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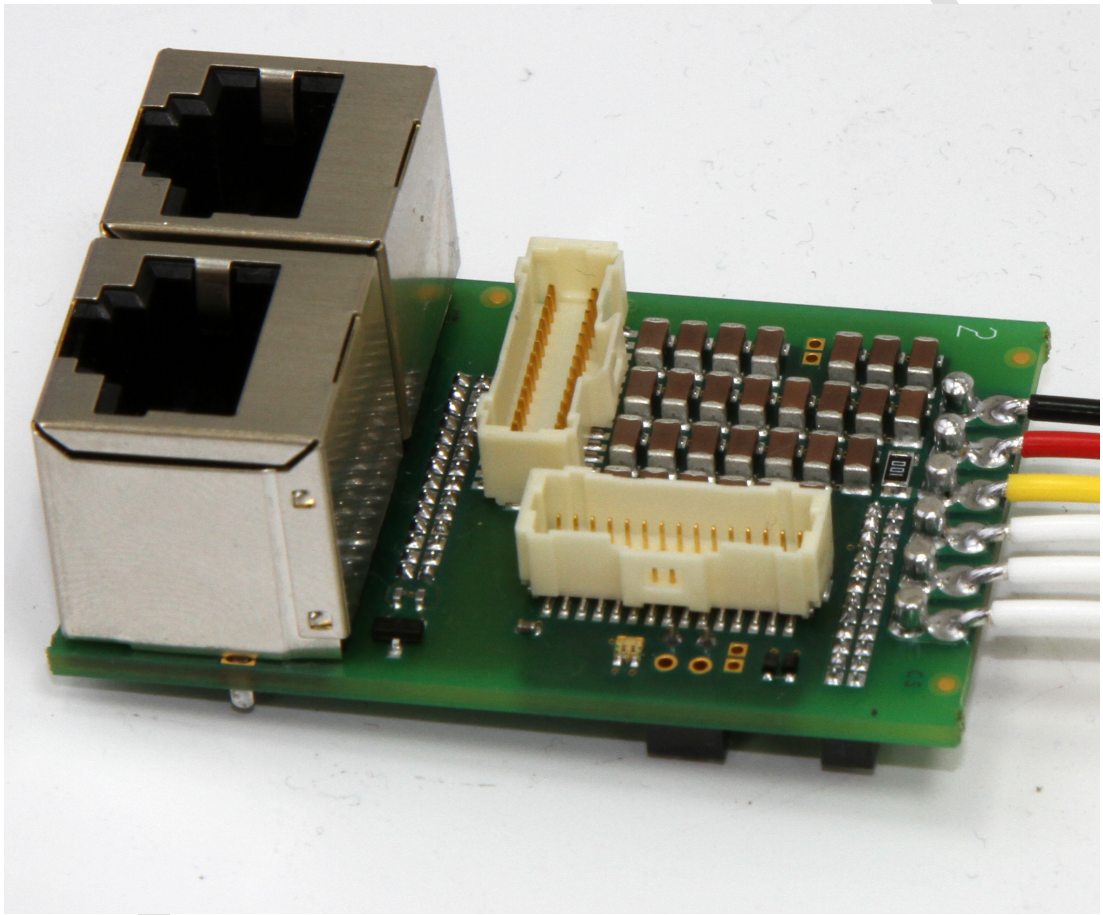
Gold Twitter/Bee Evaluation Board Installation Guide

CAN and EtherCAT



August 2015 (Ver. 1.005)

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Notice

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Document no. MAN-G-TWI-BEE-EBIG (Ver. 1.005)

Catalog Number

EVA-GTWI100CAN - EVALUATION BOARD G-TWI CAN-RS232 100V

EVA-GTWI200CAN - EVALUATION BOARD G-TWI CAN-RS232 200V

EVA-GTWI100ECT - EVALUATION BOARD G-TWI ETHERCAT 100V

EVA-GTWI200ECT - EVALUATION BOARD G-TWI ETHERCAT 200V

Revision History

Version	Date
Ver. 1.000	June 2014
Ver. 1.001	Oct 2014
Ver. 1.002	Nov 2014
Ver. 1.003	Mar 2015
Ver. 1.004	June 2015
Ver. 1.005	Aug 2015

Chapter 1: This Installation Guide

This installation Guide details the technical data, pinouts of the Gold Twitter/Bee Evaluation Board.

Chapter 2: Safety Information

In order to achieve the optimum, safe operation of the Gold Twitter/Bee Evaluation Board, 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 Twitter/Bee Evaluation Board 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 Twitter/Bee Evaluation Board 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 Twitter/Bee Evaluation Board 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 Twitter/Bee Evaluation Board 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 Twitter/Bee Evaluation Board, 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 Twitter/Bee Evaluation Board 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 Twitter/Bee Evaluation Board 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

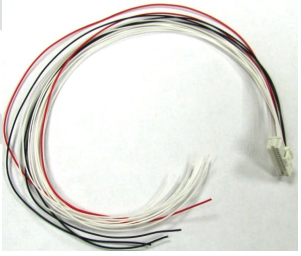
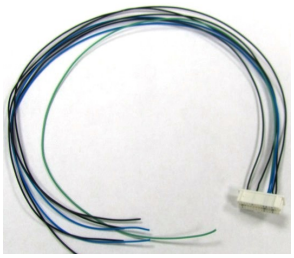
The products covered in this manual are warranted to be free of defects in material and workmanship and conform to the specifications stated either within this document or in the product catalog description. All Elmo drives are warranted for a period of 12 months from the time of installation, or 18 months from time of shipment, whichever comes first. No other warranties, expressed or implied — and including a warranty of merchantability and fitness for a particular purpose — extend beyond this warranty.

Chapter 3: Product Description

The Gold Twitter/Bee Evaluation Board which is designed to be mounted on the Gold Twitter via pin sockets, operates from a DC power source. Refer to Gold Twitter or Bee Installation Guide for detailed descriptions.

The Gold Twitter/Bee Evaluation Board drive is easily set up and tuned using the Elmo Application Studio (EASII) software tools. As part of the Gold product line, it is fully programmable with the Elmo motion control language. For more information about software tools refer to the Elmo Application Studio Software Manual (EASII).

There are four types of Gold Twitter/Bee Evaluation Board as listed in the Catalog Number. Each Gold Twitter/Bee Evaluation Board kit consists of the following:

No.	Description	
1	Evaluation Board G-TWI according to Part Number	
2	J10 connector wiring (25 cm length)	
3	J11 connector cable wiring (25 cm length)	
4	Additional 9 wires These wires can be inserted to the Gold Twitter/Bee Evaluation Board connectors J9 and J10 to add functionality. Each additional wire is preconnected to a pin. To use the optional connections, refer to the cable wiring tables and diagrams in sections 7.3.1, and 7.4.1. Insert the wire to the relevant connector pin hole and push until fully inserted. Connect the other end of the wire to the relevant device.	

Chapter 4: Technical Information

4.1. Physical Specifications

Feature	Units	All Types
Dimensions	mm (in)	52.00 x 34.50 mm (2.05” x 1.36”)
Mounting method		Socket for Gold Twitter/Bee

4.2. Technical Data

Feature	Units	100	200
Maximum supply voltage	VDC	100	200
Amplitude sinusoidal/DC continuous current	A	15	

Table 1: Technical Data

4.2.1. Auxiliary Supply Input Voltage (VL)

Feature	Unit	Details
Standard CAN (S option)		
Input range	V	12V – 40
Power consumption (including 5 V/200 mA for encoder)	W	<2.5W
ETHERCAT (E option)		
Input range	V	14V – 40
Power consumption (including 5 V/200 mA for encoder)	W	<4W

4.2.2. Product Features

Main Feature	Details	Presence / No.
STO	5V Logic Level, Opto isolated from the Control section	**√**
Digital Input Option	5V Logic Level (Internally connected to COMRET)	**6**
Digital Output Option	5V logic (Internally connected to COMRET)	**2**
	3.3V logic (Internally connected to COMRET)	**2**
Analog Input	Differential ±10V	**1**
	Single Ended	**1**
Feedback	Standard Port A, B, & C	**√**
Communication Option	USB	**√**
	EtherCAT	**√**
	CAN	**√**
	RS-232 TTL level	**√**
	Standard RS-232	**√**

Chapter 5: Unpacking the Drive Components

Before you begin working with the Gold Twitter/Bee Evaluation Board, verify that you have all of its components, as follows:

- The Gold Twitter/Bee Evaluation Board servo drive
- Gold Twitter/Bee (ordered separately)
- The Elmo Application Studio (EASII) software and software manual

The Gold Twitter/Bee Evaluation Board is shipped in a cardboard box with Styrofoam protection.

To unpack the Gold Twitter/Bee Evaluation Board:

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 Twitter/Bee Evaluation Board you have unpacked is the appropriate type for your requirements, locate the part number sticker on the side of the Gold Twitter/Bee Evaluation Board.
4. Verify that the Gold Twitter/Bee Evaluation Board 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.

Chapter 6: Mounting the Gold Twitter/Bee on the Evaluation Board

To mount the Gold Twitter/Bee on the Evaluation Board, do the following:

1. Make sure to select the appropriate Voltage evaluation board for the G-TWI.
   For example select the 200V evaluation board for the G-TWI 200V, and the 100V evaluation board for the G-TWI 100V.
2. Carefully connect the Gold Twitter/Bee to the sockets of the Evaluation Board.
   Make sure that all the pins fully insert to the evaluation board pin holes.
3. Only use the maximum DC continuous current of 15A to operate the evaluation board.

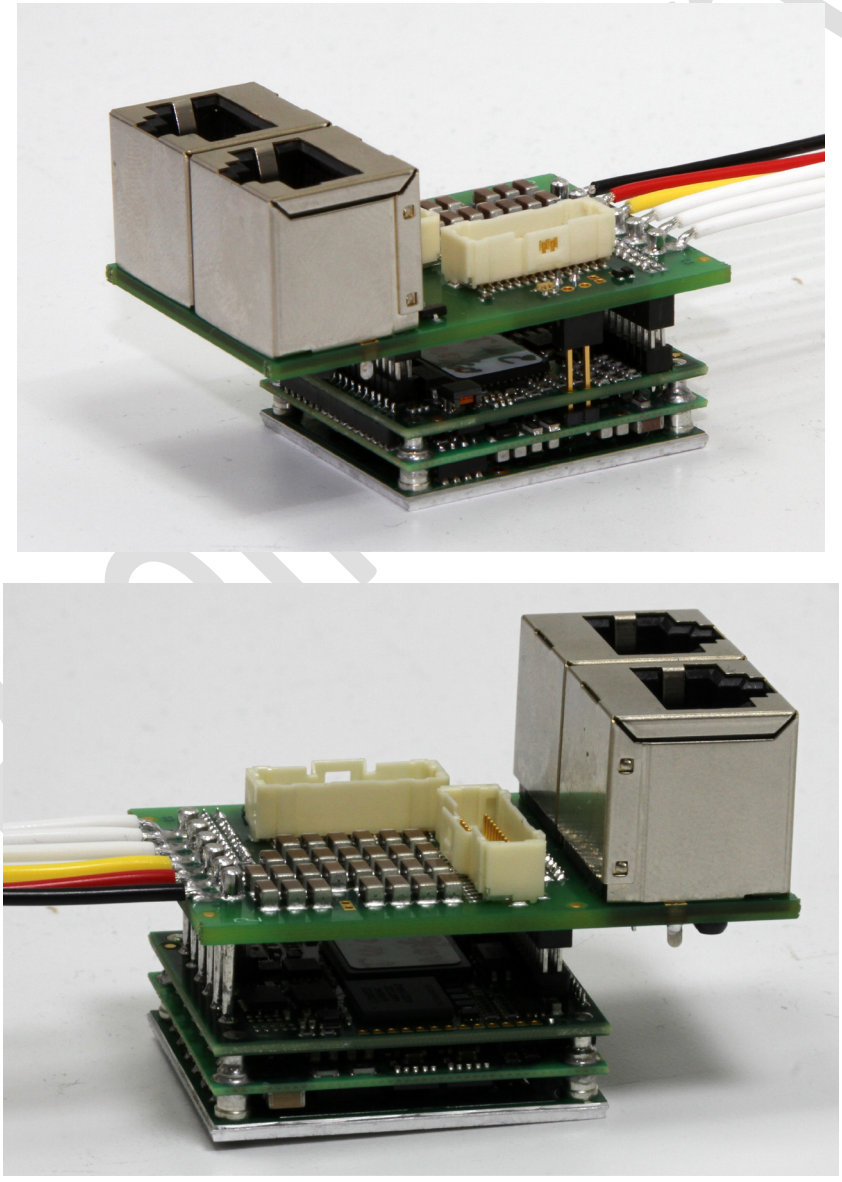


Figure 1: Gold Twitter/Bee Evaluation Board

Chapter 7: Wiring

The Gold Twitter/Bee Evaluation Board has five connectors.

7.1. Connectors

Port	Pins	Type	Function
J10	2x15	1 mm pitch	Feedbacks, Digital Halls, etc.
J11	2x15	1 mm pitch	Digital I/Os, Analog Inputs, RS-232, and LEDs
M3	1x1	30 cm Wires	Motor power output 3
M2	1x1		Motor power output 2
M1	1x1		Motor power output 1
PE	1x1		Protective earth
PR	1x1		Power output return
VP+	1x1		DC Positive power input
EtherCAT Version			
J13	8	RJ-45	EtherCAT In
J15	8	RJ-45	EtherCAT Out
CAN Version			
J13	4	2.0 mm pitch	CAN In
J15	4	2.0 mm pitch	CAN Out

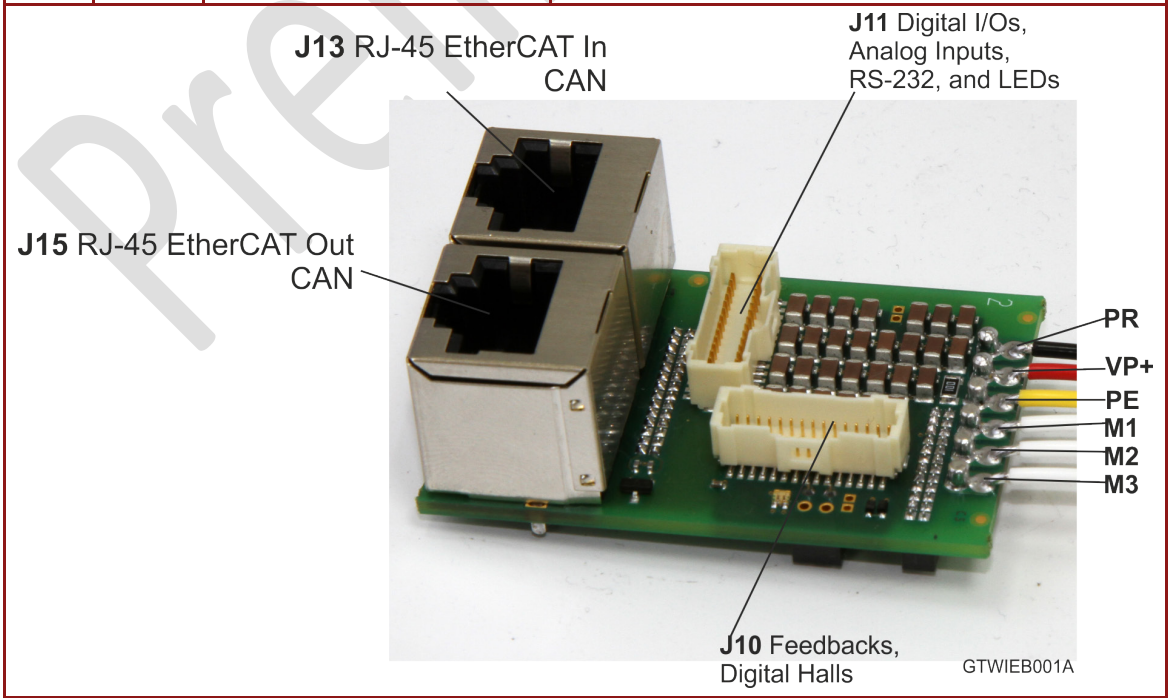


Table 2: Connector Types

7.2. Main Power, Auxiliary Power, Motor Power

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

7.2.1. Motor Power

Pin	Wire Colors	Length	Function	Cable Wires	
				Brushless Motor	Brushed DC Motor
PE	Yellow	30 cm	Protective earth	Motor	Motor
M1	White	30 cm	Motor phase	Motor	N/C
M2	White	30 cm	Motor phase	Motor	Motor
M3	White	30 cm	Motor phase	Motor	Motor
Pin Positions					

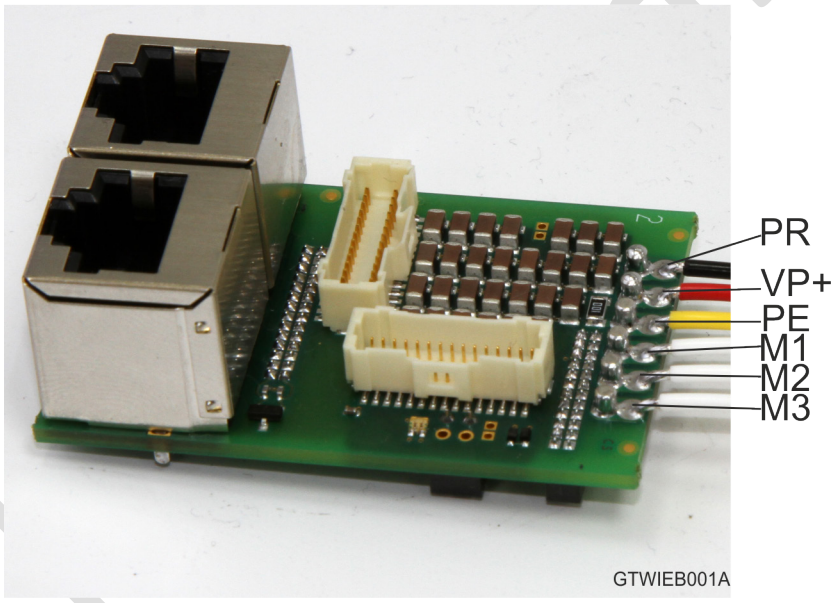


Table 3: Main Power and Motor Connections

7.2.2. Main Power and Auxiliary Power Connector

Note: Make sure that the VL is in the range defined in the Installation Guide. Refer to the Auxiliary Power table in the Installation Guide.

This section describes the Main and Auxiliary Power.

Pin	Signal	Wire Colors	Length	Function	Cable
H3, H9	PE	Yellow	30 cm	Protective Earth	Power
H1, H7	PR	Black	30 cm	Power Return	Power
H2, H8	VP+	Red	30 cm	Positive Power Input	Power
Pin Positions					

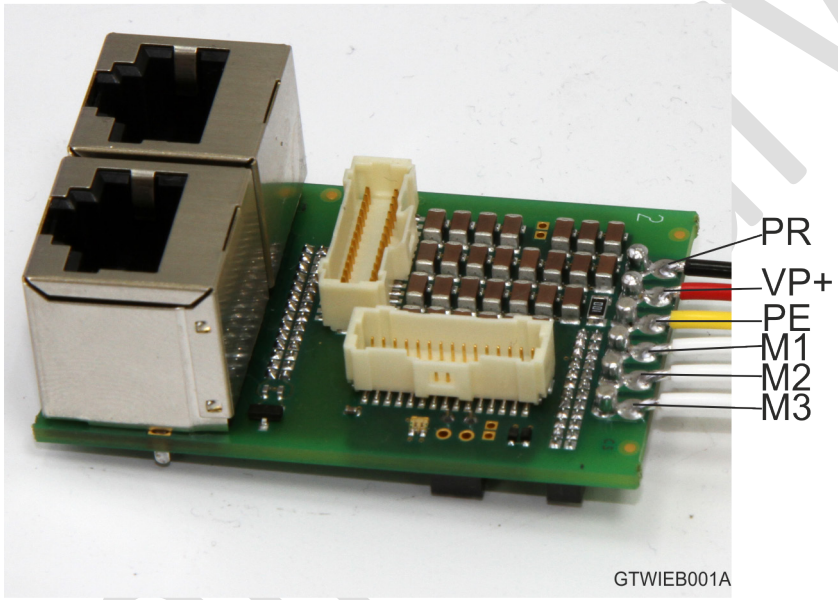


Table 4: Main Power and Motor Connections

7.3. Port A, B, & C connector (J10)

	Power and COMRET (Common Return)			
Pin (J10)	**Signal**	**Function**	**Signal**	**Function**
19,26	+5V	Encoder +5V supply		
30	VL+	Auxiliary Supply Input		
29	VL-	Auxiliary Supply Return		
21, 23, 25, 27, 28	COMRET	Common Return		

Port A	Incremental Encoder		Absolute Serial Encoder	
Pin (J10)	**Signal**	**Function**	**Signal**	**Function**
1	PortA_ENC_A+	Channel A +	ABS_CLK+	Absolute encoder clock+
3	PortA_ENC_A-	Channel A -	ABS_CLK-	Absolute encoder clock-
5	PortA_ENC_B+	Channel B+	ABS_DATA+	Absolute encoder data+
7	PortA_ENC_B-	Channel B -	ABS_DATA-	Absolute encoder data -
9	PortA_ENC_INDEX+	Index+	Reserved	Reserved
11	PortA_ENC_INDEX-	Index -	Reserved	Reserved
13	HA	Hall sensor A	HA	Hall sensor A
15	HB	Hall sensor B	HB	Hall sensor B
17	HC	Hall sensor C	HC	Hall sensor C

Port B	Incremental or Interpolated Analog Encoder		Resolver	
Pin (J10)	**Signal**	**Function**	**Signal**	**Function**
2	PortB_ENC_A-/SIN-	Channel A-/Sine-	SIN-	Sine-
4	PortB_ENC_A+/SIN+	Channel A+/Sine+	SIN+	Sine+
6	PortB_ENC_B-/COS-	Channel B-/Cosine-	COS-	Cosine-
8	PortB_ENC_B+/COS+	Channel B+/Cosine+	COS+	Cosine+
10	PortB_ENC_INDEX-	Channel_Index-	RESOLVER_OUT-	Vref f=1/TS, 50 mA Max.
12	PortB_ENC_INDEX+	Channel_Index+	RESOLVER_OUT+	Vref complement f= 1/TS, 50 mA Max.

Port C	Signal	Function
Pin (J10)	**Signal**	**Function**
14	PortC_ENCO_A-	Buffered Channel A complement output
16	PortC_ENCO_A+	Buffered Channel A output
18	PortC_ENCO_B-	Buffered Channel B complement output
20	PortC_ENCO_B+	Buffered Channel B output
22	PortC_ENCO_Index-	Buffered INDEX complement output
24	PortC_ENCO_Index+	Buffered INDEX output

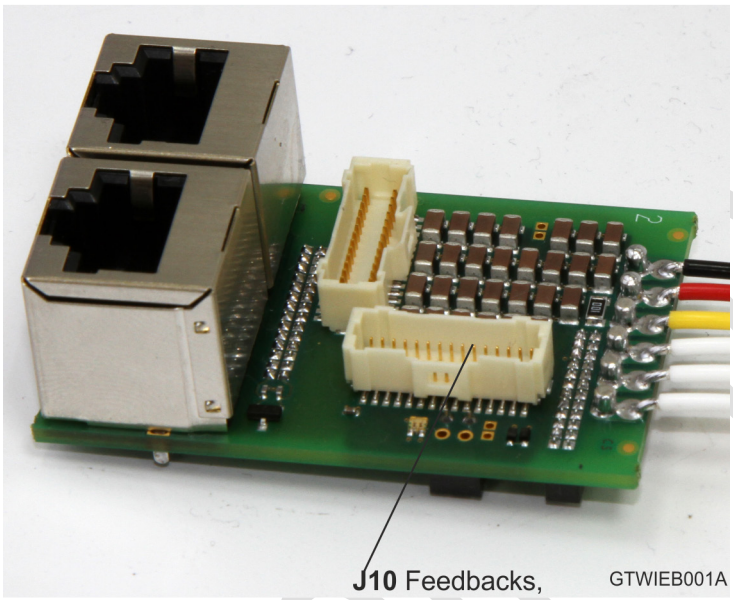
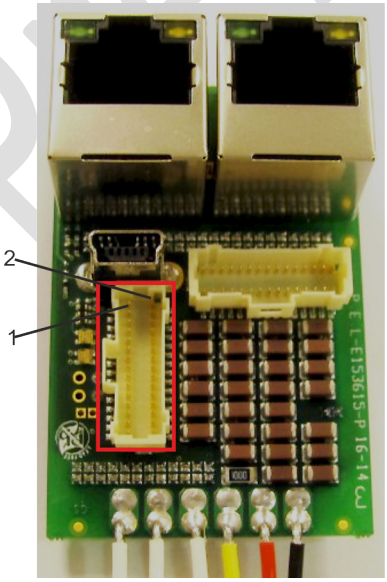
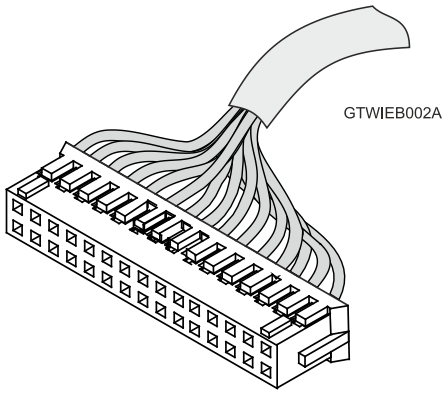
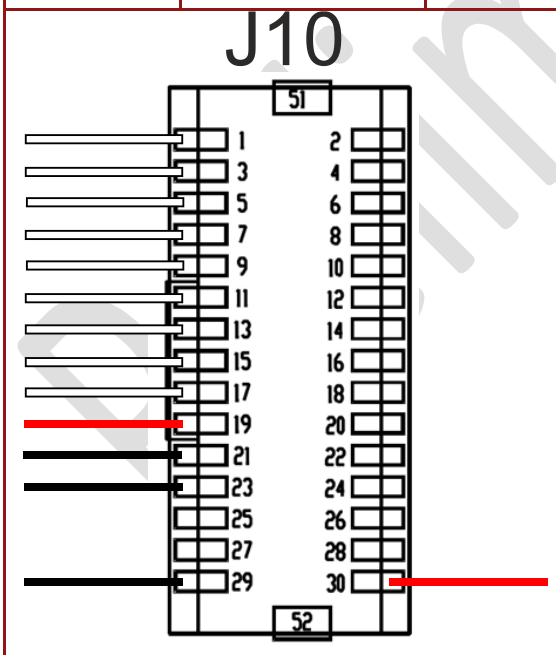
Pin Positions	Cable Connector
 	 **2x15-Pin Female Connector** **e.g. Molex 501189-3010**

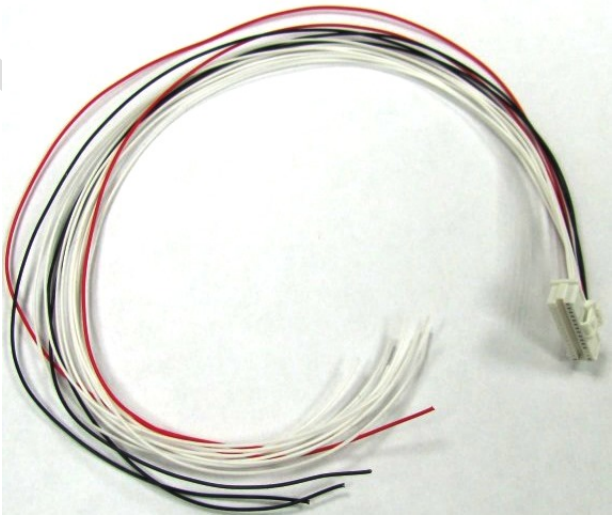
Table 5: Port A Pin Assignments

7.3.1. J10 Cable wiring

The J10 connector cable wiring is 25 cm in length.

Pins	Color	Description
1	WHITE	ENCA A+ ABS C+
3	WHITE	ENCA A- ABS C-
5	WHITE	ENCA B+ ABS D+
7	WHITE	ENCA B- ABS D-
9	WHITE	ENCA INDEX+
11	WHITE	ENCA INDEX-
13	WHITE	HA
15	WHITE	HB
17	WHITE	HC
19	RED	+5VE
21	BLACK	GND
23	BLACK	GND
29	BLACK	VL- (Auxiliary Supply Return)
30	RED	VL+ (Auxiliary Supply Input)





7.4. Digital I/O, RS-232, Analog, STO & LEDs Connector (J11)

Pin (J11)	Signal	Function
1	RS232_TX	RS232 transmit
2	RS232_RX	RS232 receive
3	Reserved	
4	Reserved	
5	COMRET	Common return
6	COMRET	Common return
7	ANALOG1+	Analog input 1
8	ANALOG1-	Analog input 1 complement
9	Reserved	
10	STO1	STO 1 input, opto isolated
11	STO_RET	STO signal return. The two digital STO inputs are optically isolated from the other parts of the drive, and share one return line.
12	STO2	STO 2 input
13	Reserved	
14	Reserved	
15	OUT4	Programmable output 4 not isolated (**3.3V TTL level**)
16	OUT2	Programmable output 2 not isolated (5V)
17	OUT3	Programmable output 3 not isolated (**3.3V TTL level**)
18	OUT1	Programmable output 1 not isolated (5V)
19	Not in use	
20	COMRET	Common return
21	IN6	Programmable digital input 6 not isolated - 5V TTL logic level
22	IN5	Programmable digital input 5 not isolated - 5V TTL logic level
23	IN4	Programmable digital input 4 not isolated - 5V TTL logic level
24	IN3	Programmable digital input 3 not isolated - 5V TTL logic level
25	IN2	Programmable digital input 2 not isolated - 5V TTL logic level
26	IN1	Programmable digital input not isolated - 5V TTL logic level
27	COMRET	Common return
28	COMRET	Common return
29	COMRET	Common return
30	Not is Use	

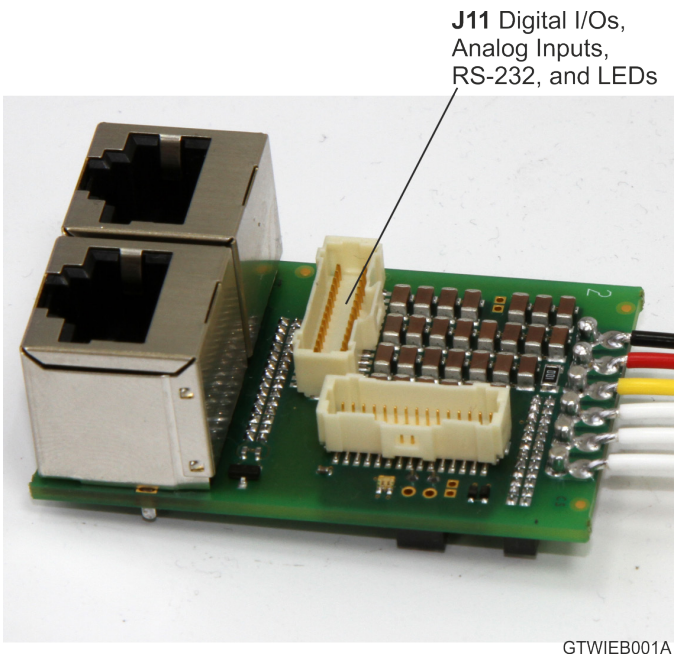
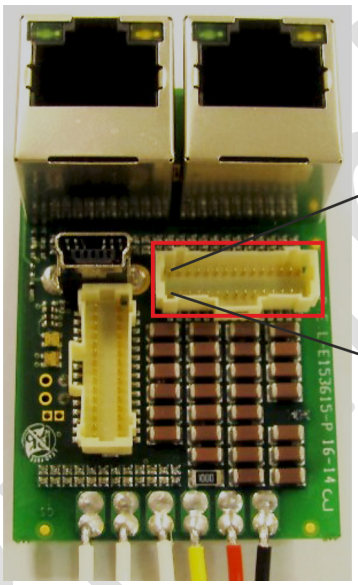
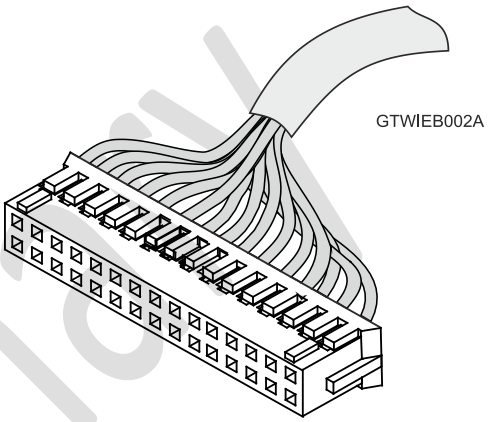
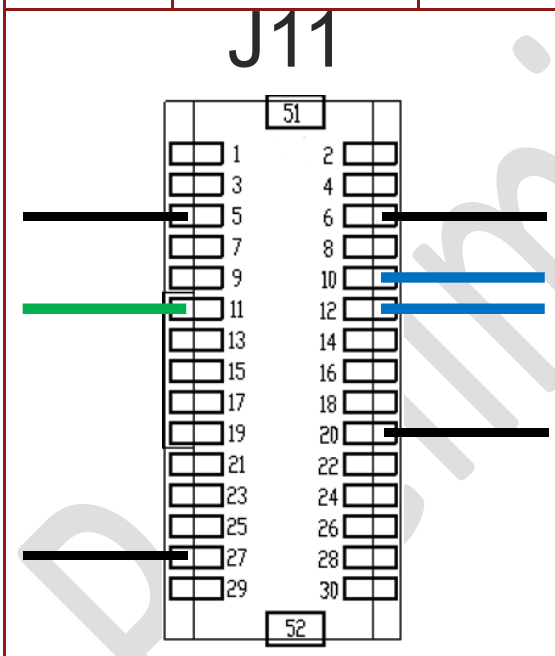
Pin Positions (J11)	Cable Connector
 GTWIEB001A 	 **2x15-Pin female connector e.g. Molex 501189-3010**

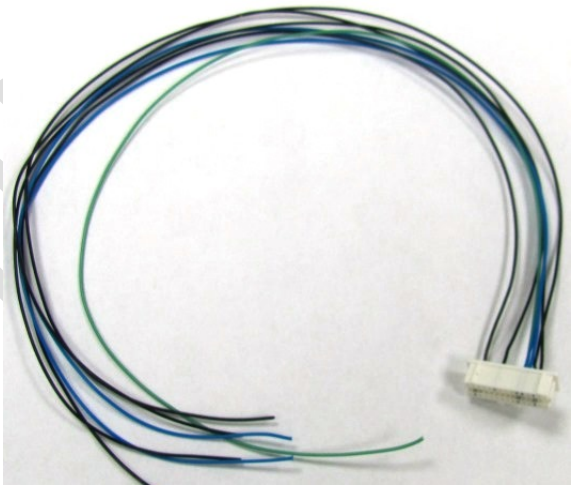
Table 6: Connector MAIN – I/O, STO, Analog, LEDs

7.4.1. J11 Cable Wiring

The J11 connector cable wiring is 25 cm in length.

Pins	Color	Description
5	BLACK	GND
6	BLACK	GND
10	BLUE	STO1
11	GREEN	STO RET
12	BLUE	STO2
20	BLACK	GND
27	BLACK	GND
NC	BLACK	Not Connected
NC	RED	Not Connected





7.4.2. I/O Implementation

It should be noted that the Input and Output are not isolated. Refer to Figure 2 and Figure 3 below.

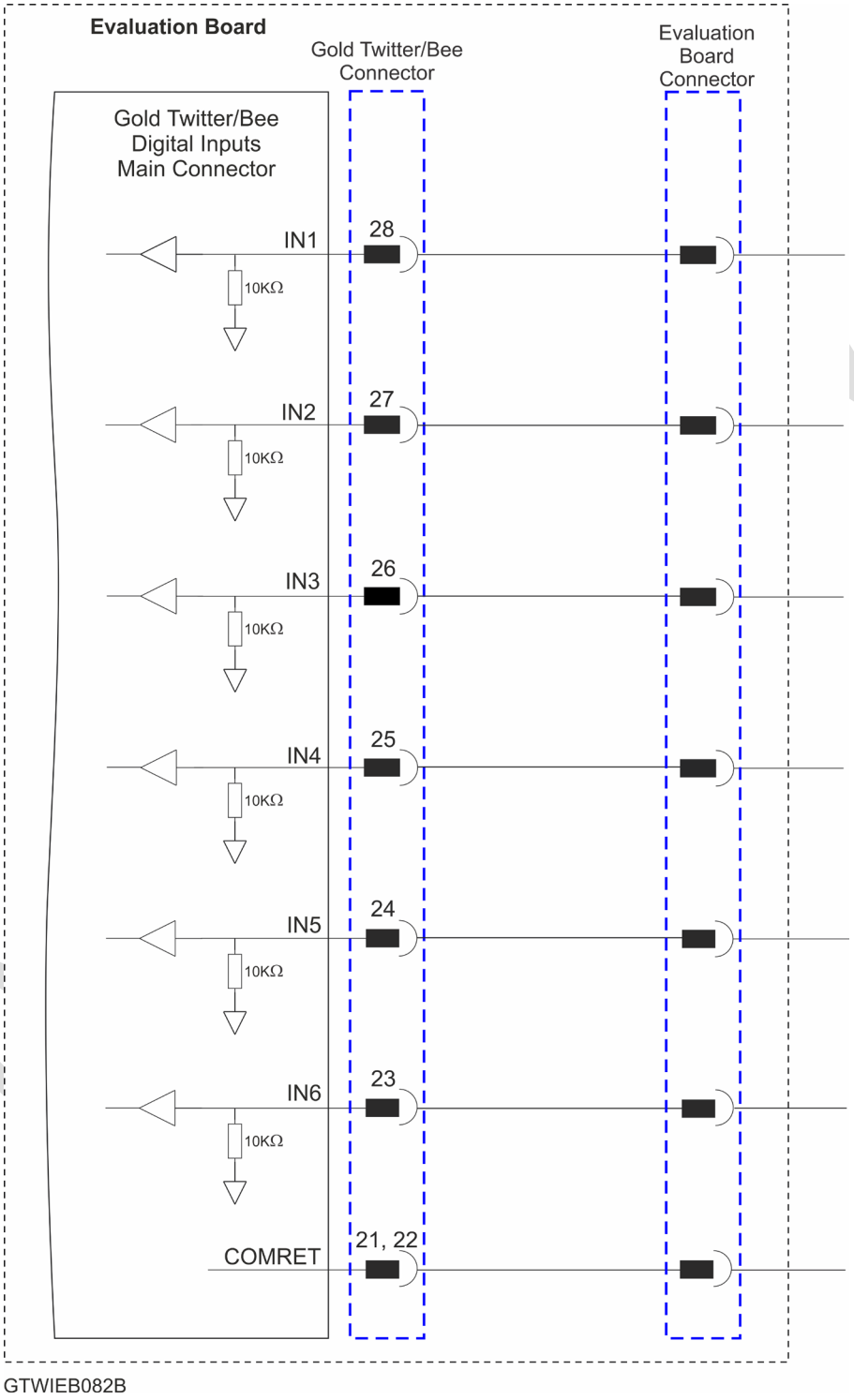


Figure 2: Digital Input 5V Logic level Mode Connection Diagram

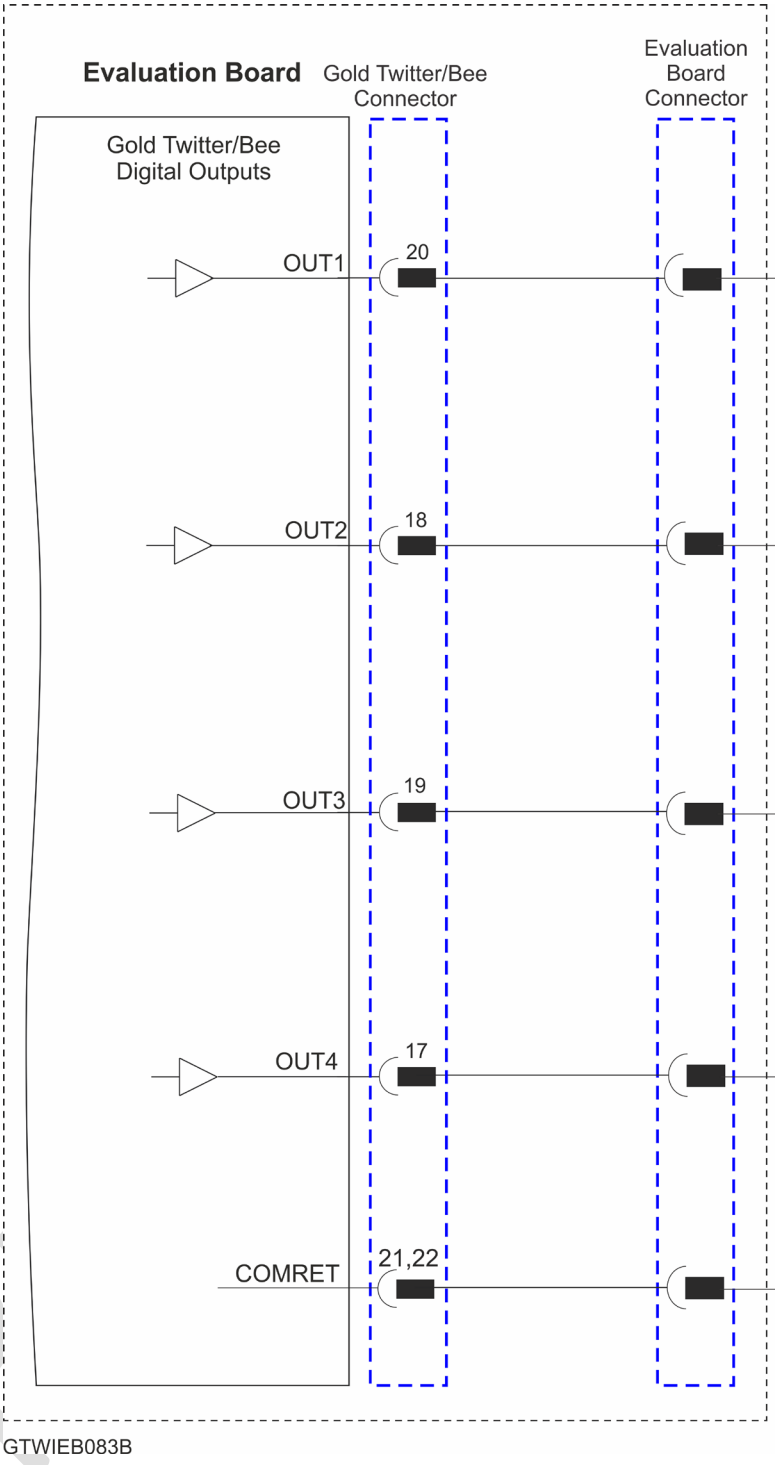


Figure 3: Digital Output 5V and 3.3V Level Mode Connection Diagram

7.5. USB Connector (J14)

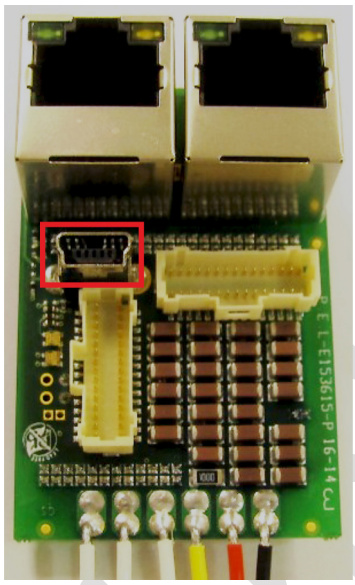
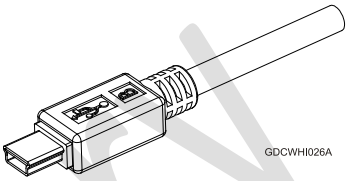
Pin (J14)	Signal	Function
1	USB VBUS	USB VBUS 5 V
2	USBD-	USB _N line
3	USBD+	USB _P line
5	USB COMRET	USB communication return
Pin Positions		**Cable Connector**
		 **USB Device Mini-B Plug**

Table 7: USB Device Mini-B - Pin Assignments

7.6. EtherCAT Communications Version

7.6.1. EtherCAT IN/Ethernet Connector (J13)

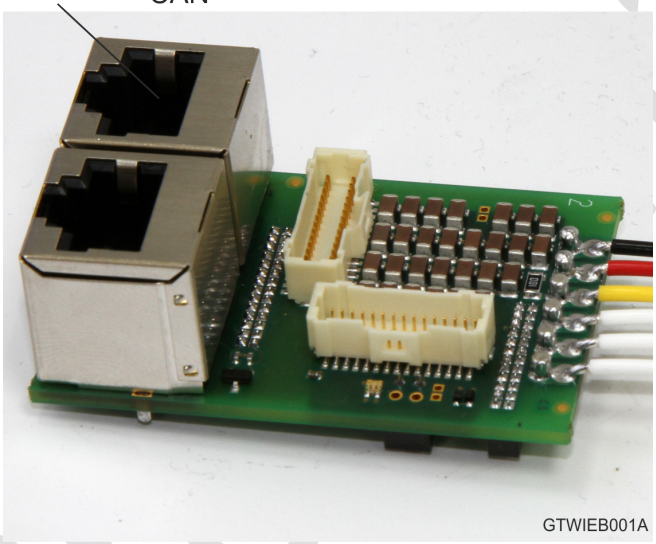
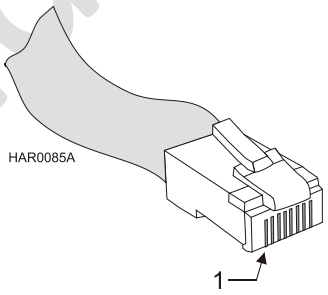
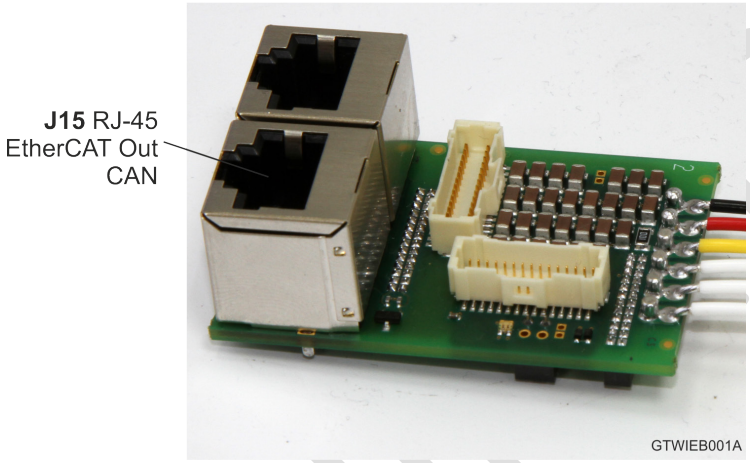
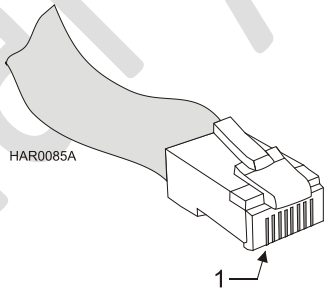
Pin (J13)	Signal	Function
1	EtherCAT_IN/Ethernet_TX+	EtherCAT in/Ethernet transmit +
3	EtherCAT_IN/Ethernet _TX-	EtherCAT in/Ethernet transmit -
4	EtherCAT_IN/Ethernet _RX+	EtherCAT in/Ethernet receive +
2, 5	N/A	
6	EtherCAT_IN/Ethernet _RX-	EtherCAT in/Ethernet receive -
7	N/A	
Pin Positions		**Cable Connector**
J13 RJ-45 EtherCAT In CAN 		 **Standard CAT5e Ethernet Cable**

Table 8: EtherCAT IN - Pin Assignments

7.6.2. EtherCAT OUT Connector (J15)

Pin (J15)	Signal	Function
1	EtherCAT_OUT_TX+	EtherCAT in transmit +
3	EtherCAT_OUT_TX-	EtherCAT in transmit -
4	EtherCAT_OUT_RX+	EtherCAT in receive +
2	N/A	
6	EtherCAT_OUT_RX-	EtherCAT in receive -
5	N/A	
7	N/A	
Pin Positions		**Cable Connector**
		 **Standard CAT5e Ethernet Cable**

7.7. CAN Communications Version

Pin (J13/15)	Signal	Function
1	CANH	CAN_H BUS Line(dominant high)
2	CANL	CAN_L BUS Line(dominant low)
3	COMRET (CAN_RET)	CAN Return
4, 5	N/A	—
6	CAN_SHLD	Shield, connected to the RJ plug cover
7	COMRET (CAN_RET)	CAN Return
8	N/A	—

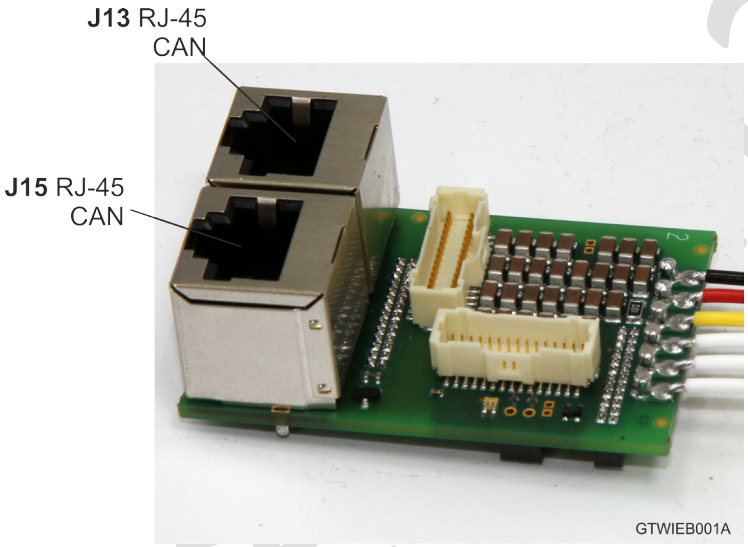
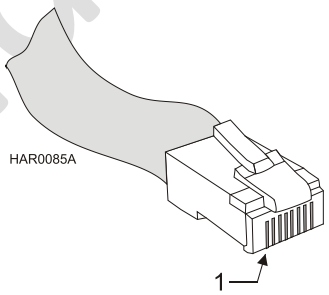
Pin Positions	Cable Connector
	 **Standard CAT5e Ethernet Cable**

Table 9: CAN Pin Assignments

7.8. Powering Up

After the Gold Twitter/Bee Evaluation Board 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 Twitter/Bee Evaluation Board has been connected and mounted, the system must be set up and initialized. This is accomplished using the *EASII*, Elmo's Windows-based software application. Install the application and then perform setup and initialization according to the directions in the *EASII User Manual*.

Chapter 8: Dimensions

This chapter provides detailed technical dimensions regarding the Gold Twitter/Bee Evaluation Board.

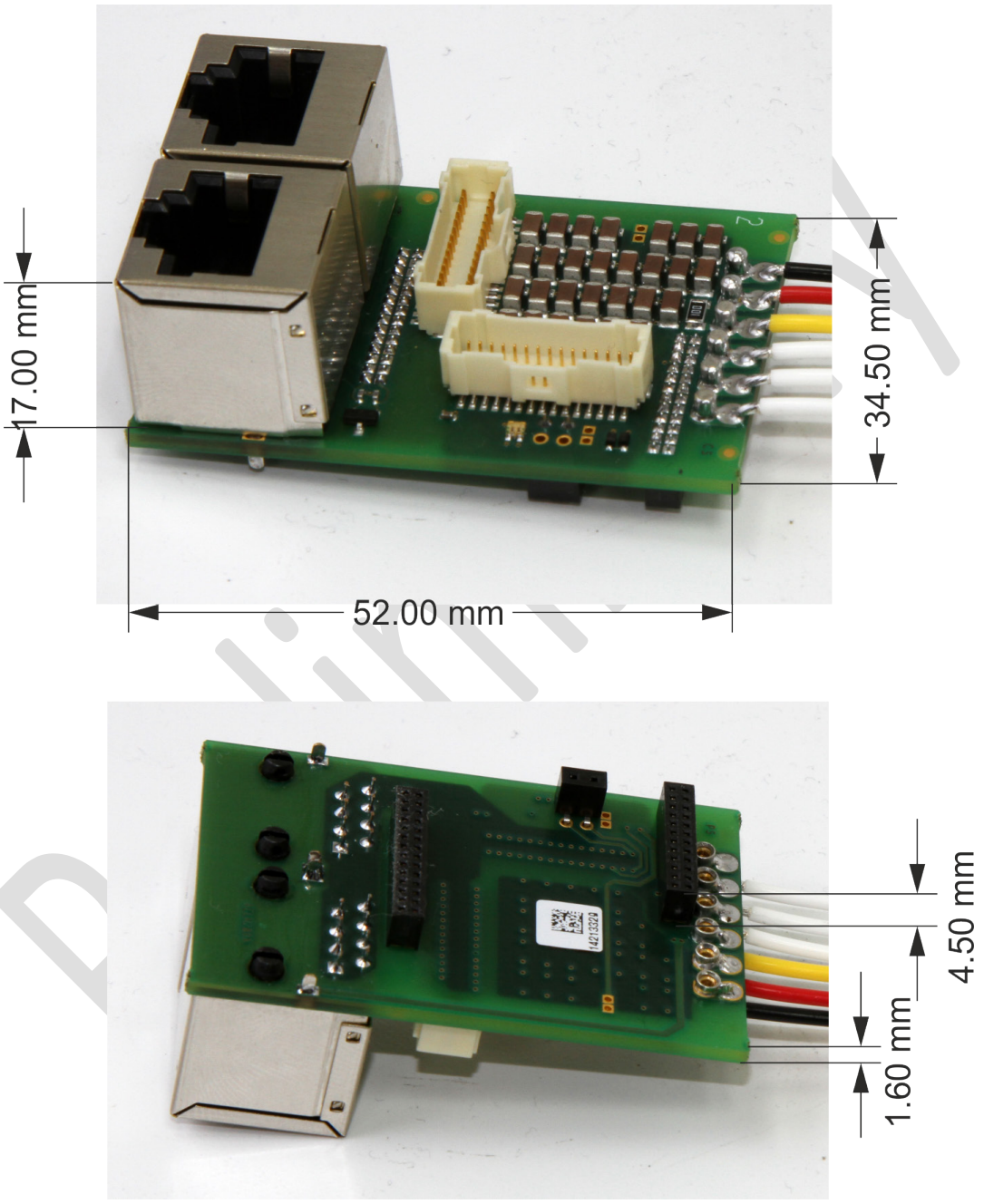


Figure 4: Gold Twitter/Bee Evaluation Board Version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