

Subject: **ServoSET™ Drive Setup with Quick Tuner™ Software (APPN0035)**
 Applies to: ServoSET™ part numbers 9700-016, 9700-017, 9700-018, 9700-019, 9700-022, 9700-023, 9700-024, and 9700-025
 Date: May 26, 2015
 Author: Matt Cole

Description

This application note addresses the tuning and configuration process used for ServoSETS™. Each ServoSET part number is a single package that consists of a servo drive, servo motor, and the necessary motor mating cables. The initial offering of ServoSETS use the **SVAC3-S-E120** and **SV7-S-AE** digital servo drives along with a 100W or 200W servo motor (with brake and without brake) and the necessary mating cables to connect the motor to the drive.

Each ServoSET drive comes pre-configured in position mode with Step Pulse & Direction selected as the input type. The input resolution is set to 10,000 steps/rev to match the resolution of the motor's built-in incremental encoder, which is 10,000 counts/rev (post quadrature).

The drive is tuned specifically for the motor in the ServoSET and the gains are intentionally set low for a motor that is uncoupled from the load (i.e. load inertia = 0).

The complete set of configuration and tuning files for each ServoSET is contained within the Quick Tuner™ installation directory once installed on your PC.

Additional tuning will likely be required once the motor shaft has been coupled to the load. The following pages of this application note provide details about drive tuning, configuration, and accessories that may be needed to complete the servo system.

Here is a list of ServoSET part numbers, indicating the model numbers of the drive and motor:

<u>ServoSET part number</u>	=	<u>Servo Drive</u>	+	<u>Servo Motor</u>
9700-016		SV7-S-AE		J0100-303-3-000*
9700-017		SV7-S-AE		J0200-304-4-000*
9700-018		SVAC3-S-E120		J0100-301-3-000*
9700-019		SVAC3-S-E120		J0200-301-4-000*
9700-022		SV7-S-AE		J0100-353-3-000**
9700-023		SV7-S-AE		J0200-354-4-000**
9700-024		SVAC3-S-E120		J0100-351-3-000**
9700-025		SVAC3-S-E120		J0200-351-4-000**

*Indicates that this motor does not have an integral brake. This ServoSET comes with cable part numbers [3004-300-3M](#) (motor power) and [3004-301-3M](#) (motor feedback).

**Indicates that this motor has an integral brake. This ServoSET comes with cable part numbers [3004-300-3M](#) (motor power), [3004-301-3M](#) (motor feedback), and [3004-302-3M](#) (motor brake).

Tuning & Configuration with Quick Tuner™

Quick Tuner™, which can be downloaded for free from the Applied Motion website, is required for drive tuning and configuration. Although each drive that is included in the ServoSET has already been tuned for the motor with no load and configured for step & direction using a 10,000 step/rev resolution, it may be necessary to adjust some of the drive settings.

Possible reasons to make adjustments to the ServoSET servo drive include:

1. The load inertia is greater than the motor's inertia (rotor inertia specs available on motor web page).
2. The desired step input resolution is different than 10,000 steps/rev.
3. The desired command input type is different than Step pulse & Direction.
4. The desired motion command mode is different than position mode (other modes available include Streaming Commands, Velocity mode, and Torque mode).

If any of the above is true, then it will be necessary to download and connect to the servo drive with Quick Tuner.

Establishing Communication

To establish a connection via RS-232 between the SV7-S-AE servo drive and Quick Tuner be sure to use the communication cable (3004-189) that is supplied with the drive. With the drive powered off, launch the software, select the COM port to which the cable is connected and then power on the SV7-S-AE drive. See SV7 hardware manual for additional details.

To establish Ethernet communication between the SVAC3-S-E120 drive and Quick Tuner use a standard Ethernet cable (not included with drive) and set the IP address in the software to match that of the drive. The SVAC3's IP address is set by the rotary switch next to the RJ45 Ethernet jack. For direct connection, set to position '0' to select IP address 10.10.10.10 and then configure the PC's address to 10.10.10.11 for example. See SVAC3 hardware manual for additional details.

Tuning and Tuning Files

Servo drives use the feedback from the motor to control torque, velocity and position. Therefore tuning is necessary to optimize these characteristics within the system that uses the servo motor. Applied Motion provides tuning files that are specific to the motor and load inertia (shown as a ratio of the motor's rotor inertia) for loads that are 0, 1, 5, and 10 times that of the motor's inertia. A complete guide on the tuning process and selection of tuning files can be found in the Quick Tuner User Manual.

Tuning files are included with the software and can be found within the installation directory of Quick Tuner. The files are labeled according to the motor model and inertia ratio. For example, **ServoSET_9700-018_J0100-301-3_X5_SVAC3-S-E120.svt** is the tuning/configuration file for the J0100-301-3-000 servo motor that is coupled to a load that is 5 times the inertia of its rotor as indicated by **X5** in the filename.

The software screen shots below show the process of opening and downloading one of these files to the servo drives.

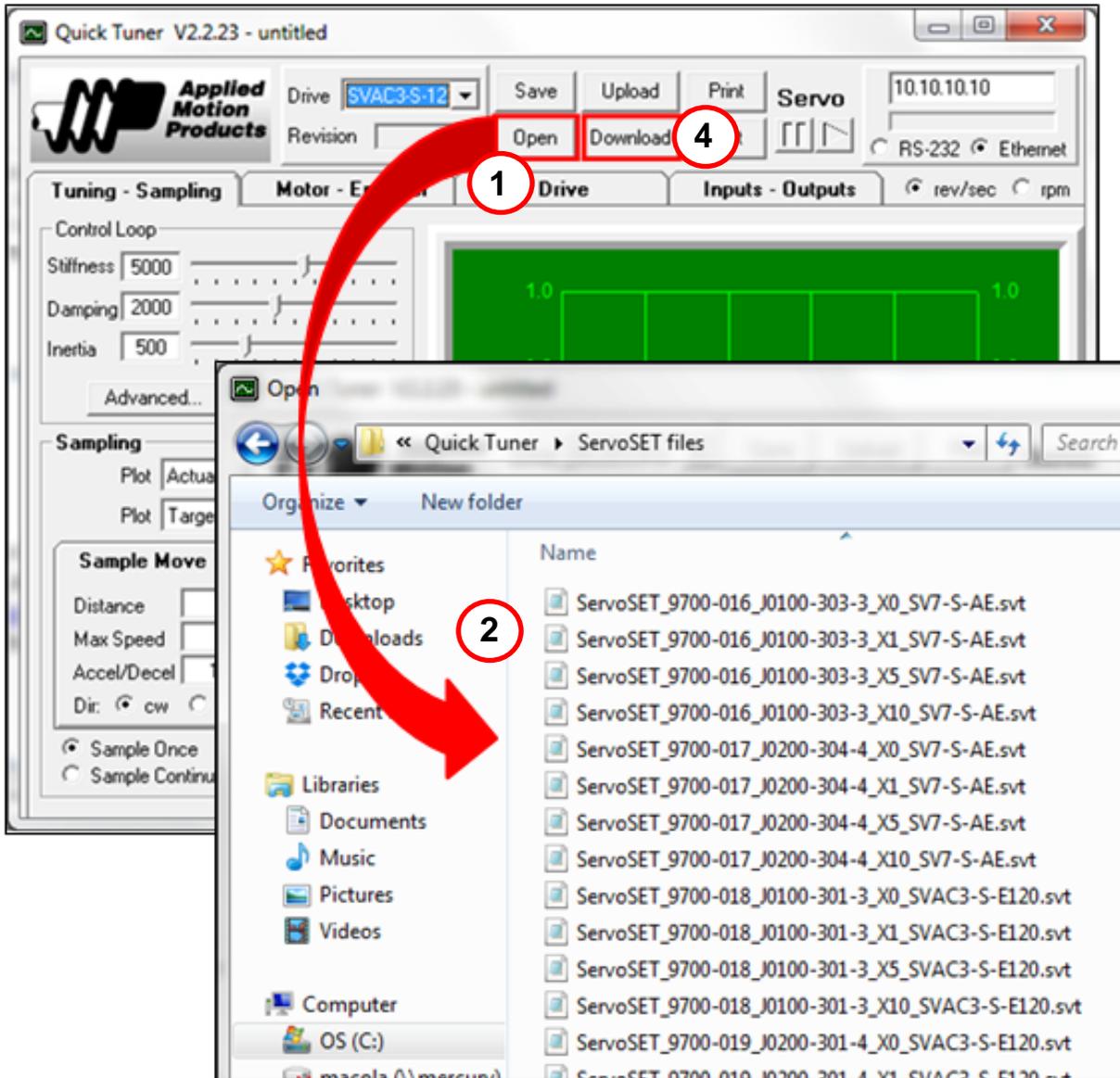


Figure 1: Opening a tuning/configuration file in Quick Tuner™

Step 1:

From within the most recent version of Quick Tuner click the **Open** button and navigate to 'C:\Program Files (x86)\Applied Motion Products\Quick Tuner\ServoSET files'. See **Fig. 1**.

Step 2:

Select the tuning file for your ServoSET paying close attention to the inertia ratio number that the follows the 'X' in the filename. When in doubt choose the 'X0' file. See **Fig. 1**.

Step 3:

Select “Import both Tuning and Drive Parameters” from *Input File Options* dialogue box and click **Continue**. See **Fig. 2**.

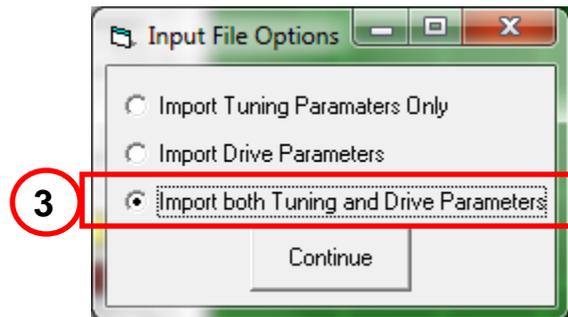


Figure 2: *Input File Options* Dialogue Box

Step 4:

Click **Download** to transfer the newly opened settings to the servo drive. See **Fig. 1**.

How to make adjustments to the drive configuration...

Step Input Resolution Setting

Step input resolution refers to the number of step pulses at the drive’s Step input in order to rotate the motor one complete revolution. Another way to look at this is from the perspective of the controller that is outputting those step pulses. The default for this step resolution value is 10,000 steps/rev as shown in **Fig. 3** below, outlined in red. This can easily be changed by entering the desired number in the *Electronic Gearing* field on the **Drive** tab in Quick Tuner while connected to the drive. Be sure to download after making this change. See the Quick Tuner User Manual for more details.

Operating Mode Setting

Also shown on the Quick Tuner *Drive* tab in **Fig. 3** below, the Operating Mode can be set to any of the following with either the SVAC3-S-E120 or the SV7-S-AE drive:

- Torque mode
- Velocity mode
- Position mode
- SCL mode (streaming commands)

See the Quick Tuner software manual for more details.

The *SiNet Hub* option that is available only for the SV7-S-AE, puts the drive into a mode that is compatible with our multi-axis hubs: [SiNet Hub444](#) and [SiNet Hub 8](#). These allow for basic

synchronization between two or more axes. The SiNet Hubs are programmed with the [SiNet Hub Programmer™](#) software.

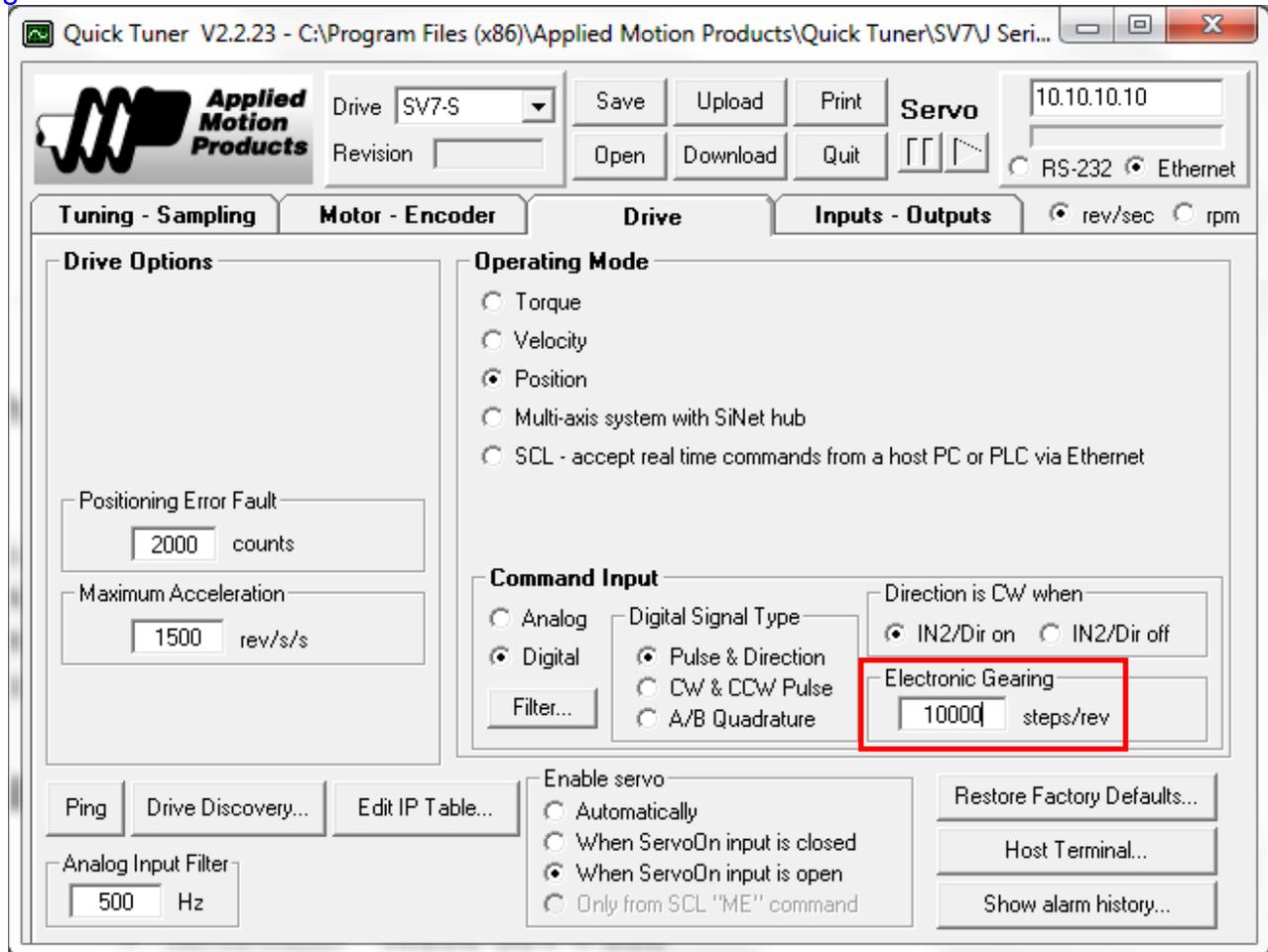


Figure 3: Drive tab in Quick Tuner software

Wiring for Step & Direction Mode

Step & Direction control mode relies on signals coming from a motion controller, indexer, or PLC that is external to the servo drive. The common types of outputs from these controllers include single-ended (sinking or sourcing) and differential. Example wiring diagrams for each of these options are shown in the following figures for the SV7-S-AE and the SVAC3-S-E120.

The voltage range for the Step & Direction signals is 5-24Vdc for the SVAC3-S-E120. However, the SV7-S-AE drive's STEP & DIR inputs are designed for a maximum of 5 Volts. See the SV7 Hardware Manual for details on resistors required if using higher voltage levels.

If wiring to the drive with a different control signal type, changing the configuration will be required. See section above for details.

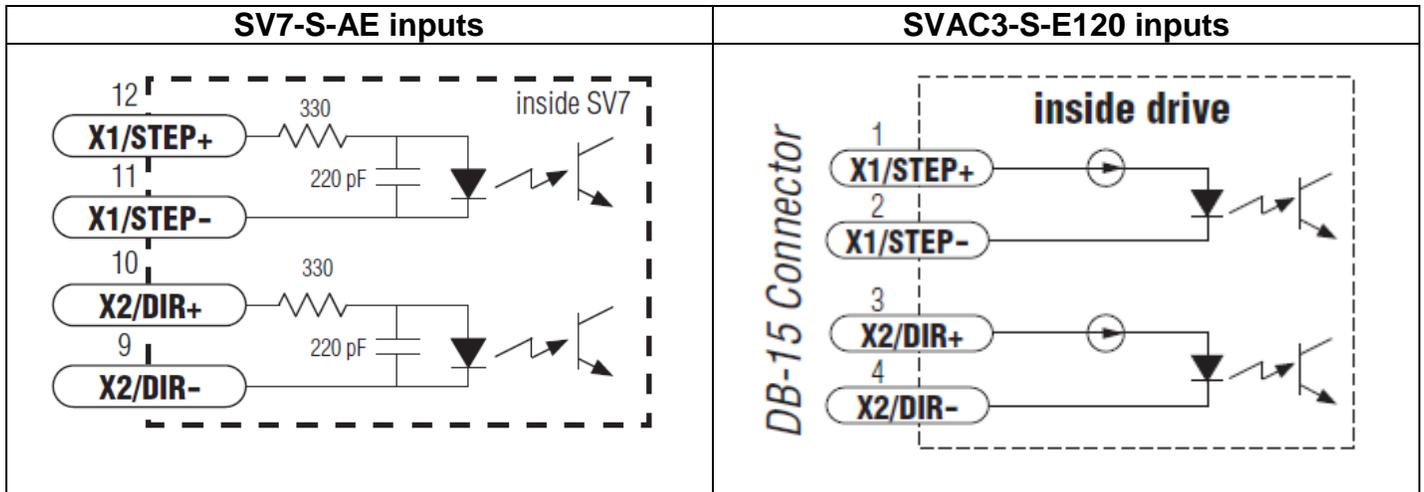
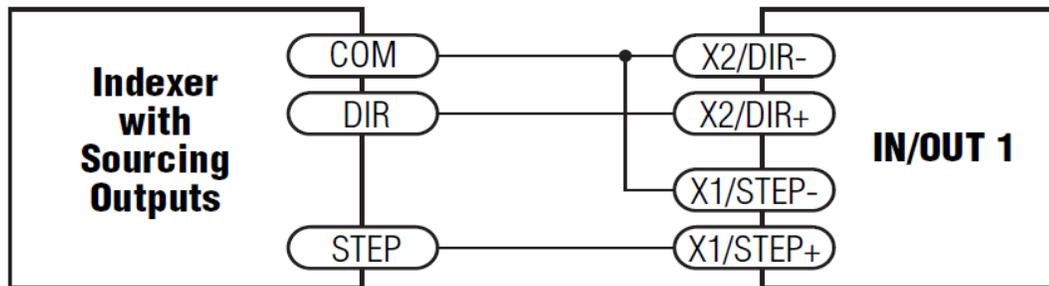
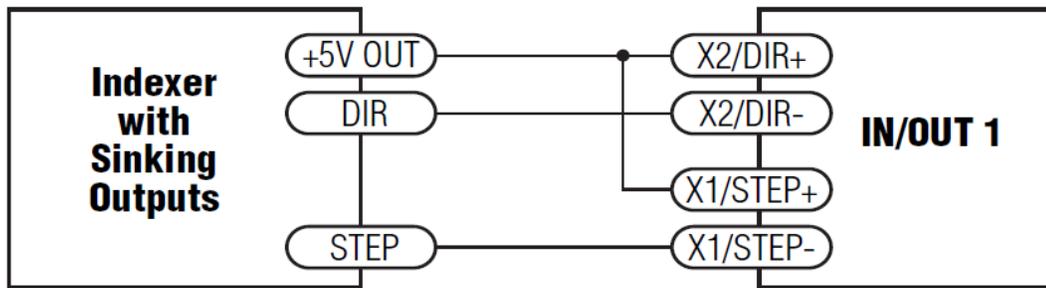


Figure 4: Schematics for Step & Direction inputs on both servo drives



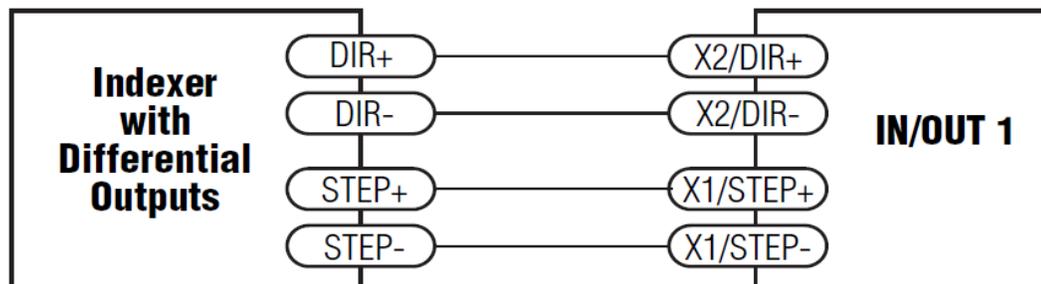
Connecting to indexer with Sourcing Outputs

Figure 5



Connecting to Indexer with Sinking Outputs

Figure 6



Connecting to Indexer with Differential Outputs

Figure 7

Recommended Accessories for ServoSETS

The SV7-S-AE requires a separate DC power supply that is not included in any of the sets.

ServoSETS 9700-016 & 9700-022	ServoSETS 9700-017 & 9700-023
24-volt power supply: PS150A24	48-volt power supply: PS320A48 24-volt power supply for motor brake in set 9700-023 only: PS150A24

The SV7-S-AE communicates with Quick Tuner software via RS-232 communication. For computers that do not have a 9-pin serial COM port, this USB-to-Serial adaptor is recommended:



USB-to-Serial RS-232 adaptor part number: [3004-235](#)

The SV7 servo drives do not have built-in regeneration clamps, which are necessary to handle regen that will occur when decelerating a heavy load rapidly. In order to protect the DC power supply, the following regen clamp is recommended.



Regen Clamp model number: [RC880](#)