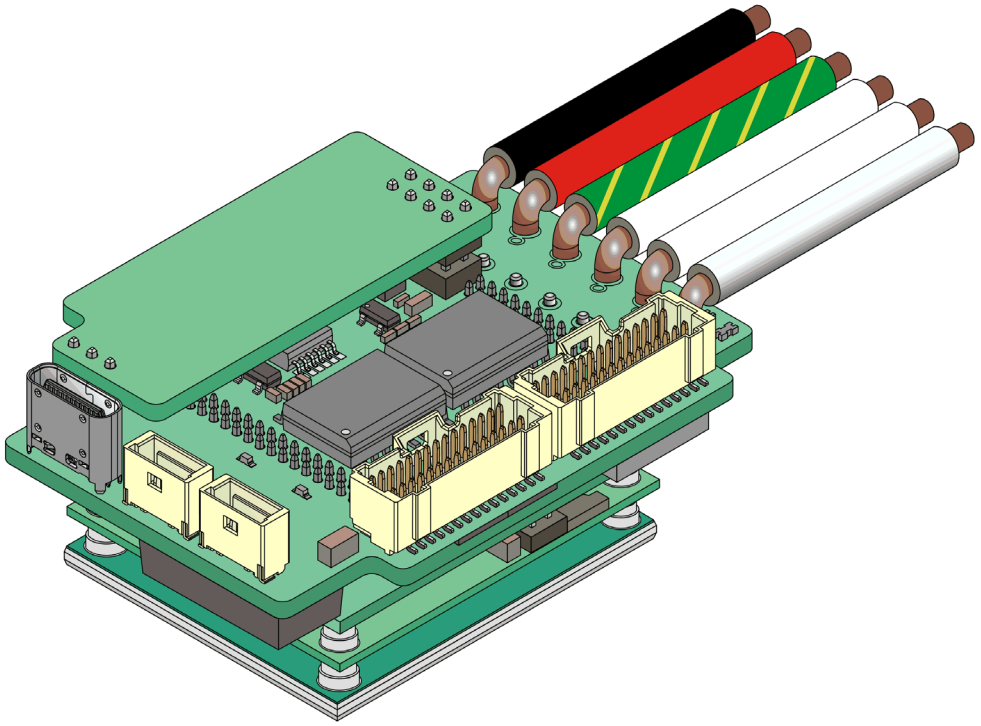
Platinum by Elmo

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

# Platinum Solo Twitter Digital Servo Drive Installation Guide

## Functional Safety with EtherCAT

## Safety Capability: F, S, T



December 2020 (Ver. 2.007)

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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 Model
**S** — Functional Safety without Safe IO
**T** — STO only

**Rated Continuous Current**

**Rated Voltage**

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

**Dual Use:**
**Q** — Dual Use Compliance 428/2009, ECCN3A225 (Consult Factory)

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

**IO Style for Non-SafeIO:**
**U** — 5V Logic
**V** — PLC SRC (High Side) or SINK (Low Side)

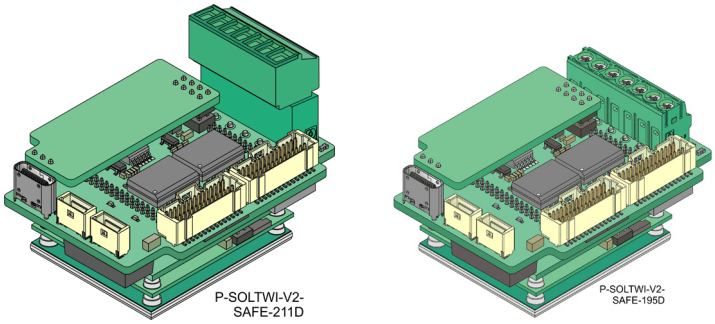
**IO Style for Safe IO:**
**B** — VDD=48V, Outputs 7,8

**Encoder Port B options:**
**E** — Encoder, Incremental, Analog Halls, Analog Encoder (SIN/COS)
**R** — Resolver

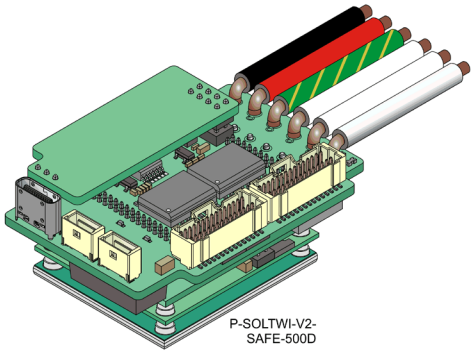
**Network for Safety Capability F:**
**E** — EtherCAT or Ethernet
USB

**Network for Safety Capability S or T:**
**G** — EtherCAT or Ethernet
USB
Differential RS-232 (RS-422) 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 | Dec 2020 | Various updates |

# 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.
- All connectors except STO, EtherCAT/Ethernet, Digital Inputs, Digital Outputs operating at voltage greater than ELV, require an isolation for working voltage 170VDC.

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-zT):** 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** | **Weights (g (oz))** | **Dimensions (mm (in))** |
| PTWI-Wz-XXX/YYYzzz | ~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/YYYzzz | | 52.0 x 37.9 x 27.4 mm (2.05" x 1.49" x 1.08") |
| PTWI-Vz-XXX/YYYzzz | | 52.3 x 37.9 x 36.9 mm (2.06" x 1.49" x 1.45") |
| PTWI-Wz-XXX/YYYzzz-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/YYYzzz-H | | 52.0 x 41.3 x 31.4 mm (2.05" x 1.63" x 1.24") |
| PTWI-Vz-XXX/YYYzzz-H | | 52.3 x 41.3 x 40.9 mm (2.06" x 1.63" x 1.61") |

## 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 1: 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 2: 200V Models Technical Data**

### 5.2.3 R Type

| Feature | Units | R80/80 | R50/100 | R70/100 | R45/150 | R15/200 |
|---|---|---|---|---|---|---|
| Minimum supply voltage | VDC | 10 | 10 | 10 | 10 | 20 |
| Nominal supply voltage | VDC | 65 | 85 | 85 | 115 | 170 |
| Maximum supply voltage | VDC | 75 | 95 | 95 | 135 | 195 |
| Maximum continuous Electrical power output | kW | 5 | 4 | 5.6 | 5 | 2.5 |
| 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 |
| Sinusoidal continuous RMS current limit (Ic) | A | 56.5 | 35.3 | 49.5 | 32 | 10.6 |

**Table 3: R Type Models Technical Data**

## 5.3 Control Supply

| Feature | Details |
|---|---|
| Control supply input voltage for Safety | **Isolated DC Source:** 12 to 60 V |
| Control supply input power | ≤4 VA without external loading<br>≤6 VA with full external loading |

## 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 | √ | |
| | RS-422 (Differential RS-232) Serial Communication | √ | Available only for network G |

### 5.4.4 Analog Input

| Feature | Details | Presence and No. |
|---|---|---|
| Analog Input | Differential ±10V | 1 |
| | Single ended | 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 | |

### 5.4.6 Safe IO Features: IO TYPE = B

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

| Main Feature | Details | Max. Values | Presence / No. |
|---|---|---|---|
| **Digital Input** | PLC Source, Isolated (IN1, IN2, IN3, IN4) | | **4** |
| **Safe Digital Output** | Isolated PLC Source (OUT3, OUT4) | $I_{out}$ (max) ≤ 250 mA per Output | **2** |
| | Isolated PLC Source (OUT 7) | $I_{out}$ (max) ≤ 500 mA per Output | **1** |
| | Isolated PLC Sink (OUT8) | $I_{out}$ (max) ≤ 500 mA per Output | **1** |
| **Regular Digital Output** | Opto isolated Output with collector and emitter for general purpose or test pulse (OUT1, OUT2) PLC Source OUT1, OUT2 | $I_{out}$ (max) ≤ 30 mA per Output | **2** |
| **VDD_24V** | Power supply for OUT1, OUT2, | 19.6V to 30V | **√** |
| **VDD_48V** | Power supply for OUT7, OUT8, | 19.6V to 60V | **√** |

### 5.4.7 Regular IO Features: IO TYPE = U, V

#### 5.4.7.1 IO TYPE = U

| Feature | Details | Max. Values | Presence / No. |
|---|---|---|---|
| **Digital Input** | 5V logic (IN1, IN2, IN3, IN4, IN5, IN6) | | **6** |
| **Digital Output** | 5V logic (OUT1, OUT2, OUT7, OUT8) *or* | Maximum 15 mA | **4** |
| **VDD** | Power supply for Outputs | 4V to 30V | **4** |

#### 5.4.7.2 IO TYPE = V

| Feature | Details | Max. Values | Presence / No. |
|---|---|---|---|
| **Digital Input** | PLC Source *or* PLC Sink, Isolated | | **6** |
| **Digital Output** | PLC Source or Sink, Isolated (OUT1, OUT2) *or* | $I_{out}$ (max) ≤ 500 mA per Output 1 (or other designated Output) | **2** |
| | PLC Source or Sink, Isolated (OUT7, OUT8) | $I_{out}$ (max) ≤ 250 mA per other Outputs each, usually 2 to 4 | **2** |
| **VDD** | Power supply for Outputs | 19.6V to 30V | |

## 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.

**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 according to IEC60068-2-2** | 0 °C to 55 °C (32 °F to 131 °F)<br>**Remark:**<br>Functional Safety is applicable to the above operating temperature. In some products, power derating is required to operate above 50°C. |
| **Storage temperature** | -20 °C to +85 °C ( -4 °F to +185 °F) |
| **Maximum non-condensing humidity according to IEC60068-2-78** | 95% |
| **Maximum Operating Altitude** | 2,000 m (6562 feet)<br>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<br>10 Hz ≤ f ≤ 57 Hz: 4G<br>57 Hz ≤ f ≤ 500 Hz: 5G |
| **Pollution Degree** | Pollution Degree 2 |

## 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**.

| Main Standards | Item |
|---|---|
| The related standards below apply to the performance of the servo drives as stated in section 5.5 Environmental Conditions, above. | |
| **IEC 61800-5-2:2016** | Adjustable speed electrical power drive systems – Safety requirements – Functional |
| **EN ISO 13849-1:2015** | Safety of machinery — Safety-related parts of control systems. |
| **IEC/EN 61800-5-1** | Adjustable speed electrical power drive systems<br>Safety requirements – Electrical, thermal and energy |
| **IEC 61508** | Functional Safety of Electrical/Electronic/Programmable Electronic Safety-related Systems (E/E/PE, or E/E/PES) |
| **In compliance with UL61800-5-1** | Adjustable speed electrical power drive systems<br>Safety requirements – Electrical, thermal and energy |
| **In compliance with CSA C22.2 NO. 274** | Industrial Control Equipment |
| **Conformity with CE 2006/95/EC** | Low-voltage directive 2006/95/EC |

### 5.6.1 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:

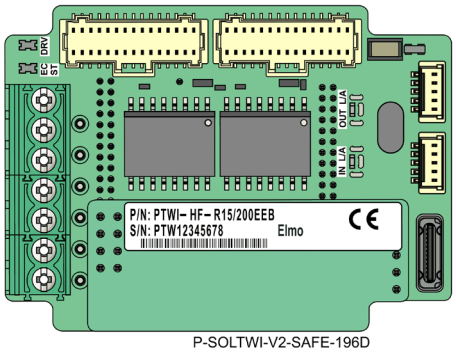



**Figure 1: Platinum Solo Twitter Module**

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<br>XXX = rated continues current [A] | Fuse | Circuit Breaker |
|---|---|---|
| 1, 3, 6, 10, 15, 25 | Slow blow | Type D |
| 45, 50, 70, 80 | Fast Acting Class J | Type B |
| Rated short - circuit breaking capacity 5kA | | |

**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.

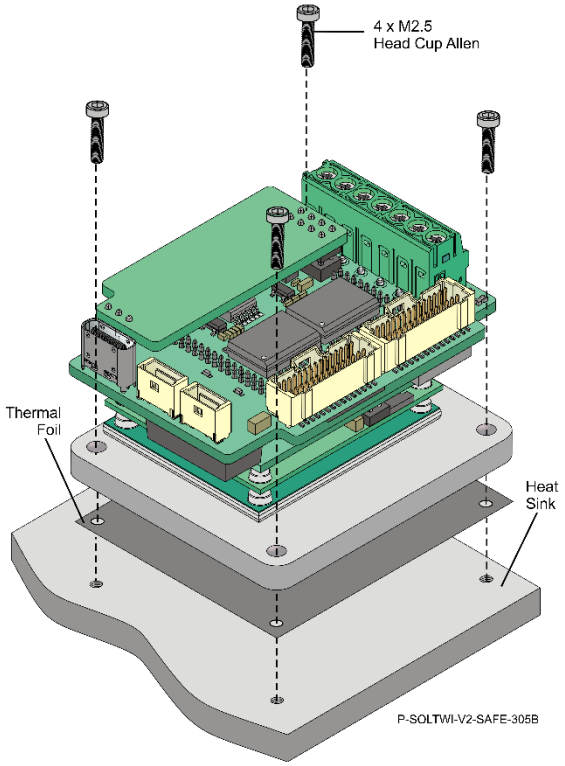
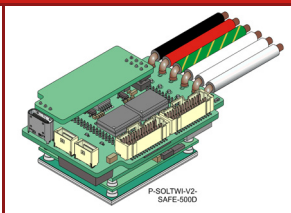
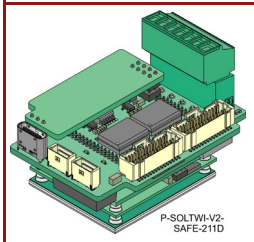
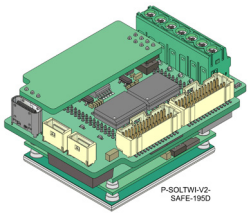



**Figure 2: Mounting the Heat Sink and Thermal Foil onto the Platinum Solo Twitter**

# 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 (14 Gauge)<br>Refer the note Wiring Technical Details in section 8.5 Main Power (PM1). | Motor phases and main power |
| |  | 7 | Horizontal Phoenix connector. PCB Terminal Block 3.5 mm pitch<br>Conductor cross-section is 28 up to 16 AWG | |
| |  | 7 | Vertical Phoenix connector.<br>PCB Terminal Block 3.5 mm pitch<br>Conductor cross-section is 26 up to 16 AWG | |
| C2 | | 2x15 | 2 rows x 15 Pins 1 mm pitch<br>Conductor cross-section is 32 up to 28 AWG | Control Supply<br>Feedback Port A/B/C |
| C1 | | 2x15 | 2 rows x 15 Pins 1 mm pitch<br>Conductor cross-section is 32 up to 28 AWG | I/O<br>STO |
| X3 | | 24 | USB Device Micro-C | Micro-USB type C |
| X4 | | 5 | 1 x 5 Pins 1 mm pitch<br>Conductor cross-section is 32 up to 28 AWG | RS-422<br>Only available for Regular IO and Network Version G (Safety Capability S or T) |
| **EtherCAT Version** | | | | |
| X1 | | 5 | 1 x 5 Pins 1 mm pitch<br>Conductor cross-section is 32 up to 28 AWG | EtherCAT in |
| X2 | | 5 | 1 x 5 Pins 1 mm pitch<br>Conductor cross-section is 32 up to 28 AWG | EtherCAT out |

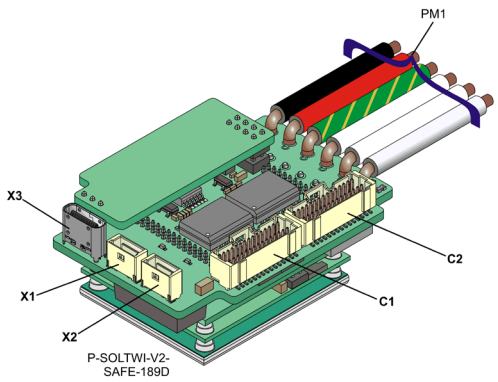
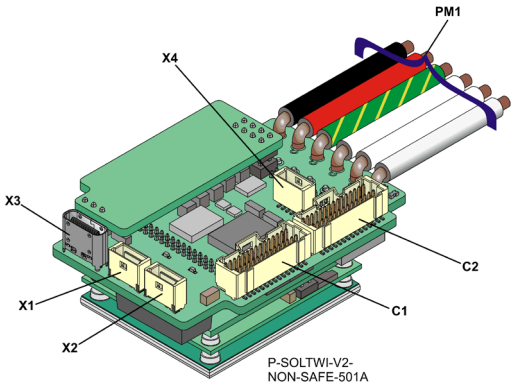
| Connectors Location |
|---|
|  **Safe IO Model** |
|  **Regular IO Model** |

**Table 4: 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**<br>**VL & Feedback Ports**<br>**IO and STO** | MOLEX 1.00mm "Pico-Clasp" 501189-3010 | MOLEX 1.00mm crimp terminal 501193-3000 |
| **X1, X2, X4**<br>**EtherCAT IN/OUT, RS-422**<br>**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** | | | | |

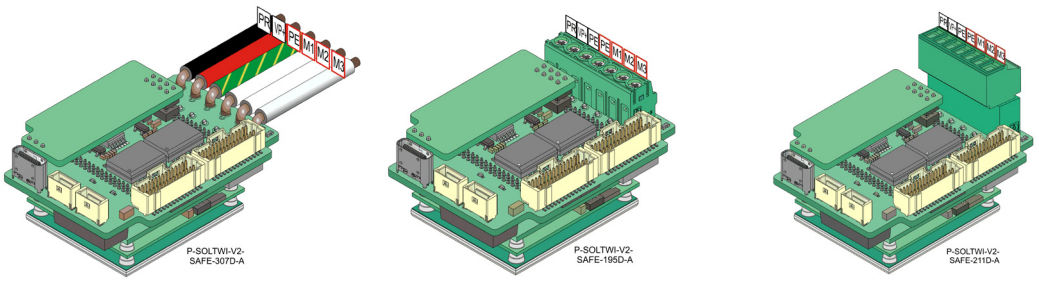



**Table 5: Motor Power**

### 7.3.2 Main Power (PM1)

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

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

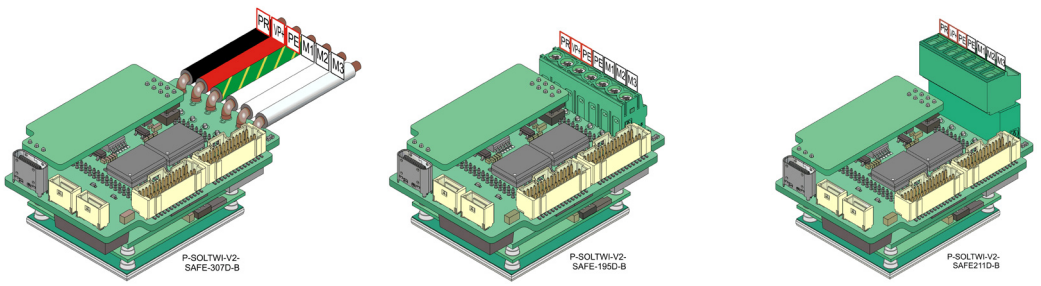



**Table 6: Main Power**

## 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.

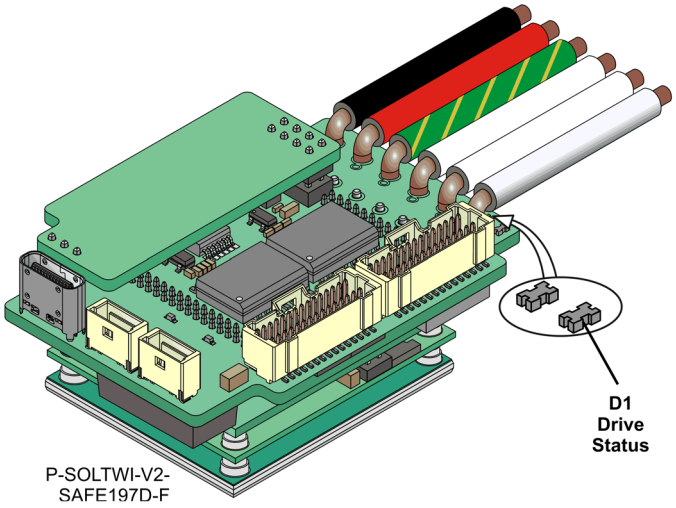



**Figure 3: Drive Status Indicator in Platinum Solo Twitter model**

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

| STATES | LED \ Time [msec] | Explanation |
|---|---|---|
| INITIATION STATE | Blinking:<br>Red 200, Off: 200 | If flashing RED ON/OFF then drive error<br>Parameter process failed during power up (**CD** command) |
| | Blinking:<br>Red 600,Off 200 | If slow flashing RED ON/OFF then drive Safety error<br>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<br>Power state error: over\under voltage, over temperature etc. |
| FIRMWARE DOWNLOAD STATE | Blinking:<br>Red 200, Green 200<br>Red 600, Green 200 | Flashing RED/GREEN during burn-in<br>Slow flashing RED/GREEN indicates stages of Firmware burn-in or validation<br>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)

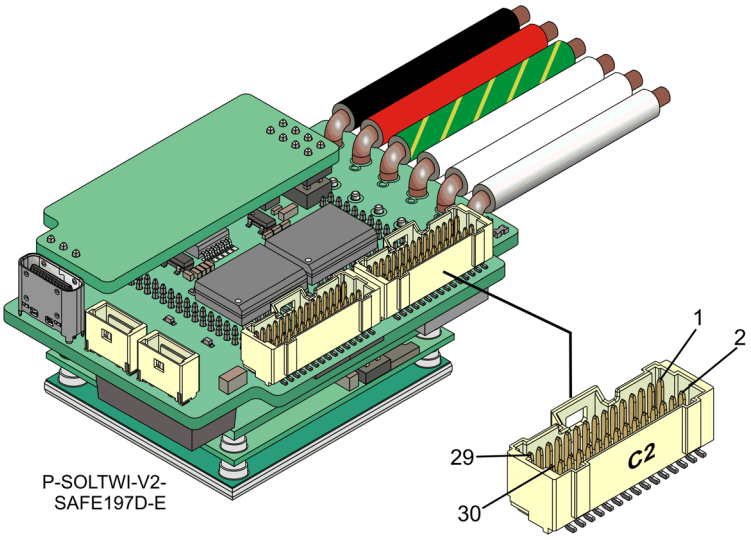



**Figure 4: Platinum Solo Twitter C2 VL & Feedback Connector**

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 |
| 16 | PortC_A+ | Port C Buffered Channel A+ |

| Pin C2 | Signal | Function |
|---|---|---|
| 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 7: Connector C2 – VL & Feedback**

## 7.6 I/O and STO Connector (C1)

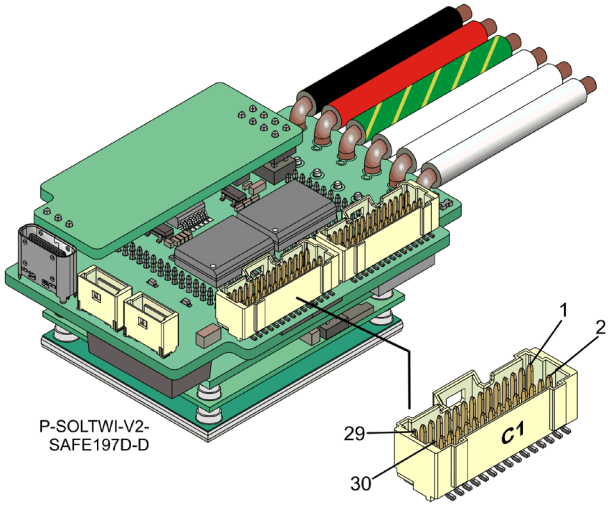



**Figure 5: Platinum Solo Twitter C1 I/O and STO Connector**

Refer to Chapters 12 Safe Digital IO and 13 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 (C1) or 8.8 Regular Digital IOs .

### 7.6.1 Safe IO: IO TYPE =B

The I/O and STO 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 19.6V up to 60V |
| 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 8: Digital I/O for Safe IO: IO Types K, L, N**

### 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_24 | 4V to 30V<br>24V for OUT1, OUT2, OUT7, and OUT8 | 19.6V to 30V<br>24V for OUT1, OUT2, OUT7, and OUT8 |
| 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<br>**For Sink:** Digital Input Power |
| 15 | Not Connected | | |
| 16 | SRC or SINK CONTROL | Not Used | **For Source:** 0 - Source Control<br>**For Sink:** VDD |
| 17 | Not Connected | | |
| 18 | VDD_RET | VDD Return | |
| 20 | OUT1 | Digital Output 1 (isolated) | |
| 22 | OUT2 | Digital Output 2 (isolated) | |

**Table 9: 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 10: Analog I/O and STO Pinouts**

## 7.7 USB 2.0 Connector Type C (X3)

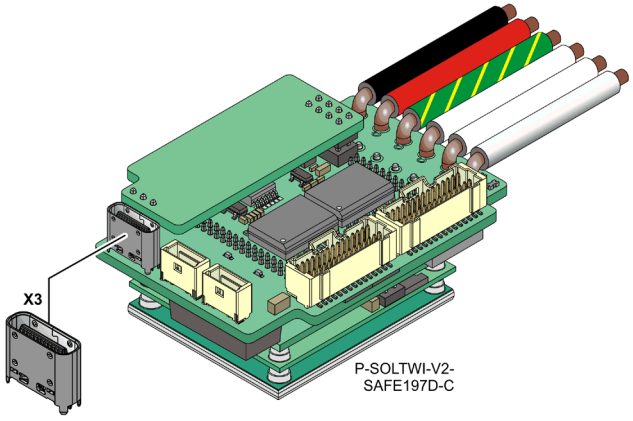



**Figure 6: Platinum Solo Twitter X3 USB Connector**

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 11: 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.

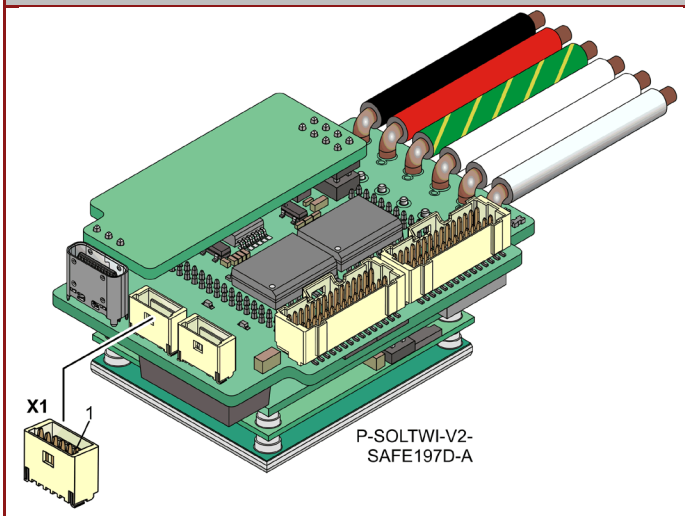
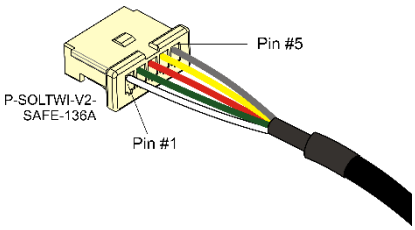
| Pin (X1) | Signal | Function |
|---|---|---|
| 1 | EtherCAT_IN_TX+ | EtherCAT in Transmit+ |
| 2 | EtherCAT_IN_TX- | EtherCAT in Transmit- |
| 3 | EtherCAT_IN_RX+ | EtherCAT in Receive+ |
| 4 | EtherCAT_IN_RX- | EtherCAT in Receive- |
| 5 | EARTH | Shield drain wire |
| **Pin Positions** | | **Cable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

**Table 12: 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.

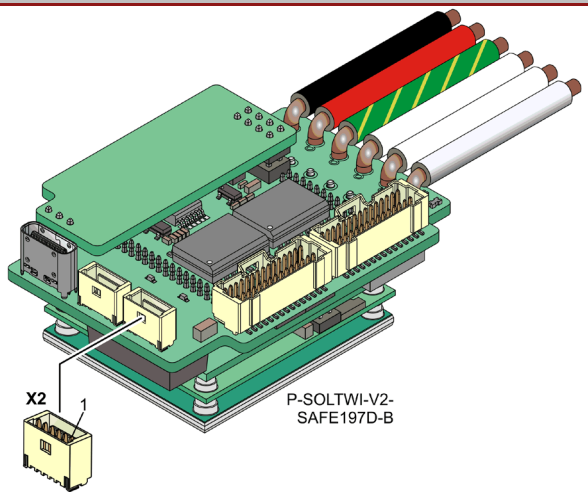
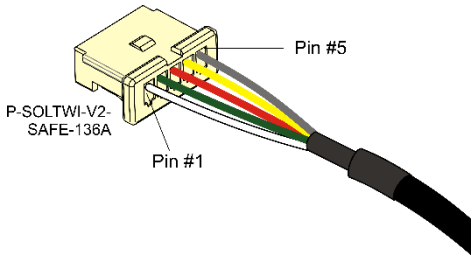
| Pin (X2) | Signal | Function |
|---|---|---|
| 1 | EtherCAT_OUT_TX+/Ethernet_TX+ | EtherCAT out/Ethernet transmit + |
| 2 | EtherCAT_OUT_TX-/Ethernet_TX- | EtherCAT out/Ethernet transmit - |
| 3 | EtherCAT_OUT_RX+/Ethernet_RX+ | EtherCAT out/Ethernet receive + |
| 4 | EtherCAT_OUT_RX-/Ethernet_RX-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

**Table 13: EtherCAT OUT/Ethernet Pin Assignments**

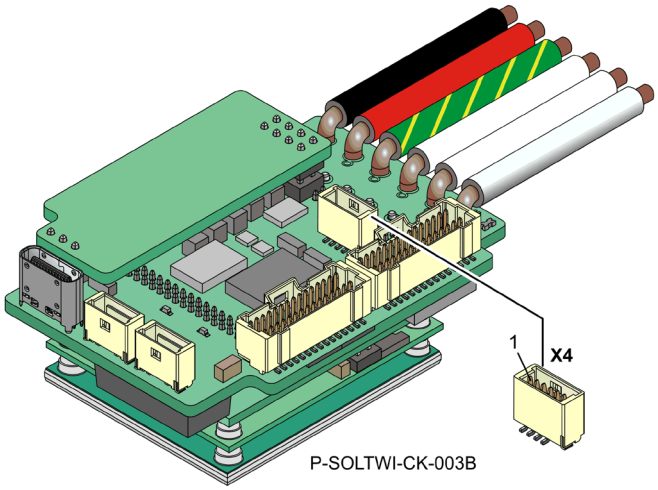
## 7.9 Differential RS-232 (RS-422) Serial Communication Connector (X4)

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:

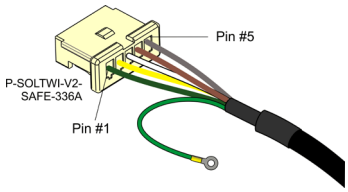
| Fieldbus Type | Part Number |
|---|---|
| Differential RS-232 (RS-422) | PTWI-zz-zXXX/YYYGzz-z |

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

| Pin (X4) | Signal | Function |
|---|---|---|
| 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 | Common return |
| **Pin Positions** | | **Cable Connector** |




**Platinum Solo Twitter Regular I/O with X4 Connector**

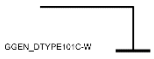
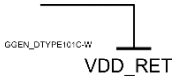
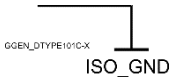
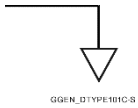
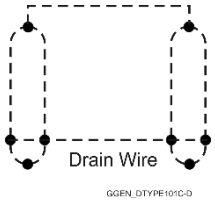
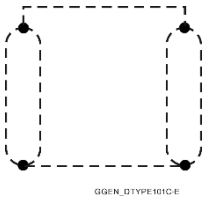
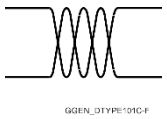
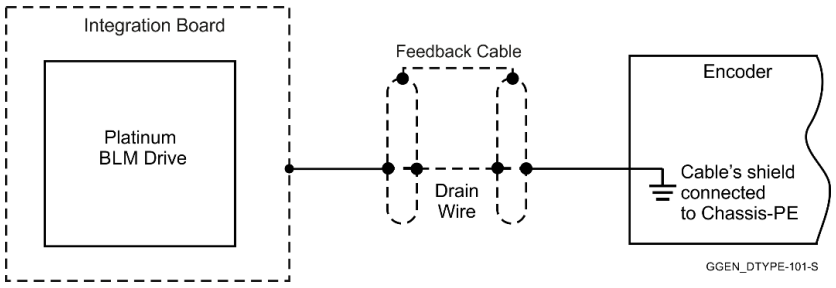



**X4 Connector**

# 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<br>Common at the Drive |
|   | Shielded cable with drain wire.<br>The drain wire is a non-insulated wire that is in direct contact with the braid (shielding).<br>Shielded cable with drain wire significantly simplifies the wiring and earthing. |
|   | Shielded cable braid only, without drain wire. |
|   | Twisted-pair wires |
|   | Encoder Earthing.<br>The cable`s shield is connected to the chassis (PE) in the connector.<br>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)

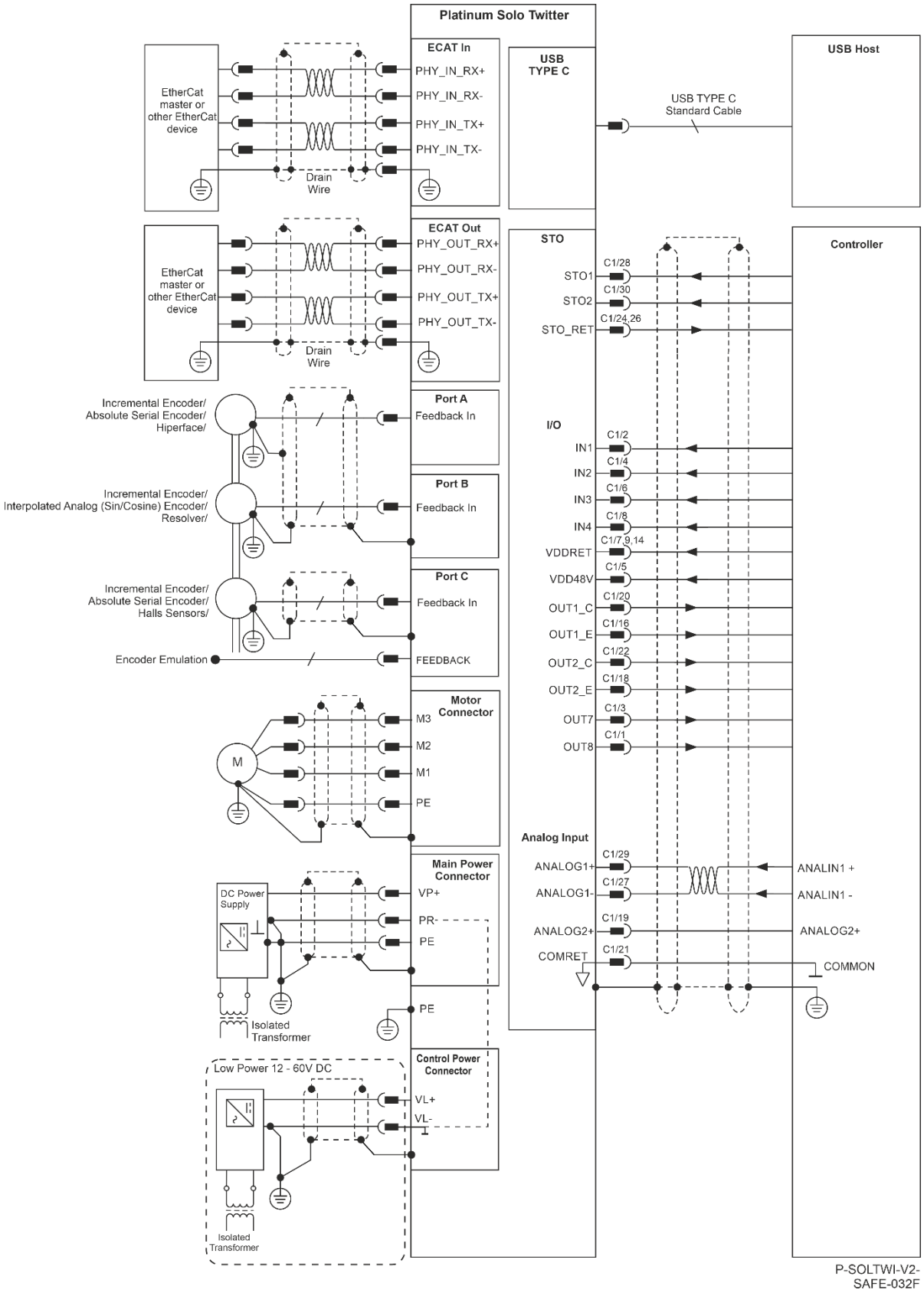



**Figure 7: The Platinum Solo Twitter EtherCAT with-Safe-IO Connection Diagram**

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

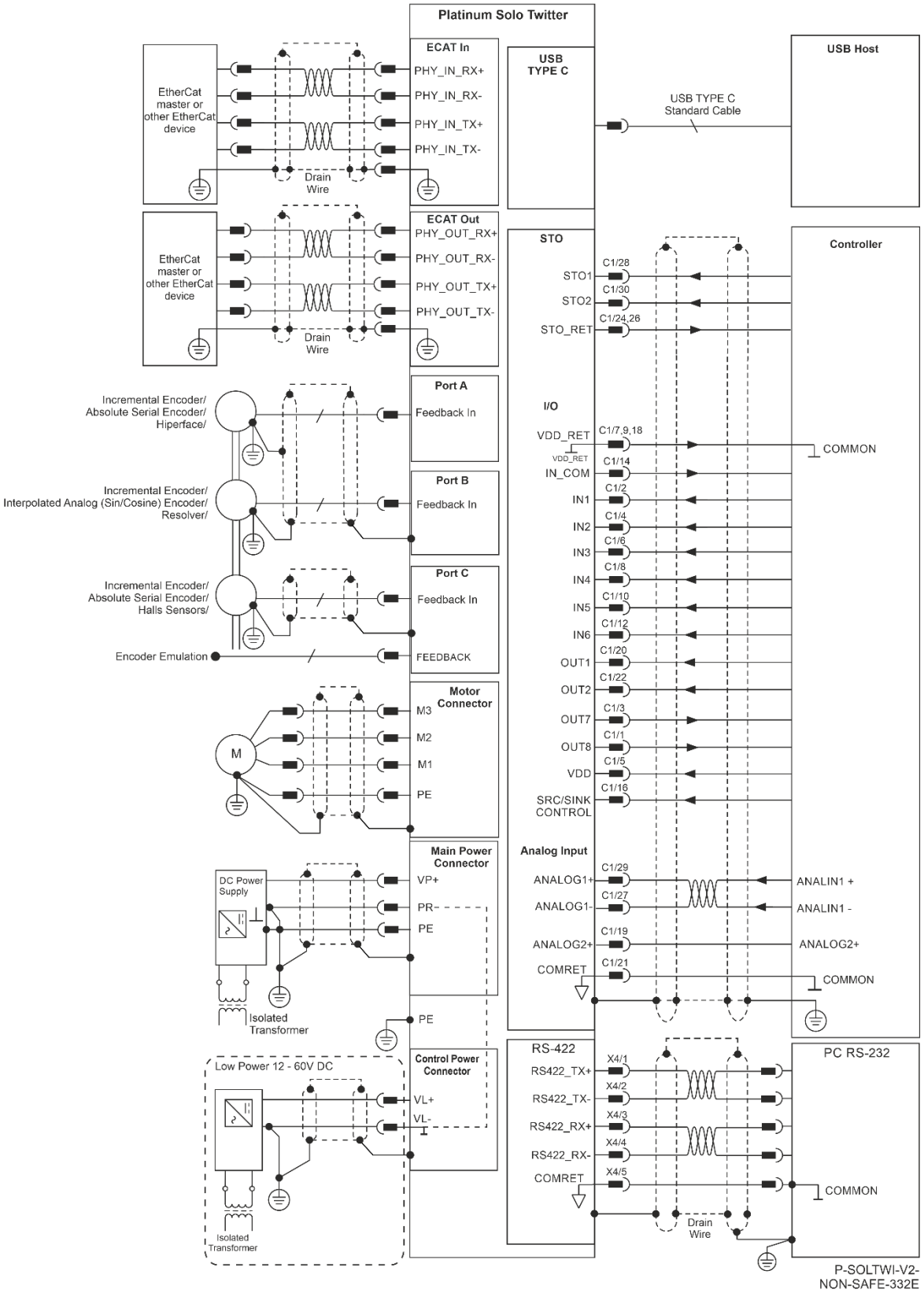



**Figure 8: The Platinum Solo Twitter EtherCAT with-Regular I/O Connection Diagram**

## 8.3 Wiring the Female Connectors

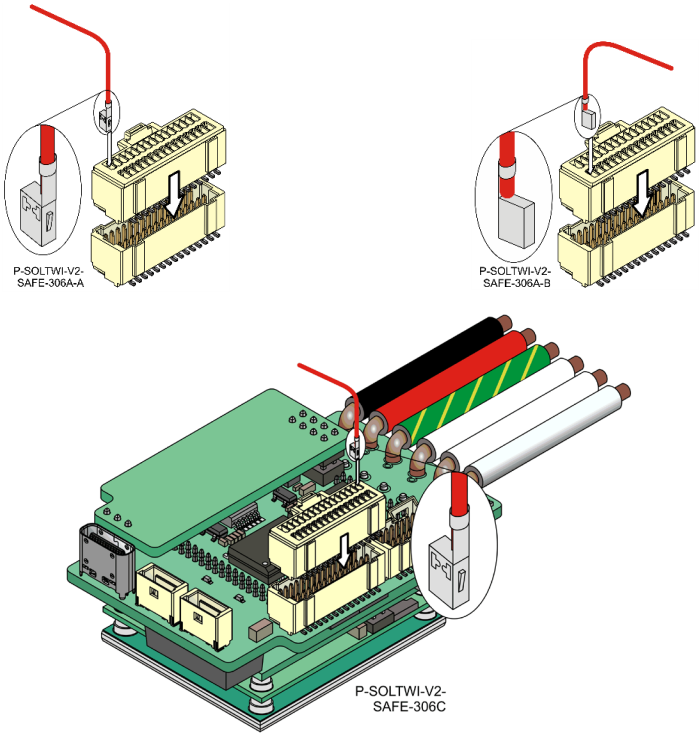



**Figure 9: Inserting a wire/pin to the Female Connector**

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 9.
   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 9. 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)

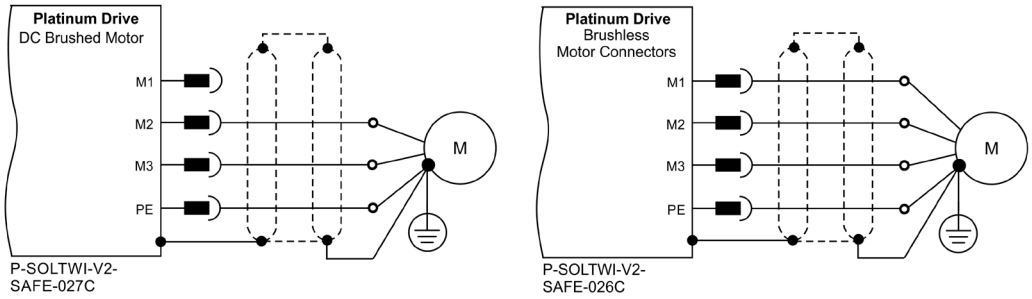



**Figure 10: Brushed and Brushless Motor Power Connection Diagram**

**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 11. The green/yellow wire is the Grounding wire.

   Make sure not to bundle the wires.

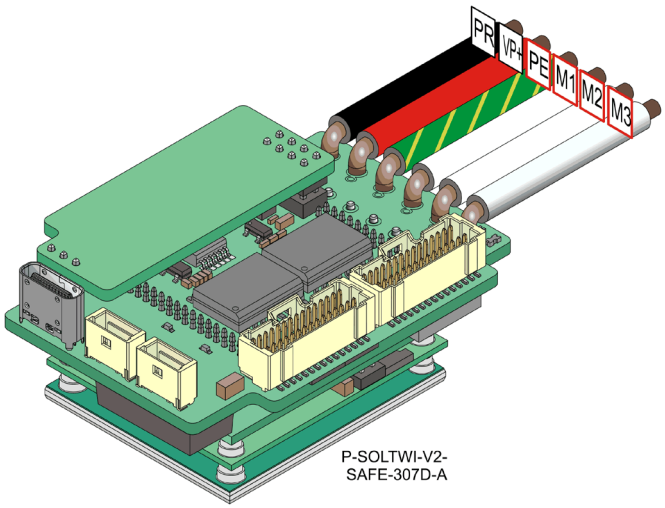



**Figure 11: Connecting the Motor Power Wires**

## 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 12.
   It is highly recommended to twist the two DC main power cables at intervals of 10 cm.

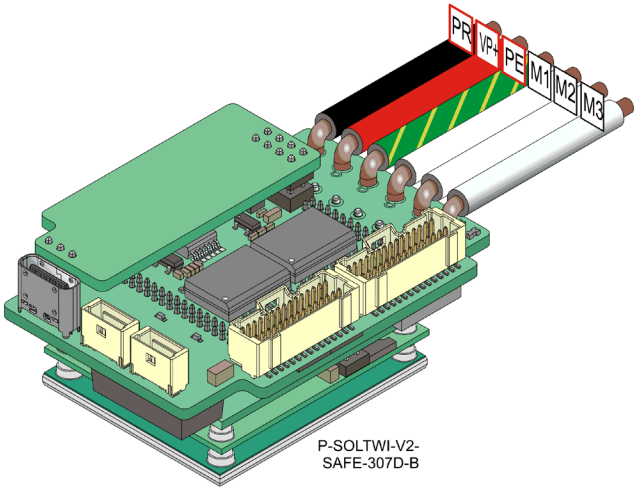



**Figure 12: Connecting the Main Power Wires**

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 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 13.

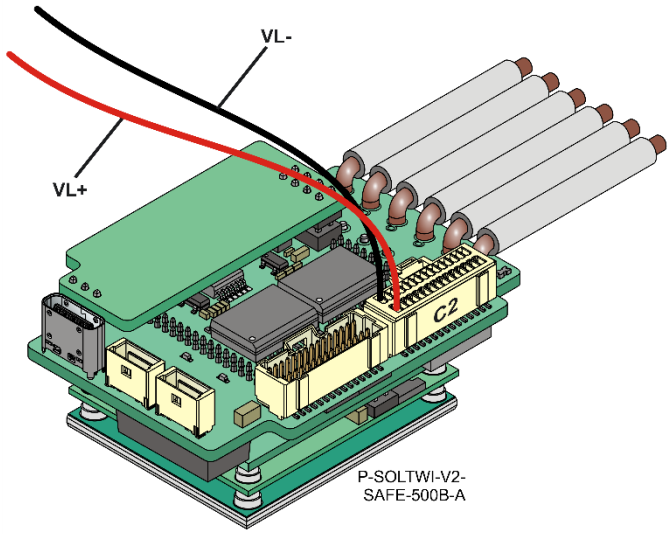



**Figure 13: Connecting the Control Supply Wires**

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 maximum **60V 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.

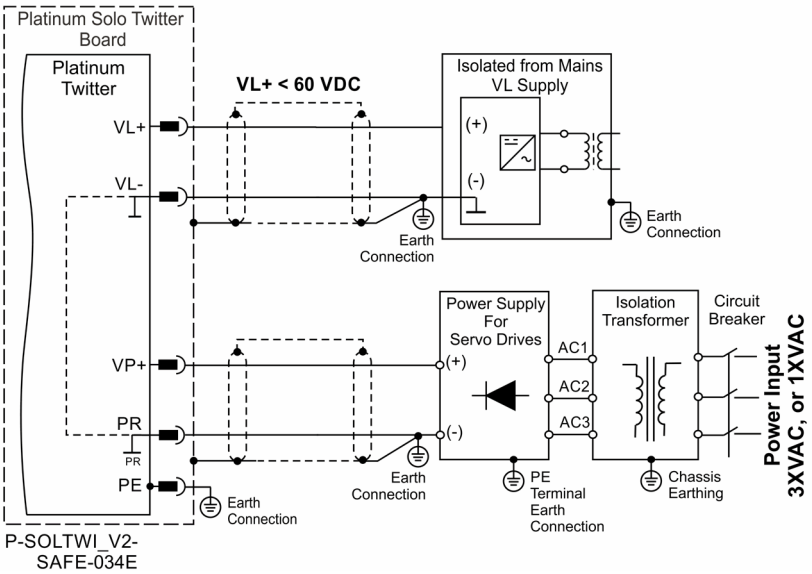



**Figure 14: Separate VP and VL Power Supplies for Safety Configurations – Connection Diagram**

## 8.6 Feedback (C2)

**Refer to the Chapter 11 Feedback, in the Platinum Safety Drive Manual for details, specification, and connections of the Feedback for safety.**

Figure 15 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.

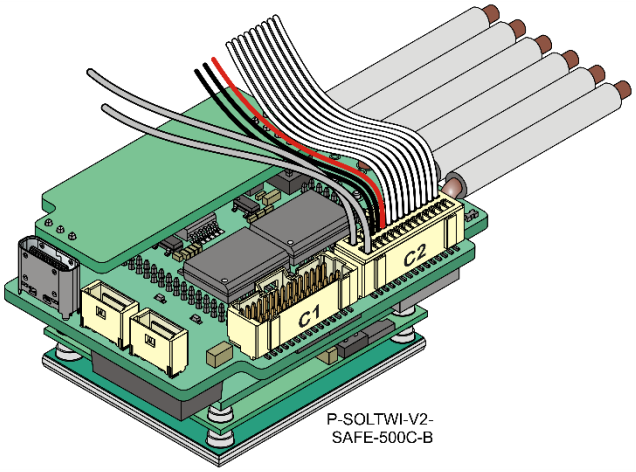



**Figure 15: Connecting the Feedback Wires**

### 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

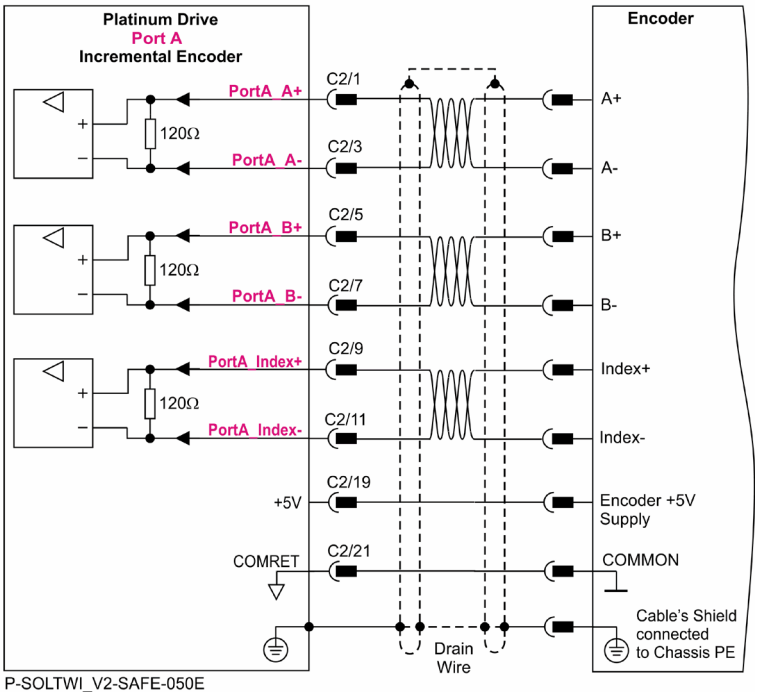



**Figure 16: Port A Incremental Encoder Input – Recommended Connection Diagram**

### 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:

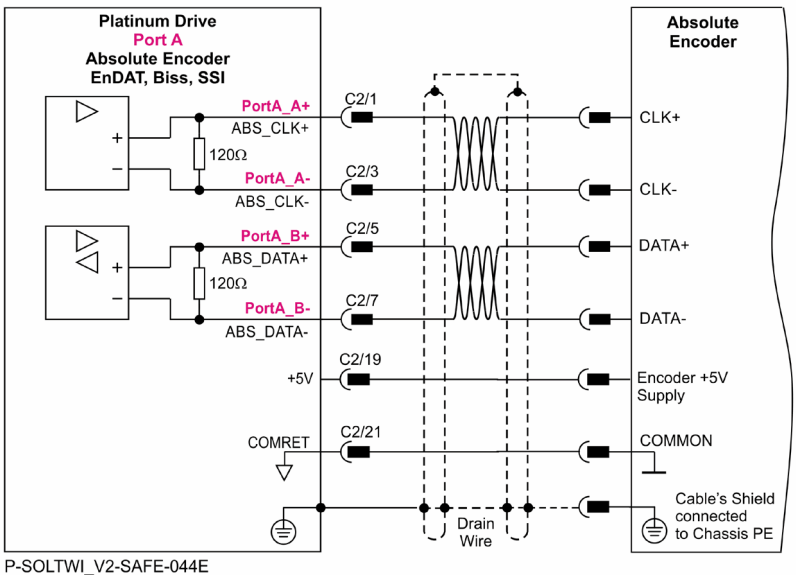



**Figure 17: Absolute Serial Encoder – Recommended Connection Diagram for Endat, Biss, SSI**

### 8.6.1.3 Hiperface

The following figure describes the connection diagram.

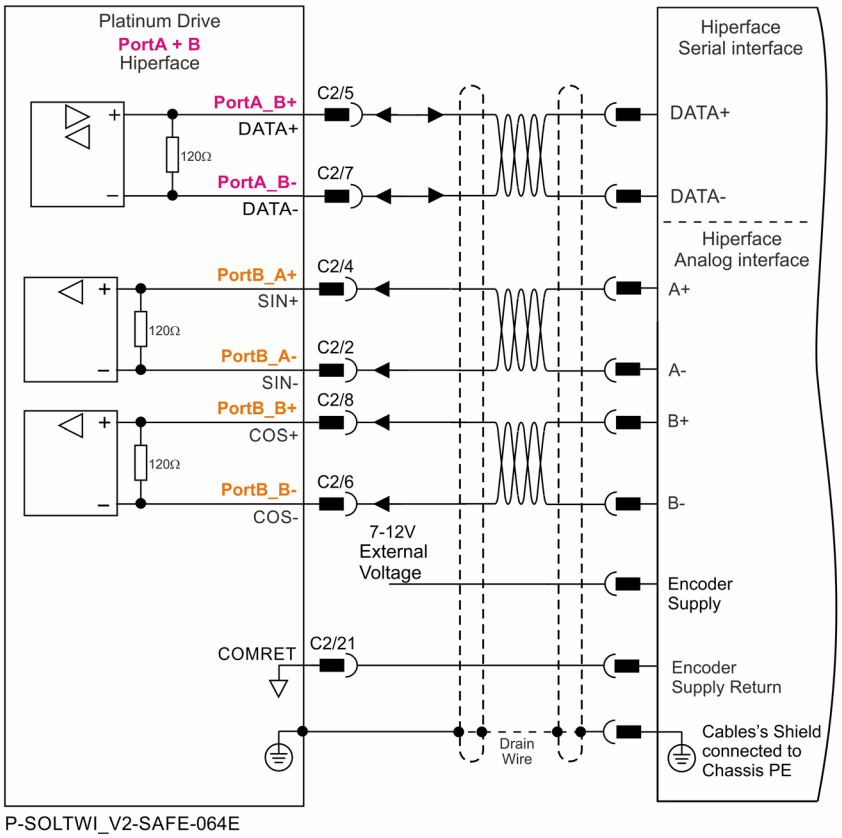



**Figure 18: Absolute Serial Encoder – Recommended Connection Diagram for Stegmann Hiperface**

**Important:**
Hiperface encoder with 7V- 12V supply voltage cannot be used for functional safety; Hiperface with a 7V-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-<br>Vref complement f= 1/TS, 50 mA Max. |
| 12 | PortB_INDEX+ | Channel_Index+ | Analog_Index+ | RESOLVER_OUT+<br>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

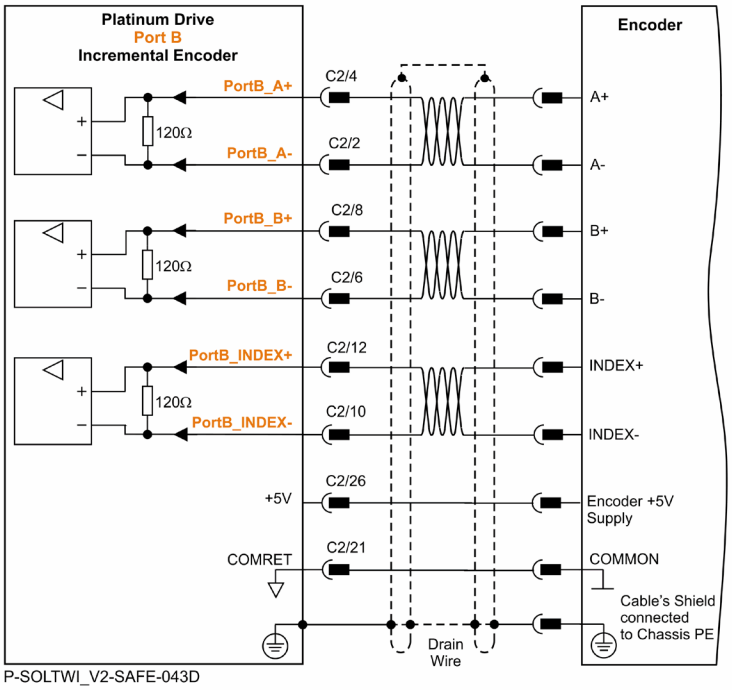



**Figure 19: Port B Incremental Encoder Input – Recommended Connection Diagram**

### 8.6.2.2 Interpolated Analog (Sine/Cosine) Encoder

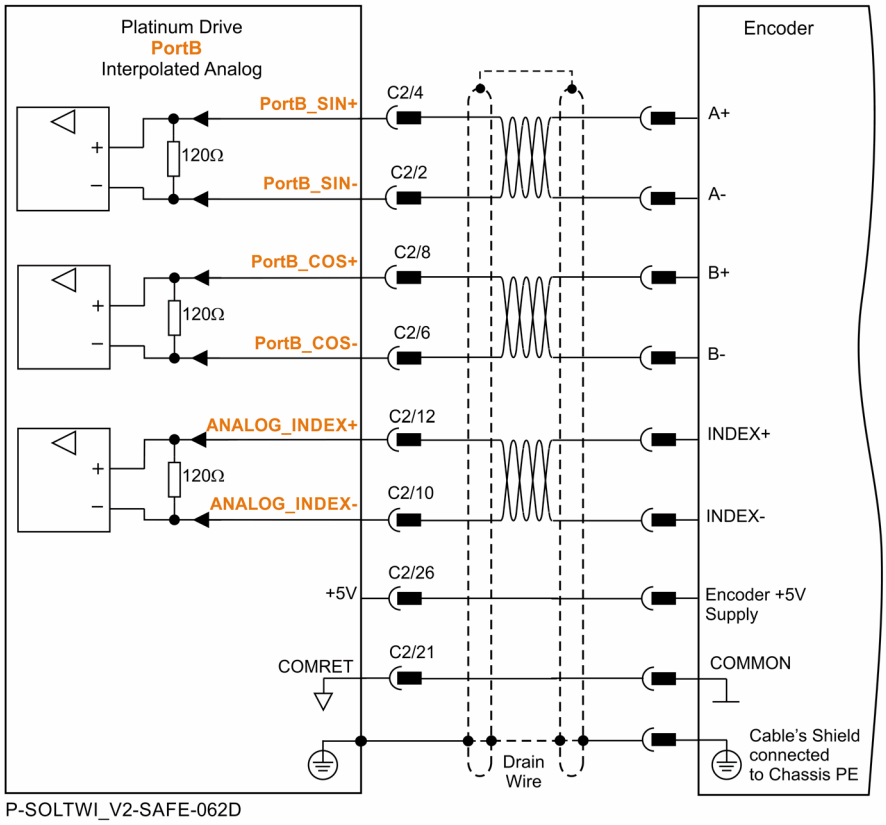



**Figure 20: Port B - Interpolated Analog Encoder Connection Diagram**

### 8.6.2.3 Resolver

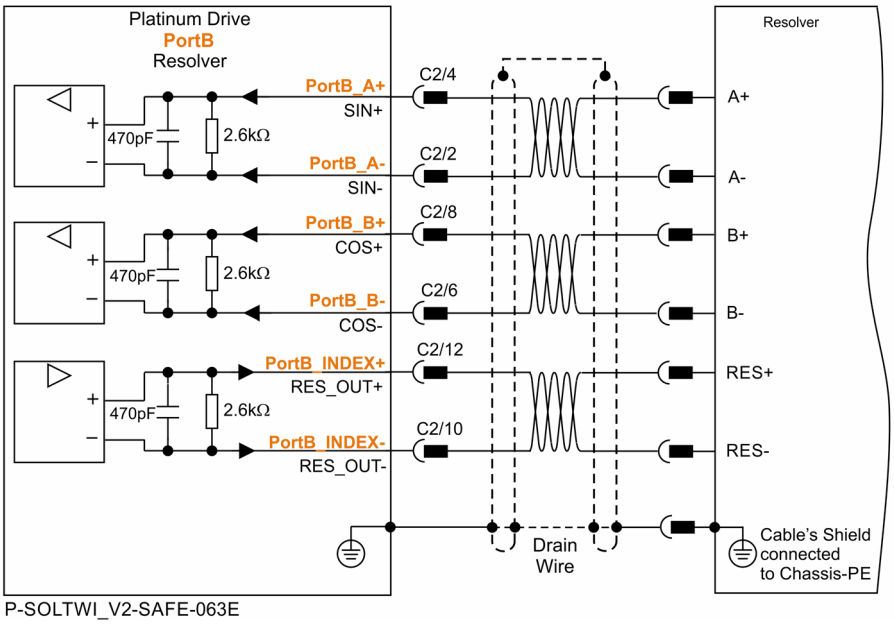



**Figure 21: Port B – Resolver Connection Diagram**

### 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:

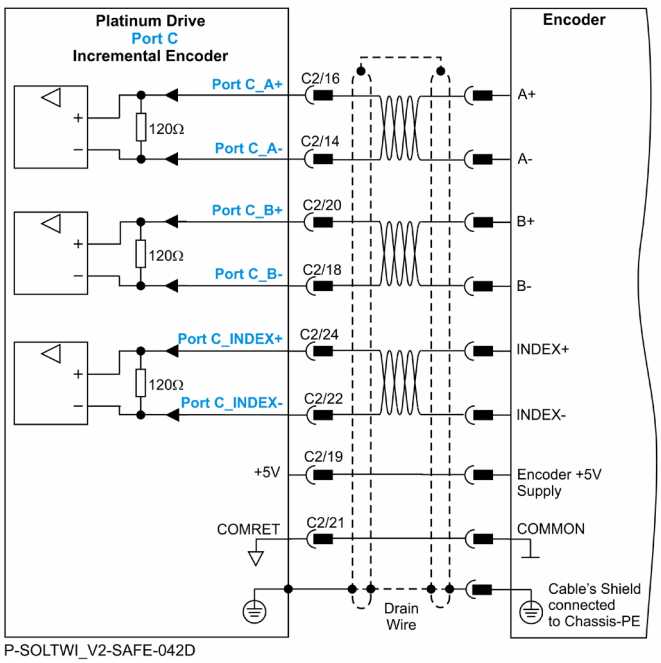



**Figure 22: Port C Incremental Encoder Input – Recommended Connection Diagram**

### 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:

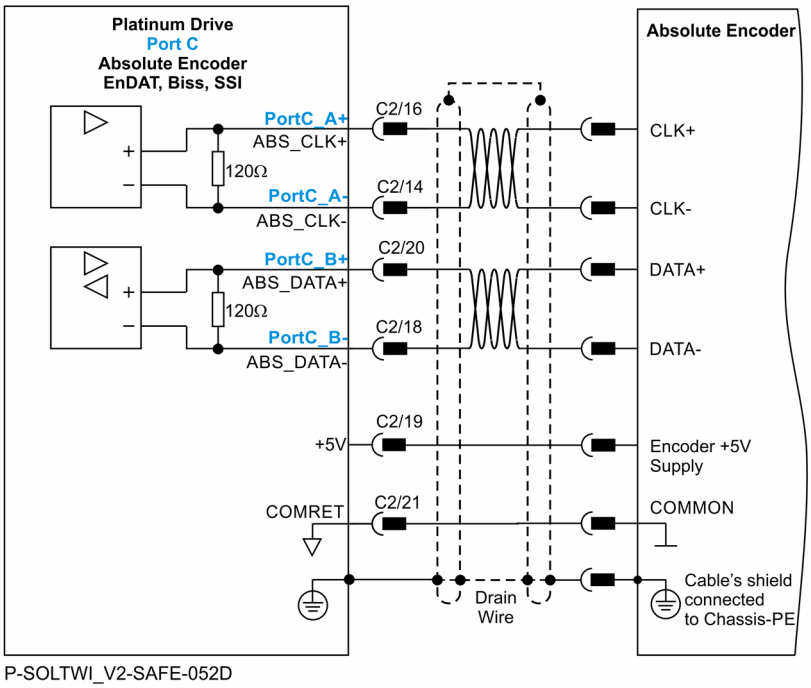



**Figure 23: Absolute Serial Encoder – Recommended Connection Diagram for Endat, Biss, SSI**

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

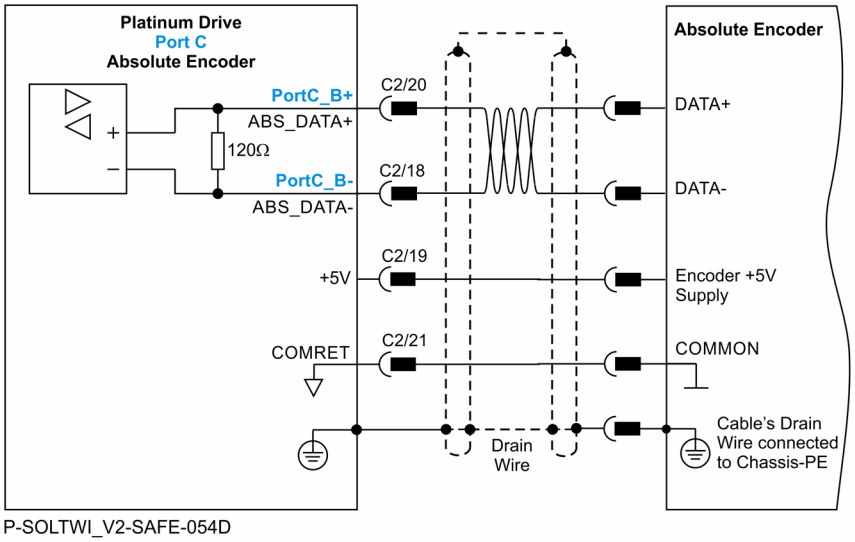



**Figure 24: Absolute Serial Encoder – Recommended Connection Diagram for Panasonic, Tamgawai, and Sanyo-Denki**

### 8.6.3.3 Emulated Encoder Output

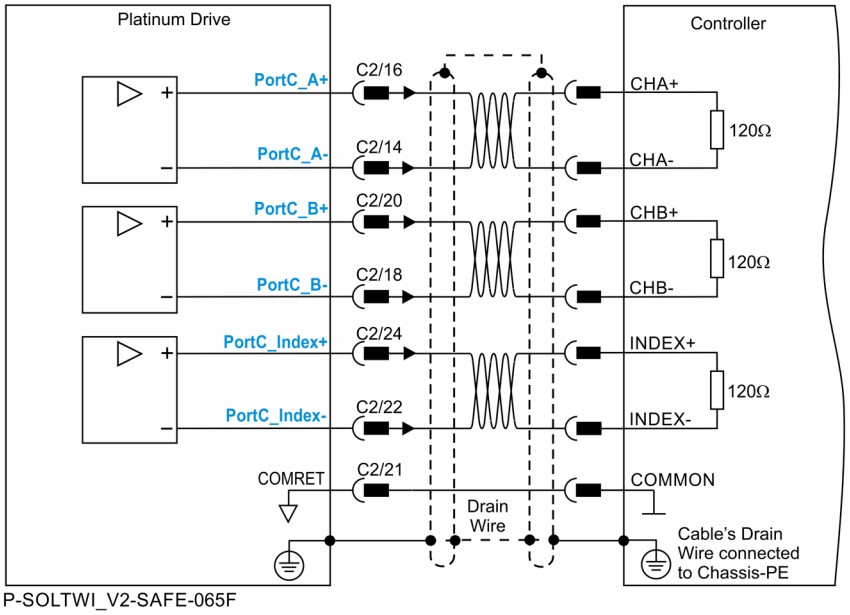



**Figure 25: Emulated Encoder Differential Output – Recommended Connection Diagram**

## 8.6.4 Feedback - Hall Sensors

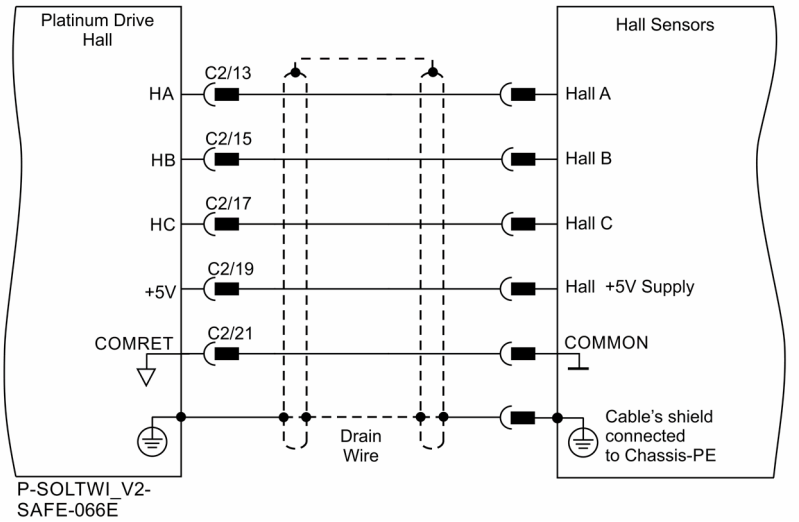



**Figure 26: Hall Sensors Connection Diagram**

## 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

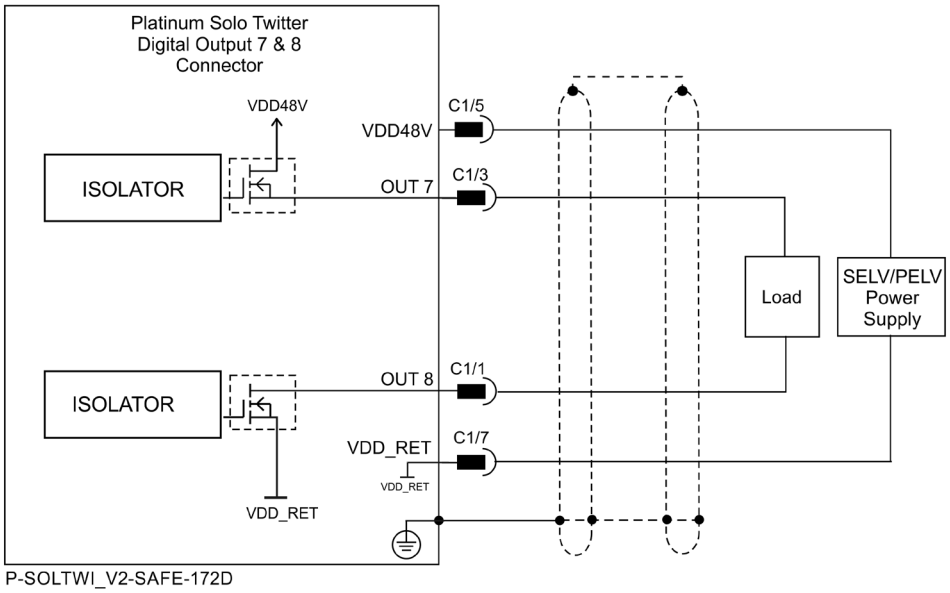



**Figure 27: Digital Outputs with Safe IO Connection Diagram (OUT7 and OUT8)**

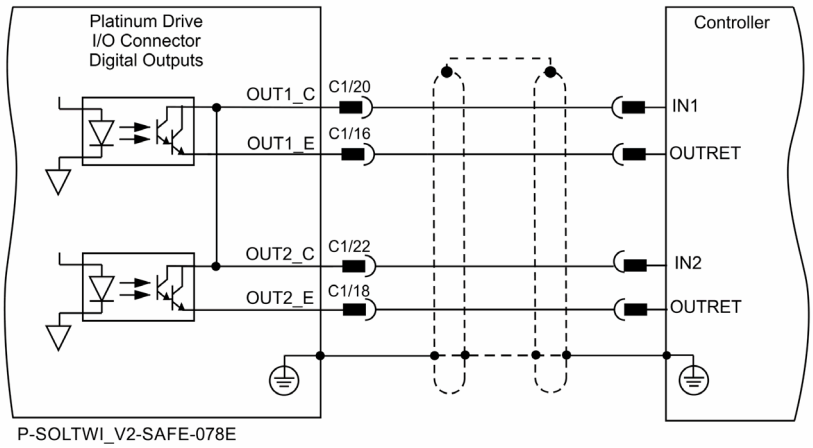



**Figure 28: Digital Outputs for Regular Connection Diagram (OUT1 and OUT2)**

### 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

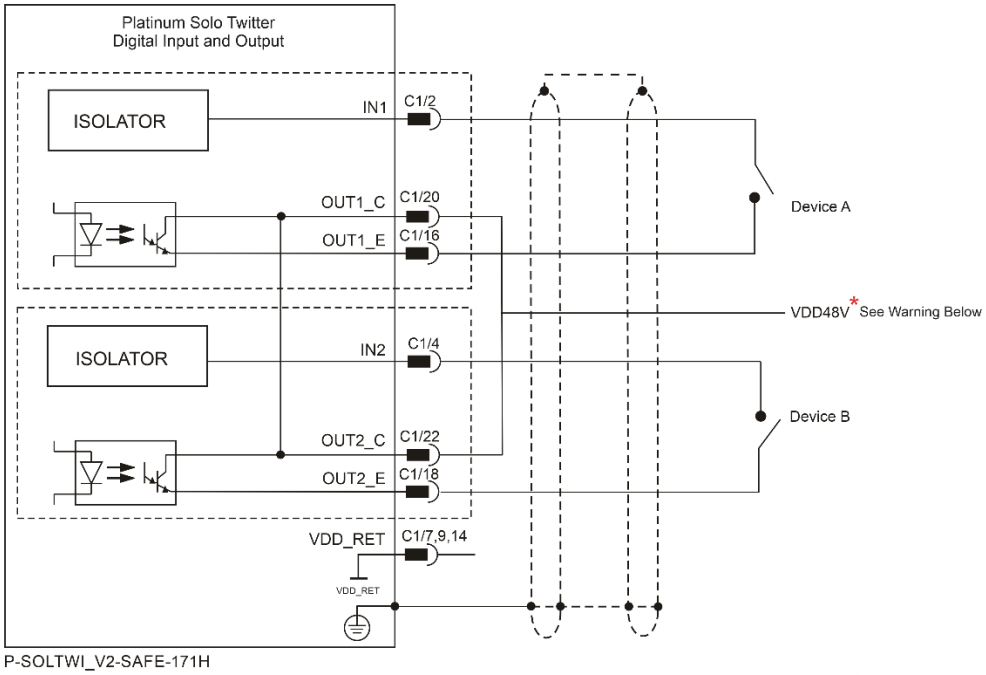



**Figure 29: Digital Input with Test Pulse Connection Diagram (IN1 and IN2)**

**Warning:** The range of VDD of the test pulse output can be between 19.6V to 60V. However, the external Device A, B must be tolerant to the VDD voltage.

#### 8.7.2.2 OSSD Inputs

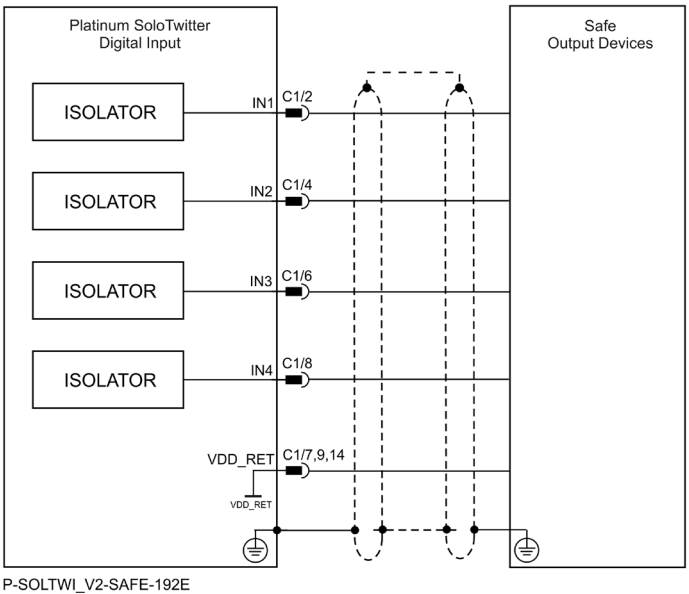



**Figure 30: OSSD Digital Input Connection Diagram (IN1, IN2, IN3, IN4)**

## 8.8 Regular Digital IOs (Safe IO: U, V) (C1)

**Refer to the Chapter 13 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.

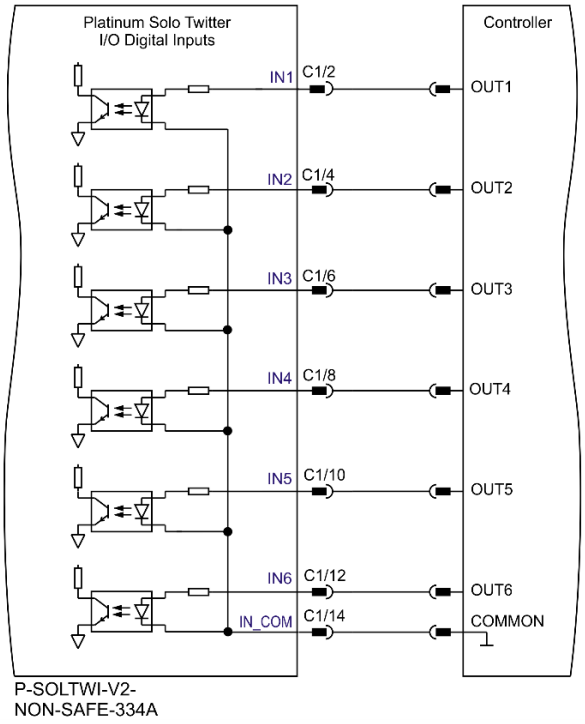



**Figure 31: Regular Digital Input 5V Logic Mode Connection Diagram**

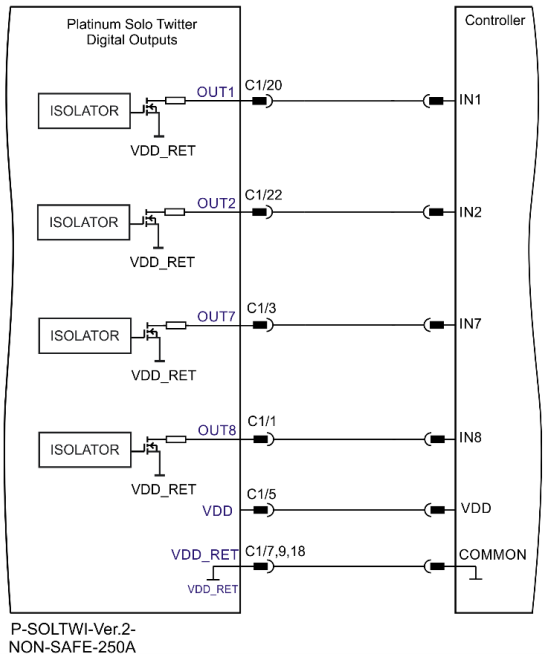



**Figure 32: Regular Digital Output Connection Diagram – 5V Logic Option**

## 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.

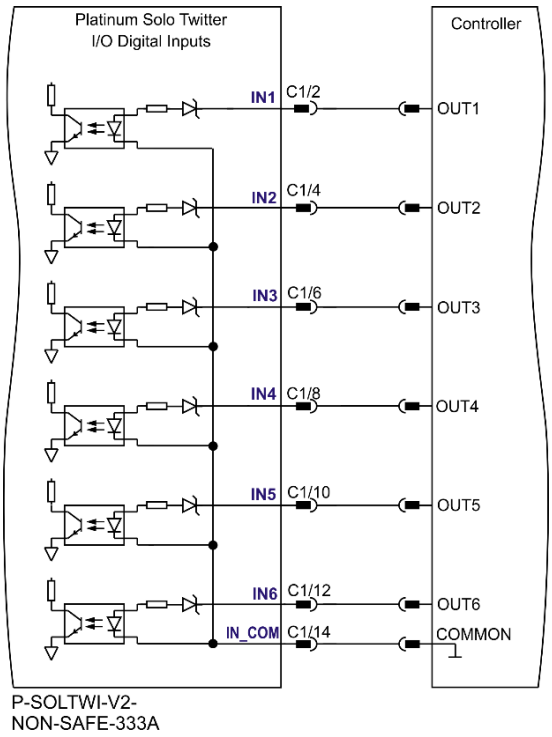



**Figure 33: Regular Digital Input Connection Diagram – PLC Source Option**

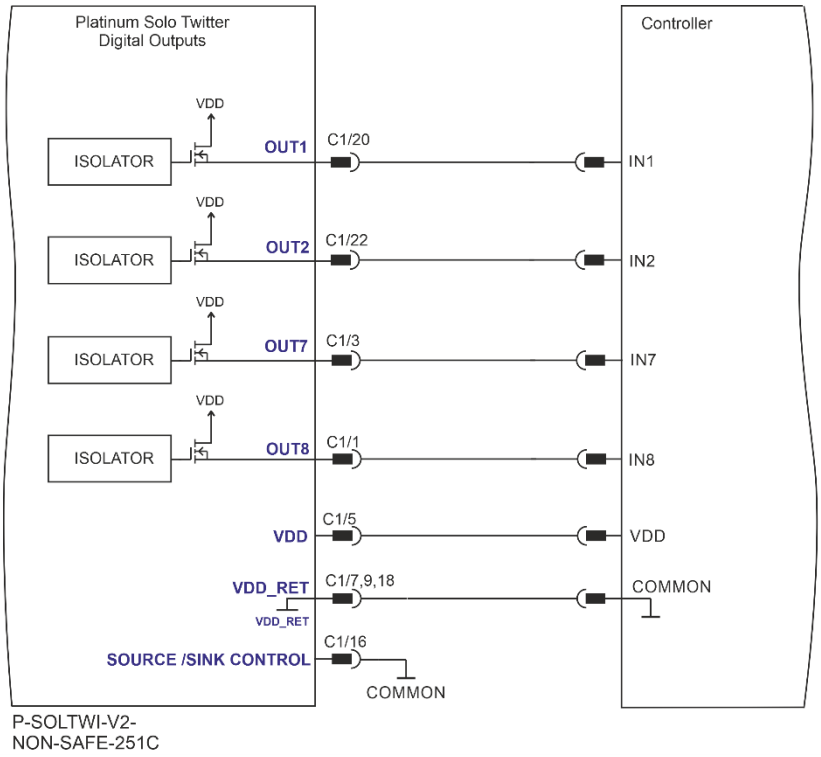



**Figure 34: Regular Digital Output Connection Diagram – PLC Source Option**

### 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.

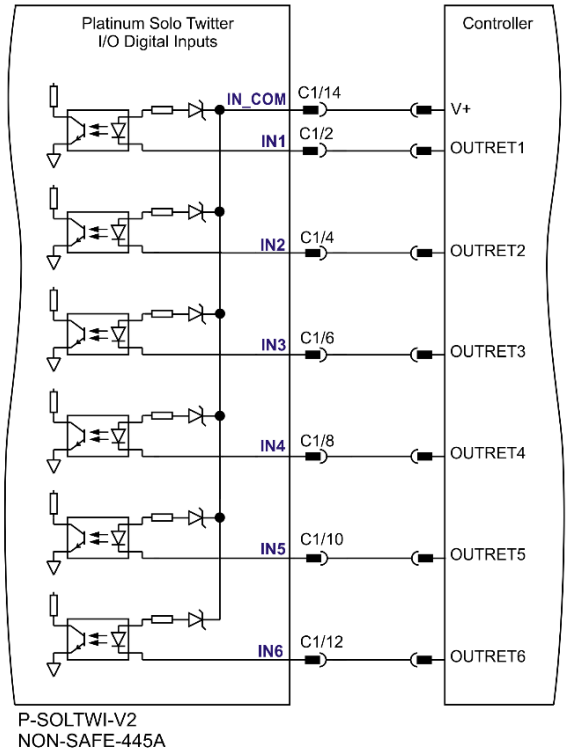



**Figure 35: Regular Digital Input Connection Diagram – PLC Sink Option**

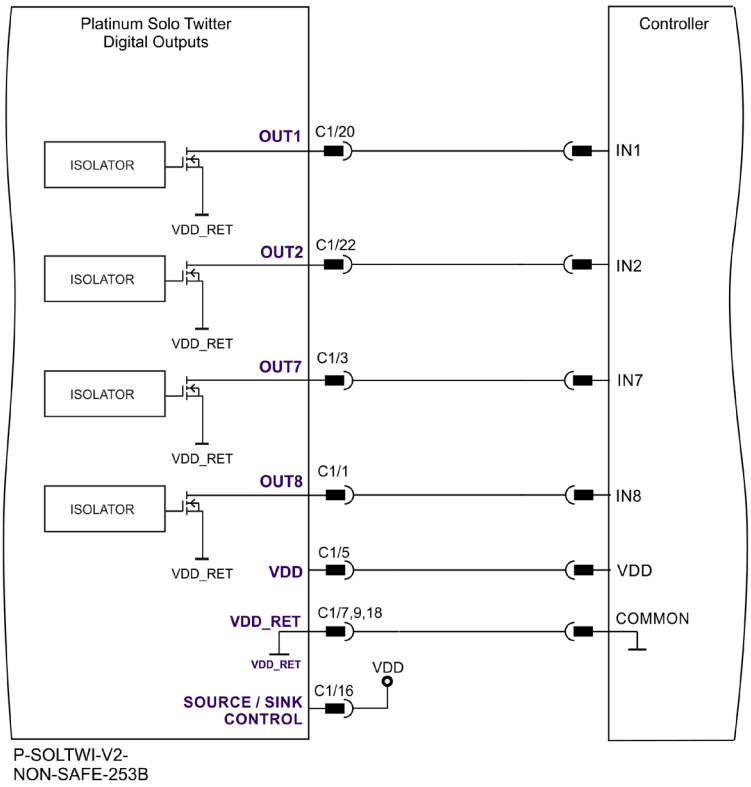



**Figure 36: Regular Digital Output Connection Diagram – PLC Sink Option**

# 8.9 STO (Safe Torque Off) (C1)

**Refer to the Chapter 10 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.

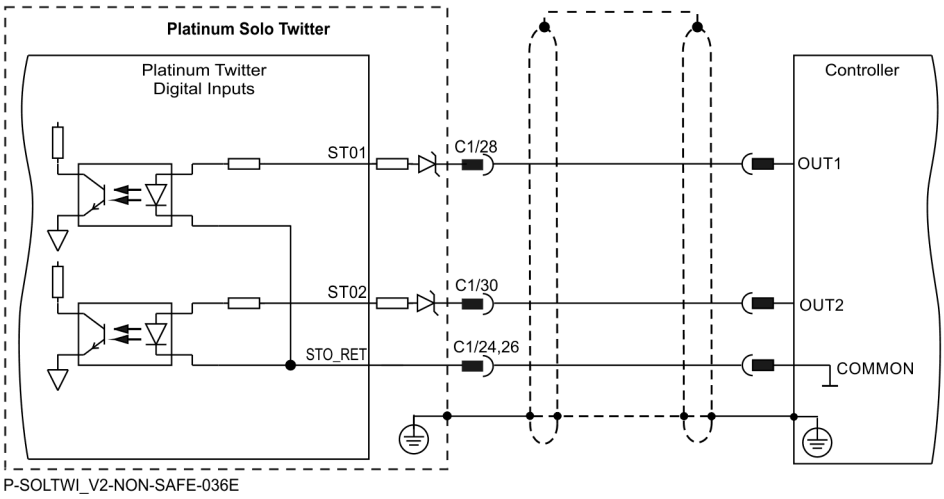



**Figure 37: STO Input Connection – PLC Source (24V Logic)**

## 8.9.2 TTL Mode – TTL Voltage Level

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

- PTWI-z**S**-zXXX/YYYGzU-z
- PTWI-z**T**-zXXX/YYYGzU-z

Refer to the diagram below for the TTL option connection.

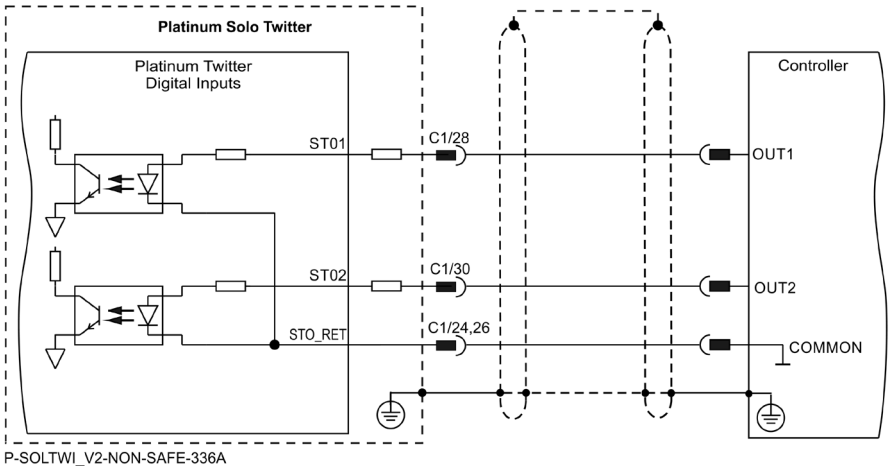



**Figure 38: STO Input Connection – TTL Source (5V Logic)**

## 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

**Refer to the Chapter 14 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 39) describes the internal interface of the Analog input.

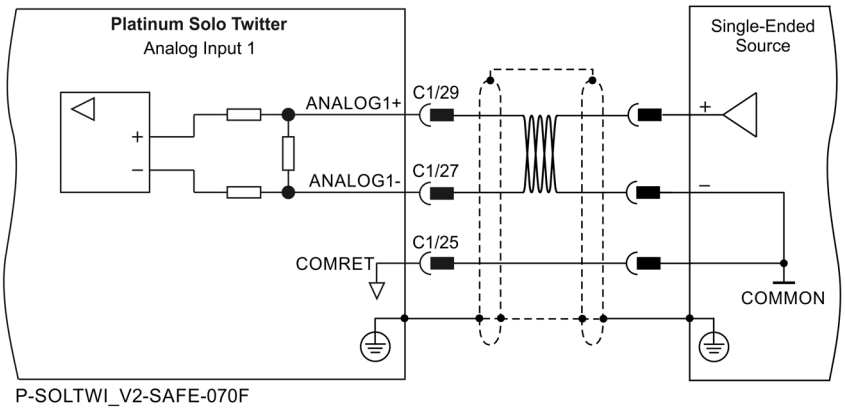



**Figure 39: Analog Input 1**

### 8.10.2 Analog Input 2

Figure 40 describes the input interface of the Analog Input 2 in the Platinum Solo Twitter.

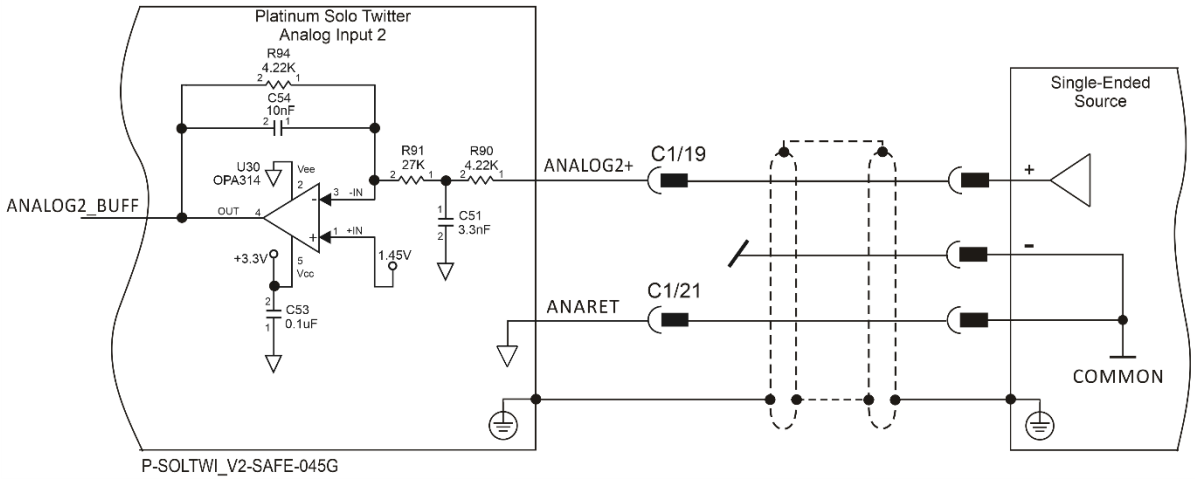



**Figure 40: Analog Input 2**

# 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/YYYGzz-z

PTWI-z**T**-zXXX/YYYGzz-z

The following describes the RS-422 specification.

| Specification | Details |
|---|---|
| Physical layer | Differential RS-232<br>Full duplex, serial communication |
| Interface | RS-422 |
| Termination | 120 Ohm<br>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 | Common Return |

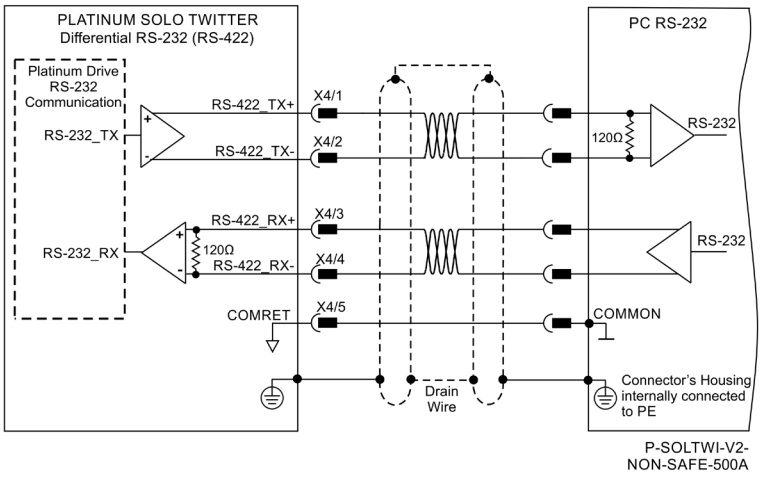



**Figure 41: Differential RS-232 Communication Example**

## 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.

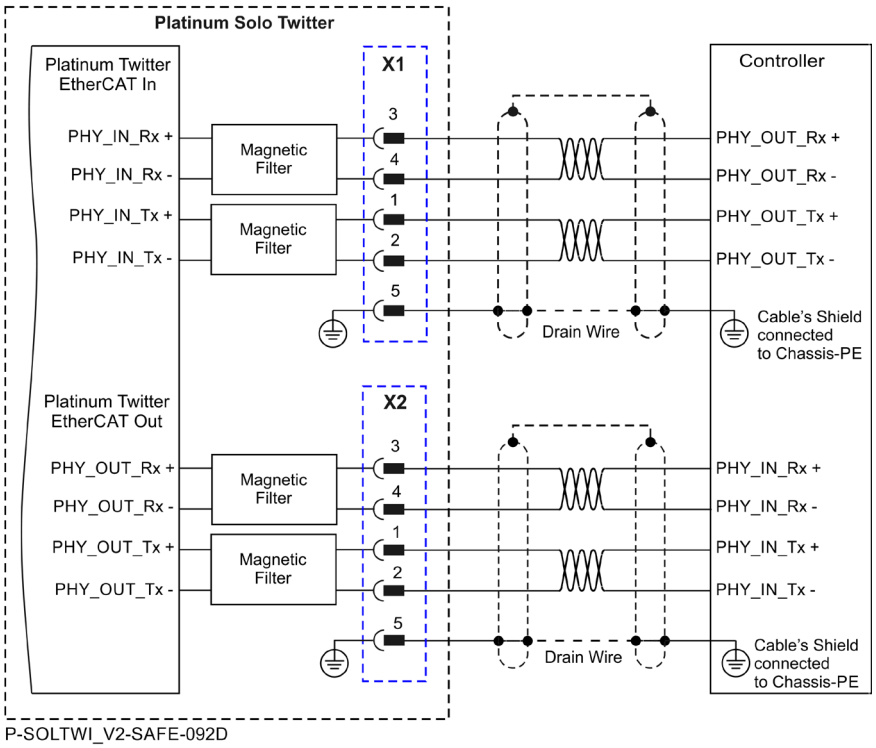



**Figure 42: EtherCAT Connection Schematic Diagram**

**Note:**
Always use CAT5e cables.

### 8.11.3.2 EtherCAT Status Indicator

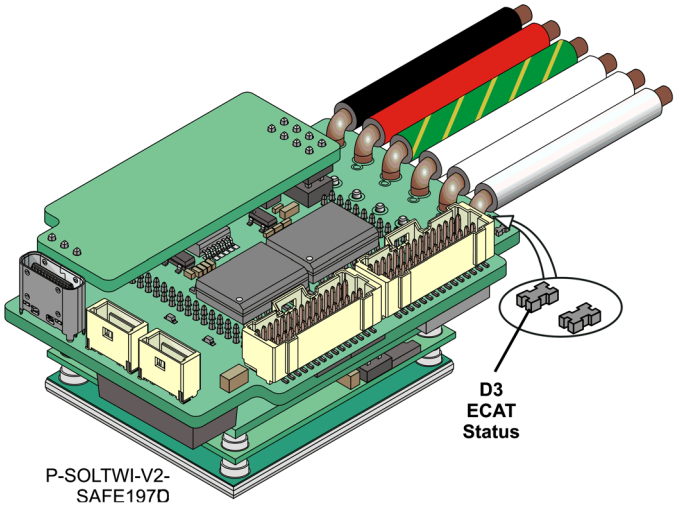



**Figure 43: EtherCAT Status LED**

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 44.

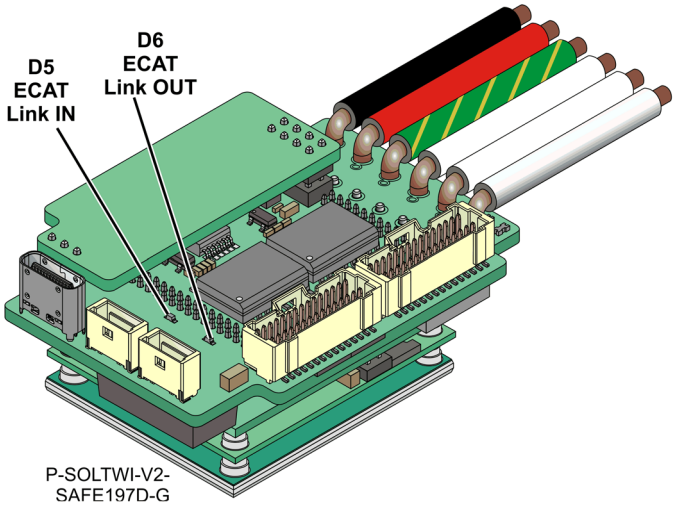



**Figure 44: Ethernet Connector LEDs**

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.

# 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

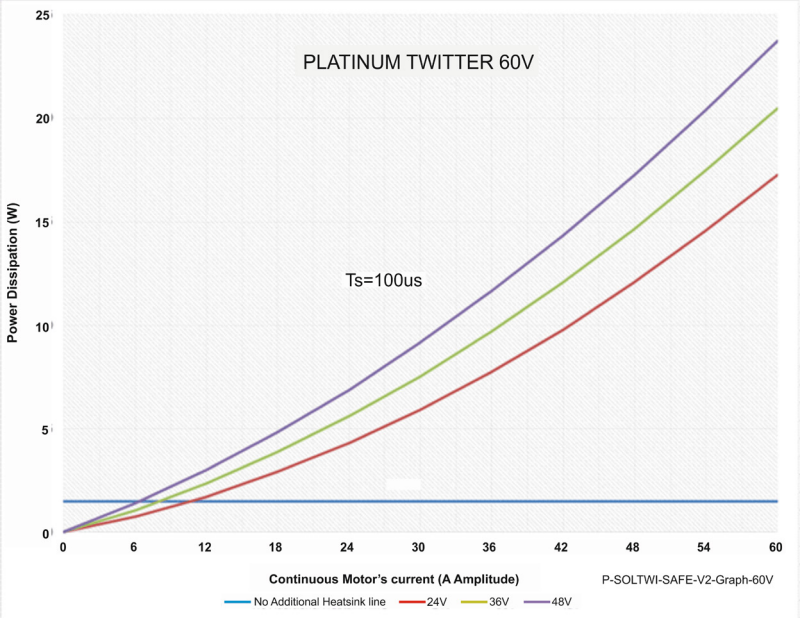
After the Platinum Solo Twitter has been connected and mounted, the system must be set up and initialized. This is accomplished using the *EASII*, Elmo's Windows-based software application. Install the application and then perform setup and initialization according to the directions in the *EASII User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

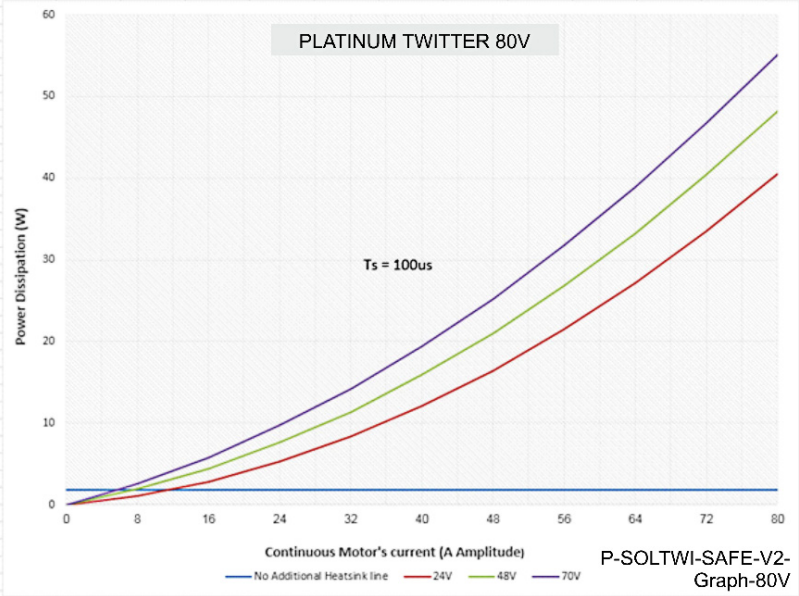
## 9.2 Heat Dissipation

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.

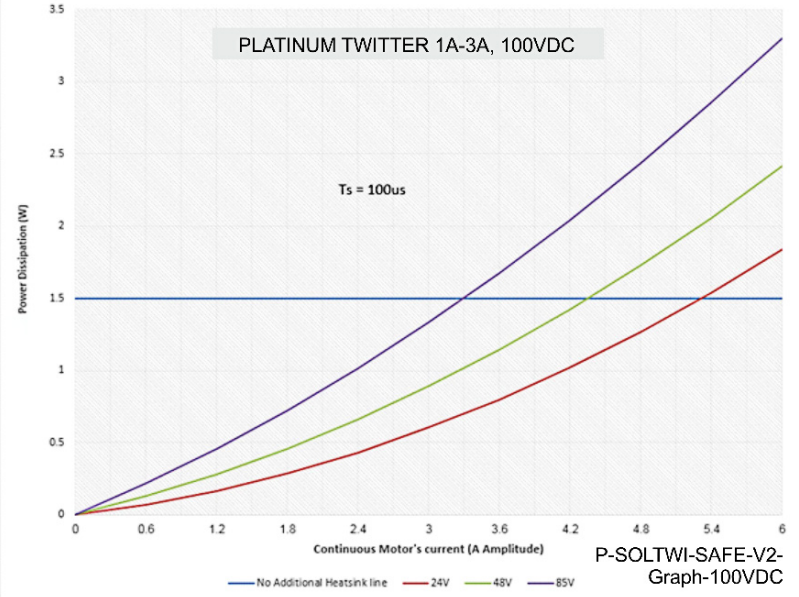
### 9.2.1 Heat Dissipation Data

Heat Dissipation is shown graphically below. The graphs below 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.**

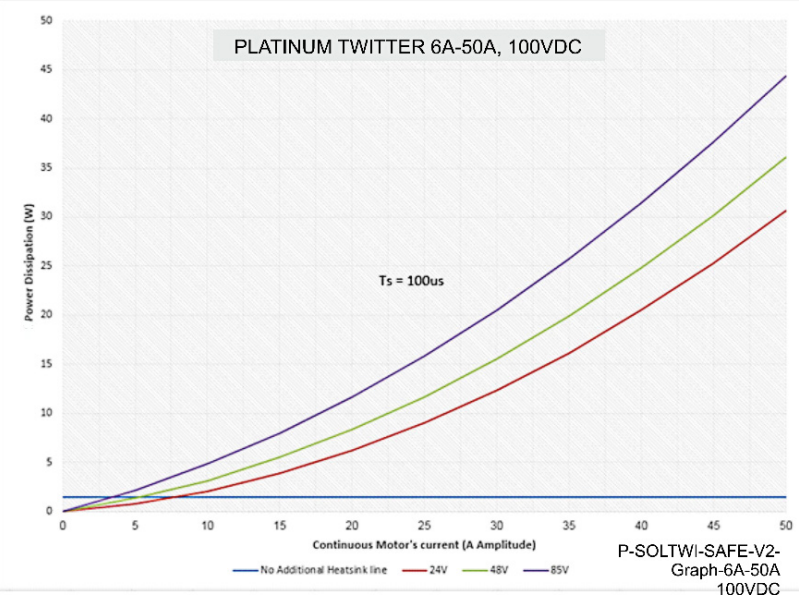




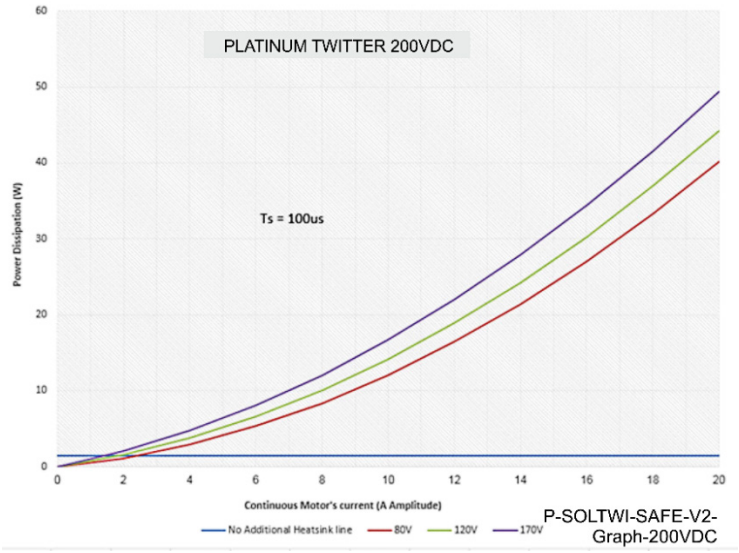

P-SOLTWI-SAFE-V2-Graph-80V




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




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




### 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:

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

# Chapter 10: Dimensions, Physical Specifications

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

## 10.1 EtherCAT Version without Heatsink

### 10.1.1 PTWI-Wz-XXX/YYYzzz

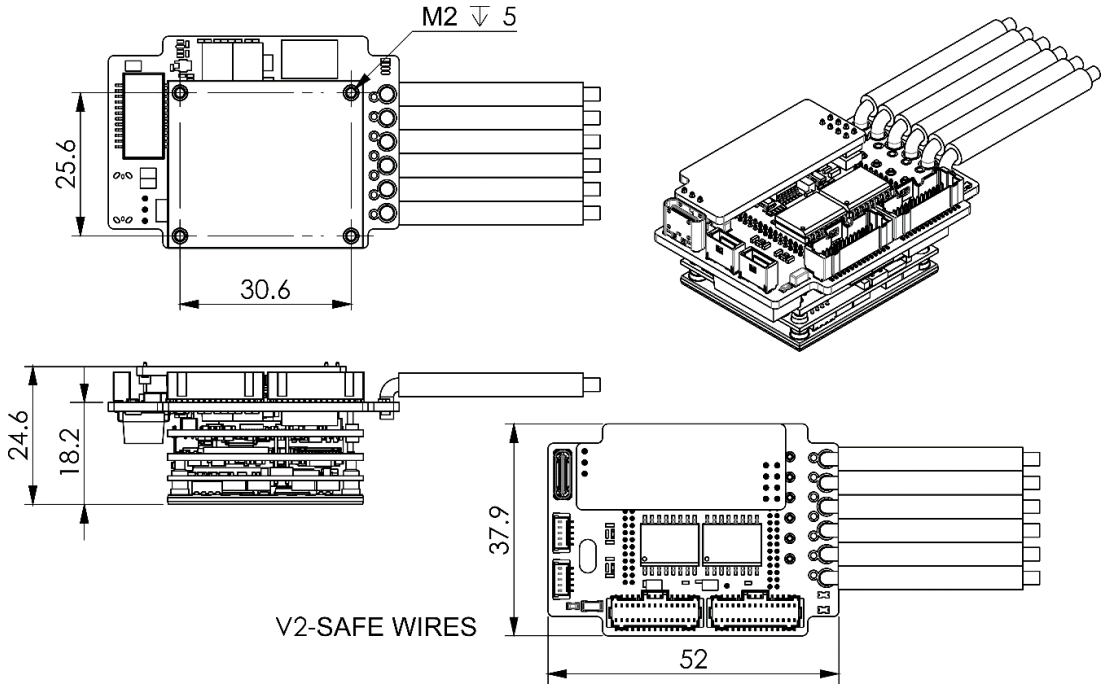



**Figure 45: P-Solo Twitter –EtherCAT version with wires to power supply and motor**

### 10.1.2 PTWI-Hz-XXX/YYYzzz

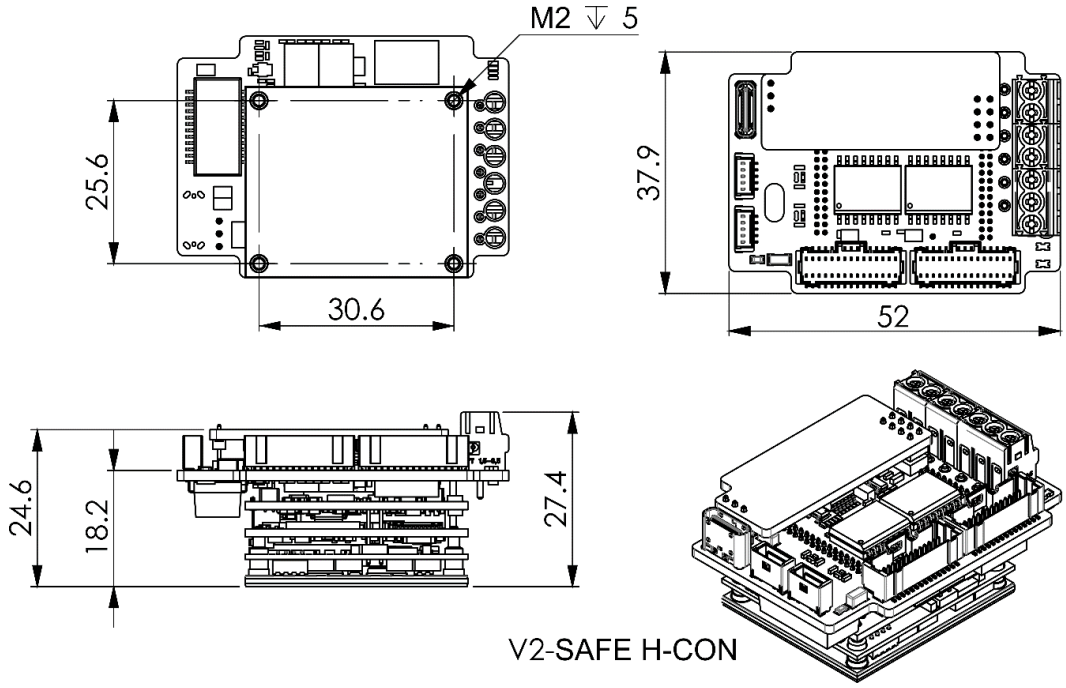



**Figure 46: P-Solo Twitter –EtherCAT version with horizontal power connector**

### 10.1.3 PTWI-Vz-XXX/YYYzzz

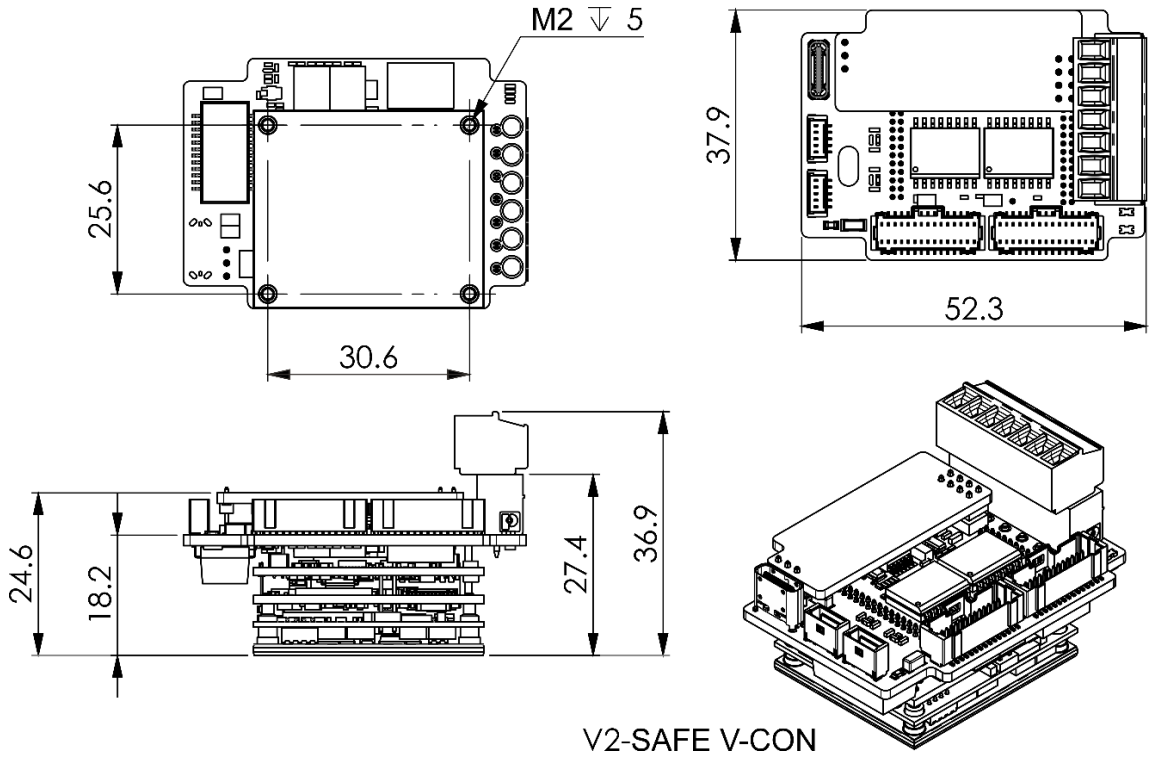



**Figure 47: P-Solo Twitter –EtherCAT version with vertical power connector**

## 10.2 EtherCAT Version with Heatsink

### 10.2.1 PTWI-Wz-XXX/YYYzzz-H

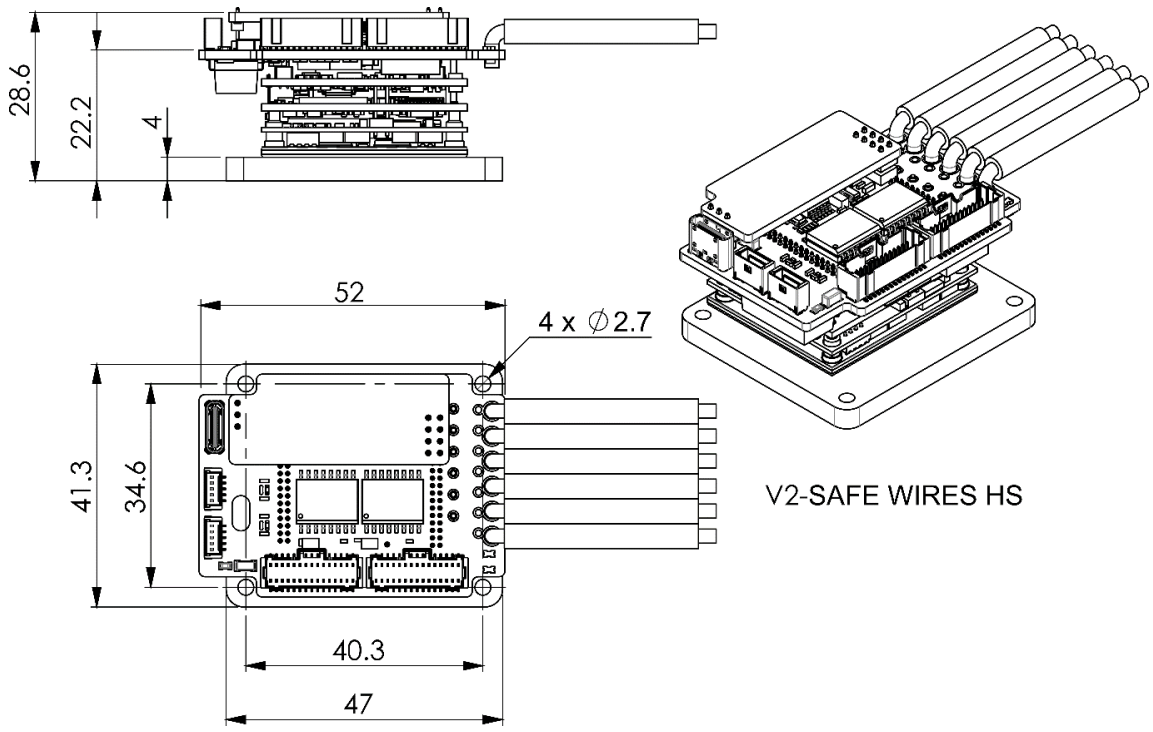



**Figure 48: P-Solo Twitter –EtherCAT version with wires to power supply and motor with heatsink**

### 10.2.2 PTWI-Hz-XXX/YYYzzz-H

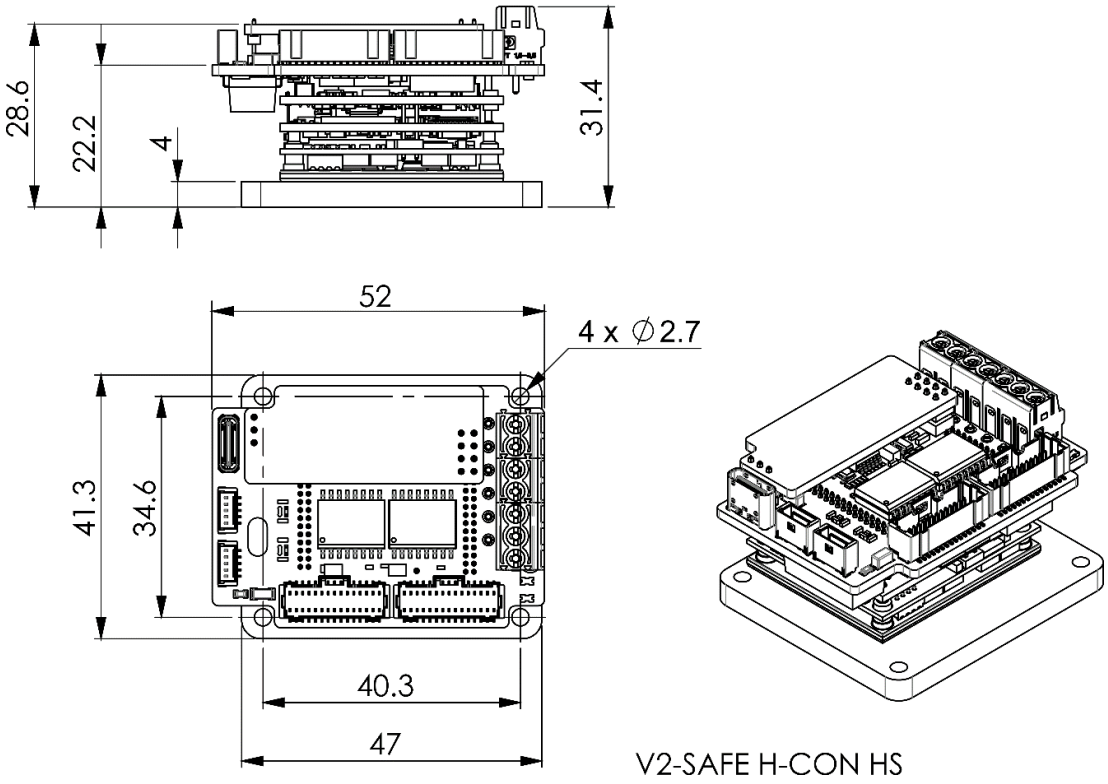



**Figure 49: P-Solo Twitter –EtherCAT version with horizontal power connector with heatsink**

### 10.2.3 PTWI-Vz-XXX/YYYzzz-H

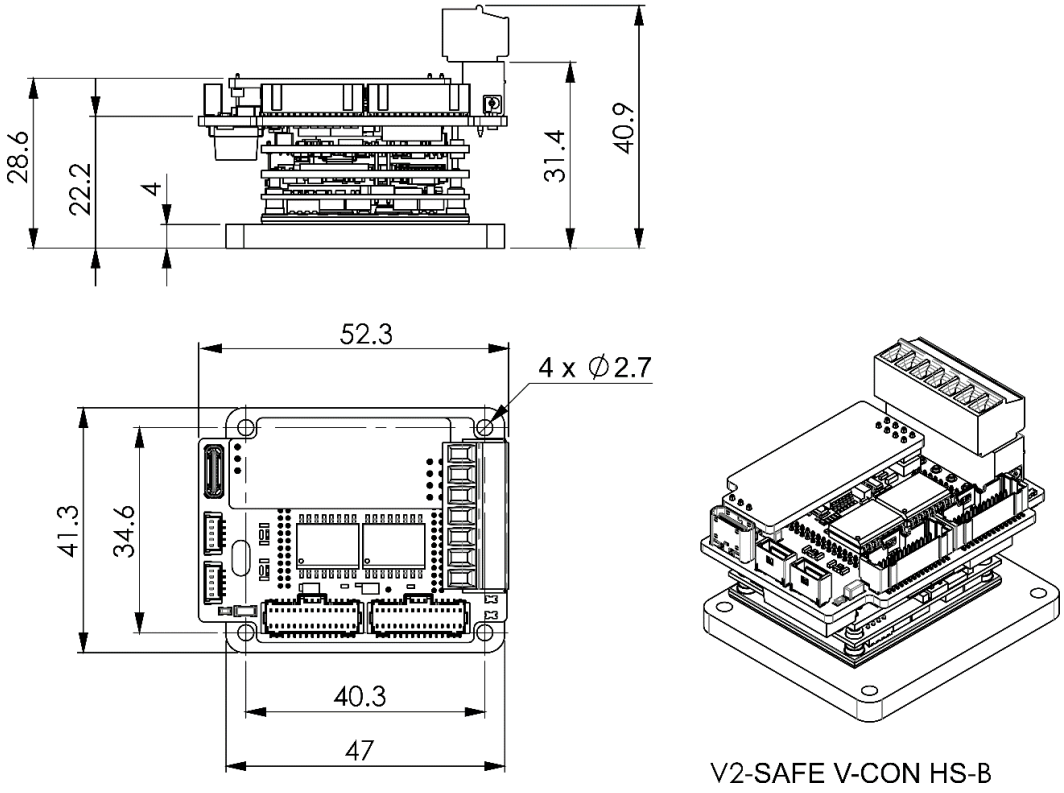



**Figure 50: P-Solo Twitter –EtherCAT version with vertical power connector with heatsink**

# Chapter 11: Accessories

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

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

* This cable is only required for models:

- PTWI-zS-zXXX/YYYGzz-z
- PTWI-zT-zXXX/YYYGzz-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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