CDHD2

CDHD2 Servo Drive

Quick Start Guide

Revision: 1.4
Firmware Version 2.15.x

SERVOTRONIX
always in motion™

Revision History

Doc. Rev.	Date	Remarks
1.4	Oct. 2018	Updated ordering information. Removed CDHD2-008/010/013 single-phase system wiring diagram Updated power board pinout diagrams (STO) and control board pinout diagrams (added mating connector specifications). Updated C2 P&D wiring diagram. Updated C3 digital output wiring diagram. Added content for CDHD2 33A-44A-55A models. Updated Software chapter.
1.3	Jan. 2018	New cover photo. Updated HMI fault codes.
1.2	Dec. 2017	New cover design.
1.1	Dec. 2017	Added LV control board pinouts. Updated ordering info. Added warnings/faults.
1.0	Oct. 2017	CDHD2. General release.

Disclaimer

This product documentation was accurate and reliable at the time of its release. Servotronix Motion Control Ltd. reserves the right to change the specifications of the product described in this manual without notice at any time.

Trademarks

All marks in this manual are the property of their respective owners.

Contact Information

Servotronix Motion Control Ltd.
21C Yagia Kapayim Street
Petach Tikva 49130, Israel
Tel: +972 (3) 927 3800
Fax: +972 (3) 922 8075
Website: www.servotronix.com

Technical Support

If you need assistance with the installation and configuration of the CDHD2 drive, contact Servotronix technical support: tech.support@servotronix.com

Ordering Information

The following diagram shows the ordering options that comprise the various model numbers of the drives in the CDHD2 product line. To enquire about product availability, contact Servotronix.

		CDHD2	–	006		2A		AP1	–	RO		000

CDHD2 Servo Drive – HD Series

Rating

	120 / 240 VAC (**MV**)		20–48 / 90 VDC (**LV**)	
	Cont. [A rms]	Peak [A rms]	Cont. [A rms]	Peak [A rms]
1D5	1.5	4.5		
003	3	9	3	9
4D5	4.5	18		
006	6	18	6	18
008	8	28		
010	10	28		
012			12	24
013	13	28		
015			15	30
020	20	60		
024	24	72		
033	33	130		
044	44	130		
055	55	130		

Input Power Supply

1D	Low Voltage Input Power Supply • 20–90 VDC for motor power (for 3A–12A models) • 20–48 VDC for motor power (for 15A model) • 20–48 VDC (optional) for logic power
2A	Medium Voltage Input Power Supply • Single Phase 120 L-N VAC +10% -15% 50/60 Hz • Single Phase 240 L-N VAC +10% -15% 50/60 Hz • Three Phase 120-240 L-L VAC +10% -15% 50/60 Hz

	Communication Interfaces	Analog Inputs
APx	Analog Voltage, Pulse Train, RS232.	1* or 2
AFx	CANopen, Analog Voltage, Pulse Train, USB, RS232	1* or 2
ECx	EtherCAT, Analog Voltage, Pulse Train, USB, RS232	1 or 2*
EB2	EtherCAT, USB.	2
	x = 1: One analog input, 16 bit x = 2: Two analog inputs, 14 bit each	* Standard configuration
	AF1 and EC2 options only for LV and MV-33/44/55 models	

Motor Type

[*blank*]	Rotary and linear servo motors
RO	Rotary servo motors. Available in Asia market only.

Special Options

[*blank*]	Standard

Contents

1 Introduction

1.1 CDHD2 Models

The various models in the CDHD2 servo drive series are differentiated by means of the communication methods and protocols they use. The following table presents the different models and their distinguishing characteristics.

Table 1-1. CDHD2 Models - Communication and Protocols

CDHD2 Model	Physical Layer	Communication Protocol	Configuration Language
CDHD2 (AP) Standard CDHD2 model.	Serial (RS232)	ASCII commands	VarCom
	Analog	±10V	
	Pulse Train	Pulse and Direction, CW/CCW, AB Quadrature	
CDHD2 CAN (AF) Uses CANopen protocol. Referred to as CDHD2 CANopen drive.	Serial (USB|RS232)	ASCII commands	VarCom
	Analog	±10V	
	Pulse Train	Pulse and Direction, CW/CCW, AB Quadrature	
	CAN	Communication: CANopen CiA 301, CiA 402	VarCom CANopen
CDHD2 EtherCAT (EC) Uses CANopen over EtherCAT (CoE) protocol.	Serial (USB|RS232)	ASCII commands	VarCom
	Analog	±10V	
	Pulse Train	Pulse and Direction, CW/CCW, AB Quadrature	
	EtherCAT	Communication: CANopen over EtherCAT (CoE) CiA 402	VarCom CANopen
CDHD2 EtherCAT (EB) Uses CANopen over EtherCAT (CoE) protocol	Serial (USB)	ASCII commands	VarCom
	Analog	±10V	
	EtherCAT	Communication: CANopen over EtherCAT (CoE) CiA 402	VarCom CANopen

1.2 Safety

Only qualified persons may perform the installation procedures. You do not need to be an expert in motion control to install and operate the drive system. However, you must have a basic understanding of electronics, computers, mechanics, and safety practices.

The CDHD2 utilizes hazardous voltages.
Be sure the drive is properly grounded.

When connecting the CDHD2 to other control equipment, be sure to follow two basic guidelines to prevent damage to the drive:

- The CDHD2 must be grounded via the earth ground of the main AC voltage supply.
- Any motion controller, PLC or PC that is connected to the CDHD2 must be grounded to the same earth ground as the CDHD2.

Before you install the CDHD2, review the safety instructions in the product documentation. Failure to follow the safety instructions may result in personal injury or equipment damage.

1.3 Installation Procedure

Perform the following steps to install and setup a CDHD2 system.

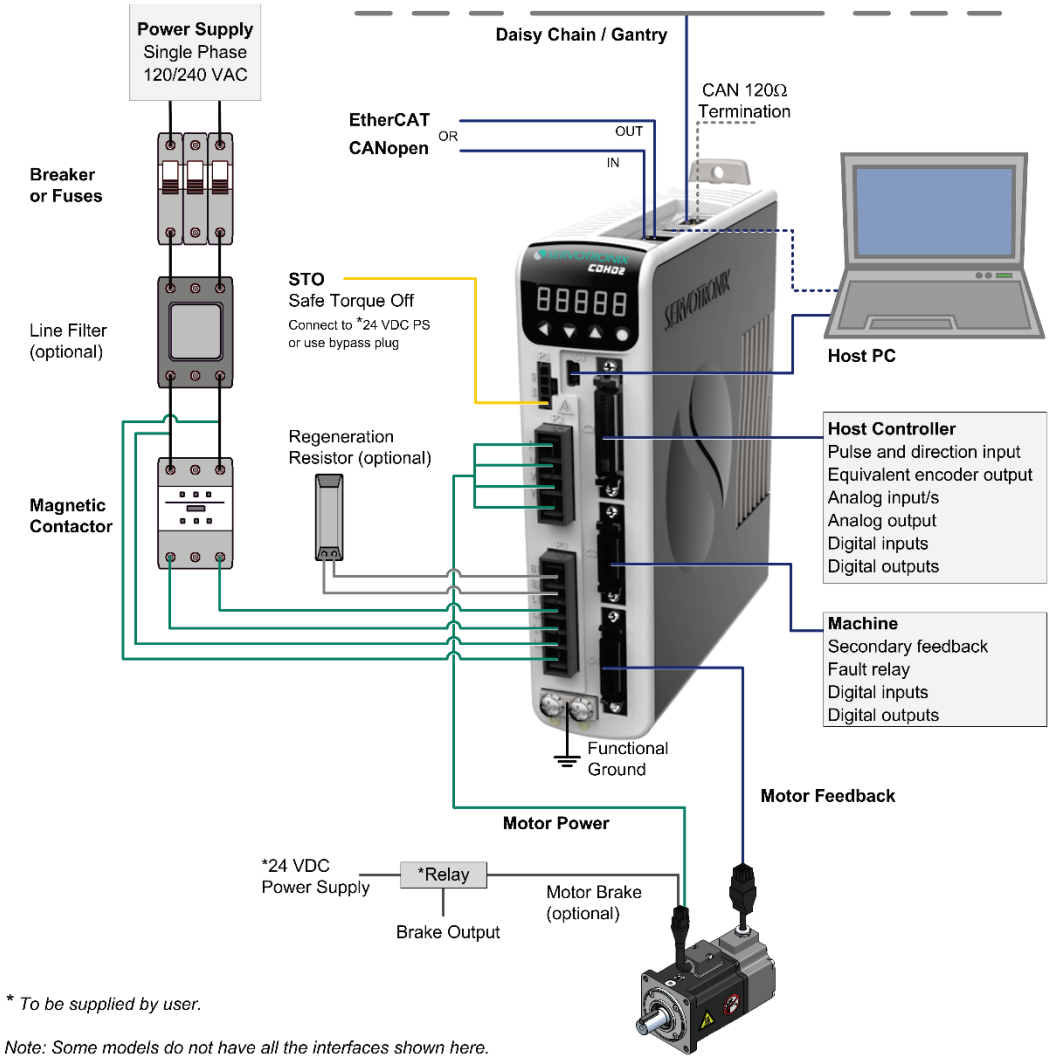
1. Mount the CDHD2.
2. Make all wiring and cable connections, as required by your application:
   - Controller I/Os and/or Machine I/Os
   - Motor feedback
   - Fieldbus devices, if in use
   - CANopen network: set 120Ω termination resistor switches as required
   - Safe torque off (STO), or bypass using jumpers
   - Motor
   - Regeneration resistor, if required
   - Motor brake, if required
   - MV models: AC input voltage
   - LV models: DC input voltage
3. Connect the drive to the host computer.
4. Power up the drive and the host computer.
5. Install ServoStudio 2 software.
6. If required, define the drive communication address.

2 Wiring

2.1 System Wiring

CDHD2-1D5/CDHD2-003 (MV) System Wiring

Single Phase

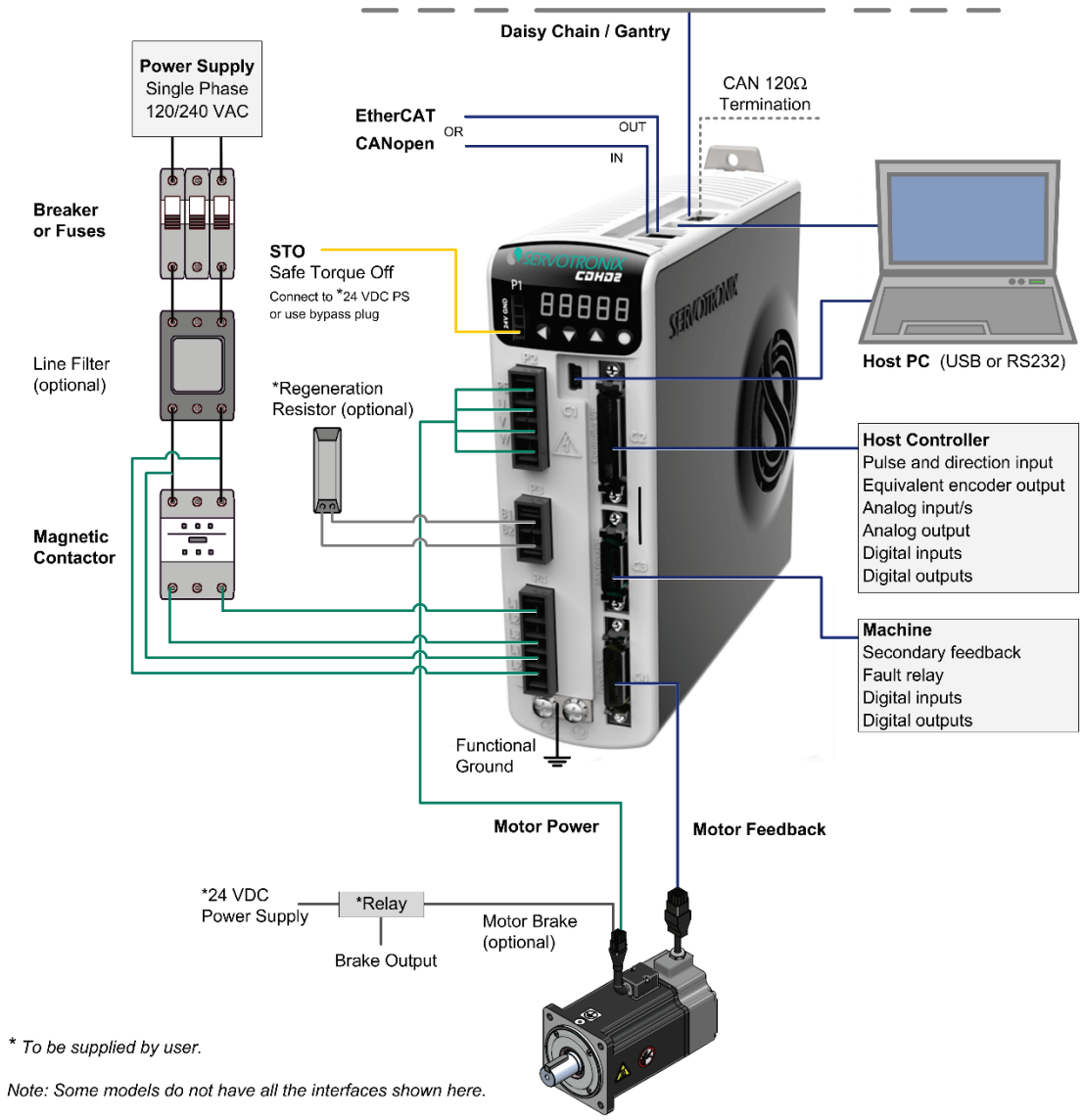


* *To be supplied by user.*

Note: Some models do not have all the interfaces shown here.

CDHD2-4D5/CDHD2-006 (MV) System Wiring

Single Phase

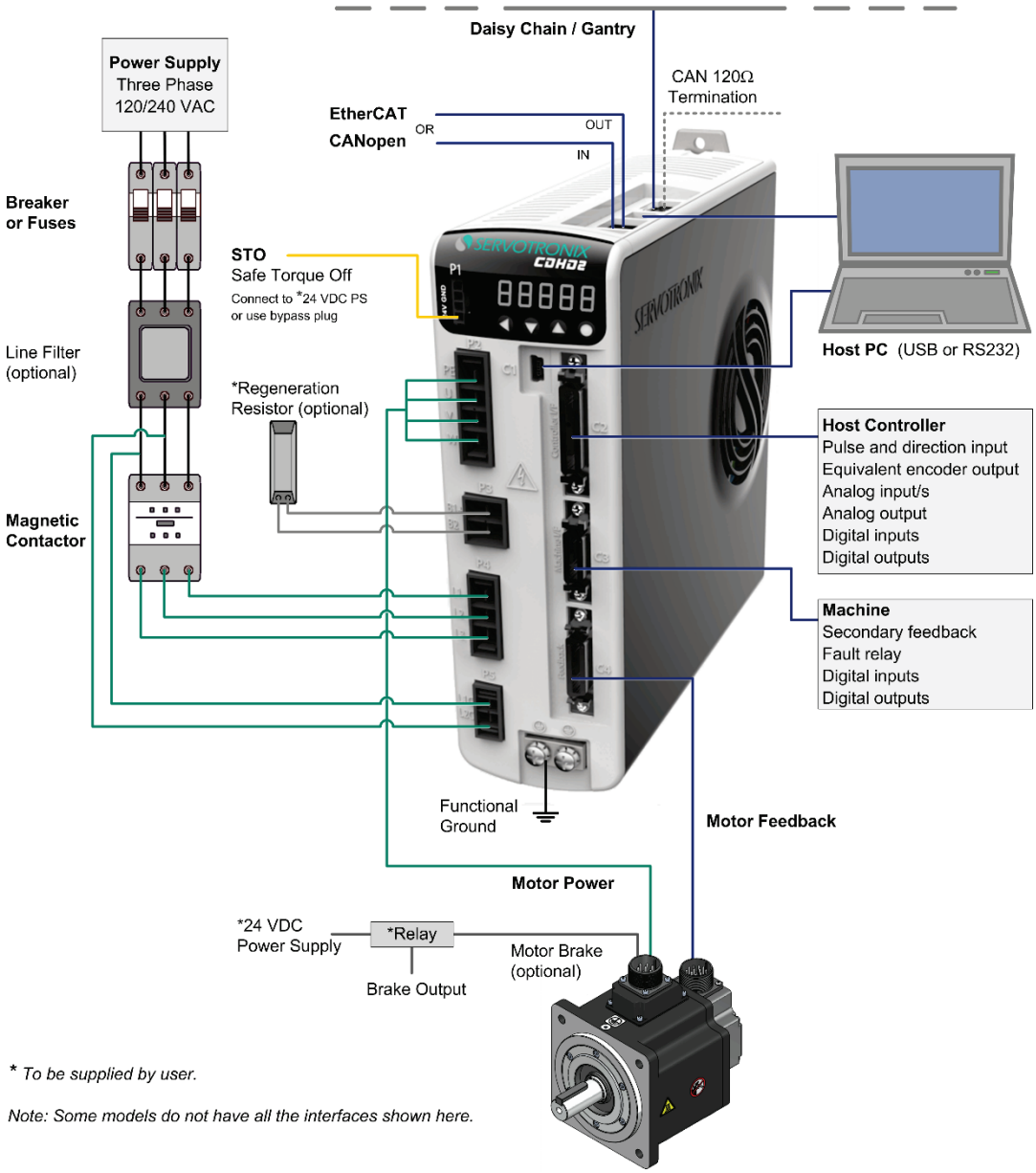


* *To be supplied by user.*

Note: Some models do not have all the interfaces shown here.

CDHD2-008/CDHD2-010/CDHD2-013 (MV) System Wiring

Three Phase

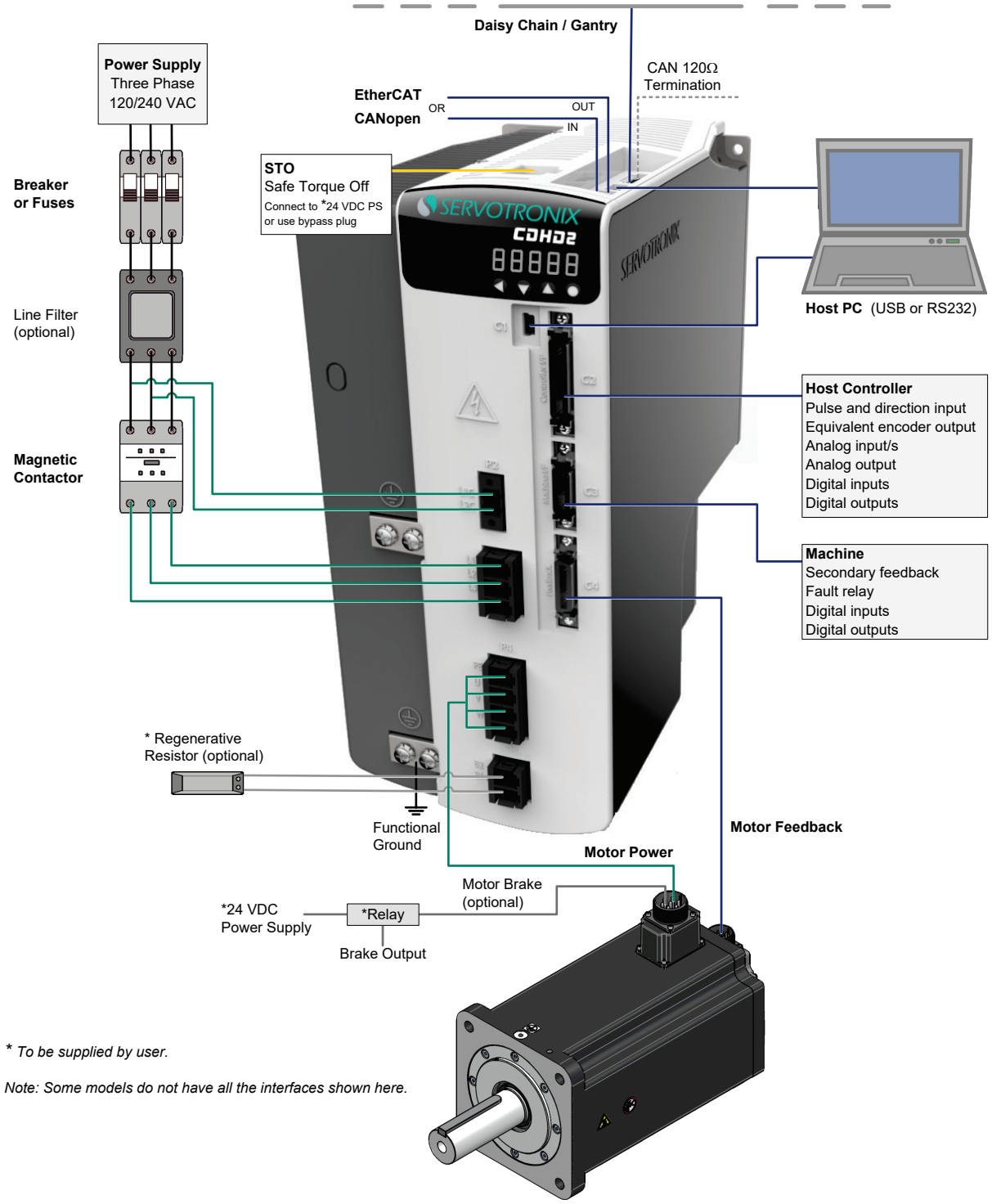


* *To be supplied by user.*

Note: Some models do not have all the interfaces shown here.

CDHD2-020/CDHD2-024 (MV) System Wiring

Three Phase

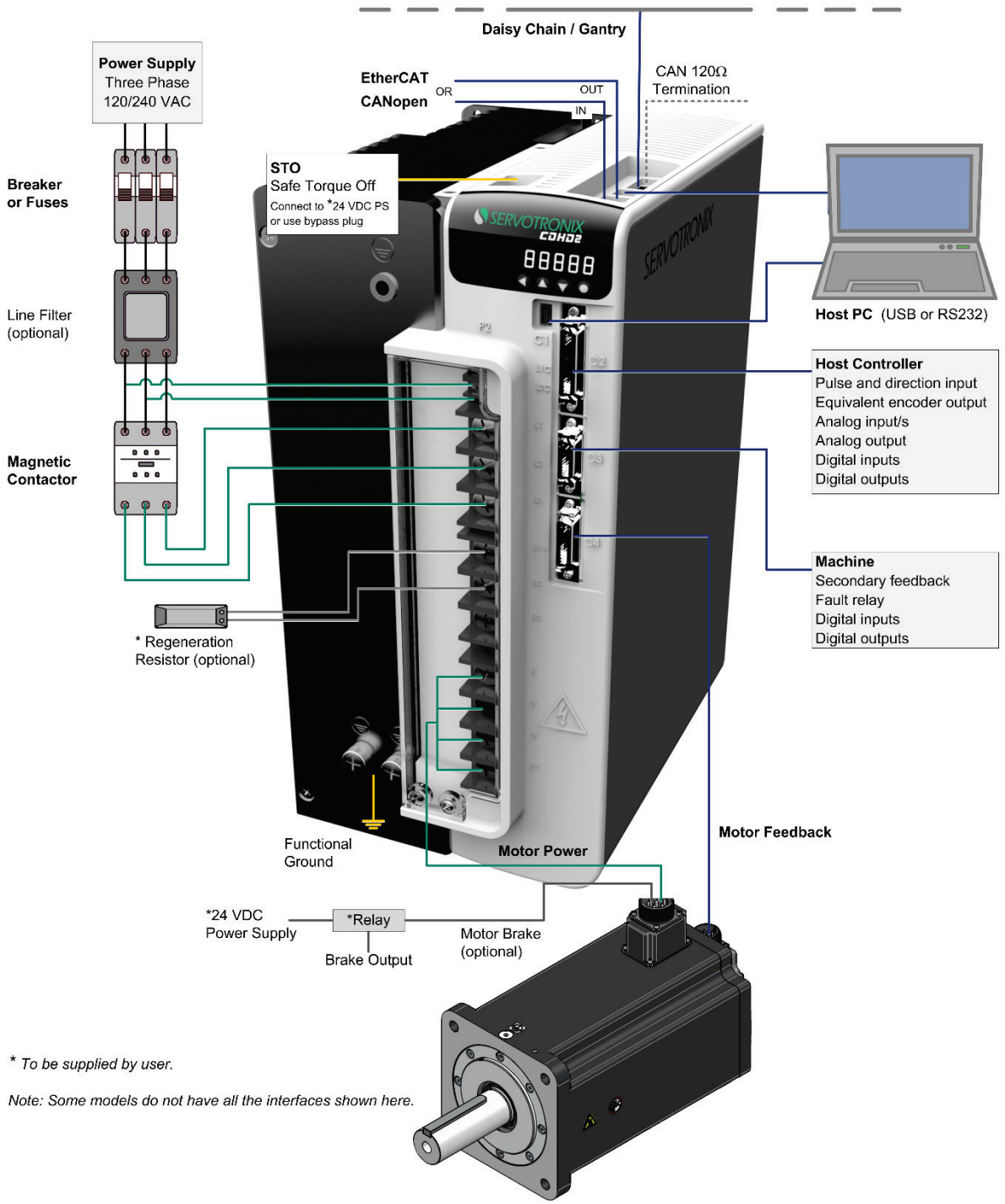


* *To be supplied by user.*

Note: Some models do not have all the interfaces shown here.

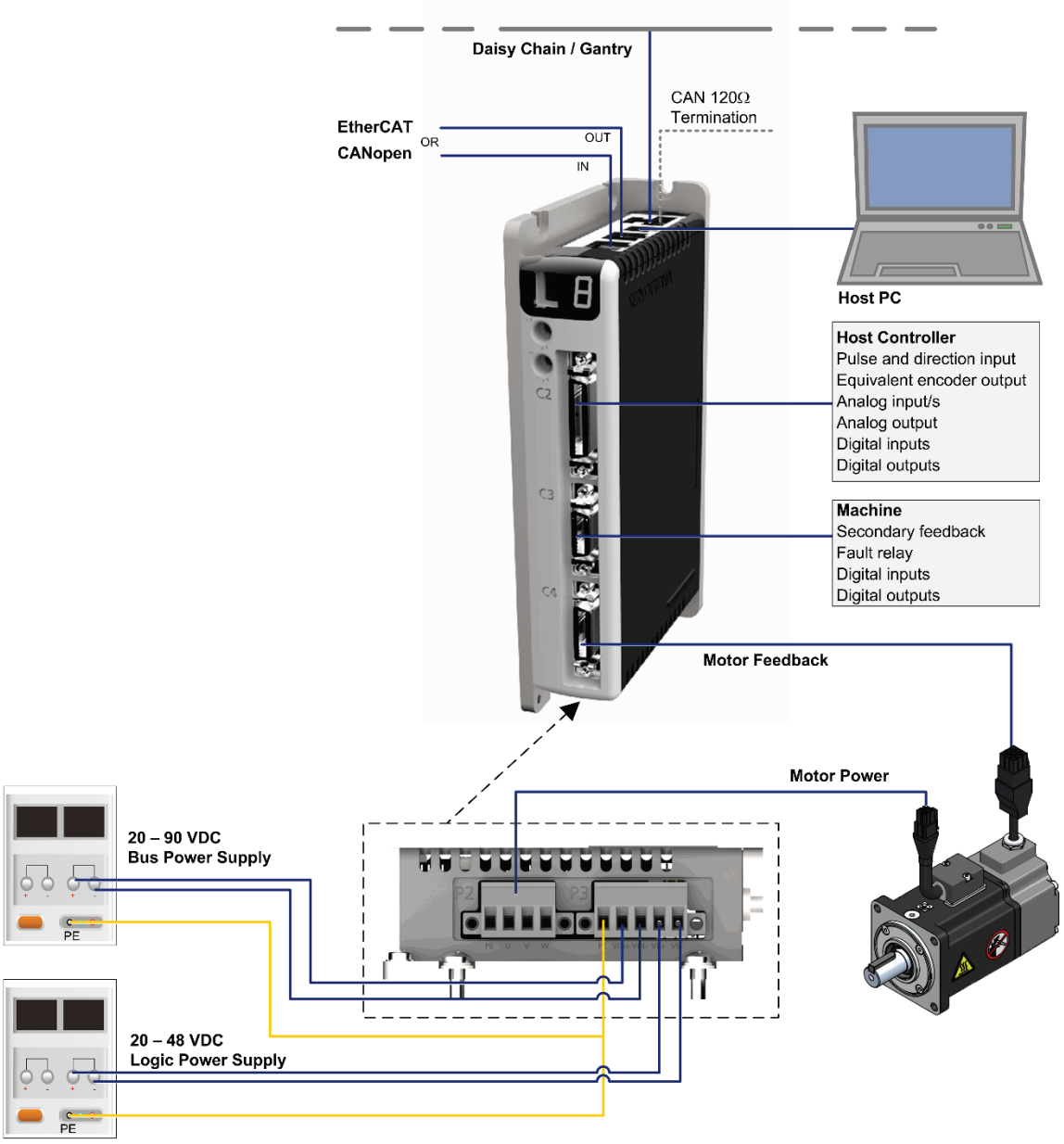
CDHD2-033/CDHD2-044/CDHD2-055 (MV) System Wiring

Three Phase



CDHD2-003/CDHD2-006/CDHD2-012/CDHD2-015 (LV) System Wiring

Two Power Supplies Configuration



2.2 Cables and Connectors

Mating Connector Kits

Power mating connectors are supplied with the drive.

Other interfaces are **not** supplied with the drive and must be ordered separately.

Description	Servotronix Part Number
CDHD2 (MV) Power mating 1.5A 3A 120/240 VAC, Spring	KIT-2A-PWSPR-00
CDHD2 (MV) Power mating 4.5A 6A 120/240 VAC, Spring	KIT-2B-PWSPR-00
CDHD2 (MV) Power mating 8A 10A 13A 120/240 VAC, Crimp	KIT-2C-POWER-00
CDHD2 (MV) Power mating 20A 24A 120/240 VAC, Spring	KIT-2D-PWSPR-00
CDHD2 (LV) Power mating 3A, 6A, 12A, 15A 20/90 VAC	KIT-1D-POWER-00
CDHD2 C2 – Controller interface MDR 36 pins	KIT-C2MDR36 0 0 0
CDHD2 C3 – Machine interface MDR 20 pins	KIT-C3MDR20 0 0 0
CDHD2 C4 – Feedback MDR 26 pins	KIT-C4MDR26 0 0 0
CDHD2 STO connector	KIT-00P1000-00

Cables

Cables are **not** supplied with the drive and must be ordered separately.

C1 – USB 2.0 A to Mini-B Cable

It is strongly recommended that you use the USB cable offered by Servotronix, which has been tested and proven for reliability.

Item	Specification	Servotronix Part Number
USB 2.0 A to Mini-B Cable		CBLr0000USBA-00
Shield	At least 85% copper braid shield coverage	
Twisted pair	Required	
Maximum length	3 m	
Wire gauge	20–28 AWG	
EMI filtering	2 ferrite cores, located near each connector	

C2 – Controller Interface Cable

Item	Specification	Servotronix Part Number
C2 Flying Leads Cable	Cable 1 meter, flying leads	CBL-MDR2-36-01
	Cable 2 meter, flying leads	CBL-MDR2-36-02
	Cable 3 meter, flying leads	CBL-MDR2-36-03
	Cable 5 meter, flying leads	CBL-MDR2-36-05
	Cable 10 meter, flying leads	CBL-MDR2-36-10

C3 – Machine Interface Cable

Item	Specification	Servotronix Part Number
C3 Flying Leads Cable	Cable 1 meter, flying leads	CBL-MDR2-20-01
	Cable 2 meter, flying leads	CBL-MDR2-20-02
	Cable 3 meter, flying leads	CBL-MDR2-20-03
	Cable 5 meter, flying leads	CBL-MDR2-20-05
	Cable 10 meter, flying leads	CBL-MDR2-20-10

C4 – Feedback Cable

Item	Specification	Servotronix Part Number
C4 Flying Leads Cable	Cable 1 meter, flying leads	CBL-MDR2-26-01
	Cable 2 meter, flying leads	CBL-MDR2-26-02
	Cable 3 meter, flying leads	CBL-MDR2-26-03
	Cable 5 meter, flying leads	CBL-MDR2-26-05
	Cable 10 meter, flying leads	CBL-MDR2-26-10

C5 | C6 – RJ45 Industrial Ethernet/EtherCAT Cat 5e Cable

Item	Specification	Servotronix Part Number
RJ45 CAT5E Cable	Length: 0.5 meter	CBLr00400100-00
	Length: 1 meter	CBLr00400180-00
	Length: 2 meter	CBLr00400110-00
	Length: 10 meter	CBLr00400140-00
Shield	At least 85% copper braid shield coverage	
Twisted pair	Required	
Maximum length	10 m	
Wire gauge	26-27 AWG	

C7 – RS232 Cable

Item	Specification	Servotronix Part Number
RS232 Cable		CBLrRS232AS0-01
Shield	At least 85% copper braid shield coverage	
Maximum length	10 m	
Wire gauge	24–28 AWG	

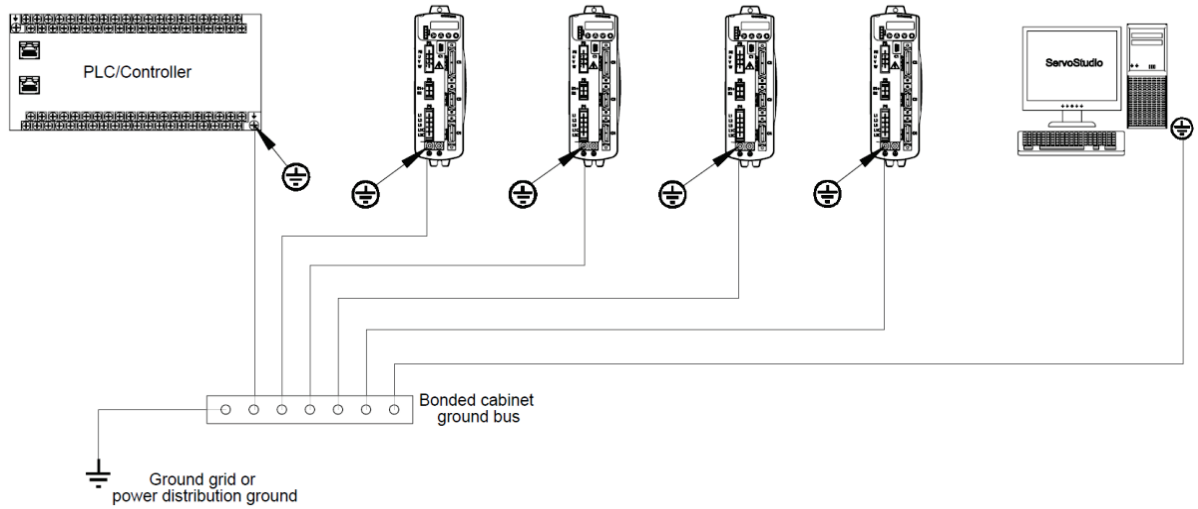
C8 – Daisy Chain

Item	Specification	Servotronix Part Number
Cable	At least 85% copper braid shield coverage	--
Twisted pair	Required	
Maximum length	0.5 m	
Wire gauge	24–28 AWG	

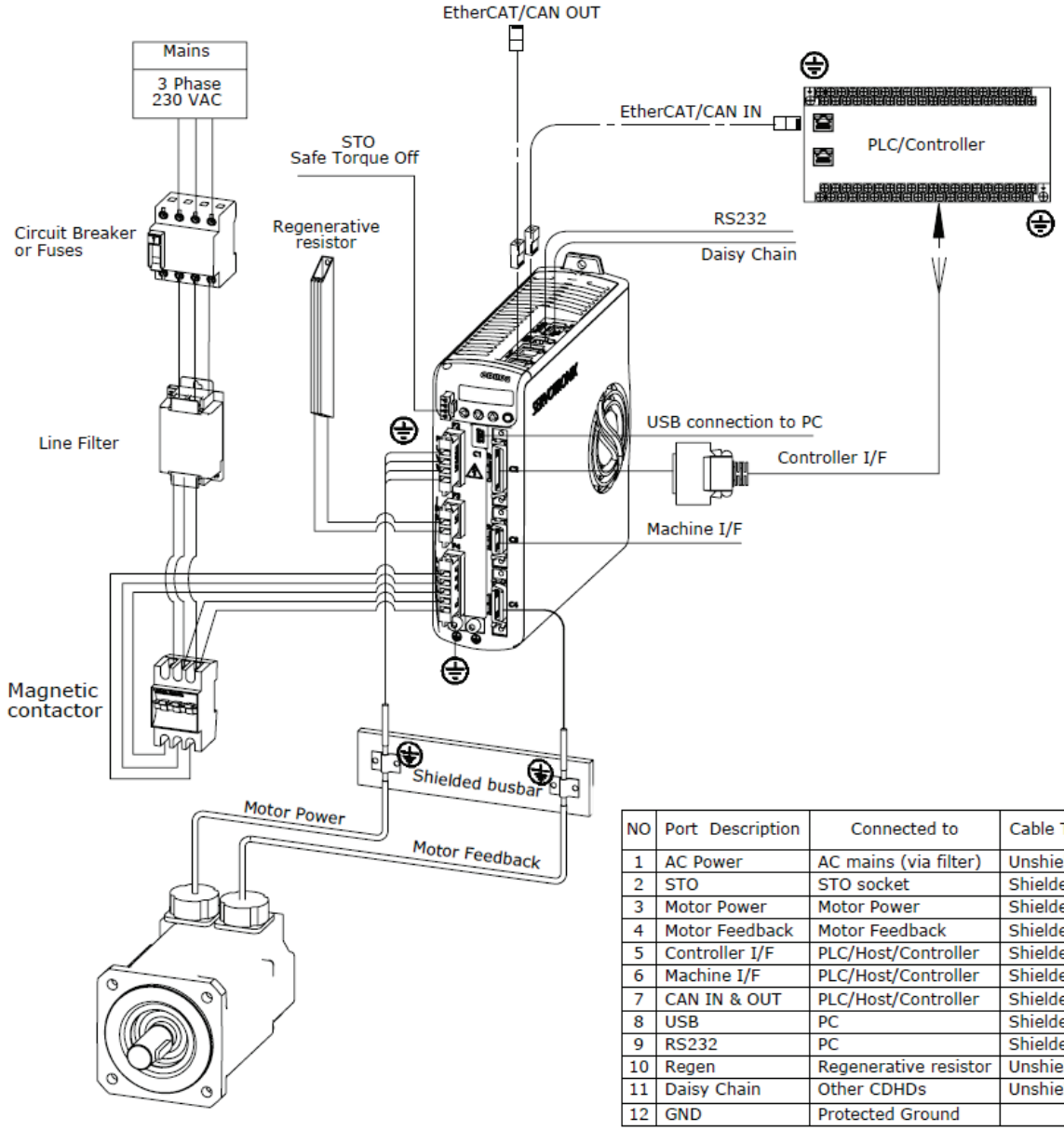
2.3 Grounding

When connecting the CDHD2 to other control equipment, be sure to follow two basic guidelines to prevent damage to the drive:

- The CDHD2 must be grounded via the earth ground of the main AC voltage supply.
- Any motion controller, PLC or PC that is connected to the CDHD2 must be grounded to the same earth ground as the CDHD2.



2.4 Shielding and Bonding



NO	Port Description	Connected to	Cable Type
1	AC Power	AC mains (via filter)	Unshielded
2	STO	STO socket	Shielded
3	Motor Power	Motor Power	Shielded
4	Motor Feedback	Motor Feedback	Shielded
5	Controller I/F	PLC/Host/Controller	Shielded
6	Machine I/F	PLC/Host/Controller	Shielded
7	CAN IN & OUT	PLC/Host/Controller	Shielded
8	USB	PC	Shielded
9	RS232	PC	Shielded
10	Regen	Regenerative resistor	Unshielded
11	Daisy Chain	Other CDHDs	Unshielded
12	GND	Protected Ground	

3 Control Board

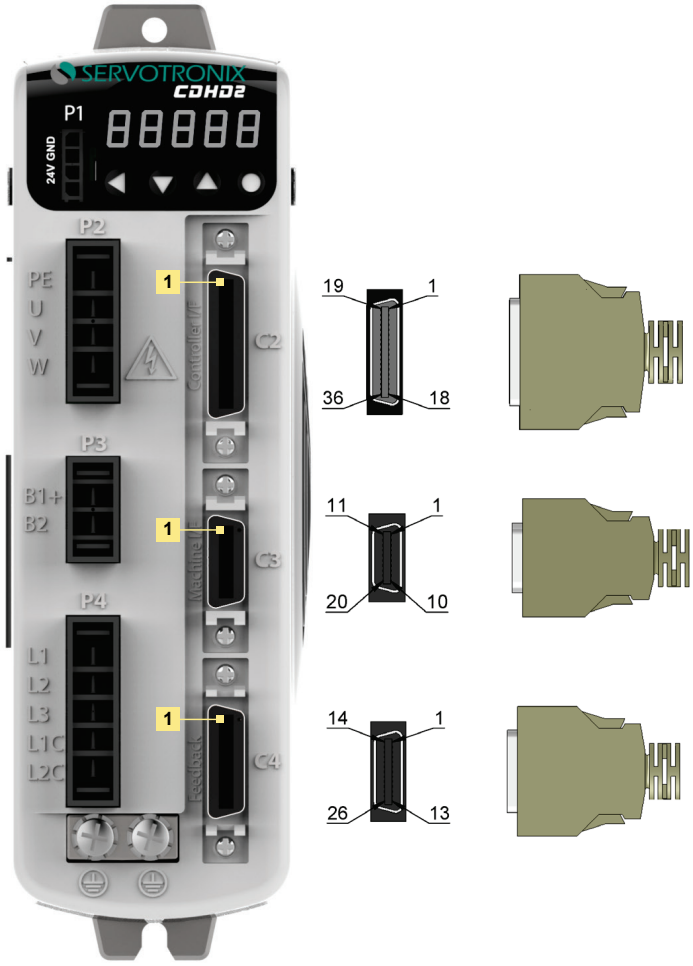
3.1 Control Board Pinouts

The control board interfaces vary depending on the specific CDHD2 model.

Unused pins must remain unwired.

CDHD2-AP (MV) Control Board

I/F	Mfgr	Mating Connector	Manufacturer PN	Servotronix PN
C2	3M	Solder Plug Connector	10136-3000PE	CONr00000036-01
	3M	Solder Plug Junction Shell	10336-52F0-008	HODr00000036-00
C3	3M	Solder Plug Connector	10120-3000PE	CONr00000020-38
	3M	Solder Plug Junction Shell	10320-52F0-008	HODr00000020-00
C4	3M	Solder Plug Connector	10126-3000PE	CONr00000026-31
	3M	Solder Plug Junction Shell	10326-52F0-008	HODr00000026-00



Each type of drive (AP, AF, EC, EB) *has the same control board, regardless of rating.*

Controller I/F **C2**: MDR 36 Plug | 24-28 AWG			
1	Common output	19	Common input
2	Digital output 1	20	Digital input 2
3	Digital input 1	21	
4	Equivalent encoder output A-	22	Equivalent encoder output A+
5	Equivalent encoder output B-	23	Equivalent encoder output B+
6	Equivalent encoder output Z-	24	Equivalent encoder output Z+
7		25	Ground
8	Analog input 1+	26	Analog input 1-
9	Direction input+	27	Direction input-
	Secondary encoder B+		Secondary encoder B-
10	Ground	28	Pulse input+
			Secondary encoder A+
11	Pulse input-	29	Ground
	Secondary encoder A-		
12	Fast digital output 8	30	Fast digital output 7
13	Ground	31	Digital input 3
14	Digital input 4	32	Fast digital input 5
15	Fast digital input 6	33	Digital output 2
16	Digital output 3	34	Fast digital output 24V return
17	Fast digital output 24V	35	* Analog input 2-
18	* Analog input 2+	36	Analog output
* Optional. Refer to *Ordering Options*.			

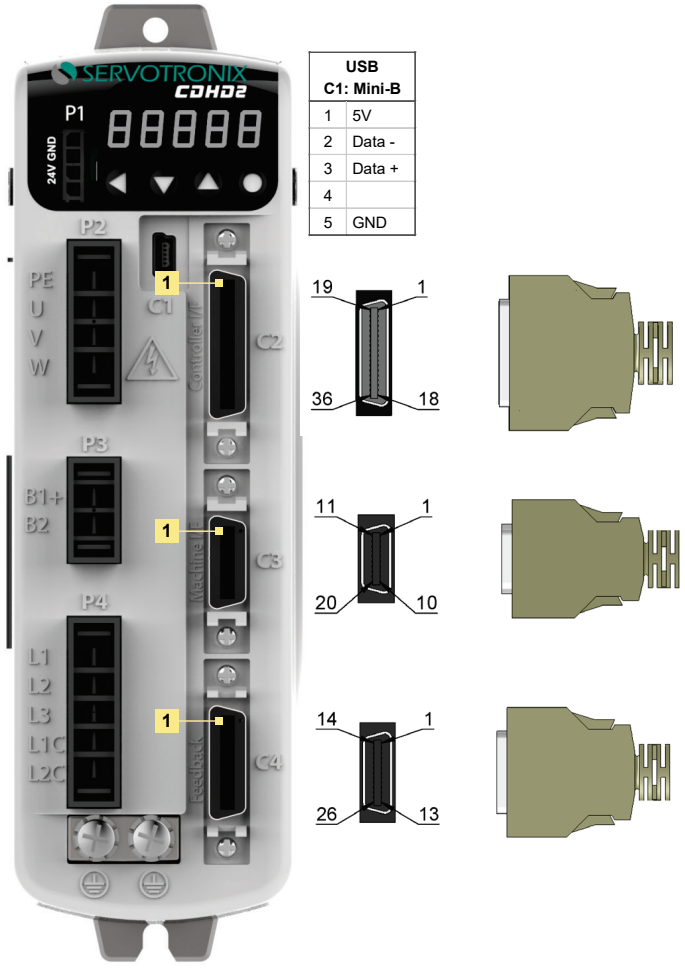
Machine I/F **C3**: MDR 20 Plug | 24-28 AWG			
1	Secondary encoder A+	11	Secondary encoder A-
	Pulse input +		Pulse input -
2	Secondary encoder B+	12	Secondary encoder B-
	Direction input+		Direction input-
3	Secondary encoder Z+	13	Secondary encoder Z-
4	Secondary encoder 5V	14	Secondary encoder ground
5	Digital input 7	15	Digital input 8
6	Digital input 9	16	Digital input 10
7	Fast digital input 11	17	Digital output 4
8	Digital output 5	18	Digital output 6
9	Common input	19	Common output
10	Fault relay 1	20	Fault relay 2

Feedback **C4**: MDR 26 Plug | 24-28 AWG			
1	Incremental encoder A +	14	Incremental encoder A -
	SSI encoder data +		SSI encoder data -
2	Incremental encoder B +	15	Incremental encoder B -
	SSI encoder clock +		SSI encoder clock -
3	Incremental encoder Z +	16	Incremental encoder Z -
4	Hall U +	17	Hall V+
5	Hall W +	18	
6	Resolver sine +	19	Resolver sine -
7	Resolver cosine +	20	Resolver cosine -
8	Resolver reference +	21	Resolver reference -
9	Sine encoder sine +	22	Sine encoder sine -
10	Sine encoder cosine +	23	Sine encoder cosine -
11	5V supply for feedback device	24	Ground (5V return)
12	Motor temperature sensor	25	Motor temperature sensor
13	5V supply for feedback device	26	Shield

AC Models Note Outputs are opto-isolated, and can be connected as sink only; outputs are compatible with source inputs. Inputs can be connected as source only; inputs are compatible with sink outputs.

CDHD2-AF (MV) Control Board

I/F	Mfgr	Mating Connector	Manufacturer PN	Servotronix PN
C2	3M	Solder Plug Connector	10136-3000PE	CONr00000036-01
	3M	Solder Plug Junction Shell	10336-52F0-008	HODr00000036-00
C3	3M	Solder Plug Connector	10120-3000PE	CONr00000020-38
	3M	Solder Plug Junction Shell	10320-52F0-008	HODr00000020-00
C4	3M	Solder Plug Connector	10126-3000PE	CONr00000026-31
	3M	Solder Plug Junction Shell	10326-52F0-008	HODr00000026-00



USB C1: Mini-B	
1	5V
2	Data -
3	Data +
4	
5	GND

Each type of drive (AP, AF, EC, EB) *has the same control board, regardless of rating.*

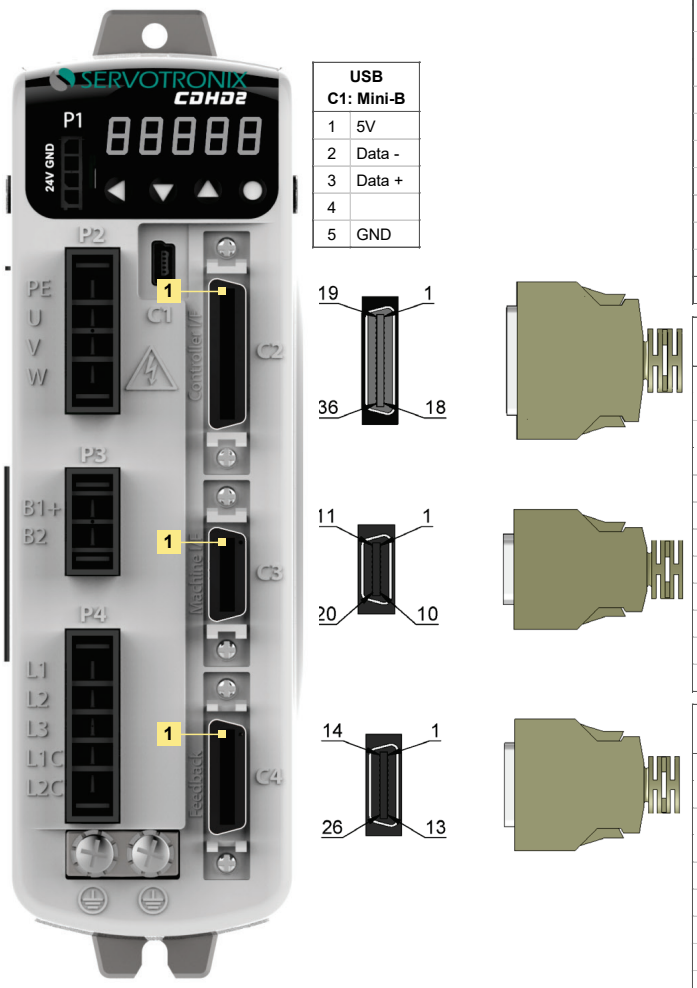
Controller I/F **C2**: MDR 36 Plug | 24-28 AWG			
1	Common output	19	Common input
2	Digital output 1	20	Digital input 2
3	Digital input 1	21	
4	Equivalent encoder output A-	22	Equivalent encoder output A+
5	Equivalent encoder output B-	23	Equivalent encoder output B+
6	Equivalent encoder output Z-	24	Equivalent encoder output Z+
7		25	Ground
8	Analog input 1+	26	Analog input 1-
9	Direction input+	27	Direction input-
	Secondary encoder B+		Secondary encoder B-
10	Ground	28	Pulse input+
			Secondary encoder A+
11	Pulse input-	29	Ground
	Secondary encoder A-		
12	Fast digital output 8	30	Fast digital output 7
13	Ground	31	Digital input 3
14	Digital input 4	32	Fast digital input 5
15	Fast digital input 6	33	Digital output 2
16	Digital output 3	34	Fast digital output 24V return
17	Fast digital output 24V	35	* Analog input 2-
18	* Analog input 2+	36	Analog output
* Optional. Refer to *Ordering Options*.			

Machine I/F **C3**: MDR 20 Plug | 24-28 AWG			
1	Secondary encoder A+	11	Secondary encoder A-
	Pulse input +		Pulse input -
2	Secondary encoder B+	12	Secondary encoder B-
	Direction input+		Direction input-
3	Secondary encoder Z+	13	Secondary encoder Z-
4	Secondary encoder 5V	14	Secondary encoder ground
5	Digital input 7	15	Digital input 8
6	Digital input 9	16	Digital input 10
7	Fast digital input 11	17	Digital output 4
8	Digital output 5	18	Digital output 6
9	Common input	19	Common output
10	Fault relay 1	20	Fault relay 2

Feedback **C4**: MDR 26 Plug | 24-28 AWG			
1	Incremental encoder A +	14	Incremental encoder A -
	SSI encoder data +		SSI encoder data -
2	Incremental encoder B +	15	Incremental encoder B -
	SSI encoder clock +		SSI encoder clock -
3	Incremental encoder Z +	16	Incremental encoder Z -
4	Hall U +	17	Hall V+
5	Hall W +	18	8V supply
6	Resolver sine +	19	Resolver sine -
7	Resolver cosine +	20	Resolver cosine -
8	Resolver reference +	21	Resolver reference -
9	Sine encoder sine +	22	Sine encoder sine -
10	Sine encoder cosine +	23	Sine encoder cosine -
11	5V/8V supply for feedback device	24	Ground (5V/8V return)
12	Motor temperature sensor	25	Motor temperature sensor
13	5V/8V supply for feedback device	26	Shield

AF Models Note Outputs are opto-isolated, and can be connected as sink only; outputs are compatible with source inputs. Inputs can be connected as source only; inputs are compatible with sink outputs.

CDHD2-EC (MV) Control Board



USB C1: Mini-B	
1	5V
2	Data -
3	Data +
4	
5	GND

Controller I/F C2: MDR 36 Plug | 24-28 AWG			
1	Common output	19	Common input
2	Digital output 1	20	Digital input 2
3	Digital input 1	21	
4	Equivalent encoder output A-	22	Equivalent encoder output A+
5	Equivalent encoder output B-	23	Equivalent encoder output B+
6	Equivalent encoder output Z-	24	Equivalent encoder output Z+
7		25	Ground
8	Analog input 1+	26	Analog input 1-
9	Direction input+	27	Direction input-
	Secondary encoder B+		Secondary encoder B-
10	Ground	28	Pulse input+
			Secondary encoder A+
11	Pulse input-	29	Ground
	Secondary encoder A-		
12	Fast digital output 8	30	Fast digital output 7
13	Ground	31	Digital input 3
14	Digital input 4	32	Fast digital input 5
15	Fast digital input 6	33	Digital output 2
16	Digital output 3	34	Fast digital output 24V return
17	Fast digital output 24V	35	* Analog input 2-
18	* Analog input 2+	36	Analog output
* Optional. Refer to *Ordering Options*.			

Machine I/F C3: MDR 20 Plug | 24-28 AWG			
1	Secondary encoder A+	11	Secondary encoder A-
	Pulse input +		Pulse input -
2	Secondary encoder B+	12	Secondary encoder B-
	Direction input+		Direction input-
3	Secondary encoder Z+	13	Secondary encoder Z-
4	Secondary encoder 5V	14	Secondary encoder ground
5	Digital input 7	15	Digital input 8
6	Digital input 9	16	Digital input 10
7	Fast digital input 11	17	Digital output 4
8	Digital output 5	18	Digital output 6
9	Common input	19	Common output
10	Fault relay 1	20	Fault relay 2

Feedback C4: MDR 26 Plug | 24-28 AWG			
1	Incremental encoder A + SSI encoder data +	14	Incremental encoder A - SSI encoder data -
2	Incremental encoder B + SSI encoder clock +	15	Incremental encoder B - SSI encoder clock -
3	Incremental encoder Z +	16	Incremental encoder Z -
4	Hall U +	17	Hall V+
5	Hall W +	18	8V supply
6	Resolver sine +	19	Resolver sine -
7	Resolver cosine +	20	Resolver cosine -
8	Resolver reference +	21	Resolver reference -
9	Sine encoder sine +	22	Sine encoder sine -
10	Sine encoder cosine +	23	Sine encoder cosine -
11	5V/8V supply for feedback device	24	Ground (5V/8V return)
12	Motor temperature sensor	25	Motor temperature sensor
13	5V/8V supply for feedback device	26	Shield

Each type of drive (AP, AF, EC, EB) *has the same control board, regardless of rating.*

EC Models Note	Outputs can be connected as either source or sink. Inputs can be connected as either as source or sink.

CDHD2-EB (MV) Control Board

I/F	Mfgr	Mating Connector	Manufacturer PN	Servotronix PN
C2	3M	Solder Plug Connector	10136-3000PE	CONr00000036-01
	3M	Solder Plug Junction Shell	10336-52F0-008	HODr00000036-00
C4	3M	Solder Plug Connector	10126-3000PE	CONr00000026-31
	3M	Solder Plug Junction Shell	10326-52F0-008	HODr00000026-00

USB **C1: Mini-B**	
1	5V
2	Data -
3	Data +
4	
5	GND

Controller I/F **C2**: MDR 36 Plug | 24-28 AWG			
1	Common output	19	Common input
2	Digital output 1	20	Digital input 2
3	Digital input 1	21	
4		22	
5		23	
6		24	
7		25	Ground
8	Analog input 1+	26	Analog input 1-
9		27	
10	Ground	28	
11		29	Ground
12		30	
13	Ground	31	Digital input 3
14	Digital input 4	32	Fast digital input 5
15		33	Digital output 2
16	Digital output 3	34	
17		35	Analog input 2-
18	Analog input 2+	36	

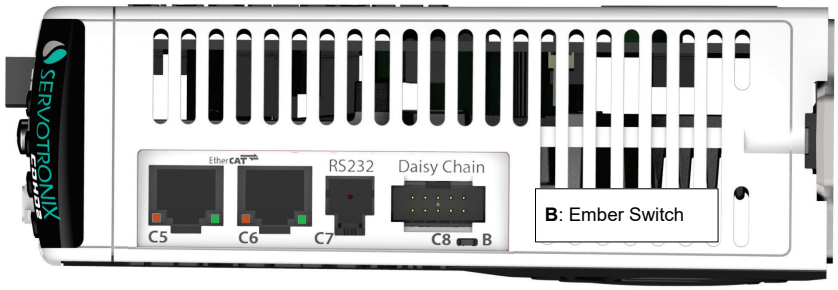
Feedback **C4**: MDR 26 Plug | 24-28 AWG			
1	Incremental encoder A + SSI encoder data +	14	Incremental encoder A - SSI encoder data -
2	Incremental encoder B + SSI encoder clock +	15	Incremental encoder B - SSI encoder clock -
3	Incremental encoder Z +	16	Incremental encoder Z -
4	Hall U +	17	Hall V+
5	Hall W +	18	
6		19	
7		20	
8		21	
9	Sine encoder sine +	22	Sine encoder sine -
10	Sine encoder cosine +	23	Sine encoder cosine -
11	5V supply for feedback device	24	Ground (5V return)
12	Motor temperature sensor	25	Motor temperature sensor
13	5V supply for feedback device	26	Shield

Each type of drive (AP, AF, EC, EB) *has the same control board, regardless of rating.*

EB Models Note | Outputs can be connected as either source or sink.
Inputs can be connected as either as source or sink.

CDHD2 (MV) Control Board Top Panel

Interfaces vary according to model.



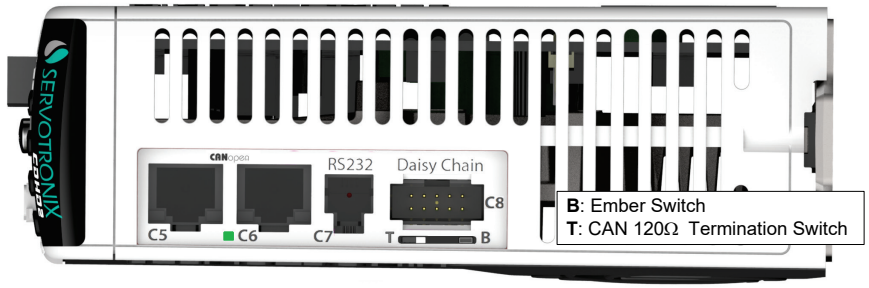
EtherCAT IN C5: RJ45	
1	TX +
2	TX -
3	RX +
4	
5	
6	RX -
7	
8	

EtherCAT OUT C5: RJ45	
1	TX +
2	TX -
3	RX +
4	
5	
6	RX -
7	
8	

RS232 C7: 4p4c	
1	RX
2	GND ISO
3	TX
4	Shield

Daisy Chain / Gantry C8: 0.1" IDC Female	
1	DC Shield
2	
3	RX
4	GND
5	TX
6	GND
7	Gantry A+
8	Gantry A-
9	Gantry B+
10	Gantry B-

I/F	Mfgr	Mating Connector	Manufacturer PN	Servotronix PN
C5 C6	Molex	Connector	44915-0011	
C7	AIM-Cambridge	Connector	32-5964UL	
C8	TE	Connector	1658527-3	CONr00000010-67



CANopen IN C5: RJ45	
1	CANH
2	CANL
3	FGND
4	
5	
6	
7	FGND
8	

CANopen OUT C6: RJ45	
1	CANH
2	CANL
3	FGND
4	
5	
6	
7	FGND
8	

RS232 C7: 4p4c	
1	RX
2	GND ISO
3	TX
4	Shield

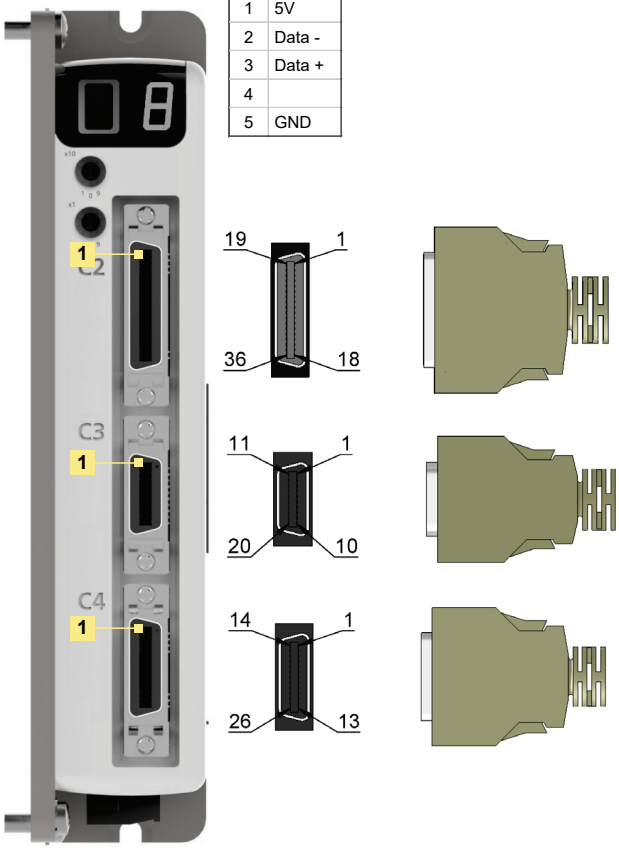
Daisy Chain / Gantry C8: 0.1" IDC Female	
1	DC Shield
2	
3	RX
4	GND
5	TX
6	GND
7	Gantry A+
8	Gantry A-
9	Gantry B+
10	Gantry B-

Note EB models do not have RS232 port (interface C7).

CDHD2-AF/EC (LV) Control Board

I/F	Mfgr	Mating Connector	Manufacturer PN	Servotronix PN
C2	3M	Solder Plug Connector	10136-3000PE	CONr00000036-01
	3M	Solder Plug Junction Shell	10336-52F0-008	HODr00000036-00
C3	3M	Solder Plug Connector	10120-3000PE	CONr00000020-38
	3M	Solder Plug Junction Shell	10320-52F0-008	HODr00000020-00
C4	3M	Solder Plug Connector	10126-3000PE	CONr00000026-31
	3M	Solder Plug Junction Shell	10326-52F0-008	HODr00000026-00

USB C1: Mini-B	
1	5V
2	Data -
3	Data +
4	
5	GND



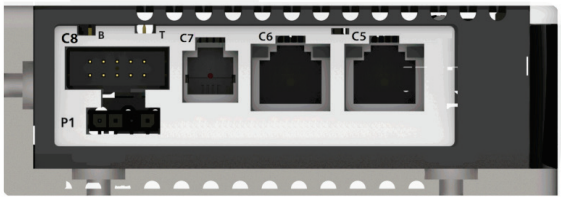
Controller I/F **C2**: MDR 36 Plug | 24-28 AWG			
1	Common output	19	Common input
2	Digital output 1	20	Digital input 2
3	Digital input 1	21	
4	Equivalent encoder output A-	22	Equivalent encoder output A+
5	Equivalent encoder output B-	23	Equivalent encoder output B+
6	Equivalent encoder output Z-	24	Equivalent encoder output Z+
7		25	Ground
8	Analog input 1+	26	Analog input 1-
9	Direction input+	27	Direction input-
	Secondary encoder B+		Secondary encoder B-
10	Ground	28	Pulse input+
			Secondary encoder A+
11	Pulse input-	29	Ground
	Secondary encoder A-		
12	Fast digital output 8	30	Fast digital output 7
13	Ground	31	Digital input 3
14	Digital input 4	32	Fast digital input 5
15	Fast digital input 6	33	Digital output 2
16	Digital output 3	34	Fast digital output 24V return
17	Fast digital output 24V	35	* Analog input 2-
18	* Analog input 2+	36	Analog output
* Optional. Refer to *Ordering Options*.			

Machine I/F **C3**: MDR 20 Plug | 24-28 AWG			
1	Secondary encoder A+	11	Secondary encoder A-
	Pulse input +		Pulse input -
2	Secondary encoder B+	12	Secondary encoder B-
	Direction input+		Direction input-
3	Secondary encoder Z+	13	Secondary encoder Z-
4	Secondary encoder 5V	14	Secondary encoder ground
5	Digital input 7	15	Digital input 8
6	Digital input 9	16	Digital input 10
7	Fast digital input 11	17	Digital output 4
8	Digital output 5	18	Digital output 6
9	Common input	19	Common output
10	Fault relay 1	20	Fault relay 2

Feedback **C4**: MDR 26 Plug | 24-28 AWG			
1	Incremental encoder A +	14	Incremental encoder A -
	SSI encoder data +		SSI encoder data -
2	Incremental encoder B +	15	Incremental encoder B -
	SSI encoder clock +		SSI encoder clock -
3	Incremental encoder Z +	16	Incremental encoder Z -
4	Hall U +	17	Hall V+
5	Hall W +	18	8V supply
6	Resolver sine +	19	Resolver sine -
7	Resolver cosine +	20	Resolver cosine -
8	Resolver reference +	21	Resolver reference -
9	Sine encoder sine +	22	Sine encoder sine -
10	Sine encoder cosine +	23	Sine encoder cosine -
11	5V/8V supply for feedback device	24	Ground (5V/8V return)
12	Motor temperature sensor	25	Motor temperature sensor
13	5V/8V supply for feedback device	26	Shield

CDHD2-AF/EC (LV) Control Board Top Panel

B: Ember Switch
T: CAN 120Ω Termination Switch



Daisy Chain / Gantry **C8**: 0.1" IDC Female	
1	DC Shield
2	
3	RX
4	GND
5	TX
6	GND
7	Gantry A+
8	Gantry A-
9	Gantry B+
10	Gantry B-

RS232 **C7**: 4p4c	
1	RX
2	GND ISO
3	TX
4	Shield

EtherCAT OUT **C5**: RJ45	
1	TX +
2	TX -
3	RX +
4	
5	
6	RX -
7	
8	

EtherCAT IN **C5**: RJ45	
1	TX +
2	TX -
3	RX +
4	
5	
6	RX -
7	
8	

Daisy Chain / Gantry **C8**: 0.1" IDC Female	
1	DC Shield
2	
3	RX
4	GND
5	TX
6	GND
7	Gantry A+
8	Gantry A-
9	Gantry B+
10	Gantry B-

RS232 **C7**: 4p4c	
1	RX
2	GND ISO
3	TX
4	Shield

CANopen OUT **C6**: RJ45	
1	CANH
2	CANL
3	FGND
4	
5	
6	
7	FGND
8	

CANopen IN **C5**: RJ45	
1	CANH
2	CANL
3	FGND
4	
5	
6	
7	FGND
8	

I/F	Mfgr	Mating Connector	Manufacturer PN	Servotronix PN
C5 **C6**	Molex	Connector	44915-0011	
C7	AIM-Cambridge	Connector	32-5964UL	
C8	TE	Connector	1658527-3	CONr00000010-67

3.2 Controller Interface – C2

Wire the digital and analog inputs and outputs according to the requirements of your application.

Unused pins must remain unwired.

Common input and common output on the Controller interface (C2) and the Machine interface (C3) are connected internally.

24 VDC supply and return can be connected on either the Controller interface (C2) or the Machine interface (C3), but it is not necessary to connect it on both.

All digital inputs and digital outputs on all CDHD2 models are opto-isolated.

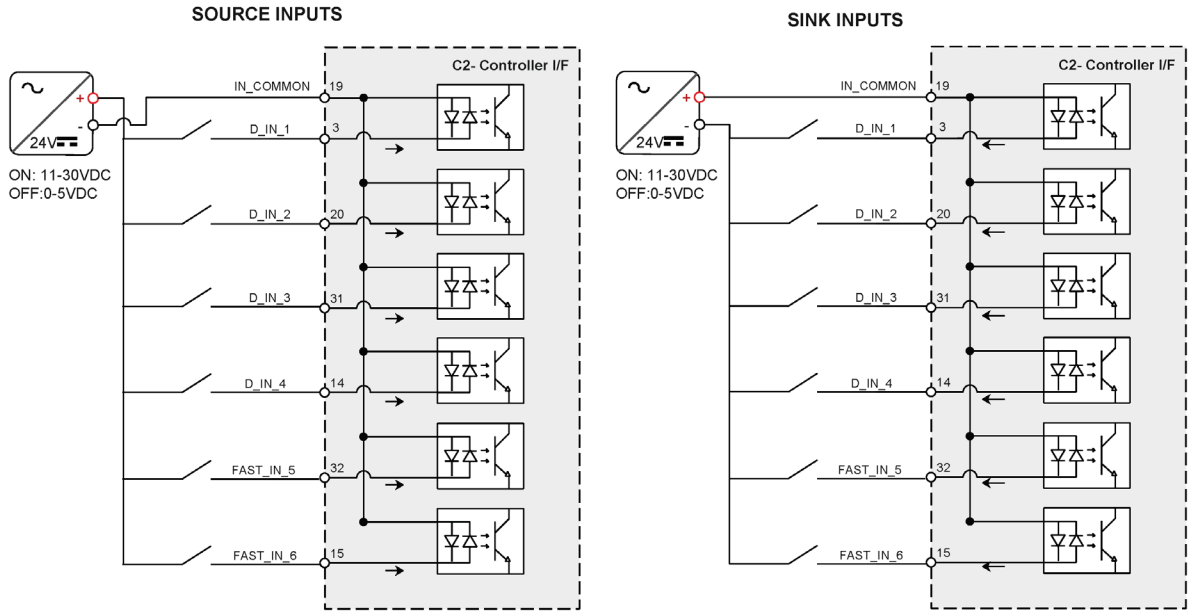
Fast outputs are sink only. All other digital inputs and digital outputs can be connected as either source or sink.

If both the fast and regular digital outputs are configured as sink, one power supply can usually be used for all outputs.

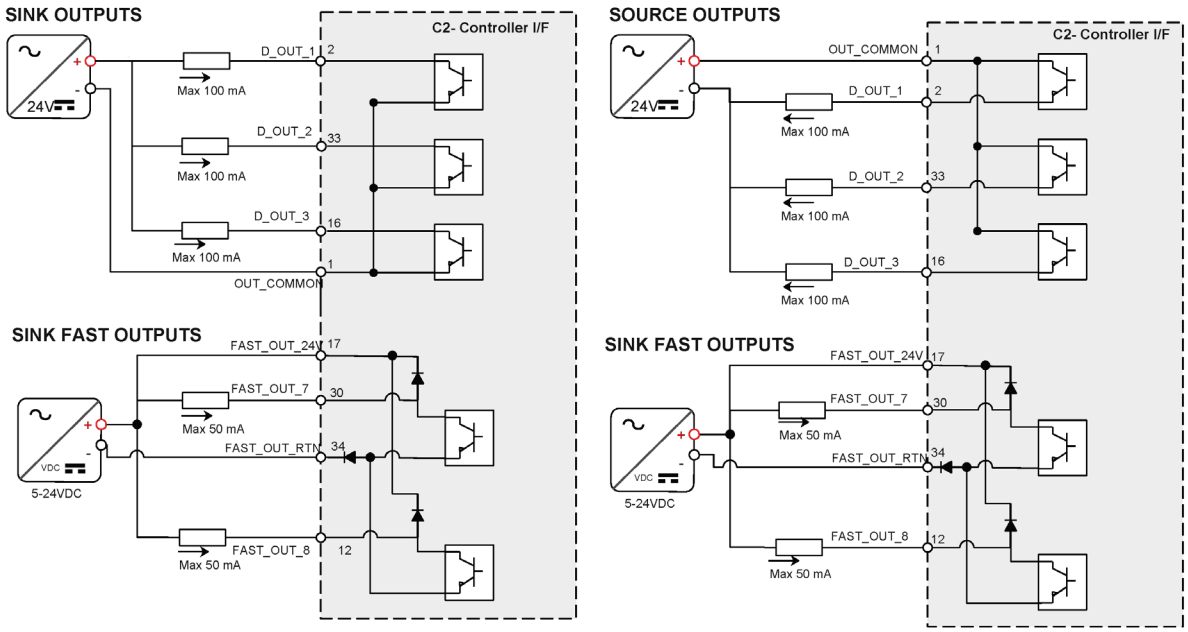
It is recommended to use a fast output (7 or 8) for the motor brake release signal.

A separate power supply is required for the motor brake. An external flywheel diode must be added if the load is inductive (e.g., relay).

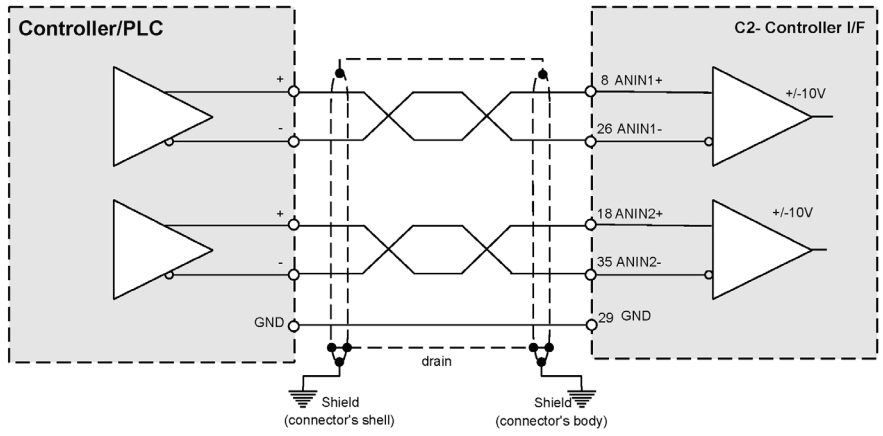
Digital Input Wiring – C2



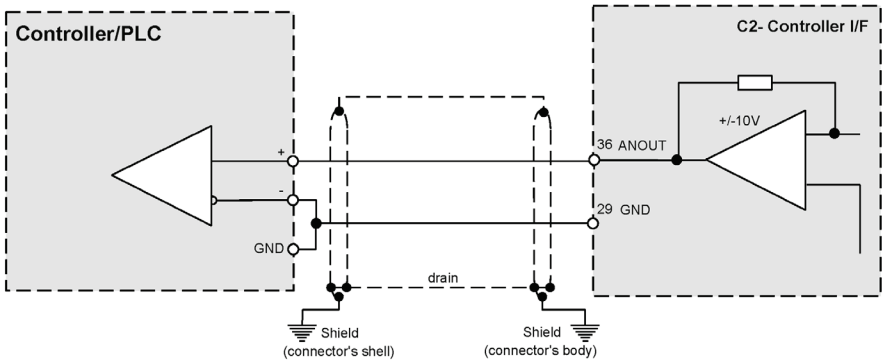
Digital Output Wiring – C2



Analog Input Wiring – C2



Analog Output Wiring – C2



Pulse and Direction Opto-Isolated Wiring – C2

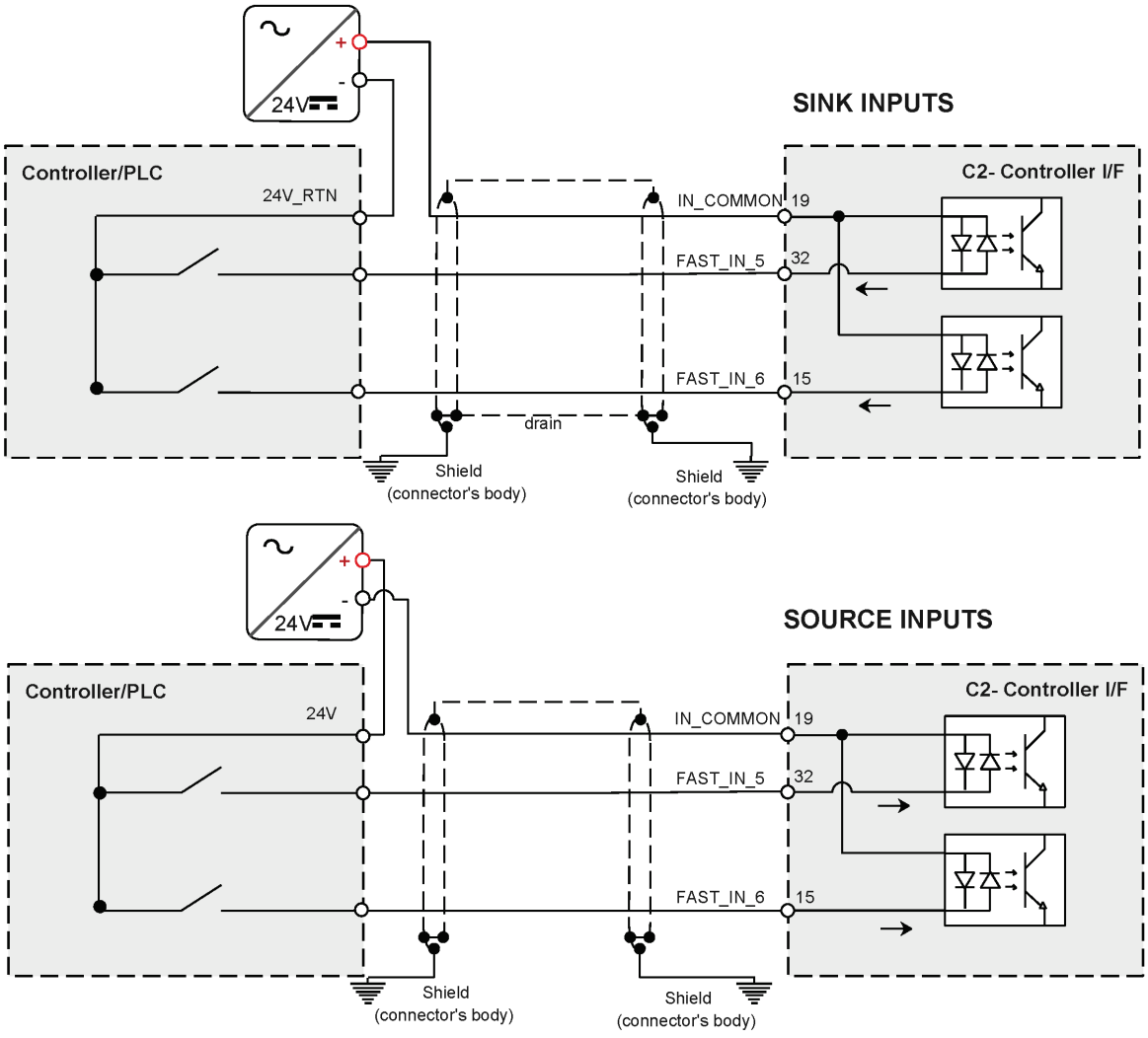
The CDHD2 enables the connection of PLCs with a 24 VDC single-end signal to the drive.

This type of signaling requires the use of the fast digital inputs on the CDHD2 Controller interface (C2).

For this configuration, CDHD2 inputs 5 and 6 must be set to INMODE 17 and 18, respectively. (Applicable/recognized in GEARMODE 0, 1, 2).

- The Pulse signal is connected to fast digital input 5 on pin 32.
- The Direction signal is connected to fast digital input 6 on pin 15.
- The cable shield on the PLC side can be connected to any available shield connector.
- The cable shield on the CDHD2 side can be connected to the shell of the 36-pin connector.

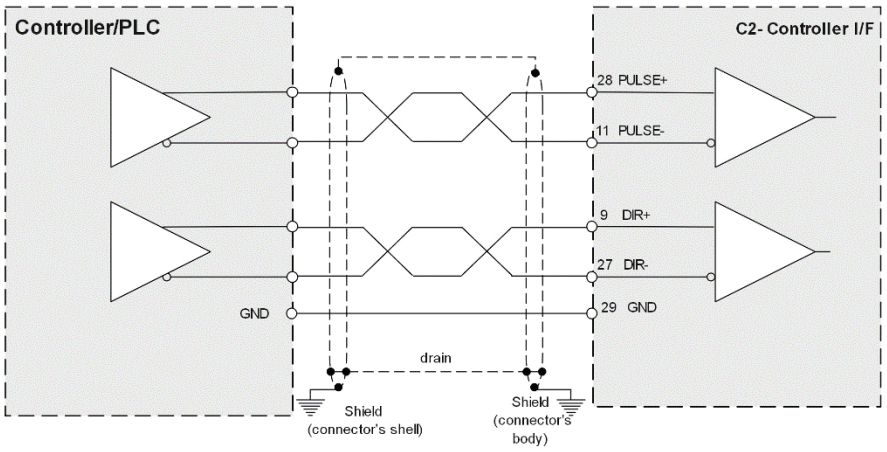
Note The 24 VDC power supply must be provided by the user.


SINK INPUTS
24V
+
-
Controller/PLC
24V_RTN
C2- Controller I/F
IN_COMMON
19
FAST_IN_5
32
FAST_IN_6
15
drain
Shield
(connector's body)
Shield
(connector's body)
SOURCE INPUTS
24V
+
-
Controller/PLC
24V
C2- Controller I/F
IN_COMMON
19
FAST_IN_5
32
FAST_IN_6
15
Shield
(connector's body)
Shield
(connector's body)

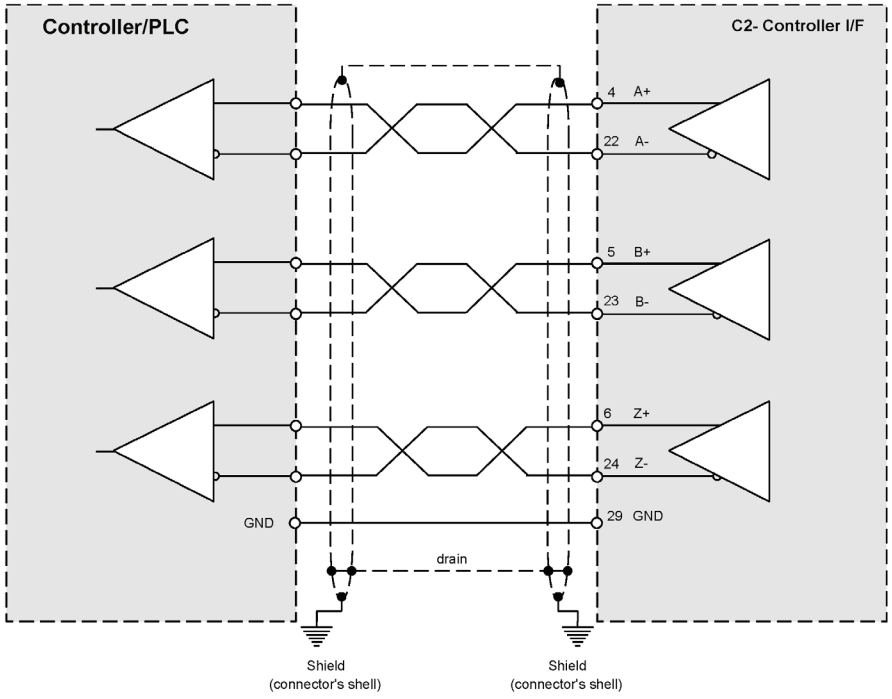
Pulse and Direction Differential Inputs Wiring – C2

When using the CDHD2 Controller interface (C2):

- The Pulse signals are received from the controller or PLC on pins 28 and 11.
- The Directions signals are received from the controller or PLC on pins 9 and 27.



Simulated Encoder Equivalent Outputs Wiring – C2



Motor Brake Wiring – C2

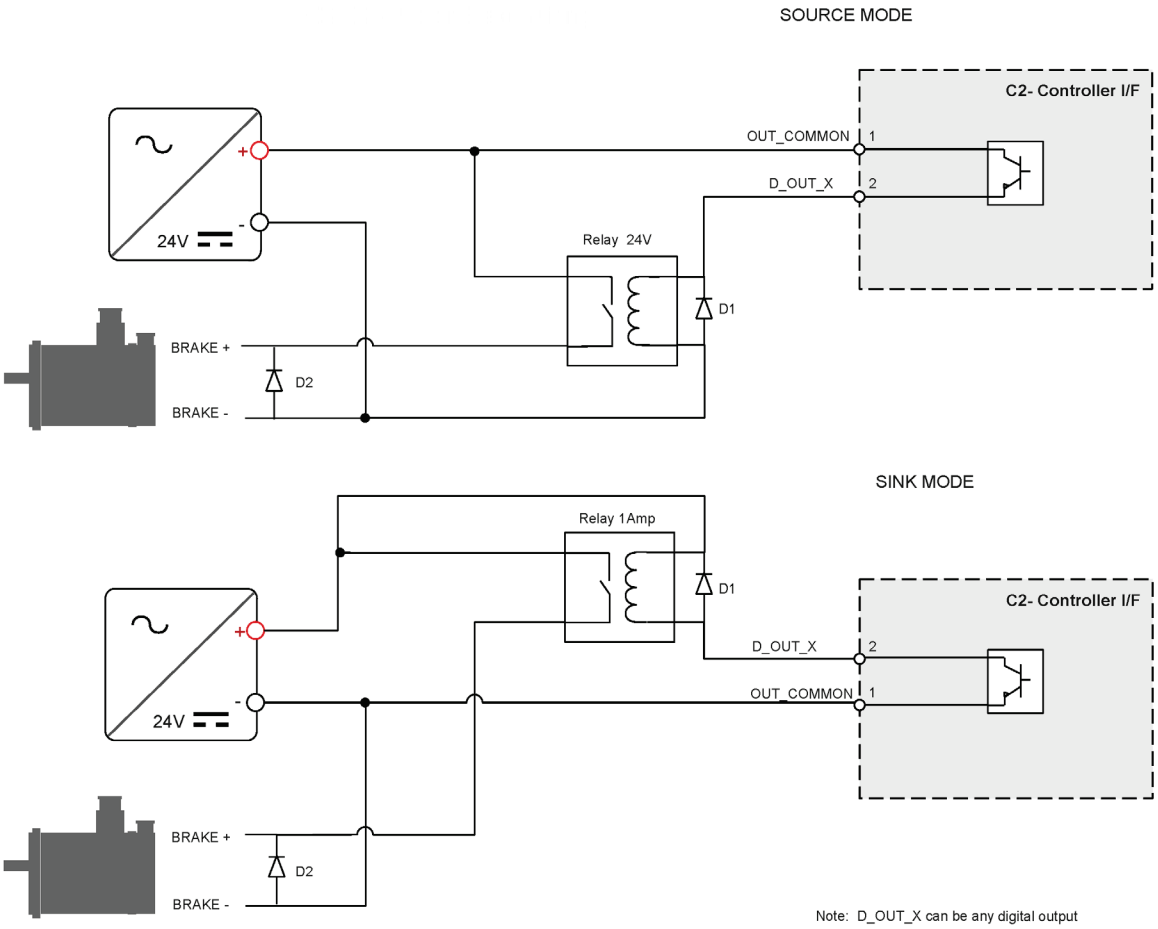
The CDHD2 does not have sufficient amperage to activate a motor brake, but can control a motor brake via an external relay. It is recommended that fast digital output 7 on the Controller interface (C2) be used for the relay.

The selection of power supply, relay and diodes depends on the specification of the actual motor brake used in the application. Motor brake wiring requires the following:

- Flyback diodes: D1 and D2 (for example, PN 1N4002)
- Relay: 24 V < 100mA
- Relay coil: > 500 Ω
- External power supply: 24V

When using an inductive load, such as motor brake, be sure to install flyback diodes according to the wiring diagrams.

When using a DC relay to switch inductive loads, such as a relay sequence circuit, a motor brake, or a DC solenoid, it is important to always absorb surges (e.g., with a diode) to protect the contacts; that is, the drive's digital inputs and outputs. Switching these inductive loads on and off can generate a counter-electromotive force (Back-EMF) of several hundred to several thousand volts, which can severely damage contacts and greatly shorten product life.



3.3 Machine Interface – C3

Note EB Models – CDHD2 EB models do not have a Machine interface.

Wire the machine inputs and outputs according to the requirements of your application.

Unused pins must remain unwired.

Common input and common output on the Controller interface (C2) and the Machine interface (C3) are connected internally.

24 VDC supply and return can be connected on either the Controller interface (C2) or the Machine interface (C3), but it is not necessary to connect it on both.

All digital inputs and digital outputs on all CDHD2 models are opto-isolated.

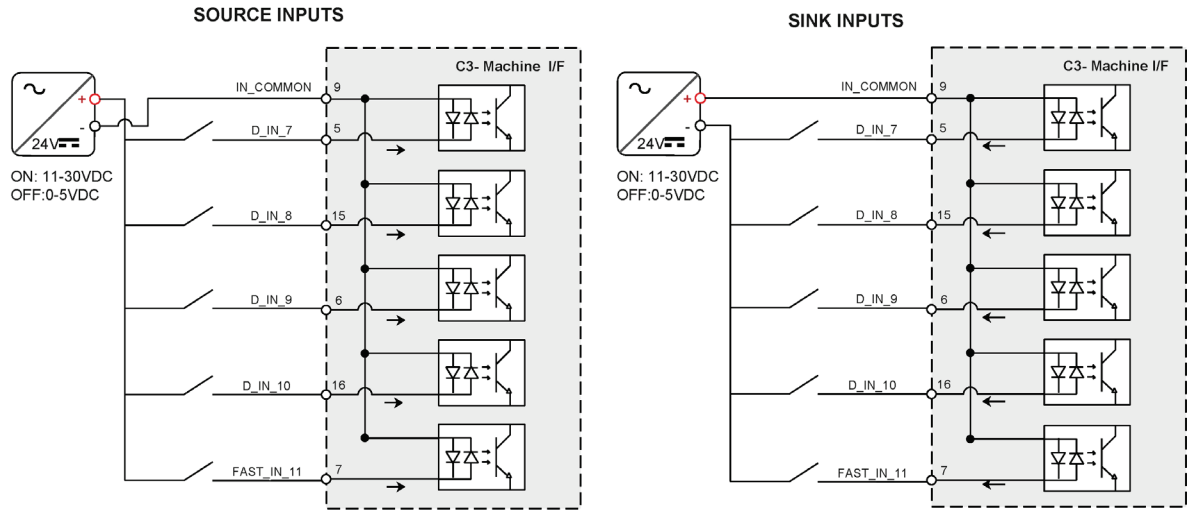
Fast outputs are sink only. All other digital inputs and digital outputs can be connected as either source or sink.

If both the fast and regular digital outputs are configured as sink, one power supply can usually be used for all outputs.

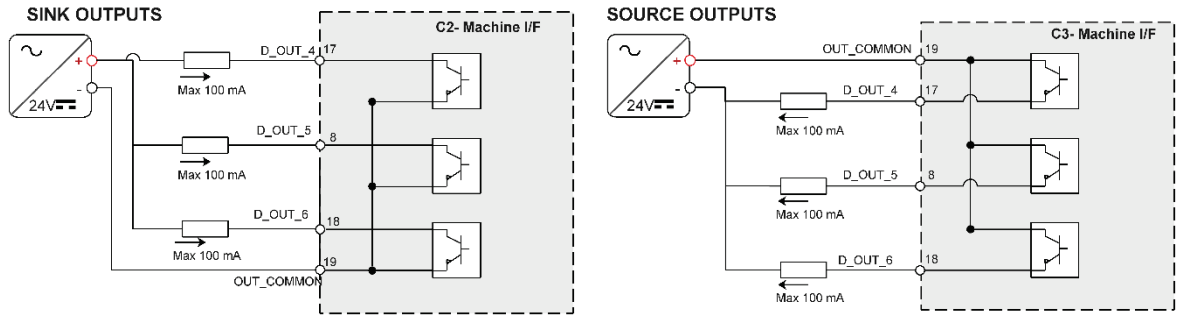
It is recommended to use a fast output (7 or 8) for the motor brake release signal.

A separate power supply is required for the motor brake. An external flywheel diode must be added if the load is inductive (e.g., relay).

Digital Input Wiring – C3



Digital Output Wiring – C3



3.4 Motor Feedback Interface – C4

Wire the motor feedback interface according to the type of feedback device to be used in your application. Refer to the tables in *Feedback Wiring* for common types of feedback wiring.

Pins 1, 2, 14 and 15 have dual functionality.

Pin 25 for the motor temperature sensor is connected internally in the drive to CDHD2 ground.

Unused pins must remain unwired.

Feedback Wiring – C4

The following tables present suggestions for the most common feedback variations. Refer to the drive's *User Manual* for additional information. If your motor feedback does not match any of the following, contact technical support.

Use the ServoStudio 2 **Motor Setup** procedure and the **Feedback** screens to define motor feedback type, resolution, and other parameters

sensAR Encoder

Pin #	Twisted Pair	Signal Description
1	Twisted Pair	Serial Data +
14		Serial Data -
11		+5 VDC
24		0 VDC
26		Shield

BiSS-C Encoder

Pin #	Twisted Pair	Signal Description
1	Twisted Pair	Serial Data + (SLO+)
14		Serial Data - (SLO-)
2	Twisted Pair	Serial Clock + (MA+)
15		Serial Clock - (MA-)
11		+5 VDC
24		0 VDC
26		Shield

Incremental Encoder A Quad B, Index Pulse and Halls

Pin #	Twisted Pair	Signal Description
1	Twisted Pair	Incremental Encoder A+
14		Incremental Encoder A-
2	Twisted Pair	Incremental Encoder B+
15		Incremental Encoder B-
3	Twisted Pair	Incremental Encoder Z+
16		Incremental Encoder Z-
4		Hall U
17		Hall V
5		Hall W
12	Twisted Pair	Motor Temperature Sensor
25		Motor Temperature Sensor
11		+5 VDC
24		0 VDC
26		Shield

Incremental Encoder A Quad B, Index Pulse and Differential Halls

Pin #	Twisted Pair	Signal Description
1	Twisted Pair	Incremental Encoder A+
14		Incremental Encoder A-
2	Twisted Pair	Incremental Encoder B+
15		Incremental Encoder B-
9		Hall U+
22		Hall U-
10		Hall V+
23		Hall V-
3		Hall W+
16		Hall W-
12	Twisted Pair	Motor Temperature Sensor
25		Motor Temperature Sensor
11		+5 VDC
24		0 VDC
26		Shield

Differential Halls Only

Pin #	Twisted Pair	Signal Description
9		Hall U+
22		Hall U-
10		Hall V+
23		Hall V-
3		Hall W+
16		Hall W-
12	Twisted Pair	Motor Temperature Sensor
25		Motor Temperature Sensor
11		+5 VDC
24		0 VDC
26		Shield

Tamagawa Incremental

Pin #	Twisted Pair	Signal Description
1	Twisted Pair	Incremental Encoder A+ / Hall U+
14		Incremental Encoder A- / Hall U-
2	Twisted Pair	Incremental Encoder B+ / Hall V+
15		Incremental Encoder B- / Hall V-
3	Twisted Pair	Incremental Encoder Z+ / Hall W+
16		Incremental Encoder Z- / Hall W-
12	Twisted Pair	Motor Temperature Sensor
25		Motor Temperature Sensor
11		+5 VDC
24		0 VDC
26		Shield

Sine Encoder

Pin #	Twisted Pair	Signal Description
9	Twisted Pair	Sine Encoder Sine+
22		Sine Encoder Sine-
10	Twisted Pair	Sine Encoder Cosine+
23		Sine Encoder Cosine-
12	Twisted Pair	Motor Temperature Sensor
25		Motor Temperature Sensor
11		+5VDC
24		0VDC
26		Shield

Sine Encoder with Halls

Pin #	Twisted Pair	Signal Description
9	Twisted Pair	Sine Encoder Sine+
22		Sine Encoder Sine-
10	Twisted Pair	Sine Encoder Cosine+
23		Sine Encoder Cosine-
4		Hall U
17		Hall V
5		Hall W
12	Twisted Pair	Motor Temperature Sensor
25		Motor Temperature Sensor
11		+5 VDC
24		0 VDC
26		Shield

Sine Encoder with Index

Pin #	Twisted Pair	Signal Description
9	Twisted Pair	Sine Encoder Sine+
22		Sine Encoder Sine-
10	Twisted Pair	Sine Encoder Cosine+
23		Sine Encoder Cosine-
3	Twisted Pair	Sine Encoder Z+
16		Sine Encoder Z-
12	Twisted Pair	Motor Temperature Sensor
25		Motor Temperature Sensor
11		+5 VDC
24		0 VDC
26		Shield

Sine Encoder with Index and Halls

Pin #	Twisted Pair	Signal Description
9	Twisted Pair	Sine Encoder Sine+
22		Sine Encoder Sine-
10	Twisted Pair	Sine Encoder Cosine+
23		Sine Encoder Cosine-
3	Twisted Pair	Sine Encoder Z+
16		Sine Encoder Z-
4		Hall U
17		Hall V
5		Hall W
12	Twisted Pair	Motor Temperature Sensor
25		Motor Temperature Sensor
11		+5 VDC
24		0 VDC
26		Shield

Sick 5V (HIPERFACE Protocol and Sine Signal)

Pin #	Twisted Pair	Signal Description
1	Twisted Pair	Serial Data +
14		Serial Data -
9	Twisted Pair	Sine Encoder Sine+
22		Sine Encoder Sine-
10	Twisted Pair	Sine Encoder Cosine+
23		Sine Encoder Cosine-
12	Twisted Pair	Motor Temperature Sensor
25		Motor Temperature Sensor
11		+5 VDC
24		0 VDC
26		Shield

Sick 8V (HIPERFACE Protocol and Sine Signal)

Pin #	Twisted Pair	Signal Description
1	Twisted Pair	Serial Data +
14		Serial Data -
9	Twisted Pair	Sine Encoder Sine+
22		Sine Encoder Sine-
10	Twisted Pair	Sine Encoder Cosine+
23		Sine Encoder Cosine-
12	Twisted Pair	Motor Temperature Sensor
25		Motor Temperature Sensor
18		+8 VDC
24		0 VDC
26		Shield

HEIDENHAIN (EnDat 2.x Communication Only)

Pin #	Twisted Pair	Signal Description
1	Twisted Pair	Serial Data +
14		Serial Data -
2	Twisted Pair	Serial Clock +
15		Serial Clock -
12	Twisted Pair	Motor Temperature Sensor
25		Motor Temperature Sensor
11		+5 VDC
24		0 VDC
26		Shield

HEIDENHAIN (EnDat 2.x with Sine/Cosine)

Pin #	Twisted Pair	Signal Description
1	Twisted Pair	Serial Data +
14		Serial Data -
2	Twisted Pair	Serial Clock +
15		Serial Clock -
9	Twisted Pair	Sine Encoder Sine+
22		Sine Encoder Sine-
10	Twisted Pair	Sine Encoder Cosine+
23		Sine Encoder Cosine-
11		+5 VDC
24		0 VDC
26		Shield

Single Turn: Nikon 17-bit Single Turn | Tamagawa 17-bit Incremental Single Turn

Pin #	Twisted Pair	Signal Description
1	Twisted Pair	Serial Data +
14		Serial Data -
11		+5 VDC
24		0 VDC
26		Shield

Multi-turn: Nikon 17-bit Multi-turn | Tamagawa 17-bit Multi-turn | Sankyo Multi-turn

Pin #	Twisted Pair	Signal Description
1	Twisted Pair	Serial Data +
14		Serial Data -
11		+5 VDC
24		0 VDC
26		Shield

Resolver

Pin #	Twisted Pair	Signal Description
6	Twisted Pair	Resolver Sine +
19		Resolver Sine -
7	Twisted Pair	Resolver Cosine +
20		Resolver Cosine -
8	Twisted Pair	Resolver Reference +
21		Resolver Reference -
12	Twisted Pair	Motor Temperature Sensor
25		Motor Temperature Sensor
24	Ground	Optional: Internal shield of each twisted pair (sine, cosine, reference)
26		Cable Shield

3.5 Communication Interfaces

Refer to the Control Board pinouts diagrams.

Fieldbus Devices – C5 and C6

Interfaces C5 and C6 are RJ45 ports that serve as transmitter and receiver for drives operating on a CAN or EtherCAT network.

Refer to the *CDHD2 EtherCAT and CANopen Reference Manual* for details on installation, configuration and operation of drives on CANopen and EtherCAT networks.

USB Serial Interface – C1

For commissioning, the drive can be connected to the host computer through interface C1 (USB port). It is strongly recommended that you use the USB cable supplied by Servotronix, which has been tested and proven for reliability.

RS232 Serial Interface – C7

For commissioning, the drive can be connected to the host computer through interface C7 (RS232 port). Alternately, interface C1 (USB port) can be used.

Daisy Chain and Gantry Interface – C8

The CDHD2 can be addressed and controlled on a daisy-chained RS232 line.

In a daisy-chain RS232 configuration, all drives must be daisy-chained through interface C8. Each drive must have a unique address to enable its identification on the network.

3.6 Drive Addressing

If only one drive is connected to the host computer, the drive address is set to 0 by default and does not need to be defined.

If two or more drives are connected to the network, they must each be assigned a unique communication address. When configuring a daisy-chain, address 0 cannot be used.

- **MV models**: Set the drive address using operator panel parameter **P0003** or VarCom parameter ADDR. Then execute SAVE and power-cycle the drive.
- **LV models**: Set the drive address using the rotary address switch on the front panel. Then power-cycle the drive.

Within a CANopen network, a unique node address (identification number) must be allocated to each individual CANopen device.

Within an EtherCAT network, a physical node address (identification number) does not have to be specifically allocated to a device; the EtherCAT controller will assign the address. Two or more drives connected in the EtherCAT network can be set at the same physical address; the EtherCAT controller will automatically set the slave IDs.

4 Power Board

4.1 Power Board Pinouts

Make sure the main voltage rating matches the drive specification. Applying incorrect voltage may cause drive failure.

Do not apply power until all hardware connections are complete.

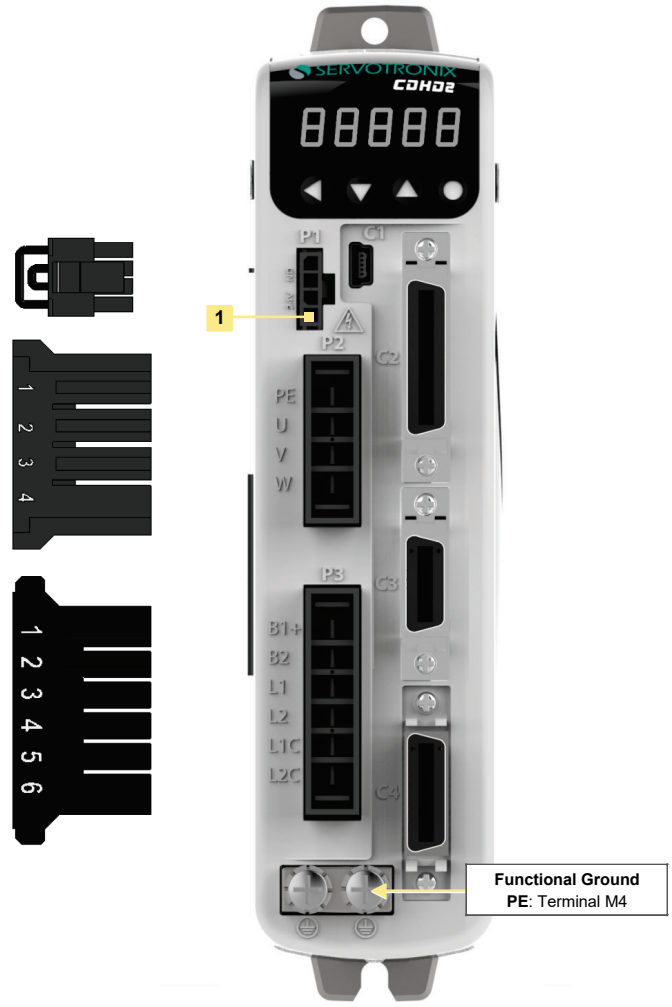
The power board interfaces vary depending on the specific CDHD2 model.

CDHD2-1D5/CDHD2-003 (MV) Power Board

STO – Safe Torque Off **P1**: Molex | 22-24 AWG	
1	24 VDC (STO enable)
2	Ground (24 VDC return)
3	
4	

Motor **P2**: JST J300 | 18 AWG		
1	PE	Functional Ground
2	U	Motor Phase U
3	V	Motor Phase V
4	W	Motor Phase W

AC Input and Regeneration **P3**: JST J300 | 18 AWG		
1	B1+	DC Bus +
2	B2	Regen Bus -
3	L1	AC Phase 1
4	L2	AC Phase 2
5	L1C	Logic AC Phase 1
6	LC2	Logic AC Phase 2



All drives of the specified rating have the same power board.

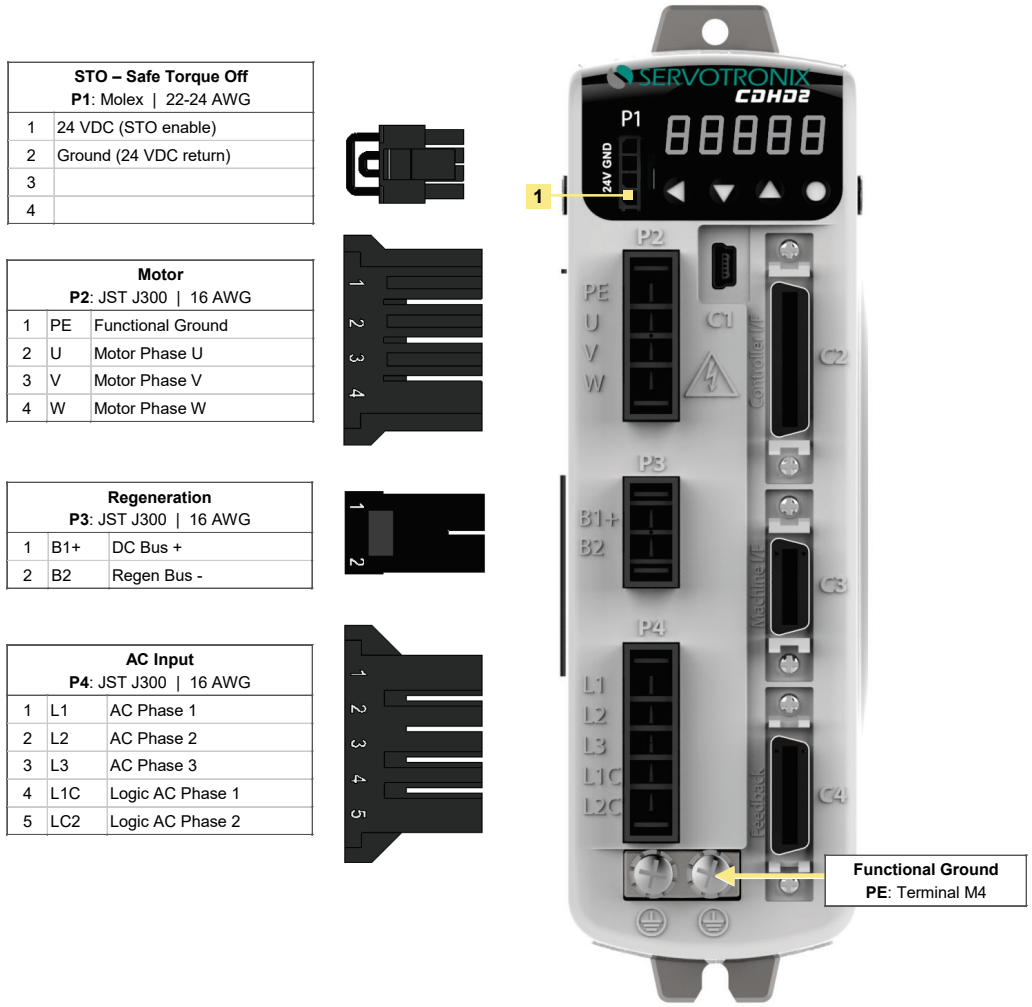
CDHD2-4D5/CDHD2-006 (MV) Power Board

STO – Safe Torque Off **P1**: Molex | 22-24 AWG	
1	24 VDC (STO enable)
2	Ground (24 VDC return)
3	
4	

Motor **P2**: JST J300 | 16 AWG		
1	PE	Functional Ground
2	U	Motor Phase U
3	V	Motor Phase V
4	W	Motor Phase W

Regeneration **P3**: JST J300 | 16 AWG		
1	B1+	DC Bus +
2	B2	Regen Bus -

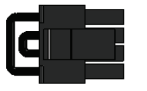
AC Input **P4**: JST J300 | 16 AWG		
1	L1	AC Phase 1
2	L2	AC Phase 2
3	L3	AC Phase 3
4	L1C	Logic AC Phase 1
5	LC2	Logic AC Phase 2



All drives of the specified rating have the same power board.

CDHD2-008/CDHD2-010/CDHD2-013 (MV) Power Board

STO – Safe Torque Off **P1**: Molex | 22-24 AWG	
1	24 VDC (STO enable)
2	Ground (24 VDC return)
3	
4	

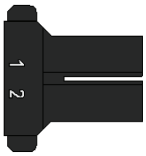


Motor **P2**: JST J400 | 14 AWG		
1	PE	Functional Ground
2	U	Motor Phase U
3	V	Motor Phase V
4	W	Motor Phase W

Regeneration **P3**: JST J300 | 16 AWG		
1	B1+	DC Bus +
2	B2	Regen Bus -

Main AC Input **P4**: JST J400 | 14 AWG		
1	L1	AC Phase 1
2	L2	AC Phase 2
3	L3	AC Phase 3

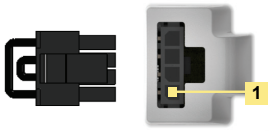
Logic Power AC Input **P5**: JST J300 | 16 AWG		
1	L1C	AC Phase 1
2	L2C	AC Phase 2



All drives of the specified rating have the same power board.

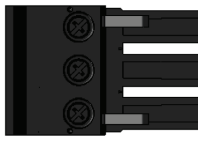
CDHD2-020/CDHD2-024 (MV) Power Board

STO – Safe Torque Off **P1**: Molex | 22-24 AWG	
1	24 VDC (STO enable)
2	Ground (24 VDC return)
3	
4	

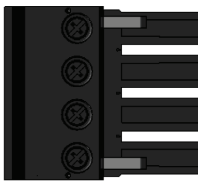


Logic Power AC Input **P2**: Phoenix | 16 AWG		
1	L1C	AC Phase 1
2	L2C	AC Phase 2

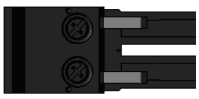
Main AC Input **P3**: Phoenix | 12-13 AWG		
1	L1	AC Phase 1
2	L2	AC Phase 2
3	L3	AC Phase 3



Motor **P4**: Phoenix | 10-11 AWG		
1	PE	Functional Ground
2	U	Motor Phase U
3	V	Motor Phase V
4	W	Motor Phase W

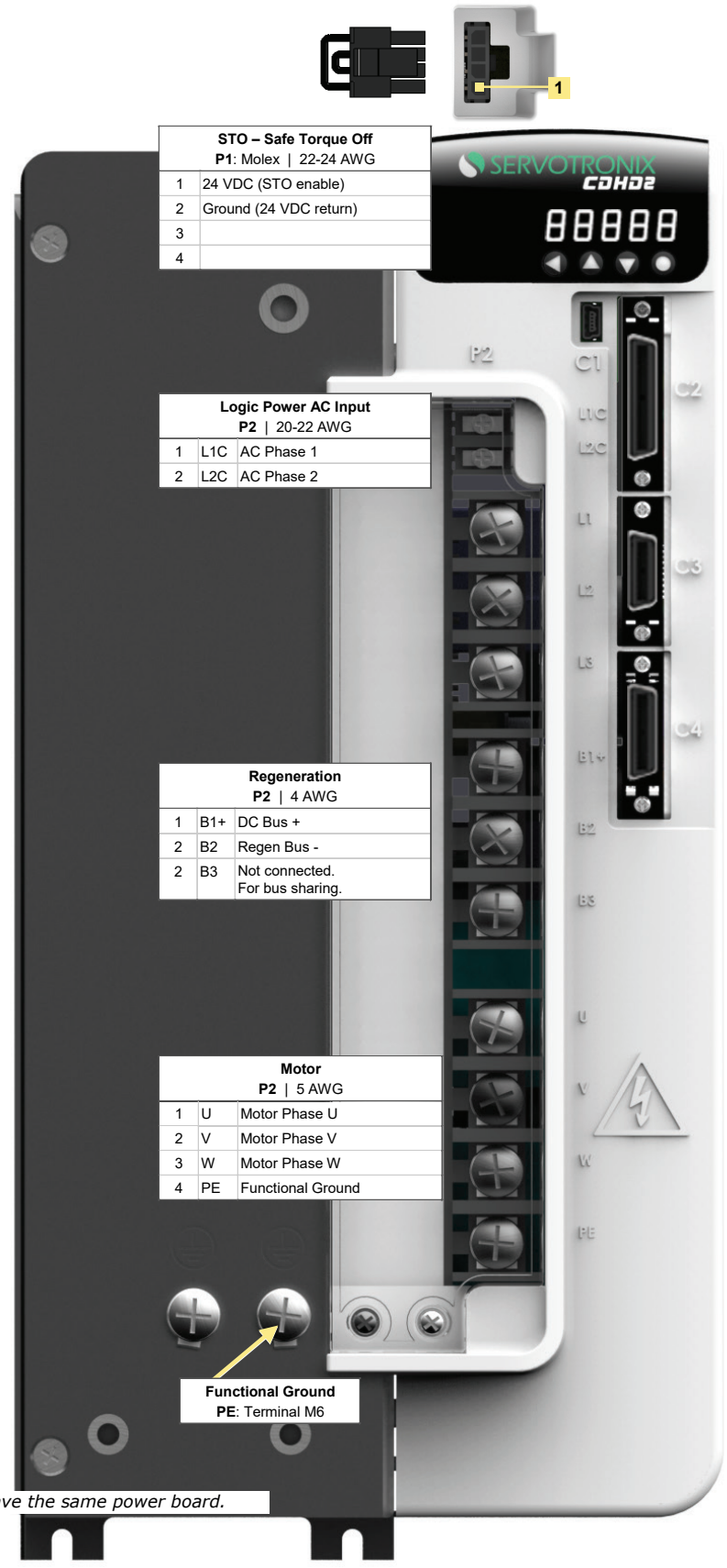


Regeneration **P5**: Phoenix | 14 AWG		
1	B2	Regen Bus -
2	B1+	DC Bus +



All drives of the specified rating have the same

CDHD2-033/CDHD2-044/CDHD2-055 (MV) Power Board



STO – Safe Torque Off **P1**: Molex | 22-24 AWG	
1	24 VDC (STO enable)
2	Ground (24 VDC return)
3	
4	

Logic Power AC Input **P2** | 20-22 AWG		
1	L1C	AC Phase 1
2	L2C	AC Phase 2

Regeneration **P2** | 4 AWG		
1	B1+	DC Bus +
2	B2	Regen Bus -
2	B3	Not connected. For bus sharing.

Motor **P2** | 5 AWG		
1	U	Motor Phase U
2	V	Motor Phase V
3	W	Motor Phase W
4	PE	Functional Ground

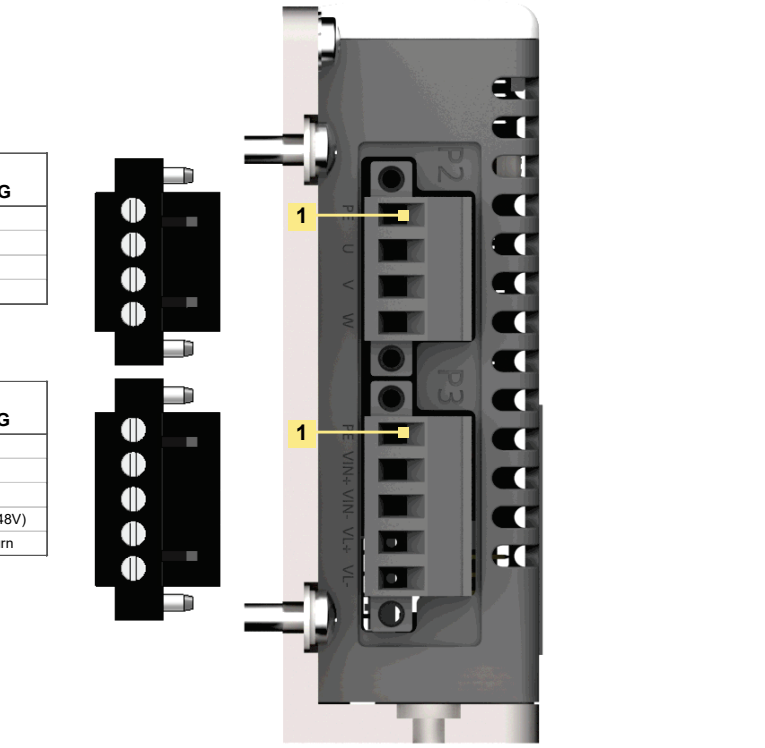
Functional Ground
PE: Terminal M6

All drives of the specified rating have the same power board.

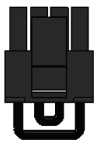
CDHD2-003/CDHD2-006/CDHD2-012 (LV) Power Board

Motor P2: Wurth | 12-24 AWG		
1	PE	Functional Ground
2	U	Motor Phase U
3	V	Motor Phase V
4	W	Motor Phase W

Power P2: Wurth | 12-24 AWG		
1	PE	Functional Ground
2	VIN+	Input Voltage + (20-90V)
3	VIN-	Input Voltage Return
4	VL+	Logic Input Voltage (20-48V)
5	VL-	Logic Input Voltage Return



STO – Safe Torque Off P1: Molex | 26-28 AWG	
1	24 VDC (STO enable)
2	Ground (24 VDC return)
3	
4	



4.2 Safe Torque Off (STO) Interface – P1

Safe torque off (STO) is a safety function that prevents the drive from delivering power to the motor, which can generate torque.

STO Enable and STO Return must be connected to enable CDHD2 operation.
The STO Enable signal voltage must be 24 VDC.

If the application does not require STO control, jumper pin 4 to pin 1, and pin 3 to pin 2, to bypass the STO.

Refer to the Power Board pinouts diagrams.

4.3 Motor Power Interface – P2 / P4

The Motor Power interfaces and connectors vary among CDHD2 models.

Refer to the Power Board Pinouts diagrams.

4.4 Regeneration Resistor Interface – P3 / P5

The Regeneration Resistor interfaces and connectors vary among CDHD2 models.

If the application requires a regeneration (regen) resistor, connect the regen resistor between terminals B1+ and B2.

Regen and **AC Input Voltage** are combined on one interface on CDHD2-1D5 and CDHD2-003, 120/240 VAC.

Refer to the Power Board pinouts diagrams.

4.5 AC Input

The AC Input interfaces and connectors vary among CDHD2 models.

On CDHD2-1D5 and CDHD2-003, Regen and AC Input Voltage are combined on one connector. Since these models support only single-phase AC, they do not have a L3 terminal for bus power.

Refer to the Power Board pinouts diagrams.

Make sure the main voltage rating matches the drive specification. Applying incorrect voltage may cause drive failure.
Do not apply power until all hardware connections are complete.

Prevent inrush surge:
Bus Power (L1-L2-L3): After switching on bus power, wait 1 minute before switching on again, regardless of time in Off state.
Logic Power (L1C-L2C): After switching off logic power, wait 1 minute before switching on again.

5 Software

Note Refer to the section *Host Computer System* in the user manual for detailed instructions on installing the software and device drivers.

5.1 ServoStudio 2 Installation

Use ServoStudio 2 software to configure the drive for your application.

1. Download ServoStudio 2 software from the Servotronix website or contact Technical Support
2. Install ServoStudio 2 software on the host computer.
3. Start ServoStudio 2 from the Windows Start menu or the shortcut on your desktop.

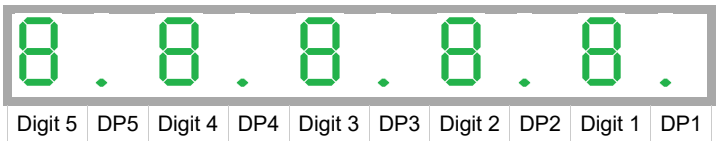
5.2 Drive Configuration

1. The first time the drive is connected to the host computer on the USB port, Windows may display a **Found New Hardware** wizard, or the new drivers will be added to the Windows Device Manager with an error or warning symbol.
2. In ServoStudio 2, select the **Motor Setup** wizard from the navigation menu.

   Follow the prompts to configure the CDHD2 for your particular motor.
3. When Motor Setup is complete, use the ServoStudio 2 **Autotuning** and the **Application Setup** wizards to optimize drive parameters for your particular application.

6 Drive Status Codes

The CDHD2 5-digit display provides indications of drive status, such as operation modes, drive enable status, warnings, and fault conditions.



Note CDHD2 **LV** models have a 1-digit display. The LV models use the same status codes, but display the code characters sequentially.

6.1 Operational Status Code

These codes are preceded by **S** (Status mode) on models with 5-digit display panel.

Digit or DP	Display	Description
DP 1	.	Drive enabled
	.	Drive disabled
Digits 1 and 2		Operating mode, depending on COMMODE.
		If COMMODE 0: Analog/P&D/Serial (OPMODE)
	0 0	0 = Velocity control, using serial commands
	0 1	1 = Velocity control, using analog input
	0 2	2 = Current control, using serial commands
	0 3	3 = Current control, using analog input
	0 4	4 = Position control, using gearing input
	0 8	8 = Position control, using serial commands
		If COMMODE 1: (Object 6061)
	P P	1 = Profile Position mode
	P S	3 = Profile Velocity mode
	P t	4 = Profile Torque mode
	H H	6 = Homing mode
	S P	8 = Cyclic Synchronous Position mode
	S S	9 = Cyclic Synchronous Velocity mode
	S t	10 = Cyclic Synchronous Torque mode
DP 2	.	EtherCAT/CANopen OP mode active
	.	EtherCAT/CANopen INIT mode

Digit or DP	Display	Description
Digit 3	**r**	Motor is moving
	.	Motor is not moving
Digit 4	**#**	First character of a warning code.
	.	No faults or warnings
Digit 5	**S**	Status mode.
	P	Parameter mode.
	C	Command mode..
	d	Monitoring mode..
	F	Faults & Information mode

6.2 Warning Codes

These codes are preceded by **S** (Status mode) on drives with a 5-digit display panel.

Warnings			
Code	**Name**	**Description**	**Action Required**
_	Realtime Overload Warning	Drive has detected that CPU is close to its computational limit.	
b	Tamagawa Battery Low-Voltage	Battery voltage is nearing fault level. Relevant only for Tamagawa encoder.	Prepare to replace battery soon.
c	Regen Resistor Overload	Regeneration resistor is overloaded.	
F	Foldback	Drive fold current dropped below the drive fold current warning threshold (MIFOLDWTHRESH). Or, motor fold current dropped below the motor fold current warning threshold (IFOLDWTHRESH).	Check the drive-motor sizing. This warning can occur if the drive or the motor is under-sized (under-powered) for the application.
H	Motor Over-Temperature	Motor is overheated.	
L 1	Hardware positive limit switch is open	Positive hardware limit switch is activated.	
L 2	Hardware negative limit switch is open	Negative hardware limit switch is activated.	
L 3	Hardware positive and negative limit switches are open	Positive and negative hardware limit switches are both activated.	
L 4	Software positive limit switch is tripped	Positive software limit switch is activated. PFB > POSLIMPOS and POSLIMMODE = 1	

Warnings			
L 5	Software negative limit switch is tripped	Negative software limit switch is activated. PFB < POSLIMNEG and POSLIMMODE = 1	
L 6	Software limit switches are tripped	Positive and negative software limit switches are activated. PFB > POSLIMPOS and PFB < POSLIMNEG and POSLIMMODE = 1	
L 7	Gantry Partner Axis Positive Limit Switch	The second gantry axis has reached a positive hardware or software limit switch.	
L 8	Gantry Partner Axis Negative Limit Switch	The second gantry axis has reached a negative hardware or software limit switch.	
n	STO	The STO signal is not connected when drive disabled.	Check that the STO connector (P1) is wired correctly.
o	Bus AC Supply Line Disconnected	At least one phase of the main power for the bus supply is not connected.	
r	Offset and/or Gain Adjustment Values Detected After SININIT	Significant offset and/or gain adjustment values were detected after SININIT. The values that trigger this warning are half the value of those used to declare a fault. Although the system may continue to function, these values indicate the existence of a problem, which may worsen over time.	Check the encoder and associated hardware. These values suggest some degradation in either electronics (e.g., encoder, drive) or wiring (e.g., increased wire resistance, increased leakage between wires). The problem must be analyzed and repaired.
S 1	Cannot Use SFBTYPE 1 with Analog OPMODE	Cannot use the specified type of secondary feedback with analog operation modes (i.e., OPMODE 1, OPMODE 3)	
t	Over-Temperature	The temperature on the power board and/or on the control board and/or the power module (IPM) has exceeded the preset limit.	Check if the ambient temperature exceeds the drive specification. Otherwise contact technical support.
u	Under-Voltage	The bus voltage is below the minimum value.	Check that the main AC voltage supply is connected to the drive and is switched on. Verify that the setting of UVMODE is correct.

6.3 Fault Codes

These codes are preceded by **F** (Fault mode) on drives with a 5-digit display panel.

Faults			
Code	**Name**	**Description**	**Action Required**
- 5	Motor Setup Failed	Motor Setup procedure failed (MOTORSETUPST will show the reason)	Check phase and motor wiring. Make sure to choose the correct feedback type, and follow the hints in MOTORSETUPST.
- 1	Not Configured	Drive configuration required.	Set drive parameters and execute CONFIG.
_	Realtime Overload Fault	CPU has exceeded its computational limit. Realtime execution takes longer than 31.25 µs.	Contact technical support.
≡	Watchdog Fault	Generally occurs due to an unforeseen circumstance. The drive is inoperable until power is cycled.	Contact technical support.
A 4	CAN Supply Fault	A problem with the internal voltage supply for the CAN bus.	The drive probably needs repair. Contact technical support.
b	Drive Locked	Security code and key do not match. Fatal fault; drive cannot be operated.	Contact technical support.
b 1	PLL (phase-locked loop) Synchronization Failed	Controller synchronization signal is missing or not stable. The fault is detected only when synchronization is enabled by SYNCSOURCE command.	Check if controller provide synchronization signal. Check the cable connection and wiring.
C 1	CAN Heartbeat Lost	Drive detected disconnection between CAN master and drive.	Reconnect master and slave, and power cycle the drive.
e	Parameter Memory Checksum Failure	The non-volatile memory used to store drive parameters is empty or the data is corrupted. May occur during power off if SAVE operation has not completed.	Reconfigure the drive, or download the parameter set, and save the parameters. If problem persists, contact technical support.
E	Failure Writing to Flash Memory	An internal problem accessing the flash memory. Fatal fault; drive cannot be operated.	Contact technical support.
e 1 0 1	FPGA Config Fail	The code for the FPGA did not load. Fatal fault; drive cannot be operated.	Contact technical support.
e 1 0 5	Self Test Fail	The power-up self test failed. Fatal fault; drive cannot be operated.	Contact technical support.
e 1 0 6	Control EEPROM Fault	A problem accessing the EEPROM on the control board. Fatal fault; drive cannot be operated.	Contact technical support.

Faults			
e107	Power EEPROM Fault	A problem accessing the EEPROM on the power board. Fatal fault; drive cannot be operated.	Contact technical support.
e108	Vbus Measure Circuit Fail	A failure occurred in the circuit that measures bus voltage.	Reset faults. If the fault persists, the drive probably needs repair. Contact technical support.
e109	Current-Sensors Offset Out-of-Range	The calculated offsets for the current sensors are out of range.	Reset faults. If the fault persists, the drive probably needs repair. Contact technical support.
e120	FPGA Version Mismatch	FPGA version does not match the firmware version	Update either the FPGA version or drive version
e121	Internal Error	Internal error due to an endless while loop or a numerical issue	Contact technical support.
e123	Motor Plate Read Failed	Motor type nameplate data cannot be read.	Reconnect the feedback device. Make sure the motor type nameplate data is present.
e124	SAVE and Power Cycle Required	Parameter was changed, and requires SAVE and power cycle to take effect.	SAVE and then cycle power to the drive.
e125	Fieldbus Version Mismatch	EtherCAT - the MicroBlaze version does not match the version specified by drive.	Make sure the correct version has been downloaded to the drive.
e126	ESI Version Mismatch	EtherCAT - the ESI version does not match the version specified by drive.	Make sure the correct version has been downloaded to the drive.
e127	Output Over-Current Detected	Over-current detected on one of the digital outputs. This fault disables the drive.	Verify correct wiring of the digital outputs. Make sure the output circuit is not shorted.
e129	Feedback Type Auto-Detection Failed	Feedback type auto-detection failed to identify the type of feedback device. This fault disables the drive.	Verify the connection. Manually configure the actual type of feedback.
e130	EnDat Excessive Resolution	EnDat high resolution feedback cannot be handled by the drive. This fault disables the drive.	
e131	MOTORNAME/MTP Data Mismatch	Drive may have been configured previously for another, different motor. This fault disables the drive.	Clear MOTORNAME and clear faults. Perform tuning with parameters for the connected motor.
e132	Firmware Version is Not Supported by this Drive	Firmware version higher than 1.44.X cannot run on this drive. This fault disables the drive.	Download a compatible firmware version to the drive.

Faults			
e 1 3 4	ESI Vendor Mismatch	On EtherCAT. The ESI vendor data does not match the data specified by the drive. This fault disables the drive.	Make sure the correct vendor data is downloaded to drive.
F 1	Drive Foldback	Drive average current exceeds rated drive continuous current. It occurs after the Foldback warning has occurred.	Check motor-drive sizing. This fault can occur if the drive is under-sized (under-powered) for the application. Check that the commutation angle is correct (i.e., commutation is balanced).
F 2	Motor Foldback	Motor average current exceeds rated motor continuous current. It occurs after the Foldback warning has occurred.	Check the drive-motor sizing. This fault can occur if the motor is under-sized (under-powered) for the application.
F 2 H	Pulse Train Frequency Too High	The external pulse train frequency has exceeded the maximum specified input frequency.	Reduce the frequency of the gearing pulses commanded from the controller.
F 3	Stall Fault	A stall fault occurred because the motor was in a stalled state for too long; that is, [I > MICONT] and [I > 0.9 ILIM] and [V < STALLVEL] for [time > STALLTIME].	Remove the stall condition, and take care to prevent stall conditions.
F b 1	Fieldbus – Target position exceeds velocity limit	A target position command from controller was rejected because it would cause the motor to exceed the velocity limit.	Enable the drive and send valid position commands.
F b 1 2	Fieldbus Interpolation Cycle Exceeds Sync Time	The fieldbus interpolation cycle exceeds the defined sync time.	Adjust the cycle time setting.
F b 1 3	Received Object Index Exceed Objects Array Size		Reset the drive.
F b 3	EtherCAT – Cable disconnected	The connection between controller and drive was removed.	Reestablish the connection between controller and drive.
F b 4	Fieldbus Target Command Lost	The fieldbus controller has not sent a target command in 3 consecutive instances.	Clear the fault and allow the controller to send new commands.
F b 7	CAN is in Bus-Off State	The drive has disconnected from the CAN bus due to communication errors, and is no longer sending/receiving communication packets.	Check CAN cabling, and verify the CAN network is functioning properly.
F b 8	EtherCAT Packet Loss	EtherCAT packets have been lost.	Make sure the EtherCAT master (controller) sends the packets within the time defined (by the master).

Faults			
F b 9	Fieldbus - Drive Active but not in Operational State	Drive was enabled and in an operational state upon receiving a command to move to a lower state of communication.	Make sure the controller does not switch to a lower state of communication while the drive is enabled.
G 1	Gantry Difference Axis Fault (Active Disable)	The gantry difference axis has reported a fault that requires active disable to be handled by the master axis.	Correct the fault on the gantry difference axis, and use GANTRYCLRFLT
G 2	Gantry Difference Axis Fault (not Active Disable)	The gantry difference axis has reported a fault that cannot be handled by active disable.	Correct the fault on the gantry difference axis, and use GANTRYCLRFLT
G 3	Inter-Drive Communication Fault	There is a sync loss or timeout error in the inter-drive communication layer.	Check the physical connection of the inter-drive communication cable.
G 4	Gantry Alignment Process Failed	The gantry alignment failed due to a timeout or a fault or drive disabling during the alignment process.	
G 5	Gantry Difference Controller is Saturated	The gantry controller current command is saturated.	
G 6	Gantry Did Not Receive PFB Ack from Partner Axis	The axis sent position feedback data to the partner axis but the partner axis did not acknowledge receipt.	Check the physical connection of the inter-drive communication cable.
G 7	Gantry FIFO Buffer is Higher than Expected	The FIFO buffer counter indicates a number of frames that is higher than expected.	
G 8	Too Many Communication Errors	There are too many consecutive or parity or timeout errors.	
G 9	High Rate of Gantry Communication Errors	The number of communication errors has exceeded the acceptable rate.	
G 1 0	Gantry Did Not Receive Home Offset Ack from Partner	The axis sent home offset data to the partner axis but the partner axis did not acknowledge receipt.	Check the physical connection of the inter-drive communication cable.
G 1 1	Gantry Partner Axis Did Not Enable	The gantry partner axis did not become enabled during gantry enabling.	Check the gantry partner drive.
G 1 2	Gantry Partner Axis Reported a Fault	The gantry partner axis reported a fault.	Correct and clear the faults.
G 1 3	Gantry Homing Failed	Gantry homing failed.	Correct and clear the faults.
H	Motor Over-Temperature	Either the motor has overheated, or the drive is not set up correctly for the motor temperature sensor.	Check that the drive is configured properly (using THERMODE, THERMTYPE, THERMTHRESH and THERMTIME), and that the motor temperature sensor is properly connected to the drive if needed. If the drive is configured and wired properly, check whether the motor is under-sized for the application.

Faults			
J	Velocity Over-Speed Exceeded	Actual velocity exceeded 1.2 times the velocity limit. The velocity limit is set using VLIM.	Check that VLIM is set to match the application requirements. Using velocity loop tuning, check for excessive overshoot.
J 1	Exceeded Maximum Position Error	The position error (PE) has exceeded the position error limit (PEMAX)	Change drive tuning to improve position tracking, or increase PEMAX to allow a greater position error.
J 2	Exceeded Maximum Velocity Error	The velocity error (VE) has exceeded the velocity error limit (VEMAX)	Change drive tuning to improve velocity tracking, or increase VEMAX to allow a greater velocity error.
J 3	Excessive PE Value	The position error (PE) has reached the software numerical limit.	Check tuning.
J 4	Motor Runaway Condition Detected	The motor moves in negative direction although the commanded current is positive. Commutation is incorrect. (Algebraic signs of actual current, acceleration and velocity do not match.)	Correct MPHASE setting. Activate and improve the phase find process.
J 5	Secondary Feedback Position Mismatch	Position deviation between motor and load is too great.	Increase SFBPETHRESH, SFBPETIME, SFBPEMAX, or improve position tuning.
n	STO Fault	The STO signal is not connected when drive enabled.	Check that the STO connector (P1) is wired correctly.
n 1	Regen Over- Current	The preset current limit for regen current has been exceeded.	Increase the value of the regen resistor.
n 3	Emergency Stop Issued	The input defined as emergency stop has been activated.	Turn off the specific input.
n 4 1	Power Brake Open Load	Open load on the power brake output	Make sure the power brake load cables are connected properly and are not damaged.
n 4 2	Power Brake Short	Short circuit on the power brake output	Replace the motor brake or the entire motor.
n 4 3	Invalid Gain Table Data	The condition LMJRGT1 < LMJRGT2 <LMJRGT3 has not been met.	Modify and correct the gain tables.
n 4 5	Power Brake Fault	A fault occurred on the power brake.	Replace the motor brake.
o	Over-Voltage	The bus voltage exceeded the maximum value.	Check whether a regen resistor is required for the application.
o 1 5	Plus 15V Out of Range	The internal +15 V supply is out of range.	The drive probably needs repair. Contact technical support.

Faults			
o - 1 5	Minus 15V Out of Range	The internal -15 V supply is out of range.	The drive probably needs repair. Contact technical support.
o 5	5V Out of Range	5V is low or powering off.	May occur during power off. If occurs otherwise, contact technical support.
o 6	Logic AC Power Failure	The main power for the logic supply is off.	No action required. This is a normal response when logic power is turned off.
o 7	Bus AC Supply Line Disconnect	At least one phase of the main power for the bus supply is not connected.	Check the connection of the bus AC supply. Make sure the supply is on.
o 8	Regen Resistor Overload	The regen resistor load exceeds its allowed power.	Check whether the regen resistor properties are suited to the application.
o 9	Digital Output Over-Current	Over-current at the digital output has been detected. This fault disables the drive.	Check the digital output connections.
P	Over-Current	Over-current at the drive output has been detected. The drive allows this fault to occur up to 3 times in succession. After 3 faults, the drive forces a delay of 1 minute before it can be reenabled.	Check for a short circuit on the motor connection. Check for excessive overshoot in the current loop.
P 2	Unstable Current Loop	An unexpected high current overshoot has been detected	Check and modify current controller settings.
P 3	High IQ Current Detected	The detected IQ current is greater than 120% of ILIM.	Check and modify current controller settings.
r 1 0	Sine Feedback Communication Fail	Communication problem between the drive and EnDat/HIPERFACE encoder.	Check that the data and clock signals to the EnDat or HIPERFACE encoder are connected properly. The cable must be shielded.
r 1 4	Sine Encoder Quadrature Fault	Mismatch between calculated and actual encoder quadrature information.	Check the feedback device wiring. Check that the correct encoder type (MENCTYPE) is selected.
r 1 5	Sin/Cos Calibration Invalid	The sine/cosine calibration parameters are out of range. This fault is related to resolver and sine encoder feedback.	Re-execute the sine/cosine calibration process.

Faults			
r16	Feedback 5V Over-Current	The current supplied by the drive on the 5V primary encoder supply has exceeded the preset current limit. The drive allows this fault to occur up to 3 times in succession. After 3 faults, the drive forces a delay of 1 minute before it can be reenabled.	The CDHD2 can source a maximum current of 250 mA to the primary encoder. Check for a short-circuit on the encoder. Check if the encoder is drawing more than the current limit.
r17	Secondary Feedback Index Break	Secondary encoder index line not connected.	Check whether the drive is configured for working with the index signal on the secondary encoder, and check if the index signal is connected.
r18	Secondary Feedback A/B Line Break	One of the secondary feedback signals is not connected.	Check that all signals from the secondary encoder are properly connected to the drive.
r19	Secondary Feedback 5V Over-Current	The preset current limit for current supplied by the drive on the 5 V secondary encoder supply has been exceeded.	The CDHD2 can source a maximum current of 250 mA to the secondary encoder. Check for a short-circuit at the encoder. Check if the encoder is drawing more than the current limit.
r20	Feedback Communication Error	Communication with the feedback device did not initialize correctly.	Check that the feedback device is wired correctly. Check that the correct encoder type (MENCTYPE) is selected.
r21	Nikon Encoder Operational Fault	Communication with the Nikon MAR-A40A feedback device did not initialize correctly.	Check that the feedback device is wired correctly. Check that the correct encoder type (MENCTYPE) is selected.
r23	Phase Find Failed	Commutation initialization has failed. This fault occurs in systems that do not have commutation information (e.g., Hall signals) in the motor feedback device.	Check whether the motor feedback type and the phase-finding parameters are set correctly for the application.
r24	Tamagawa Init Failed	The initialization process with the Tamagawa feedback device has failed.	Check that the wiring to the encoder is correct.
r25	Pulse & Direction Input Line Break	One of the Pulse & Direction signals is not connected.	Check that all signals to the P&D inputs are properly connected to the drive.

Faults			
r26	Tamagawa Abs Operational Fault	Several faults are indicated by the feedback device and include one or more of the following: battery low/error, over-speed, counting error, multi-turn error.	Check the battery voltage and feedback wiring. Make sure the motor did not move at a high velocity during encoder initialization.
r27	Motor Phases Disconnected	One of the motor phases is disconnected. The current of one of the motor phases is effectively zero for more than 160 electrical degrees while the current command is greater than 100.	Check the wiring of the motor phases.
r28	Resolver Initialization Failed	The drive could not detect the proper gain setting or sampling point for the sine/cosine signals.	Check resolver wiring and gain value.
r29	Absolute Encoder Battery Low-Voltage	An error bit indicating a battery problem was detected in data from the drive.	Replace battery, then reset drive. If battery is replaced while drive is on, position information is retained.
r32	Endat2X Feedback Fault	CRC error occurred while drive was communicating with EnDat encoder. Also caused by EnDat encoder setting Alarm bit/s to indicate an encoder problem. This fault disables the drive.	Reset the encoder including encoder power off.
r33	Custom Absolute Encoder Internal Faults	Several possible issues are indicated by this feedback device fault: battery low or error; over-speed; counting error; multiturn error.	Check the battery voltage and feedback wiring. Make sure the motor did not move at a high velocity during encoder initialization.
r34	PFB Off Checksum Invalid	The calculated checksum of the PFB backup data does not match the expected checksum.	If required by the application, home the machine.
r35	PFB Off Data Mismatch	Multi-turn data of the PFB cannot be restored due to axis movement.	If required by the application, home the machine.
r36	No PFB Off Data	PFB backup memory is empty.	If required by the application, home the machine.
r37	Encoder Phase Error	In normal incremental encoder operation, quadrature inputs A and B are 90 degrees out of phase. The phase error occurs when edge transition is detected simultaneously on the A and B signals.	Set MENCAQBFILT to 0 to remove the filter on A and B signals. If problem persists, it may be due to a faulty encoder.

Faults			
r38	Differential Halls Line Break	Line break in differential Hall sensors.	Make sure HALLSTYPE matches the Hall sensors in use (single-ended or differential). Check whether all signals from the differential Hall sensors are properly connected to the drive.
r39	AB Quadrature Commutation Fault	Loss of commutation/encoder counts for AB quadrature encoder. The index signal serves as a reference position for detecting loss of commutation/pulses. The AB quadrature encoder counter is compared at different index positions. Between index position captures the count must be exactly MENCRESx4 (or 0 counts if moved back to same index location).	If a fault occurs shortly after motion begins, check MENCRES settings. If a fault occurs after some time it is likely due to EMI noise. Improve the installation. Make sure ground is connected. Make sure shield is connected on feedback and motor cables.
r4	A/B Line Break	One of the primary feedback signals is not connected. This fault occurs in incremental encoder, resolver and sine encoder feedback types.	Check whether all signals from the primary feedback device are properly connected to the drive.
r40	sensAR Encoder Fault	The drive has detected an internal fault on the sensAR encoder through communication.	Use command SRVSNSINFO to identify the fault.
r41	Sankyo Absolute Encoder Fault	One or more faults are indicated by the feedback device, including: battery low or error, over-speed, counting error, multi-turn error.	Check the battery voltage and feedback wiring. Make sure the motor did not move at a high velocity during encoder initialization.
r42	BiSS-C Encoder Indicates Internal Fault	This fault disables the drive.	Refer to the BiSS-C encoder manufacturer specific documentation.
r43	HIPERFACE Data Error	This fault disables the drive.	Enter the command HSAVE 1.
r45	MENCZPOS Does Not Match Halls	Either an incorrect MENCZPOS value was saved or the encoder has a different index location. The fault is declared when the difference between the electrical angle based on MENCZPOS and the electrical angle of the Hall sensors is greater than 30 degrees. This fault disables the drive.	Run Motor Setup wizard and save the new value of MENCZPOS.
r46	sensAR Encoder Position Fault	The returned position values are no longer considered reliable. This fault disables the drive.	Restart the drive.

Faults			
r47	sensAR Over-Temperature Fault	The device temperature is too high. This fault disables the drive.	
r48	sensAR Power Supply Insufficient for Operation	The voltage supply to the device has dropped below operational value. This fault disables the drive.	Check the encoder power supply.
r49	sensAR Battery Voltage is Below Threshold	The battery voltage is less than the threshold value. This fault disables the drive.	Replace the encoder battery.
r5	Index Line Break	Encoder index line is not connected.	Check that the drive is configured for working with the index signal (using MENCTYPE), and check if the index signal is connected.
r50	sensAR Requires Configuration Command	sensAR requires the reset command MTTURNRESET. This fault disables the drive.	
r51	Internal Position Synchronization Failure	Internal position synchronization of the multi-turn and single-turn modules is not functioning properly. This fault disables the drive.	Restart the drive.
r52	Multi-Turn Encoder General Failure	The multi-turn module is not functioning properly. This fault disables the drive.	Restart the drive.
r53	sensAR Firmware Not Compatible with sensAR Hardware	The firmware version is not compatible with the sensAR hardware. This fault disables the drive.	Contact Technical Support.
r6	Invalid Halls	The drive has detected either 000 or 111 state on the Hall feedback signals.	Check that the Hall signals are all properly connected. While turning the motor, read the Halls state (using HALLS) to see which signal is not connected. If the feedback type is Tamagawa, check that the feedback wiring is correct
r8	A/B Out of Range	Feedback analog signal is out of range. This fault is related to resolver and sine encoder feedback. The drive checks that the amplitudes of the sine and cosine signals are correct, based on the calculation sin2 + cos2 = 1	Check the amplitudes of the sine and cosine signals.

Faults			
r 9	Encoder Simulation Frequency Too High	The computed equivalent encoder output frequency exceeds the upper limit for this signal, which is 4 MHz.	Check the parameters used for setting up the equivalent encoder output. If using a sine encoder, check the ENCOUTRES parameter settings.
t 1	Power Stage Over-Temperature	The temperature on the power board has exceeded the preset limit.	Check if the ambient temperature exceeds the drive specification. Otherwise contact technical support.
t 2	Power Module Over-Temperature	The temperature inside the integrated power module has exceeded the preset limit.	Check if the ambient temperature exceeds the drive specification. Otherwise contact technical support.
t 3	Control Board Over-Temperature	The temperature on the control board has exceeded the preset limit.	Check if the ambient temperature exceeds the drive specification. Otherwise contact technical support.
t 4	Temperature Sensor Failure	Temperature sensor malfunction.	Cycle power. If problem persists, contact technical support.
u	Under-Voltage	The bus voltage is below the minimum value.	Check that the main AC voltage supply is connected to the drive and is switched on. The under-voltage limit can be read with the UVTHRESH command.

CDHD2

CDHD2 Servo Drive
Quick Start Guide

SERVOTRONIX
always in motion™

Servotronix - 21C Yagia Kapayim St.
POB 3919 Petach Tikva 49130, Israel
Tel: 972-3-927-3800
info@servotronix.com
www.servotronix.com