

DC1 120112 User Guide

4/22/13

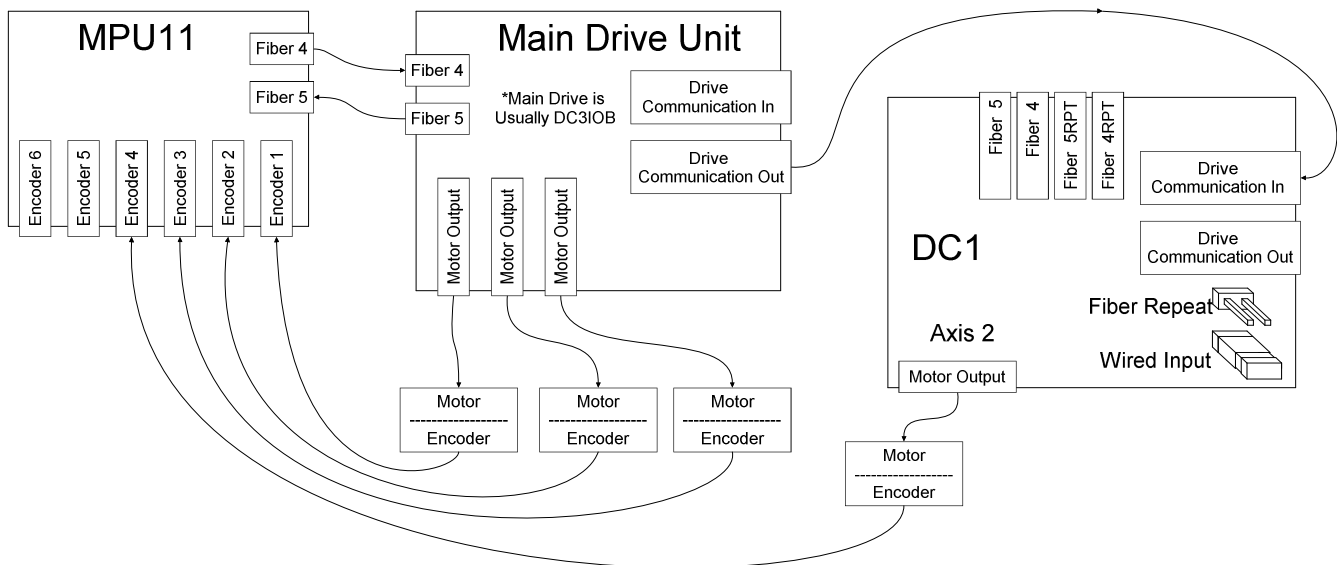
The DC1 is a single axis DC brush motor drive. DC1 works with MPU11 motion control card based systems. This drive is designed to add axes to existing three axis systems. Up to six axis operation can be achieved before running out of encoder feedback ports on MPU11. Revision 120112 and newer DC1 drives have fiber communication connections to allow direct connection to an MPU11 or connection to legacy systems.

DC1 Features

Drive Application:	DC Brush Motors
Number of Axes:	1
Current rating per axis:	6 to 15 Amps
Motor Voltage:	20 to 180 Volts
Limit Inputs:	2
Control Interface:	Shielded, twisted pair cable to DriveBus expansion port, or fiber optic DriveBus connection, or legacy DC fiber optic protocol
Dimensions (W*D*H):	5.5 * 5.3 * 1.5 Inches

Connection Overview

Typical wiring of the DCSINGLE requires only logic power, motor power, motor, communication, and drive fault connections. Logic power typically comes from a PC style power supply. A shielded, twisted pair cable is used for communication. Fault relay terminals RLY1 and RLY2 are wired in series with the emergency stop power loop to cut motor power in the case of a fault.



Drive Protocol Features

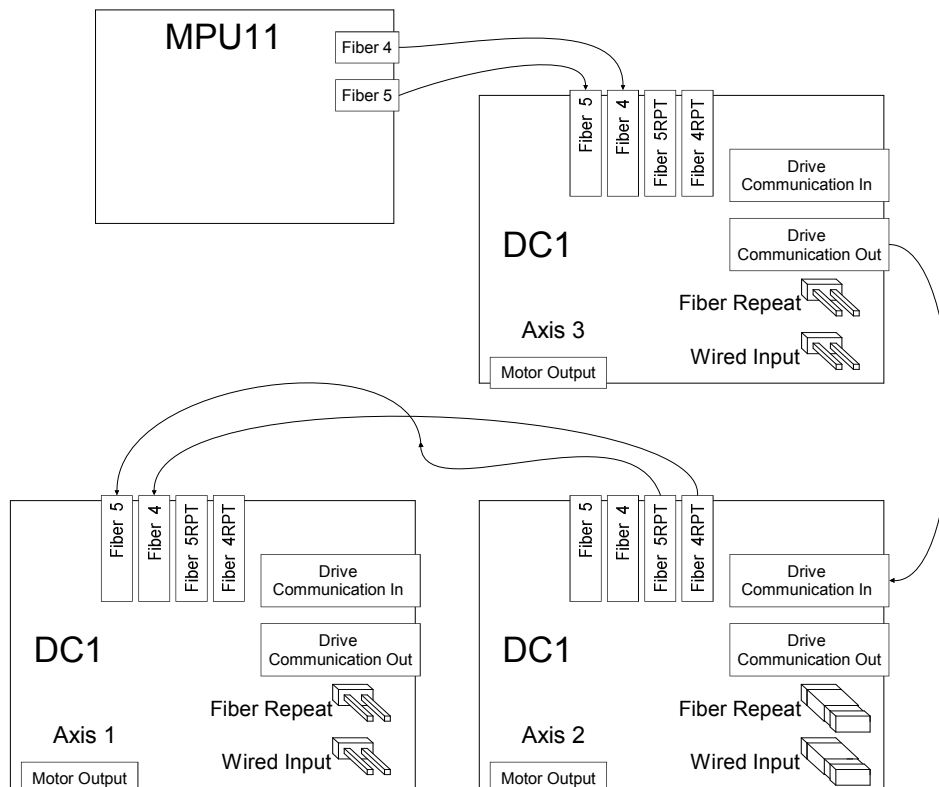
Each DC1 drive is connected to another drive through the “Drive Communication In” connector. The “Drive Communication Out” connector goes to drives further away from the MPU11 in the communication chain. The “Drive Communication In” connector gets data from drives closer to MPU11. Fiber optic communication is also available. Fiber connections “5” and “4” perform communication toward MPU11, while “5RPT” and “4RPT” connect to additional drives. A mix of fiber and wire communication can be selected using on board jumper blocks.

LED1 status display will show the axis number for the drive as long as no error codes are present. The axis farthest from the MPU11 in the communication chain will always be axis 1. Axis numbers increase along the chain toward the MPU11, up to a maximum axis number of 8. If a DC1 is connected to a DC3IOB, the DC1 will be axis 1, and the DC3IOB will be axes 2, 3, and 4. In this example, if a second DC1 is connected to the first, it will be axis 1, the DC1 connected to the DC3IOB will be axis 2, and DC3IOB will be axes 3, 4, and 5.

If error codes exist, the decimal point on LED1 will light and an error number will flash. See the “LED1 Error Codes” chart for information on error codes.

Connection Type Setup

DC1 drives may be configured for a variety of communication arrangements. The “WIRED INPUT” and “FIBER RPT” jumpers are used to select the communication mediums. When the “WIRED INPUT” jumper block is installed, a cable connection is expected at the “DRIVE COMM. IN” header, otherwise fiber optic connectors “4” and “5” will be used to communicate with MPU11. The “FIBER RPT” jumper block can be installed to communicate with additional drives over fiber optic connectors “4RPT” and “5RPT”. If the jumper block is removed, the “Drive Comm. Out” header will be used to communicate with other drives in the chain. The following example illustrates some possible DC1 configurations.

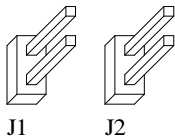


Drive Section

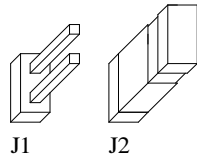
The DC1 drive section is based on Centroid's proven DC brush motor drive technology. Several built in features allow for easy integration with a variety of hardware.

Each axis can be built with a range of current ratings determined by jumper settings and drive hardware. Current ratings of 6, 9, 12, and 15 amps can be provided on the DC1. The following examples show the various current settings. The 15 amp setting is only available on drives built with heavy duty components. If the drive is set for 15 amps, but is not capable of this current rating, an error code will display on the LED readout.

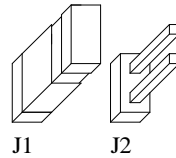
6 Amp Setting



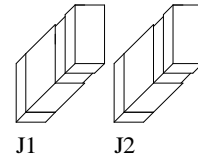
9 Amp Setting



12 Amp Setting



15 Amp Setting

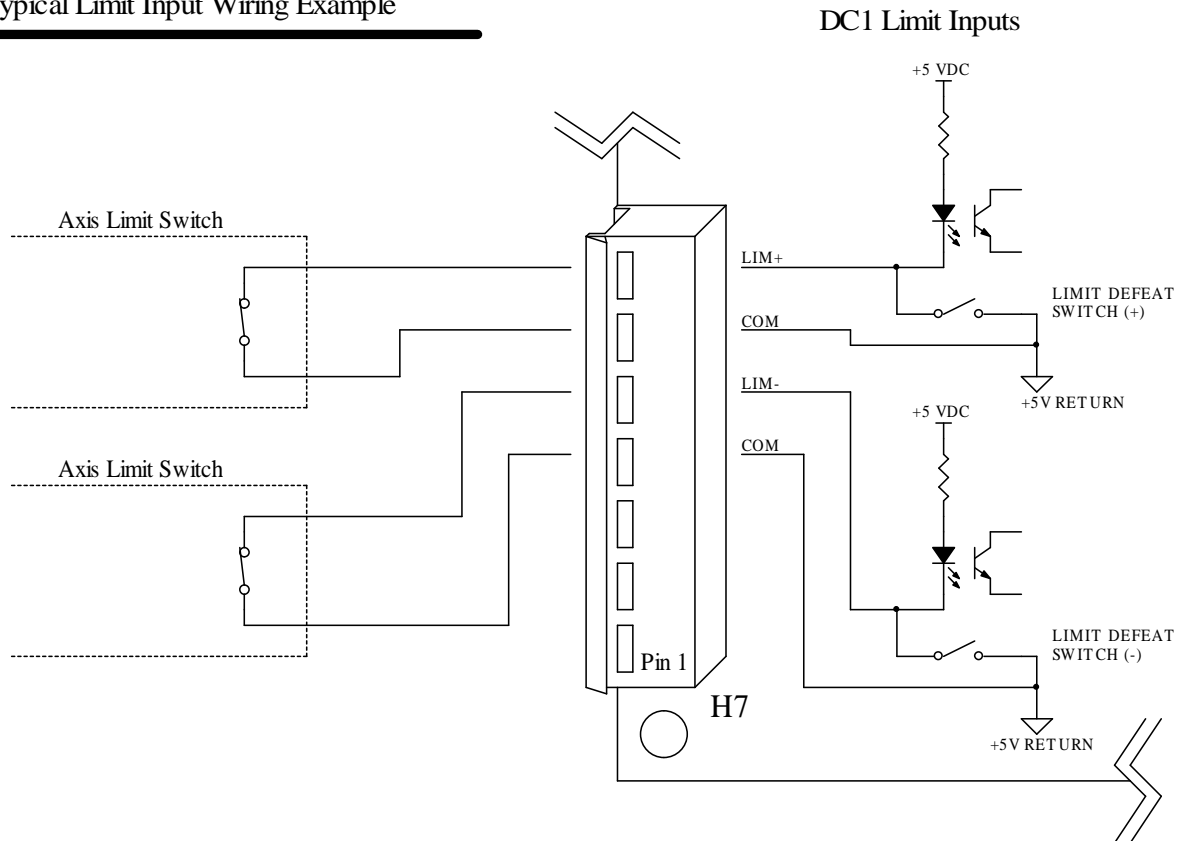


A drive fault relay output is provided for connection of the E-stop power loop. The relay contacts stays closed as long as communication is valid and no serious faults exist.

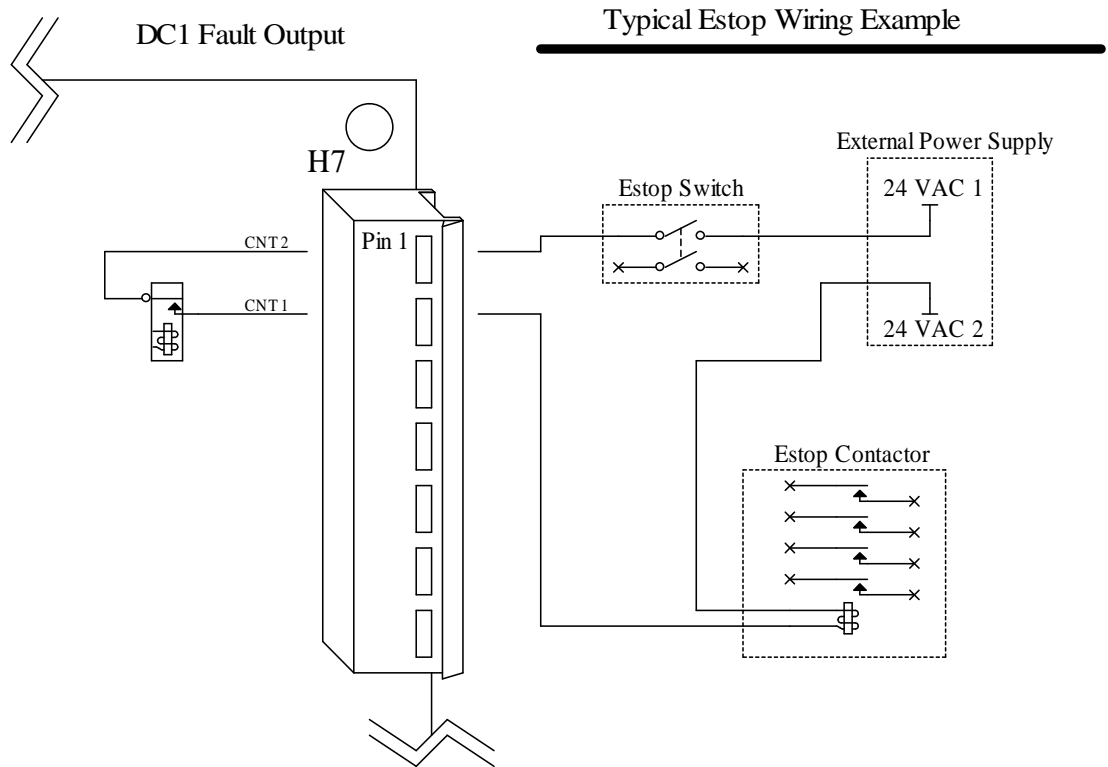
Axis limit inputs are provided on the DC1. These inputs inhibit motion in the direction of a tripped limit switch. If limits are required, it will also be necessary in most cases to run the limit switches in parallel to PLC inputs to provide feedback to the control. If limits are not required, the limit defeat DIP switches may be pushed down toward the PCB to ignore the external limit inputs.

Limit Input Overview

Typical Limit Input Wiring Example



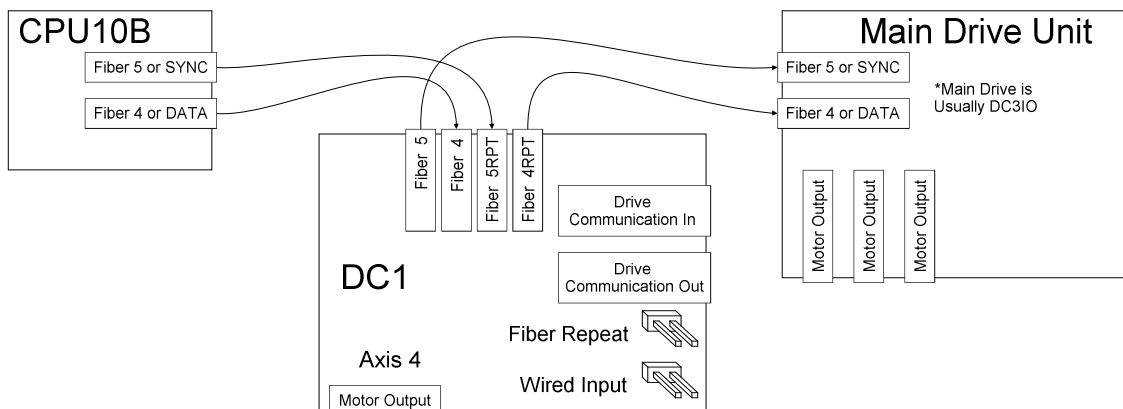
Fault Output Overview



Legacy Mode

A legacy DC protocol compatibility mode is available to allow the DC1 to replace the older DCSINGLE. To activate legacy mode, a jumper block must be installed on the “LEGACY” jumper pins (J9) before applying power to the DC1. When the DC1 is operating in legacy mode, LED1 will display “L” rather than an axis number. The DC1 is always the fourth axis in legacy mode.

The legacy protocol uses two fiber optic cables labeled “4” and “5” or “DATA” and “SYNC” to send data to drives. No data returns to the CPU7, CPU10, or CPU10B motion control card. This requires the fiber cables from the motion control card to be connected to the blue receivers on DC1. Signals are repeated to another drive over the gray transmitters. The following example shows the proper connection of DC1 fibers in legacy mode.



LED1 Error Codes

Error Number	Meaning	Cause	Corrective Action
1	Not Used		
2	15A Not Available	Current selection jumpers are set to 15A, but the drive is not equipped with the appropriate FETs for long term use at 15A, so the drive will drop back to 12A	Select 12A or lower current settings or use a high power DC1
3	Null Error	The self adjust routine has detected too large an offset on the current feedback	Send the drive back for repair. There is likely an internal failure causing the large offset
4	Limit Tripped	Any limit switch is tripped	move away from the limit, check limit switch wiring, or use the limit defeat switches if a limit switch is not required
5	Not Used		
6	Not Used		
7	Not Used		
8	Not Used		
9	Not Used		
L	Legacy mode	Legacy jumper block J9 is installed	See "Legacy Mode" section or remove jumper

DC1 specifications

Characteristic	Min.	Typ.	Max.	Unit
5 Volt Supply Current	0.3	-	-	A
12 Volt Supply Current	-	-	0	A
Input Pullup Voltage (V _{inp})	-	5	-	VDC
Input On Voltage	3.75	-	-	VDC
Input Off Voltage	-	-	1.25	VDC
Input Operating current	9	11	15	mA
Fault Relay Output Current	0.01	-	10	A @ 125VAC
Fault Relay Output Current	0.01	-	5	A @ 30VDC
Motor Output Current Settings	6	12	15	A
Motor Supply Voltage	20	115	180	VDC
Communication Cable Length	-	-	20	feet
Communication Fiber Optic Length	-	-	100	feet
Size: 5.5 * 5.3 * 1.5 (W*D*H)				Inches

DC1 Troubleshooting

Symptom	Possible Cause	Corrective Action
DF LED not lit	Motion control card hasn't booted up	Start software, wait for the main screen to load
	Drive communication cable connected incorrectly or faulty	See "Connection Type Setup" section. Replace cables if correctly connected.
	Incorrect jumper settings	See "Connection Type Setup" section
	"Servo Power Removed" due to fault	Restart system to reset runaway or other serious fault condition
	Incorrect PLC program	Check for PLC program that handles DC1 faults properly
Axis ? Communication Out Fault	Communication to DC1 is faulty	Check or replace fiber 4 (or communication cable), see "Connection Type Setup" section
Axis ? Communication In Fault	Communication to MPU11 is faulty	Check or replace fiber 5 (or communication cable), see "Connection Type Setup" section
5V and 3.3V LEDs not lit	Logic power missing	Measure DC voltage between +5V and +5V return pins on "LOGIC POWER" connector. Replace or repair wiring or supply if voltage is not 5V +/-0.5V
3.3V LED not lit, but 5V LED lit	Internal problem	Return for repair
LED1 display flashing with decimal point lit	An error condition has been detected	See the "LED1 Error Codes" section for details on the error
LEDs on, but motor doesn't run	Limits tripped	Check limit switch wiring or push the limit defeat switches down toward the board
	No motor voltage	Measure between +Vm and -Vm for correct motor voltage and polarity, correct wiring
	Axis Fuse blown	Check fuse F1 with a meter, replace as necessary

DC1 Jumper Functions

Designator	Jumper Name	Function with jumper block in place	Function with jumper block in removed
J1		Current select high bit set	Current select high bit clear
J2		Current select low bit set	Current select low bit clear
J7	WIRED INPUT	Communicate with another drive over wires (this DC1 is not connected directly to MPU11)	Communicate with MPU11 or another drive through fiber connectors 4 and 5
J8	FIBER RPT	Drivebus out to another drive connects with fiber optics 4RPT and 5RPT	Drivebus out connects to another drive over wires
J9	LEGACY	Use legacy DC protocol	Use DriveBus protocol
J10	AUX	None	None

DC1 Connections

