TB250 (Rev1) - Delta VFD-VE inverter Setup procedure for Y-Delta Inverter

This parameter table is created for step-by-step setup procedure for Delta VFD-VE Y-Delta inverter. It contains the auto tuning setup for both Y and Delta connection, moment of inertia estimate of motor, and ATC orientation.

To program the Delta Inverter programming parameters:
Each Delta inverter parameter has 2 set of numbers.
Example: 01-02. We will call 01 "Group Parameter" and 02 "Parameter Number."
1. Press **PROG**
2. Press the up or down arrow key to select the group parameter.
3. Press **PROG**
4. Press the up or down arrow key to select the parameter number.
5. Press **PROG** At this time parameter value should be blinking. Use arrow key to change the value.
6. Press **PROG** again to save parameter values or **MODE** to discard.

Continue until all the parameters have been set.

00-06 Software version 9.91
00-00 Identity Code 12 (7.5HP)
14 (10HP)
16 (15HP)
18 (20HP)
20 (25HP)

Parameter	Value	Function
00-02	10	Parameter Reset – Factory defaults for 60Hz
00-02	5577	Parameter Reset – to change inverter model
00-06		Software Version (Read-only)
00-00		ID of the AC motor Drive (Read-only)
00-01		Rated Current Display of the AC motor drive (Read-only)
00-02	2	Enable group 11 parameter settings
Pull out the keypad and insert it back to re-initialize.		
01-00		Maximum Output Frequency – 266.66 Hz – 8000 RPM 200 Hz - 6000 RPM
06-01	0	Over-voltage Stall Prevention – 0=Disable
07-00	350	Software Brake Level

The external I/O module – EMN-APP01 com switch set to LOW

Parameter	Value	Function
09-01		COM1 Transmission Speed (115.2 I/O set to High, 9.6 I/O set to Low) Note: If this is changed the I/O module will need reset by pulling the COM cable.
09-04	12	COM1 Communication Protocol – 12=8N1 (RTU)
02-01	30	Multi-Function Input, MI1 – 30 = Signal confirmation for Delta-connection
02-02	29	Multi-Function Input, MI1 – 29 = Signal confirmation for Y-connection
Parameters 02-35 to 02-42 Specify which outputs you are using refer to schematic and set parameters accordingly		
02-35	31	Multi-function Output 5, MO3 – 31 = Y-Connection for the motor coil.
02-36	32	Multi-function Output 6, MO4 – 32 = Delta-Connection for the motor coil.
02-37		Multi-function Output 7, MO5
02-38		Multi-function Output 8, MO6
02-39		Multi-function Output 9, MO7
02-40		Multi-function Output 10, MO8
02-41		Multi-function Output 11, MO9
02-42		Multi-function Output 12, MOA
01-01	030	1st Output Frequency Setting 1 – Y-connection
01-02	220	1st Output Voltage Setting 1 – Y-connection
01-35	090	1st Output Frequency Setting 2 – D-connection
01-36	220	1st Output Voltage Setting 2 – D-connection

05-01		Full-load current of Motor – Y-coil (check Motor tag)
05-02		Rated Power of Motor (kw) – Y-coil (Check Motor tag)
05-03	810	Rated speed of Motor (rpm) – Y-coil (Auto-detect by autotune)
05-04	4	Number of motor pole – Y-coil
Delta-Connection setup		
05-13		Full-load current of Motor – D-coil (check Motor tag)
05-14		Rated Power of Motor (kw) – D-coil (Check motor tag)
05-15	2400	Rated speed of Motor (rpm) – D-coil (Auto-detect by autotune)
05-16	4	Number of motor pole – D-coil
Y-connection auto tune		
05-12	1	Y / Delta connection switch, 1=enable
05-10	1	Y / Delta coil selection. 1=Y-coil and 2=Delta coil
05-00	1	Motor Auto Tuning, 1=Rolling test

Press **PU** on the inverter Keypad

Press **RUN** to run autotune for Y-coil.

Check if 05-05 to 05-09 are changed by autotune.

Parameter	Value	Function
Delta-Connection auto tune		
05-10	2	Y / Delta coil selection. 1=Y-coil and 2=Delta coil
05-00	1	Motor Auto Tuning, 1=Rolling test

Press **PU** on the inverter Keypad

Press **RUN** to run autotune for D-coil.

Check if 05-17 to 05-21 are changed by autotune.

Moment of Inertia Estimate

Parameter	Value	Function
11-00	2	System Control, 2=moment of Inertia estimate
05-10	1	Y / Delta coil selection. 1=Y-coil and 2=Delta coil
01-12	0.2	Accel time. Must be low for inertia estimate
01-13	0.2	Decel time. Must be low for inertia estimate
00-10	3	Control Method. 3=FOC vector Control + encoder.
10-00	1024	Encoder Pulse
10-01	2 or 1	Encoder Input type Setting.

Press Mode until you see 60Hz on the display, then the arrow keys to set the frequency to 40 Hz.

Press **PU** to enable PU mode. Make sure the PU light is on.

*** Make sure spindle is free to run***

Press **RUN**

Go to “P11-01” to see the calculated moment of inertia

Press forward and reverse continuously until this number in P11-01 stop changing.
(Switching between FWD and REV within 10 to 20 seconds.)

And then **STOP**

Press **PROG** to save this tuning value into P11-01

Parameter	Value	Function
11-01		Per Unit of System Inertia.
11-00	1	System Control, 1=Auto tuning for ASR and APR
05-11	xxx	Y/Delta – connection switching frequency
05-30	0.2~0.4	Delay Time for Y / Delta switch
00-04	9	Display of Multi-Function Display. 9=Display PG position
00-20	2	Source of the Master Frequency Command. 2=External analog input
00-21	1	Source of the Operation Command. 1=External terminals.
01-12	3~5	Accel Time (s)
01-13	5~7	Decel Time

02-04	35	Multi-Function Input Command 4, MI4. 35=Enable position control. Orientation Start
02-05	5	Multi-Function Input Command 5, MI5. 5=Reset
02-11	11	Multi-function Output 1 RA RM, RC (Relay1). 11=Malfunction indication. Inverter fault.
02-12	39	Multi-function Output 2 MRA, MRC (Relay2). 39=Position attained (Orientation attained).
02-13	2	Multi-function Output 3 (MO1). 34=Zero speed with Stop.
02-14	34	Multi-function Output 4 (MO2)
10-19	xxxx	Orientation Position
10-20	10	Range for Encoder Position Attained
10-24	4	Deceleration time for orient operation
03-18	3	Analog Output Selection 3=Output current (RMS)

Press **PU** to disable PU mode

The parameters listed above are from Delta VFD-VE inverter manual. You can download the full Delta
VFD-VE inverter manual from Delta electronic website.

Delta electronic website: http://www.delta.com.tw/

Delta Inverter product website:
http://www.delta.com.tw/product/em/drive/ac_motor/ac_motor_main.asp

Setting Orient Position (Parameter 10-19) (Orient card model: EMV-PG01L)

Parameter 10-19 tells the inverter where to position the spindle via encoder counts, which puts the spindle in the right orientation for the ATC to grab the tool.

To determine the correct encoder counts, please follow the following steps:
1. Home the machine.
2. To locate the index pulse, rotate the spindle one revolution by hand.
3. For Umbrella type: bring the carousel in with M80 (make sure holding down Aux12).
For swing arm type: bring the arm in with M13 (make sure holding Aux12)
4. Slowly jog the Z Axis down and rotate the spindle by hand until the "half key" is lined up with the notch in the ATC.
5. At the inverter Press Mode until the "U" led lights up.
6. Record this number and enter in Parameter 10-19

Trouble Shooting Spindle Orient
If you have a problem with the spindle hunting (oscillating) when trying to hold the orient position. Change parameter **11-11** Zero-speed Bandwidth from **10 to 20** and save it.

Note:

Multi-Function I/Os on the inverter should be in **"sink"** mode. There is a jumper on the board behind the orientation card.
If PU mode is locked, please follow the following steps below to unlock it. 1. P00-02 = 2, 2. P00-02 = 5577 3, P11-08 = 8.

Document History

Rev1 Created on *2014-10-08* by *#240*