



FAQ – AC Motor Drives

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VFD series AC Motor Drives

Q What does the line start lockout function do?

A If Line Start Lockout is disabled, the AC motor drive will run when mains power is switched on if a RUN command was present at power off.
If Line Start Lockout is enabled, the AC motor drive does not run when mains power is switched on. It needs a new RUN command after power on.
If between power off and power on the source of operation command is changed, the AC motor drive can be set to follow this new status or ignore this and keep the old status.

Q How to dimension brake resistors for VFD?

A Please look for the application note “Dimensioning brake resistors 2008-01.pdf” and AMD Braking.ppsx on ftp-site (Industrial Automation Products\AMD-Options\AMD Brake units & resistors\Application notes for braking).

Q Can two drives in parallel control one motor?

A No, with Delta VFD this is not possible.
For this application, drives need to be able to cooperate in master-slave configuration where one drive acts as master with frequency command input and controls the slave gate drive.

Q Reset to defaults via Modbus RS-485 communication doesn't work. Why?

A When a reset to defaults (e.g in VFD-E Pr00-02=9 (Modbus RTU command 01 06 0002 0009) is performed, all parameters, including the communication parameters, are reset to default.
If the settings you use are different from default (Station address, protocol and/or Baudrate), they will be reset to the default values and the communication will fail. Also the source of frequency command and operation command (e.g. Pr02-00 and 02-01 in VFD-E) will be reset to their default values, making it afterwards impossible to control the drive via Modbus RS-485.
This is an extra attention point that has to be taken into account when setting up serial communication.

Q Where can I find CAD drawings of the VFD series?

A You can find them on Delta's download center.

**Q How to read/write parameters via serial communication?
Which address to use?**

A To read/write parameters in the drives via serial communication, the parameter number is also the address. However, the address is in Hex format.

Please see examples below:

Pr05-14 = 050Dh

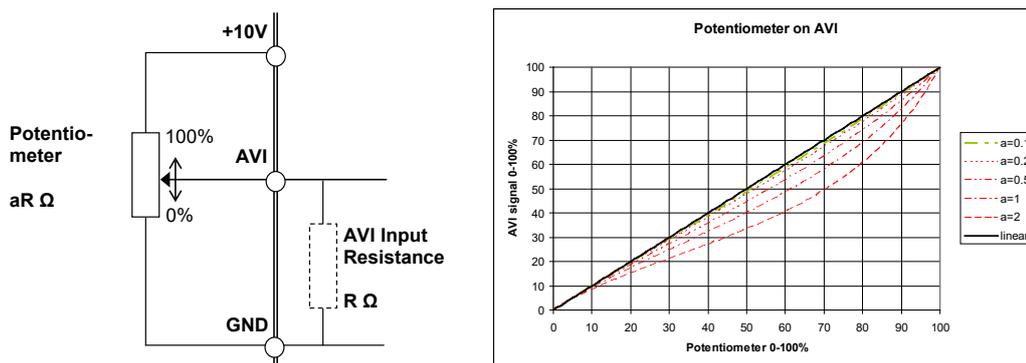
Pr10-03 = 0A03h

Q When and how are the DC-link capacitors to be recharged?

A The drive's DC link capacitors need to be recharged if the drive has been non-operational for more than one year. Without recharging, the capacitors may be damaged when the drive is powered up. The recharging methods are introduced in the application note **Guide For Capacitor Recharging in Delta AC Motor Drives.pdf** which you can download from our ftp-site (Industrial Automation Products\AMD\General VFD\VFD-General Applications).

Q How to select the potentiometer for the AVI analogue input?

A See the circuit diagram and curves below:



Assume the AVI input resistance is $R \Omega$ and the potentiometer value is $aR \Omega$, where "a" is a ratio.

In the curves diagram the black line represents a fully linear response when the potentiometer is moved from 0 to 100%.

The green and red curves show the response depending on "a", the larger "a" is, the

more non-linear the response becomes, see the **red** curves.

As an engineering rule of thumb “a” should be ≤ 0.1 to have an acceptably linear response, although ≤ 0.2 is also often accepted.

The next consideration is the current that can be supplied by the 10V terminal. This gives the minimum allowed potentiometer value. The lower the value is, the more power is dissipated in the potentiometer, therefore you want to keep the potentiometer resistance as high as possible.

Example for VFD-E:

- The AVI input resistance is 47k Ω .
- Select potentiometer $\leq 0.1 \cdot 47k = 4.7k$.
- The 10V terminal can supply 3mA so the minimum potentiometer value is $10V/3mA = 3.3k\Omega$.
- So in practice a potentiometer value between 3.3k Ω and 4.7k Ω gives a linear response and will not overload the 10V terminal (if $a \leq 0.2$ is accepted, then a potentiometer between 3.3k Ω and 10k Ω ($=47k\Omega/5$) can be used).

Q Which parameters must be set when using the built-in brake chopper or a brake unit?

A The OV stall prevention must be disabled because it would interfere with the brake chopper action and the DC-bus voltage level at which the brake chopper is activated must be set.

	VFD-EL	VFD-E	MS300	ME300	MH300	C2000	C2000 CFP2000	VFD-ED
Disable OV stall prevention	Pr06-00=0		Pr06-01=0					n.a.
Set level	n.a.	Pr08-19	Pr07-00					

Q How to connect a 4-20mA sensor to an analogue input?

A 4-20mA sensors have 2 terminals and “source” the current into the input. They need normally a minimum voltage drop of ca. $8V_{DC}$.

On Delta drives the input impedance of 4-20mA inputs is 250 Ω (please refer to the user manual which input can be used for 4-20mA and how to set it).

At 20mA the input voltage is 5V_{DC}.

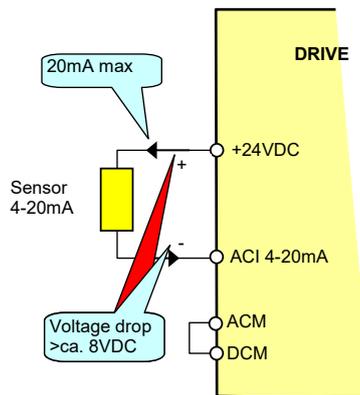
So the total supply voltage must be $\geq 13V_{DC}$ (5V_{DC} + 8V_{DC}).

The supply voltage must be able to supply at least 20mA.

Internal power supply

In general the 24V_{DC} power supply terminal can be used, except on VFD-L, VFD-M, VFD-S (A and D version) and VFD-VL.

On VFD-B, VFD-E, VFD-F, VFD-S (E version) and VFD-VE the 24V_{DC} terminal can supply 20mA, therefore it depends also on the use of the digital inputs whether 20mA is available. Connection is as follows (also connect DCM to ACM):

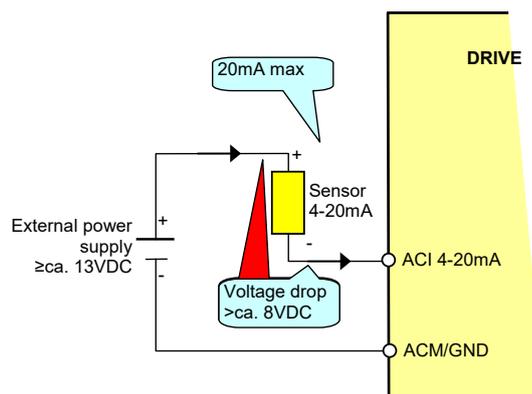


External power supply

For VFD-L, VFD-M, VFD-S and VFD-VL an external power supply must be used of at least $\geq 13V_{DC}$ and $\geq 20mA$. (Delta's 24V_{DC} power supplies are perfect).

For other drives an external power supply can be used.

The external power supply must be connected as follows:



Q What are the available control modes in the different drives?

A

Series	C2000	CP2000	C200 *	B	E	EL	L
V/F	OK	OK	OK	OK	OK	OK	OK
V/F+PG	OK		OK	OK	OK		
Sensorless	OK	OK	OK	OK	OK	OK	
Vector+PG				OK	OK		
FOC+PG for IM	OK		OK				
FOC+PG for PM	OK						
TQC+PG for IM	OK		OK				
TQC+PG for PM	OK						
FOC Sensorless	OK		OK				
PM Sensorless	OK		OK				
TQC Sensorless	OK		OK				

Q What is the slip compensation parameter?

A The slip to be compensated in all our drives is calculated as follows:

$$Slip = \sqrt{\frac{(I_L)^2 - (I_{NL})^2}{(I_{FL})^2 - (I_{NL})^2}} * (Rated_Slip) * (Slip_Compensation)$$

where

Slip = slip to be compensated

I_L = actual load current

I_{NL} = no load current

I_{FL} = full load current.

Rated_slip = the motor rated slip in Hz

Slip_compensation = slip compensation factor

In some drives the slip compensation is $(Rated_Slip) * (Slip_Compensation)$

The setting range is in that case 0.0~10.0 and the rated slip cannot be entered separately

In some drives the slip compensation is $(Slip_Compensation)$

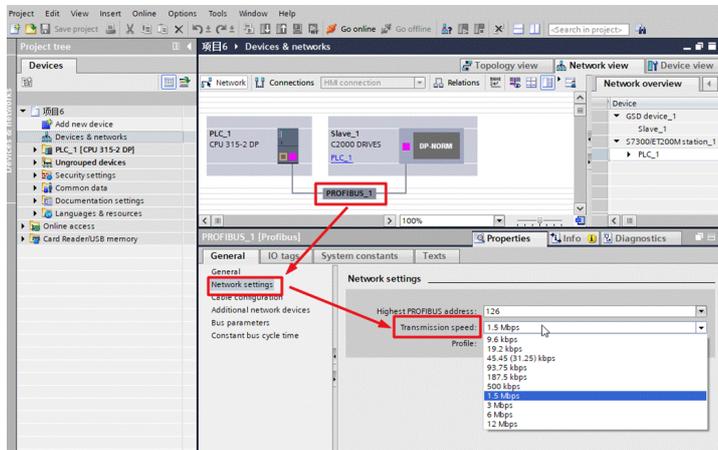
The setting range is in that case 0.0~3.0 and the rated slip can be entered separately

Q What is the maximum output frequency with the 599Hz limitation?

- A**
- In VF Mode the maximum output frequency is **599Hz**.
 - In SVC or Vector Mode the maximum output frequency, including slip compensation, is 599Hz. Therefore the max frequency command is **599Hz-Slip !**
 - In FOC mode (C2000) , the max frequency command is limited to **(F_{set} + Pr10-29)≤599Hz**, to make sure the actual output frequency is limited to 599.00Hz.

Q When using a Profibus card how do I change the Baud rate? Do I need to make any changes in the Menu 9 parameters?

A No, the transmission speed is only set in the master configuration (as shown below) and the Profibus slave card will auto-detect the speed.

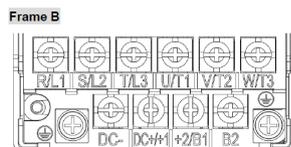


Q What power cable section to use?

A We often get questions about the power cable cross section that is needed in an application and the relevant info in the user manuals.

In our user manuals, we state the cable cross section that the power terminals can accommodate. It doesn't mean you always have to use the indicated cable.

Example: ME300 Frame B



Models	Main Circuit Terminals R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, D/C, DC+/M, +2/B1, B2		
	Max. Wire Gauge	Min. Wire Gauge	Screw & Torque (±10%)
VFD04ME21AFNAA VFD04ME21AFSAA		0.75mm ² [18AWG]	M5 15 Kg-cm [13.0 lb-in] [1.47 Nm]
VFD14ME21AFNAA VFD14ME21AFSAA		1.5mm ² [16AWG]	
VFD24ME21AFNAA VFD24ME21AFSAA		2.5mm ² [14 AWG]	
VFD48ME21ANNAA VFD48ME21AFNAA VFD48ME21AFSAA		2 mm ² [12 AWG]	
VFD74ME23ANNAA VFD74ME23AFNAA VFD74ME23AFSAA	4 mm ² [12 AWG]		
VFD14ME43AFNAA VFD14ME43AFSAA		0.75mm ² [18AWG]	
VFD24ME43AFNAA VFD24ME43AFSAA			
VFD42ME43ANNAA VFD42ME43AFNAA VFD42ME43AFSAA		2.5mm ² [14 AWG]	

The maximum cable section that these terminals can accommodate is 12AWG or 4mm².

The minimum cable section that these terminals can accommodate is 18AWG or 0.75mm².

Because the terminals of a frame size are always the same, it means that the power terminals of any ME300 in Frame B can accommodate a wire section between 0.75~4mm².

The actual wire section, that should be used, depends on the application: Current and Cable length.

- Very long cables or cables for higher current should be thicker (but in this case not >4mm²).
- Short cables or cable for lower current can be thinner (but in this case not <0.75mm²).

If you have to or want to use another cable section, please use lugs or ferrules.

The same applies to other frame sizes and Delta drives.

Motors

Q Can a 230V 3-phase motor be driven by a 400V drive?

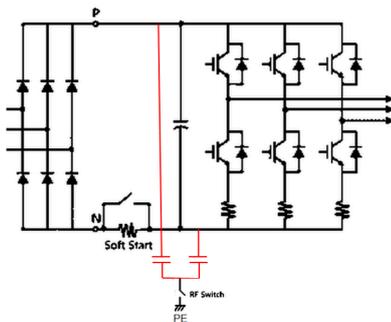
A Yes, no problem. Just set the Max. Output Voltage Pr01-02=230V.
The output rms voltage is in this case 230V but the peaks are still 560V (from the DC-bus). But 230V motors in general can handle this. If you use 400V drives, you should select them based on the motor's rated current.

Q How to preset speeds and master frequency via Modbus?

A When Frequency command by RS-485 and preset speeds are active, all drives will accept a change of the master frequency via RS-485 without 04 error, except VFD-E.

Q Why do we measure voltage on PE?

A See diagram:



When PE is left open, both red capacitors (the so-called Y-capacitors) act as a voltage divider.

The same happens because of capacitors in the built-in filter.

Therefore at PE you will find about half the mains voltage. When PE is connected (which is very strongly recommended), you will have no problem.

Q Braking with brake resistor doesn't work well. Why?

A When you use a brake resistor (brake chopper built-in or external brake unit) you have to disable OV-stall prevention. It will interfere with the braking action, resulting in longer deceleration ramps than expected.

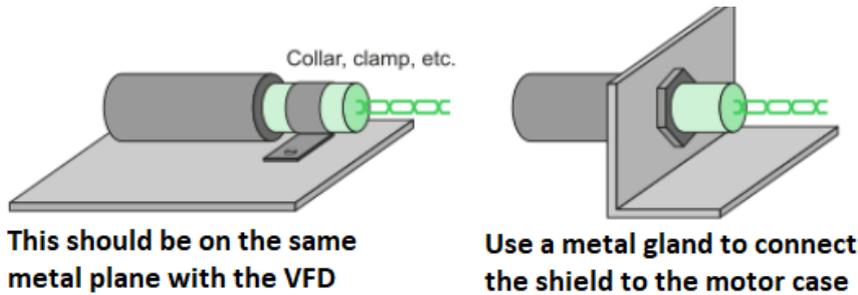
Please refer to the different user manuals for the exact parameter.

Q Do I need to connect the shielding on one end or on both ends?

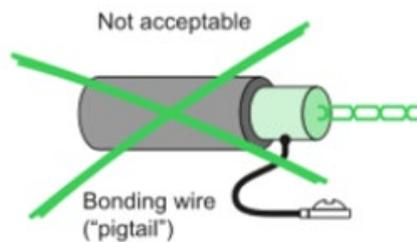
A -Motor power cables need to be connected on both ends.
-Encoder and control cables need to be connected only at one end.

In both cases, the cable shield needs to have a 360° connection.

Below are some examples of proper shielding connection.

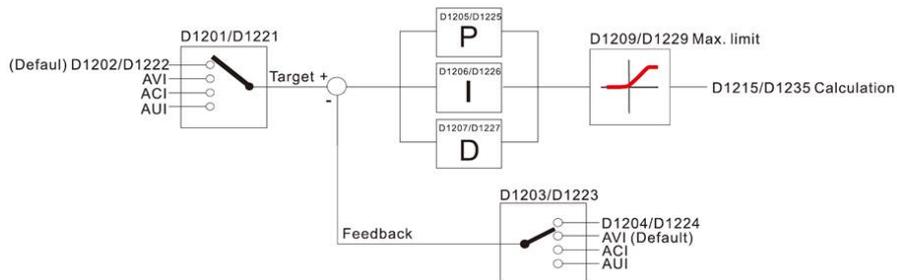


Connecting the shield via a pigtail directly to the VFD ground terminal is not acceptable.



Q When using the internal PLC of a VFD, is it possible to use the FPID function block to control other processes? Or can it only be used for the output frequency?

A The FPID can only be used to control the output frequency. However, the onboard PLC does offer two independent PID functions (not in all drives) which can be assigned to any process. These work by using the Special D registers D1200 to D1235 as shown below.



In order to enable these PID functions it is necessary to use the Special M contacts below.

M1260	PLC PID1 Enable	RW
M1262	PLC PID1 integral positive value limit	RW
M1270	PLC PID2 Enable	RW
M1272	PLC PID2 integral positive value limit	RW

A working example of such a PID function can be found on our ftp site (Industrial Automation Products_Delta Application Guide\General information\Built-in PID function).

Q How to read/write from/to the onboard PLC through Modbus TCP and Ethernet IP?

A For the **CMC-MOD01** and **CMC-EIP01** cards this is supported starting with firmware **V1.08** (date code: W1852).

The drive firmware needs to be at least:

- **CP2000** - **V2.06** or higher.
- **CFP2000** - **V1.06** or higher.
- For **C2000** this has not yet been released.

For the **CMM-MOD01** and **CMM-EIP01** cards this is supported starting with firmware **V1.04** (date code: W1850)

The drive firmware needs to be at least:

- **MS300** - **V1.08** or higher.

You can control the onboard PLC registers and contacts directly through station address acc. to Pr09-35.

<p>Example 1: You can read D100 by using command: '02 03 1064 0001'</p> <p>02 (PLC address) 03 (Read register) 1064 (D100) 0001(1 register)</p>	<p>Example 2: You can read Y0~Y2 by using the command: '02 01 0500 0003'</p> <p>02 (PLC address) 01 (Coil read) 0500 (Y0) 0003 (3 values)</p>
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16-5-4 PLC Communication address

Device	Range	Type	Address (Hex)
X	00-37 (Octal)	bit	0400-041F
Y	00-37 (Octal)	bit	0500-051F
T	00-159	bit/word	0600-069F
M	000-799	bit	0800-0B1F
M	1000-1079	bit	0BE8-0C37
C	0-79	bit/word	0E00-0E47
D	00-399	word	1000-118F
D	1000-1099	word	13E8-144B
D	2000-2799	word	17D0-1AEF

Command code that can be used

Function Code	Description of Function	Function target
01	Coil status read	Y,M,T,C
02	Input status read	X,Y,M,T,C
03	Read single unit of data	T,C,D
05	Compulsory single coil status change	Y,M,T,C
06	Write single unit of data	T,C,D
0F	Compulsory multiple coil status change	Y,M,T,C
10	Write multiple units of data	T,C,D

 **NOTE**

When PLC functions have been activated, the C2000 can match PLC and drive parameters; this method employs different addresses, drives (default station number is 1, PLC sets station number as 2)

Q In C/CP2000 and MS300: What is the difference between M1042 Quick Stop and M1044 Pause in the PLC?

A Quick Stop M1042 = 1: Drive will stop with the shortest possible deceleration ramp.
M1042 = 0: Drive start enabled. The drive will not restart by itself.

Pause M1044 = 1: The drive will stop with the normal deceleration ramp.

M1044 = 0: The drive will resume the previous operation with the normal acceleration ramp. The user does not need to restart.

Q How can I read drive series and model by serial communication?

A Read address 2110hex.

Series	Code	2110h High byte	2110h Low byte	Type
C2000	20	14h	FFh	Read ID in Pr00-00 (Address 000h)
CP2000	21	15h		
CH2000	22	16h		
C200	25	19h		
CT2000	30	1Eh		
CFP2000	42	2Ah		
MH300	31	1Fh		
MS300	32	20h		
ME300	33	21h		
MH300-L	48	30h		
C2000HS	49	31h		
MH300HS	51	33h		
MS300HS	52	34h		

Series	Code	2110h High byte	2110h Low byte	Type
VFD-M	0	00h	ID (as in Pr00-00)	N/A
VFD-S	1	01h		
VFD-B	2	02h		
VFD-L	3	03h		
VFD-V/VE	4	04h		
VFD-F	5	05h		
VFD-E	6	06h		
VFD-E-C	7	07h		
VFD-EL	8	08h		
VFD-VL	9	09h		
VFD-DD	13	0Dh		
VFD-ED	17	11h		

VFD-E

Q How to use the PTC function?

A Please ask for the [application note "VFD-E PTC.pdf"](#). It shows how to set up the VFD-E for use with PTC acc. to DIN44081/44082 for motor protection.

Q Can an option card be used together with a fieldbus option on the VFD-E?

A Yes, there is room for one option card and one fieldbus option, which can be mounted together on the VFD-E.

Q What is the function of the dipswitches 1, 2, 3?

A Dipswitch 123



The dipswitches 1,2,3 are meant to be used in case there is no keypad.

If you use keypad, its recommended to set all dipswitches to OFF to avoid conflict between parameter settings and dipswitches. The dipswitches have priority. The ex-factory setting of the dipswitches is OFF.

Dipswitch 1 (50Hz defaults)

To set to 50Hz defaults. The following parameters are set: Pr01.00=50Hz and Pr01.01=50Hz.

Dipswitch 1 = OFF

The defaults are for 60Hz. When keypad is connected it is possible to set Pr00-02=10 (60Hz defaults and all other defaults) or Pr00-02=9 (50Hz defaults and all other defaults).

Dipswitch 1 = ON

Only Pr01.00=50Hz and Pr01.01=50Hz are set. All other parameters are not influenced.

When keypad is connected and Pr00-02=10 then display shows "Err" and no defaults are reset. When keypad is connected and Pr00-02=9 then 50Hz defaults are set but also all other defaults.

Dipswitch 2 (Free run to stop)

This sets the stop mode. Its identical to setting Pr02 -02=1. It means the stop mode is free run or coast.

Dipswitch 2 = OFF

When keypad connected Pr02-02 can be set as needed.

Dipswitch 2 = ON

Pr02-02 is set to 1 automatically and when keypad connected other setting results in "Err" on display.

Dipswitch 3 (ACI)

This sets the frequency command source to ACI.

Dipswitch 3 = OFF

Pr02-00 sets the Frequency command source, see manual.

Dipswitch 3 = ON

The Frequency command source is ACI 4~20mA, independently of the ACI/AVI dipswitch.

Normally when you set Pr02-00=2 to select ACI/AVI2 and Pr04-19=0 (ACI) or 1 (AVI2), you can select with the dipswitch ACI/AVI the input to be ACI with 4-20mA or AVI2 with 0-10V.

If input ACI 4-20mA is selected, either via dipswitch 3 or via Pr02.00=2, Pr04-19=0 (default) with dipswitch ACI/AVI=ACI it gives "Aerr" on display and the FAULT LED lights up because the current is >0mA and <4mA. In case of keypad, the fault "AErr" can be reset by RESET command (via digital input of keypad depending on Pr02.01) provided cause of the fault is removed. The FAULT LED can only be reset by power off/power on, also if the cause of the fault is removed.

In case you want to use AVI2, you need to set Pr04-19=1, then Pr02-00=2, then set switch ACI/AVI=AVI to avoid "AErr" error.

Therefore, it is recommended to set all **dipswitches 1, 2, 3 to OFF** in case you use the keypad.

Q What is the function of the dipswitches ACI/AVI?

A Dipswitch ACI/AVI

Normally when you set Pr02-00=2 to select ACI/AVI2 and Pr04-19=0 (ACI) or 1 (AVI2), you can select with the dipswitch ACI/AVI the input to be ACI with 4-20mA or AVI2 with 0-10V.

In case you want to use AVI2, you need to set Pr04-19=1, then Pr02-00=2, then set switch ACI/AVI=AVI to avoid "AErr" error.

The delivery condition is ACI.



Q What is the function of the dipswitch NPN/PNP?

A It can be used to select the Digital Inputs as NPN (sink) or PNP (source).

Dipswitch NPN/PNP=PNP

The Digital Inputs are PNP (source), see user manual (Sensorless Vecotr Control Compact Drive VFD-E Series user manual).

Dipswitch NPN/PNP=NPN

The Digital Inputs are NPN (sink), see user manual (Sensorless Vecotr Control Compact Drive VFD-E Series user manual).

The delivery condition is NPN.

Q Does the option card EME-D33A have PNP inputs?

A Yes, it can be used for PNP inputs. On the card there's a switch J1 to select PNP or NPN.

Q Why is Parameter group 11 not visible?

A Parameter group 11 is meant for setting parameters for options. It will become visible and accessible when an option card is installed and recognized. Please remember to switch off the power when installing option cards.

Q When I read AVI in a PLC program, why does it not work for frequency command?

A When any digital input/output or any analogue input/output is used in the PLC program, it loses its normal function.

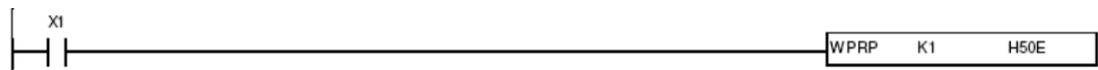
For example, if Pr02.00=1 (frequency command via AVI) and AVI is read in the PLC

program by reading D1028, then it doesn't work for frequency command anymore. In that case, the PLC program needs to include functionality to let the AVI input also function for frequency command.

Q How to save variables in the PLC at power off?

A The VFD-E PLC cannot save variables when it is power off. However, by writing the variable to an unused parameter, e.g. the Preset Speeds, it can be done.

Writing Constant K1 to Pr05.14:



Reading Pr05.14 and move to register D20:



Q How to set a 0.01Hz frequency step for the UP/DOWN mode?

A You can set Pr02-07=3, then each time the up/down input is activated, the change is acc. to Pr02-08, so each step is from 0.01Hz to 10Hz. Since the output frequency display has only resolution of 0.1Hz, you need 10 steps to notice a change on the display.

You can set Pr02-07=2. Then the rate of change of the output frequency is acc. to Pr02-08, so from 0.01Hz/ms to 10.00Hz/ms.

Of course, you need to set Pr02-00=0 for UP/DOWN operation.

Q How to read the PID feedback value via serial communication?

A Set Pr00.04=5 (PID feedback value 0-100%) At address 2116H you can read this value. In general: At address 2116H you can read the value as selected by Pr00.04.

Q Why does Pr00.04=6 show strange behaviour?

A Pr00.04=6 shows the power factor **angle** in ° (degrees) and not **cosphi** !

Q How to set a negative slope in AVI-input?

A This is not possible.

The parameters Pr04.00 ~ Pr04.03 can only be used to set Bias and Gain of the front potentiometer on the keypad. In the examples, however, it is inadvertently suggested that it also is possible for the AVI-input.

And with Pr04.11 ~ Pr04-14 it is also not possible, because Pr04.12 must be lower than Pr04.14. (the same applies to the settings of ACI and AVI2).

Q How to set PID?

A To set-up PID do the following:

Pr10-00 to select the PID set point (not via Pr02-00 as e.g. in VFD-B)

Pr10-01 to select the feedback input and positive or negative feedback

[negative means error=setpoint – feedback]

[positive means error=feedback – setpoint]

Q What is the difference between “AErr” and “FbE” error messages?

A Both messages are generated when the signal on the ACI input is lost. Normally, when using 4-20mA, if the signal is <4mA.

In normal operation (no PID) with the frequency command via ACI (Pr02-00=2) the blinking warning “AErr” (Analogue Error) can be displayed when the signal is lost.

In Pr02-06 the required action can be set. The detection cannot be set and is immediate.

- **Pr02-06=0.** When feedback on ACI is lost, the drive ramps to stop. After reconnecting ACI the drive goes back to the set frequency.
- **Pr02-06=1.** When feedback on ACI is lost, display shows blinking "AErr" and coasts to stop. After reconnecting ACI it becomes steady. Press reset, give new RUN command, and it runs again to the set frequency.
- **Pr02-06=2.** When feedback on ACI is lost, the drive goes to last frequency command value without any warning on display. After reconnecting ACI the drive goes back to the set frequency.

When using PID with the feedback signal on ACI, the VFD-E can show the warning “FbE” (Feedback Error) when the feedback signal is lost. The detection time is set in Pr10.08. The default value is 60s, so in that case it will take 60s before the warning is

displayed. The required action in case the signal is lost can be set in Pr10-09.

- **Pr10.09=0.** When feedback on ACI is lost, display shows blinking "FbE" and ramps to stop after 60s, after reconnecting ACI it remains blinking. Press reset, give new RUN command, and it runs again.
- **Pr10.09=1.** When feedback on ACI is lost, display shows blinking "FbE" and coasts to stop after 60s, after reconnecting ACI it remains blinking. Press reset, give new RUN command, and it runs again.
- **Pr10.09=2.** When feedback on ACI is lost, display shows blinking "FbE" after 60s. Because no feedback, the output goes to max frequency, after reconnecting ACI it goes immediately back to normal PID control.

Q How does the mechanical brake output function in case of faults?

A Normally the brake will be engaged after a STOP command and if the frequency is lower than the value set in Pr03.12.

After one of the faults OV, OC, LV an internal STOP command is given and because the motor coasts to 0Hz, the output frequency is immediately 0Hz and lower than value of P03.12, therefore the brake engages also immediately.

Upon external fault EF, also an internal STOP command is given but because the drive ramps to 0Hz, the brake will be engaged when the frequency drops below the value of Pr03.12.

Please set one of the outputs MO1 (Pr03.01) or RA-RC (Pr03.00) to 21 for mechanical brake control. The frequency values for brake engage and brake release can be set in Pr03.11 and Pr03.12 respectively.

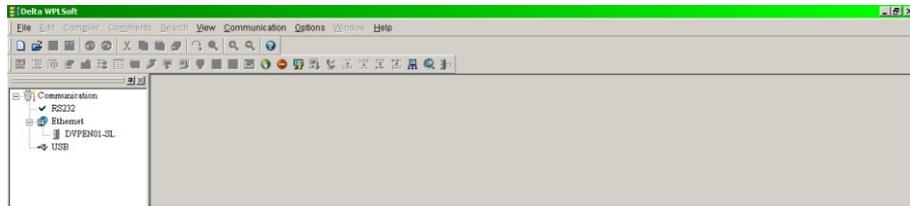
Q How to clear the status of MI3 when 3-wire operation is selected (Pr04.04=2)?

A When MI3 is on (active) and when Pr04.02=2 to select 3-wire operation, MI3 keeps its status. To clear this, please power off and power it on again.

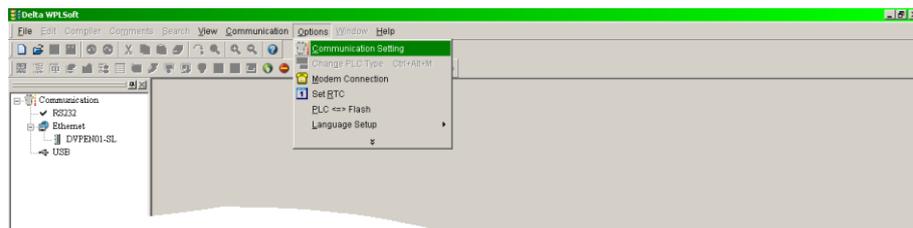
Q How to connect the new PLC editor WPLSoft to VFD-E?

A If you haven't done so, please download the latest version of WPLSoft from our website and install it.

Step 1: Start the program.



Step 2: Open Options/Communication Setting

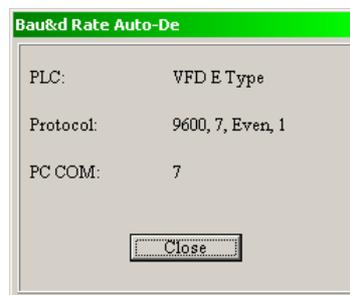
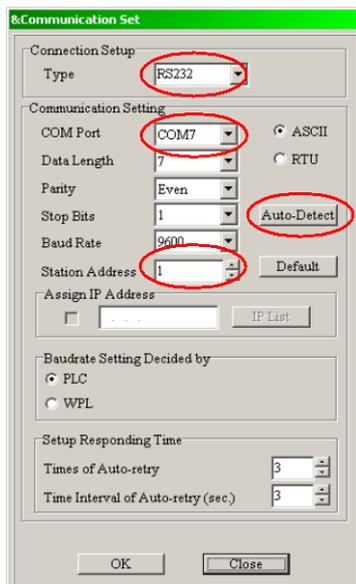


Step 3: Select **RS-232**. If you use **VFD-USB01**, please connect your computer to the VFD-E.

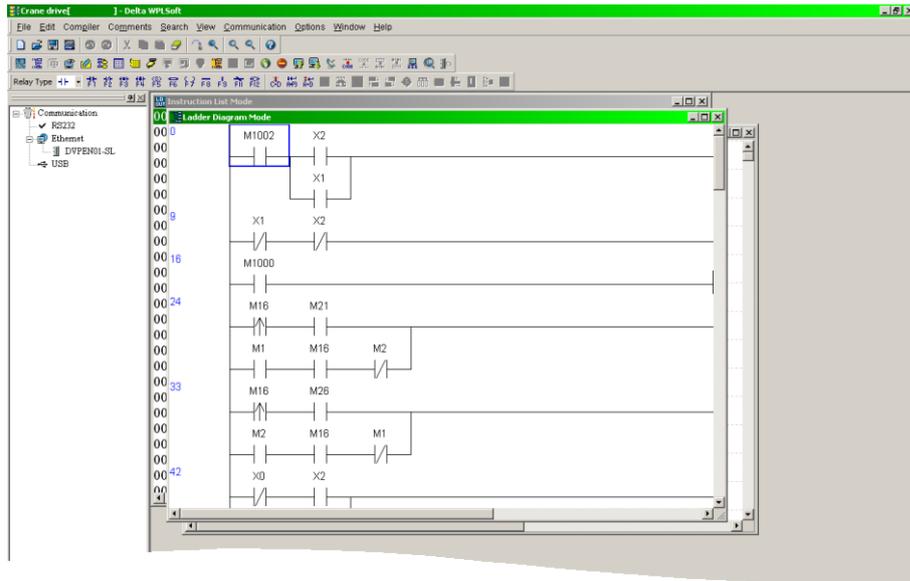
Step 4: Select the right COM port, this depends on your computer.

Step 5: Select the right Station Address. It must be equal to VFD-E Pr09.00.

Step 6: Press Autodetect. The communication settings are now automatically detected and the message as shown on the right appears.

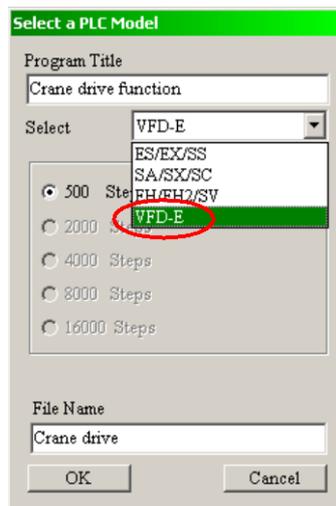
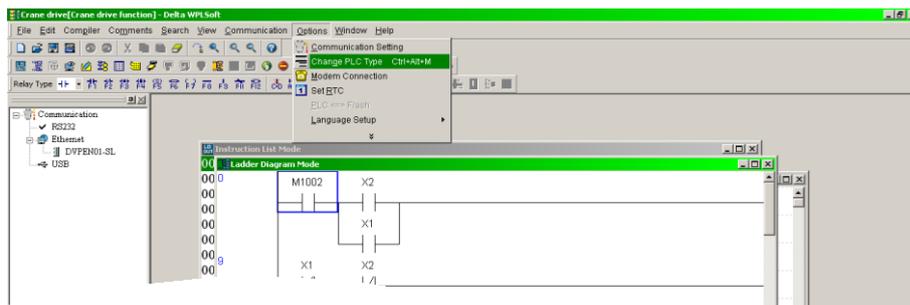


Step 7: Open a project with **File/Open**.



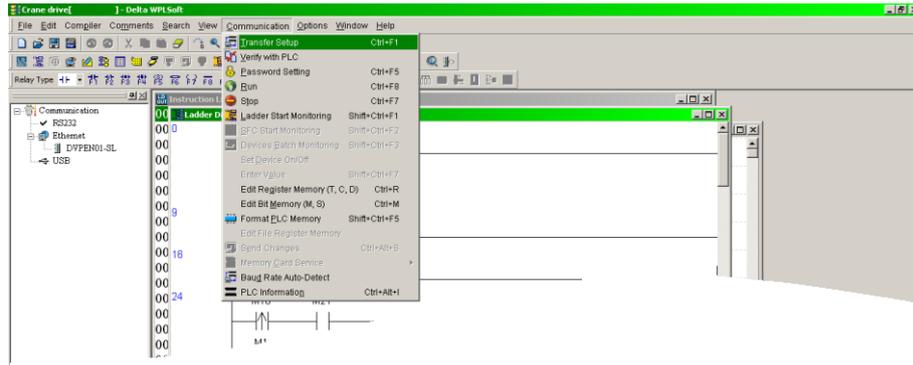
Step 8: Select **Options/Change PLC Type** and select **VFD-E** and press OK.

Note: VFRD-Eplus now has 500 steps (was 350)

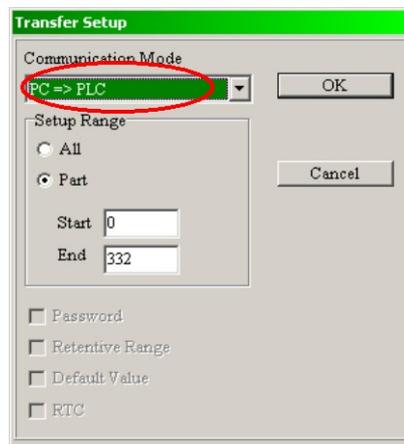


Step 9: On VFD-E press the **MODE** key several times until the display shows [PLC0]. With the **▲** or **▼** keys change to [PLC2] and press **ENTER**. VFD-E is now ready to receive a PLC-program.

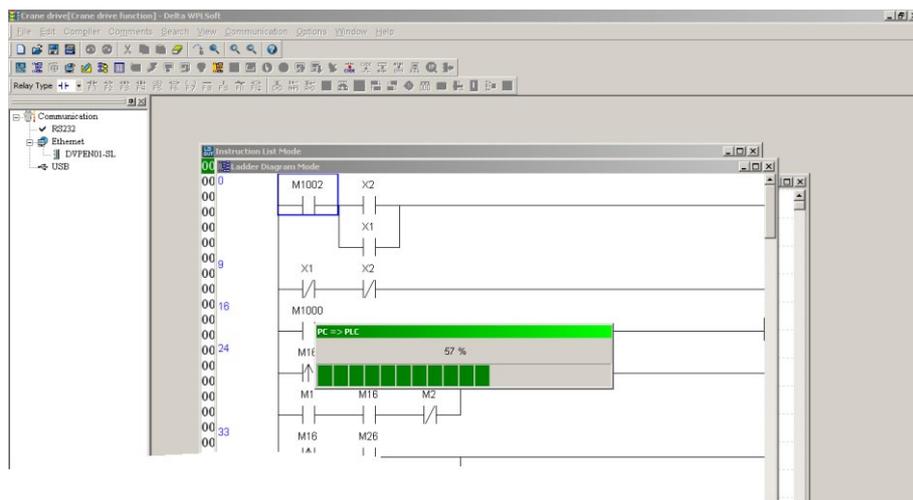
Step 10: Select **Communication/Transfer Setup**.



Step 11: Select **PC => PLC** and press OK



Step 12: The transfer progress is shown as follows:



Step 13: After completion of the transfer please set VFD-E with the ▲ or ▼ keys to [PLC1] and press **ENTER** for standalone operation or leave at [PLC2] for online operation and monitoring. Please refer to the user manual (Sensorless Vecotr Control Compact Drive VFD-E Series user manual) for further details.

Q Can individual inputs be inverted, so they can be operated from NC contacts?

A Yes, refer to the user manual, Pr04-09. Normally they are set for NO (Normally Closed) contacts (input is activated when contact is closed). Please see the example below: Inputs MI2 and MI5 too be set for NC (Normally Closed) contacts, e.g. when used for EF. Pr04-09=18 (= 010010 binary).

Q Does Pr07-03 Slip Compensation have to be set in Vector Mode?

A No, when the control mode (Pr00-10) is changed from V/f to Vector, Pr07-03 is automatically set to 1.

When the control mode is changed from Vector to V/f, Pr07-03 is set to 0.0. If slip compensation is to be used in V/f mode, Pr07-03 must be set normally to 1.0.

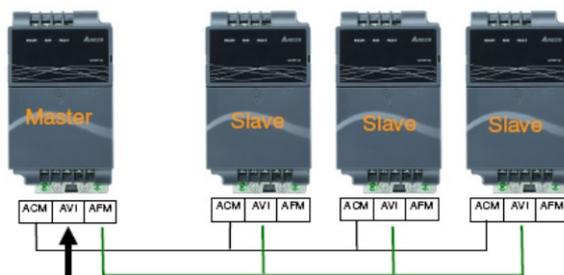
In order to have good slip compensation, please set Pr07-00, Pr07-01 and Pr07-06 to the right values and execute an Autotune (Pr05-00) for optimal vector mode performance.

Q OL in PLC2 mode: How to reset?

A When VFD-E works in PLC2 mode and OL is displayed, it will be reset after power off/on.

Q What is the best way to set up Master-Slave operation?

A One VFD-E, the master, needs to control three VFD-E (we call them slaves). The best way is to connect the AFM output the master to all AVI inputs of the slaves, which are thus all connected in parallel.



The VFD-E AFM output can do 10V/2mA, so the maximum load resistance is $10V/2mA=5k\Omega$.

The AVI input impedance is 47k Ω . If you put 3 inputs in parallel, the total resistance

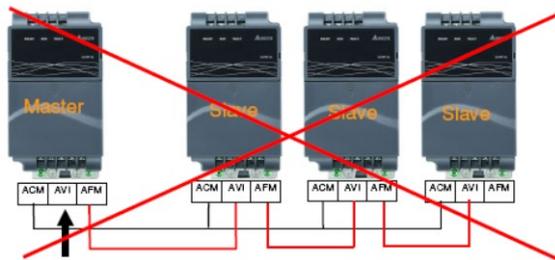
is $47k/3=15.67k\Omega$. (Or, each input takes $10V/47k=0.2mA$. Three inputs in parallel take $3 \times 0.2mA = 0.6mA$, well below $2mA$).

It is best to tune the AFM output to have exactly 10V at 50Hz (or max freq) by Pr03.04.

Then, to tune each AVI input to give 50Hz at 10V by using Pr04-13 and Pr04-14.

This way gives much better performance and linearity.

We DO NOT recommend to connect the AFM output of the master to the AVI input of the first slave, its AFM output to next slave's AVI input, etc. Because of the AVI input resolution of 10 bits and the AFM output resolution of 8 bits, this will lead to unacceptable errors in the command frequency of the slaves



Note: This applies to other drive series as well (not all VFD have 0-10VDC AFM outputs but some have PWM which is unsuitable for master-slave operation).

Q What is the maximum voltage on analogue input AVI?

A The maximum voltage in AVI is 15 V_{DC}.

Q How to read AVI and ACI via serial communication?

A In register A7C0h you can read AVI and in A7C2h you can read ACI, both from 0-3FFh=0-1023d. (There is no such solution for AVI3, AVI4, ACI2 and ACI3 on option card EME-A22A.)

Q What is the maximum frequency of the digital inputs MIx when set to 12 for counting?

A Due to the internal debouncing delay of 6ms, the maximum frequency is $1/(6ms_{ON} + 6ms_{OFF}) = 83.33Hz$.

Q How can I read the EME-A22A analogue inputs in the PLC?

A AI1 can be read in D1031 and AI2 can be read in D1032.

Q What does fault code 42“Acl” mean?

A “AcL” means communication error between power board and control board in STOP mode and “CP10” means communication error between power board and control board in RUN mode.

Q Why does the display show PLSn error?

A If there’s no PLC program loaded and the drive is accidentally set to PLC1 or PLC2, the PLSn error is displayed (all PLC error messages are mentioned in the Sensorless Vector Control Compact Drive VFD-E Series User Manual - Appendix D. To solve this, please set the PLC mode back to PLC0.

Q Does the option card EME-D33A have PNP outputs?

A No, the outputs are always NPN. The inputs, however, can be set to NPN or PNP.

Q Where can I get the eds file for CME-COP01?

A Download the file [VFD-E Drives.eds](#) from our ftp-site in the folder (AMD-Options/AMD Fieldbus options/CANopen/CME-COP01/EDS for CME-COP01).

Q Pr00-03 setting is different in the summary and description, which one is correct?

A There is a difference in the settings for Pr00-03 in the Summary of Parameter Settings and in the Description of Parameter Settings. The latter one is correct. It will be corrected in the next version of the user manual (Sensorless Vecotr Control Compact Drive VFD-E Series user manual).

Q How to set the range 30-50Hz for the front potentiometer?

A This is not possible. If Pr04-00=100% and Pr04-02=50%, only 25-50Hz can be achieved because the bias can only be 100%. (With AVI it is possible by setting Pr04-11 to 04-14).

Q EME-A22A: How to set 4-20mA for the analogue inputs?

A Please refer to Pr12.20 and Pr12.23 in the manual (Sensorless Vecotr Control Compact Drive VFD-E Series user manual) to select 0-20mA or 4-20mA.

Q When Pr10-01=1, the PID set-point is via front potentiometer, but the manual says via UP/DOWN keys, why?

A This is an error in the manual (Sensorless Vecotr Control Compact Drive VFD-E Series user manual). When Pr10-01=1, PID set-point is acc. to Pr02-00, but in that case only 1 (UP/DOWN keys) or 4 (front potentiometer) can be selected.

Q Register D1029 in the PLC shows wrong info

A This is an error in the manual (Sensorless Vecotr Control Compact Drive VFD-E Series user manual). When ACI 4-20mA is selected, the range of 4-20mA corresponds to 205-1023. 0-20mA corresponds to 0-1023.

Q How to read a PLC register via Modbus?

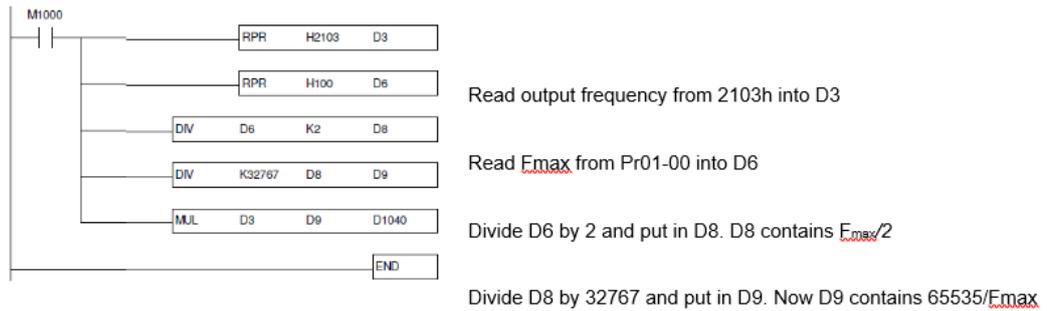
A It is not possible to read a PLC register directly via Modbus, but it can be done with the following workaround. Assume your data are in Register D5. With instruction WPR write the value of D5 to an unused parameter, e.g. Preset Speed 15 in Pr05-14. Then read address 050D (the address of Pr05-14) by Modbus.

Q How to use and scale the analogue output AFM in the PLC program?

A The analogue output AFM can be used by putting the value in register D1040. The range is 0-10V=0-65535.

The PLC cannot handle unsigned numbers >32767, therefore, first division by 2 and then by 32767 is used. The loss of resolution is acceptable because the real AFM resolution is 8 bits.

An example to output the output frequency on AFM, scaled to 0-10V=0-Fmax:



Multiply D3 by D9 and save result to D1040. D1040 contains $(F_{out}/F_{max}) * 65535$.

If needed the AFM output voltage can be adjusted by Pr03-04.

Q How to use preset speed as PID setpoint?

A The preset speeds can be used as follows as PID setpoint.

- Pr05-00=15 Preset speed 1=15Hz
- Pr05-01=25 Preset Speed 2=25Hz
- Pr05-02=35 Preset Speed 3=35Hz (to have 3 set points)

- Pr04-05=1 MI3=Select Preset Speed 1
- Pr04-06=2 MI4=Select Preset Speed 2 (to select different setpoints)
- Pr10-03=3 (to use AVI2 as setpoint if no preset speeds are selected)
- Pr10-01=1 (to use AVI as negative feedback)

If you Run the drive, it will use either AVI2 as setpoint (MI3=Off, MI4=Off) or a preset speed (MI3=On and/or MI4=On).

Note: Bear in mind that in this case the preset speeds are not speeds or frequencies but PID setpoints. For example, 15Hz means $15/50=30\%$, 35Hz means $35/50=70\%$.

Q Is it possible to use EME D33A with NPN mode and use VFD-E terminal with PNP mode?

A Yes, it is possible. Bear in mind that the 24V on the control board is the same as the 24V on the option card. Also, both DCM terminals are the same.

Q On EME-D33A, is it possible to switch between NPN and PNP?

A The inputs can be switched from NPN to PNP by the switch.
The outputs are NPN only with MCM as common.

Q How to read the analogue inputs and outputs of EME-A22A?

A Both inputs and outputs can be read via the following PLC registers (it is not possible to read them directly via Modbus):

D1031	AI1
D1032	AI2
D1041	AO1
D1042	AO2

Q When writing to 2002hex, BaseBlock is set. Why?

A BaseBlock is set when Bit2 of 2002hex is set to 1.

The definition of 2002hex is:

Bit0	EF on
Bit1	Reset
Bit2	BaseBlock on.

Bit3~Bit15 Unused. When writing, best set to 0.

Q How does line-start lock-out work?

A When Pr02-01=1 or 2 (line-start lock-out only works when operation command is via terminals), Pr02-05=0 or 2 and Pr08-04=1 or 2 it works as follows:

- As long as the display is normal and the power comes back, the drive continues.
- As the display shows LV and the power comes back within the time Pr08-05, the drive runs (with speed search acc. to Pr08-04). In firmware 2.14 the Pr08-05 max setting range is 20s, previously it was 5s.
- As the display shows LV and the power comes back after time Pr08-05, nothing happens. The drive needs to finish its internal LV process (save parameters etc). It needs a new RUN command.
- When the drive is powered off and "dead", then, with Pr02-05=0 or 2, the drives

starts running when the power comes back, provided there's an active RUN command.

Q How to display the motor speed in rpm?

A To be able to display the speed in rpm, an encoder must be used (and the option card EME-PG01).

Pr00-04=14 (Press **MODE** until display shows [G xxx]. (When Pr00-03=3, it shows the value as selected by Pr00-04 as start-up display). Please set Pr13-00, Pr13-01, Pr13-02 acc. to the used encoder.

Q Which parameters can be used to save data (RS-485 or PLC)?

A In principle any unused parameter can be used to save data.

In Newsletter 2007-01 it was suggested to use the Preset Speeds (Pr05-00 to 05-14) for this but these parameters are saved in EEPROM (written) whenever they are changed. It could lead to exceeding the number of EEPROM write operations and fault cF1.0 or cF2.0.

Therefore, it is better to use (one of) the following parameters hereafter, they are not used in their original function.

Pr01-11; Pr01-12; Pr01-13; Pr01-14; Pr02-11; Pr02-12; Pr10-02; Pr10-03; Pr10-04.
They are only saved at power off.

Q Is it possible to use option card EME D33A with NPN inputs and use VFD-E with PNP inputs?

A Yes, this is possible. Bear in mind that the 24V on the control board is the same as the 24V on the option card, also DCM on both are the same.

Q Where can a warning be read by serial communication?

A In address 2100hex both warnings and alarms are saved.

The MSB (Most Significant Byte) contains the warning code.

The LSB (Least Significant Byte) contains the alarm code.

Please see examples below:

2100hex = **0D**00hex (PTC2 warn code 13)

2100hex = 00**22**hex (PTC1 fault code 34)

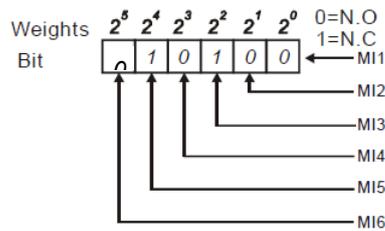
Q How to set a digital input for NC operation?

A Normally the digital input is activated when the input is closed (to DCM for NPN inputs or to 24V for PNP inputs).

Sometimes it is useful to activate an input when its contact is opened (NC operation), For instance, when an input is used for EF and the connected switch (or clixon) opens in case of a fault. In that case, please set Pr04-09.

Example:

MI5 and MI3 need to be NC; MI1, MI2, MI4, MI6 need to be NO. Please refer to the user manual for Pr04-09:



010100bin = 20dec, therefore set Pr04-09=20.

Q What does fault code AcL mean?

A AcL is the same as CP10. Both indicate that the communication between control board and power board is abnormal. This can be caused by a bad connection, EMC or even defect IGBTs.

AcL is detected during power up and initializing and CP10 is detected during normal operation.

Q What is the max. frequency for a digital input and for the PLC counter?

A The normal counter, such as Pr03-05 and 03-06, has a maximum input frequency of 250Hz (2ms high, 2ms low) acc. to the VFD-E manual but in reality ca. 80Hz.

The hi-speed counter in the PLC uses the signal from the encoder card, it cannot use normal inputs. In Chapter D.4.6 of the VFD-E manual a single pulse signal the frequency can be 500 kHz. An encoder with A and B channels. it can be 30kHz (so $n \cdot 60 \cdot \text{ppr} < 30\text{kHz}$ where $n = \text{shaft rpm}$).

Q Which brake resistors to use for VFD-E ?

A The brake resistors are given in the VFD-E manual (Chapter B1) but not all types are specified or stated. You can either buy it locally or "build" them from several individual brake resistors. Please also refer to the Datasheet Brake Res Version8 Mar2019.pdf on the ftp-site (Industrial Automation Products\AMD-Options\AMD Brake units & resistors\Brake resistors for available types). Remember the total resistance must never be lower than the indicated minimum and the power maybe higher.

Q How to make AVI=0-10V=Fmax-0 (reversed)?

A In 1.15/2.15 and higher it is possible in a normal way.
Pr04-11=0, Pr04-12=100%, Pr04-13=10, Pr04-14=0.

Q Which parameters are only saved in EEPROM at power-off and not when changed?

A The following parameters are only saved in EEPROM at power off and can be used in a PLC program to avoid frequent writing by serial communication or WPR instruction:

Pr01-09 1st Acc time
Pr01-10 1st Dec time
Pr01-11 2nd Acc time
Pr01-12 2nd Dec time
Pr01-13 JOG Acc time
Pr01-14 JOG Dec time
Pr01-17 S-Curve Acc time
Pr01-18 S-Curve Dec time
Pr10-02 P value of PID function
Pr10-03 I value of PID function
Pr10-04 D value of PID function
Pr10-12 PID set point

Besides, VFD-E offers two parameters, P09-05 and P09-06, for temporary buffer. Users can use WPR to write to these parameters. However, these parameters will not be written to EEPROM when power off.

Q Is it possible to use CME-USB01 to connect to WPL and at the same time use RS-485 port for control of the drive (by an external PLC or even VFDSOft)?

A Yes, they can be used at the same time.

Q After OV fault the drive doesn't restart. Why?

A E.g. Pr08-15=3 and Pr08-16=30.

The auto-reset function ONLY works in RUN status. For example, if the DC-bus voltage rises during deceleration and the drive trips on OV, the drive automatically restarts when the DC-bus voltage goes back to its normal level.

But if the drive is stopped, the auto-restart function doesn't not work because the drive is then in STOP status.

Q How to unlock the keypad when Pr00-02=8?

A Pr00-02=8 locks the keypad.

To unlock it, press and hold the ENTER key for 5 seconds to temporarily unlock the keypad. Then set Pr00-02=0 to unlock the keypad. You can also set Pr00-02=0 via VFDSOft.

Q What is the difference between Pr00-04=0 and Pr00-04=16?

A Pr00-04=0: Display shows [Output Frequency * Pr00-05]

Pr00-04=16: Display shows [Frequency Command * Pr00-05]

Q How to restart at power on?

A From one of our customers who wanted a reliable solution to RUN the drive after a short or long mains power interruption.

DCM to MCM and connect MO1 to MI1. Then set parameter Pr03.01=22 (Drive Ready). Leave Pr02-05, 08-04 and 08-05 at their default values. This ensures a new RUN command every time after power on.

Note: As long as other Delta drive series also have a "Drive Ready" signal, this method can be used, even with a Relay output.

Q When is FbE fault generated?

A FbE (feedback error) is generated when the signal on ACI (4-20mA) is lost (input < Pr04-15 during > Pr10-08 seconds).

In Pr10-09 you can set the response. When Pr10-09=2, the drive keeps running and FbE is automatically cleared when feedback is normal again. When Pr10-09=0 or 1, the drive stops and you have to reset.

Q How does PID offset detection (Pr10-12/10-13) work?

A The PID Offset is the absolute value of the difference between setpoint and feedback in %. So, PID Offset is |setpoint – feedback|.

The PID Offset can be set in Pr10-12. The detection time is in Pr10-13.

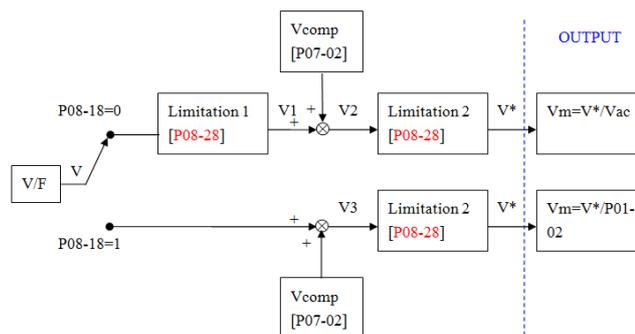
Please see the example below:

Pr10-12=10%, Setpoint is 50%. When feedback is <40% or >60% a signal is generated after the time in Pr10-13. The signal can be output via relay or MO by setting Pr03-00/Pr03-01=16.

Q What is the function of Pr08-28?

A VFD-E Pr08-28 is the same as VFD-F Pr01-22. When Pr08-28>100%, it will increase output voltage limitation. Please see the function block diagram below for reference.

VFDE output voltage in V/F mode



Limitation 1: IF $V > Pr08-28 * (\text{Minimum of VAC and } Pr01-02)$ then $V = Pr08-28 * (\text{Minimum of VAC and } Pr01-02)$

Limitation 2: IF $V > Pr08-28 * (Pr01-02)$ then $V = Pr08-28 * (Pr01-02)$, where VAC is based on average DC-bus voltage.

*Vm: voltage command for modulation

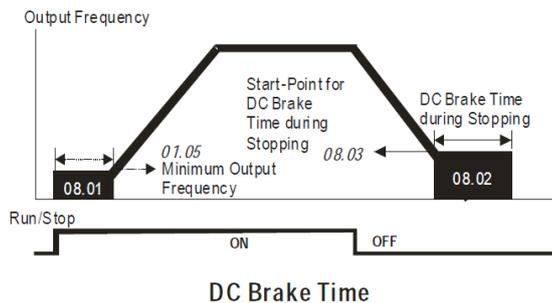
Q What is the effect of the S-curve settings?

A Pr01-17 must be smaller than Pr01-09/01-11 and Pr01-18 must be smaller than Pr01-10/01-12. Higher values of Pr01-17/01-18 will have no effect.

Q Why does DC-braking not work at start-up?

A When started with frequency command $< F_{min}$, DC braking doesn't work. The frequency command must be $> F_{min}$.

Acc. to the picture in the manual (Sensorless Vector Control Compact Drive VFD-E Series user manual)



DC-braking should be always on when $F_{command} < F_{min}$. But that could mean that DC-braking is on for a very long time. We took precaution to prevent this.

Q When is OH1 activated/deactivated?

A OH1 activates at 85°C. It will be deactivated at $85^{\circ} - 5^{\circ} = 80^{\circ}C$.

Q How to restart after LV?

A In the latest firmware 1.22/2.22 and higher the setting of Pr02-05 has been extended. When Pr02-05=4, the drive restarts also when powered again during "LV" and also during "LV" the RUN command on MI1/MI2 is interrupted. Valid when Pr02-01=1 or 2.

Q In PLC Mode, the drive always starts with [PLC1] or [PLC2] display, despite Pr00-03 setting. Why?

A When PLC1 or PLC2 mode is activated, the setting of Pr00-03 is changed to 5, so the start-up display is always PLC1 or 2.

Q How to reset VFD-E with a Modbus Multi-write instruction?

A 01 10 2000 0003 06 0011 1388 0002 Doesn't allow to reset the drive, gives error message.

01 10 2000 0003 06 0000 1388 0002 Allows to reset the drive.

Q How to set the PLC registers D1041 and 1042?

A The PLC registers D1041 (AO1) and D1042 (AO2) can be set as follows:

Set switch to 0~10V:

D1041 = 0000hex → AO1 will output 0V

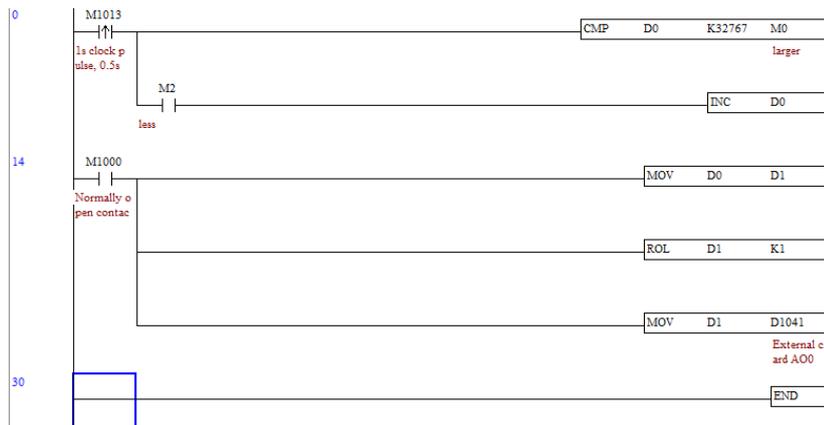
FFFFhex → AO1 will output 10V

Set switch to 0~20mA:

D1041 = 0000hex → AO1 will output 0mA

FFFFhex → AO1 will output 20mA

Here is an example program showing how to set values >32767:



Q How to set Pr10-00 for PID set-point?

A In VFD-E Pr10-00=1 means it follows Pr02-00 setting.

Pr10-01=1 and:

Pr02-00=0: Setpoint via keypad UP/DOWN

Pr02-00=1: Setpoint AVI (same as Pr10-00=2)

Pr02-00=2: Setpoint ACI (same as Pr10-00=3)

Pr02-00=3: Setpoint via comm

Pr02-00=4: Setpoint via front potmeter

Q What is the function of register 210Ch~210Fh ?

A 210Chex: AVI 0~3FFhex or 0~1023dec
210Dhex: ACI or AVI2 0~3FFhex or 0~1023dec
210Ehex: ACI2 or AVI3 0~FFFhex or 0~4092dec
210Fhex: ACI3 or AVI4 0~FFFhex or 0~4092dec

Q EME-PG01: What is the number of output pulses on A0 and B0?

A The ratio of input/output pulses is 1:1.

Q How to switch between two different setpoints for PID?

A Pr00-02=9 (50Hz default)
Pr02-00=1
Pr04-19=1 and switch AVI to use ACI=AVI2 0-10V for feedback
Pr05-00=25Hz (=50% setpoint)
Pr08-00=1 (setpoint acc. to Pr02-00)
Prt08-00=3 (neg feedback on AVI2)
Pr04-05=1 (MI3)
So the setpoint can be switched between AVI and Preset1 (value in Pr05-00 and active via MI3).

Q How to preset speed and master frequency via Modbus

A When Pr02-00=3 (Frequency command by RS-485) and preset speed are active (Pr04-05 to -08, Pr05-00 to -14, MI3~6 active), the drive doesn't accept a change of the master frequency via RS-485 and gives 04 error. It keeps the last frequency command value before preset speeds were activated.



History Message:
25/10/2016 17:02:36 > Setup Com Port and Protocol
25/10/2016 17:03:16 > CE 4 : Comm. error 04

Only when MI3~MI6 are off (no preset speed selected), you can change the master frequency by RS-485.

Q Does MKE-EP fit on all VFD-E?

A MKE-EP only fits on Frame A, B and C. It does not fit on Frame D

Q What is the 2101h bit assignment?

A Bit 7 shows “reserved” in the manual but its assignment is Operation via External Terminals. When Bit7=1, operation is via external terminals. The other bits “reserved” are not assigned.

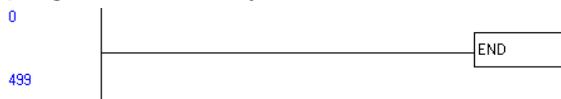
Q VFD-E brake units: BUE or VFDB?

A In the VFD-E user manual (Sensorless Vector Control Compact Drive VFD-E Series User Manual), the brake units are stated as VFDB. This is an error. It should be BUE.

230V Series								
Applicable Motor HP [kW]	Ac Drive Part No.	125% Braking Torque 10%ED*				Max. Brake Torque**		
		Full Load Torque KG-M***	Brake Unit [VFDB]	Resistor or Value spec. for each Ac motor Drive	Braking Resistor series for each Brake Unit ****	total Braking current (A)	Min. resistor value (Ω)	Max.Total Braking current (A)

Q What is the meaning of [PLor] on the display?

A PLor happens when the PLC memory is really empty. In PLC0 Mode the message should disappear. In PLC1 or 2 mode, you can solve the issue by uploading a simple program which only includes the END instruction.



Q What is DEV fault?

A DEV means the PID feedback deviates too much from the setpoint. This is not in the manual but it works. The function is the same as in VFD-EL. The level and time can be set in Pr10-12/10-13 and when it is exceeded the display showing the warning [Dev]. Pr03-00=16 activates the relay.

dEv	Unusual PID feedback	Check if wiring of PID feedback is correct and parameter of PID feedback is properly setup.
-----	----------------------	---

Pr06-08

36 dEv: unusual PID feedback deviation

10.12	PID Feedback Level	Unit: 0.1
Settings	0.0 to 100.0%	Factory Setting: 10.0
<input type="checkbox"/> When Pr10.12=0, PID feedback error detection is disable.		
10.13	Detection Time of PID Feedback	Unit: 0.1
Settings	0.1 to 300.0 sec	Factory Setting: 5.0
<input type="checkbox"/> This parameter is used to set detection of the offset between set point and feedback.		
<input type="checkbox"/> When the offset is higher than (the setting of Pr.10.12 X Pr.01.00) for a time exceeding the setting of Pr.10.13, the AC motor drive will output a signal when Pr.03.00 is set to 16 and will act according to Pr.10.20.		

Q How to activate an output/relay in case of a warning?

A Set Pr03-00/03-01=20.

Q Why does Pr07-01 display the wrong value?

A This is a bug in firmware 1.23/2.23.
After setting Pr07-01, it shows the wrong value after power off/on. The internal value of Pr07-01 is still correct, only the display value is wrong. It will be corrected in the next firmware.

Q How does OPL work and which parameters to set?

A See user manual (Sensorless Vecotr Control Compact Drive VFD-E Series user manual) but some parameter descriptions and explanations are not correct.

06.13	Action for detected Output Phase Loss (OPHL)	Factory Setting: 3
Settings	0 Warn and keep operation	
	1 Warn and ramp to stop	
	2 Warn and coast to stop	
	3 No warning	

Ramping will be done by DC-braking.

06.14	Deceleration Time of Output Phase Loss	Unit: second
Settings	0.0 ~120.0 seconds	Factory Setting: 0.5

Same as Pr06-46 in C20000/MS300. It should be "Detection Time of Output Phase Loss"

06.15	Detected Current Bandwidth	Unit: %
Settings	2 ~100.0 %	Factory Setting: 2

This is "Detection Current Level". 100% is drive rated current. Setting range 0~100.0% with default 2.0%. **When the setting is 0.0%, there's no OPL detection.**

06.16	Detected DC Brake Time of Output Phase Loss	Unit: second
Settings	0.0 ~120.0 seconds	Factory Setting: 0.1
	Set Pr.06.13~06.16 can detect the driver output is disconnected or not.	
	Open this function may cause misjudgment due to load or starting voltage is too small, here we can extend the detection time appropriately (Pr.06.14&Pr.06.16) or set Pr.06.15 value smaller.	

When Pr06-13=1, the drive will decelerate (ramp down) by DC-braking (This is the only way because only 2 phases are available). The DC-brake current level is set in Pr08-00. During DC-braking (also when set acc. to Pr08-01 ~ Pr08-03), there is no OPL detection.

Summary

- When the phase current is <Pr06-15 for Pr06-14 time, you get OPL with action acc. to Pr06-13.
- Ramping down (decelerating) is done by DC-braking with current level acc. to Pr08-00.
- During DC-braking action or when Pr06-15=0, there's no OPL detection.

Q Can I see in the PLC which keypad button is pressed?

A Yes, see D1015.

D1015	Keypad Status: Bit0: MODE; Bit1: STOP; Bit2: RUN; Bit5: UP; Bit6: DOWN; Bit7: ENTER;	R
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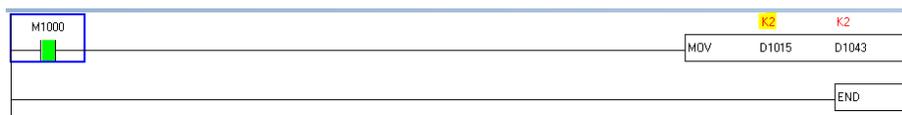
As long as the button is pressed, the relevant bit in D1015 is set. The buttons keep their original function. Please see the example below:



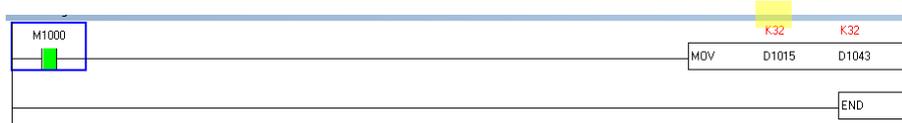
Press RUN (Bit 2)



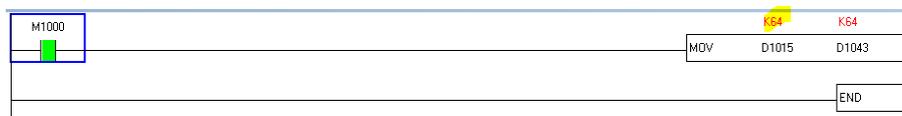
Press STOP (Bit 1)



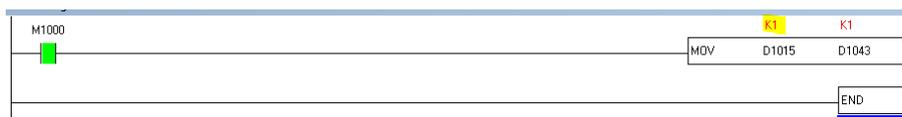
Press UP (Bit 5)



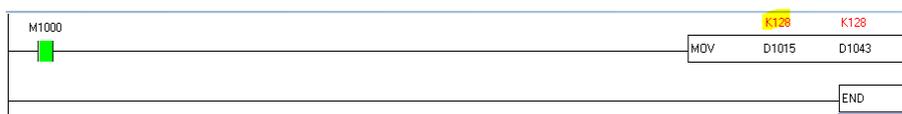
Press DOWN (Bit 6)



Press MODE (Bit 0)



Press ENTER (Bit 7)



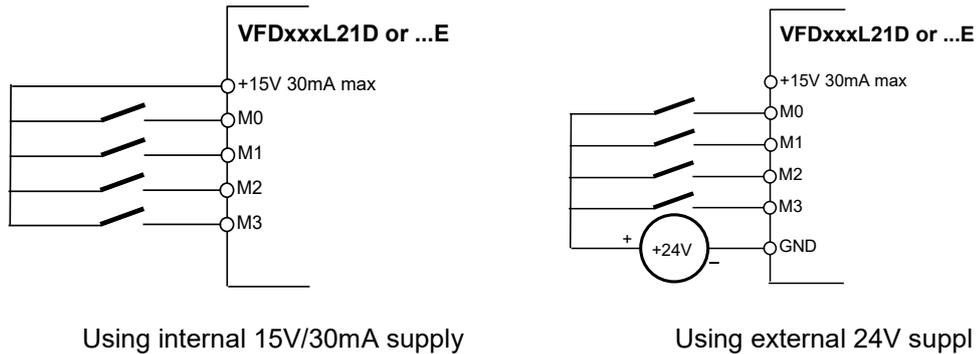
VFD-L

Q Can the digital inputs be operated from 24V?

A Yes, this is possible.

VFDxxxL21A or ...B: They have NPN inputs that are activated by shorting them to ground.

VFDxxxL21D or ...E: They have PNP inputs. Either the internal 15V or an external 24V supply can be used.



Q What does error code “23” mean?

A The fault codes have been extended; this info is not in the manual:

1	oc	13	FAIL	25	AN4
2	oU	14	LV	26	AN5
3	oH	15	cF1	27	AN6
4	oL	16	cF2	28	AN7
5	oL1	17	bb	29	HPF.1, IRQ0(OC)
6	EF	18	oL2	30	HPF.2, IRQ1(CC)
7	cF3	19	cFA	31	HPF3
8	HPF	20	codE	32	CE10
9	ocA	21	oPE	33	cdog, cpu watchdog
10	ocd	22	cF3.1 (AN1(DCBUS) FAIL)	34	S-Er. S/W Error
11	ocn	23	cF3.2 (AN2(VTH) FAIL)	35	Eto, EEPROM timeout
12	GF	24	cF3.3 (AN3(VCPP) FAIL)	-	-

Q What is the difference in high and low torque setting on VFD-L1?

A High torque output is $V_{out} = V_{command} + 8\%$ Rated input voltage.

Low torque output is $V_{out} = V_{command}$.

Q Bug: Pr09-02 and Pr09-03 do not work.

A When Pr09-02=1 or 2 and Pr09-03=1s (or other value), when the drive communication is interrupted (by pulling the connector for example, nothing happens. Acc. to manual the drive should stop after Pr09-03 time. But it doesn't work.

Q Why does VFD-L2 show cF2 after power on?

A When the value of Pr07-01 > Pr07-00 this will happen. Normally it is not a problem but when you set a full load current value in Pr07-00 that is lower than the no-load current value in Pr07-01, this problem occurs. The solution is to make sure that Pr07-01 < Pr07-00.

Q Why is EF (fault code 6) not saved in the fault memory?

A This is a bug in the firmware. At the moment, there are no plans to correct it.

Q How can I set the delay between Autorestarts?

A Autorestart only works for OC and OV.

Number of Autorestarts	Pr8-14
Autorestart Recovery Time	PrA-15 (hidden parameter)

To change the hidden parameter, set Pr0-02=2, then go to Pr-group A and change the setting in PrA-15. Default is 10min.

Q What is the difference among A, B, D and E versions of VFD-L?

A: No filter, NPN inputs
B: Filter, NPN inputs
D: No filter, PNP inputs (only for 0.4 and 0.75kW)
E: Filter, PNP inputs (only for 0.4 and 0.75kW)

Q Can the relay be used on 230VAC?

A Yes, it can be used to switch 230V_{AC} with a max. current of 1A.

Q What is the class and max. motor length for VFD-L2?

A For VFDxxxL21B/E the class is EN61800-3:2011 C2 with 10m shielded motor cable both for conducted and radiated emission.

Q How do Pr06-02, 06-03 and 06-04 work together?

A OL2 happens always when output current >Pr06-03 for time Pr06-04 and the conditions below are met.

Pr06-02=1 or 3:

When OL2 occurs, the drive keeps running and no warning message on the display. You can set Pr03-03=4 for the relay to activate in that case.

Pr06-02=2 or 4:

When OL2 occurs, the drive stops and "OL2" is displayed. You can set Pr03-03=4 for the relay to activate in that case.

Pr06-02=1 or 2:

OL2 happens when output frequency \geq command frequency ($H \geq F$)

Pr06-02=3 or 4:

OL2 happens when output frequency < command frequency ($H < F$). So during acceleration.

Q Which Modbus commands are available?

A 03 = read N words
06 = write 1 word
08 (loop detection) and 10 (write multiple registers) are not available.

Q Does VFD-L have brake chopper built-in?

A No. The VFD-L manual is wrong. This parameter has no function.

8 - 16	Dynamic Braking Voltage	Factory Setting: d 380*
Settings	d 350 to d 450V*	Unit: 1Volt*

 During deceleration, the DC-bus voltage will increase due to motor regeneration. When DC bus voltage level exceeds the Dynamic Braking Voltage, the DC brake output pins (B1, B2) will be activated.

VFD-EL

Q Pr00-03 setting is different in the summary and description, which one is right?

A There is a difference in the settings for Pr00-03 in the Summary of Parameter Settings and in the Description of Parameter Settings. The latter is correct. It will be corrected in the next version of the user manual.

Q Is it possible to get AErr message when the PID feedback signal on ACI is lost?

A No, when the ACI input for PID feedback is used, you cannot get "AErr" message. Instead, you can have FbE (FeedbackError) message, see Sensorless Vector Control Micro Drive VFD-EL Series User manual - Chapter 6. You have to set Pr10-01 and then set Pr10-08 and 10-09 accordingly. You can set an output to 20 to have a signal in case of FbE.

Q How to read the PWM AFM output by a digital voltmeter?

A On VFD-EL the AFM output is a 1kHz PWM signal, which is suitable for read-out by an analogue voltmeter but not always by a digital voltmeter. The signal can be smoothed by a 100k Ω /100nF combination. This is only suitable for high-impedance digital voltmeters or equipment.

Q Is it possible in VFD-EL to read AVI and ACI directly via Modbus?

A Yes, it is possible.
210Chex AVI
210Dhex ACI

Q How to set a range of 3~50Hz on AVI 0~10V?

A Pr04-11=0.00V
Pr04-12=6.0% (3Hz is 6% of F_{MAX} =50Hz in Pr01-00)
Pr04-13=10.00V
Pr04-14=100.0% (50Hz is 100% of F_{MAX} =50Hz in Pr01-00)

Q When are parameters saved in EEPROM?

A We save the parameters in EEPROM at power off, except some special frequently written parameters, such as Fcmd & Fpid. They are written in RAM.

Q How to set Pr10-00 for PID set-point?

A In VFD-EL Pr10-00=1 means it follows Pr02-00 setting.

Pr10-01=1 and:

Pr02-00=0: Setpoint via keypad UP/DOWN

Pr02-00=1: Setpoint AVI (same as Pr10-00=2)

Pr02-00=2: Setpoint ACI/AVI2 (same as Pr10-00=3)

Pr02-00=3: Setpoint via comm

Pr02-00=4: Setpoint via front potmeter

Q Why can the carrier frequency not be set >8kHz?

A When Pr00-10=0, then Pr02-03=12 it's OK.

When Pr00-10=1 (vector mode) Pr02-03=12, but it goes back to 8kHz.

When Pr00-10=0, then Pr02-03=12 it's OK, but when Pr00-10=1, Pr02-03 shows 8kHz.

So in vector mode max carrier frequency is 8kHz.

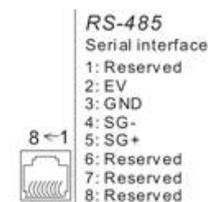
Q What is the temperature for OH1?

A OH1 happens when IGBT temperature >105°C. It can be reset when <72°C

Q What cable to use for the multi-pump function?

A See user manual page Pr-group 10.

The RS-485 wiring in VFD-EL as below:



EV is supply voltage to external keypad

GND is for communication cable shielding

SG+ & SG- are for RS-485 communication wiring

For multi-pump communication application, we could only connect SG+ ,SG- ,GND(option) with customized RJ45 or RJ11 cable, or use CAT5 cable cutting off pin2(EV). CAT5 A or B cross-over cables cannot work.

Q What is DEV fault?

A DEV means the PID feedback deviates too much from the setpoint. The level and time can be set in Pr10-12/10-13 and when it is exceeded the display shows the warning [Dev]. Pr03-00=16 activates in this case the relay.

dEv	Unusual PID feedback	Check if wiring of PID feedback is correct and parameter of PID feedback is properly setup.
-----	----------------------	---

Pr06-08

- 35 FBE_ERR : PID feedback error (the signal of the feedback is wrong)
- 36 dEv: unusual PID feedback deviation
- 37 10

10.12	PID Feedback Level	Unit: 0.1
Settings	0.0 to 100.0%	Factory Setting: 10.0
<input type="checkbox"/> When Pr10.12=0, PID feedback error detection is disable.		
10.13	Detection Time of PID Feedback	Unit: 0.1
Settings	0.1 to 300.0 sec	Factory Setting: 5.0
<input type="checkbox"/> This parameter is used to set detection of the offset between set point and feedback.		
<input type="checkbox"/> When the offset is higher than (the setting of Pr.10.12 X Pr.01.00) for a time exceeding the setting of Pr.10.13, the AC motor drive will output a signal when Pr.03.00 is set to 16 and will act according to Pr.10.20.		

Q How to activate the relay in case of a warning?

A Set Pr03-00=20. Please refer to the Sensorless Vector Control Micro Drive VFD-EL Series User manual for further information.

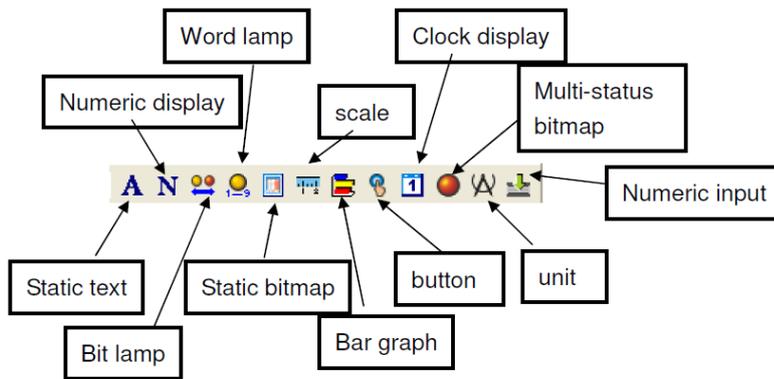
C2000/CP2000/CFP2000

Q WPL cannot make connection to C2000. Why?

A Please check the setting of Pr09-35. The default station address for PLC is 2. You need to select station address 2 when setting up the connection to WPL
*VFDSOft uses station address 1 (as set in Pr09-00).

Q Which elements are supported by KPC-CC01?

A In the latest firmware KPC1021-20110720 and higher, the following elements are available.



1	Static text	Totally supported
2	Numeric display	When the referred value is from VFD then the integer/decimal number is decided by the control board. When the referred value is from PLC then value type can be Unsigned, Signed and Hex, and the decimal number is available (to be decided by user). Frame/Font/Alignment settings are available but always with leading zero
3	Bit lamp	Not available
4	Word lamp	Not available
5	Static bitmap	Totally supported
6	Scale	Totally supported
7	Bar graph	The value type only support Unsigned and Signed , the value length only support 16 bits

8	Buttons	Support constant setting and jump page only , The Call function and User level are not available
9	Clock display	The setting of refer device is useless , cause the keypad have build-in RTC
10	Multi-status bitmap	Support bit type of device only
11	Unit	Totally supported
12	Numeric input	When the referred value is from PLC then the integer/decimal number will be available (to be decided by user) When the referred value is from VFD then the integer/decimal number is decided by control board. The value length only supports 16 bits. Call function and User level are not available.

Q How to connect a PT100 temperature sensor?

A Analogue output AFM2 can be set to give 9mA. The voltage drop over the PT100 is measured via AVI. 2 Levels can be set, at the first level the frequency command can be changed to avoid further temperature increase and that the second level Alarm OH3 is generated. The required action can be set.

Please find more in the application note **VFD-C PT100.pdf** on the ftp-site (Industrial Automation Products\AMD\VFD-C2000\C2000 Application notes).

Q Write to EEPROM: Yes or no?

A In the C2000, it is possible to disable writing to EEPROM, e.g. when using serial communication for changing parameters. Set Mlx=38 (Pr02-01, etc) and activate the input. The setting of Mlx=38 itself is saved in EEPROM at power off, independent of the input status.

Q Can C2000 work without keypad?

A Yes, C2000 works normal without keypad, you can remove it. But you have to make sure the drive's frequency command and start/stop command do not come from the keypad, otherwise it is not possible to run the drive (or, more dangerously, stop it when it is running). So please make sure, before you remove the keypad, that Pr00-20≠0 and Pr00-21≠0.

Q How to set a range of 42~50Hz on the AVI analogue input?

A Due to the limited bias range of -100% to +100% Pr03-03, it is not possible to set this range of 42~50Hz. Therefore an alternative way of scaling the analogue inputs by setting 3 points is introduced in C2000 and CP2000.

Pr03-50=0 Use Bias and Gain acc. to Pr03-03, Pr03-07, Pr03-10, Pr03-11.

Pr03-50=1 Use Pr03-51 to Pr03-56 to set AVI by 3 points

Pr03-50=2~7 to select ACI, AUI and combinations of AVI, ACI and AUI.

*Please refer to the user manual for the parameters for the analogue inputs ACI and AUI.

Q Which parameters in C2000 are only saved in EEPROM at power-off?

A The following parameters are only saved in EEPROM at power off (and can be used in a PLC program to avoid frequent writing by serial communication or WPR instruction:

Pr00-10 Control Mode

Pr00-11 Control of Speed Mode

Pr00-12 P2P control

Pr00-13 Torque mode

Pr01-12~Pr01-19 1st ~ 4th Acc/Dec Time

Pr02-12 Digital Input Operation Setting

Pr02-18 Multi-function Output Direction

Pr08-04 Upper Limit of Integral Control

Pr08-05 PID Output Frequency Limit

Pr10-17 Electrical Gear A

Pr10-18 Electrical Gear B

Pr11-34 Torque Command

Q C2000 Autotuning

A Pr05-00=1: For IM motor dynamic auto-tuning. You can get the motor parameters R_s , R_r , L_m , L_x and no-load current. This is for FOC+PG mode.

The motor runs and must be unloaded.

Pr05-00=2: For IM motor static auto-tuning. You can get the same motor parameters as Pr05-00=1 except the no-load current. So you must input the no-load current to parameter by hand. This mode is to be used when the motor cannot be unloaded.

So the auto-tuning result is not good as after Pr05-00=1.

This is for FOC+PG or SVC mode.

Pr05-00=6: For IM motor dynamic auto-tuning. You can get the motor parameters R_s , R_r , L_m , L_x and no-load current and the field weakening flux table.

This is for FOC Sensorless mode.

The motor runs and must be unloaded.

Pr05-00=12: For IM motor inertia auto-tuning in FOC Sensorless.

After finishing Pr05-00=6 auto-tuning, if you want to use Pr11-03, Pr11-04, and Pr11-05 as ASR, you must set Pr05-00=12 for inertia auto-tuning.

Q How to read parameters from C2000/CP2000 keypad by VFDSOft?

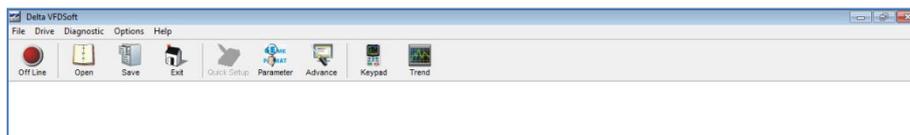
A Connect the keypad via IFD6530.

Press **MENU**, go to 13. PC-Link, **ENTER**, select VFDSOft, **ENTER**.

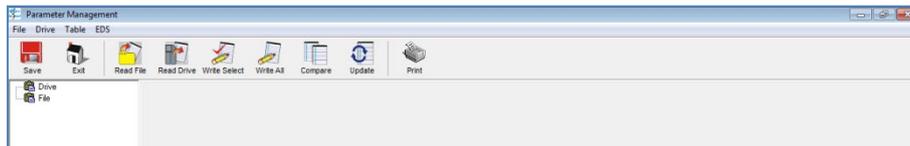
Select the file you want. Press **ENTER**.

The display shows Waiting 0%

Now open VFDSOft.

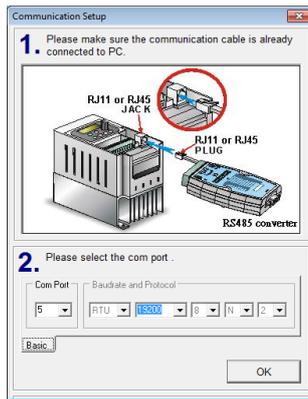


Open Parameter



Select Table: Read from KPC-CC01





Select the right COM port and press **OK**.

If a table is already loaded, then a message will pop up and ask if you want to save it. Then, the transfer begins and the table is read into VFDSOft until Completed 100%. After connecting the keypad again to the drive, via **MENU**, 2. Copy Pr, select the right file, **ENTER**, you can select 1:Keypad->VFD upon which the transfer begins.

Q How low can the motor rated power be compared to C2000 rated power and still have good FOC+PG performance?

A FOC+PG is OK as long as the motor rated current is $\geq 10\%$ of drive rated current. If the motor rated current is $< 10\%$, the current measurement resolution is not very precise anymore.

Q How can the keypad backlight set to be always on?

- A
1. Press **MENU** key
 2. Select item 8 Display Setup
 3. Select sub item "2" Back-light
 4. Press the "Down key" to make the time as "0"

Q How do Sleep and Wake-up work in CP2000?

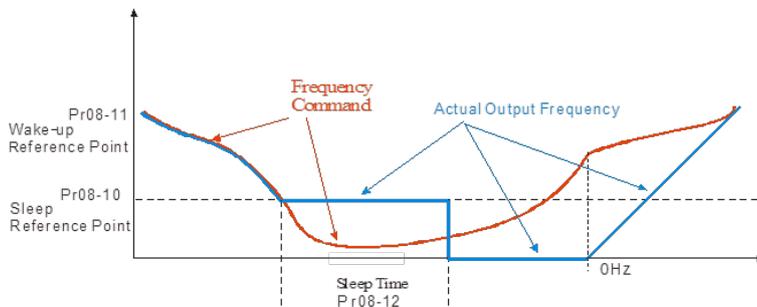
A The relevant parameters are:

08 - 10	Sleep Reference Point	Factory Setting: 0.00
Settings 0.00~600.00Hz or 0~200.00%		
08 - 11	Wake-up Reference Point	Factory Setting: 0.00
Settings 0.00~600.00Hz or 0~200.00%		
📖 When 08-18= 0, the unit of Pr08-10 and Pr08-11 is Hz, settings 0~600.00Hz		
📖 When 08-18= 1, the unit of Pr08-10 and Pr08-11 is percentage, settings 0~200.00%		
08 - 12	Sleep Time	Factory Setting : 0.0
Settings 0.00~600.00 seconds		
08 - 18	Setting of Sleep Mode Function	Factory Setting: 0
Settings 0: Follow PID output command; 1: Follow PID feedback signal		
08 - 19	Integral Limit during Wakeup	Factory Setting: 50.0%
Settings 0~ 200.0%		
📖 This upper integral limit of the motor drive is to avoid running at high speed right after being waken up.		

There are 3 different Sleep/Wake-up modes:

1. Frequency command (PID off, Pr08-00=0)

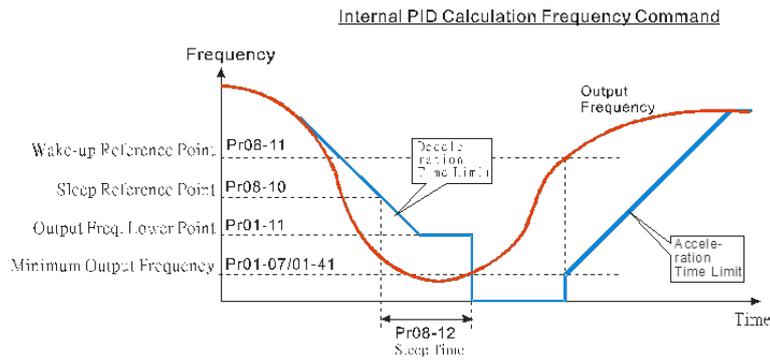
When the Frequency Command < Sleep Frequency, the output frequency will remain at the sleep frequency. Once the setting of Pr08-12 Sleep Time is reached, the drive will go to sleep at 0Hz.



2. Internal PID calculated frequency command (PID on, Pr08-00≠0)

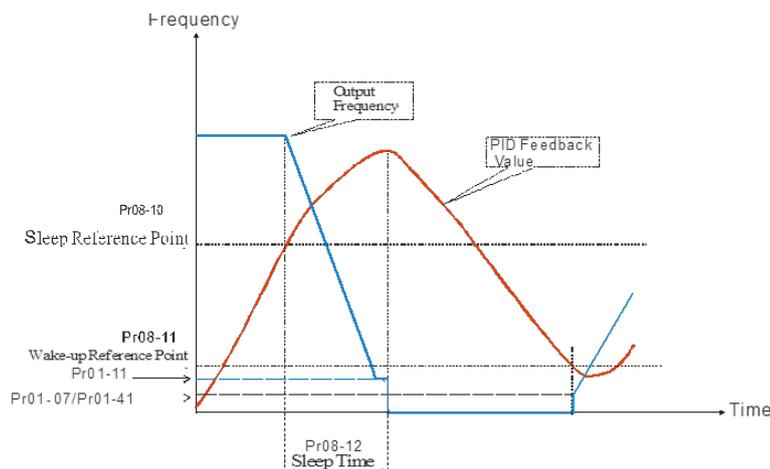
Once the sleep frequency is reached, the system starts to calculate the sleep time and the output frequency starts to decrease. When it passes the preset sleep time, the motor drive will go to sleep at 0Hz.

If the preset sleep time is not reached (if there is a preset), the motor drive will remain at the lower frequency or will stay at Pr01-07 Minimum Output Frequency. Then the drive waits to for the sleep time to elapse, then goes to sleep at 0Hz.



3: Percentage of PID's Target Value (Set PID, Pr08-00 ≠ 0)

Once reaching the percentage of PID's target value and the percentage of the feedback value, the motor drive starts to calculate the sleep time. The output frequency decreases immediately. If the motor drive passes the preset sleep time, it will go to sleep at 0Hz. However, if it doesn't reach the preset sleep time, it will remain at lower frequency (if there is a preset) or Pr01-07 Minimum Output Frequency. Then the motor drive waits to reach the sleep time and go to sleep at 0Hz.



Q What is the max. motor cable length for CP2000?

A At full load condition without reactor:

Non-shielded cables:

≤ 5.5kW(7.5hp): Max 100m

≥ 7.5kW(10hp): Max. 200m

Shielded cables:

≤ 5.5kW(7.5hp): Max 50m

≥ 7.5kW(10hp): Max. 100m

For longer cables, an output reactor is required. Please refer to the manual for recommended values. Delta does not have output reactors so you need to purchase them locally.

Q What is the effect of motor cable length on motor insulation?

A When the motor is driven by an AC motor drive with PWM modulated output voltage, the motor terminals will experience surge voltages due to cable capacitance. When the motor cable is very long (especially for the 460V series), surge voltages can reduce the insulation quality.

To prevent this, please follow the rules below:

- a. Use a motor with enhanced insulation
- b. Connect an output reactor (optional) to the output terminals of the AC motor drive
- c. The length of the cable between AC motor drive and motor should be as short as possible (10 to 20m or less).

Please refer to the Delta Vector Control Drive C2000 Series User Manual and Delta Fan/Pump Vector Control Drive CP2000 Series User Manual - Chapter 7.

Q Is in C2000 the charge resistor after the DC+/DC- connection?

A Yes, it is. When the drive is supplied by the DC-bus, the inrush current is still limited.

Q How to add analogue input signals?

A See Pr03-18.

Pr03-18=0 Adding disabled. When AVI, ACI, AVI2 (or AUI) have the same setting in Pr03-00 to 03-02, the priority is AVI>ACI>AVI2orAUI.

Pr03-18=1 Adding enabled. Only the analogue input signals with the same setting in Pr03-00 to 03-02 are added. Subtraction is possible by inverting an input.

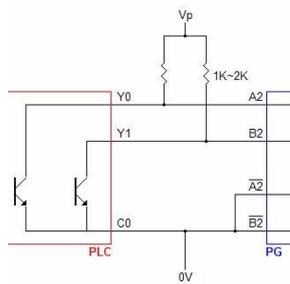
Please see examples below:

Pr03-00=1, Pr03-01=1: AVI+ACI for frequency command

Pr03-00=5, Pr03-01=5, Pr03-02=5 AVI+ACI+AVI2orAUI for PID feedback.

Q How to connect Open Collector signals to PG card Channel 2?

A Please refer to the following diagram for wiring information. V_P depends on type of encoder card.



Pull-up resistor: 1~2kΩ 0.5W

Q Can EMC-BPS01 also be used in CP2000?

A Yes, but the info is not in the user manual. Please consult the info in the Delta Vector Control Drive C2000 Series User Manual. The CP2000 user manual will soon be updated.

Q How to set up PID in CP2000?

A An example based on a customer requirement.

Requirement:

Setpoint via keypad. 0~6bar

Feedback on AVI1. Sensor 0~10V = 0~10bar

Sensor 0~10V = 0~20bar

Do reset to 50Hz defaults, Pr00-02=9 to have a well-defined starting point.

Setting the unit to bar:

Pr00-25=162hex to have bar with 2 decimals (set 163hex for 3 decimals)

Pr00-26=6.00 (so the max range is 6.00bar). (Will be 6.000bar if you use 3 decimals)

Setting up PID

Pr08-00=1 Negative feedback on analogue input acc. to Pr03-00 to 03-02

Pr03-00=5 AVI1 for PID feedback.

Pr00-04=10 to show feedback (in bar) on the display.

So now you have 0~6.00-bar setpoint range and also feedback is 0~10V = 0~6.00bar

Scaling the feedback

Sensor 0~10V = 0~10bar:

You can use two methods:

1. Pr03-50=0 (default setting). In that case you use bias and gain for AVI1.
Pr03-11=166.7% (=10/6)
The feedback range is now 0~6.00bar for the 0~10bar sensor. (or 0~6.000bar)
2. Pr03-50=1. To set AVI1 via 3 points.
Pr03-51=0V
Pr03-52=0%
Pr03-53=3V
Pr03-54=50%
Pr03-55=6V
Pr03-56=100%
The feedback range is now 0~6.00bar for the 0~10bar sensor.

Sensor 0~10V = 0~20bar:

You can use two methods:

1. Pr03-50=0 (default setting). In that case you use bias and gain for AVI1.
Pr03-11=333.3% (20/6)
The feedback range is now 0~6.00bar for the 0~20bar sensor. (or 6.000bar)
2. Pr03-50=1. To set AVI1 via 3 points.
Pr03-51=0V
Pr03-52=0%
Pr03-53=1.5V
Pr03-54=50%
Pr03-55=3V
Pr03-56=100%
The feedback range is now 0~6.00bar for the 0~20bar sensor.

And if you use PID, it's best in general to set acc and dec time as low as possible without overcurrent or overvoltage. Acc and Dec time add an unnecessary delay to the PID loop.

Q How do I order fans?

A In C/CP2000 the fans are defined as an option, not as a spare part.
You can find info about the fan kits, for easy change, in the Delta Vector Control Drive C2000 Series User Manual and Delta Fan/Pump Vector Control Drive CP2000 Series User Manual - Chapter 7 and you can order them as regular parts. They are in your

price list.

Q Are C/CP2000 suitable for flange mounting on a panel for heat dissipation?

A See Delta Vector Control Drive C2000 Series User Manual and Delta Fan/Pump Vector Control Drive CP2000 Series User Manual - Chapter 7 for the flange mounting kits for Frame A~C: MKC-AFM(1), -BFM, -CFM. For Frame D~F the lower flange brackets can be moved up to halfway of the drive.

Q What is the difference between 210Bhex and 2208hex?

A There is no difference. Both display the output torque in %.
The address range 22xxh is designed for TP, because TP cannot read 21xxh.

Q Is it possible to connect external 24VDC power supply to C2000?

A It is possible by using option card EMC-BPS01. Then, keep the control board alive via an external 24VDC power supply.

Q What does “V” and “V(RS)” mean in the table for error detection in normal mode, fire mode and bypass mode? (See Pr06-85)

A “V” means detectable and “V(RS)” means detectable and can be auto-reset.

Q How to clear the alarm via the STO connector on CP2000/C2000?

A An error can occur as a result of incorrect connection of the STO connector of the CP2000/C2000 series when testing or after moving.
Screw the connector again with torque screwdriver in 1.5~2.2 kgf.cm. Then shake the wiring board to ensure the connector is correctly tightened and the alarm is cleared.



Q What is the relationship between duty and the max. output frequency on C2000?

A Contrary to what is stated in the manual, it is:

			0.7	1.1	2.2	3.7	4	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	280	315	355	450
C2000	230V	ND	0~600Hz						0~500Hz						0~450Hz													
		HD	0~300Hz																									
	460V	ND	0~600Hz						0~500Hz						0~450Hz													
		HD	0~300Hz																									

Valid for firmware 1.20.

Q How to control AFM1&2 via Modbus?

A There are no Modbus registers to directly control AFM1&2. But it can be done in this way:

Please follow the steps below:

Set Pr 03-20/03-23 = 23 for constant voltage. Then, write to Pr03-32/03-33 to control the level.

Pr03-32 has Modbus address 320h and setting is 0~10000 = 0.00~100.00%

Pr03-33 has Modbus address 321h and setting is 0~10000 = 0.00~100.00%

This also works in CP2000.

Q What is the setting range of Pr08-01 in CP2000?

A In the CP2000 manual the setting range is 0.0~100.0%. This is not correct.

The setting range is 0.0~100.0.

Q How can we read that the drive is in a fault condition in the PLC or a C/CP2000?

A In address 2100hex, a warning or fault code is saved.

2100H	High byte: Warn Code Low Byte: Error Code
-------	--

So if 2100hex=0, then no fault or warning is saved.

Only the latest warning and fault is saved in 2100hex.

Q What is the bandwidth for the master speed attained function?

A For the master speed attained function:

CP2000: Pr02-13, 02-14, 02-15=2

C2000: Pr02-13, 02-14, 02-16, 02-17=2)

The bandwidth is ±2Hz. It is fixed and cannot be changed.

Q How to read the kWh value in Pr05-28~05-30?

A Pr05-28 shows the Wh value in xxx.x Wh. When it exceeds 1000.0Wh, Pr05-28=0 and Pr05-29 is incremented.

Pr05-29 is kWh low word from 0~65535 (the decimal point has no meaning). When it exceeds 65535, it becomes 0 and Pr05-30 is incremented.

Pr05-30 is kWh high word, also from 0~65535.

Basically Pr05-29 and 05-30 are just 2 binary words that show the total kWh

XXXXXXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX

high word	low word
Pr05-29	Pr05-30

So the reading

Pr05-29= 4.060,8 means 40608kWh

Pr05-30= 1,1 means 11*65535=720885kWh

Total 720885+40608=761493kWh

Q What is the minimum response time of the digital inputs?

A The minimum response time of the digital inputs MIx is 1ms.

Exception: When in C2000 MI8 is used for single-phase encoder feedback (Pr10-00=5), the max. frequency is 30kHz. and Pr02-11 is not valid for MI8.

Q How to disable PID control in HAND mode in CP2000?

A In HAND mode, PID control can be disabled by Bit2 of Pr00-28 (Firmware 1.21 and up)

↗ 00 - 28 Switching from Auto mode to Hand mode Factory Setting: 0

Settings 0 - 65535

- Bit0 : Sleep Function Control Bit
 - 0: Cancel sleep function
 - 1: Sleep function and Auto mode are the same
- Bit1 : Unit of the Control Bit
 - 0: Unit of the Control Bit
 - 1: Same unit as the Auto mode
- Bit2 : PID Control Bit**
 - 0: Cancel PID control
 - 1: PID control and Auto mode are the same.
- Bit3: Frequency Source Control Bit
 - 0: Frequency command set by parameter, if multi-step speed is activate, then multi-step speed has the priority
 - 1: Frequency command set by parameter 00-30

Q Fan control: Can changing ID cause damage?

A C/CP2000 Frame A and B have on/off fan control. Frame C and up have PWM fan control. When the ID is (re)set on a Frame A and B drive to e.g. prepare the control board for a drive of Frame C and up, the fan control changes but it won't cause any damage. It can be that the fan on the Frame A or B drive doesn't work properly at that moment.

Q How to read HAND/AUTO and Local/Remote status via serial comm or in PLC?

A Bits 13 to 15 from register 2119H can be used to identify if HAND/AUTO or Local/Remote are active. Please see the table below for the definition

	Bit15~13	Meaning
2119H	000	OFF
	001	Hand
	010	Auto
	011	Local
	100	Remote

Q What is the function of the settings 50, 51, 52 for the digital outputs and relays?

A In the slave, these settings assign the outputs to bits in a special register, depending on the communication. By sending the bits to the register, the assigned outputs can be controlled.

- The actual MO or RY depends on the drive series and option card
- The bits (1 or 0) in this register set the outputs active/inactive.
- Some bits are not available depending on drive series and option cards.

CANopen

Output	Setting 50 for:	Register
RY1	Pr02-13	2016-41 Bit0
RY2	Pr02-14	2016-41 Bit1
RY3 (CP2000 only)	Pr02-15	2016-41 Bit2
MO1 (C2000 only)	Pr02-16	2016-41 Bit3
MO2 (C2000 only)	Pr02-17	2016-41 Bit4
MO10/RY10	Pr02-36	2016-41 Bit5
MO11/RY11	Pr02-37	2016-41 Bit6
RY12	Pr02-38	2016-41 Bit7

RY13	Pr02-39	2016-41 Bit8
RY14	Pr02-40	2016-41 Bit9
RY15	Pr02-41	2016-41 Bit10

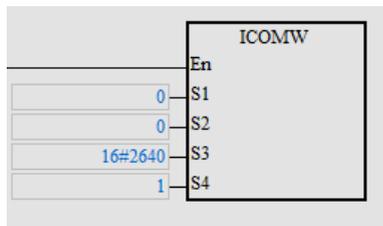
Fieldbus option

Output	Setting 52 for:	Register
RY1	Pr02-13	H2640 Bit0
RY2	Pr02-14	H2640 Bit1
RY3 (CP2000 only)	Pr02-15	H2640 Bit2
MO1 (C2000 only)	Pr02-16	H2640 Bit3
MO2 (C2000 only)	Pr02-17	H2640 Bit4
MO10/R Y10	Pr02-36	H2640 Bit5
MO11/R Y11	Pr02-37	H2640 Bit6
RY12	Pr02-38	H2640 Bit7
RY13	Pr02-39	H2640 Bit8
RY14	Pr02-40	H2640 Bit9
RY15	Pr02-41	H2640 Bit10

RS485 internal communication (only)

Output	Setting 51 for:	Register
RY1	Pr02-13	H2640 Bit0
RY2	Pr02-14	H2640 Bit1
RY3 (CP2000 only)	Pr02-15	H2640 Bit2
MO1 (C2000 only)	Pr02-16	H2640 Bit3
MO2 (C2000 only)	Pr02-17	H2640 Bit4
MO10/R Y10	Pr02-36	H2640 Bit5
MO11/R Y11	Pr02-37	H2640 Bit6
RY12	Pr02-38	H2640 Bit7
RY13	Pr02-39	H2640 Bit8
RY14	Pr02-40	H2640 Bit9
RY15	Pr02-41	H2640 Bit10

The correct way to address this is by using the function block below to write in the Inter-Com master PLC program:



This FB is written in the master PLC and it is used to write a value inside one of the slave drives as follows:

S1 = Select Slave 1

S2 = Device (0: converter, 1: internal PLC)

S3 = Register H2640

S4 = Value to write (1 corresponds to RY1)

- Set the master drive 9-31=-10 (which stops communication with the laptop)
- Connect the master to the slave
- Set the slave pr09-31=-1 (Slave 1) and pr02-13=51 (to allow the Relay to be controlled through RS485)
- Set the PLC program on the master drive in RUN state

See also the Application Note **Inner Com Control for C2000.pdf** on the ftp-site in the folder (Industrial Automation Products\AMD\VFD-C2000\VFD-C Application notes\C2000 Application Notes\C2000 PLC Built-in\Internal Communication in Modbus).

Q What is the fan behaviour when Pr07-19=3?

A When Pr07-19=3:

When IGBT temperature >60°C **or** CAP temperature >60°C, the fan is ON.

When IGBT temperature <40°C **and** CAP temperature <40°C, the fan is OFF.

It will be corrected in the next user manual.

Q What does fault CE3 mean?

A

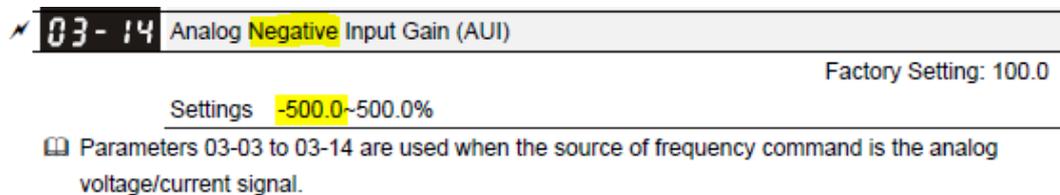
03	ILLEGAL DATA VALUE	A value contained in the query data field is not an allowable value for server (or slave). This indicates a fault in the structure of the remainder of a complex request, such as that the implied length is incorrect. It specifically does NOT mean that a data item submitted for storage in a register has a value outside the expectation of the application program, since the MODBUS protocol is unaware of the significance of any particular value of any particular register.
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Q What is the function of Pr08-15?

A Contrary to what's in the C2000 and CP2000 manual, Pr08-15 is reserved and has no function.

Q What is the function of Pr03-14 in C2000?

A Pr03-14 sets the gain for the negative input on AUI.
If you put a negative value to the negative input, you will get a positive gain.
If you put a positive value to the negative input, you will get a negative gain.



03 - 14 Analog Negative Input Gain (AUI) Factory Setting: 100.0

Settings -500.0-500.0%

Parameters 03-03 to 03-14 are used when the source of frequency command is the analog voltage/current signal.

Q C2000 doesn't run when Enable and FWD are activated simultaneously. Why?

A MI5=49 is Drive Enable. Level triggered. Only when MI5 is active, Drive Enable, RUN, FWD, REV can be activated (edge triggered).
The driver scans Multi-IO status at 500µs timer interrupts with scan sequence FWD, REV, MI1, MI2 ...MI8. Due to this scan sequence, the drive can't run when Enable and FWD are activated simultaneously. Therefore a delay of minimum 500 µs between activating Enable and RUN (or FWD, REV) is required.

Q How to copy the PLC program into the keypad?

A For C family, we need to disable PLC first. Please see the steps below:

1. Disable PLC

On the keypad, go to Menu #4 PLC. Then, select 1=Disable PLC

2. Upload PLC program

On the keypad, go to Menu #5 Copy PLC and select the file (001, 002, etc). Then, press ENTER and select 2:VFD->Keypad (for uploading to keypad). Enter a password if desired, otherwise skip. Finally, press ENTER and uploading starts

Q C2000 Pr08-23 setting?

A Pr08-23 is bit setting. But because it only affects bit0, you can consider it to be: Pr08-23=0 (bit0=0) and Pr08-23=1 (bit0=1).

Bit0=0

When the PID calculates its output to be positive or negative for forward or reverse, it is enabled if Pr08-21=1. If Pr08-21=0, it only runs in the direction of the RUN command (FWD or REV).

Bit0=1

Then the PID calculates its output, but it follows the rule as set in Pr00-23 (0=FWD/REV enable, 1=REV disable, 2=FWD disable).

Q We get a warning TPNO unsupported (TP editor object unsupported) on keypad KPC-CC01. How can we reset it?

A Press "Menu" → Select "12: Main Page" → Select "1:Default"

Q Are both heatsink fan and capacitor fan in C/CP/CH2000 controlled by Pr07-19 setting?

A See the following table, which is valid for C2000, CP2000 and CH2000:

Frame	Heatsink fan	Capacitor fan
A	Pr07-19	n.a.
B	Pr07-19	Pr07-19
C	Pr07-19	Pr07-19 230V models always ON
D0	Pr07-19	Pr07-19
D	Pr07-19	ON
E	Pr07-19	Pr07-19
F	Pr07-19	Pr07-19
G	Pr07-19	n.a.
H	Pr07-19	n.a.

The heatsink fans are always controlled by Pr07-19, the capacitor fan acc. to the table.

Q Is it possible to run the C2000 in torque mode and use a pulse train as speed limit?

A Yes, this is possible by setting the following parameters:

Pr00-20 = 4 or 5

Pr11-36 = 2

Pr10-16 = 1 ~ 5 (depending on the type of pulses you are using)

Note: For Pr10-16 = 1 ~ 4 you will need to use a PG card and connect the pulse train to the PG2 terminals.

Q Is it possible to set the password only by software?

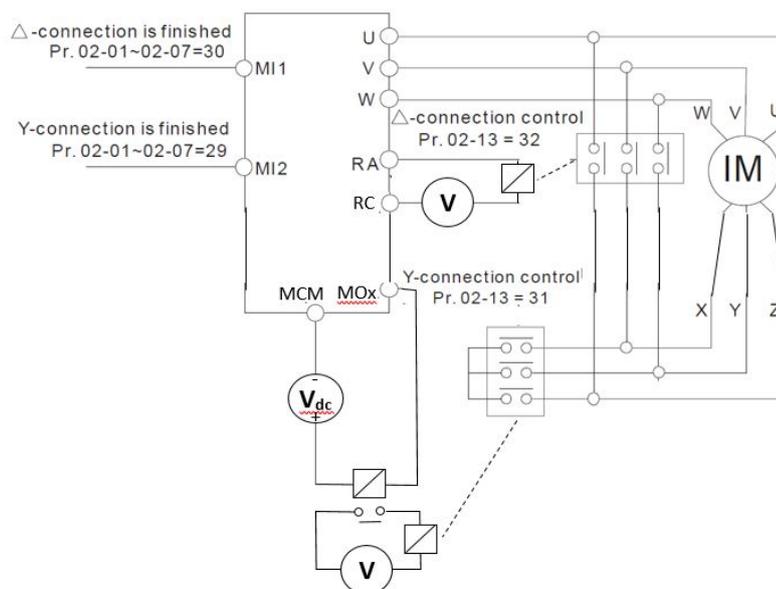
A Yes, it is possible. Please follow the steps below.

Fristly, enter the password in VFDSOft, e.g. Pr00-08=1234 and write to Pr00-08.

Password is then set. After that all parameters show 0 because the drive is password protected and Pr00-08 shows reserved. Then, you can write 1234 to Pr00-07 (the only parameter you can write to in that case) to unlock the drive.

Q How to wire for Y-Δ switch-over?

A The picture as shown for Pr05-25 in the user manual is for indication only and is not complete. Please see below of how it should be connected.



Note: This also applies to C/CP/CFP2000.

Q What is the compatibility of CP2000 firmware and CMC-EIP01/-MOD01 option cards?

A There is a compatibility issue between the newer CMC-EIP01/CMC-MOD01 cards and the older CP2000 firmware. When a card with firmware version 1.08 or newer is placed on a CP2000 firmware version 2.03 or older, the card will not be recognized (Pr09-60=0)

Solution: Update the CP2000 firmware to the latest version V2.06. The firmware and update instructions are available on the ftp-site.

Q Why can't I find Pr11-17~Pr11-20 and Pr06-12 in the C2000 of firmware V2.06?

A These are removed in 2.06. OC-stall prevention can now only be set in Pr06-03 and Pr06-04.

Q How to use the Bypass functionality in CP/CFP2000?

A The Bypass function only works in combination with Fire Mode functionality in the CP/CFP2000.

In Fire mode the drive can ignore most drive fault codes and can continue running (the complete list of faults ignored is in the manual). If bypass is enabled, the drive can use one of its relays to automatically switch the motor directly to the mains supply when a particular fault occurs. Below is the complete list of faults which can trigger the bypass function:

Code	Error name	Enable bypass function
1	Over-current during acceleration (ocA)	√
2	Over-current during deceleration (ocd)	√
3	Over-current during constant speed (ocn)	√
4	Ground Fault (GFF)	√
5	IGBT short circuit (occ)	√
6	Over-current during stop (ocS)	√
7	Over-voltage during acceleration (ovA)	√
8	Over-voltage during deceleration (ovd)	√
9	Over-voltage during constant speed (ovn)	√
10	Over-voltage during stop (ovS)	√
15	Input phase loss (OrP)	√
16	Over-heat 1 (oH1)	√
17	Over-heat 2 (oH2)	√
18	Thermistor 1 open (tH1o)	√
19	Thermistor 2 open (tH2o)	√
24	Over heat 3 (oH3)	√
82	U-phase output phase loss (OPHL)	√
83	V-phase output phase loss (OPHL)	√
84	W-phase output phase loss (OPHL)	√
89	RoPd initial rotor position detection error	√

The minimum settings required to enable this function are:

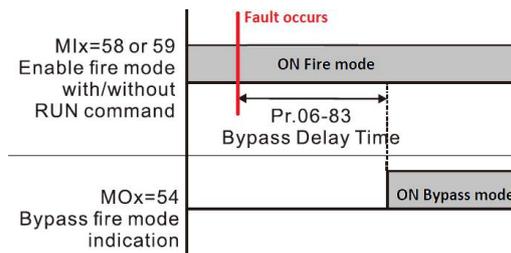
- Pr06-82=1 and Pr06-83≠0

✓	06-82	Enable bypass on fire mode	0: Disable bypass 1: Enable bypass	0
✓	06-83	Bypass delay time on fire mode	0.0–6550.0 sec.	0.0

- One relay output must be set to function 54. This will be the function that controls the contactors that switch the motor to mains supply

54	Bypass fire mode indication	The contact works when bypass function is enabled in the fire mode.
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- Parameter 06-83 is the delay time from when a fault occurs to when the drive enables Bypass:



- In addition, the drive can attempt to auto-reset the fault that occurred during fire mode and prevent it from going into Bypass mode. This can be programmed using parameters Pr06-84 and Pr06-85:

✓	06-84	Number of times of reset in fire mode	0–10	0
✓	06-85	Length of time of reset in fire mode	0.0–6000.0 sec.	60.0

When Pr06-84=0 this function is disabled meaning that if a fault from the above list occurs the drive will inevitably go into Bypass mode (after the time set in pr06-83). If, for example, Pr06-84=3 then the drive will reset a fault up to 3 times. If a fault occurs 4 times within the time set in pr06-85, then the drive will no longer attempt to reset the fault and will switch to Bypass mode.

C200

Q Is Pr02-11 Digital input response time also valid for MI7, 8?

A Yes it is. However, when encoder feedback is used (Pr10-02≠0), Pr02-11 is disabled for MI7&8.

Q How to select RS-485 Modbus or CANopen?

A When Pr09-36=0, CANopen is disabled and RS-485 Modbus is enabled.
When Pr09-36≠0, CANopen is enabled by assigning a CANopen slave address and RS-485 Modbus is disabled.

Q How to change to high speed for spindles?

A Set Pr00-14=1, then set Pr00-14=2 to enable high-speed mode with max. output frequency of 2000Hz.

Set Pr00-14=1, then set Pr00-14=0 to disable high-speed mode and go back to the normal max. output frequency of 600Hz.

Note: Whenever Pr 00-14 has been changed, the drive will reset to factory defaults, so please set this parameter first before any setting in case of data loss.

Q Does C200 support pulse signals for frequency commands? How does it work?

A The external pulse signal (AB phase) can be converted into frequency commands by the following steps:

The C200 series only supports open-collector type signals and the maximum speed is 33kHz. When the AB phase pulse signal is connected to MI7 and MI8 for frequency command, then, if the difference between phase A and phase B exceeds 90 degrees, it is counted as 1 pulse. The pulse counting is stored at D1056.

- D1054 Present MI8 count value (L word) Read Only
- D1055 Present MI8 count value (H word) Read Only
- D1056 MI8 corresponding frequency Read Only
- D1057 MI8 speed ratio Read/Write
- D1058 MI8 mapping frequency update speed (ms) Read/Write
- D1059 MI8 mapping frequency decimal place Read/Write

- Then set MI1038 to 1

- D1058 Starts MI8 counting Read/Write
- D1059 Reset MI8 count value Read/Write

- For the last step, the internal PLC instruction FREQ will send a frequency command to the drive.

Note: C200 doesn't support PG cards. Once MI7 and MI8 are used for pulse train frequency commands, the drive cannot support closed-loop operation.

Q MI7/8 for encoder?

A When Pr10-02=1,2,3,4, then MI7/8 are automatically assigned for encoder input.

Q How to activate encoder?

A When 10-01~02 is set, MI7 & MI8 are automatically activated for encoder input. The original setting of MI7 & MI8 will be ignored. The encoder type must be 24V Open Collector. See also page 6-5 of the Delta Economy Vector Control Drive C200 Series User Manual (PG-Function Explanation).

Q Which PLC registers in C200 are latched?

A The register D0~D99.
The C200 manual says D0~399, this will be corrected.

MS300

Q What does Pr07-20=5 (System deceleration) mean?

A For MS300, there is the function Forced to stop (Pr02-01 ~ 02-06 = 18 or 10). Then, Pr07-20 needs to be set.

07-20	Deceleration of Emergency or Forced Stop	Factory Setting: 0
Settings 0: Coast to stop		
1: Stop by 1 st deceleration time		
2: Stop by 2 nd deceleration time		
3: Stop by 3 rd deceleration time		
4: Stop by 4 th deceleration time		
5: System Deceleration		
6: Automatic Deceleration		
<p> When the multi-function input terminal is set to EF (10) or forced stop (18) and the terminal contact is ON, the drive will stop according to the setting of this parameter.</p>		

Pr07-20=5 means the drive stops with the actual deceleration time.

Q What is the crane function (MO=42)?

A The crane function is as follows.

42	Crane function	<p>The crane function is to control a mechanical brake. It works together with Pr02-34 and Pr02-58.</p> <p>When a multi-function output is set (Pr02-13, Pr02-17, Pr02-18) to 42: It activates when the output frequency (H) \geq Pr02-34 It de-activates when the output frequency (H) $<$ Pr02-58 after a stop command.</p> <p>See following diagram:</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> <p>Example of crane application:</p> </div> <p>It is recommended to use it together with the dwell function which is then active after STOP command and output frequency $<$ Pr02-58:</p> <div style="border: 1px solid black; padding: 5px; margin: 5px 0;"> </div> <p>In heavy load conditions using Dwell function can keep the output frequency stable and prevent OC or OV.</p>
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02-34	Frequency Setting for Multi-function Output	Factory Setting: 0.00Hz
Setting range 0.00~599.0Hz		
<p> When output frequency (H) \geq Pr.02-34, the multi-function output activates when set to 29. (Pr.02-13, Pr.02-16, Pr.02-17). It de-activates when output frequency (H) $<$ Pr.02-34.</p> <p> When output frequency (H) \geq Pr.02-34, the multi-function output activates when set to 42. (Pr.02-13, Pr.02-16, Pr.02-17).</p> <p> When output frequency (H) $<$ Pr.02-34, the multi-function output activates when set to 30. (Pr.02-13, Pr.02-16, Pr.02-17). It de-activates when output frequency (H) \geq Pr.02-34.</p> <p> When using MO=42, Pr02-34 must be $>$ Pr02-58.</p>		

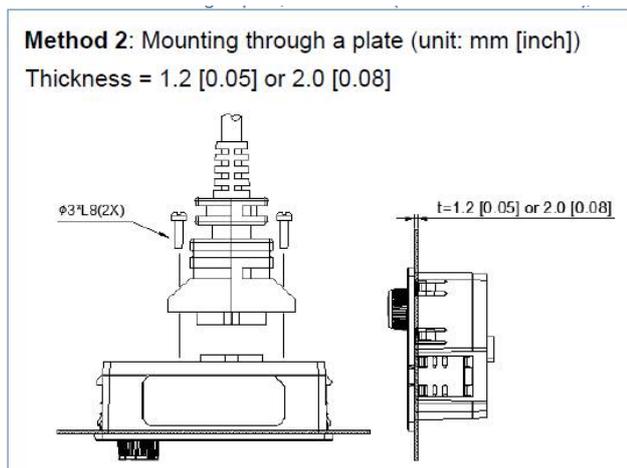
- ❑ Pr.02-58 is used together with Pr.02-34 and multi-function out set to 42_of (Pr.02-13, Pr.02-16, Pr.02-17).
- ❑ When, after STOP command, output frequency (H) <Pr.02-58, the multi-function output de-activates.
- ❑ When using MO=42, Pr02-58 must be <Pr02-34.

Q How to set pulse train frequency command?

- A** Set the following parameters to use a pulse train as frequency command:.
- Pr02-07=0 (MI7 no function, therefore can be used for pulse train input.)
 - Connect a 24VDC pulse train signal to MI7 (PNP or NPN depending on wiring).
The max. frequency on MI7 is 33kHz.
 - Pr00-20=4 (pulse input without direction)
Note: direction via terminals or keypad
 - Pr10-00=5 (pulse input MI7)
 - Pr10-16=5 (single phase input MI7)
 - Pr10-01 for frequency relationship:
E.g. Pulse train f=0~10kHz. Pr10-01=100. Then Fout (H)= f/100
Note: F_{max} must be $\geq f/100$

Q What is the IP of the keypad?

- A** If the keypad is mounted through a plate, like below, it is IP40.



Q Why is MS300 unstable at 0Hz frequency command?

- A** When the frequency command is 0Hz, the drive goes in standby mode. Any noise on the analogue input can keep the drive switching between RUN and standby.
- Pr00-21=1 Operation command via terminals

In firmware **1.05** 3 additional settings were introduced for Pr02-00.

Pr. 02-00	Control Circuits of the External Terminal	
Setting value: 1 2-wire FWD / STOP REV / STOP		M11 *OPEN*: STOP *CLOSE*: FWD M12 *OPEN*: STOP *CLOSE*: REV DCM M300
Setting value: 2 2-wire RUN / STOP FWD / REV REV / FWD		M11 *OPEN*: STOP *CLOSE*: RUN M12 *OPEN*: FWD *CLOSE*: REV DCM M300
Setting value: 3 3-wire		M11 *CLOSE*: RUN M13 *OPEN*: STOP M12 REV/FWD: *OPEN*: FWD *CLOSE*: REV DCM M300
Setting value: 4 2-wire Quick Start		M11 *OPEN*: STOP *CLOSE*: FWD M12 *OPEN*: STOP *CLOSE*: REV DCM M300
Setting value: 5 2-wire Quick Start		M11 *OPEN*: STOP *CLOSE*: RUN M12 *OPEN*: FWD *CLOSE*: REV DCM M300
Setting value: 6 3-wire Quick Start		M11 *CLOSE*: RUN M13 *OPEN*: STOP M12 REV/FWD: *OPEN*: FWD *CLOSE*: REV DCM M300

Select 4-5-6 instead of 1-2-3 to avoid this problem.

The response with these settings is faster and with higher initial output voltage.

► Pr00-21≠1 Operation command **not** via terminals

- Select Pr03-50≠0.

- **Using AVI or ACI:0~10V:**

Set Voltage Lowest Point to 1V (Pr03-57 or 03-63).

Set Proportional Lowest Point to 10% (Pr03-58 or 03-64).

- **Using ACI:0~20mA:**

Set ACI Lowest Point to 2mA (Pr03-57).

Set ACI Proportional Lowest Point to 10% (Pr03-58).

With these settings some margins around 0V and 0Hz are set. Please change the values if needed.

In firmware 1.06 this problem is solved and selecting Pr02-00 settings 4~5~6 is not needed anymore for solving this problem.

Q How to calculate and set the OPL level?

A In Pr06-47 the trigger level for Output Phase Loss is set as a percentage of drive rated current =100%. If one the output phase currents >Pr06-47*Rated current for Pr06-46 time, OPL fault is generated. Please see the example below.

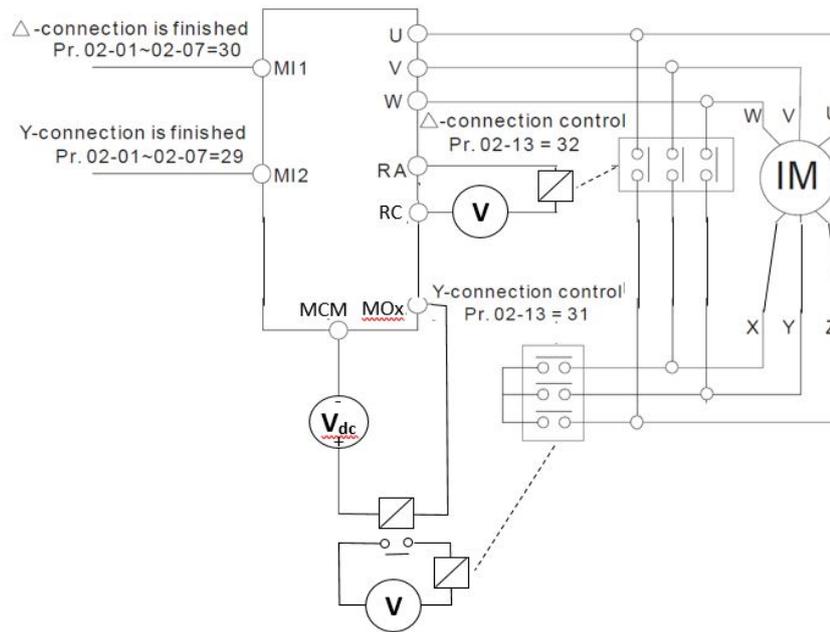
VFD rated current: 10A

Pr06-47=10%

One of three phase current < 1A for >Pr06-46 time, OPL is generated.

Q How to wire for Y-Δ switch-over?

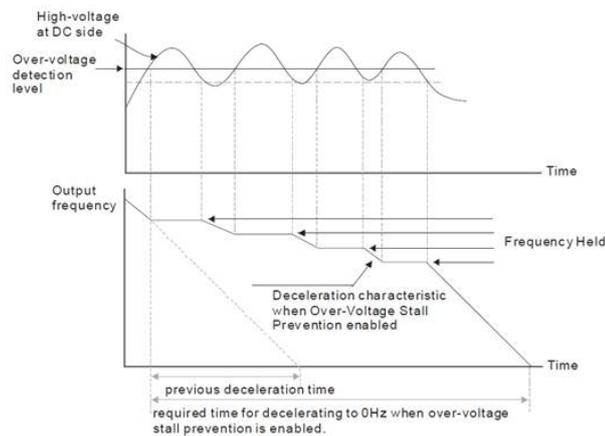
A The picture as shown for Pr05-25 in the user manual is for indication only and is not complete. Here's how it should be connected.



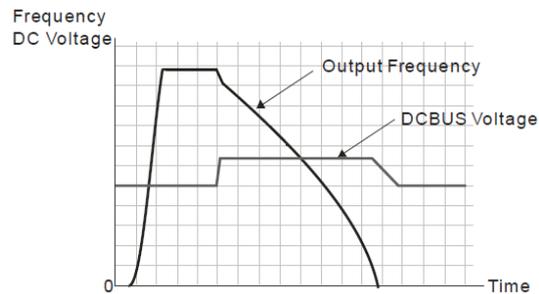
This applies also to C/CP/CFP2000.

Q What is the difference between the Traditional OV stall prevention (Pr06-02=0) and the Smart OV stall prevention (Pr06-02=1)?

A Over Voltage stall prevention is a function commonly used in applications where the goal is to decelerate the motor as quickly as possible without using a braking resistor. To enable this function parameter Pr06-01 needs to be $\neq 0$. In traditional OV stall, during deceleration the drive will maintain the output frequency at a constant level when $VDC > Pr06-01$. When $VDC < Pr06-01$ the drive will always follow the same slope to decelerate ($Hz/s = \text{constant}$)



In smart OV stall, during Acceleration/Deceleration/Normal state, the drive will maintain and/or increase the output frequency when the $VDC > Pr06-01$. When $VDC < Pr06-01$ the drive will change the slope by which it decelerates (Hz/s not constant). In this mode the drive will calculate a new deceleration slope with the aim of maintaining a stable DC bus voltage. It will therefore ignore the deceleration ramp (Pr01-13) and the 4th S ramp (Pr01-27).



When smart OV stall is used it is recommended to also set Pr01-49=1.

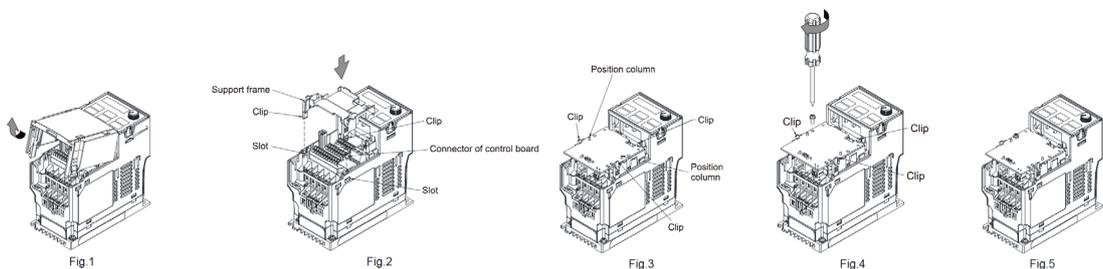
Q How does Pr00-02=8 work?

A Pr00-02=8 works differently on MS300 than on VFD-E. When Pr00-02=8 is set, the keys **RUN**, **STOP**, **▲** and **</▼** do not work. When parameters are entered via ENTER the keys **▲** and **</▼** can be used to change parameter and settings.

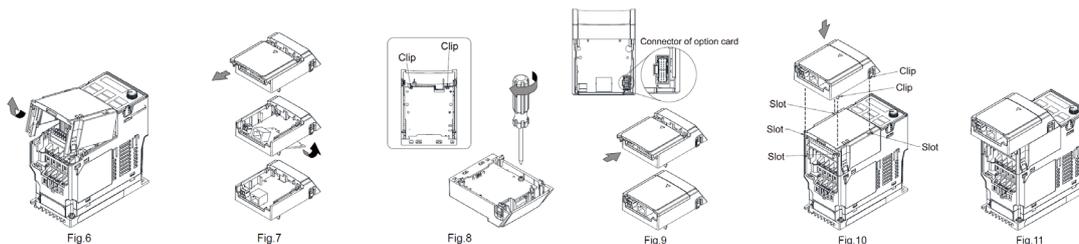
Q How to install a fieldbus option card on MS300?

A There have been some changes, please refer to MS300_Comm card_installation.pdf, which is available on our ftp-site (Industrial Automation Products\AMD-Options\AMD Fieldbus options).

Mounting position 1 (Frame A~F)



Mounting position 2 (Frame A~D)



Cable

Three types of cable length are available. As shown in the Fig.14, there are numbers on the two ends of the communication cable near the connector. The connection methods of option card of different frames are shown in the table below. Read the wording and numbers on the cables before wiring.

Frame	Mounting Position 1		Mounting Position 2	
	Connect to control board connector	Connect to option card connector	Connect to control board connector	Connect to option card connector
A	1	2	3	4
B	1	2	3	4
C	3	4	3	4
D	5	6	5	6
E	3	4	3	4
F	3	4	3	4

Number 1, 3, 5:
Connect to control board connector

Number 2, 4, 6:
Connect to option card connector

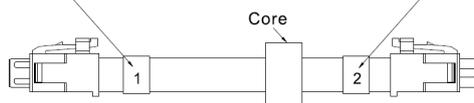


Fig.14

Q Why do I get LV-error even if the voltage is >LV-level (supplying 230VAC to a 400V drive)?

A In Pr06-00 you can set the LV-level. For a 400V drive, the minimum setting value is 300VDC. When the drive is supplied with 230VAC, the DC-bus voltage is around $230 \times \sqrt{2} = 325V_{DC}$ which is higher than 300V_{DC} so LV is not expected.

But in order to “cancel” LV, the DC-bus voltage must become $>(\text{Pr06-00} + 60V_{DC}^*)$ which in this case never happens. Therefore LV stays and cannot be reset.

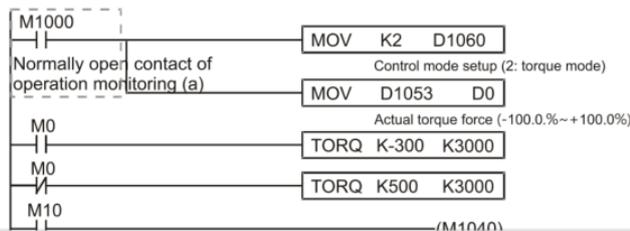
Note: For 230V drives, this value is +30V_{DC}.

Q How to use the TORQ command in the PLC?

A The TORQ command works in the same way as in C2000.

API 263	TORQ										P	(S1) (S2)	Drive torque control mode		
Bit device			Word device										16-bit command (5 STEP)		
X	Y	M	K	H	KnX	KnY	KnM	T	C	D	TORQ	Continuous execution type	TORQ P	Pulse execution type	
S1			*	*						*					
S2			*	*						*					
Notes on operand usage: none															
32-bit command															
Flag signal: M1063															

- Explanation**
- (S1): Torque command (numbered, no more than one digit). (S2): Speed limit.
 - The TORQ command can control the drive torque command and speed limits; it also uses special register control actions, such as:
M1040: Controls Servo On/Servo Off. When Servo is ON, if a TORQ command is executed, the torque will output the torque defined by the TORQ command, and the frequency restrictions will similarly be controlled by the TORQ command.
- Example**
- M1040: Control Servo On/Servo Off. M1063: set torque attained. D1060 is the mode controls. D1053 is the actual torque.
 - When M0=Off, set the drive torque command K+500 (+50.0%), rotational speed restrictions is 3000 (30Hz).
 - When M0=On, sets the drive torque command K-300 (-30.0%), rotational speed restrictions is 3000 (30Hz).
 - When M10=On, drive began output torque command.
 - When set torque is attained, M1063 will go On; this flag usually jumps continuously, however.



ME300

Q What class and motor cable length for the ME300 built-in filter?

A 230V 1phase: Class C2 20m shielded motor cable.
400V: Class C3 30m shielded motor cable.
Carrier frequency can be over the whole setting range.

Q Is the STO certificate valid when I install the option card EMM-SAF01?

A No. The STO certificate is only valid for ME300 models with pre-installed STO option: VFDxxxMExxAxSAA. However, the STO functionality is exactly the same when you install EMM-SAF01 later yourself.

VFD-ED

Q How to connect the encoder in case of non-differential signals?

A If the encoder only has non-differential output signals A1, B1, and Z1, please do the following:

Connect the encoder signals to the inputs A1, B1, and Z1.

Connect the unused inputs /A1, /B1, and /Z1 to DCM to avoid interference problems.

EMC-PG010

Q How to connect an encoder with OC outputs to EMC-PG010?

A The encoder outputs A, /A, B, /B, Z, /Z should be connected to the following pins of EMC-PG010: A1, /A1, B1, /B1, Z1, /Z1 respectively. Because these inputs do not have an internal pull-up resistor, it is necessary to connect them externally from each input to VP.

VP=12V R= 680Ω~1.2kΩ ½W

VP=5V R= 330Ω~470Ω ½W

Brake Units

Q What happens on BUExxxxx when the MASTER-SLAVE switch is set to SLAVE and only one brake unit is connected?

A If you use one braking unit and set the switch to SLAVE, it means there is no signal to control the braking unit. Therefore, there will be no braking action. When the DC-bus voltage (P-N) is too high, the drive and/or the brake unit may be damaged.

Q What is the braking voltage when all dipswitches are OFF on a BUExxxxx ?

A When you set all dip-switch OFF, the voltage is equal to 190V_{AC} (380V_{AC}). It is shorted by inside circuit. It means dip-switch 190V_{AC} (380V_{AC}) is always ON for safety concerns.

Q What is the purpose of the Master-Slave switch?

A On BUE20015 (and other BUE and VFDB brake units) the master-slave switch is used whenever you need 2 units on one drive.

The dipswitch Master-Slave tells the unit if it is used as master or slave. When it is used as the master, it responds to the DC-bus voltage. When it is used as the slave, it responds to slave input (S1-S2) which has to be connected to the masters M1-M2 output. In case only one brake unit is used, leave it at Master position, which is the factory setting.

CMM-EIP01

Q What is the meaning of the LEDs on CMM-EIP01?

A The explanation in the MS300 manual is not complete.

Name	Indicator	Status	Correction Actions
NET1 (NS)	Red and Green flashing alternately	The product under itself test	n/a
	Red Light ON	IP address conflict	Check the IP address setting.
	Green Light ON	Network connection in normal status	n/a
	Red flashing	Network timeout/disconnected/changing IP	Check the Network setting.
	Green flashing	Network in operation	n/a
	OFF	Network not connected	Check if network cable has connected
NET2 (MS)	Red and Green flashing alternately	The product under itself test	n/a
	Red Light ON	The product has a un-recoverable issue	Hardware issue, please contact the distributor.
	Green Light ON	The product parameters have been set.	n/a
	Red flashing	The product has a recoverable error.	Check the parameter setting.
	Green flashing	The product parameters have not been set.	Set parameters.
	OFF	No power supply	Check the power supply

The 2 yellow LEDS are for engineering purposes and can be disregarded by the user.

AFE Series Active Front End

AFE2000

Q To reduce harmonics we want to use AFE2000. We do not need regeneration; do we still need the input reactor?

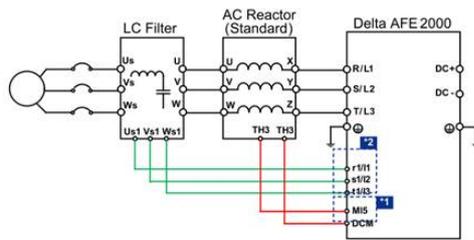
A Yes, AFE2000 does not only reduce harmonics, correct the power factor and regenerate braking energy back into the mains power supply, but also stabilises its DC output voltage. For all these functions the reactor is necessary (think of it as a switched-mode power supply).

Q How to connect the AFE LC filter?

A Refer to the **AFE** user manual (which user manual?)

LC Filter Wiring Diagram

The AFE LC filter enhances system power efficiency and suppresses frequency interference when matched with standard reactors and active front end units.



*1 Delta's AC reactor (standard installation accessory) is equipped with a thermal protection function. The TH3 terminal will have the AFE2000 send out a warning message when the reactor temperature exceeds 120°C.

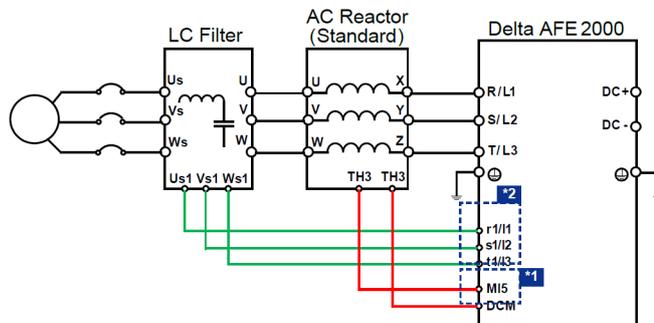
*2 For installing an LC filter, please connect the AFE's power input terminals (r1/I1, s1/I2, t1/I3) to the LC filter's AC detection terminals (Us1, Vs1, Ws1).

Q Why do we get ocn fault?

A When the recommended LC-filter is used, please connect r1,s1,t1 to the LC-filter Us1,Vs1,Ws1 and not to the RC reactor so the AFE can lock to the mains..

LC Filter Wiring Diagram

The AFE LC filter enhances system power efficiency and suppresses frequency interference when matched with standard reactors and active front end units.



*1 Delta's AC reactor (standard installation accessory) is equipped with a thermal protection function. The TH3 terminal will have the AFE2000 send out a warning message when the reactor temperature exceeds 120°C.

*2 For installing an LC filter, please connect the AFE's power input terminals (r1/I1, s1/I2, t1/I3) to the LC filter's AC detection terminals (Us1, Vs1, Ws1).

Q Does AFE start running if MI1 is active at power on?

A Yes.

Q Which fuses are recommended?

A Each drive must be fused at the DC-bus terminals. Please select the fuse value acc. to $(AC \text{ rated input current}/0.78)*1.5$. We recommend to use fast DC fuses.