Sevcon MillipaK SBPM Controller Worksheet

Team Delta Engineering

Customer: _____

Serial #: _____ Date: _____

This document is derived from the settings contained in pages 15-41 of the Sevcon manual and will help me program your controller so that it runs properly out of the box. I do this with what Sevcon refers to as their "calibration tool" – a simple hand held device that lets me menu through the settings and save them so that they persist in the controller. If you want them changed at a later date, contact me and I may be able to loan you a calibration tool. Otherwise you can return the controller to me or purchase your own calibration tool from a Sevcon dealer for around $250.

I have not included *every* setting here, just the important ones. If you have any questions please Email me (dan@teamdelta.com) - if I can't answer it directly I'll contact Sevcon Tech/Ops; please don't bug them (let me do it!)

1. System voltage: _____
   This is the main system supply battery voltage. The manual is somewhat confusing and indicates both a range of 24-48V as well as 24-36V. This model of controller tops out at 36V. So your choice is 24V, 36V or something in between in 2V steps. *(Ref 12.07, pg 18)*

2. Armature current limit: _____
   The controller is good for 250A but the brushless Etek can only take 100A continuously, 200A for 1 minute and 300A for 30 seconds. You can pick any amp rating between 50 and 250 in 10 amp increments. *(Ref 0.01, pg 20)*

3. Contactor chopping: _____
   The controller will let you run a 24V line contactor with a 36V system voltage. It does this by chopping the 36V so that it looks like 24V to the contactor coil. You have three choices for this setting:
   OFF – The line contactor coil is the same as the system voltage
   ON – The output is chopped to 24V
   24V – The output is chopped to 24V for 1 second and then chopped further to 16V, which is usually enough to keep the contactor energized but dissipates less power. *(Ref 12.01, pg 21)*

4. Maximum motor RPM: _____
   Any value between 1000 and 4,000 RPM in 100 RPM steps. Note that with the 36V limit of this controller, and the 70 RPM/volt Kv rating of the brushless Etek, you won't ever be able to see more than 2,520 RPM. *(Ref 8.02, pg 24)*

5. Control mode: _____
   The controller uses current sensing and Hall effect feedback to servo the motor in either speed or torque mode, so those are your two choices. The command pot voltage will be used to achieve motor operation in one of these two regimes. If you don't understand the difference, Email me. *(Ref 12.03, pg 26)*

6. Acceleration delay: _____
   Between this and the next setting, you decide how snappy or sluggish your motor will be in response to changes in the throttle command. This value is applied to increases in throttle, scaled to the maximum range difference, 0-100%. Any value between 0.1 and 5.0 seconds, in 0.1 second increments. *(Ref 2.01, pg 27)*

7. Deceleration delay: _____
   Same as above but applied to decreases in throttle. *(Ref 2.02, pg 27)*

8. Line contactor dropout: _____
   As a safety precaution, the controller can open the line contactor if no drive activity is detected for some period of time. It will re-engage the contactor automatically once a drive condition is commanded. The range is 0 to 60 seconds in 1 second increments; 0 will disable this feature. *(Ref 12.04 and 11.01, pg 31)*

9. Temporary current boost: _____A for _____sec
   As the manual says, this feature will temporarily boost the armature current limit in an attempt to improve acceleration. The temporary increase in current equates to a higher torque. You need to supply two values here, the boost current (5-250A in 10A increments) and the boost time (0-10 seconds in 1 second increments). *(Ref 0.04 and 0.05, pg 33)*

10. Start up sequence: _____
    If you choose ON, the controller will check the forward and reverse switches when you engage the main keyswitch. If either is closed, the controller will fault with a 2 flash condition (illegal start condition). This is to prevent unexpected movement (like preventing you from starting your car if it isn't in neutral). Turning this OFF, not surprisingly, disables this checking. If you wire up a single SPDT switch to choose forward/reverse, you have no neutral and you must set this OFF. *(Ref 12.02, pg 34)*

11. Idle fault: _____
    The manual explains this just fine, choose OFF or the number of seconds of permitted idle time. *(Ref 11.02, pg 35)*

12. Accelerator zero/full speed settings: _____0% _____100%
    These two settings define the voltage endpoints of speed/torque control, that is, how 0% and 100% are interpreted. The typical value for 0% is 0.10V, so anything below that is still considered "off" while the typical value for 100% is 3.50V – once again, anything above that is still 100%. You can pick any two voltages as long as they are at least 0.50V apart. You can even invert them: choosing 0%=4.00V and 100%= 1.00V is perfectly legal. Each value can range from 0.00V to 4.50V but I don't recommend you set them at these extremes: if your command throttle never gets to either point, you will just waste energy in chopping when it isn't necessary. If you're not sure what to set, go with the defaults: 0.1 – 3.50V. *(Ref 2.03 and 2.04, pg 22)*

That's it! There are other settings mentioned in the controller manual, and if you want them changed from their defaults note them below so that I have a record of them. I will include a copy of this document with your controller and also keep one for myself, in case you lose yours and need to know how things are set up.