



Product	AMD	Type	VFD-C2000	Security Level	☒ General ☐ High ☐ Top
				No.	N/A
Issued by	SC	Author	John Zuo	Release Date	5 th May, 2012

Outside Pulses Position Control for PM based on C2000

Devices and tools:

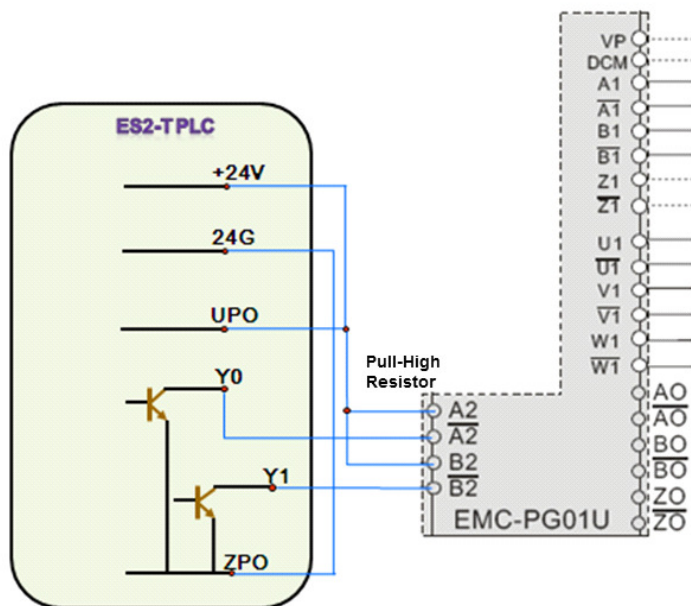
Inverter: VFD007C23A, Firmware 9.021(12452), PG:EMC-PG01U

PM motor: ECMA-C30602ES

PLC: DVP-32ES200T

Operation Steps:

1. Wiring ES2 PLC with C2000 PG card.



2. Set 00-02=9 for going back to Factory Setting.
3. Set correct parameters 01-00, 01-01 and 01-02 based on PM you are using.
4. Key in the following parameters:

Pr. no	Definition	Setting value
05-33	IM or PM motor choice	1
05-34	PM motor rated current (A)	1.55
05-35	PM motor rated power (kw)	0.20
05-36	PM motor rated speed (rpm)	3000
05-37	PM magnetic roles	10
05-38	PM Inertia (E^{-4} kg-m ²)	0.2

5. Set 05-00=5 for PM motor auto-tuning:

05-33 to 05-37 must be set before PM motor auto-tuning. However, 05-38 has nothing to do with auto-tuning but for automatical bandwidth in ASR.

6. Check the following parameters after PM motor auto-tuning:

05-39 stator resistance, 05-40 PM Ld, 05-41 PM Lq and 05-43 PM Ke

7. Set parameters about encoder:

10-00	Encoder types	2
10-01	Pulse Encoder PPR	2500
10-02	Encoder operation modes	1

8. Set 05-00=4 for PM magnetic angle detecting:

The angle would be set into 05-42 automatically after the magnetic angle detecting. And for ECMA series motor, 05-42 will be 0° or 360° because of the setting in factory. Hence, if the motor is ECMA, we can cancel the magnetic angle detecting but set 05-42=0 directly.

9. Set 00-11=4 for PM FOC PG control mode.

10. Repower the inverter if motor is ECMA:

11. Set 11-00=2 for inertia auto-tuning:

- Set speed command= $\frac{2}{3}$ *rated speed of PM(05-36).
- Set acceleration and deceleration time is 1.5s or 2s.
- Forward and reverse in turn until 11-01 is stable. (11-01 must be based on 05-38)

12. Set ASR parameters based on the practical situations:

- Please set 11-03 11-04 11-05 if we set 11-00=1 and finish the inertia auto-tuning.
- Please set 11-06 to 11-11 if we set 11-00=0 which doesn't need the inertia auto-tuning.

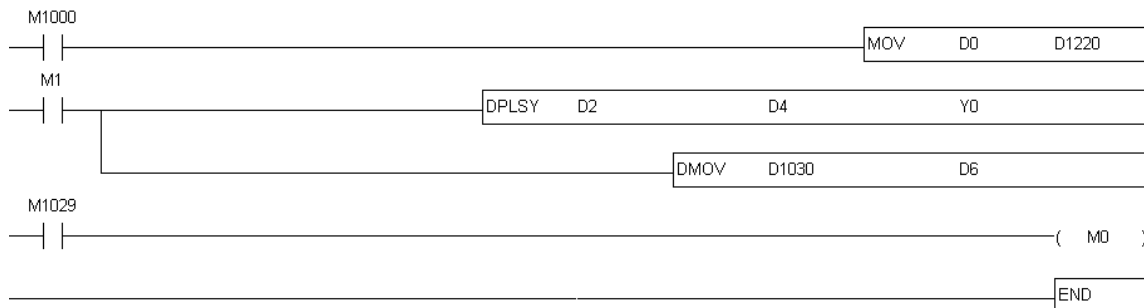
13. Choose one Multi-input to 37 and switch it on.

37 Full position control
 pulse command input
 enable

14. Set 00-20 frequency source to 5. (source is from outside pulses)

15. Making the program to ES2 for sending pulses out to C2000.

- DPLSY instruction is enough for testing outside pulses position control of C2000. And D1220 can choose which type pulse you want to send out, Pulse+direction or AB phases.



- Set C2000 10-16 to 3 or 4 if you choose pulse+direction from PLC.
Set C2000 10-16 to 1 or 2 if you choose AB phase from PLC.

16. RUN PLC program and record the practical position.

- If you choose Pulse+direction from PLC, C2000 PG2 channel will make the pulses from PLC onefold. So, e.g., if you send 10000 pulses from PLC, the C2000 PG2 channel will receive 10000 pulses.
- If you choose AB phase from PLC, C2000 PG2 channel will make the pulses from PLC fourfold. So, e.g., if you send 10000 pulses from PLC, the C2000 PG2 channel will receive 40000 pulses.

Attentions:

A. Why don't we set Pr00-10=1 for Position mode since this is output pulse position control?

In C2000, Pr00-10=1 is for P2P mode which is special position like PR mode in Servo. But for output pulses position control, it is based on speed mode namely Pr.00-10=0, and only make M1=37 on for enabling the output pulses position control. Hence we don't need to set

Pr00-10=1.

B. Can we use the Line driver output from PLC to connect the PG01U PG2 Channel (A2 A2_Bar B2 B2_Bar)?

In this case, the ES2 PLC Pulses Outputs structure are open collector, and we connect them to our PG01U PG2 channel. But even if for the PLC which has line driver output, it also can connect to PG01U PG2. The connection wiring is different but it is all based on the pulses on_off mechanism.

C. Which pulse type from PLC is better for output pulse position control?

Generally, there are two pulse types is very popular in output pulse position control. One is Pulse+Dir. and the other is A+B phases. [The A+B phases is better since it can cause C2000 PG card fourfold for receiving the pulses](#) so it is higher precision for controlling the position. But for Pulse+Dir. Mode, it only cause the C2000 PG card onefold for receiving the pulses, and the precision is not so high like A+B phases. Hence the Pulse + Dir. Mode is very easy to cause the pulses loss and we must set a fussy APR & ASR setting for making up.

