logic	PLC
Absolute Maximum Voltage	60V	30V	60V
Nominal Recommended VDD	24 to 48V ±10%	4 to 30V	24 to 48V ±10%
OUT1	30mA	15mA	1000mA
OUT2	30mA	15mA	1000mA
OUT7	1000mA	15mA	1000mA
OUT8 (PLC SINK)	1000mA	15mA	1000mA
Total Current[1]	1000mA		1000mA

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

5.5 Environmental Conditions

You can guarantee the safe operation of the Platinum Solo Twitter by ensuring that it is installed in an appropriate environment. The Functional Safety of the servo drives is certified according to the environmental conditions in the following table.

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

Feature	Details
Operating ambient temperature	0 °C to 55 °C (32 °F to 131 °F)  **Remark:** Functional Safety is applicable to the above operating temperature.
Storage temperature	-40 °C to +85 °C (-40 °F to +185 °F)
Maximum non-condensing humidity according to 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 according to IEC60068-2-27	15g / 11ms Half Sine
Vibration according to IEC60068-2-6	5 Hz ≤ f ≤ 10 Hz: ±10mm 10 Hz ≤ f ≤ 57 Hz: 4G 57 Hz ≤ f ≤ 500 Hz: 5G
Pollution Degree	Pollution Degree 1

5.6 Standards and Certification

The following table describes the Main Standards of the Platinum Solo Twitter servo drive. For further details, refer to Chapter 22 in the Platinum Safety Drive Manual.

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

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

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

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

5.6.5 Other Compliant Standards

For other compliant standards refer to the
Platinum Safety Drive Manual Section 22.5 or refer to the Elmo website:

https://www.elmomc.com/capabilities/standards-compliance/platinum-family/

5.6.6 Dual Use

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

The operating frequency of the Platinum 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

The Platinum Solo Twitter must be installed in a suitable environment and properly connected to its voltage supplies and the motor.

6.1 Unpacking the Drive Components

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

- The Platinum Solo Twitter servo drive
- The Elmo Application Studio (EASII) software and software manual

The Platinum Solo Twitter is shipped in a cardboard box with Styrofoam protection.

To unpack the Platinum Solo Twitter:

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 Platinum Solo Twitter you have unpacked is the appropriate type for your requirements, locate the part number sticker on the top of the Platinum Solo Twitter. It looks like this:

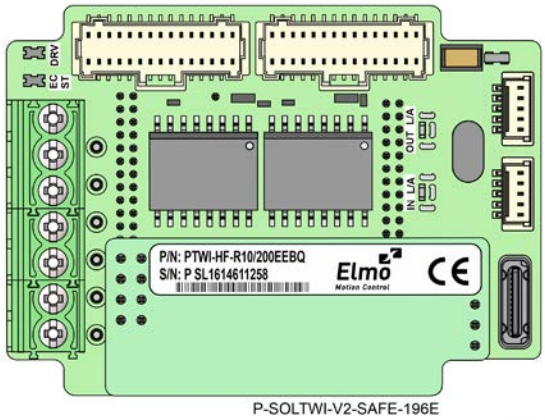


Figure 1: Platinum Solo Twitter Module

4. Verify that the Platinum Solo Twitter 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 section Catalog Number 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**.**

PTWI –zz-zXXX/YYYzzz-z XXX = rated continues current [A]	Fuse	Circuit Breaker
1, 3, 6, 10, 15, 25	Slow blow	Type D
35, 45, 50, 70, 80	Fast Acting Class J	Type B

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. Please refer to the "Platinum Administrative Guide".

6.3 Mounting Platinum Solo Twitter onto an External Heat Sink

Note: This feature is available only in model PTWI-zz-zXXX/YYYzzz-**H**.

The selected heat sink must be screwed to the lower surface of the Platinum Solo Twitter.

To mount the Platinum Solo Twitter onto an external heat sink:

1. Mount the heat sink under the base of the Platinum Solo Twitter.
2. Place the Thermal foil (PN IMT-GTWIALHFLAT purchased from Elmo) between the lower surface of the servo drive, and the upper surface of the heatsink.
3. Use four M2.5 head cup Allen screws to secure the heat sink under the servo drive.
4. Tighten the screws to the relevant torque force applicable to an M2.5 stainless steel A2 screw.

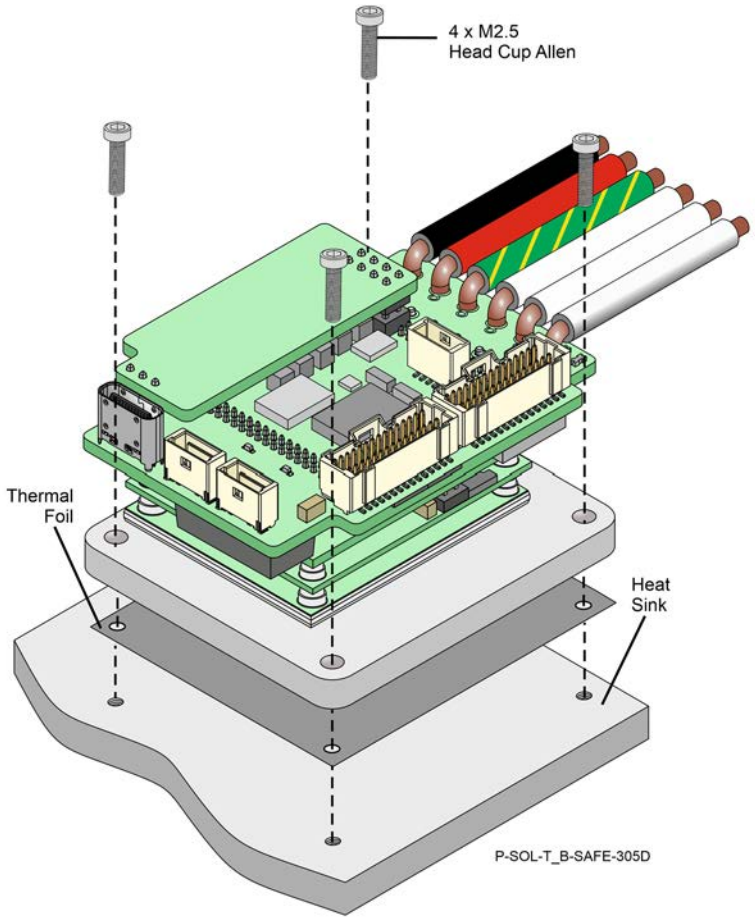
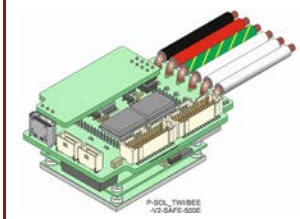
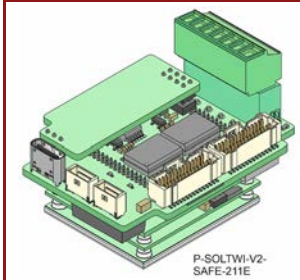
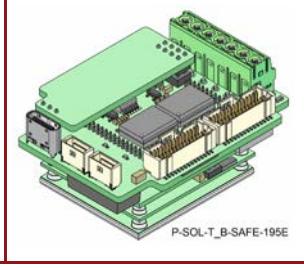


Figure 2: Mounting the Heat Sink and Thermal Foil onto the Platinum Solo Twitter

Chapter 7: Connector Types, Pinouts, and LEDs

The Platinum Solo Twitter with Safe IO has six connectors, and with Regular IO has seven connectors:

7.1 Connector Types

Connector		No. Pins	Type	Function
PM1		6	Wires (22AWG for 1 - 3A Models, 18AWG for 6A Model, and 14AWG for 10 - 80A Models) Refer the note Wiring Technical Details in section 8.5 Main Power (PM1).	Motor phases and main power
		7	Vertical Phoenix connector. PCB Terminal Block 3.5 mm pitch Conductor cross-section is 26 up to 16 AWG	
		7	Horizontal Phoenix connector. PCB Terminal Block 3.5 mm pitch Conductor cross-section is 28 up to 16 AWG	
C2		2x15	2 rows x 15 Pins 1 mm pitch Conductor cross-section is 32 up to 28 AWG	Control Supply Feedback Port A/B/C
C1		2x15	2 rows x 15 Pins 1 mm pitch Conductor cross-section is 32 up to 28 AWG	I/O STO
X3		24	USB Device Type C	USB Type C
X4		5	1 x 5 Pins 1 mm pitch Conductor cross-section is 32 up to 28 AWG	RS-422 Only available for Regular IO and Network Version G or T (Safety Capability S, O)
EtherCAT Version				
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	EtherCAT out

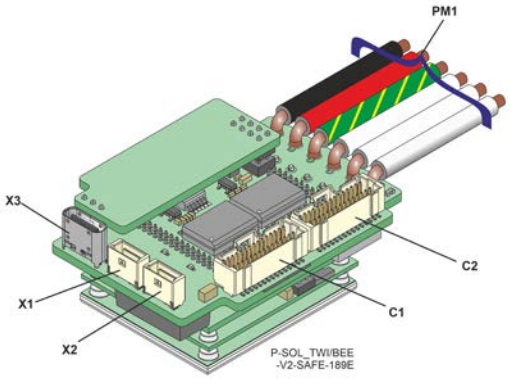
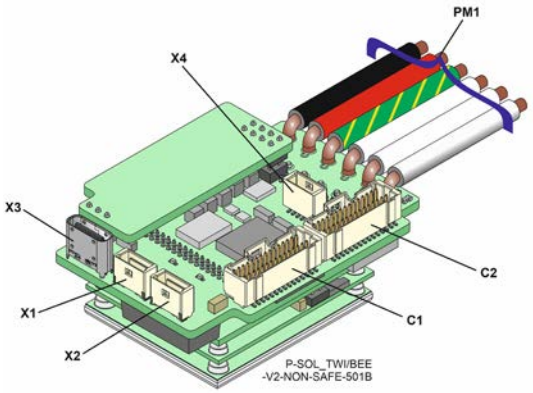
Connector	No. Pins	Type	Function
		Conductor cross-section is 32 up to 28 AWG	
CAN Version			
X1	5	1 x 5 Pins 1 mm pitch Conductor cross-section is 32 up to 28 AWG	CAN
X2	5	1 x 5 Pins 1 mm pitch Conductor cross-section is 32 up to 28 AWG	CAN
Connectors Location			
 **Safe IO Model**		 **Regular IO Model**	

Table 5: Connector Types

7.2 Mating Connectors

Connector	Mating Connector Type	Mating Crimping Pins
Power (Vertical model)	PHOENIX 3.5 mm pitch terminal 7-pin plug straight 1702095	N/A
C2, C1 **VL & Feedback Ports** **IO and STO**	MOLEX 1.00mm "Pico-Clasp" 501189-3010	MOLEX 1.00mm crimp terminal 501193-3000
X1, X2, X4 **EtherCAT IN/OUT or CAN, RS-422 Communication**	MOLEX 1.00mm "Pico-Clasp" 501330-0500	MOLEX 1.00mm crimp terminal 501334-0100

7.3 Main, Control, and Motor Power

This section describes the Main and Control supplies, and Motor Power connections.
There are three optional Motor and Main Power interfaces:

- The current carrying capacity of the Solo board wires is up to 80A (57A RMS)
- Pheonix horizontal connector on models have an output current of 25A (17.7A RMS) or less
- Pheonix pluggable vertical connector on models have an output current of 10A (7.1A RMS) or less

7.3.1 Motor Power (PM1)

For further details, refer to the section 4.1 Input Power Supply in the Platinum Safety Drive Manual.

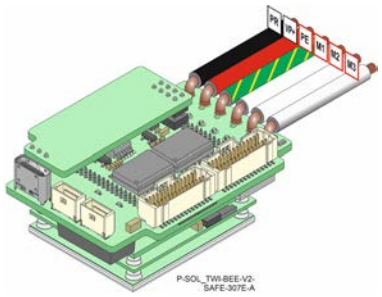
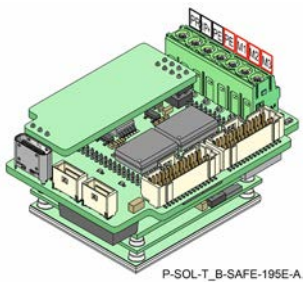
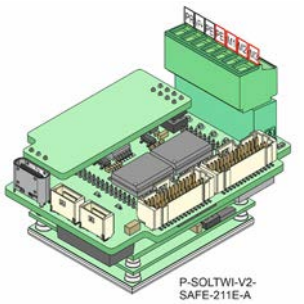
Pin	Wire Color	Function	Cable	
			Brushless Motor	Brushed DC Motor
PE	Green or Green-Yellow	Connection earth	Motor	Motor
M1	White	Motor phase	Motor	N/C
M2	White	Motor phase	Motor	Motor
M3	White	Motor phase	Motor	Motor
Pin Positions				
				

Table 6: Motor Power

7.3.2 Main Power (PM1)

The isolated DC power source is not included with the Platinum Solo Twitter.

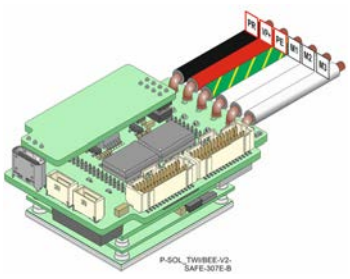
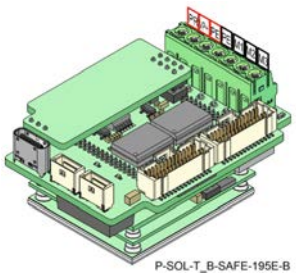
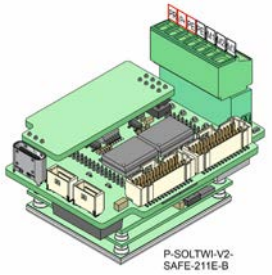
Pin	Wire Color	Function	Cable
PR	Black	Power return	Power
VP+	Red	DC Pos. Power input	Power
PE	Green or Green-Yellow	Connection earth	Power
Pin Positions			
			

Table 7: Main Power

7.4 Drive Status Indicator

Figure 3 shows the position of the D1 red/green dual LED, which immediately indicates the Initiation and Working states.

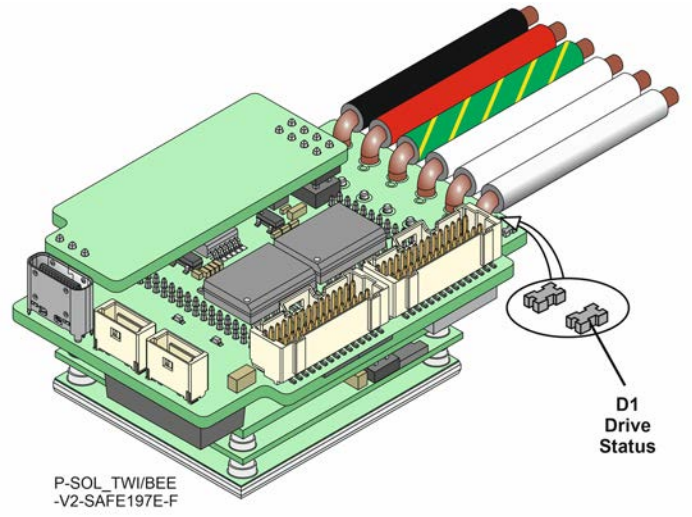


Figure 3: Drive Status Indicator in Platinum Solo Twitter model

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-in Slow flashing RED/GREEN indicates stages of Firmware burn-in or validation Frequency depends on the stage of burn-in/validation and the CPLD/FPGA that is been burned-in

7.5 VL and Feedback Connector (C2)

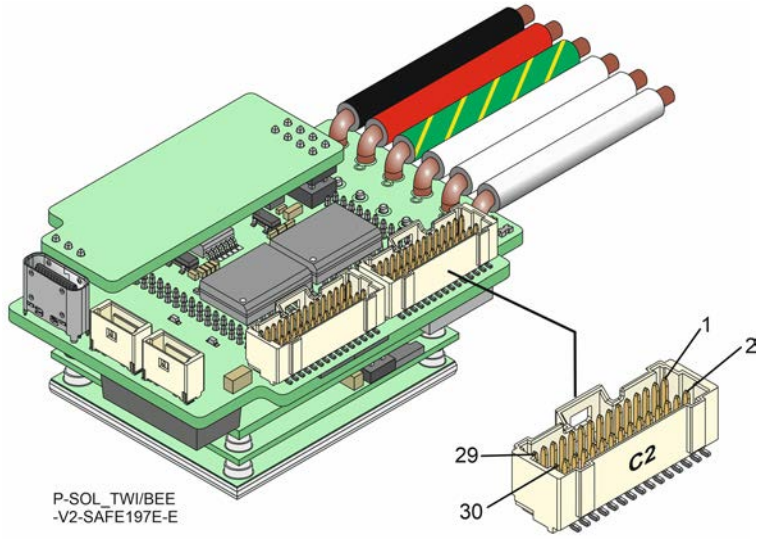


Figure 4: Platinum Solo Twitter C2 VL & Feedback Connector

The following table describes the C2 VL and Feedback connections to the 2 x 15 pins connector. For wiring details, refer to the section 8.6 Feedback (C2).

Pin C2	Signal	Function
1	PortA_A+	Port A Channel A+
2	PortB_A-/Sine-	Port B Channel A-/Sine-
3	PortA_A-	Port A Channel A-
4	PortB_A+/Sine+	Port B Channel A+/Sine+
5	PortA_B+	Port A Channel B+
6	PortB_B-/Cosine-	Port B Channel B-/Cosine-
7	PortA_B-	Port A Channel B-
8	PortB_B+/Cosine+	Port B Channel B+/Cosine+
9	PortA_INDEX+	Port A Channel Index+
10	PortB_INDEX-/Analog_Index-	Port B Channel Index-/Analog Index-
11	PortA_INDEX-	Port A Channel Index-
12	PortB_INDEX+/Analog_Index+	Port B Channel Index+/Analog Index+
13	HALL A	Hall sensor A input
14	PortC_A-	Port C Buffered Channel A-
15	HALL B	Hall sensor B Input

Pin C2	Signal	Function
16	PortC_A+	Port C Buffered Channel A+
17	HALL C	Hall sensor C Input
18	PortC_B-	Port C Buffered Channel B- output / Dir-
19	+5V	Encoder +5V supply with a total allowable maximum consumption of 400mA using Pins 19 or 26
20	PortC_B+	Port C Buffered Channel B+ output / Dir+
21	COMRET	Common return
22	PortC_INDEX-	Port C Buffered Channel INDEX- output
23	COMRET	Common return
24	PortC_INDEX+	Port C Buffered Channel INDEX+ output
25	COMRET	Common return
26	+5V	Encoder +5V supply with a total allowable maximum consumption of 400mA using Pins 19 or 26
27	COMRET	Common return
28	COMRET	Common return
29	VL-	Control 24V supply return
30	VL+	Control 24V supply

Table 8: Connector C2 – VL & Feedback

7.6 I/O and STO Connector (C1)

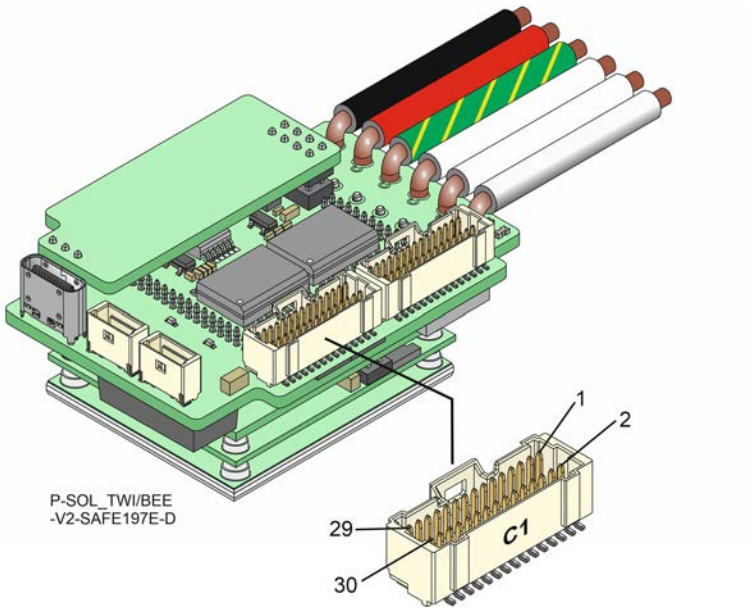


Figure 5: Platinum Solo Twitter C1 I/O and STO Connector

Refer to Chapters 14 Safe Digital IO and 15 Regular Digital IO in the Platinum Safety Drive Manual for full details.

The following table describes the C1 IO and STO connections to the 2 x 15 pins connector. For wiring details, refer to the section 8.7 Safe Digital I/Os or 8.8 Regular Digital IOs .

7.6.1 Safe IO: IO TYPE = B

The Digital I/Os connector includes the following functions:

Pin (C1)	Signal	IO TYPE B
1	OUT8	Digital Output 8 (isolated)
2	IN1	Digital input 1 (isolated)
3	OUT7	Digital Output 7 (isolated)
4	IN2	Digital input 2 (isolated)
5	VDD_48V	VDD for Digital Outputs
6	IN3	Digital input 3 (isolated)
7	VDD_RET	VDD Return
8	IN4	Digital input 4 (isolated)
9	VDD_RET	VDD Return
10	Not Connected	
11	Not Connected	
12	Not Connected	
13	Not Connected	
14	VDD_RET	VDD Return

15	Not Connected	
16	OUT1_E	Digital Output 1 emitter (isolated)
17	Not Connected	
18	OUT2_E	Digital Output 2 emitter (isolated)
20	OUT1_C	Digital Output 1 collector (isolated)
22	OUT2_C	Digital Output 2 collector (isolated)

Table 9: Digital I/O for Safe IO: IO Type = B

7.6.2 Regular IO: IO TYPE = U, V

The Digital I/Os connector includes the following functions:

Pin (C1)	Signal	TYPE U	TYPE V
1	OUT8	Digital Output 8 (isolated)	
2	IN1	Digital input 1 (isolated)	
3	OUT7	Digital Output 7 (isolated)	
4	IN2	Digital input 2 (isolated)	
5	VDD	VDD for Digital Outputs	
6	IN3	Digital input 3 (isolated)	
7	VDD_RET	VDD Return	
8	IN4	Digital input 4 (isolated)	
9	VDD_RET	VDD Return	
10	IN5	Digital input 5 (isolated)	
11	Not Connected		
12	IN6	Digital input 6 (isolated)	
13	Not Connected		
14	IN_COM	Digital Input Return	**For Source:** Digital Input Return **For Sink:** Digital Input Power
15	Not Connected		
16	SRC or SINK CONTROL	Not Used	**For Source:** 0 - Source Control **For Sink:** VDD
17	Not Connected		
18	VDD_RET	VDD Return	
20	OUT1	Digital Output 1 (isolated)	
22	OUT2	Digital Output 2 (isolated)	

Table 10: Digital I/O for Regular IO: IO Types U, V

7.6.3 Analog I/O and STO

The I/O and STO connector also includes the following functions:

Pin (J3)	Signal	All IO Types
19	ANALOG2+	Analog input 2
21	COMRET	Common return
23	COMRET	Common return
24	STO_RET	STO signal return
25	COMRET	Common return
26	STO_RET	STO signal return
27	ANALOG1-	Analog input 1 complement
28	STO1	STO 1 input opto isolated
29	ANALOG1+	Analog input 1
30	STO2	STO 2 input opto isolated

Table 11: Analog I/O and STO Pinouts

7.7 USB 2.0 Connector Type C (X3)

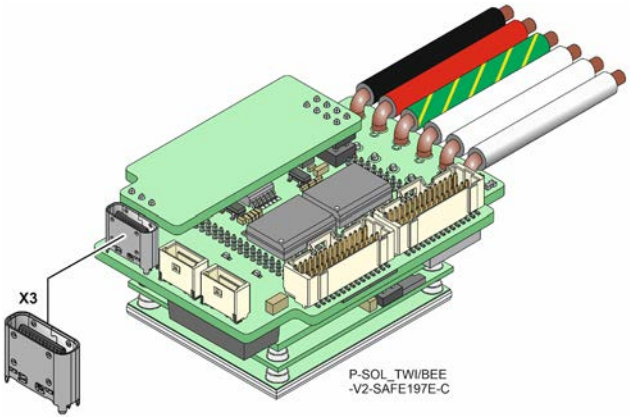


Figure 6: Platinum Solo Twitter X3 USB Connector

The following describes the pinouts of the USB connector in the Platinum Solo Twitter modules.

Pin (X3)	Signal	Function
A1	COMRET	Common return
A2	Not Connected	
A3	Not Connected	
A4	USB_VBUS	USB VBUS 5 V
A5	Not Connected	
A6	USBD+	USB _P line
A7	USBD-	USB _N line
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	Not Connected	
B6	USBD+	USB _P line
B7	USBD-	USB _N line
B8	Not Connected	
B9	USB_VBUS	USB VBUS 5 V
B10	Not Connected	
B11	Not Connected	
B12	COMRET	Common return

Table 12: USB Device Type C Pin Assignments

7.8 EtherCAT/Ethernet (X1 & X2)

Fieldbus communications are industrial network protocols for real-time distributed control that allows connection of servo drives. The Platinum Solo Twitter supports the following EtherCAT fieldbus type industrial network protocol:

Fieldbus Type	Product Number
EtherCAT	PTWI-zz-zXXX/YYY**E**zz-z
	PTWI-zz-zXXX/YYY**G**zz-z

7.8.1 EtherCAT IN Connector (X1)

The following table describes the EtherCAT IN connections to the 1 x 5 pins connector.

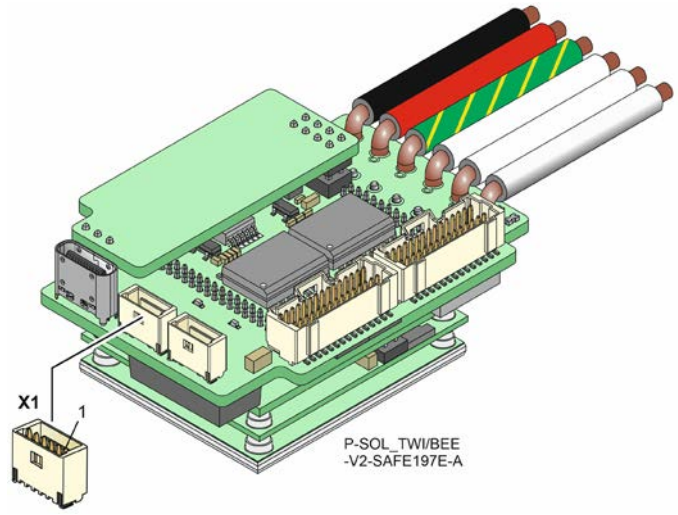
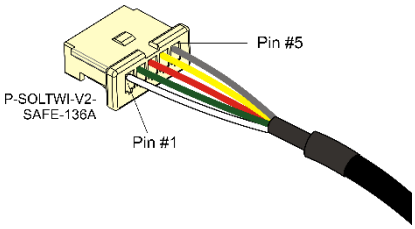
Pin (X1)	Signal	Function
1	EtherCAT_IN_TX+	EtherCAT in Transmit+
2	EtherCAT_IN_TX-	EtherCAT in Transmit-
3	EtherCAT_IN_RX+	EtherCAT in Receive+
4	EtherCAT_IN_RX-	EtherCAT in Receive-
5	EARTH	Shield drain wire
Pin Positions		**Cable Connector**
		 **Ethernet Cable Connector**

Table 13: EtherCAT IN Pin Assignments

7.8.2 EtherCAT OUT/Ethernet Connector (X2)

The following table describes the EtherCAT OUT/Ethernet connections to the 1 x 5 pins connector.

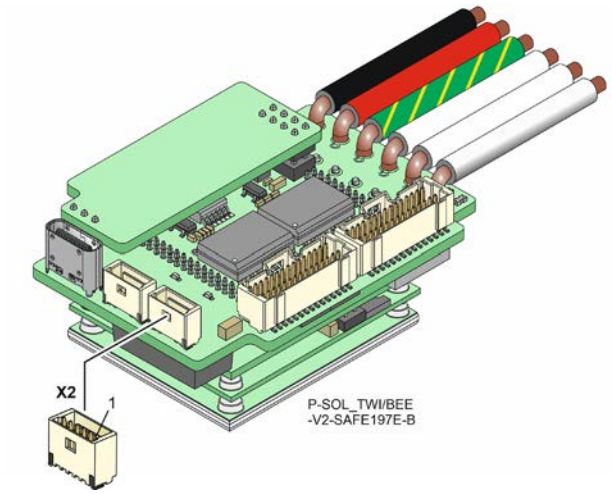
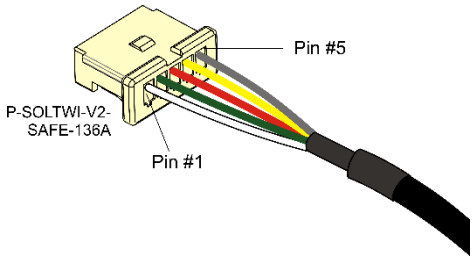
Pin (X2)	Signal	Function
1	EtherCAT_OUT_TX+/Ethernet_TX+	EtherCAT out/Ethernet transmit +
2	EtherCAT_OUT_TX-/Ethernet_TX-	EtherCAT out/Ethernet transmit -
3	EtherCAT_OUT_RX+/Ethernet_RX+	EtherCAT out/Ethernet receive +
4	EtherCAT_OUT_RX-/Ethernet_RX-	EtherCAT out/Ethernet receive -
5	EARTH	Shield drain wire
Pin Positions		**Cable Connector**
 **Platinum Solo Twitter X2 EtherCAT OUT Connector**		 **Ethernet Cable Connector**

Table 14: EtherCAT OUT/Ethernet Pin Assignments

7.9 CAN (X1 & X2)

Fieldbus communications are industrial network protocols for real-time distributed control that allows connection of servo drives. The Platinum Solo Twitter supports the following CAN fieldbus type industrial network protocol:

Fieldbus Type	Product Number
CAN	PTWI-zz-zXXX/YYYTzz-z

The following table describes the CAN connections to both of the 1 x 5 pin connectors.

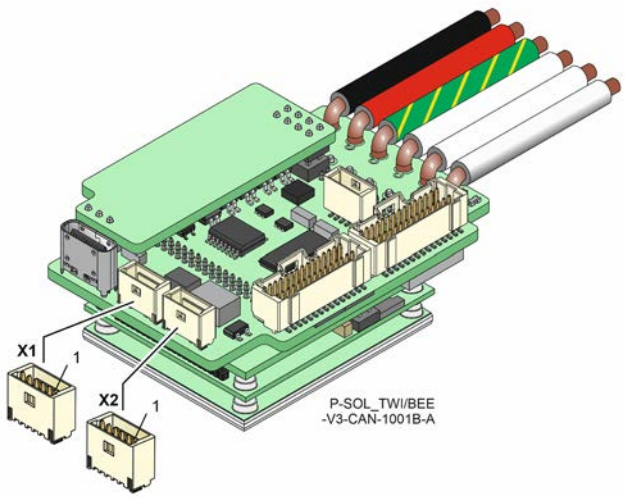
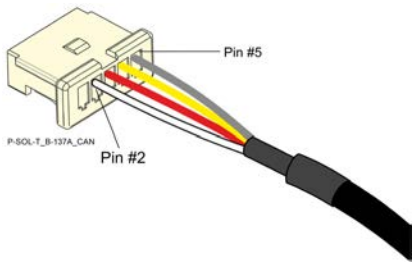
Pin (X1 and X2)	Signal	Function
1	Not Connected	Not Connected
2	CAN_ISO_RET	CAN Isolated Return
3	CAN_H	CAN_H bus line (dominant high)
4	CAN_L	CAN_L bus line (dominant low)
5	PE	Shield drain wire
Pin Positions		**Cable Connector**
 **Platinum Solo Twitter X1 and X2 CAN Connectors**		 **CAN Cable Connector**

Table 15: CAN Pin Assignments

7.10 Differential RS-232 (RS-422) Serial Communication Connector (X4)

Fieldbus communications are industrial network protocols for real-time distributed control that allows connection of servo drives. The Platinum Solo Twitter supports the following fieldbus type industrial network protocol:

Fieldbus Type	Part Number
Differential RS-232 (RS-422)	PTWI-zz-zXXX/YYYGzz-z
	PTWI-zz-zXXX/YYYTzz-z

The following table describes the Differential RS-232 connections to the 1 x 5 pins connector.

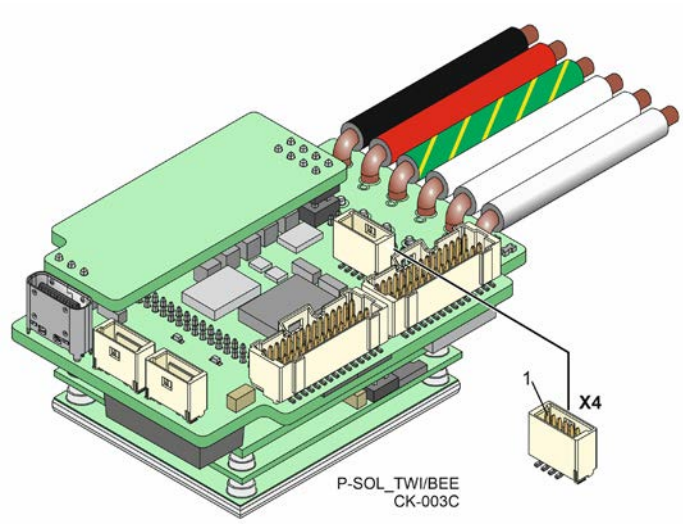
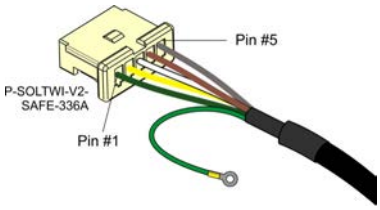
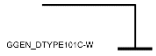
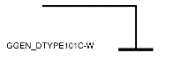
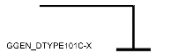
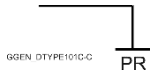
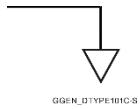
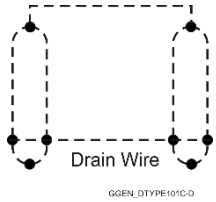
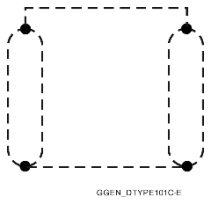
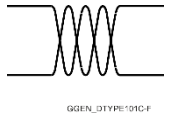
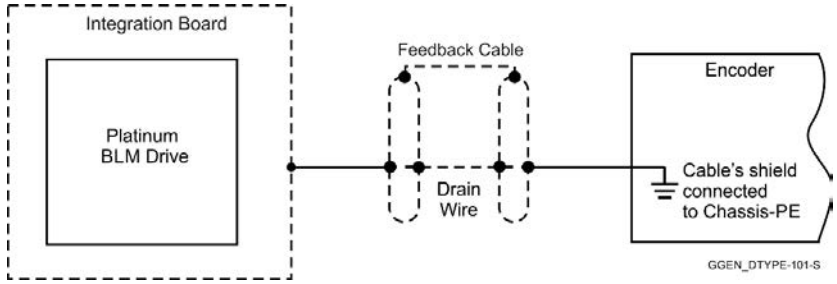
Pin (X4)	Signal	Function
	PTWI-zz-zXXX/YYYGzz-z **PTWI-zz-zXXX/YYYTzz-z**	
1	RS422_TX+	Differential RS232 transmit +
2	RS422_TX-	Differential RS232 transmit -
3	RS422_RX+	Differential RS232 receive +
4	RS422_RX-	Differential RS232 receive -
5	COMRET/ISO_GROUND	Option G: COMRET – Not isolated Ground
		Option T: ISO_GND - Isolated Ground
Pin Positions		**Cable Connector**
 Platinum Solo Twitter Regular I/O with X4 Connector		 **X4 Connector**

Table 16: Differential RS-232 (RS-422) Serial Communication Connector X4 Pin Assignment

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 Platinum Solo Twitter Connection Diagrams

8.2.1 EtherCAT Connection Diagram with Safe IO (Safety Capability: F)

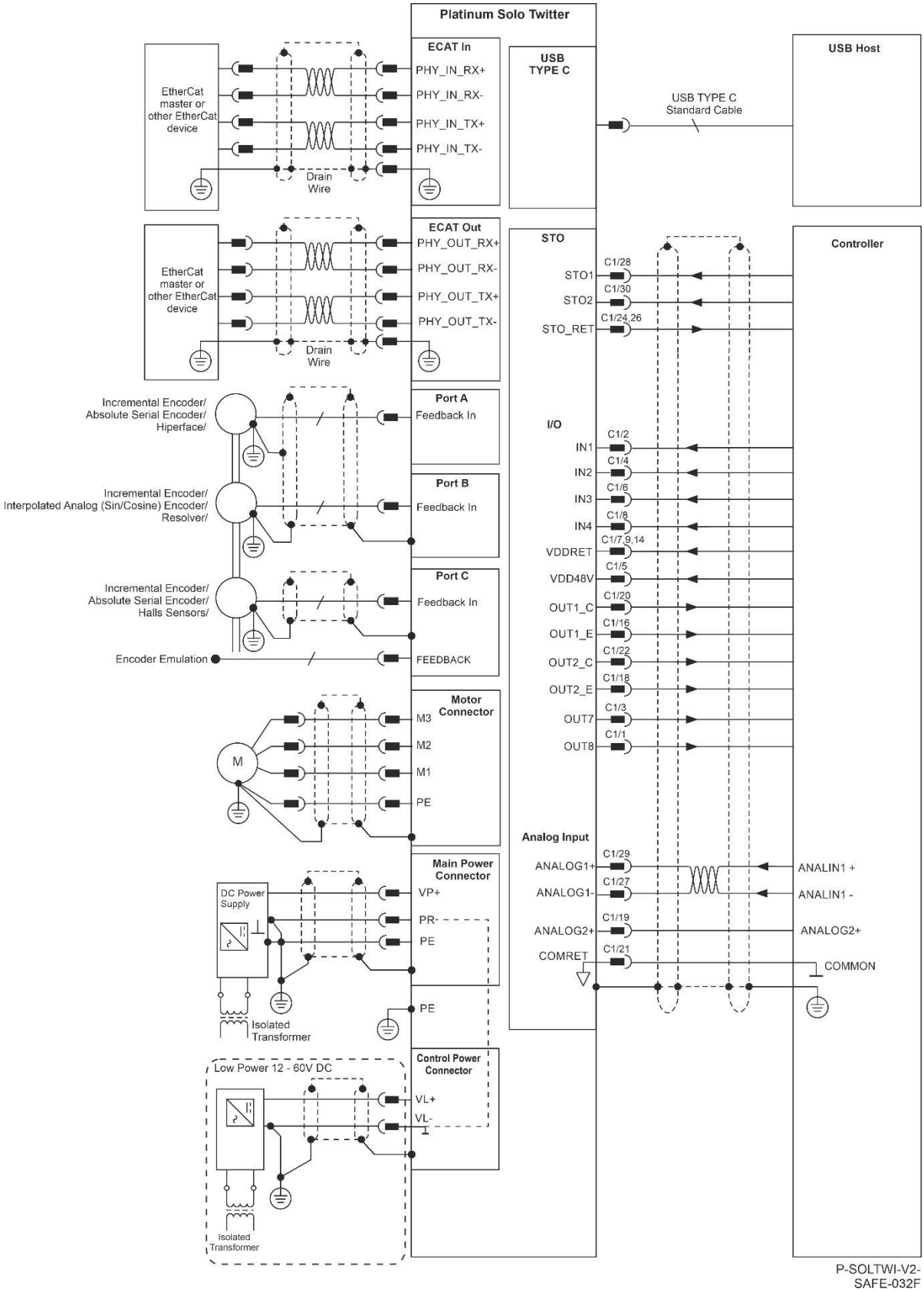


Figure 7: The Platinum Solo Twitter EtherCAT with-Safe-IO Connection Diagram

8.2.2 EtherCAT Connection Diagram with Regular IO (Safety Capability: S, O)

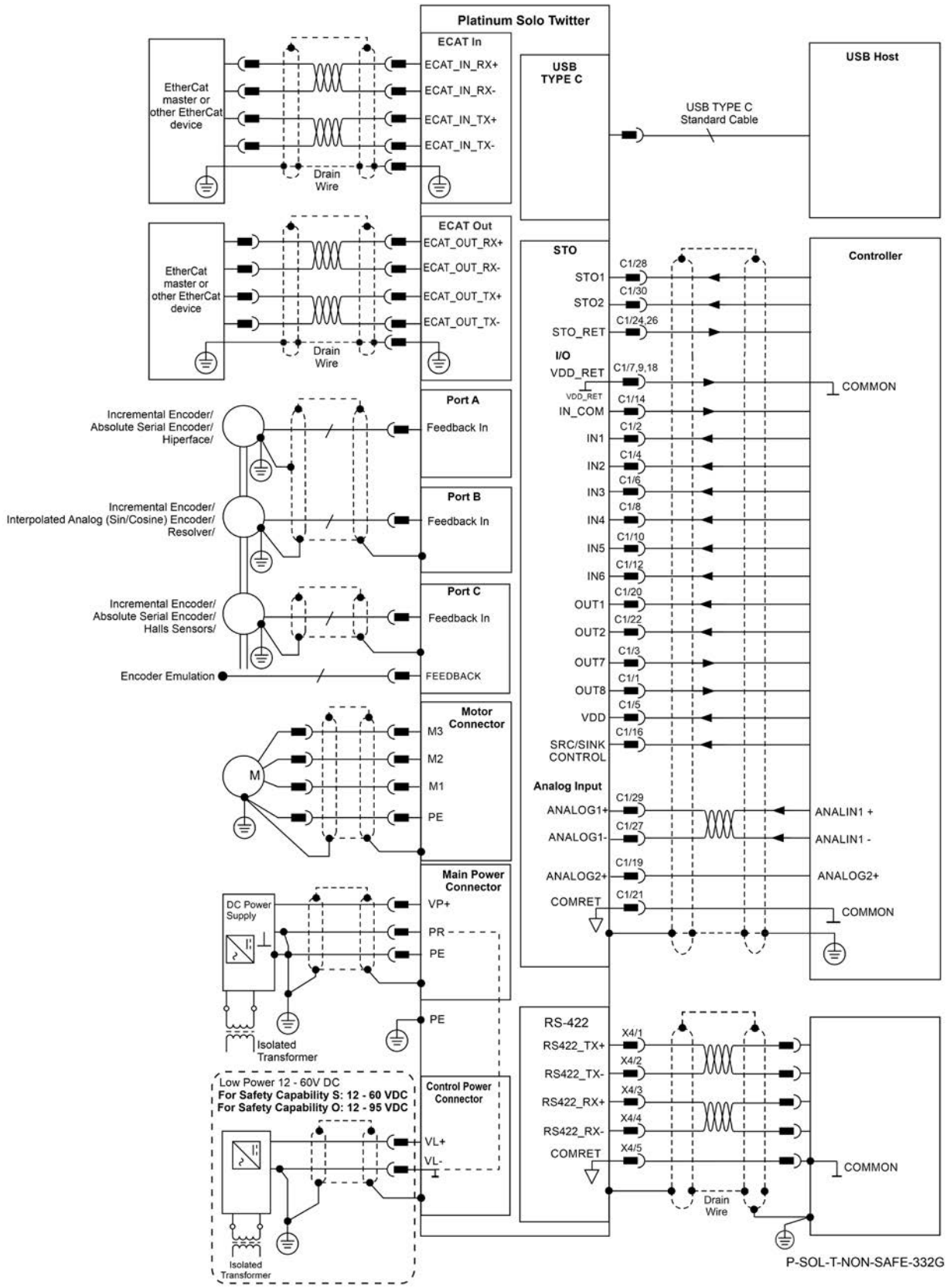


Figure 8: The Platinum Solo Twitter EtherCAT with-Regular I/O Connection Diagram

8.2.3 CAN Connection Diagram with Regular IO (Safety Capability: S, O)

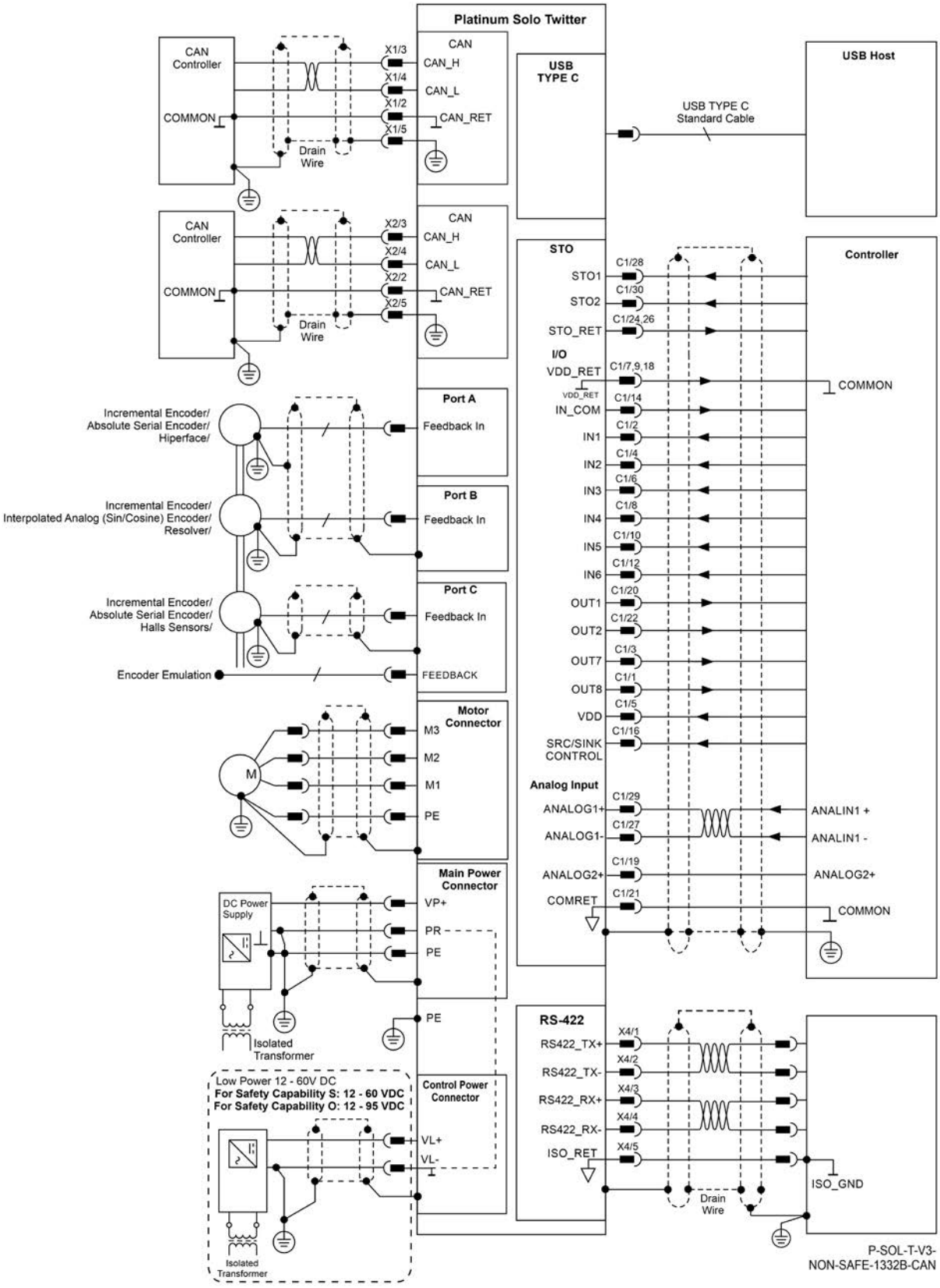


Figure 9: The Platinum Solo Twitter CAN with-Regular I/O Connection Diagram

8.3 Wiring the Female Connectors

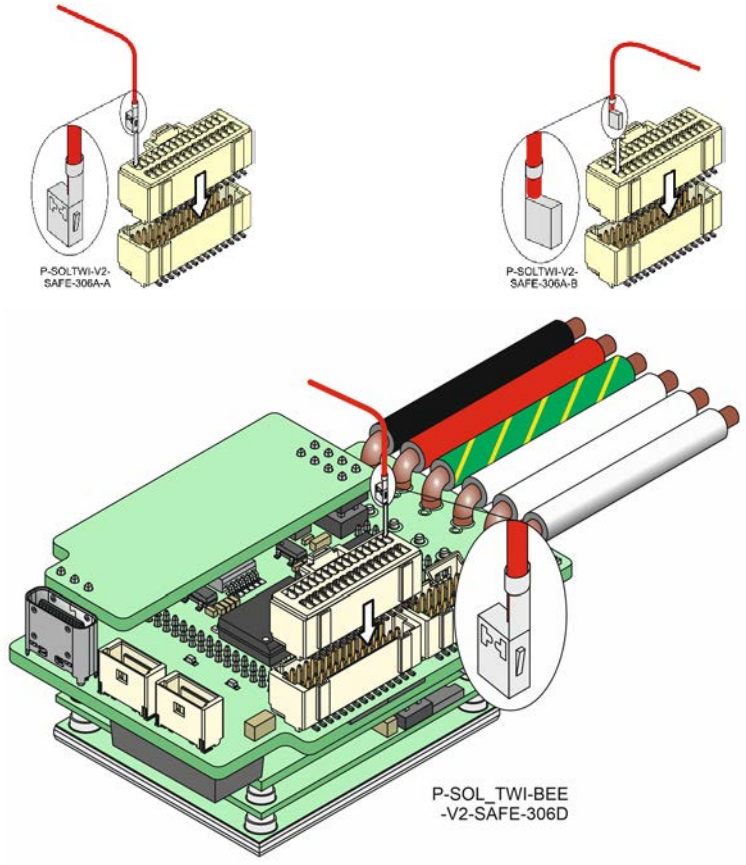


Figure 10: Inserting a wire/pin to the Female Connector

To insert a wire/pin into any of the female connectors C1, C2, X1, X2 and X4, 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 10.
   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 10. 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 Motor Power (PM1)

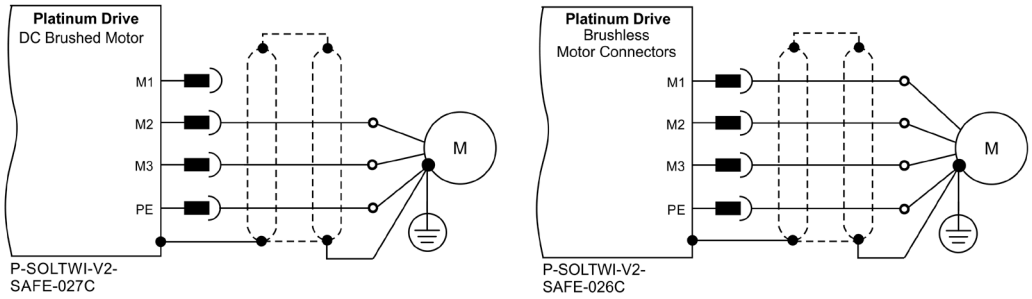


Figure 11: Brushed and Brushless Motor Power Connection Diagram

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 Platinum Solo Twitter.
   The phase connection is arbitrary, as Elmo Application Studio (EAS II) 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.
3. For high EMI environment, it is highly recommended to use a 4-wire shielded (not twisted) cable for 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. Connect the motor power wires as shown in Figure 12. The green/yellow wire is the Grounding wire.
   Make sure not to bundle the wires.

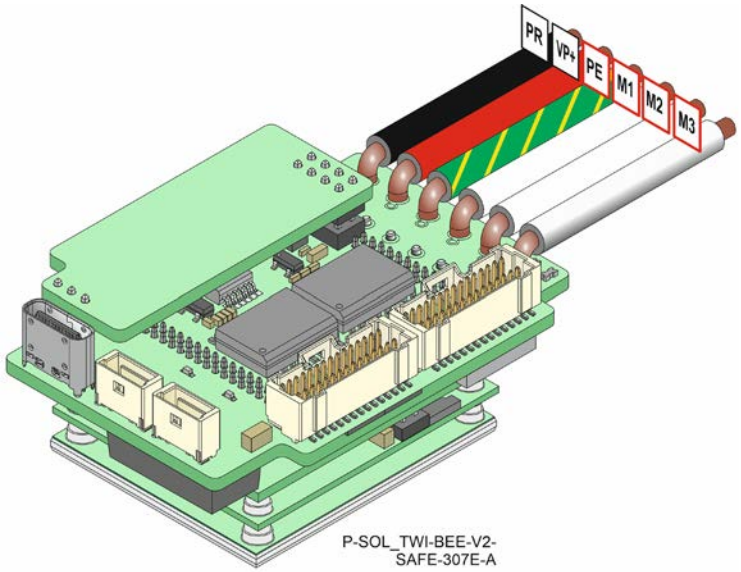


Figure 12: Connecting the Motor Power Wires

8.5 Main Power (PM1)

The isolated DC power source is not included with the Platinum Solo Twitter.

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

To connect the Platinum Solo Twitter 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 as shown in Figure 13.
   It is highly recommended to twist the two DC main power cables at intervals of 10 cm.

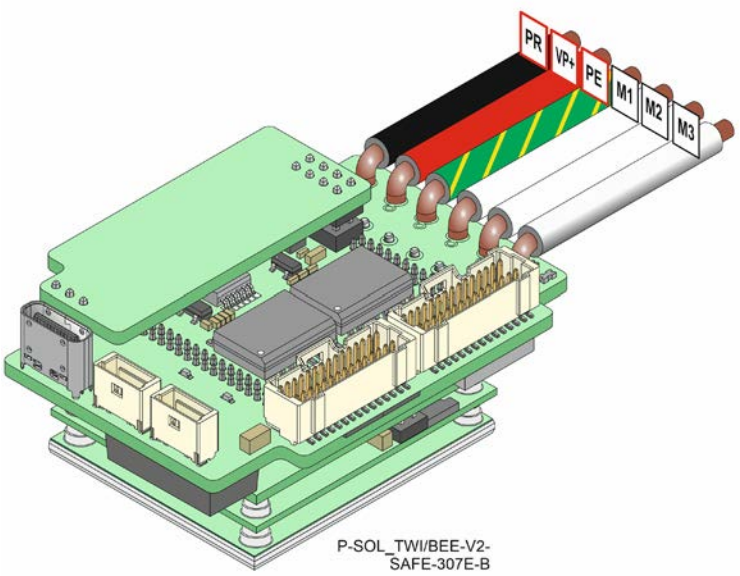


Figure 13: Connecting the Main Power Wires

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.

Wiring Technical Details

The six 14-AWG, silicon insulated, 300mm length colored high quality, power connection wires are rated to operate up to 200°C:

The Platinum Solo Twitter wire connection conforms to UL standards for operation up to 105°C (on the wires). Under extensive load conditions the wires temperature gradient is ≈50 °C above ambient.

8.5.1 Control Supply Connections (C2)

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 14.

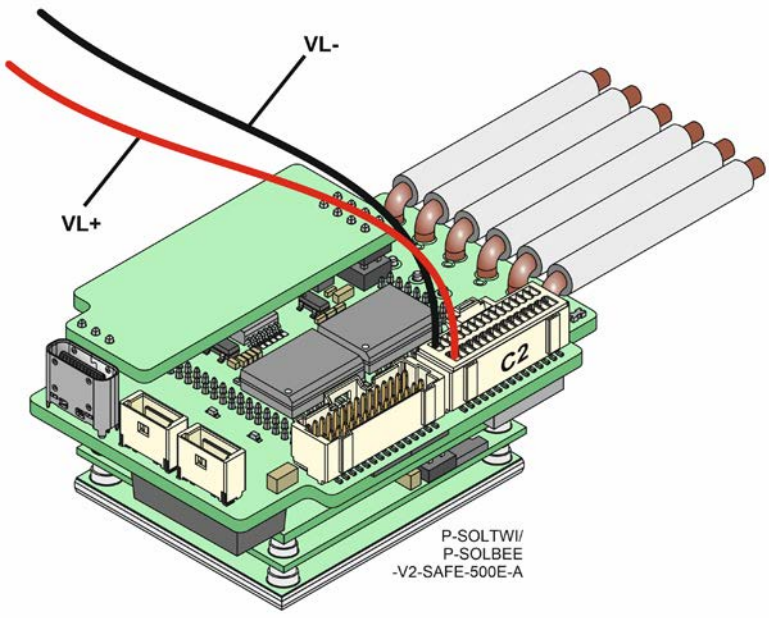


Figure 14: Connecting the Control Supply Wires

4. Before applying power, first verify the polarity of the connection.

8.5.2 Dual Power Supply for Safety

Two DC power sources are required for functional safety:

- Main power isolated from the Mains
  - Main power 20 to 195VDC for 200V module
  - Main power 10 to 135VDC for 150V module
  - Main power 10 to 95VDC for 100V module
  - Main power 10 to 75VDC for 80V module
- Control Power: Isolated DC Source supply
  - Control Power where Safety Capability is F, S: Maximum **60V for the logic**
  - Control Power where Safety Capability is O: Maximum **95V for the logic**

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 Platinum Solo Twitter.

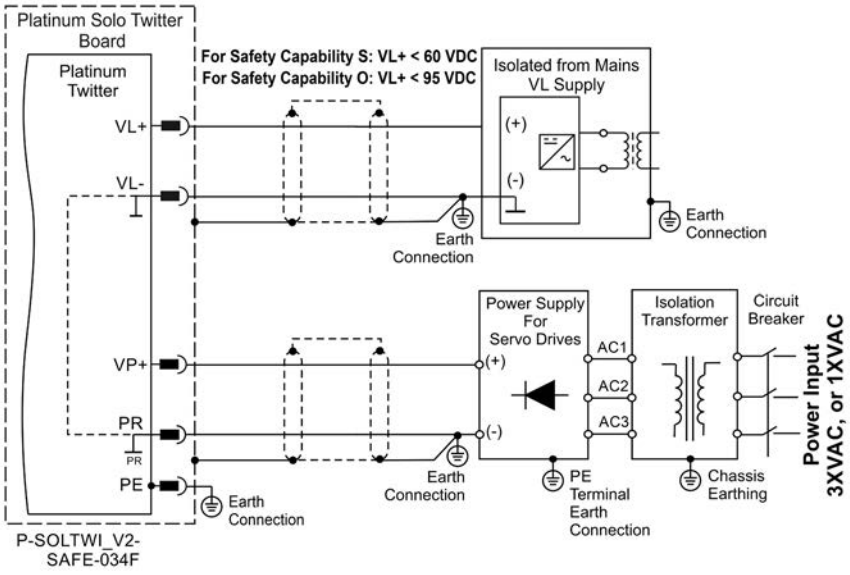


Figure 15: Separate VP and VL Power Supplies for Safety Configurations – Connection Diagram

8.6 Feedback (C2)

Refer to the Chapter 13 Feedback, in the Platinum Safety Drive Manual for details, specification, and connections of the Feedback for safety.

Figure 16 describes the wiring of the Feedback connector. The wires should be inserted as detailed in section 8.3 Wiring the Female Connectors, according to the relevant Feedback Port sensors' pinouts as described in the next five subsections.

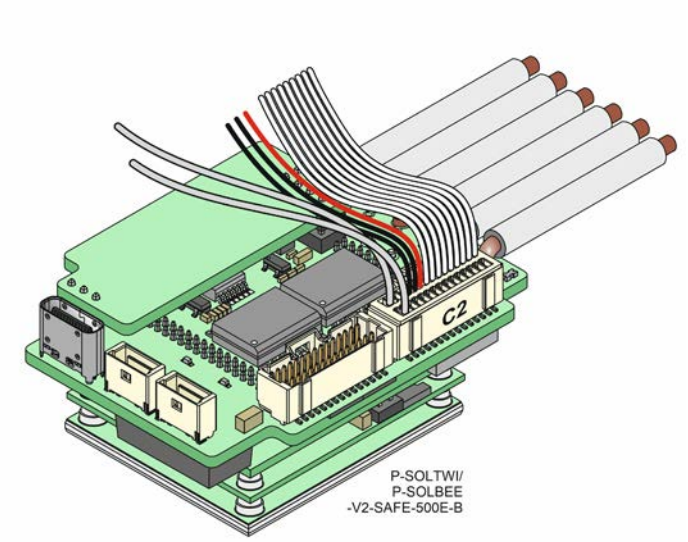


Figure 16: Connecting the Feedback Wires

8.6.1 Feedback Port A

Port A supports the following sensor inputs as described in the table below:

- Incremental Encoder or absolute serial Encoder
- Differential pulse-width modulation (PWM) signal input
- Differential Pulse & Direction signal inputs

Pin (C2) Port A		Incremental Encoder	Absolute Serial Encoder
	Signal	**Function**	**Function**
1	PortA_A+	Channel A +	Absolute encoder clock+
3	PortA_A-	Channel A -	Absolute encoder clock-
5	PortA_B+	Channel B+	Absolute encoder data+
7	PortA_B-	Channel B -	Absolute encoder data -
9	PortA_INDEX+	Channel_Index+	
11	PortA_INDEX-	Channel_Index-	
19, 26	+5V	Encoder +5V supply with a total allowable maximum consumption of 400mA using Pins 19 or 26	
21, 23, 25, 27, 28	COMRET	Common return	

8.6.1.1 Incremental Encoder

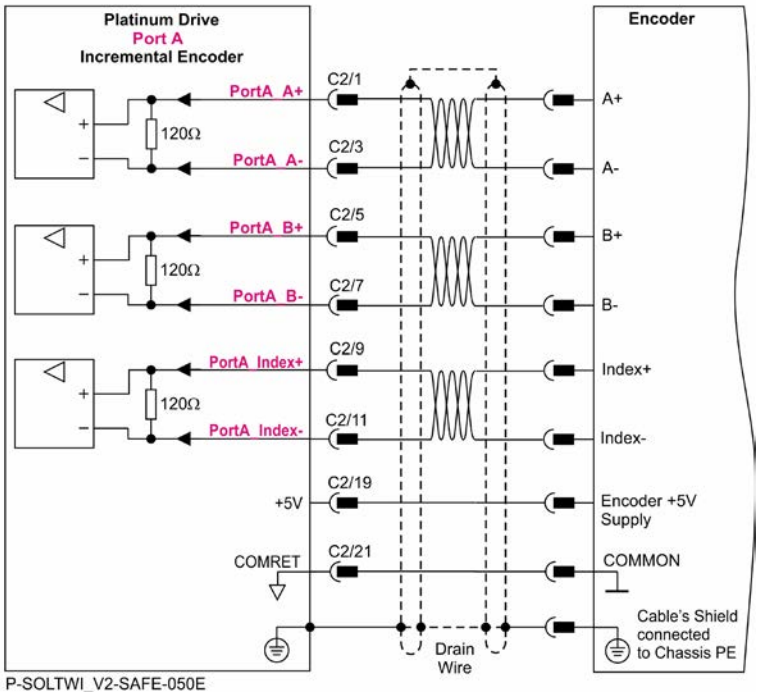


Figure 17: Port A Incremental Encoder Input – Recommended Connection Diagram

8.6.1.2 Absolute Serial Encoder

The following Absolute Encoder types are supported:

- EnDat 2.2
- Biss C and Biss B
- SSI
- Hiperface

The following is the diagram connection of the EnDat, Biss, SSI:

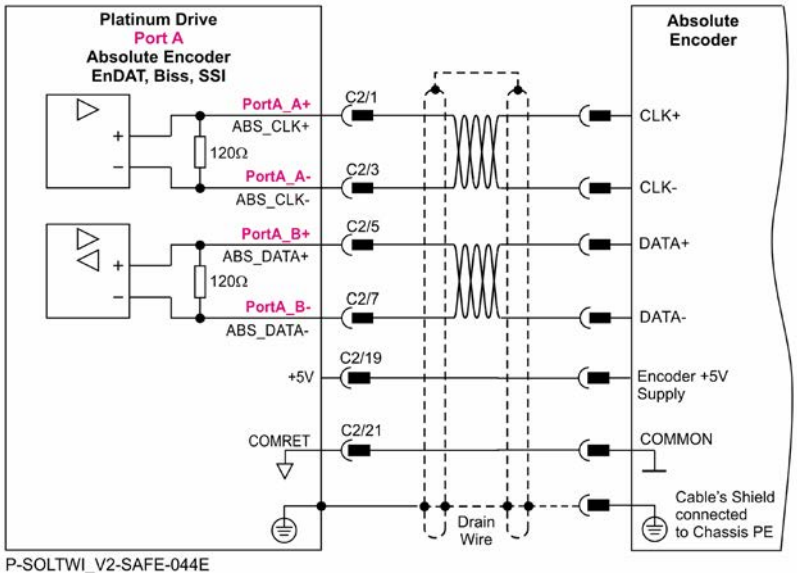


Figure 18: Absolute Serial Encoder – Recommended Connection Diagram for Endat, Biss, SSI

8.6.1.3 Hiperface

The following figure describes the connection diagram.

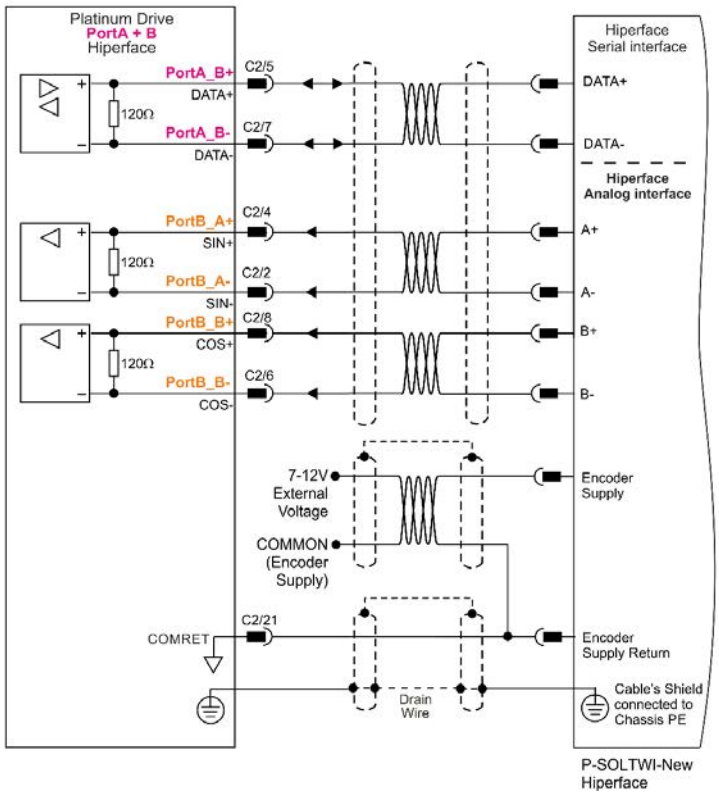


Figure 19: Absolute Serial Encoder – Recommended Connection Diagram for Stegmann Hiperface

Important:

Hiperface encoder with 7V- 12V supply voltage cannot be used for functional safety.

12V power supply can only be used for a non-safety application with an external voltage supply of 7V to 12V.

8.6.2 Feedback Port B

Port B supports any of the following sensors described in the table:

- Incremental Encoder, interpolated analog Encoder

Or

- Resolver (separate hardware option)

Differential PWM signal input can be connected to port B.

Pin (C2) Port B		Incremental Encoder	Interpolated Analog Encoder	Resolver
	Signal	Function	Function	Function
		PTWI-zz-zXXX/YYYzEz-z		PTWI-zz-zXXX/YYYzRz-z
2	PortB_A-	Channel A -	Sine-	Sine-
4	PortB_A+	Channel A+	Sine+	Sine+
6	PortB_B-	Channel B-	Cosine-	Cosine-
8	PortB_B+	Channel B+	Cosine+	Cosine+
10	PortB_INDEX-	Channel_Index-	Analog_Index-	RESOLVER_OUT- Vref complement f= 1/TS, 50 mA Max.
12	PortB_INDEX+	Channel_Index+	Analog_Index+	RESOLVER_OUT+ Vref f=1/TS, 50 mA Max.
19,26	+5V	Encoder +5V supply with a total allowable maximum consumption of 400mA using Pins 19 or 26		
21,23	COMRET	Common return		

8.6.2.1 Incremental Encoder

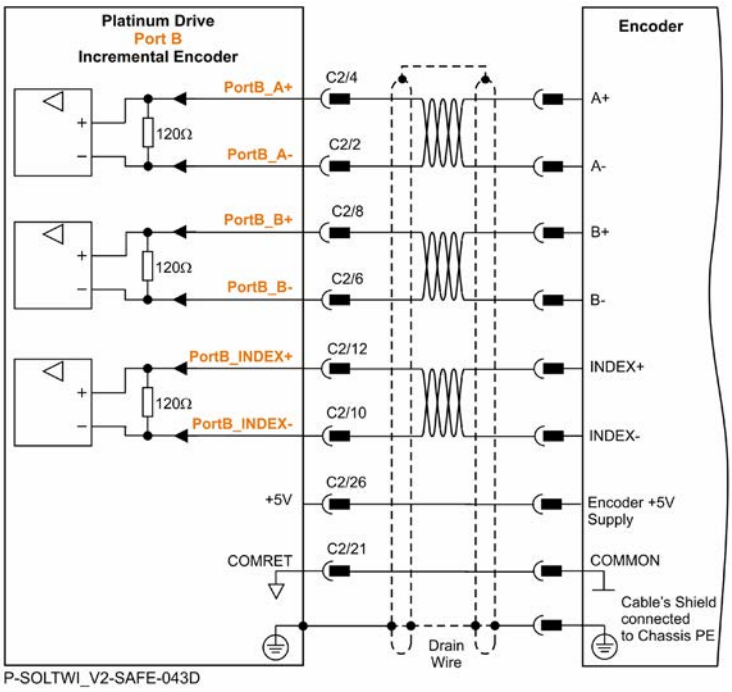


Figure 20: Port B Incremental Encoder Input – Recommended Connection Diagram

8.6.2.2 Interpolated Analog (Sine/Cosine) Encoder

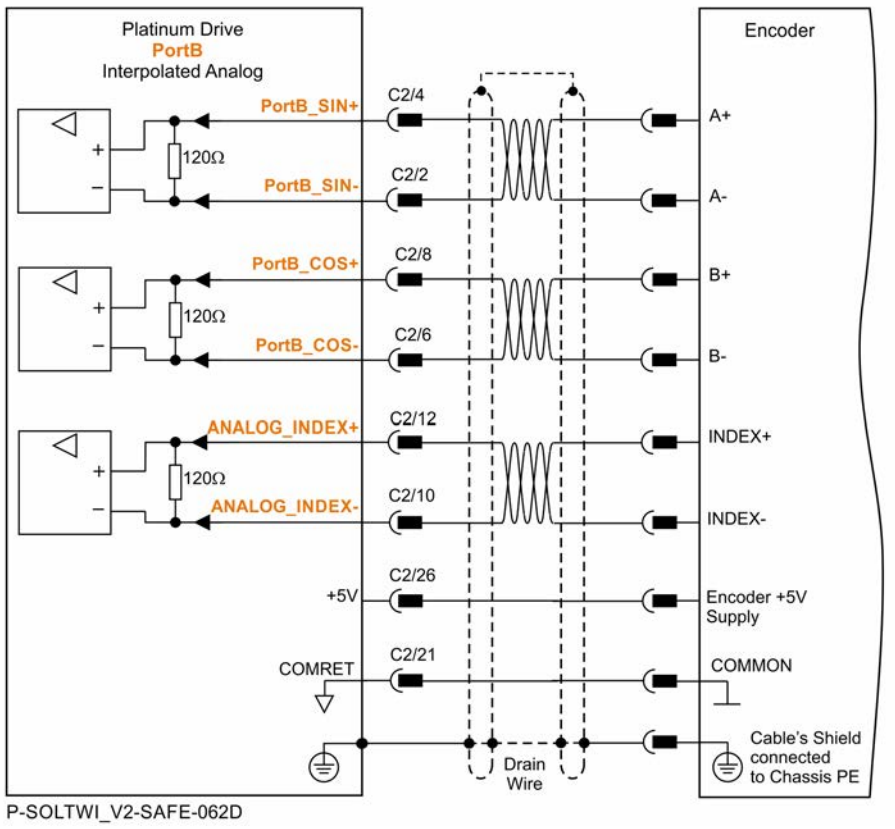


Figure 21: Port B - Interpolated Analog Encoder Connection Diagram

8.6.2.3 Resolver

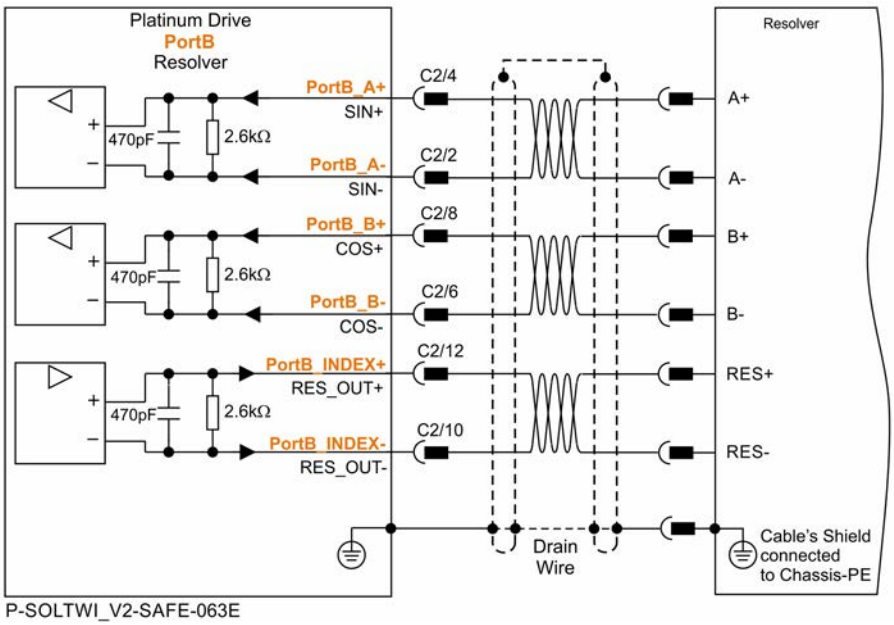


Figure 22: Port B – Resolver Connection Diagram

8.6.3 Feedback Port C

Port C provides the following as described in the table below:

- Incremental Encoder feedbacks
- Absolute Serial Encoder feedbacks
- Hall Sensors
- Emulated Encoder output derived from port A, port B feedback inputs, or from internal variables

Pin (C2) Port C		Incremental Encoder	Absolute Serial Encoder	Emulated Encoder
	Signal	**Function**	**Function**	**Function**
13	HALL A	Hall A Input		
15	HALL B	Hall B Input		
17	HALL C	Hall C Input		
14	PORTC_A-	Channel A -	Absolute encoder clock-	Emulated Output A-
16	PORTC_A+	Channel A +	Absolute encoder clock+	Emulated Output A+
18	PORTC_B-	Channel B –	Absolute encoder data -	Emulated Output B-
20	PORTC_B+	Channel B+	Absolute encoder data+	Emulated Output B+
22	PORTC_INDEX-	Index -	Reserved	Emulated Output Index-
24	PORTC_INDEX+	Index+	Reserved	Emulated Output Index+
19, 26	+5V	Encoder +5V supply with a total allowable maximum consumption of 400mA using Pins 19 or 26.		
21, 23	COMRET	Common return		

8.6.3.1 Incremental Encoder

The following Incremental Encoder types are supported:

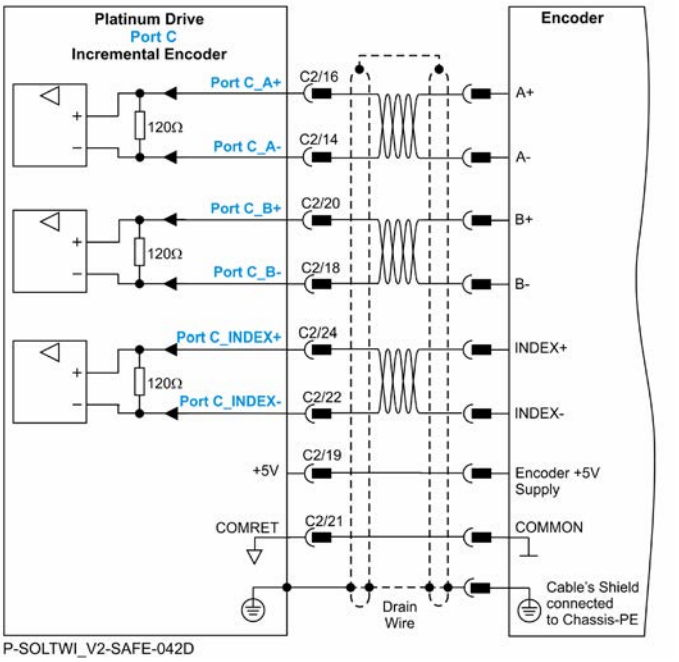


Figure 23: Port C Incremental Encoder Input – Recommended Connection Diagram

8.6.3.2 Absolute Serial Encoder

Port C supports the following ABS feedback:

- EnDat 2.2
- Biss C and Biss B
- SSI
- Panasonic, Tamagawa
- Sanyo

The following is the diagram connection of the EnDat, Biss, SSI:

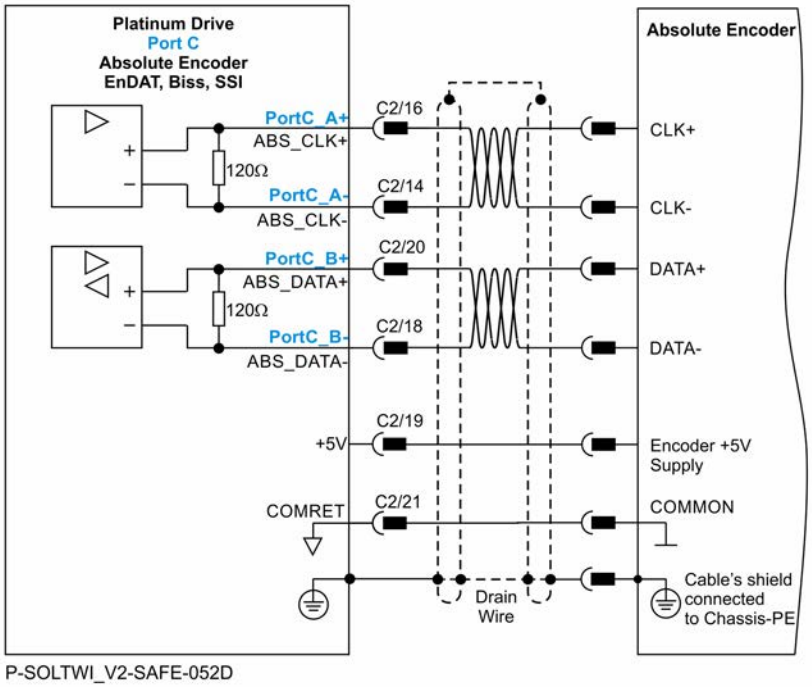


Figure 24: Absolute Serial Encoder – Recommended Connection Diagram for Endat, Biss, SSI

The following is the feedback diagram connection for Panasonic, Tamgawai, Sanyo-Denki:

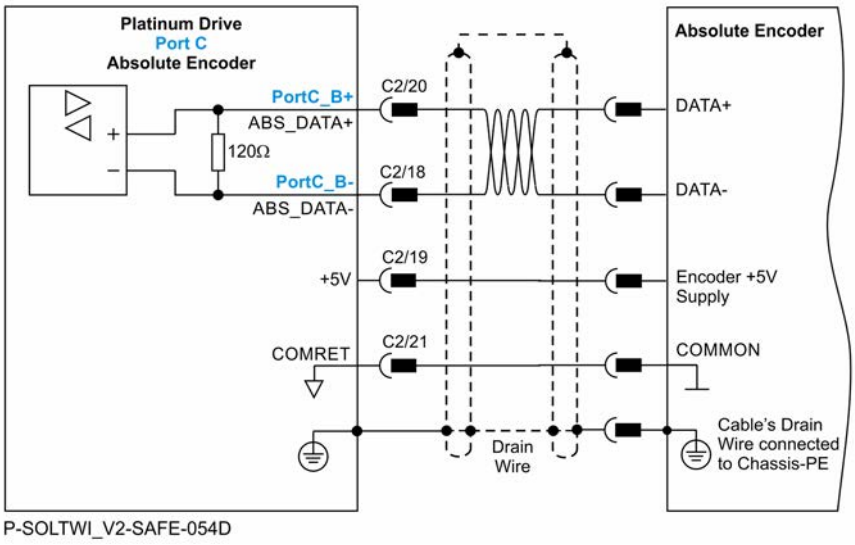


Figure 25: Absolute Serial Encoder – Recommended Connection Diagram for Panasonic, Tamgawai, and Sanyo-Denki

8.6.3.3 Emulated Encoder Output

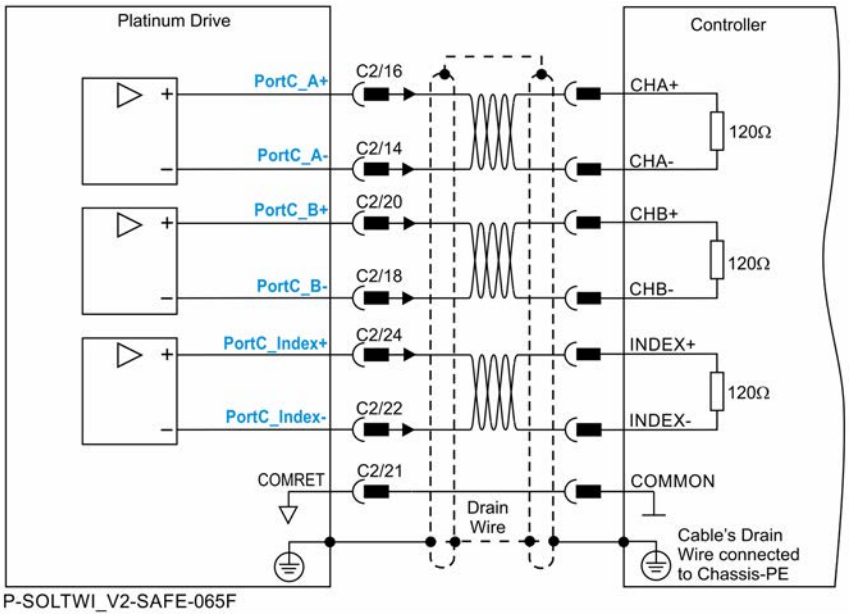


Figure 26: Emulated Encoder Differential Output – Recommended Connection Diagram

8.6.4 Feedback - Hall Sensors

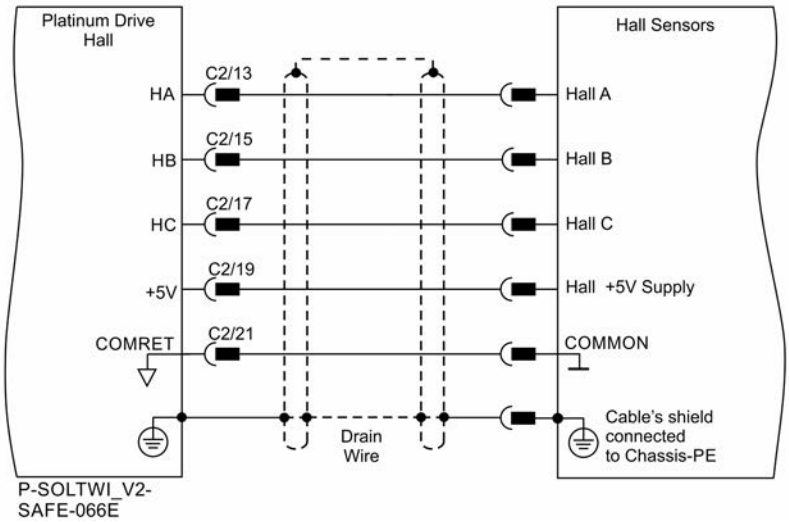


Figure 27: Hall Sensors Connection Diagram

8.7 Safe Digital I/Os (Safe IO Style: B) (C1)

The wires should be inserted as detailed in section 8.3 Wiring the Female Connectors.

Refer to the section 14.5 Safe Digital IO Style: B, in the Platinum Safety Drive Manual for details, specification and connection of IO for Safety.

8.7.1 Digital Outputs

The Platinum Solo Twitter supports four digital outputs:

- Two Safe Outputs: OUT7 – SRC and OUT8 SINK
- Two regular Outputs that can be used as regular output or test pulse outputs: OUT1 and OUT2

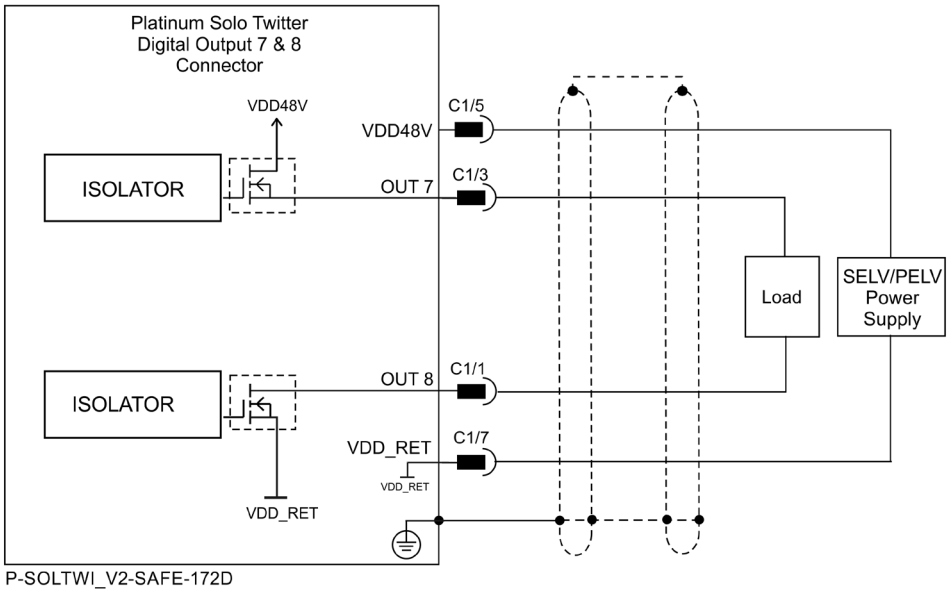


Figure 28: Digital Outputs with Safe IO Connection Diagram (OUT7 and OUT8)

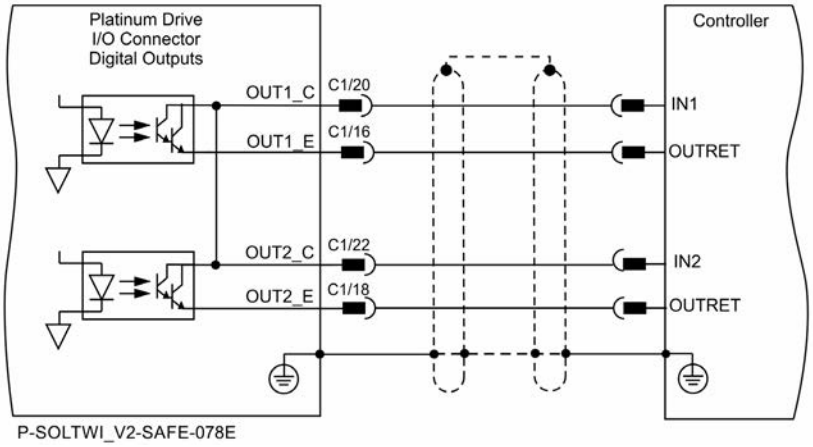


Figure 29: Digital Outputs for Regular Connection Diagram (OUT1 and OUT2)

8.7.2 Digital Inputs

The Platinum Solo Twitter supports up to four digital inputs:

- Two Safe inputs with Test Pulse (IN1 and IN2)
- Four OSSD Inputs (IN1, IN2, IN3, IN4)

8.7.2.1 Digital Input with Test Pulse

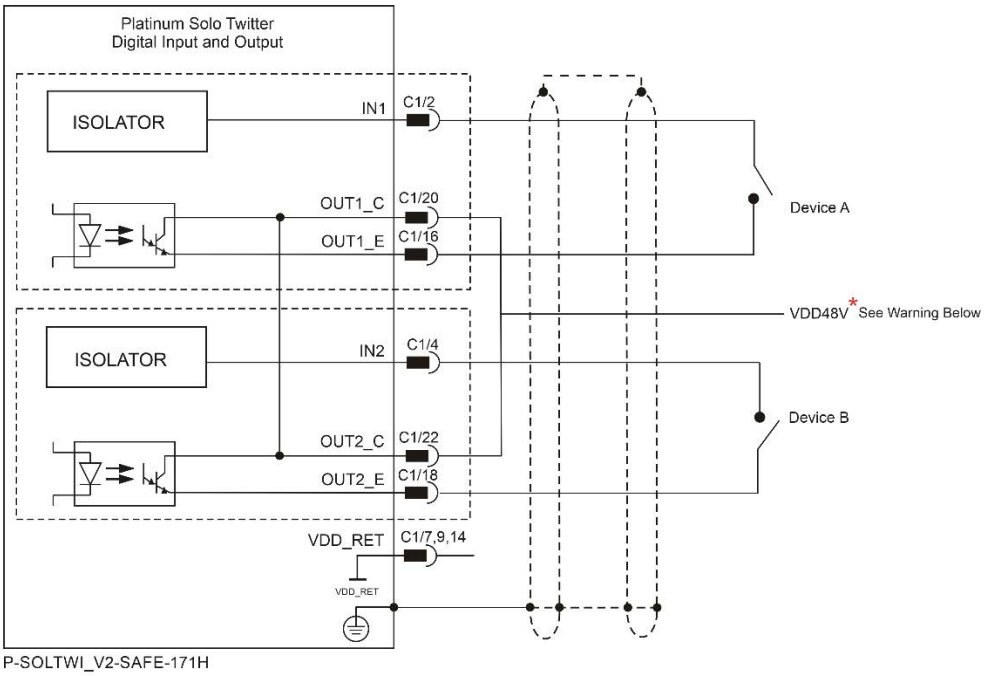


Figure 30: Digital Input with Test Pulse Connection Diagram (IN1 and IN2)

Warning: The range of VDD is according to the table in 5.4.7 Digital Output. However, the external Device A, B must be tolerant to the VDD voltage.

8.7.2.2 OSSD Inputs

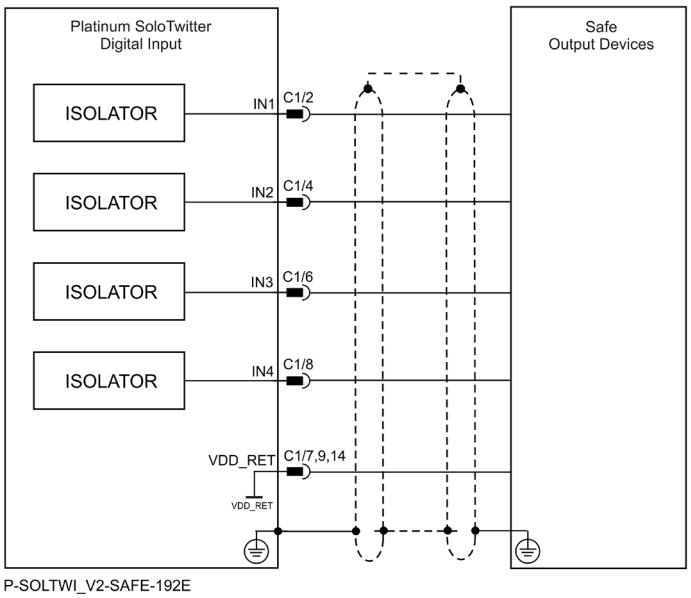


Figure 31: OSSD Digital Input Connection Diagram (IN1, IN2, IN3, IN4)

8.8 Regular Digital IOs (U, V) (C1)

Refer to the Chapter 15 Regular Digital IO section, in the Platinum Safety Drive Manual for details, specification and connection of the Regular IO connections.

8.8.1 Digital Input and Output 5V Logic Mode (IO Type: U)

The following figures describes the connections at the I/O Port for the Digital Input and Output 5V logic Mode.

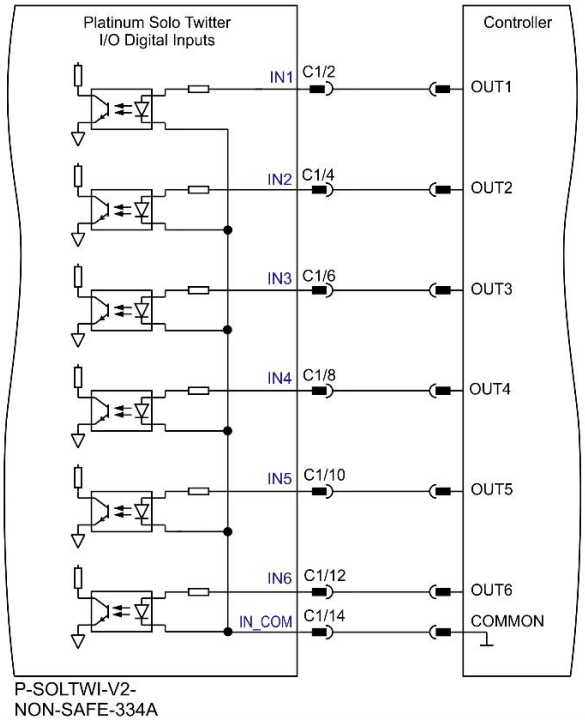


Figure 32: Regular Digital Input 5V Logic Mode Connection Diagram

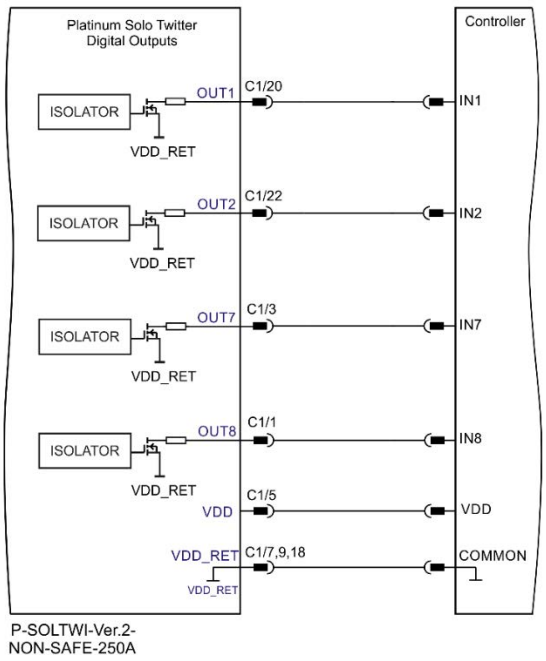


Figure 33: Regular Digital Output Connection Diagram – 5V Logic Option

8.8.2 Digital IO PLC Source and Sink Mode (IO Type: V)

8.8.2.1 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 Source Mode.

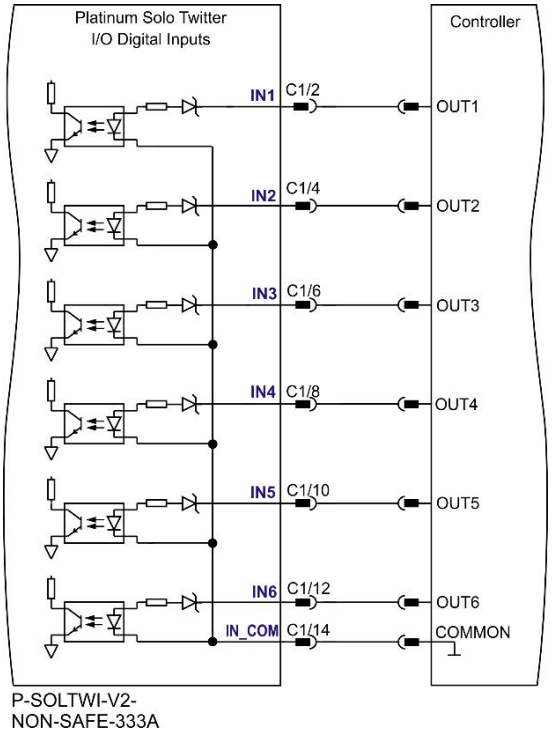


Figure 34: Regular Digital Input Connection Diagram – PLC Source Option

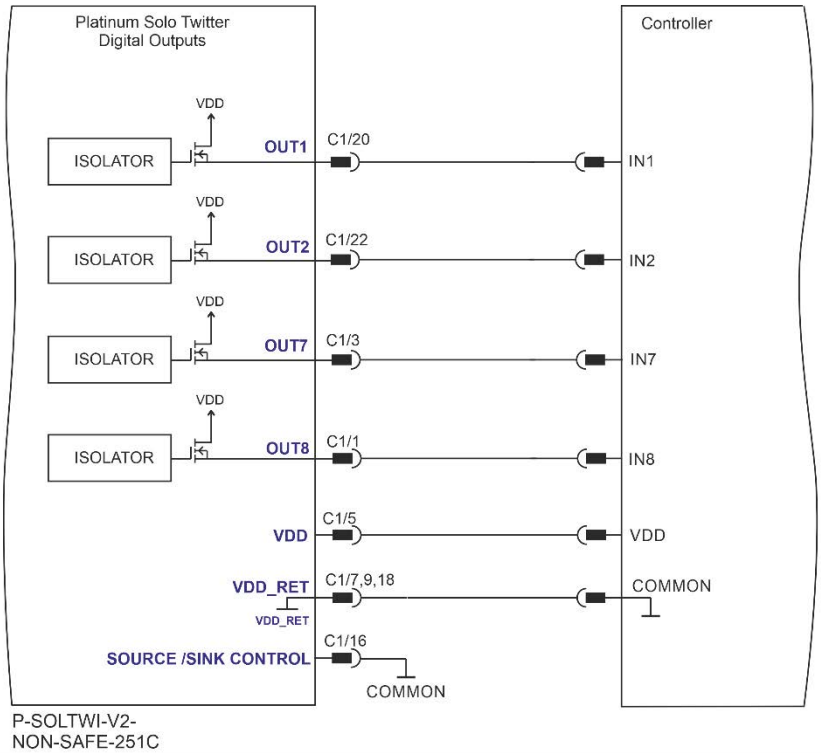


Figure 35: Regular Digital Output Connection Diagram – PLC Source Option

8.8.2.2 Digital Input and Output PLC Sink Mode

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

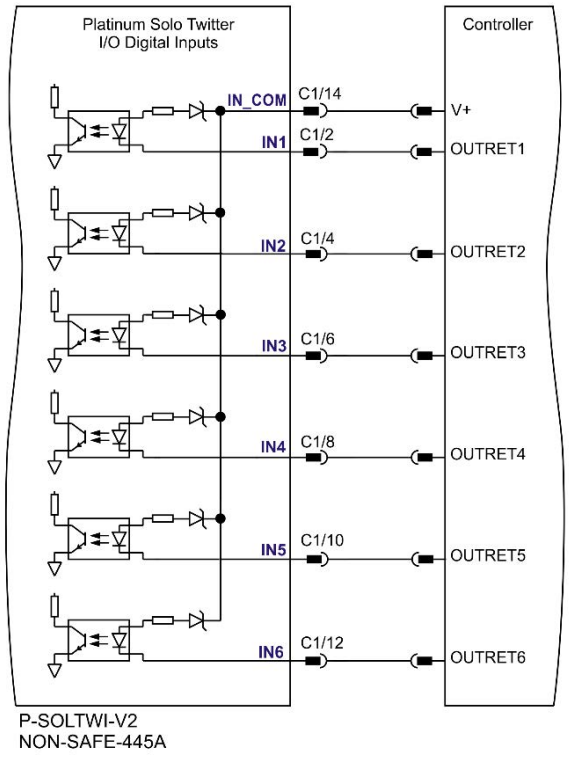


Figure 36: Regular Digital Input Connection Diagram – PLC Sink Option

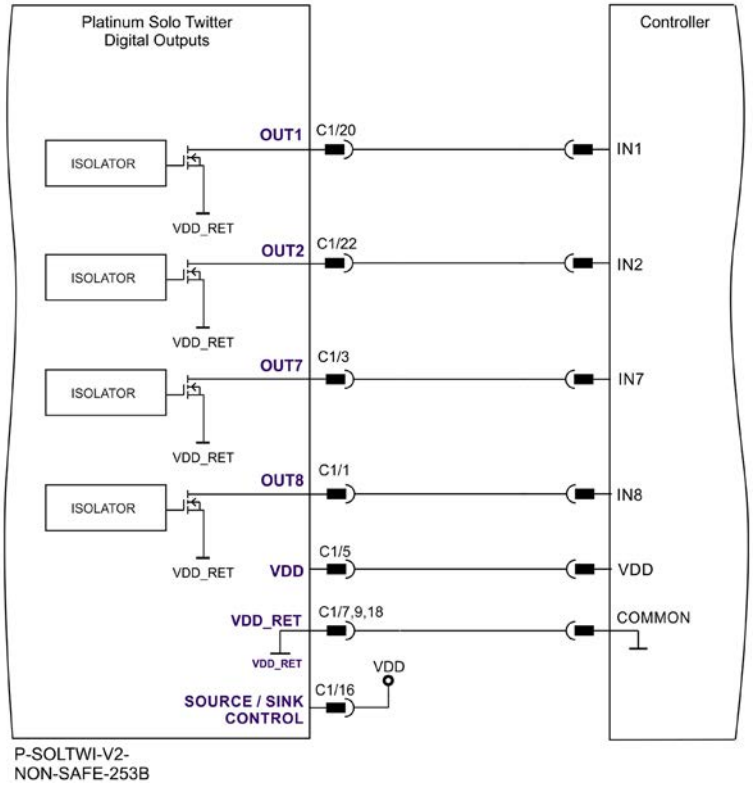


Figure 37: Regular Digital Output Connection Diagram – PLC Sink Option

8.9 STO (Safe Torque Off) (C1)

Refer to the Chapter 12 Safe Torque Off (STO) section, in the Platinum Safety Drive Manual for details, specification and connection of the STO.

8.9.1 Source Mode – PLC Voltage Level

Refer to the diagram below for the PLC Source option connection.

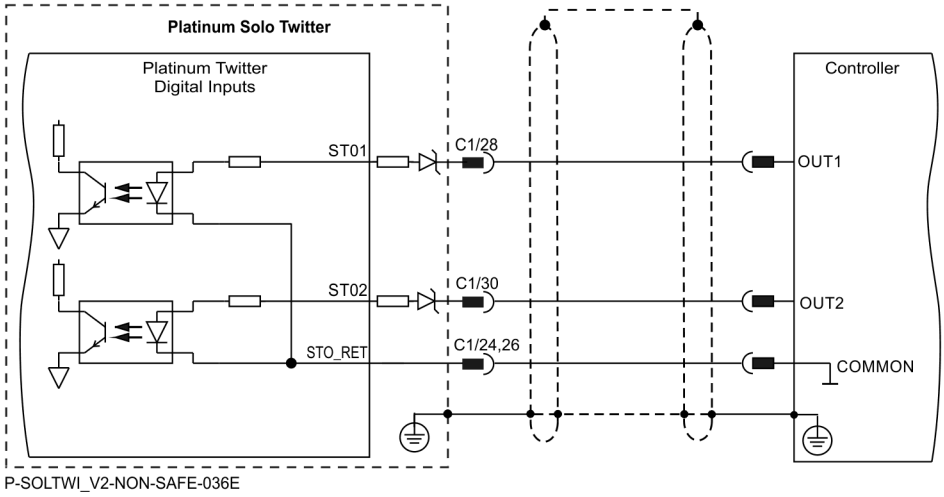


Figure 38: STO Input Connection – PLC Source (24V Logic)

8.9.2 TTL Mode – TTL Voltage Level

The TTL (5V Logic) option is only available for models:

- PTWI-z**S**-zXXX/YYYzzU-z
- PTWI-z**O**-zXXX/YYYzzU-z

Refer to the diagram below for the TTL option connection.

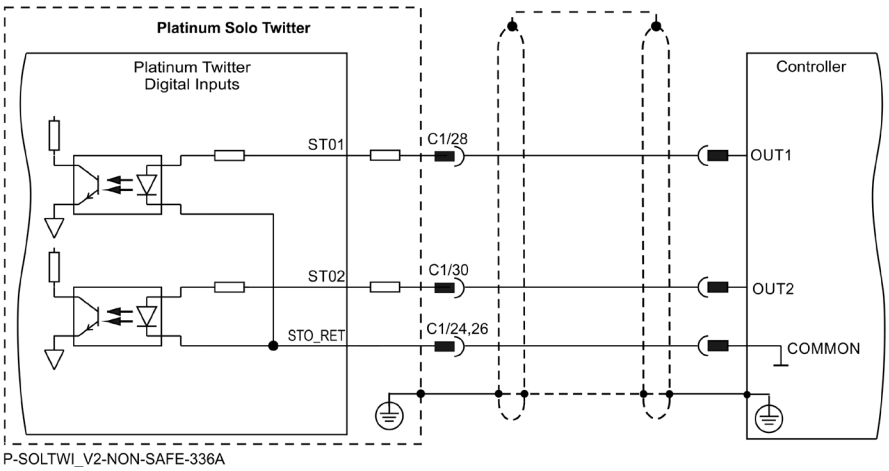


Figure 39: STO Input Connection – TTL Source (5V Logic)

8.10 Analog Input (C1)

There are two possible types of Analog Inputs in the Platinum Solo Twitter:

- Analog Input 1 – Differential ±10 V
- Analog Input 2 – Single ended ±10 V

Refer to the Chapter 16 Analog Input section, in the Platinum Safety Drive Manual for details, specification and connection of the Analog Input.

8.10.1 Analog Input 1

The following circuit (Figure 40) describes the internal interface of the Analog input.

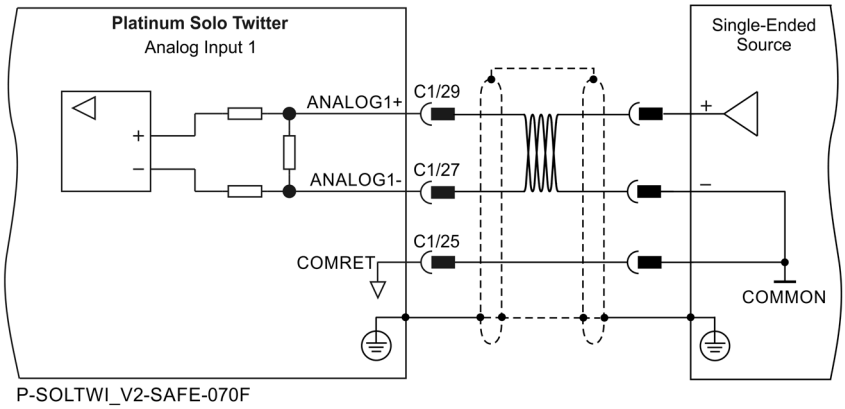


Figure 40: Analog Input 1

8.10.2 Analog Input 2

Figure 41 describes the input interface of the Analog Input 2 in the Platinum Solo Twitter.

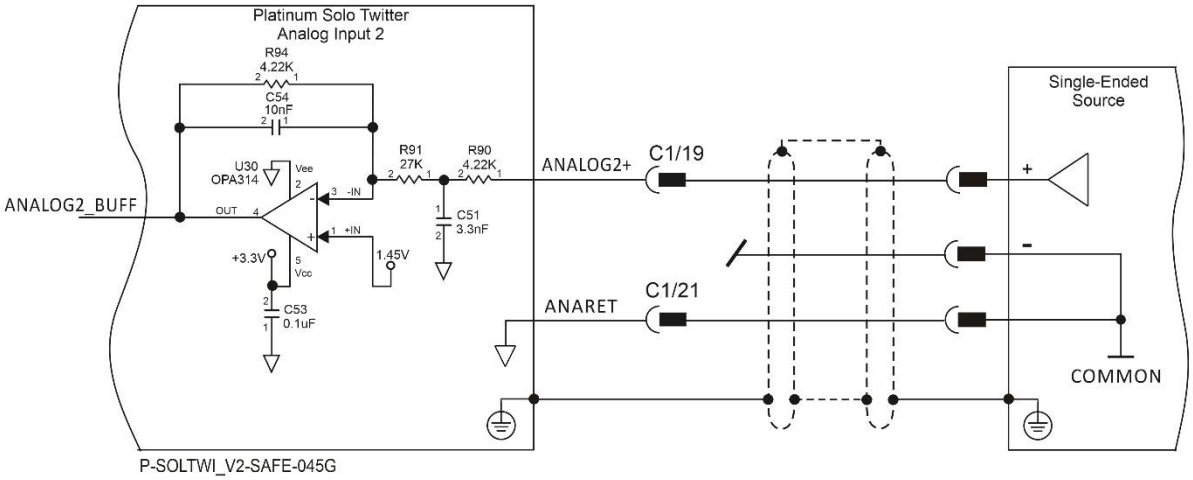


Figure 41: Analog Input 2

8.11 Communication (X1, X2, X3, and X4)

8.11.1 USB 2.0 Connector Type C (X3)

Use a standard USB 2.0 Type C cable and connector to connect the USB. Refer to section 17.1 in the Platinum Safety Drive Manual.

8.11.2 RS-422 (Differential RS-232) Serial Communication (X4)

The X4 connector is for RS-422 communication, and is only available for models:

PTWI-z**S**-zXXX/YYY**G**zz-z / PTWI-z**S**-zXXX/YYY**T**zz-z

PTWI-z**O**-zXXX/YYY**G**zz-z / PTWI-z**O**-zXXX/YYY**T**zz-z

The following 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

The following are 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 *or* ISO_RET	For option **G**: Common Return
	For option **T**: ISO_RET

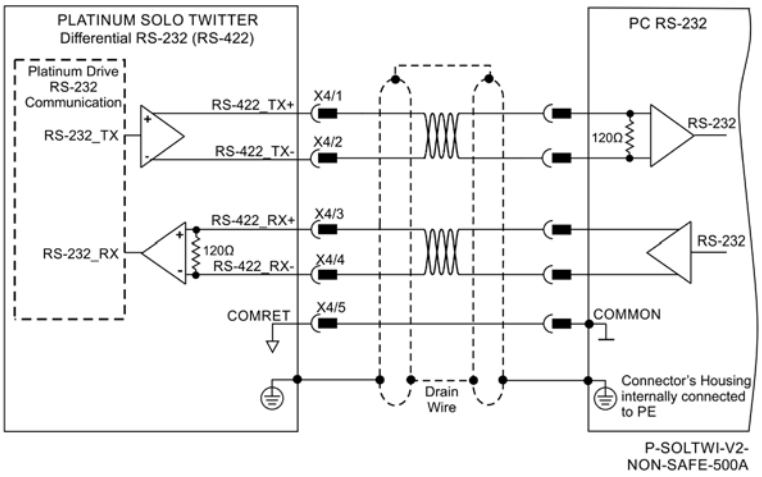


Figure 42: Differential RS-232 Communication Example for Option G

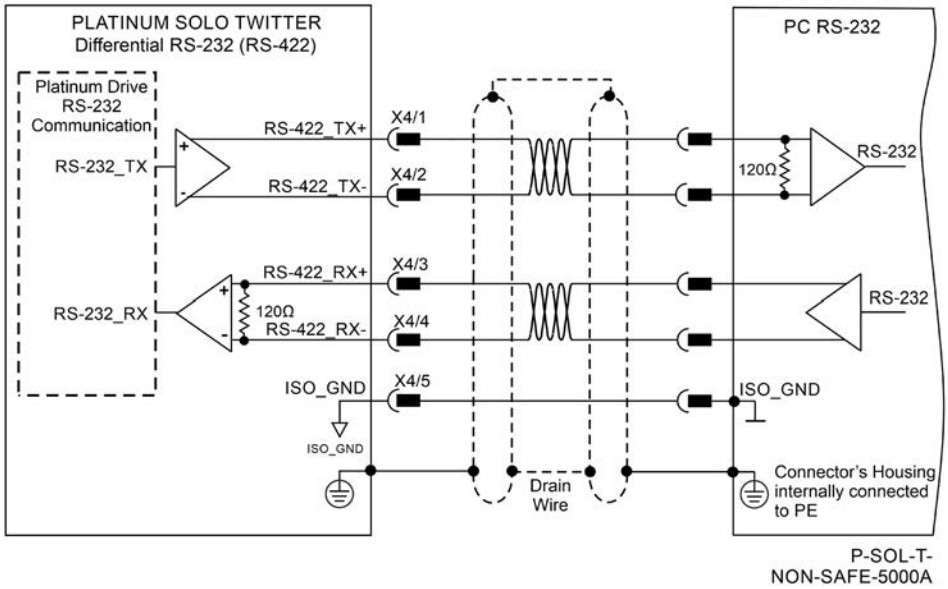


Figure 43: Differential RS-232 Communication Example for Option T

8.11.3 EtherCAT (X1 and X2)

8.11.3.1 EtherCAT Schematic Connections

Note:
The EtherCAT OUT port can be configured to an Ethernet Port.
This section only describes the EtherCAT communication, and the pinout drawing of the connector.

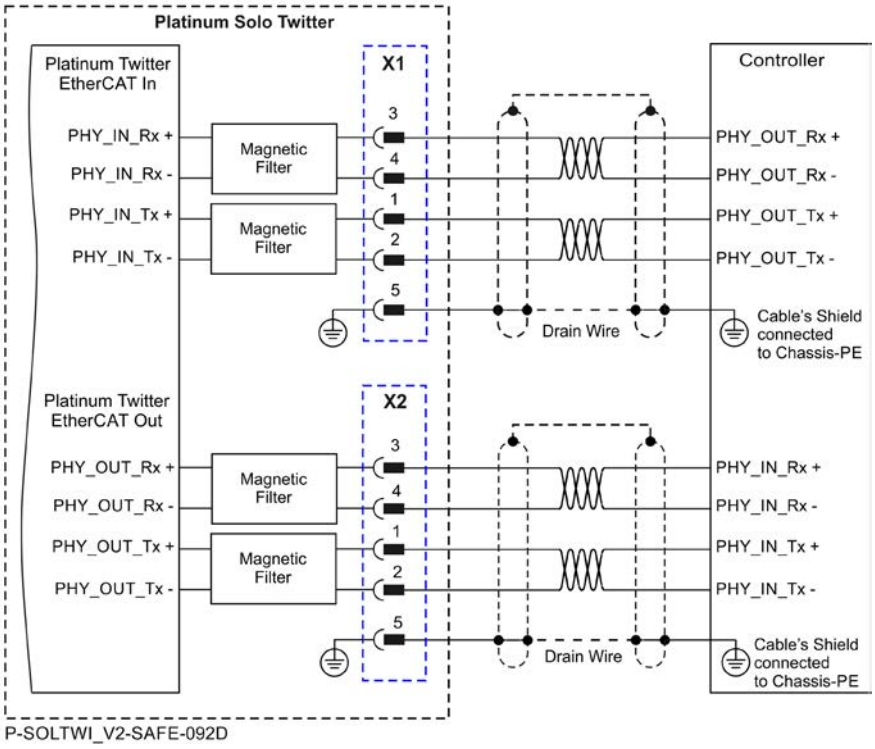


Figure 44: EtherCAT Connection Schematic Diagram

Note:
Always use CAT5e cables.

8.11.3.2 EtherCAT Status Indicator

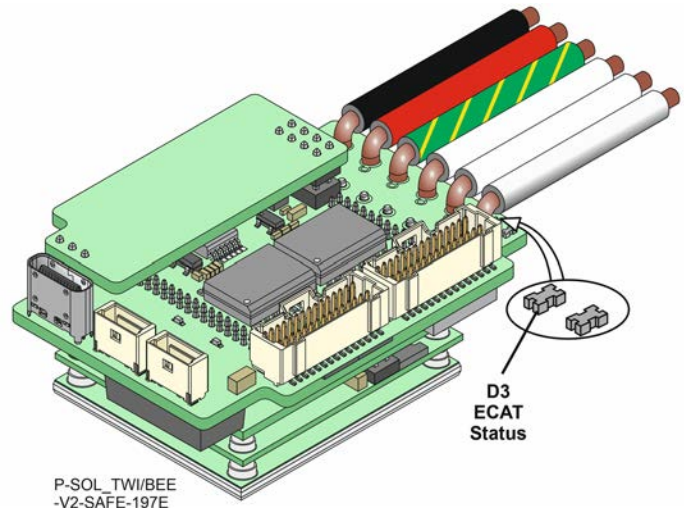


Figure 45: EtherCAT Status LED

The EtherCAT status indicator D3 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.

8.11.3.3 EtherCAT Link Indicators

The Platinum Solo Twitter 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. Each of these Ports has a status LED; D5 EtherCAT In and D6 EtherCAT Out, which are shown in Figure 46.

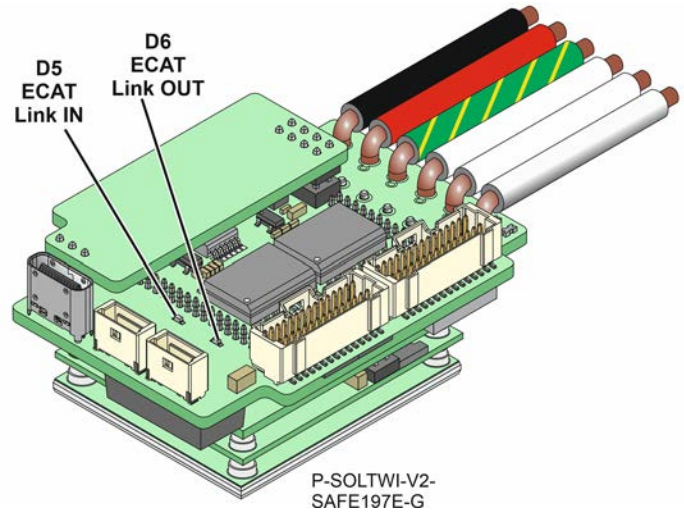


Figure 46: Ethernet Connector LEDs

The green LEDs D5 and D6 are the link/activity indicators. They show the state of the applicable physical link and the activity on that link; blinking green, D5 for the Link Act IN, and D6 for the Link Act OUT.

8.11.4 CAN (X1 and X2)

Note:
It should be noted that all signals are isolated.

For full details on CANopen communication, see section 14.3 in the MAN-G-Board Level Modules Hardware manual.

8.11.4.1 CAN Schematic Connections – Interface

The Platinum Solo Twitter includes the CAN transceiver, common mode choke, and a CAN Bus Protector against ESD and other harmful transient voltage events.

The following signals describe how to connect CAN to the external connector.

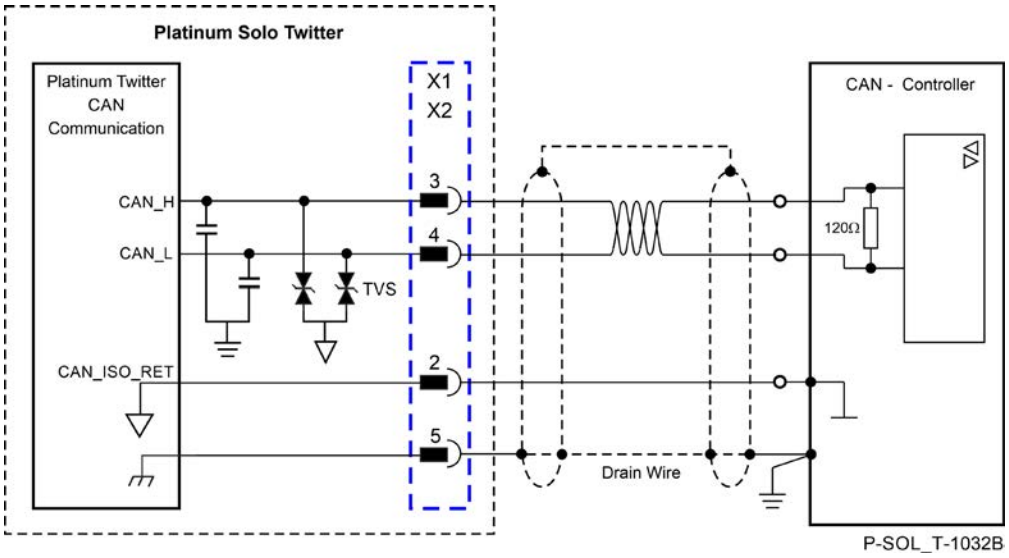


Figure 47: CAN Interface

8.11.4.2 CAN Network Topology

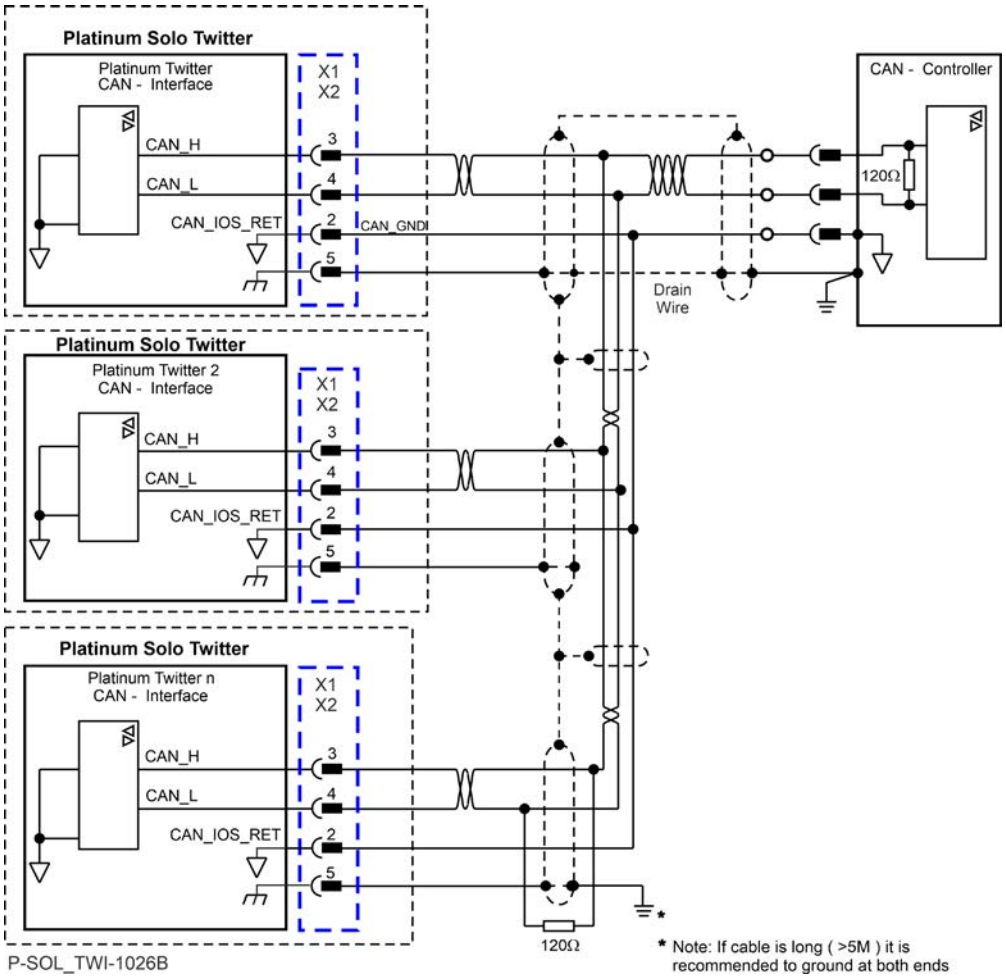


Figure 48: CAN Network Diagram – Drop Off Topology

Caution: When installing CAN communication, ensure that each servo drive is allocated a unique ID. Otherwise, the CAN network may "hang".

Note: Daisy chain topology can also be accomplished using X2.

Note: Always use CAT5e cables.

Chapter 9: Powering Up

After the Platinum Solo Twitter is connected to its device, it is ready to be powered up.

Caution:
Before applying power, ensure that the DC supply is within the specified range and that the proper plus-minus connections are in order.

9.1 Initializing the System

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

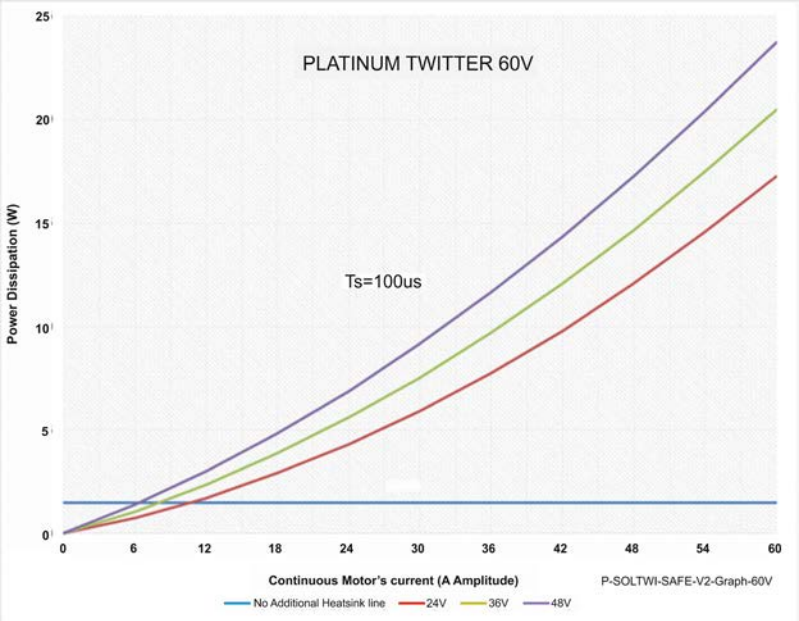
9.2 Heat Dissipation

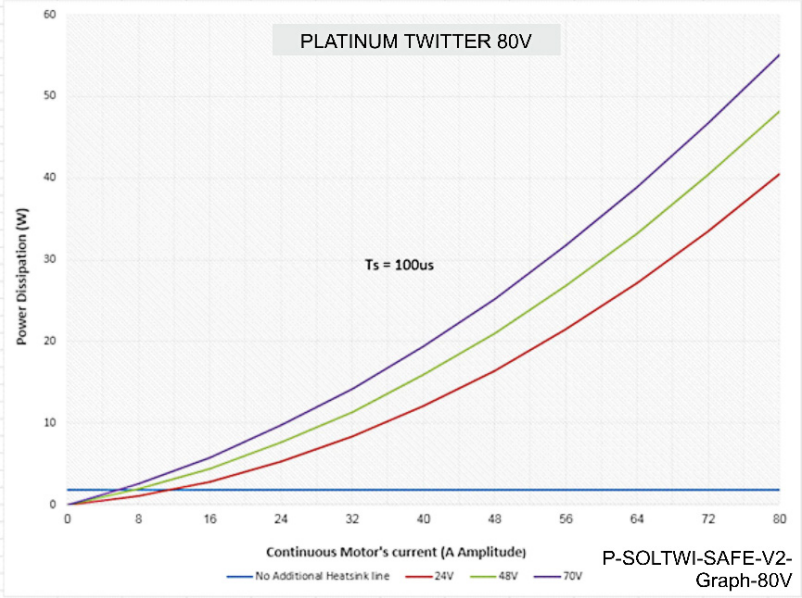
The best way to dissipate heat from the Platinum Solo Twitter is to mount it so that its heat-sink is attached to the machine chassis. If mounted with its heat-sink suspended, then for best results mount the servo drive faced upwards and leave approximately 10 mm of space between the Platinum Solo Twitter's heat-sink and any other assembly.

9.2.1 Heat Dissipation Data

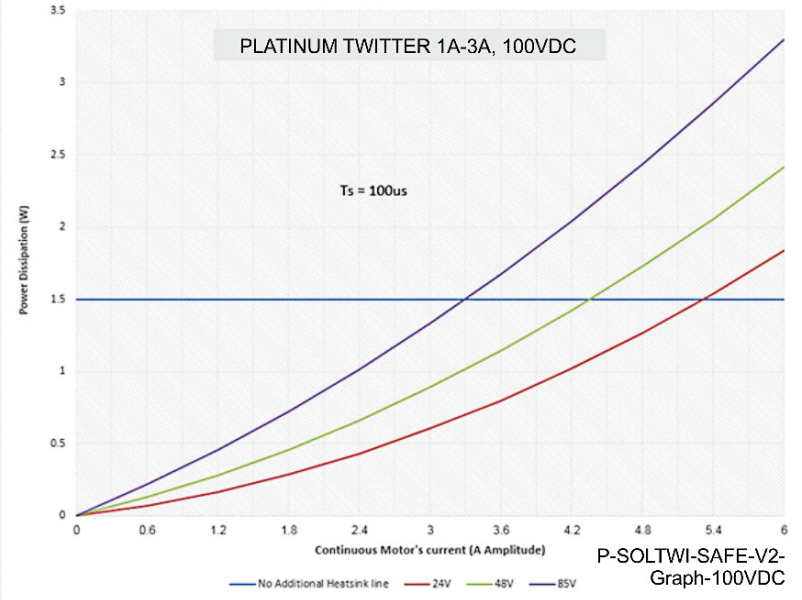
The Heat Dissipation shown graphically below is applicable for an ambient of 25°C.

These graphs describe the basic Platinum Solo Twitter PN PTWI-zz-zXXX/YYY-zzz-Blank.
It should also be noted that the Heat Sink of the model PN PTWI-zz-zXXX/YYY-zzz-H can dissipate up to 5.5W.

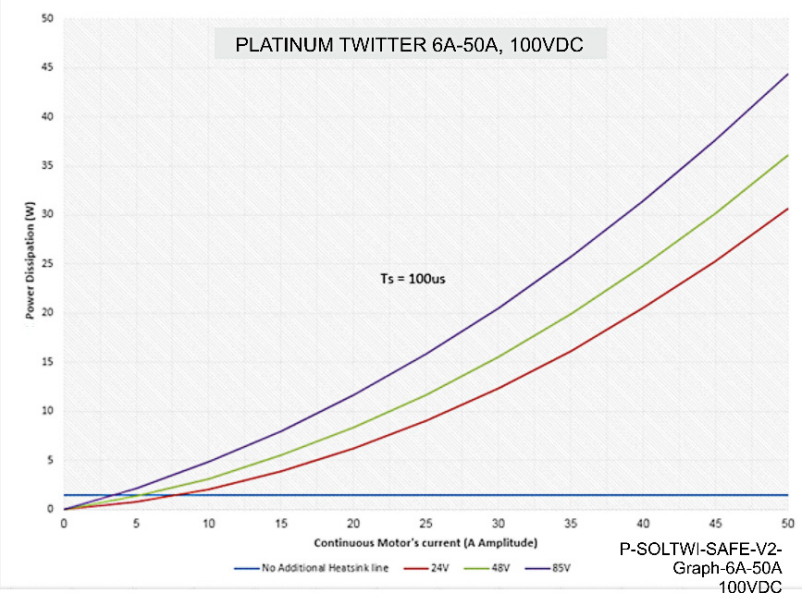




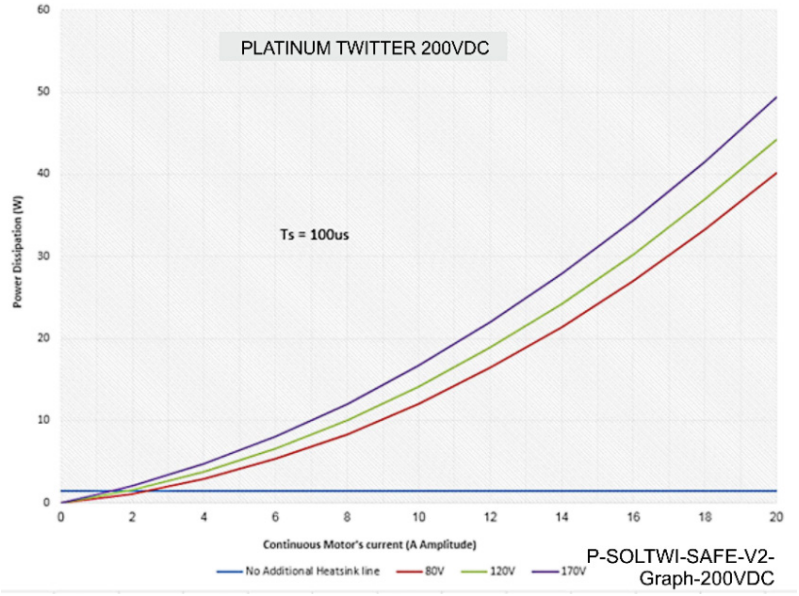
P-SOLTWI-SAFE-V2-Graph-80V

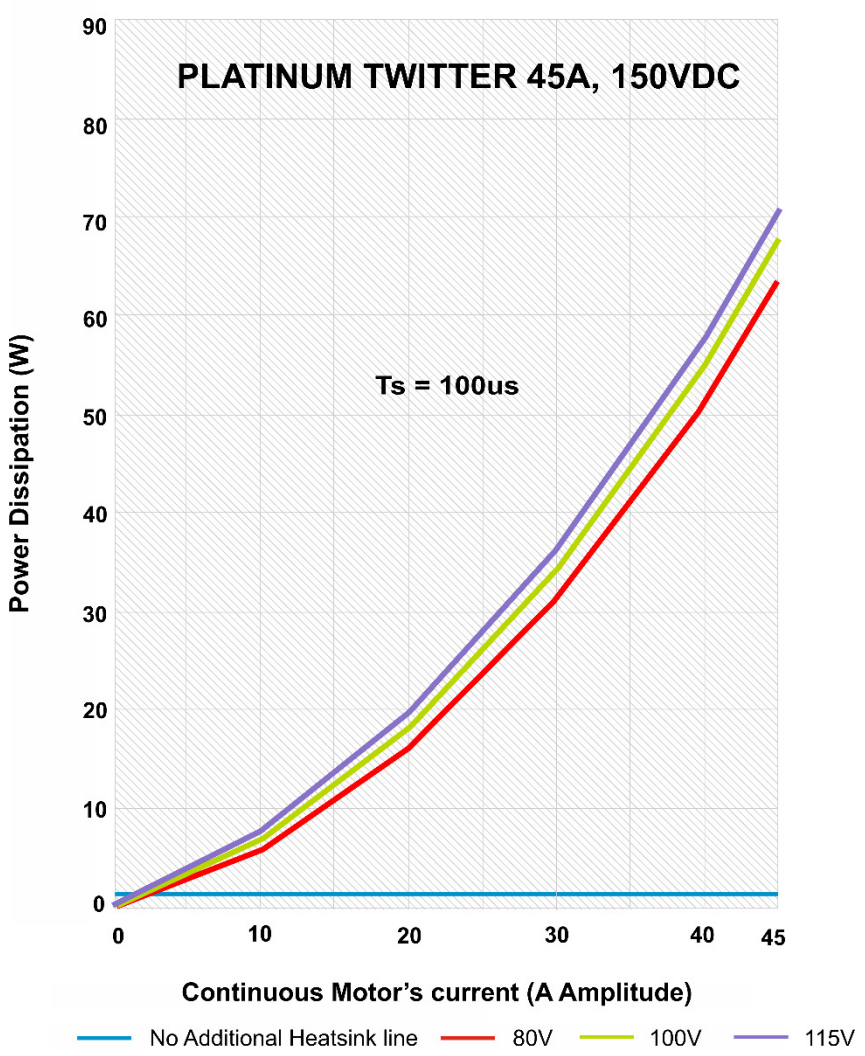


P-SOLTWI-SAFE-V2-Graph-100VDC



P-SOLTWI-SAFE-V2-Graph-6A-50A 100VDC


PLATINUM TWITTER 200VDC
Ts = 100us
Power Dissipation (W)
Continuous Motor's current (A Amplitude)
No Additional Heatsink line
80V
120V
170V
P-SOLTWI-SAFE-V2-Graph-200VDC


PLATINUM TWITTER 45A, 150VDC
Ts = 100us
Power Dissipation (W)
Continuous Motor's current (A Amplitude)
No Additional Heatsink line
80V
100V
115V

9.2.2 How to Use the Chart

The charts above are based upon the theoretical worst-case scenario. The actual test results display a 20% -30% lower power dissipation.

The above charts indicate the net power conversion losses and exclude the control losses.

To determine if your application heat dissipation requires a heat sink:

1. Determine the power dissipation according to the "continuous current" and the DC bus voltage curve. If the DC bus is not one of the three curves above, estimate the dissipation by interpolation. The estimation error is not critical.
2. The chart is calculated for continuous current operation. If the actual operation is pulsed current; add 25% to 30% to the power dissipation of the average (RMS) current.
3. When the Heat-Sink temperature reaches ≈ 85 °C, the Platinum Solo Twitter will shut down.
   Design the system for continuous operation so that the maximum Heat Sink temperature should be no higher than between 80°C to 82°C.
4. For model **PTWI-zz-zXXX/YYYzzz -Blank**
   If the average heat dissipation is less than ≈1.5W (Average operating power of 100W to 200W) there will be no requirement for an external heat sink.
   If the average Heat dissipation is higher than 1.5W then an additional heat dissipation means is required, usually by connecting to an external heat-sink.
   For model **PTWI-zz-zXXX/YYYzzz-H**
   If the average heat dissipation is less than ≈4W to 5W (Average operating power of 300W to 600W) there will be no requirement for an additional external heat sink.
   If the average Heat dissipation is higher than 4W then an additional heat dissipation means is required, usually by connecting to an additional external heat-sink.
5. When an external Heat-Sink is required, calculate the thermal resistance of the heat sink according to:

$$Ø_{°C/W} = \frac{80°C - T_{Ambient}}{Heat\ Dissipation}$$

Chapter 10: Dimensions, Physical Specifications

This chapter provides detailed technical dimensions regarding the Platinum Solo Twitter.

10.1 Wired Version

10.1.1 Wired Version without Heat Sink

Part Number	Description	Dimensions
PTWI-**W**F-XXX/YYY**E**zz	EtherCAT – Safe IO	52.0 x 37.9 x 24.6 mm (2.05" x 1.49" x 0.97")
PTWI-**W**z-XXX/YYY**G**zz	EtherCAT – Regular IO	
PTWI-**W**z-XXX/YYY**T**zz	CAN – Regular IO	

Table 17: Dimensions for the Wired version without Heat Sink

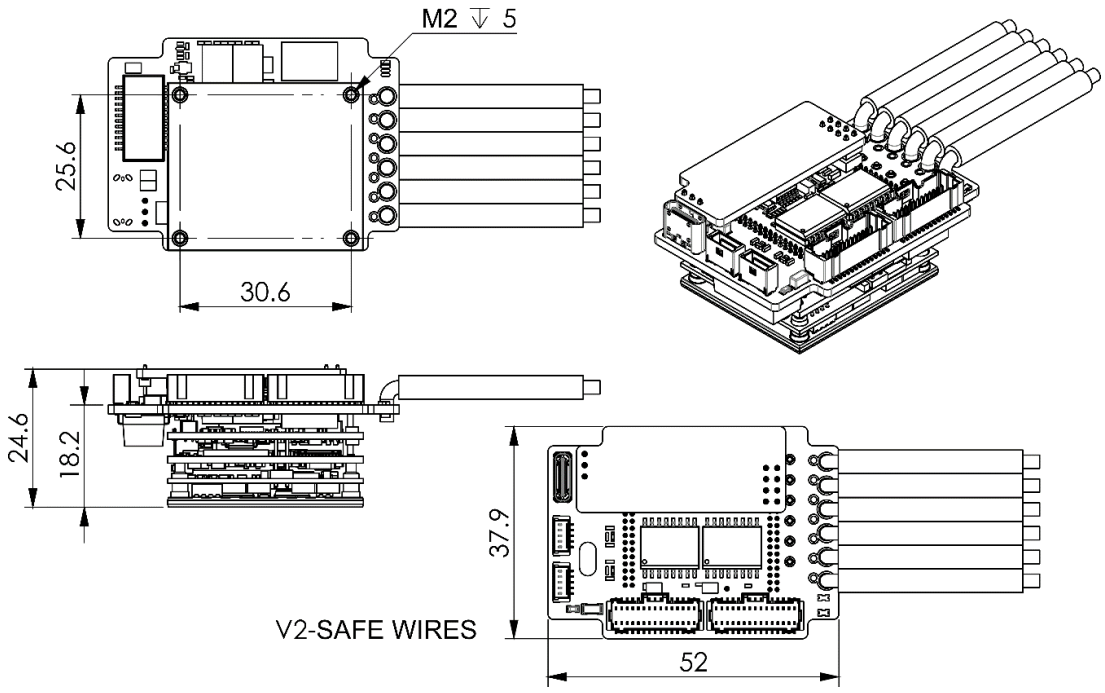


Figure 49: Platinum Solo Twitter – Wired version without Heat Sink Dimensions

10.1.2 Wired Version with Heat Sink

Part Number	Description	Dimensions
PTWI-**W**F-XXX/YYY**E**zz-H	EtherCAT – Safe IO	52.0 x 41.3 x 28.6 mm (2.05" x 1.63" x 1.13")
PTWI-**W**z-XXX/YYY**G**zz-H	EtherCAT – Regular IO	
PTWI-**W**z-XXX/YYY**T**zz-H	CAN – Regular IO	

Table 18: Dimensions for the Wired version with Heat Sink

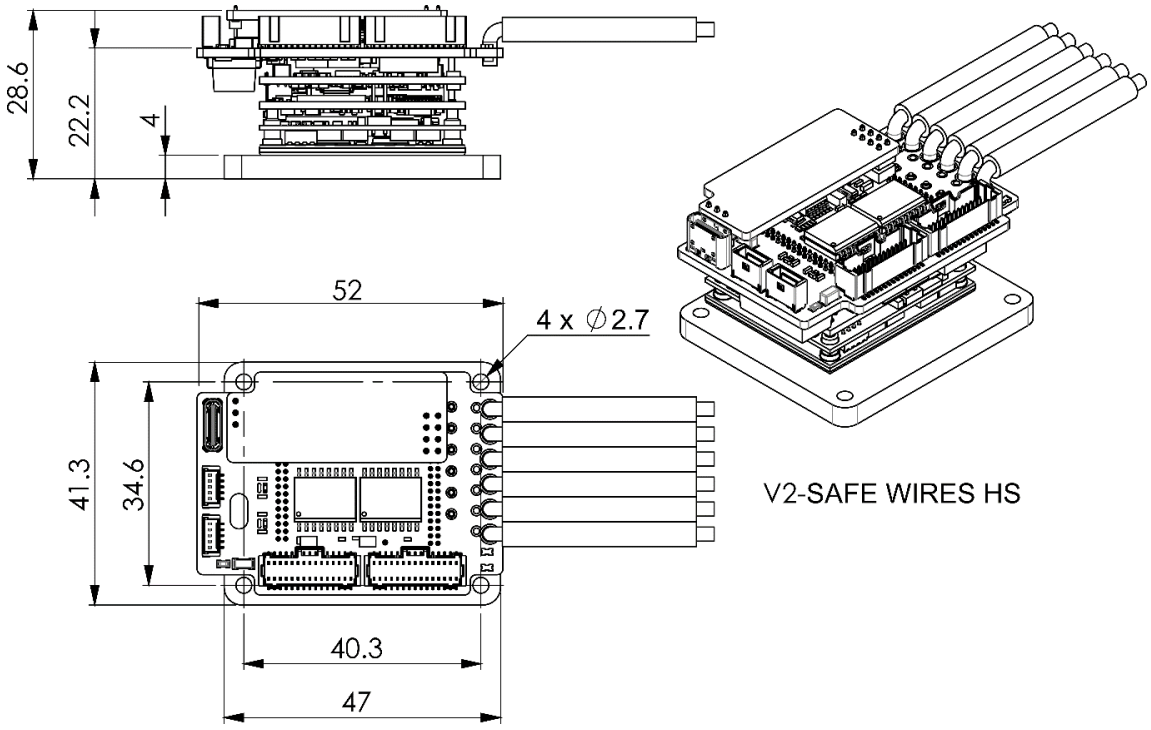


Figure 50: Platinum Solo Twitter – Wired version with Heat Sink Dimensions

10.2 Horizontal Connector Version

10.2.1 Horizontal Connector Version without Heat Sink

Part Number	Description	Dimensions
PTWI-**H**F-XXX/YYY**E**zz	EtherCAT – Safe IO	52.0 x 37.9 x 27.4 mm (2.05" x 1.49" x 1.08")
PTWI-**H**z-XXX/YYY**G**zz	EtherCAT – Regular IO	
PTWI-**H**z-XXX/YYY**T**zz	CAN – Regular IO	

Table 19: Dimensions for the Horizontal Connector version without the Heat Sink

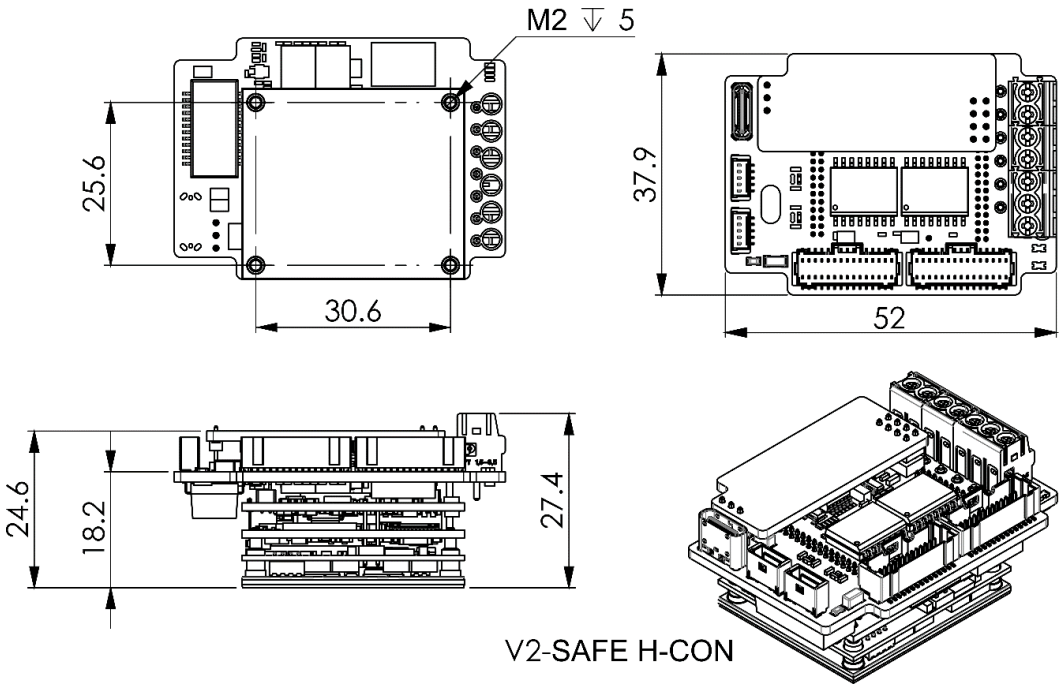


Figure 51: Platinum Solo Twitter – Horizontal Connector version without Heat Sink Dimensions

10.2.2 Horizontal Connector Version with Heat Sink

Part Number	Description	Dimensions
PTWI-**H**F-XXX/YYY**E**zz-H	EtherCAT – Safe IO	52.0 x 41.3 x 31.4 mm (2.05" x 1.63" x 1.24")
PTWI-**H**z-XXX/YYY**G**zz-H	EtherCAT – Regular IO	
PTWI-**H**z-XXX/YYY**T**zz-H	CAN – Regular IO	

Table 20: Dimensions for the Horizontal Connector version with Heat Sink

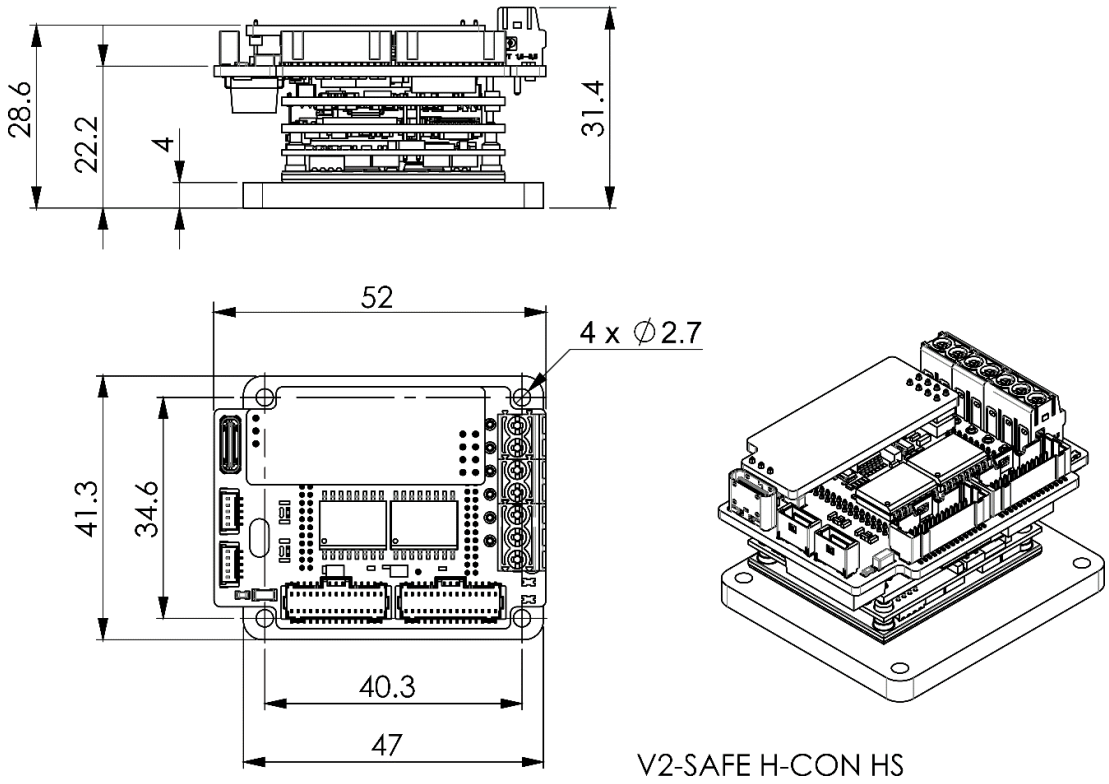


Figure 52: Platinum Solo Twitter – Horizontal Connector version with Heat Sink Dimensions

10.3 Vertical Connector Version

10.3.1 Vertical Connector Version without Heat Sink

Part Number	Description	Dimensions
PTWI-**V**F-XXX/YYY**E**zz	EtherCAT – Safe IO	52.3 x 37.9 x 36.9 mm (2.06" x 1.49" x 1.45")
PTWI-**V**z-XXX/YYY**G**zz	EtherCAT – Regular IO	
PTWI-**V**z-XXX/YYY**T**zz	CAN – Regular IO	

Table 21: Dimensions for the Vertical Connector version without Heat Sink

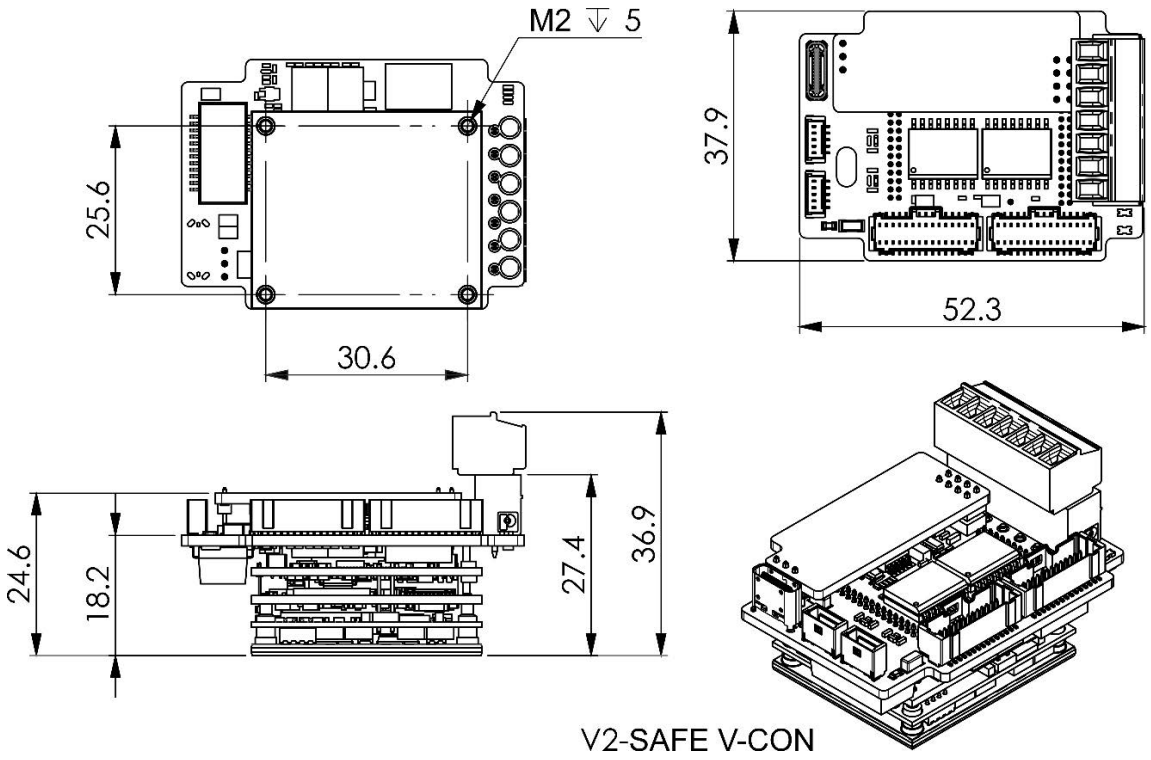


Figure 53: Platinum Solo Twitter – Vertical Connector version without Heat Sink Dimensions

10.3.2 Vertical Connector Version with Heat Sink

Part Number	Description	Dimensions
PTWI-**V**F-XXX/YYY**E**zz-H	EtherCAT – Safe IO	52.3 x 41.3 x 40.9 mm (2.06" x 1.63" x 1.61")
PTWI-**V**z-XXX/YYY**G**zz-H	EtherCAT – Regular IO	
PTWI-**V**z-XXX/YYY**T**zz-H	CAN – Regular IO	

Table 22: Dimensions for the Vertical Connector version with Heat Sink

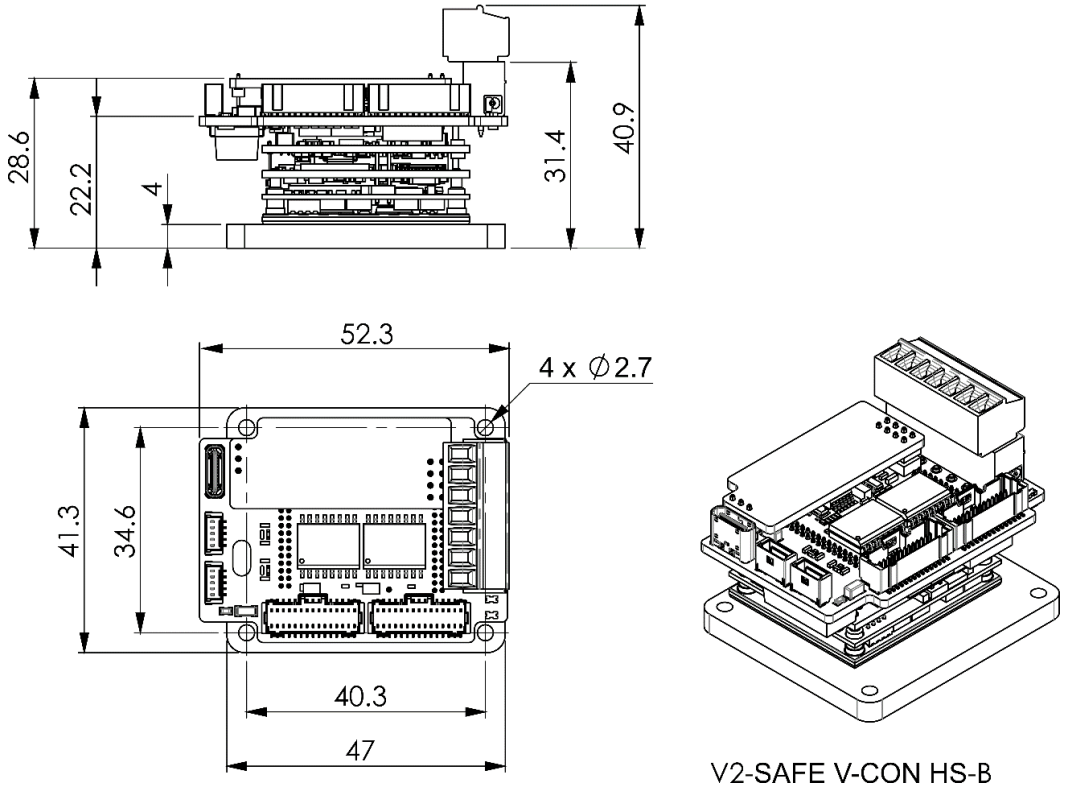


Figure 54: Platinum Solo Twitter – Vertical Connector version with Heat Sink Dimensions

Chapter 11: Accessories

The following describes the accessory kits available for the Platinum Solo Twitter.

Part Number	Description
CBL-PSOLTWIKIT02	Cable Kit for EtherCAT model
CBL-PSOLTWIKIT03	CONNECTORS AND PINS KIT
CBL-PSOLTWIKIT04	Cable Kit for CAN model
CBL-PICOCLASP5P-1*	The cable for the RS-422

* This cable is only required for models:

- PTWI-z**S**-zXXX/YYY**G**zz-z
- PTWI-z**O**-zXXX/YYY**G**zz-z
- PTWI-z**S**-zXXX/YYY**T**zz-z
- PTWI-z**O**-zXXX/YYY**T**zz-z

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 501193-3000

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