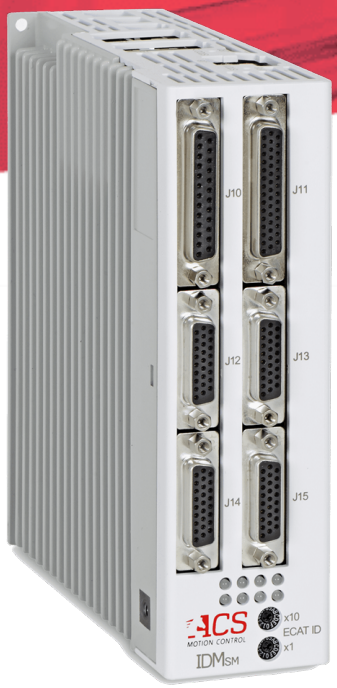

IDMsm

Installation Guide

March 2024

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ACS MOTION CONTROL

IDMsm

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PATENTS

Israel Patent No. 235022
US Patent Application No. 14/532,023
Europe Patent application No.15187586.1
Japan Patent Application No.: 2015-193179
Chinese Patent Application No.: 201510639732.X
Taiwan(R.O.C.) Patent Application No. 104132118
Korean Patent Application No. 10-2015-0137612

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NOTICE

The information in this document is deemed to be correct at the time of publishing. ACS Motion Control reserves the right to change specifications without notice. ACS Motion Control is not responsible for incidental, consequential, or special damages of any kind in connection with using this document.

Revision History

Date	Revision	Description
February 2024	3.14	Fix link in connections table Update Sin-Cos information per 29013 UL certification is pending Correct J11 pinout table
October 2023	3.13.01.06	Corrected Ordering Options
August 2023	3.13.01.05	SS1-t deceleration Factory default procedure Accessories kit
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March 2023	3.13.01.02	Correct limits table
March 2023	3.13.01.01	Added compatibility table
February 2023	3.13.01	Correct J3 in Jumper Table, SPI connector
November 2022	3.13	Correct Jumper Table
September 2022	3.12.04	Correct Introduction text
August 2022	3.12.03	Remove RS232 connection diagram
July 2022	3.12.02	Correct Dimensions drawing Regen circuit warning
July 2022	3.12.01	Changes to ordering options
April 2022	3.12	MARK output maximum capture
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February 2022	3.11.01.06	Remove erroneous references to 150V
February 2022	3.11.01.05	Ordering Options Correction
January 2022	3.11.01.04	Corrections to Limits, Encoders, I/O diagrams

Date	Revision	Description
December 2021	3.11.01.03	Add Analog I/O connections
December 2021	3.11.01.01	Indicate Pin 1 on J9
November 2021	3.11.01	Encoder description correction, LED image corrections
June 2021	3.10.01	Added note about capacitor between 150V supply and drive supply connector
April 2021	3.10	New Ordering Options, motor connection warning, add CTIME table
January 2021	1.00.01	STO Connector number correction
August 2020	1.00	Initial Version

Conventions Used in this Guide

Text Formats

Format	Description
Bold	Names of GUI objects or commands
BOLD + UPPERCASE	ACSPL+ variables and commands
`Monospace + grey background`	Code example
Italic	Names of other documents
Blue	Hyperlink
[ ]	In commands indicates optional item(s)
|	In commands indicates either/or items

Flagged Text

	**Note** - includes additional information or programming tips.
	**Caution** - describes a condition that may result in damage to equipment.
	**Warning** - describes a condition that may result in serious bodily injury or death.
	**Model** - highlights a specification, procedure, condition, or statement that depends on the product model
	**Advanced** - indicates a topic for advanced users.

Related Documents

Documents listed below provide additional information related to this document.
The most updated version of the documents can be downloaded by authorized users from ACS Downloads.

Document	Description
SPiiPlus Setup Guide	Provides guidance on how to configure and adjust the SPiiPlusNT systems to work with supported types of motors and feedback devices.
SPiiPlus MMI Application Studio User Guide	Explains how to use the SPiiPlus MMI Application Studio and associated monitoring tools.
NT PEG and MARK Operations Application Note	Provides detailed description, specification and operation instructions for PEG capabilities.
EtherCAT Network Diagnostics	An application note describing how to perform diagnostics of the EtherCAT network.
Dual Axis PEG	An application note describing dual axis PEG usage.
Using Absolute Encoders with ACS Products	An application note that addresses the physical connections, configurations and operation of absolute encoders with ACS networking products.
Safe Torque Off Function	An application note providing the technical details for implementing the STO function for drives installed in ACS Motion Control systems.

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1. Introduction

1.1 Document Scope

This document describes the installation information for the IDMsm.

This document is intended for the use of engineers and technicians experienced in commissioning motion control systems.

The **IDMsm** is a member of the Intelligent Drive Module (IDM) series of EtherCAT® DS402 drives designed to meet the needs of OEMs employing EtherCAT-based control systems with high-precision motion stages. Controllable by any EtherCAT master, its unique multi-processor architecture leverages powerful control algorithms to maximize motion system performance, while its universal servo drive technology enables the system designer to easily control most types of motors and stages.

2. Detailed Description

2.1 Package Contents

The IDMsm package contains the following items:

- IDMsm
- Control supply mating connector (for J9): Phoenix MC 1,5/ 3-STF-3,81 BK(1753180)

- Drive supply mating connector, P/N: Molex 171692-0104

- Drive supply mating connector pins, P/N: Molex 1720630311
- STO Connector Kit P/N: STO-ACC2 (supplied only for units ordered with STO, see STO Breakout Cable)

2.2 Connectors

Connectors are on the front panel.

Figure 2-1. Front Panel - Connectors

For details about the connectors, see Table 4-1

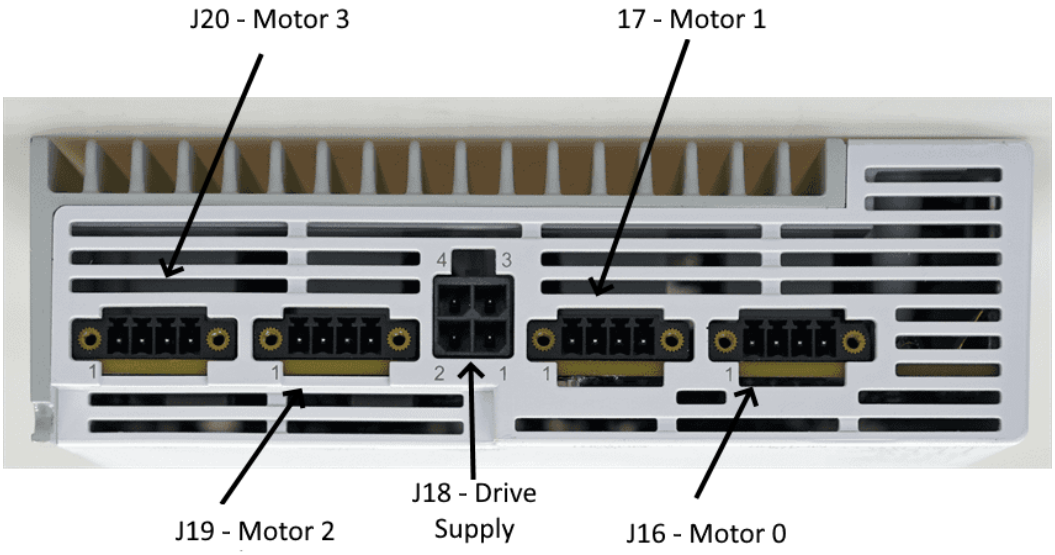


Figure 2-2. Bottom View

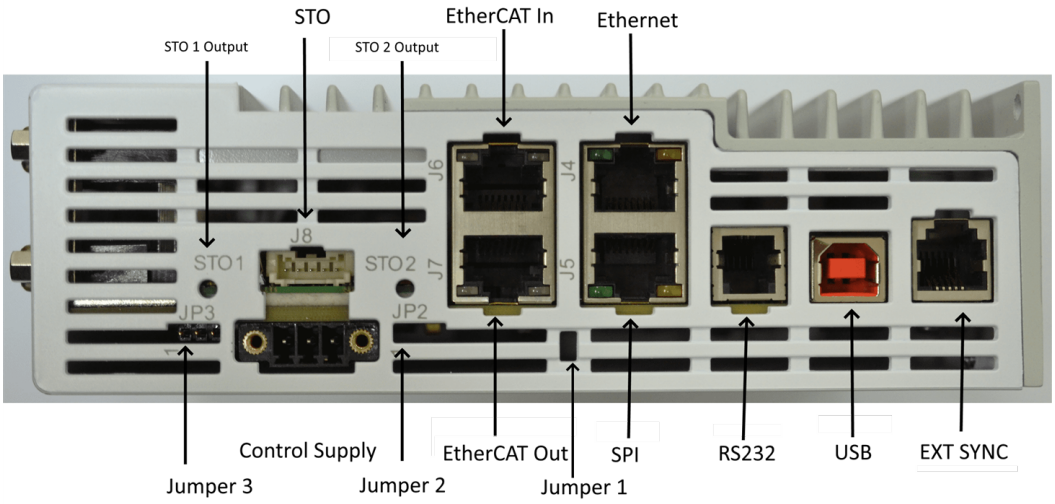


Figure 2-3. Top View

2.3 Jumpers

Table 2-1. Jumpers

Jumper Name	Position 1-2	Position 2-3
JP1 Recovery	FW Recovery Mode	N/A
JP2 -SINK/SOURCE selection for safety inputs	Source input type	Sink input type
JP3 - SINK/SOURCE selection for mechanical brake / digital outputs	Sink output type	Source output Type

The IDMsm may be reset to factory defaults as follows:

1. Power down the device.
2. Short pins 1-2 of the JP1 Recovery jumper.
3. Connect the TX and RX pins of the RS232 COM port with a loopback plug.
4. Power up the device and wait 3 minutes.
5. Power down the device, remove the jumper connector and loopback plug.
6. Power up the device and configure as needed.

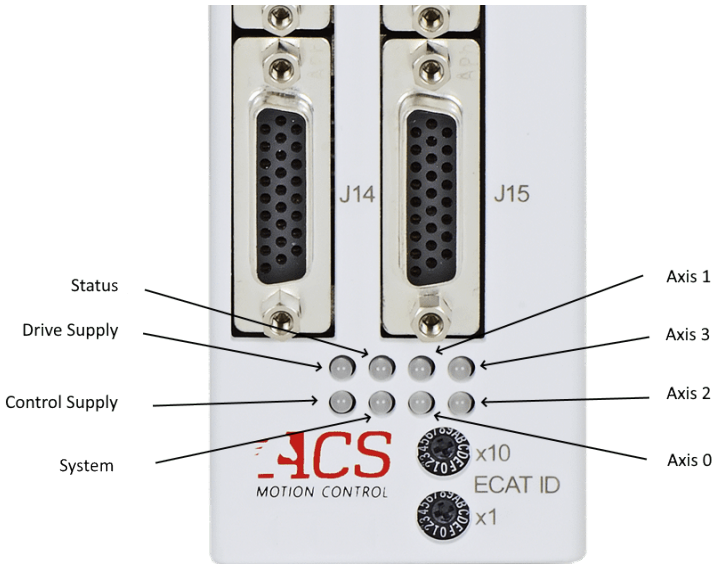
2.4 LED Indicators

Table 2-2. LED Indicators

Designator	Description	Note
Control supply	Green > Off- Logic supply not connected > On- power supply OK	
ECs_IN ECs_OUT Link/Activity	Green (one per connector) > Off- No link (no connection) > Blinking -Link and activity > On -Link without activity	Located on the RJ45 connectors. Right LED. Note: the left LED is not used

Designator	Description	Note
Ethernet Link/Activity	Yellow > Off- No link (no connection) > Blinking -Link and activity > On -Link without activity	Located on the Ethernet RJ45 connector. Right LED.
Ethernet Speed	Green > 100Mbit	Located on the Ethernet RJ45 connector. Left LED.
STATUS External network status	Bicolor > Green LED – according to "RUN Indicator" > Red LED – according to "ERROR Indicator"	According to ETG.1300 S ® V1.1.1
System	Bicolor > Red – System Fault > Green – System Ok > Blinking Green– Software command	Located on the front
Axis status	Bicolor, one per axis > Off- axis disabled > Green- axis enabled > Red- fault	
Drive supply	Green > On - drive supply connected.	

The following image indicates the function of the LEDs on the front panel:



2.5 Product & Software/Firmware Compatibility

The following table indicates the earliest and latest software and firmware versions compatible with the IDMsm device.

Product Name	Product Revision	Software	First Release Version	Last Release Version
IDMsm	A	SPiiPlus ADK Suite	3.02	Current

2.6 Optional Accessories

2.6.1 Ethernet Cables

ACS offers the following Ethernet CAT5 cables:

Table 2-3. Ethernet Cables

Length [m]	Part Number
0.3	SP+ECAT-CA-30CM-00
0.5	SP+ECAT-CA-50CM-00
1	SP+ECAT-CA-1M-00
2	SP+ECAT-CA-2M-00
3	SP+ECAT-CA-3M-00

Length [m]	Part Number
5	SP+ECAT-CA-5M-00
10	SP+ECAT-CA-10M-00
15	SP+ECAT-CA-15M-00
20	SP+ECAT-CA-20M-00

2.6.2 Mating Connector Kits

P/N: XDMsm-ACC1 Mating Connector Kit

Connector	Part Description	Manufacturer	Manufacturer P/N	Quantity
J10-LIMITS and Analog (25-pin)	CON D-TYPE 25P MALE	Amphenol	G175-2510-110-EU	1
	HOOD D-Type 25P STR Metal NPB	AMTEK	HOOD117-25V-L A1/HOOD117-25VY-L	1
		NELTRON	5507M-25-7-LF	1
J11-I/O (44-pin)	D-type CUP 44P Hi-DNSTY MLNPB	NELTRON Industrial Co. Ltd.	5508-44P-02-F1	1
		McMurdo	HDA44POL	1
		WCON	6210-44MNS0B01	1
	HOOD D-Type 25P STR Metal NPB	AMTEC	HOOD117-25V-L-A1/HOOD117-25VY-L	1
		NELTRON	5507M-25-7-LF	1

Connector	Part Description	Manufacturer	Manufacturer P/N	Quantity
J12-Encoder0 J13-Encoder1 J14-Encoder2 J15-Encoder3	D-type CUP 26P Hi-DNSTY MLNPB	Amphenol	G17TH-2610122EU	4
		AMTEK	HDBS-M26SBNA-L	4
		McMurdo	HDA26POL	4
		NELTRON	5508-26P-01-F1	4
	HOOD plast+nickl 15P std EMI npb	Amphenol	G17Z15014-LF	4
J16 for MOTOR0 J17 for MOTOR1 J19 for MOTOR2 J20 for MOTOR3	4 Position Terminal Block Plug	PHOENIX	1743074	4

2.6.3 STO Breakout Cable

P/N: STO-ACC1

Description: 2 meter cable with the STO mating connector on one end and flying leads on the other.

Figure 2-4. STO-ACC1 Breakout Cable

Table 2-4. STO Cable Pinout

Pin	Name	Description
1	STO1-	STO input 1 inverted input
2	STO1+	STO input 1 non inverted input
3	NC	not connected
4	STO2+	STO input 2 non inverted input
5	STO2-	STO input 2 inverted input

2.6.4 SPI Breakout Cable

P/N: SPI-ACC1

Description: 10 meter cable with SPI mating connector on one end, connecting to J5. The other end has flying leads for connection to user equipment.

Figure 2-5. SPI Breakout Cable

Table 2-5. SPI Cable Pinout

Pin	Wire Color	Signal
1	Green/White	SPI_MOSI+
2	Green	SPI_MOSI-
3	Red/White	SPI_MISO+
4	Blue	SPI_CLK+
5	Blue/White	SPI_CLK-
6	Red	SPI_MISO-
7	Black/White	SPI_SS+
8	Black	SPI_SS-

2.6.5 RS232 Adapter Cable

P/N: RS232-ACC1

Description: The RS232-ACC1 is a cable with an RJ11 4P4C connector on one end, which connects to the IDMsm. A male D-Sub connector on the other end allows the user to connect to external devices according to the pinout in Table 2-6.

Figure 2-6. RS232 Adapter

Table 2-6. RS232 Adapter Pinout

Pin	Name	Description
1	SHIELD	Cable shield connection
2	RX232	RS-232 receive signal
3	TX232	RS-232 transmit signal
4	NC	Not connected.
5	DGND	Digital ground.
6	NC	Not connected.
7	NC	Not connected.
8	NC	Not connected.
9	NC	Not connected.

2.7 Ordering Part Number

The ordering part number (P/N) contains several characters (see example in Figure 2-7) that each specify a configuration characteristic ordered for the IDMsm module, as described in Table 2-7.

Figure 2-7. Label with Ordered P/N - Example

Table 2-7. Configuration as Indicated by P/N

Ordering Options	Field	Example User Selection	Values
Number of axes	1	4	2, 4
Current Rating (Amps Peak of Sine)	2	C	A = Reserved B = 2.5/5A C = 5/10A
Number of 500 kHz SinCos Encoder Channels[1]	3	2	0, 1, 2, 3, 4
10 MHz SinCos encoder channels[1]	4	0	0, 1, 2, 3, 4
Number of absolute encoder channels[1]	5	1	0, 1, 2, 3, 4
Functional Safety	6	T	N=None, T=STO & SS1
Non-Linear Control	7	N	N(None), C(Non-Linear Control)
Autofocus	8	N	N = No A = Autofocus
Reserved	9	N	N=N/A
Reserved	10	N	N=N/A

[1] The total number of encoder channels ordered may not exceed 4 per field. Multi-Channel feedback requires both a digital(incremental or absolute) and an analog feedback device.

Example: IDMsm-4C201-TNNNN Description: 4 axis 5/10A, 2x SinCos 500kHz encoder, 1x Absolute encoder , STO & SS1

Field		1	2	3	4	5	6	7	8	9	10
PN	**IDMsm**	4	C	2	0	1	T	N	N	N	N

3. Mounting and Cooling

- Unit must be mounted vertically, using M4 type Philips screws. The dimensions (in millimeters) are shown below.
- Leave sufficient clearance of 50 millimeters on all open sides for cable routing and free airflow.
- Unit operates in the ambient temperature range of 0 to 50°C.
  - Up to 40°C without forced cooling
  - Up to 50°C with forced cooling 24 CFM in direction from the power connections to the communication connectors

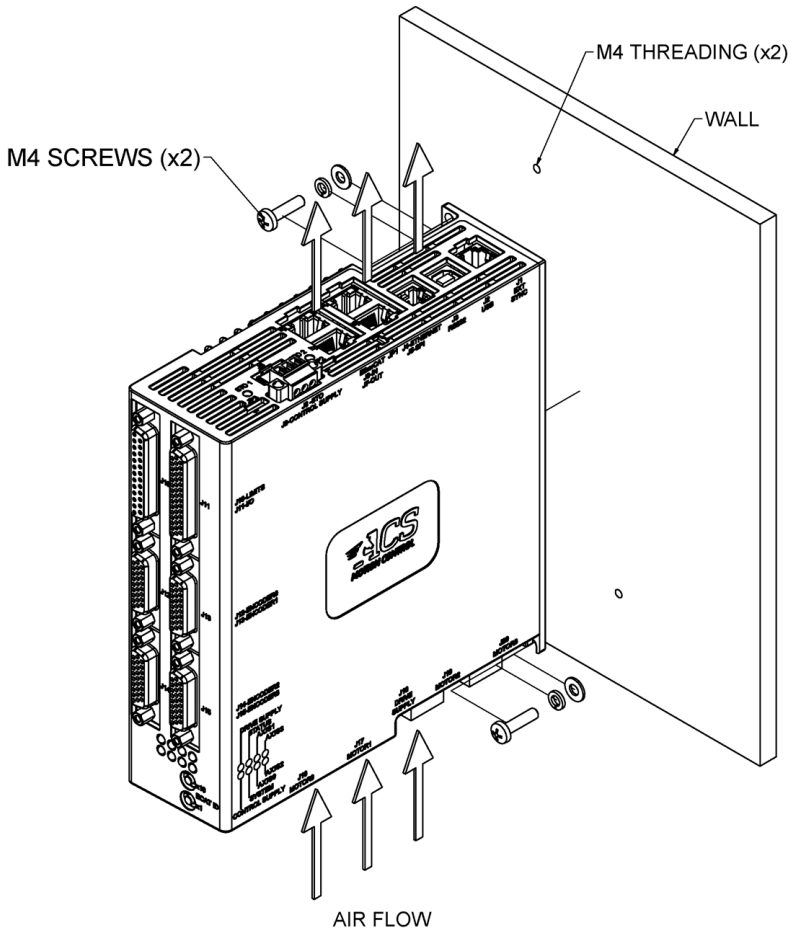


Figure 3-1. Airflow and Mounting

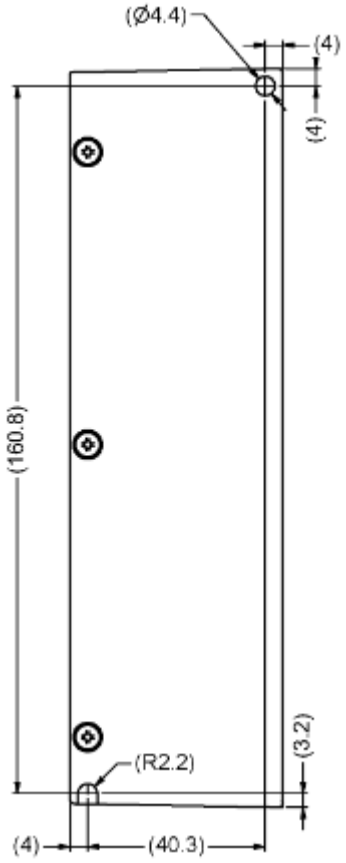


Figure 3-2. Dimensions - Rear (mounting side) View

4. Connections

This section describes how to interface with the IDMsm using proper safety, EMC and wiring guidelines.

The USB connector is not intended for customer use.
The EXT SYNC connector is not in use.

Table 4-1. Connections

Connector Assignment	Connector Name	Connector Type	Mating Connector
J1	EXT SYNC	RJ11 socket 6 positions 4 contacts, shielded	RJ11 plug 6 positions 4 contacts
J2	USB	HIGH RETENTION USB TYPE B, shielded	USB plug type B
J3	RS232	RJ11 socket 4 positions 4 contacts, shielded	RJ11 plug 4 positions 4 contacts An adapter from RJ11 to standard DB9 is available, see RS232 Adapter Cable.
J4	Ethernet	RJ45 socket 8 positions 8 contacts, shielded, CAT 5e	RJ45 plug 8 positions 8 contacts, see Ethernet
J5	SPI	RJ45 socket 8 positions 8 contacts, shielded, CAT 5e	RJ45 plug 8 positions 8 contacts, see SPI
J6	EtherCAT IN	RJ45 socket 8 positions 8 contacts, shielded, CAT 5e	RJ45 plug 8 positions 8 contacts, see EtherCAT (J6, J7)
J7	EtherCAT OUT	RJ45 socket 8 positions 8 contacts, shielded, CAT 5e	RJ45 plug 8 positions 8 contacts, see EtherCAT (J6, J7)

Connector Assignment	Connector Name	Connector Type	Mating Connector
J8	STO	JST 5 PIN 2mm male	JST 5 PIN 2mm female PAP-05V-S Pin type: SPHD-001T-P0.5 See STO and SS1-t (J8) (Certification Pending)
J9	Control Supply		MC 1,5/ 4-STF-3,81 BK, by Phoenix, P/N 1763180 See Control Supply (J9)
J10	LIMITS	D-type 25 pin female	D-type 25 pin male, see Limits
J11	I/O	D-type 44 pin high density female	D-type 44 pin high density male, see General I/O
J12	Encoder0	D-type 26 pin high density female	D-type 26 pin high density male, see Encoder Connectors
J13	Encoder1	D-type 26 pin high density female	D-type 26 pin high density male Encoder Connectors
J14	Encoder2	D-type 26 pin high density female	D-type 26 pin high density male, see Encoder Connectors
J15	Encoder3	D-type 26 pin high density female	D-type 26 pin high density male, see Encoder Connectors
J16	MOTOR0		See Motor Connectors
J17	MOTOR1		See Motor Connectors
J18	DRIVE SUPPLY		Molex 171692-0104 Pin: Molex 1720630311 See Drive Supply
J19	MOTOR2		See Motor Connectors
J20	MOTOR3		See Motor Connectors

4.1 Power Supplies

The unit is fed by two power supplies:

- Drive Supply: 12 to 48Vdc (J18)
- Control Supply: 24Vdc (J9)

The power supplies must be provided by the customer and be UL certified or equivalent. Each power supply input has a LED indicator on the unit.
The supplies can be switched on and off in any order. During emergency situations, the drive supply can be disconnected while the control supply should remain connected.

4.1.1 Drive Supply

The drive supply must be connected to the unit via fuse. The fuse rating should be calculated according to the total input current of the unit and should not exceed the ratings in the table.

The drive supply must be able to provide the peak current or inductance load required by the motor. An external capacitor of 4400µF can answer this need.

Table 4-2. Fuse Ratings

Driver	Ampere Rating	Voltage Rating	Interrupted Rating DC	Class	Example
1.25/2.5A	5A	250V	2Ka	K5	0NLN005.T from Littelfuse
2.5/5A	10A				0NLN010.T from Littelfuse
5/10A	20A				0NLN020.T from Littelfuse

4.1.1.1 Drive Supply Guidelines

When selecting the drive power supply, use the following guidelines:

⚠WARNING The IDMsm does not include a regeneration circuit. You must ensure that the DC drive supply voltage does not exceed 52Vdc under any conditions. For more details contact your ACS representative.

- The power supply must be isolated.
- The power supply must be CE and UL approved.
- The power supply must be short circuit protected.

- Make sure the power supply can absorb the regeneration energy from the motor when it decelerates. Otherwise an external regeneration circuit is needed.
- The power supply must be able to provide the peak current required by the motor (inductance load). Adding an external capacitor of 4400µF, installed as close as possible to the drives, can help the power supply to handle the peak current and reduce the bus current ripple.
- The power supply must be selected based on the power consumed by the drives.
- An example of a suitable 48V/1500W power supply is the XP Power P/N HPU1K5PS48 supply.

4.1.1.2 Drive Supply Description

Label: J18 DRIVE SUPPLY

Manufacturing P/N: 1716920104

Figure 4-1. J1 - Drive Supply Connector

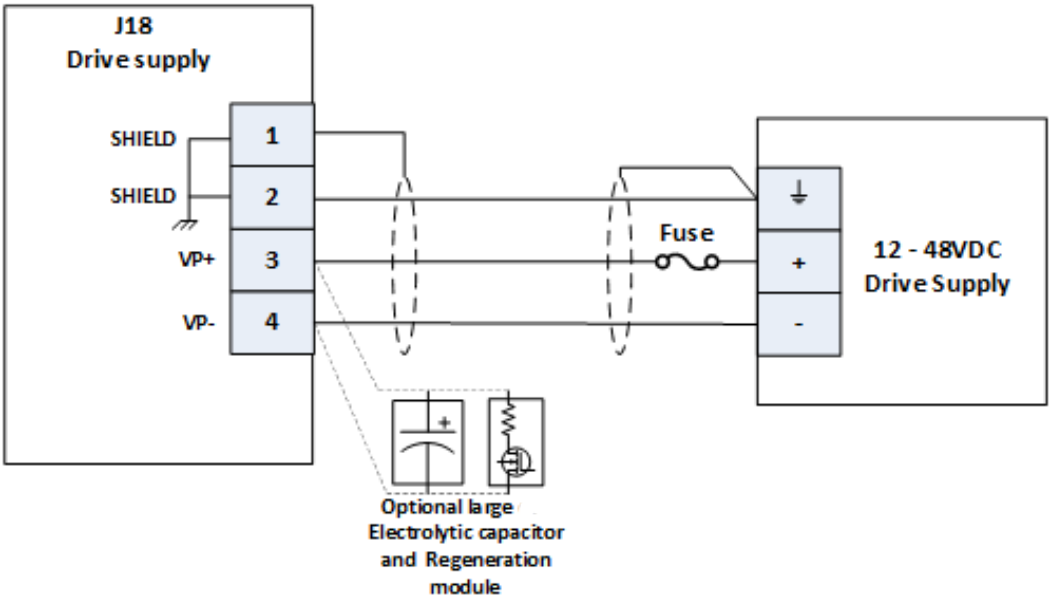
Table 4-3. J1 - Drive Supply Connector Pinout

Pin	Signal	Description
1	PE	Electrical Ground
2	PE	Electrical Ground
3	VP+	Drive supply positive edge
4	VP-	Drive supply return

For better noise immunity, make a short between VP- and PE.

4.1.1.3 Drive Supply Connection Instructions

1. Use a low inductance cable with a minimum gauge of 14-16 AWG.
2. Route the drive supply and motor cables as far as possible from all other noise sensitive cables (such as encoders and I/O).
3. Connect a fast active fuse between the unit and the external power supply.
4. If required, connect the External Regeneration Resistor.
5. Connect the unit PE (Protective Earth) to the power supply PE point.



User should measure the ripple right next to the drive supply connector and verify that the voltage ripple is not more than 1V during motion. If the ripple is higher, external capacitors should be added close to the drive to reduce the ripple.

4.1.2 Control Supply (J9)

An external 24Vdc isolated power supply (not included with the unit) feeds all logic and control low voltage circuitry.

This power supply should remain active (on) even during emergency stop situations, thus ensuring the continuing operation of the network, the controller, the feedback sensors and I/Os.

4.1.2.1 Control Supply Guidelines

When selecting the control power supply, use the following guidelines:

> The power supply must be isolated.
> The power supply must be CE and UL approved.
> The power supply must be short circuit protected.
> The minimum output power should be 40W.

> An example of a suitable 24V/50W power supply is the XP power, P/N VCS50US24.

4.1.2.2 Control Supply Description

Label: J9 24V CONTROL SUPPLY

Mating Connector: Phoenix MC 1,5/ 3-STF-3,81

J9 - Control Supply Connector

Table 4-4. J9 - Control Supply Pinout

Pin	Name	Description
1	24VDC	+24V dc control supply
2	24V_RTN	24V dc control supply return
3	SHIELD	Electrical Ground

4.1.2.3 Control Supply Connection Instructions

> Use a shielded cable with a minimum gauge of 18 AWG.

> Connect a 3A fuse between the IDMsm and the control supply.

> Connect the terminals, applying tightening torque of 2-4 lb-in (0.22-0.54 Nm) to the clamping screws.

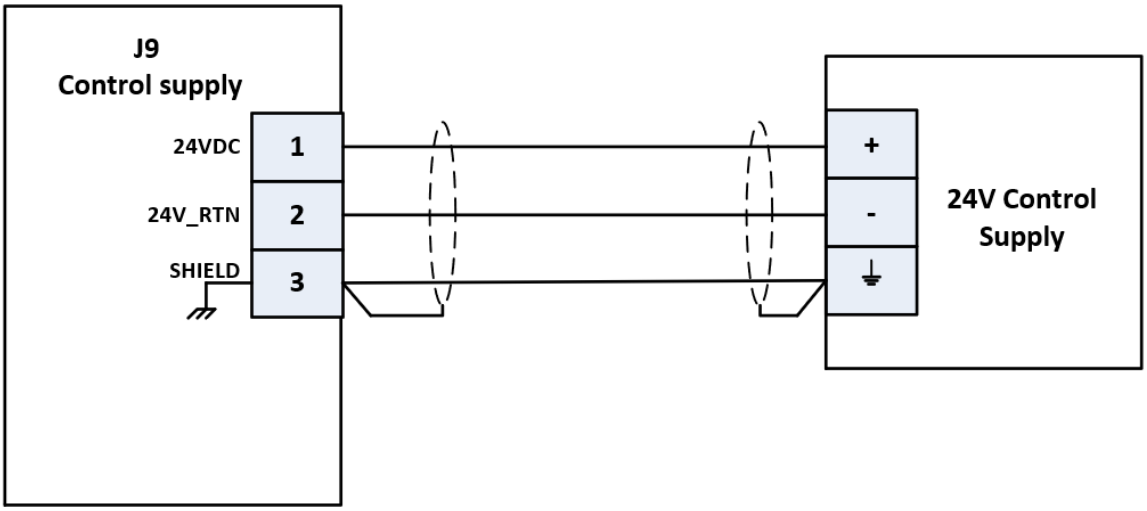


Figure 4-2. Control Supply Connections

4.2 Safety, EMC and Wiring Guidelines

Read this section carefully before beginning the installation process.

Make sure that the following guidelines and procedures are addressed and observed prior to powering up and while handling any of the EtherCAT network elements.

An STO module (Safe Torque Off) is an optional feature of the unit. Additional information can be found in STO and SS1-t (J8) (Certification Pending).

Installation and maintenance must be performed only by qualified personnel who have been trained and certified to install and maintain high power electrical and electro-mechanical equipment, servo systems, power conversion equipment and distributed networks.

Prior to powering up the system, ensure that all EtherCAT network devices are properly installed and grounded. Further ensure that all of the attached power and signal cables are in good operating condition. Maintenance should be performed only after the relevant network devices have been powered down, and all associated and surrounding moving parts have settled in their safe mode of operation. Certain drives require a longer time to fully discharge.

To avoid electric arcing and hazards to personnel and electrical contacts, avoid connecting and disconnecting the IDMsm while the power source is on.

When connecting the IDMsm to an approved isolated control and drive supply, connect it through a line that is separated from hazardous live voltages using reinforced or double insulation, in accordance with approved safety standards.

⚠WARNING The IDMsm is not intended for use in safety-critical applications (such as life support devices) where a failure of the IDMsm can reasonably be expected to cause severe personal injury or death.

Perform the following instructions to ensure safe and proper wiring:

> Whenever possible, use shielded cables with braided shield of at least 80%-95% coverage.

> Follow the guidance below, based on the current rating of your IDMsm.

> Proper wiring, grounding and shielding are essential for ensuring safe, dependable, and optimal servo performance. After completing the wiring, carefully inspect all wires to ensure tightness, good solder joints, and general safety.

> Use 75°C copper conductors only

Table 4-5. Wiring Guidelines

Item	Gauge	Twisted pair
Control power supply	18AWG	No
Drive power supply	14-16AWG	No
Motor	16-18AWG	No
Encoders	28AWG (up to 0.6A), 26AWG (up to 1A)	Yes

⚠ WARNING Connecting or disconnecting the motor without disabling the drive first can potentially damage the drive.

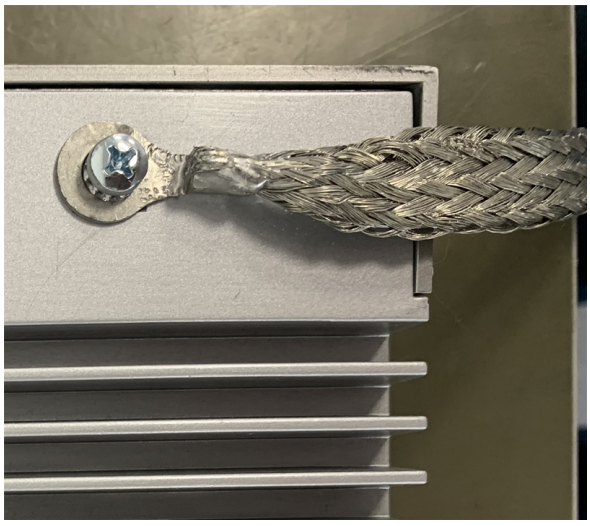


Figure 4-3. Device Grounding Screw

Ground the device using a M4x6 screw and a spring washer.

4.3 SPI

"SPI Description" on the next page

SPI Connection Pinout

SPI Software Interface

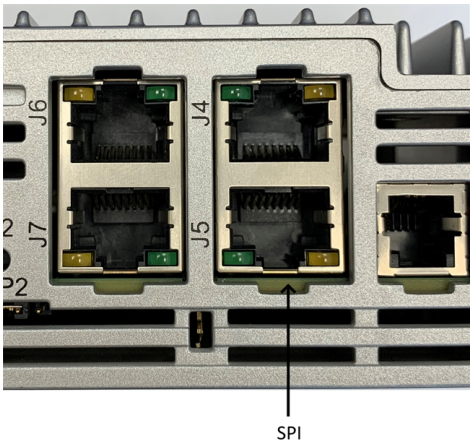
4.3.1 SPI Description

Label: J5 SPI

Connector: CAT 5e cable with flying leads

P/N: CB-20800-100/LF

Connector name	SPI
Connector assignment	J5
Manufacturer part number or type	RJ45 socket 8 positions 8 contacts, shielded, CAT 5e
Mating type	RJ45 plug 8 positions 8 contacts



4.3.2 SPI Connection Pinout

Table 4-6. SPI Connection Pinout

Pin	Name	Description
1	SPI_MOSI+	SPI data master output / slave input non inverted
2	SPI_MOSI-	SPI data master output / slave input inverted
3	SPI_MISO+	SPI data master input / slave output non inverted
4	SPI_CLK+	SPI clock non inverted (bi-directional interface for master and slave mode)
5	SPI_CLK-	SPI clock inverted (bi-directional interface for master and slave mode)

Pin	Name	Description
6	SPI_MISO-	SPI data master input / slave output inverted
7	SPI_SS+	SPI slave select non inverted (bi-directional interface for master and slave mode)
8	SPI_SS-	SPI slave select inverted (bi-directional interface for master and slave mode)
	SHIELD	Connector shell

The SPI is a high-speed synchronous serial interface, allows a serial bit stream of programmed length to be shifted into and out of the drive.

The SPI is normally used for communications between the ACS drive and external peripherals.

The SPI can be configured as master or slave, up to 8 words of 16 bits. For more information refer to the section on SPI support in the *ACSPL+ Programmer's Guide*.

4.3.3 SPI Software Interface

The ACSPL+ programming language supports SPI data communication through the use of the **SPICFG** and **SPIWRITE** commands. For further details see the descriptions of the commands in the *ACSPL+ Commands and Variables Guide* and the section on the SPI interface in the *ACSPL+ Programmer's Guide*.

4.4 STO and SS1-t (J8) (Certification Pending)

The Safe Torque Off module is intended for use in safety applications up to and including SIL-3 according to:

- EN/IEC 61800-5-2 Ed. 2 (second environment)
- EN/ IEC 61800-5-1
- IEC 61508
- IEC 62061

Performance Level PLe and Category 3 according to:

- EN ISO 13849-1/-2

STO is an ordering option.

The STO (Safe Torque Off) inputs should be connected to a 24V (18Vdc to 33Vdc) source to enable the drives to generate current and feed the motors. When the 24V is removed from one or both STO inputs, the PWM signals to the power stages are blocked within 460msec. In addition, the controller is informed about this event within a few milliseconds. This delay (between informing the controller and blocking of the PWM signals of the drive) provides the controller the ability to bring all axes to a complete stop or slow velocity movement in an orderly manner. The implementation of the STO

guarantees that under any foreseen circumstances, failure or damage, any of following types of motors will not move:

- AC synchronous (DC brushless)
- Step motor

4.4.1 STO Description

Label: J8 STO

Mating connector: 5 pin 2mm female by JST P/N PAP-05V-S; Pin: SPHD-001T-P0.5

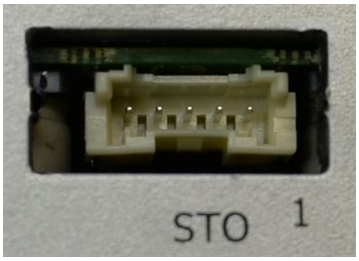


Figure 4-4. J8 - STO Connector

Table 4-7. J8 - STO Connectors Pinout

Pin	Signal	Description
1	STO1-	STO input 1 inverted input
2	STO1+	STO input 1 non inverted input
3	NC	Not connected
4	STO2+	STO input 2 non inverted input
5	STO2-	STO input 2 inverted input

4.4.2 SS1-t Description

The SS1-t function provides a delay time between the emergency stop request and the point at which the drive is switched to the torque off mode (STO). During this time the motor will be decelerated by the controller to zero speed. It is important to mention here, that SS1-t does not monitor the deceleration ramp of the drive. The intention of using the SS1-t instead of the pure STO function is to decrease the time which the drive requires to reach standstill.

The delay time is in the range of 110ms to 230ms, depending on the input supply voltage. For nominal 24V the STO input supply delay time is 110 – 230mSec. If the delay is outside this range the controller generates a fault and disables the drive. The deceleration of the motors due to STO/SS1 is not automatic and requires a special user application.

For more details refer to the *IDMsm Safety Manual*.

4.4.3 STO Connection Instructions

The STO1 and STO2 are typically connected to a 24 V source via an industry standard safety switch. This device disconnects the 24 V upon opening a door, a light current tripping, or other safety related event. Details for handling STO are provided in the *Safe Torque Off Function Application Note*.

The STO circuit draws up to 50 mA per STO input, with an inrush current of less than 70 mA.

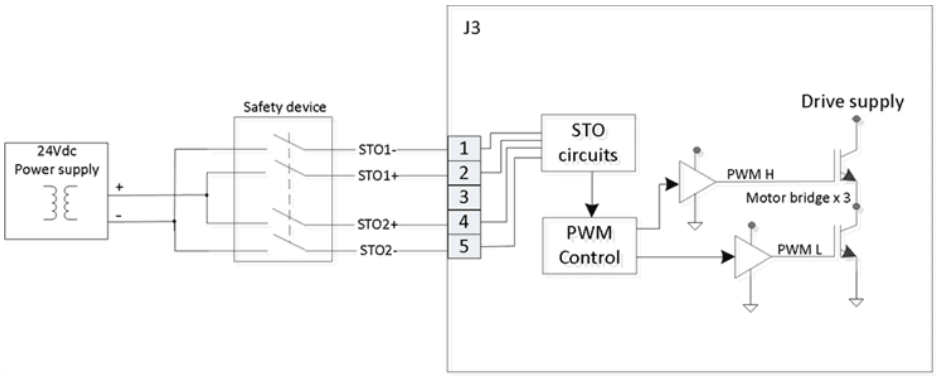


Figure 4-5. STO Connections

4.5 ID Chip Interface

4.5.1 ID Chip Interface Description

The ID Chip interface is a 1-Wire communication interface for automatically identifying parameters of stages supporting the feature

Connector: Pin 21 on encoder connector

Items	Description	Remarks
Designation	ID Chip	
Quantity	4	
Mode	Master	
Interface	1-wire serial protocol using a single data line plus ground reference for communication	

Contact ACS for more details

4.6 EtherCAT (J6, J7)

4.6.1 EtherCAT Description

Labels: J6 EtherCAT IN, J7 EtherCAT OUT

Connectors: standard RJ45

Mating connector: Ethernet plug, Standard Ethernet CAT5e cable

Figure 4-6. J6, J7- EtherCAT Connectors

Table 4-8. J6, J7- EtherCAT Connectors

Pin	Signal	Description
1	TD+	Positive transmit signal
2	TD-	Negative transmit signal
3	RD+	Positive receive signal
4	NC	Not connected
5	NC	Not connected
6	RD-	Negative receive signal
7	NC	Not connected
8	NC	Not connected

4.6.2 EtherCAT Connection Instructions

1. Use Ethernet cables CAT 5e or better. ACS offers standard cables in different lengths (see Ethernet Cables).
2. Connect EtherCAT cable between the EtherCAT master unit or preceding slave toJ6 (ETHERCAT IN).
3. When the unit is not the last network node, connect EtherCAT cable betweenJ7 and EtherCAT IN of the next EtherCAT slave.
4. When the unit is the last network node and a ring topology is used, connect J7 to the EtherCAT Master secondary port.
5. When the unit is the last network node and a line topology is used, leave J7 not connected.

4.6.2.1 EtherCAT Connections to Slave

The following diagram illustrates the wiring of the IN connection of the IDMsm to an EtherCAT Slave.

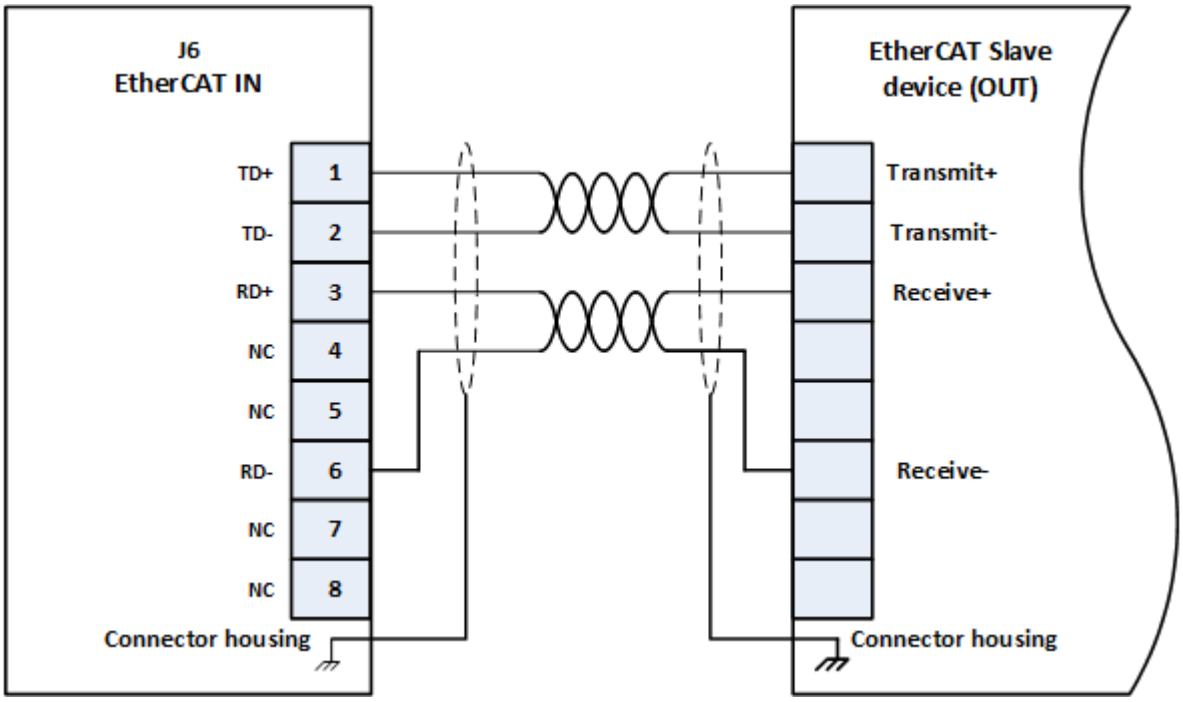


Figure 4-7. EtherCAT In (J6) Connection

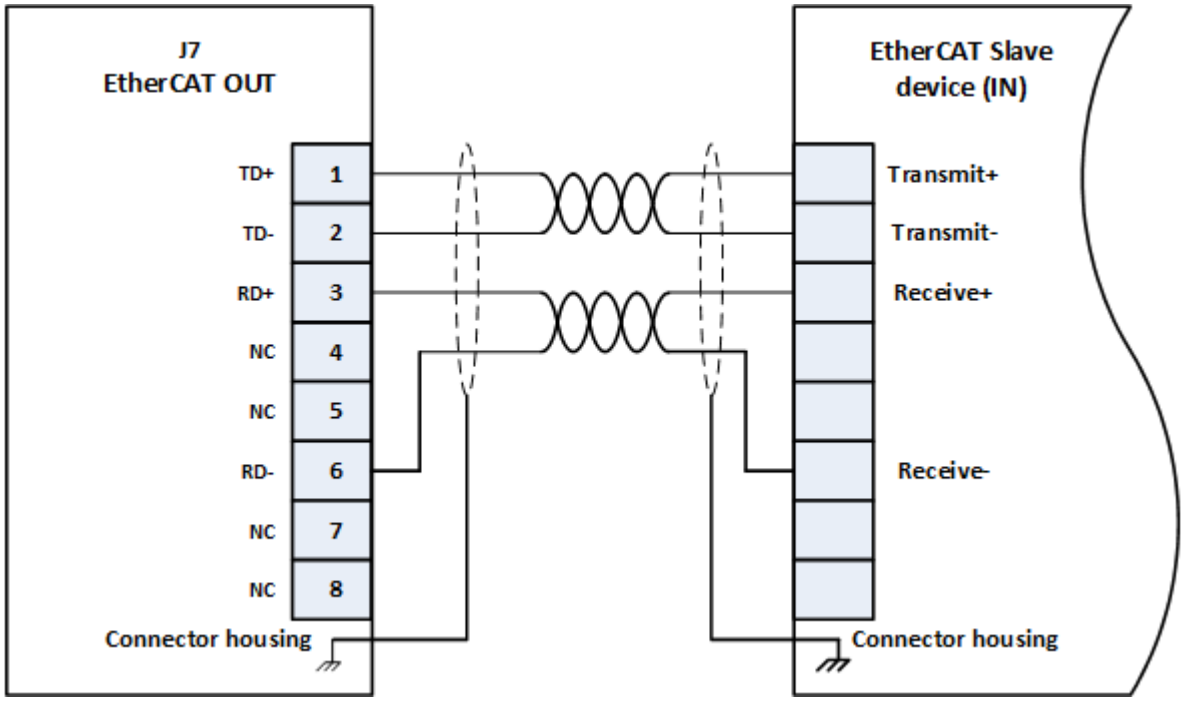


Figure 4-8. EtherCAT Out (J7) Connection

4.6.2.2 EtherCAT Connections as Slave

The following diagrams illustrate the connection of the IDMsm as a slave, for example when connecting to a TwinCAT Master device.

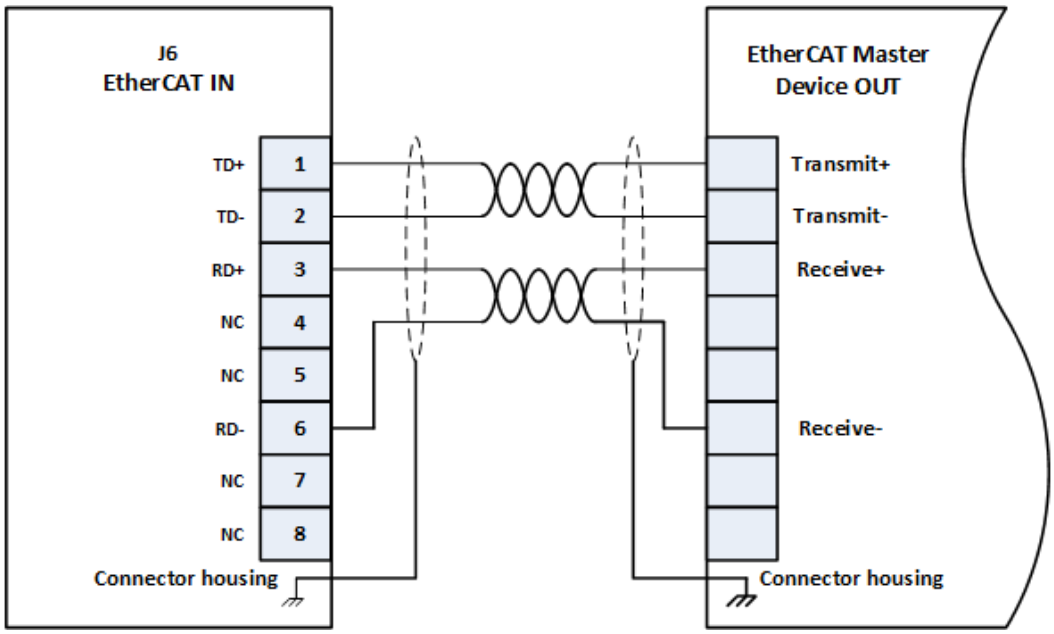


Figure 4-9. EtherCAT IN connection to external EtherCAT Master (TwinCAT) device

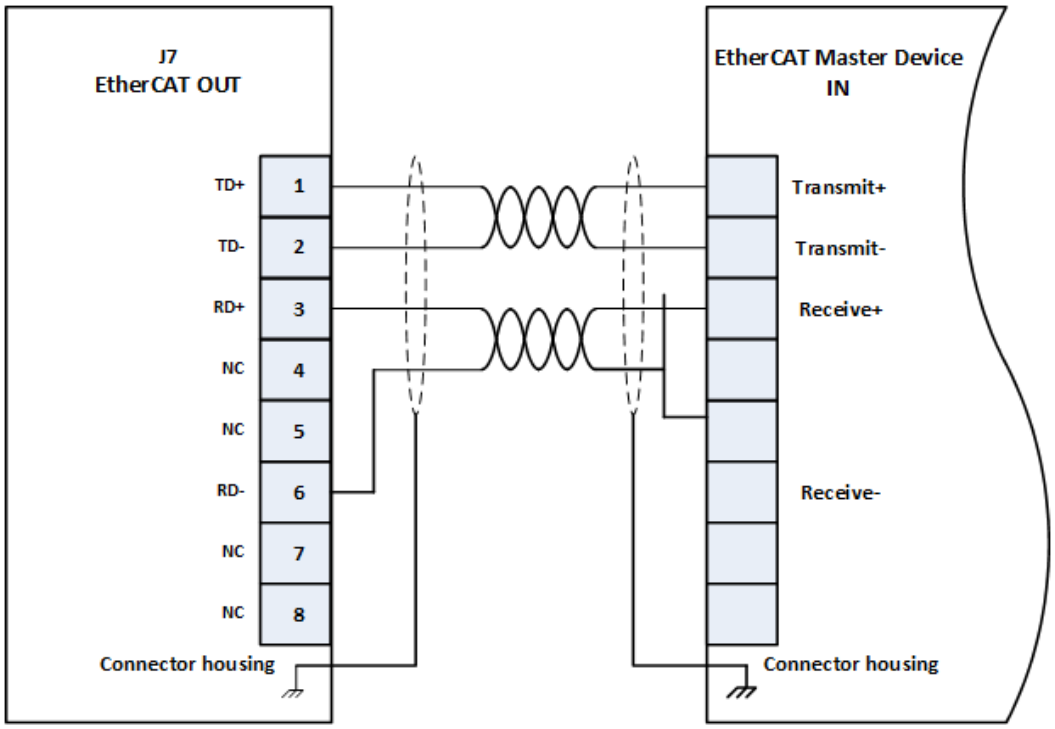
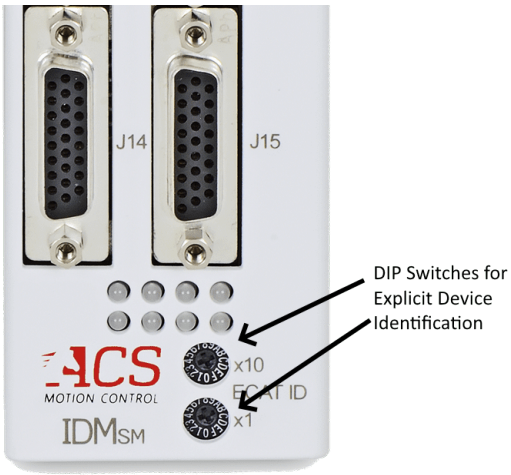


Table 4-9. EtherCAT OUT connection to external EtherCAT Master (TwinCAT) device

4.6.3 EtherCAT ID Rotary Switches

The IDMsm supports Explicit Device Identification as defined by ETG.1020, using the rotary switches on the front panel, as illustrated below.



The use of EtherCAT Device identification is to identify an EtherCAT slave explicitly. This is necessary for the following use cases:

> Hot Connect applications. Within some applications it might be useful to connect or disconnect parts of the network. In this case the master must be able to identify which part of the network is available.

> Prevention against cable swapping. If at least two identical devices are used in one application it might be necessary to prevent the mix-up of these devices by cable swapping.

Example Scenario: Within a machining center there might be two identical drives to work in X and Y direction. To avoid a situation in which the drives receive wrong process data, for example after a device replacement, an explicit identification of the devices can be used.

The Device Identification value can be used optionally for unique addressing.

4.7 Ethernet

4.7.1 Ethernet Description

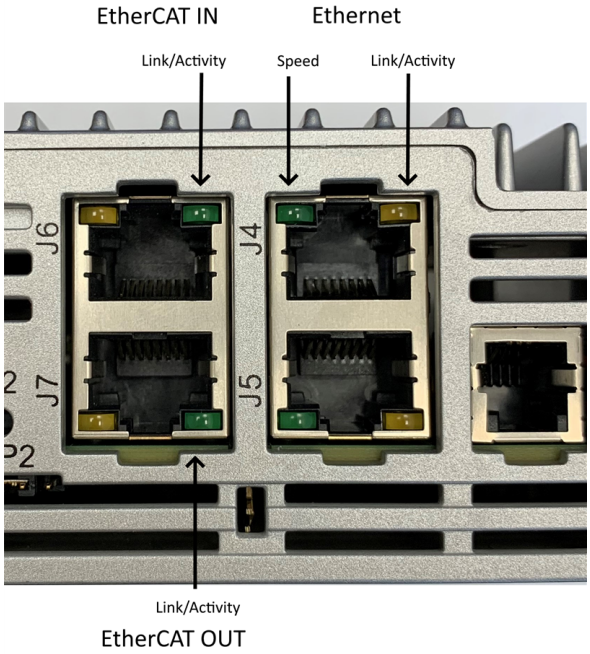
Label: J4 Ethernet

Connector: RJ45 socket 8 positions 8 contacts, shielded, CAT 5e

Mating Connector: RJ45 plug 8 positions 8 contacts

	Name	Description
1	TD+	Positive transmit signal
2	TD-	Negative transmit signal
3	RD+	Positive receive signal
4	NC	Not connected
5	NC	Not connected
6	RD-	Negative receive signal
7	NC	Not connected
8	NC	Not connected

The Ethernet connector is illustrated in the image below:



4.7.2 Ethernet Connection Instructions

The following diagram illustrates the connection from the IDMsm to an Ethernet host.

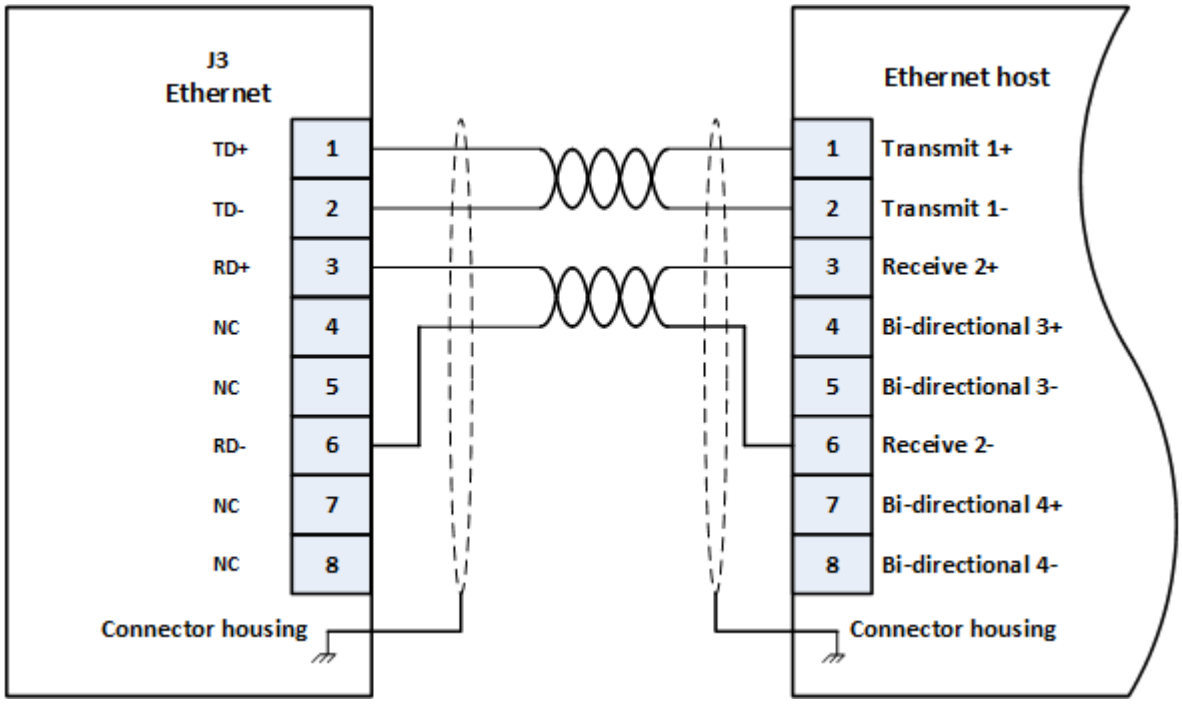


Figure 4-10. Ethernet connection to Ethernet host

4.8 I/O Interfaces

4.8.1 General I/O

4.8.1.1 I/O Description

Label: J11

Connector: D-type 44 pin high density female

Mating connector: D-type 44 pin high density male

Table 4-10. J11 - I/O Connector Pinout

Pin	Signal	Description
1	MARK0-	Axis 0 , Mark input 0 inverted
2	MARK1-	Axis 0, Mark input 1 inverted
3	MARK2-	Axis 1, Mark input 2 inverted
4	MARK3-	Axis 1, Mark input 3 inverted
5	DGND	Digital Ground
6	PEG0-	PEG 0 output inverted
7	PEG1-	PEG 1 output inverted
8	PEG2-	PEG 2 output inverted
9	PEG3-	PEG 3 output inverted
10	OUT_CNFG_3-	Configurable output 3 inverted RS422
11	AIN0-/ TRQ_ CMD_0-	Analog input 0 inverted
12	AIN1-/ TRQ_ CMD_1-	Analog input 1 inverted
13	TRQ_CMD_2-	NA, reserved for future usage
14	TRQ_CMD_3-	NA, reserved for future usage
15	AOUT1-	Analog output 1 inverted
16	MARK0+	Axis 0 mark input non inverted
17	MARK1+	Axis 1 mark input non inverted

Pin	Signal	Description
18	MARK2+	Axis 2 mark input non inverted
19	MARK3+	Axis 3 mark input non inverted
20	OUT3	Mechanical brake 3 or Digital output 3
21	PEG0+	PEG 0 output non inverted
22	PEG1+	PEG 1 output non inverted
23	PEG2+	PEG 2 output non inverted
24	PEG3+	PEG 3 output non inverted
25	OUT_CNFG_3+	Configurable output 3 non-inverted RS422
26	AIN0+/ TRQ_ CMD_0+	Analog input 0 non inverted/ external analog command for axis 0 non inverted
27	AIN1+/ TRQ_ CMD_1+	Analog input 1 non inverted/ external analog command for axis 1 non inverted
28	TRQ_CMD_2+	NA, reserved for future usage
29	TRQ_CMD_3+	NA, reserved for future usage
30	AOUT1+	Analog output 1 non inverted
31	V_SUP_IO	Supply for the IO
32	V_RTN_IO	Supply return for the IO
33	OUT0	Mechanical brake 0 or Digital output 0
34	OUT1	Mechanical brake 1 or Digital output 1
35	OUT2	Mechanical brake 2 or Digital output 0
36	OUT_CNFG_0+	Configurable output 0 non-inverted RS422
37	OUT_CNFG_0-	Configurable output 0 inverted RS422
38	OUT_CNFG_1+	Configurable output 1 non-inverted RS422
39	OUT_CNFG_1-	Configurable output 1 inverted RS422
40	OUT_CNFG_2+	Configurable output 2 non-inverted RS422

Pin	Signal	Description
41	OUT_CNFG_2-	Configurable output 2 inverted RS422
42	AOUT0+	Analog output 0 non inverted
43	AOUT0-	Analog output 0 inverted
44	AGND	Analog ground
	SHIELD	Connector shell and front screw

4.8.1.2 I/O Connection Instructions

The I/O connector, J11, can be configured to support Mark inputs, as indicated in the following diagram. See Registration MARK Inputs for details.

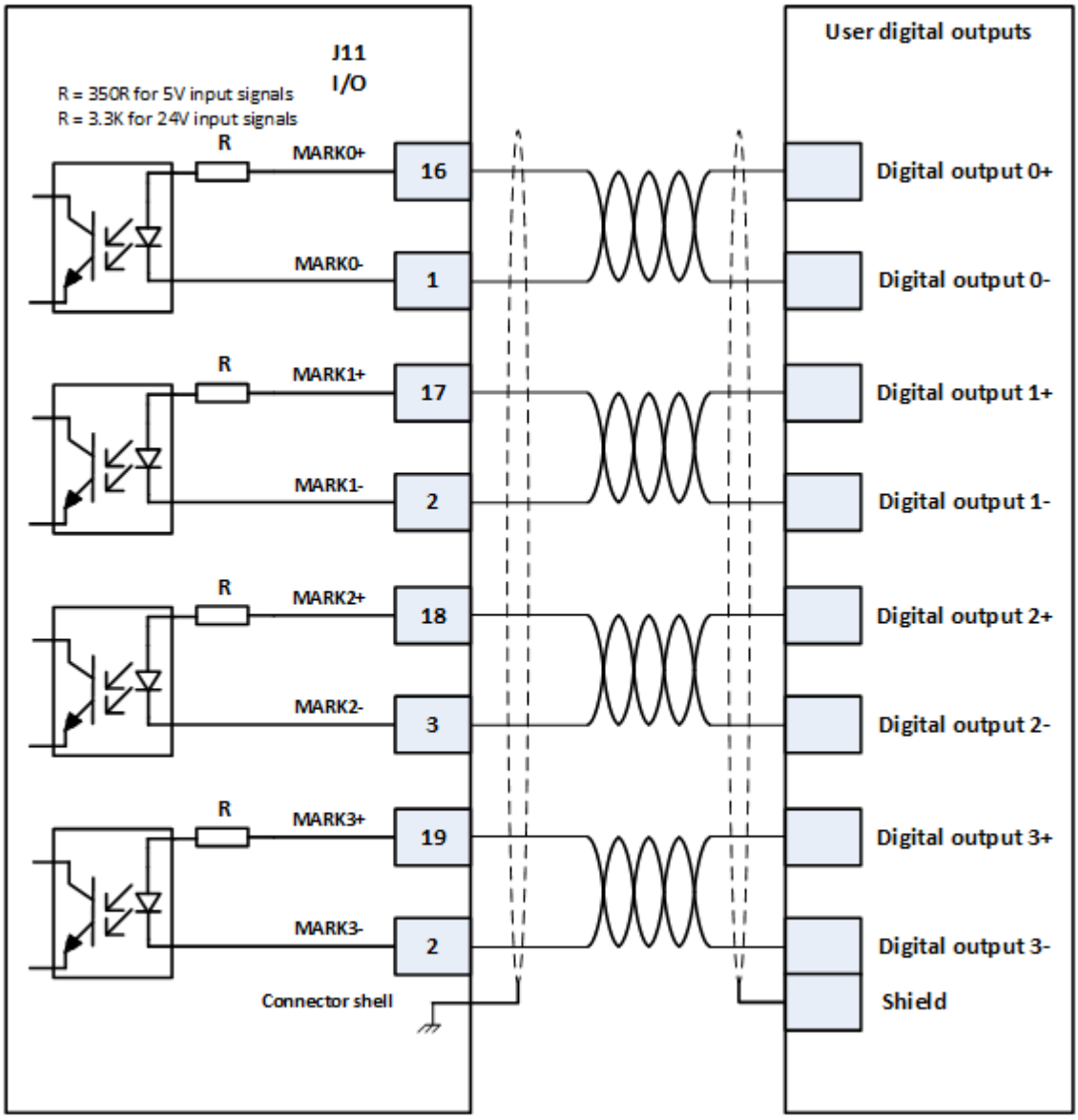


Figure 4-11. Mark Inputs Connection Diagram

J11 can also be used to support PEG outputs, as indicated in the following diagram. See PEG (Position Event Generator) for more details.

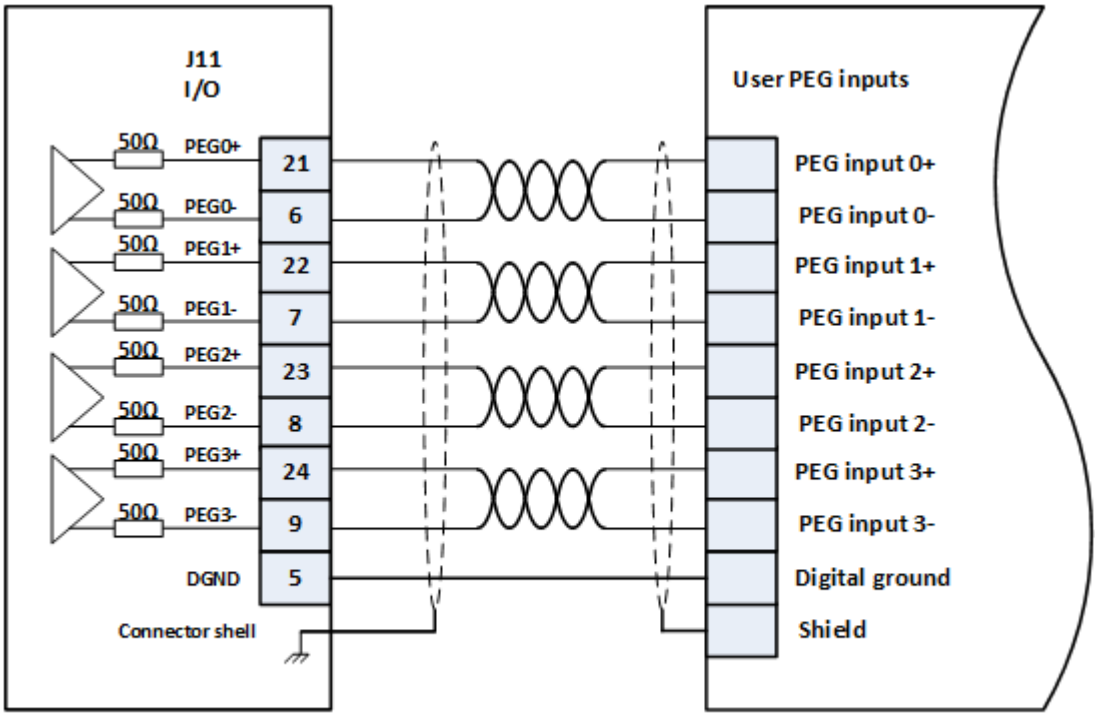


Figure 4-12. PEG Outputs Connection Diagram J11-I/O Connector

J11 can also be used to support various digital outputs to user devices, as shown in the following diagrams. See Digital Outputs for more details.

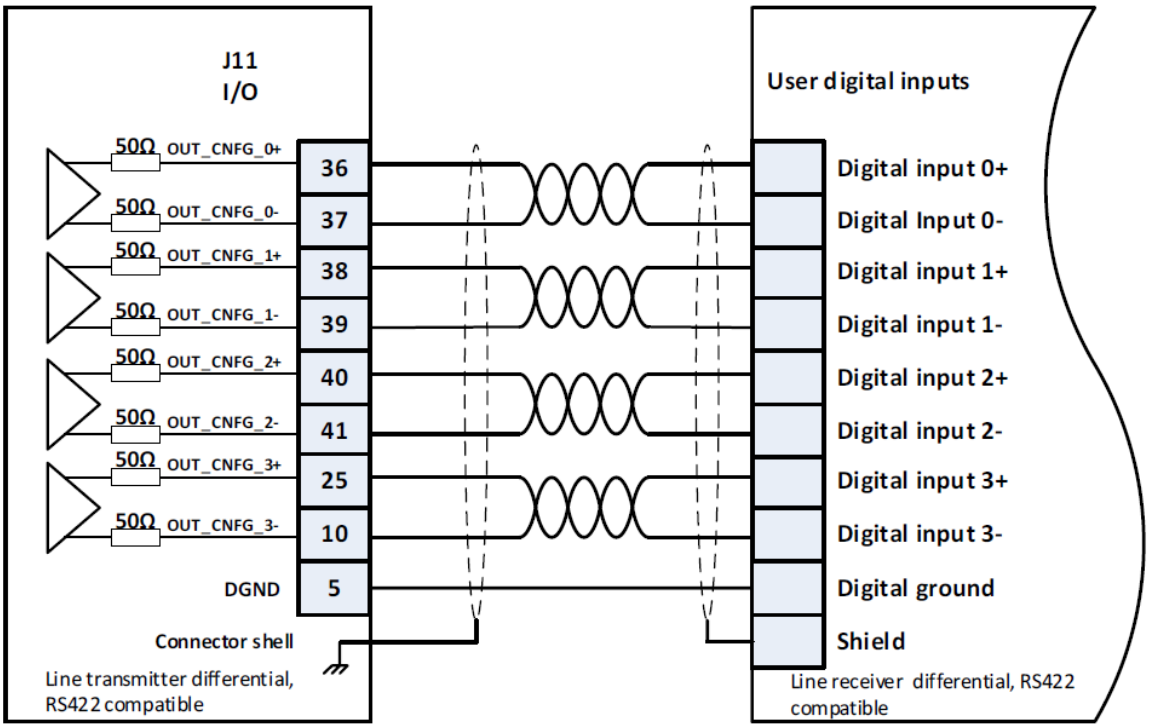


Figure 4-13. GP Digital Outputs Connection Diagram

J11 can also be used to support analog inputs from and outputs to user devices, as shown in the following diagrams. See Analog Inputs and Analog Outputs for more details.

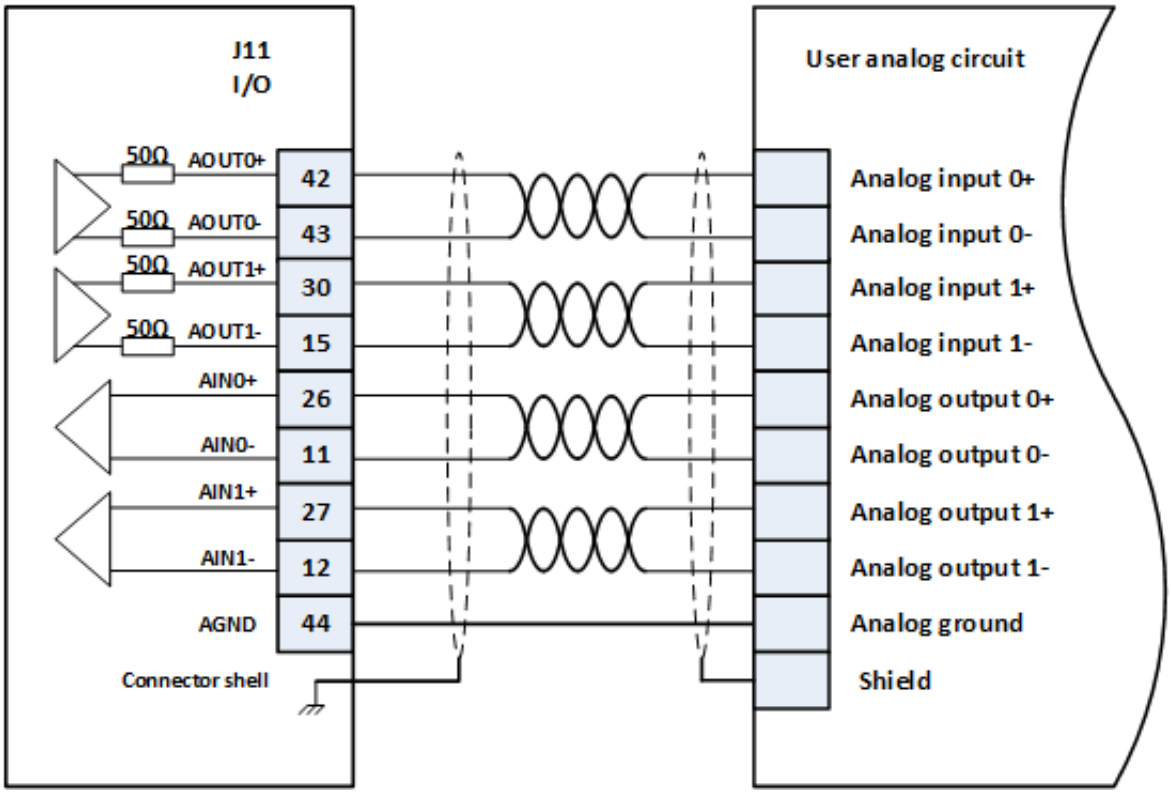


Figure 4-14. GP Analog Inputs and Outputs Connection Diagram

J11 can also implement wiring for mechanical brakes and GP digital outputs in a source configuration. See

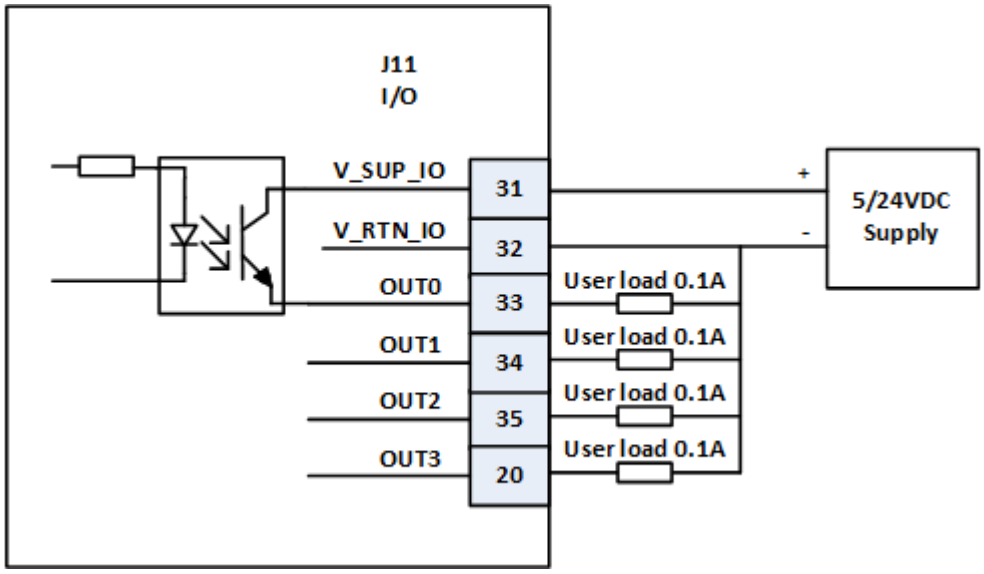


Figure 4-15. Mechanical Brake & GP Digital outputs source connection diagram

The connector can also be configured for the same purpose in a sink configuration.

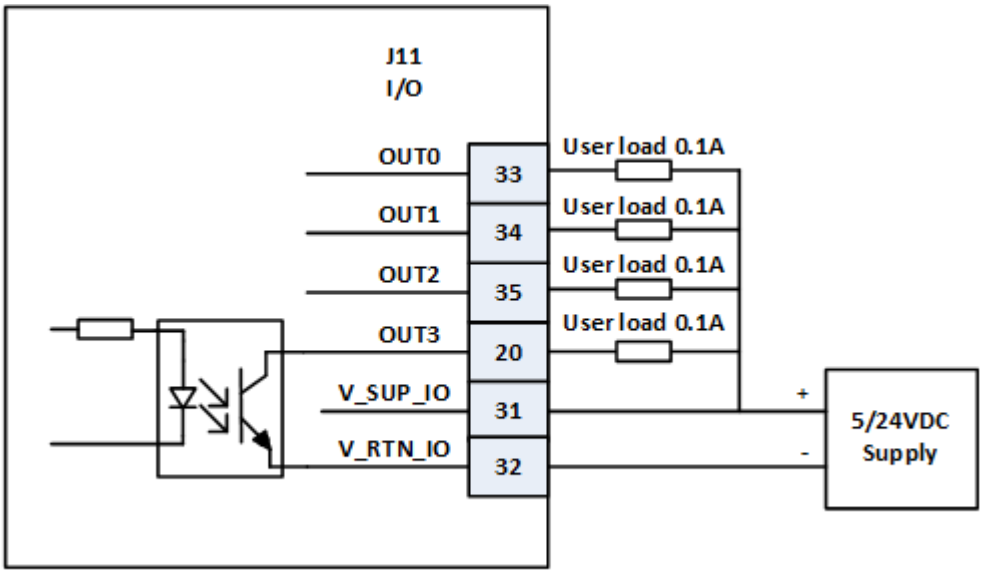


Figure 4-16. Mechanical Brake & GP Digital Outputs Sink Connection Diagram

When a power source of 24V or 5V is connected to V_SUP_IO and V_RTN_IO the output amplitude is automatically set appropriately.

Note the mapping of the mechanical brake outputs to the **OUT** command.

```
OUT(SP_Node).8 = 1 ! Activates the brake connected to OUT0
OUT(SP_Node).9 = 1 ! Activates the brake connected to OUT1
OUT(SP_Node).10 = 1 ! Activates the brake connected to OUT2
OUT(SP_Node).11 = 1 ! Activates the brake connected to OUT3
```

The following code demonstrates configuration of OUT0-3 as a general-purpose digital output or as mechanical brake:

```
AA = 0    ! AA - axis designation (00-99)
NN = 0   ! NN - digital output index (00-99)
OO = 8   ! OO - specific output (00-99)
value = 0   ! value: 0 for GPIO, 2 for brake

loop 4
     AANNOO = AA * 10000 + NN * 100 + OO
     setconf(29, AANNOO , value )
     if value = 0 ! GPIO - brake not active
          MFLAGS(AA).#BRAKE = 0
     end
     if value = 2 ! Mechanical brake active
```

```
            MFLAGS(AA).#BRAKE = 1
        end
        AA = AA + 1;
        OO = OO + 1;
end
```

4.8.2 Limits

4.8.2.1 Limits Description

Label: J10 LIMITS

Connector: D-type 25 pin female

Mating Connector: D-type 25 pin male

Table 4-11. Limits Connector Pinout

	Name	Description
1	V_SUP_SFTY	Safety supply
2	0_LL	Axis 0 left limit
3	1_LL	Axis 1 left limit
4	2_LL	Axis 2 left limit
5	3_LL	Axis 3 left limit
6	N/C	Not Connected
7	N/C	Not Connected
8	N/C	Not Connected
9	OUT_CNFG_4+	Configurable output 4 non-inverted RS422
10	OUT_CNFG_5+	Configurable output 5 non-inverted RS422
11	OUT_CNFG_6+	Configurable output 6 non-inverted RS422
12	OUT_CNFG_7+	Configurable output 7 non-inverted RS422
13	SA_MODE	N/A
14	V_RTN_SFTY	Safety supply return

	Name	Description
15	0_RL	Axis 0 right limit
16	1_RL	Axis 1 right limit
17	2_RL	Axis 2 right limit
18	3_RL	Axis 3 right limit
19	N/C	Not Connected
20	N/C	Not Connected
21	DGND	Digital ground
22	OUT_CNFG_4-	Configurable output 4 inverted RS422
23	OUT_CNFG_5-	Configurable output 5 inverted RS422
24	OUT_CNFG_6-	Configurable output 6 inverted RS422
25	OUT_CNFG_7-	Configurable output 7 inverted RS422
	SHIELD	Connector shell and front screw

4.8.2.2 Limits Connection Instructions

The following diagrams specify the configuration of the limits connector for various possible configurations.

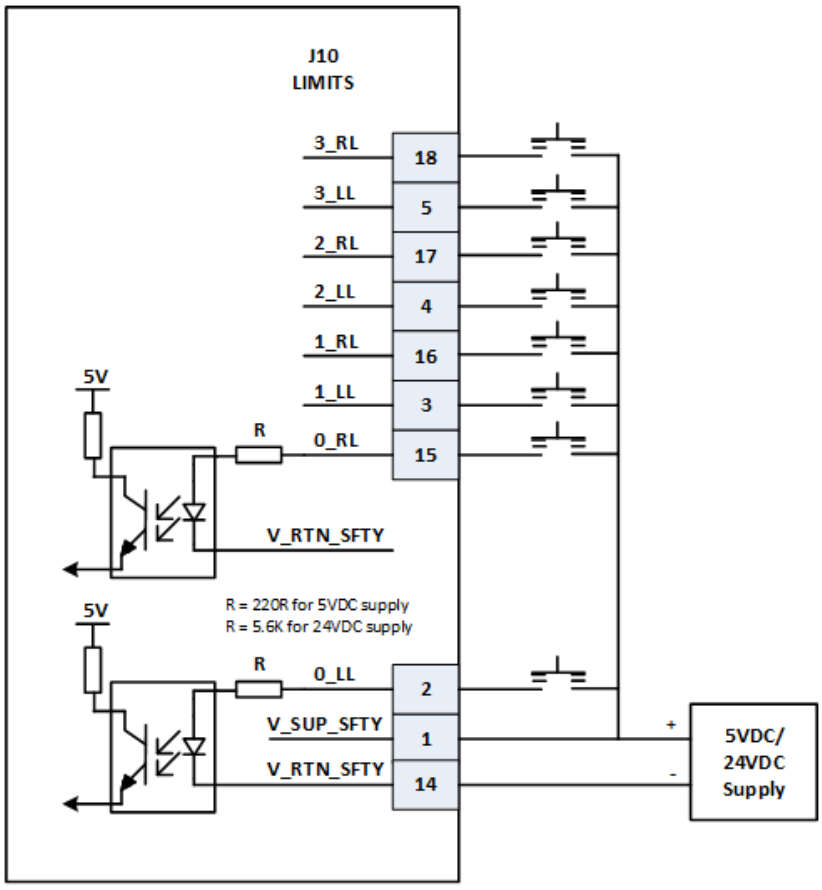


Figure 4-17. Left and Right Source Connection on Limits Connector

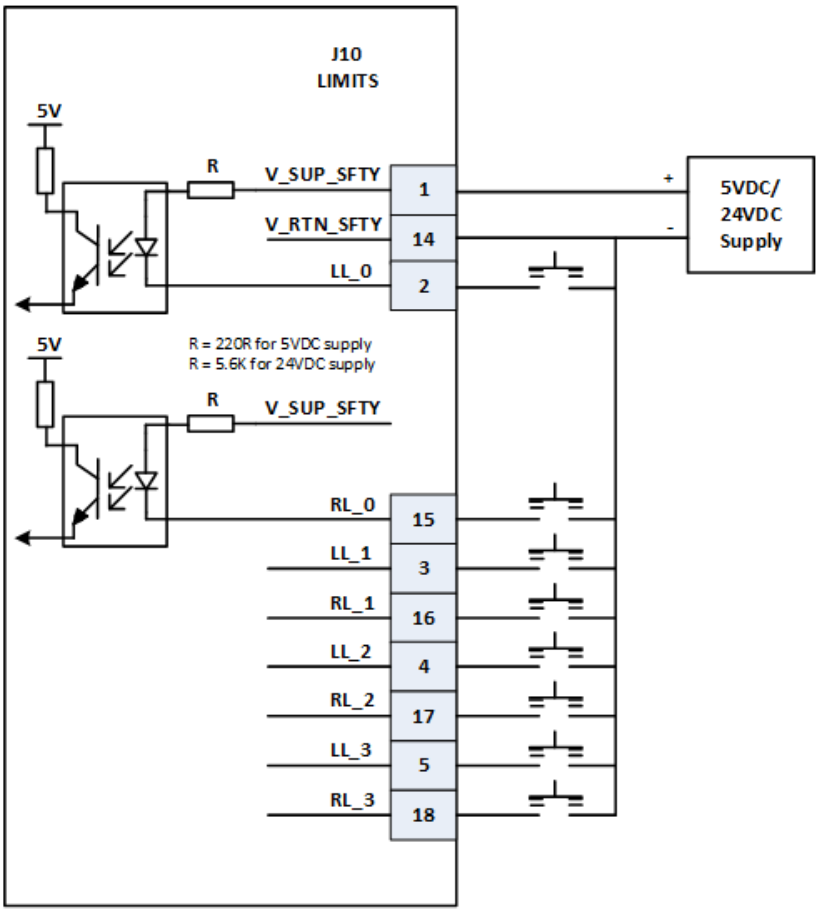


Figure 4-18. Left and Right Sink Connection on Limits Connector

When voltage is supplied to V_SUP_SFTY and V_RTN_SFTY the device automatically determines the voltage supplied to the limit inputs.

4.9 Encoder Connectors

4.9.1 Encoder Description

Connector Name	Encoder
Connector Assignment	Encoder 0 J12 Encoder 1 J13 Encoder 2 J14 Encoder 3 J15
Mating Connector	D-type 26 pin high density male

Table 4-12. Encoder Connector Pinout

	Name	Description
1	$_CHA-/ SQR_SIN$-	$ digital encoder, channel A inverted input, for differential encoder only. Absolute encoder Data-. Squared SIN inverted output.
2	$_CHB-/ SQR_COS$-	$ digital encoder, channel B inverted input for differential encoder only. Absolute encoder CLK-. Squared COS inverted output.
3	$_CHI-	$ digital encoder, channel I (index) inverted input for differential encoder only.
4	$_HB	$ Motor Hall B
5	V_SUP_ SFTY	Supply for limits input.
6	$_RL	Right limit
7	$_SIN-	$ Encoder SIN inverted input
8	$_COS-	$ Encoder COS inverted input
9	$_SC_I-	$ Encoder SIN-COS Index inverted input
10	$_CHA+/ SQR_SIN$+	$ digital encoder, channel A non-inverted input, used for differential encoders. Absolute encoder Data+. Squared SIN non inverted output.
11	$_CHB+/ SQR_COS$+	$ digital encoder, channel B non-inverted input, used for differential encoders Absolute encoder CLK+. Squared COS non inverted output.
12	$_CHI+	$ digital encoder, channel I (index) non inverted input, used for differential encoders
13	X_HA	$ Motor Hall A
14	X_HC	$ Motor Hall C
15	$_LL	Left limit

	Name	Description
16	$_SIN+	$ SIN non inverted input
17	$_COS+	$ Encoder COS non inverted input
18	$_SC_I+	$ Encoder SIN-COS Index non inverted input
19	5U	5V user supply for digital encoder and Hall
20	5U_RTN	5V return user supply for digital encoder, A return for $ Motor temperature sensor and Hall
21	ID_chip	Bidirectional interface used for ID Chip. If the ID chip is not used leave this pin unconnected. In any case this pin should not be connected to shield or ground.
22	MTMP_#	MTMP Motor temperature sensor
23	MTMP_#_ RTN	Return supply for MTMP
24	V_RTN_ SFTY	A return for limits input.
25	5F	5V user supply for analog encoder and Hall
26	5F_RTN	5V return user supply for analog encoder and Hall
	SHIELD	Connector shell and front screw

Pin number 21 in the encoder connector is used for ID Chip. Leave this pin unconnected if the ID chip is not used. This pin should not be connected to shield or ground.

4.9.2 Encoder Connection Instructions

The following tables specify the encoder connections for the various possible configurations.

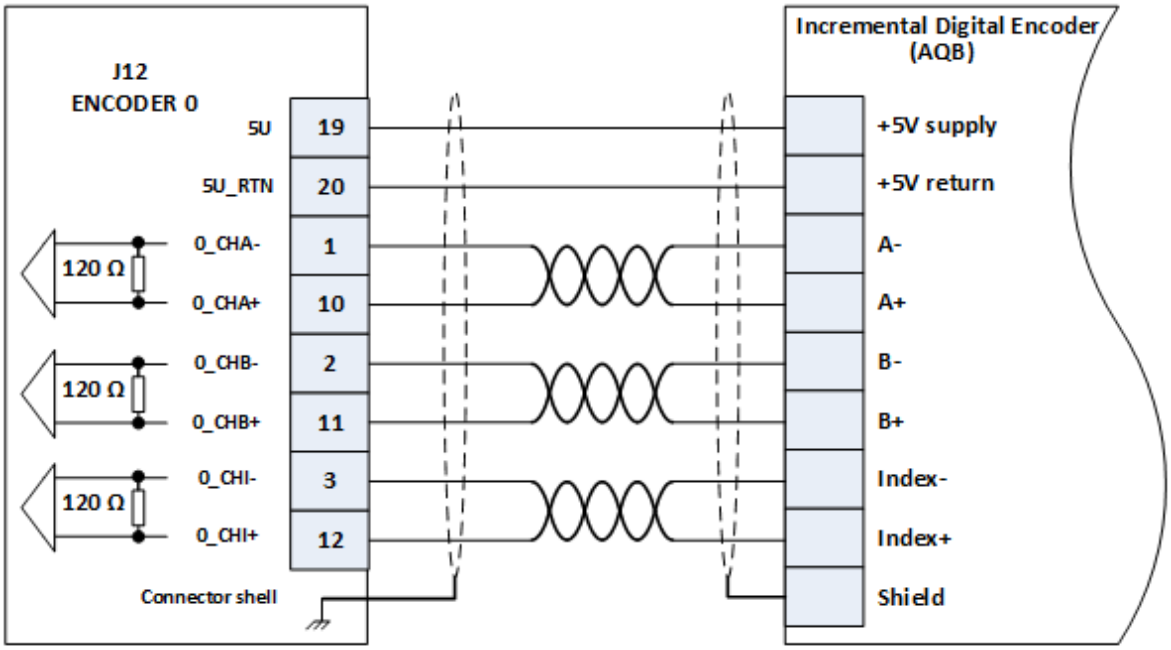


Figure 4-19. Incremental Digital Encoder (AqB) Connection

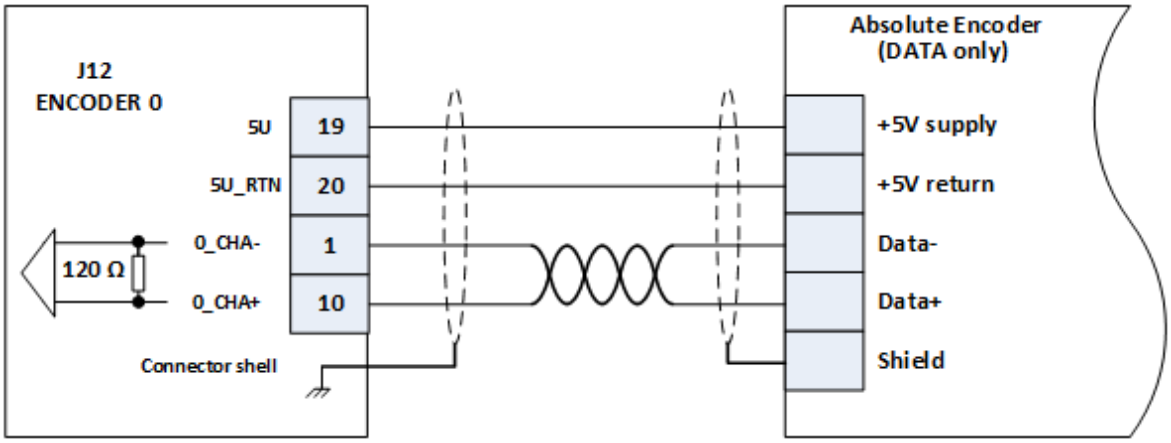


Figure 4-20. Absolute Encoder (Data Only) Connection

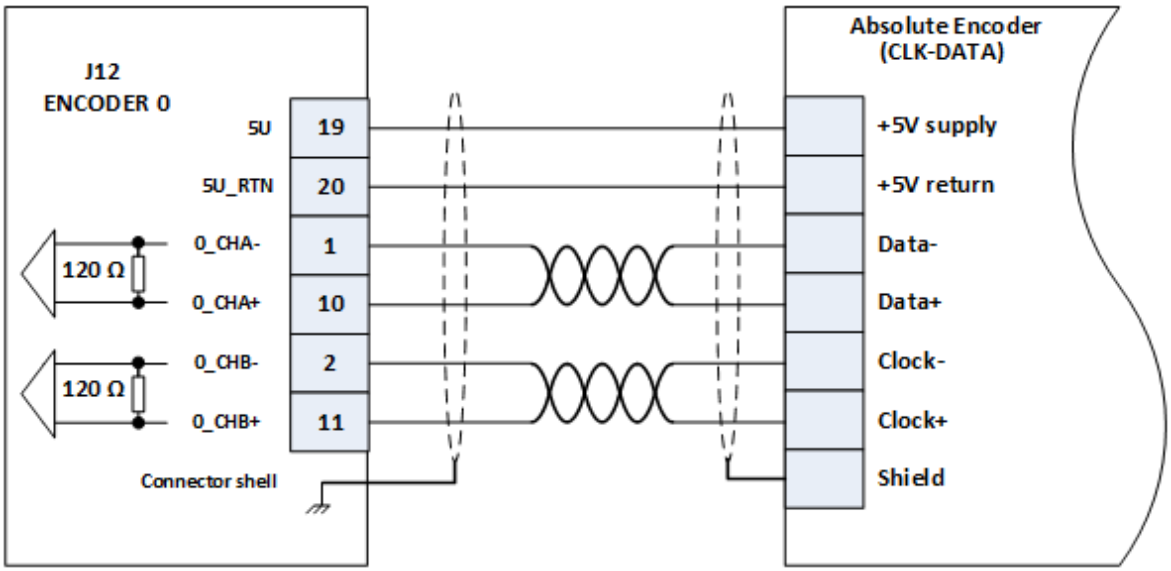


Figure 4-21. Absolute Encoder (CLK-Data) Connection Diagram

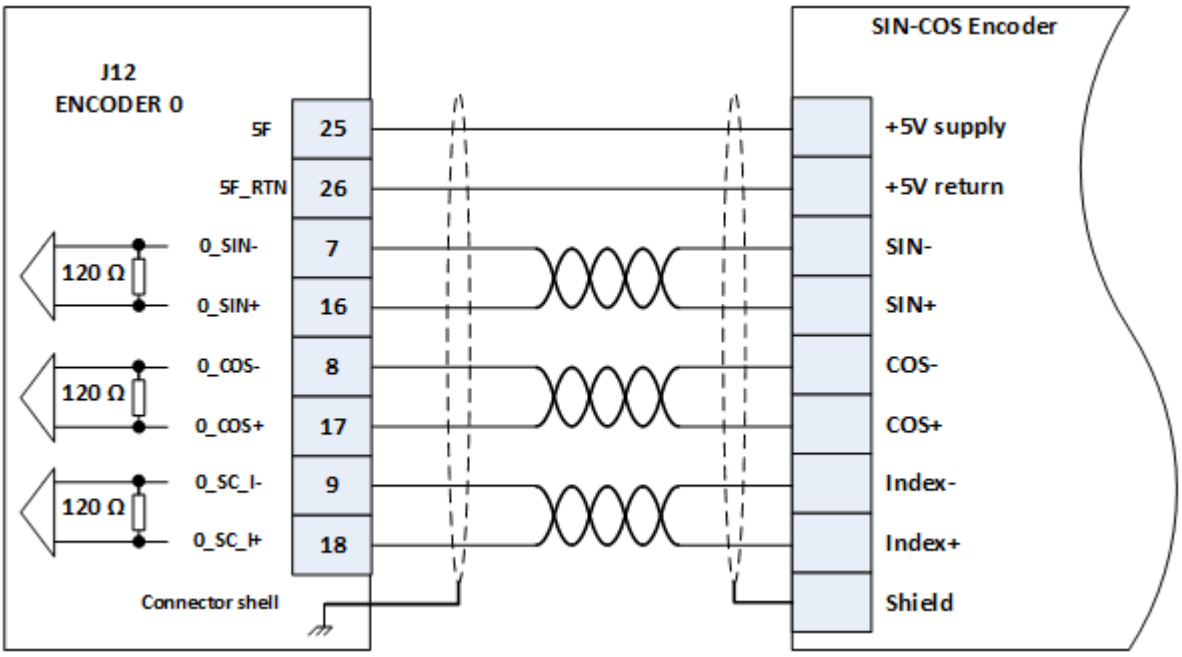


Figure 4-22. SinCos Connection

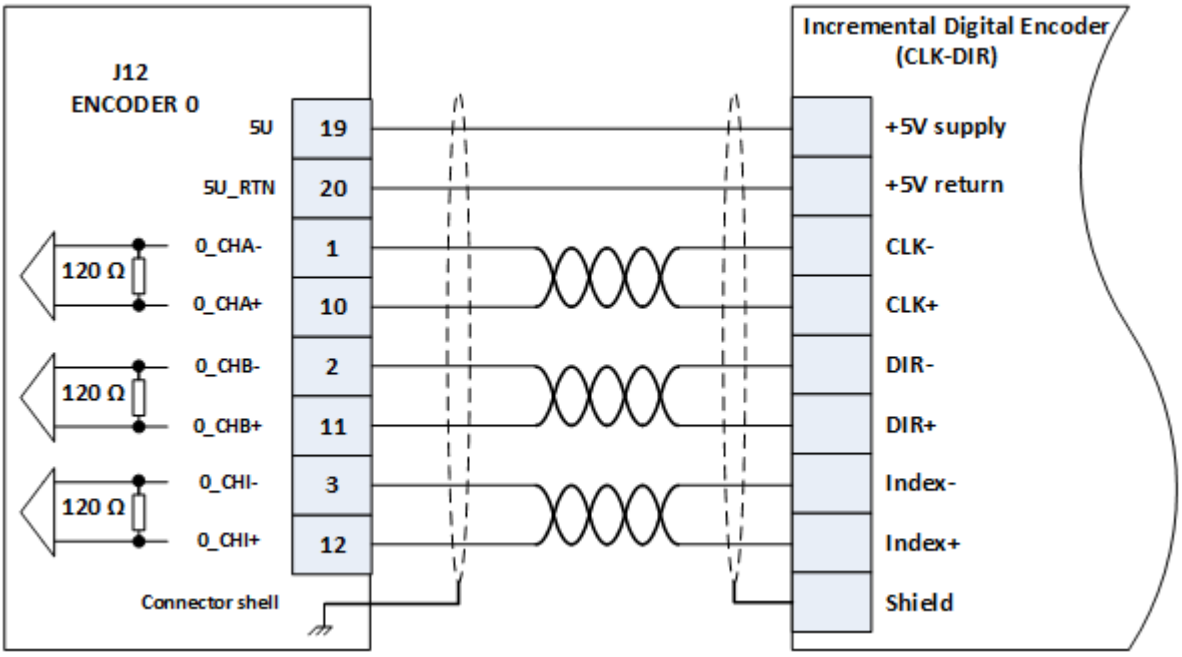


Figure 4-23. Incremental Digital Encoder (CLK-DIR) Connection

4.9.2.1 Additional Device Connections

The system can include an MTMP Motor Temperature sensor, connected according to the following diagram. See

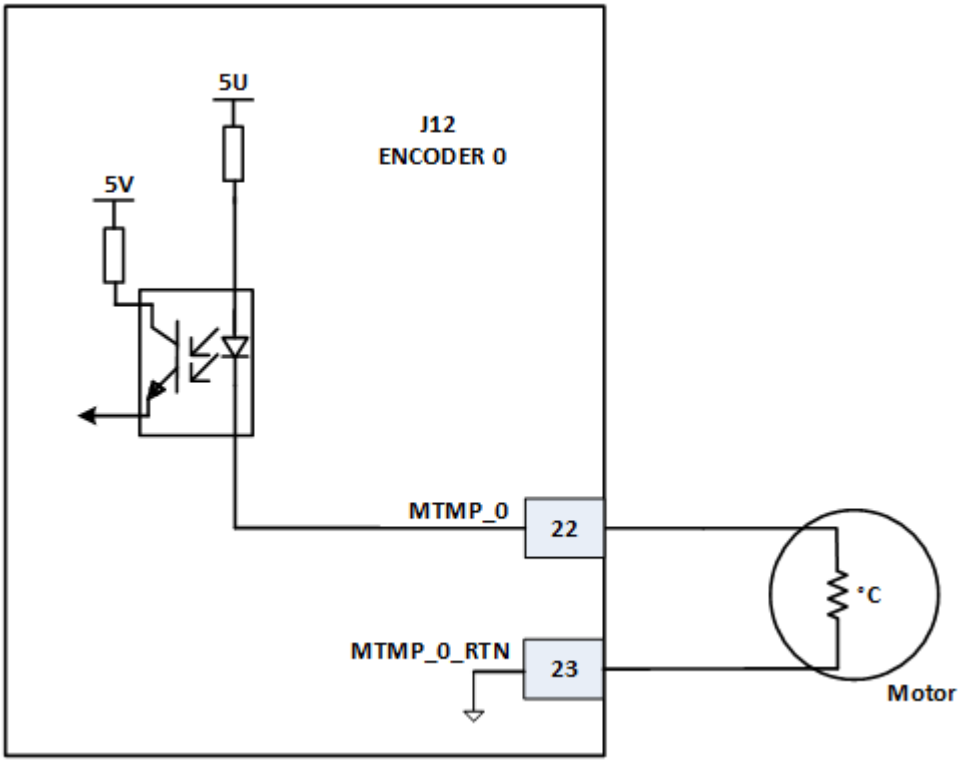


Figure 4-24. MTMP Motor Temperature Sensor Connection

A Hall sensor can also be connected, according to the following diagram.

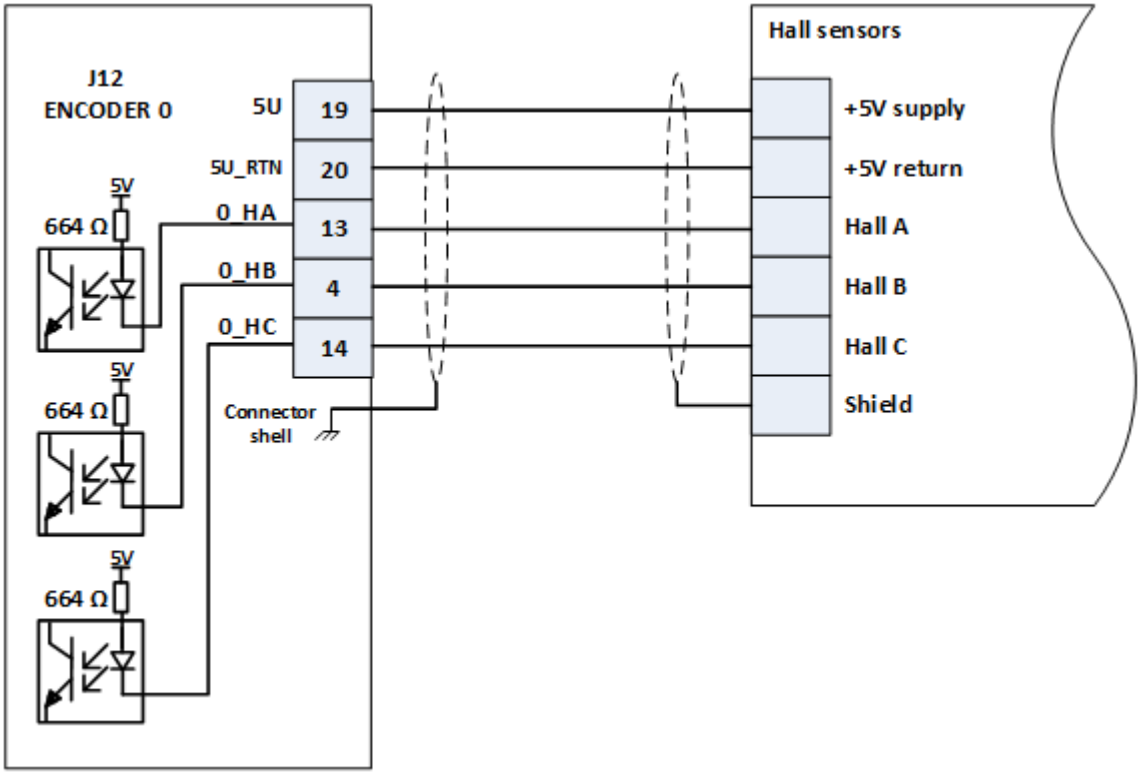


Figure 4-25. Hall Sensor Inputs Connection

Limit inputs may be connected to the limits connector, as shown in Limits Connection Instructions section. They may also be added to the encoders connector in sink or source configuration, as shown in the following two images. The examples show connections to Encoder 0, but other connectors may be used with the appropriate modifications.

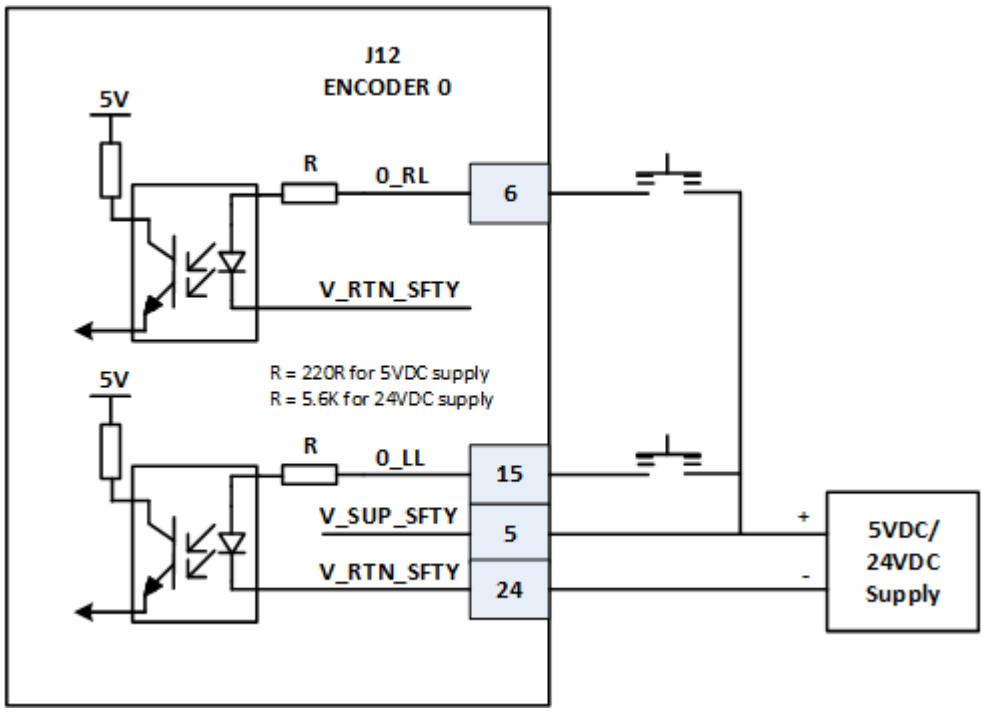


Figure 4-26. Left and Right Limit Source Connection

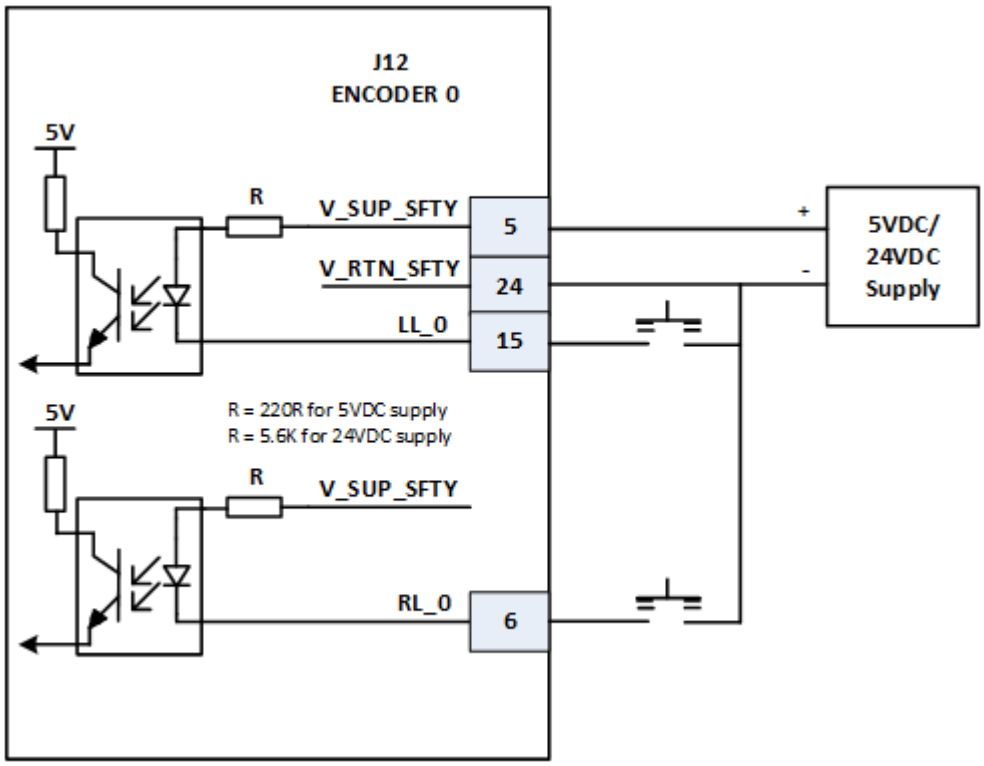


Figure 4-27. Left and Right Limit Sink Connection

4.10 Motor Connectors

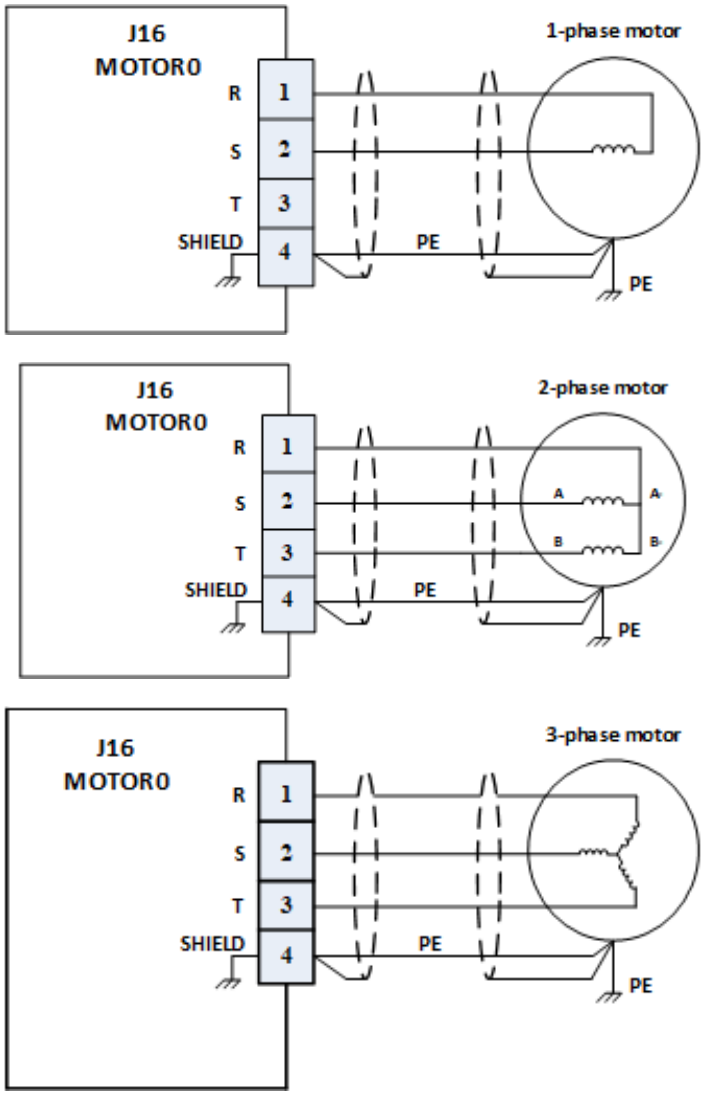
4.10.1 Motor Description

Connector name	Motor
Connector assignment	J16 for MOTOR0 J17 for MOTOR1 J19 for MOTOR2 J20 for MOTOR3
Mating connector type	4 Position Terminal Block Plug, Phoenix P/N 1743074

	Name	Description
1	R	Motor Phase R
2	S	Motor Phase S
3	T	Motor Phase T
4	SHIELD	Electrical Ground / Protective Earth

4.10.2 Motor Connection Instructions

1. Use a shielded cable with a minimum gauge of 18 AWG. It should be less than 20 meters long.
2. Route the motor's cable (and the drive supply cable) as far as possible from all other noise sensitive cables (such as encoders and I/O).
3. Connect the motors according to the figures below.
4. Connect the terminals, applying tightening torque of 2-4 lb-in (0.22-0.54 Nm) to the clamping screws.



5. Product Specifications

Table 5-1. System Specifications

Feature	Specifications
Drives	> Type: PWM three phase power bridge > Output Current (A): > 1.25/2.5A Continuous/Peak sine amplitude > 2.5/5A Continuous/Peak sine amplitude > 5/10A Continuous/Peak sine amplitude > Maximum output voltage (Vrms): 32/31 (Continuous/peak) phase to phase (92% modulation) > PWM frequency: 20 kHz > Output power per axis (W): > 47/94W (Continuous/peak) for 1.25/2.5A version > 94/186W (Continuous/peak) for 2.5/5A version > 186/363W (Continuous/peak) for 5/10A version > Minimum load inductance: 25 µH per phase at 48VDC > Commutation type: Sinusoidal. Initiation with and without hall sensors > Current dynamic range: > 1000:1 (standard) > Protection: > Short and over current: 14A ± 20% > Over Temperature: 100°C (on the product's PCB) > Over voltage: 55V±3% > Under voltage: 10.7V±3%
Supply	The module is fed by two power sources: > Drive Supply > 24Vdc control supply. During emergency conditions there is no need to remove the 24Vdc control supply.

Feature	Specifications
Motor Drive Supply	> Range: 12Vdc to 48Vdc > Maximum input current (continuous/peak), [Arms] > 1.0/2.0A for 1-axis 1.25/2.5A > 2.0/4.0A for 1-axis 2.5/5A > 4.0/8.0A for 1-axis 5/10A > 2.0/4.0A for 2-axis 1.25/2.5A > 4.1/8.0A for 2-axis 2.5/5A > 8.1/16.0A for 2-axis 5/10A > 4.1/8.1A for 4-axis 1.25/2.5A > 8.1/16.2A for 4-axis 2.5/5A > 16.2/32.2A for 4-axis 5/10A > Input power (continuous/peak), [W] > 49.4/97.6W for 1-axis 1.25/2.5A > 97.6 /193.8 W for 1-axis 2.5/5A > 193.8 /385.9 W for 1-axis 5/10A > 98.8 /195.1 W for 2-axis 1.25/2.5A > 195.1 /387.6 W for 2-axis 2.5/5A > 387.6 /771.8 W for 2-axis 5/10A > 197.6 /390.3 W for 4-axis 1.25/2.5A > 390.3 /775.2 W for 4-axis 2.5/5A > 775.2 /1543.6 W for 4-axis 5/10A > Inrush current: 100A for 40uS @48Vdc
Control Supply	> Range: 24Vdc ± 5% > Maximum input current: 1.5A @ 22.8Vdc > Protection: short circuit and reverse polarity
Motor Type	> 2/3 Phase DC brushless > DC brush > 2/3 phase step motors > Voice Coil Motors
Feedback	Standard > Incremental digital encoders (AqB) Optional: > Absolute encoders > SIN-COS encoder

Feature	Specifications
Incremental Digital Encoder	> Four > Interface: Differential, RS422 (12.5MHz A & B input frequency appropriate to 50 million quadrature counts per second) > Maximum input frequency: 50M counts per second for differential > Protection: Encoder error, encoder not connected > Input termination: 120Ω (on each signal pair) > Encoder supply: 5.0 - 5.25V, 1.5A total for all analog encoders.

Sin-Cos Analog Encoder (optional)	> Quantity: Four
	> Programmable multiplication factor: x4 to x4096
	> Maximum frequency: 500kHz or 10 MHz
	> Maximum acceleration with sin-cos encoder: 10^8 sin periods/second^2
	> Format: SIN, COS and Index
	> Type:
	  > Differential input
	  > Input impedance: 120Ω±10%
	  > Encoder voltage range: 1V-PTP±10%
	  > Input voltage range: 1.25V-PTP
	> Encoder analog output supply: 5.0-5.25V, 1.5A total for all analog encoders.
	> ADC resolution: 12-bit
	> Protection: Encoder error, not connected
	> Designation: SIN±, COS±, SC_I±
	> Squared SIN-COS: The squared signals of the SIN-COS are available for all encoders

Absolute Encoder (optional)	> Interface : Differential RS485 > Encoder supply: 5.0 - 5.25V, 1.5A total for all analog encoders. > Designation: #_CHA, #_CHB
Digital Hall inputs	> Four sets of three inputs > Input current: <7mA > Interfaces: 5V Single-ended, source, opto-isolated (open cathode), reference DGND > Designation: $_HA, $_HB, $_HC

Feature	Specifications
Mechanical Brake & GP Digital output	> Quantity: 4 > Interface: 5/24V±20%,opto isolated, sink/source > Reference: V_RTN_IO > Output current: 0.1A per output > Output drop: 2.5V@0.1A > Protection: short current > Designation: OUT0, OUT1,OUT2,OUT3
Limit Switch Inputs	> Quantity: 2 per axis > Single-ended, 5/24V±20%,opto isolated, sink/source > Protection: short current > Behavior: No current= limit off. > Designation: #_RL, #_LL
Registration MARK Inputs	> Quantity: 4, 5/24V±20% > Interface: opto-isolated, two terminals > Maximum Encoder Frequency: <12.5MHz > Input propagation delay: <100nS > Position latch: Both raising and falling edge > Maximum Input current: <14mA > Max Capture Frequency: 1 per 2 MPU cycles > Can be used as general purpose inputs > Designation: MARK0±, MARK1±, MARK2±, MARK3±

Digital Outputs	> Quantity: 8
	> Configurations:
	  > PEG State (OUT0-3)
	  > GP Output (OUT4-7)
	> Interface: Differential, RS422 compatible.
	> Designation: OUT_CNFG_#± where # is the output number from 0 to 7

Feature	Specifications
PEG (Position Event Generator)	> (Position Event Generator): Four PEG State, P/D output pair, AqB output pair > Differential, RS422 compatible > Pulse width: 40 ns to 671 ms > Maximum rate: 10MHz > Can be used as general purpose output > Allocation: By default, the PEG output pins are mapped to ACSPL+ variables. Other optional selections are SW programmable (see the *PEG and MARK Operations & Application Notes*). > Designation: PEG0±, PEG1±, PEG2±, PEG3±  PEG does not operate with absolute encoders.
Analog Inputs	> Two ±10V±5% or Single- ended 0-10V±5% > Max. input frequency: 5 kHz > Offset: < 100mV > SNR: >56dB > Designation: AIN_#± (# = analog output number 0-1) > Resolution: 12-bit
Analog Outputs	> Two ±10V, differential, two terminal, 10 bit resolution > Offset: ±50mV > Max. output load: 10kΩ > Noise & Ripple: <25mV > Non-linearity: <5%
Ethernet Port	> Ethernet port for configuration > Interface: TCP/IP communication > Speed: 100 Mbps > Designation: Transmit: ETH#_TX±, Receive: ETH#_RX± > Default IP Address: 10.0.0.100
EtherCAT Communication	> Two EtherCAT ports: In and Out > Interface: EtherCAT protocol > Speed: 100Mbps > Designation: Transmit: ETH#_TX±, Receive: ETH#_RX±

Table 5-2. Motor Over Temperature Specifications

Item	Description	Remarks
Designation	Motor over temperature: #_OVER_T	
Quantity	One per axis	
Type	> Single-ended, opto-isolated > Reference: DGND	
Threshold	> Over temperature protection is on, when the impedance between $_Motor_OVER pin to ground is above 10kΩ > Over temperature protection is off, when the impedance between $_Motor_OVER pin to ground is below 1kΩ	When this protection is not used, the Motor_OVER pin should be shorted to ground.
Default state	Over temperature off = Low impedance <1kΩ	

Table 5-3. STO and SS1 (Optional)

Item	Description	Remarks
Designation	STO1± STO2±	
Quantity	2 inputs	Switch off all axes simultaneously. One input shuts off the upper part of the motor bridge and the other shuts off the lower part.

Item	Description	Remarks
Interface	> 24V isolated, two terminals for each input	
Input current (per input pin)	> <70mA	
Behavioral	No current=drive off.	

Table 5-4. RS232

Item	Description	Remarks
Interface	Isolated	
Designation	COM1_TX COM1_RX	COM1
Quantity	1	
Speed	Up to 115,200 Baud rate	

Table 5-5. SPI

Item	Description	Remarks
Designation	SPI_MISO± (data master input / slave output)SPI_ MOSI± (data master output / slave input) SPI_SS± (chip select) SPI_CLK± (clock)	bi-directional interface supports master or slave mode
Quantity	1	
Interface	Differential RS422	
Speed	4 MHz	
Data word length	8 words of 16 bits	

Table 5-6. Physical Parameters

Length	168 mm
Depth	158 mm

Height	48.3 mm
Weight	800 g

5.1 EtherCAT Cycle Rate

Table 5-7. CTIME Values for IDMsm/sa

Controller	Number of Internal Axes	Maximum Number of Axes	Default Number of Available ACSPL+ Buffers	Maximum Number of Simultaneously Running		Controller Cycle Time					ServoBoost Supported
				Motors	ACSPL+ Buffers	1 (msec)	0.50 (msec)*	0.25 (msec)*	0.20 (msec)*	Default Value (msec)	
IDMsm-1xxxx-xxxxx	1	1	4	1	4	√	√	√	-	0.5	-
IDMsm-2xxxx-xxxxx	2	2	4	2	4	√	√	√	-	0.5	-
IDMsm-4xxxx-xxxxx	4	4	4	4	4	√	√	√	-	0.5	-

* Supported Ordering option

5.2 Dimensions

- Length: 246mm
- Depth: 177mm
- Height: 55mm

5.3 Weight

- 2kg

5.4 Compliance with Standards

5.4.1 Environment

Maximum surrounding air temperature:

- 40°C without forced cooling;
- 50°C with forced cooling of 24 CFM in direction from the power connections to the communication connectors.

5.4.2 EMC

- IEC 61800-3: 2017, Part 3

5.4.3 Electrical Safety

- IEC 61800-5-1:2016, part 5-1
- UL 61800-5-1 (Pending)

5.4.4 Functional Safety (Pending)

- IEC 61800-5-2:2016 part 5-2
- IEC 61508 Part 1-7:2010

5.4.5 Mechanical Safety

- EN ISO 13849-1:2015, Part 1
- EN ISO 13849-2:2012, Part 2
- IEC 62061:2005 + A1:2012 + A2:2015
- IEC 60204-1:2016, Part 1

5.4.6 ETG

- This certification is given to products that conform to the EtherCAT Technology Group standard and successfully works with other certified devices.

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