



Product Solutions Announcement

Delta Industrial Automation Global Solution Center



Product	AMD	Type	VFD-C2000	Security Level	☒ General ☐ High ☐ Top
				No.	N/A
Issued by	SC	Author	Leo Yang John Zuo	Release Date	11 th Feb. 2014

C2000 driving IM with TQC+PG

Devices and tools:

Inverter: VFD007C43A, 1PCS (Firmware V1.04 D13305)

Induction motor: TECO/3phase/380V/0.75kw

PG: EMC-PG01L 1PCS

Operation Steps:

1. Set Pr00-02=9(50Hz) or 10(60Hz) to go back factory setting.

2. Set the following parameters based on IM motor you are using:

Parameters	Definition	Value
01-00	Induction motor max frequency (Hz)	50.00
01-01	Induction motor rated frequency (Hz)	50.00
01-02	Induction motor rated voltage (V)	380.0
05-01	Induction motor rated current (A)	2.0
05-02	Induction motor rated power (kW)	0.75
05-03	Induction motor rated speed (rpm)	1410
05-04	Induction motor pole numbers	4

3. Set Pr05-00=1 and press **【run】** to begin auto-tuning in rolling test (empty load).

Make sure the motor has no-load before executing auto-tuning and the shaft is not connected to any belt or gear motor. It is recommended to set to 2 if the motor can't separate from the load.

If Pr.05-00 is set to 2 (static test), user needs to input the no-load current value of motor into Pr.05-05 for motor 1/Pr.05-17 for motor 2. The figure is about 40% of the rated current

4. Check the following parameters after IM rotary auto-tuning.

When auto-tuning is completed, please check if the measured values are written into motor

1(Pr.05-05 ~05-09) and motor 2 (Pr.05-17 ~05-21) automatically.

5. Set parameters about encoder.

Pr 10-00	Encoder Type	1
Pr 10-01	Encoder pulse	1024
Pr 10-02	Encoder Input Type	1

6. Set Pr00-11=3 for IM FOC+PG control mode.

Keep Pr00-10=0 which means velocity mode, and set Pr00-11 to 3 for IM FOC+PG mode. Set a low speed for the inverter, for example 10 Hz and press “Run” to make sure the inverter is working properly. If not, check the wiring or change Pr10-02 to 2, and then please try again.

7. Set Pr11-00=2 for inertia auto-tuning (After tuning over, 11-00 will be 0 automatically):

- Keep empty load first.
- Set speed command= $2/3$ *rated speed of motor(05-03).
- Set acceleration and deceleration time is 1s or 1.5s.
- Forward and reverse in turn until 11-01 is stable. And then press stop, the tuning is over.
- Connect the load, and repeat the inertia auto-tuning procedures again. If the inertia auto-tuning is OK, the loading inertia result is better. If the loading inertia not OK, we must input the 11-01 inertia by hand based on the tuning result in empty load.

8. Enable ASR bandwidth adjustment automatically function.

- If we keep Pr11-00=0, we just disable the ASR bandwidth adjustment automatically. And we only can use Pr11-06 to Pr11-11 and the PI ASR will be invariable during running.
- If we set Pr11-00=1, we enable the ASR bandwidth adjustment automatically, and we can use Pr11-03 to Pr11-05 (no Pr11-06 to Pr11-11 anymore), and Pr11-03 to Pr11-05 can make real ASR PI changed automatically based on practical current situation. This is more flexible for practical commissioning.

9. Set Pr00-10=2 for torque mode and Pr00-13=0 for TQCPG mode.

TQCPG mode is based on FOCPG mode, so if you want to use this mode, you have to finished the FOCPG mode settings first, then, change Pr00-10 to 2 for torque mode.

10. Set Pr11-27=100: maximum torque command according to your real situation.

This parameter is used to set the upper limit of torque command, and the factory setting is 100%.

11. Set Pr11-33=0 to choose the source of torque command.

Parameter	Value	Definition
11-33	0	Digital Keypad (Pr11-34)
	1	RS485 serial communication
	2	Analog signal (Pr03-00)
	3	CANopen
	4	Reserved
	5	Communication Card

In this case, set Pr11-33=0, which means the torque command source comes from the digital keypad, and the value can be set in Pr11-34. For example, if you need 50% torque, you can just key in 50 in Pr 11-34. The interval of Pr11-34 is changeable according to Pr11-27.

12. Set Pr11-36=0 to choose the source of speed limitation.

Parameter	Value	Definition
11-36	0	Set by Pr.11-37 (Forward speed limit) and Pr.11-38 (Reverse speed limit)
	1	Set by Pr.11-37,11-38 and Pr.00-20 (Source of Master Frequency Command)
	2	Set by Pr.00-20 (Source of Master Frequency Command).

You can set Pr11-36 to choose the source of this speed limitation. In this case, set Pr11-36=0 to choose Pr11-37&Pr11-38 as the source of speed limitation. In TQCPG mode, when the motor speed is accelerated to speed limit value (Pr.11-36, 11-37 and 11-38), it will switch to speed control mode to stop acceleration.

13. Set forward and reverse speed limit.

Set Pr11-37=10, Pr11-38=10, here 10 means 10% of Pr01-00 max output frequency. For example, if you set Pr01-00=50Hz, forward and reverse speed limit will be 5Hz.

14. Set ASR control at Torque mode according to your real situation:

ASR control function under torque mode is contained in firmware since V1.01 date12055. If you want to adjust PI value in the ASR of torque mode, please refer to Pr10-24:

Bit#0	0: Use PI as ASR	1: Use P as ASR
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FAQ:

1. In TQCPG mode, the output frequency rises immediately or speeds up with a accelerate time?

In standard factory firmware, if you choose Pr11-37&Pr11-38 as your speed limitation, the output frequency will rise immediately without a accelerate/decelerate time; if you choose frequency command as your speed limitation, the output frequency will speed up or decelerate with a

accelerate/decelerate time, and you can adjust this time in Pr01-12~Pr01-19.

2. How to understand 11-39?

If torque command is 0%, speed limit also is 0, you can set Pr11-39=1 to make inverter go to FOCPG mode and the AC motor drive can have the output torque there like 0HZ in FOCPG.

3. What happen if speed limit is 0?

If speed limit is 0, the output torque will be influenced by torque command directly, so if we enhance torque command, we can get bigger torque for output.

4. What's the difference between P and PI in ASR control for speed limit loop of Torque control?

“P” in ASR, the speed feedback will be lower than speed limit because of no integration. And the load is bigger, the gap is bigger between speed feedback with frequency command.

“PI” in ASR, the speed feedback will be the same as speed limit because of integration there.

