SJ300 Closed loop vector control (Velocity)

1. **Scope**
   1.1. The scope of this document is to provide a step-by-step procedure for setting up a SJ300 for closed loop vector control (velocity).
2. **Parts**
   2.1. SJ300-XXXXFU– quantity 1
   2.2. DOP-PRO (optional) – quantity 1
   2.3. SJ-FB – quantity 1
   2.4. 5 vdc quadrature differential encoder – quantity 1
   2.5. Drive rated motor – quantity 1
3. **Tools**
   3.1. Flat blade screwdriver
   3.2. Philips screwdriver
   3.3. Diagonal cutters
   3.4. Wire strippers
4. **Reference material**
   4.1. NB613X Hitachi SJ300 manual
   4.2. NB616X Hitachi SJ-FB manual
   4.3. NEC article 430
   4.4. Nation Electrical Installation Standards (NEIS)
   4.5. NEMA ICS 2.3
   4.6. EASA Understanding Energy Efficient Motors
5. **Definitions**
   5.1. Vector control – the magnitude and phase of the ac motor's stator current vector is to be controlled by producing constant magnetic flux while generating the necessary component of torque producing current.
   5.2. Closed loop vector control – vector control using an external feedback device like an encoder or resolver.
   5.3. Open loop control – Any control that does not use a feedback device.
   5.4. Velocity – accurate speed regulation through closed loop vector control.
   5.5. Electronic Gearing – Master drive controlling slave drive(s) through feedback loop.
6. **Hardware set-up**
   6.1. Power-up testing procedure should have been performed prior to SJ-FB set-up reference SJ300 manual page 2-17.
   6.2. Gain access to inside front cover of SJ300 following directions on page 9 of SJ-FB manual.
   6.3. Install encoder cable following channel pin-out to terminal one of SJ-FB board.
      6.3.1. Pay attention to the torque of the terminals to ensure proper installation.
   6.4. The closed loop vector set-up does not require any additional configuration of the SJ-FB including dipswitches and wiring.

7. **Drive parameter set-up**

7.1. Preliminary test.

7.1.1. Parameter changes

A081	00 – AVR always on
A082	XX – Motor nameplate voltage
A001	00 – Speed reference local control
A002	02 – Run enable local control

7.1.1.1. These parameters will allow the drive to be driven locally to verify the operation of the system in constant torque mode prior to closed loop control.

7.2. Run test.

7.2.1. Parameter.

A044	05 – closed loop vector control
P010	01 – option card valid

7.2.1.1. The drive is now in closed loop vector mode; and must be tuned prior to run.

7.2.2. Tuning.

7.2.2.1. Follow auto-tuning procedure on page 4-67 of SJ300 manual.

7.2.2.1.1. It is recommended to perform auto-tune procedure with active rotation (H001 – 02)

7.2.2.2. H002 must be set to 01 or 02 after tuning is complete.

7.2.3. Run.

7.2.3.1. Ensure speed pot on front of keypad is turned to 0%.

7.2.3.2. Press the run button and see if run indicator in illuminated.

7.2.3.3. Slowly bring up speed reference and verify rotation.

7.2.3.3.1. Note – If the motor acts erratic or trips out (over-current) quickly, then swap the poles of the B channel on the SJ-FB card.

7.2.4. Test completion.

7.2.4.1. If the drive performs satisfactory, then the control can be changed to remote as the process requirements dictate.

8. Tips

8.1. When using DOP-PRO and getting "com" errors periodically, instead of cycling power to the drive, try selecting online monitor. Once online monitor is established, exit and try to upload/download again.

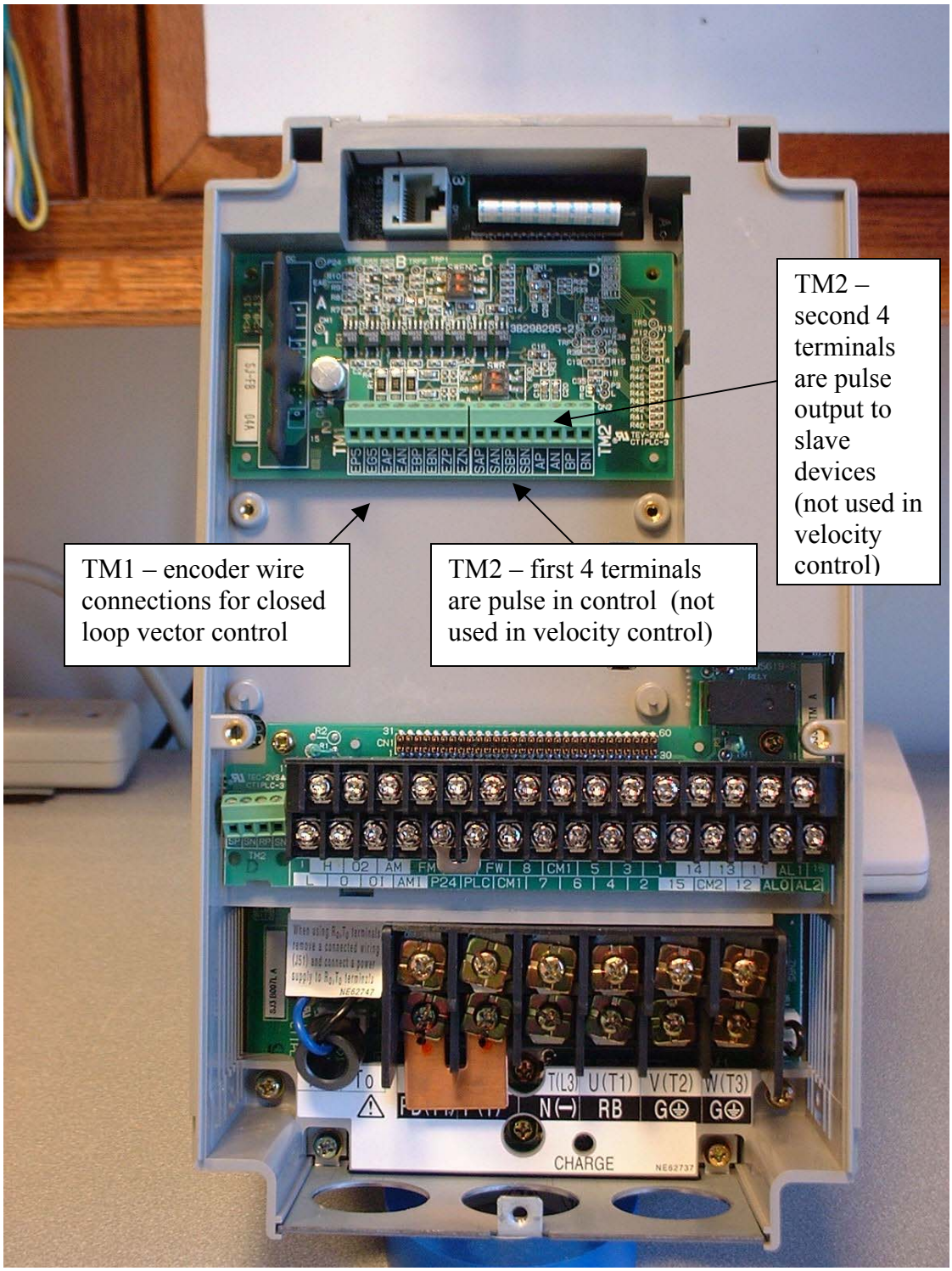
8.2. If the hertz display (D001) shows increasing hertz, but the motor does not move, try the following tips:

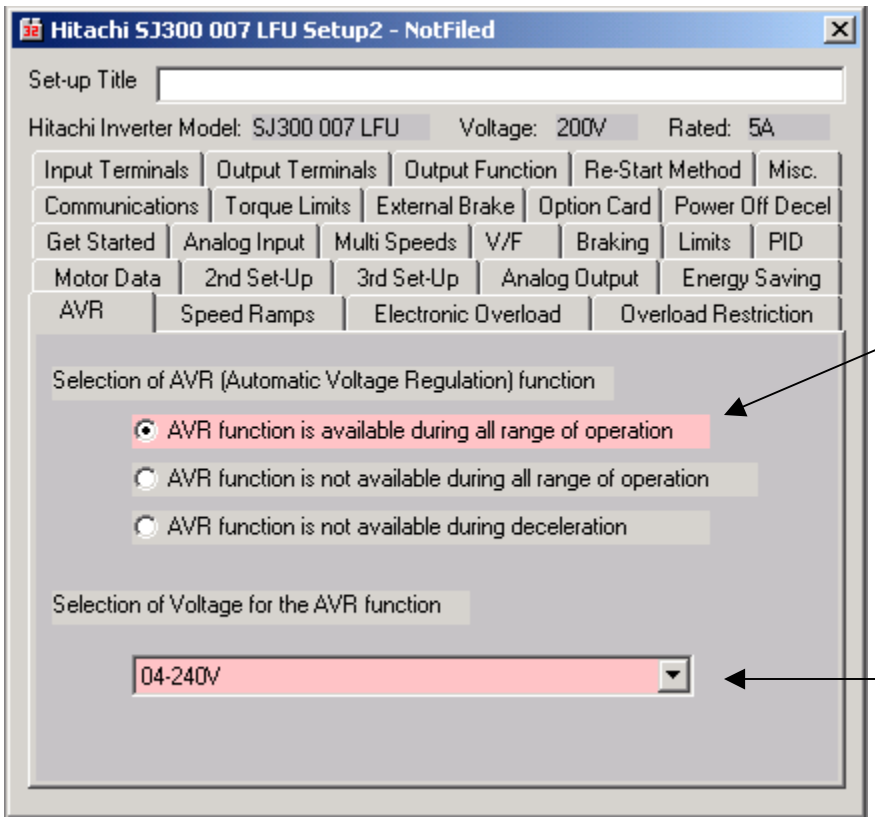
8.2.1. Cycle power on drive and resume run test.

8.2.2. Connect to Trend on the DOP-PRO software.

8.2.2.1. You may get an E11 alarm, clear and resume run test.

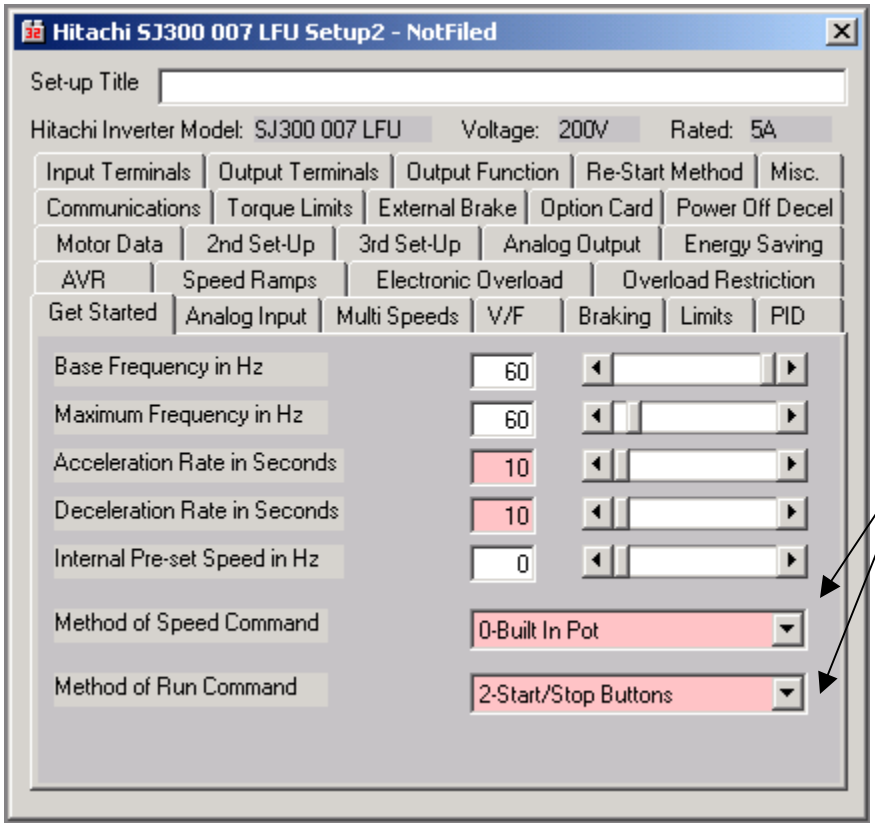
8.2.3. Conduct a second auto-tune and ensure H002 is set to 01 or 02.


TM2 – second 4 terminals are pulse output to slave devices (not used in velocity control)
TM1 – encoder wire connections for closed loop vector control
TM2 – first 4 terminals are pulse in control (not used in velocity control)
EPS EGS EAP EAN EBP EBN EZP EZN SAP SAN SBP SBN AP AN BP BN
H O2 AM FM FW 8 CM1 5 3 1 14 13 11 AL1
L O O1 AM1 P24 PLC CM1 7 6 4 2 15 CM2 12 AL0 AL2
T(L3) U(T1) V(T2) W(T3)
N(−) RB G⏚ G⏚
CHARGE

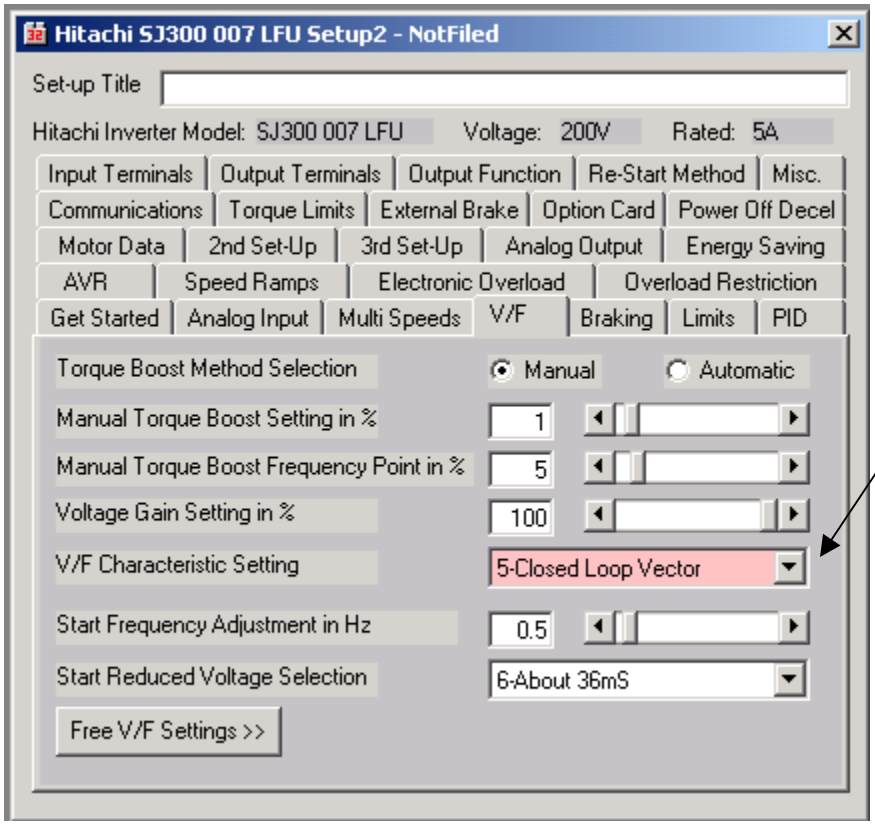


A081 – set to 00

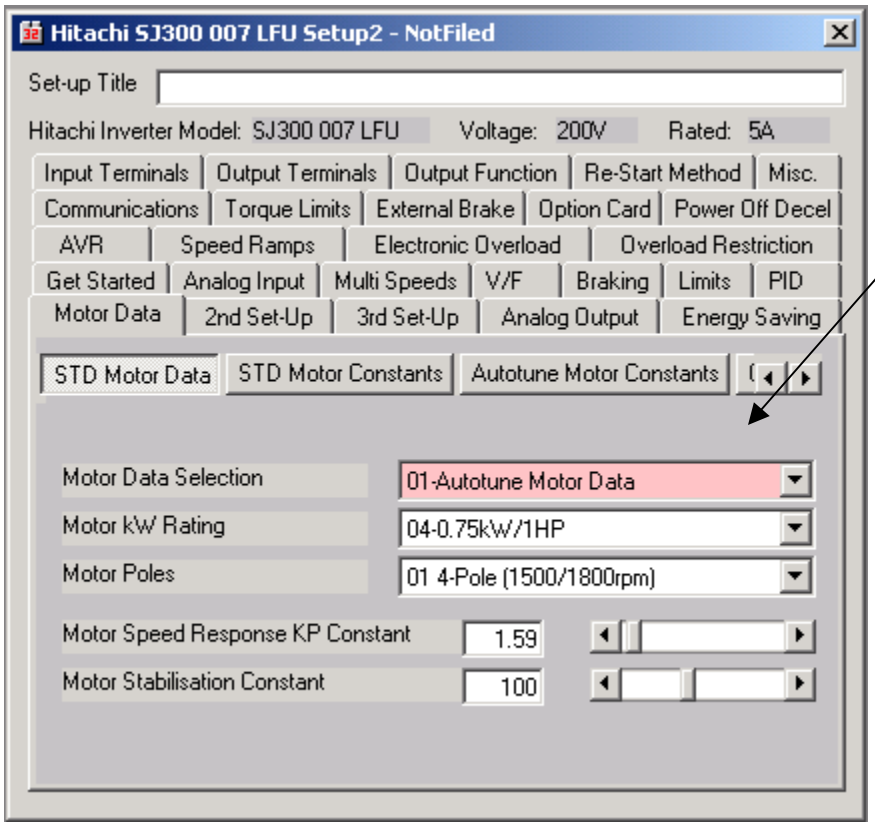
A082 – set to value to motor nameplate voltage



A001 and A002 set to local control for initial testing purposes

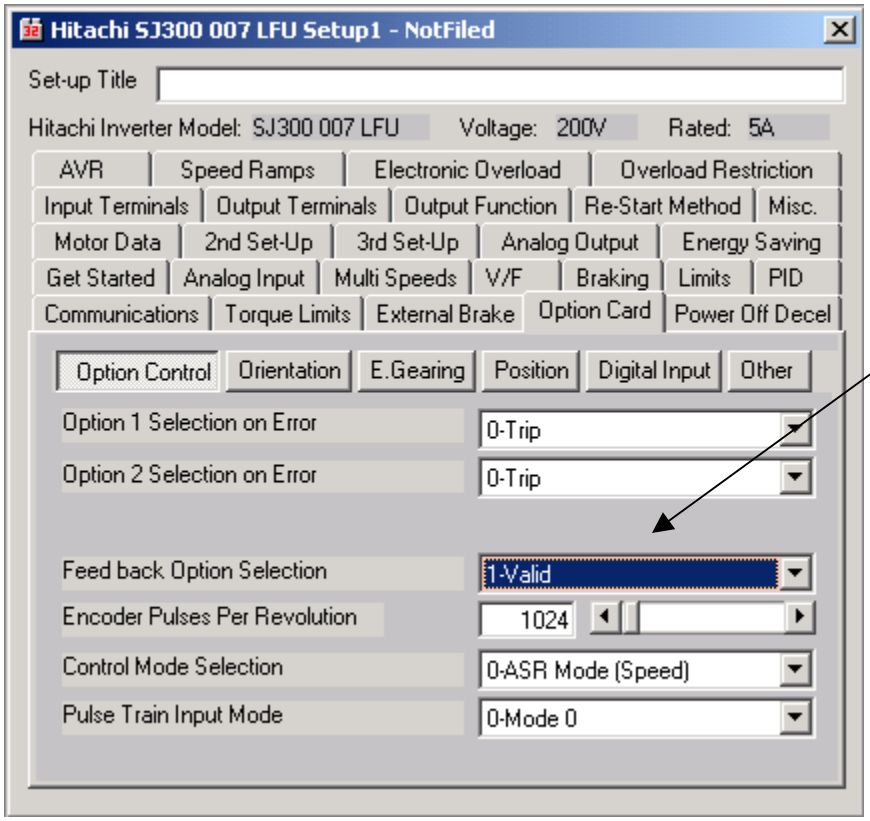


A044 – set to 05 for closed loop vector control



Note: It is suggested to go through the local auto-tune procedure versus using the software wizard.

After auto-tune is complete (symbol ___0) Ensure that H002 is set to 01 or 02



P010 – set to 01