

Using PLC to send pulse output in order to drive IM motor via C2000 with PG card

Robert LO 2011/08/22



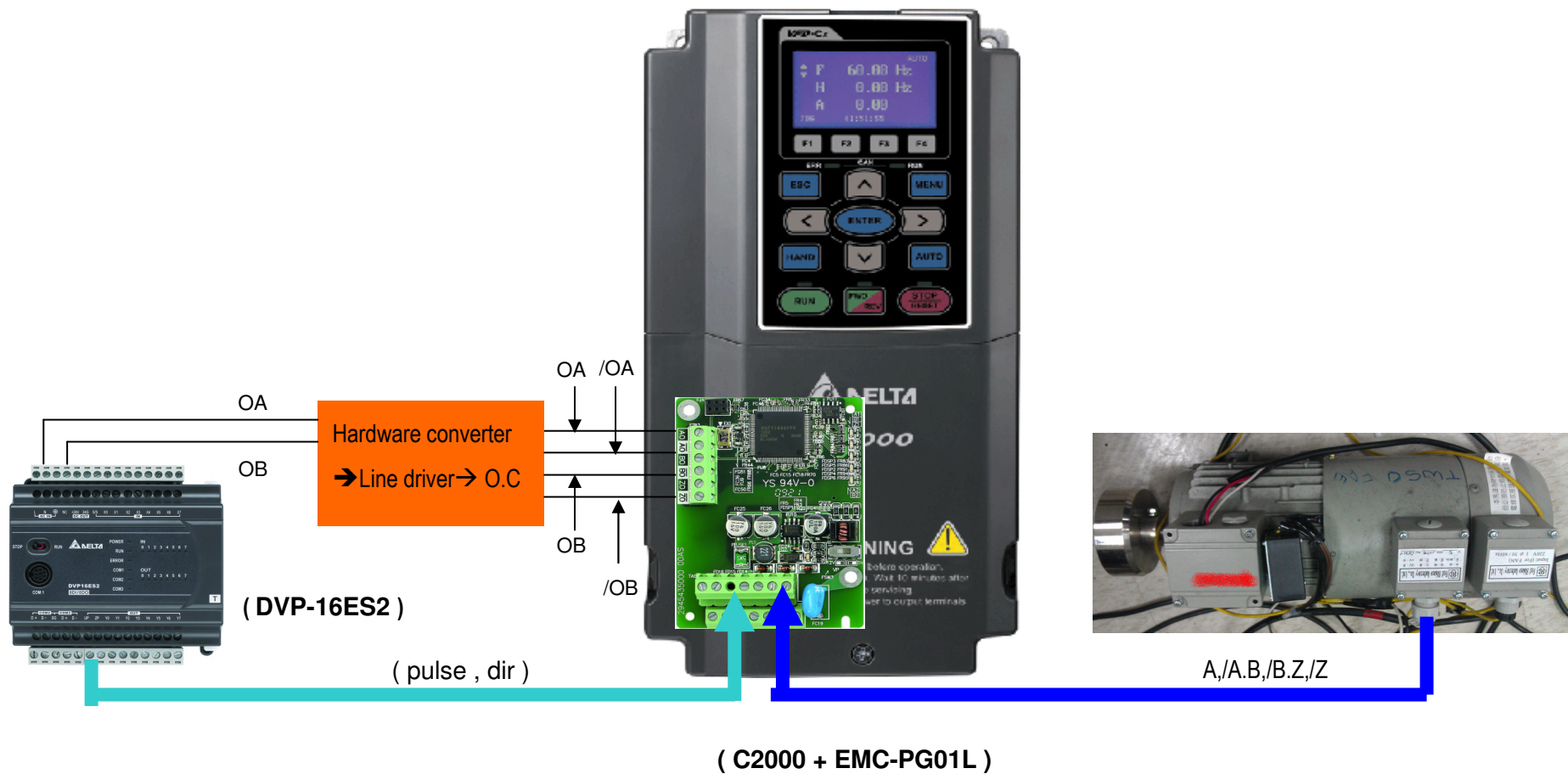


Outline

1. Configuration
2. Hardware wiring
3. The information about IM Motor and EMC-PG01L
4. The VFD-C2000 parameter setup for auto-tuning
5. The VFD-C2000 parameter setup for connecting PG card
6. Pulse output sending via DDRVI instruction and high speed counter of C251/C243

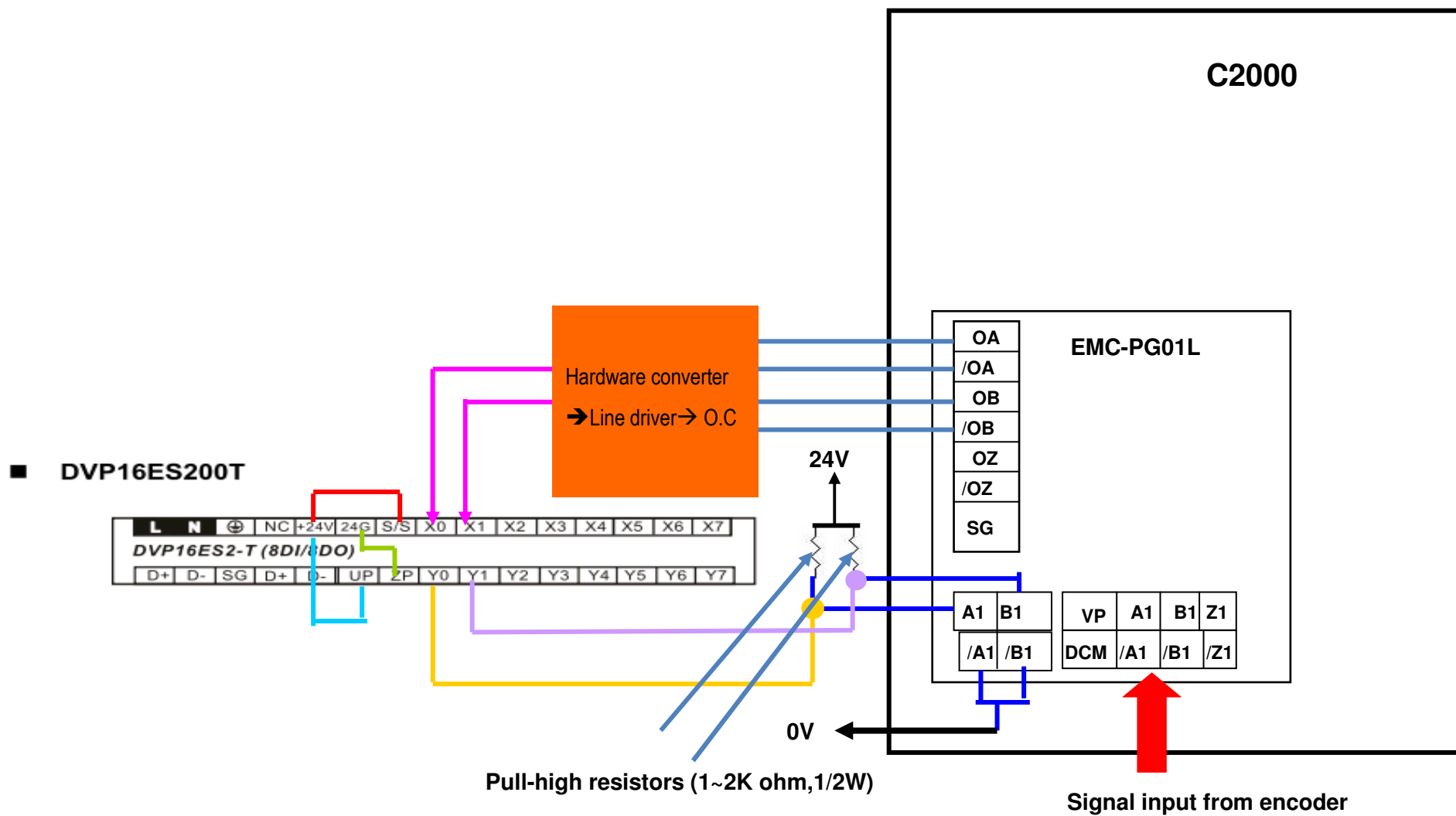


1.Configuration:





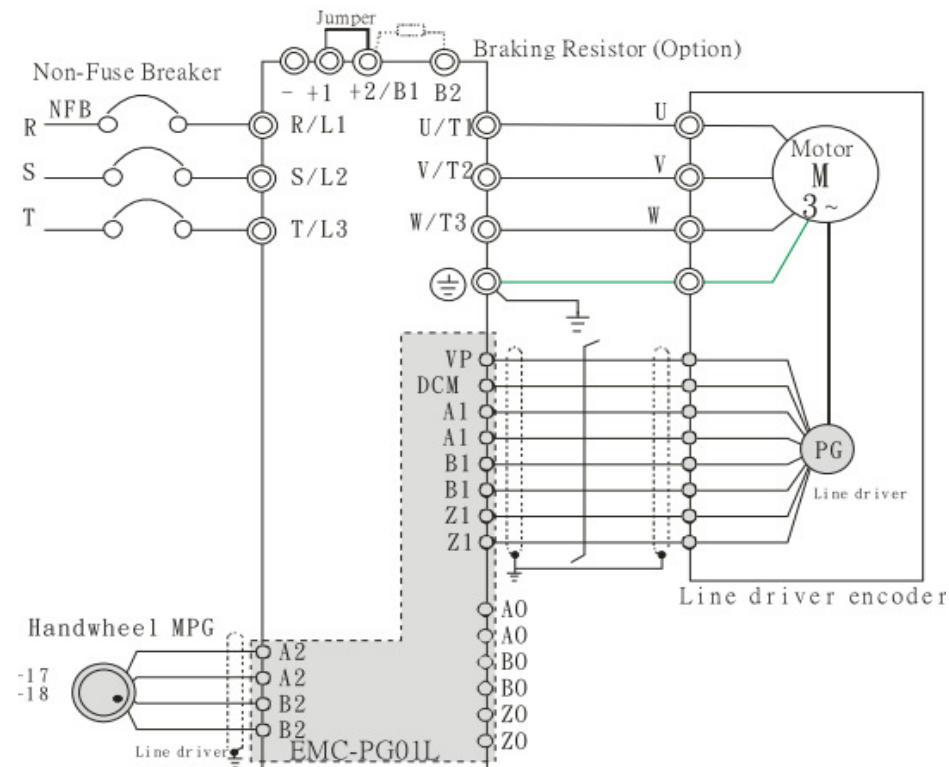
2. Hardware wiring:





3.The information about IM Motor and EMC-PG01L:

- IM motor:
 1. Max operation frequency → 50Hz
 2. Number of pole → 4
 3. Rate power of induction motor → 0.75 KW (1HP)
 4. Rate input current → 3.2A
 5. Rate Speed → 1395 rpm
- EMC-PG01L:
 6. Encoder resolution of IM → 1024





4.The VFD-C2000 parameter setup for auto-tuning :

- Filling in the following parameters: 05-01,05-02,05-03,05-04, before activate the function of Auto-tuning

01-00	Max. Operation Frequency	50.00~600.00Hz	60.00/ 50.00	→ <u>50</u>
Parameter	Explanation	Settings	Factory Setting	
05-00	Motor Auto Tuning	0: No function 1: Measure induction motor in dynamic status (motor spinning) (Rs, Rr, Lm, Lx, no-load current) 2: Measure induction motor in static status (motor not spinning) 3: No function 4: Measure PM motor magnetic pole and PG origin in static status (motor not spinning) 5: Measure PM motor parameter in dynamic status (motor spinning) 6: Measure IM motor flux curve in dynamic status 12: FOC Sensorless inertia estimation	0	→ <u>1</u>
05-01	Full-load Current of Induction Motor 1(A)	10~120% of drive's rated current	###	→ <u>3.2</u>
05-02	Rated Power of Induction Motor 1(kW)	0~655.35kW	###	→ <u>0.75</u>
05-03	Rated Speed of Induction Motor 1 (rpm)	0~65535 1710(60Hz 4poles) ; 1410(50Hz 4 poles)	1710	→ <u>1395</u>
05-04	Pole Number of Induction Motor 1	2~20	4	→ <u>4</u>





5.The VFD-C2000 parameter setup for connecting PG card(1) :

00-20	Source of Master Frequency Command (AUTO)	0: Digital keypad 1: RS-485 serial communication 2: External analog input (Pr.03-00) 3: External UP/DOWN terminal 4: Pulse input without direction command (Pr.10-16 without direction) 5: Pulse input with direction command (Pr.10-16) 6: CANopen communication card 7: Reserved 8: Communication card (no CANopen card)	0	→	<u>5</u>
00-21	Source of the Operation Command (AUTO)	0: Digital keypad 1: External terminals. Keypad STOP disabled. 2: RS-485 serial communication. Keypad STOP disabled. 3: CANopen communication card 4: Reserved 5: Communication card (no CANopen card)	0	→	<u>0</u>
10-00	Encoder Type Selection	0: Disable 1: ABZ 2: ABZ (Delta Encoder for PM motor) 3: Resolver (Standard encoder for PM motor) 4: ABZ/UVW (Standard encoder for PM motor)	0	→	<u>1</u>
10-01	Encoder Pulse	1~20000	600	→	<u>1024</u>
10-02	Encoder Input Type Setting	0: Disable 1: Phase A leads in a forward run command and phase B leads in a reverse run command 2: Phase B leads in a forward run command and phase A leads in a reverse run command 3: Phase A is a pulse input and phase B is a direction input. (low input=reverse direction, high input=forward direction) 4: Phase A is a pulse input and phase B is a direction input. (low input=forward direction, high input=reverse direction) 5: Single-phase input	0	→	<u>2</u>
10-16	Pulse Input Type Setting	0: Disable 1: Phase A leads in a forward run command and phase B leads in a reverse run command 2: Phase B leads in a forward run command and phase A leads in a reverse run command 3: Phase A is a pulse input and phase B is a direction input. (L=reverse direction, H=forward direction). 4: Phase A is a pulse input and phase B is a direction input. (L=forward direction, H=reverse direction). 5: Single-phase input	0	→	<u>3</u>



5.1. The VFD-C2000 parameter setup for connecting PG card(2) :

00-11	Control of Speed Mode	0: VF (IM V/f control) 1: VFPG (IM V/f control+ Encoder) 2: SVC(IM Sensorless vector control) 3: FOC PG (IM FOC vector control+ encoder) 4: FOC PG (PM FOC vector control + Encoder) 5: FOC Sensorless (IM field oriented sensorless vector control)	0
-------	-----------------------	--	---

02-01	Multi-function Input Command 1 (MI1)
02-02	Multi-function Input Command 2 (MI2)
02-03	Multi-function Input Command 3 (MI3)
02-04	Multi-function Input Command 4 (MI4)
02-05	Multi-function Input Command 5 (MI5)
02-06	Multi-function Input Command 6 (MI6)
02-07	Multi-function Input Command 7 (MI7)
02-08	Multi-function Input Command 8 (MI8)



37: Full position control pulse command input enable



6. Pulse output sending via DDRVI instruction and high speed counter of C251/C243:

API	Mnemonic		Operands				Function				Controllers			
158	D	DRVI	(S₁)	(S₂)	(D₁)	(D₂)	Relative Position Control				ES2/EX2	SS2	SA2	SX2

Type OP	Bit Devices				Word devices												Program Steps			
	X	Y	M	S	K	H	KnX	KnY	KnM	KnS	T	C	D	E	F	DDRVI: 17 steps				
S ₁					*	*	*	*	*	*	*	*	*	*	*					
S ₂					*	*	*	*	*	*	*	*	*	*	*					
D ₁		*																		
D ₂		*	*	*																

PULSE				16-bit				32-bit			
ES2/EX2	SS2	SA2	SX2	ES2/EX2	SS2	SA2	SX2	ES2/EX2	SS2	SA2	SX2

Operands:

S₁: Number of pulses (relative positioning) **S₂**: Pulse output frequency **D₁**: Pulse output device

D₂: Direction signal output

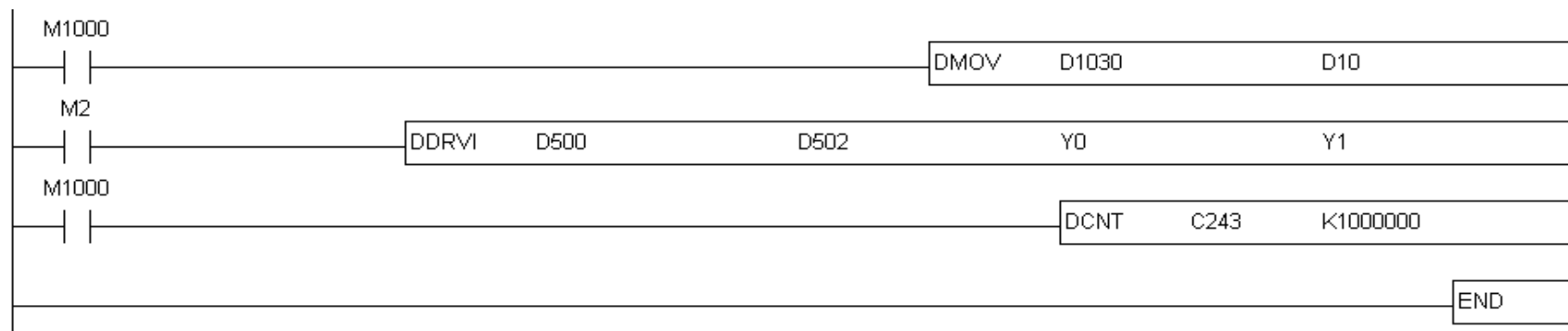
C X	1-phase input		1-phase 2-input						2-phase 2-input			
	C243	C244	C245	C246	C247	C248	C249	C250	C251	C252	C253	C254
X0	U		U/D	U/D	U	U			A	A		
X1	R		Dir	Dir	D	D			B	B		
X2		U					U/D	U/D			A	A
X3		R					Dir	Dir			B	B
X4				R		R				R		
X5								R				R

The max frequency of the 2-phase 2-input counter (X0, X1)(C251, C252) is 5kHz on ES2/EX2

The max frequency of the 2-phase 2-input counter (X2, X3)(C253, C254) is 5kHz on ES2/EX2/SA2 model, 10 kHz on SS2/SX2 model and 50kHz on 32ES211T.



6.1.PLC Ladder program:



~ END ~

To learn more about Delta, please visit www.deltaww.com.

