Platinum by Elmo

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Platinum Cimbasso Digital Servo Drive Installation Guide

EtherCAT

Safety Capability: F, O

May 2024 (Ver. 1.012)

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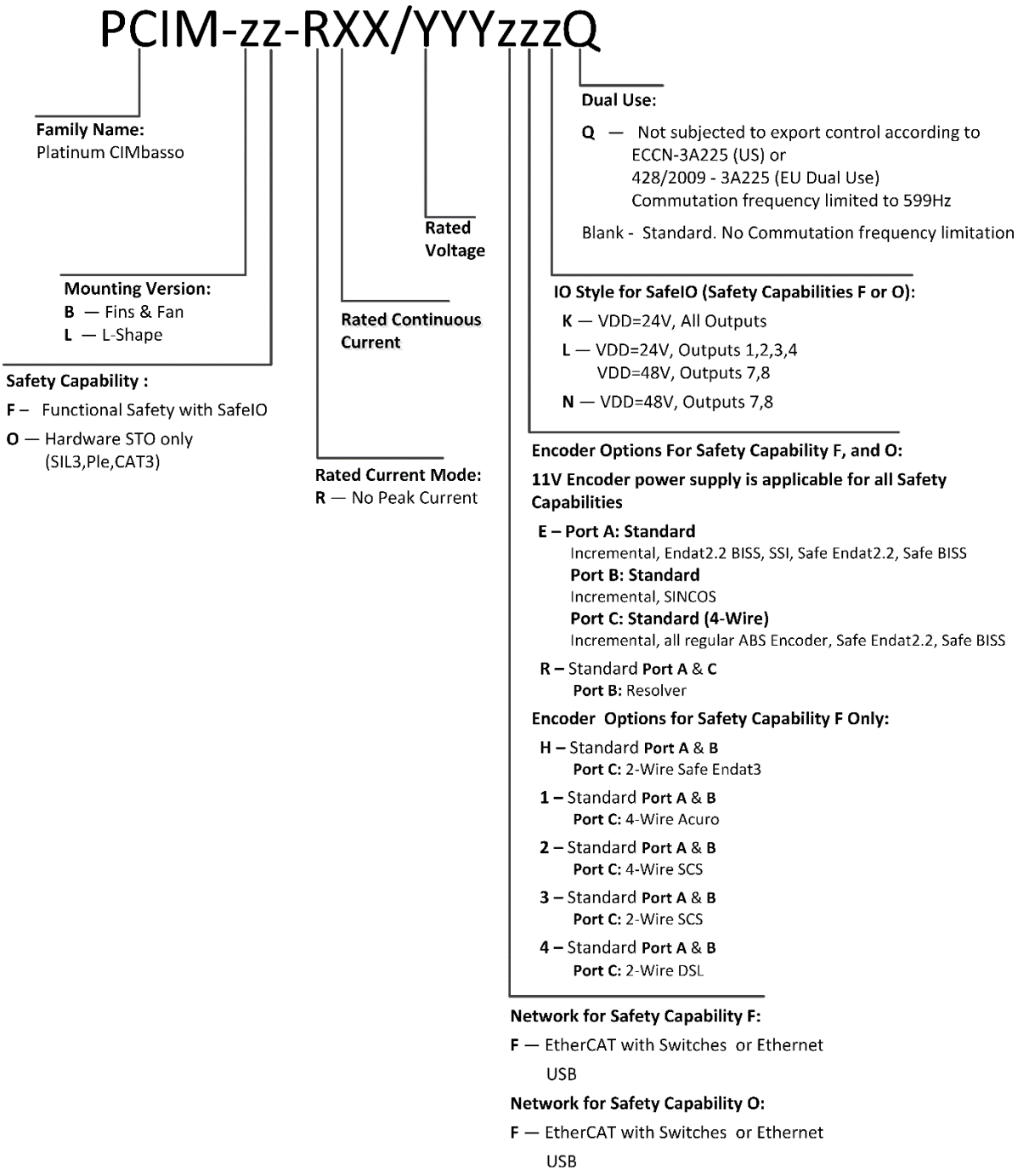
Catalog Number



Cable Kit

- The following cable kit may be ordered
  Catalog number: CBL-PCIMKIT02 EtherCAT Cable kit
  For further details, see the latest version of the MAN-P-CIM-CBKIT cable kit manual.

Revision History

Version	Date	Details
Ver. 1.000	Dec 2020	Initial Release
Ver. 1.001	Jan 2021	400V Models removed
Ver. 1.002	June 2021	Updated Part Number
Ver. 1.003	Aug 2021	Updated
Ver. 1.004	Oct 2021	Updated
Ver. 1.005	Oct 2021	Updated
Ver. 1.006	Nov 2021	Updated
Ver. 1.007	June 2022	New version updates
Ver. 1.008	June 2022	Updated with Heat Dissipation graph
Ver. 1.009	Mar 2023	Updated
Ver. 1.010	Mar 2023	Updated
Ver. 1.011	Nov 2023	Replaced section 5.3.3 “Safe IO Features: IO TYPE = K, L, N” with sections 5.3.3 “Digital Input” and 5.3.4 “Digital Output and Current”.
Ver. 1.012	May 2024	Correction to section 8.6.1.3 Hyperface drawing

Chapter 1: *This Installation Guide*

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

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

Chapter 2: *Functional Safety*

The Platinum family of servo drives enable 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 Cimbasso, 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 Cimbasso 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 Cimbasso 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 Cimbasso 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, and Digital Outputs operating at voltage greater than ELV, require an isolation.

Capacitance Discharge
After shutting off the power and removing the power source from your equipment, wait at least 3 minutes before touching or disconnecting parts of the equipment that are normally loaded with electrical charges (such as plugs or connectors). Measuring the electrical contact points with a meter, before touching the equipment, is recommended.

3.2 Cautions

- The DC power supply connected to the instrument must comply with the parameters outlined in this guide.
- When connecting the Platinum Cimbasso to an approved isolated power 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 Cimbasso, 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 Cimbasso 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 Cimbasso 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 time of installation, or 12 months from time of shipment, whichever comes first. 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 Cimbasso is an integrated solution delivering up to **32 kW of continuous power** in a compact package (73 x 158 x 110 mm (2.87" x 6.22" x 4.33")), and designed to simply and efficiently connect Elmo's Platinum Cimbasso servo drive directly to the application.

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 Cimbasso is provided in the following configurations:

- **Functional Safety with Safe IO (PCIM-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.
- **STO Only (PCIM-zO(SIL3,Ple,CAT3)):** Servo drive with STO – The servo drive supports only STO

The Power to the drives is provided by a DC power source (not included with the Platinum Cimbasso).

Since the power stage is fully isolated from the control stage, the DC rectifier can be fed directly from the mains, without the need for a bulky and expensive transformer.

A control 24 VDC power supply is required as the Platinum Cimbasso does not operate without one. In addition, the control 24 VDC also powers the heat cooling fan. This smart fan is activated only "when required", significantly prolonging the fan's lifetime. The control 24 VDC power supply also serves as a backup functionality.

Note: The control 24 VDC must operate from an isolated voltage source within the range of 18 to 30 VDC for the L-shape model and 24 ±10% VDC for the Fins+Fan model.

Elmo offers the appropriate Elmo TAM-30 or the Elmo TAM-100 power supplies, depending on the voltage /current-sum of the application:

- For 800 V applications with a current-sum of up to 30A, the TAM-30/480 VAC can be used.
- For 800 V applications with a current-sum above 30A, the TAM-100/480 VAC can be used.

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 Cimbasso drive is easily set up and tuned using Elmo Application Studio (EASII) software tools now available in both 32bit and 64bit versions. As part of the Platinum product line, it is fully programmable with the Elmo motion control language. For more about software tools refer to the Elmo Application Studio Inline-Help.

The Platinum Cimbasso is available in a variety of options. There are multiple power rating options, an EtherCAT/Ethernet communications option, and a variety of feedback selections and I/O configuration possibilities.

4.1 Accessories

The following cable kit may be ordered
Catalog number: **CBL-PCIMKIT02** (Screw lock)

For further details, see the documentation for the Platinum Cimbasso cable kit.

Chapter 5: *Technical Information*

5.1 Physical Specification

Feature	Units	Heatsink	All Types
Weight	g (oz.)	L-Shape:	650 g (22.9 oz)
		Fins+Fan:	1240 g (43.7 oz)
Dimensions	mm (in)	L-Shape:	48.4 x 144 x110 mm (1.91" x 5.66" x 4.33")
		Fins+Fan:	73 x 158 x 110 mm (2.87" x 6.22" x 4.33")
Mounting method		L-Shape:	• Narrow back-Side Panel-Mounted • Wide-Side Panel-Mounted (preferred)
		Fins+Fan:	• Narrow back-Side Panel-Mounted

Table 1: Physical Specifications

5.2 Current/Voltage Technical Data

5.2.1 800V Type Models

Feature	Units	R8/800	R16/800	R25/800	R50/800
Minimum supply voltage	VDC	50			
Nominal supply voltage	VDC	560 (when rectified from 3 x 400 VAC) 680 (when rectified from 3 x 480 VAC)			
Maximum supply voltage	VDC	780			
Maximum continuous power output	kW	5	10	16	32
Efficiency at rated power (at nominal conditions)	%	> 98			
Continuous current limit (Ic) Amplitude sinusoidal/DC trapezoidal commutation	A	8	16	25	50
Sinusoidal continuous RMS current limit (Ic)	A	5.6	11.3	17.7	35.3
Peak current limit	A	No peak			

Table 2: Technical Data for 800 V Type Version

Note (on current ratings): The current ratings of the Platinum Cimbasso are given in units of DC amperes (ratings that are used for trapezoidal commutation or DC motors).

5.2.2 Control Supply

The servo drive needs an external power supply for its logic circuitry.

Feature		Units	Details	
			L-Shape	Fins+Fan
Control supply for input voltage where the Safety Capability is F		V	18 to 30	24 ± 10%
Control supply for input voltage where the Safety Capability is O		V	12 to 95	24 ± 10%
24V Control supply input power consumption	Without Encoder (VL Only)	W	≤4.5	≤13
	With encoder up to 400mA@5V	W	≤7.5	≤15.5
	With encoder up to 300mA@11V	W	≤8	≤16.5

5.2.3 Encoder Supply

The servo drives have the facility to supply external appliances, like position sensors (encoders), with the following power ratings:

Feature	Details
5V supply	5VDC Nominal, 4.75V÷5.25V; up to 400mA
11V supply only with Safety Capability: F	11VDC Nominal, 10.6V÷11.5V; up to 300mA

5.3 Product Features

5.3.1 Analog Input

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

5.3.2 General Product Features

Main Feature	Details	Presence and No.
Feedback	Standard Port A, B, and C	**√**
Communication Option	USB	**√**
	EtherCAT	**√**

5.3.3 Digital Input

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

I/O Style	K	L	N
Safety/Regular	Safe IO PLC Source, Isolated	Safe IO PLC Source, Isolated	Safe IO PLC Source, Isolated
Input	(IN1, IN2, IN3, IN4)		

5.3.4 Digital Output and Current

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

I/O Style	K	L	N
Safety/Regular	Safe IO	Safe IO	Safe IO
Voltage	24V – All IOs	24V – OUT1,2,3,4 48V – OUT7,8	48V – OUT7,8
VDD **VDD_24** **VDD_48**	19.6 to 30V	19.6 to 30V 19.6 to 60V	19.6 to 60V
OUT1	250mA	250mA	N/A
OUT2	250mA	250mA	N/A
OUT3	250mA	250mA	N/A
OUT4	250mA	250mA	N/A
OUT7	1000mA	1000mA	1000mA
OUT8 (PLC SINK)	1000mA	1000mA	1000mA
Total Current[1]	1500mA	1500mA	1500mA

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

5.4 Environmental Conditions

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

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 2

5.5 Standards and Certifications

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

5.5.1 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

5.5.2 Electrical Safety

Specification	Details
In compliance with 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

5.5.3 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

5.5.4 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

5.5.5 Other Compliant Standards

For other compliant standards refer to the Elmo website:

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

5.5.6 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 Cimbasso must be installed in a suitable environment and properly connected to its power supplies and the motor.

6.1 Unpacking the Drive Components

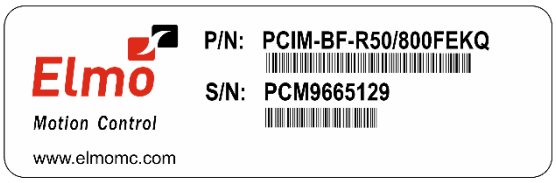
Before you begin working with the Platinum Cimbasso, verify that you have all of its components, as follows:

- The Platinum Cimbasso servo drive
- The Elmo Application Studio (EASII) software

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

To unpack the Platinum Cimbasso:

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



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4. Verify that the Platinum Cimbasso 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 Mounting the Platinum Cimbasso

Mount the Platinum Cimbasso as follows:

L-Shape models:

- Narrow backside mounting with four M4 screws
- Wide side mounting with four M4 screws (recommended)

Fan+Fins models:

- Narrow backside mounting with three M4 screws

6.2.1 Mounting the L-shaped Platinum Cimbasso

The Platinum Cimbasso mounting dimensional guidelines are shown in Figure 37.

To mount the L-shape Platinum Cimbasso:

- For the narrow backside mounting of the Platinum Cimbasso, use two, three, or four M4 screws, as shown in Figure 1 below,
- For wide side mounting of the Platinum Cimbasso, use four M4 screws, as shown in Figure 1 below. This is the recommended way to mount the L-shaped Platinum Cimbasso.

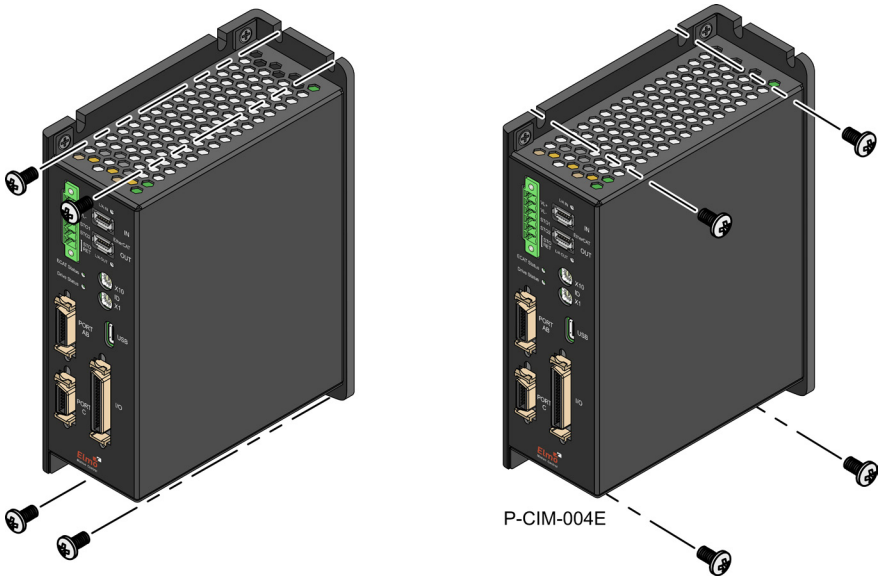


Figure 1: Narrow Back-Side and Wide-Side Mounting of an L-shape Platinum Cimbasso

6.2.2 Mounting the Fins+Fan Platinum Cimbasso

The Platinum Cimbasso mounting dimensional guidelines are shown in Figure 38.

To mount the Fins+Fan Platinum Cimbasso:

- For the narrow back-side mounting of the Fins+Fan Platinum Cimbasso, use three M4 screws, as shown in the following figure:

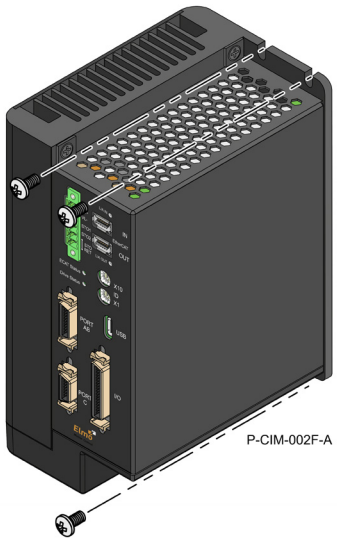


Figure 2: Narrow back-side mounting of Fins+Fan Platinum Cimbasso

Chapter 7: Connectors and Pinouts

7.1 Connectors

The Platinum Cimbasso has nine on-board connectors.

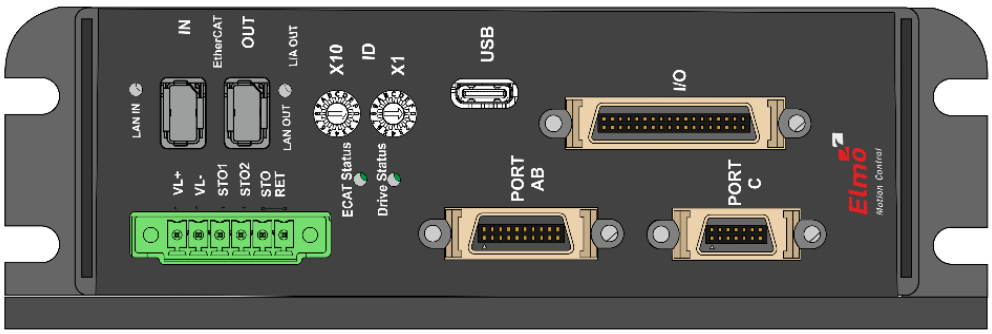
Connector	No. Pins	Type	Function
Power			
Motor Power Connector	4	Phoenix 7.62mm pitch	Motor Phases
Main Power Connector	3	Phoenix 7.62mm pitch	Power
Other			
VL and STO	6	Phoenix 3.5mm pitch	Control Power, STO Input
Port AB	20	MDR 1.27mm pitch	Feedback Port A/B
Port C	14	MDR 1.27mm pitch	Feedback Port C
Port I/O	36	MDR 1.27mm pitch	I/O
USB	24	USB Type C	USB
EtherCAT			
EtherCAT IN	10	Hirose IX 0.5 mm pitch	EtherCAT Input
EtherCAT OUT	10	Hirose IX 0.5 mm pitch	EtherCAT Output

7.2 Mating Connectors

Connector	No. Pins	Type
Motor Power		
Motor Power Connector	4	Phoenix 7.62 mm pitch terminal 4-pin plug PN 1777749
Main Power Connector	3	Phoenix 7.62 mm pitch terminal 3-pin plug PN 1777736
Other		
VL and STO	6	Phoenix 3.5 mm pitch terminal 6-pin plug PN 1966130
Port AB	20	SUNCHU 1.27 mm pitch 20 pin PN SC-20-3 (Screw Locked)
Port C	14	SUNCHU 1.27 mm pitch 14 pin PN SC-14-3 (Screw Locked)
Port I/O	36	SUNCHU 1.27 mm pitch 36 pin PN SC-36-3 (Screw Locked)
USB	24	A standard USB Type C Mating DATA-Cable
EtherCAT		
EtherCAT IN	10	Hirose 0.5 mm pitch 10-pin PN IX30G-A-10s-cv (7.0)
EtherCAT OUT	10	Hirose 0.5 mm pitch 10-pin PN IX30G-A-10s-cv (7.0)

7.3 Connector Locations

The Platinum Cimbasso connector locations are shown in the following drawings.



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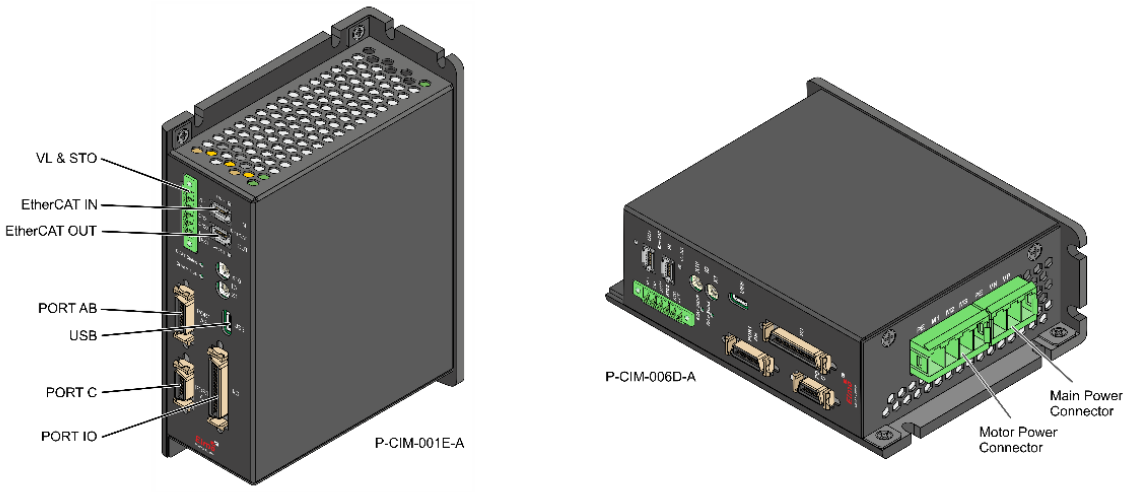

Figure 3: Platinum Cimbasso Front and Power Connectors

7.4 Motor Power Connector Pinouts

For further details, refer to Chapter 10 Input Power Supply in the Platinum Safety Drive Manual.

Pin Name	Function	Cable	Function	Cable
	Brushless Motor		**Brushed DC Motor**	
M3	Motor Phase 3	Motor Cable	Motor Phase 1	Motor Cable
M2	Motor Phase 2	Motor Cable	Motor Phase 2	Motor Cable
M1	Motor Phase 1	Motor Cable	Reserved	Reserved
PE	Protective Earth	Motor Cable	Protective Earth	Motor Cable
Pin Positions				

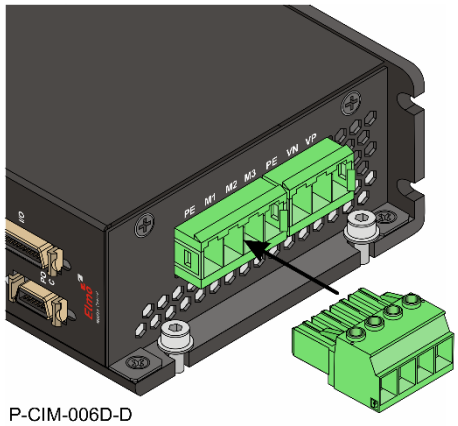

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Table 3: Motor Connections

7.5 Main Power Connector Pinouts

Pin Name	Function	Cable
VP	Supply, Power Positive	DC Power
VN	Supply, Power Negative	DC Power
PE	Protective Earth	DC Power
Pin Positions		

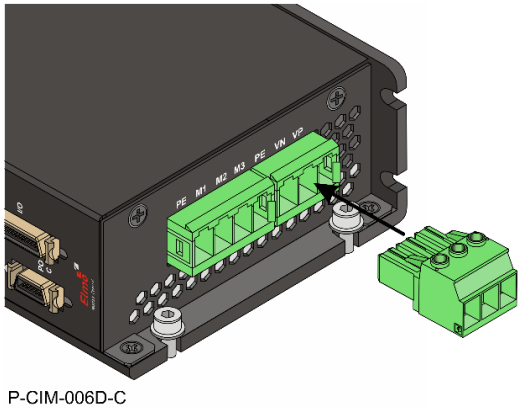

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Table 4: Main Power Connections

7.6 VL and STO Connector Pinouts

7.6.1 VL Pinouts

Pin #	Signal	Function
1	VL+	Control Supply Positive
2	VL-	Control Supply Return

Table 5: VL Pinouts

7.6.2 STO (Safe Torque Off) Pinouts

For further details, refer to the Chapter 12 STO in the MAN-P Safety Drive Manual.

Pin #	Signal	Function
3	STO1	STO 1 Input, Isolated
4	STO2	STO 2 Input, Isolated
5, 6	STO RET	STO Return

Table 6: STO Input Pin Assignments

7.6.3 VL and STO Pin Positions

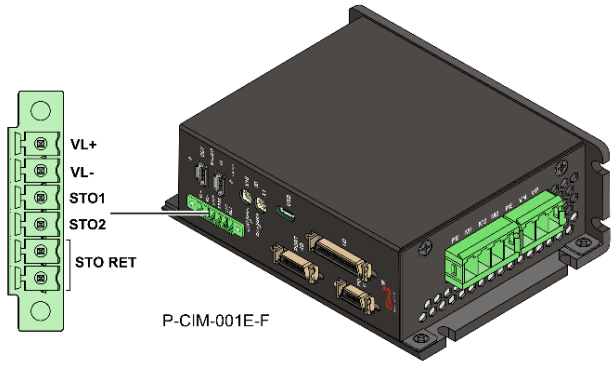
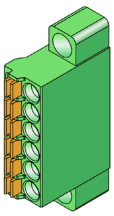
Pin Positions	Connector
	 P-CIM-005A-E

Table 7: VL and STO Pin Positions

7.7 Drive Status Indicator

Figure 4 shows the position of the red/green dual LED, which is used for immediate indication of the current states of the drive.

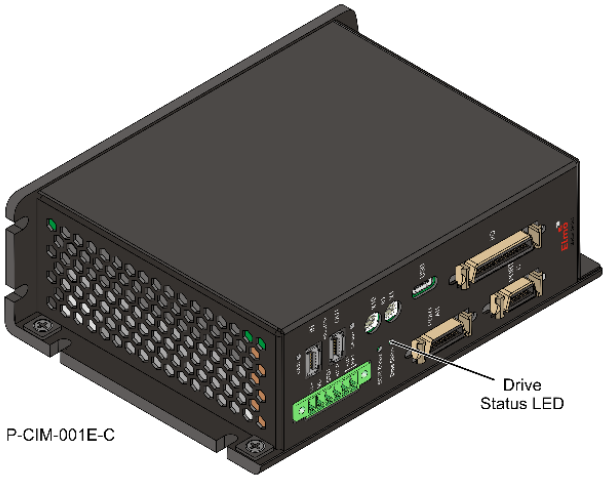


Figure 4: Drive Status Indicator

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	Drive 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 OR Flashing: Red 600, Green 200	Flashing RED/GREEN during burn Slow flashing RED/GREEN indicates stages of Firmware burn-in or validation Frequency depends on the stage of burning/validation and the CPLD/FPGA that is been burned

7.8 Port AB Pinouts

For full details, refer to Chapter 13 Feedback in the Platinum Safety Drive Manual.

7.8.1 Port A

			Incremental Encoder	Absolute Serial Encoder
Pin#		Signal	Function	Function
3A	3	PORTA_A+/ CLK+	Channel A +	Absolute encoder clock+
4A	4	PORTA_A-/ CLK-	Channel A -	Absolute encoder clock-
5A	5	PORTA_B+/DATA+	Channel B +	Absolute encoder data +
6A	6	PORTA_B-/ DATA-	Channel B -	Absolute encoder data -
7A	7	PORTA_Index+	Channel Index+	
8A	8	PORTA_Index-	Channel Index-	

Table 8: Port A Pin Assignments

7.8.2 Port B

			Incremental Encoder	Interpolated Analog Encoder	Resolver
Pin#		Signal	Function	Function	Function
3B	13	PORTB_A+ /SIN+	Channel A+	Sine+	Sine+
4B	14	PORTB A- /SIN-	Channel A-	Sine-	Sine-
5B	15	PORTB_B+ /COS+	Channel B+	Cosine+	Cosine+
6B	16	PORTB B- /COS-	Channel B-	Cosine-	Cosine-
7B	17	PORTB_Index+	Channel Index+	Analog Index+	RESOLVER_OUT+
8B	18	PORTB_Index-	Channel Index-	Analog Index-	RESOLVER_OUT-

Table 9: Port B Pin Assignments

7.8.3 Hall Sensors

Pin #		Signal	Function
9A	9	HA	Hall sensor A
10A	10	HC	Hall sensor C
9B	19	HB	Hall sensor B

Table 10: Hall Sensors

7.8.4 Power Pins

Pin #		Signal	Function
1A	1	+11V	+11V supply output
2A	2	COMRET	Common return
1B	11	+5V	+5V supply output
2B	12	COMRET	Common return
10B	20	COMRET	Common return

Table 11: Power Pins

7.8.5 Pin Positions

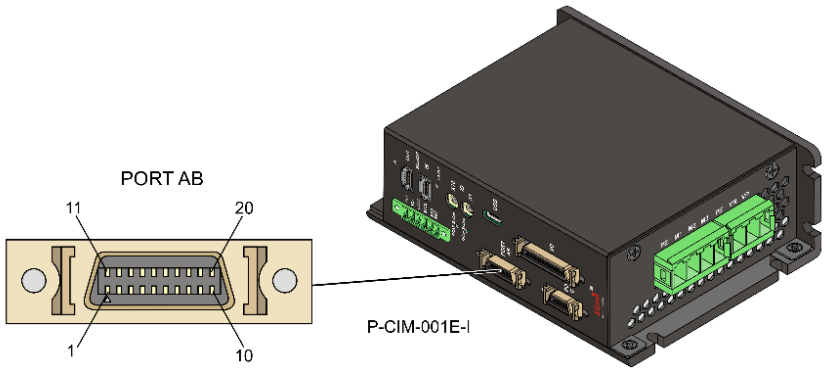
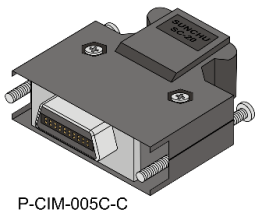
Pin Positions	Cable Connector
	

Table 12: Port AB Pin Positions

7.9 Port C Pinouts

For full details, refer to section 13.2.6 Port C Encoder in the Platinum Safety Drive Manual.

7.9.1 Port C

			Incremental Encoder	Absolute Serial Encoder	Two Wire Encoder
Pin#		**Signal**	**Function**		
4A	4	PORTC_DATA+	Reserved	Reserved	Encoder Data DSL+/ S2W+
5A	5	PORTC_DATA-	Reserved	Reserved	Encoder Data DSL-/ S2W-
1B	8	PORTC_A+	Channel A +	Clock+	Reserved
2B	9	PORTC_A-	Channel A -	Clock-	Reserved
3B	10	PORTC_B+	Channel B +	Data +	Reserved
4B	11	PORTC _B-	Channel B -	Data -	Reserved
5B	12	PORTC_INDEX+	Index+	Reserved	Reserved
6B	13	PORTC_INDEX-	Index-	Reserved	Reserved

Table 13 Port C Pin Assignments

7.9.2 Power Pins

Pin #		Signal	Function
1A	1	COMRET	Common return
2A	2	+5V	+5V supply output
3A	3	+11V	+11V supply output
6A	6	COMRET	Common Return
7A	7	COMRET	Common Return
7B	14	COMRET	Common Return

Table 14: Power Pins

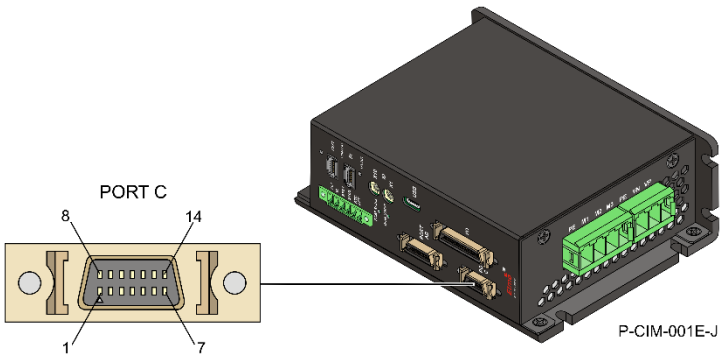
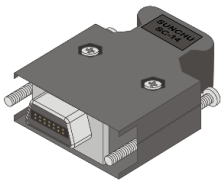
Pin Positions	Cable Connector
	

Table 15: Port C Pin Positions

7.10 Digital I/Os with Safe IO, and Analog Inputs Connector Pinouts

The Safe Digital I/Os and Analog Inputs connector includes the following functions:

- **I/O:** Refer to Chapter 14 Safe Digital IO in the **Platinum Safety Drive Manual** for full details.
- **Analog input:** Refer to chapter 14, Analog Input section, in the Platinum Safety Drive Manual for full details.

Pin		Signal	Function
1A	1	VDD 24V	VDD 24V Supply input
2A	2	VDDRET	VDD Return
3A	3	VDD 24V	VDD 24V Supply input
4A	4	VDDRET	VDD Return
5A	5	OUT7	Digital Output 7 (Safe Brake)
6A	6	OUT7	Digital Output 7 (Safe Brake)
7A	7	OUT1	Digital Output 1 (isolated)
8A	8	OUT2	Digital Output 2 (isolated)
9A	9	ANALOG1-	Analog Input 1 negative
10A	10	ANARET1	Analog Input 1 Return
11A	11	ANALOG1+	Analog Input 1 positive
12A	12	ANARET2	Analog Input 2 Return
13A	13	ANALOG2	Analog Input 2
14A	14	Reserved	
15A	15	Reserved	
16A	16	Reserved	
17A	17	Reserved	
18A	18	Reserved	
1B	19	VDDRET	VDD Return
2B	20	VDD 48V	VDD 48V Supply input
3B	21	VDDRET	VDD Return
4B	22	VDD 48V	VDD 48V Supply input
5B	23	OUT8	Digital Output 8 (Safe Brake)
6B	24	OUT8	Digital Output 8 (Safe Brake)
7B	25	OUT4	Digital Output 4 (isolated)

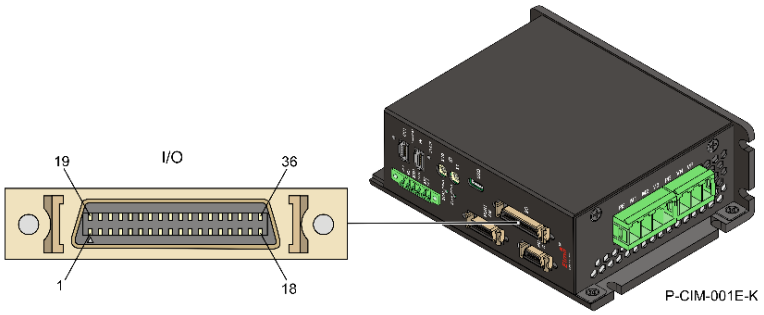
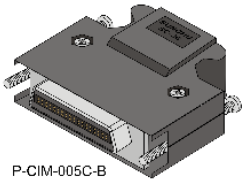
Pin		Signal	Function
8B	26	OUT3	Digital Output 3 (isolated)
9B	27	IN4	Digital Input 4 (isolated)
10B	28	IN3	Digital Input 3 (isolated)
11B	29	IN2	Digital Input 2 (isolated)
12B	30	IN1	Digital Input 1 (isolated)
13B	31	VDDRET	VDD Return
14B	32	Reserved	
15B	33	Reserved	
16B	34	Reserved	
17B	35	Reserved	
18B	36	Reserved	
Pin Positions			**Connector**
			

Table 16: I/O and Analog Connector Pinouts

7.11 USB 2.0 Connector Type C Pinouts

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

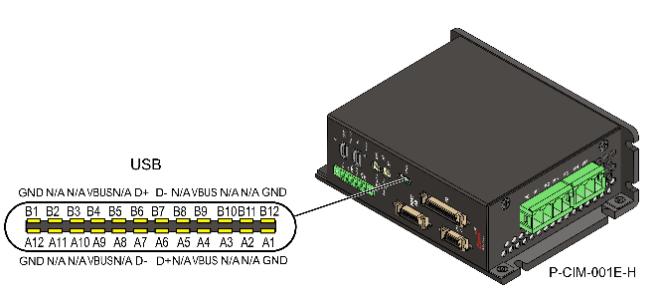
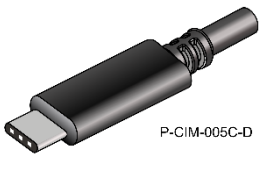
Pin #	Signal	Function
A1	COMRET	Common Return
A2	Reserved	
A3	Reserved	
A4	USB_VBUS	USB VBUS 5 V detection
A5	Reserved	
A6	USBD+	USB _P line
A7	USBD-	USB _N line
A8	Reserved	
A9	USB_VBUS	USB VBUS 5 V detection
A10	Reserved	
A11	Reserved	
A12	COMRET	Common Return
B1	COMRET	Common Return
B2	Reserved	
B3	Reserved	
B4	USB_VBUS	USB VBUS 5 V detection
B5	Reserved	
B6	USBD+	USB _P line
B7	USBD-	USB _N line
B8	Reserved	
B9	USB_VBUS	USB VBUS 5 V detection
B10	Reserved	
B11	Reserved	
B12	COMRET	Common Return
Metal body	SHLD	Shield
Pin Positions		**Connector**
		

Table 17: USB Device Type C Pin Assignments

7.12 EtherCAT Connector Pinouts

Fieldbus communications are industrial network protocols for real-time distributed control. The Platinum Cimbasso supports EtherCAT fieldbus type industrial network protocol.

7.12.1 EtherCAT IN Connector Pinouts

Fieldbus Type	Product Number
EtherCAT	PCIM-zz-RXX/YYYFzzQ

Refer to section 17.2 EtherCAT/Ethernet in the Platinum Safety Drive Manual for full details.

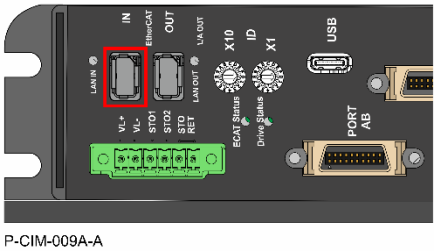
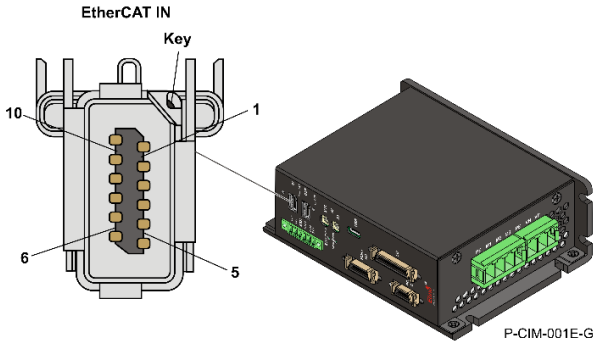
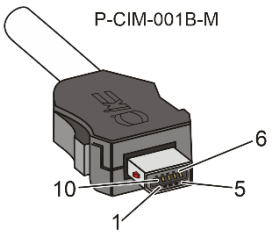
Pin#	Signal	Function
1	ECAT_IN_TX+	EtherCAT IN Transmit +
2	ECAT_IN_TX-	EtherCAT IN Transmit -
3	Reserved	
4	Reserved	
5	Reserved	
6	ECAT_IN_RX+	EtherCAT IN Receive +
7	ECAT_IN_RX-	EtherCAT IN Receive -
8	Reserved	
9	Reserved	
10	Reserved	
Body	SHIELD	Shield/PE
Pin Positions		**Connector**
 P-CIM-009A-A  P-CIM-001E-G	 **IX Industrial**

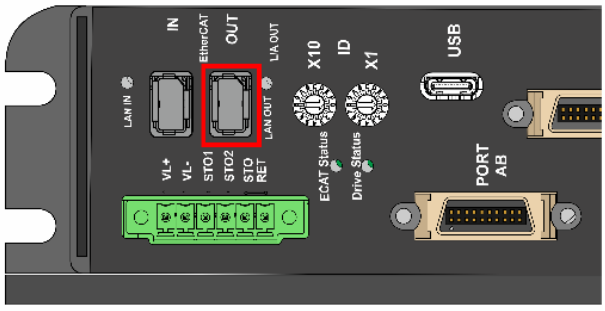
Table 18: EtherCAT IN Pin Assignments

7.12.2 EtherCAT OUT Connector Pinouts

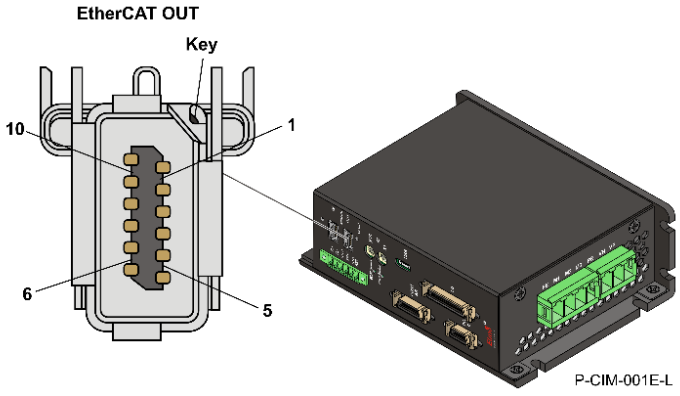
Refer to section 17.2 EtherCAT/Ethernet in the Platinum Safety Drive Manual for full details.

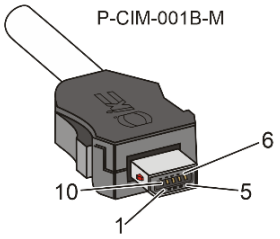
Fieldbus Type	Product Number
EtherCAT	PCIM-zz-RXX/YYYFzzQ

Pin#	Signal	Function
1	ECAT_OUT_TX+	EtherCAT OUT Transmit +
2	ECAT_OUT_TX-	EtherCAT OUT Transmit -
3	Reserved	
4	Reserved	
5	Reserved	
6	ECAT_ OUT _RX+	EtherCAT OUT Receive +
7	ECAT_ OUT _RX-	EtherCAT OUT Receive -
8	Reserved	
9	Reserved	
10	Reserved	
Body	SHIELD	Shield/PE
Pin Positions		**Connector**



P-CIM-009A-B





IX Industrial

Table 19: EtherCAT OUT Pin Assignments

7.12.3 Connecting Mating Cables to EtherCAT IN and EtherCAT OUT Connectors

Proper connecting of the mating EtherCAT cables to the Platinum Cimbasso connector is shown in the following drawing.

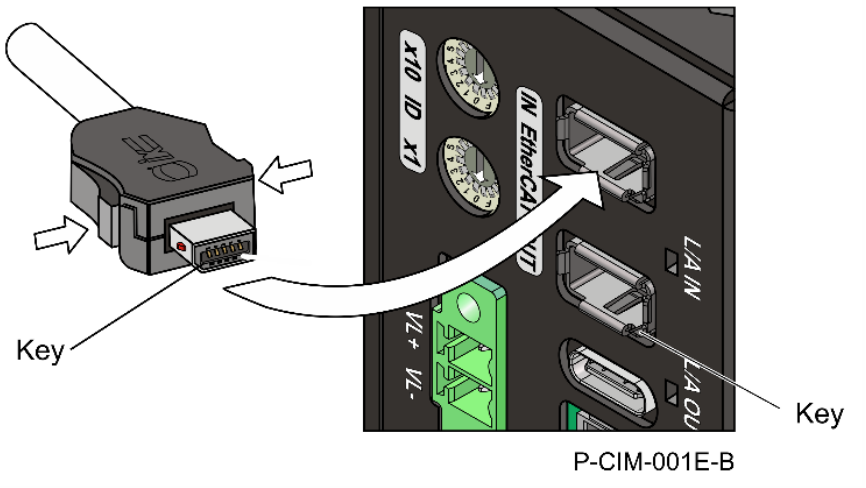


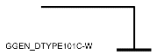
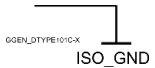
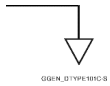
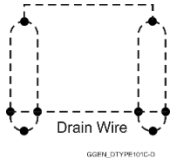
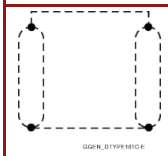
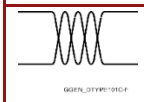
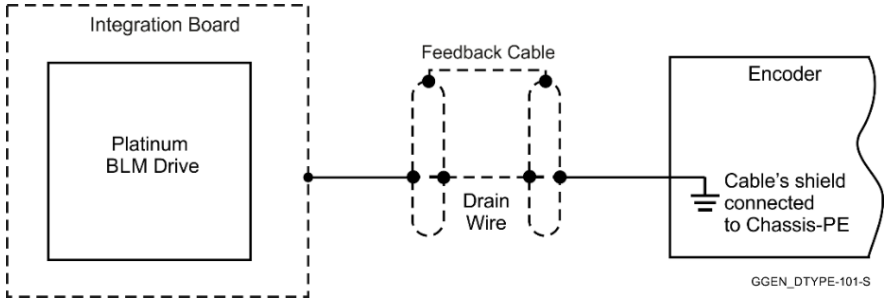
Figure 5: Connecting EtherCAT Mating Connectors to Platinum Cimbasso

Chapter 8: *Wiring*

8.1 Wiring Legend

Once the product is mounted, you are ready to wire the device. Proper wiring, grounding, and shielding are essential for ensuring safe, immune and optimal servo performance of the drive.

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 Cimbasso Connections Diagram

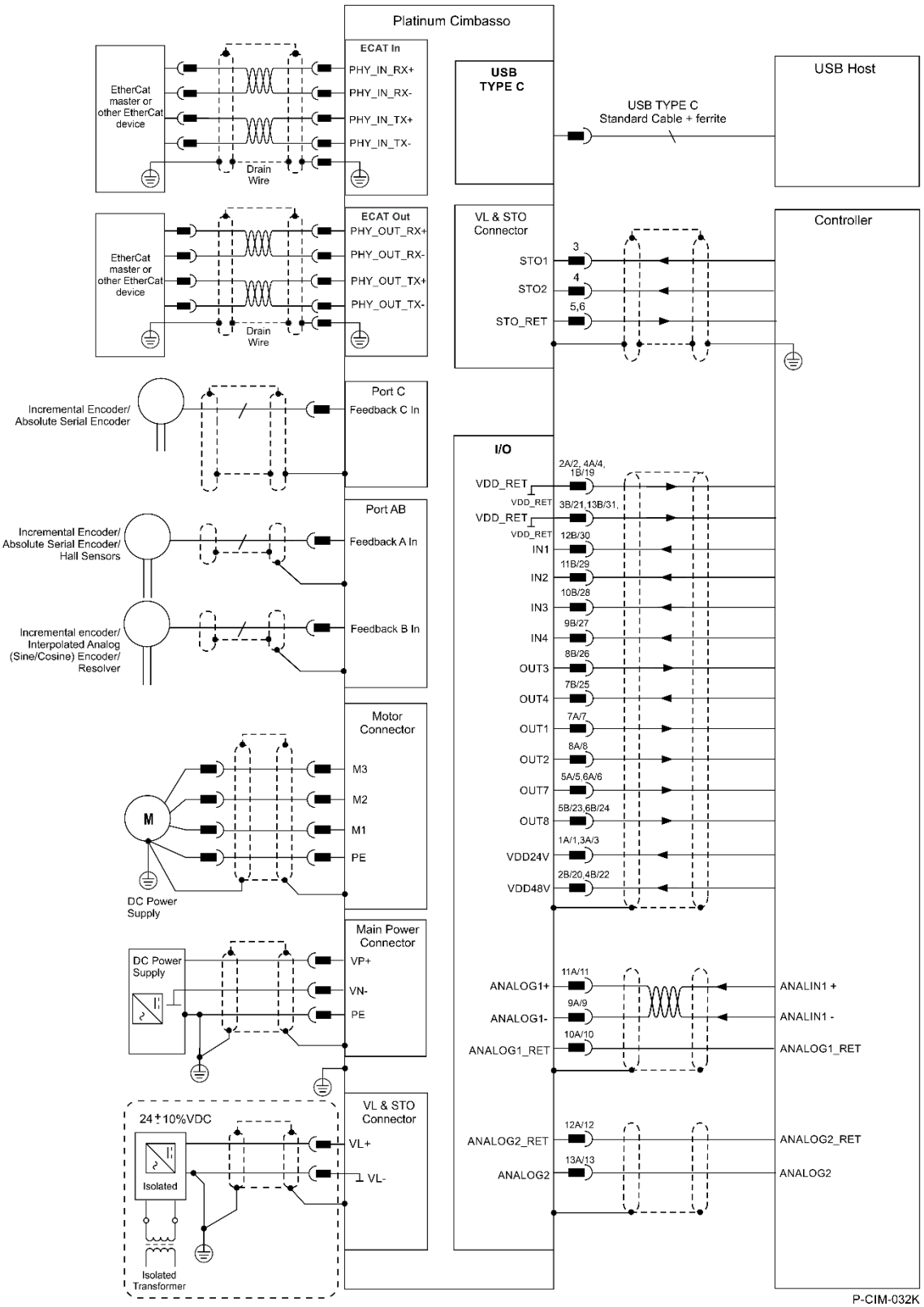


Figure 6: The Platinum Cimbasso with Safe IO, General Connection Diagram – EtherCAT

8.3 Motor Power

When connecting several drives to several similar motors, all should be wired in an identical manner. This will enable the same settings to run on all drives.

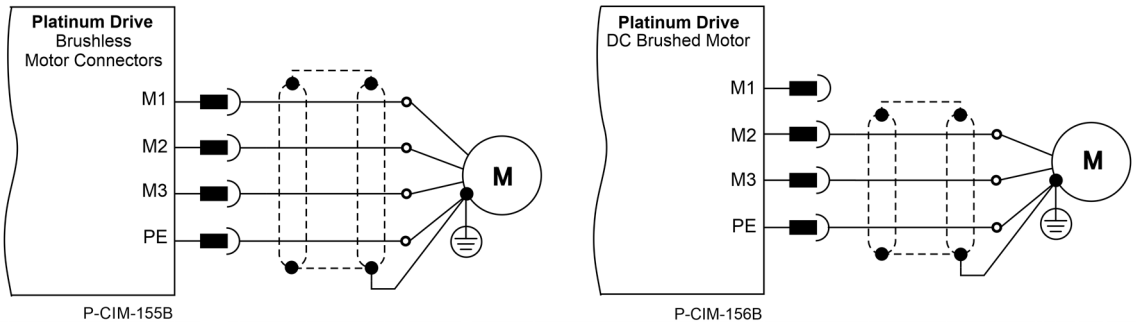


Figure 7: Brushless and DC Brushed Motor Power Connection Diagrams

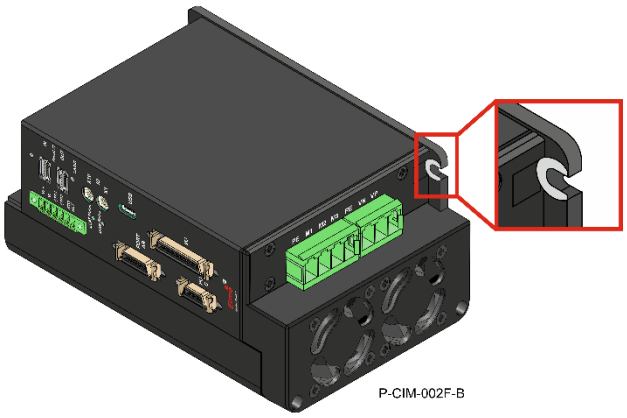
To connect the motor power:

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 Cimbasso.

   Make sure not to bundle the wires.

   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 (wall mounting holes as shown in drawing at side).



8.4 Main and Control Power Supplies

The Platinum Cimbasso receives power from Main and Control supplies and delivers power to the motor.

8.4.1 Main Supply

The DC power for the Platinum Cimbasso is delivered from a separated rectifying unit (supplied by the user). Elmo recommends using the Tambourine rectifier specifically designed for use with Elmo drives which offers a range of versatile options.

The following sections contain topology recommendations for implementing three-phase supply chain.

The power stage of the Platinum Cimbasso is fully isolated from the other sections of the Platinum Cimbasso, such as the control-stage and the heat sink. **This isolation allows the user to connect the common of the control section to the PE, a connection that significantly contributes to proper functionality, safety, and EMI immunity, leading to better performance of the Platinum Cimbasso**.

In addition, this isolation simplifies the requirements of the DC power supply that is used to power the DC bus of the Platinum Cimbasso, by allowing it to operate with a non-isolated DC power source (a direct-to-mains connection) which eliminates the need for a bulky and expensive isolation transformer.

However, as well as operating from a non-isolated/direct-to-mains DC power supply, the Platinum Cimbasso can also operate from an isolated power supply or batteries.

When rectifying the AC voltage source, the AC voltage-level must be limited as follows:

Drive Model (V)	AC voltage-level limit (VAC)	DC Maximum (VDC)
800	528	747

8.4.2 Direct-to-Mains Power Source

This section relates to the configuration of the drive, which is connected directly to the mains.

To connect the non-isolated DC power supply:

1. For best immunity, it is highly recommended to use twisted cables for the DC power supply cable. A 3-wire shielded cable should be used. The gauge is determined by the actual current consumption of the motor.
2. Connect both ends of the cable shield to the closest ground connection, one end near the power supply and the other end to the PE terminal on the Platinum Cimbasso's heat sink.
   Do not connect the VN of the power supply to the ground connection in the power supply side. This connection is only for isolated connections.
3. Connect the appropriate terminal lugs from the DC Power Input cables to the VP, VN, and PE terminals on the Platinum Cimbasso.
   For safety requirements, the green/yellow wire must be connected to the earth connection (PE terminal). Connect the Earth Connection wire to the PE terminal on the main power connector.

Caution For all the following non-isolated Topologies:

Take care and note that in a direct-to-mains connection the Neutral point is *not* the most negative voltage level. It is the mid-point level of the rectified DC bus.

8.4.2.1 Three-Phase Direct-to-Mains Connection Topology

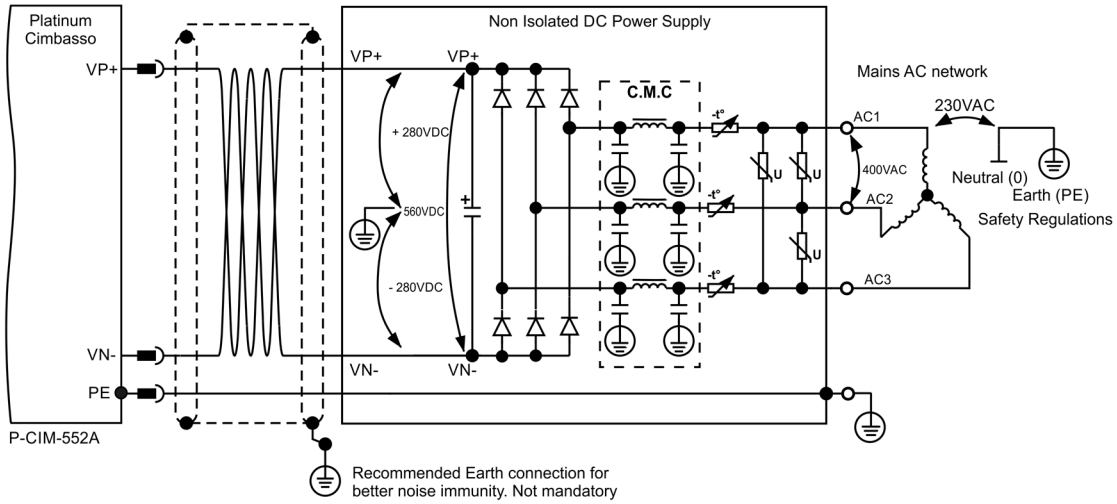


Figure 8: Non-Isolated Three-Phase Connection Topology

8.4.2.2 Single-Phase Direct-to-Mains Connection Topology

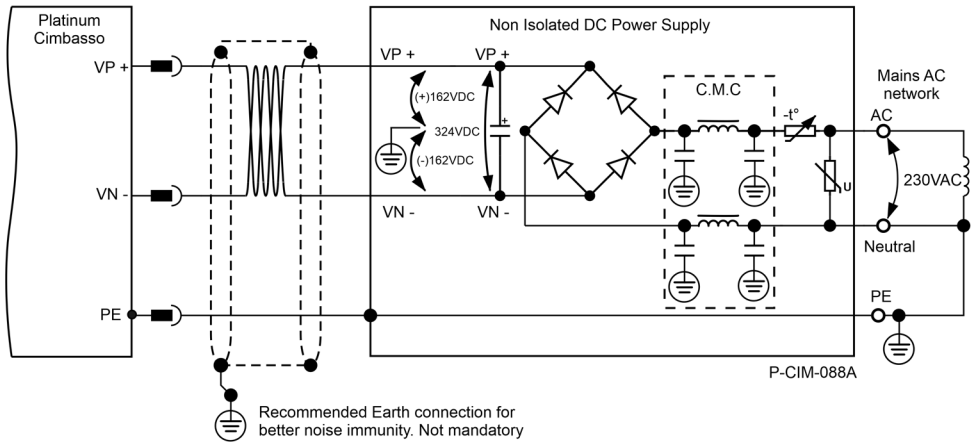


Figure 9: Non-Isolated Single-Phase Connection Topology

The Power Supply is connected directly to the mains AC line.

8.4.2.3 Multiple Connections Topology

In a multi-axis application, it is likely that a single power supply can feed several drives in parallel. The power supply is connected directly to the mains AC line which then feeds more than one drive.

This topology is efficient and cost saving, by reducing the number of power supplies and the amount of wiring. Most importantly it utilizes an energy sharing environment among all the drives that share the same DC bus network.

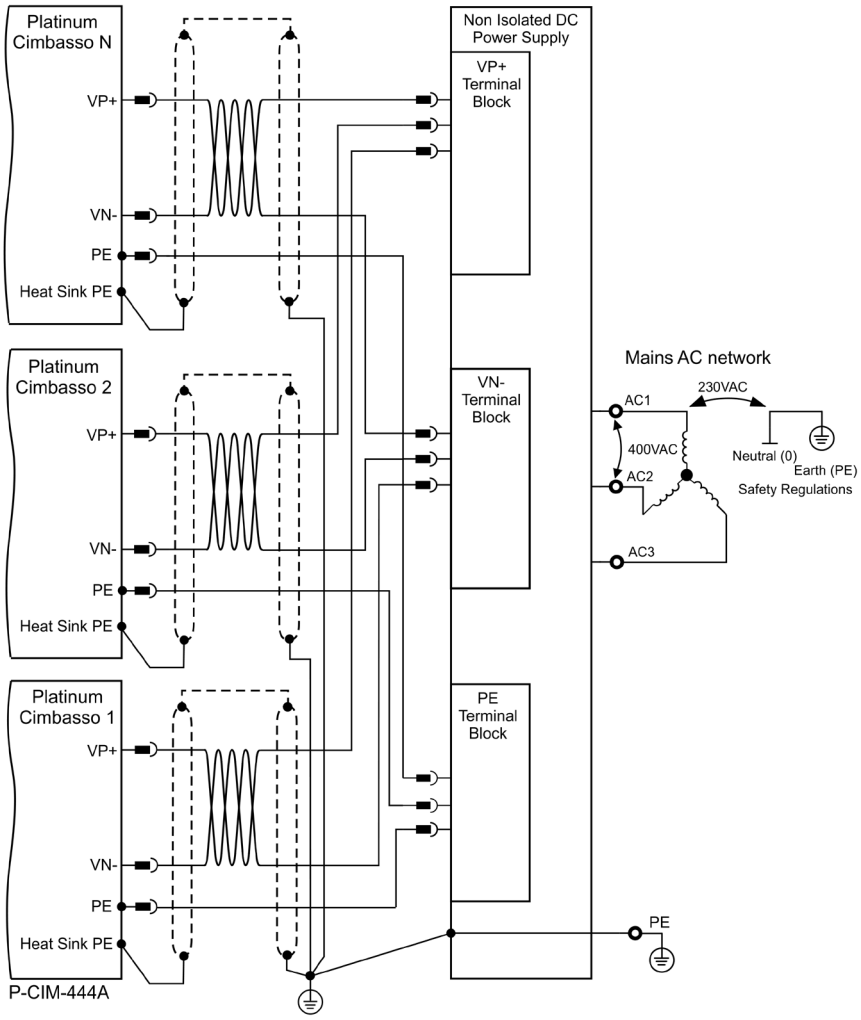


Figure 10: Non-Isolated Three-Phase Multiple Connection Topology

8.4.3 Control Supply

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

1. The source of the control supply must be isolated from the Mains.
2. For safety reasons, connect the return (common) of the control supply source to the closest earth connection near the control supply source.
3. Connect the cable shield to the closest earth connection near the control supply source.
4. Before applying power, verify the polarity of the connection.

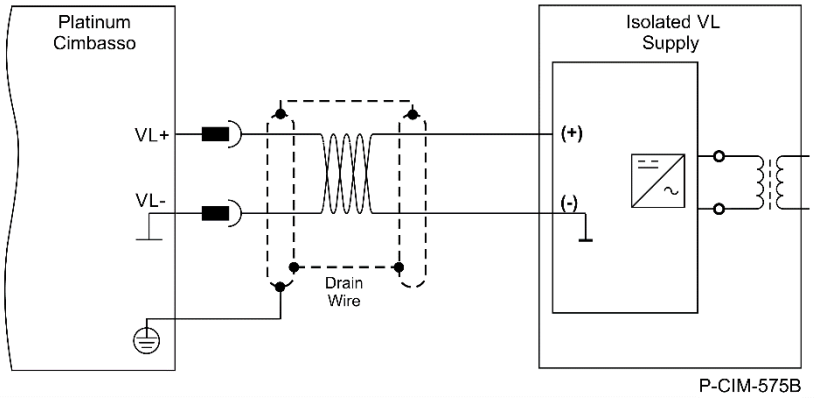


Figure 11: 24 VDC Control Supply VL Connection Diagram

8.5 STO (Safe Torque Off)

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

8.5.1 Source Mode – PLC Voltage Level

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

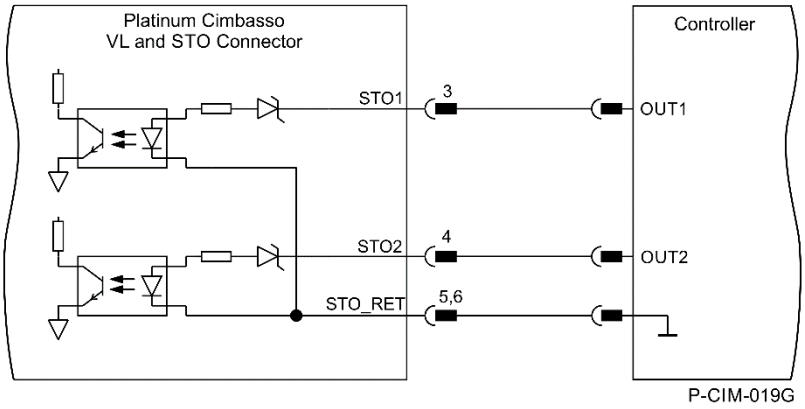


Figure 12: STO – PLC Source Option

8.6 Feedbacks

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

***Note:**

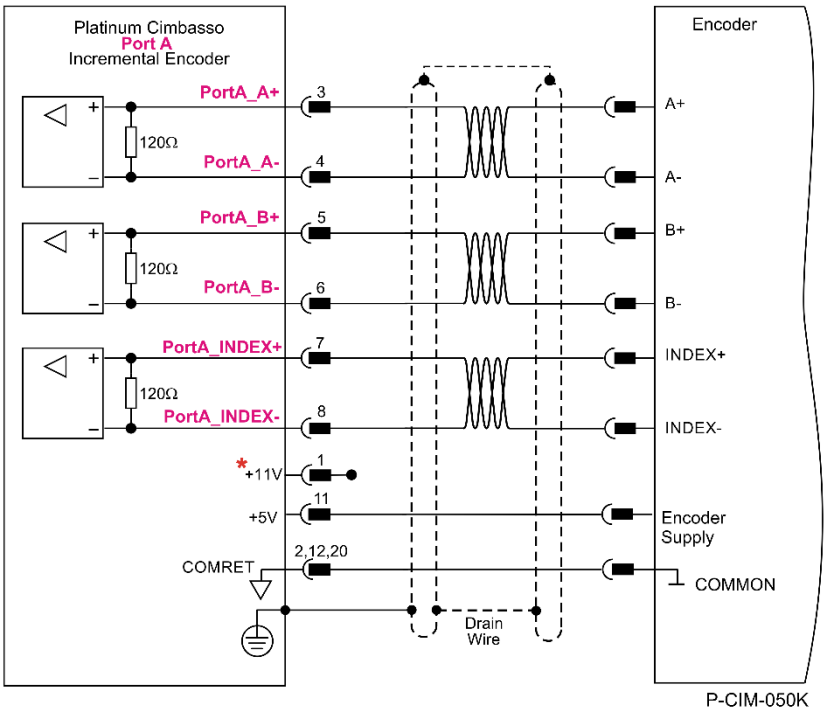
When using a 11 V power pin at the Encoder Connector, make sure that the encoder supports 11 V.

8.6.1 Feedback Port AB – Port A Section

Port A supports the following sensor inputs:

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

8.6.1.1 Incremental Encoder



***Note:** **11 V is available for supporting an 11 V encoder.**

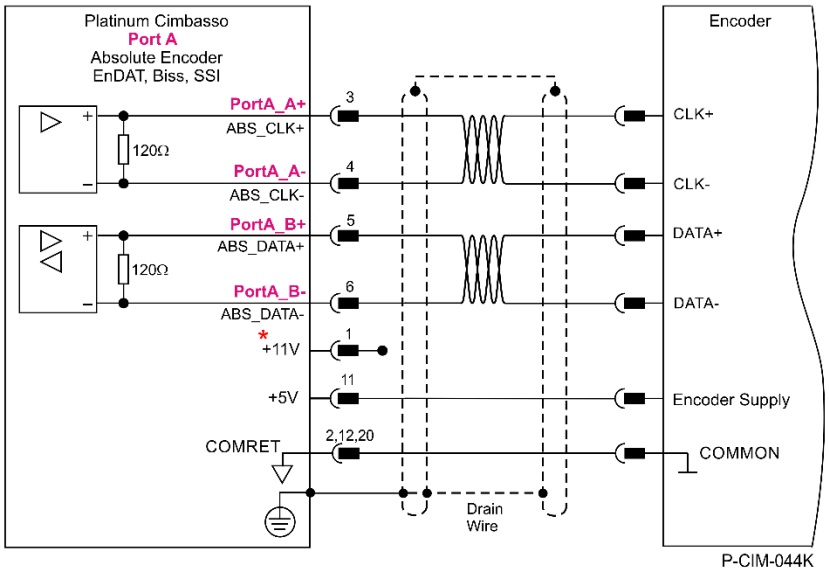
Figure 13: Port A Incremental Encoder Input – Recommended Connection Diagram

8.6.1.2 Absolute Serial Encoder

The following Absolute Encoder types are supported:

- EnDat 2.2
- BiSS C and Biss B
- SSI

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



***Note:** **11 V is available for supporting an 11 V encoder.**

Figure 14: Absolute Serial Encoder – Recommended Connection Diagram for EnDat, Biss, SSI

8.6.1.3 Hiperface

The following figure describes the connection diagram.

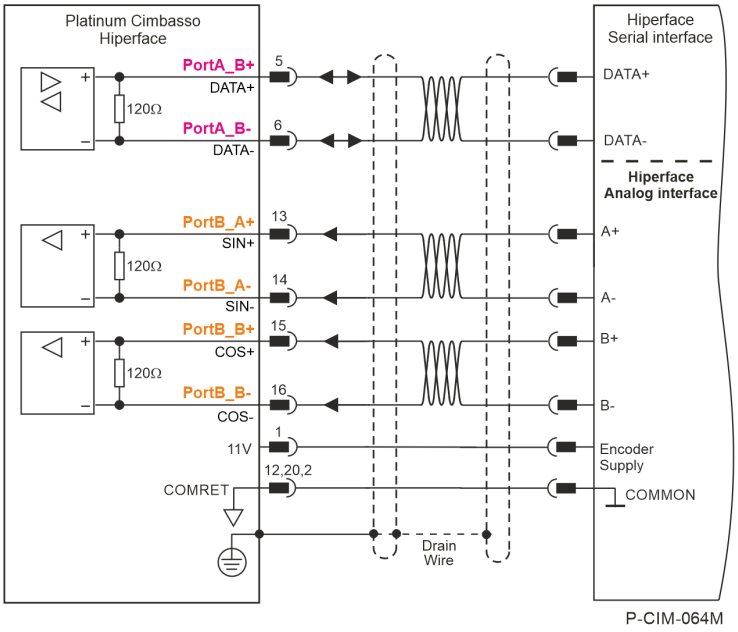


Figure 15: Absolute Serial Encoder – Recommended Connection Diagram for Stegmann Hiperface

8.6.2 Feedback Port AB – Port B Section

Port B supports any of the following sensors:

- Incremental Encoder, Interpolated Analog Encoder or Analog Hall Sensors

Or

- Resolver

Differential PWM signal input can be connected to Port B

8.6.2.1 Incremental Encoder

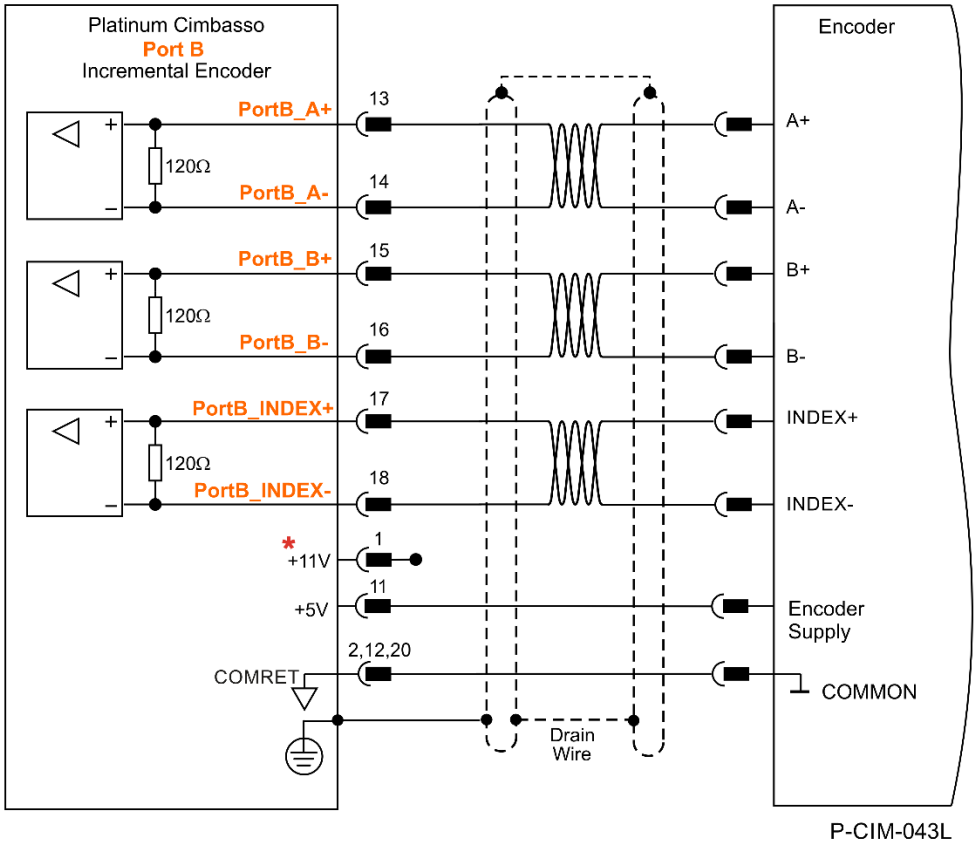


Figure 16: Port B Incremental Encoder Input – Recommended Connection Diagram

***Note: 11 V is available for supporting an 11 V encoder.**

8.6.2.2 Interpolated Analog (Sine/Cosine) Encoder

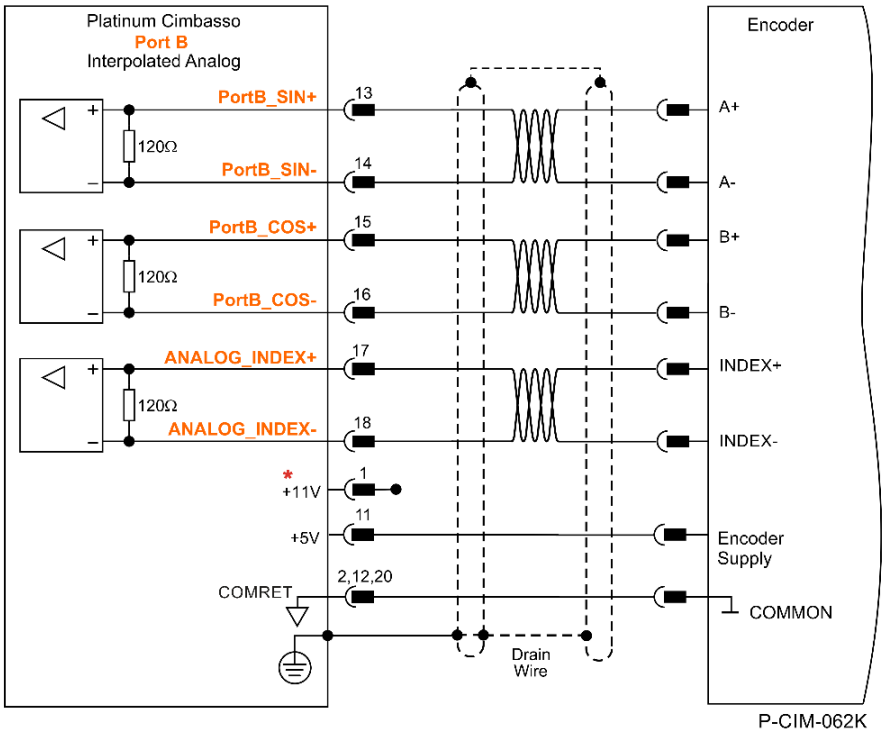


Figure 17: Port B - Interpolated Analog Encoder Connection Diagram

***Note:** **11 V is available for supporting an 11 V encoder.**

8.6.2.3 Resolver

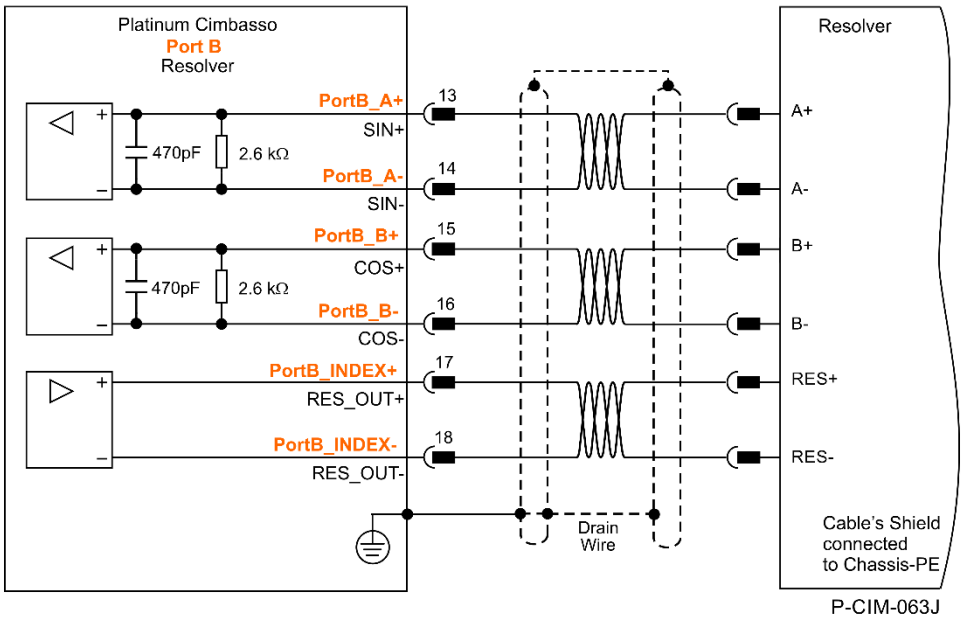


Figure 18: Port B – Resolver Connection Diagram

8.6.3 Feedback Port C

Port C provides:

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

8.6.3.1 Incremental Encoder

The following Incremental Encoder types are supported:

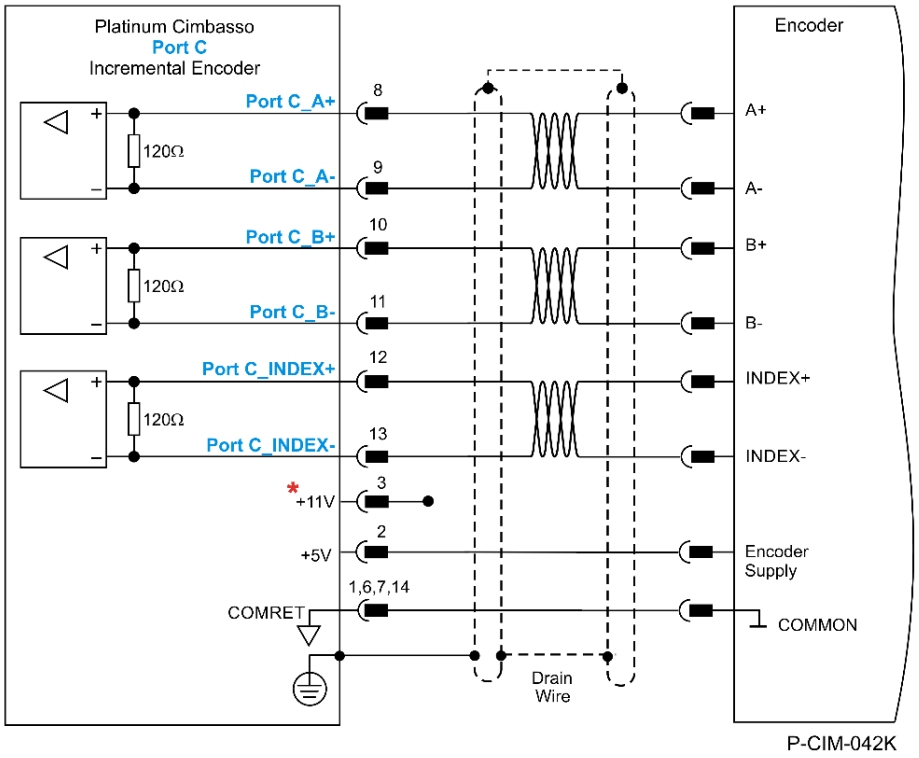


Figure 19: Port C Incremental Encoder Input – Recommended Connection Diagram

***Note:** **11 V is available for supporting an 11 V encoder.**

8.6.3.2 Absolute Serial Encoder

Port C supports three types of encoder wire connections:

- Encoder 6-Wires
- Encoder 4-Wires
- Encoder 2-Wires

8.6.3.2.1 Encoder 6-Wires

The following encoders are supported (Encoder Option E):

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

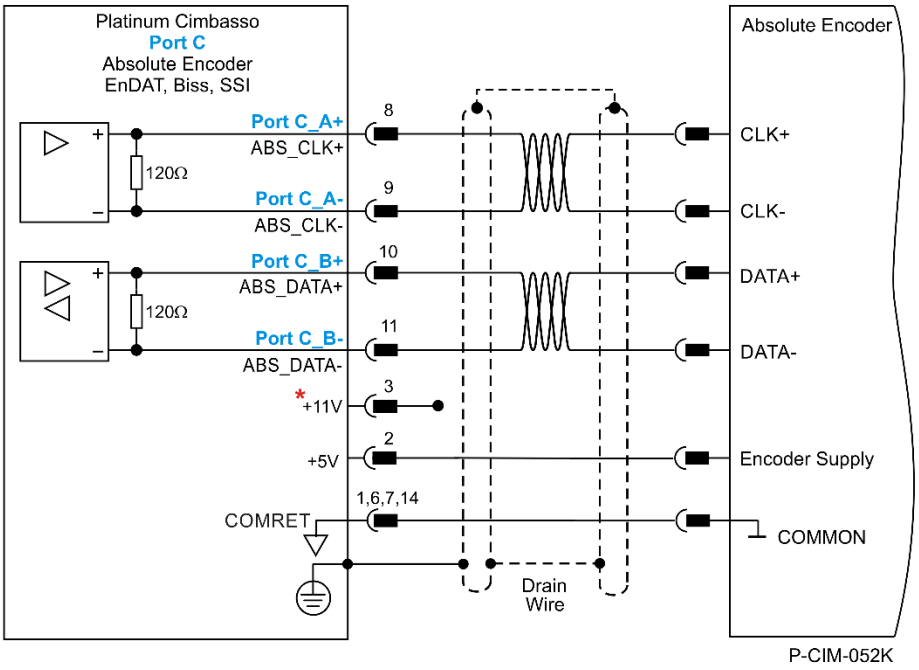


Figure 20: **Absolute Serial Encoder – 6-Wires Connection Diagram Example**

***Note:** **For Safety Capability F, 11V is available. Therefore, the encoder of 11V can be used.**

8.6.3.2.2 Encoder 4-Wires

The following encoders are supported:

- Pansonic (Encoder Option E)
- Tamagawa (Encoder Option E)
- Sanyo-Danki (Encoder Option E)
- Acuro Link (Safety Capability F and Encoder Option 1)
- SCS (Safety Capability F and Encoder Option 2)

The following is the feedback diagram connection:

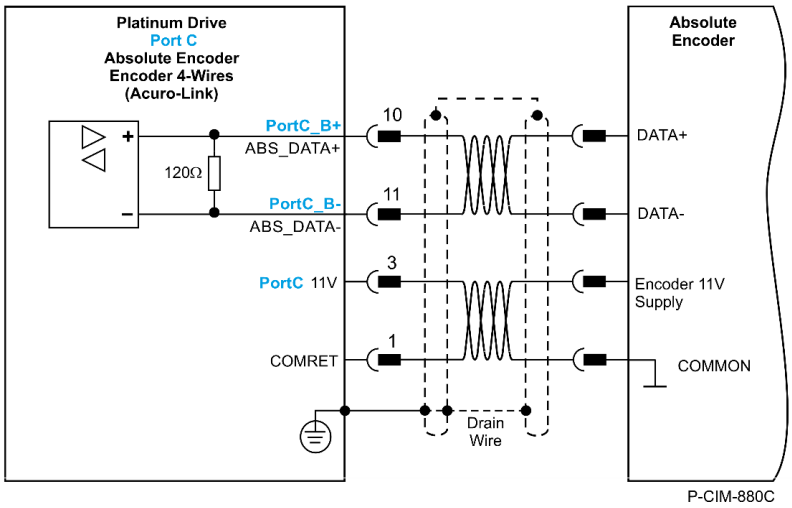


Figure 21: **Absolute Serial Encoder – 4-Wires Connection Diagram Example**

***Note:** **For Safety Capability F, 11V is available. Therefore, the encoder of 11V can be used.**

8.6.3.2.3 Encoder 2-Wires

The following encoders are supported:

- Endat3, Safe Endat3 (Safety Capability F and Encoder Option H)
- SCS Open link (Safety Capability F and Encoder Option 3)
- Hiperface DSL (Safety Capability F and Encoder Option 4)

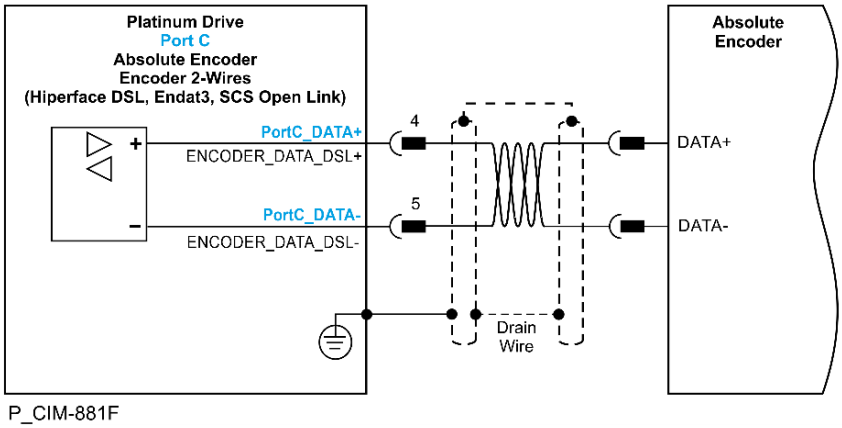


Figure 22: Absolute Serial Encoder – 2-Wires Connection Diagram Example

8.6.3.3 Emulated Encoder Output

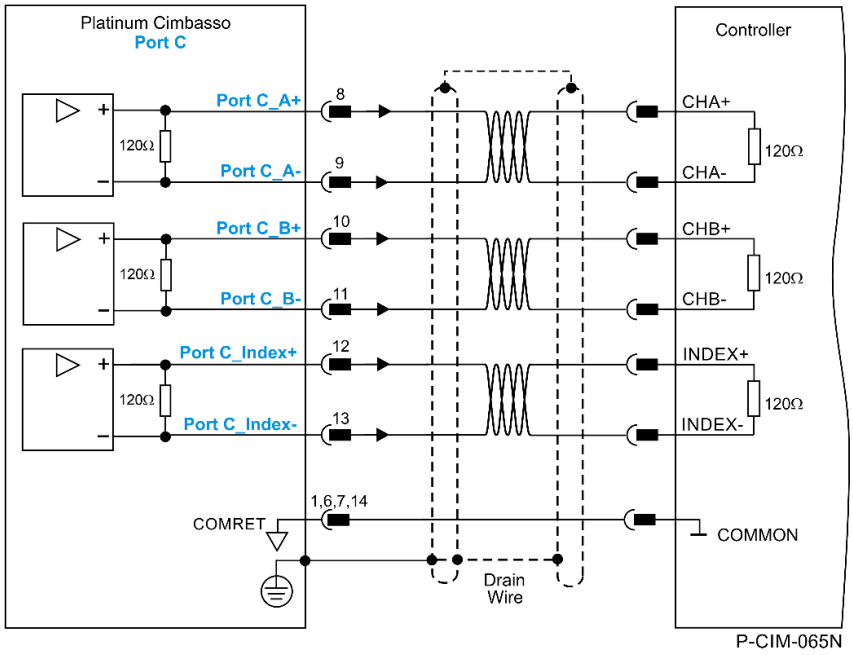


Figure 23: Emulated Encoder Differential Output – Recommended Connection Diagram

8.6.4 Feedback - Hall Sensors

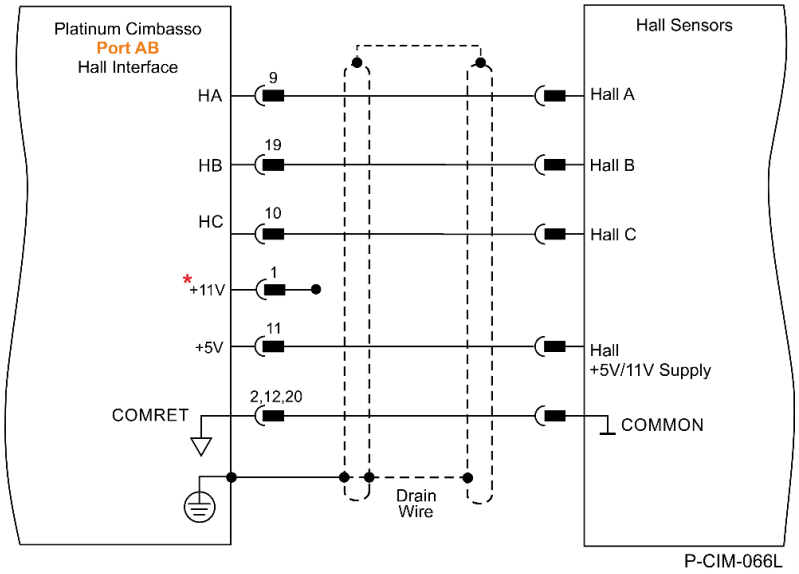


Figure 24: Hall Sensors Connection Diagram

***Note:** **11 V is available for supporting 11 V Hall sensors.**

8.7 Safe Digital I/Os (Safety Capability: F)

Refer to the Chapter 14 Safe Digital IO section, in the Platinum Safety Drive Manual for details, specification and connection of IO for Safety.

8.7.1 Digital Input with Test Pulse

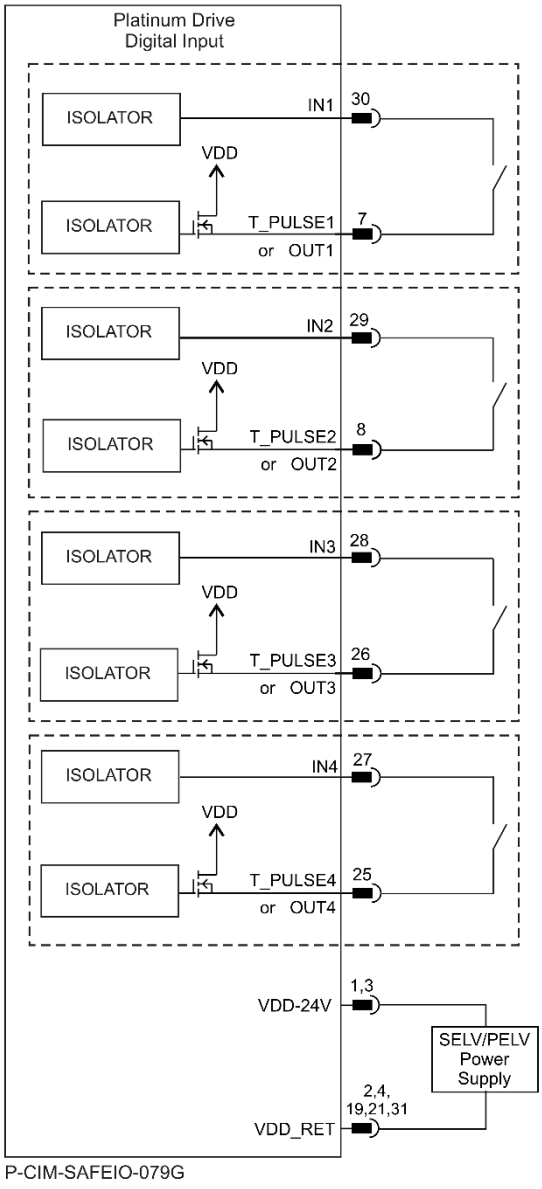


Figure 25: Digital input with Test Pulse

8.7.2 OSSD Digital Input

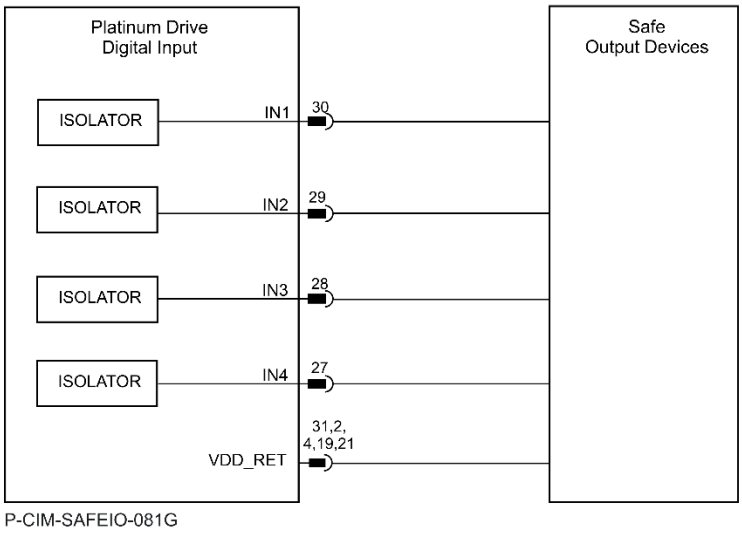


Figure 26: OSSD Digital input

8.7.3 Digital Output

The Platinum servo drive provides three configurations of the VDD connection:

- **K** — VDD=24V, All Outputs
- **L** — VDD=24V, Outputs 1,2,3,4 and VDD=48V, Outputs 7,8
- **N** — VDD=48V, Outputs 7,8

8.7.3.1 Option L Configuration VDD=24V & 48V

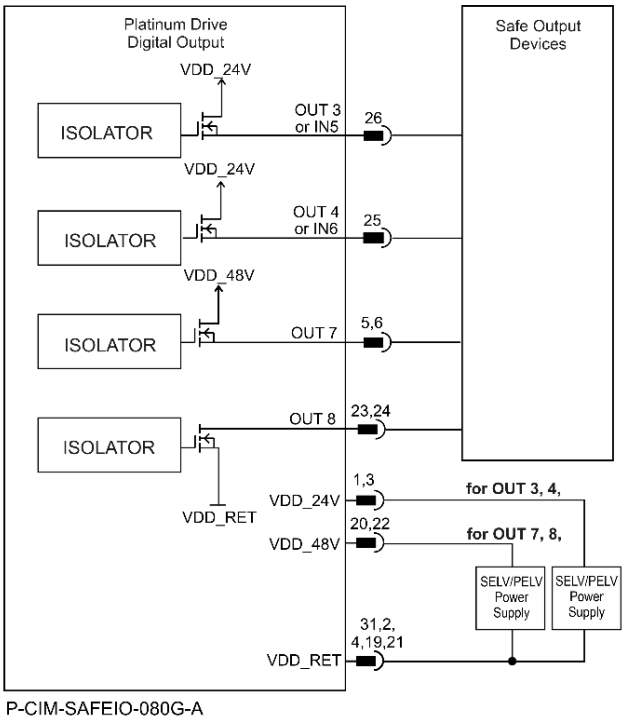


Figure 27: Safe Digital Outputs for Option L Configuration

8.7.3.2 Option K Configuration VDD=24V

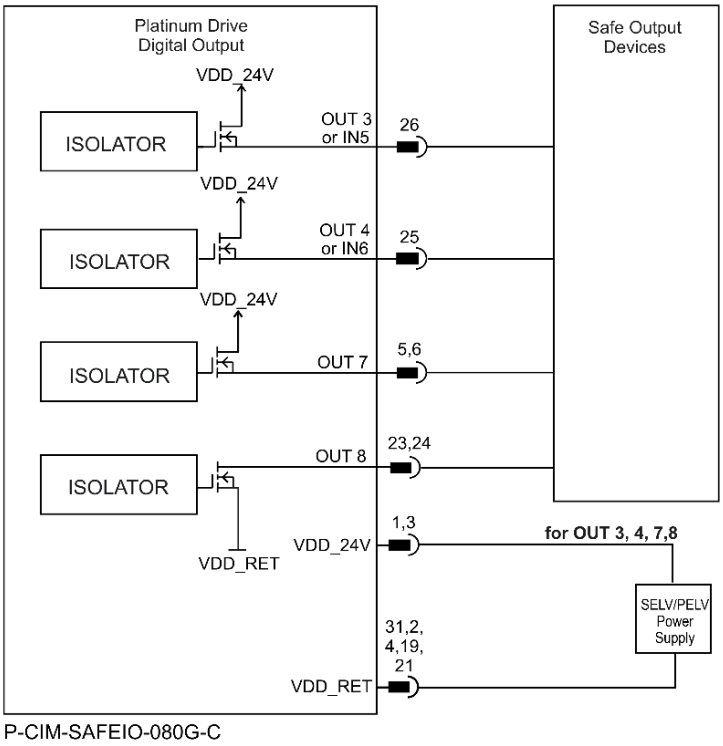


Figure 28: Safe Digital Outputs for K Option Configuration

8.7.3.3 Option N Configuration VDD=48V

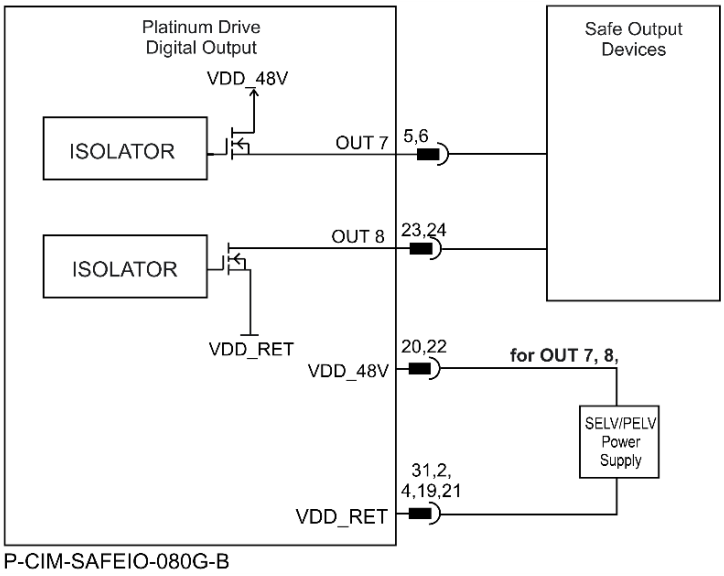


Figure 29: Safe Digital Outputs for Option N Configuration

8.8 Analog Input

There are two possible types of Analog Input in the Platinum Cimbasso:

- 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 specification details of the Analog Input.

8.8.1 Analog Input1 – Differential

The following circuit describes the internal interface of the Analog input1.

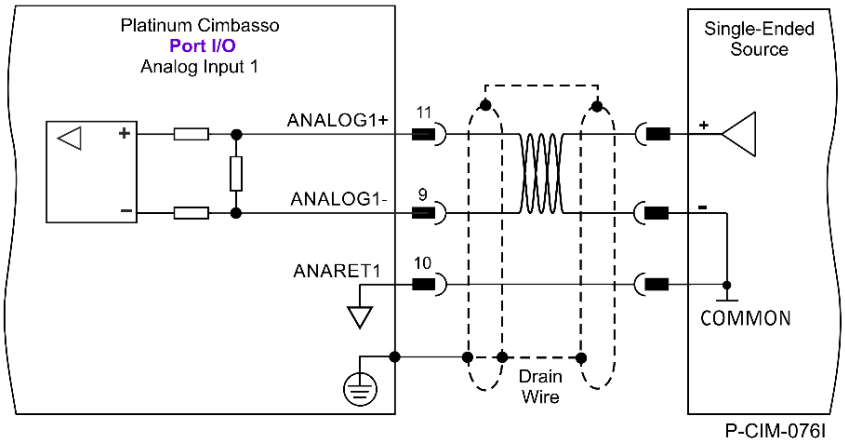


Figure 30: Differential Analog Input1 in the I/O connector

8.8.2 Analog Input2 – Single-ended

The following circuit describes the internal interface of the Analog input2.

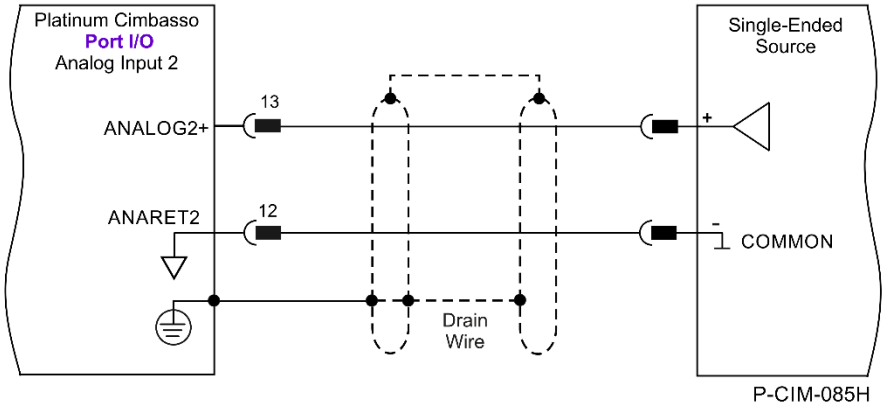


Figure 31: Single-ended Analog Input2 in the I/O connector

8.9 Communication

8.9.1 USB 2.0

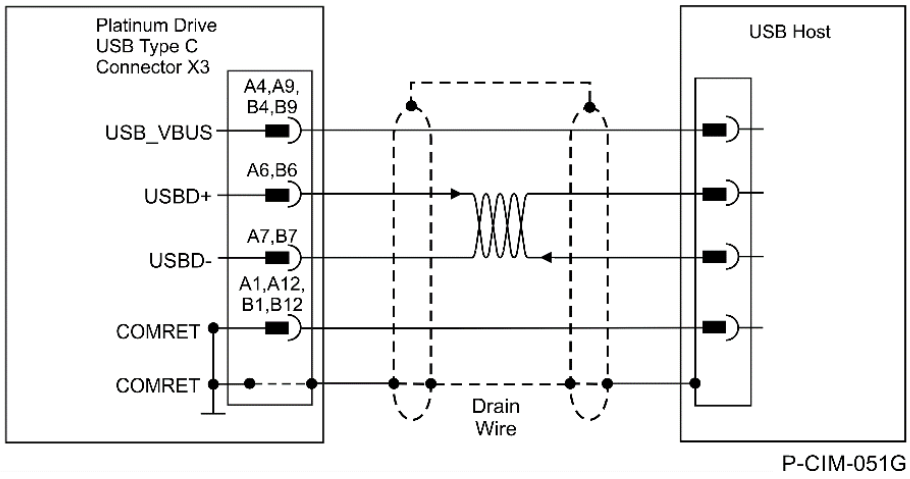


Figure 32: USB Network Diagram

***Note:** **Elmo suggests using a USB cable with integrated ferrite around it.**

8.9.2 EtherCAT/Ethernet

Note: The EtherCAT OUT port can be configured to an Ethernet Port

8.9.2.1 EtherCAT Connection

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

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

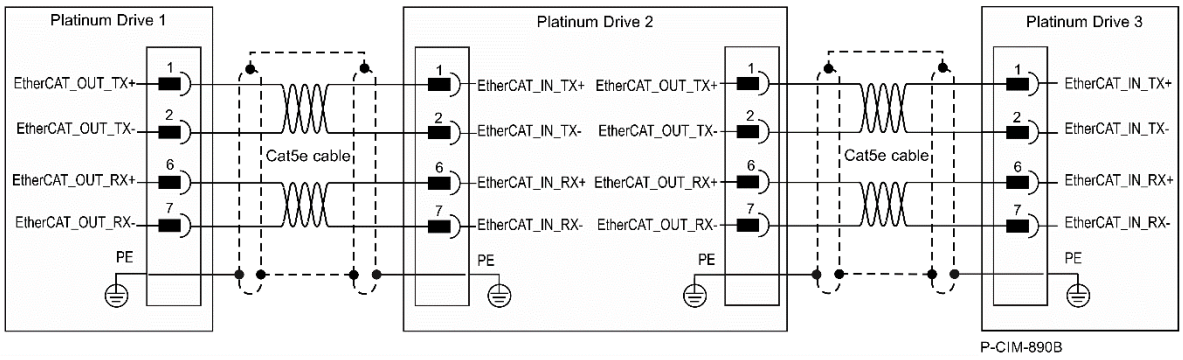


Figure 33: EtherCAT Connection Schematic Diagram

8.9.2.2 EtherCAT Status Indicator

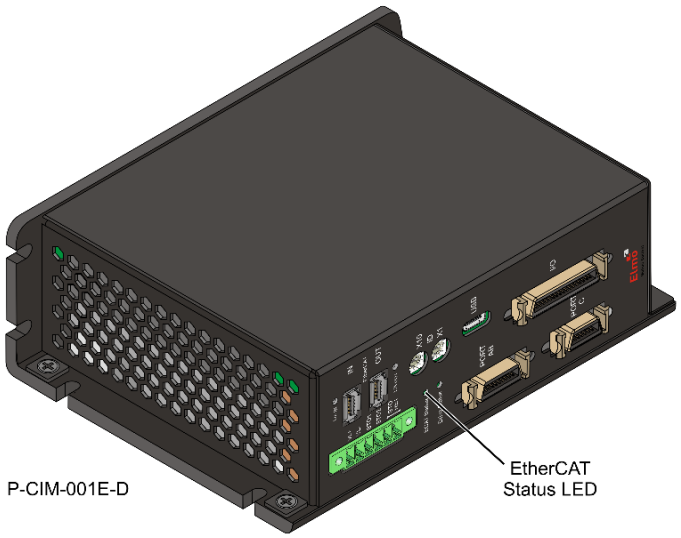


Figure 34: EtherCAT Status LED

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

8.9.2.3 EtherCAT Link Indicators

Each of the EtherCAT Ports also has an EtherCAT Link In and EtherCAT Link Out LED, which are shown in Figure 35.

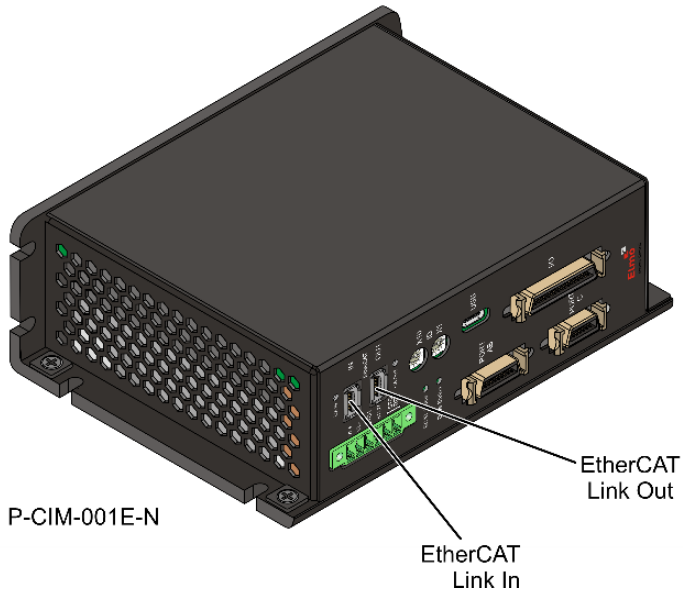


Figure 35: Ethernet Connector LEDs

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

8.9.2.4 EtherCAT Address Switches

The Platinum Cimbasso has two rotary switches that allow the user to define a unique node ID to the slave. EtherCAT address switches set the ECAT address (LOW is ADD low, HIGH is ADD high). The two rotary switches offer up to 255 addresses, with the 0-setting referring to No alias address.

Figure 36 displays the switches available in the EtherCAT Version. Refer to section **15.2.5 EtherCAT Switches** in the Platinum Safety Drive Manual for full details.

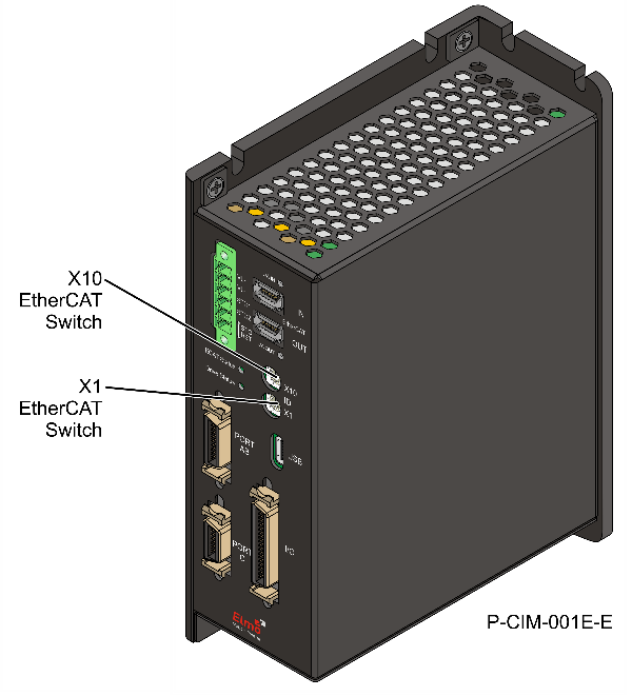


Figure 36: EtherCAT Address Switches

The positions of the switches on the drive are shown in Figure 36. Use a screwdriver to set the low and high bytes values of the drive EtherCAT address. This address is only retrieved after power-up.

Chapter 9: *Powering Up*

After the Platinum Cimbasso 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 Cimbasso 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

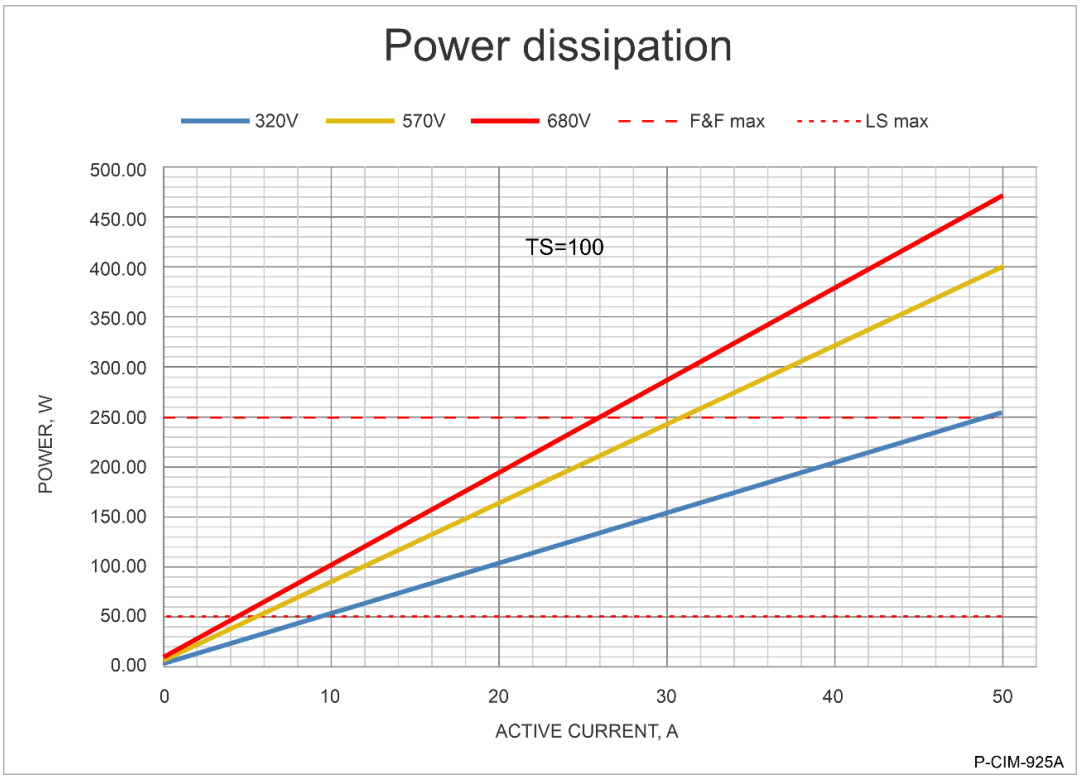
The best way to dissipate heat from the Platinum Cimbasso is to mount it so that its heat-sink is attached to the machine chassis. If mounted with its heat-sink suspended, then for best results mount the servo drive faced upwards and leave approximately 10 mm of space between the Platinum Cimbasso's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

9.2.1 Thermal Dissipation Data

The heat dissipation shown graphically below is applicable for an ambient of 25ºC.

It should be noted that:

- **The Heat Sink of the PN model PCIM-Lz-RXX/YYY-zzzQ can dissipate up to 50W.**
- **The Heat Sink of the PN model PCIM-Bz-RXX/YYY-zzzQ can dissipate up to 250W.**



9.2.2 How to Use the Chart

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

The above chart indicates the net power conversion losses and exclude the power control losses.

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

1. Determine the power dissipation according to the motor type support, "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 Cimbasso will shut down.
   Design the system for continuous operation so that the maximum Heat Sink temperature is no higher than between 80°C and 82°C.
4. When an external Heat-Sink is required, calculate the thermal resistance of the heat sink according to:

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

Chapter 10: *Dimensions*

This chapter provides the Platinum Cimbasso drive dimensions.

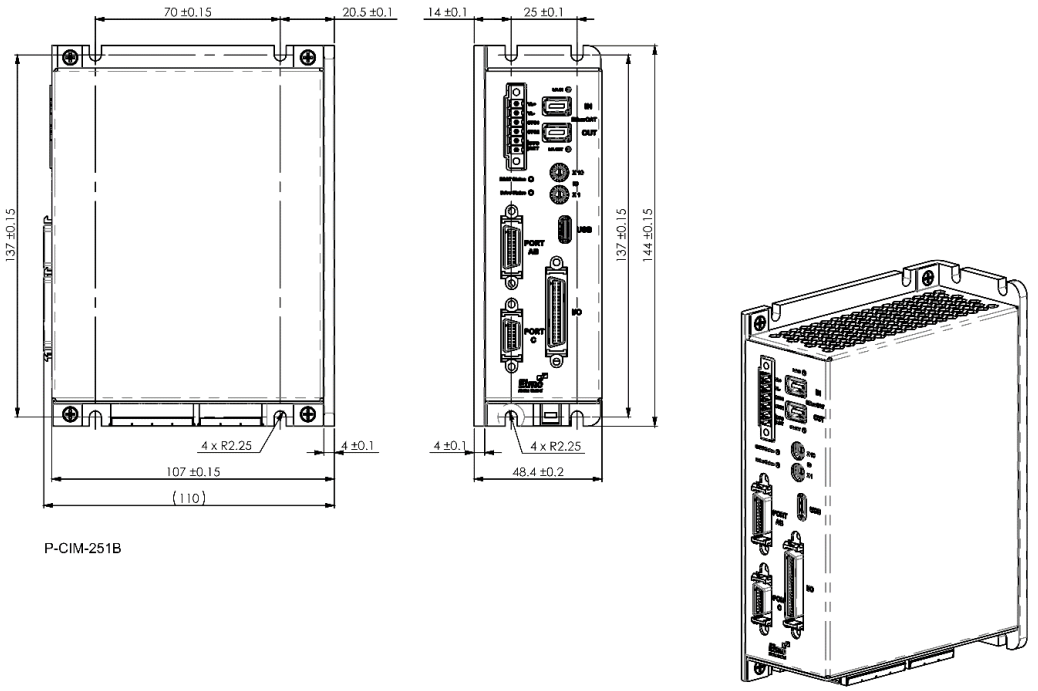


Figure 37: Platinum Cimbasso L-Shape Dimensions

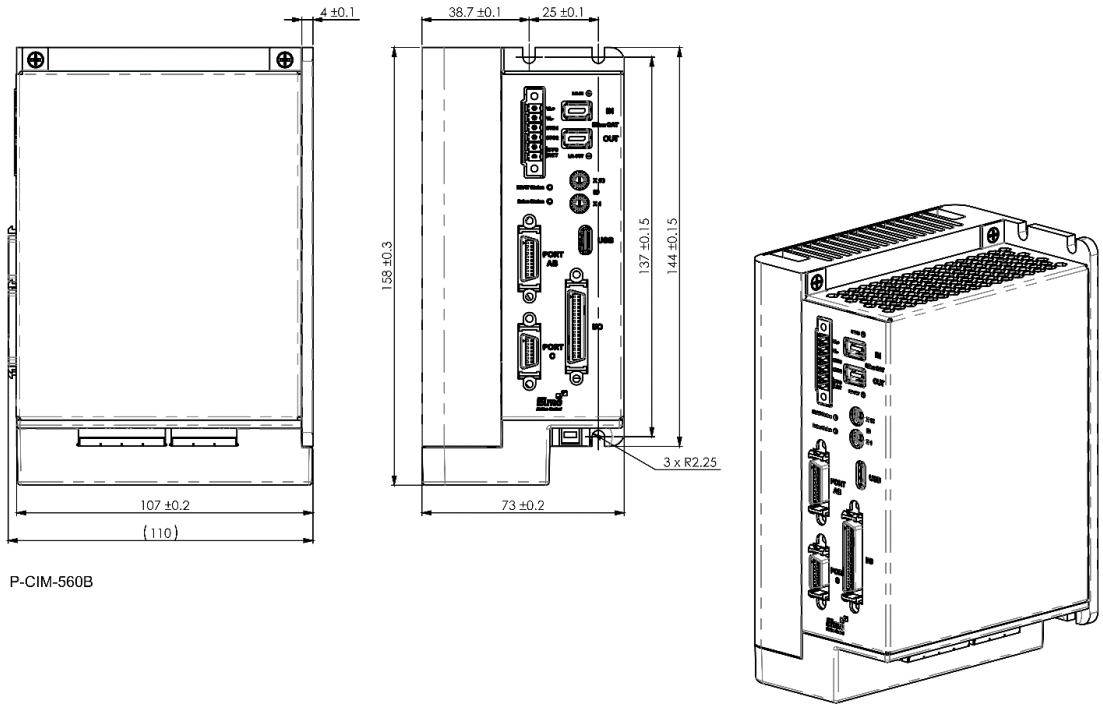


Figure 38: Platinum Cimbasso Fin+Fans Dimensions

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