KOLLMORGEN

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OFDL Installation Manual

Manual Number Rev 0.2

DANAHER MOTION

Record of Manual Revisions

ISSUE	Date	Description of Revision
0.1	January-2006	Initial release
0.2	February-2006	Updated Model Number table

Safety Instructions

Only qualified personnel are permitted to transport, assembly, commission, and maintenance this equipment. Properly qualified personnel are persons who are familiar with the transport, assembly, installation, commissioning and operation of motors, and who have the appropriate qualifications for their jobs. The qualified personnel must know and observe the following standards and regulations:

IEC 364 resp. CENELEC HD 384 or DIN VDE 0100
IEC report 664 or DIN VDE 0110
National regulations for safety and accident prevention or VBG 4

- Read all available documentation before assembly and commissioning. Incorrect handling of products in this manual can result in injury and damage to persons and machinery. Strictly adhere to the technical information on the installation requirements.
- It is vital to ensure that all system components are connected to earth ground. Electrical safety is impossible without a low-resistance earth connection.
- This product contains electro-statically sensitive components that can be damaged by incorrect handling. Discharge yourself before touching the product. Avoid contact with high insulating materials (artificial fabrics, plastic film, etc.). Place the product on a conductive surface.
- During operation keep all covers and cabinet doors shut. Otherwise, there are deadly hazards that could possibility cause severe damage to health or the product.
- In operation, depending on the degree of enclosure protection, the product can have bare components that are live or have hot surfaces. Control and power cables can carry a high voltage even when the motor is not rotating.
- Never pull out or plug in the product while the system is live. There is a danger of electric arcing and danger to persons and contacts.
- After powering down the product, wait at least ten minutes before touching live sections of the equipment or undoing connections (e.g., contacts, screwed connections). Capacitors can store dangerous voltages for long periods of time after power has been switched off. To be safe, measure the contact points with a meter before touching.

When these symbols are seen in this manual, be alert to the potential for personal injury. Follow the recommended precautions and safe operating practices included with the alert symbols. Safety notices in this manual provide important information. Read and be familiar with these instructions before attempting installation, operation, or maintenance. The purpose of this section is to alert users to possible safety hazards associated with this equipment and the precautions that need to be taken to reduce the risk of personal injury and damage to the equipment. Failure to observe these precautions could result in serious bodily injury, damage to the equipment, or operational difficulty.

- The safety-alert symbols are:

Warning Alerts users to potential physical danger or harm. Failure to follow warning notices could result in personal injury or death.

Caution Directs attention to general precautions, which if not followed, could result in personal injury and/or equipment damage.

Note Highlights information critical to your understanding or use of the product.

CE Mark Conformance

Servo drives are components that are intended to be incorporated into electrical plant and machines for industrial use. When the servo drives are built into machines or plants, drives cannot be operated until the machine or plant fulfills the requirements of the EC Directive on Machines 89/392/EEC and the EC Directive on EMC (89/336/EEC). EN 60204 and EN 292 must also be observed.

In connection with the Low Voltage Directive 73/23/EEC, the harmonized standards of the EN 50178 series are applied to the amplifiers, together with EN 60439-1, EN 60146 and EN 60204.

The manufacturer of the machine or plant is responsible for ensuring that they meet the limits required by the EMC regulations. Advice on the correct installation for EMC - such as shielding, grounding, arrangement of filters, treatment of connectors and the laying out of cabling - can be found within this documentation.

Conformance with the EC Directive on EMC 89/336/EEC and the Low Voltage Directive 73/23/EEC is mandatory for the supply of servo drives within the European Community.

An authorized testing laboratory in a defined configuration with the system components has tested the servo drives. Any divergence from the configuration and installation described in this documentation means that you are responsible for the performance of new measurements to ensure that the regulatory requirements are met.

Installation of the equipment is critical in designing for system and machine electromagnetic compatibility (EMC). You must apply the installation recommendations and the CE filtering Practices when mounting and installing the drive system for CE conformance.

Table of Contents

UNPACKING AND INSPECTING

Electronic components in this amplifier are design hardened to reduce static sensitivity. However, proper procedures should be used when handling.

Remove all packing material and equipment from the shipping container. Be aware that some connector kits and other equipment pieces may be quite small and can be accidentally discarded if care is not observed when unpacking the equipment. Do not dispose of shipping materials until the packing list has been checked.

Upon receipt of the equipment, inspect components to ensure that no damage has occurred in shipment. If damage is detected, notify the carrier immediately. Check all shipping material for connector kits, manuals, diskettes, and other small pieces of equipment.

Model Number

Part Number	Motor & Feedback connectors	Opto-Isolated Pulse & Direction	IO Connector
OFDL02	AMP Round connectors on rear panel	Not Installed	Flat Cable
OFDL03	PCB Connectors	Installed	Weidmueller

MOUNTING

Hardware Specifications

		OFDL-02	OFDL-03
Unit Weight	Lbs./kgs.		
Mounting Hardware	English (Metric)	4 x 6-32 or 2 x 5mm.	
Connection Hardware	Ground Screw Size/Torque	4mm.	
	Shield Screw Size/Torque	4mm.	
Wire Size (AWG#)	Motor Line	16-18AWG	14-18AWG
	Main Input	14-18AWG	
	Configurable I/O wire gauge	28-30AWG (Flat cable)	20-24AWG
	Regen wire gauge	14AWG	
	DC Bus Sharing wire gauge	14AWG	
	Encoder simulation wire gauge	20-24AWG	
	Hand Wheel wire gauge	20-24AWG	
	SKF & Pulse and Direction wire gauge	N/A	20-24AWG
Clearance Distance	Side-to-Side		
	Top/Bottom		

Electrical Characteristics

Main Power Input	Voltage (VAC_{L-L}) Nominal ±10%	110 to 230
	120VAC	1Φ or 3Φ
	230VAC	1Φ
	Line Frequency	47-63
	KVA at 120VAC	0.6 (1Φ) 1.1 (3Φ)
	KVA at 230VAC	1.2 (1Φ)
	Continuous Current (amps)	
	Peak Current (amps) for 2Sec	
	Line Fuses	UL listed, Time blow (Slow blow) fuse, rated 15 A, 250Vac
SoftStart	Max. SoftStart Surge Current (amps)	65A 1 minute, minimum time between power cycles.
	Max. Charge Time (sec)	2
Protection Functions	Fault Contact Rating (amps)	30VDC 1A, 125VAC 0.3A (resistive)
	Fault Contact Operating Times (ms)	Close = 3ms, Open = 3ms
Rated Main Output (Ma, Mb, Mc)	Max continuous power (KVA) at 120VAC Line Input (25ºC (77ºF) Ambient)	
	Max. continuous power (KVA) at 230 VAC Line Input (25ºC (77ºF) Ambient)	
	Continuous Current (Arms)*	9
	Peak Current (Arms) for 2 Sec	18
	PWM Frequency (kHz)	16
	PWM Motor Current Ripple (kHz)	16
	Form Factor (rms/avg)	≤1.01
Protective Functions	Under Voltage Trip (nominal)	85 VAC
	Over Voltage Trip	400 VDC
	Over Temperature Trip	90°C max
	Internal heat dissipation (watts)	
Environment	Operation temperature	0 ÷ +45°C
	Storage temperature	-25 ÷ +55 °C
	Ambient humidity	5-95%RH @30 C
	Pollution degree	2
	Altitude	Sea level to 10000 feet
	Vibration	5Grms

* Forced cooling or external heat-sink may be required when using continuous current above 6 Arms.

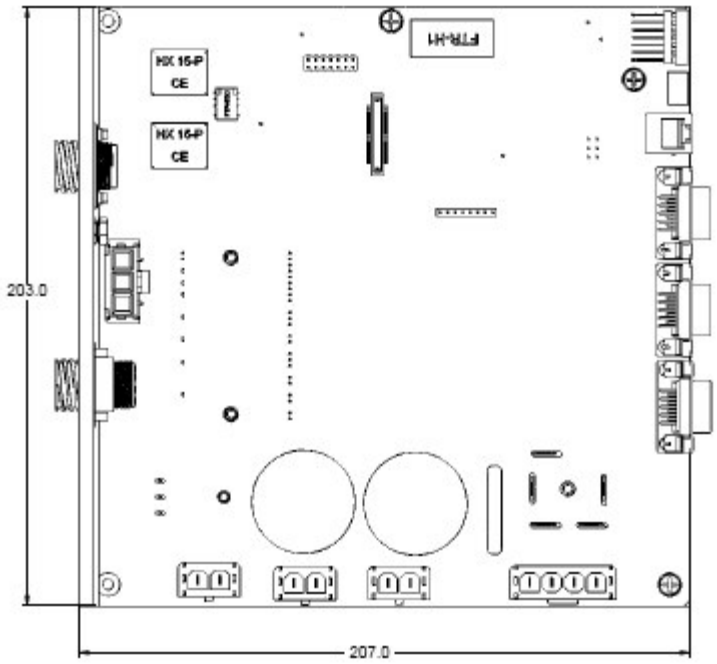
Control Specifications

Current Loop	Update Rate	62.5 µs (16 kHz)
	Bandwidth	~1KHz
Commutation Loop	Update Rate	62.5 µs (16 kHz)
	Max. Commutation Freq.	~400 Hz
	Output Waveform	Sinusoidal
Velocity Loop	Update Rate	250 µs (4 kHz)
	Bandwidth	<400 Hz
	Speed Command Resolution	Serial: 1 rpm / Analog: (1/2048) * VSCALE
Position Loop	Update Rate	500 µs (2 kHz)
I/O Connector (J108/J109 by pinout)		
Remote Enable (2) Configurable Inputs(3, 4, 5, 6, 7, 8, 9)	Bandwidth	2.5 kHz (Opto-isolated)
	Input Voltage Range	5 V to 26 V Nominal (bi-directional)
	Min. On/Max. Off	4 V/1 V
	Current Demand per Input	20 mA (max)
Configurable Digital Output (12, 13)	Output Voltage (max.)	24 V Nominal - unidirectional (Open Collector)
	(Min. On)	1 V
	Max. Output Current	60 mA
Brake Output Relay (15, 16)	Max. Output Current	10 A 30 VDC/250 VAC (resistive) 3A 250 VAC inductive (PF=0.4)
Fault Output Relay (17, 18)	Max. Output Current	30VDC 1A, 125VAC 0.3A (resistive)
Analog Input (19, 20)	Absolute Maximum Voltage	12 V differential
	Input Resolution	12 Bit/1.2
	Sensitivity	4.88 mV min
	Voltage Range	-10 V to +10 V = -120% Motor rated speed to +120% Motor rated speed (Adjustable Vscale parameter)
	Input Impedance/CMR	> 10 kΩ/75 dB
	Long-term Drift	100 ppm (0.075%/°C)
Encoder Equivalent Output (J102 by pinout)		
A/B & Complements (2, 3, 6, 7)	Output Voltage (high level) at 25° C	2.5 V min. at 20 mA Differential

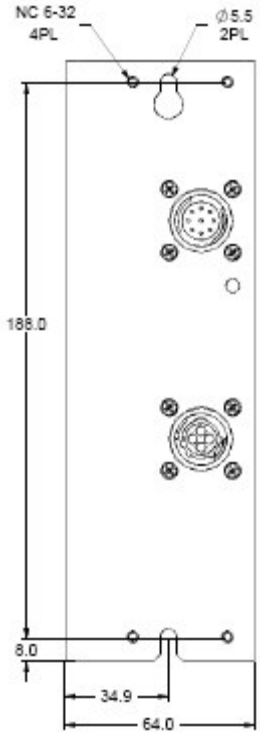
	RS 485 Line Drive Type	DS26C31TM
Auxiliary Encoder Input (J103 by pinout)		
A/B & Complements (2, 3, 6, 7)	Input Voltage at 25° C	5 V Differential
	Input Sensitivity	±0.2 V
	Input Impedance	150 Ω
	RS 485 Line Receiver Type	DS26C32TM

Outline Dimensions

Top View

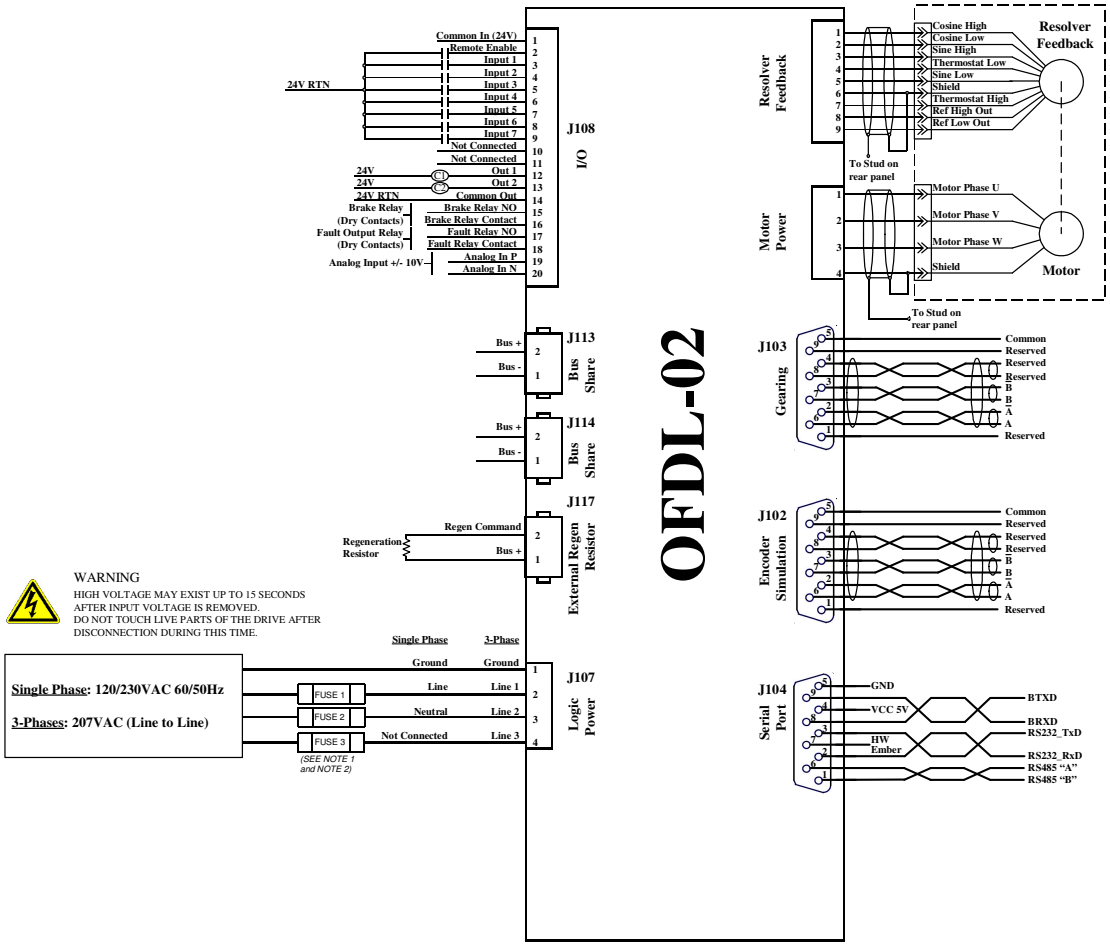


Front View



WIRING

OFDL02 Wiring Diagram



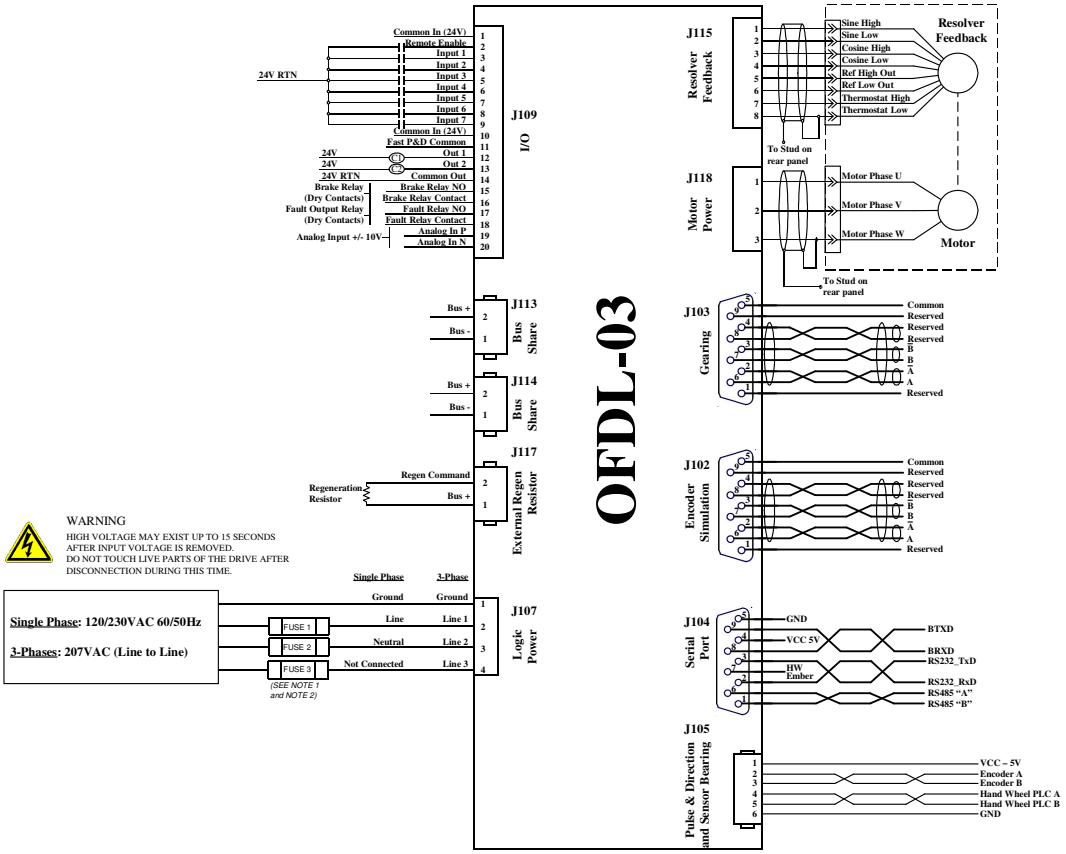
Notes:

Note 1: Fuse 1 and Fuse 2 are not required for Single Phase power input.

Note 2: Use UL listed, Time blow (Slow blow) fuse, rated 15 A, 250Vac

Note 3: Permanent dedicated grounding should be provided for the drive

OFDL03 Wiring Diagram



Notes:

Note 1: Fuse 1 and Fuse 2 are not required for Single Phase power input.

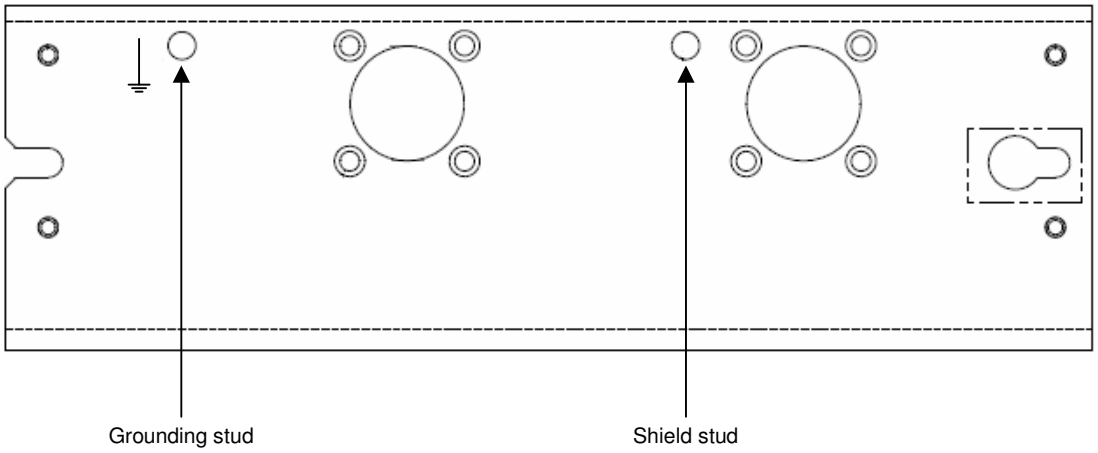
Note 2: Use UL listed, Time blow (Slow blow) fuse, rated 15 A, 250Vac

Note 3: Permanent dedicated grounding should be provided for the drive

Grounding and Shielding

Connect the shield cables of the Motor power and Resolver feedback to the shield stud as shown in the following diagram.

Permanent dedicated safety grounding should be provided for the drive, connect the grounding cable to the grounding stud as shown in the following diagram.



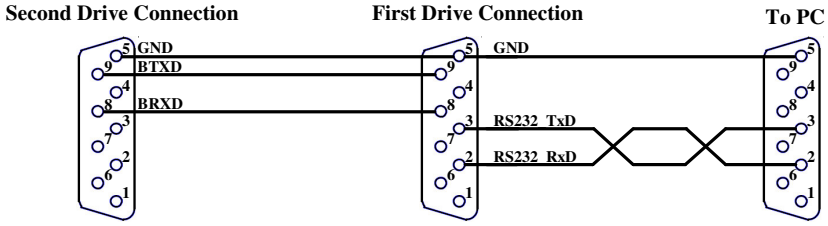
SYSTEM COMMUNICATION

RS232 Interface

The OFDL has RS-232 Daisy-Chain support built into the communications port. The Daisy-Chain mechanism implements a communications bus that allows multiple drives to be connected together from a single PC.
A simple cable can be used to connect the PC and the drive.

When using the daisy-chain connection, all the rotary-switches must be set to an address different than zero.

The diagram below shows the connection from the PC to the first drive, and from the first drive to subsequent drives.



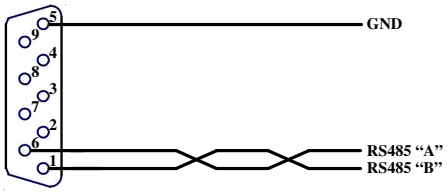
CAUTION

To avoid damaging either the PC or the OFDL do not connect wires to pins that are not in use in the diagram.

RS232 communication parameters	
Data bits	8
Stop bit	1
Parity	None
Configuration tool baud rate	9600bps

If RS232 signal isolation is required, VCC 5V signal on pin #4 can be used.

RS485 Half Duplex Interface



RS485 communication parameters	
Data bits	8
Stop bit	1
Parity	Odd
Baud rates	9.6, 19.2, 38.4, 57.6 and 115.2Kbps

SYSTEM OPERATION

Wiring a Motor to the Drive

Kollmorgen AKM Motors

Historically Kollmorgen motor phases have been designated with the letters 'A', 'B', and 'C' for each of the 3 phase connections. The AKM motors are labeled 'U', 'V', and 'W'. The relationship of these signals is shown in the following table:

Motor Phases

Motor Phase	Drive Phase
U	C
V	B
W	A

Resolver Feedback Specifications

Resolver Requirements	
Type	**Control Transmitter**
Transformation Ratio	0.4-0.6
Excitation Frequency	8KHz
Resolver Reference Voltage (From Drive)	18±2 V peak-to-peak ($7\text{-}8V_{RMS}$)
Max Drive Current	30mA

IO Connector

General-Purpose Inputs and Remote Enable

The digital inputs are optically isolated, compatible with either sourcing or sinking currents to provide maximum flexibility when interfacing to field wiring.

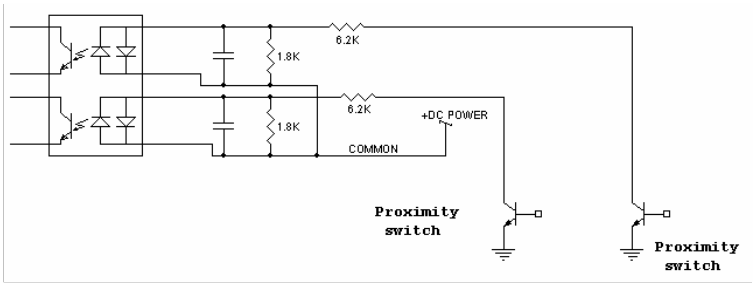
The inputs operate over an input voltage range of ±5 to 26 volts mA). (Logic low level: ±0 to 2 volts, logic high level: ±5 to 26 volts.)

Maximum frequency at 5VDC, 10KHz

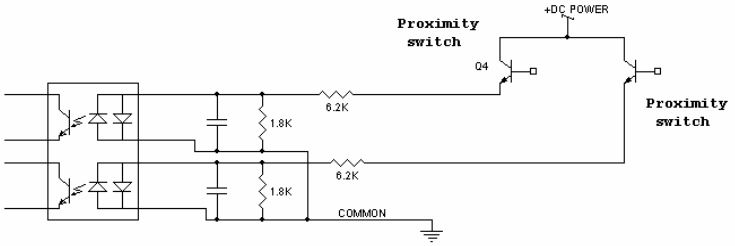
Maximum frequency at 10VDC, 20 KHz

Driving the General Purpose Inputs

Sinking Logic For compatibility with sinking outputs, the digital input common terminals are connected to the + terminal of a power source. The input is connected to the sinking logic output of the field device as shown below.

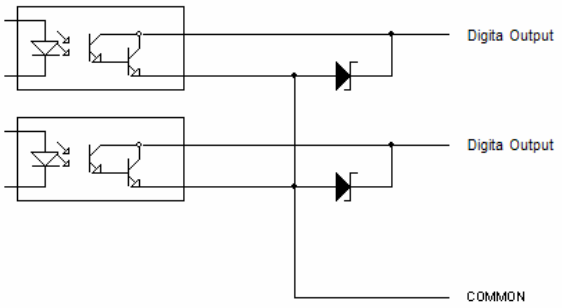


Sourcing Logic For compatibility with sinking outputs, the digital input common terminals are connected to the - terminal of the power source. The input is connected to the sourcing logic output on the field device as shown below.



General-Purpose Outputs

Digital outputs are optically isolated. The outputs are Darlington phototransistors with a 28 volt Zener diode wired in parallel to clamp voltage transients.



The following are the maximum output ratings.

Maximum Voltage	26 VDC
Maximum Current	60 mA
IOFF	0.4 µA
Response time	Less than 1 ms
Clamp voltage	28 V (nominal)

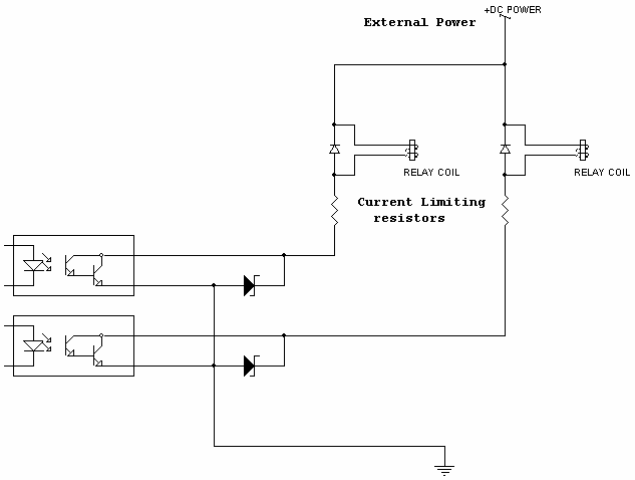
CAUTION

The outputs are NOT short circuit protected. Configure the application to ensure the maximum current is not exceeded.

Outputs Typical Loads

The open collector of the phototransistor provides the ability to drive sourcing loads.

Sourcing Load The following figure shows how to connect a sourcing load (load connected to the power supply return).

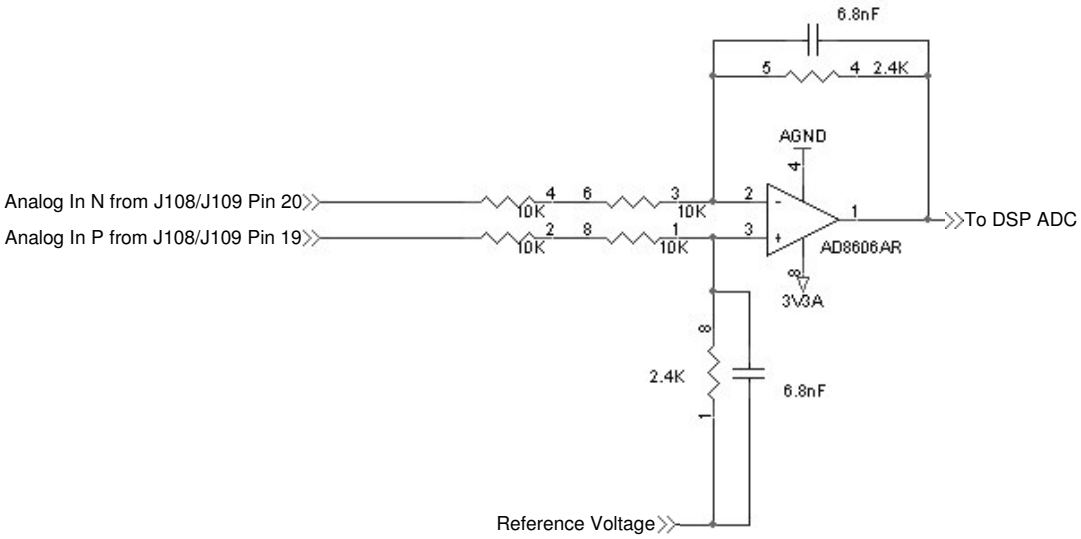


In this example, an opto-isolator is being driven. The current through the output needs to be limited to 15 mA or less by selecting an appropriate current limiting resistor. The voltage of the external power source needs to be 26 VDC or less and can be the same source used to provide power to the inputs.

Analog Input

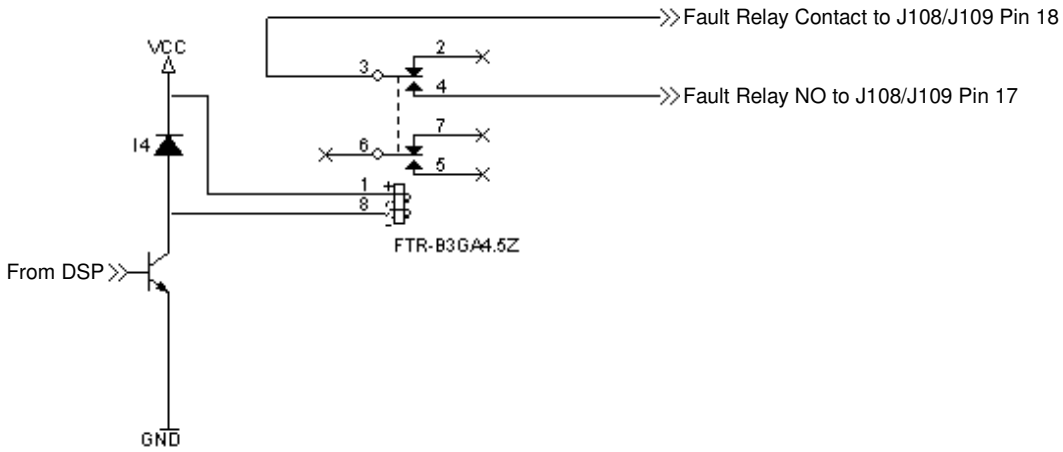
Analog inputs are differential, ±10V.

Bandwidth 3 KHz.



Fault Relay

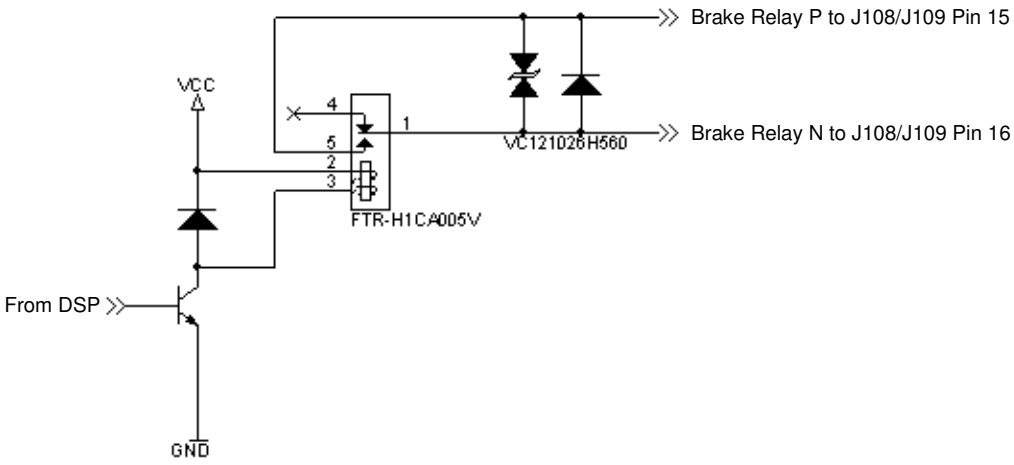
Fault relay is used for disconnecting the fault control chain of the controller (PLC) as a result of a drive fault.



Brake Relay

Brake relay is intended for switching the motor brakes.

Contact current rating is 10Amps 30VDC.

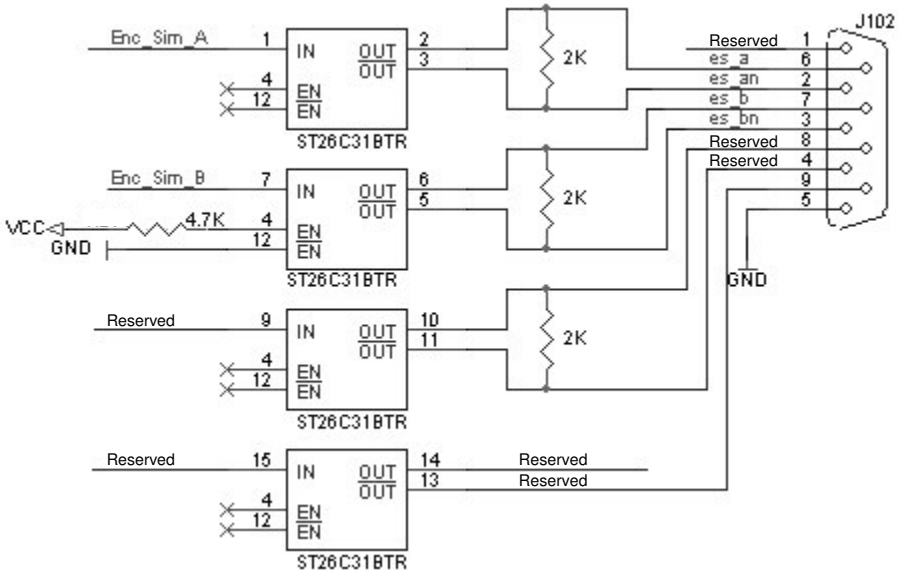


Encoder Simulation Output

Encoder Simulation is used to keep external controller updated with the drive current position. The encoder simulation signal is generally generated in the A-quad-B format.

The DSP calculates the encoder simulation output based on the Resolver feedback advance and a scaling factor (ENCOUT).

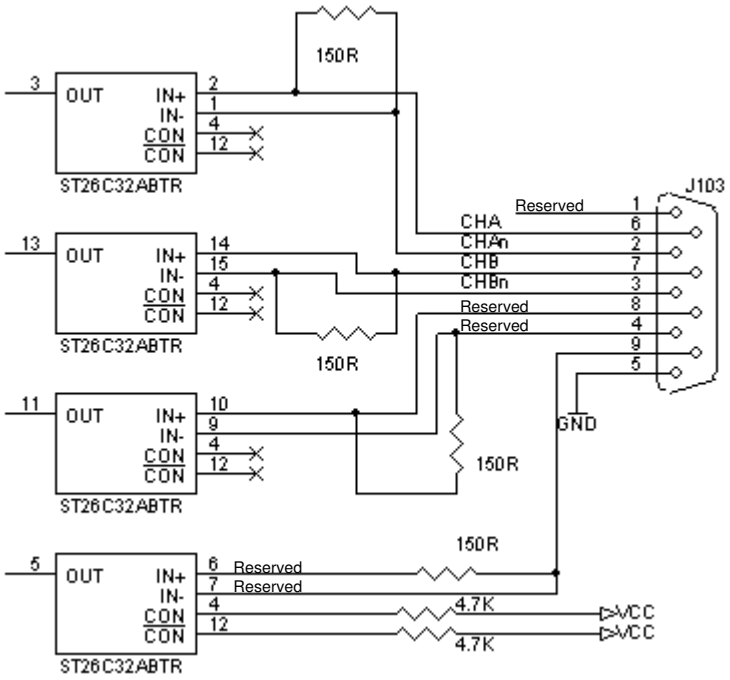
The encoder simulation signals are sent via RS422 driver.



Handwheel Input

Handwheel (or auxiliary Encoder) is used to follow external master position.
Supported modes:

- A-quad-B
- Pulse and Direction.

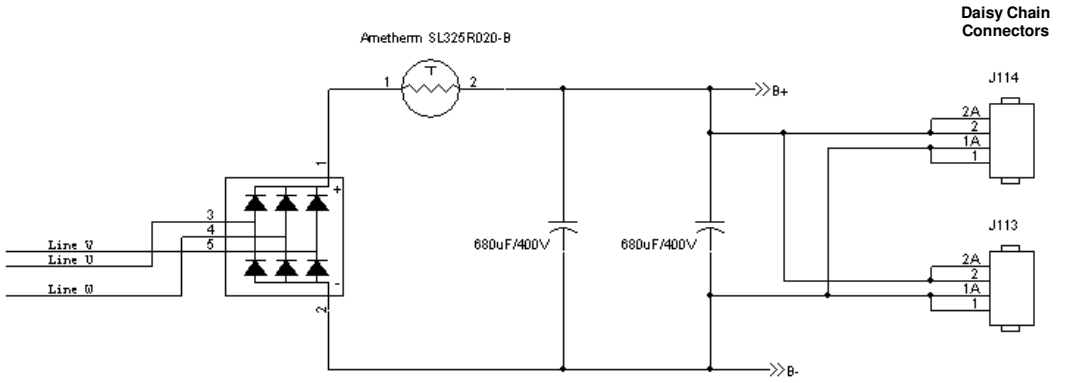


CAUTION

When using auxiliary Encoder at J103 do not connect any wiring to J105 (Opto Isolated Pulse And Direction) connector.

DC BUS Sharing

DC BUS Sharing is used for common use of the Bus capacitors. It is useful when some drives in the system have big back EMF and others small back EMF. In some cases this feature allows elimination of the usage in Regen resistor.

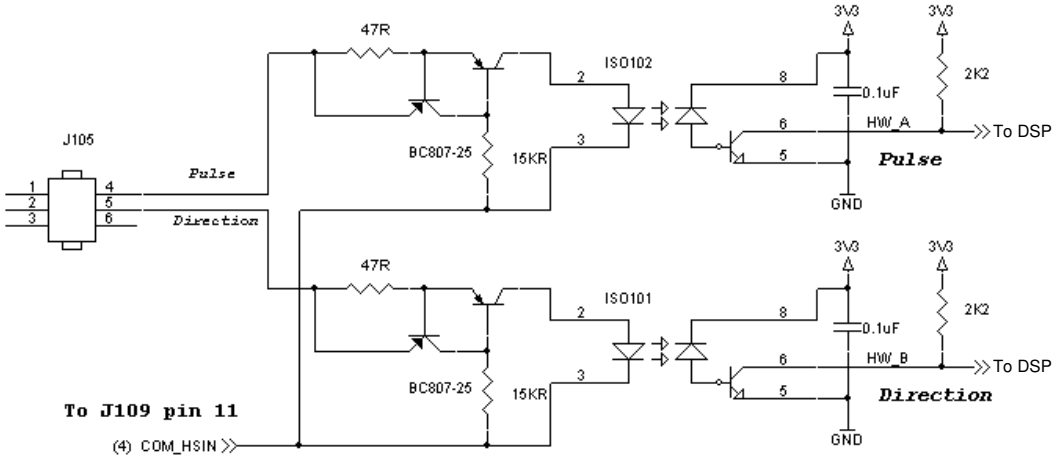


CAUTION

Do not connect more than 3 drives in BUS sharing daisy chain.

Opto Isolated Pulse and Direction

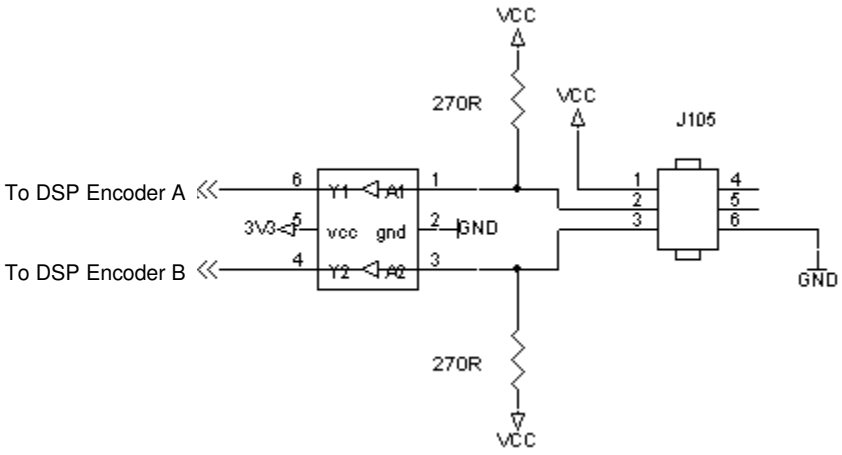
Optically isolated Pulse and Direction is used when auxiliary encoder pulses require optical isolation.



CAUTION

When using J105 (Opto Isolated Pulse And Direction) connector do not connect any wiring to J103 (auxiliary Encoder) connector.

SKF Sensor Bearing Interface



Regen Information

External Shunt Regulator	Peak current (amps)	20
	Minimum resistance (ohms)	20ohm
	Watt	250
Application Information	BUS Voltage (nominal) (VDC)	160 / 320
	VHYS (Regen circuit turn-off) (VDC)	370
	VMAX (Regen circuit turn-on) (VDC)	390
External Regen Kits	ERH-26	

Connector Pin-Outs

Logic Power

Connector Definition		
Manufacturer		MOLEX
Part Number		43160-2104
Mating Connector Part Number		44441-2004 (Housing) 43375-0001 (Pins)
Location		J107
Single-Phase connection Pin Out		
Pin #	Description	Comments
1	Ground	
2	Line	
3	Neutral	
3	Not Connected	
3-Phase connection Pin Out		
Pin #	Description	Comments
1	Ground	
2	Line 1	
3	Line 2	
3	Line 3	

DC Bus Sharing

Connector Definition	
Manufacturer	Molex
Part Number	43160-2102
Mating Connector Part Number	44441-2002 (Housing) 43375-0001 (Pins)
Location	J113 and J114

Pin Out		
Pin #	Description	Comments
1	Bus -	
2	Bus +	

External Regeneration Resistor

Connector Definition	
Manufacturer	Phoenix contact
Part Number	PCV 4/ 2-G-7,62
Mating Connector Part Number	PC4/2-ST-7.62 or PC4HV/2-ST-7.62
Location	J117

Pin Out		
Pin #	Description	Comments
1	Bus +	
2	Regen command	

Motor Power

Connector Definition			
Model Number		OFDL-02	OFDL-03
Manufacturer		AMP	MOLEX
Part Number		206430-1	43160-2103
Mating Connector Part Number		206429-1 (Housing) 66180-1 (Pins) 206358-1(Cable clamp)	44441-2003 (Housing) 43375-0001 (Pins)
Location		Rear panel	J118
Pin Out			
Model #	Comments	OFDL-02	OFDL-03
Pin #		Description	Description
1		Motor Phase U	Motor Phase U
2		Motor Phase V	Motor Phase V
3		Motor Phase W	Motor Phase W
4		Shield	

Resolver Feedback

Connector Definition			
Model Number		OFDL-02	OFDL-03
Manufacturer		AMP	Molex
Part Number		206486-1	MicroFit 43045-0812
Mating Connector Part Number		206485-1 (Housing) 66569-3 (Pins) 206062-1/3 (Cable clamp)	43025-0800 (Housing) 43030-0007 (Pins)
Location		Rear panel	J115
Pin Out			
Model #	Comments	OFDL-02	OFDL-03
Pin #		Description	Description
1		Cosine High	Sine High
2		Cosine Low	Sine Low
3		Sine High	Cosine High
4		Thermostat Low	Cosine Low
5		Sine Low	Ref High Out
6		Shield	Ref Low Out
7		Thermostat High	Thermostat High
8		Ref High Out	Thermostat Low
9		Ref Low Out	

I/O

Connector Definition			
Model Number		OFDL-02	OFDL-03
Manufacturer		20 pins standard box header male. Pitch 0.1”x0.1”	Weidmueller
Part Number		Any Manufacturer	S2L-SMT3.5/180
Mating Connector Part Number		Flat cable, 20 pins standard, female. Pitch 0.1”x0.1”	B2L 3.5 20 poles (ordering number 1727710000)
Location		J108	J109
Pin Out			
Model #	Comments	OFDL-02	OFDL-03
Pin #		**Description**	**Description**
1		Common In	Common In
2		Remote Enable	Remote Enable
3		Input 1	Input 1
4		Input 2	Input 2
5		Input 3	Input 3
6		Input 4	Input 4
7		Input 5	Input 5
8		Input 6	Input 6
9		Input 7	Input 7
10		Not connected	Common In
11		Not connected	Common for high-speed Pulse & Direction inputs
12		Output 1	Output 1
13		Output 2	Output 2
14		Common Out	Common Out
15		Brake P	Brake P
16		Brake N	Brake N
17		Fault Relay NO	Fault Relay NO
18		Fault Relay Contact	Fault Relay Contact
19		Analog In P	Analog In P
20		Analog In N	Analog In N

Serial Communication

Connector Definition		
Type		D-type 9-pin male
Mating Connector Type		D-type 9-pin female
Location		J104
Pin Out		
Pin #	Description	Comments
1	RS485 “B”	
2	RS232_RxD	OFDL receive data
3	RS232_TxD	OFDL transmit data
4	VCC	5V supply voltage
5	GND	Ground
6	RS485 “A”	
7	HW Ember	Hardware ember input
8	BRXD	Daisy chain receive data (from PC)
9	BTXD	Daisy chain transmit data (to PC)

Gearing

Connector Definition		
Type		D-type 9-pin female
Mating Connector Type		D-type 9-pin male
Location		J103
Pin Out		
Pin #	Description	Comments
1	Reserved	
2	A/	
3	B/	
4	Reserved	
5	DGND	
6	A	
7	B	
8	Reserved	
9	Reserved	

Encoder Simulation

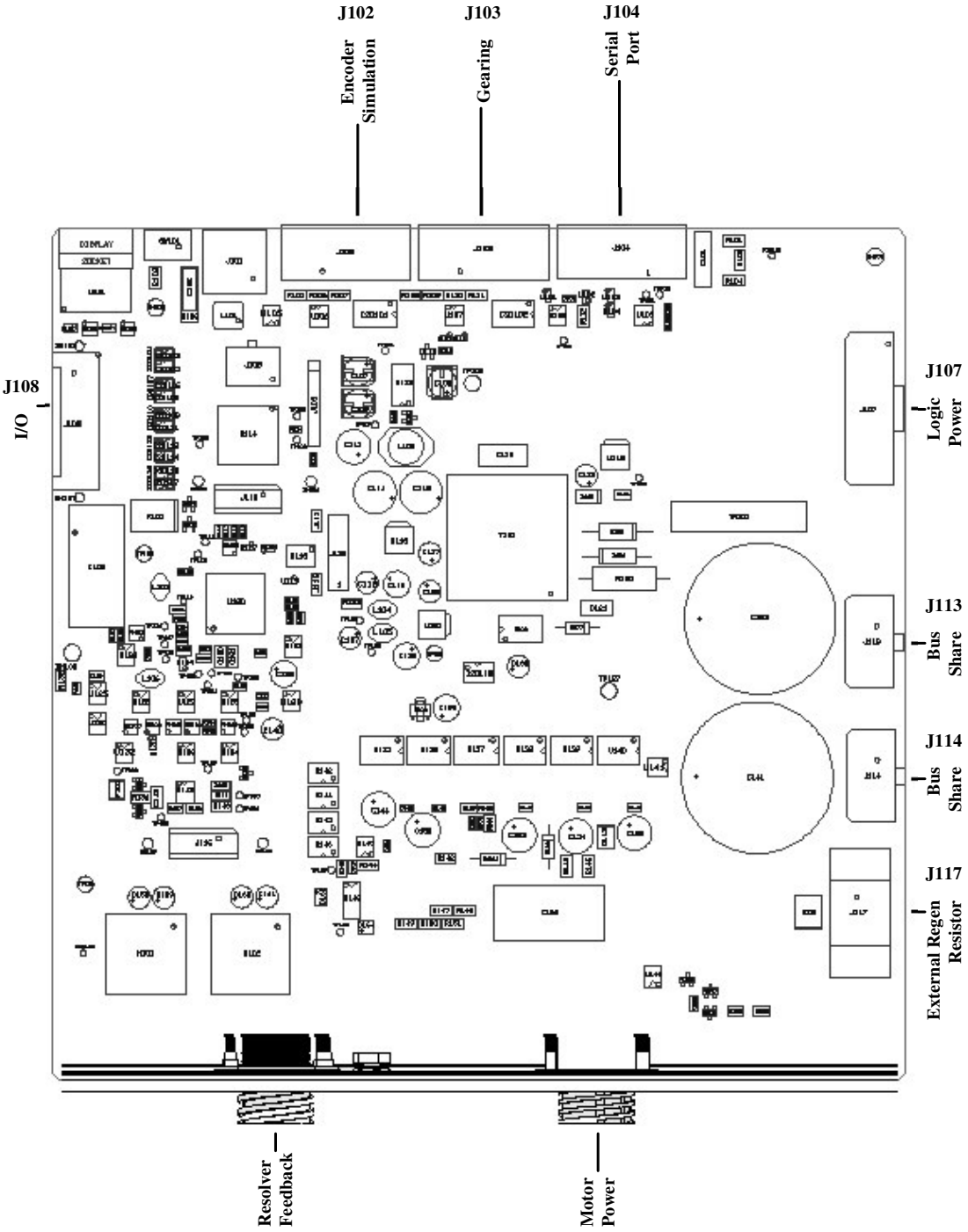
Connector Definition		
Type		D-type 9-pin female
Mating Connector Type		D-type 9-pin male
Location		J102
Pin Out		
Pin #	Description	Comments
1	Reserved	
2	A/	
3	B/	
4	Reserved	
5	DGND	
6	A	
7	B	
8	Reserved	
9	Reserved	

Pulse and Direction and Sensor Bearing (available on OFDL-03 only)

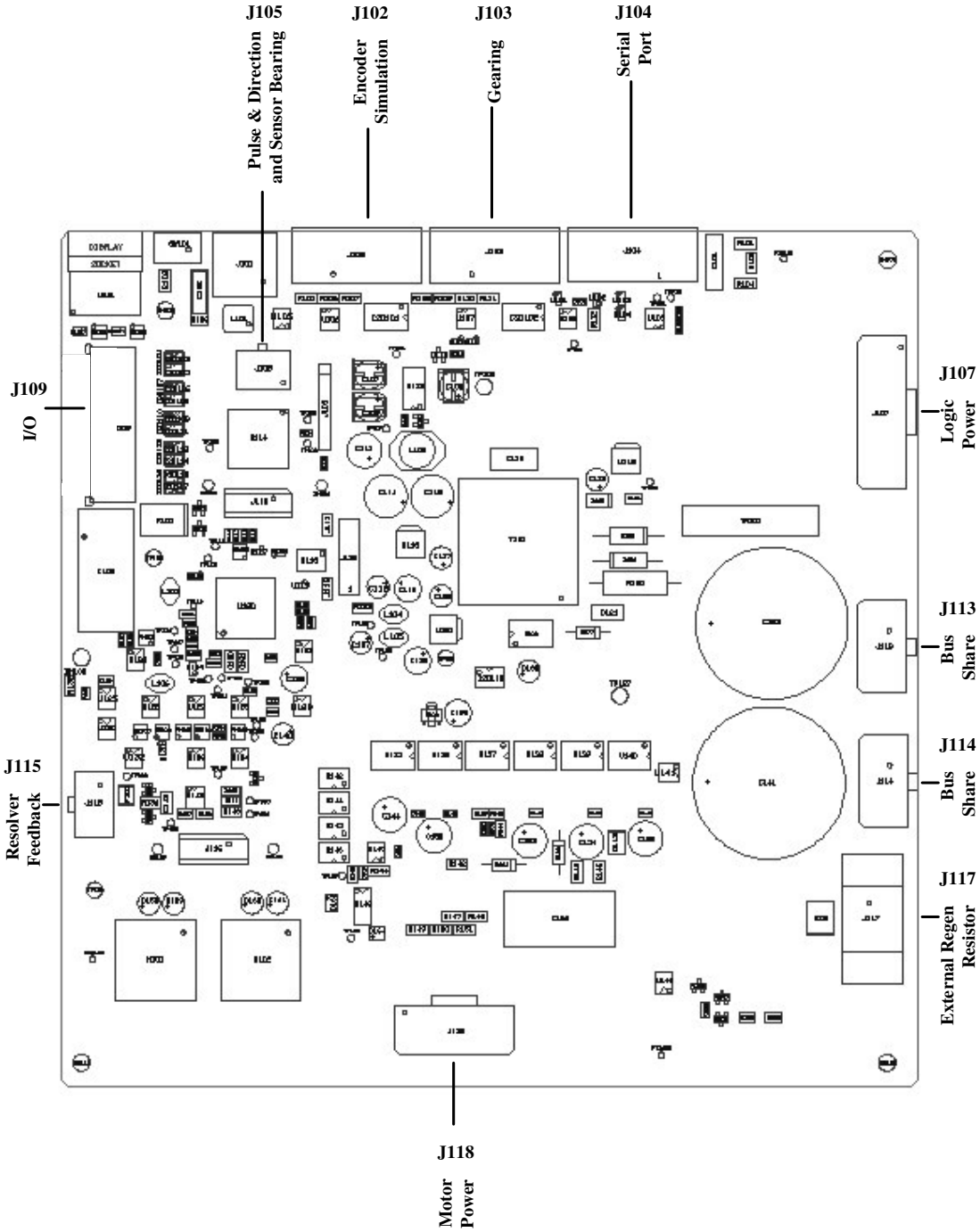
Connector Definition		
Manufacturer		Molex
Type		MicroFit 43045-0612
Mating Connector Type		MicroFit 43025-0600 (Housing) 43030-007 (Pins)
Location		J105
Pin Out		
Pin #	Description	Comments
1	VCC – 5V	
2	Encoder A	
3	Encoder B	
4	Hand Wheel PLC A	
5	Hand Wheel PLC B	
6	GND	

Connectors Locations

OFDL-02



OFDL-03


J105
Pulse & Direction and Sensor Bearing
J102
Encoder Simulation
J103
Gearing
J104
Serial Port
J109
I/O
J107
Logic Power
J113
Bus Share
J114
Bus Share
J115
Resolver Feedback
J117
External Regen Resistor
J118
Motor Power

Enabling the System

The drive enable logic is based on the following variable switches and flags:

ACTIVE: This is the overall readiness flag indicating the enable/disable state of the drive. If high (1), the drive is enabled and power is being applied to motor.

The following equation must hold true for ACTIVE to go high:
ACTIVE = (**READY**) AND (**REMOTE**) AND (**User remote enable if configured**)
Where **READY** = (**DRIVEOK**) AND (**SWEN**)
READY: flag that indicates the drive is free of faults and ready to hardware enable
DRIVEOK: switch that indicates the status of the drive faults.
SWEN: switch that indicates the status of the software enable (EN or DIS).
REMOTE: switch that indicates the status of the hardware Remote Enable (I1) line on the I/O connector (unless DINXMODE is set to 33 - see below).

User remote enable: The user can define one of the inputs on the I/O connector to be used as another REMOTE enable input (by setting DINXMODE <input #> 33). In this case the remote enable will be "AND"ed with this input to give the total **REMOTE** status of the drive.

DRIVEOK (faults status)	SWEN (software enable)	READY (drive ready)
0 (fault exists)	0 (disable)	0
0 (fault exists)	1 (enable)	0
1 (no faults)	0 (disable)	0
1 (no faults)	1 (enable)	1

READY (drive ready)	REMOTE (hardware enable)	ACTIVE (power to the motor)
0	x	0
x	0	0
1	1	1

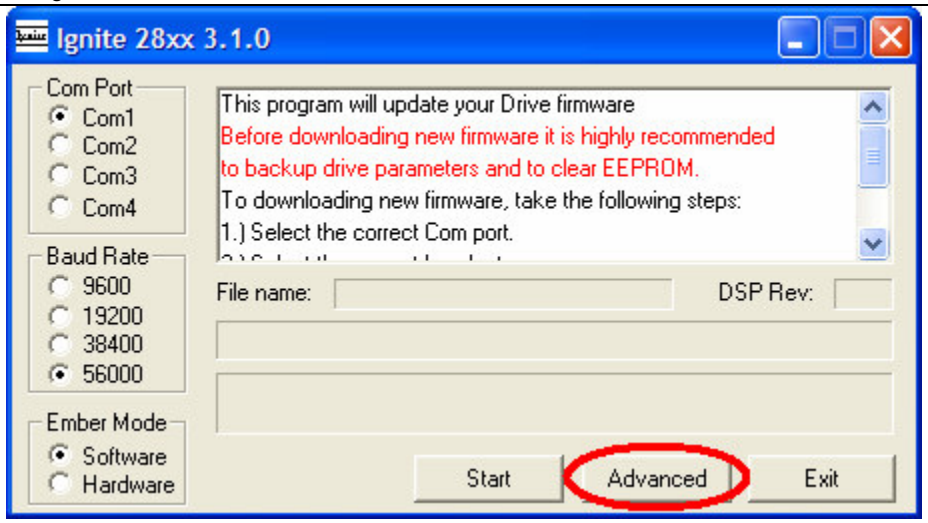
If the drive does not enable, you can check the "STAT" command to get existing faults. The Status Display indicates an enabled drive when the decimal point is illuminated solid/ or flashing.

Firmware Upgrade Procedure

The field upgrade of firmware in OFDL product requires an application program called **Ignite.exe** that is provided at www.danahermotion.com. The following steps are provided for the use of this software utility.

Setup: The power must be on to the servo drive. The servo drive must be disabled. An RS232 Serial port connection between the computer and the drive must be made. **Ignite.exe** and the firmware and ember files must be accessible by the computer. The communication rate in the servo drive and **Ignite.exe** can be set up to 56K Baud for a more rapid download of firmware.

Launching **Ignite.exe** brings up the following screen on your computer. Press the *Advanced* button to select the firmware file that you want to download to the servo drive.



Select the firmware file and the ember file. Only one firmware file should show up in the selection window. Use the *Add* button and *Delete* buttons to obtain the correct firmware file, and *Browse* button to select the ember file.

Firmware file has *i00* extension and the following format: ***Ofdl x_y_z.i00***

Where x, y and z denote the firmware version number.

For example: firmware file for version 0.2.3 is called *Ofdl 0_2_3.i00*

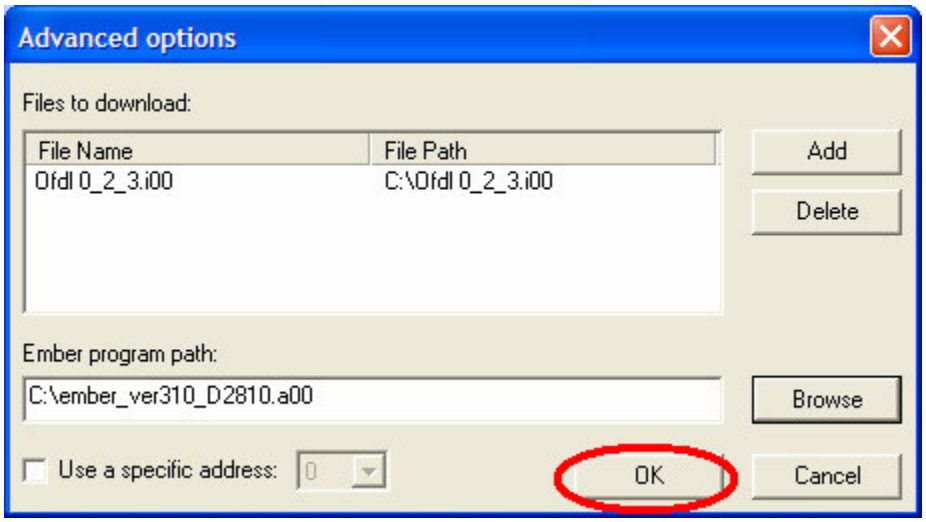
Ember file name has *a00* extension and the following format: ***ember_verXYZ_D2810.a00***

Where x, y and z denote the **Ignite.exe** software firmware version number.

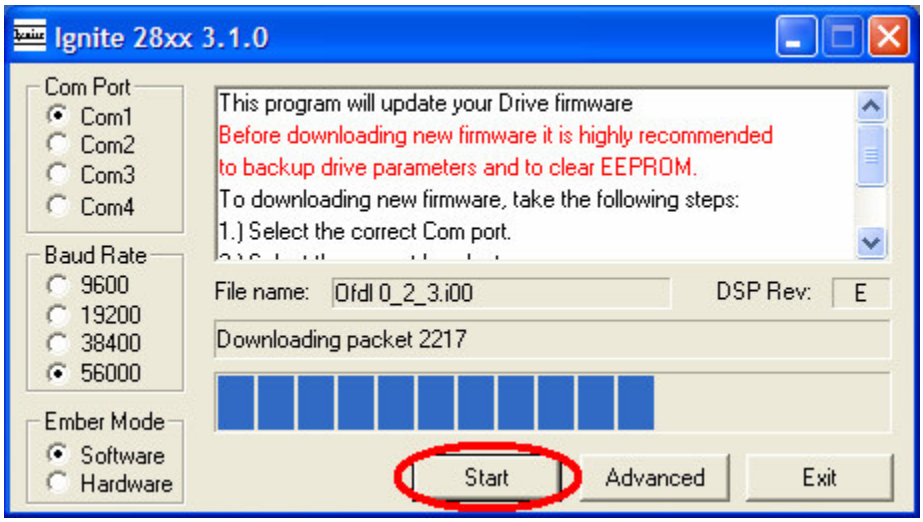
For example: ember file for **Ignite.exe** software version 3.1.0 is called *ember_ver310_D2810.a00*

When using RS232 multidrop, select the *Use a specific address* option to direct the firmware to a specific drive on the communication multidrop

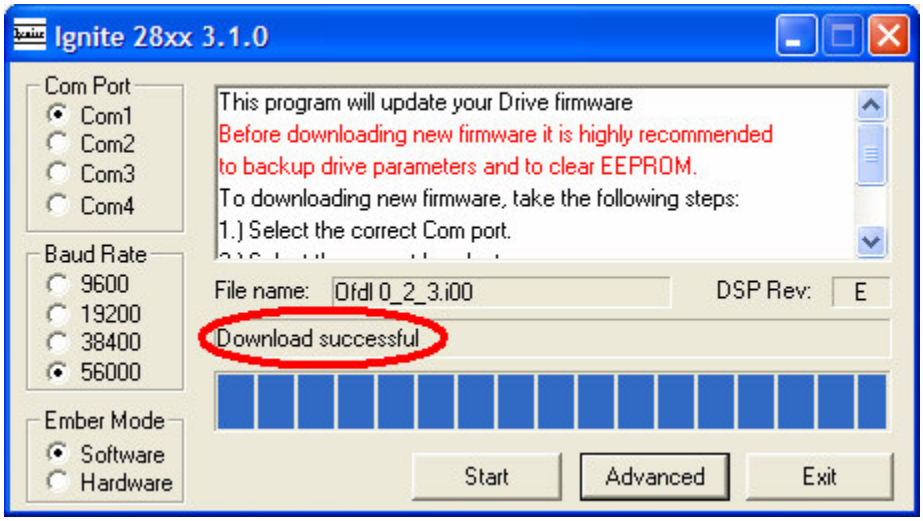
After selecting the firmware and Ember files, press OK to continue.



The first window reappears to allow you to select the appropriate communication port (Com Port) and communication rate (Baud Rate). Once you have made your selections, press the *Start* button.



The drive will display an *E* in the display acknowledging that it has been put into the firmware download mode. When the software download is complete, **Ignite.exe** will signal "*Download successful*". The servo drive power must be cycled (turned off then back on) in order to return the servo drive to its normal operating mode.



You should then use SEPLINK to do one of the following:

a.) Issue a RSTVAR and Load the motor compensation file (reset variables) command
OR
b.) Load a user file that has been saved to your computer (xxxx.SSV)

SYSTEM DESCRIPTION

Product Features

Real-Time Data Monitoring
• Bus voltage
• Drive temperature
• Motor Current
• Analog inputs

Feedback
• Resolver
• Encoder Sensor bearing SKF
• Auxiliary encoder feedback (Master/Slave)

Servo Control
• Fully digital current, velocity and position loops.
• Analog velocity control loop
• Sinusoidal Commutation
• Patented torque angle control enhances motor performances
• Accurate torque control due to precision
• PWM switching frequency 16 kHz
• Advanced patented sinewave commutation technology balanced current loops with open loop
• Velocity loop bandwidths up to 400 Hz provides smooth, precise low-speed control as well as sensors high-speed performance

Reference Command
• 12 bit analog-to-digital conversion
• Pulse following control, configured as an encoder
• Serial command follower or pulse/direction counter

Motion Options
• Point-to-point incremental or absolute with trapeze
• Motion indexing profiles in memory
• Homing functions and S-Curve profiles acceleration and deceleration control

I/O's
• 7-Segment Indicator
• Motor temperature sensor
• Digital I/O (Configurable):
    • 1 Analog input
    • Brake Relay - Optically isolated
    • Fault relay - 7 bi-directional inputs + HW Enable input
    - 2 Outputs

Communication
• RS-232
• RS485 Half Duplex
• ModBus RTU protocol

Additional Features
• Encoder simulation
• New HW features can be added using high-density pin header connector
• 16-positions rotary switch for drive addressing

Robust Power Stage Options
• Self-protecting power modules
• Full protection against short circuit, under-voltage, over-temperature, over-current, feedback loss, over speed and break (regeneration)
• Flexible current foldback protection
• DC Bus sharing over voltage, over current, motor and drive
• External Regen resistor readiness

TROUBLESHOOTING

Status Display

After the drive power up it will show its status, faults and errors on the Status Display (7-segment LED)

Error Codes

In most cases, the drive communicates error codes with a text message via the serial port to the host. Some error codes are also transmitted to the Status Display. The same message is saved in the EEPROM under an error history log (FLTHIST) so that nothing is lost when power is removed. Not all errors reflect a message back to the host. In these cases, the no-message errors communicate to the Status Display only.
The response of the drive to an error depends on the error's severity. There are three levels of severity:

1) Warnings, simply called errors, are not considered faults and do not disable operation
2) Non-fatal errors, or simply faults, that disable the drive and indicate a fault status
3) Fatal faults – faults that needs power cycling.

The drive is automatically disabled at the occurrence of a fault. Executing a drive disable command (DIS or K) followed by the EN command, or toggling the Remote Enable line (REMOTE) resets the fault latch, and if the fault condition is no longer present, re-enables the system.

Warnings

Status Display	Fault Message	Possible Cause
C1	None displayed but means communication fault	Bad serial cable
R15	Feedback loss (Sininit invalid)	Motor should spin a while for the Resolver ref to scale
L1	Hardware CW limit switch open	
L2	Hardware CCW limit switch open	
L3	Hardware CW and CCW limit switches open	

Fault Codes

Status Display Flashing	Fault Message	Possible Cause
E	EEPROM fault	Faulty EEPROM
E	EEPROM checksum failure	EEPROM checksum invalid on power up*
P	Over current	Power stage surge current*

O	Over voltage	Excessive decel rate*
T	Power stage over temperature	Overload, power stage failure
U	Under voltage	Bus voltage is too low
-1	Not configured	
C2	Pemax exceeded	PE > PEMAX
F**	Foldback	System in Foldback mode
J	Vospd exceeded	velocity >= VOSPD
R8	Feedback loss (A/B out of range)	Resolver A/B level out of range
H**	Feedback loss (Motor over temperature)	Motor overload caused overheating, feedback cable wiring issue

*These faults can only be cleared by cycling power

** These faults can be set as warning to not disable the drive when they occur, see command ref.

Non Fatal Error Codes

Fault Message	**Possible Cause**
No error	no error was recorded
Unknown command	
Unknown variable	
Drive active	Drive needs to be active for the requested command or variable
Drive inactive	Drive needs to be inactive for the requested command or variable
Value out of range	Variable value out of range
Syntax error	Communication message syntax error
Not programmable	Variable is read-only
Recording active	The requested command cannot be executed because it conflicts with a recording in progress
Rec data not available	No data are available for the GET command
Not available	The requested variable value is not available
Command into limit	Requested motion is in direction of tripped limit switch
Current loop design failed	CONFIG failed due to bad current loop parameter
MENCRES out of range	CONFIG failed due to MENCRES
MENCOFF out of range	CONFIG failed due to MENCOFF
MSPEED out of range	CONFIG failed due to MSPEED
MBEMF out of range	CONFIG failed due to MBEMF
MVANGLF out of range	CONFIG failed due to MVANGLF
MVANGLH out of range	CONFIG failed due to MVANGLH

VLIM out of range	CONFIG failed due to VLIM
EEPROM empty	EEprom is empty
EEPROM invalid	EEprom stored parameter are not valid
Burnin active	The requested function cannot be executed during Burnin (a factory function)
Burnin not active	Burnin (factory function) cannot be stopped if it is not active
Motor in motion	The last ordered move command has not been completed yet
Velocity Config Failed	CONFIG failed due to bad velocity loop parameter
Invalid Opmode	Command cannot be issued in current Opmode
Command Exceeds SW Limits	Command exceeds PMIN or PMAX
Functionality is occupied	Selected DINxMODE function is already assigned to another input
Functionality not set	Functionality needs one of the DINxModes to be set accordingly
Value Not Supported	Command value not supported
Password Protected	The command or variable requested is password protected and intended for factory use only

Fault Monitoring System

The OFDL is constantly monitoring the status of many different components. In general, the philosophy of the drive is to latch all fault conditions so you can readily determine the source of the problem. When a fault is detected, it is logged in the internal error log, indicated in the Status Display, enunciated over the serial port, and in most conditions causes a drive disable. Many faults can be reset by toggling the hardware remote enable (REMOTE input).
The following provides a list of some of the more frequent faults the drive may detect in the unit hardware and operating system.

- **Motor Over Temperature**: The Motor's External Thermostat input is monitored for an open circuit condition. You can define (using THERMODE) what happens under this fault condition. The worst case event is a power stage disable when an 'H' appears in the status display, and the fault relay contacts (RELAY) are open.
- **Hardware Position Limit Inputs**: The IN1-7 Inputs are constantly monitored. If DINxMODE set these inputs for CW/CCW hardware position limits, they are monitored for an open-circuit condition. Although not necessarily an error condition, motor operation can be affected by these inputs. The OFDL can ignore the hardware position limits if you set LIMDIS = 1. The worst case event is that further motion in the given direction is not allowed with an 'L' illuminated in the status display. If both CW and CCW position limit inputs have detected an open-circuit condition, the OFDL enters into Hold position state.
- **Drive Over Temperature**: The internal heat sink temperature is monitored for an unsafe condition. This condition causes a 't' to be displayed and disables the drive. The drive will eventually cool enough to allow reset of this condition.
- **RMS Over Current (Foldback)**: The Foldback detection system can 'clamp' the available output current. This is not a true fault condition, but may cause undesired performance, due to the command current being limited below what is required to achieve the desired performance. This condition is indicated with an 'F' in the status display and can be detected by monitoring the FOLD switch variable.

- **Bus Over Voltage**: An over-voltage condition shuts down the drive and displays a lowercase ‘o’ in the status display. This fault will occur mostly during Regen operation where the BUS is raised to higher values than that produced by the power supply.
- **Bus Under Voltage**: An under-voltage condition shuts down the drive and displays a ‘u’ in the status display. This fault normally occurs when the incoming line voltage drops out or a fault occurs in the power supply.
- **PowerStage Fault (Over Current)**: Hardware circuitry monitors load short-circuit, transistor failure, and instantaneous Over Current. In general, toggling the Remote Enable cannot reset a power stage fault. Power must be cycled. A flashing ‘P’ in the status display indicates this condition.
- **Feedback Loss**: The drive monitors the Sine and Cosine Resolver feedback signals in Resolver based systems. Either of these signals not being present will cause the OFDL to disable and display an ‘rXX’ in the status display.
- **OverSpeed fault**: Software continuously monitors the actual (feedback) speed. If the motor speed exceeds the VOSPD limit, a ‘J’ will be displayed and the drive will be disabled. This normally occurs when there is an improperly tuned system and the load overshoots its commanded speed.
- **No compensator**: In case the drive cannot design a compensator, such as after a RSTVAR command, CLREEPROM, or any change in the motor or drive parameters, a flashing minus one (-1) will be displayed and will cause the drive to disable. This display normally indicates that the drive does not have a compensation file (SSV) loaded.
- **Memory reliability**: The non-volatile memory (EEPROM) is checked for integrity upon power-up. Any discrepancy in this data is noted with an ‘e’ in the status display. After power-up is successfully completed, any subsequent fault in the operation of the EEPROM is noted with an ‘E’ in the status display.

Contact Information

Danaher Motion products are available nationwide through an extensive authorized distributor network. These distributors offer literature, technical assistance and a wide range of models off the shelf for fastest possible delivery.

Danaher Motion sales engineers are conveniently located to provide prompt attention to customers' needs. Call the nearest office listed for ordering and application information or for the address of the closest authorized distributor.

Danaher Motion
Email: customer.support@DanaherMotion.com
Web: www.DanaherMotion.com