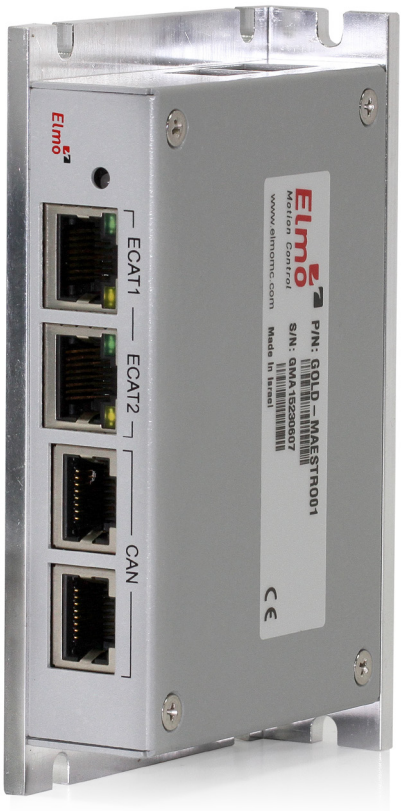
Inspiring Motion
Since 1988

Gold Maestro
Network Motion Controller
Installation Guide



August 2020 (Ver. 1.500)

www.elmomc.com

Elmo
Motion Control

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 Maestro 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.

Elmo Motion Control and the Elmo Motion Control logo are registered trademarks of Elmo Motion Control Ltd.

EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

CANopen compliant. CANopen® is a registered trademark and patented technology, licensed by CAN in Automation (CiA) GmbH, Kontumazgarten 3, DE-90429 Nuremberg, Germany.

Document no. MAN-GOLD-MAESTRO-IG (Ver. 1.500)
Copyright © 2020
Elmo Motion Control Ltd.
All rights reserved.

Catalog Number

GOLD-MAESTRO01	13 to 96 VDC power supply
GOLD-MAESTRO02	20 to 196 VDC power supply

Revision History

Version	Date	Details
Ver. 1.0	6th May 2010	Initial Release
Ver. 1.1	13th May 2010	Minor updates
Ver. 1.2	July 2010	Updates to Chapter 3 and Chapter 4 (Appendix)
Ver. 1.300	Oct. 2012	Updates to Chapter 3 and minor updates in other chapters.
Ver. 1.301	January 2013	Added a caution and recommendation on the type of cleaning solution to use for the Elmo unit.
Ver. 1.400	October 2013	Formatted according to new template
Ver. 1.401		
Ver. 1.402	July 2015	Changes to ECAT names
Ver. 1.403	Sep 2015	Section 3.4.3 Installation on a DIN Rail removed
Ver. 1.404	Sep 2015	Section 3.5 Connecting the Cables edited
Ver. 1.405	Oct 2015	Update of relevant drawings throughout IG
Ver. 1.406	Nov 2015	Remove drawing of EtherCAT redundancy (Fig 11)
Ver. 1.407	Dec 2015	Updated some diagrams and standards
Ver. 1.408	Nov 2016	Further updates to standards
Ver. 1.409	Dec 2016	Further updates to standards
Ver. 1.410	Dec 2016	Further updates to standards
Ver. 1.411	Aug. 2017	Changes to Section 1.3 Warranty information
Ver. 1.500	Aug. 2020	Further updates to standards

Chapter 1: Safety Information 6
1.1 Cautions 6
1.2 Directives and Standards 6
1.3 Warranty Information 6

Chapter 2: Product Description 7
2.1 Description 7

Chapter 3: Technical Specifications 8
3.1.1 Gold Maestro Hardware 8

Chapter 4: Gold Maestro Software Specifications 9
4.1 Operating System 9
4.2 Axes 9
4.3 Motion Modes and Interfaces 9
4.4 Drive Communication Bridge Support 10
4.5 Network Encoders 11
4.6 Position Error Mapping 11
4.7 Communication Options 11

Chapter 5: How to Use this Guide 11

Chapter 6: Installation 12
6.1 Environmental Conditions 12
6.2 Unpacking the Components 12
6.3 Connectors 14
6.3.1 Connector Types 14
6.3.2 Pinouts 15
6.3.2.1 Power Connector 15
6.3.2.2 EtherCAT1 Connector 16
6.3.2.3 EtherCAT2 Connector 16
6.3.2.4 CAN Connectors 17
6.3.2.5 Ethernet Connector 17
6.3.2.6 USB 2.0 Connector 18
6.4 Mounting the Gold Maestro 19
6.4.1 Wall Mount 19
6.4.2 Surface Mount 19
6.5 Connecting the Cables 20
6.5.1 Wiring the Gold Maestro 20
6.5.2 Connecting the DC Power Supply 22
6.5.3 Ethernet 23
6.5.4 USB 2.0 Communication 24

6.5.5 CAN Communication 25
6.5.6 EtherCAT Communication 27
6.6 Powering Up 29
6.7 Initializing the System 29

Chapter 7: Technical Specifications 30

7.1 Gold Maestro Dimensions 30
7.2 General Specifications 31
7.3 Environmental Conditions 31
7.4 Power Supply 31
7.5 Communications 32

Chapter 8: Compliance with Standards 33

8.1 Low Voltage Directive 33
8.2 EMC 33
8.3 Other Compliant Standards 33

Chapter 1: Safety Information

In order to achieve the optimum, safe operation of the Gold Maestro Multi-Axis Controller, 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 Maestro 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.

The following safety symbols are used in this manual:



Warning:
This information is needed to avoid a safety hazard, which might cause bodily injury.



Caution:
This information is necessary for preventing damage to the product or to other equipment.



1.1 Cautions

- The Gold Maestro must be connected to an approved 24 VDC power supply through a line that is separated from hazardous line voltages using reinforced or double insulation in accordance with approved safety standards.
- Before switching on the Gold Maestro, verify that all safety precautions have been observed and that the installation procedures in this manual have been followed.

1.2 Directives & Standards

The Gold Maestro has been developed, produced, tested and documented in accordance with the relevant standards. Refer to the detailed standards in Chapter 8: Compliance with Standards. Elmo Motion Control is not responsible for any deviation from the configuration and installation described in this documentation. Furthermore, Elmo is not responsible for the performance of new measurements or ensuring that regulatory requirements are met.

1.3 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. The Gold Maestro is 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 2: Product Description

This installation guide describes the Gold Maestro Network Motion Controller and the steps for its wiring, installation and power up. Following these guidelines ensures maximum functionality of the system to which it is connected.

2.1 Description

The Gold Maestro is Elmo's network motion controller. It works in a network based system in conjunction with Elmo's intelligent servo drives to provide a total multi-axis motion control system solution.

The Gold Maestro is designed to support both the existing SimplIQ drives, based on standard CAN network architecture, as well as the new Gold Line, adding EtherCAT networking.

While being a true network controller, the Gold Maestro shares the motion processing workload with Elmo's SimplIQ and Gold Line drives, forming a distributed motion control system. The best servo and system performance is achieved combining the Gold Family drives, and the new real-time motion control capabilities of the Gold Maestro controller.

The Gold Maestro provides:

- Full, real-time, multi-axis motion synchronization
- Advanced user programming capabilities based on the leading standards
- Time deterministic control over motion, I/Os and processes in the system

The Gold Maestro offers real-time motion control support for full multi-axis system synchronization, using the well-known industry interface PLCopen for Motion Control standard.

Various programming capabilities, such as the IEC-61131-3 standard languages, as well as native C programming support, dramatically accelerate user level program execution. Standard solutions were selected for ease of use.

Low level communication with drives and I/O devices over the device network uses the CAN industry standard (DS 301, DS 401 for I/O devices, and DS 402 for drives and motion device profiles). These are used over standard CAN networks, as well as with the new EtherCAT CoE (CAN over EtherCAT) protocols.

Host interfaces are implemented using industry standard communications protocols, such as Ethernet TCP/IP and higher level protocols such as Ethernet/IP and Modbus.

Standardization in protocols, definitions and APIs allows users rapid system level integration and opens the system to third party devices on the device network.

Chapter 3: Technical Specifications

3.1.1 Gold Maestro Hardware

- **Hardware:** Standalone
- **Power Supply**: Single DC supply, with two product options available:
  - 13 VDC to 96 VDC
  - 20 VDC to 196 VDC
- **Processor:** PowerPC, 333 MHz, with double precision floating point support by hardware.
- **Memory**
  - Flash: 32 MB
  - RAM: 64 MB (DDR2, 333 MHz)
- **Communication Hardware**
  - Host:
    - Ethernet: 1 port, Standard Ethernet, 10/100 Mbps, automatically detected
    - USB: 1 port, USB2.0, 12 Mbps
  - Device Networks:
    - EtherCAT: 2 x EtherCAT master ports, with redundancy support (optional)
    - CAN: CANopen master port
- **I/O System:** All I/O interfaces are handled via the device network.
- **Internal System BIT:** The Gold Maestro supports internal hardware BIT (Built-in-tests) procedures to check the system integrity level on each power up.
- **Diagnostic LEDs:** EtherCAT and Ethernet activity
- **Dimensions:** 115 mm x 75 mm x 25.4 mm (4.53" x 2.95" x 1")
- **Weight:** 250 g (8.75 oz)
- **Operational Temperature: 0 °C to 40 °C**

Chapter 4: Gold Maestro Software Specifications

4.1 Operating System

- Linux Operating System, with Elmo's RT extension for real-time motion control support
- Motion Programming and Debugging
  - Native C Programming, running on the target CPU. Compiling and debugging via the Eclipse IDE using GCC under Cygwin
  - IEC 61131-3 with PLCopen Motion Library extension, using Elmo IDE. The following languages are supported:
    - Structured text (ST), textual
    - Function block diagram (FBD), graphical
    - Ladder diagram (LD), graphical
    - Sequential function chart (SFC), has elements to organize programs for sequential and parallel control processing.

4.2 Axes

- Up to 96 axes, allowing mixed single axis, multiple axis and coordinated axes motions
- Axis Types
  - Intelligent Servo Drives (Elmo), supporting both the SimplIQ and Gold lines
  - Operation in Numeric Control – NC - (real-time master synchronization) as well as non-NC modes
  - DS 402 CoE for EtherCAT and standard DS 402 drives for CANopen
- Control System Update Rate
  - EtherCAT
    - Cycle Update Rate: ≥ 500 µs (up to 16 axes can be updated simultaneously at a rate of 500 µs)
    - Cycle Jitter: < 1 µs, based on Master DC (Distributed Clock) support, for the full network
  - CAN
    - Cycle Update Rate ≥ 1 ms (CAN physical network limitations only)
    - Cycle Jitter: < 100 µs for CAN Sync message initiation (actual jitter dependant on the CAN network's physical limitations)

4.3 Motion Modes and Interfaces

- The Gold Maestro motion interfaces use the PLCopen Standard.
  - 64 bit, real-time, double precision profile calculations, allowing full on-the-fly control over speed, acceleration, deceleration and jerk
  - Complex motion schemes, including look-ahead optimizing of trajectory speed calculations, for complex vector motions

- Cyclic buffer for 1,000 function blocks (a buffer for 1,000 motion segments). The cyclical buffer removes any practical limit on the number of function blocks.

- Communication Protocols
  - Host
    - Ethernet TCP-IP/UDP for operational modes
    - Telnet communication for setup and configuration
    - USB: Using binary protocol (maintenance)
    - Application level: Ethernet-IP/Modbus
  - Device Network
    - EtherCAT: CoE/EoE/FoE, supports distributed clock master
    - CAN: CANopen device profiles, e.g., DS 301, DS 305, DS 402, DS 401 (I/O device profile)
- Host and Internal Software Interface
  - TCP/IP interface from Host Computer. Software Library is provided for easy TCP/IP communication interface.
  - Future version will also support Ethernet-IP and Modbus over the TCP-IP.
  - Internal Software libraries, for "C" user programs are provided, to write user code running on the Gold Maestro target processor (native mode).
- Data Recording
  - 4 MB data recording
  - Up to 32 vectors can be recorded simultaneously.
  - Supports more than 10 advanced triggering options and real-time scope capabilities
  - Very fast data upload using Ethernet
- Upload/Download Support
  - Firmware update support (Gold Maestro and drives)
  - System resource files
  - Axis parameter files

4.4 Drive Communication Bridge Support

- The Gold Maestro supports full communication with any specific drive (EtherCAT and CAN), for the purpose of simple tuning or configuration at the drive level, i.e. there is no need for direct communication with the drive.
- Spatial Position-Based Pulse Generation
  - The Gold Maestro supports spatial (along the path) position-based pulse generation. This is a unique feature, required for the generation of position-based events in 3D scanning systems.
  - The Gold Maestro system, with Elmo's intelligent Gold servo drives, can support single axis and spatial enhanced position-based compare functions, resulting in trigger output signals accurate to 1 encoder count along the trajectory path.

4.5 Network Encoders

- Supports master based motion on network encoders

4.6 Position Error Mapping

- Supports 1-D and 2-D position-based error mapping compensation
- System Boot up Time: **< 30 sec**

4.7 Communication Options

The Gold Maestro can communicate with a host PC either via a standard Ethernet port or through USB using a binary protocol for maintenance.

The Gold Maestro communicates with its network devices using either EtherCAT or CAN networks.

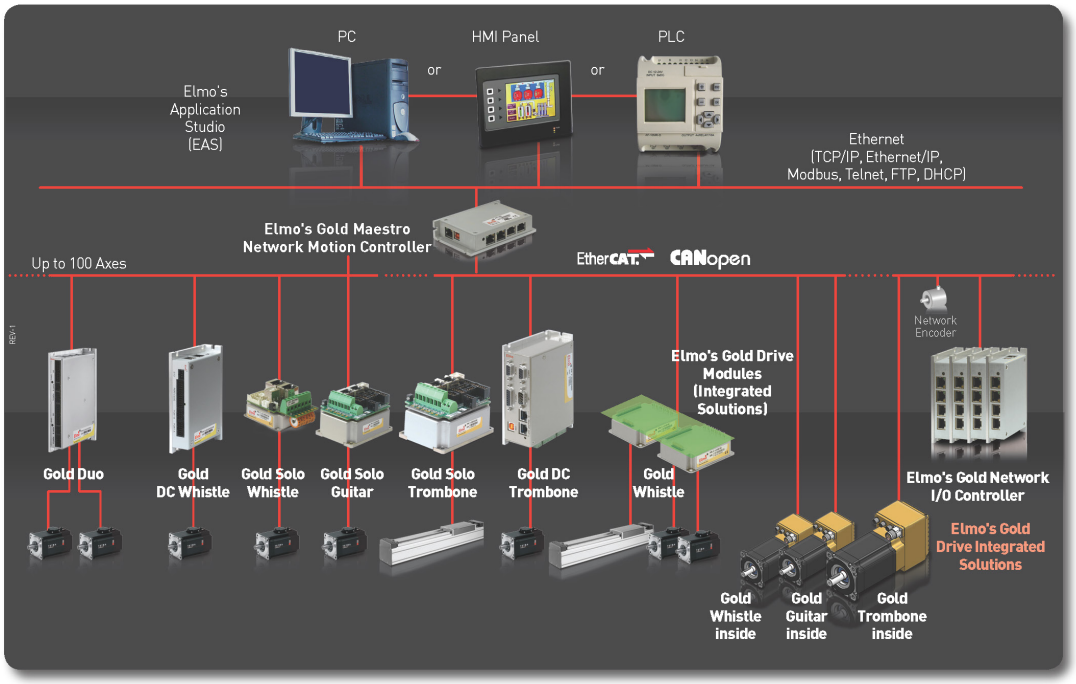


Figure 1: The Gold Maestro Network Connections

Chapter 5: How to Use this Guide

This manual is part of a documentation set that can be used to set up and program the motion of any machine whose motors are controlled by Elmo's SimplIQ or Gold Line servo drives. When used in conjunction with the Gold Maestro Software Manual it describes everything needed to get the Gold Maestro up and running. Please read the safety instructions in the first chapter before starting.

After you have successfully mounted and installed the Gold Maestro we suggest that you read the Gold Maestro Software Manual. If you have not already done so, follow the instructions in the Installation Guide that arrived with your servo drive, and install a drive. At least one drive needs to be connected to the Gold Maestro in order for it to function as a motion controller.

Chapter 6: Installation

6.1 Environmental Conditions

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



Warning: During operation the Gold Maestro becomes hot to the touch (the case can heat up to 50 °C). Care should be taken when handling it.



Caution: The Gold Maestro dissipates its heat by natural convection. The maximum ambient operating temperature must not be exceeded.

For safe operation of the Gold Maestro make sure it is installed in an appropriate environment.

Feature	Value
Ambient operating temperature	0 °C to 40 °C (32 °F to 104 °F)
Maximum non-condensing humidity	90%
Operating area atmosphere	No flammable gases or vapors permitted in area

6.2 Unpacking the Components

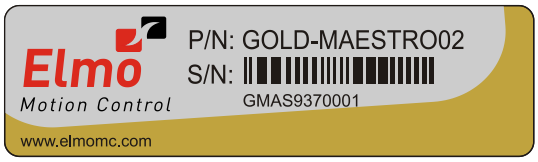
Before you begin working with the Gold Maestro system, verify that you have all of its components, as follows:

- The Gold Maestro multi-axis controller
- Gold Maestro software which may be downloaded from www.elmomc.com

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

To unpack the Gold Maestro:

1. Carefully remove the Gold Maestro from the box.
2. Check the Gold Maestro 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 controller.
3. To ensure that the Gold Maestro you have unpacked is the appropriate type for your requirements, locate the part number sticker on the side of the Gold Maestro as shown below.



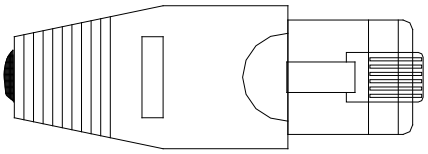
GMAS005A

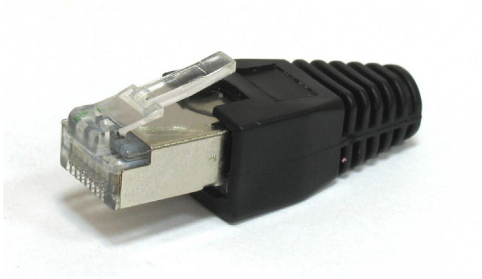
The part number at the top gives the type designation as follows:

GOLD-MAESTRO01: 13 to 96 VDC power supply

GOLD-MAESTRO02: 20 to 196 VDC power supply

4. Verify that the Gold Maestro type is the one that you ordered.
5. Verify that you have CAN termination resistors (dongles), illustrated below.





6.3 Connectors

6.3.1 Connector Types

The Gold Maestro has the following connectors:

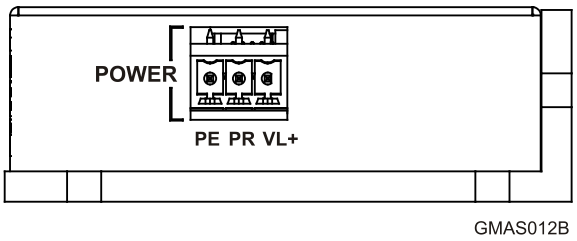
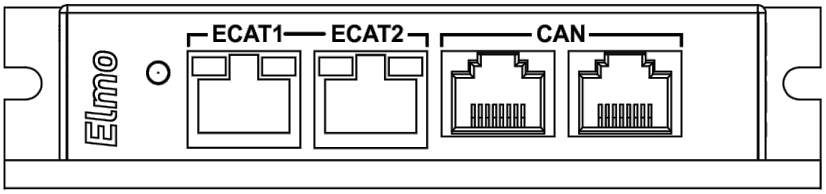
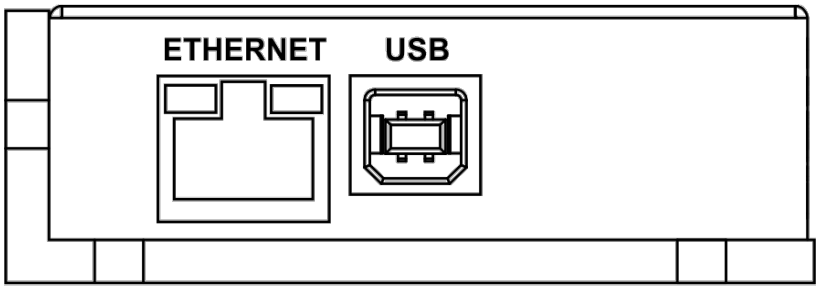
Pins	Type	Function	
Bottom Connector			
 GMAS012B			
3	Phoenix 3.81 mm Pitch Header	Power and ground	
Front Connectors			
 GMAS013B			
8	RJ-45	EtherCAT1	
8	RJ-45	EtherCAT2	
8	RJ-45	CAN1	
8	RJ-45	CAN2	
Bottom Connectors			
 GMAS014B			
8	RJ-45	Ethernet	
4	USB	USB	



Table 1: Connector Types

6.3.2 Pinouts

6.3.2.1 Power Connector

See Section 6.5.2 for full details.

Pin	Function
PE	Protective Earth
PR	Power Return
VL+	Positive Power Input

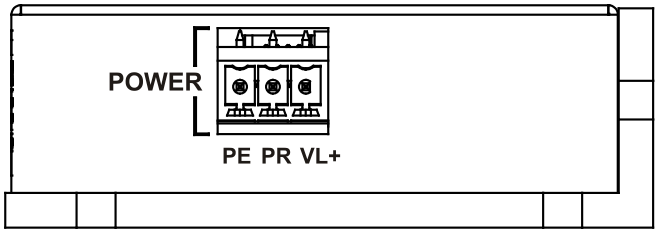
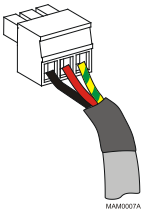
Connector Location	Cable Connector
 **3-Pin 3.81 mm Pitch Phoenix Header (MC 1.5/3-G-3.81)**	 **3-Pin Phoenix Plug (MC 1.5/3-ST-3.81)**

Table 2: Gold Maestro Power and Ground Connectors

6.3.2.2 EtherCAT1 Connector

See Section 6.5.6 for full details.

Pin	Signal	Function
1	Ethernet_TX+	Ethernet transmit +
2	Ethernet_TX-	Ethernet transmit -
3	Ethernet_RX+	Ethernet receive +
4,5	N/A	
6	Ethernet_RX-	Ethernet receive -
7, 8	N/A	

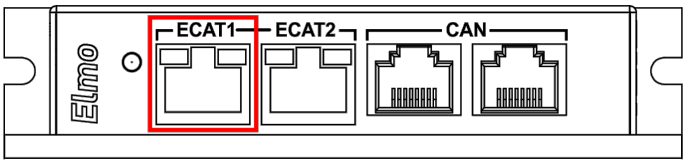
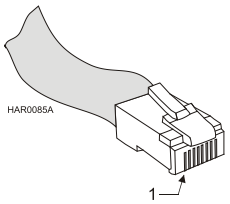
Connector Location	Cable Connector
 8-Pin RJ-45 Connector	 8 pin RJ-45 plug

Table 3: EtherCAT1 Pin Assignments

6.3.2.3 EtherCAT2 Connector

See Section 6.5.6 for full details.

Pin	Signal	Function
1	Ethernet_TX+	Ethernet transmit +
2	Ethernet_TX-	Ethernet transmit -
3	Ethernet_RX+	Ethernet receive +
4,5	N/A	
6	Ethernet_RX-	Ethernet receive -
7, 8	N/A	

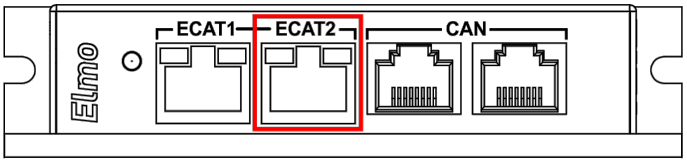
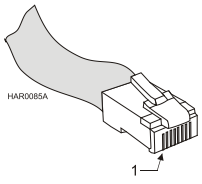
Connector Location	Cable Connector
 8-Pin RJ-45 Connector	 8 pin RJ-45 plug

Table 4: EtherCAT2 Pin Assignments

6.3.2.4 CAN Connectors

See Section 6.5.5 for full details.

Pin	Signal	Function
1	CAN_H	CAN_H bus line (dominant high)
2	CAN_L	CAN_L bus line (dominant low)
3	CAN_COMRET	CAN Communication Return
4,5	N/A	—
6	CAN_SHLD	Shield, connected to the RJ-45 plug cover
7	CAN_COMRET	CAN Communication Return
8	N/A	—

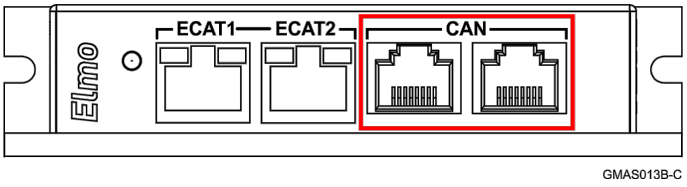
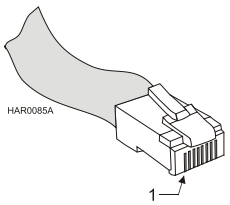
Connector Location	Cable Connector
 8-Pin RJ-45 Connector	 8 pin RJ-45 plug

Table 5: CAN Pin Assignments

6.3.2.5 Ethernet Connector

See Section 6.5.3 for full details.

Pin	Signal	Function
1	TX+	Ethernet transmit +
2	TX-	Ethernet transmit -
3	RX+	Ethernet receive +
4,5	N/A	
6	RX-	Ethernet receive -
7, 8	N/A	

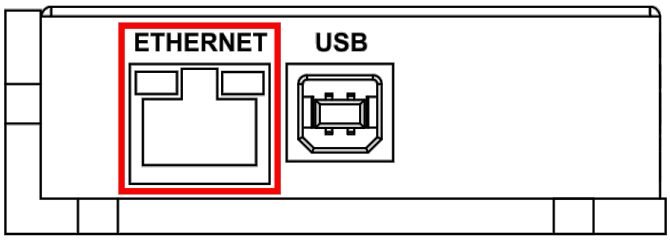
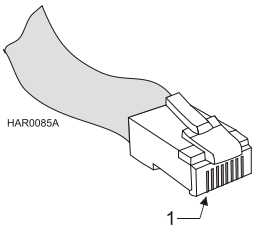
Connector Location	Cable Connector
 8-Pin RJ-45 Connector	 8 pin RJ-45 plug

Table 6: Ethernet Pin Assignments

6.3.2.6 USB 2.0 Connector

See Section 6.5.4 for full details.

Pin	Signal	Function
1	USB VBUS	USB VBUS from host
2	USBD-	USB _N line
3	USBD+	USB _P line
4	USB COMRET	USB communication return

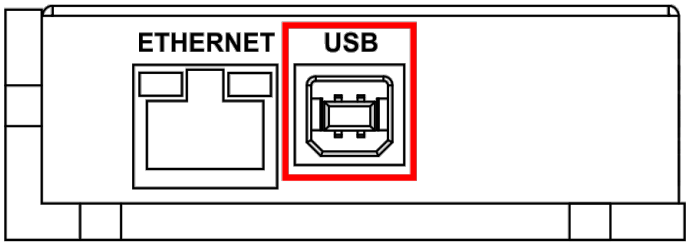
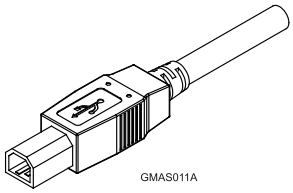
Connector Location	Cable Connector
 GMAS014B-B **USB 2.0 Connector**	 **USB Device Type B Plug**

Table 7: USB Pin Assignments

6.4 Mounting the Gold Maestro

The Gold Maestro has three mounting options:

- Wall mount
- Surface mount

6.4.1 Wall Mount

Two M4 round head screws, one through each opening in the heat sink, are used to mount the Gold Maestro (see the diagram below) on a wall.

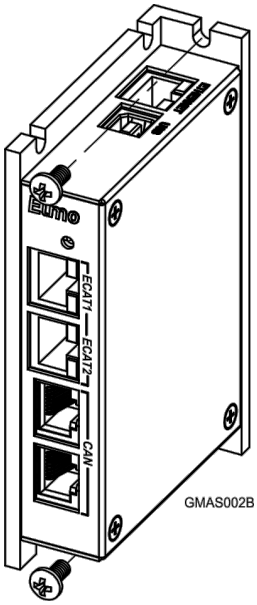


Figure 2: Wall Mounting the Gold Maestro

6.4.2 Surface Mount

Use four M4 round head screws, one through each opening in the heat sink to connect the Gold Maestro to a surface.

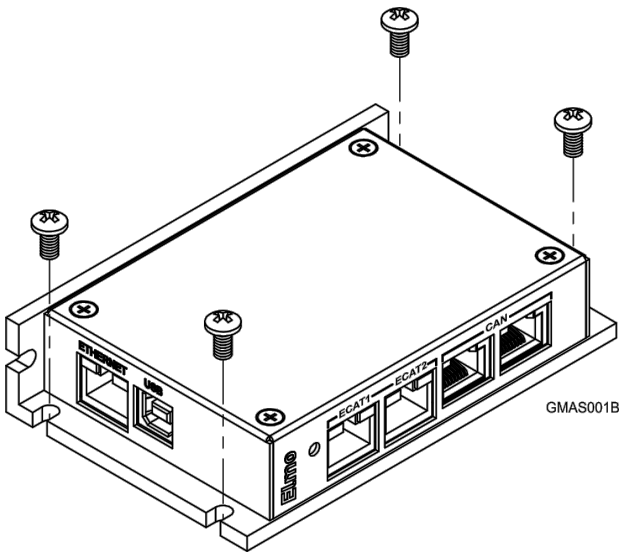


Figure 3: Surface Mounting the Gold Maestro

6.5 Connecting the Cables

6.5.1 Wiring the Gold Maestro

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



Caution: Follow these instructions to ensure safe and proper wiring.

- Use CAT5e cables for Ethernet and EtherCAT communication.
- After completing the wiring, carefully inspect all wires to ensure tightness, good solder joints and general safety.



Caution: When the EtherCAT is connected, and FoE in operation, the USB cable connection must be disconnected.

The following connectors are used for wiring the Gold Maestro:

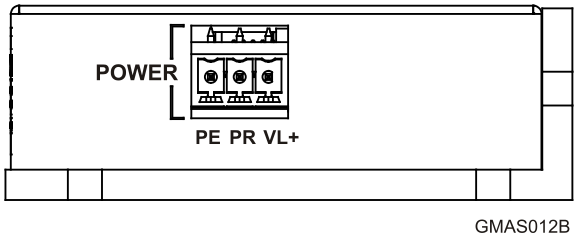
Type	Manufacturer & Part No.	Mating Connector	Port
3.81 mm pitch Header and Plug	Phoenix Header MC 1.5/3-G-3.81	Phoenix Plug (supplied) MC 1.5/3-ST-3.81	Power PE, PR, VL+
			

Table 8: Gold Maestro Power and Ground Connectors

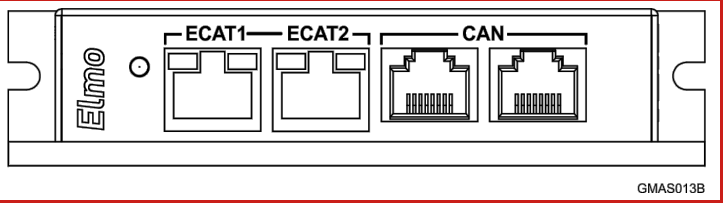
Type	Port	Connector Location
RJ-45	EtherCAT1 EtherCAT2	
RJ-45	CAN x 2	

Table 9: Connectors on the Front of the Gold Maestro

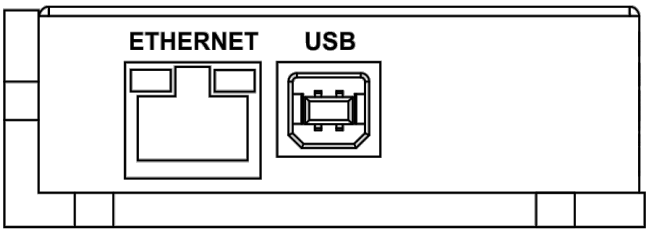
Type	Port	Connector Location
USB	USB	
RJ-45	Ethernet	

Table 10: Connectors on the Top of the Gold Maestro

6.5.2 Connecting the DC Power Supply

The Gold Maestro requires 4.5 W when turned on. Any isolated power supply that can supply that power is acceptable. The supplied power must be within the rated voltage range according to the model: 13 V to 96 V or 20 V to 196 V.

Connect the DC output from the power supply to the power input port on the Gold Maestro using the 3-pin power plug provided.

To connect the power supply:

- Use a 24 AWG twisted pair shielded cable. The shield should have copper braid.
- Before applying power, first verify the polarity of the connection (protected).

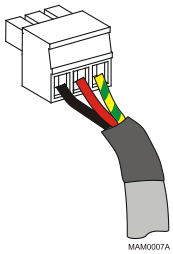
Pin	Signal	Function	Pin Position
[+]	VL+	DC power supply	
[-]	PR	Power Return	
⏚	PE	Protective Earth	

Table 11: Power Plug

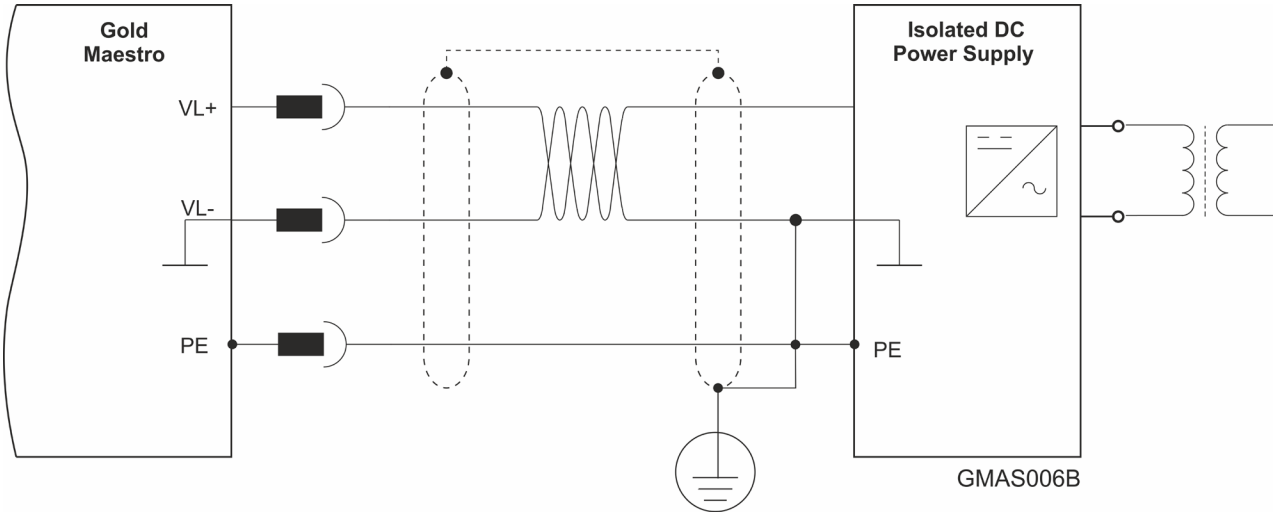


Figure 4: Power Supply Connection Diagram

6.5.3 Ethernet

Note: When connecting the Ethernet communication cable use a shielded CAT5e Ethernet cable.

The Gold Maestro connects to a PC either directly or through a hub, switch or router. Use a standard CAT5e Ethernet cable.

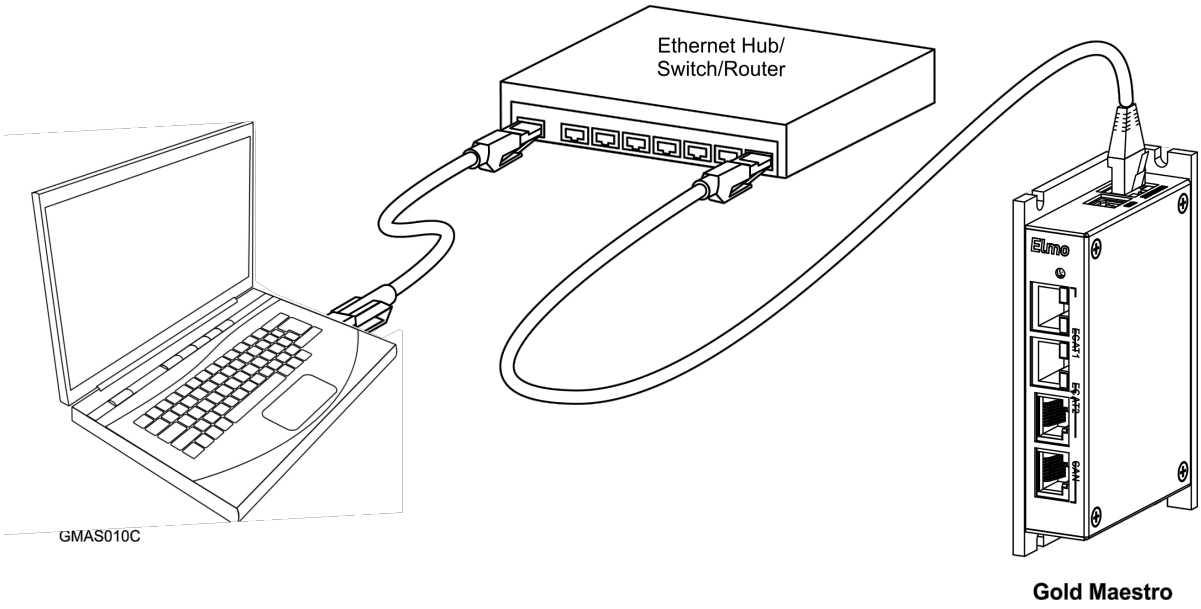


Figure 5: Gold Maestro Connected to a Network

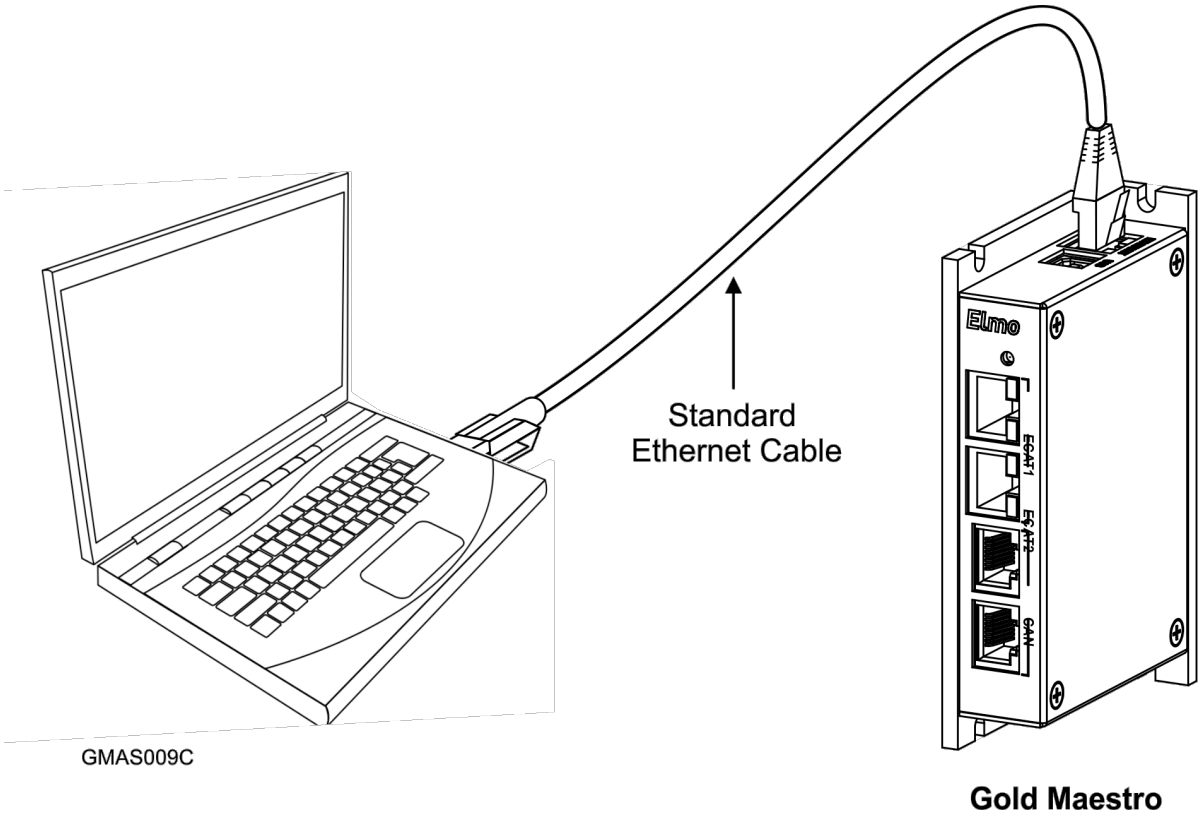


Figure 6: Gold Maestro Connected Peer-to-Peer to a PC

6.5.4 USB 2.0 Communication

The USB Network consists of Host controller and multiple devices. The GMAS is a USB Device.

Pin	Signal	Function
1	USB VBUS	USB VBUS From Host
2	USBD-	USB _N line
3	USBD+	USB _P line
4	USB COMRET	USB Communication Return

Table 12: USB 2.0 Pin Assignments

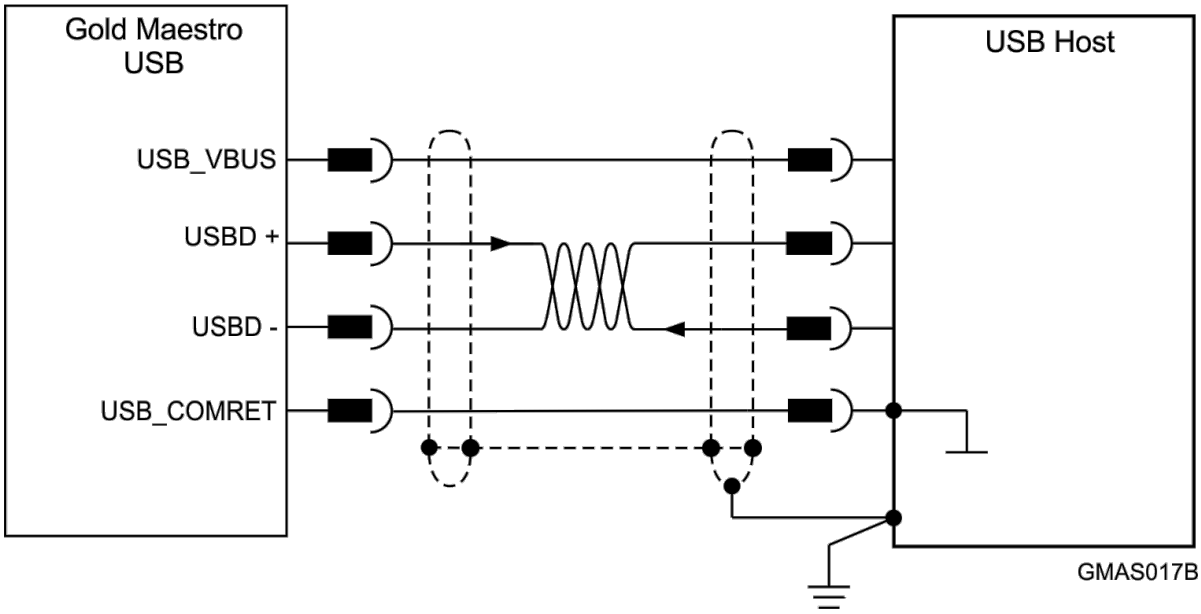


Figure 7: USB Network Diagram

To connect the USB communication cable:

- Connect the shield to the ground of the host (PC). Usually, this connection is soldered internally inside the connector at the PC end. You can use the drain wire to facilitate connection.
- Ensure that the shield of the cable is connected to the shield of the connector used for communications. The drain wire can be used to facilitate the connection.

6.5.5 CAN Communication

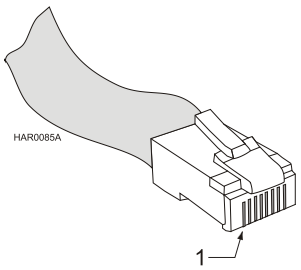
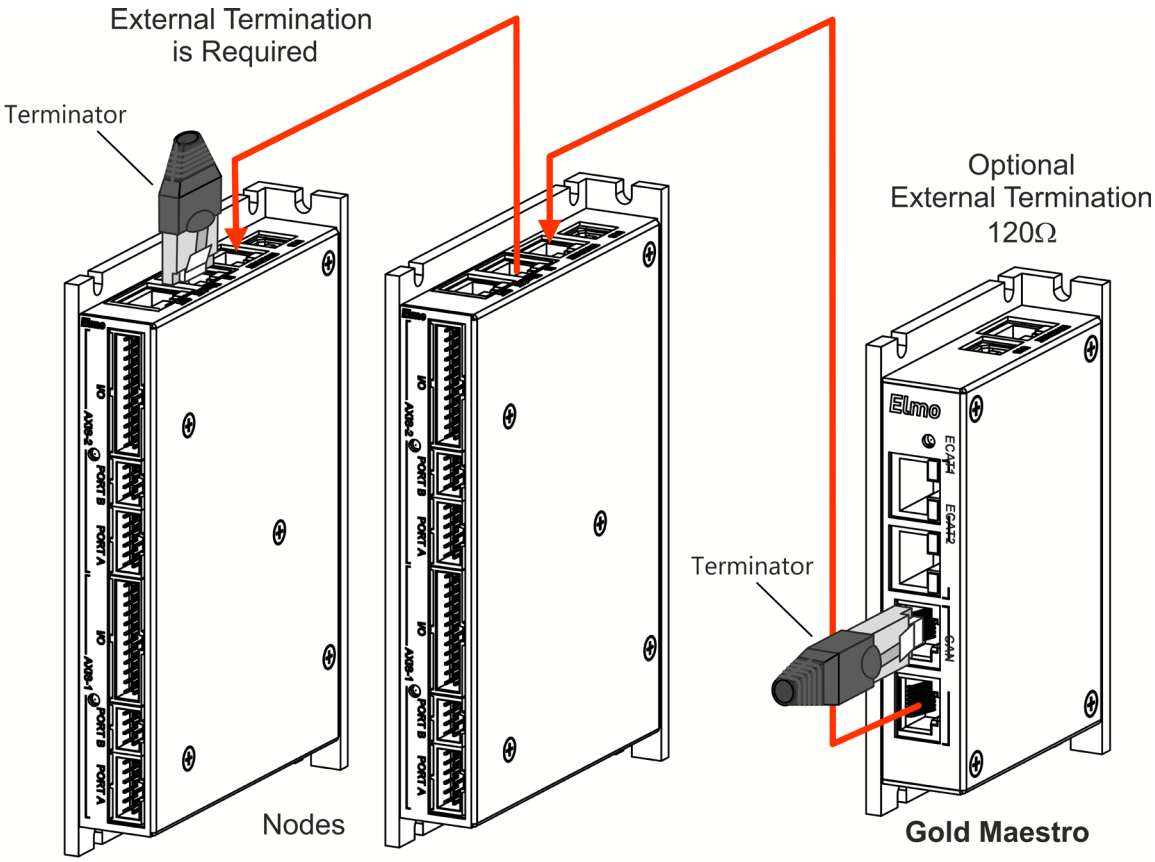
Pin	Signal	Function	Pin Position
1	CAN_H	CAN_H bus line (dominant high)	
2	CAN_L	CAN_L bus line (dominant low)	
3	CAN_COMRET	CAN Communication Return	
4, 5	N/A	—	
6	CAN_SHLD	Shield, connected to the RJ plug cover	
7	CAN_COMRET	CAN Communication Return	
8	N/A	—	

Table 13: CAN Cable Pin Assignments

To connect the CAN communication cable:

- Use 26 or 28 AWG twisted pair shielded cables. For best results, the shield should have aluminum foil and be covered by copper braid with a drain wire (CAT5e FTP applicable).
- Connect the shield to the ground of the host (PC). Usually, this connection is soldered internally inside the connector at the PC end. You can use the drain wire to facilitate connection.
- The male RJ plug must have a shield cover.
- Ensure that the shield of the cable is connected to the shield of the RJ plug. The drain wire can be used to facilitate the connection.
- Connect a 120 Ω termination resistor to each end of the network cable.
  (The Gold Maestro does not have an internal terminal.)
- A termination resistor is not required to be installed at the unused CAN port on the Gold Maestro. It is optional.

- Use the CAN termination dongle supplied as a second “device end”. Simply insert the termination resistor into the CAN connector of the second end device on the bus. This is only possible if there are two CAN connectors.



GMAS007E

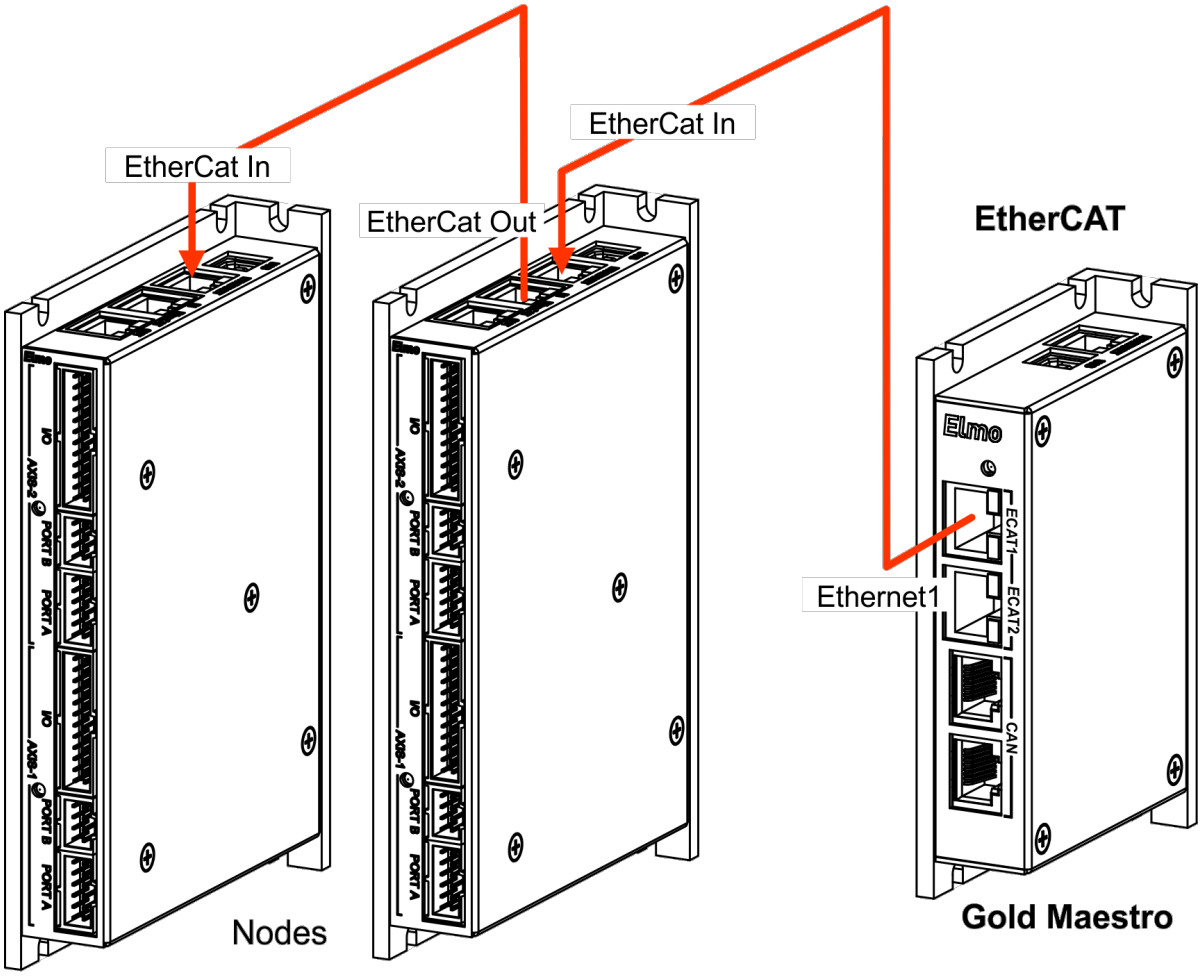
Figure 8: Connecting a 120 Ω Termination Resistor to Each End of the Network Cable

6.5.6 EtherCAT Communication

The Gold Maestro is the master of the EtherCAT network and must always be the first device in the line.

The EtherCAT Out port of the Gold Maestro should be connected to the EtherCAT In port of the next device down the line. The Out port of the last device in line can be left open. If redundancy is required, the Out port of the last device should be connected to the In port of the Gold Maestro.

Note: **When connecting the EtherCAT communication cable it is recommended to use CAT5e cable.**



GMAS008D

Figure 9: EtherCAT Network with no Redundancy

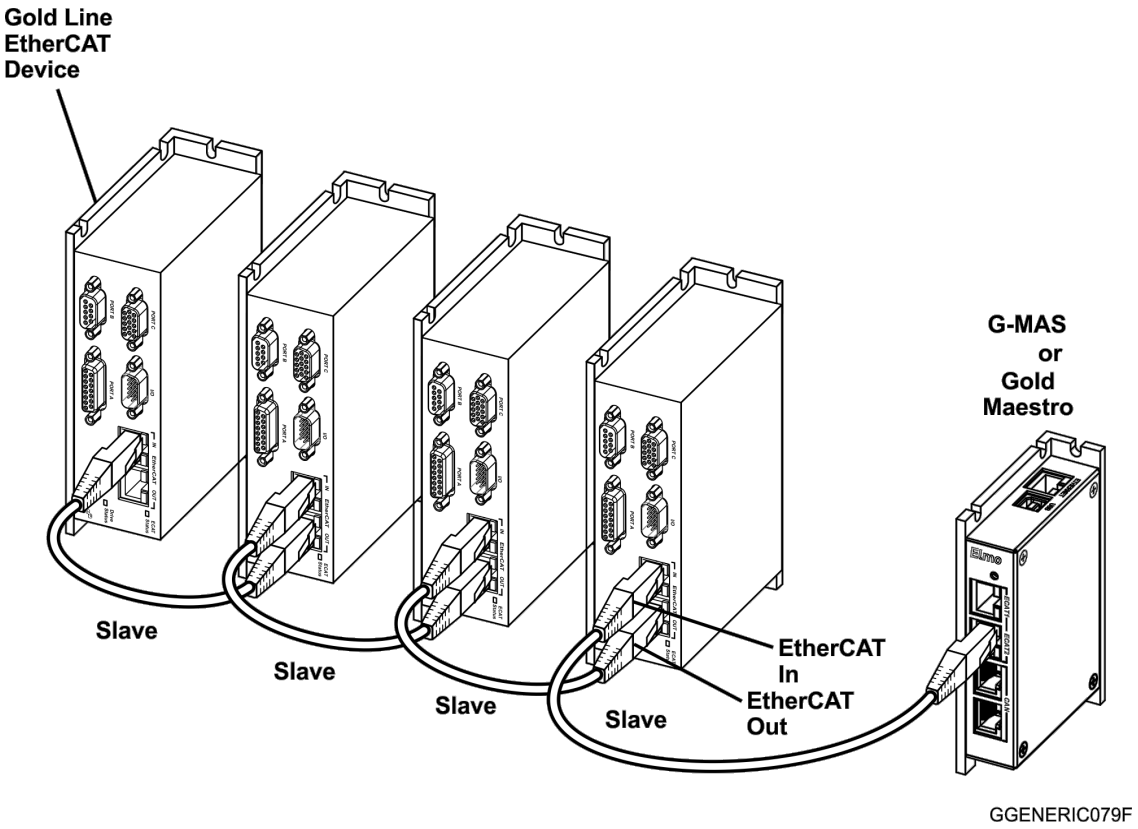


Figure 10: EtherCAT Network Example

Note: **EtherCAT Network with redundancy at ECAT2 is not available at this time.**

6.6 Powering Up

After the Gold Maestro has been mounted, check that the cables are intact. The Gold Maestro is then ready to be powered up.

6.7 Initializing the System

After the Gold Maestro has been connected and mounted, the system must be set up and initialized. The minimum system requirements for a setup are:

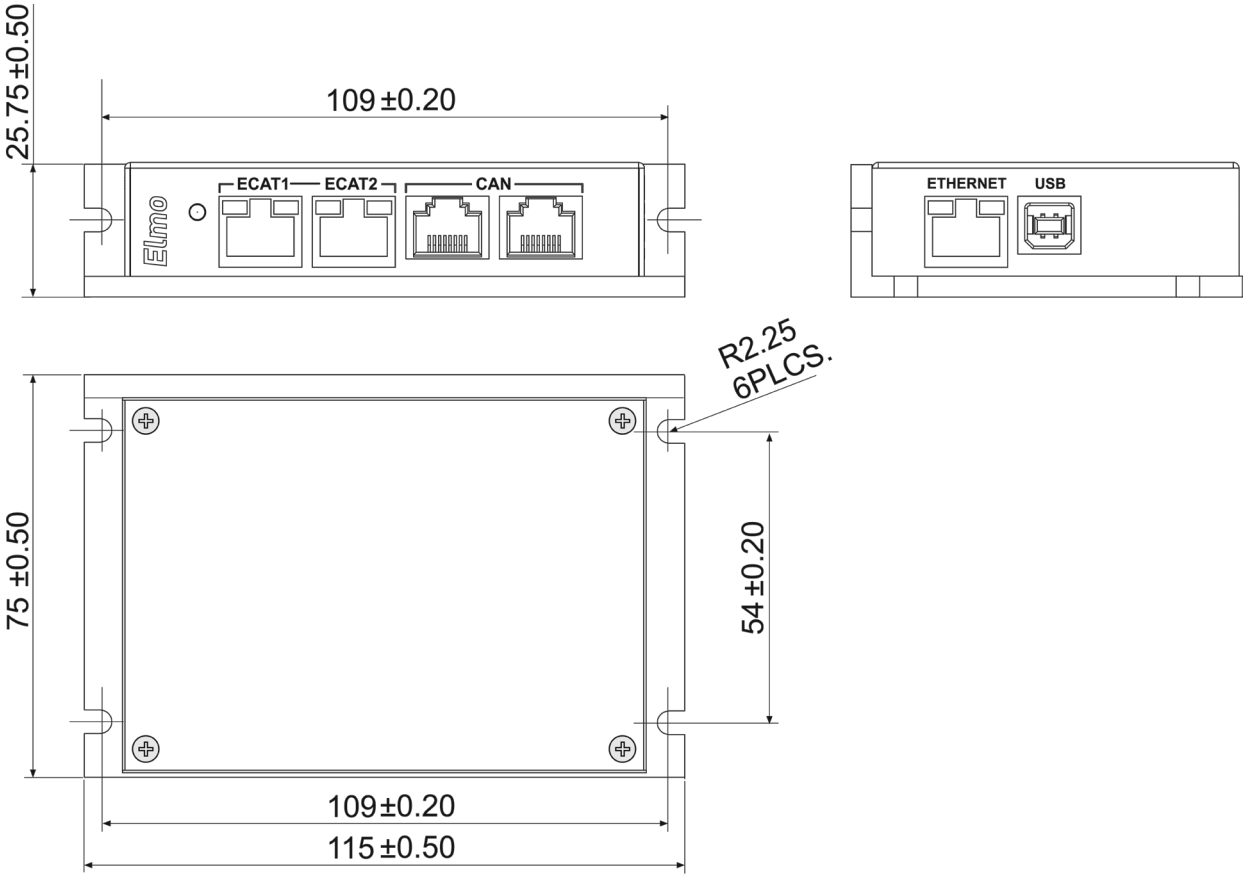
- Gold Maestro (and power supply)
- PC with the required Elmo software
- At least one servo drive and motor
- EtherCAT cables or a terminated CAN network
- A servo drive connected through an EtherCAT cable or a CAN cable (the terminated CAN network)

Users of SimplIQ servo drives:
Setting up the drives and motors is described in the Installation Guide for each servo drive and in the Elmo Application Studio User Guide. Advanced features are described in the SimplIQ Software Manual, Interlude API User Guide, SimplIQ Command Reference and CAN Implementation Guide.

Users of Gold Line servo drives:
Setting up the drives and motors is described in the Gold Line Servo Drive Installation Guide and Elmo Application Studio Users Guide. Advanced features are described in the Gold Line Software Manual, Gold Line Command Reference and CAN Implementation Guide.

Chapter 7: Technical Specifications

7.1 Gold Maestro Dimensions



All measurements are in mm.

7.2 General Specifications

Feature	Details
Weight	250 g (8.75 ounces)
Dimensions	115 mm x 75 mm x 25.4 mm (4.53" x 2.95" x 1")
Mounting Method (with adapter)	Wall Mount (“Bookshelf”)

7.3 Environmental Conditions

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	90%
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
Protection level	IP32

7.4 Power Supply

Feature	Details
Auxiliary power supply	*DC source only*
Auxiliary supply input voltage	13 V to 96 V or 20 V to 196 V depending on the model
Auxiliary supply input power	4.5 W

7.5 Communications

Specification	Details
Ethernet	100 base-T Baud Rate: 10/100 Mbit/sec, automatically detected CAT5e Cable UDP, Telnet, TCP
USB	One port, USB 2.0, 12 Mbps Used only for setup and determining IP address.
EtherCAT	100 base-T Baud Rate: 100 Mbit/sec CAT5e Cable CoE, EoE, FoE
CAN	**CAN bus Signals:** CAN_H, CAN_L, CAN_GND Maximum Baud Rate of 1 Mbits/sec. **CAN Profile:** DS 301 **Device Profile** (drive and motion control)**:** CAN device profiles, e.g., DS301, DS505, DS402, DS401 (for I/O)

Chapter 8: Compliance with Standards

The Gold Maestro network motion controller has been developed, produced, tested and documented in accordance with the relevant standards. Elmo Motion Control is not responsible for any deviation from the configuration and installation described in this documentation. Furthermore, Elmo is not responsible for the performance of new measurements or ensuring that regulatory requirements are met.

8.1 Low Voltage Directive

Specification	Details
The related standards below apply to the performance of the servo drives as stated in the environmental conditions paragraph 7.3 Environmental Conditions. The Gold Maestro is UL compliant up to 42 VDC. For power supplies higher than 42 VDC, the Gold Maestro is NON UL compliant.	
In compliance with **EN 60204-1**	Low Voltage Directive 73/23/EEC
In compliance with **CE 2014/35/EU**	Low-voltage directive 2014/35/EU

8.2 EMC

Specification	Details
In compliance with **IEC/EN 61800-3**	Adjustable speed electrical power drive systems

8.3 Other Compliant Standards

Quality Assurance	
ISO 9001:2008	Quality Management
Design	
IPC-D-275 **IPC-SM-782** **IPC-CM-770**	Printed wiring for electronic equipment (clearance, creepage, spacing, conductors sizing, etc.)
Reliability	
MIL-HDBK- 217F	Reliability prediction of electronic equipment (rating, de-rating, stress, etc.)
Workmanship	
In compliance with **IPC-A-610**, level 3	Acceptability of electronic assemblies

PCB	
In compliance with **IPC-A-600**, level 3	Acceptability of printed circuit boards
Packing	
In compliance with **EN 100015**	Protection of electrostatic sensitive devices
Environmental	
In compliance with **2002/96/EC**	Waste Electrical and Electronic Equipment regulations (WEEE) **Note:** Out-of-service Elmo drives should be sent to the nearest Elmo sales office.
In compliance with **2002/95/EC** (effective July 2006)	Restrictions on Application of Hazardous Substances in Electric and Electronic Equipment (RoHS)


Inspiring Motion
Since 1988
For a list of Elmo's branches, and your local area office, refer to the Elmo site www.elmomc.com
Elmo
Motion Control