# DC3IOB Revision 080910 User Guide

Updated 7/12/12

## Overview

The DC3IOB is a three axis DC brush motor drive with an integrated PLC. A range of motor drive currents are selectable with jumper blocks. The integrated PLC includes 30 inputs, 31 digital outputs, and one analog output (see "PLC Section" for details). The DC3IOB can be operated in legacy mode by a CPU10 or compatible motion control card equipped with an IO2PIC. The DC3IOB can also be operated by a MPU11 motion control card running the latest PLC and drive protocols to allow additional features. To change between MPU11 and CPU10 compatibility modes, the DC3IOB must be reprogrammed by Centroid.

### Differences from DC3IO in Legacy Mode

The DC3IOB is an upgraded version of the DC3IO. When operating in legacy mode, the DC3IOB is functionally equivalent to the DC3IO. The most notable change is in the current selection. Drive current is set using jumpers for each axis, rather than changing current sensors. The 6, 9, and 12 amp current settings can be selected on any DC3IOB. The 3 amp setting is no longer a standard option. The 15 amp current setting will only take effect on high power DC3IOBs that have heavy duty drive components. Another new feature is the base axis / error number display (LED1). This readout will display 0 during normal legacy mode operation and will flash an error code if errors are detected. See the "LED1 Error Codes" section for details on readout codes.

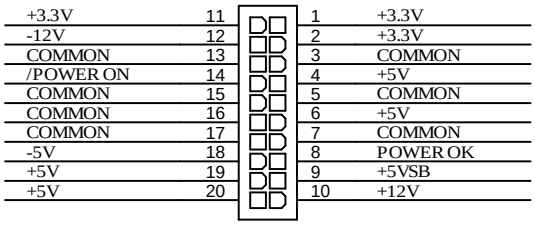
### DC3IOB Features

| | |
|---|---|
| Drive Application: | DC Brush Motors |
| Number of Axes: | 3 |
| Current rating per axis: | 6 to 15 Amps |
| Motor Voltage: | 20 to 120 Volts |
| PLC Inputs: | 30 |
| PLC Outputs: | 31 |
| Spindle Analog resolution: | 12 bits |
| Control Interface: | 5 fiber optics to CPU10 compatible motion control card with IO2PIC<br>or<br>4 fiber optics to MPU11 motion control card |
| Dimensions (W*D*H): | 16 * 8 * 5.25 inches |

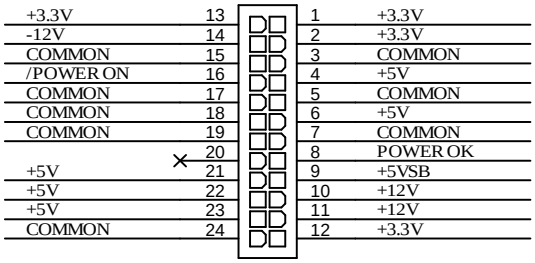
### Logic Power Connection

An ATX style PC power supply provides voltage for DC3IOB logic circuits. The power supply connector may have 20 pins or 24 pins on units equipped with an ATX 2.2 compatible supply. The -5V and +5VSB pins are not used by the DC3IOB, but all other pins should be checked if troubleshooting a supply problem.

ATX 2.0 Power Connector (H14)




Optional ATX 2.2 Power Connector (H14)

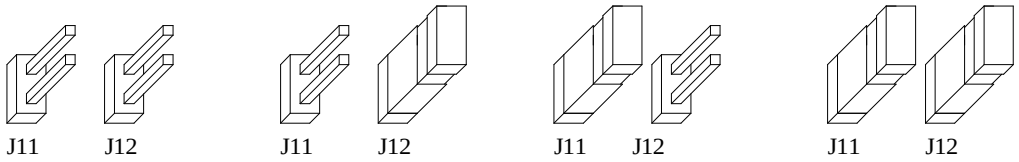



## Drive Section

The DC3IOB 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 DC3IOB. The following examples show the various current settings for the first, or "X", axis. The second axis uses jumpers J13 and J14, while the third axis uses jumpers J9 and J10 for current setting.

6 Amp Setting 9 Amp Setting 12 Amp Setting 15 Amp Setting




Open collector output drivers are provided for a brake on each axis (see "DC3IOB Connections" and "PLC Section" for wiring details). The brake output drivers can be wired to a 5 volt relay to release motor brakes when each axis is enabled.

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

An analog current request output is provided on the 3rd (Z on a mill) axis for running third party drives. This feature is particularly useful for C axis lathe applications. The current request signal swings from –10 volts to +10 volts and is centered at 0 volts. This signal is used for spindle control in positioning mode. See the "DC3IOB Connections" page to locate the C axis analog and C axis common pins.

## PLC Section

The DC3IOB has 30 inputs, 31 digital outputs, and one analog output. Some I/O is dedicated to a particular function, but 21 inputs and 29 digital outputs can be used for any purpose. See the "DC3IO I/O Map" for an overview.

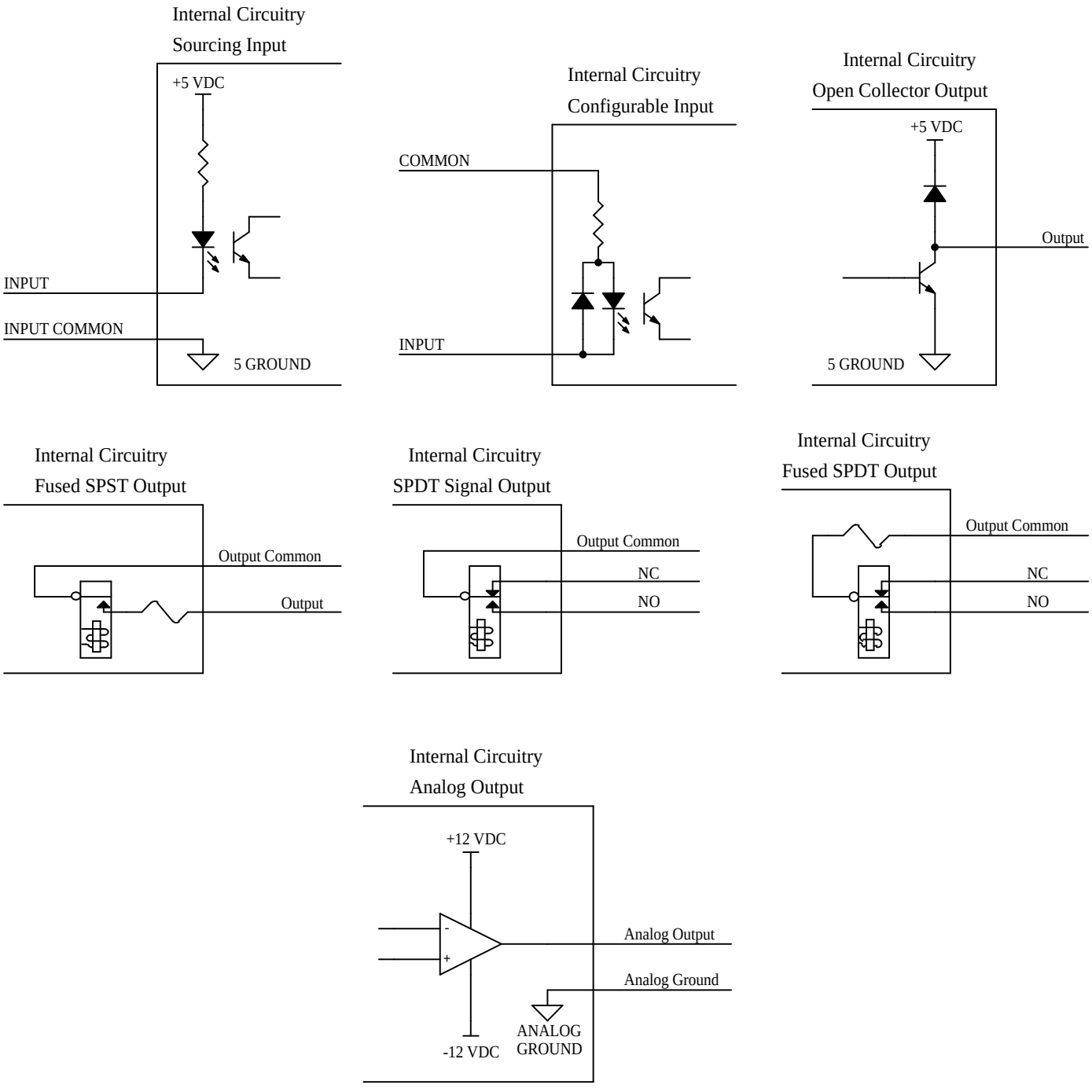
Twelve inputs are configurable types, 16 are sourcing, and 2 are internally wired. The internal drive fault and error check inputs are dedicated and not user definable. X-, X+, Y-, Y+, Z-, and Z+ limit inputs are not configurable for other uses since they are hard wired to drive circuitry that inhibits axis motion. The emergency stop input is also dedicated, has increased pull up current, and disables spindle analog output when it is high. The 21 remaining inputs can be configured for special purposes if necessary.

Several output types are used on the DC3IOB. Relay outputs are provided for common functions. Signal relays are used on spindle outputs to provide a reliable connection on low level outputs when connecting an inverter. Fused power relays are provided for the rotary clamp and other higher level outputs. Outputs that

are not used on many systems are open collector type. These outputs will usually need to drive an external 5 volt relay to interface with higher power devices. Check the “DC3IOB I/O Map” and “DC3IOB Specifications” sections to determine an output’s type and capability.

The spindle direction output is not available for other uses. The spindle analog section uses this output to determine polarity when configured as a bipolar output (-5 to +5 or –10 to +10). Internal error checking output and spindle speed bits are also dedicated, leaving 29 outputs definable for custom uses.

The DC3IOB analog output for spindle control has a 12bit resolution. This should not be confused with the C axis analog output described in the “Drive Section”. Four analog output ranges can be selected. See the “Spindle Analog Output Adjustment” section for jumper settings.

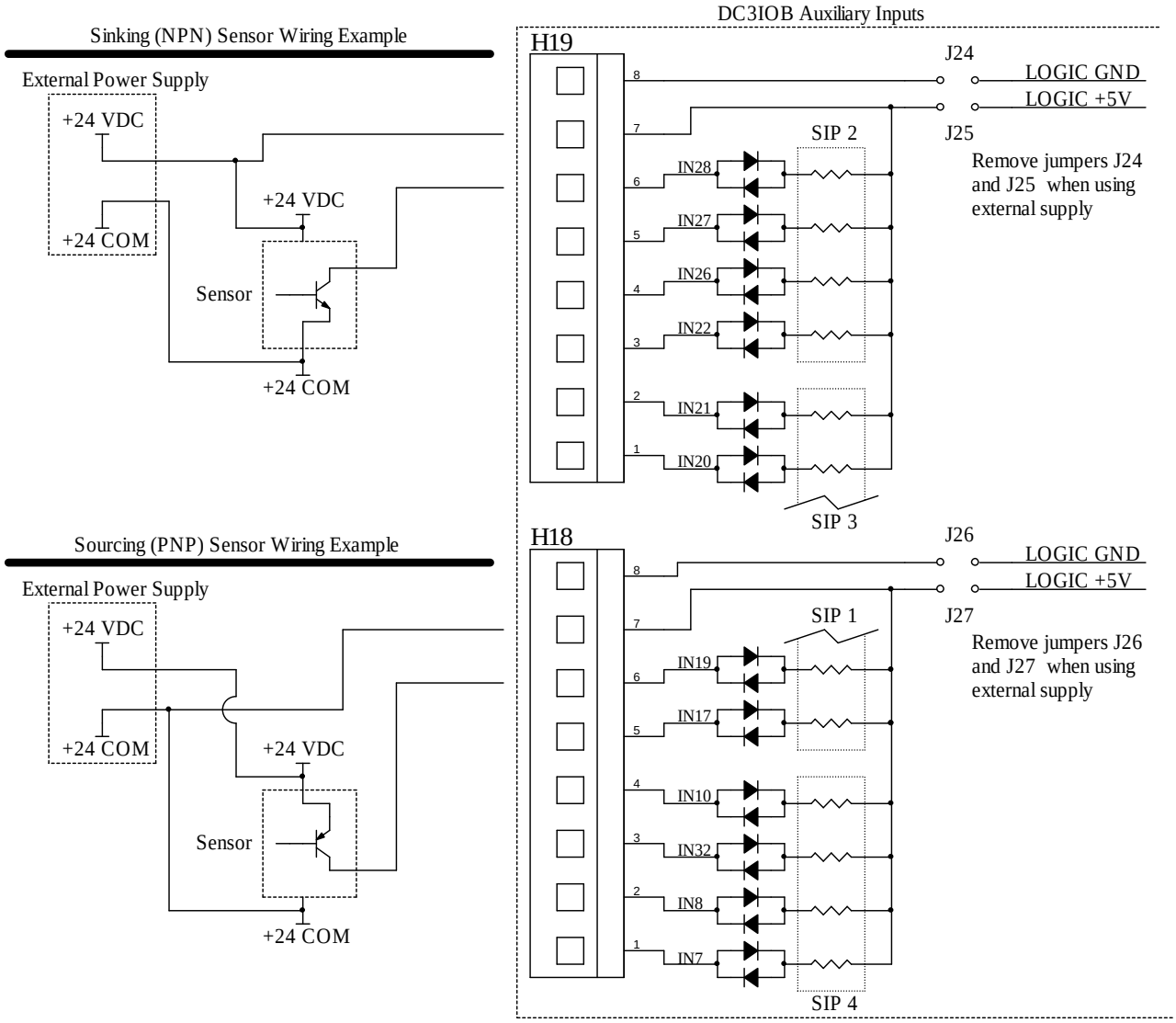


## Auxiliary Configurable Inputs

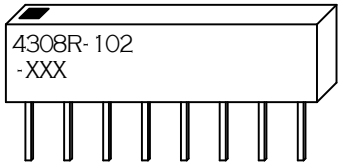
Configurable inputs are available through the auxiliary input connectors for custom applications. These inputs can be used with 5, 12, or 24 VDC sensors or switches. Compare the specifications of sensors to the "DC3IOB Specifications" chart to ensure reliable operation. Resistor packs SIP1, SIP2, SIP3, and SIP4 must be changed to match the input voltage for auxiliary inputs. Sinking or sourcing operation is determined by the wiring configuration.

Jumpers J24 through J27 may be installed to power the inputs from the DC3IO's logic power supply. External power may be wired through pins 7 and 8 of H18 and H19. Make sure there are no jumper blocks on J24, J25, J26, or J27 before applying external power, or the DC3IOB will be damaged.

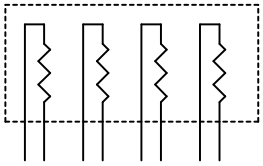
## Auxiliary Inputs Schematic



SIP Identification – XXX Indicates Value




SIP Internal Wiring / Pinout



SIP Input Reference

| SIP Designator | Related Inputs |
|---|---|
| SIP1 | 17,19 |
| SIP2 | 22,26,27,28 |
| SIP3 | 20,21 |
| SIP4 | 7,8,32,10 |

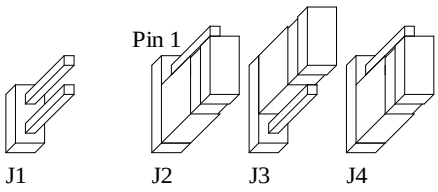
SIP Input Voltage Selection

| SIP Value Marking | Resistor Value (Ohms) | Input Voltage |
|---|---|---|
| 471 | 470 | 5 |
| 102 | 1.0k | 12 |
| 222 | 2.2k | 24 |

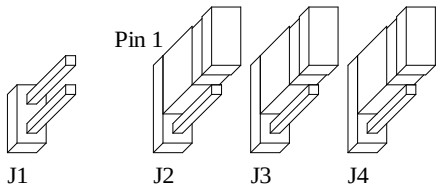
## Spindle Analog Output Adjustment

Output voltage range can be set to 0 to +5VDC, 0 to +10VDC, -5 to +5VDC, or -10 to +10VDC by setting jumpers J1, J2, J3, and J4 according to the diagrams below. Trimming the output can be accomplished with VR1 and VR2 potentiometers. See the "DC3IOB Connections" diagram for the location of adjustment hardware. The analog levels are adjusted at the factory for the 0 to +10VDC range, so only slight adjustments should be needed for each installation. Only adjust the "OFFSET" potentiometer (pot) (VR2) at the minimum possible spindle speed. This adjustment is intended only to null the voltage level when 0 RPM is commanded. The "GAIN" pot (VR1) should be used at maximum speed to match actual RPM with commanded RPM. Adjustments to the analog output should be very minor and cannot be used to compensate for incorrect inverter or control settings.

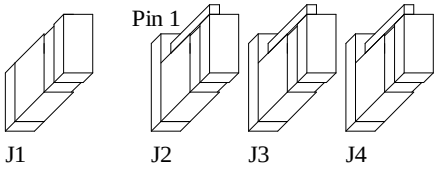
0 to 10 VDC Jumper Settings



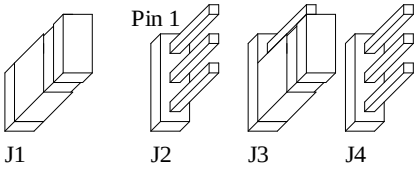

0 to 5 VDC Jumper Settings




-5 to +5 VDC Jumper Settings



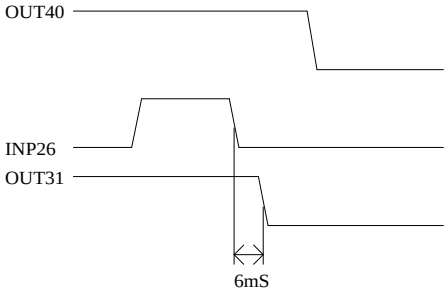

-10 to +10 VDC Jumper Settings



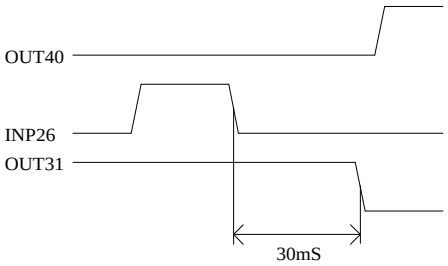
## Fast I/O Operation

The Fast I/O is a hard-coded function that is enabled in legacy mode when output 40 is turned on in the PLC program. The Fast I/O immediately turns off output 31 when a falling edge is detected on input 26. This is done immediately before sending any data back to the control. The function is self-resetting - after output 31 is turned off, output 40 must be turned on again in order to reactivate the Fast I/O. The Fast I/O feature was developed to prevent a tool carousel from moving too far due to communication delays. When output 40 is off, output 31 and input 26 work normally. Output 40 is not a physical output in legacy mode, since using this output for purposes other than Fast I/O enable could cause confusion. In MPU11 mode, the Fast I/O feature is not available, and output 40 is an open collector output.

Legacy Mode Timing - Fast I/O Enabled




Legacy Mode Timing - Normal PLC Operation



# MPU11 Mode Features

When the DC3IOB is programmed for use with MPU11, additional features are enabled. The new drive protocol supports multiple drives for up to 8 axes of motion. The new PLC protocol supports programmable debounce times as well as more I/O, allowing for PLC expansion.

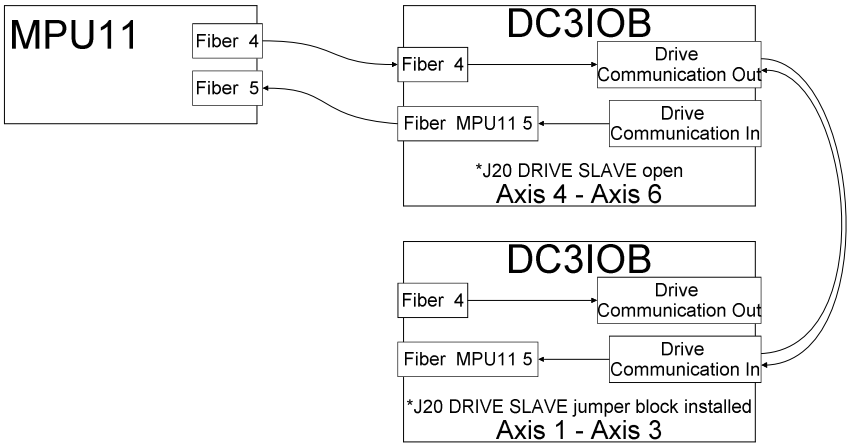
## MPU11 Mode Drive Features

Other drives may be connected to the DC3IOB through the “Drive Communication In” and “Drive Communication Out” connectors. The “Drive Communication Out” goes to drives further away from the MPU11 in the communication chain, and is always active. The “Drive Communication In” connector gets data from drives closer to MPU11, and must be enabled by installing a jumper block on J20 “DRIVE SLAVE” pins. Shorting the pins of J20 will cause the drive to look for communication on the “Drive Communication In” cable connection rather than fiber optic connections “4” and “MPU11 5”.

LED1 status display will show the base or first axis number for the drive. For example, a DC3IOB that is running axes 3, 4, and 5 will display 3 on LED1 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 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.

Drive Communication Connection for Two DC3IOBs

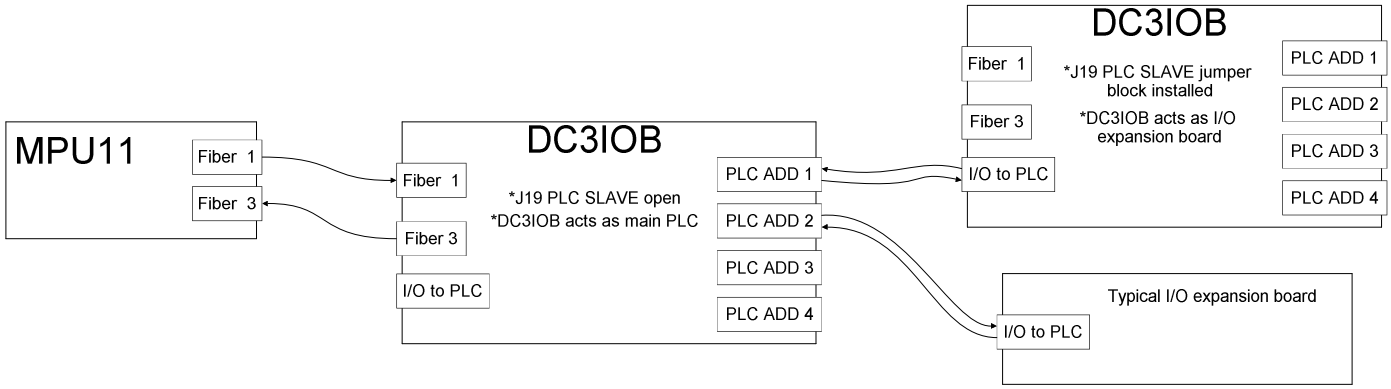


## MPU11 Mode PLC Features

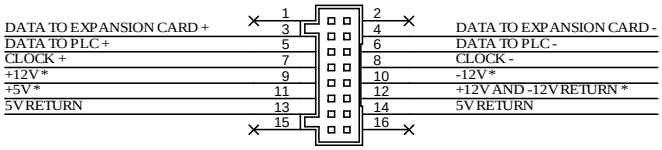
PLC I/O expansion is possible through the four “PLC ADD” connectors. Each PLC expansion port can accept 16 – 128 inputs, outputs, or inputs and outputs in 16 bit increments. This allows for digital I/O, DACs, ADCs, or other devices to be added to the system as needed.

If two DC3IOB units are used in a system, one DC3IOB PLC may act as an expansion board to the other DC3IOB to double the system’s I/O. The DC3IOB connected to the MPU11 through fibers 1 and 3 will act as the main PLC card. The second DC3IOB must have a jumper block on the pins of J19 “PLC SLAVE” to communicate through the “I/O to PLC” connector H6. An expansion cable may then be run from the “I/O to PLC” connector to any of the four “PLC ADD” connectors on the DC3IOB communicating with MPU11.

### PLC Communication Connection for Two DC3IOBs

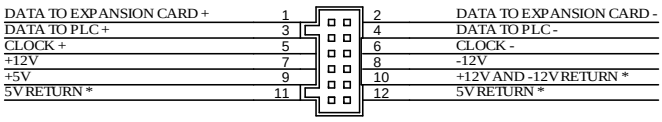



### I/O TO PLC Connector Pinout




* Power supply voltages are noted as part of the standard, but are not used by the DC3IOB since it has its own power supply.

### PLC ADD 1 – 4 Connector Pinouts



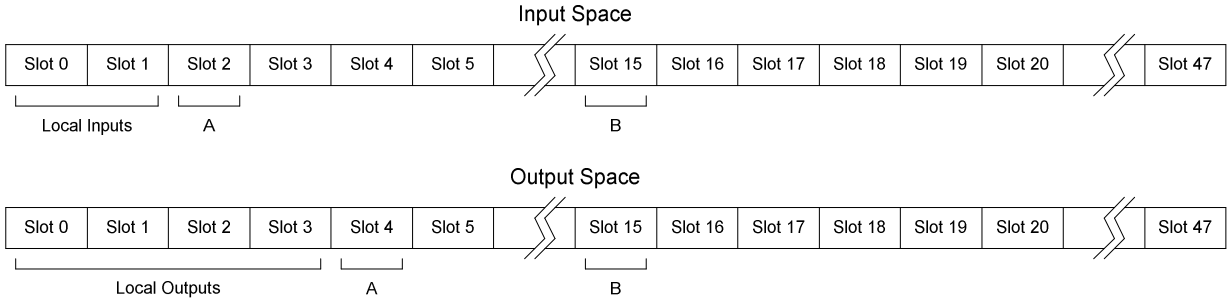

* +12V AND -12V RETURN and 5V RETURN are connected on the DC3IOB

## PLC Expansion Details

PLC I/O is arranged in 16 bit groups or slots. As a general rule, slots 0-14 are used for individual I/Os such as switches and have a programmable debounce time for the inputs. Slots 15-47 are reserved for ADCs, DACs, or other devices that do not require debounce. Every device using I/O space must use space in 16 bit multiples by reserving slots. A DC3IOB operating as a PLC uses 2 slots for its inputs and 4 slots for outputs. PLC expansion boards with inputs and outputs must have a matching number of input and output slots. Therefore, a DC3IOB acting as an expansion board (PLC slave jumper installed) will use 4 slots for inputs and 4 slots for outputs. The I/O map remains unchanged for a DC3IOB working as an expansion card, except that it is shifted up in the I/O space based on the slots it is assigned to.

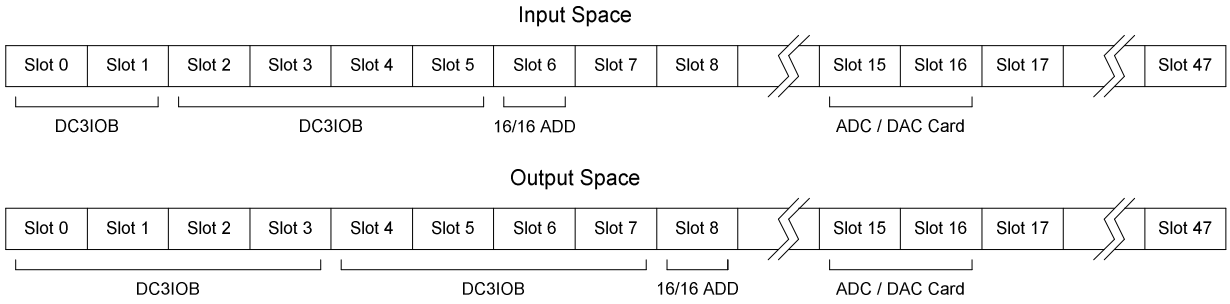
Assignment of I/O slots occurs in a linear fashion starting at the main PLC, then “PLC ADD” port 1, “PLC ADD” port 2, etc. In the following general example, local inputs and outputs represent a DC3IOB working as the main PLC. Devices plugged into the “PLC ADD” ports that require debounce will be assigned starting at the slots marked “A”, while devices that do not require debounce will start being assigned at the slots marked “B”.

PLC Expansion Location Assignment General Example



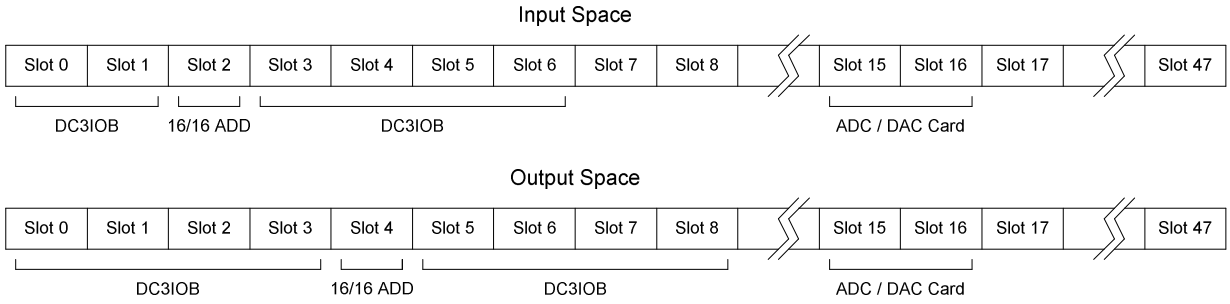

Example 2 illustrates I/O assignments on a system that has a DC3IOB main PLC, a DC3IOB plugged into “PLC ADD 1”, a 16/16 digital I/O expansion card connected to “PLC ADD 2”, and an ADC/DAC expansion card plugged into PLC ADD 3. Note that the ADC/DAC expansion card is assigned starting at slot 15 since it does not require debounce.

PLC Expansion Example 2




Example 3 shows the results of plugging an ADC/DAC expansion card into “PLC ADD 1”, a 16/16 digital I/O expansion card into “PLC ADD 2”, and a DC3IOB into “PLC ADD 3”. The location of the ADC/DAC expansion card I/O is unaffected since it is the only device in the example that does not require debounce. The 16/16 digital I/O expansion card and DC3IOB have changed locations since the 16/16 is plugged into a lower number “PLC ADD” port and is therefore assigned I/O locations before the DC3IOB.

PLC Expansion Example 3



# DC3IOB I/O MAP

| Input Specification | | | | Input Location | |
|---|---|---|---|---|---|
| Number | Function | Type | Use | Connector | Pin |
| 1 | X- Limit | Sourcing | Dedicated | H21 | 1 |
| 2 | X+ Limit | Sourcing | Dedicated | H21 | 2 |
| 3 | Y- Limit | Sourcing | Dedicated | H21 | 4 |
| 4 | Y+ Limit | Sourcing | Dedicated | H21 | 5 |
| 5 | Z- Limit | Sourcing | Dedicated | H21 | 7 |
| 6 | Z+ Limit | Sourcing | Dedicated | H21 | 8 |
| 7 | W- Limit | Configurable | General | H18 | 1 |
| 8 | W+ Limit | Configurable | General | H18 | 2 |
| 9 | Range | Sourcing | General | H20 | 11 |
| 10 | 5th+ Limit | Configurable | General | H18 | 4 |
| 11 | Emergency Stop | Sourcing | Dedicated | H21 | 10 |
| 12 | Servo Drive Fault | Internal | Dedicated | N/A | N/A |
| 13 | TT1 | Sourcing | General | H21 | 11 |
| 14 | Probe | Sourcing | General | H20 | 1 |
| 15 | Probe Detect | Sourcing | General | H20 | 2 |
| 16 | Error Check | Internal | Dedicated | N/A | N/A |
| 17 | Door Interlock | Configurable | General | H18 | 5 |
| 18 | Low Lube | Sourcing | General | H20 | 4 |
| 19 | Spindle Zero Speed | Configurable | General | H18 | 6 |
| 20 | Spindle At Speed | Configurable | General | H19 | 1 |
| 21 | Spindle Orient Complete | Configurable | General | H19 | 2 |
| 22 | Tool Clamped | Configurable | General | H19 | 3 |
| 23 | NOT USED | N/A | N/A | N/A | N/A |
| 24 | Tool Release Switch | Sourcing | General | H20 | 5 |
| 25 | Spindle Drive Fault | Sourcing | General | H20 | 7 |
| 26 | Tool Counter * | Configurable | General | H19 | 4 |
| 27 | Carousel Out / TP Up | Configurable | General | H19 | 5 |
| 28 | Carousel In / TP Dwn | Configurable | General | H19 | 6 |
| 29 | NOT USED | N/A | N/A | N/A | N/A |
| 30 | Rotary Home | Sourcing | General | H20 | 8 |
| 31 | Rotary Clamped | Sourcing | General | H20 | 10 |
| 32 | Air Pressure Low | Configurable | General | H18 | 3 |
| 33 | NOT USED | N/A | N/A | N/A | N/A |
| 34 | NOT USED | N/A | N/A | N/A | N/A |
| 35 | NOT USED | N/A | N/A | N/A | N/A |
| 36 | NOT USED | N/A | N/A | N/A | N/A |
| 37 | NOT USED | N/A | N/A | N/A | N/A |
| 38 | NOT USED | N/A | N/A | N/A | N/A |
| 39 | NOT USED | N/A | N/A | N/A | N/A |
| 40 | NOT USED | N/A | N/A | N/A | N/A |
| 41 | NOT USED | N/A | N/A | N/A | N/A |
| 42 | NOT USED | N/A | N/A | N/A | N/A |
| 43 | NOT USED | N/A | N/A | N/A | N/A |
| 44 | NOT USED | N/A | N/A | N/A | N/A |
| 45 | NOT USED | N/A | N/A | N/A | N/A |
| 46 | NOT USED | N/A | N/A | N/A | N/A |
| 47 | NOT USED | N/A | N/A | N/A | N/A |
| 48 | NOT USED | N/A | N/A | N/A | N/A |
| 49 | NOT USED | N/A | N/A | N/A | N/A |
| 50 | NOT USED | N/A | N/A | N/A | N/A |
| 51 | NOT USED | N/A | N/A | N/A | N/A |
| 52 | NOT USED | N/A | N/A | N/A | N/A |
| 53 | NOT USED | N/A | N/A | N/A | N/A |
| 54 | NOT USED | N/A | N/A | N/A | N/A |
| 55 | NOT USED | N/A | N/A | N/A | N/A |
| 56 | NOT USED | N/A | N/A | N/A | N/A |
| 57 | NOT USED | N/A | N/A | N/A | N/A |
| 58 | NOT USED | N/A | N/A | N/A | N/A |
| 59 | NOT USED | N/A | N/A | N/A | N/A |
| 60 | NOT USED | N/A | N/A | N/A | N/A |
| 61 | NOT USED | N/A | N/A | N/A | N/A |
| 62 | NOT USED | N/A | N/A | N/A | N/A |

* Fast I/O Related

*In MPU11 compatibility mode, Output 40 is Auxiliary 17 Open Collector on H5 pin 8

| Output Specification | | | Output Location | |
|---|---|---|---|---|
| Number | Function | Type | Connector | Pin |
| 1 | Emergency Stop | Open Collector | H9 | 1 |
| 2 | Lube Pump | Fused Relay SPST | H16 | 7,8 |
| 3 | Flood Pump | Fused Relay SPST | H16 | 9,10 |
| 4 | Mist Solenoid | Fused Relay SPST | H17 | 7,8 |
| 5 | Carousel Direction | Open Collector | H9 | 2 |
| 6 | Carousel Out Solenoid | Open Collector | H9 | 3 |
| 7 | Tool Clamp Solenoid | Open Collector | H9 | 4 |
| 8 | Air Blow Through | Open Collector | H9 | 5 |
| 9 | Carousel In Solenoid | Open Collector | H9 | 6 |
| 10 | Orient | Open Collector | H9 | 7 |
| 11 | Spindle Chiller | Open Collector | H9 | 8 |
| 12 | Spindle Cooling Fan | Open Collector | H7 | 1 |
| 13 | Spindle Direction | Signal Relay SPDT | H16 | 1,2,3 |
| 14 | Spindle Enable | Signal Relay SPDT | H17 | 1,2,3 |
| 15 | Inverter Reset | Signal Relay SPDT | H16 | 4,5,6 |
| 16 | Error Check | Internal | N/A | N/A |
| 17 | Spin. Speed Bit 0 | Internal | N/A | N/A |
| 18 | Spin. Speed Bit 1 | Internal | N/A | N/A |
| 19 | Spin. Speed Bit 2 | Internal | N/A | N/A |
| 20 | Spin. Speed Bit 3 | Internal | N/A | N/A |
| 21 | Spin. Speed Bit 4 | Internal | N/A | N/A |
| 22 | Spin. Speed Bit 5 | Internal | N/A | N/A |
| 23 | Spin. Speed Bit 6 | Internal | N/A | N/A |
| 24 | Spin. Speed Bit 7 | Internal | N/A | N/A |
| 25 | Spin. Speed Bit 8 | Internal | N/A | N/A |
| 26 | Spin. Speed Bit 9 | Internal | N/A | N/A |
| 27 | Spin. Speed Bit 10 | Internal | N/A | N/A |
| 28 | Spin. Speed Bit 11 | Internal | N/A | N/A |
| 29 | Gear Change | Open Collector | H7 | 2 |
| 30 | Rotary Clamp Solenoid | Fused Relay SPDT | H17 | 4,5,6 |
| 31 | Carousel Enable * | Open Collector | H7 | 3 |
| 32 | Red Light | Open Collector | H7 | 4 |
| 33 | Green Light | Open Collector | H7 | 5 |
| 34 | Yellow Light | Open Collector | H7 | 6 |
| 35 | Worklight | Open Collector | H7 | 7 |
| 36 | Auxiliary 1 | Open Collector | H7 | 8 |
| 37 | Auxiliary 2 | Open Collector | H5 | 1 |
| 38 | Auxiliary 3 | Open Collector | H5 | 2 |
| 39 | Auxiliary 4 | Open Collector | H5 | 3 |
| 40 | Fast I/O Enable * | N/A | N/A | N/A |
| 41 | NOT USED | N/A | N/A | N/A |
| 42 | NOT USED | N/A | N/A | N/A |
| 43 | NOT USED | N/A | N/A | N/A |
| 44 | NOT USED | N/A | N/A | N/A |
| 45 | NOT USED | N/A | N/A | N/A |
| 46 | NOT USED | N/A | N/A | N/A |
| 47 | NOT USED | N/A | N/A | N/A |
| 48 | NOT USED | N/A | N/A | N/A |
| 49 | NOT USED | N/A | N/A | N/A |
| 50 | NOT USED | N/A | N/A | N/A |
| 51 | NOT USED | N/A | N/A | N/A |
| 52 | NOT USED | N/A | N/A | N/A |
| 53 | NOT USED | N/A | N/A | N/A |
| 54 | NOT USED | N/A | N/A | N/A |
| 55 | NOT USED | N/A | N/A | N/A |
| 56 | NOT USED | N/A | N/A | N/A |
| 57 | NOT USED | N/A | N/A | N/A |
| 58 | NOT USED | N/A | N/A | N/A |
| 59 | Auxiliary 13 | Open Collector | H5 | 4 |
| 60 | Auxiliary 14 | Open Collector | H5 | 5 |
| 61 | Auxiliary 15 | Open Collector | H5 | 6 |
| 62 | Auxiliary 16 | Open Collector | H5 | 7 |
| | Drive Fault | Power Relay SPST | H17 | 9,10 |
| | X Brake | Open Collector | H1 | 1 |
| | Y Brake | Open Collector | H1 | 2 |
| | Z Brake | Open Collector | H1 | 3 |

# DC3IOB Specifications

| Characteristic | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|
| 3.3 Volt Supply Current | 1 | - | - | A |
| 5 Volt Supply Current | 2 | - | - | A |
| 12 Volt Supply Current | 0.2 | - | - | A |
| -12 Volt Supply Current | 0.2 | - | - | A |
| Input Pullup Voltage (Vinp) | - | 5 | - | VDC |
| Input On Voltage | Vinp-1.25 | - | - | VDC |
| Input Off Voltage | - | - | 1.25 | VDC |
| Power Relay Output Current | 0.01 | - | 10 | A @ 125VAC |
| Power Relay Output Current | 0.01 | - | 5 | A @ 30VDC |
| Signal Relay Output Current | 0.001 | - | 0.5 | A @ 125VAC |
| Signal Relay Output Current | 0.001 | - | 1 | A @ 24VDC |
| Open Collector Output Current | - | 10 | 90 | mA |
| Open Collector Output Voltage | - | 5 | 5 | VDC |
| Input Operating current | 9 | 11 | 15 | mA |
| Analog Output Resolution | - | 12 | - | bits |
| Analog Output Voltage | -10 | - | 10 | VDC |
| Analog Output Current | 0 | 1 | 20 | mA |
| Motor Output Current Settings | 6 | 12 | 15 | A |
| Motor Supply Voltage | 20 | 115 | 130 | VDC |
| MPU11 Mode Fiber Length | - | - | 100 | feet |
| | | | | |
| Size: 16 * 8 * 5.25 (W*D*H) | | | | Inches |

# DC3IOB General Troubleshooting

| Symptom | Possible Cause | Corrective Action |
|---|---|---|
| All status LEDs out | Logic power not applied | Measure AC coming into power supply, correct wiring or supply problems |
| 5, 3.3, or 12 LED out | Power supply or connection problem | Measure AC coming into power supply, correct wiring or supply problems |
| 5 LED out, 3.3 and 12 LEDs lit | 5 volt logic supply missing | Damage has probably been done due to incorrect connection to the AUX OUTPUTS headers, return for repair |
| +12V, -12V, or +5V LED out | Analog section power loss | If other power LEDs are lit, the analog section has probably been damaged by incorrect connection, return for repair |
| XVCC LED out | PLC input supply missing | If 5 LED is lit, the PLC input section has probably been damaged by incorrect connection, 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 | Axis Fuse blown | Check fuses with a meter, replace as necessary |
| | Limits tripped | Check limit switch wiring or pull up the limit defeat switches |
| Input doesn't work with sensor | Incorrect wiring | Correct wiring for sensor type (sinking or sourcing), check that SIP values are appropriate for the input voltage |
| | Voltage drop across sensor is too high | Use 3-wire sensors with lower voltage drop spec. |

## DC3IOB Legacy Mode Troubleshooting

| Symptom | Possible Cause | Corrective Action |
|---|---|---|
| DF LED out | Motion control card hasn't booted up | Start software, wait for the main screen to load |
| | Fibers 4 and 5 connected incorrectly or faulty | Check connections one at a time, swap with a known good set of fibers |
| | "Servo Power Removed" due to fault | Restart system to reset runaway or other serious fault condition |
| | Incorrect .HEX file | Make sure CNC8.HEX is loading |
| PLC OK LED out | Motion control card hasn't booted up | Start software, wait for the main screen to load |
| | Fibers 1, 2, or 3 connected incorrectly or faulty | Check connections one at a time, swap with a known good set of fibers |
| | Incorrect PIC on CPU7 | Install IO2PIC |
| No analog output or non-linear output | Incorrect Parameter 31 setting | Set P31 to -1 |

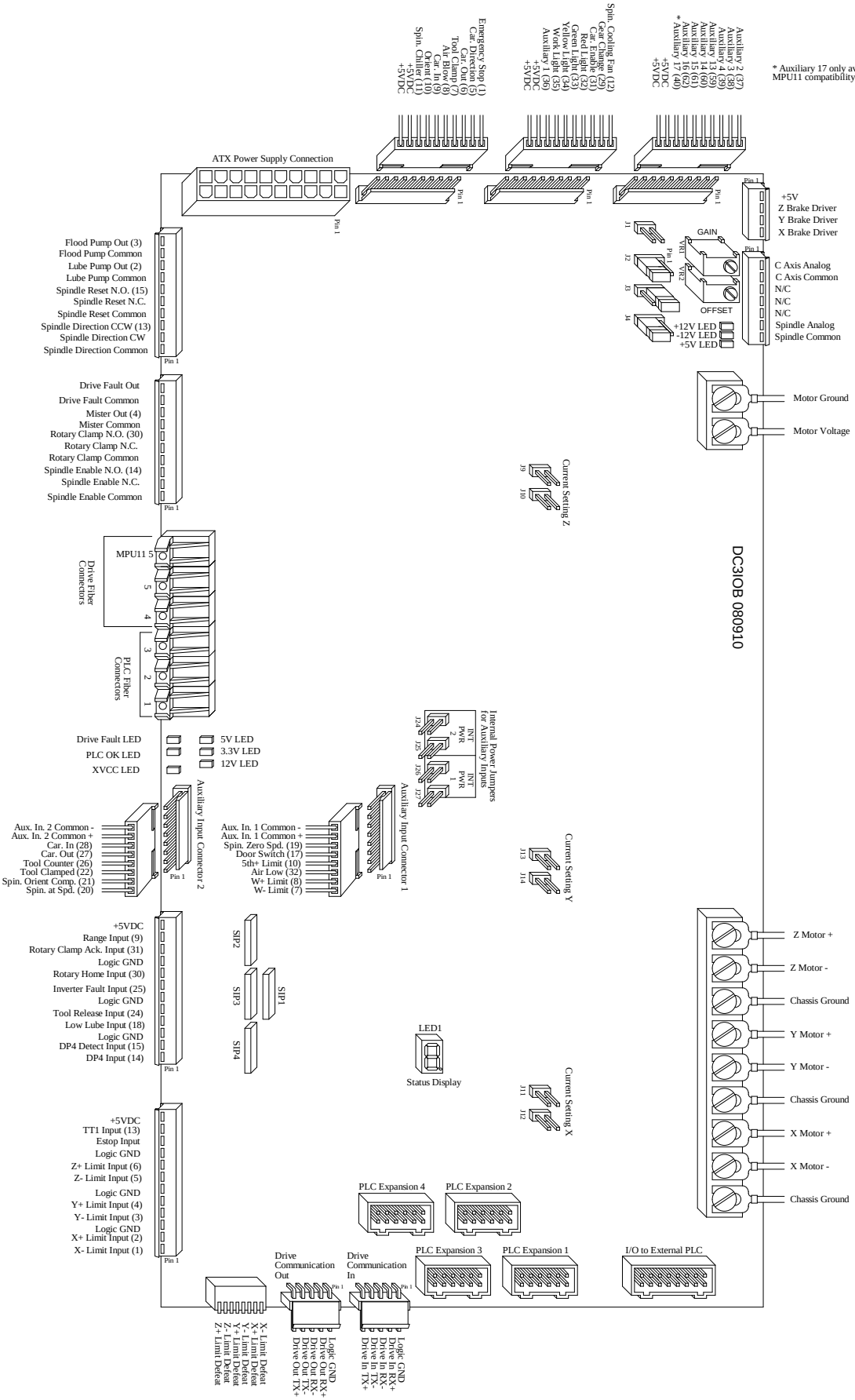
## DC3IOB MPU11 Mode Troubleshooting

| Symptom | Possible Cause | Corrective Action |
|---|---|---|
| DF LED out | Motion control card hasn't booted up | Start software, wait for the main screen to load |
| | Fibers 4 and MPU11 5 connected incorrectly or faulty | Check connections one at a time, swap with a known good set of fibers |
| | "Servo Power Removed" due to fault | Restart system to reset runaway or other serious fault condition |
| PLC OK LED out | Motion control card hasn't booted up | Start software, wait for the main screen to load |
| | Fibers 1 or 3 connected incorrectly or faulty | Check connections one at a time, swap with a known good set of fibers |

## LED1 Error Codes

| Error Number | Meaning | Cause | Corrective Action |
|---|---|---|---|
| 1 | Power Failure | the logic power supply is indicating to the DC3IOB that it is operating out of specification | Check power supply wiring (the grey wire and AC input in particular), replace power supply |
| 2 | 15A Not Available | current selection jumpers on any axis 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 DC3IOB |
| 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 |

# DC3IOB Connections



# DC3IOB Mounting Footprint