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Gold Mol Whistle Digital Servo Drive Installation Guide

EtherCAT and CAN

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Notice

This guide is delivered subject to the following conditions and restrictions:

- This guide contains proprietary information belonging to Elmo Motion Control Ltd. Such information is supplied solely for the purpose of assisting users of the Gold Mol Whistle servo drive in its installation.
- The text and graphics included in this manual are for the purpose of illustration and reference only. The specifications on which they are based are subject to change without notice.
- Information in this document is subject to change without notice
- The part number of the Gold Mol Whistle (EtherCAT version) has an E, for example, G-MOLWHI1/100E whereas the CAN version has an S, for example G-MOLWHI1/100S.

Catalog Number

G–MOLWHI xx /100 E E O

GOLD LINE

Monotion customizes PCB boards

Continuous Current（A）

Max Voltage（VDC）

S = USB + CANopen
E = USB + EtherCAT

O=-DO 输出 2A
-PNP
H=-DO 输出 2A
-NPN
OT=-DO 输出 2A
-需外接 STO 实现
OC=-DO 输出 2A
-USB接口molex

E = **Port A：**
-Absolute
-Incremental
-HALL
Port B：
-Incremental
-Analog encoder

R = **Port A：**
-Absolute
-Incremental
-HALL
Port B：
- Resolver

目录

Chapter 1: This Installation Guide

This installation Guide details the technical data, pinouts, and power connectivity of the Gold Mol Whistle. For a comprehensive detailed description of the functions refer to the MAN-G-Panel Mounted Drives Hardware manual which describes Panel Mounted products.

Chapter 2: Safety Information

In order to achieve the optimum, safe operation of the Gold Mol Whistle, 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 Gold Mol Whistle 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 Gold Mol Whistle 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.

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.

2.1 warning

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 Gold Mol Whistle from all voltage sources before servicing.

The high voltage products within the Gold Line range contain grounding conduits for electric current protection. Any disruption to these conduits may cause the instrument to become hot (live) and dangerous.

After shutting off the power and removing the power source from your equipment, wait at least 1 minute 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.

2.2 Cautions

The maximum DC power supply connected to the instrument must comply with the parameters outlined in this guide.

When connecting the Gold Mol Whistle to an approved isolated auxiliary 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 Gold Mol Whistle, 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

2.3 CE Marking Conformance

The Gold Mol Whistle 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 Gold Mol Whistle 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.

2.4 Warranty Information

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

Chapter 3: Product Description

The Gold Mol Whistle is an integrated solution delivering up to **1.6 kW of continuous power** or **3.2 kW of peak power** in a compact package (75x 46.5 x35 mm), and designed to simply and efficiently connect Elmo's Gold Whistle servo drive directly to the application.The solution consists of the Gold Whistle together with a convenient connection interface which either eliminates or reduces development time and resources when designing an application's PCB board.

This advanced, high power density servo drive provides top performance, advanced networking and built-in safety, as well as a fully featured motion controller and local intelligence. The Gold Solo Whistle is powered by a single 12 V – 195 V isolated DC power source (not included) and a "smart" control-supply algorithm enables the drive to operate up to 95V with only one power supply with no need for an auxiliary 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 Gold Mol Whistle drive is easily set up and tuned using Elmo Application Studio (EASII) software tools. As part of the Gold product line, it is fully programmable with the Elmo motion control language. For more about software tools refer to the Elmo Application Studio Software Manual.

The Gold Mol Whistle is available in a variety of options. There are multiple power rating options,two different communications options – Standard (S suffix in the part number) or EtherCAT (E suffix in the part number), a variety of feedback selections and I/O configuration possibilities.

3.1. Accessories

Cable Kit, catalog number: CBL-GMOLWHIKIT (can be ordered separately) For further details, see the documentation for this cable kit (CBL-GMOLWHIKIT).

Chapter 4: Technical Information

4.1. Physical Specification

Feature	Units	All Types
Weight	g (oz)	106 g (3.74 oz)
Dimension	mm (in)	75x 46.5 x35 mm
Mounting method		Panel Mounted

4.2. Technical Data

Feature	Units	5/100	10/100	20/100	20/100SR	6/200
Minimum supply voltage	VDC	12				
Nominal supply voltage	VDC	85				
Maximum supply voltage	VDC	95				
Maximum continuous power output	W	400	800	1600	1600	960
Efficiency at rated power (at nominal conditions)	%	> 99				
Maximum output voltage		> 95% of DC bus voltage at f = 22 kHz				
Auxiliary power supply	VDC	12 to 95 VDC (up to 6 VA inc. 5 V/2 x 200 mA for encoder)				
Amplitude sinusoidal/DC continuous current	A	5	10	20	20	6
Sinusoidal continuous RMS current limit (Ic)	A	3.5	7	14.1	14.1	4.2
Peak current limit	A	2 x Ic				

table 1: Power Rating

Note on current ratings: The current ratings of the Gold Mol Whistle 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.

4.2.1. Product Features

Main Feature	Details	Presence and No.
STO	PLC Source	**√**
Digital Input	PLC Source	**3**
Digital Output	PLC Source	**2**
Analog Input	Differential ±10V	**1**
Feedback	Standard Port A, B, & C	**√**
Communication Option	USB	**√**
	EtherCAT	**√**
	CAN	**√**

4.3. Environmental Conditions

You can guarantee the safe operation of the Gold Mol Whistle by ensuring that it is installed in an appropriate environment.

4.3.1. Gold Line

Feature	Details
Operating ambient temperature according to IEC60068-2-2	0 °C to 40 °C (32 °F to 104 °F)
Storage temperature	-20 °C to +85 °C (-4 °F to +185 °F)
Maximum non-condensing humidity according to IEC60068-2-78	95%
Maximum Operating Altitude	2,000 m (6562 feet) It should be noted that servo drives capable of higher operating altitudes are available onrequest.
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

4.4. Gold Line Standards and Certifications

The following table describes the Main Standards of the Gold Mol Whistle servo drive. For further details refer to the MAN-G-Panel Mounted Drives Hardware manual.

Main Standards	Item
The related standards below apply to the performance of the servo drives as stated in the environmental conditions in section4.3.1Gold Lineabove.	
STO IEC 61800-5-2:2007 SIL 3	Adjustable speed electrical power drive systems – Safety requirements – Functional
EN ISO 13849-1:2008 PL e, Cat 3	Safety of machinery — Safety-related parts of control systems.
Approved IEC/EN 61800-5-1	Adjustable speed electrical power drive systems Safety requirements – Electrical, thermal and energy
Recognized UL61800-5-1	Adjustable speed electrical power drive systems Safety requirements – Electrical, thermal and energy
Recognized UL 508C	Power Conversion Equipment
In compliance with UL 840	Insulation Coordination Including Clearances and Creepage Distances for Electrical Equipment
Conformity with CE 2006/95/EC	Low-voltage directive 2006/95/EC
Recognized CSA C22.2 NO. 14-13	Industrial Control Equipment

Chapter 5: Installation

The Gold Mol Whistle must be installed in a suitable environment and properly connected to its voltage supplies and the motor.

5.1. Unpacking the Drive Components

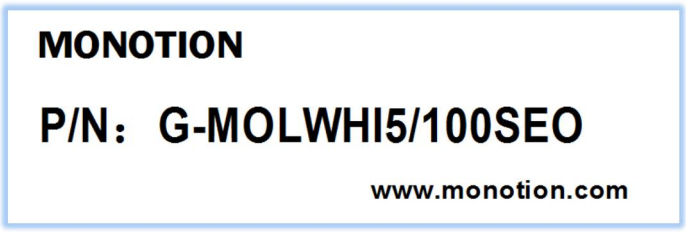
Before you begin working with the Gold Mol Whistle, verify that you have all of its components, as follows:

- The Gold Mol Whistle servo drive
- The Elmo Application Studio software and software manual

The Gold Mol Whistle is shipped in a cardboard box with Styrofoam protection.

To unpack the Gold Mol Whistle:

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



4. Verify that the Gold Mol Whistle 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 sectionCatalog Numberat the beginning of the installation guide.

The part number of the Gold Mol Whistle (EtherCAT version) has an E, for example,

G- MOLWHI10/100E whereas the CAN version has an S, for example G- SOLWHI10/100S.

There are two models of the Gold Mol Whistle: connectors only (for currents of 10 A or less) and wires only (for currents of 15 A or more). On request, the wires model may be ordered for currents of 10 A or less.

5.2. Connector Types

The Gold Mol Whistle has twelve connectors (connectors' version).

5.2.1.Connector Types

Port	No. Pins	Type	Function
J1	7	5.08 mm pitch	Motor phases &power supply
J4	12	2.0 mm pitch	Feedback port A
J5	8	2.0 mm pitch	Feedback port B
J6	10	2.0 mm pitch	I/O
J9		USB Device Mini-B	Mini-USB type B
J30 (PR, VL)	2	2.0 mm pitch	Auxiliary supply input
STO Version			
J26	3	2.0 mm pitch	STO
EtherCAT Version			
J7	5	2.0 mm pitch	EtherCAT IN
J8	5	2.0 mm pitch	EtherCAT OUT
CAN Version			
J22	4	2.0 mm pitch	CAN IN
J23	4	2.0 mm pitch	CAN OUT

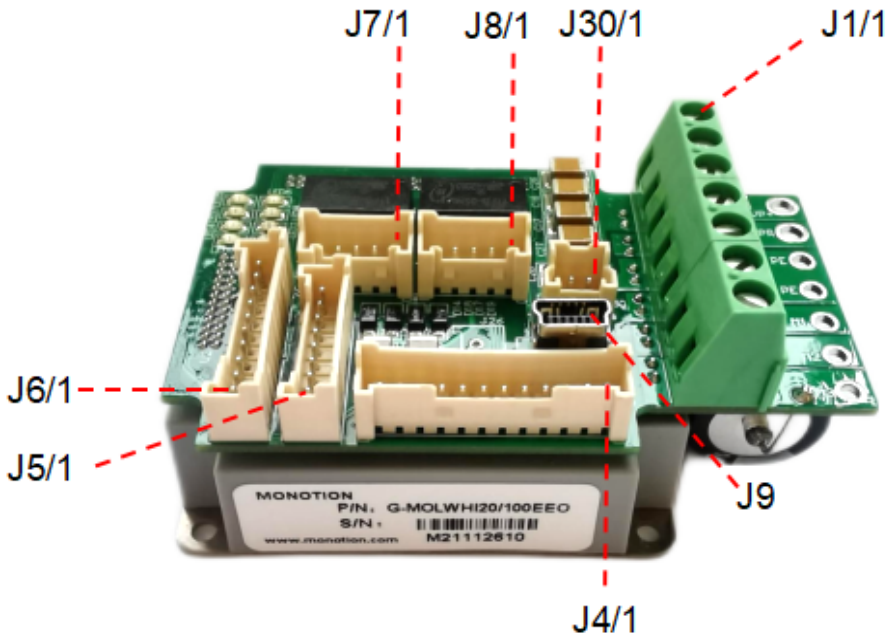


Figure 1: Connector Locations – EtherCAT

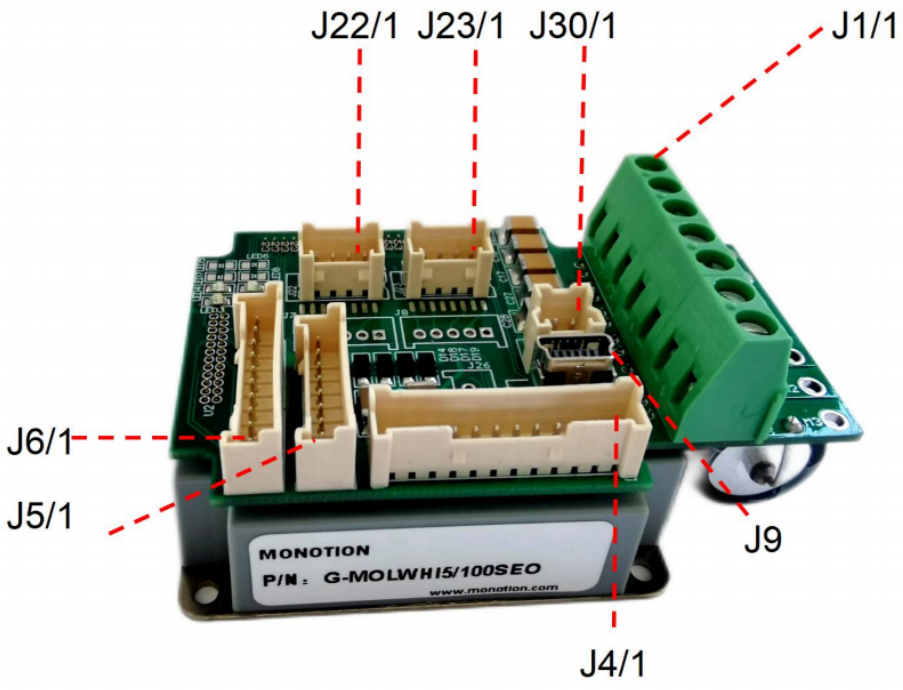


Figure 2: Connector Locations – CAN

Table 2: Connector Types

The pinouts inChapter 6:Wiringdescribe the function of each pin in the Gold Mol Whistle connectors that are listed inTable 2.

5.3. Mounting the Gold Mol Whistle

The Gold Mol Whistle was designed for mounting on a surface. When integrating the Gold Solo Whistle into a device, be sure to leave about 1 cm (0.4") outward from the heat-sink to enable free air convection around the drive. If the Gold Mol Whistle is enclosed in a metal chassis, we recommend that the Gold Mol Whistle be screw-mounted to it to help with heat dissipation. TheGold Mol Whistle has screw-mount holes on each corner of the heat-sink for this purpose – see below.

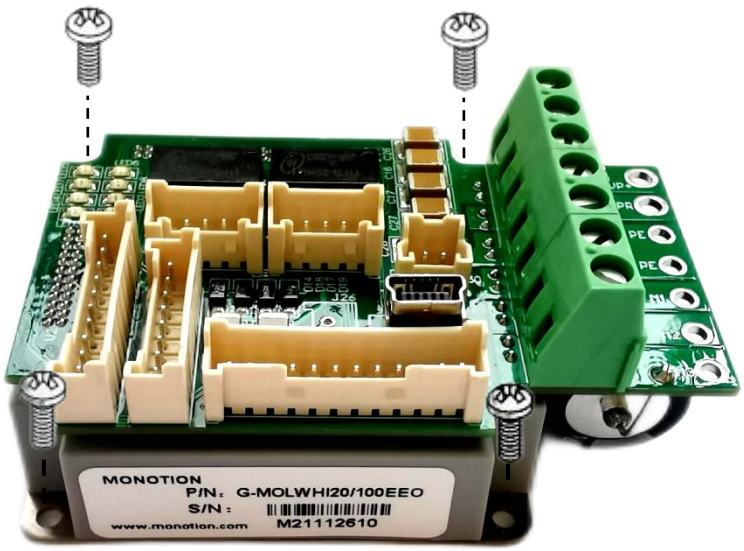


Figure 3: Mounting the Gold Mol Whistle

When the Gold Mol Whistle 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-WHI) that can be ordered for this purpose – see below.

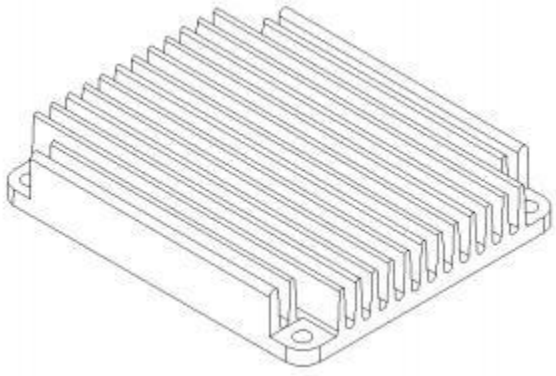


Figure 4: Gold Mol Whistle External Heat-sink

5.4. The Gold Mol Whistle Connection Diagrams

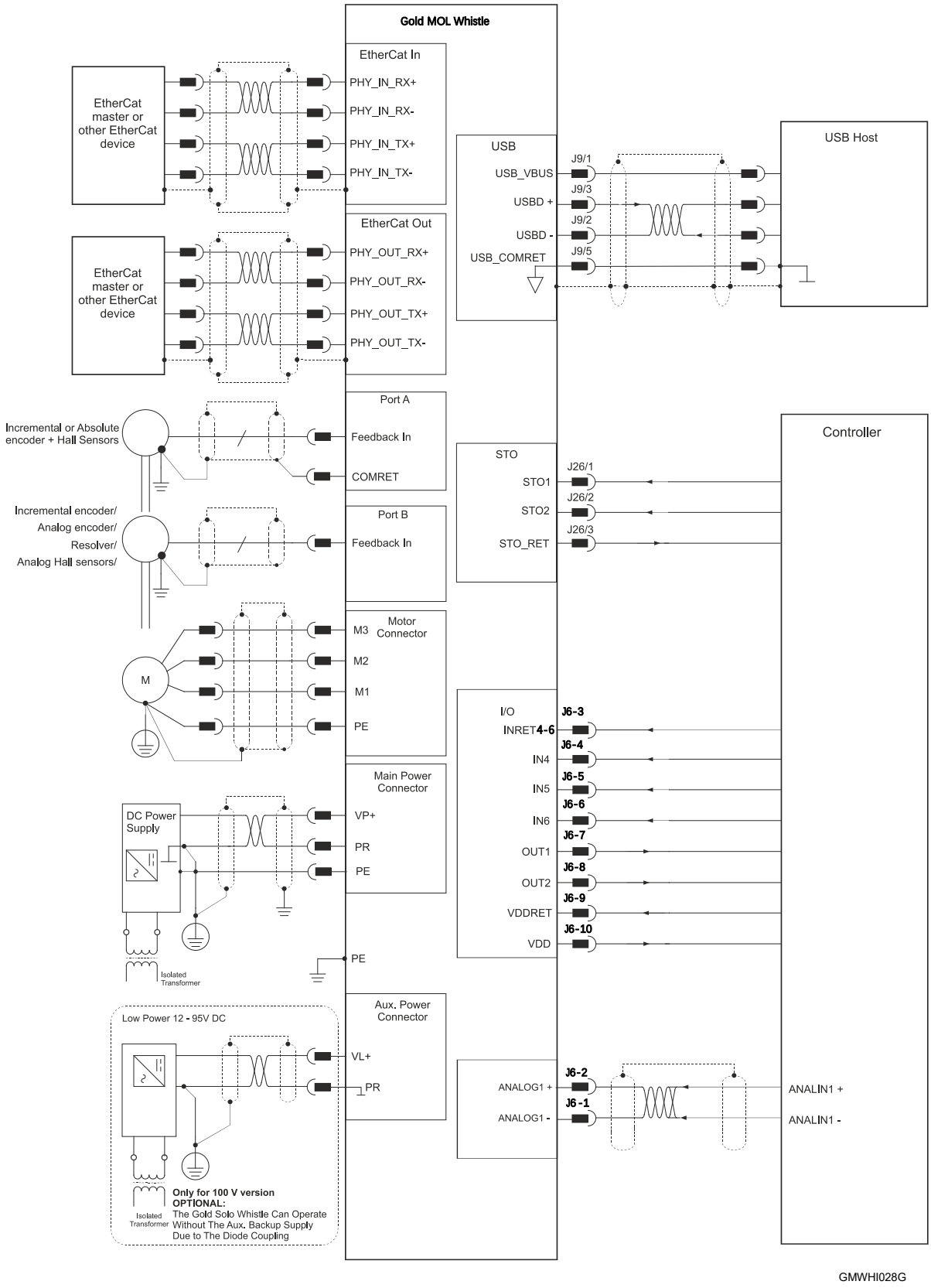


Figure 5: The Gold Mol Whistle Connection Diagram - EtherCAT

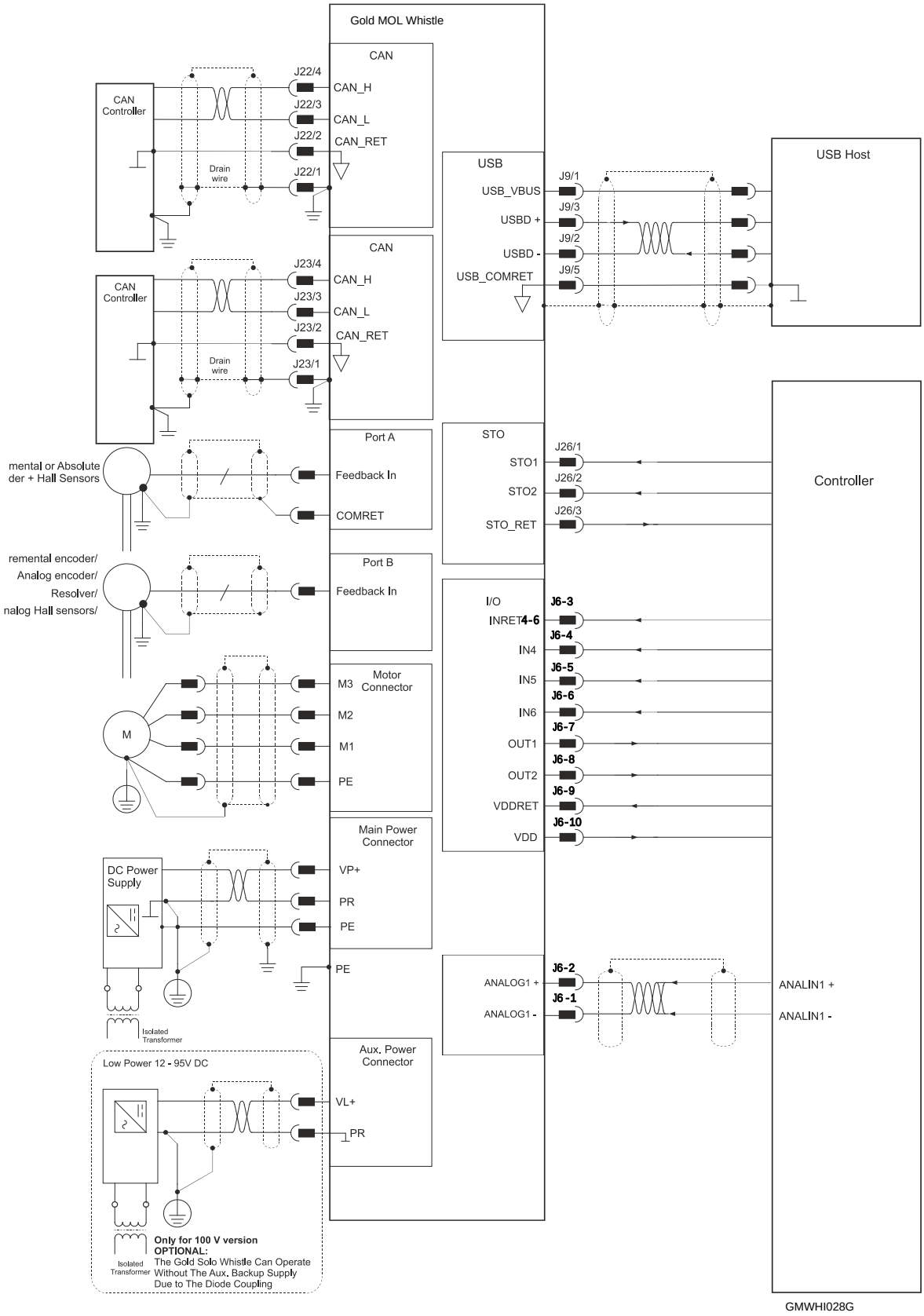
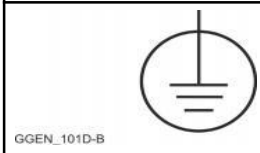
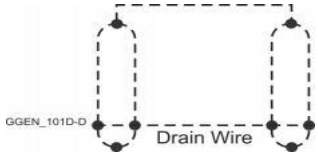
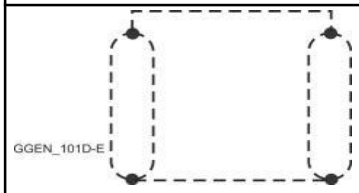
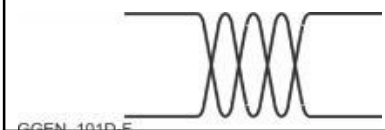
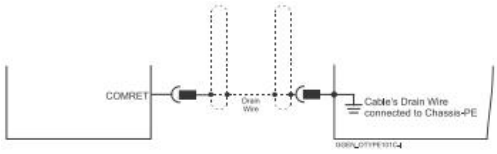


Figure 6: The Gold Mol Whistle Connection Diagram – CAN

Chapter 6: Wiring

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)
	Earth Connection
	Common at the Controller
	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
	Shielded cable braid only, without drain wire.
	Twisted-pair wires
	Analog Ground
	Encoder Earthing. The cable`s shield is connected to the chassis (PE) in the connector.Earthing the Encoder and connecting the Earth (PE) to the drive COMRET is mandatory to insure reliable operation, high noise immunity and rejection of voltage common mode interferences.

6.1. Basic Recommendations

6.1.1. 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.Use 24, 26 or 28 AWG twisted-pair shielded with drain wire cables.

2. Keep the cable as short as possible.Do not mount the power cables of the motor and power bus in the proximity of the control and feedback cables.

3. 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.

4. After completing the wiring, carefully inspect all wires to ensure tightness, good solder of joints and general safety.

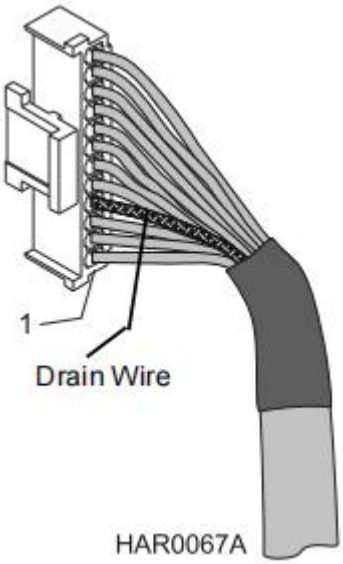


Figure 7: Feedback and Shrouded Control Cable Assemblies – Example

5. Where there is only one COMRET pin (Common Return) in the connector, which MUST be connected to the DRAIN WIRE and also to COMRET signal of the cable, it is necessary to connect the drain wire and COMRET signal to the same pin.

6.1.2. 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 Shrouded feedback connector (Figure 8).

b. At the motor, connect the feedback cable drain wire to the GND motor chassis terminal of the feedback connector (Figure 8).

The drawing displays two earth connections.

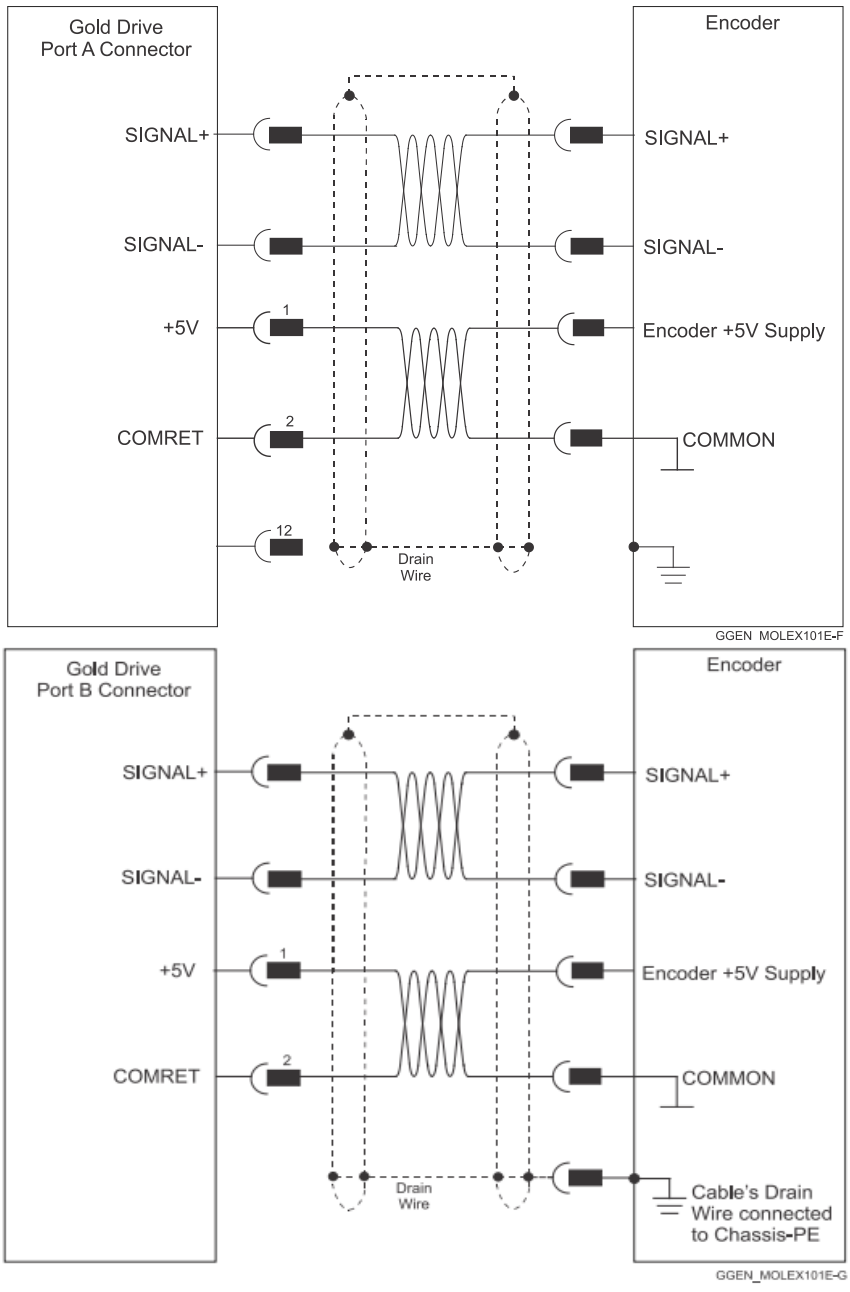


Figure 8: Feedback Port A and B Cable Assemblies

6.1.3. IO Cable Connector

It is recommended to use shielded cable, but is not mandatory.

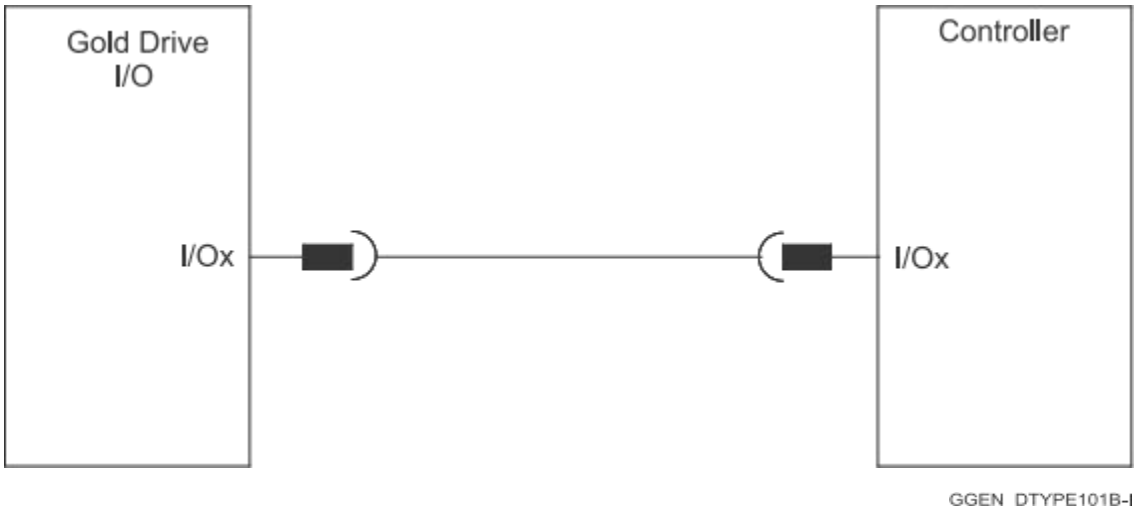


Figure 10: Feedback IO Cable Assemblies

6.1.4. STO Cable Connector

It is recommended to use shielded cable, but is not mandatory.

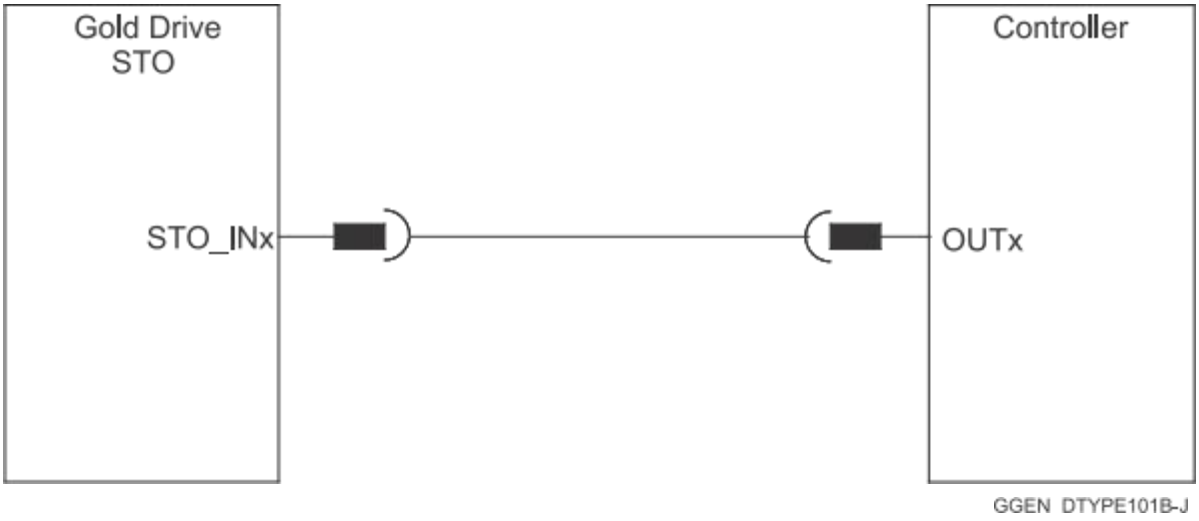


Figure 11: STO Cable Assemblies

6.2. Motor Power Connector Pinouts (J1)

See Chapter 8 in the in the MAN-G-Panel Mounted Drives Hardware manual for full details.

Pin (J1)	Signal	Function	Cable – Wires	
			Brushless Motor	**Brushed DC Motor**
4	PE	Protective earth	Motor	Motor
5	M1	Motor phase	Motor	N/C
6	M2	Motor phase	Motor	Motor
7	M3	Motor phase	Motor	Motor
Pin Positions				

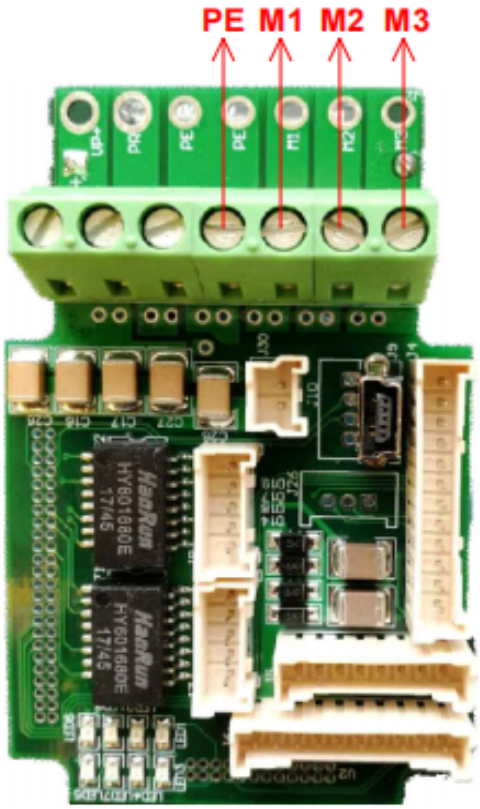


Table 3: Main Power and Motor Connections

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.

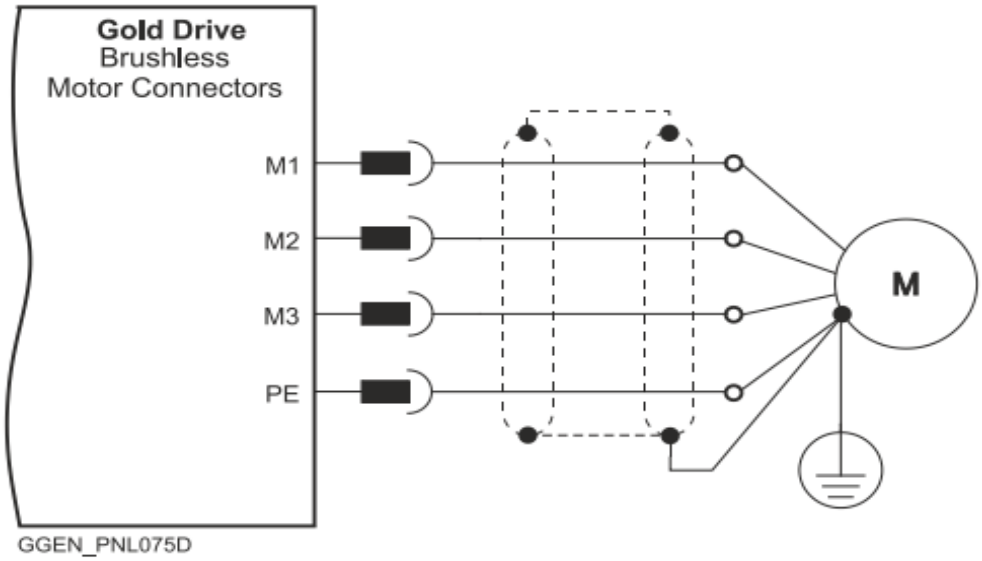


Figure 12: Brushless Motor Power Connection Diagram

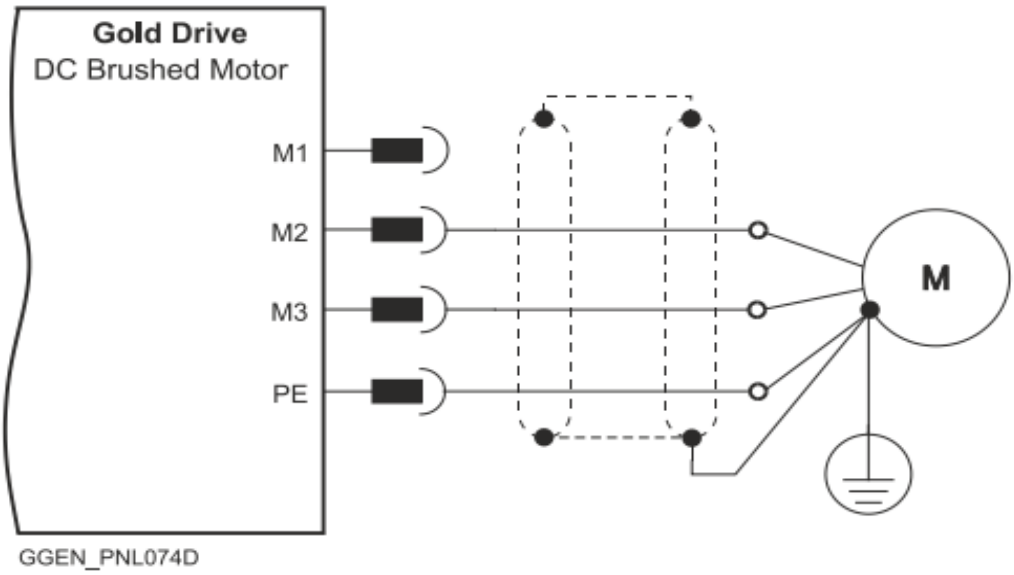


Figure 13: Brushed Motor Power Connection Diagram

6.3. Main and Auxiliary Power

The Gold Mol Whistle receives power from main and auxiliary supplies and delivers power to the motor.

6.3.1 .Description

This section describes the Main and Auxiliary Power for power ratings 200V and 100V, and provides details for the optional Backup (Auxiliary) Supply.

- The Gold Mol Whistle Power rating is 12 to 195 VDC
- There are Two power ratings for Gold Mol Whistle; 100V and 200V:

For power rating 200V
Two power isolated DC power sources are required, main power 12 - 195V and Auxiliary Power 12-95V for the logic.

For power rating of 100V
Single DC Power Supply - Power to the Gold Mol Whistle is provided by a 12–95 VDC single isolated DC power source (not included with the Gold Mol Whistle). A “smart” control-supply algorithm enables the Gold Mol Whistle to operate with only one power supply with no need for an auxiliary power supply for the logic.

Optional Backup (Auxiliary) Supply
If backup functionality is required in case of power loss, e.g., to keep the original position, a 12–95 VDC external isolated supply should be connected (via the Gold Mol Whistle’s VL+ terminal). This is more flexible than the requirement for 24 VDC supply.
If backup is not needed, a single power supply is used for both the power and logic circuits. There are two voltage ratings of the Gold Mol Whistle, therefore the correct power supply must be used, according to the maximum operating voltage of the Gold Mol Whistle. Refer to section4.2Technical Data.

6.3.2.Main Power (J1)

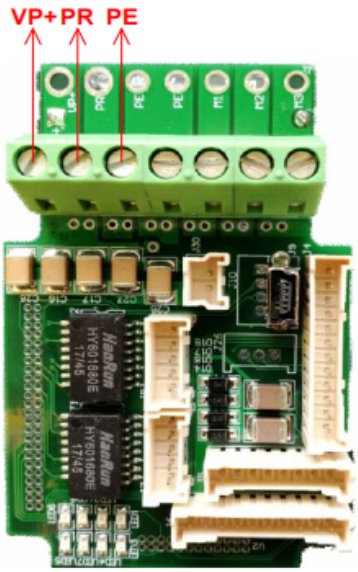
Pin (J1)	Signal	Function	Cable
1	VP+	Positive Power Input	DC Power
2	PR	Power Return	DC Power
3	PE	Protective Earth	DC Power
Pin Positions			
			

Table 4: Main Power and Motor Connections

Power to the Gold Mol Whistle is provided by a 12 to 195 VDC source.

Connect the DC power cable to the VP+ and PR terminals on the Main Power Connector.

To connect the DC power supply:

1. The source of the 12 to 195 VDC power supply must be isolated.
2. For best immunity, it is highly recommended to use twisted and shielded cables for the DC power supply. 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 ground connection near the power supply.
4. Connect the PE to the closest ground connection near the power supply.
5. Connect the PR to the closest ground connection near the power supply.
6. Before applying power, first verify the polarity of the connection.

6.3.3.Auxiliary Power Supply (J30)

Pin (J30)	Signal	Function
1	VL+	Auxiliary Supply Input
2	PR	Auxiliary Supply Return

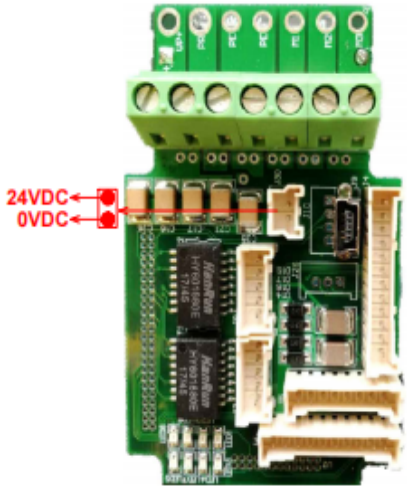
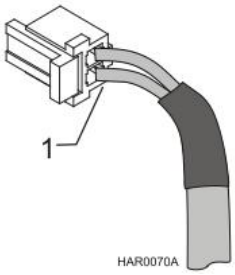
Pin Positions	Cable Connector
	 **2-Pin MOLEX** This cable is included in the cable kit described in Section 3.1.1.

Table 5: Auxiliary Supply Pins

Caution: Power from the Gold Mol Whistle to the motor must come from the Main Supply and **NOT** from the Auxiliary Supply.

The backup functionality can be used for storing control parameters in case of power-outs, providing maximum flexibility and backup capability when needed.

*Connect the VL+ and PR terminal to the **Auxiliary** Connector.*

To connect the auxiliary supply:

1. The source of the Auxiliary Supply must be isolated.
2. For safety reasons, connect the return (common) of the auxiliary supply source to the closest ground near the auxiliary supply source.
3. Connect the cable shield to the closest ground near the auxiliary supply source. A cable kit containing a cable that connects to the auxiliary supply connector (J30) is available. See Section3.1.1.
4. Before applying power, first verify the polarity of the connection.

6.3.4.Connectivity

6.3.4.1. Power Rating 200 V

For Power Rating 200 V, two power isolated DC power sources are required, main power **12 - 195V** and auxiliary Power **12-95V** for the logic.

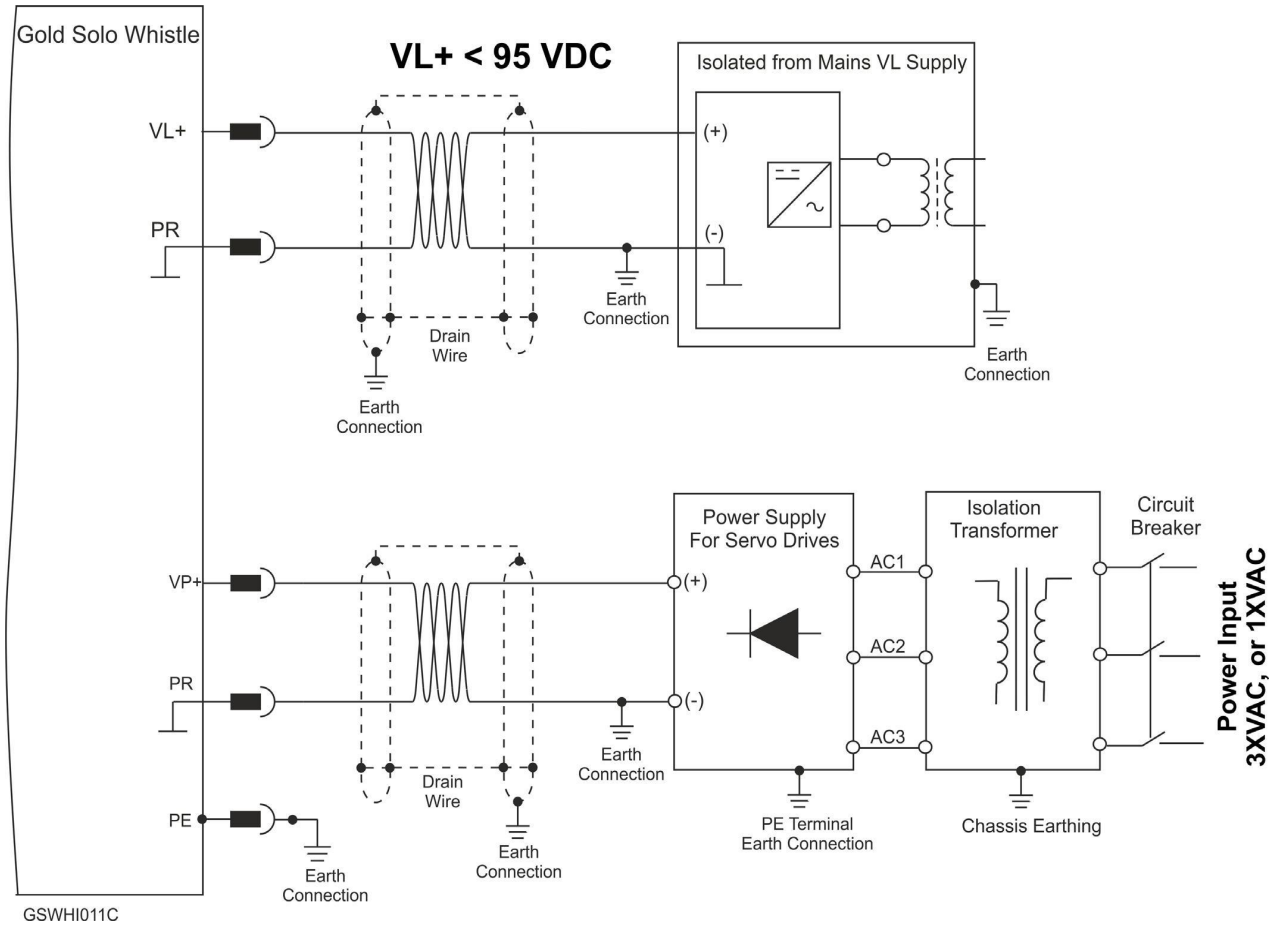


Figure 14: 200 VDC Power Source Connection Diagram

6.3.4.2. Power Rating 100 V

6.3.4.2.a Single Power Supply

For power rating 100 V , a single Power Supply is required which contains a “smart” control-supply algorithm, enabling the Gold Mol Whistle to operate with only one power supply with no need for an auxiliary power supply for the logic.

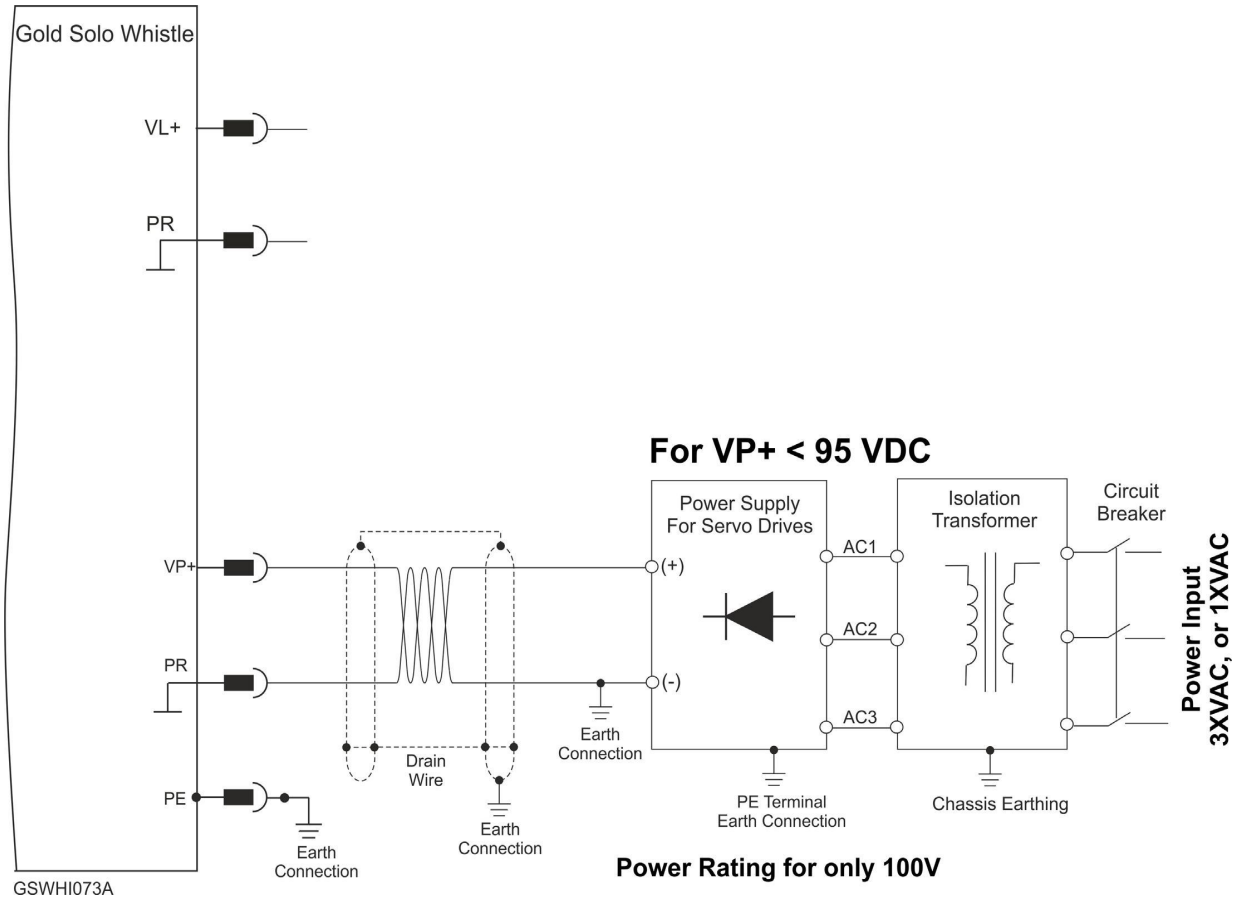


Figure 15: Main Power Supply Connection Diagram (No Auxiliary Supply)

6.3.4.2.b Optional Backup Supply

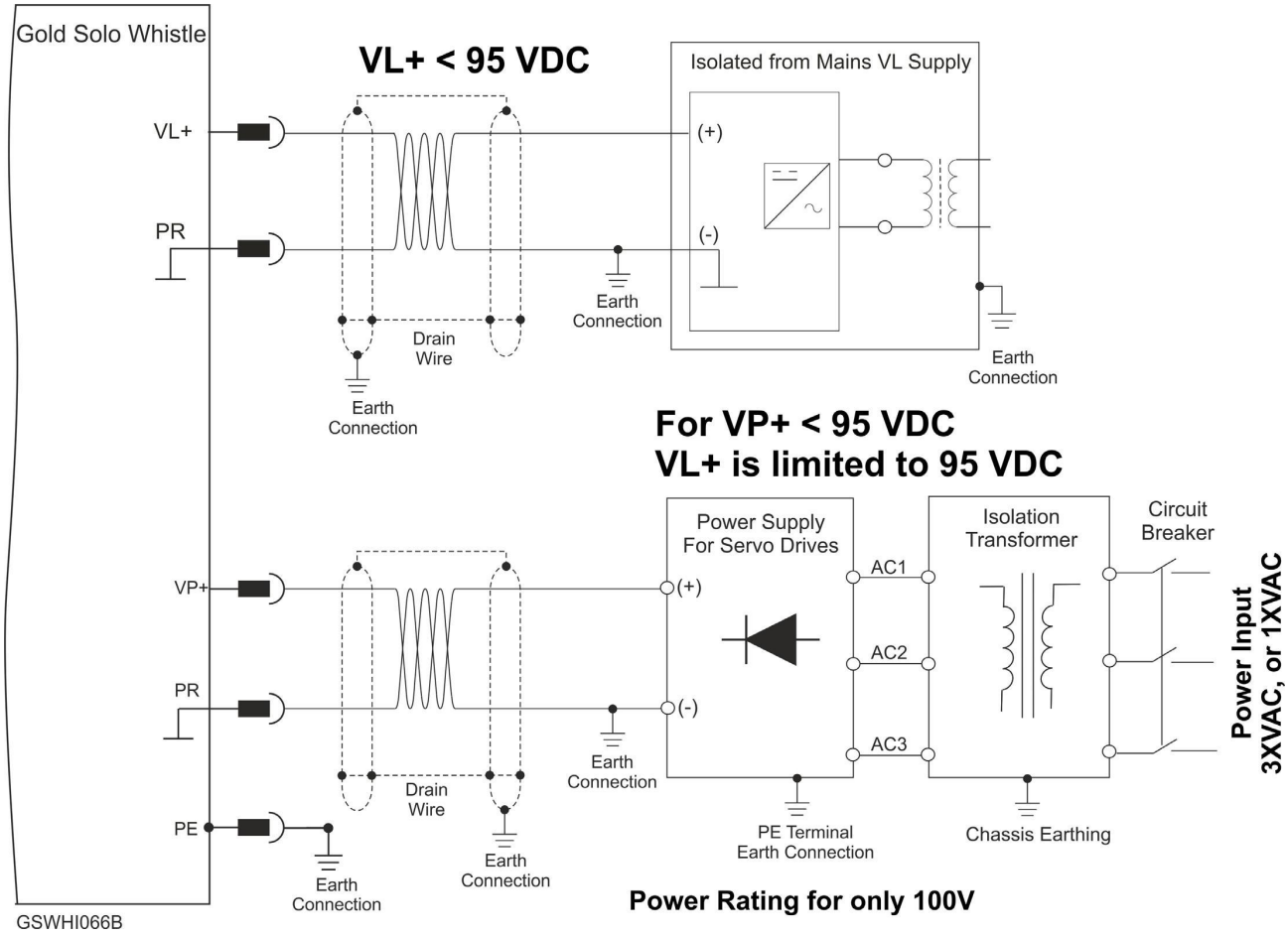
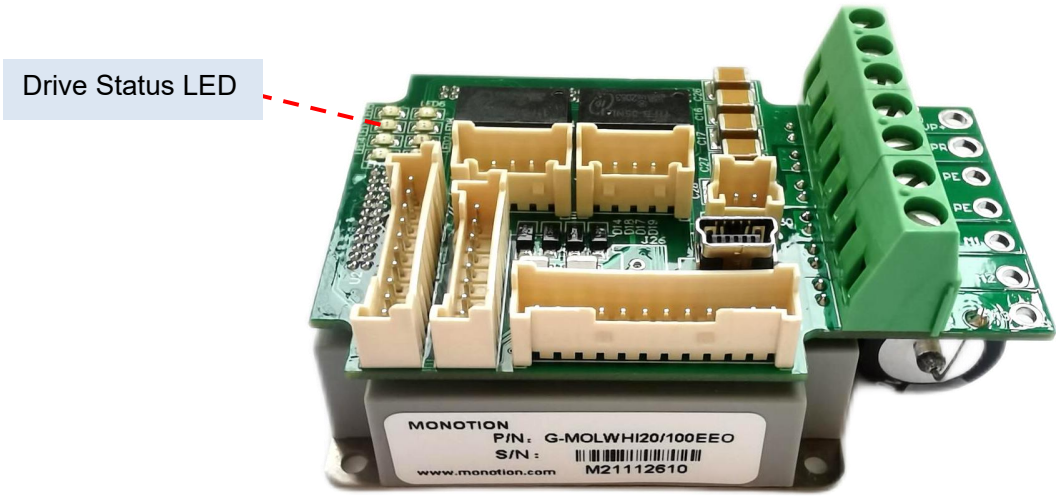


Figure 16: Auxiliary Supply Connection Diagram

6.4. Drive Status Indicator

Figure 17shows the position of the red/green dual LED, which is used for immediate indication of the Initiation and Working states. For details refer to Chapter 7 Drive Status Indicator, in the MAN-G-Panel Mounted Drives Hardware manual.



Drive Status Indicator - EtherCAT

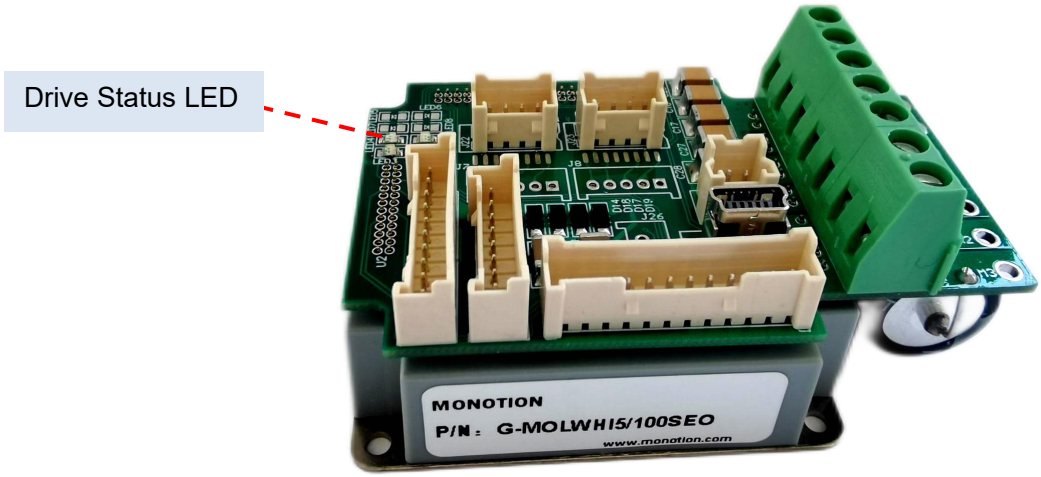


Figure 17: Drive Status Indicator - CAN

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

- **Initiation state:** In this state the LED indicates whether the drive is in the boot state (blinking red) or in the operational state (steady red).
- **Working state:** In this state the LED indicates whether the drive is in an amplifier failure state (red) or is ready to enable the motor (green).

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

6.5. STO (Safe Torque Off) (J26)

See Chapter 9 in the in the MAN-G-Panel Mounted Drives Hardware manual for full details.

Pin (J26)	Signal	Function
1	STO1	STO 1 input (24V for PLC voltages)
2	STO2	STO 2 input (24V for PLC voltages)
3	STO_RET	STO signal return

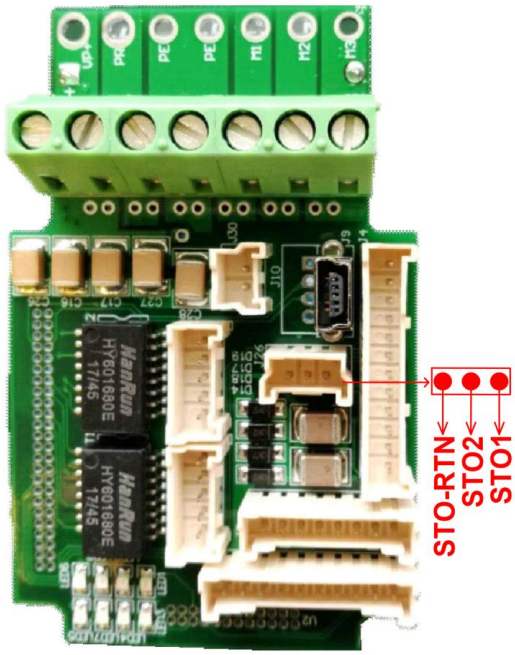
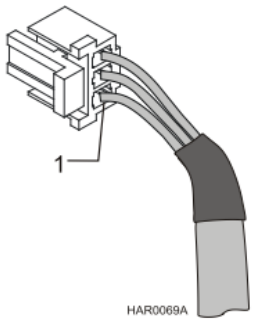
Pin Positions	Cable Connector
	 **3-Pin MOLEX** This cable is included in the cable kit described in Section3.1.1.

Table 6: STO Input Pin Assignments

6.5.1. Source Mode – PLC Voltage Level

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

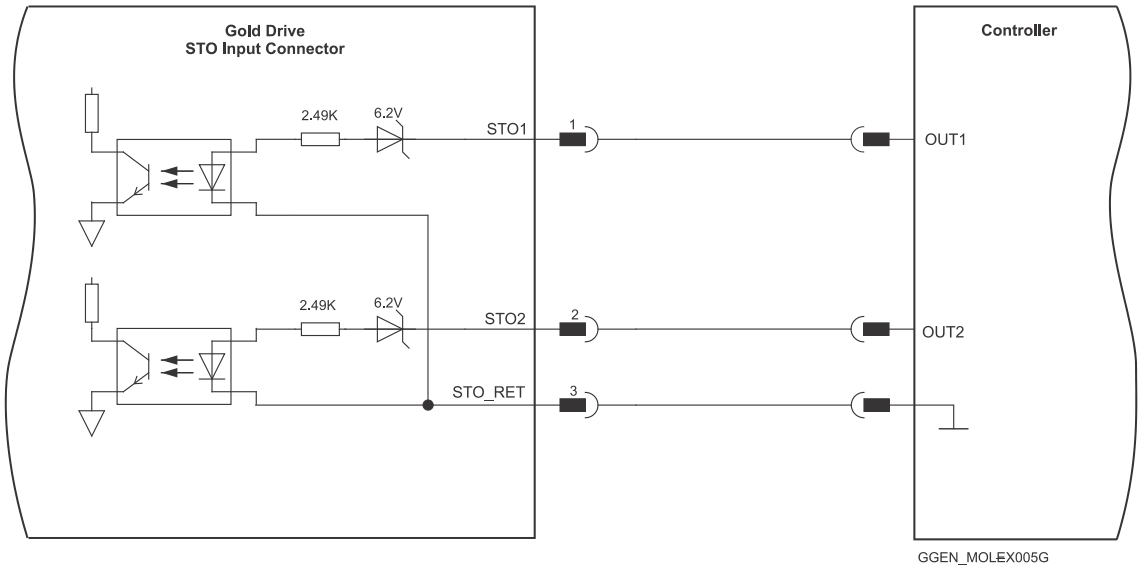
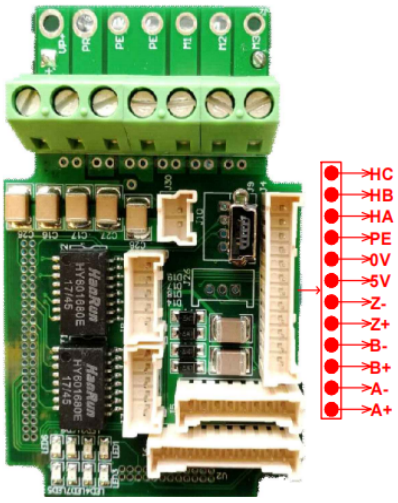


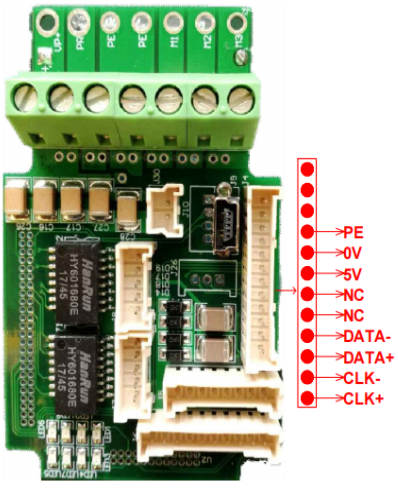
Figure 18: STO Shrouded Type Input Connection – PLC Source Option

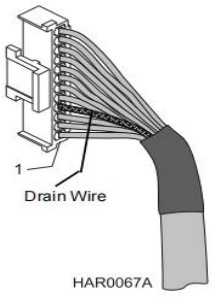
6.6. Port A Connector (J4)

See Section 10.3 in the in the MAN-G-Panel Mounted Drives Hardware manual for full details.

	Incremental Encoder		Absolute Serial Encoder	
Pin (J4)	**Signal**	**Function**	**Signal**	**Function**
1	HC	Hall sensor C	HC	Hall sensor C
2	HB	Hall sensor B	HB	Hall sensor B
3	HA	Hall sensor A	HA	Hall sensor A
4	COMRET	Common Return	COMRET	Common Return
5	COMRET	Common Return	COMRET	Common Return
6	+5V	Encoder +5V supply	+5V	Encoder +5V supply
7	PortA_ENC_INDEX-	Index -	Reserved	Reserved
8	PortA_ENC_INDEX+	Index+	Reserved	Reserved
9	PortA_ENC_B-	Channel B -	ABS_DATA-	Absolute encoder data -
10	PortA_ENC_B+	Channel B+	ABS_DATA+	Absolute encoder data+
11	PortA_ENC_A-	Channel A -	ABS_CLK-	Absolute encoder clock-
12	PortA_ENC_A+	Channel A +	ABS_CLK+	Absolute encoder clock+
Pin Positions			**Cable Connector**	







12-Pin MOLEX

This cable is included in the cable kit described in Section 3.1.1.

Table 7: Port A Pin Assignments

6.6.1. Incremental Encoder

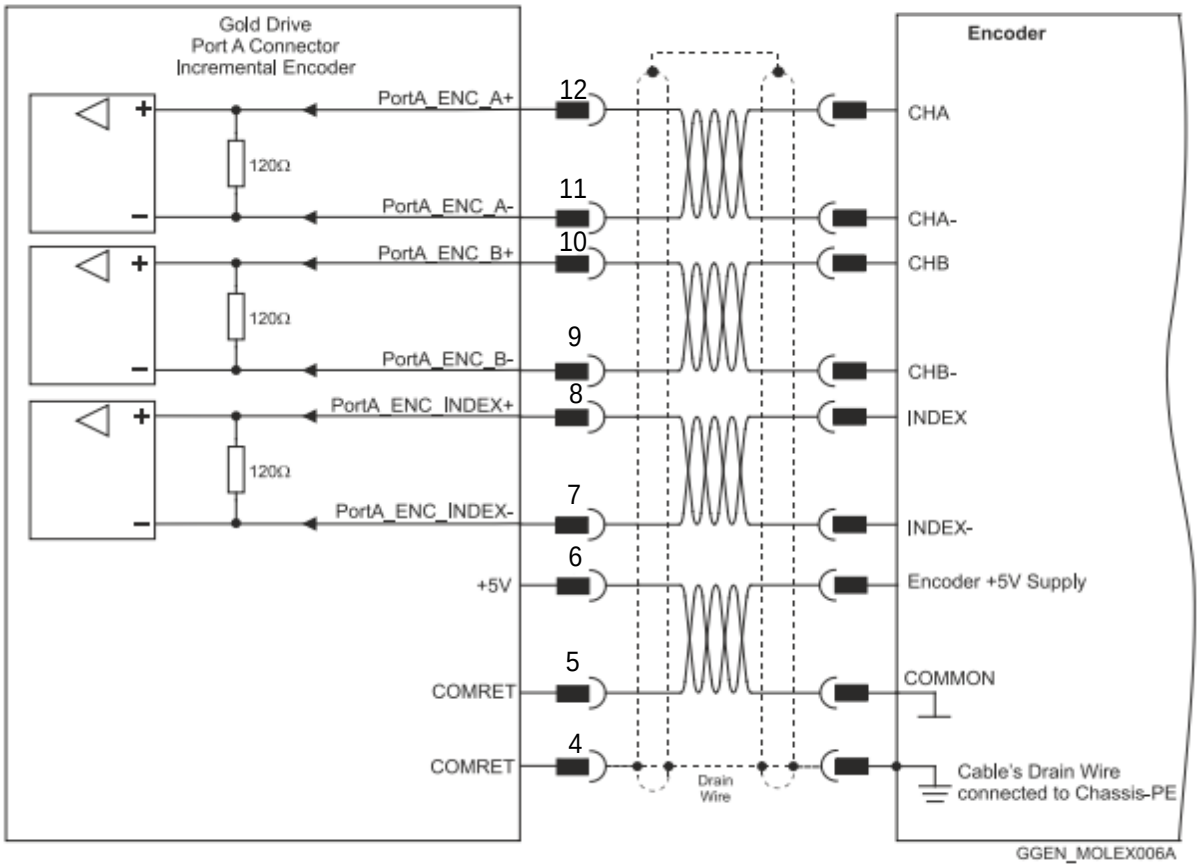


Figure 20: Port A Shrouded Type Incremental Encoder Input – Recommended Connection Diagram

6.6.2. Halls Sensor

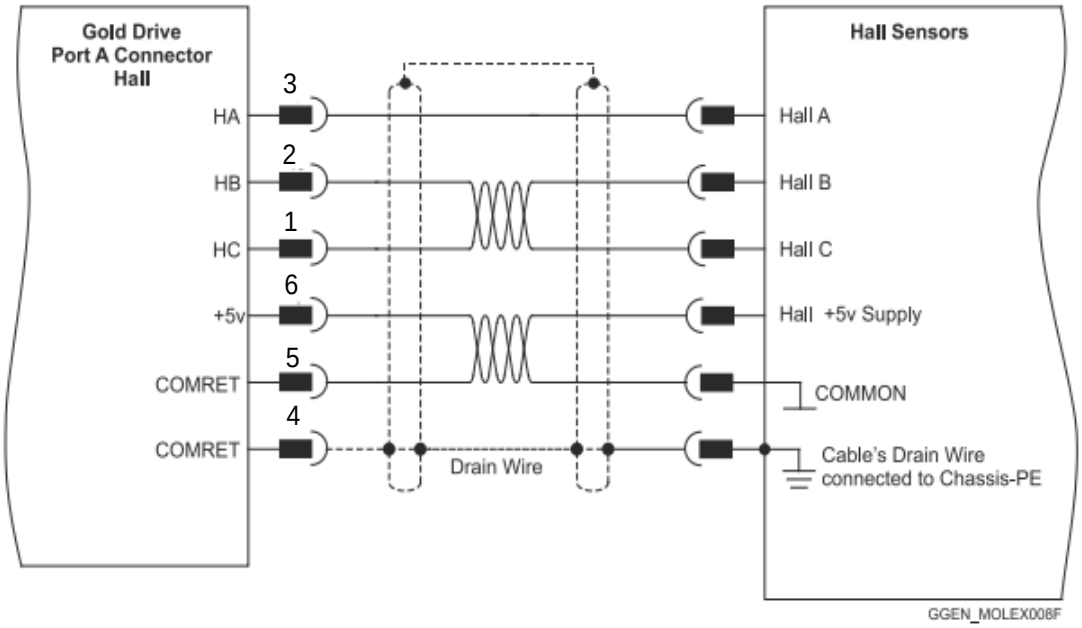


Figure 21: Shrouded Type Hall Sensors Connection Diagram

6.6.3. Absolute Serial Encoder

The following figures describe the connections at Port A for the Absolute Serial type encoders.

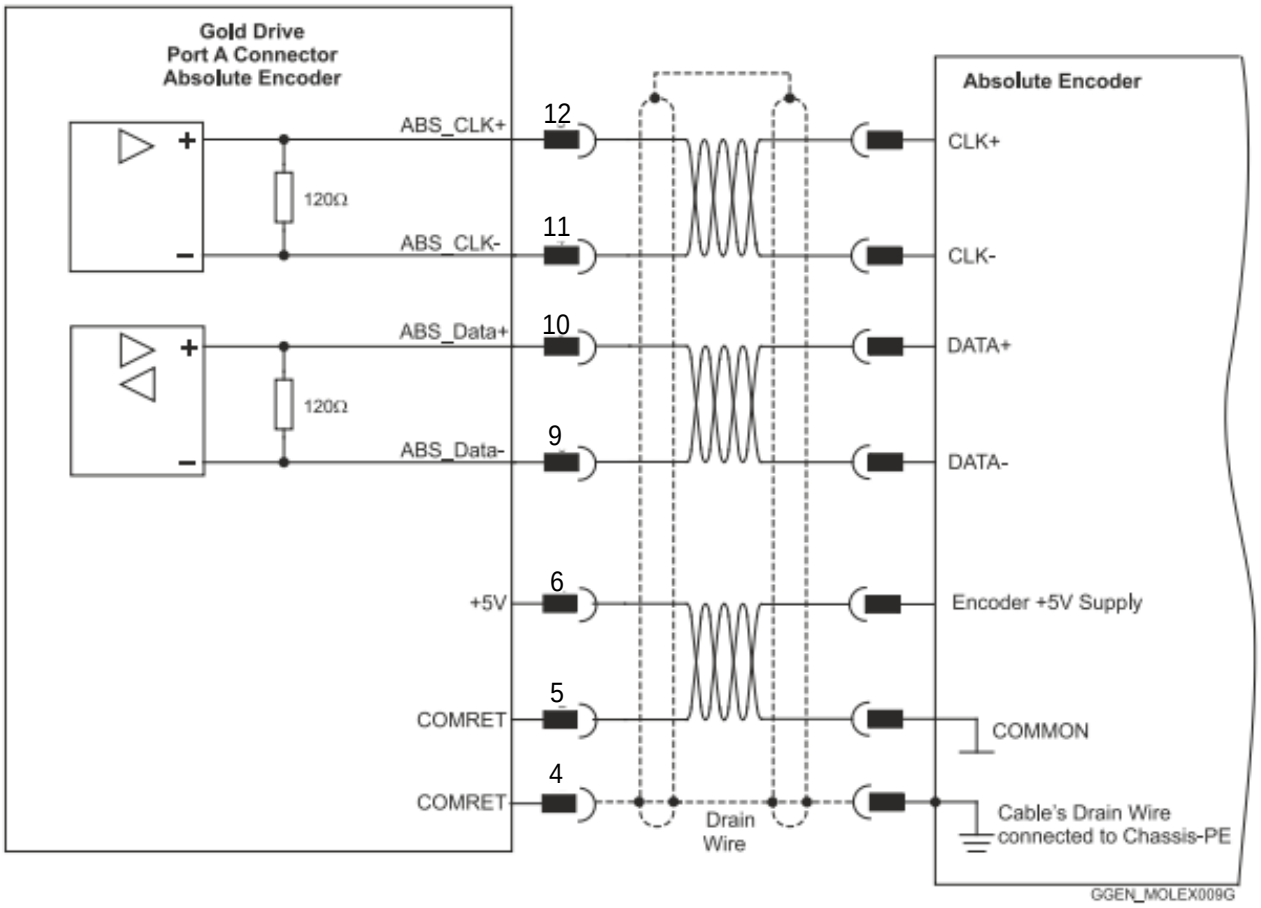


Figure 22: Absolute Serial Encoder – Recommended Connection Diagram for EnDAT, Biss, SSI

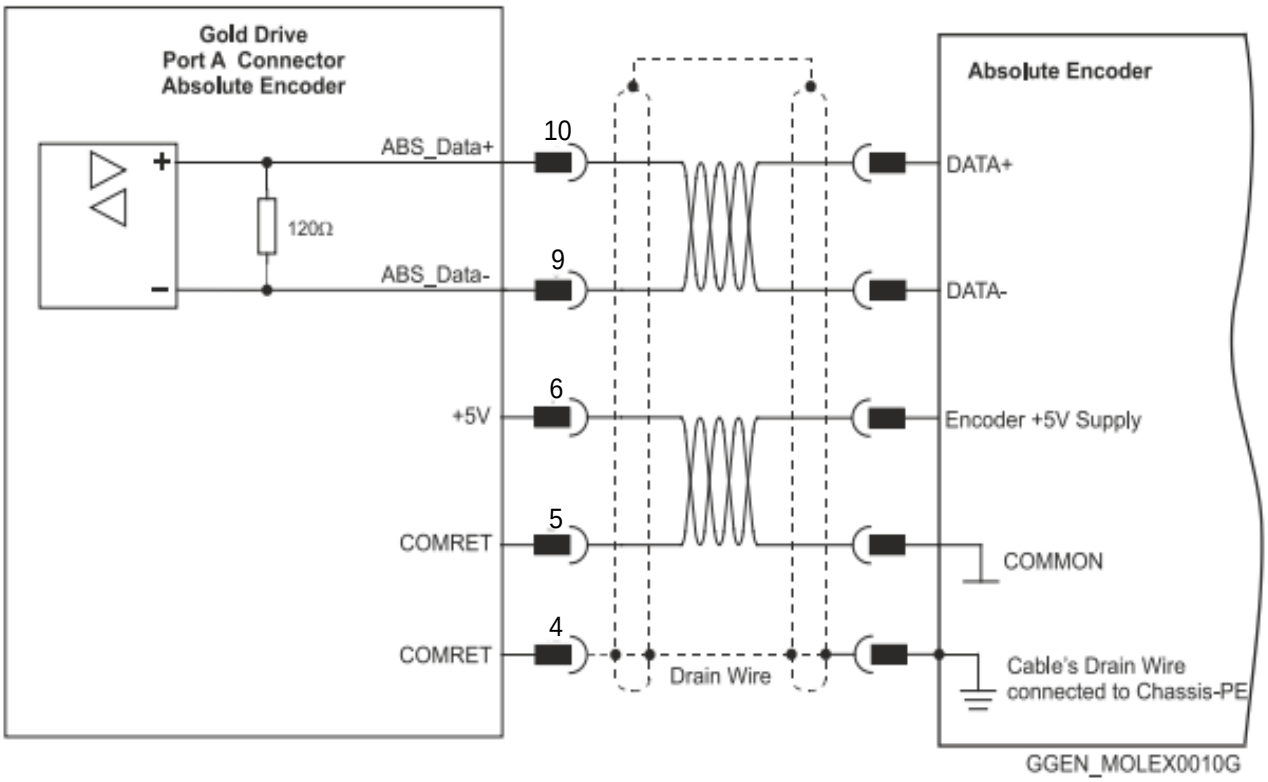
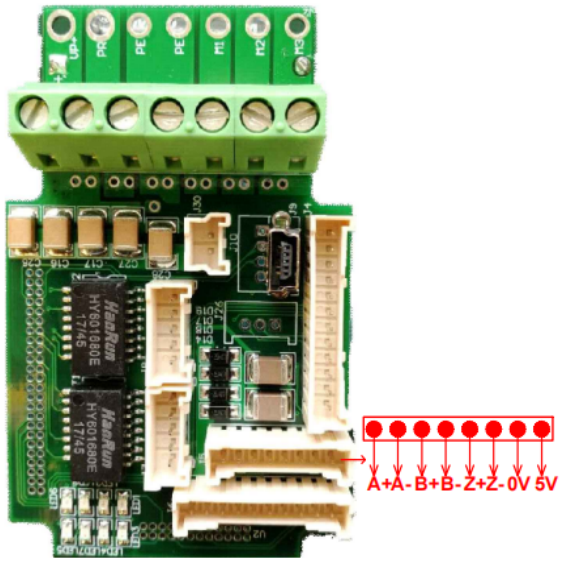


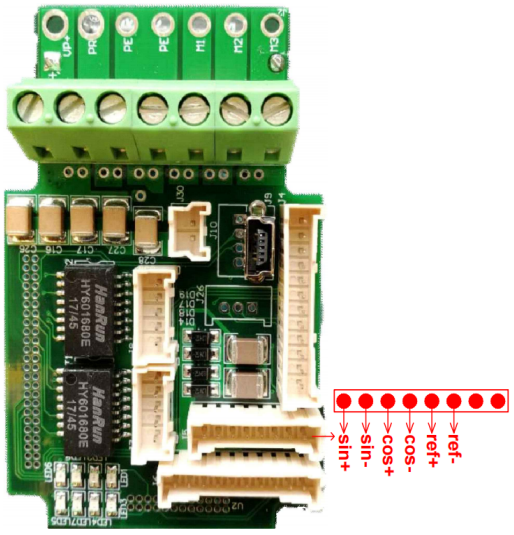
Figure 23: Absolute Serial Encoder – Recommended Connection Diagram for Sensors Supporting Data Line Only (NRZ types, e.g., Panasonic / Mitutoyo / Sanyo Danki / Tamagawa)

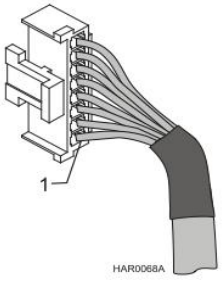
6.7. Port B Connector (J5)

See Section 10.4 in the in the MAN-G-Panel Mounted Drives Hardware manual for full details.

	Incremental or Interpolated Analog Encoder		Resolver	
	G-MOLWHIXXX/YYYYEX		G-MOLWHIXXX/YYYYRX	
Pin (J5)	Signal	Function	Signal	Function
8	PortB_ENC_A+/SIN+	Channel A+/Sine+	SIN+	Sine+
7	PortB_ENC_A-/SIN-	Channel A -/Sine-	SIN-	Sine-
6	PortB_ENC_B+/COS+	Channel B+/Cosine+	COS+	Cosine+
5	PortB_ENC_B-/COS-	Channel B-/Cosine-	COS-	Cosine-
4	PortB_ENC_INDEX +/ Analog_Index+	Channel_Index+/ Analog_Index+	RESOLVER_OUT+	Vref f=1/TS, 50 mA Max.
3	PortB_ENC_INDEX -/ Analog_Index-	Channel_Index- / Analog_Index-	RESOLVER_OUT-	Vref complement f= 1/TS, 50 mA Max.
2	COMRET	Common Return	COMRET	Common Return
1	+5V	Encoder +5V supply	NC	
Pin Positions			Cable Connector	







8-Pin MOLEX

This cable is included in the cable kit described in Section3.1.1.

Table 8: Port B Pin Assignments

6.7.1. Incremental Encoder

The following figure describes the connections at Port B for the Incremental encoder.

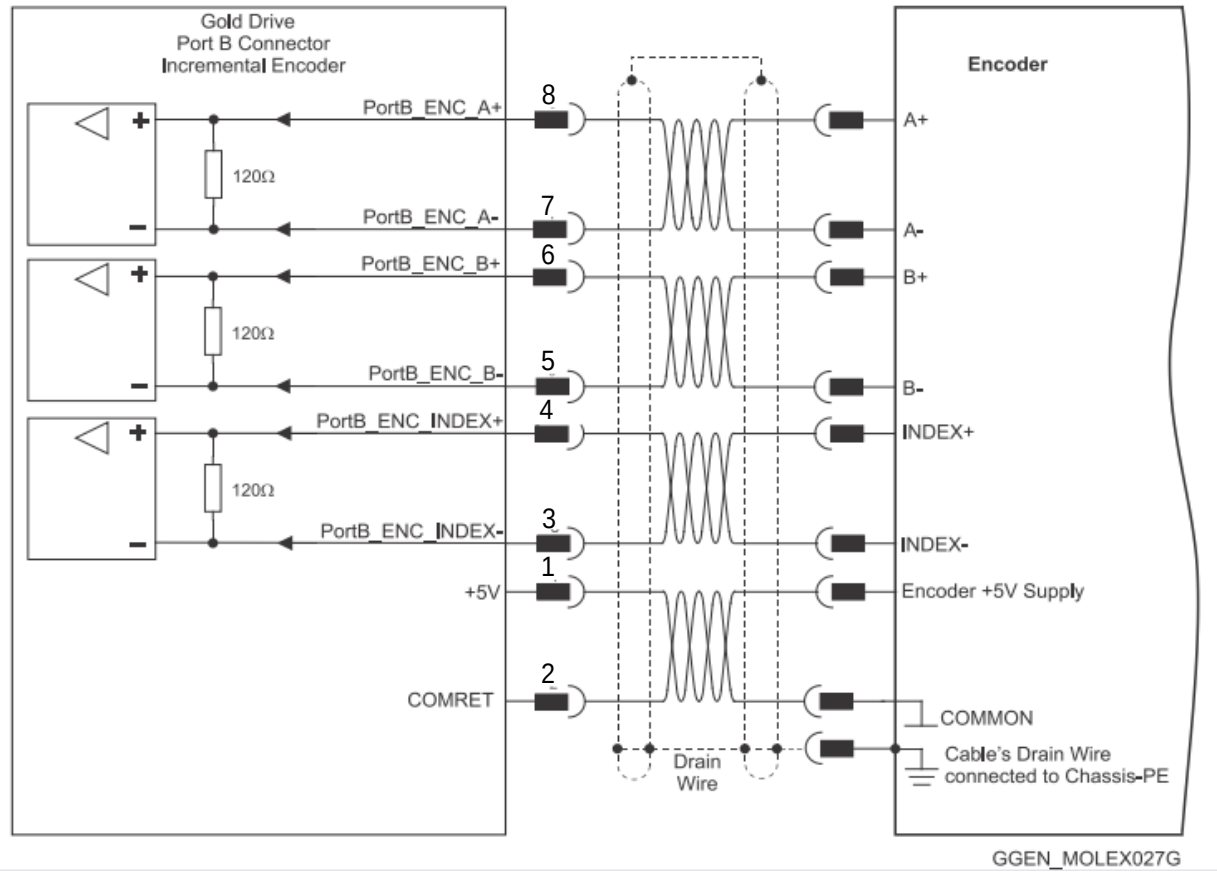


Figure 25: Port B Incremental Encoder Input – Recommended Connection Diagram

6.7.2. Resolver

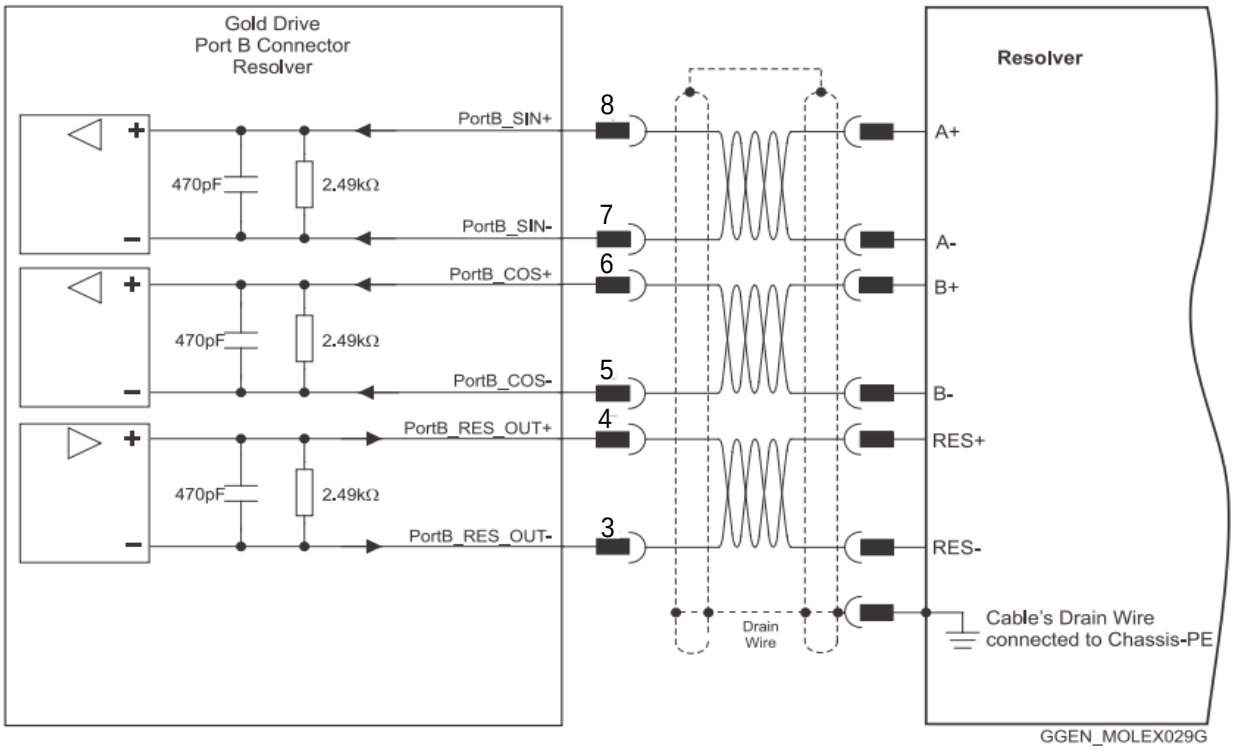


Figure 27: Port B – Resolver Shrouded Type Connection Diagram

6.8. Digital I/Os, and Analog Inputs (J6)

Pin (J6)	Signal	Function
10	VDD	24V Power supply.
9	0V	0V
8	OUT2	Programmable output 2
7	OUT1	Programmable output 1
6	IN6	Programmable input 6 (High speed)
5	IN5	Programmable input 5 (High speed)
4	IN4	Programmable input 4 (High speed)
3	0V	0V
2	ANALOG1+	Analog input
1	ANALOG1-	Analog input complement

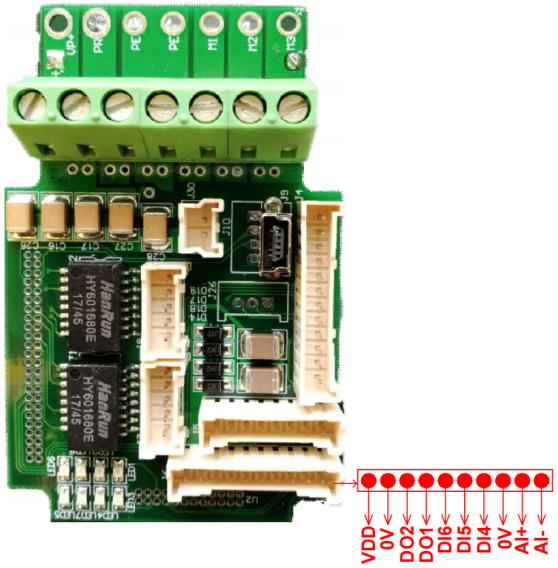
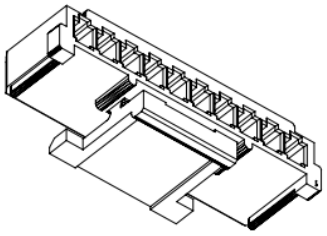
Pin Positions	Cable Connector
	 **10-pin molex Plug** This cable is included in the cable kit described in Section3.1.1.

Table 9: Digital I/Os, and Analog Inputs

6.8.1. Analog Input

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

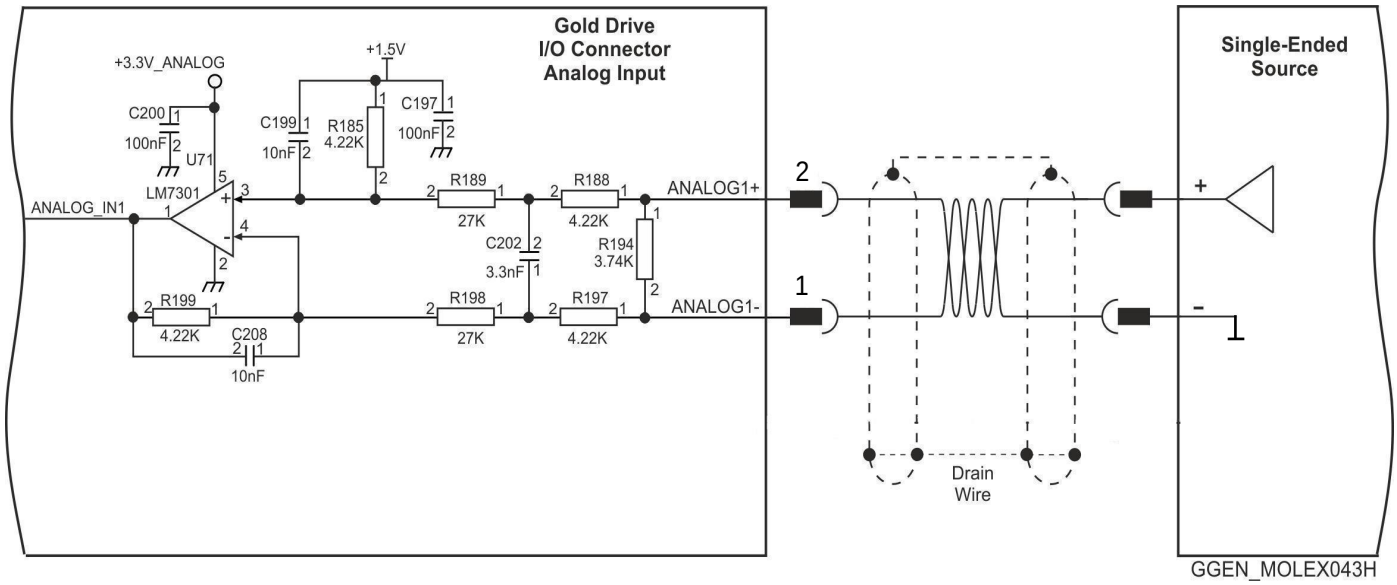


Figure 29: Differential Analog Input

6.8.2. Digital Input and Output PLC Source Mode

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

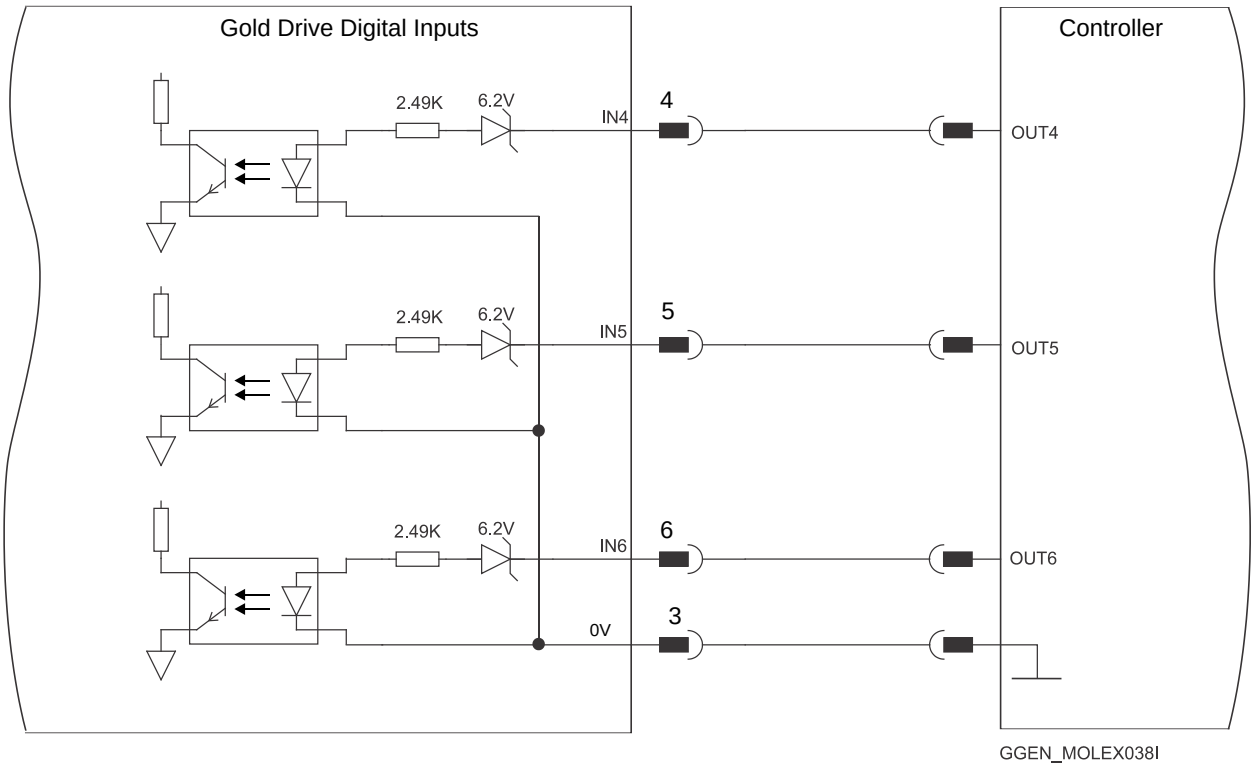


Figure 32: Digital Input Connection Diagram – Source PLC Option

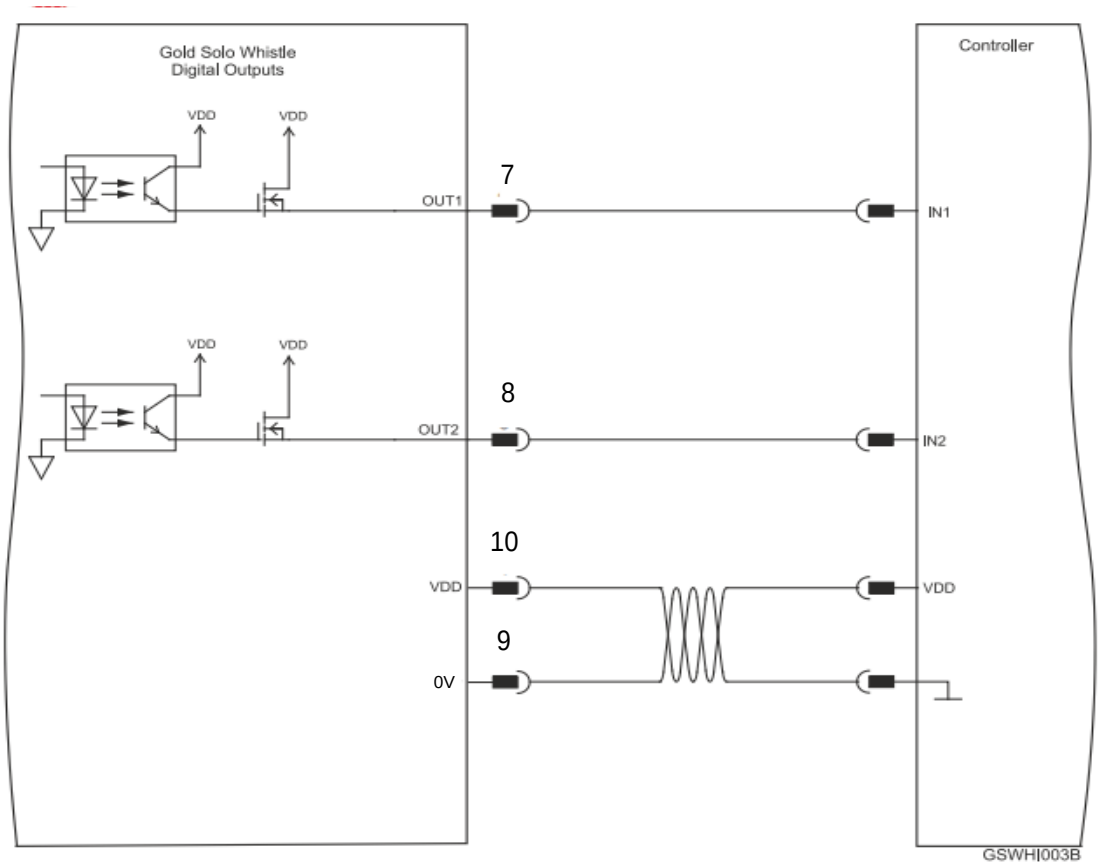


Figure 33: Digital Output Connection Diagram – Source PLC Option

6.8.3. Digital Input and Output Sink Mode

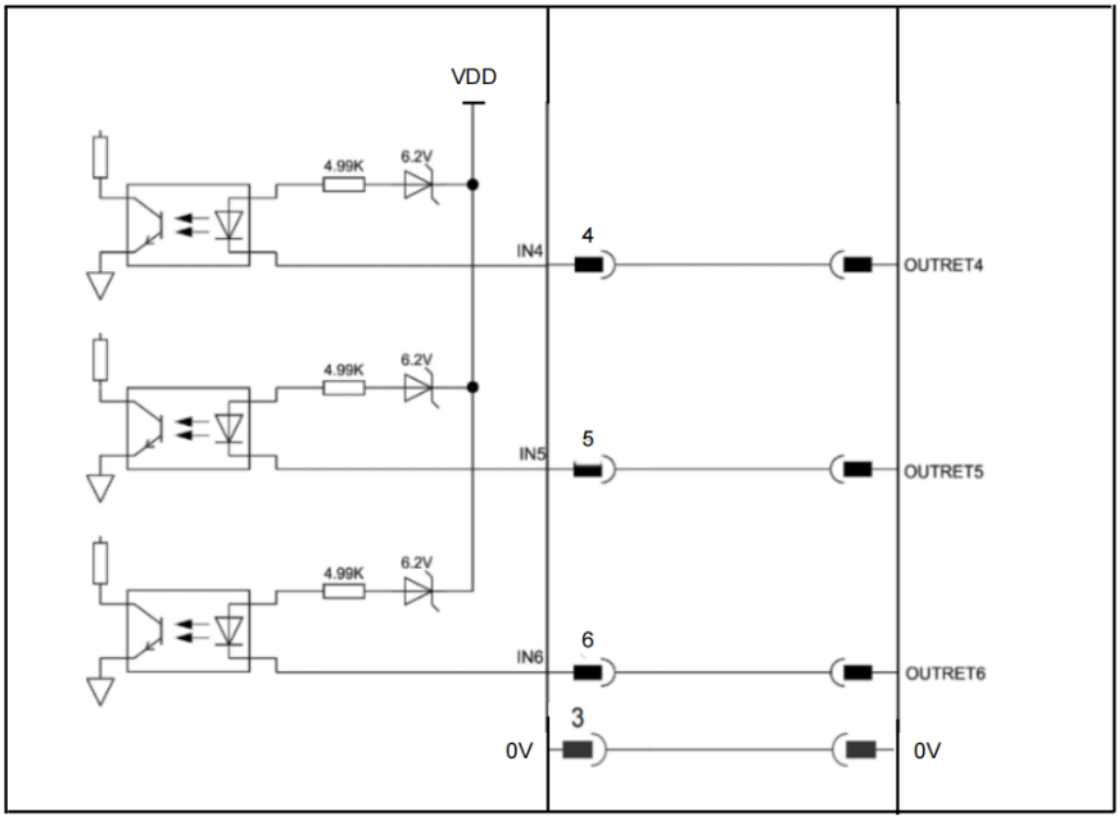


Figure34:Digital Input Connection Diagram Example – Sink

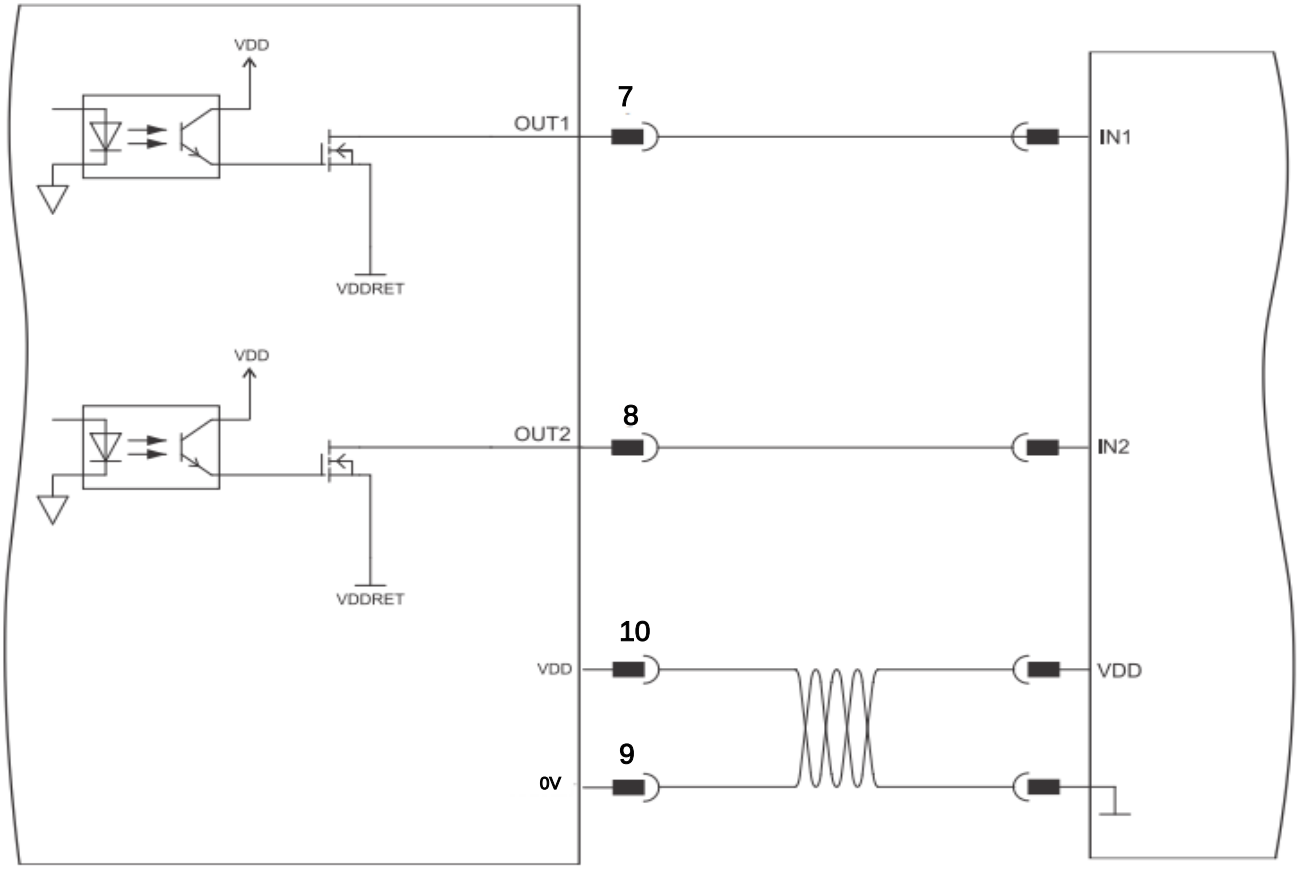


Figure35:Digital Output Connection Diagram Example – NPN

6.9. USB 2.0 (J9)

See Section 12.1 in the in the MAN-G-Panel Mounted Drives Hardware manual for full details.

Pin (J9)	Signal	Function
1	USB VBUS	USB VBUS 5 V
2	USBD-	USB _N line
3	USBD+	USB _P line
5	USB COMRET	USB communication return

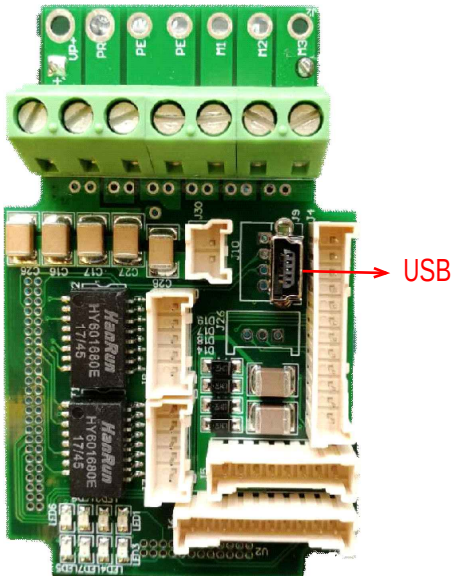
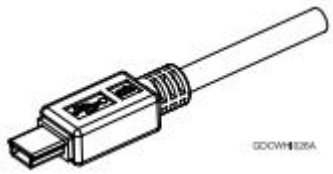
Pin Positions	Cable Connector
	 USB Device Mini-B Plug

Table 9: USB Device Mini-B - Pin Assignments

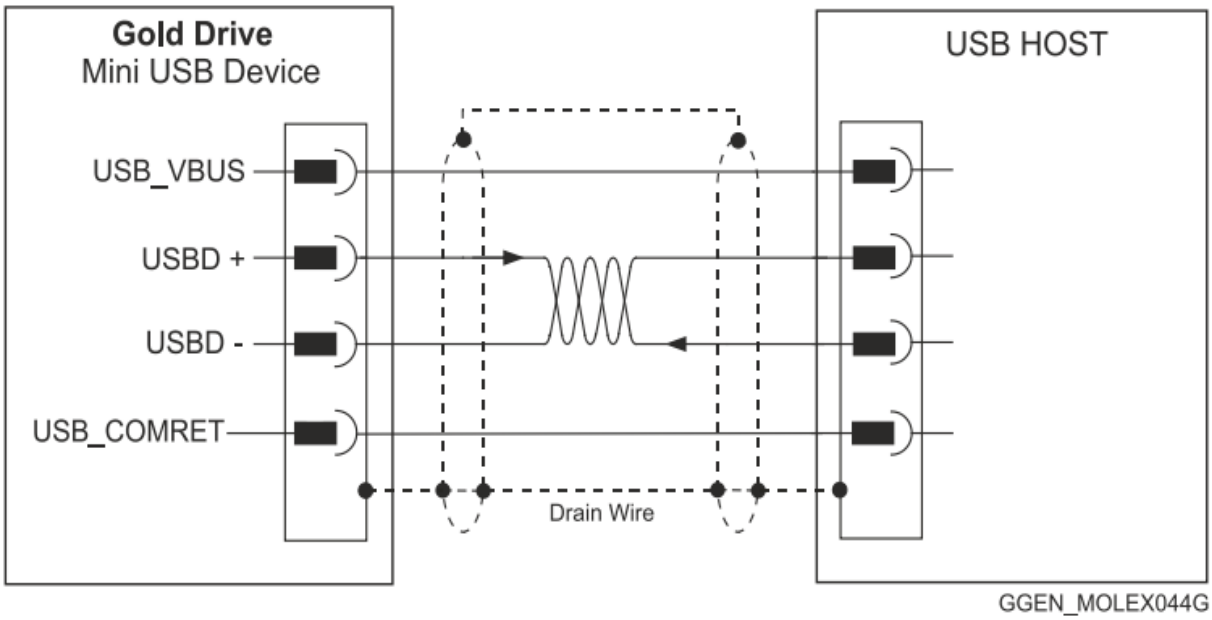


Figure 34: USB Network Diagram

6.10. EtherCAT Communications Version

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

Fieldbus Type	Product Number
EtherCAT	G-MOLWHI XX/YYY**E**XX

6.10.1. EtherCAT IN/Ethernet Connector (J7)

Refer to section 12.2 in the MAN-G-Panel Mounted Drives Hardware manual for more details.

Pin (J7)	Signal	Function
1	PE	
2	EtherCAT_IN_TX-/Ethernet_TX-	EtherCAT in/Ethernet transmit -
3	EtherCAT_IN_TX+/Ethernet_TX+	EtherCAT in/Ethernet transmit +
4	EtherCAT_IN_RX-/Ethernet_RX-	EtherCAT in/Ethernet receive -
5	EtherCAT_IN_RX+/Ethernet_RX+	EtherCAT in/Ethernet receive +

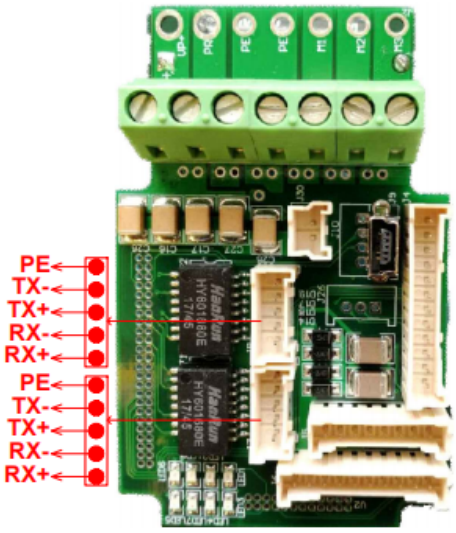
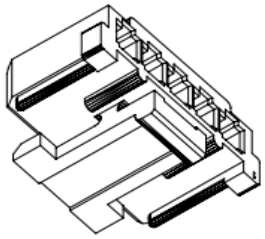
Pin Positions	Cable Connector
	 **5-pin molex Plug** This cable is included in the cable kit described inSection3.1.1.

Table 11: EtherCAT IN - Pin Assignments

6.10.2. EtherCAT OUT Connector (J8)

See Section 12.2 in the MAN-G-Panel Mounted Drives Hardware manual for the electrical diagram.

Pin (J8)	Signal	Function
1	PE	
2	EtherCAT_OUT_TX-	EtherCAT out transmit -
3	EtherCAT_OUT_TX+	EtherCAT out transmit +
4	EtherCAT_OUT_RX-	EtherCAT out receive -
5	EtherCAT_OUT_RX+	EtherCAT out receive +

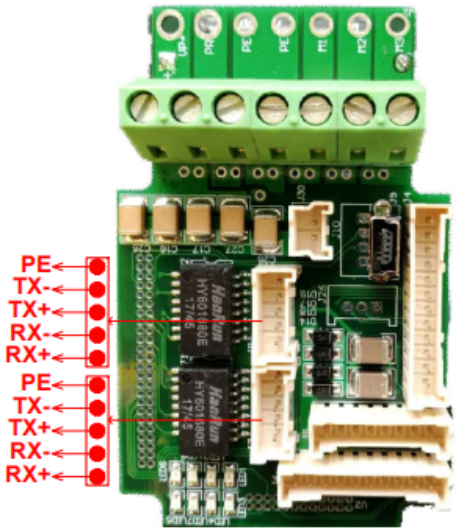
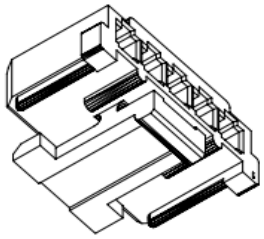
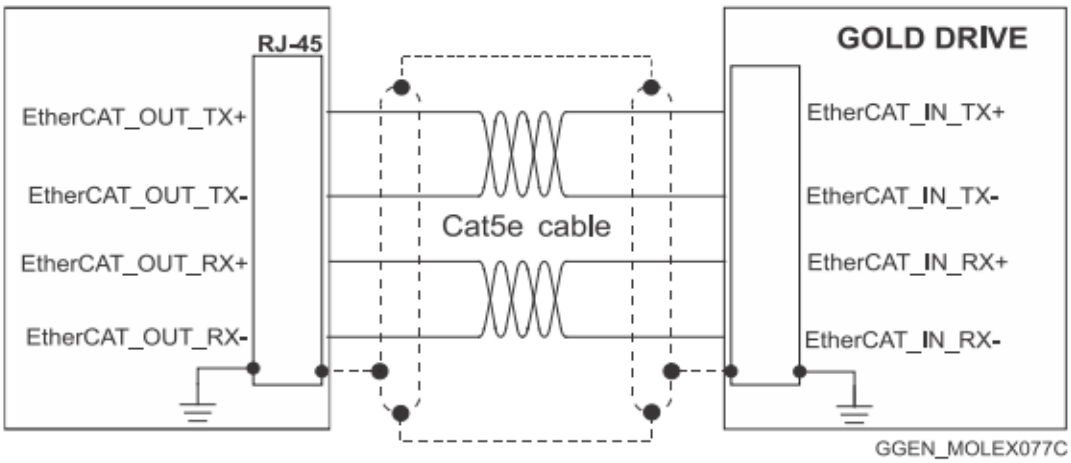
Pin Positions	Cable Connector
	 **5-PIN MOLEX Plug** This cable is included in the cable kit described in Section 3.1.1.

Table 12: EtherCAT OUT - Pin Assignments

6.10.3. EtherCAT Wiring

Figure 36 describes the wiring diagram for the EtherCAT connections.



6.11. CAN Communications Version

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

Fieldbus Type	Product Number
CAN	G-MOLWHI XX/YYY**S**XX

See Section 12.4 in the MAN-G-Panel Mounted Drives Hardware manual for the electrical diagram.

Pin (J22, J23)	Signal	Function
1	PE	Protective Earth
2	COMRET (CAN_RET)	CAN Return
3	CAN_L	CAN_L bus line (dominant low)
4	CAN_H	CAN_H bus line (dominant high)

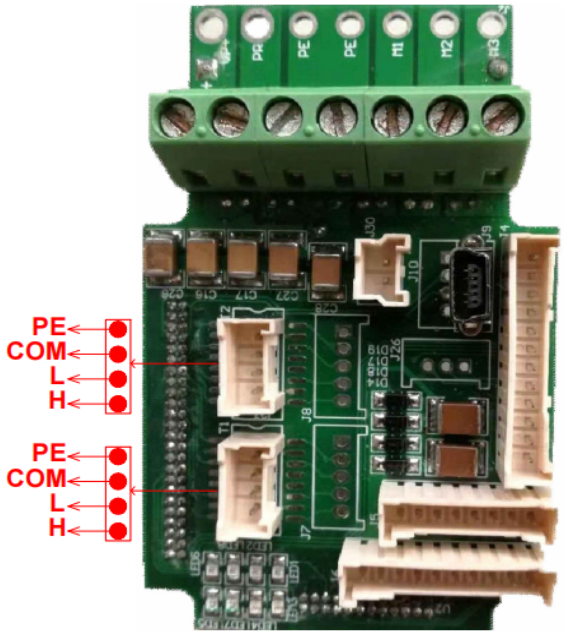
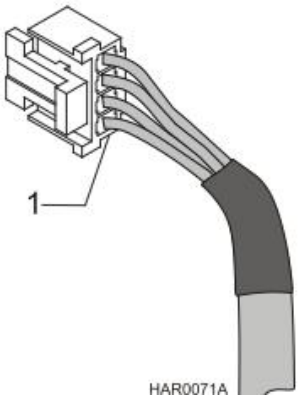
Pin Positions	Cable Connector
	 **4-PIN MOLEX Plug** This cable is included in the cable kit described in Section 3.1.1.

Table 13: CAN Connectors Pin Assignments

6.11.1. CAN Wiring

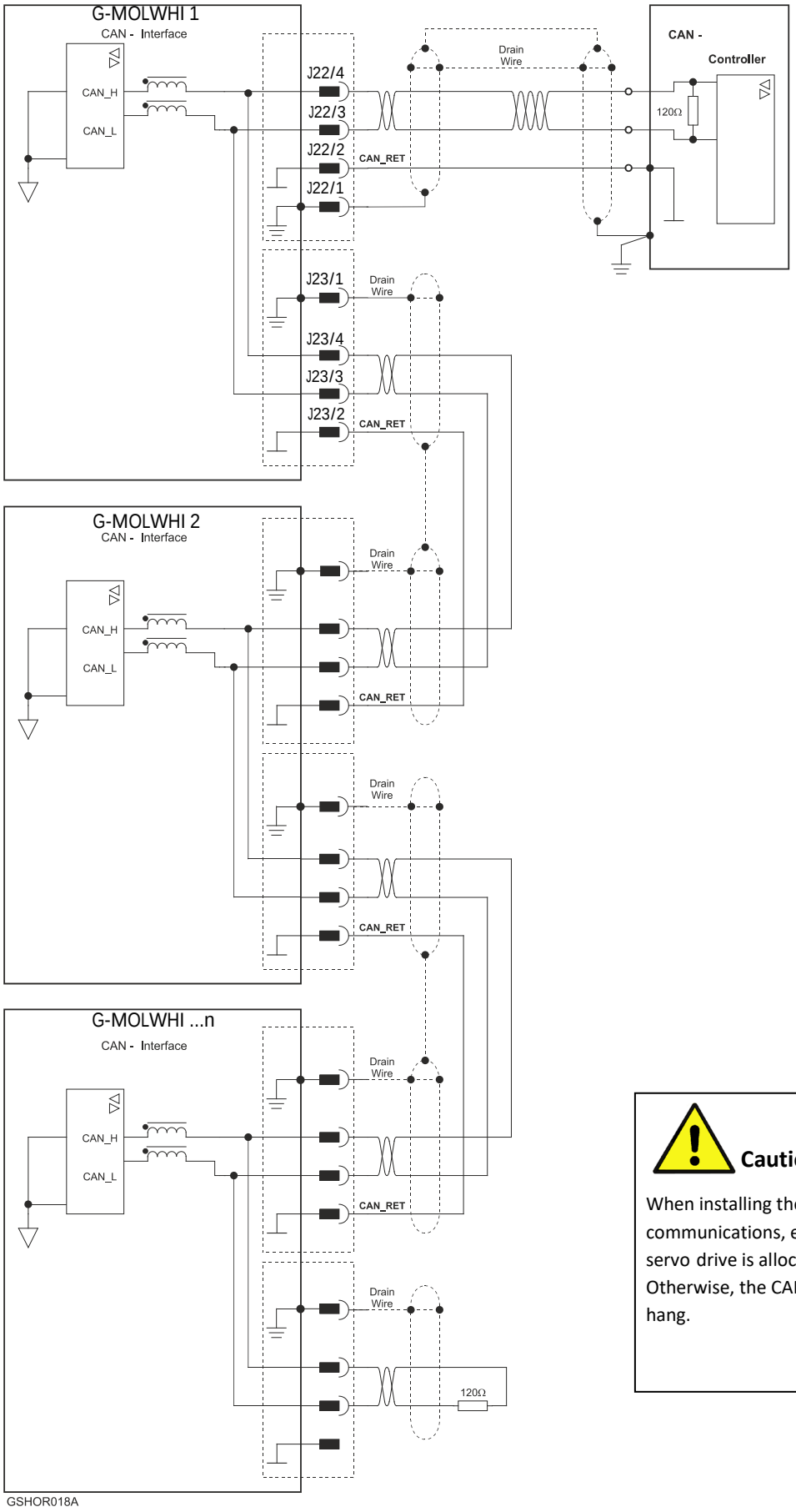


Figure 39: Gold Mol Whistle Connection Diagram – CAN

Caution

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

6.11.2. CANopen Network topology and Settings

The CANopen network topology is as follows:

• Set CANopen ID and baud rate by Composer-- terminal

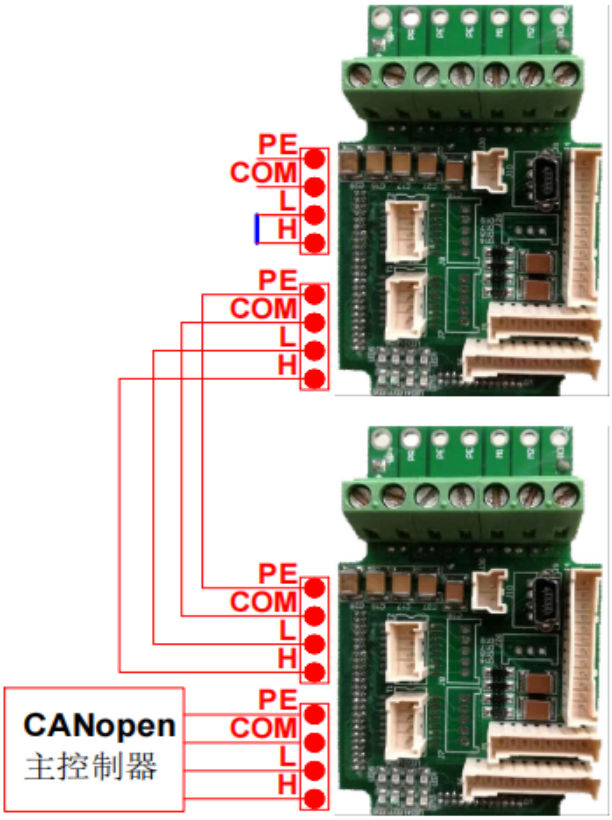
-PP [13] set ID

-PP[14] Set the baud rate. Refer to Elmo CR manual page 3‐112 for details

• Such as:

- Drive 1, ID set to 1, so PP[13]=1 --Enter
- Drive 2, ID set to 2, so PP[13]=2 --Enter

The Baud rate of the primary controller must be consistent with that of all drives, such as 500K



6.12. Powering Up

After the Gold Mol Whistle 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.

6.13. Initializing the System

After the Gold Mol Whistle 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*.

6.14. Heat Dissipation

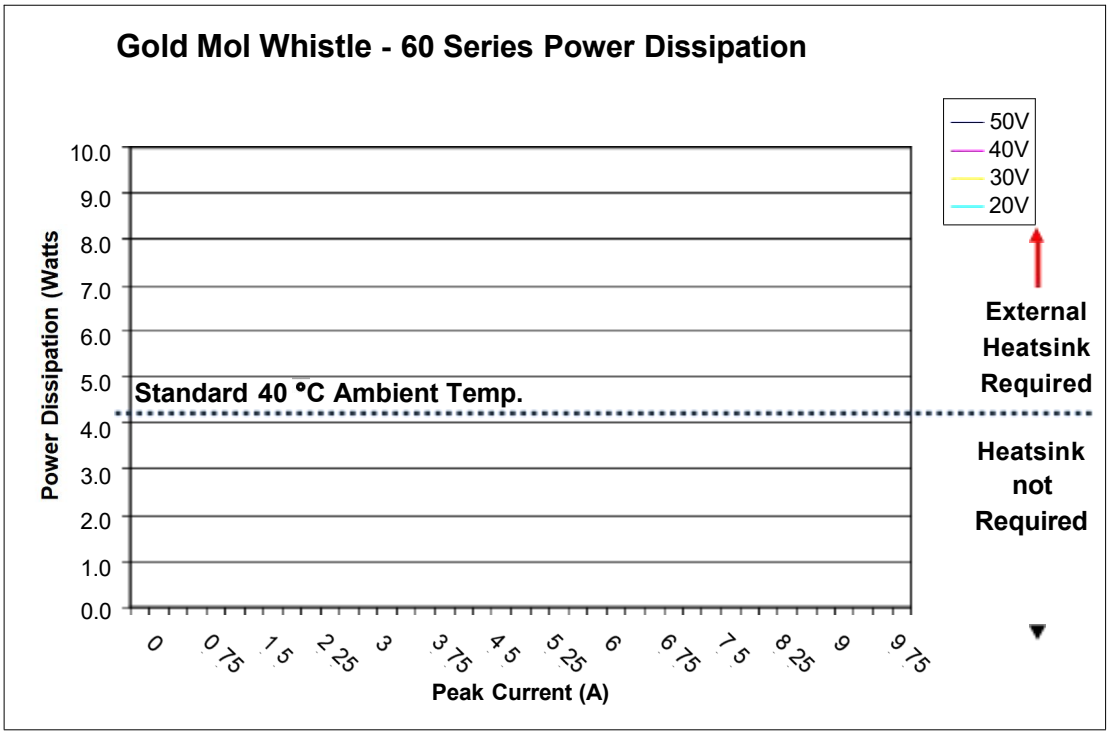
The best way to dissipate heat from the Gold Mol Whistle is to mount it so that its heat sink facesup. For best results leave approximately 10 mm of space between the Gold Mol Whistle's heat sink and any other assembly.

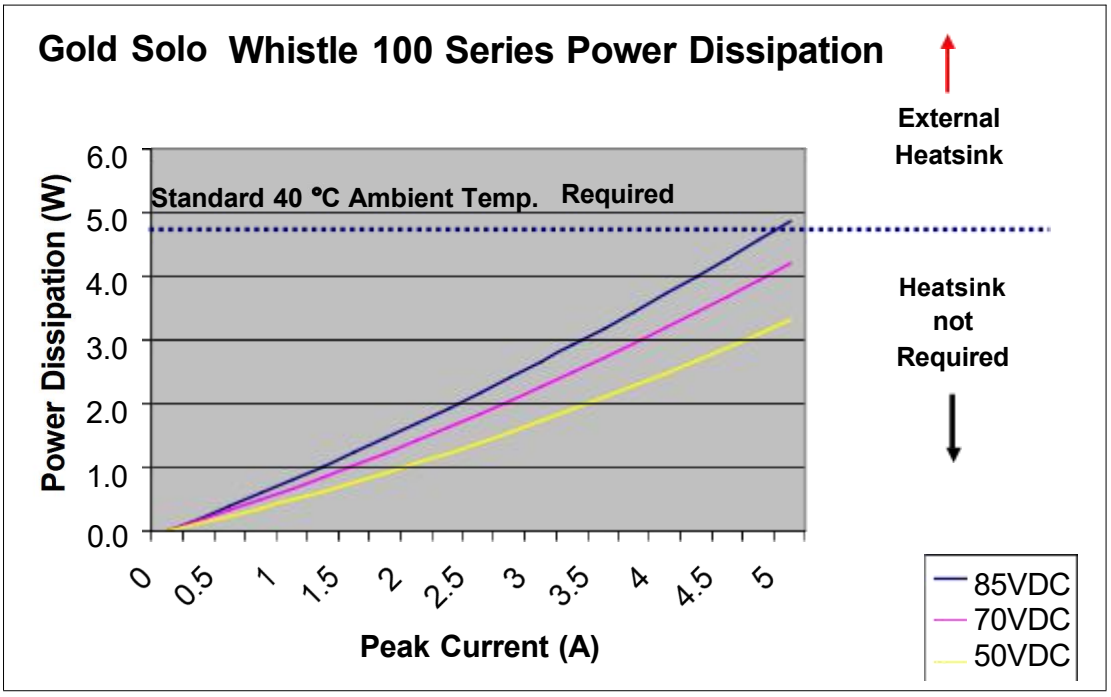
6.14.1. Thermal Data

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

6.14.2. Heat Dissipation Data

Heat dissipation is shown in graphically below:





6.14.3. How to Use the Charts

The charts above are based upon theoretical worst-case conditions. Actual test results show 30% to 50% better power dissipation.

To determine ifyour application needs a heat sink:

6. Allow maximum heat sink temperature to be 80 °C or less.

7.Determine the ambient operating temperature of the Solo Whistle.

8.Calculate the allowable temperature increase as follows:

- For an ambient temperature of 40 °C , ΔT= 80°C – 40 °C = 40 °C

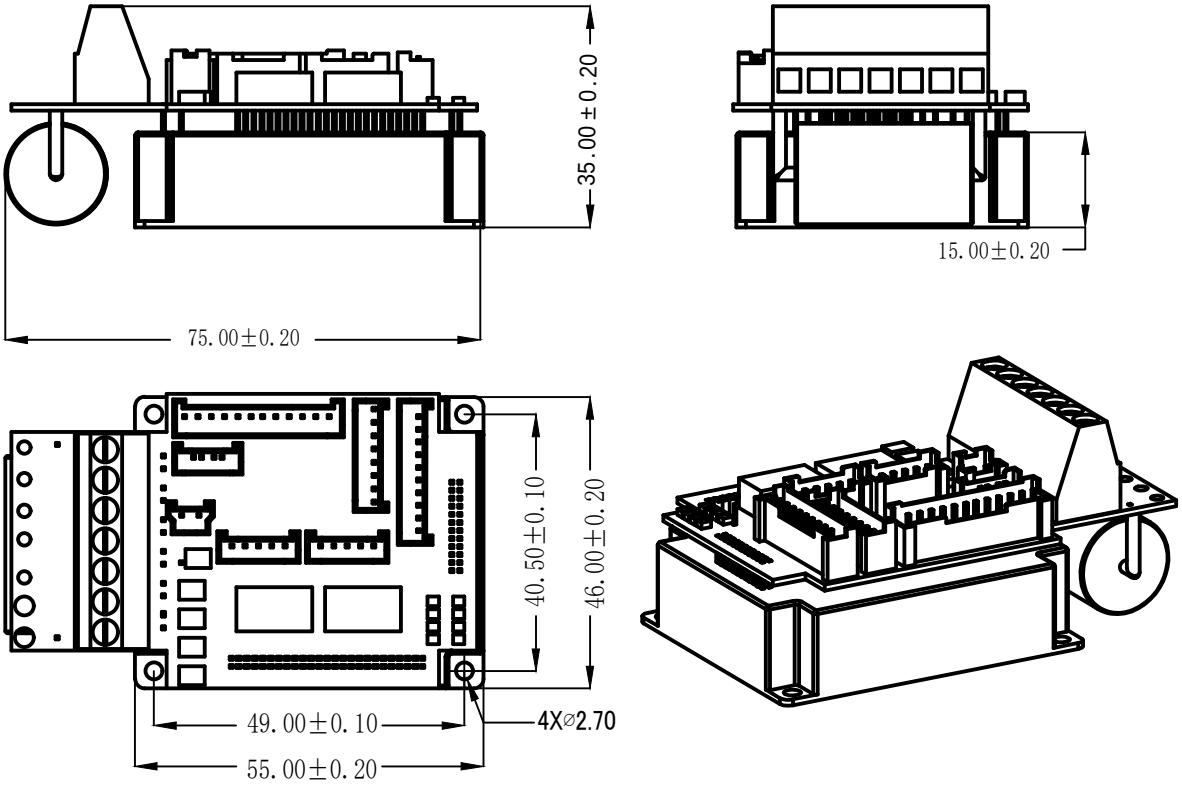
9.Use the chart to find the actual dissipation power of the drive. Follow the voltage curve to the desired output current and then find the dissipated power.

10. If the dissipated power is below 4 W the Solo Whistle will need no additional cooling.

Note: The chart above shows that no heat sink is needed when the heat sink temperature is 80 °C, ambient temperature is 40 °C and heat dissipated is 4 Watts.

Chapter 7: Dimensions

This chapter provides detailed technical dimensions regarding the Gold Mol Whistle.



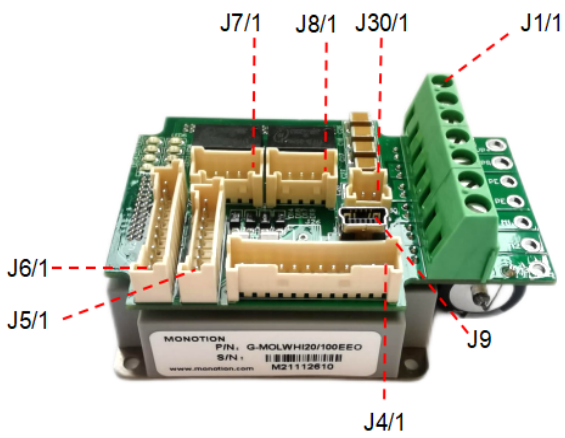
Chapter 8:Gold MOL Whistle Cable Kit

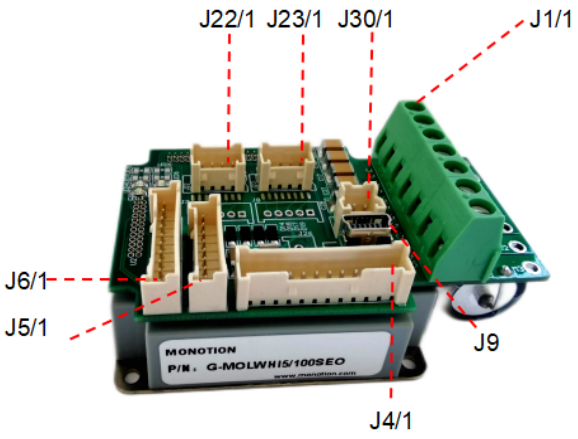
CBL-GMOLWHISEKIT CBL-GMOLWHIEEKIT

8.1 G-MOL Whistle Connectors

The table below presents the connector panel of the Gold MOL Whistle drive and specifies the cable connectors.

Port	No. Pins	Type	Connector Manufacturer and Part Number
J1	7	5.08 mm pitch	Wires
J4	12	2.0 mm pitch	Molex 35507-1200
J5	8	2.0 mm pitch	Molex 35507-0800
J6	10	2.0 mm pitch	Molex 35507-1000
J9		USB Device Mini-B	
J30 (PR, VL)	2	2.0 mm pitch	Molex 35507-0200
STO Version			
J26	3	2.0 mm pitch	Molex 35507-0300
EtherCAT Version			
J7	5	2.0 mm pitch	Molex 35507-0500
J8	5	2.0 mm pitch	Molex 35507-0500
CAN Version			
J22	4	2.0 mm pitch	Molex 35507-0400
J23	4	2.0 mm pitch	Molex 35507-0400
Connector Locations			





8.2 Cable Kit Details

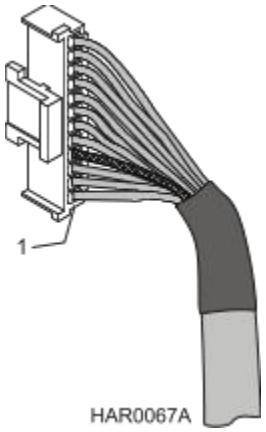
The kit contain six cables in CBL-GMOLWHIKIT for the G-MOLWhistle between 28 to 24 AWG. All the cables are 1 m long. The contents of each kit are listed below:

Cable Application	CBL-MOLWHIKIT	Pins	Pins Location
Main Feedback	CBL-MOLFBK1M	12	J4
Auxiliary Feedback	CBL-GMOLAUXFBK1M	8	J3
IO	CBL-GMOLWHIO	10	J6
EtherCAT Version			
EthereCAT IN	CBL-ETH1MR	5	J7
EthereCAT OUT	CBL-ETH1M	5	J8
CAN Version			
CANIN	MOL-CAN1R	4	J7
CANOUT	MOL-CAN0.3 or MOL-CANT	4	J8

8.3 Main Feedback Cable (CBL-MOLFBK1M)

The main feedback cable is provided as a cable between 28 to 24 AWG, six twisted-pair shielded. There is one type of feedback cable, which uses a 12-pin Molex 2 mm pitch plug on the *Gold Line* side.

The Main Feedback Cable (CBL-MOLFBK1M) is open on the motor side so that it can be connected to customer-specific connectors.

Pin No.	Color	Twisted & Shielded Wire	Incremental Encoder Signal	
1	Black/white		Hall C	
2	Red/white		Hall B	
3	Brown/white		Hall A	
4	Drain wire		Shield	
5	Blank	Pair	0V	
6	Red		5V	
7	orange/white	Pair	Z-	
8	orange		Z+	
9	blue/white	Pair	B-	
10	blue		B+	
11	Green/white	Pair	A-	
12	green		A+	

The specific functionality of each pin is fully outlined in the MOLWhistle *Installation Guide*.

8.4 Auxiliary Feedback Cable (CBL-GMOLAUXFBK1M)

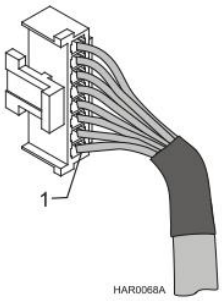
The auxiliary feedback cable is provided as a cable between 28 to 24 AWG twisted-pair shielded. It is connected using an 8-pin Molex 2 mm pitch plug.

Four options — described in the *Auxiliary Feedback* section(s) in the G-MOL Whistle *Installation Guide* — are available for auxiliary feedback:

- Main encoder buffered outputs
- Differential encoder inputs
- Pulse-and-direction input

The Auxiliary Feedback cable (CBL-GMOLAUXFBK1M) is open on the motor side so that it can be connected to customer-specific connectors.

The general pinout of the auxiliary feedback cable is as follows:

Pin No.	Color	Twisted & Shielded Wire	Description	
1	Red		5V	
2	Blank		0V	
3	orange/white	Pair	Z-	
4	orange		Z+	
5	blue/white	Pair	B-	
6	blue		B+	
7	Green/white	Pair	A-	
8	green		A+	

The specific functionality of each pin is fully outlined in the MOLWhistle *Installation Guides*.

Figure 2: Auxiliary Feedback Cable (Part No. CBL-GMOLAUXFBK1M)

8.5 Communication Cables

The communication cables are provided as cables between 26 AWG two twisted pair shielded. They are connected using a 5-pin Molex 2 mm pitch plug or 4-pin Molex 2 mm pitch plug . Elmo drives can communicate using the following options:

- USB
- EtherCAT(EtherCAT IN &EthereCAT OUT)
- CAN open (CAN in & CAN out)

8.5.1 USB Communication Cable

Figure 3:USB Communication Cable(Part No.G-MOLUSB)

8.5.2 EthereCAT In Communication Cables (MOL-ETH1MR)

The Communication Cables (MOL-ETH1MR) ,It is connected using a 5-pin Molex 2 mm pitch plug connector to the GMOLWhistle J7(EthereCAT IN) connector,and using a RJ45 connector to the controller .

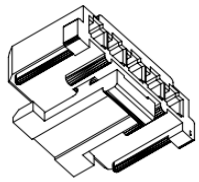
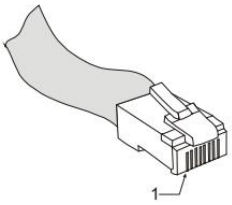
	Pin No.	Color	Signal	Pin No.	
	1	Shield	PE	Shield	
	2	Orange/White	TX-	3	
	3	Orange	TX+	6	
	4	Green	RX-	2	
	5	Green/white	RX+	1	

Figure 4: EthereCAT IN Communication Cable (Part No.MOL-ETH1MR)

8.5.3 EthereCAT Out Communication Cables (MOL-ETH0.3M)

The Communication Cables (MOL-ETH0.3M) is 30 cm long and is used to daisy-chain EthereCAT nodes. On the GMOLWhistle, this cable is connected to the External Dual EthereCAT Port. They are connected using a 5-pin Molex 2 mm pitch plug.

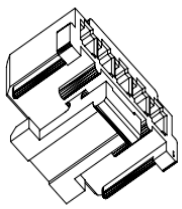
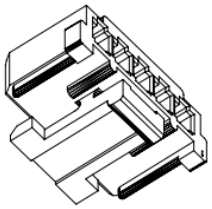
	Pin No.	Color	Signal	Pin No.	
	1	Shield	PE	1	
	2	Orange/White	TX-	2	
	3	Orange	TX+	3	
	4	Green	RX-	4	
	5	Green/white	RX+	5	

Figure 4: EthereCAT Out Communication Cable (Part No.MOL-ETH0.3M)

8.5.4 CAN In Communication Cables (GMOL-CAN1MR)

The Communication Cables (GMOL-CAN1MR) ,It is connected using a 4-pin Molex 2 mm pitch plug connector to the GMOLWhistle J7(CANIN) connector,and using a RJ45 connector to the controller .

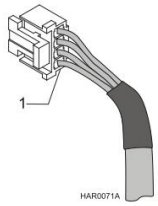
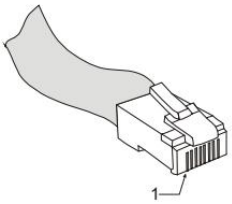
	Pin No.	Color	Signal	Pin No.	
	1	Shield	CAN-shield	Shield	
	2	Orange/White	CAN-GND	3	
	3	Green	CAN-L	2	
	4	Green/white	CAN-H	1	

Figure 4: CAN In Communication Cable (Part No.GMOL-CAN1MR)

8.5.5 CAN Out Communication Cables (MOL-CAN0.3)

The Communication Cables (MOL-CAN0.3) is 20 cm long and is used to daisy-chain CAN nodes. On the MOLWhistle, this cable is connected to the External Dual Can Port. They are connected using a 3-pin Molex 2 mm pitch plug.

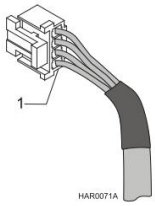
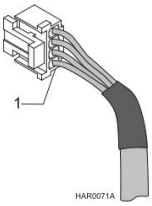
	Pin No.	Color	Signal	Pin No.	
	1	Shield	CAN-shield	1	
	2	Orange/White	CAN-GND	2	
	3	Green	CAN-L	3	
	4	Green/white	CAN-H	4	

Figure 4: CAN Out Communication Cable (Part No.MOL-CAN0.3)

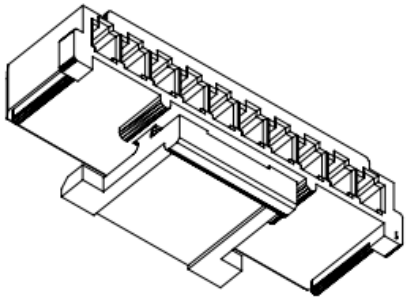
8.5.6. CAN Terminator (GMOL-CANT)

The CAN terminator is used only for CAN applications. It is used to terminate the CAN communication line.
The CAN terminations prevent the CAN signal reflection at the end of the physical lines.
The reflection suppresses the CAN signal which may lead to Error Frames and causes the CAN controller message to be discarded.120 Ω resistors are required on both physical ends of the CAN network to prevent the signal reflection.

8.6 I/O Cable (CBL-GMOLIO1)

The I/O cable is provided as a cable between 28 to 24 AWG, six twisted-pair shielded. There is one type of I/O cable, which uses a 10-pin Molex 2.0 mm pitch plug on the *Gold* side.

The I/O Cable (CBL-GMOLIO1) is open on the controller side so that it can be connected to customer-specific connectors.

Pin No.	Color	Description	
10	Red	VDD	
9	Black	VDD-RET	
8	Blue	DO2	
7	Green	DO1	
6	Black/White	DI6	
5	Brown/White	DI5	
4	Red/White	DI4	
3	Brown	AI-RET,DI-RET	
2	Orange	AI+	
1	Orange/White	AI-	

The specific functionality of each pin is fully outlined in the Solo Whistle *Installation Guide*.

Figure 5: I/O Cable (Part No. CBL-GMOLIO1)