

Platinum DBBell Digital Servo Drive Installation Guide



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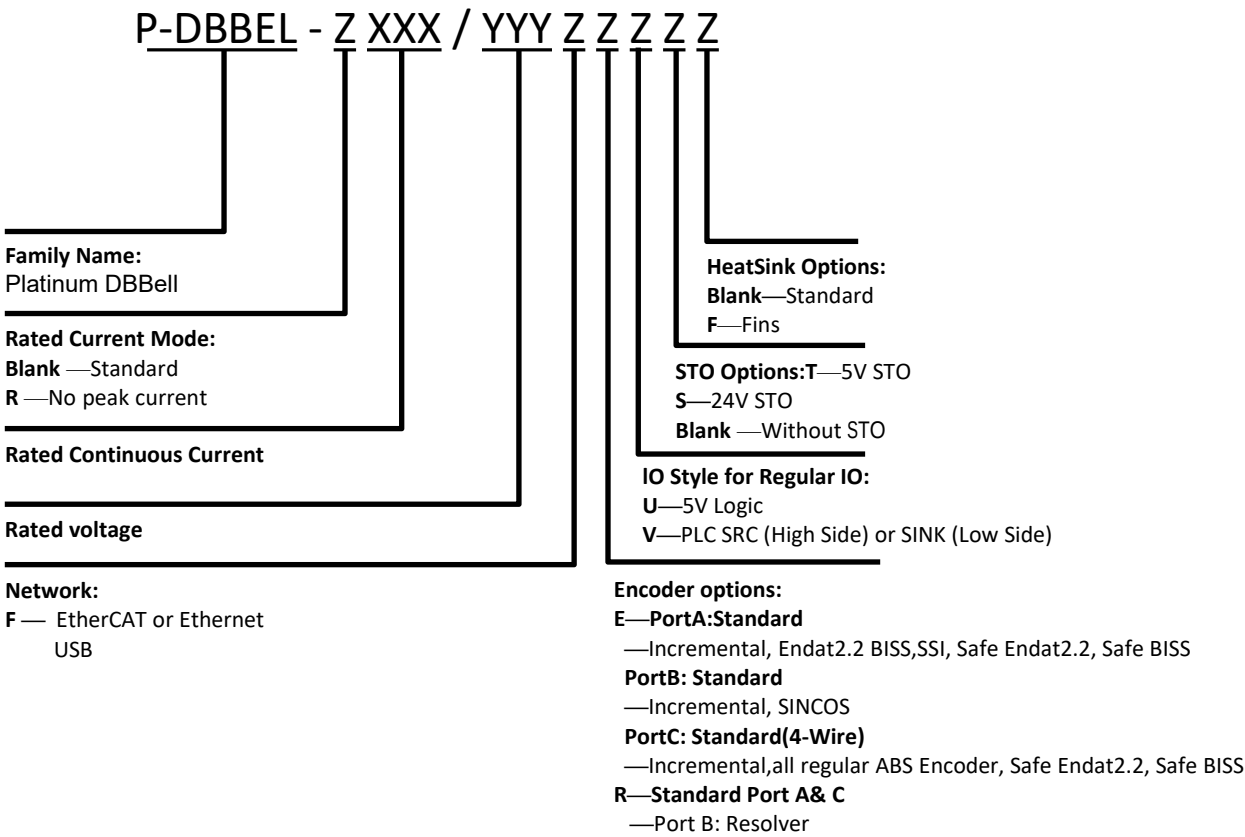


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Catalog Number



<i>chapter1:</i>	<i>This Installation Guide</i>	5
<i>chapter2:</i>	<i>Functional Safety</i>	5
<i>chapter3:</i>	<i>Safety Information</i>	5
3.1	Warnings	6
3.2	Cautions	6
3.3	Warranty Information	6
<i>chapter4:</i>	<i>Product Description</i>	7
<i>chapter5:</i>	<i>Technical Information</i>	8
5.1	Physical Specifications	8
5.2	Technical Data	8
5.2.1	100V Models	8
5.2.2	200V Models	9
5.3	Control Supply	9
5.4	Product Features	10
5.4.1	General Product Features	10
5.4.2	Encoder Supply	10
5.4.3	STO	10
5.4.4	Digital Input	10
5.4.5	Digital Output and Current	10
5.5	Environmental Conditions	11
5.6	Certifications and Standards	12
5.6.1	Functional Safety	12
5.6.2	Electrical Safety	12
5.6.3	Electromagnetic Compatibility	12
5.6.4	Environmental	12
5.6.5	Other Compliant Standards	13
5.6.6	Dual Use	13
<i>chapter6:</i>	<i>Installation</i>	14
6.1	Unpacking the Drive Components	14
6.2	Over-Current and Short-Circuit Protection	14
6.3	Mounting the Platinum DBBell	15
<i>Chapter7:</i>	<i>Wiring</i>	16
7.1	Basic Recommendations	17
7.1.1	General	17
7.1.2	Feedback Cable Port A and Port B Connector	17
7.1.3	Feedback Cable Port C Connector	18
7.1.4	IO Cable Connector	19
7.2	The Platinum DBBell Connection Diagrams	20
<i>Chapter 8:</i>	<i>Connector Types, Pinouts, and LEDs</i>	21
8.1	Main Power & Motor Power Connector Pinouts	22
8.1.1	Main Power	22
8.1.2	Motor Power	23
8.2	Control Power Supply & STO Connector Pinouts	25
8.2.1	Control Power Supply	25
8.2.2	Dual Power Supply for Safety Configuration	25
8.2.3	DC Bus Capacitance	26
8.2.4	STO (Safe Torque Off) Connector Pinouts	26
8.3	Port A Connector Pinouts	27
8.3.1	Feedback Port A	27
8.4	Port B&C Connector Pinouts	30
8.4.1	Feedback Port B	30
8.4.2	Feedback Port C	32
8.5	Digital I/Os Connector Pinouts	34
8.5.1	Input and Output 5V Logic	34
8.5.2	Digital IO PLC Source and Sink Mode	36
8.6	Communication	39

8.6.1	EtherCAT IN Connector Pinouts	39
8.6.2	EtherCAT OUT/Ethernet Connector Pinouts	39
8.6.3	EtherCAT Connection	40
8.6.4	EtherCAT Link Indicators	40
8.6.5	EtherCAT Status Indicator	41
8.6.6	EtherCAT Address Switches	41
8.6.7	USB 2.0 Communication	41
Chapter9:	Powering Up	42
9.1	Initializing the System	42
9.2	Heat Dissipation	42
9.2.1	Thermal Data	42
9.2.2	Heat Dissipation Data	42
9.2.3	How to Use the Charts	43
Chapter10:	Dimensions	44

chapter1: This Installation Guide

This installation Guide details the technical data, pinouts, and power connectivity of the Platinum DBBell. **For a comprehensive specification and detailed description of the functions, refer to the Platinum Safety Drive Manual.**

chapter2: Functional Safety

The modules of the Platinum DBBell 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.

chapter3: Safety Information

In order to achieve the optimum, safe operation of the Platinum DBBell, 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 DBBell 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 DBBell 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 DBBell from all voltage sources before servicing.
- The high voltage products within the Platinum Line range contain grounding conduits for electric current protection. Any disruption to these conduits may cause the instrument to become hot (live) and dangerous.
- STO and EtherCAT circuits are separated from power circuits by reinforced insulation and can be supplied by SELV power supply. Other Control and communication level circuits are separated from power circuits by functional insulation. These circuits shall have insulation to their surroundings and other control or communication circuits based on the Working Voltage and requirements of the end use application.



Capacitance Discharge

After shutting off the power and removing the power source from your equipment, wait at least 10 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 source connected to the instrument must comply with the parameters outlined in this guide.
- When connecting the Platinum DBBell 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 DBBell, 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 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.

chapter4: Product Description

The Platinum DBBell is an advanced high power density servo drive, delivering up to 2 kW of continuous power or 4 kW of peak power in a compact package (145 x 88 x 26 mm or 5.7" x 3.46" x 1.02"). The Platinum DBBell is designed to be mounted on a PCB by soldering its pins directly to the PCB.

The Platinum DBBell is powered by dual isolated power supplies from the Main, main DC power 10 V to 195 V and a Control power supply for the logic.

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 DBBell 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 language. For more information about software tools refer to the Elmo Application Studio (EASII) User Guide.

chapter5: Technical Information

5.1 Physical Specifications

Feature	Units	All Types
Weight	g (oz)	~245g (8.64oz)
Dimension	mm (in)	(145 x 88 x 26 mm or 5.7" x 3.46" x 1.02")
Mounting method		PCB mount
Degrees of Protection		IP00

5.2 Technical Data

5.2.1 100V Models

Feature	Units	1/100	5/100	10/100	25/100
Minimum supply voltage	VDC	10			
Nominal supply voltage	VDC	85			
Maximum supply voltage	VDC	95			
Maximum continuous power output	W	80	400	800	2000
Efficiency at rated power (at nominal conditions)	%	> 99			
Maximum output voltage		Up to 95% of DC bus voltage			
Amplitude sinusoidal/DC continuous current	A	1.0	5	10	25
Sinusoidal continuous RMS current limit (Ic)	A	0.7	3.5	7	17.5
Peak current limit	A	2 x Ic			

Table 1: Technical Data



Note (on current ratings):

The current ratings of the Platinum DBBell are given in units of DC amperes (ratings that are used for trapezoidal commutation or DC motors). The RMS (sinusoidal commutation) value is the DC value divided by 1.41.

5.2.2 200V Models

Elmo offers a 200 VDC maximum output rating selection of Platinum DBBell, according to the following technical data:

Feature	Units	9/200
Minimum supply voltage	VDC	20
Nominal supply voltage	VDC	170
Maximum supply voltage	VDC	195
Maximum continuous power output	W	1450
Efficiency at rated power (at nominal conditions)	%	>99
Maximum output voltage		Up to 95% of DC bus voltage
Amplitude sinusoidal/DC continuous current	A	9
Sinusoidal continuous RMS current limit (Ic)	A	6.3
Peak current limit	A	2 x Ic

5.3 Control Supply

Feature	Units	Details
Control supply input voltage	V	Isolated DC source: 12 to 60V
24V Control supply input power consumption	Without encoder	W ≤4
	With encoder up to 400mA@5V	W ≤6
	With encoder up to 300mA@11V	W ≤7

5.4 Product Features

5.4.1 General Product Features

Main Feature	Details	Presence and No
Feedback	Standard Port A, B, and C	√
Communication Option	USB	√
	EtherCAT or	√
	CAN	√
	RS-232 TTL level	√
Analog Input	Differential ±10V	2

5.4.2 Encoder Supply

Feature	Details
5V supply	5V Nominal, 4.75V±5.25V up to 400mA

5.4.3 STO

Feature	Details	Presence and No
STO	5V Logic, Opto Isolated, for IO TYPE = T	√
	PLC source, Opto Isolated, for IO TYPE = S	

5.4.4 Digital Input

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

5.4.5 Digital Output and Current

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

I/O Style	U	V
Safety/Regular	Regular IO	Regular IO
Voltage	5V Logic	PLC
VDD_24	4 to 30V	19.6 to 30V
OUT1	15mA	1000mA
OUT2	15mA	1000mA
OUT7	15mA	1000mA

OUT8 (PLC SINK)	15mA	1000mA
Total Current¹		1250mA



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

5.5 Environmental Conditions

You can guarantee the safe operation of the Platinum DBBell 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 1

5.6 Certifications and Standards

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

5.6.1 Functional Safety

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

5.6.2 Electrical Safety

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

5.6.3 Electromagnetic Compatibility

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

5.6.4 Environmental

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

5.6.5 Other Compliant Standards

For other compliant standards refer to the [Platinum Safety Drive Manual Section 22.5](#) or refer to the Elmo website:

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

5.6.6 Dual Use

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

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

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

chapter6: Installation

The Platinum DBBell 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 DBBell, verify that you have all of its components, as follows:

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

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

To unpack the Platinum DBBell:

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

P/N:P-DBBEL5/100FEUT



S/N:M26071601



Made in Israel

4. Verify that the Platinum DBBell type is the one that you ordered and ensure that the voltage meets your specific requirements.
5. 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.

P-DBBEL zz-zXXX/YYYzzz-z XXX = rated continues current [A]	Fuse	Circuit Breaker
1, 5, 10, 25 / 100v	Fast Acting	Type B
9 / 200v	Fast Acting	
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 the Platinum DBBell

The Platinum DBBell has been designed for two standard mounting options:

- Wall Mount along the back (can also be mounted horizontally on a metal surface)
- Book Shelf along the side

M4 round head screws, one through each opening in the heat sink, are used to mount the Platinum DBBell (see the diagram below).

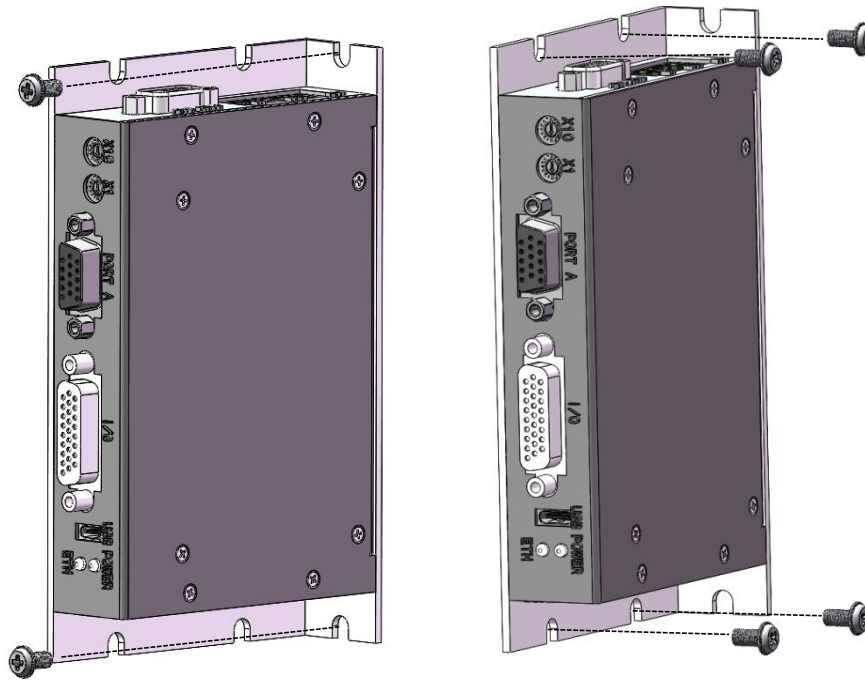


Figure 1: Mounting the Platinum DBBell

When the Platinum DBBell is not connected to a metal chassis, the application's thermal profile may require a solution for heat dissipation due to insufficient air convection. In this case, we recommend that you connect an external heat sink. Elmo has an external heat sink (Catalog number: Fin-DBBEL) that can be ordered for this purpose (see figure at side).

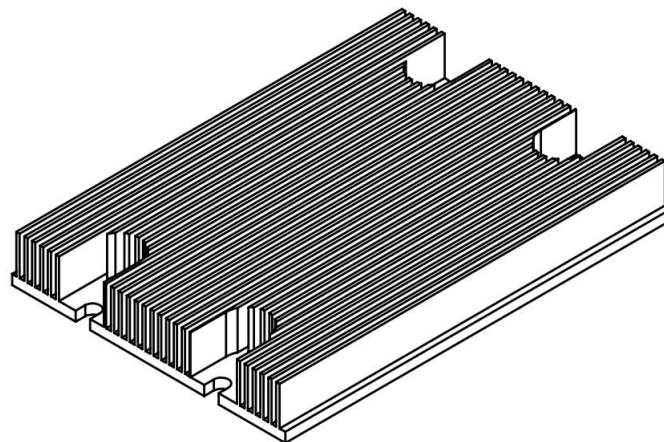
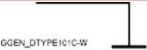
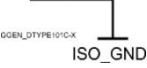
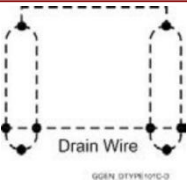
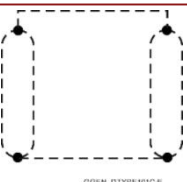
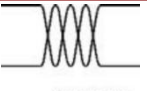
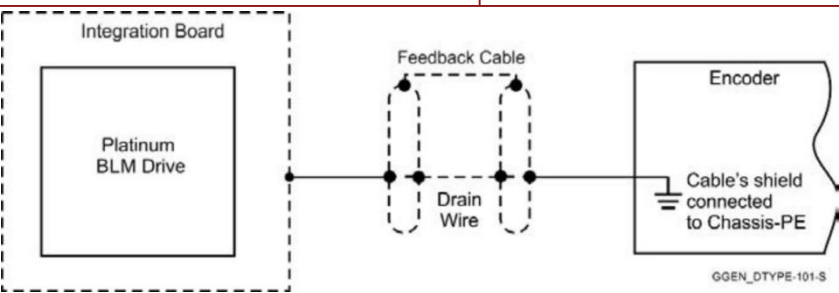


Figure 2: Platinum DBBell External Heat-sink

Chapter7: Wiring

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.	

7.1 Basic Recommendations

7.1.1 General

1. Use shielded cables. For best results, the cable should have an aluminum foil shield covered by copper braid, and should contain a drain wire.
2. Use 24, 26 or 28 AWG twisted-pair shielded with drain wire cables.
3. Keep the cable as short as possible.
4. Do not mount the power cables of the motor and power bus in the proximity of the control and feedback cables.
5. Ensure that in normal operating conditions, the “earth connection” wires and shield of the control cables carry no current. The only time these conductors carry current is under abnormal conditions, when electrical equipment has become a potential shock or fire hazard while conducting external EMI interferences directly to ground, in order to prevent them from affecting the drive. Failing to meet this requirement might result in drive/controller/host failure.
6. After completing the wiring, carefully inspect all wires to ensure tightness, good solder of joints.
7. and general safety.

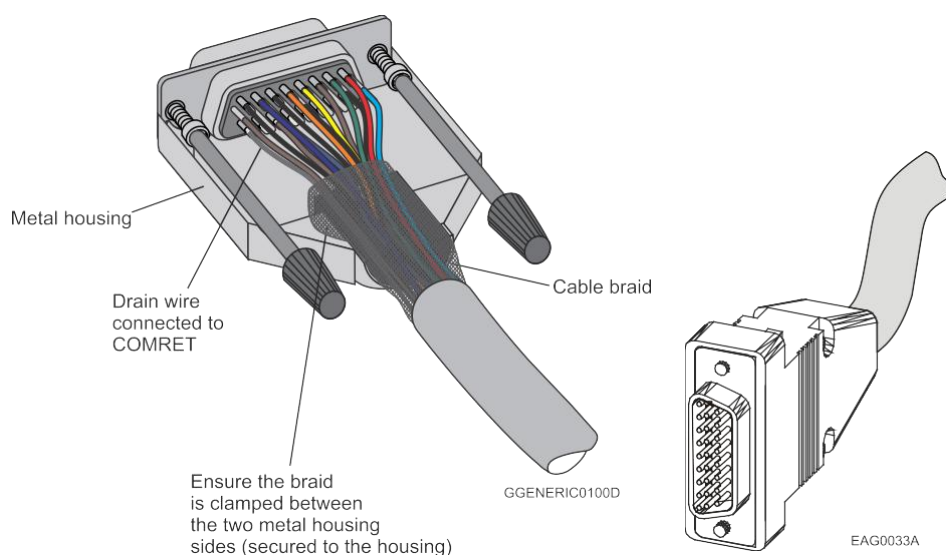


Figure 3: D-Type Cable Assemblies

8. Use only a D-Sub connector with a metal housing (Figure 4).
9. Make sure the braid shield is in tight contact with the metal housing of the D-type connector (Figure 4).

7.1.2 Feedback Cable Port A and Port B Connector

1. On the motor side connections, ground the shield to the motor chassis.
2. At least One COMRET (Common Return) must be connected to the PE. Implement the following steps to connect the COMRET to the PE:
 - A. At the drive, connect the feedback drain wire to one of the COMRET terminals in the D-Type feedback connector (Figure 5).

B. At the motor, connect the feedback cable drain wire to the GND motor chassis terminal of the feedback connector.

The drawings below display two earth connections

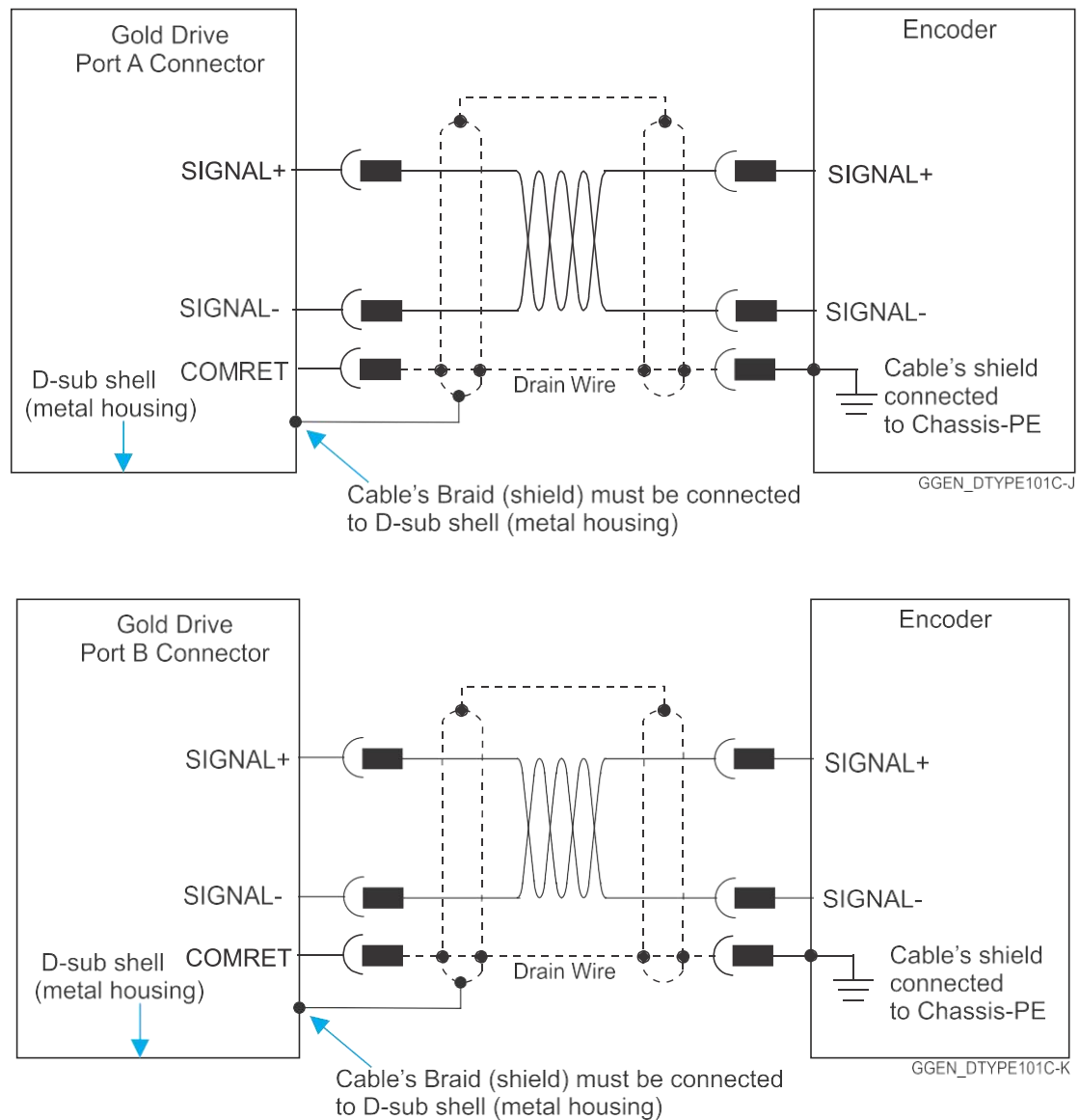


Figure 4: Feedback Port A and B Cable Assemblies

7.1.3 Feedback Cable Port C Connector

1. At the controller side connections, follow the controller manufacturer's recommendations concerning the shield.
2. The connection of the Drain wire to the Port C is not mandatory.

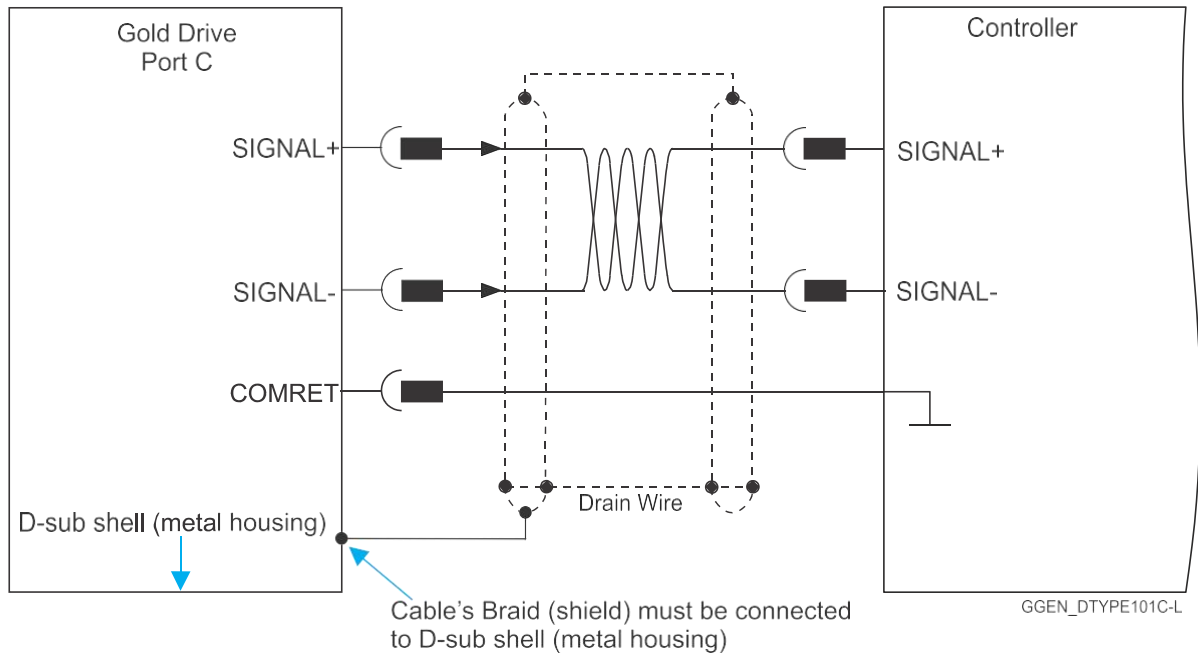


Figure 5: Feedback Port C Cable Assemblies

7.1.4 IO Cable Connector

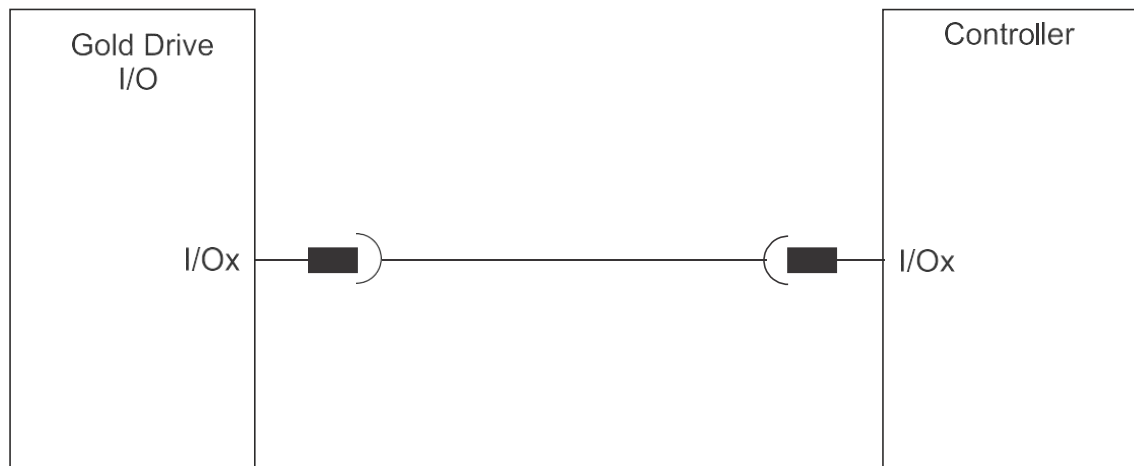


Figure 6: Feedback IO Cable Assemblies

7.2 The Platinum DBBell Connection Diagrams

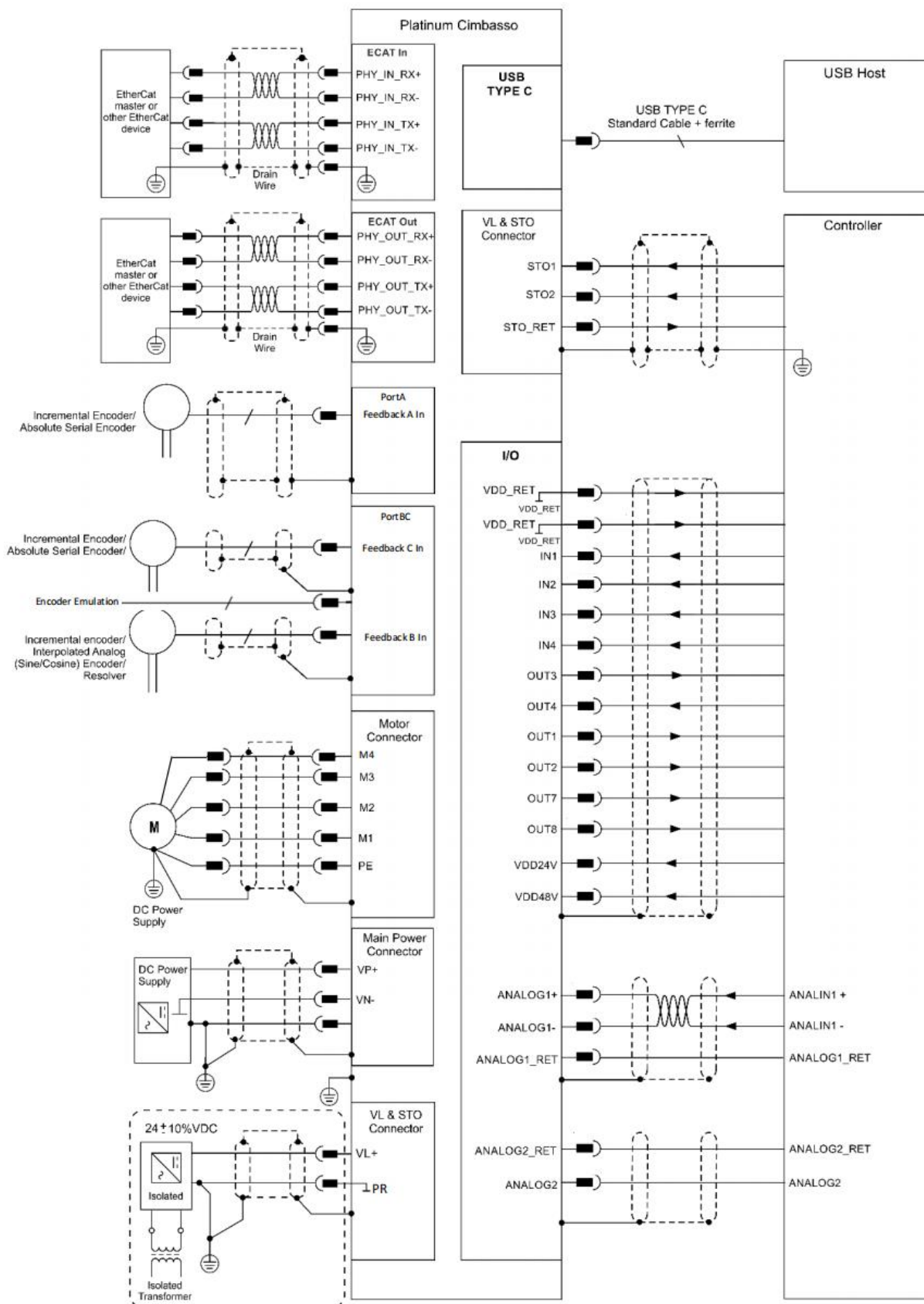


Figure 7: The Platinum Bell Connection Diagram – EtherCAT

Chapter 8: Connector Types, Pinouts, and LEDs

The Platinum Bell has twelve connectors.

Port	No Pins	Type	Function
J13 M1, M2, M3, M4, PE	7	Anytek: CON TH TB Straight,5.8mm pitch. TJ-D.F/5.08-7P	Motor phases
J13 VP+, PR	7	Anytek: CON TH TB Straight,5.8mm pitch. TJ-D.F/5.08-7P	Power
J14 PR, VL+	5 or 2	Anytek: CON TH TB Straight,3.5mm pitch. TJ-F/3.50-5P or TJ-F3.50-2P	Control Power
J14 STO1,STO2,STO-RET	5	Anytek: CON TH TB Straight,3.5mm pitch. TJ-F/3.50-5P	STO
PortA	15	DB15-3F	Feedback Port A
Port B&C	15	DB15-3M	Feedback PortB\C
IO	26	DB26-3F	I/O
USB		USB Type C	USB
EtherCAT Version			
IN		RJ45	EtherCAT IN
OUT		RJ45	EtherCAT OUT

8.1 Main Power & Motor Power Connector Pinouts

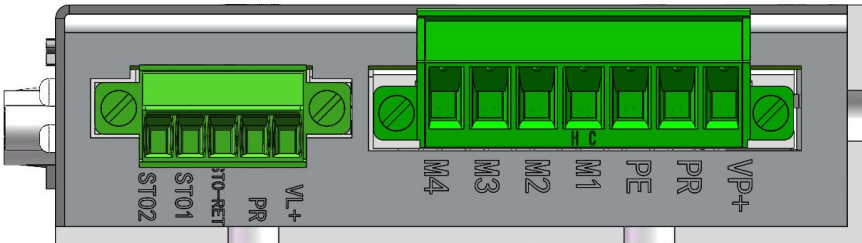
Signal	Function	Cable – Wires			
		Brushless Motor	Brushed DC Motor		Stepper Motor
PR	Power Return				
VP+	Positive Power Input				
PE	Protective earth	Motor	Motor	Motor	Motor
M1	Motor phase	Motor	No Connection	Motor	Motor
M2	Motor phase	Motor	No Connection	Motor	Motor
M3	Motor phase	Motor	Motor	No Connection	Motor
M4	Motor phase	No Connection	Motor	No Connection	Motor
Pin Positions					
					

Table 2: Main Power and Motor Connections

8.1.1 Main Power

There are two power ratings for the Platinum DBBell:

- 100V is for the 10 to 95 VDC
- 200V is for the 20 to 195 VDC

For power rating 200V

Two DC power sources are required, a DC power source of 20 to 195V isolated from the Mains, and a control supply 12 to 60 VDC (isolated from the Mains) for the logic.

For power rating of 100V

Two DC power sources are required, a DC power source of 10 to 95V isolated from the Mains, and a control supply 12 to 60 VDC (isolated from the Mains) for the logic.



Note: The Main power supply (10V to 95VDC or 20V to 195VDC) and Control supply (12 to 60VDC) must be isolated from the Mains.

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

To connect to the main power:

1. The DC power supply source must be isolated from the Mains.
2. For best immunity, it is highly recommended to use twisted and shielded cables for the DC power source. A 3-wire shielded cable should be used. The gauge is determined by the actual current consumption of the motor.
3. Connect the cable shield to the closest earth connection near the power supply.

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

8.1.2 Motor Power

It should be noted that to connect the Brushed DC Motor, there are two options:

- M1 and M2, and PE

OR

- M3 and M4, and PE

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.

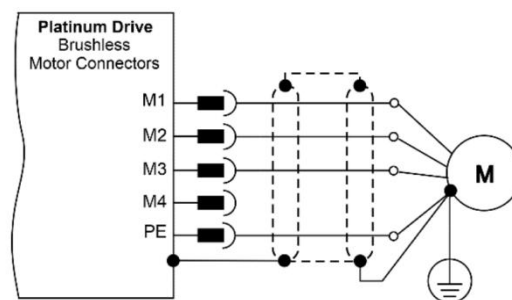


Figure 8: Brushless Motor Power Connection Diagram

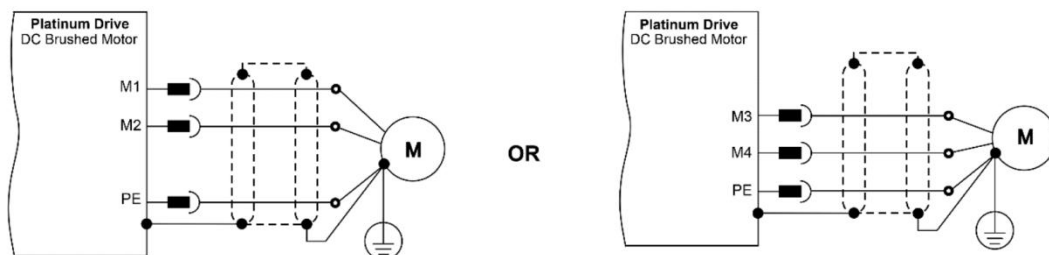


Figure 9: Brushed DC Single Motor Power Connection Diagrams

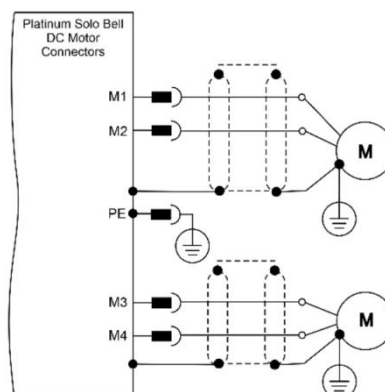


Figure 10: Two Motor Power Connection Diagram

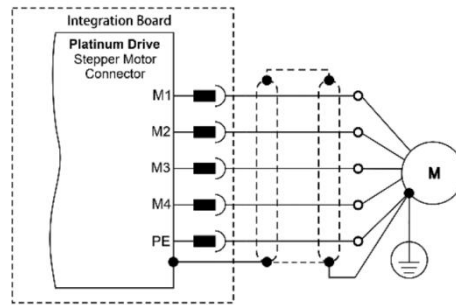


Figure 11: Stepper Single Motor Power Connection Diagram

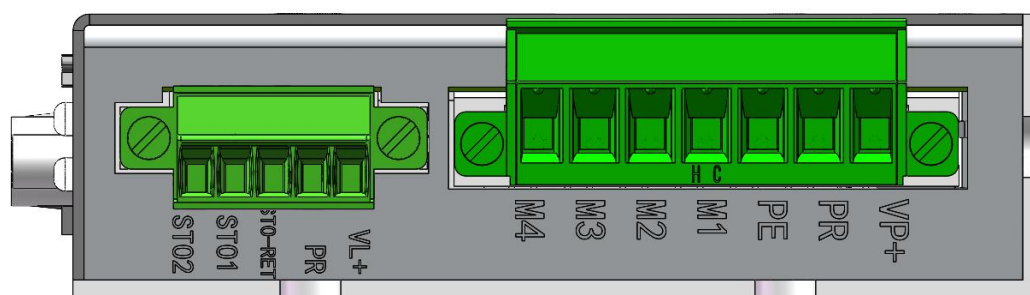
To connect the motor power:

1. Ensure that the motor chassis is properly earthed.
2. Connect the appropriate wire from the Motor Power cables to the M1, M2, M3, M4 and PE terminals on the Platinum DBBell.
3. Make sure not to bundle the wires.
4. 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.
5. For high EMI environment, it is highly recommended to use a 5-wire shielded (not twisted) cable for the motor connection. The gauge is determined by the actual RMS current consumption of the motor.
6. 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).

8.2 Control Power Supply & STO Connector Pinouts

Signal	Function
VL+	Control Supply Input(12VDC-60VDC)
PR	Control Supply Return(0VDC)
STO-RET	STO signal return
STO1	STO1 input
STO2	STO2 input

STO Version



Standard Version

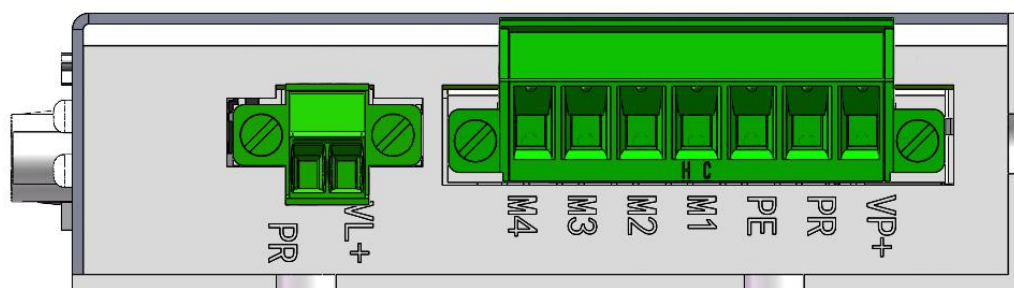


Table 3: Control Power Supply & STO Connections

8.2.1 Control Power Supply

The Control Power (VL) for Safety configuration must be 12V to 60V. Refer to the Safety Power Configuration and to **Chapter 8 Input Power Supply** in the **MAN-P Safety Drive Manual**.

To connect your integration board 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.

8.2.2 Dual Power Supply for Safety Configuration

Two DC power sources are required for the Platinum DBBell, a DC power source, and a control supply for the logic:

- Main power isolated from the Mains
 - Main power 20 to 195 V DC for 200 V module
 - Main power 10 to 95 V DC for 100 V module
- Control Power supply must be 12V to 60V (isolated from the Mains)

The following figure describes the connection of main power and control.

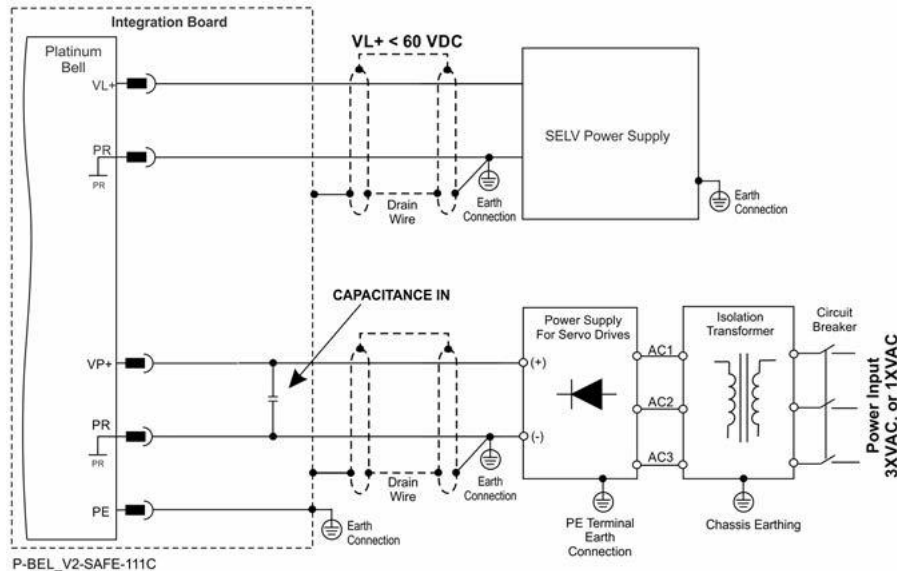


Figure 12: Power Supply Connection Diagram for Safety Configuration



Note:

Make sure to connect the PR to the closest earth connection near the power supply.

8.2.3 DC Bus Capacitance

CAPACITANCE IN for 100V: A DC Bus Capacitance must be connected between the VP+ and the PR in the integration board as shown in the following figure. It is recommended to use a combination of ceramic capacitor (up to 50uF) and electrolytic capacitor of 150uF.

An additional Capacitance of 900uF must be connected for the P-D B B E L modules 20/100 and 25 /100.

CAPACITANCE IN for 200V: A DC Bus Capacitance must be connected between the VP+ and the PR in the integration board as shown in the following figure.

It is recommended to use a combination of ceramic capacitor (up to 6uF) and electrolytic capacitor of 50uF.

8.2.4 STO (Safe Torque Off) Connector Pinouts

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

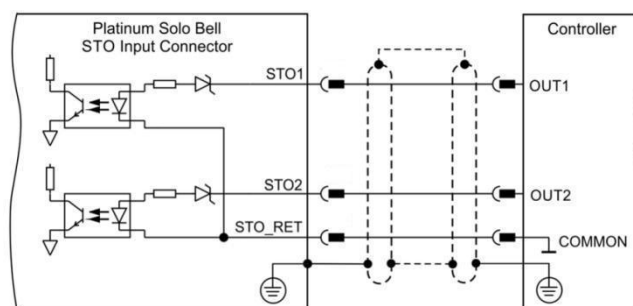
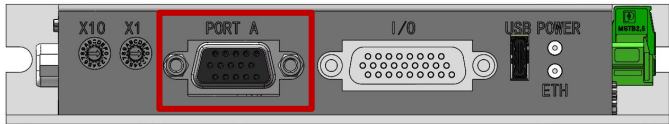
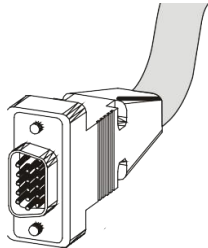


Figure 13: STO Type Connection – PLC Source Option

8.3 Port A Connector Pinouts

Incremental Encoder			Absolute Serial Encoder	
Pin	Signal	Function	Signal	Function
13, 14, 15	+5V	Encoder +5V supply	+5V	Encoder +5V supply
11, 12	COMRET	Common return	COMRET	Common return
4	PortA_ENC_A+	Channel A+	ABS_CLK+	Abs encoder clock +
5	PortA_ENC_A-	Channel A-	ABS_CLK-	Abs encoder clock -
7	PortA_ENC_B+	Channel B+	ABS_DATA+	Abs encoder data +
8	PortA_ENC_B-	Channel B-	ABS_DATA-	Abs encoder data -
9	PortA_ENC_INDEX+	Index+	Reserved	Reserved
10	PortA_ENC_INDEX-	Index-	Reserved	Reserved
1	HA	Hall sensor A	HA	Hall sensor A
2	HB	Hall sensor B	HB	Hall sensor B
3	HC	Hall sensor C	HC	Hall sensor C

Pin Positions	
	

15-Pin D-Type Male Connector

Table 4: Feedback Port A Connections

8.3.1 Feedback Port A

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

8.3.1.1 Incremental Encoder

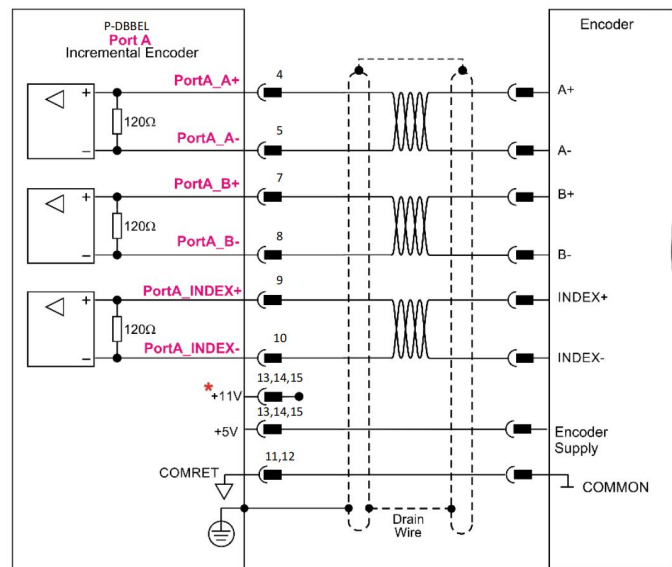


Figure 14: Port A Incremental Encoder Input – Recommended Connection Diagram

8.3.1.2 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:

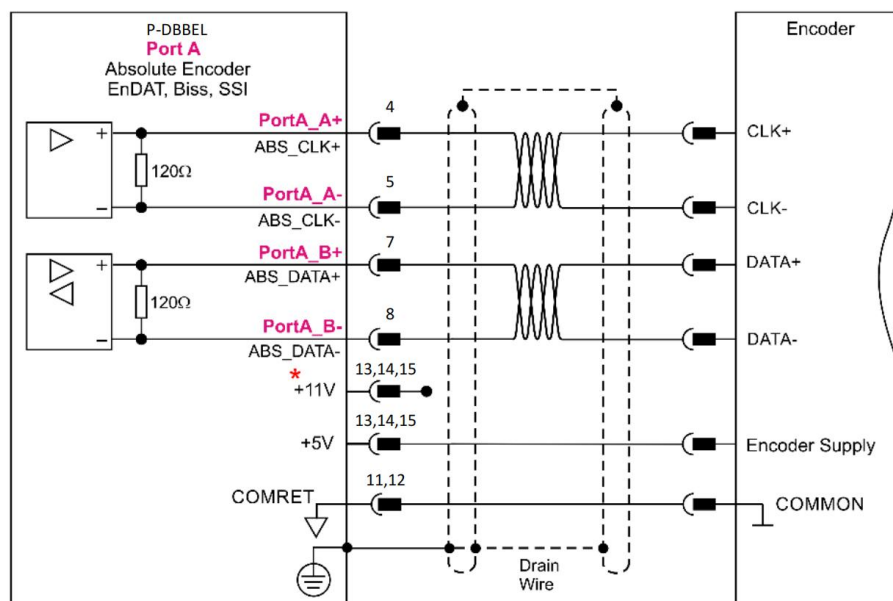


Figure 15: Absolute Serial Encoder – Recommended Connection Diagram for EnDat, Biss, SSI

8.3.1.3 Hiperface

Hiperface that requires power of 7-12V can be used with external power supply for non-safety application. The following figure describes the connection diagram.

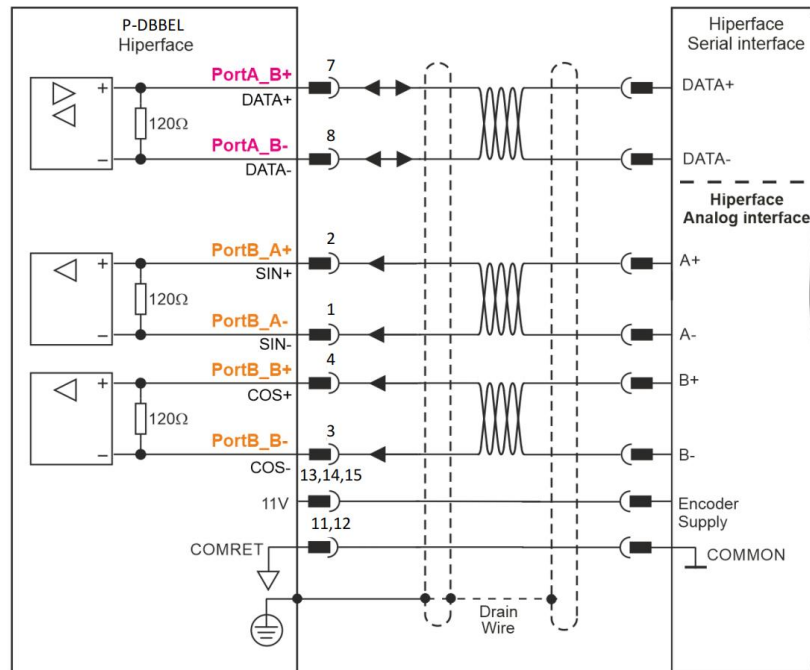
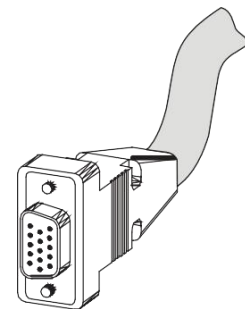
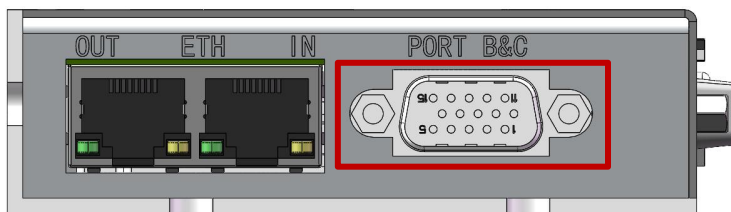


Figure 16: Absolute Serial Encoder – Recommended Connection Diagram for Hiperface

8.4 Port B&C Connector Pinouts

Port B&C	Incremental or Interpolated Analog Encoder		Resolver	
	Signal	Function	Signal	Function
7	+5V/11V	Encoder +5V/11V supply	NC	
8	COMRET	Common return	COMRET	Common return
2	PortB_ENC_A+/SIN+	Incremental Encoder A+ / Sine+	SIN+	Sine+
1	PortB_ENC_A-/SIN-	Channel A- / Sine-	SIN-	Sine-
4	PortB_ENC_B+/COS+	Channel B+ / Cosine+	COS+	Cosine+
3	PortB_ENC_B-/COS-	Channel B- / Cosine-	COS-	Cosine-
6	PortB_ENC_INDEX+	Index+	RESOLVER_OUT+	Vref f=1/TS, 50 mA Max.
5	PortB_ENC_INDEX-	Index -	RESOLVER_OUT-	Vref complement f=1/TS, 50 mA Max.
10	PortC_ENCO_A+/ABS_CLK+	Channel A+/Abs encoder clock+		
9	PortC_ENCO_A-/ABS_CLK-	Channel A+/Abs encoder clock-		
14	PortC_ENCO_B+/ABS_DATA+	Channel B+/Abs encoder data+		
15	PortC_ENCO_B-/ABS_DATA-	Channel B+/Abs encoder data-		
12	PortC_ENCO _ Index+	Index+		
13	PortC_ENCO _ Index-	Index-		

Pin Positions



15-Pin D-Type Male Connector

Table 5: Feedback Port B&C Connections

8.4.1 Feedback Port B

Port B supports any of the following sensors:

- Incremental Encoder, interpolated analog Encoder or analog Hall sensors

Or

- Resolver (separate hardware option)

Differential PWM signal input can be connected to port B

Differential Pulse & Direction signal inputs can be connected to port B.

8.4.1.1 Incremental Encoder

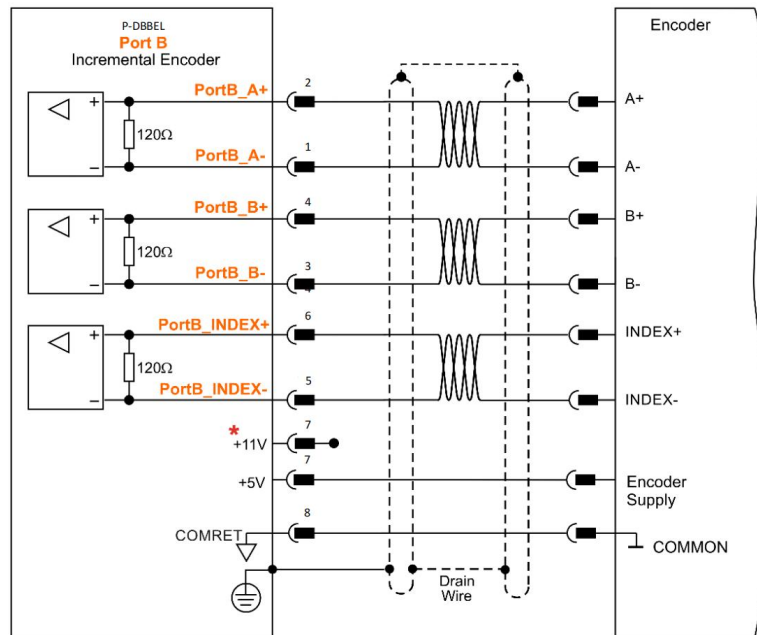


Figure 18: Port B Incremental Encoder Input – Recommended Connection Diagram

8.4.1.2 Interpolated Analog (Sine/Cosine) Encoder

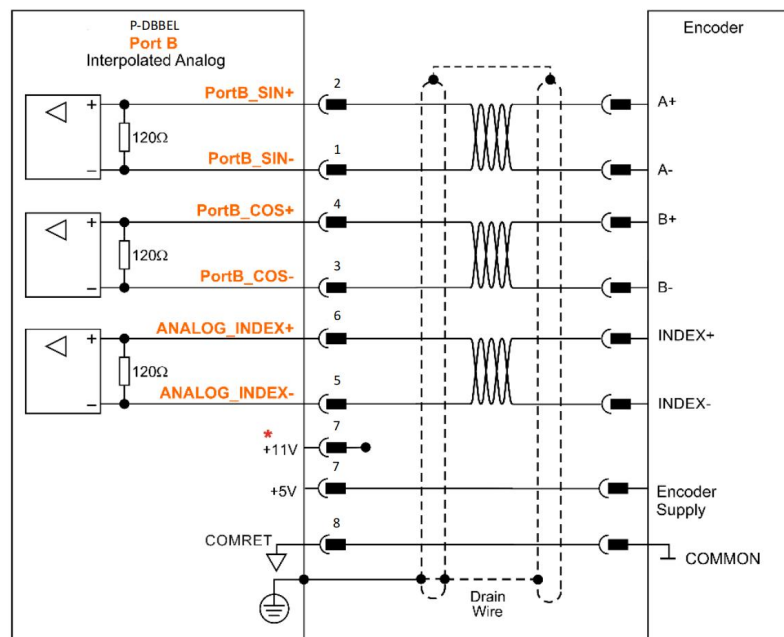


Figure 19: Port B - Interpolated Analog Encoder Connection Diagram

8.4.1.3 Resolver

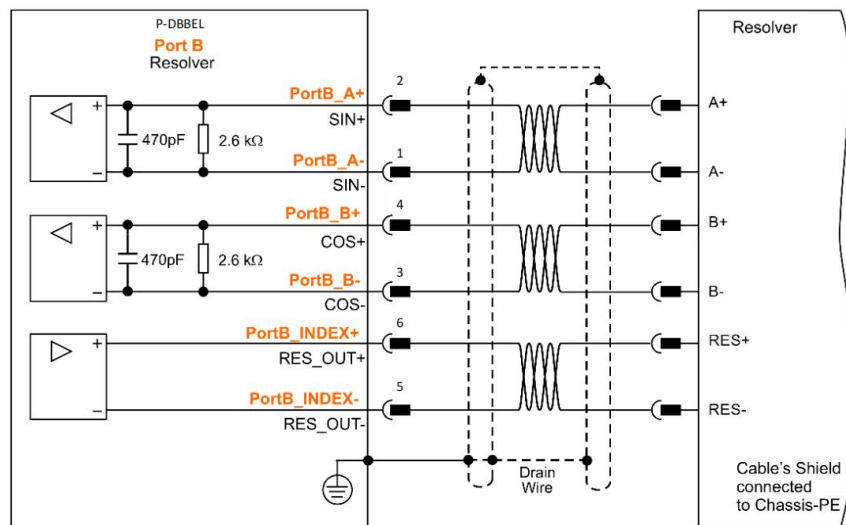


Figure 20: Port B – Resolver Connection Diagram

8.4.2 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

8.4.2.1 Incremental Encoder

The following Incremental Encoder types are supported:

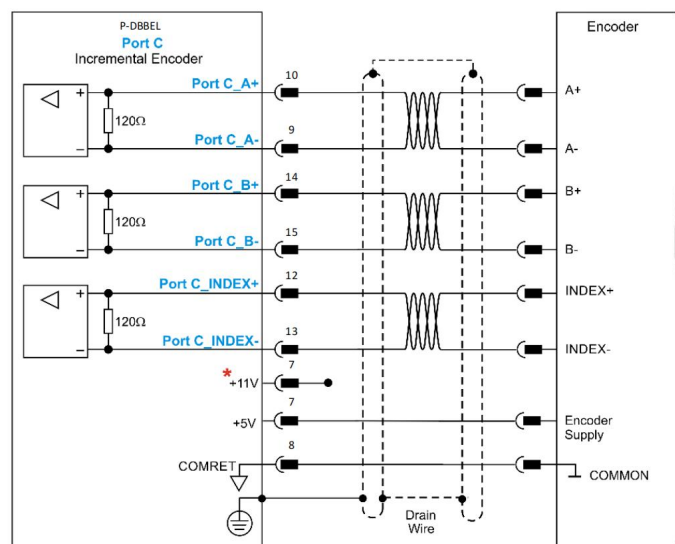


Figure 21: Port C Incremental Encoder Input – Recommended Connection Diagram

8.4.2.2 Absolute Serial Encoder

Port C supports the following ABS feedback:

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

- Tamagawa

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

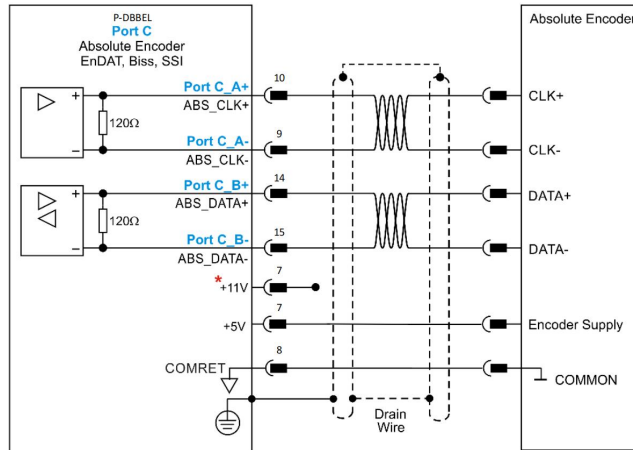


Figure 22: Absolute Serial Encoder – Recommended Connection Diagram for EnDat, Biss, SSI

The following is the feedback diagram connection for Panasonic, Tamagawai, and Sanyo-Danki:

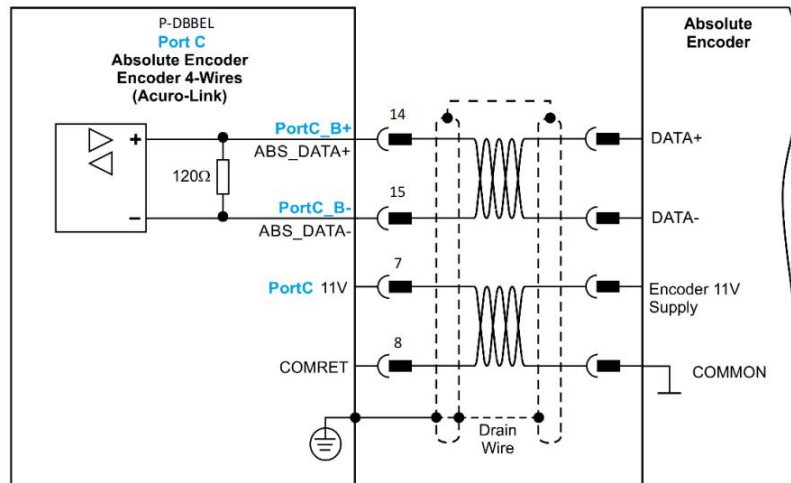


Figure 23: Absolute Serial Encoder–Recommended Connection Diagram for Panasonic, Tamagawai, Sanyo-Danki

8.4.2.3 Emulated Encoder Output

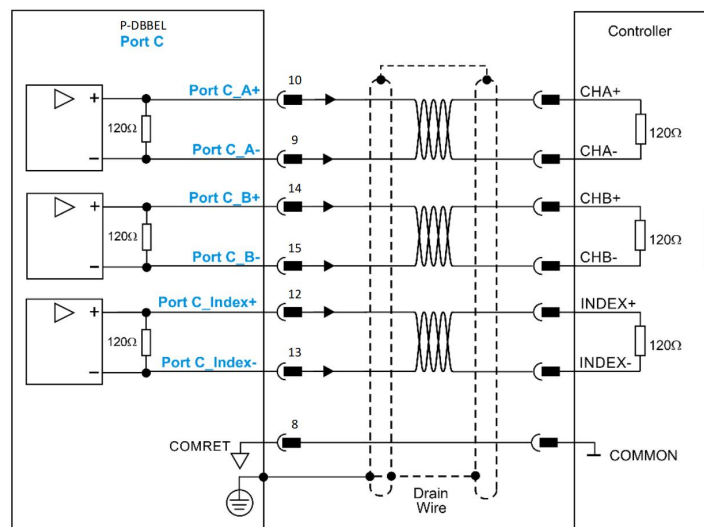
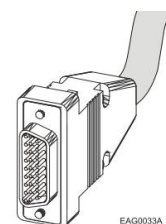
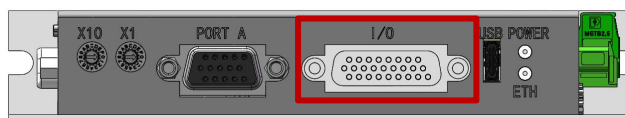


Figure 24: Emulated Encoder Differential Output – Recommended Connection Diagram

8.5 Digital I/Os Connector Pinouts

IO	Signal	Function
1	OUT8	Programmable output 8
2	OUTCOM8	Programmable output return 8
3	OUT7	Programmable output 7
4	OUTCOM7	Programmable output return 7
5	OUT2	Programmable output 2
6	OUTCOM2	Programmable output return 2
7	OUT1	Programmable output 1
8	OUTCOM1	Programmable output return 1
9	ANALOG2	Analog input 2
10	VDD	Supply for out 1-8
11	VDD	Supply for out 1-8
12	OUT4/ IN6	Programmable output 4/High speed programmable input 6
13	OUT3/IN5	Programmable output 3/High speed programmable input 5
14	IN4	High speed programmable input 4
15	IN3	High speed programmable input 3
16	IN2	High speed programmable input 2
17	IN1	High speed programmable input 1
18	INRET 1-6	Inputs 1 to 6 return
19	VDDRET	Supply return for out 1-8
20	VDDRET	Supply return for out 1-8
21	RS232-COM	NC
22	RS232_TX	NC
23	RS232_RX	NC
24	ANALRET	Analog Input Return
25	ANALOG1-	Analog input 1-
26	ANALOG1+	Analog input 1+

Pin Positions



26-Pin High Density D- Type Female Connector

Table 6: IO Connections

8.5.1 Input and Output 5V Logic

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

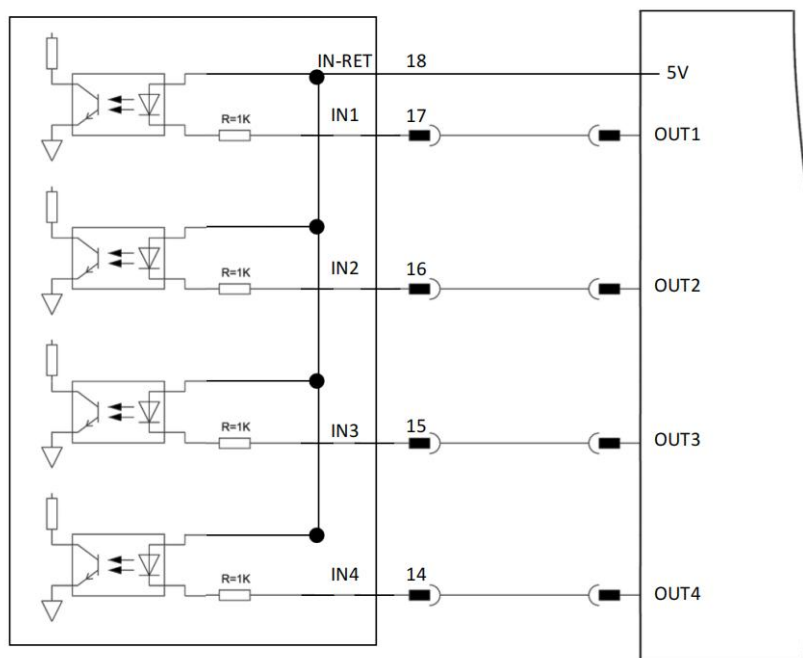


Figure 25: Regular Digital Input 5V Logic Connection Diagram

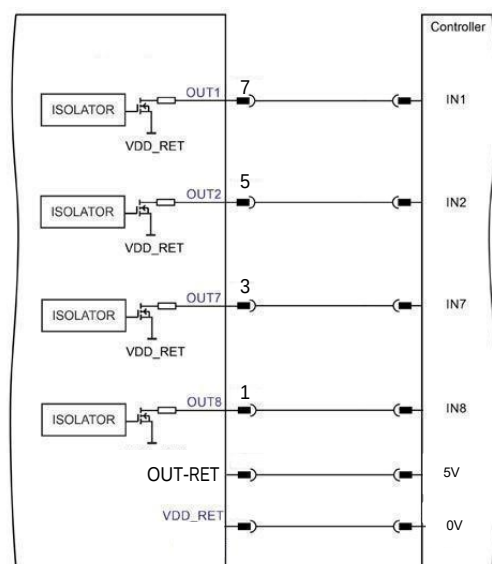


Figure 26: Regular Digital Output Connection Diagram – 5V Logic Option

8.5.2 Digital IO PLC Source and Sink Mode

8.5.2.1 Digital Input and Output PLC Source Mode

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

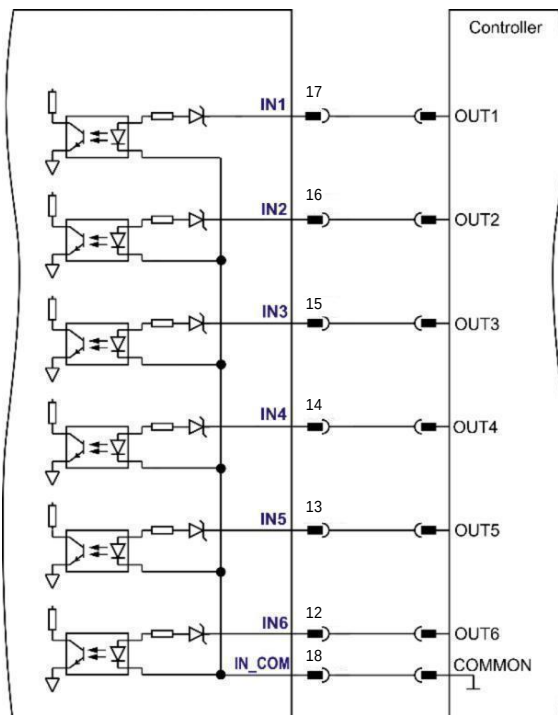


Figure 27: Regular Digital Input Connection Diagram – PLC Source Option

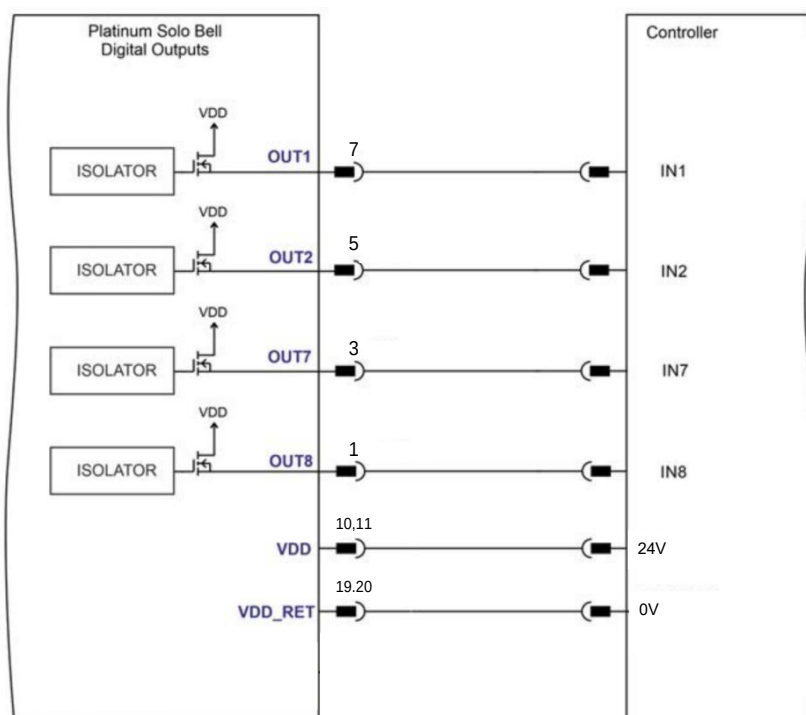


Figure 28: Regular Digital Output Connection Diagram – PLC Source Option

8.5.2.2 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.

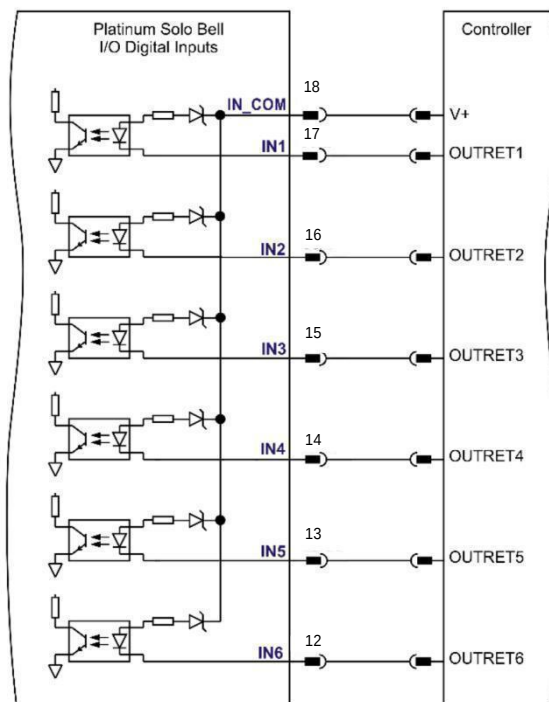


Figure 29: Regular Digital Input Connection Diagram – PLC Sink Option

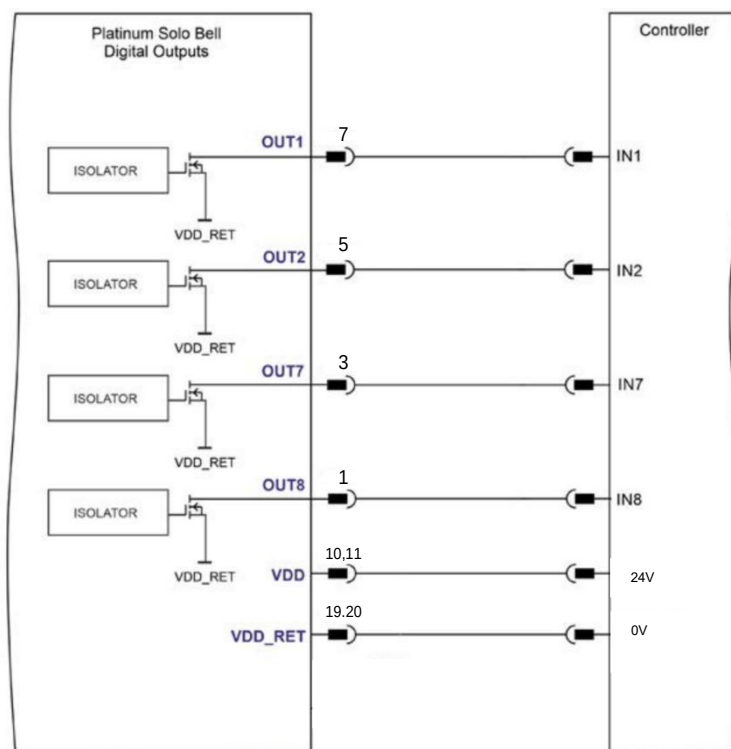


Figure 30: Regular Digital Output Connection Diagram – PLC Sink Option

8.5.2.3 Analog Input

- Analog Input 1 – Differential ± 10 V

The following circuit describes the internal interface of the Analog input

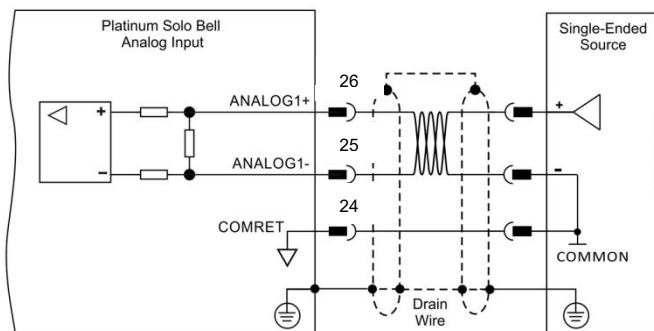


Figure 31: Differential Analog Input

8.5.2.4 Analog Input 2

- Analog Input 2 – Differential ± 10 V

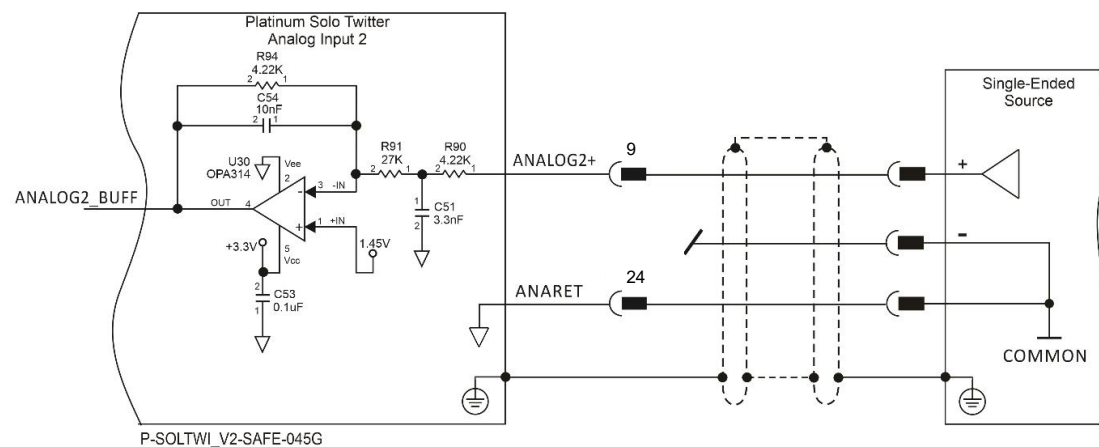


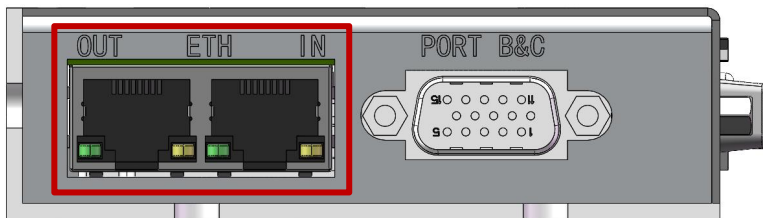
Figure 32: Analog Input 2

8.6 Communication

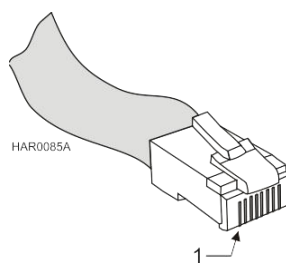
8.6.1 EtherCAT IN Connector Pinouts

Pin on EtherCAT IN	Signal	Function
1	EtherCAT_IN_TX+/Ethernet_TX+	EtherCAT in transmit+/Ethernet transmit +
2	EtherCAT_IN_TX-/Ethernet_TX-	EtherCAT in transmit-/Ethernet transmit -
3	EtherCAT_IN_RX+/Ethernet_RX+	EtherCAT in receive+/Ethernet receive +
4/5	N/A	
6	EtherCAT_IN_RX-/Ethernet_RX-	EtherCAT in receive-/Ethernet receive -
7/8	N/A	

Pin Positions



EtherCAT IN RJ-45 Connector



Standard CAT5e Ethernet Cable

Table 7: EtherCAT IN Pin Assignments

8.6.2 EtherCAT OUT/Ethernet Connector Pinouts

Pin on EtherCAT OUT	Signal	Function
1	EtherCAT_OUT_TX+	EtherCAT out transmit +
2	EtherCAT_OUT_TX-	EtherCAT out transmit -
3	EtherCAT_OUT_RX+	EtherCAT out receive +
4/5	N/A	
6	EtherCAT_OUT_RX-	EtherCAT out receive -
7/8	N/A	

Pin Positions



Table 8: EtherCAT OUT/Ethernet Pin Assignments



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

8.6.3 EtherCAT Connection

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

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

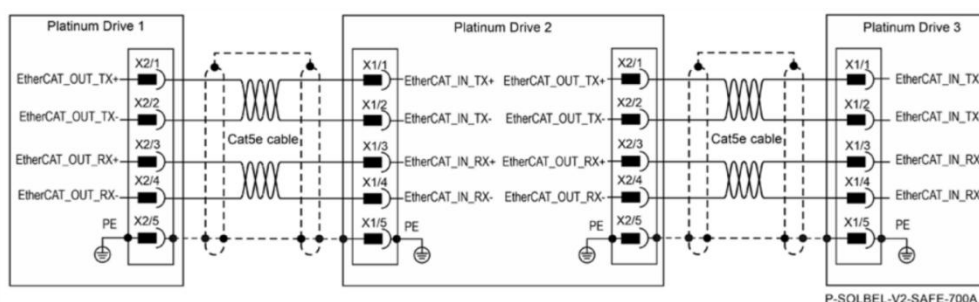


Figure 33: EtherCAT Connection Schematic Diagram



Note: Always use CAT5e cables.

8.6.4 EtherCAT Link Indicators

The Platinum DBBel can serve as an EtherCAT slave device. For this purpose it has two RJ-45 connectors, which are designated as EtherCAT In and EtherCAT Out. Each of these RJ-45 connectors has two status LEDs, which are shown in Figure 36.

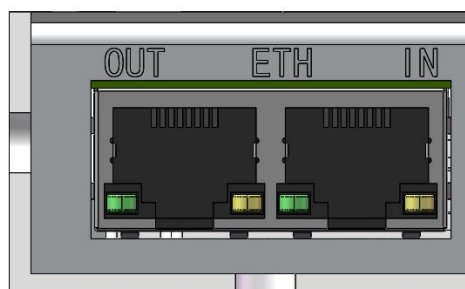


Figure 34: Ethernet Connector LEDs

The green LED is the link/activity indicator. It shows the state of the applicable physical link and the activity on that link. The amber LED is the speed indicator. It shows the speed of the connection on

the Ethernet line. Refer to the section 12.2.2 in the document; MAN-G-Panel Mounted Drives Hardware manual.

8.6.5 EtherCAT Status Indicator

The EtherCAT status indicator is a red/green dual LED. It combines run indication (when it is green) and error indication (when it is red) of the EtherCAT device.

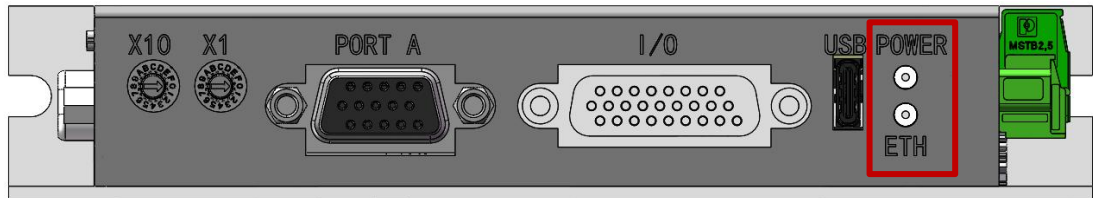


Figure 35: EtherCAT Status LED Indicator

8.6.6 EtherCAT Address Switches

The EtherCAT address (of each axis), is specified by two switches. Using a screwdriver, you can set the low and the high bytes of the EtherCAT address.

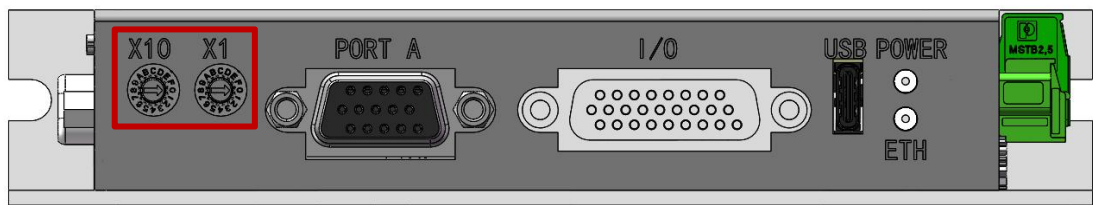


Figure 36: EtherCAT Address Switches

8.6.7 USB 2.0 Communication

Use a standard USB Type C cable and connector to connect the USB.

For full details on USB communication, see section 12.1 in the MAN-G-Board Level Modules Hardware manual.

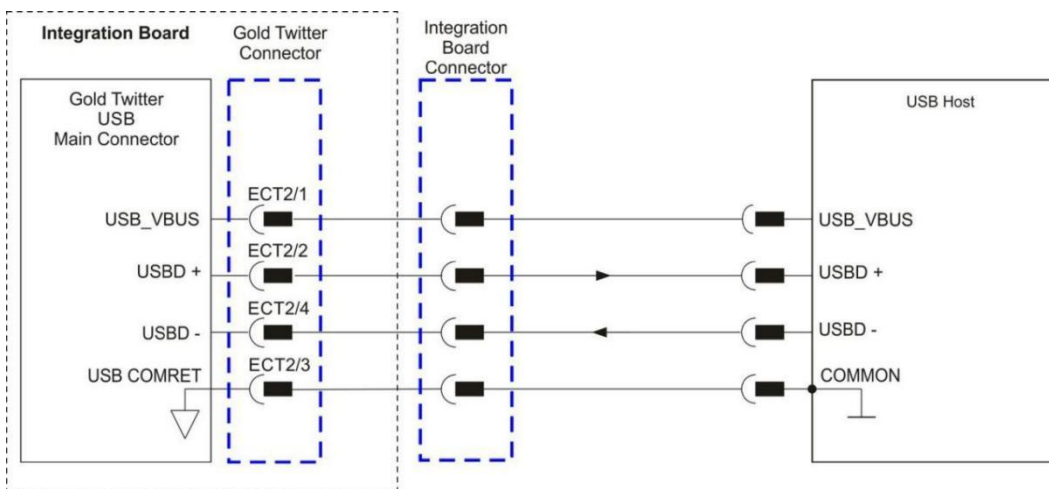


Figure 37: USB Network Diagram

For short distances between the drive and control, 0.5 to 1.0 m wires can be used and shielding is not required. For longer distances than 1.0 m and/or high EMI environment, shielded and twisted wires should be used. Drain wires should be connected to Elmo COMRET.

Chapter9: Powering Up



After the Platinum DBBell 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 DBBell 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

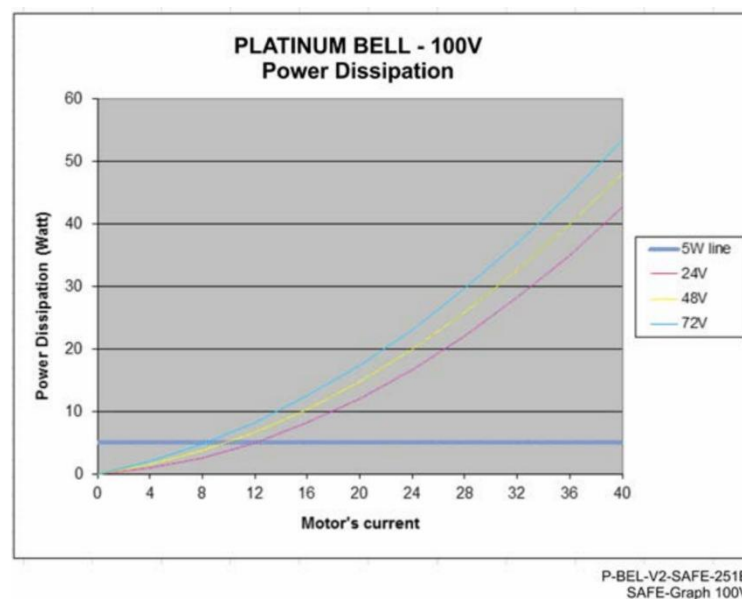
The best way to dissipate heat from the Platinum DBBell is to mount it so that its heat-sink faces up. For best results leave approximately 10 mm of space between the Platinum DBBell's heat-sink and any other assembly.

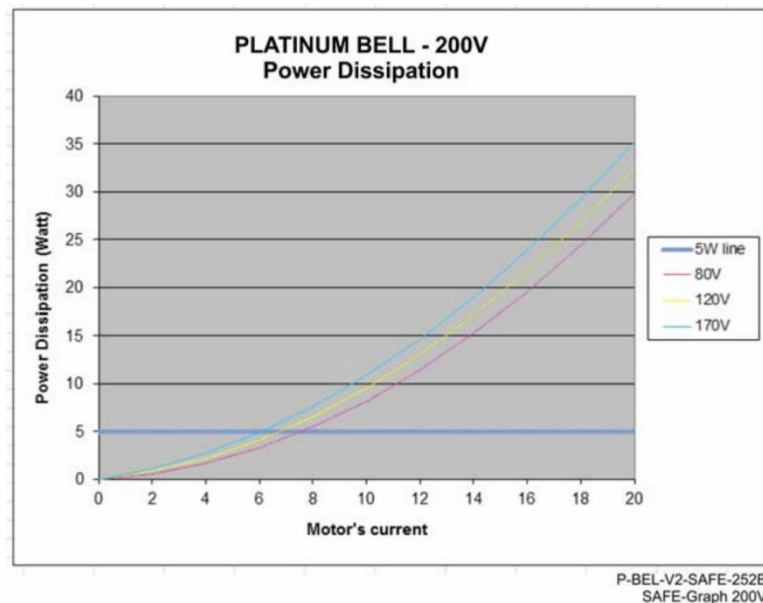
9.2.1 Thermal Data

- Heat dissipation capability (θ): Approximately 10 °C/W
- Thermal time constant: Approximately 240 seconds (thermal time constant means that the Platinum DBBell will reach 2/3 of its final temperature after 4 minutes)
- Shut-off temperature: 86 °C to 88 °C (measured on the heat sink)

9.2.2 Heat Dissipation Data

Heat Dissipation is shown in graphically below:





9.2.3 How to Use the Charts

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.
2. If the DC bus is not one of the two curves above, estimate the dissipation by interpolation. The estimation error is not critical.
3. 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.
4. When the Heat-Sink temperature reaches $\approx 85^{\circ}\text{C}$, the Platinum DBBell 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 .
5. For model **P-DBBEL-Mz-zXXX/YYYzzM**

If the average heat dissipation is less than $\approx 4\text{W}$ 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.

6. When an external Heat-Sink is required, calculate the thermal resistance of the heat sink according to:

$$\theta_{\text{C/W}} = \frac{80^{\circ}\text{C} - T_{\text{Ambient}}}{\text{Heat Dissipation}}$$

Chapter10: Dimensions

This chapter provides detailed technical dimensions regarding the Platinum DBBell.

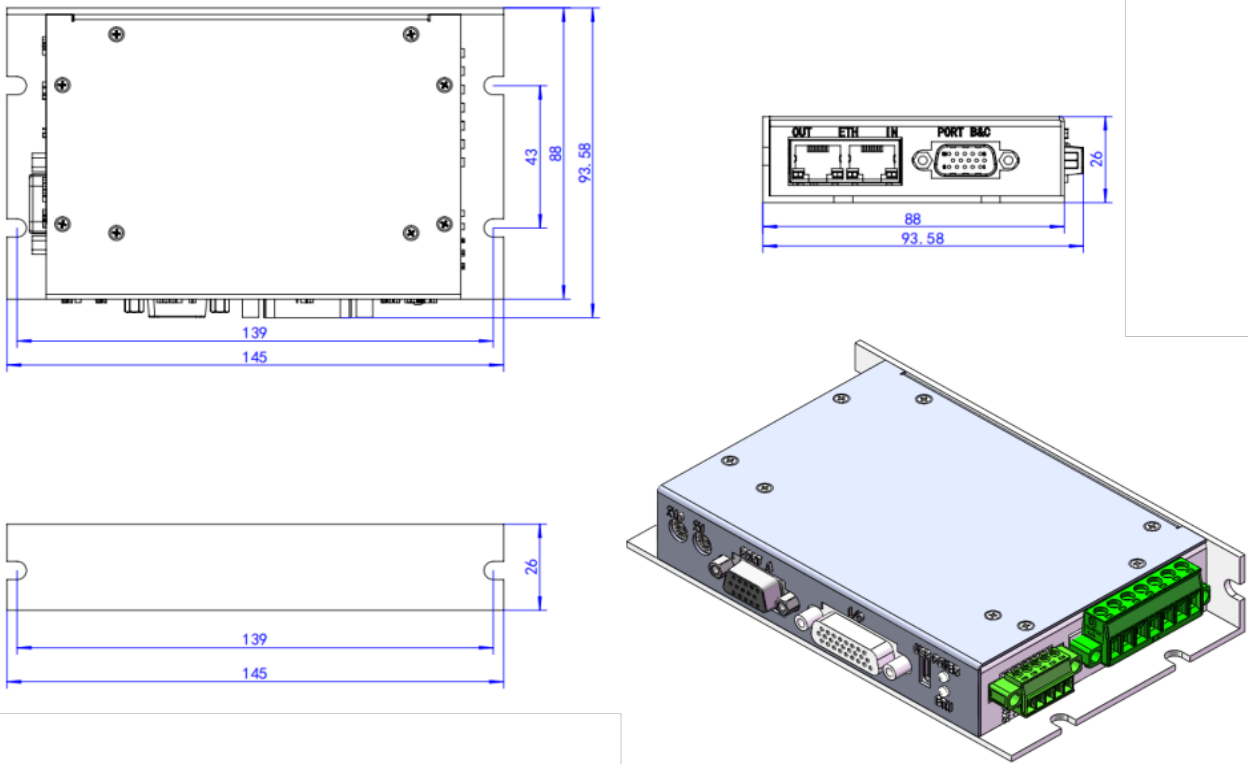


Figure 37: Platinum DBBell

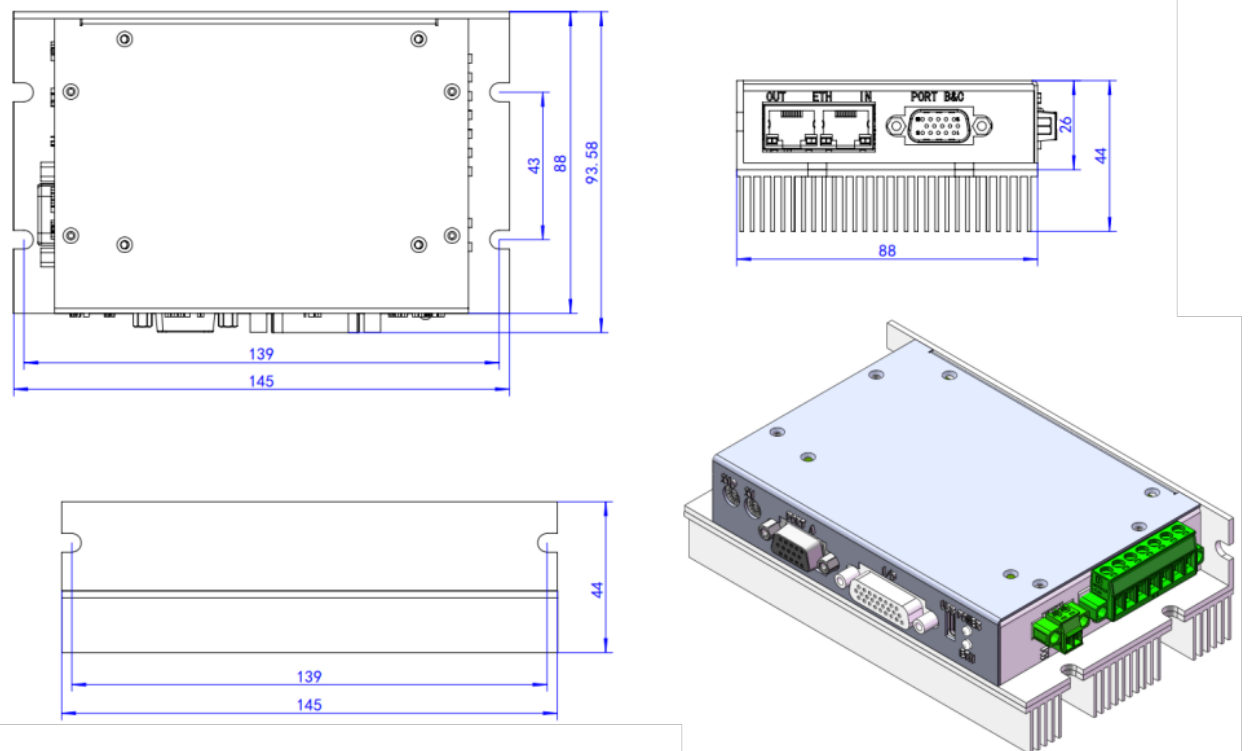


Figure 37: Platinum Bell with Fins Heat-Sink

Go Safer, Smarter, Smaller, Simpler.
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