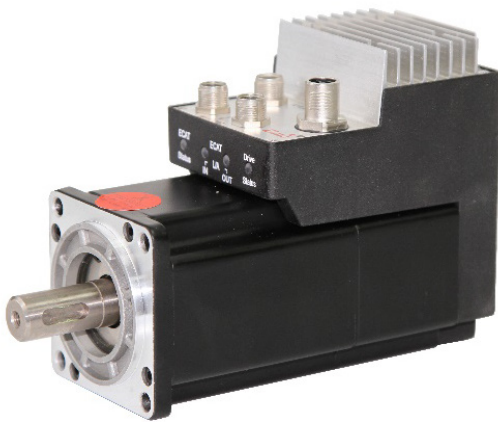


# **Gold Duet Integrated Drive-Motor Installation Guide**

**EtherCAT**

**100VDC, 200VDC, Flange Sizes: 40, 60**



## Notice

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- 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 Duet servo drive in its installation.
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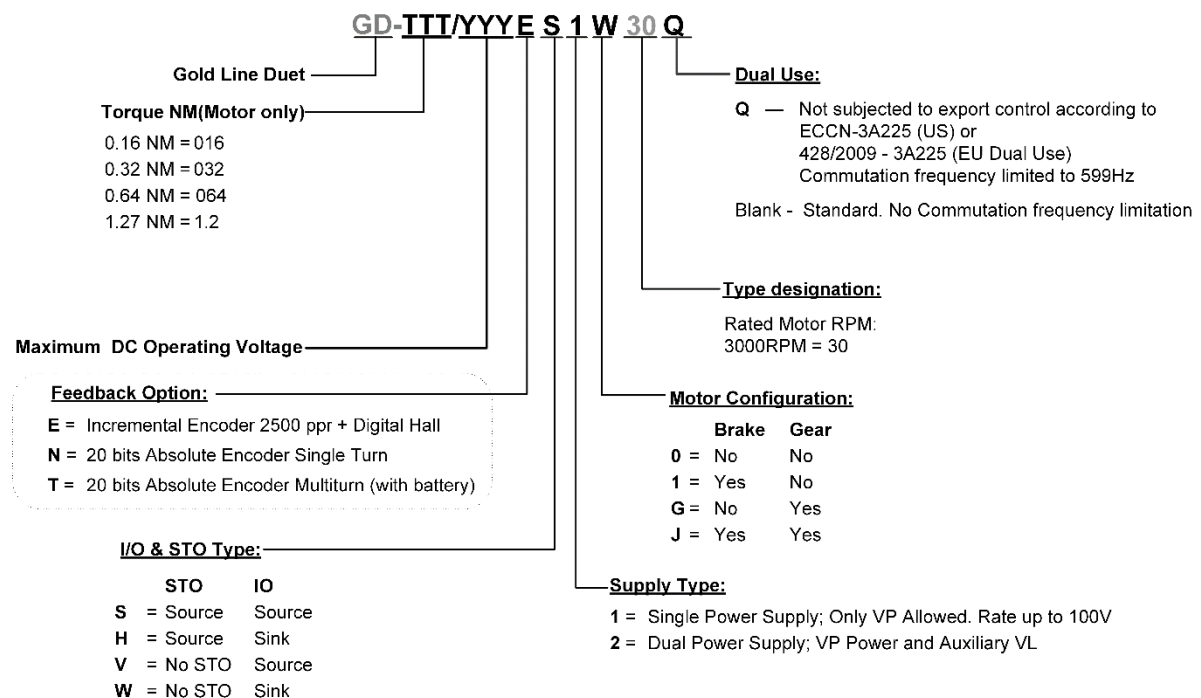
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## Catalog Number



**Notes:** The standard Gold Duets are EtherCAT with ID switches

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## Chapter 1: This Installation Guide

This installation Guide details the technical data, pinouts, wiring, and power connectivity of the Gold Duet.

## Chapter 2: Safety Information

In order to achieve the optimum, safe operation of the Gold Duet, 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 Duet 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 Duet 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 Warnings

- To avoid electric arcing and hazards to personnel and electrical contacts, never connect/disconnect the servo drive while the power source is on.
- Power cables can carry a high voltage, even when the motor is not in motion. Disconnect the Gold Duet 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 Duet 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 Duet, 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 Duet 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 Duet 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*

This installation guide describes the installation of the Gold Duet models with flange sizes; 40 and 60 mm. The Gold Duet series of digital servo drives are highly resilient and designed to deliver the highest density of power and intelligence. The Gold Duet delivers up to **400W of continuous power** and **1200W peak power** in a compact high quality package.

The Gold Duet includes the digital drive which is part of Elmo's advanced Gold Line. The digital servo drives are designed for use with any type of sinusoidal and trapezoidal commutation, with vector control. The Gold Duet 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 Elmo Application Studio (EASII) software tools enable users to quickly and simply configure the servo drive for optimal use with their motor. The Gold drive inside the Gold Duet, as part of the Gold Line, is fully programmable.

Power to the drives is provided by an isolated Mains DC power source.

The Gold Duet can operate with single power or dual power supplies.



## Chapter 4: Technical Information

### 4.1 40 mm Frame Motor Electrical and Physical Data

Parameter			50W 100V	50W 200V	100W 100V	100W 200V
Motor						
Rated Rotation Speed		rev/min	3000	3000	3000	3000
Rated Torque		Nm	0.16	0.16	0.32	0.32
Maximum Peak Torque		Nm	0.48	0.48	0.96	0.96
Rotor Inertia		x10 <sup>-4</sup> kgm <sup>2</sup>	0.018	0.018	0.033	0.033
Rotor Inertia with brake		x10 <sup>-4</sup> kgm <sup>2</sup>	0.021	0.021	0.046	0.046
Electrical						
Min DC bus for Rated Speed @ 3XRated Torque		VDC	45	170	45	170
Minimum Supply Voltage	Supply Type 1	VDC	24	NA	24	NA
	Supply Type 2		10	20	10	20
Maximum Supply Voltage		VDC	96	196	96	196
DC Bus Input Current @Vbus At Rated Speed & Rated Torque		A/V	1.2A@48V 0.7A@85V	0.4A@170V	2.4A@48V 1.4A@85V	0.7A@170V
VL , Control & Logic Supply		VDC	See Table in section 4.3 Auxiliary Supply Input Voltage (VL)			
Mechanical						
Weight W/O Brake		Kg	0.65	0.65	~0.85	~0.85
Weight With brake		Kg	~0.85	~0.85	~1.05	~1.05
Dimensions W/O Brake		Mm (in)	104.3x83.4x43 (4.11x3.28x1.69)	104.3x83.4x43 (4.11x3.28x1.69)	126.3x83.4x43 (4.97x3.28x1.69)	126.3x83.4x43 (4.97x3.28x1.69)
Dimensions With Brake		mm (in)	134.3x83.4x43 (5.29x3.28x1.69)	134.3x83.4x43 (5.29x3.28x1.69)	156.3x83.4x43 (6.15x3.28x1.69)	156.3x83.4x43 (6.15x3.28x1.69)
Encoders			Options 1. Single turn 20 bits Absolute Encoder, <b>N option</b> . 2. Multi-turn, 20 bits single turn + 16 bits multi-turn, including battery, <b>T option</b> 3. Quadrature 2500 ppr + commutation signals (Hall signals), <b>E option</b> Other resolution on request			
Structure			Totally enclosed, non-ventilated			
Protection level			IP65			



## 4.2 60 mm Frame Motor Electrical and Physical Data

Parameter			200W 100V	200W 200V	400W 100V	400W 200V
Motor						
Rated Rotation Speed		rev/min	3000	3000	3000	3000
Rated Torque		Nm	0.64	0.64	1.27	1.27
Maximum Peak Torque		Nm	1.92	1.92	3.8	3.8
Rotor Inertia		x10 <sup>-4</sup> kgm <sup>2</sup>	0.258	0.258	0.479	0.479
Rotor Inertia with brake		x10 <sup>-4</sup> kgm <sup>2</sup>	0.262	0.262	0.483	0.483
Electrical						
Min DC bus for Rated Speed @ 3XRated Torque		VDC	45	170	45	170
Minimum Supply Voltage	Supply Type 1	VDC	24	NA	24	NA
	Supply Type 2		10	20	10	20
Maximum Supply Voltage		VDC	96	196	96	196
DC Bus Input Current @Vbus At Rated Speed & Rated Torque		A/V	4.7A@48V 2.6A@85V	1.3A/170V	9.2A@48V 5.2A@85V	2.6A@170V
VL , Control & Logic Supply		VDC	See Table in See Table in section 4.3 Auxiliary Supply Input Voltage (VL)			
Mechanical						
Weight W/O Brake		Kg	1.3	1.3	1.8	1.8
Weight With brake		Kg	1.8	1.8	2.3	2.3
Dimensions W/O Brake		mm (in)	158.5x101.7x60.3 (6.24x4.00x2.37)	158.5x101.7x60.3 (6.24x4.00x2.37)	188.5x101.7x60.3 (7.42x4.00x2.37)	188.5x101.7x60.3 (7.42x4.00x2.37)
Dimensions With Brake		mm (in)	197.5x101.7x60.3 (7.78x4.00x2.37)	197.5x101.7x60.3 (7.78x4.00x2.37)	227.5x101.7x60.3 (8.96x4.00x2.37)	227.5x101.7x60.3 (8.96x4.00x2.37)
Encoders			Options 1. Single turn 20 bits Absolute Encoder, <b>N option</b> . 2. Multi-turn, 20 bits single turn + 16 bits multi-turn, including battery, <b>T option</b> 3. Quadrature 2500 ppr + commutation signals (Hall signals), <b>E option</b> Other resolution on request			
Structure			Totally enclosed, non-ventilated			
Protection level			IP65			



## 4.3 Auxiliary Supply Input Voltage (VL)

There are two rated power voltages; 100V and 200V.

The Gold Duet 100V rated has two options:

1. **Single power supply (Supply Type 1).** Only VP Allowed. No need for auxiliary VL power supply even when using a brake
2. **Two separate power supplies (Supply Type 2),** VP for the Power and VL to power the control, logic, I/O, and brake

The Gold Duet 200V rated must have a VL auxiliary power supply (Supply Type 2)

Feature		100V	100V	200V
		Single supply (Supply Type 1)	VL required (Supply Type 2)	VL required (Supply Type 2)
Without Brake				
VL input range	VDC	Must not be connected	14 to 30	14 to 30
Power consumption	W		3 to 10	3 to 10
With Brake				
VL input range	VDC	Must not be connected	23 to 25.5	23 to 25.5
Power consumption	W		3 to 22	3 to 22

## 4.4 Environmental Conditions

Feature	Details
<b>Operating ambient temperature according to IEC60068-2-2</b>	0 °C to 40 °C (32 °F to 104 °F)
<b>Storage temperature</b>	-20 °C to +85 °C ( -4 °F to +185 °F)
<b>Maximum non-condensing humidity according to IEC60068-2-78</b>	95%
<b>Maximum Operating Altitude</b>	2,000 m (6562 feet) It should be noted that servo drives capable of higher operating altitudes are available on request.
<b>Mechanical Shock according to IEC60068-2-27</b>	15g / 11ms Half Sine
<b>Vibration according to IEC60068-2-6</b>	5 Hz ≤ f ≤ 10 Hz: ±10mm 10 Hz ≤ f ≤ 57 Hz: 4G 57 Hz ≤ f ≤ 500 Hz: 5G





## 4.5 Product Resource

Main Feature	Details	
STO	PLC Source	√
Digital Input Option	PLC Source or PLC Sink	With STO = 2 Without STO = 4
Digital Output Option	PLC Source or PLC Sink	1
Communication Option	USB	√
	EtherCAT	√
	Ethernet	√



## **Chapter 5: Product Features**

### **5.1 Supply Input**

The Gold Duet can operate with a single power or dual power supplies.

### **5.2 Communications**

- Fast and efficient EtherCAT networking
- EtherCAT Slave:
  - CoE (CANopen over EtherCAT)
  - EoE (Ethernet over EtherCAT)
  - FoE (File over EtherCAT) for firmware download
  - Supports Distributed Clock
  - EtherCAT cyclic modes supported down to a cycle time of 250  $\mu$ s
- Ethernet TCP/IP:
  - UDP
  - Telnet
- USB; Accessible via drive body compartment

### **5.3 Feedback Sensor Specifications**

The motor of the Gold Duet supports 20 bit Absolute serial encoders.

### **5.4 STO**

- For STO standard compliance, refer to chapter Chapter 11: Compliance with Standards

### **5.5 Safety**

- For Safety standard compliance, refer to chapter Chapter 11: Compliance with Standards



## 5.6 Outputs

- There is one digital output which can be configured to the following options:
  - Source mode – PLC voltage level, Conforming to IEC 61131-2
  - Sink mode – PLC voltage level
  - Output current for OUT1; 250 mA
- There is an internal output for the brake (OUT2)
- Short circuit protection
- Thermal protection
- Optional functions:
  - Fast output compare (for one output only)
  - Brake control
  - Amplifier fault indication
  - General purpose
  - Servo enable indication
  - Additional internal output for the brake

## 5.7 Inputs

- There are two digital inputs for the Gold Duet with the STO option and four digital inputs for Gold Duet without STO option. The digital input can be configured to the following options:
  - Source mode – PLC voltage level
  - Sink mode – PLC voltage level
- Optional functions:
  - Fast event capture (for two inputs only)
  - Inhibit/Enable motion
  - Stop motion under control (hard stop)
  - Motion reverse and forward limit switches
  - Begin on input
  - Abort motion
  - Homing
  - Fast Digital capture
  - General purpose



## 5.8 Motor Product Features

The motor has the following features:

- Sinusoidal Commutation servo motor
- For Torque – Speed operating curves, refer to Chapter Chapter 8: Gold Duet Motor Characteristic Curves

## 5.9 Drive Product Features

The Gold Duet's features determine how it controls motion, as well as how it processes host commands, feedback and other input.

### 5.9.1 Servo Control

- Advanced and extremely fast vector control algorithm (current loop bandwidth: 4 kHz)
- Current/Torque sampling rate: up to 25 kHz (40  $\mu$ s)
- Velocity sampling rate: up to 12.5 kHz (80  $\mu$ s)
- Position sampling rate: up to 12.5 kHz (80  $\mu$ s)
- Electrical commutation frequency: up to 4 kHz
- Current closed loop bandwidth exceeds 4 kHz
- Position/Velocity/Acceleration command range – full 32 bit
- Position over velocity, with full dual loop support
- Current gain scheduling to compensate for the motor's non-linear characteristics
- Advanced filtering: Low pass, Notch, General Biquad
- Current loop gain scheduling to compensate for bus voltage variations
- Velocity gain scheduling for ultimate velocity loop performance
- Gains and filter scheduling vs. position for mechanical coupling optimization, speed and position tracking errors
- High order filters gain scheduling vs. speed and position
- S-curve Profile Smoothing
- Cogging, BEMF and  $\omega \times L$  compensation
- Dual Loop Operation supported by Auto Tuning
- Fast, easy and efficient advanced Auto Tuning
- Incremental encoder frequency of up to 75 Megacounts/sec
- Motion profiler numeric range:
  - Position up to  $\pm 2 \times 10^9$  counts
  - Velocity up to  $2 \times 10^9$  counts/sec
  - Acceleration up to  $2 \times 10^9$  counts/sec<sup>2</sup>



## 5.9.2 Advanced Filters and Gain Scheduling

- “On-the-Fly” gain scheduling of current and velocity
- Velocity and position with “1-2-2” PIP controllers
- Automatic commutation alignment
- Automatic motor phase sequencing
- Current gain scheduling to compensate for the motor’s non-linear characteristics
- Advanced filtering: Low pass, Notch, General Biquad
- Current loop gain scheduling to compensate for bus voltage variations
- Velocity gain scheduling for ultimate velocity loop performance
- Gains and filter scheduling vs. position for mechanical coupling optimization, speed and position tracking errors
- High order filters gain scheduling vs. speed and position

## 5.9.3 Motion Control

- Motion control programming environment
- Motion modes: PTP, PT, PVT, ECAM, Follower, Dual Loop, Current Follower, Fast event capturing inputs
- Full DS-402 motion mode support, in both the CANopen and CANopen over EtherCAT (CoE) protocols, including Cyclic Position/Velocity modes. Fast (Hardware) event capturing inputs, supporting < 1  $\mu$ s latch latency
- Fast (hardware) Output Compare, with < 1  $\mu$ s latency
- Output compare repetition rate:
- Fixed Gap: Unlimited
- Table based: 4 kHz
- Motion Commands: Analog current and velocity, pulse-width modulation (PWM) current and velocity, digital (SW) and Pulse and Direction
- Distributed Motion Control
- EAS (Elmo Application Studio) software: an efficient and user friendly auto tuner

## 5.9.4 Fully Programmable

- Third generation programming structure
- Event capturing interrupts
- Event triggered programming



### 5.9.5 Built-In Protection

- Software error handling
- Abort (hard stops and soft stops)
- Status reporting
- Protection against:
  - Shorts between motor power outputs
  - Shorts between motor power outputs and power input/return
  - Failure of internal power supplies
  - Over-heating
- Continuous temperature measurement. Temperature can be read on the fly; a warning can be initiated x degrees before temperature disable is activated.
- Over/Under voltage
- Loss of feedback
- Following error
- Current limits

### 5.9.6 Status Indication

- Red/Green dual LED, used for immediate indication of the initiation and working states.

### 5.9.7 Backup Battery

The battery for absolute encoder is required to store the multi-turn data into the encoder. This battery consists of a 1200 mAh Lithium Chloride ER14250 (1/2AA Size) with the following specification:

- Nominal Voltage: 3.6 V
- Nominal Capacity: 1.2 Ah

### 5.9.8 Automatic Procedures

- Commutation alignment
- Phase sequencing
- Current loop offset adjustment
- Current loop gain tuning
- Current gain scheduling
- Velocity loop offset adjustment
- Velocity gain tuning
- Velocity gain scheduling
- Position gain tuning



## 5.10 System Architecture

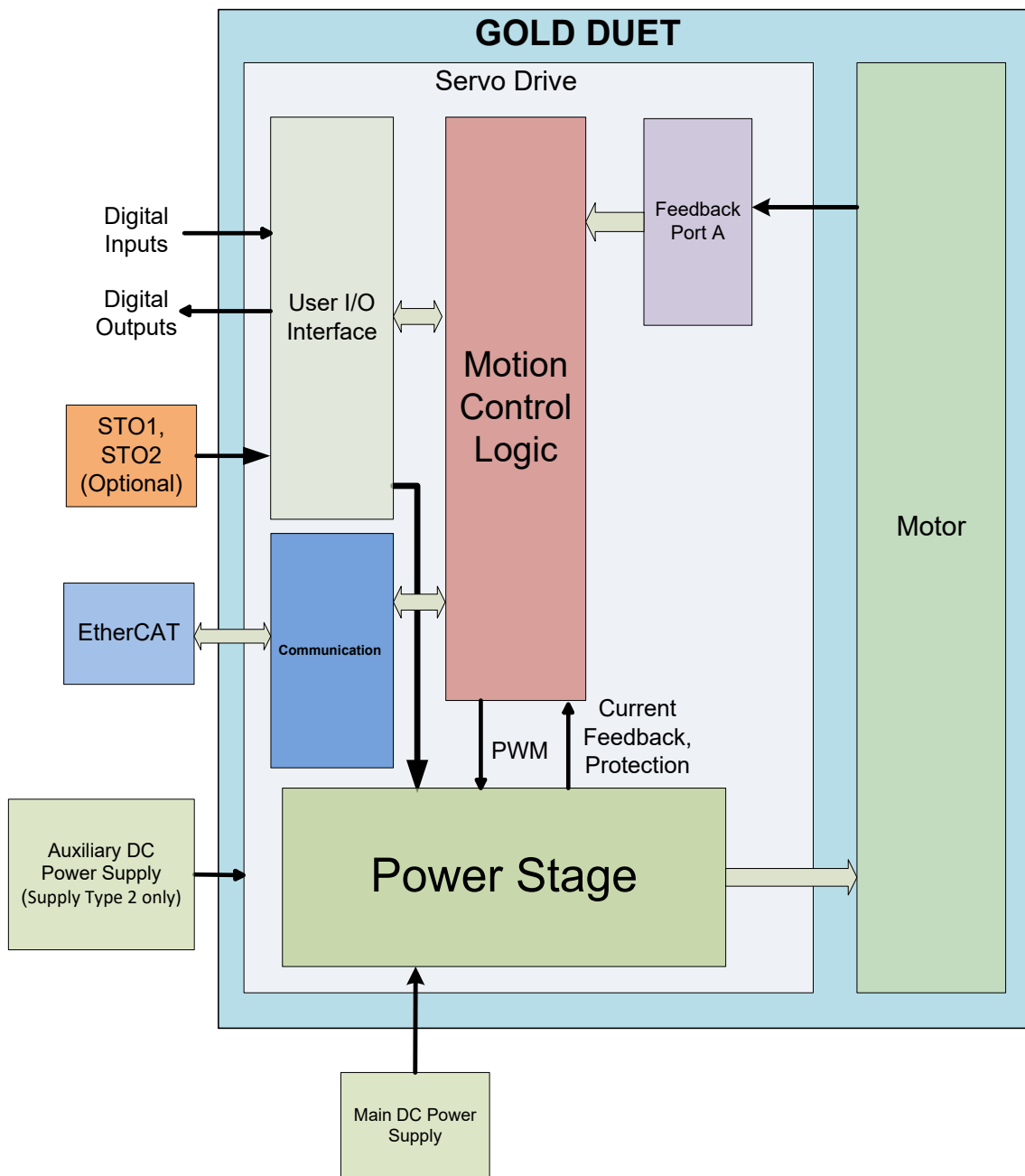


Figure 1: Gold Duet System Block Diagram



## Chapter 6: Installation

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

### 6.1 Site Requirements

You can guarantee the safe operation of the Gold Duet by ensuring that it is installed in an appropriate environment. Refer to the Table in section 4.4 Environmental Conditions.



**Caution:** The Gold Duet dissipates its heat by convection. The maximum ambient operating temperature of 40 °C (104 °F) must not be exceeded.

### 6.2 Unpacking the Drive Components

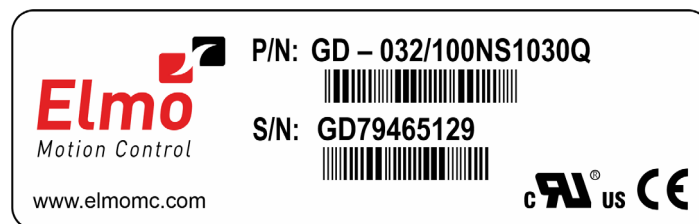
Before you begin working with the Gold Duet, verify that you have all of its components, as follows:

- The Gold Duet Integrated Drive-Motor
- The Elmo Application Studio software and software manual

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

**To unpack the Gold Duet:**

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



4. Verify that the Gold Duet type is the one that you ordered, and ensure that the voltage meets your specific requirements.

The part number at the top provides the type designation. Refer to the appropriate part number in the section Catalog Number at the beginning of the installation guide.





## 6.3 Mounting the Gold Duet

Use round head screws to mount the Gold Duet (Figure 2), depending on the flange size as described in the following table:

Flange Size	Screw Size
40	M3 x 2
60	M5 x 4

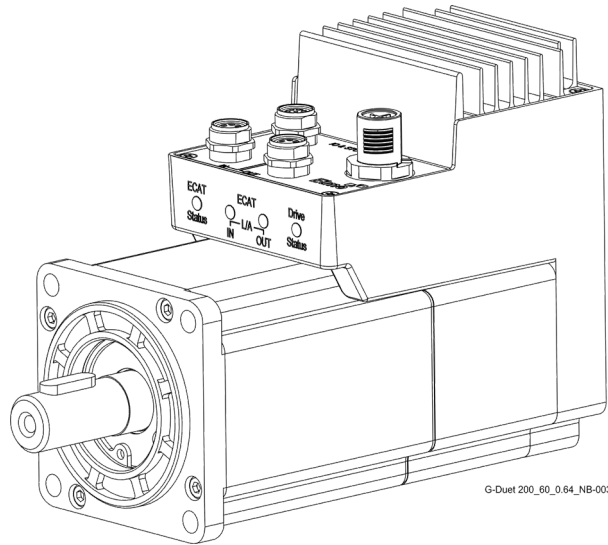
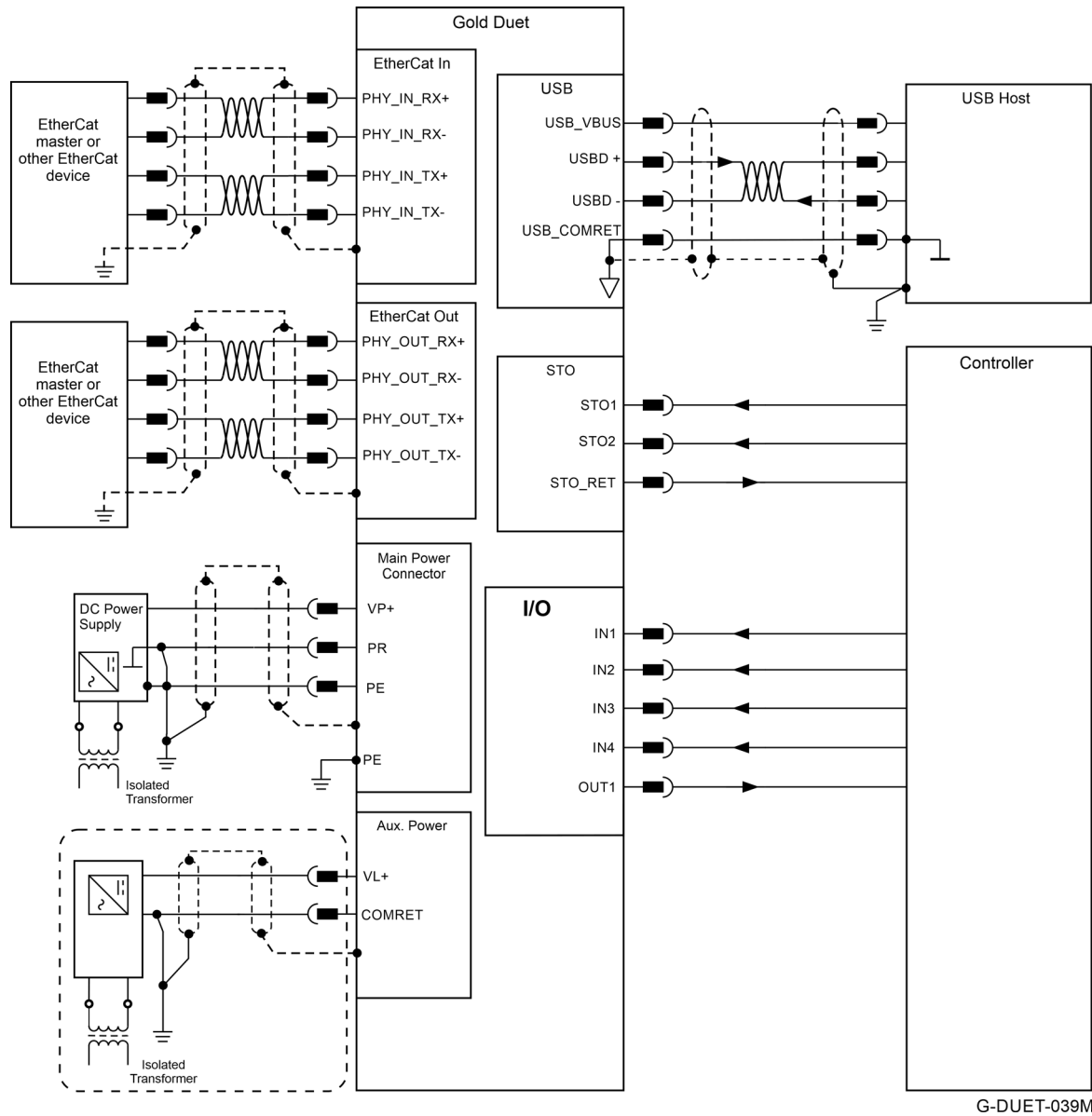


Figure 2: Mounting the Gold Duet

## 6.4 The Gold Duet Connection Diagram



G-DUET-039M




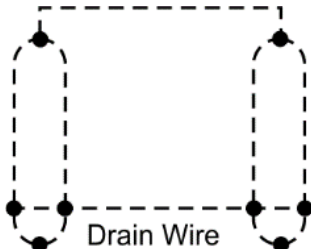
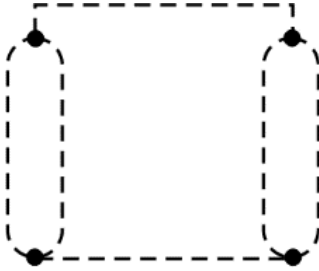
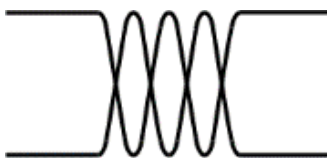
**Figure 3: The Gold Duet EtherCAT Connection Diagram**



## Chapter 7: 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
 GGEN_DYPE101C-A	Earth connection (PE)
 GGEN_DYPE101C-B	Protective Earth Connection
 GGEN_DYPE101C-C	Common at the Controller
 GGEN_DTYPE101C-D	Shielded cable with drain wire. The drain wire is a non-insulated wire that is in direct contact with the braid (shielding). Shielded cable with drain wire significantly simplifies the wiring and earthing.
 GGEN_DTYPE101C-E	Shielded cable braid only, without drain wire.
 GGEN_DTYPE101C-F	Twisted-pair wires



## 7.1 Wiring the Gold Duet

When the Gold Duet 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 Gold Duet.



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

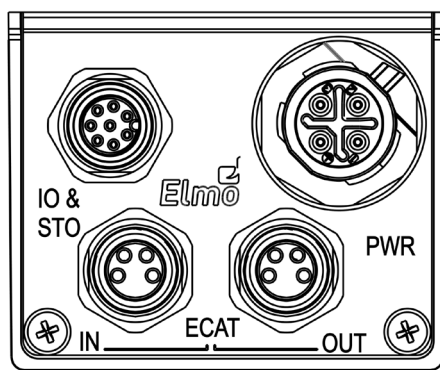
- Use twisted pair shielded cables for communication connections. For best results, the cable should have an aluminum foil shield covered by copper braid, and should contain a drain wire.
- The drain wire is a non-insulated wire that is in contact with parts of the cable, usually the shield. It is used to terminate the shield and as a grounding connection.
- The impedance of the wire must be as low as possible. The size of the wire must be thicker than actually required by the carrying current.
- Keep all wires and cables as short as possible.
- Ensure that in normal operating conditions, the shielded wires and drain *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 can result in drive/controller/host failure.
- After completing the wiring, carefully inspect all wires to ensure tightness, good solder joints and general safety.



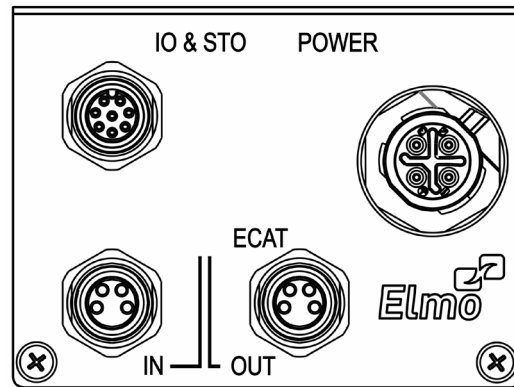
## 7.2 Gold Duet Connector Types

The Gold Duet has the following M12 and M8 connectors:

No. Pins	Type	Function
4	4-pin M12 Connector	Main Power
8	8-pin M8 Connector	I/O and STO
4	4-pin M8 Connector	EtherCAT OUT
4	4-pin M8 Connector	EtherCAT IN
4	USB Device Mini-B (at rear compartment)	USB



Gold Duet 40



Gold Duet 60

G-DUET-505A

Gold Duet-Connector Interface

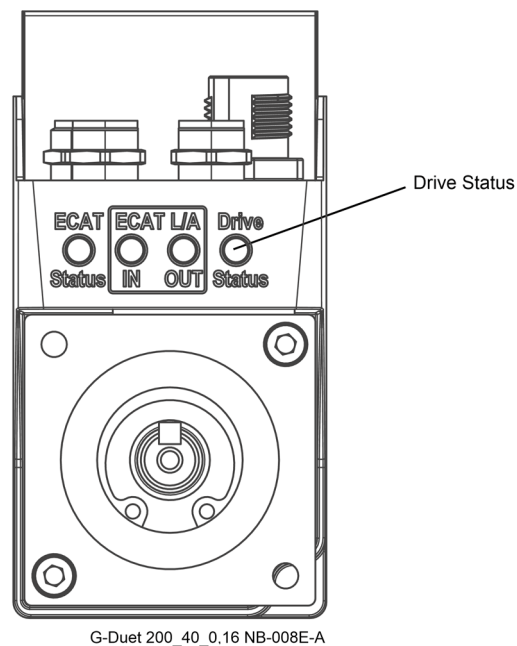
Table 1: Connector Types

The pinouts in the following sections describe the function of each pin in the Gold Duet connectors.



## 7.3 Drive Status Indicator

The G-DUET is equipped with light-emitting diode (LED) indicators and a Drive status indicator.



**Figure 4: LED Indicators**

Figure 4 shows the position of the red/green dual LED for drive status indication. The Drive Status red/green dual LED is used for immediate indication of the following states:

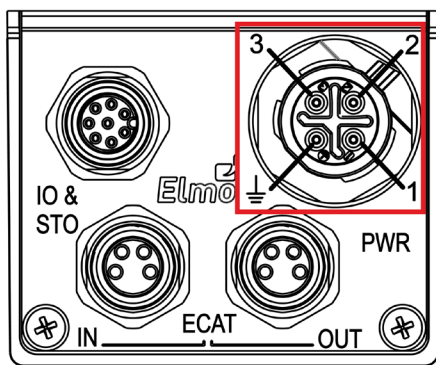
- **Initiation state:** In this state the LED indicates whether the drive is in the boot state (blinking red) or in the operational state (steady red).
- **Working state:** In this state the LED indicates whether the drive is in an amplifier failure state (red) or is ready to enable the motor (green).



## 7.4 Main Power (J6) and Auxiliary Power (J2)

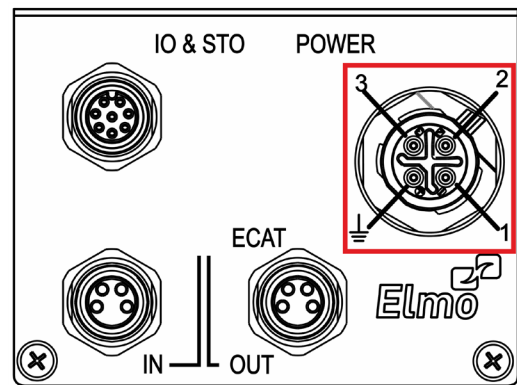
For more details on J2, please refer to 7.5 I/O and STO Connector (J2).

Pin	Signal	Function	Cable
<b>J6</b>			
1	Reserved	Reserved	
2	PR	Supply return	Power
3	VP+	Power supply input	Power
	PE	Protective Earth	Power
<b>J2</b>			
8	VL+	Auxiliary Power Supply	Power
6	COMRET	Common Return	Power



Gold Duet 40

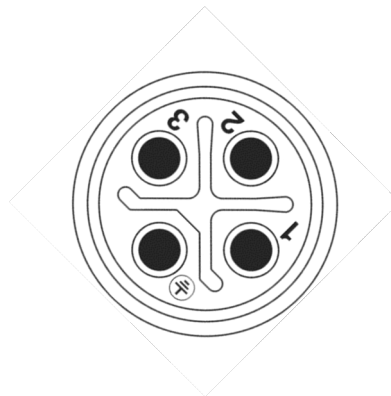
**G-DUET-40 Connectors Interface**



Gold Duet 60

G-DUET-500A

**G-DUET-60 Connectors Interface**



**Figure 5: M12 socket 4-pos S-encoded Power Male Connector**



### 7.4.1 Description

This section describes the Main power (VP) and Auxiliary Power (VL) for power ratings 200V and 100V.

The VL is connected via the IO & STO connector.

- **The Gold Duet 100V Power rating** supports two options:
  - Single power supply (Supply Type 1) with only VP Allowed. No need for auxiliary VL power supply even when using a brake
  - Two separate power supplies (Supply Type 2), VP for the Main Power and VL to power the control, logic, I/O, and brake
- **The Gold Duet 200V Power rating (Supply Type 2) must have VL auxiliary power supply. Two power isolated DC power sources are required, main power 20 to 196V and Auxiliary Power logic as follows:**
  - Without Brake, 14 to 30 VDC
  - With Brake, 23 to 25.5 VDC

#### To connect the DC power supply:

1. The source of the power supply must be isolated from the Mains.
2. For best immunity, it is highly recommended to use 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.

#### To connect the auxiliary supply:

1. The source of the Auxiliary Supply must be isolated from the Mains.
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
4. Before applying power, first verify the polarity of the connection.





## 7.4.2 Single Power Supply (Order Code Option Supply Type 1)

For Single Power Rating (Supply Type 1), only one power isolated DC power source is required; main power.

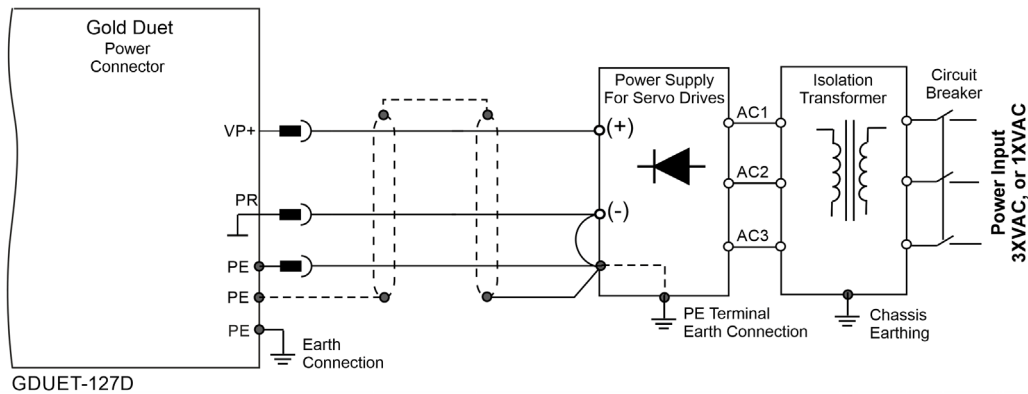


Figure 6: Main Power Supply Connection Diagram (no Auxiliary Supply)

## 7.4.3 Dual Power Supplies (Order Code Option Supply Type 2)

**Note:** The Duet requires an external VL Logic power supply; the drive cannot operate without it.

For Dual Power Rating (Supply Type 2), two power isolated DC power sources are required, main power and auxiliary Power for the control, logic, I/O, and break.

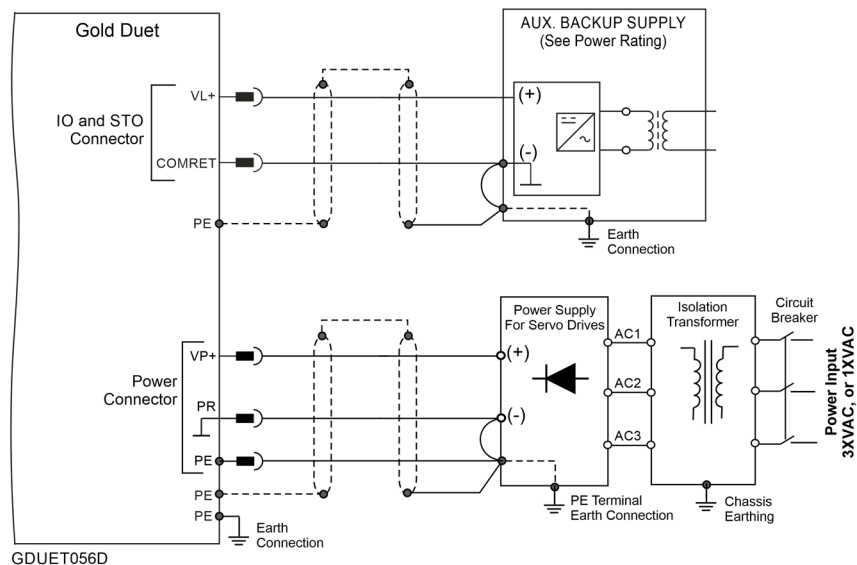


Figure 7: Auxiliary Power Supply Connections Diagram— VL is connected via IO & STO connector



## 7.5 I/O and STO Connector (J2)

The Gold Duet has up to four digital inputs and 1 digital outputs, which can be configured to the following options:

- Source mode – PLC voltage level
- Sink mode – PLC voltage level

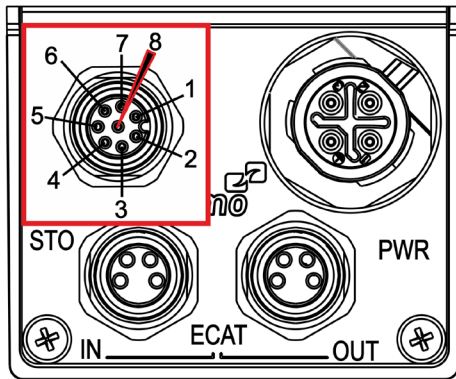
Gold Duet versions S, H - with STO, has two digital inputs

Gold Duet versions V, W - without STO, have four digital inputs

Cat No.	S or H		V or W	
Pin	Signal	Function	Signal	Function
1	STO1	STO 1 input	IN3	Programmable input 3
2	STO2	STO 2 input	IN4	Programmable input 4
3	STO_RET	STO Common Return	IN_RET3, 4	The common of inputs 3&4, isolated from the control section
4	IN2	Programmable input 2		
5	IN1	Programmable input 1		
6	COMRET	Common Return. This is the common of inputs1 & 2 , and output 1 and VL+		
7	OUT1	Programmable output 1		
8	VL+	For Power Supply Type 1 : VL+ is not connected For Power Supply Type 2 : VL+ input (control , Logic ,I/O and Brake)		

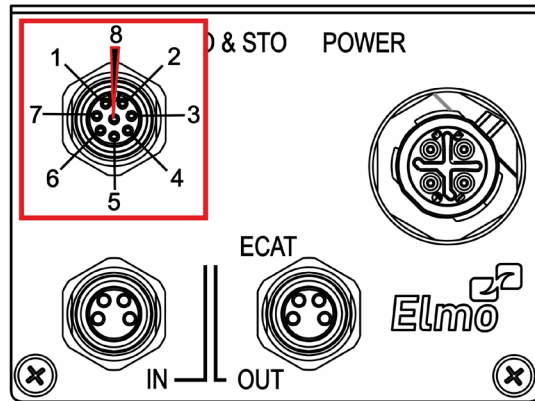


## Connectors



Gold Duet 40

G-DUET-40 Connectors Interface

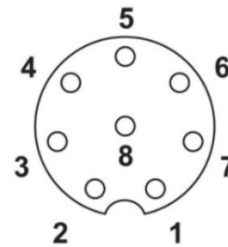


Gold Duet 60

G-DUET-60 Connectors Interface



M8 8-pin Female Connector



M8 Male Cable Connector

### 7.5.1 STO (Safe Torque Off) Inputs

Refer to [Chapter 9 STO](#) / [Chapter 3.12 Digital Inputs](#) in the in the MAN-G-Panel Mounted Drives Hardware manual for full details.

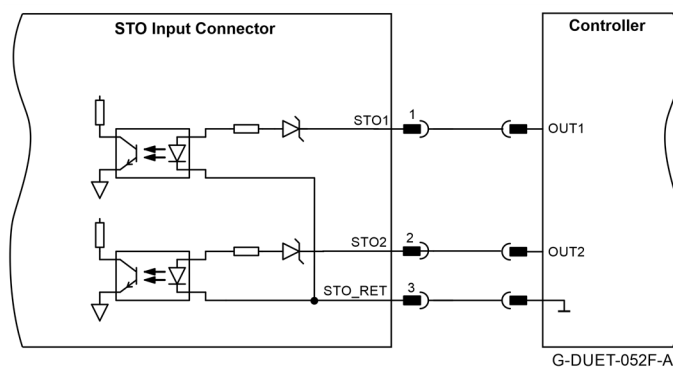


Figure 8: STO Input Connection – PLC Option



## 7.5.2 Digital IO PLC Source Type

### 7.5.2.1 Digital Input

Refer to section [11.1.2.3 Source PLC Voltage Level Digital Input](#) in the Gold Panel Mounted Drives HW Manual for full details.

The following drawings describe the specification of digital input.

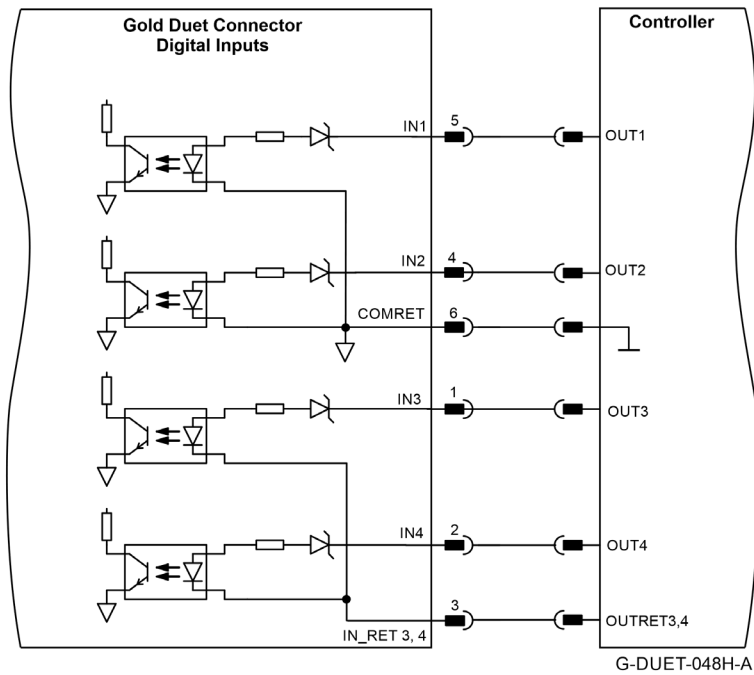


Figure 9: Digital Input PLC Source Mode Connection Diagram for Cat. No. V

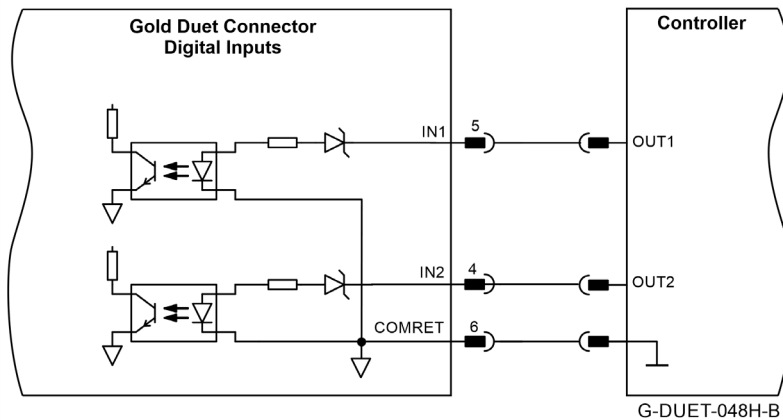


Figure 10: Digital Input PLC Source Mode Connection Diagram for Cat. No. S



### 7.5.2.2 Digital Output

Refer to section [11.1.2.4 Source PLC Voltage Level Digital Output](#) in the Gold Panel Mounted Drives HW Manual for full details.

**Note:** When the Supply Output in the Gold Panel Mounted Drives HW Manual is VDD, the Gold Duet requires  $24V \pm 10\%$  for type 1 and VL for type 2.

The following drawings describe the specification of digital output.

#### 7.5.2.2.1 Supply Type 1

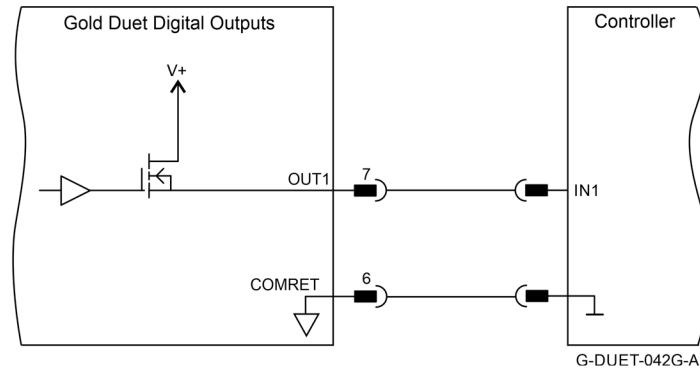


Figure 11: Digital Output as PLC Source Configuration Connection Diagram Supply Type 1

**Note:** V+ is the Internal Voltage from the internal power supply.

#### 7.5.2.2.2 Supply Type 2

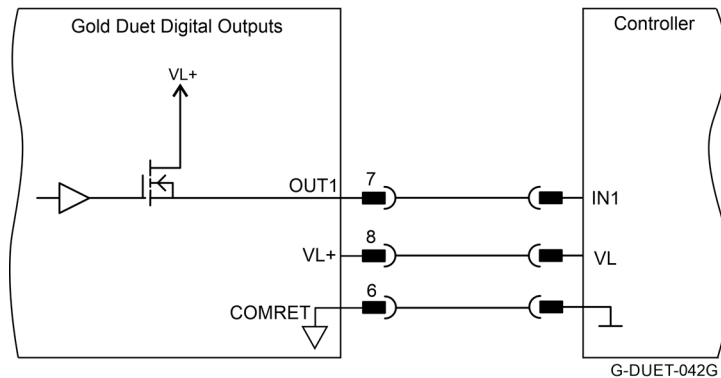


Figure 12: Digital Output as PLC Source Configuration Connection Diagram Supply Type 2



## 7.5.3 Digital IO PLC Sink Type

### 7.5.3.1 Digital Input

Refer to section 11.1.2.5 Sink PLC Voltage Level Digital Input in the Gold Panel Mounted Drives HW Manual for full details.

The following drawings describe the specification of digital input.

#### 7.5.3.1.1 Supply Type 1

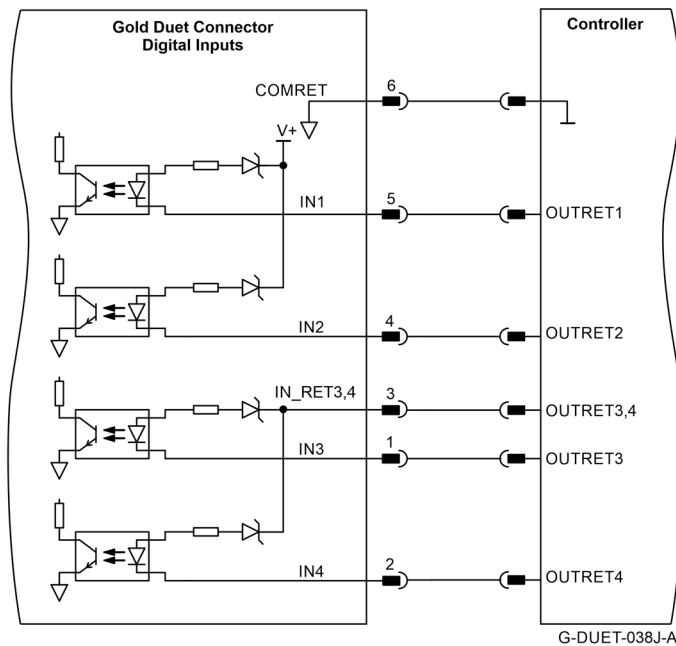


Figure 13: Digital Input as Sink Configuration Connection Diagram for Cat. No. W Supply Type 1

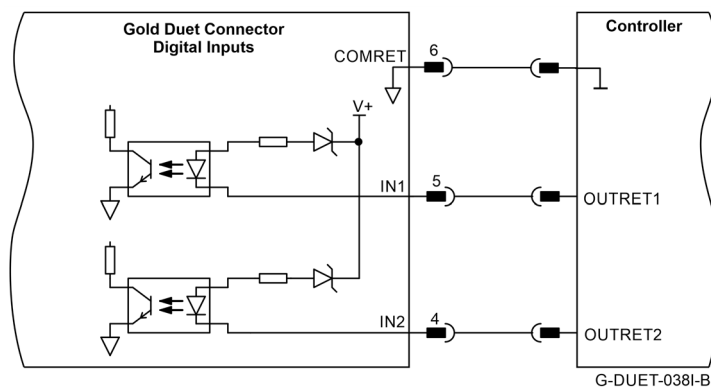


Figure 14: Digital Input as Sink Configuration Connection Diagram for Cat. No. H Supply Type 1

**Note:** V+ is the Internal Voltage from the internal power supply.



### 7.5.3.1.2 Supply Type 2

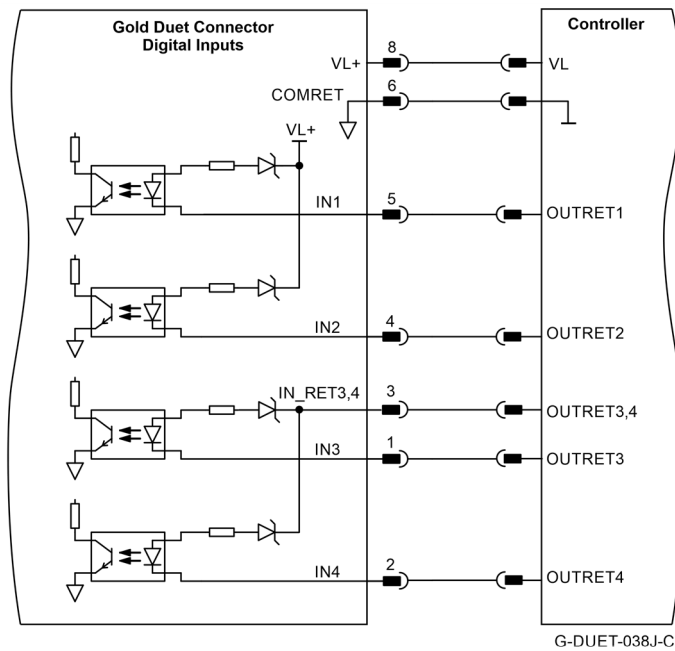


Figure 15: Digital Input as Sink Configuration Connection Diagram for Cat. No. W Supply Type 2

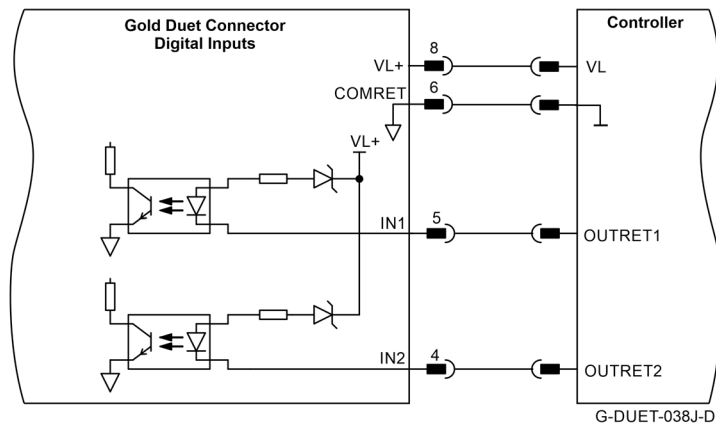


Figure 16: Digital Input as Sink Configuration Connection Diagram for Cat. No. H Supply Type 2

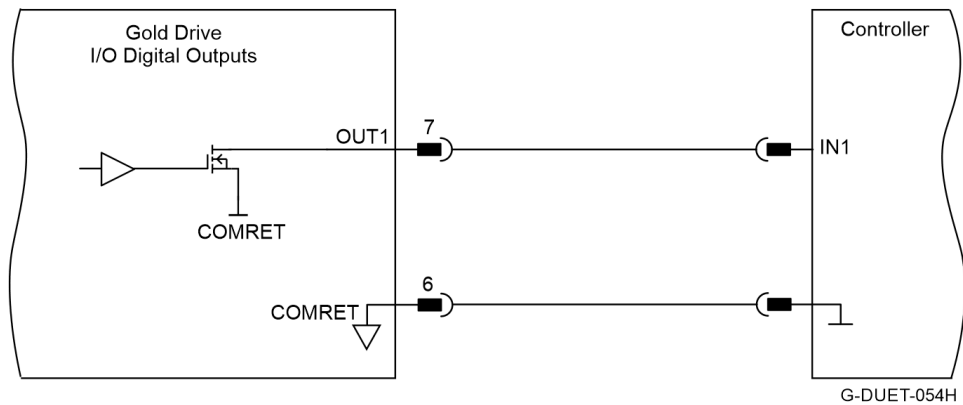


### 7.5.3.2 Digital Output

Refer to section [11.1.2.6 Sink PLC Voltage Level Digital Output](#) in the Gold Panel Mounted Drives HW Manual for full details.

**Note:** When the Supply Output in the Gold Panel Mounted Drives HW Manual is VDD, the Gold Duet requires  $24V \pm 10\%$  for type 1 and VL for type 2.

The following drawing describes the specification of digital output.







## 7.6 EtherCAT /Ethernet Communications

### 7.6.1 Introduction

The Gold Duet serves as an EtherCAT slave device, therefore it includes EtherCAT\_IN and EtherCAT\_OUT ports. The EtherCAT\_IN port can be configured to an Ethernet port using the **FW** command. Refer to the Gold Command Reference manual.

### 7.6.2 Specification

Specification	Details
Physical layer	<ul style="list-style-type: none"><li>100base-T</li></ul>
Speed	<ul style="list-style-type: none"><li>100 Mbit/sec</li></ul>
Cable Type	CAT5e (Category 5 cable is a high signal integrity cable with four twisted pairs. It is recommended to use with shielded cable).
<b>EtherCAT</b>	
EtherCAT Type	EtherCAT Slave (Includes EtherCAT IN and EtherCAT out ports)
Protocols	CoE, FoE, EoE Distributed clock <b>Note:</b> During the FoE operation, the USB cable connection must be disconnected.
<b>Ethernet (EtherCAT IN Port)</b>	
Protocols	UDP



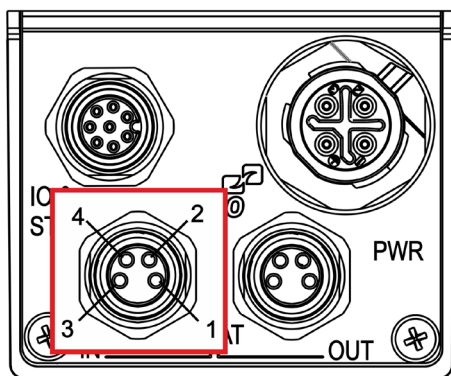
### 7.6.3 EtherCAT IN Signals (J3)

The EtherCAT IN port can be configured as an Ethernet port for TCP/IP – see the EtherCAT Manual.

The following table describes the signals of EtherCAT\_IN

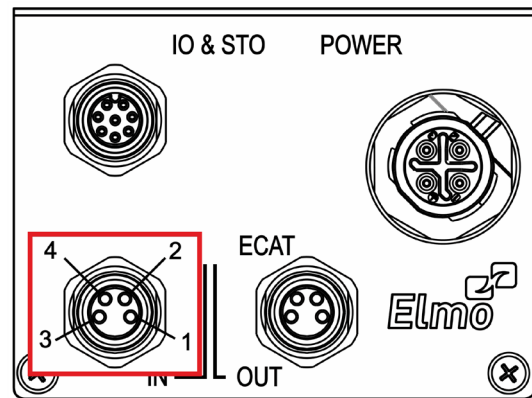
Pin (J3)	Signal	Function
1	EtherCAT_IN_TX+/Ethernet_TX+	EtherCAT in/Ethernet transmit +
4	EtherCAT_IN_TX-/Ethernet_TX-	EtherCAT in/Ethernet transmit -
2	EtherCAT_IN_RX+/Ethernet_RX+	EtherCAT in/Ethernet receive +
3	EtherCAT_IN_RX-/Ethernet_RX-	EtherCAT in/Ethernet receive -

#### Connector Location



Gold Duet 40

G-DUET-40 Connectors Interface



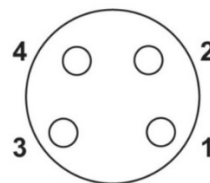
Gold Duet 60

G-DUET-502A

G-DUET-60 Connectors Interface



M8 4 pins Female



M8 4 pins Male

Table 2: EtherCAT IN - Pin Assignments

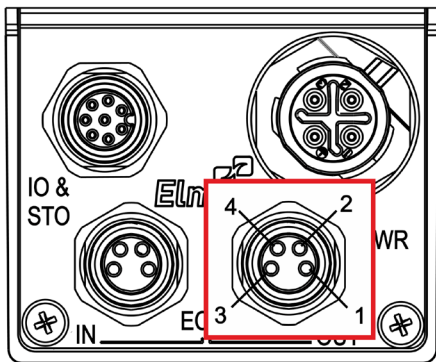


## 7.6.4 EtherCAT OUT Signals (J5)

The following table describes the signals of EtherCAT\_OUT.

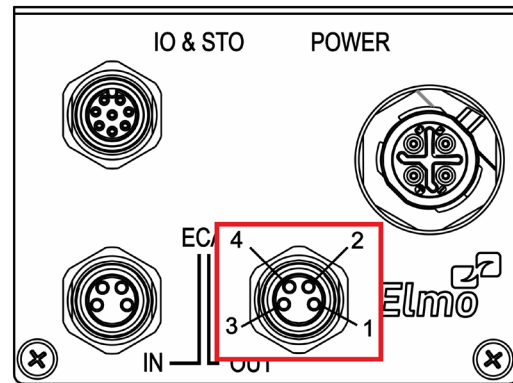
Pin (J5)	Signal	Function
1	EtherCAT_OUT_TX+	EtherCAT OUT transmit +
4	EtherCAT_OUT_TX-	EtherCAT OUT transmit -
2	EtherCAT_OUT_RX+	EtherCAT OUT receive +
3	EtherCAT_OUT_RX-	EtherCAT OUT receive -

### Connector Location



Gold Duet 40

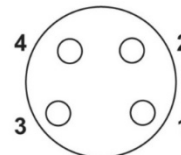
#### G-DUET-40 Connectors Interface



Gold Duet 60

G-DUET-503A

#### G-DUET-60 Connectors Interface

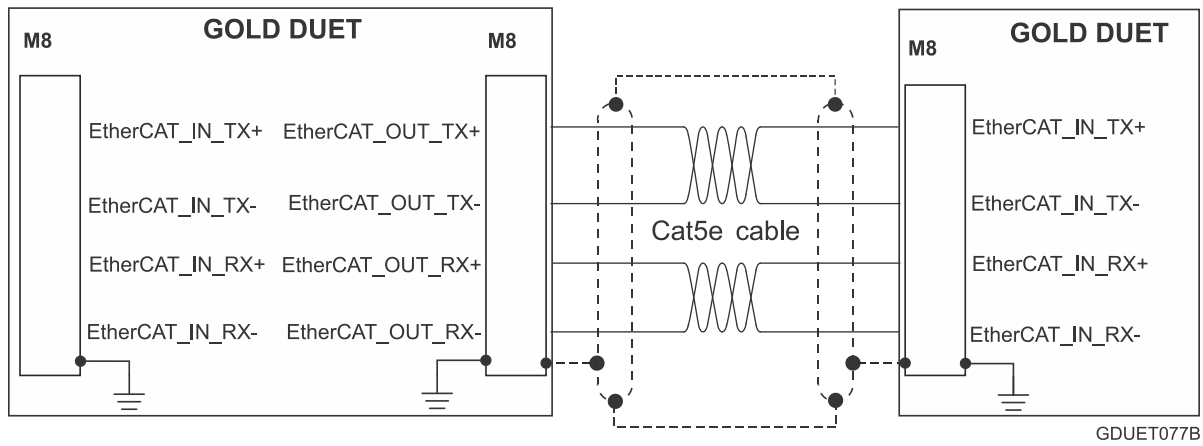


M8 4 pins Female



M8 4 pins Male

Table 3: EtherCAT OUT Pin Assignments





## 7.6.5 Indicators and Switches

The G-DUET is equipped with EtherCAT status and switches.

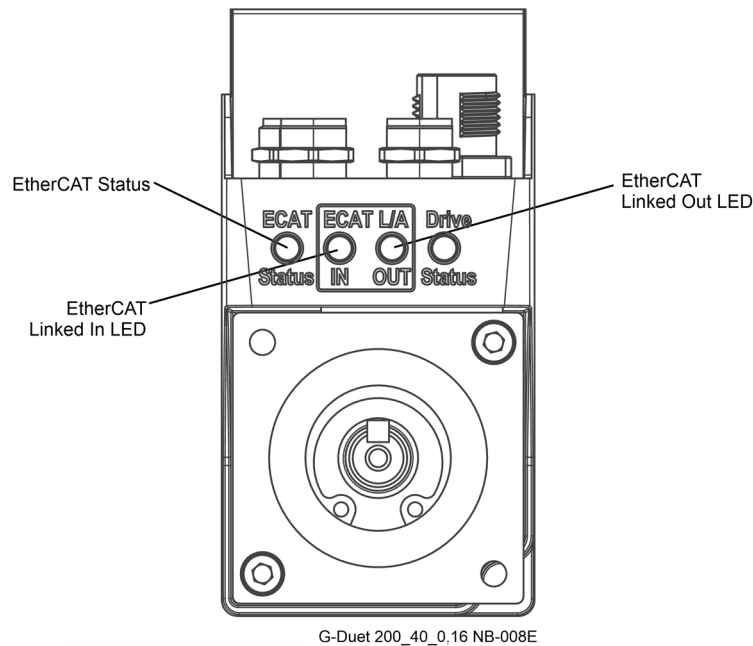


Figure 19: LED Indicators

### 7.6.5.1 EtherCAT Status Indicator

The EtherCAT status indicator is a red/green LED (Figure 19). It combines run state indication (when it is green) and error state indication (when it is red) of the EtherCAT device. For further details, see the EtherCAT Application Manual.

### 7.6.5.2 EtherCAT Link Indicators

The Gold Duet has EtherCAT IN and EtherCAT OUT link/activity LED indicators. The green LED is the link/activity indicator (Figure 19), and shows the state of the applicable physical link and the activity on that link.

LED	State	Meaning
Link /Activity	Off	No link is established
	On	A link is established
	Blinking	There is data transmission activity

Table 4: LED States



### 7.6.6 EtherCAT Address Switches

The Gold Duet Integrated Drive-Motor includes EtherCAT switches which determine the EtherCAT address.

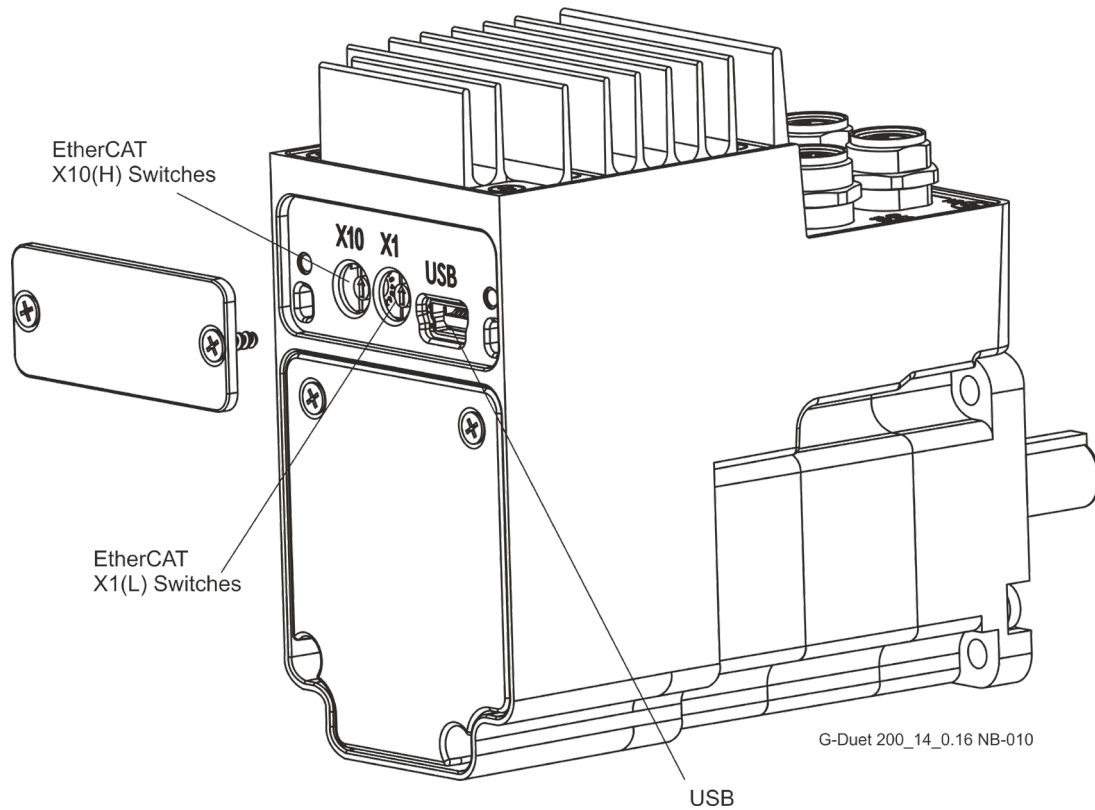


Figure 20: EtherCAT Address Switches

Using a screwdriver, you can set the low (X1 switch) and the high (X10 switch) bytes of the EtherCAT address.

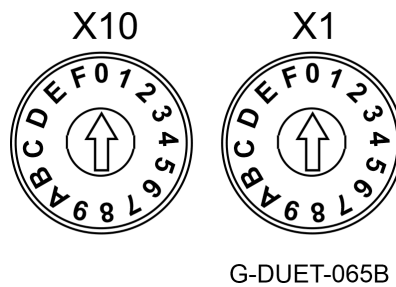


Figure 21: EtherCAT Address Switches

**Note:** When the EtherCAT switches are set to 0, it is similar to operating without EtherCAT switches.

**To tune the EtherCAT switches:**

1. To access the EtherCAT switches, remove the two small screws securing the EtherCAT switches, and release the compartment.
2. Tune the X1 and X10 EtherCAT switches inside the compartment.
3. Reinstall the EtherCAT switches compartment using the original screws.



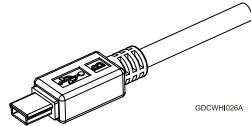
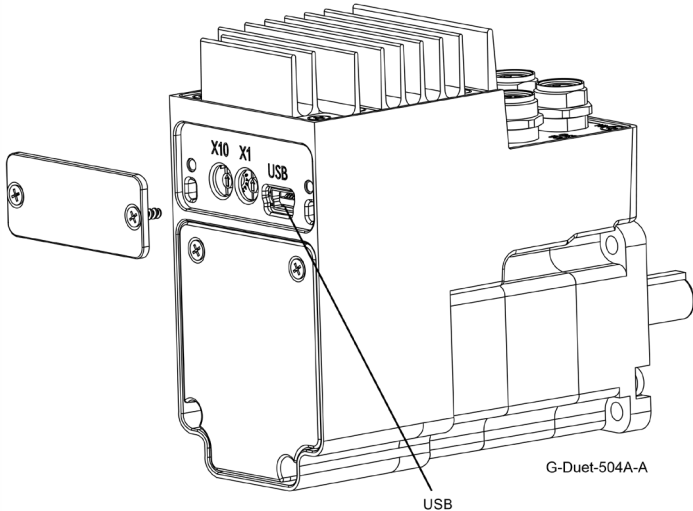
## 7.7 USB

To access the Gold Duet Integrated Drive-Motor USB, release the drive body rear compartment panel two screws and remove the panel (same compartment with the EtherCAT switches).

Specification	Details
USB Type	USB 2.0 Device mode
Speed	Up to 12Mbit/s "Full Speed"
Cable length	maximum 5 m
Cable Type	<div>Standard USB cable</div> <ul style="list-style-type: none"><li>constructed with 4 wires of 20AWG to 28AWG, shield with a foil</li><li>D+ and D- comprise a twisted pair in the cable</li><li>The shield of the cable is connected to the shield of the connector used for communication</li></ul>
Protocols	For setup and control

The following table describes the signals of the USB.

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



**USB Device Mini-B Plug**

Table 5: USB 2.0 Mini-B Pin Assignments

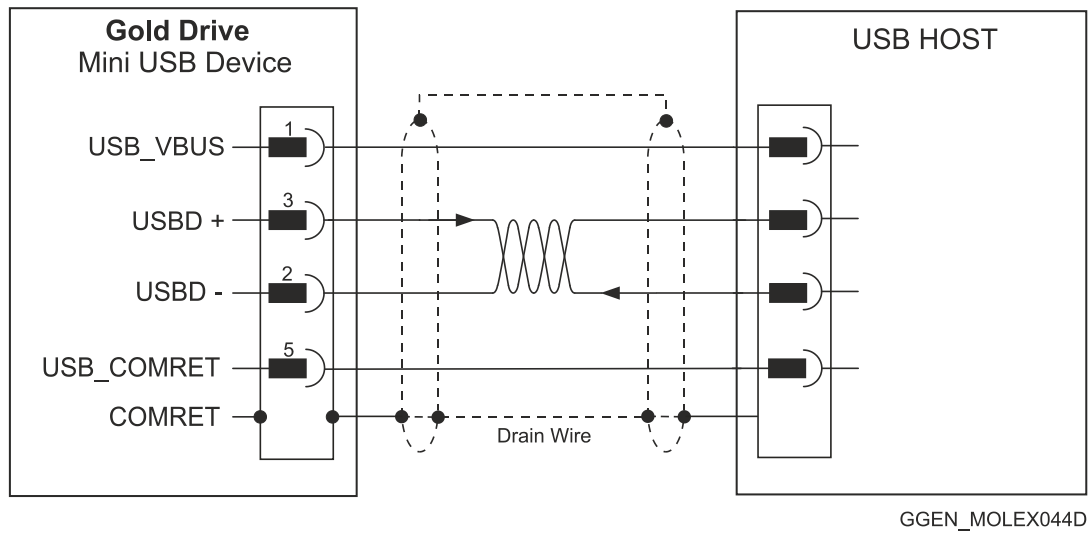


Figure 22: USB Network Diagram





## 7.8 Powering Up

After the Gold Duet 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.

## 7.9 Initializing the System

After the Gold Duet has been connected and mounted, the system must be set up and initialized. This is accomplished using Elmo's Application Studio (EAS), Elmo's Windows-based software application. Install the application and then perform setup and initialization according to the directions in the *EAS II Software Manual*.

## 7.10 Battery Replacement

The data read by the absolute encoder include the single-revolution data that indicate the motor position per revolution, and the multi-revolution data that indicate a pulse count per revolution. Since the multi-revolution data are electrically counted, they will be backed up with a battery.

Note the following reason to replace the absolute encoder backup battery. A battery voltage drop results in an absolute encoder error. Battery voltage drop is caused by the exhausted service life of the battery, and voltage delay. The battery's service life will be reduced as the ambient conditions deteriorate.

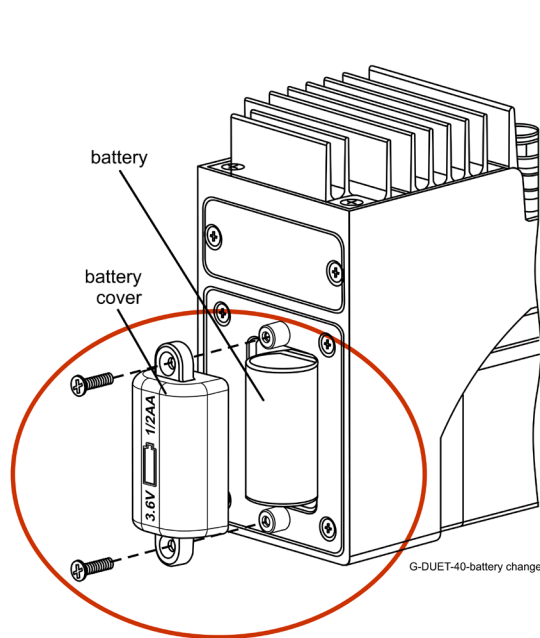
**It is recommended that the battery should be replaced whenever the encoder error is continuously recorded. This will allow sufficient time for the battery to be replaced. However, it should be noted that the data and time recorded is maintained even during replacement of the battery, to allow easy replacement of the battery without losing any data and time.**

When necessary, use the following procedure to replace the battery. Refer to the battery specification in 5.9.7 Backup Battery.

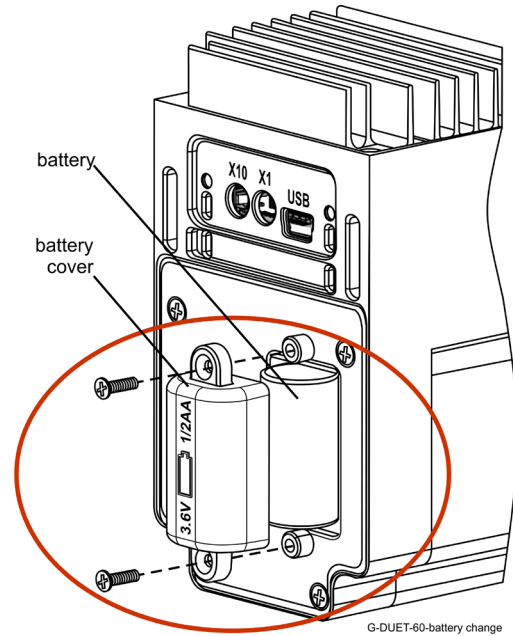


### To replace the battery:

1. Leave the auxiliary power supply on during battery replacement.
2. Remove the two small screws securing the battery compartment, and release the compartment cover.



**G-Duet 40 Removing/Replacing Battery**



**G-Duet 60 Removing/Replacing Battery**

3. Remove the battery.
4. Disconnect the battery connectors.
5. Replace the battery.
6. Connect the battery connectors to the new battery.
7. Reinstall the battery compartment using the original screws.

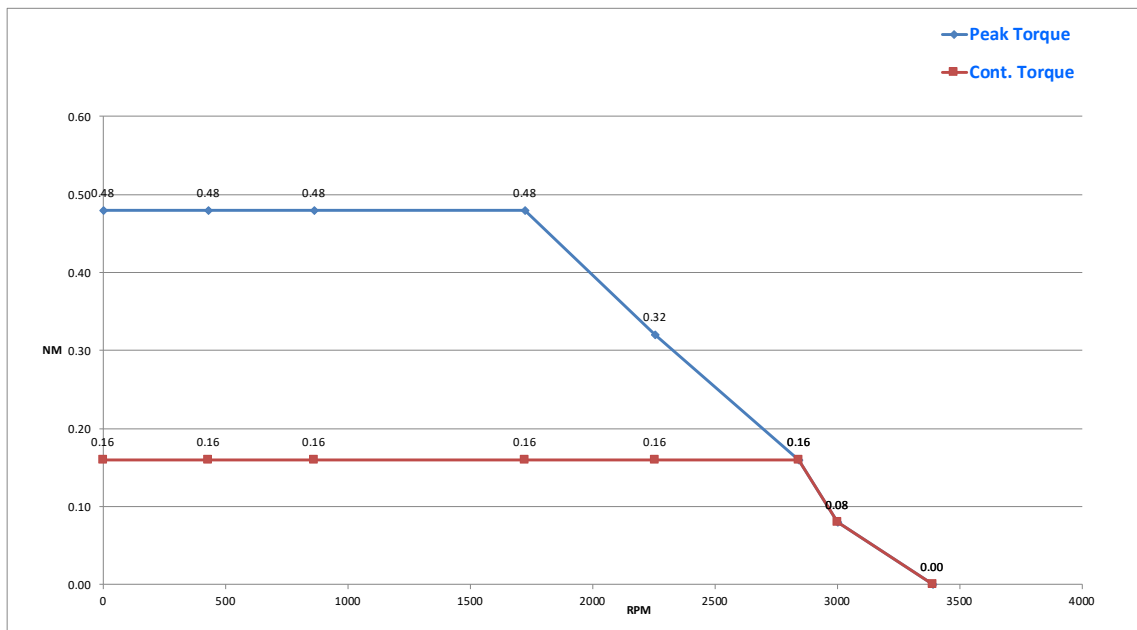


## Chapter 8: Gold Duet Motor Characteristic Curves

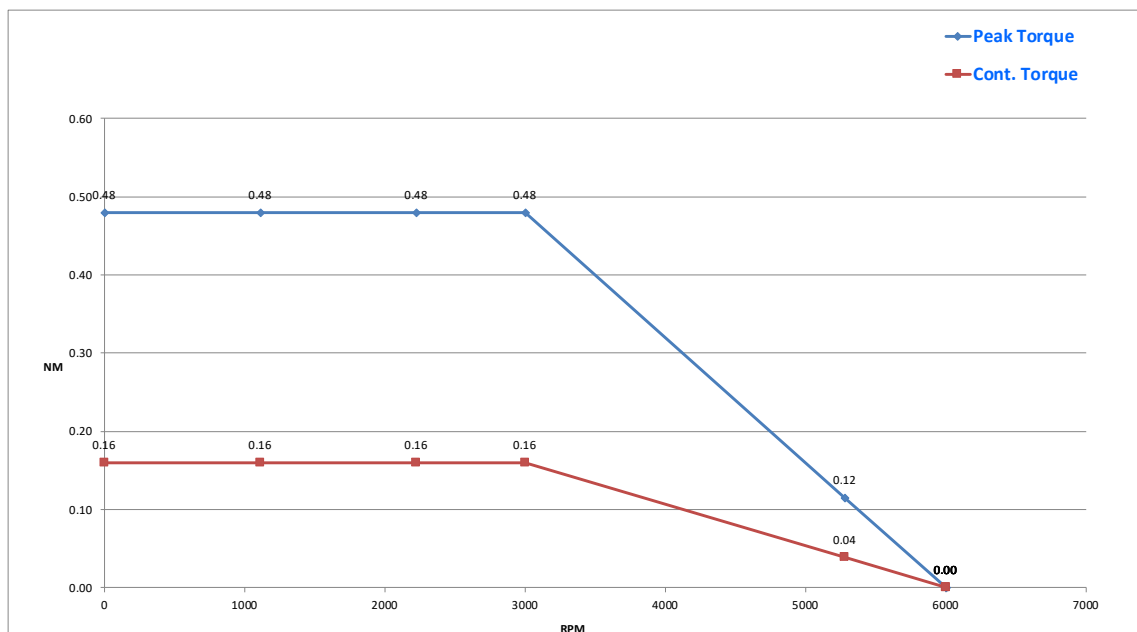
### 8.1 40 mm Frame 50W/ 0.16Nm

The section includes graphs of Torque-speed for the following DC voltages: 24, 48, 64, 85, 90, 130, and 170.

24 VDC 40mm, 50W, "100V", Torque- Speed

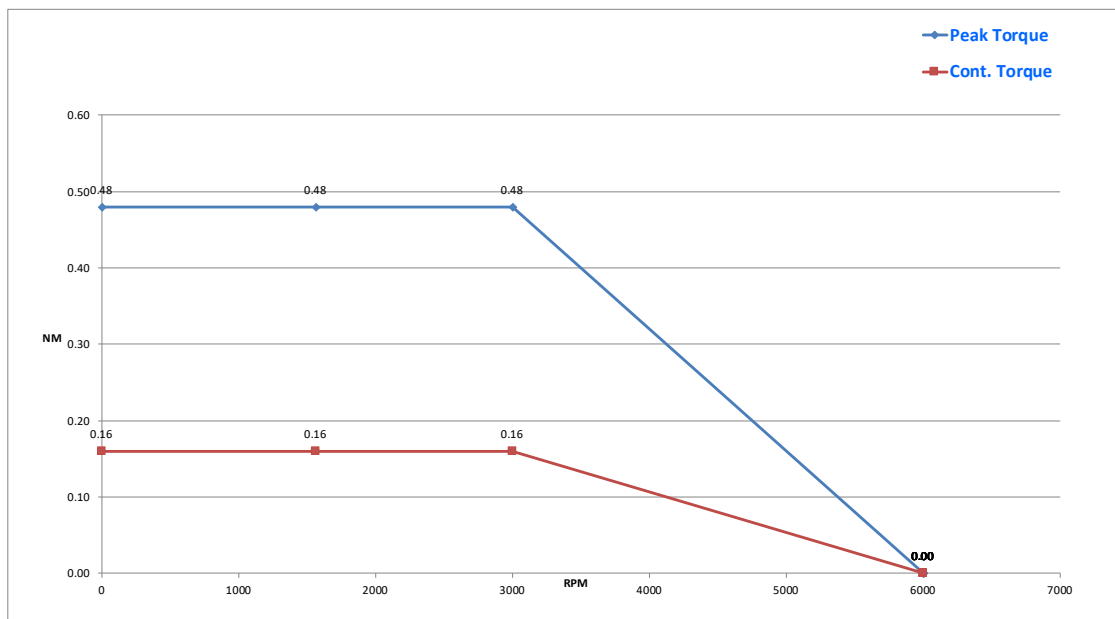


48 VDC 40mm, 50W, "100V", Torque- Speed

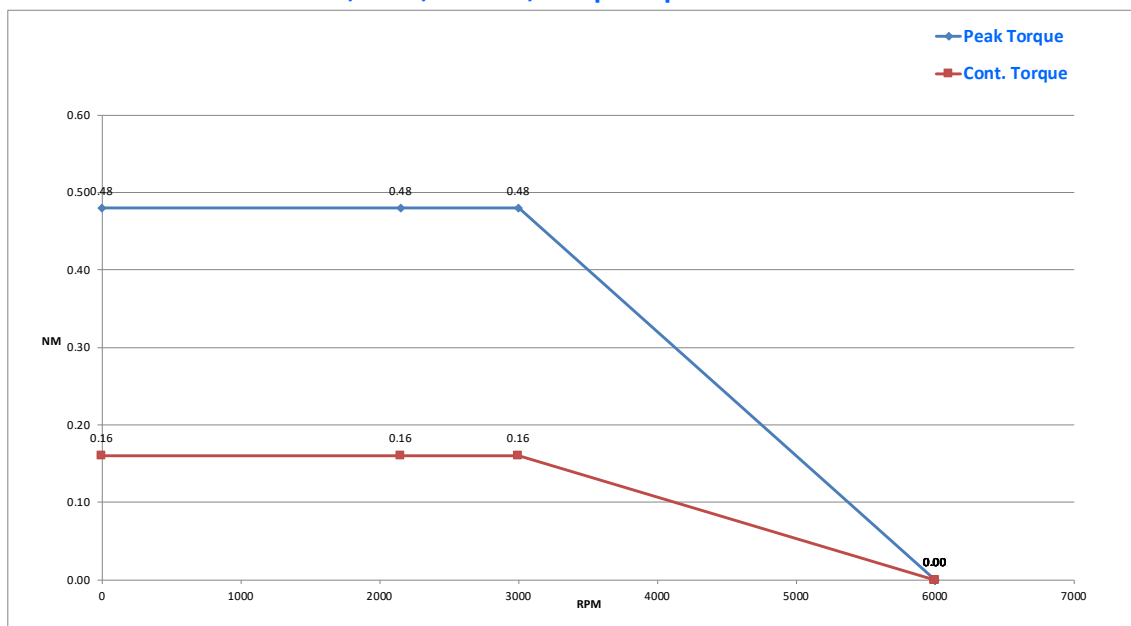




### 64 VDC 40mm, 50W, "100V", Torque- Speed

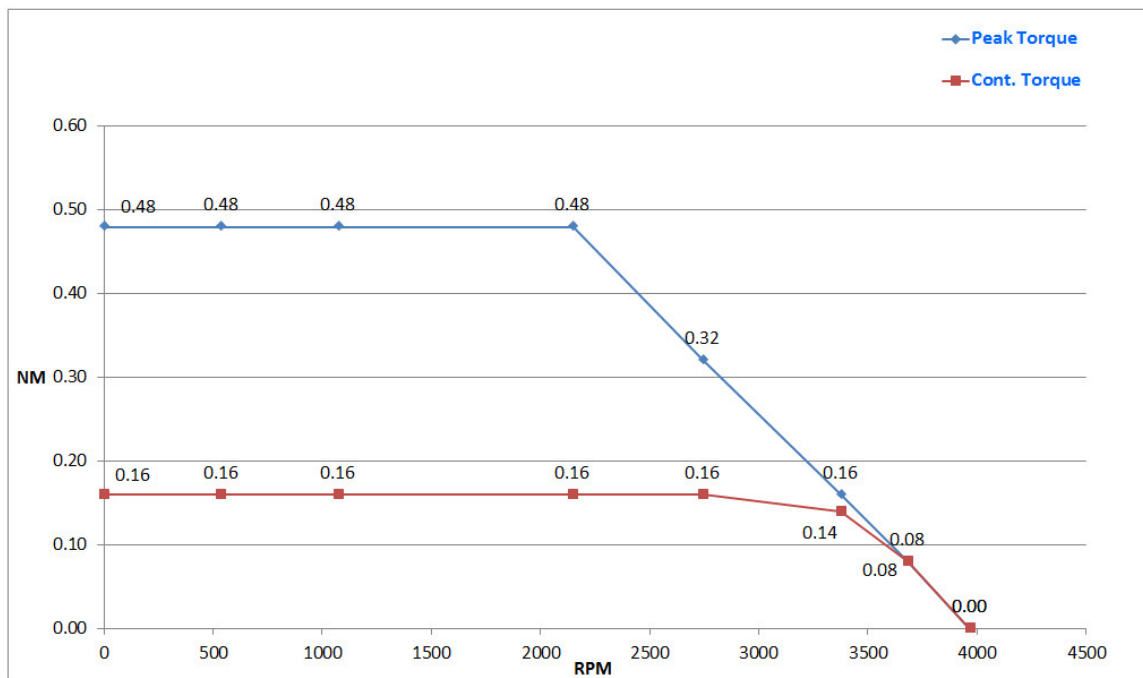


### 85 VDC 40mm, 50W, "100V", Torque- Speed

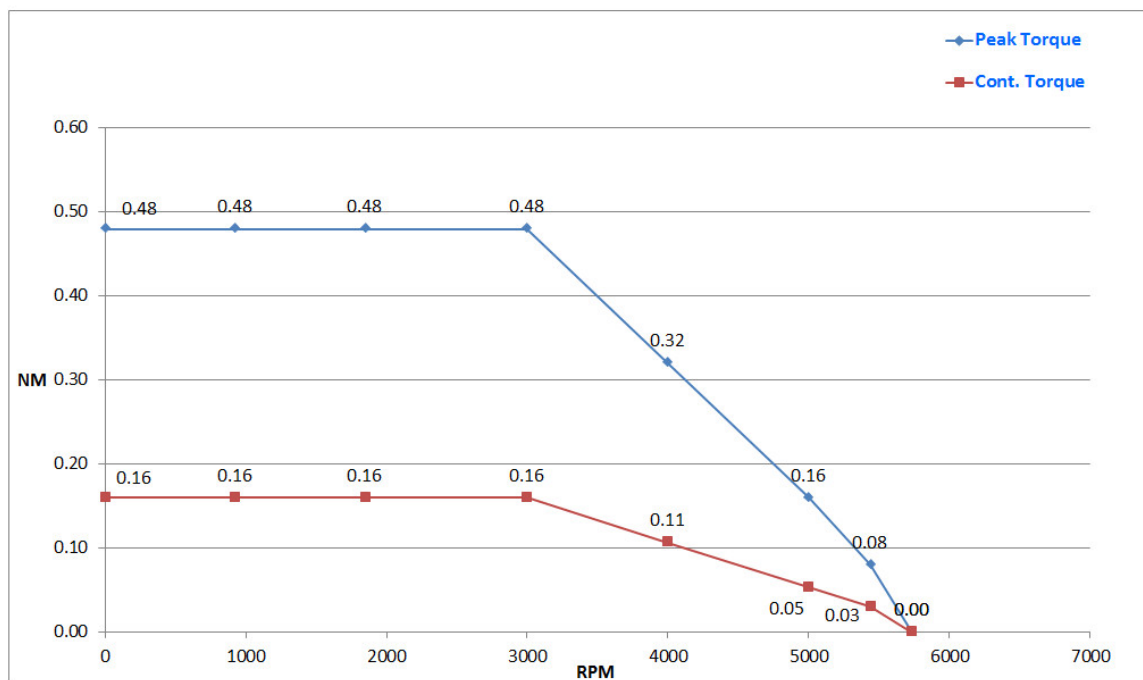




### 90 VDC ,40mm, 50W, "200V", Torque- Speed

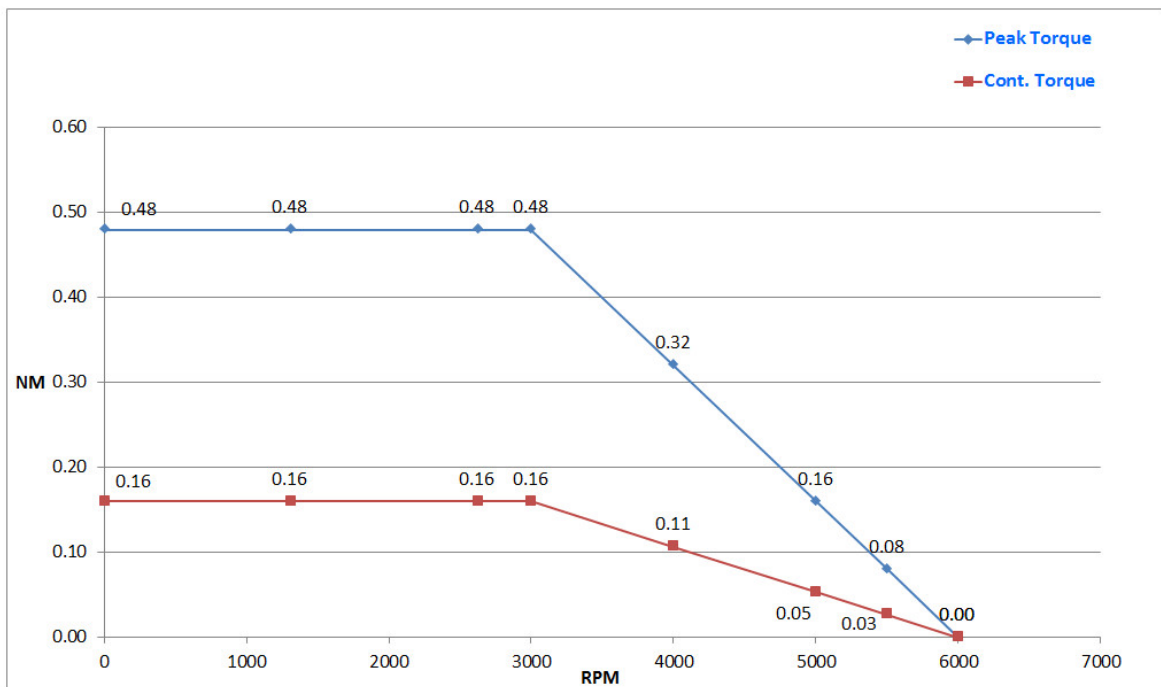


### 130 VDC ,40mm, 50W, "200V", Torque- Speed





### 170 VDC ,40mm, 50W, "200V", Torque- Speed



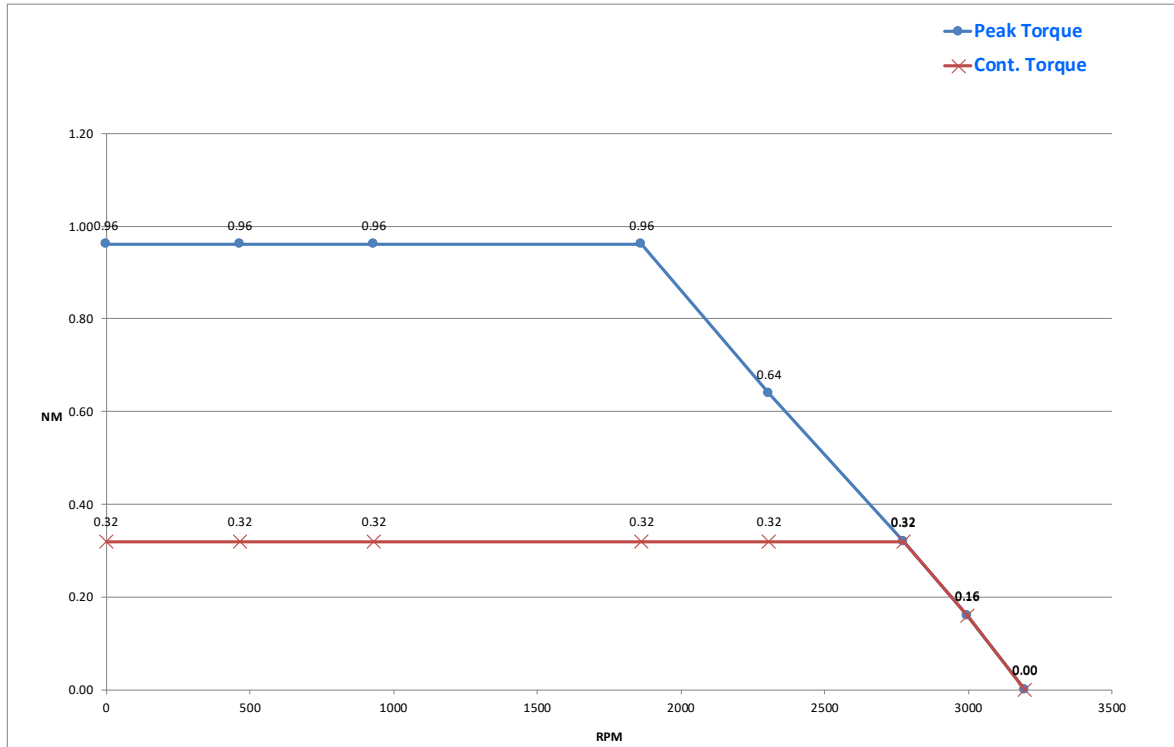


## 8.2 40 mm Frame 100W/ 0.32Nm

The section includes graphs of Torque-speed for the following DC voltage: 24, 48, 64, 85, 90, 130, and 170.

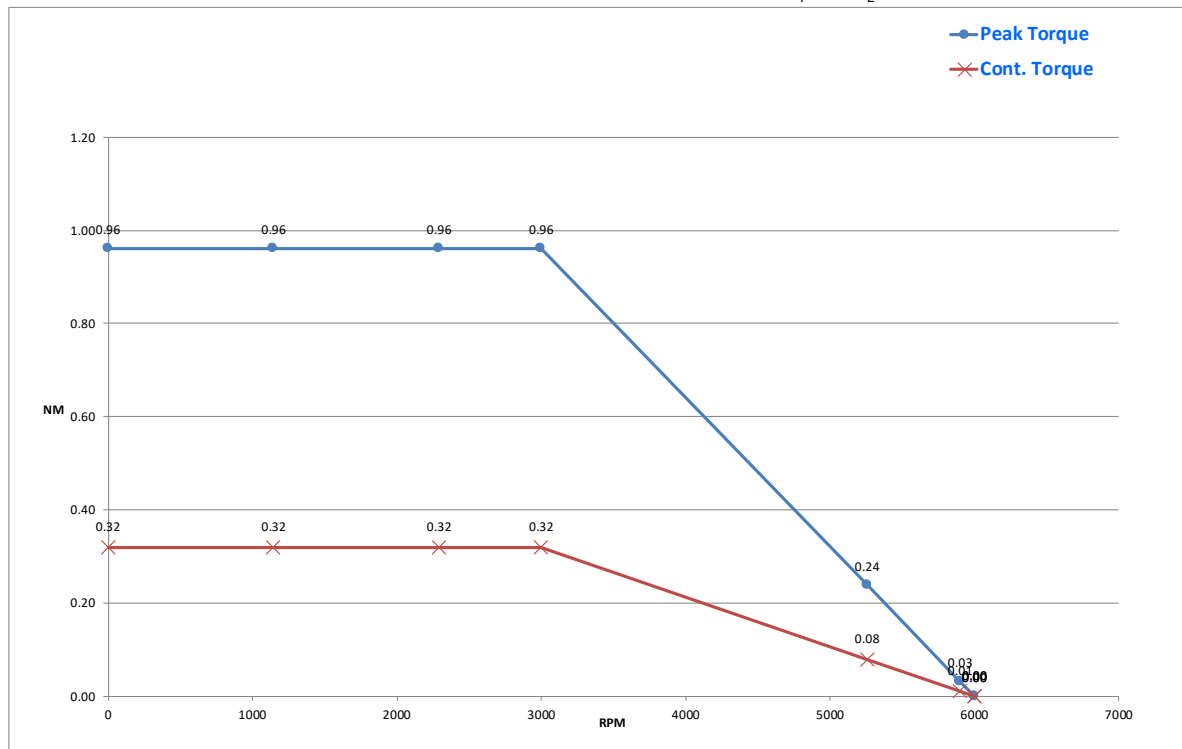
24 VDC

40mm, 100W, "100V", Torque- Speed



48 VDC

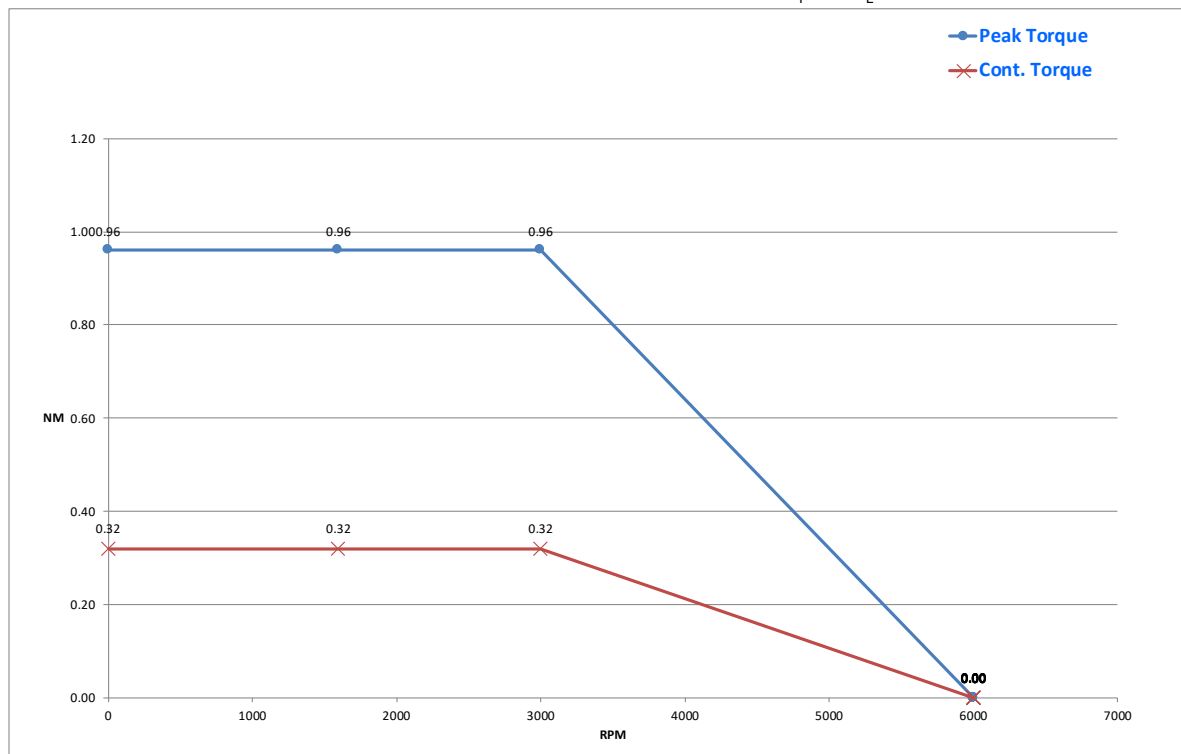
40mm, 100W, "100V", Torque- Speed





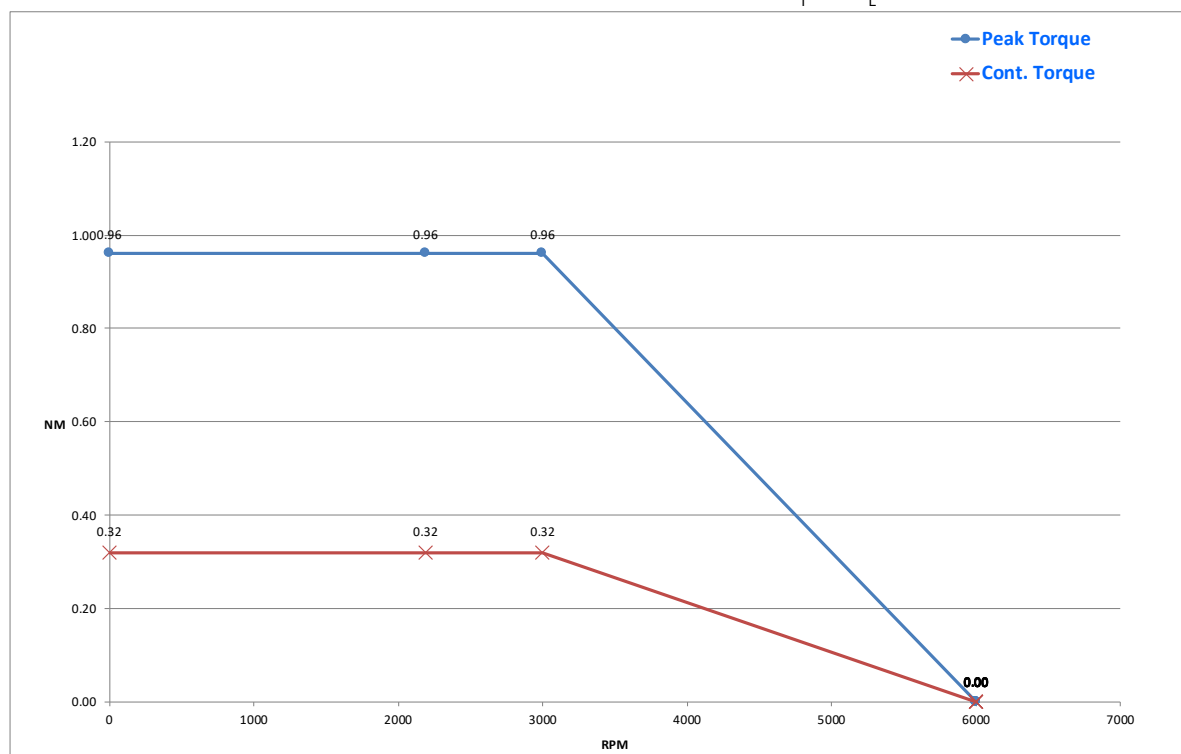
## 64 VDC

## 40mm, 100W, "100V", Torque- Speed



## 85 VDC

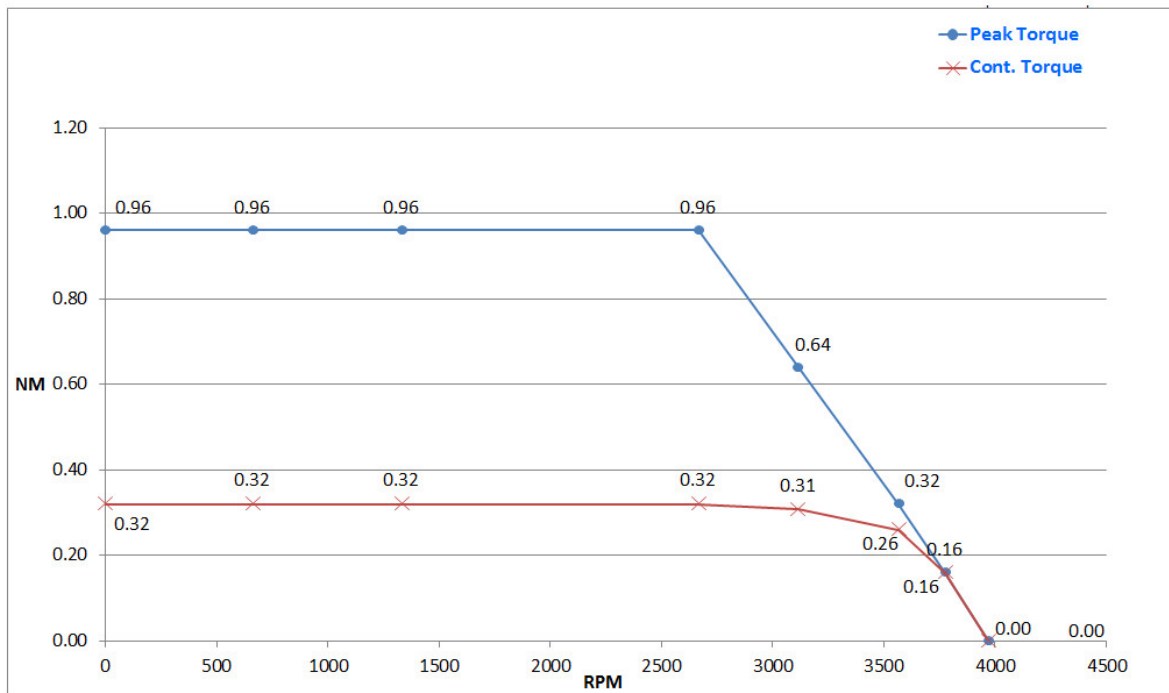
## 40mm, 100W, "100V", Torque- Speed



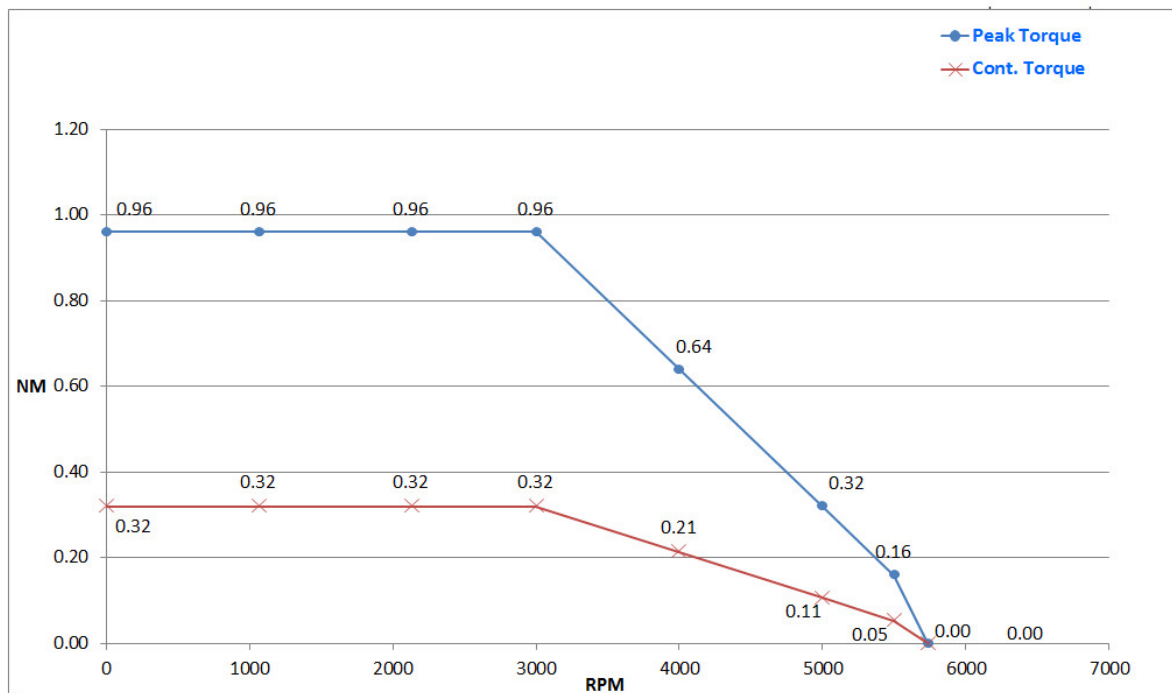


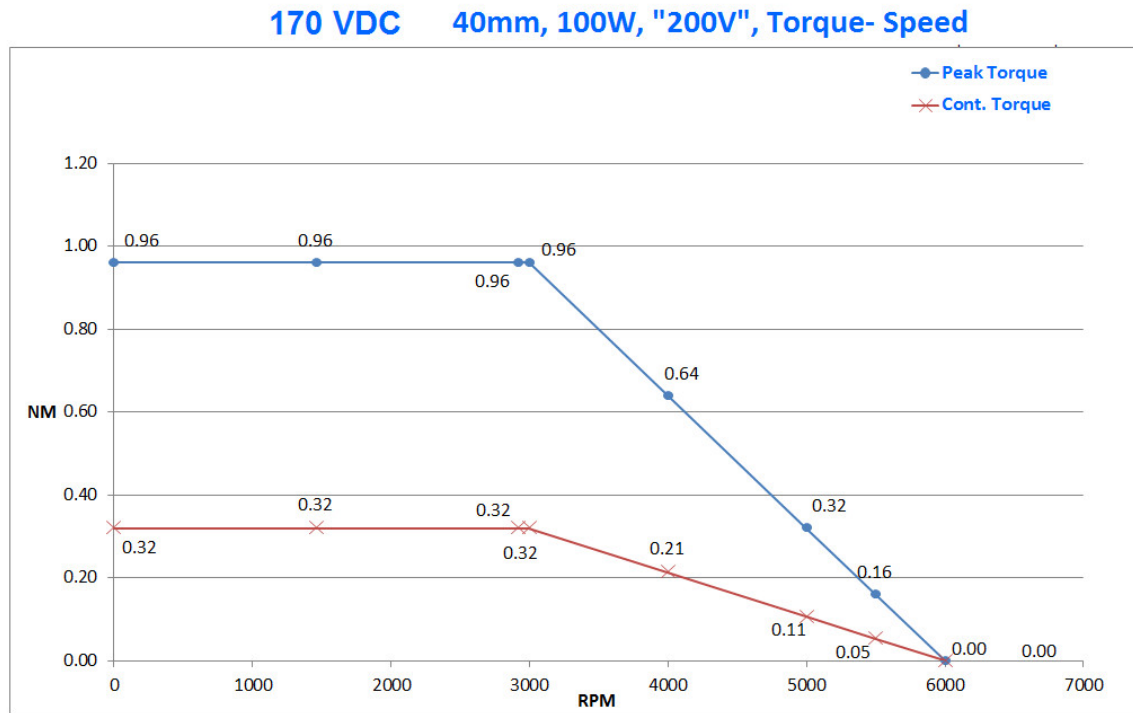


### 90 VDC 40mm, 100W, "200V", Torque- Speed



### 130 VDC 40mm, 100W, "200V", Torque- Speed



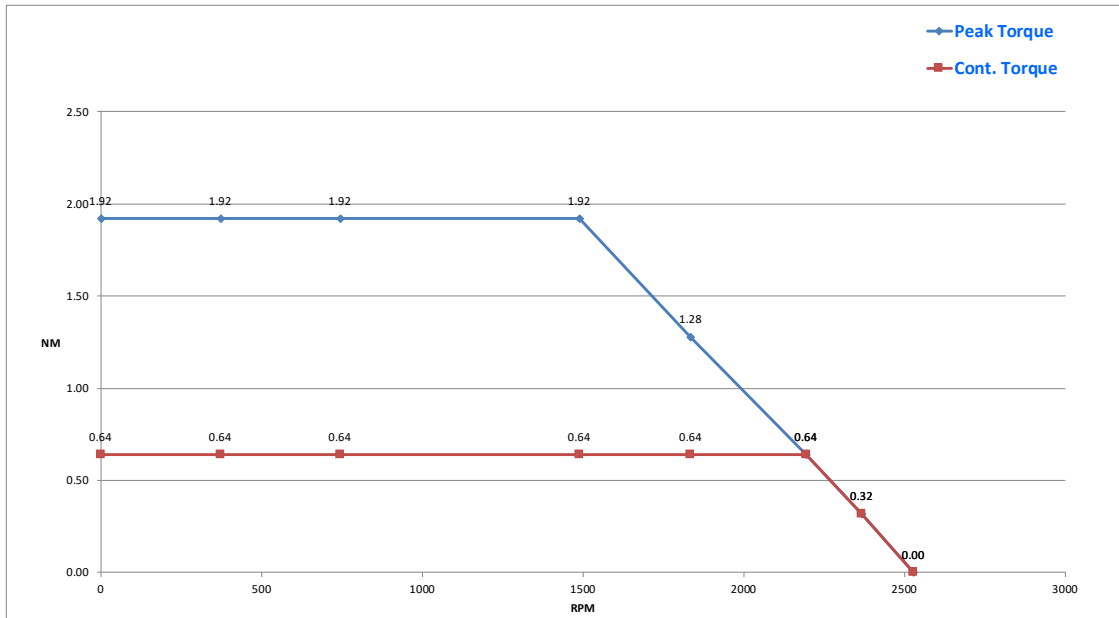




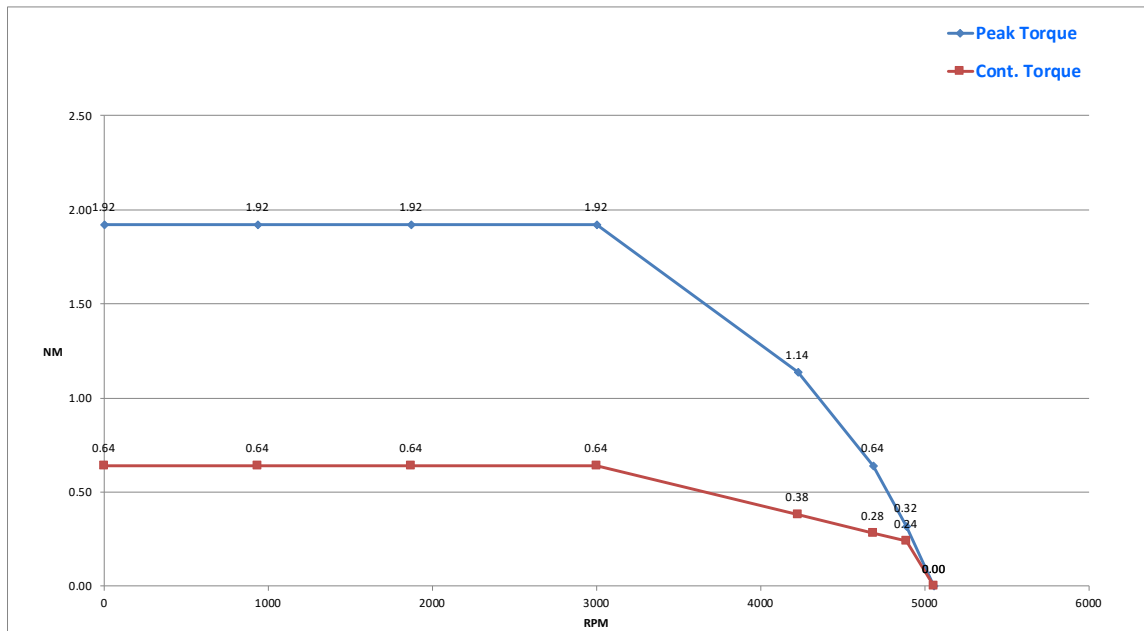
## 8.3 60 mm Frame 200W/ 0.64Nm

The section includes graphs of Torque-speed for the following DC voltage: 24, 48, 64, 85, 90, 130, and 170.

**24 VDC** 60mm, 200W, "100V", Torque- Speed

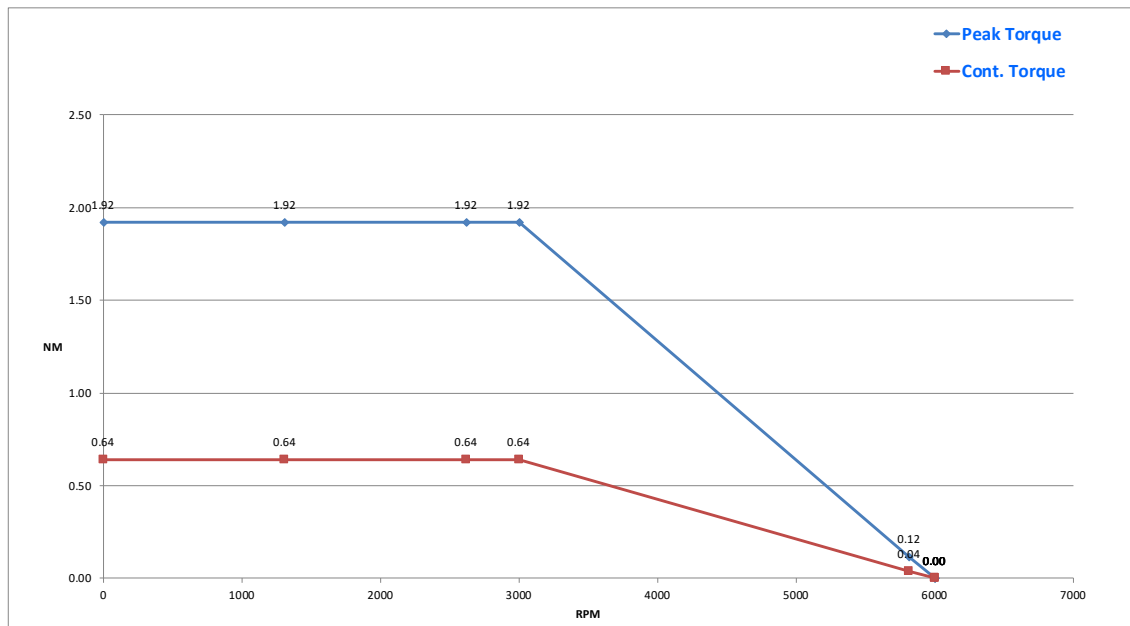


**48 VDC** 60mm, 200W, "100V", Torque- Speed

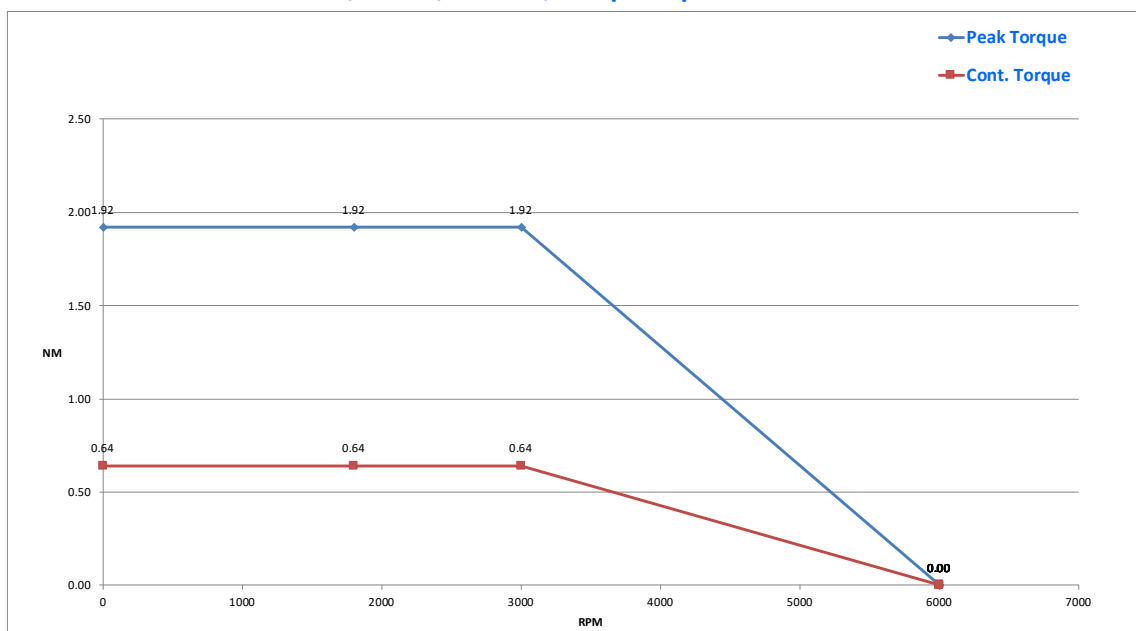




### 64 VDC 60mm, 200W, "100V", Torque- Speed

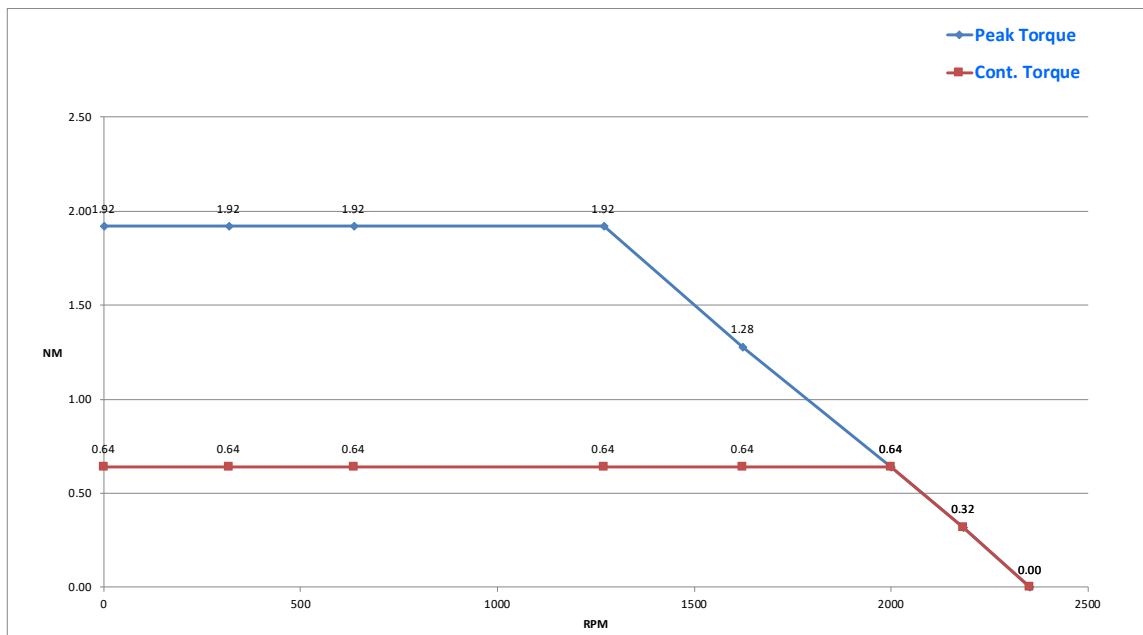


### 85 VDC 60mm, 200W, "100V", Torque- Speed

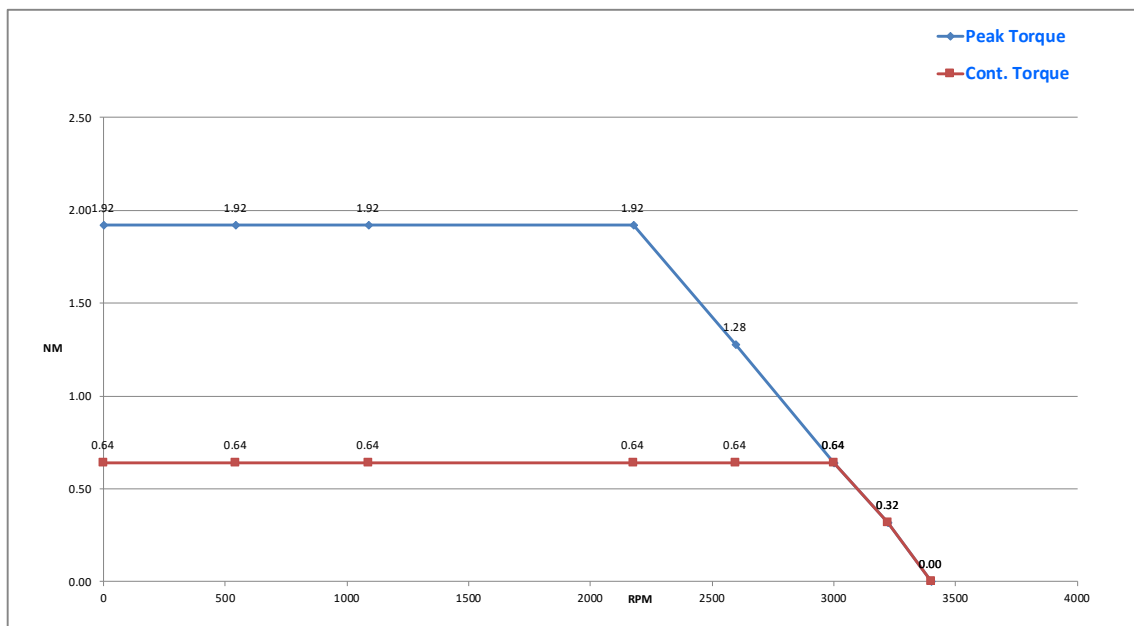




### 90 VDC 60mm, 200W, "200V", Torque- Speed

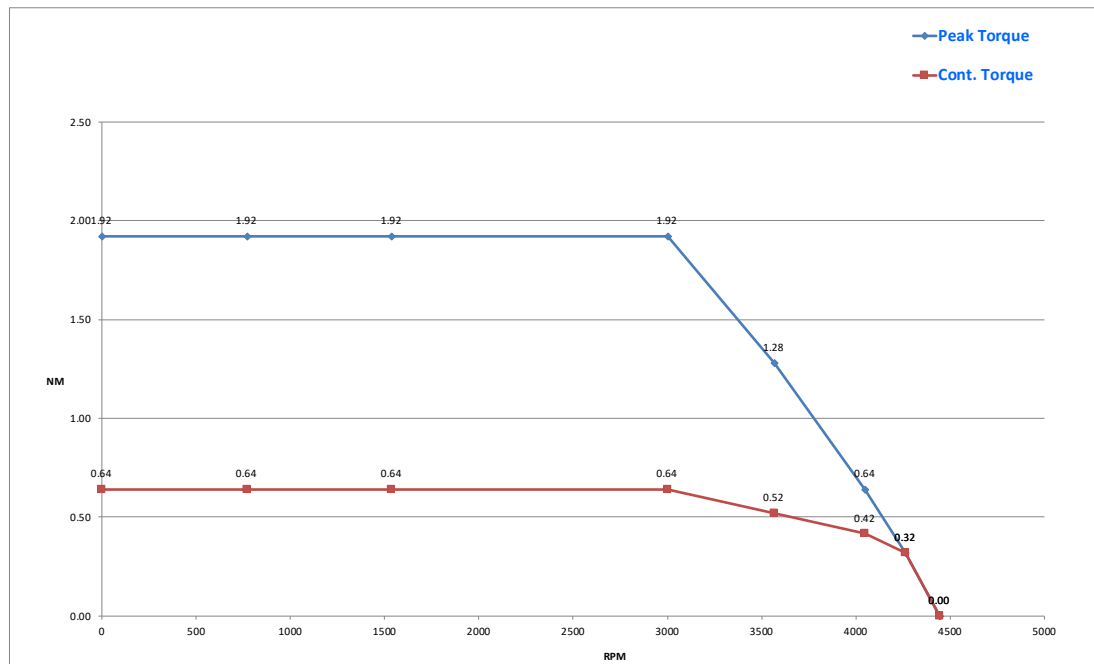


### 130 VDC 60mm, 200W, "200V", Torque- Speed





170 VDC 60mm, 200W, "200V", Torque- Speed

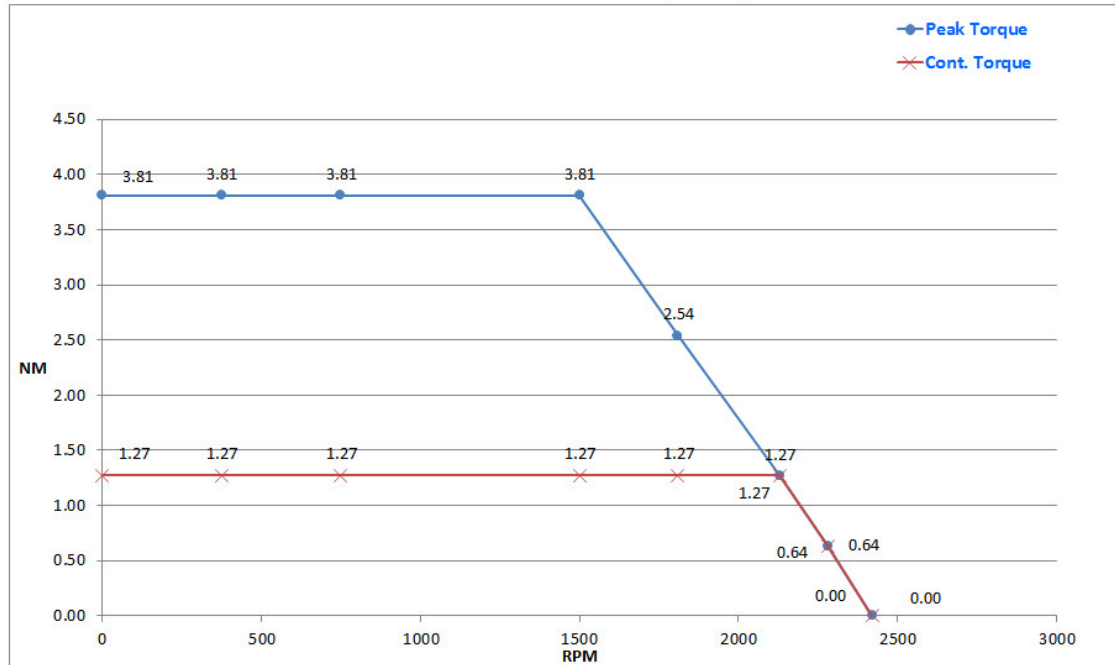




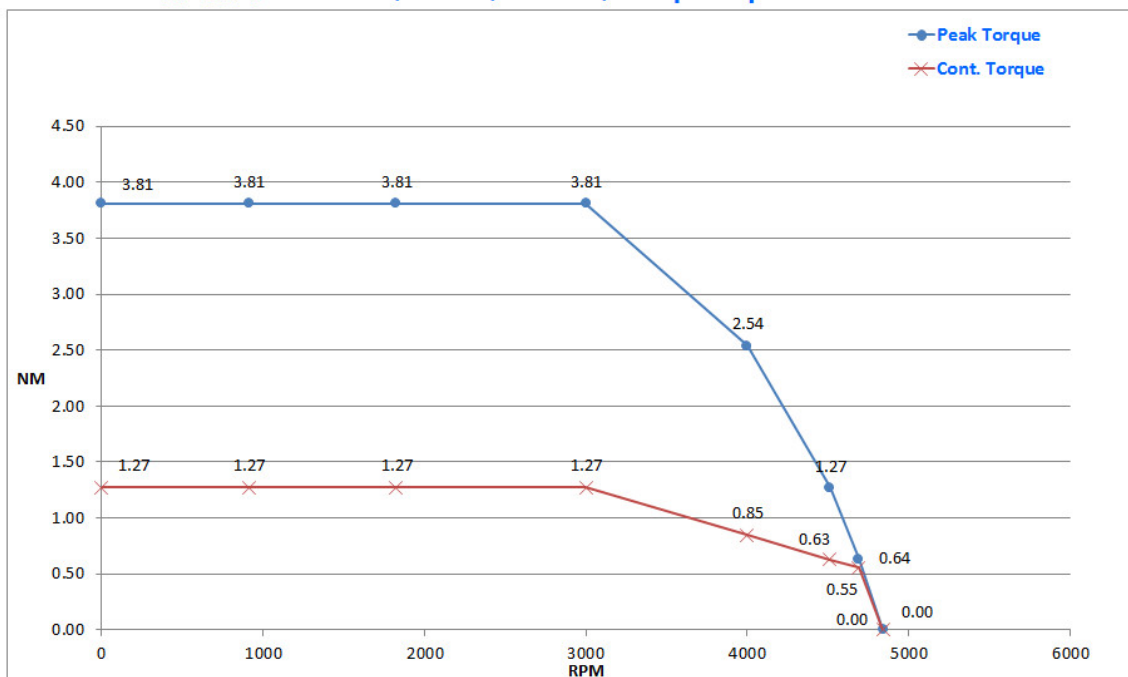
## 8.4 60 mm Frame 400W/ 1.27NM

The section includes Graphs of Torque-speed for the following DC voltage: 24, 48, 64, 85, 90, 130, and 170.

24 VDC 60mm, 400W, "100V", Torque- Speed

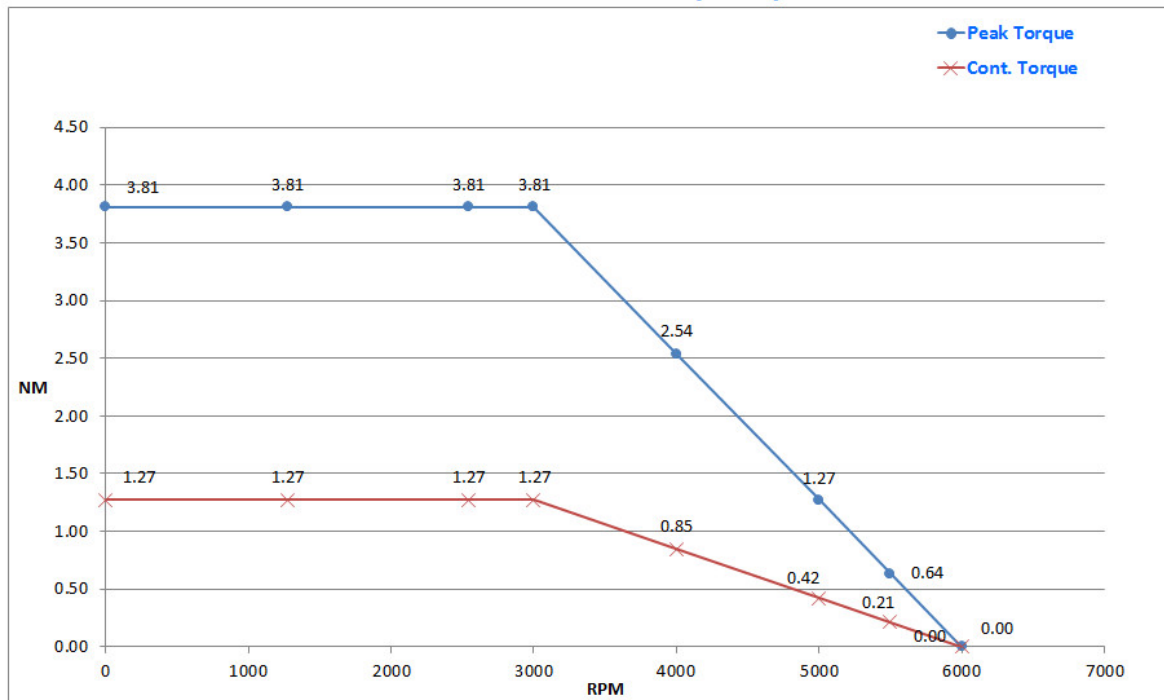


48 VDC 60mm, 400W, "100V", Torque- Speed

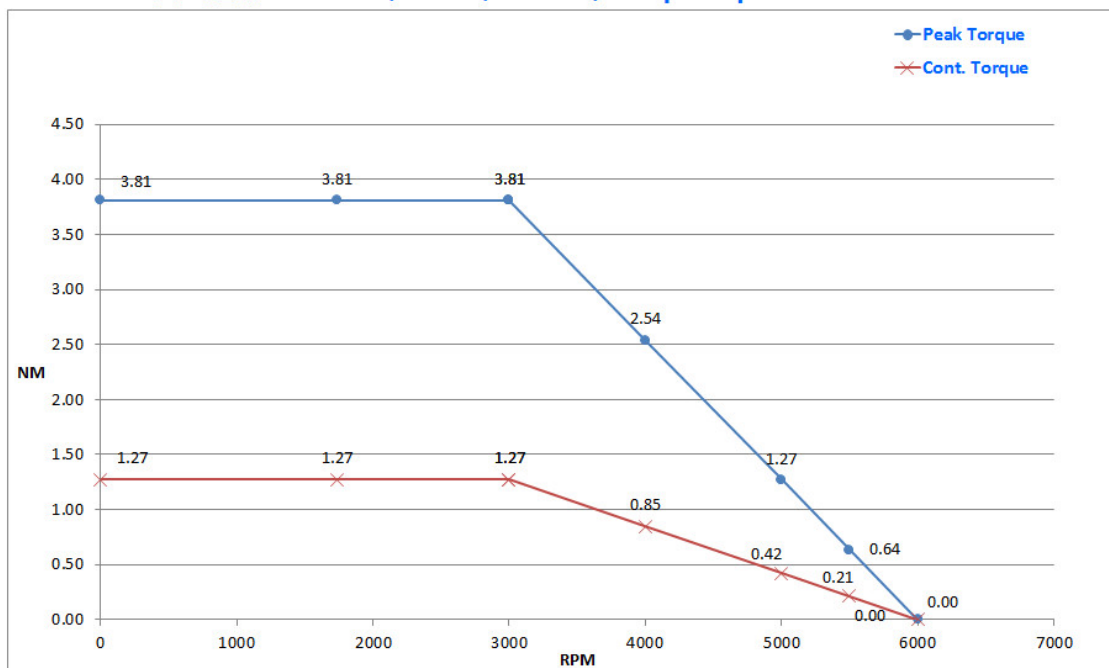




### 64 VDC 60mm, 400W, "100V", Torque- Speed



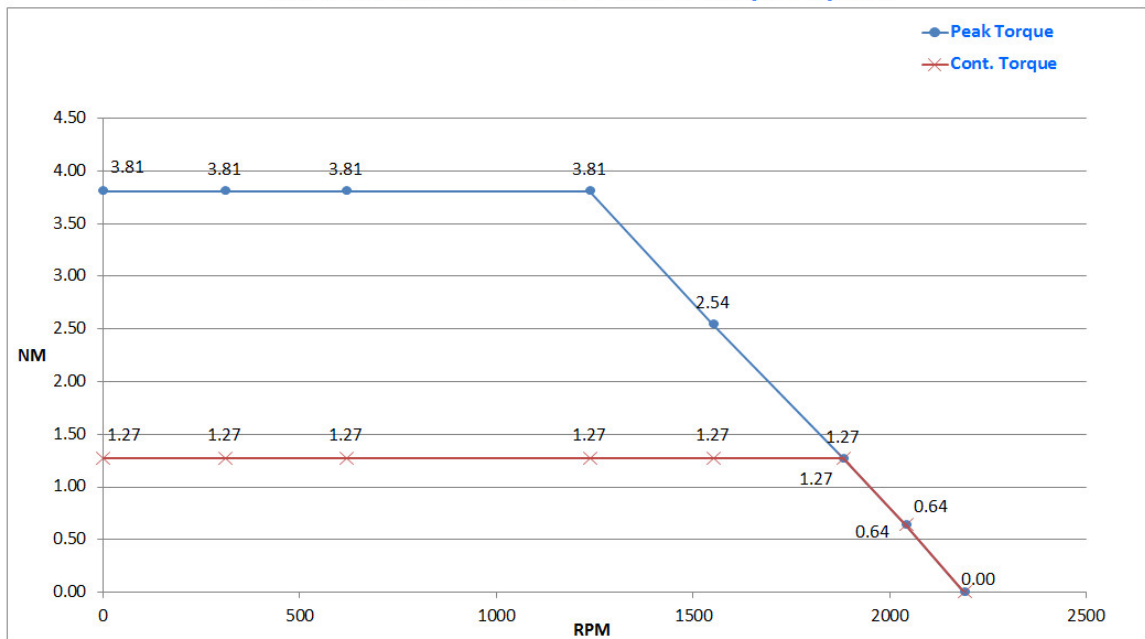
### 85 VDC 60mm, 400W, "100V", Torque- Speed



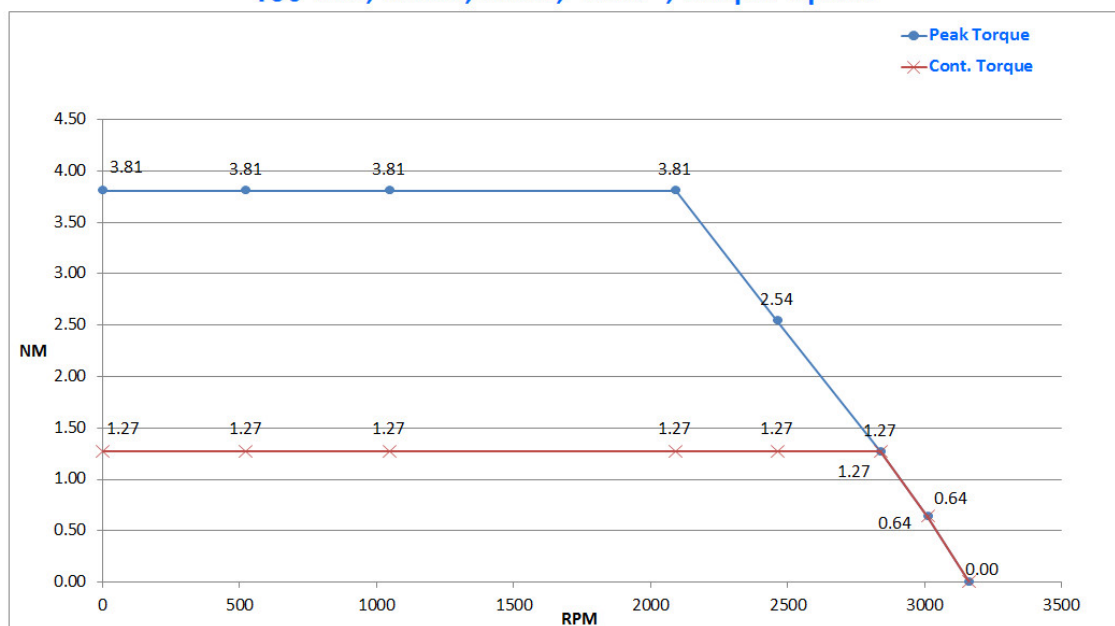




### 90 VDC, 60mm, 400W, "200V", Torque- Speed

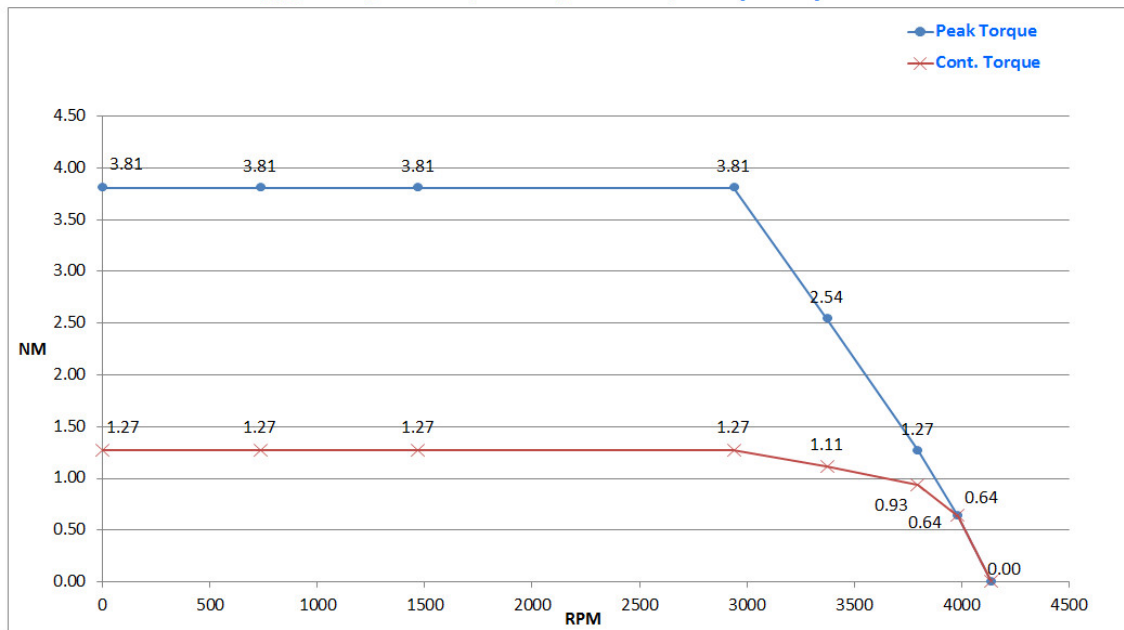


### 130 VDC, 60mm, 400W, "200V", Torque- Speed





### 170 VDC, 60mm, 400W, "200V", Torque- Speed





## Chapter 9: Control Specifications

This chapter provides detailed technical information regarding the Gold Duet.

### 9.1 Current Loop

Feature	Details
Controller type	Vector, digital
Compensation for bus voltage variations	“On-the-fly” automatic gain scheduling
Motor types	AC brushless (sinusoidal)
Current control	Fully digital Sinusoidal with vector control Programmable PI control filter based on a pair of PI controls of AC current signals and constant power at high speed
Current loop bandwidth	> 4 kHz closed loop
Current sampling time	Programmable 40 to 120 $\mu$ sec
Current sampling rate	Up to 25 kHz; default 20 kHz

### 9.2 Velocity Loop

Feature	Details
Controller type	PI + Four advanced filters + Two advanced gain scheduling filters
Velocity control	Fully digital Programmable PI and feed forward control filters On-the-fly gain scheduling according to either speed or position command or feedback. Automatic, quick, advanced or expert tuning
Velocity loop bandwidth	< 500 Hz
Velocity sampling time	80 to 240 $\mu$ sec (2x current loop sample time)
Velocity sampling rate	Up to 12.5 kHz; default 10 kHz
Velocity command options	Internally calculated by either jogging or step <b>Note:</b> All software-calculated profiles support on-the-fly changes.



## 9.3 Position Loop

Feature	Details
Controller type	"1-2-2" PIP + three advanced filters + one advanced gain scheduling filter
Position command options	Software Pulse and Direction
Position loop bandwidth	< 200 Hz
Position sampling time	80 to 240 $\mu$ sec (2x current loop sample time)
Position sampling rate	Up to 12.5 kHz; default 10 kHz

## 9.4 Pulse-Width Modulation (PWM)

Feature	Details
PWM resolution	Minimum 10-bit Default 12-bit Maximum 14-bit
PWM switching frequency on the load	2/Ts (factory default 40 kHz on the motor)



## Chapter 10: Gold Duet Dimensions

### 10.1 40 mm Frame 50W/0.16Nm

The Gold Duet Integrated Drive-Motor has the following dimensions:

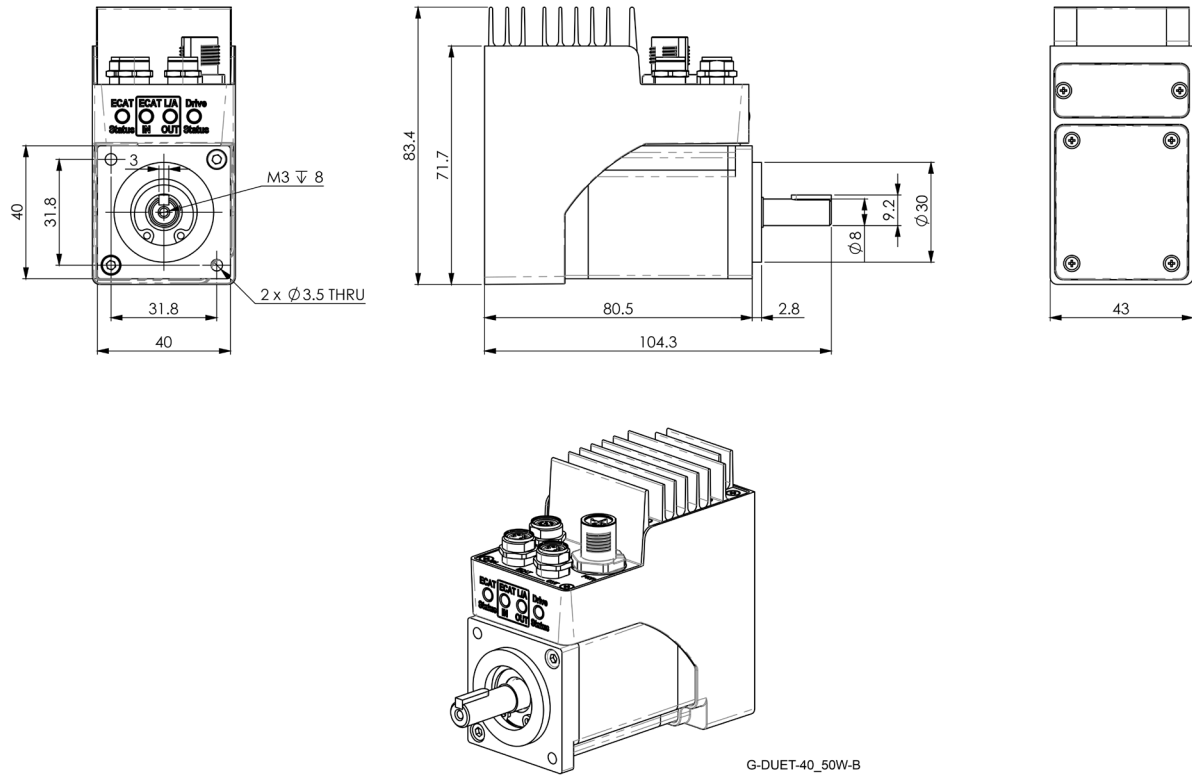


Figure 23: 40mm Frame 50W - Dimensions

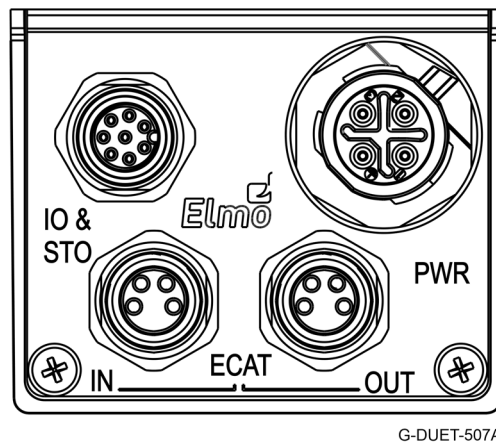


Figure 24: 40mm Frame 50W - Interface Details



## 10.2 40 mm Frame 50W/0.16Nm With Brake

The Gold Duet Integrated Drive-Motor has the following dimensions:

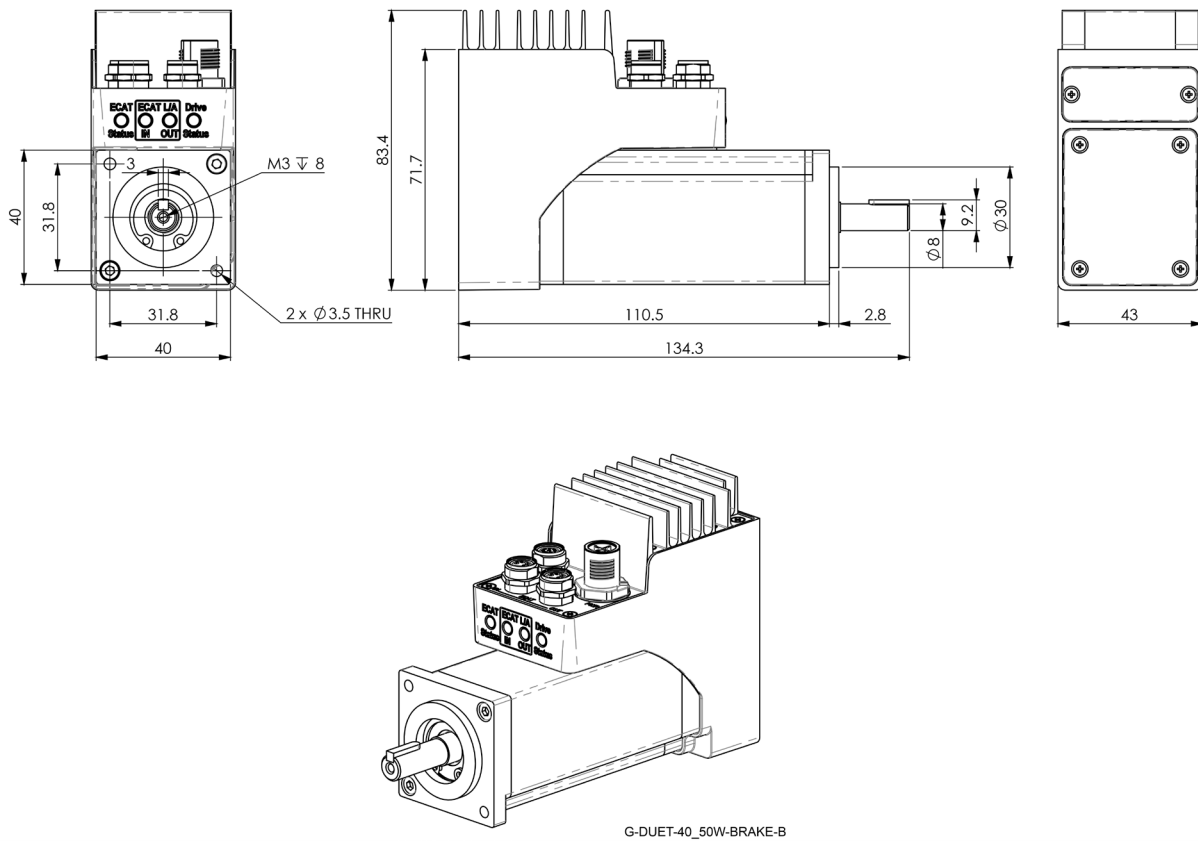


Figure 25: 40mm Frame 50W with Brake - Dimensions

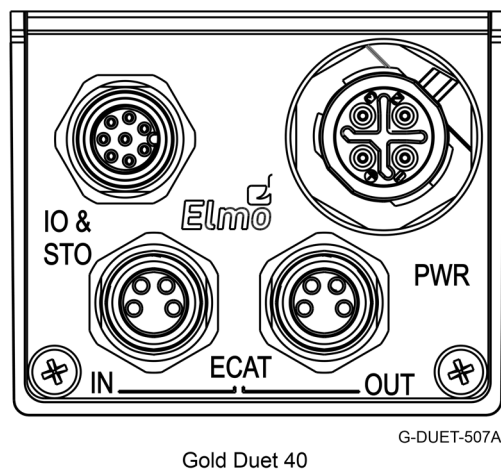


Figure 26: 40mm Frame 50W with Brake - Interface Details



## 10.3 40mm Frame 100W / 0.32Nm

The Gold Duet Integrated Drive-Motor has the following dimensions:

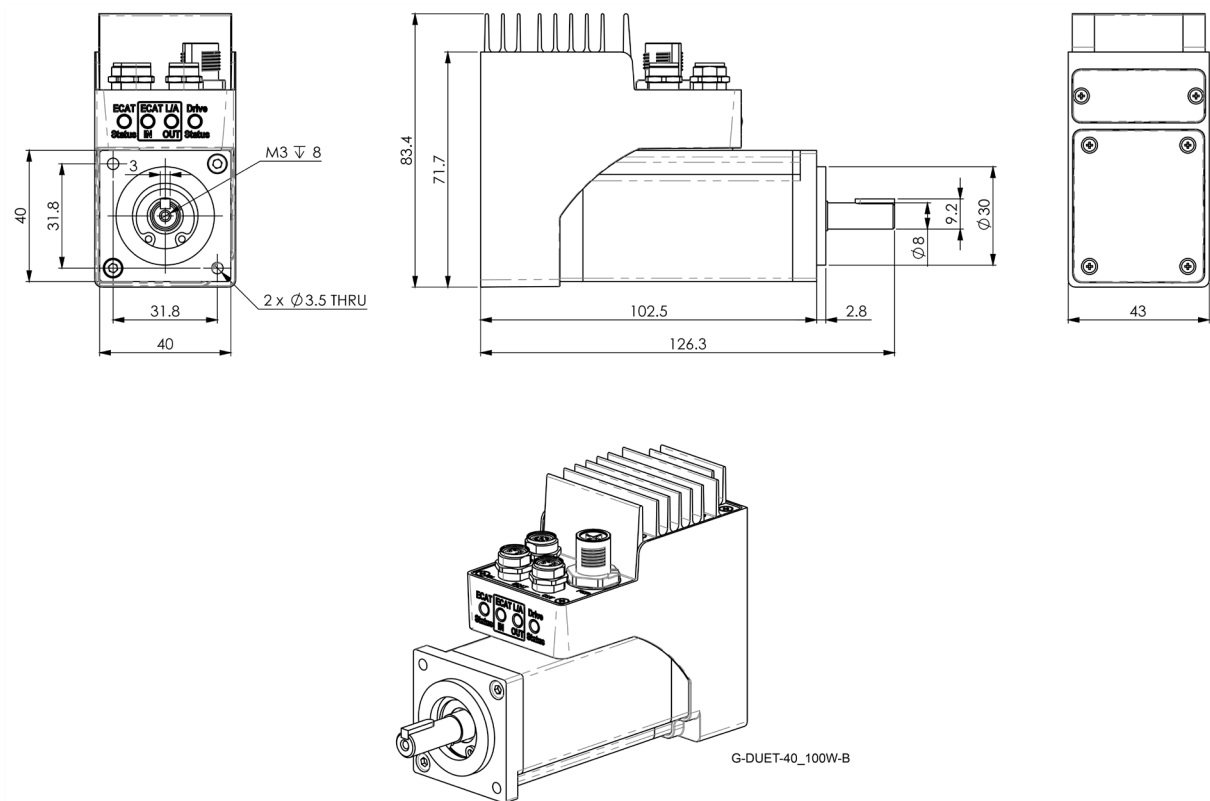


Figure 27: 40mm Frame 100W - Dimensions

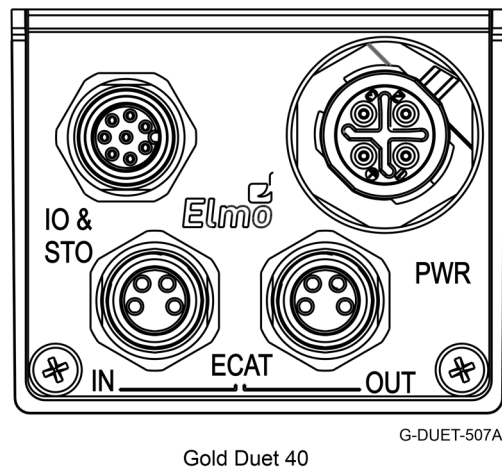


Figure 28: 40mm Frame 100W - Interface Details



## 10.4 40mm Frame 100W / 0.32Nm With Brake

The Gold Duet Integrated Drive-Motor has the following dimensions:

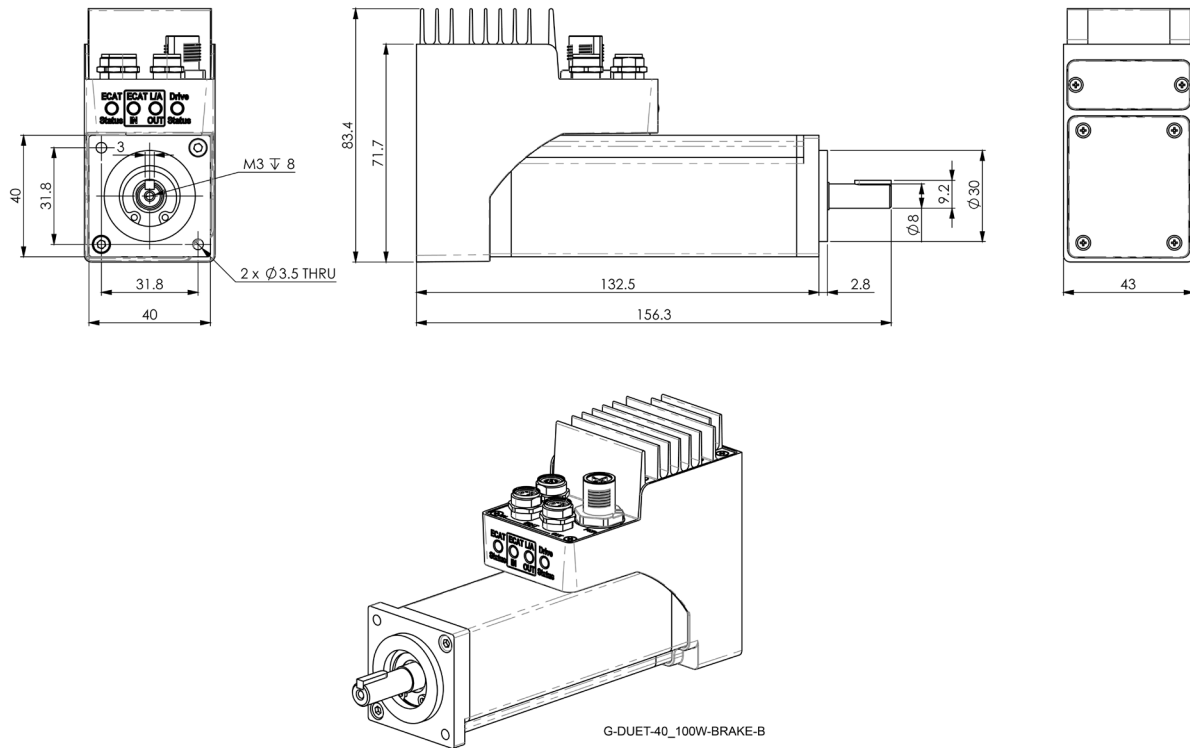


Figure 29: 40mm Frame 100W with Brake - Dimensions

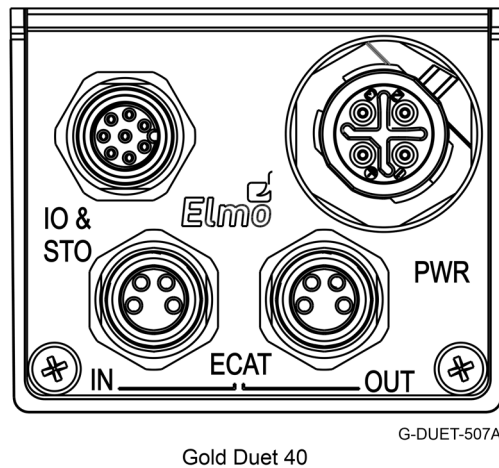


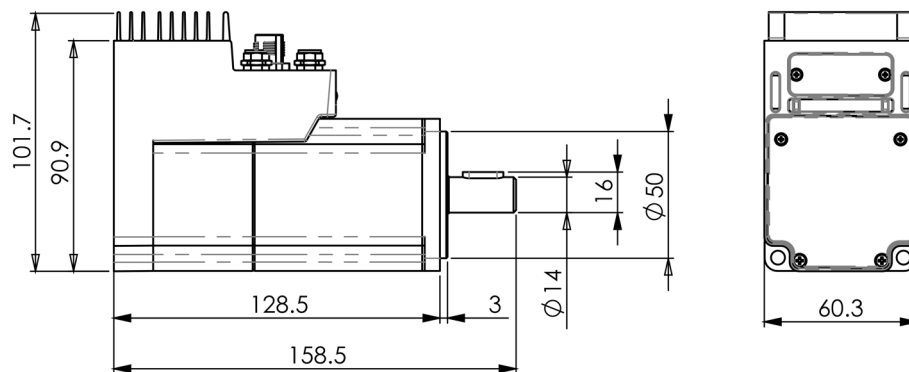
Figure 30: 44mm Frame 100W with Brake - Interface Details





## 10.5 60 mm Frame 200W/0.64Nm

The Gold Duet Integrated Drive-Motor has the following dimensions:



G-DUET60-200W

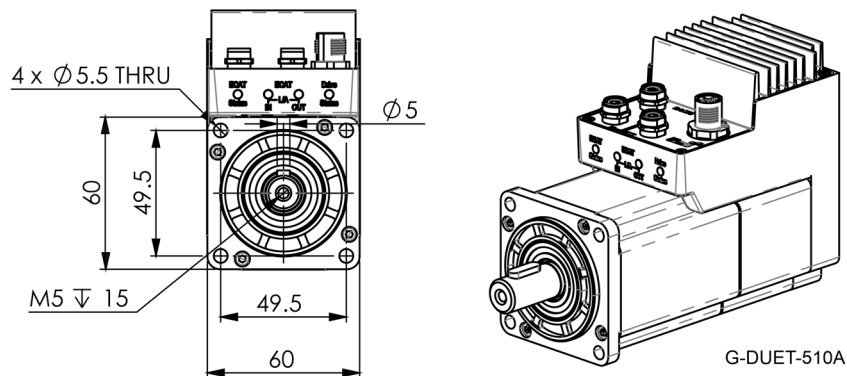
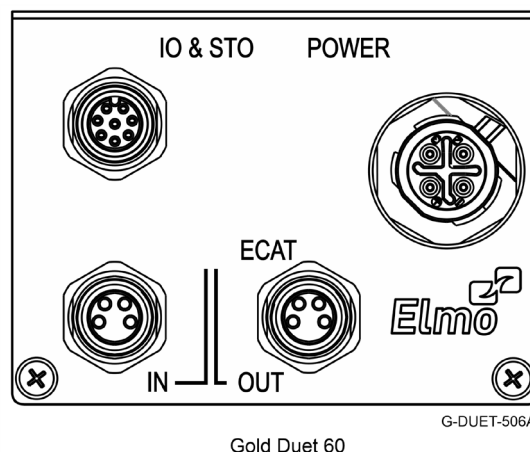


Figure 31: 60mm Frame 200W – Dimensions



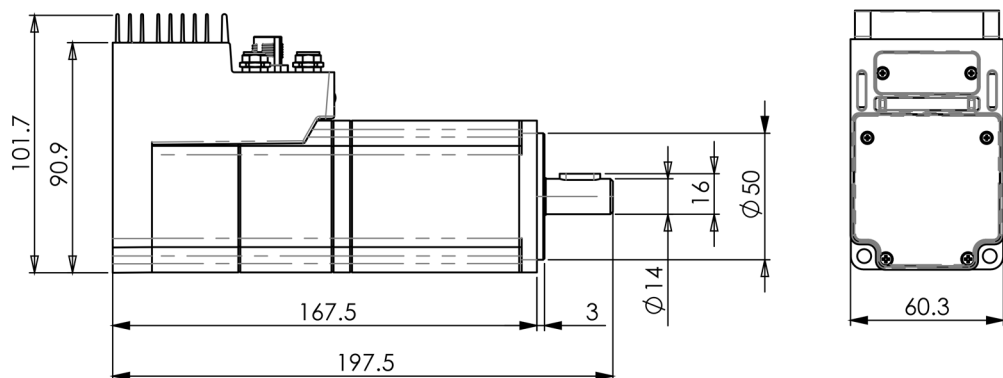
Gold Duet 60

Figure 32: 60mm Frame 200W – Interface Details



## 10.6 60 mm Frame 200W/0.64Nm With Brake

The Gold Duet Integrated Drive-Motor has the following dimensions:



G-DUET60-200W + brake

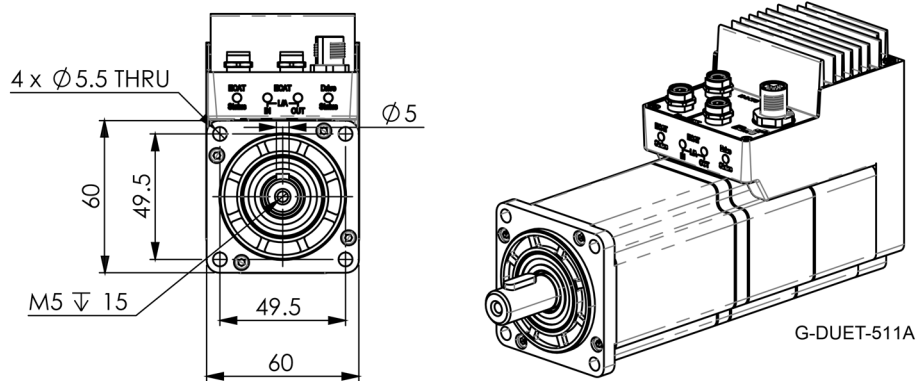
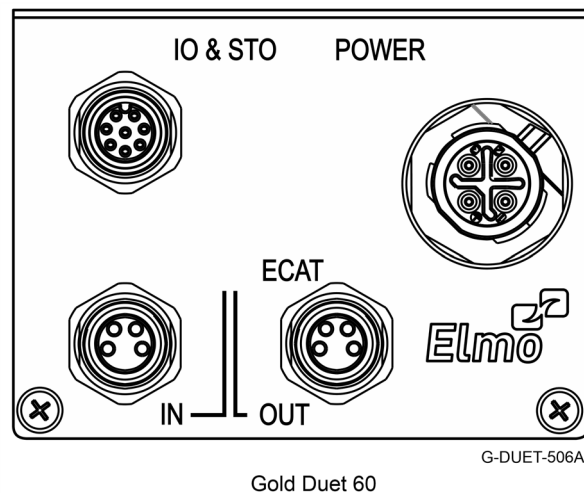


Figure 33: 60mm Frame 200W with Brake – Dimensions



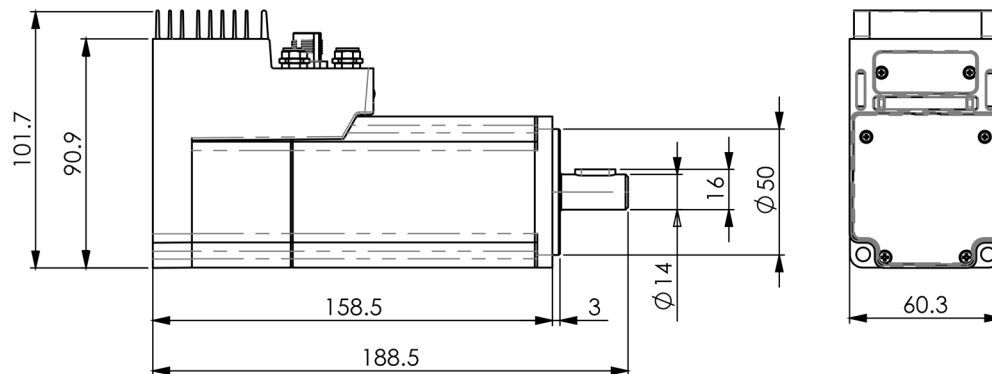
Gold Duet 60

Figure 34: Interface Details



## 10.7 60 mm Frame 400W / 1.27Nm

The Gold Duet Integrated Drive-Motor has the following dimensions:



G-DUET60-400W

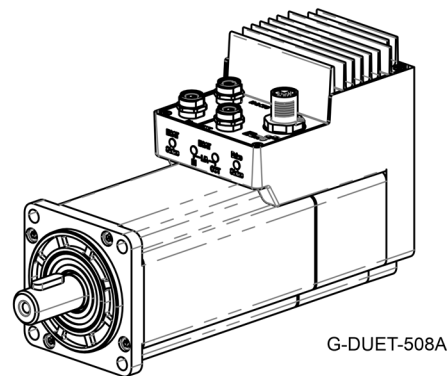
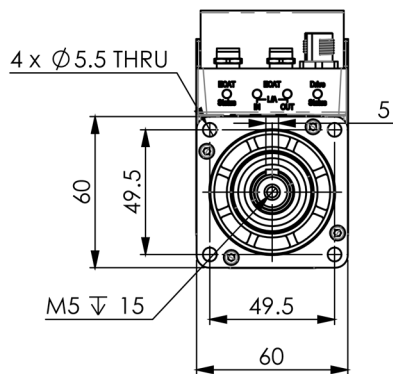


Figure 35: 60mm Frame 400W – Dimensions

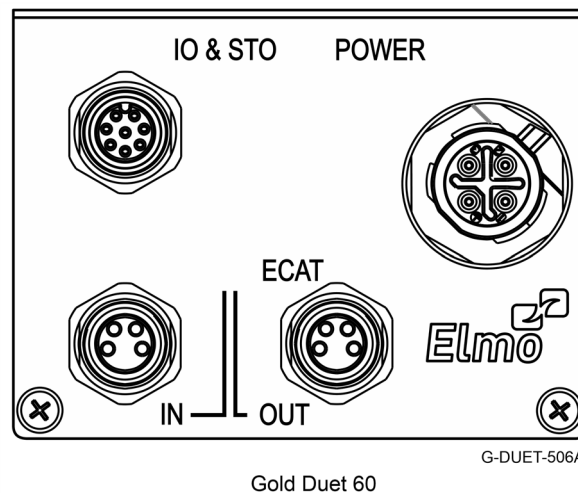
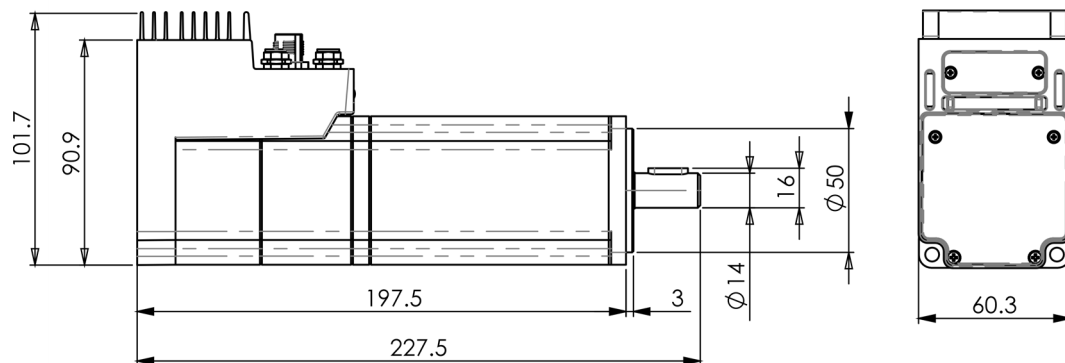


Figure 36: 60mm Frame 400W – Interface Details



## 10.8 60 mm Frame 400W / 1.27Nm With Brake

The Gold Duet Integrated Drive-Motor has the following dimensions:



G-DUET60-400W + brake

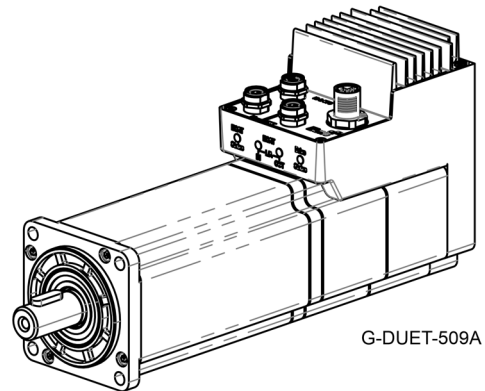
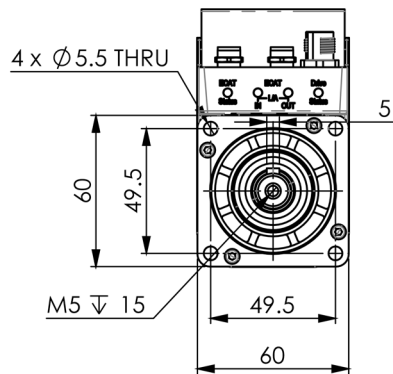
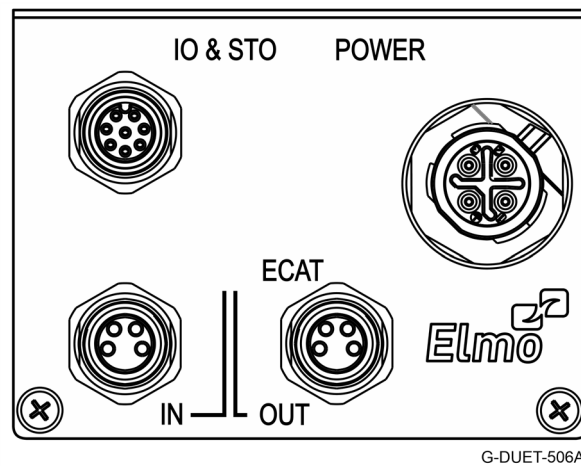


Figure 37: 60mm Frame 400W with Brake – Dimensions



Gold Duet 60

Figure 38: 60mm Frame 400W with Brake - Interface Details



## Chapter 11: Compliance with Standards

The Gold Duet 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.

### 11.1 Functional Safety

Safe Torque Off (STO) Safety Standard	Item
The related standards below apply to the performance of the mounted servo drive within the Gold Duet as stated in section 4.4 Environmental Conditions. The mounted servo drive is compliant with all the standards described.	
IEC 61800-5-2:2007	Adjustable speed electrical power drive systems – Safety requirements – Functional
EN ISO 13849-1:2008	Safety of machinery — Safety-related parts of control systems.
EN 61508-1:2010	Functional safety of electrical/electronic/ programmable electronic safety-related systems
EN 61508-2:2010	Functional safety of electrical/electronic/ programmable electronic safety-related systems
EN 61508-3:2010	Functional safety of electrical/electronic/ programmable electronic safety-related systems



## Certification

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

A1 / 04-11



Product Service

# CERTIFICATE

No. Z10 13 08 84596 001

**Holder of Certificate:** Elmo Motion Control Ltd.

60 Amal St. P.O. Box 3078  
49516 Petach-Tikva  
ISRAEL

**Factory(ies):**

84596

**Certification Mark:**



**Product:**

Safety Related Programmable Electronic System

**Model(s):**

Drive System GOLD LINE

**Parameters:**

Safety Function: STO (EN 61800-5-2)  
PL e, CAT 3 (EN ISO 13849)  
SIL 3 (EN 61508)

Further approvals can be found in the report below.

The report below and the user documentation in the currently valid revision are mandatory part of this certificate. The product complies with the following listed safety requirements only if the specifications documented in the currently valid revision of this report are met.

**Tested according to:**

EN 61508-1:2010 (SIL 3)  
EN 61508-2:2010 (SIL 3)  
EN 61508-3:2010 (SIL 3)  
EN 61800-5-2:2007  
EN ISO 13849-1:2008 (Cat 3, PL e)

The product was tested on a voluntary basis and complies with the essential requirements. The certification mark shown above can be affixed on the product. It is not permitted to alter the certification mark in any way. In addition the certification holder must not transfer the certificate to third parties. See also notes overleaf.

**Test report no.:** EP85169C

**Date,** 2013-08-12

( Peter Weiss )

Page 1 of 1



TÜV SÜD Product Service GmbH · Zertifizierstelle · Ridlerstraße 65 · 80339 München · Germany

TÜV®



## 11.2 Safety

Specification	Details
The related standards below apply to the performance of the mounted servo drive within the Gold Duet as stated in section 4.4 Environmental Conditions. The mounted servo drive is compliant with all the standards described.	
Approved <b>IEC/EN 61800-5-1</b>	Adjustable speed electrical power drive systems Safety requirements – Electrical, thermal and energy
Recognized <b>UL 61800-5-1</b>	Adjustable speed electrical power drive systems Safety requirements – Electrical, thermal and energy
Conformity with <b>CE 2006/95/EC</b>	Low-voltage directive 2006/95/EC
Recognized <b>CSA C22.2 NO. 14-13</b> Or Recognized <b>CSA C22.2 NO. 274-13</b>	Industrial Control Equipment  Adjustable drive speeds

## 11.3 Environmental

Specification	Details
Approved <b>IEC60068-2-78</b>	Environmental testing – Damp heat, steady state
Approved <b>IEC60068-2-6</b>	Environmental testing –Vibration (sinusoidal)
Approved <b>IEC60068-2-2</b>	Environmental testing – Dry heat
Approved <b>IEC60068-2-27</b>	Basic environmental testing procedures - Shock

## 11.4 EMC


Specification	Details
Approved <b>IEC/EN 61800-3</b>	Adjustable speed electrical power drive systems
In compliance with <b>EN 55011</b> Class A with <b>EN 61000-6-2</b> : Immunity for industrial environment, according to: <b>IEC 61000-4-2</b> / criteria B <b>IEC 61000-4-3</b> / criteria A <b>IEC 61000-4-4</b> / criteria B <b>IEC 61000-4-5</b> / criteria B <b>IEC 61000-4-6</b> / criteria A <b>IEC 61000-4-8</b> / criteria A <b>IEC 61000-4-11</b> / criteria B/C	Electromagnetic compatibility (EMC)
Approved <b>IEC 61326-3-1</b>	Electrical equipment for measurement, control and laboratory use. Standard required for STO.





## 11.5 EtherCAT Conformance

### EtherCAT Conformance Test – certification



# Certificate

## EtherCAT Conformance Test

**Elmo Motion Control Ltd.**  
64 Gisin St. Petach Tikva 49103 Israel

EtherCAT Technology Group hereby confirms the above named company that the following family devices are successfully **EtherCAT Conformance Tested**.

**Device under Test 1**

Product Name:	G-DCWHI
Product Code:	0x30924
Revision Number:	0x103F6

**Device under Test 2**

Product Name:	G-DCTRO
Product Code:	0x30924
Revision Number:	0x103F6


Device family is listed on one following page.

Assigned Vendor ID:	0x9A
Test Report Number:	0x9A_001
EtherCAT Test Center:	Beckhoff Automation GmbH, Nuremberg, Germany

The following tests were performed:

- EtherCAT Protocol Test (CTT Ver.1.20.52.0)
- Indicator Test
- Labeling Test
- Interoperability Test

Nuremberg, February 27, 2012



Martin Rostan, Executive Director  
EtherCAT Technology Group





## 11.6 Dual Use

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

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

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

## 11.7 Other Compliant Standards

Quality Assurance	
ISO 9001:2008	Quality Management
Design	
<ul style="list-style-type: none"><li>IPC-D-275</li><li>IPC-SM-782</li><li>IPC-CM-770</li></ul>	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) <b>Note:</b> 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](http://www.elmomc.com)

