## Cable Construction

MPU11 Encoder Cable

Make sure the cable is a shielded, twisted pair cable.

1. Dorna's definition of "A" and "B" is revered from ours (Shown in the table below)

    1. Connect the "B+" encoder output of the EPS-B1 to the "A+" encoder input of the MPU11
    2. Connect the "B-" encoder output of the EPS-B1 to the "A-" encoder input of the MPU11
    3. Connect the "A+" encoder output of the EPS-B1 to the "B+" encoder input of the MPU11
    4. Connect the "A-" encoder output of the EPS-B1 to the "B-" encoder input of the MPU11
    5. Connect the Z+ and Z- normally.

2. Connect the cable shield at BOTH ENDS. Connect one end to the shield of the DB connector for the MPU11 as shown in the picture below. Connect the other end of the cable shield to the CN2 connector of the Dorna.

At the time of this writing the connector output of the EPS-B1 can be found in section 3.4.1 of the Dorna manual.

MPU11 Encoder Connector Pin #	MPU11 Signal	Dorna Signal	Dorna CN2 Pin #
3	Z-	Z-	20
4	A-	B-	34
5	B-	A-	36
6	Z+	Z+	19
7	A+	B+	33
8	B+	A+	35
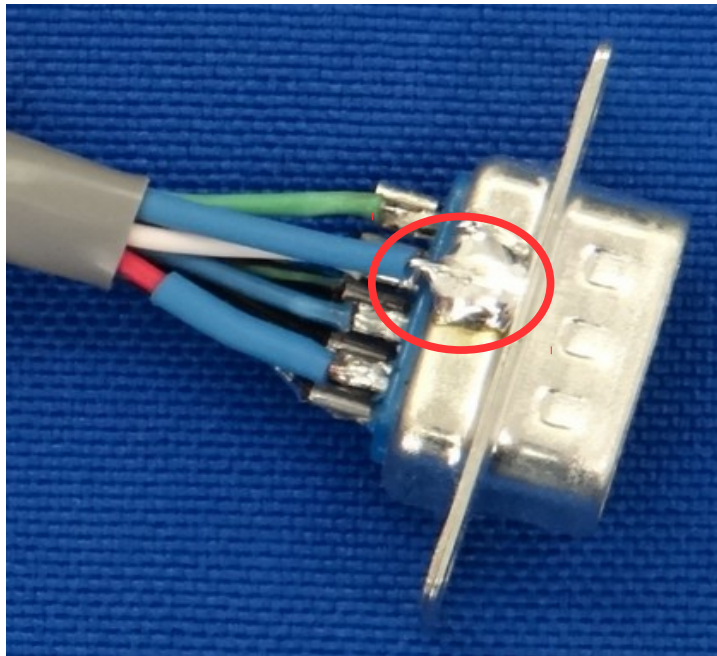
GPIO4D Cable

Make sure to use a shielded cable. A shielded twisted pair must be used for the analog output.

1. **Wire the Analog Output** - Use a twisted shielded pair to connect the "Speed instruction +" of the EPS-B1 to the "Analaog out +" of the GPIO4D. Use the other wire from that twisted pair to connect from the "Speed Instruction -" of the EPS-B1 to the "Analog out -" of the GPIO4D. Connect the shield AT BOTH ENDS. On the GPIO4D side connect the shield to the "Output COM". On the EPS-B1 side connect to shield of the CN2 connector.

2. **Wire the power supply**

    1. Connect the "Alarm +" and "COM+" on the EPS-B1 as well as the "COM9-12" on the GPIO4D to the positive terminal of the 24VDC power supply.

    2. Connect the "Fault Com" and "Output Com" of the GPIO4D and the "GND" of the EPS-B1 to the common terminal of the 24VDC power supply.

3. **Wire the Drive Enable** Connect the "S-ON" (servo drive on) from the EPS-B1 to the "Enable" of the GPIO4D.

4. **Wire the Drive Fault** Connect the "Alarm-" of the EPS-B1 to the "Fault" of the GPIO4D.

5. **Wire the Fault Reset** Connect the "A-RST" (Servo drive alarm reset) of the EPS-B1 to the input 11 (E-Stop) of the GPIO4D.

    1. **NOTE**: This will allow the machine operator to clear minor errors from the EPS-B1 by toggling E-stop. Major errors on the EPS-B1 will require that the entire machine is completely powered down to clear the error.
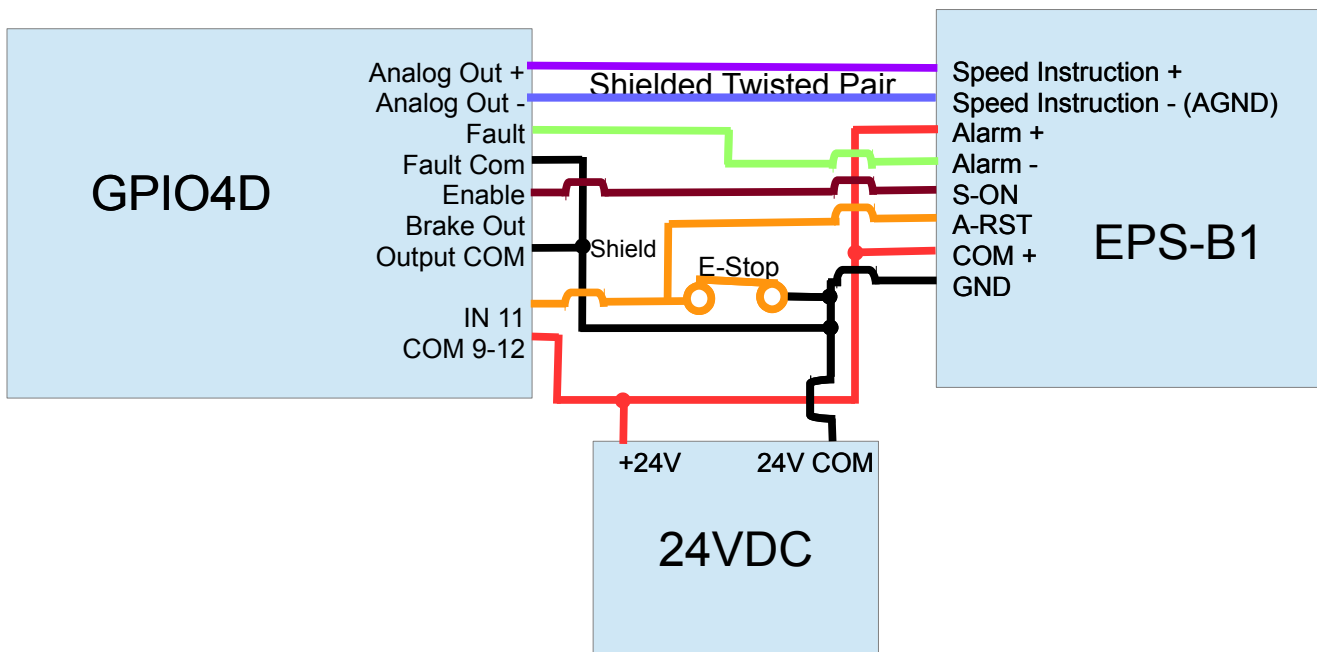
Software Configuration

EPS-B1 Parameter Setup

(Dorna parameters can be changed using the arrow keys on the Dorna or using the DorWin software via a RS-485 cable)

1.   **PA000:** Set to 0010 for velocity (speed) mode. (Chapter 8.5.1 of the Dorna manual)

2.   **PA001:** Set to 0100 if using a three-phase input.

3.   **PA300:** Set to 1200. The "1" is because we want it to automatically stop (hold position) when CNC11 puts out zero volts. (Chapter 8.5.6 of the Dorna manual)

4.   **PA301**: Set to 1000. Because the maximum output of the GPIO4D is 10.00 volts. (Chapter 8.5.2 of the Dorna manual)

5.   **PA316**: Set to 0. Because we want to tell the EPS-B1 to stop (hold position) when it is commanded to go 0 RPM by the GPIO4D. (Chapter 8.5.6 of the Dorna manual)

6.   **PA509** Set to 0010. We want to tie the alarm reset to the E-stop switch. The alarm should reset when the E-stop is open (E-Stop is normally closed for machine operation.). This will clear the alarms when the optoisolator on the DPS-B1 is not conductive.

7.   **RESET THE DRIVE AFTER CHANGING PARAMETERS!**

CNC11 PID Set Up

(The PID menu can be access by pressing F1 Setup → F3 Config. The password is 137. Then pressing F4 PID → F1 PID Config)

These are "baseline" parameters to get started. The drive may require additional tuning as described in TB 234 found here (http://www.centroidcnc.com/dealersupport/tech_bulletins/uploads/234.pdf)

1.   Kp = 0.02

2.   Ki = 0.001

3.   Kd = 0

4.   Kv1 = 4.5

CNC 11 Parameter Setup

(The parameters menu can be access by pressing F1 Setup → F3 Config. The password is 137. Then pressing F3 Parms.)

1.   **Parameter 21-24** = 0. CNC11 can not measure heating and cooling using a third party servo drive, therefore the heating parameters should be zeroed out to prevent errors.

2.   **Parameter 143 = 8 or 11** CNC 11 is not able to measure load on the Dorna EPS-B1. Therefore the load meters will **not** display load, but the voltage output of the GPIO4D. A value of 8 will disable the load meters. A value of 11 will enable the load meters.

3.   **Parameter 256 = 1**. The GPIO4D needs to be put into velocity mode.

4.   **Parameter 300 = 9, 301 = 10 , 302 = 11, and 303 = 12**. This will tell CNC11 that the GPIO4D will be controlling axis 1-4.

5.   **Parameter 308 = 1, 309 = 2, 310 = 3, 311 = 4, and 312 = 5**. This will tell the CNC that the MPU11 will be controlling encoders 1-4