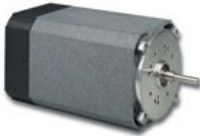


Applying Groschopp Motors to Commander SK & SL Drives

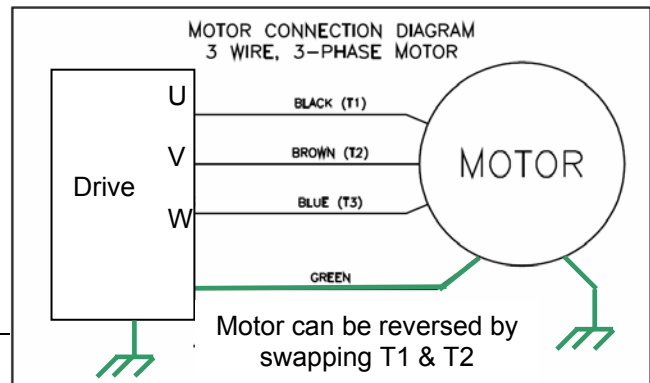


Through the One-Source program, Emerson Control Techniques has partnered with Groschopp, a manufacturer of fractional HP AC motors and gear motors. These motors offer a variety of options and boast a compact square frame design. Ideally suited for the OEM customer, these motors can be applied where traditional Nema frame induction motors are prohibitive due to physical size.


All models are 230VAC 3 Phase induction motors rated below 3 amps at full load. Because of their electrical nature and low current design, care must be taken to set the drive and tune it to the motor so that current can be optimized and motor heating minimized. Failure to properly set up the drive with these motors may cause excess motor heating and premature failure.

For each set-up below, the motor must be first wired to the drive with no load connected to the output shaft. See the standard wiring diagram to the right for installation. This diagram is shipped with each motor.

Each set-up below the can be performed by using only the drive keypad and Menu 0.



General Instructions:

To set up either the Commander SL or Commander SK, you only need the drive keypad and access to the main parameter list in Menu 0. The list of parameters below is a summary of what is needed for this application note and can be used for both drives. Consult the drive's Getting Started Guide or Advanced User's Guide for further details and programming instructions. If you'd like to see a video showing how to change a drive parameter(s) click the following link:  [CTVI100](#)

Parameter	Description	Default	Memory	Units
00.06 (05.07)	Motor rated current	0.00	1.03	A
00.07 (05.08)	Motor rated full load rpm	1800	1670	RPM
00.08 (05.09)	Motor rated voltage	230	230	V
00.09 (05.10)	Motor rated power factor	0.85	0.55	
00.32 (05.13)	Dynamic V to f select	OFF	On	
00.38 (05.12)	Auto-tune	0	2	
00.39 (05.06)	Motor rated frequency	60.0	60.0	Hz
00.40 (05.11)	Number of motor poles	Auto	Auto	
00.41 (05.14)	Voltage mode select	Fd	Ur	
05.17	Stator resistance	0.000	0.000	Ohm
05.23	Voltage offset	0.0	0.0	V
05.24	Transient inductance (sLs)	0.00	0.00	mH

Commander SK Setup

Step #1 – Set the Drive Mode

The SK ships with its default mode of operation as Volts/Hz. You will achieve the best performance from these motors by using the Sensorless Vector mode of operation. To do this, change parameter Pr41 from its default of “Fd” to “Ur”

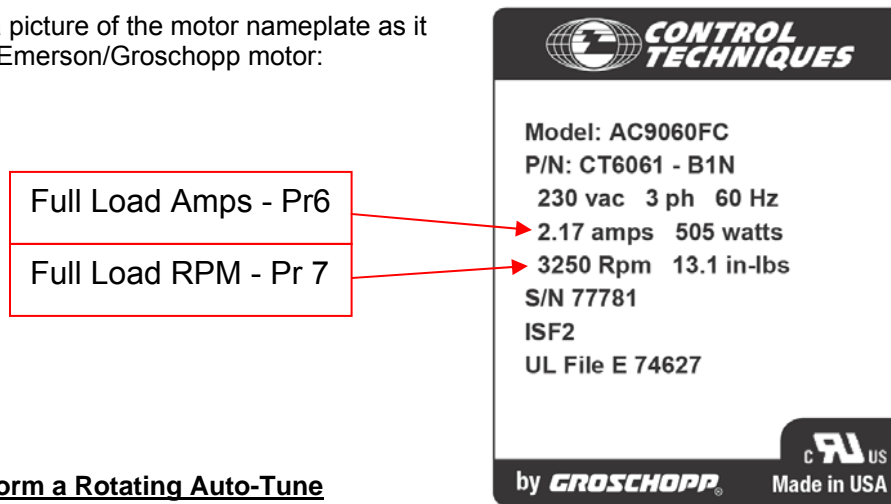


Step #2 – Enter the Motor Nameplate Data

First, verify that parameter Pr8, Pr39, and Pr40 are set to their factory default setting of “230”, “60.0”, and “Auto” respectively (You will need to set Pr10 = L2).

Next, set the full load amps (Pr06) and full load RPM (Pr7). This information can be found on the motor nameplate. See the examples below for details.

To the right is a picture of the motor nameplate as it appears on an Emerson/Groschopp motor:




Step #3 – Perform a Rotating Auto-Tune

The factory default setting for motor power factor (Pr9) is 0.85. Average motor performance will be achieved with this nominal value when using most industrial induction motors with NEMA frames 56 and above. Fractional HP motors like the Groschopp, however, have power factors in the range of 0.40 to 0.60. If the incorrect value for power factor is used, the motor will experience loss of torque and over-heating.

Fortunately, the Commander SK provides an auto-tune feature which not only calculates the correct motor power factor, but also measures other critical parameters such as motor resistance and inductance. Performing a rotating auto-tune will allow the drive to measure and calculate parameters Pr9, #05.17, #05.23, and #05.24. Very small motors may fall outside the range for the autotuner (those having stator resistances > 65ohms - such as the 23W – 103W models). In those cases, “r5” will appear indicating a stator resistance issue. In those cases, simply skip to the autotune procedure outlined in step 3b for Commander SL- manual method.

To perform an accurate rotating auto-tune:

- 1) Ensure the motor shaft is unloaded.
- 2) Set Parameter Pr38 to “2.” (2 is the command to perform a rotating autotune)
- 3) Ensure the ‘Enable’ input of the drive is closed. “rd” will appear in the drive display.
- 4) Give the drive a valid “start” command.

The drive will accelerate the motor to 2/3 base speed for 10-15 seconds then the motor will coast to a stop. The drive will automatically calculate and fill in the information in the appropriate parameters and reset parameter Pr38 to “0.” See the Getting Started Guide that comes with the drive for additional help with this procedure. If you’d like to see a Video showing what this would look like on the drive click the following link: [CTVI127](#) 

Step #4 – Enable Dynamic V/Hz Mode

This feature is often associated with a fan or pump application where energy savings can be achieved due to the nature of the load. Since the Groschopp motors have low FLA, it is essential that the use of those amps be optimized. Field testing has proven that enabling this parameter greatly reduces the current draw of the motor under low load conditions while not sacrificing performance even under constant torque types of loads.

It is recommended that Parameter Pr32 be set to “ON.”

Commander SL Setup

Step #1 – Set the Drive Mode

Repeat the same step as outlined in SK Step#1 above.

Step #2 – Enter the Motor Nameplate Data

Repeat the same step as outlined in SK Step #2 above.

Step #3 – Perform a Rotating Auto-Tune



The SL is a simplified version of the SK and does not have the auto-tune feature. In addition, the motor parameters #5.17, #5.23, and #5.24 are not available. The critical parameter, then, for the SL is the motor power factor (Pr 9). There are two methods that can be used to set this parameter.

- a) For multi-motor installations, particularly at OEM customers, where this setup will need to be repeated, use a Commander SK, Commander GP20 or Unidrive SP as a demo unit to perform the motor setup and auto-tune. This will allow you to acquire the calculated value for the motor power factor. Record the power factor and enter it into the Commander SL.
- b) Using the SL, start the motor unloaded and adjust the speed for a value above 50%. Begin with a power factor of 0.40 in parameter Pr 9. Actual motor current can be monitored in parameter Pr88 (Pr10= L3 to gain access to Pr88) . Note the value for motor current and continue to adjust power factor in the range of 0.40-0.60 until the motor amp value is at a minimum.

Step #4 – Enable Dynamic V/Hz Mode

Repeat the same step as outlined in the Commander SK Step #4 above.

Additional Notes:

- 1) For multi-motor installations of the same motor model#, once a tuned set of parameters is found, you should not need to repeat the setup each time. Simply enter the parameter set into the next drive.
- 2) The Groschopp motors offer an encoder feedback option, E2, which is compatible with the Unidrive SP series to operate in the closed-loop vector mode. This option allows the user to achieve more accurate velocity control but continuous operation must stay within the 20:1 constant torque speed range for the TENV and 10:1 for the TEFC motor. Consult an Emerson Application Engineer for help with your specific application.

Author: Gene Greiner

E-mail: gene.greiner@emerson.com