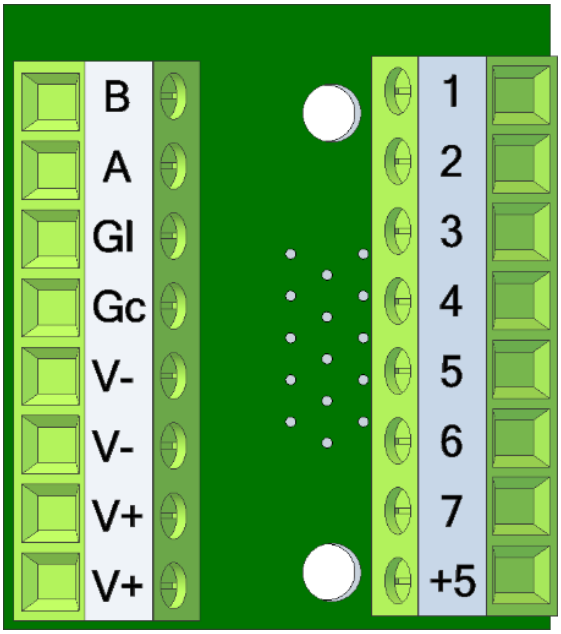
# SilverNugget N2 X-series Breakout – QCI-BO-B4 & QCI-BO-B4A




QCI-BO-B4

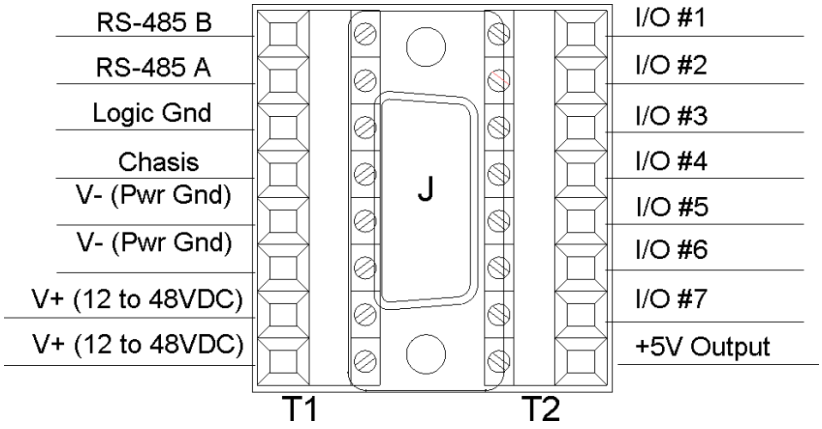
## Product Overview

The breakout board interfaces with SilverNugget N2 X-series controllers. The breakout board plugs directly into the SilverNugget N2 X-series' SMI port to break out power input, RS-485 communication lines, 7 I/Os, and local +5v supply onto two, 8 position screw-in terminal blocks. The breakout board makes for a convenient way of quickly wiring power, communications and I/O. The provided screws lock the breakout to the DB15HD connector.

The QCI-BO-B4A adds an active filter that translates the SilverNugget servo controller's 0 to 3.3v PWM output on I/O #2 into a 0-5v analog output. Besides the special circuitry on I/O #2, the QCI-BO-B4A is the same as the QCI-BO-B4. Refer to the last page of this document for examples of how to use the QCI-BO-B4A analog output feature.

Terminal Connector Wire Range: 16-28 AWG

## Pin-out Descriptions

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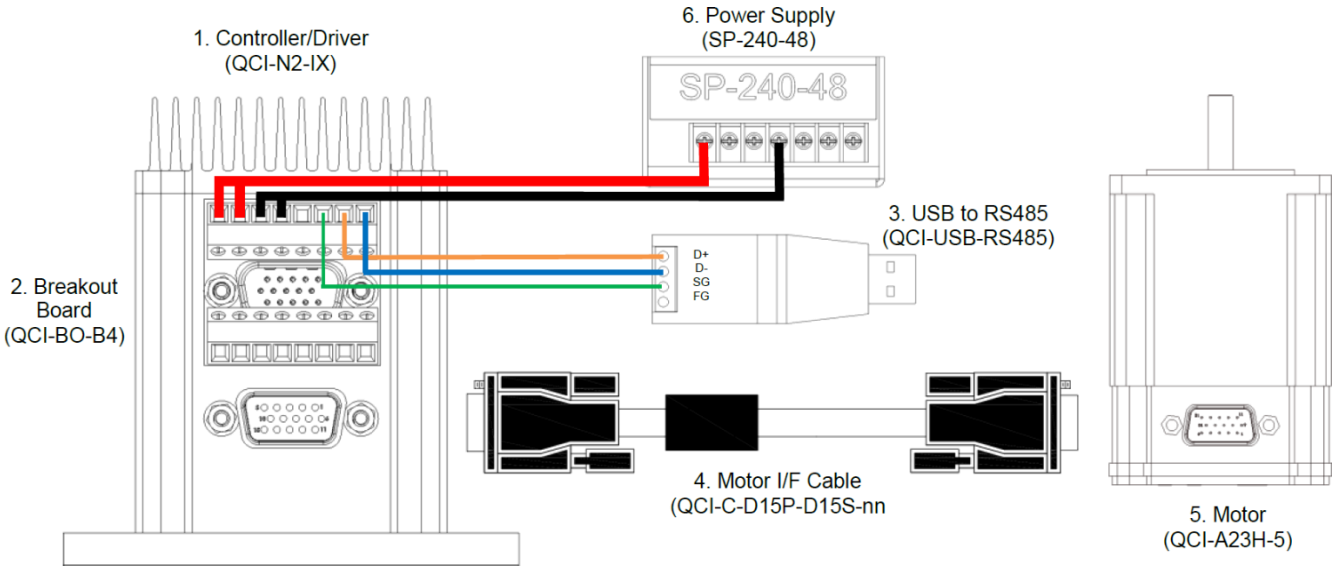
| DBHD Pin # | Signal Name |
|---|---|
| 1 | V+ (12 to 48VDC) |
| 2 | RS-485A |
| 3 | +5V OUTPUT 100mA |
| 4 | I/O #3 |
| 5 | I/O #6 |
| 6 | V- (Pwr Gnd) |
| 7 | V+ (12 to 48VDC) |
| 8 | LOGIC GROUND |
| 9 | I/O #2 |
| 10 | I/O #5 |
| 11 | V- (Pwr Gnd) |
| 12 | RS-485B |
| 13 | I/O #1 |
| 14 | I/O #4 |
| 15 | I/O #7 |

# How to Use

### N2 X-series Typical Setup



# How to Use QCI-BO-B4A

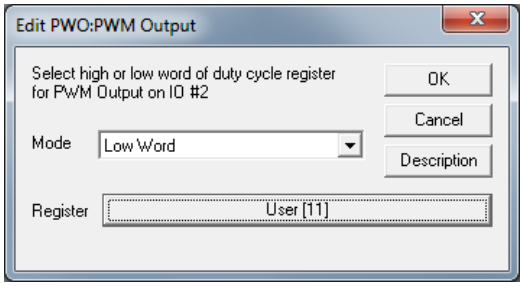
Configure the PWO command to get duty cycle from lower or upper word of any register. As this word ranges from -32768 to 32767, the PWM output (I/O #2) duty cycle ranges from 0 to 100% at 3.3V. The QCI-BO-B4A filters this PWM output and amplifies it to 0-5V.

Note: PWO "Mode" parameter may have the following values:
Disable, High Word, Low Word

Use the following equation to determine the Register Value (R) for the desired QCI-BO-B4A output voltage (Vo):

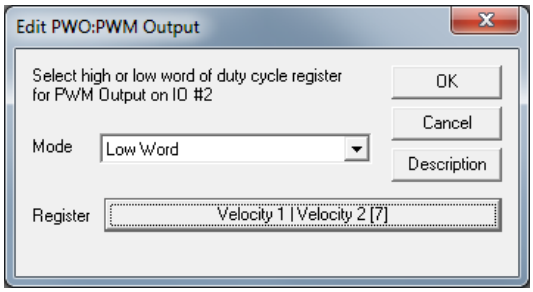
$R = [(Vo - 2.5)/2.5]*32767$

**Example 1:**
Desired analog output is 1.75 volts.




1) Configure PWO to get duty cycle from lower word of User Register 11.

2) Set Register 11 according to the following equation:
   $R = [(Vo - 2.5)/2.5]*32767$
   $R = [(1.75 - 2.5)/2.5]*32767$
   $R = -9830.1 \approx -9830$




**Example 2:**
Output Analog Actual Velocity

All SilverLode servo systems store velocity in Register 7 [Velocity 1|Velocity 2]. Velocity 1 is the actual velocity filtered once. Velocity 2 is the actual velocity filtered twice. The above example uses Velocity 2. Velocity 2 is a signed 16-bit number where -32768 is –4000 RPM and +32767 is +4000 RPM. At zero speed, the output voltage will be 2.5 volts.

**Example 3:**
Using Analog Output for Torque

All SilverLode servo systems store torque in Register 9 [Control|Torque]. The lower word is the actual output torque on the motor shaft. Torque values of –30000 is –150% torque and +30000 is +150% torque. The minus and plus represents clockwise and counter clockwise torque. A value of 0 is zero torque.