TB183 (Rev1) - Delta Inverter ATC Settings (VFD-V)

Overview:

This Technical Bulletin describes how to set the parameters for Delta VFD-V series inverter.
note: there is another newer Delta inverter model that is VFD-VE, please make sure the model number is correct before you process.

To program the Delta Inverter programming parameters:

Each Delta inverter parameter has 2 sets of numbers (Example: 01-02). We will call 01 the ?Group Parameter" and 02 the ?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.

Delta Inverter ATC Parameter Settings

Model: **VFD-V** and Orientation Control/PLG Feedback option card

Parameter	Function	Setting
00-04	Definitions of the Multi-Function Control	31
00-10	Control Methods	3
00-15	Carrier Frequency Upper Bound	10 Hz
00-20	Source of the Frequency Command	2
00-21	Source of the Operation Command	1
01-00	Maximum Operation Frequency	xxx
01-01	Maximum Voltage Frequency (Base Frequency)	60 Hz
01-02	Maximum Output Voltage	xxx
01-12	The 1_{st} Acceleration Time	3~5
01-13	The 1_{st} Deceleration Time	3~5
02-04	Multi-Function Input Command (MI4)	30
02-05	Multi-Function Input Command (MI5)	5
02-11	Multi-Function Output 1 RA, RB, Rc (Relay 1)	15
02-12	Multi-Function Output 1 RA, RB, Rc (Relay 2)	31
02-13	Multi-Function Output 1 (MO1)	2
02-14	Multi-Function Output 4 (MO2)	70

* Parameter 01-00 depends on the maximum spindle speed desired.
* Parameter 01-02 depends on the AC motor specification. Usually this information is listed on the tag of motor.
* To reset, set parameter 00-02 to 10 for 60 Hz input.

Motor Tuning Parameters

Parameter	Function	Setting
05-00	Motor Auto Tuning	2
05-01	Full-Load Current of Motor 1	xxx

* Parameter 05-00 automatically measures the motor?s characteristics and enters the values into parameter 05-02 and 05-06 ~ 09. To use autotune feature with a loaded motor, set this parameter to 2 for static tuning only.
* Parameter 05-01 depends on the AC motor specification. Usually this information is listed on the tag of motor.

Position Control Parameters

Parameter	Function	Setting
10-00	PG (Encoder) Pulses	1024
10-09	PG Position Control Orient Position	xxxx
10-10	Range for PG Position Attained (Orient Position Range)	15
10-13	Proportional Gain	100
10-14	Integral Time	0
10-15	Differential Time	0.01
10-16	Orient Speed	5
10-22	Position Control Speed Gain	100

* Parameter 10-09 is the orient position where tool change will occur. To set this parameter user need to change parameter 00-04 to 31 first for user-selected display.
* Parameters 10-13 and 10-15 might need to be adjusted depending on motor.

Setting Orient Position (Parameter 10-09)

Parameter 10-09 tells the inverter where to position the spindle by encoder counts to properly orient for use with an ATC. To determine the proper encoder count, please follow the steps listed below:

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 (while holding Aux 12.)
For swing arm type: bring the arm in with M13 (while holding Aux 12.)
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 carousel / arm rack.
5. At inverter, lt;br> i. Press ?Mode" until the ?U" LED lights up (user selected display.).

5. ii. Record this number and enter it in parameter 10-09.
6. For umbrella type: bring the carousel with M81 (while holding Aux 12.)
For swing arm type: move up Z-axis, then cycle the arm back to home position with M13 (while holding Aux 12.)

Auto Tuning Procedures

1.Static tuning only. Make sure parameter 05-00 is 2.
2.Make sure all power wiring is correct.
3.Enter the motor rated voltage in parameter 01-02 and frequency in parameter 01-01.
4.Set parameter 05-01 to XXX, then press RUN on the digital keypad for auto tuning. This procedure takes about 2 minutes.
5.After auto tuning is complete, verify the following parameters have been updated. Parameter 05-02, 05-06 to 05-12. If not, run the auto tuning again.

Other Issues:

When using the ATC1/2 PLC programs, the technician is required to use an override to perform certain M functions when using them in MDI. To perform an M80 or M81 from MDI the operator must press and hold the Aux 12 key on the jog panel. The Aux 12 key is not labeled, but can be seen on the picture below. The Aux 12 key is the key marked with the * directly above the MPG button and to the right of the coolant buttons.

Jog Panel showing location of Aux 12.

ATC INSTALLATION CHECK LIST

Umbrella type tool changers:

_1. Power-up and home.
_2. Air Pressure regulator set at ~7kg/cm^2.
_3. Air Pressure switch Range is 90psig.
_4. Air Pressure switch Differential is 20-25psig
_5. Check head mounted unclamp switch for operation with spindle off.?Remove any tool.
_6. Enter manual spindle mode & start spindle at slow speed, check that unclamp switch doesn't work.
_7. Execute M80* - carousel should come in. Adjust speed and cushioning if needed.
_8. Execute M81* - carousel should go out. Adjust speed and cushioning if needed.
_9. Execute M15* - drawbar should unclamp and air blow will come on. Adjust airflow if needed.
_10.Execute M16* - drawbar will clamp and air blow goes off
_11.Execute M22 - Z axis moves to tool change position
_12.Execute M21 - Z axis moves home
_13.Execute M22 - Z axis moves to tool change position
_14.Execute M19 - Spindle will orient. Check to make sure it is aligned.
_15.Execute M80* to bring carousel in. Check alignment with ATC tabs.
_16.Execute M81* to retract carousel.
_17.Execute M5 to turn off orient. Move spindle by hand.
_18.Check the Tool Index + and - functions. Reverse motor operation if needed.
_19.Use the tool index keys to align tool #1.

_20.Execute an M18, verify "Tool #1 set in ATC" message in CNC10 message window
_21.Execute a T2M6.
_22.Verify ATC changed to tool #2 Press <Alt>+<K> to verify carousel at Bin 2

* - **Aux 12 must be pressed.**

Once all the Delta parameters are correct, you must ensure that the relevant ATC parameters are set on the Centroid control.

Swing Arm type tool changers:
_1. Power-up and home.
_2. Air Pressure regulator set at ~7kg/cm^2.
_3. Air Pressure switch Range is 90 psig.
_4. Air Pressure switch Differential is 20-25 psig.
_5. Check head mounted unclamp switch for operation with spindle off. Remove any tool.
_6. Enter manual spindle mode & start spindle at slow speed, check that unclamp switch doesn't work.
_7. Execute M22 - Z axis moves to tool change position
_8. Execute M21 - Z axis moves home
_9. Execute M22 - Z axis moves to tool change position
_10.Execute M19 - Spindle will orient. Check to make sure it is aligned.
_11.Execute M5 to turn off orient. Move spindle by hand.
_12. Check the Tool Index + and - functions. Reverse motor operation if needed.
_13. Use the tool index keys to align tool #1.
_14. Execute an M18, verify "Tool #1 set in ATC" message in CNC10 message window
_15. Execute a T2M6.
_16. Verify ATC changed to tool #2

Once all the Delta parameters are correct, you must ensure that the relevant ATC parameters are set on the Centroid control.

Document History

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