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1 FAQ

1.1 VFD-series AC Motor drives

1.1.1 VFD series

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

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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 set up serial communication for VFD?

A Please ask for the [application note "Serial communication.pdf"](#). It shows how to make the hardware connection and how to set up the CVFD communication program on your PC.

Q How to dimension brake resistors for VFD?

A Please ask for the [application note "Dimensioning brake resistors.pdf"](#).

Q Can 2 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 RS485 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 RS485.

This is an extra attention point that has to be taken into account when setting up serial communication.

Q Which VFD-B, VFD-F, VFD-V, and VFD-VE have brake chopper built-in?

A Up to Frame size C they have brake chopper built-in.

For **VFD-B** it means up to VFD110B43A (11kW).

For **VFD-F** it means up to VFD150F43A (15kW)

For **VFD-V** it means up to VFD110V43A (11kW). This applies to the VFD110V43**B** which has Frame size C dimensions. Previously it was up to VFD075V43A. The VFD110V43A has no brake chopper built-in because it has Frame size D dimensions.

For **VFD-VE** the situation is the same as for VFD-V. It means up to VFD110V43A-2 (11kW). This applies to the VFD110V43**B-2** which has Frame size C dimensions.

The VFD110V43A-2 has no brake chopper built-in because it has Frame size D dimensions.

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

A On our ftp-site you can find for each VFD drive series a folder with 2D CAD drawings, both in .dwg and .pdf format. For easy downloading there's also one .zip file per VFD series.

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.

Example:

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** (Folder: AMD/General VFD/VFD-

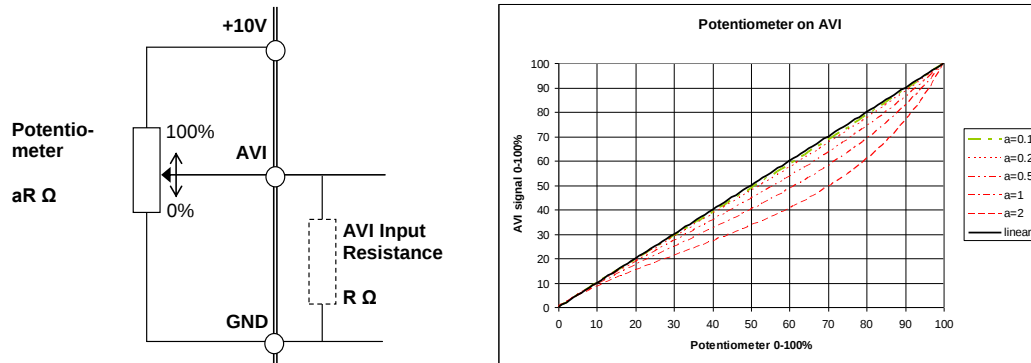
General Applications) which you can download from our ftp-site:

<ftp://den-eindhoven.BuPd2175@ftp2.euro.delta-corp.com/deltronics-eindhoven/customer-service>

Q
A

How to select the potentiometer for the AVI analogue input?

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.

And 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 $47k\Omega$.
- 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 $3.3k\Omega$ and $4.7k\Omega$ gives a linear response and will not overload the 10V terminal (if $a \leq 0.2$ is accepted, then a potentiometer between $3.3k\Omega$ and $10k\Omega (=47k\Omega/5)$ can be used).

Q
A

Which parameters must be set to use the built-in brake chopper?

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-B	VFD-E	VFD-F	VFD-M	VFD-S	VFD-VE	VFD-VL	C2000
Disable OV stall prevention	Pr06-00=0	Pr06-00=0	Pr06-00=0	Pr25=0	Pr06-00=0	Pr06-01=0	none	Pr06-01=0
Set level	Pr08-17	Pr08-19	Pr08-19	Pr143	Pr08-16	Pr07-00	Pr07-00	Pr07-00

Q
A

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

4-20mA sensors have 2 terminals and “source” the current into the input. They need normally a minimum voltage drop of ca. 8VDC.

On Delta drives the input impedance of 4-20mA inputs is 250Ω (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 5VDC.

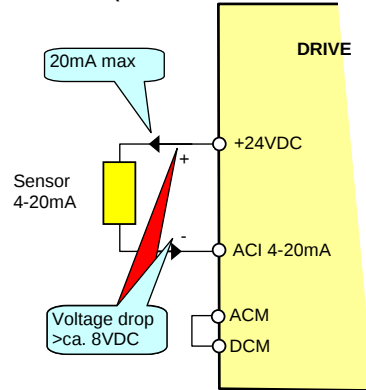
So the total supply voltage must be $\geq 13VDC$ ($5VDC + 8VDC$).

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

Internal power supply

In general the 24VDC 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 24VDC 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):

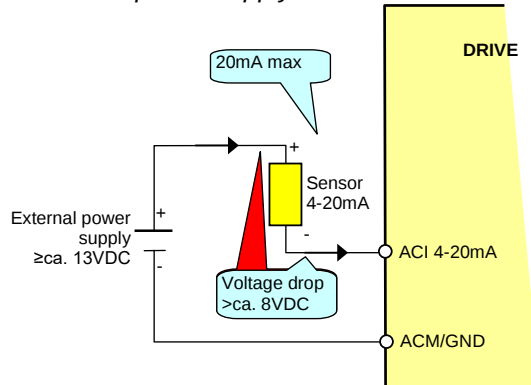


External power supply

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

For other drives an external power supply can be used.

The external power supply must be connected as follows:



Q
A

What are the available control modes in the different drives?

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 Vector	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 for	OK		OK				
PM Sensorless for	OK		OK				
TQC Sensorless for	OK		OK				

- For C200 some control modes are still under test.

Q
A

What is the slip compensation parameter?

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

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

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 $(\text{Rated_Slip}) * (\text{Slip_Compensation})$

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 $(\text{Slip_Compensation})$

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

Q In VFD-S is it possible to activate the brake resistor manually, e.g. by digital input?

A No, in VFD-S (and all our drives) it is not possible to switch the brake resistor manually.

Q How to read the drive series by serial comm?

A You can read register 2110h to obtain the series and model.

The High Byte is the VFD series identification:

VFD M=0

VFD-S=1

VFD-B=2

VFD-L=3

VFD-V=4

VFD-F=5

VFD-E=6

VFD-E-C=7

VFD-EL=8

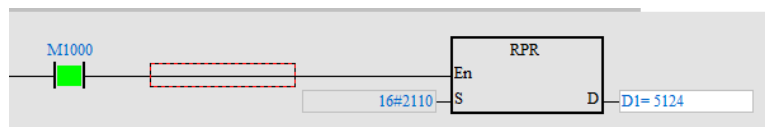
VFD-VL=9

C2000=20

CP2000=21

C200=25

The Low Byte is the Model information as in Pr00-00.



2110h contains 5124d=0001.0100-0000.0100b

So, high byte in decimal is 20d that means it's a C2000 series drive.

Low byte is 4d and that means it's a 0.75kW 230V model.

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

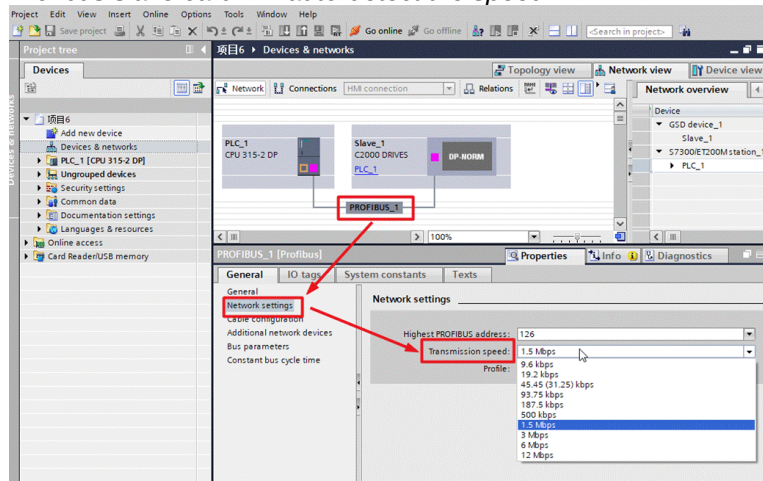
A - In VF Mode the maximum output frequency is **599Hz**.

- 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 $(F_{set} + Pr10-29) \leq 599\text{Hz}$, 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?

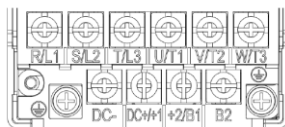
A We often get questions about the power cable cross section that is needed in an application and the relevant info in the user manuals.

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

Frame B



Models	Main Circuit Terminals R/L1, S/L2, T/L3, U/T1, V/T2, W/T3, DC-, DC+/M1, +2/B1, B2		
	Max. Wire Gauge	Min. Wire Gauge	Screw & Torque (±10%)
VFD0A8ME21AFNAA VFD0A8ME21AFSAA		0.75mm ² [18AWG]	M4 15 Kg-cm [13.0 lb-in] [1.47 Nm]
VFD1A8ME21AFNAA VFD1A8ME21AFSAA		1.5mm ² [16AWG]	
VFD2A8ME21AFNAA VFD2A8ME21AFSAA		2.5mm ² [14 AWG]	
VFD4A8ME21AFNAA VFD4A8ME21AFSAA		4 mm ² [12 AWG]	
VFD4A8ME21AFNAA VFD4A8ME21AFSAA	4 mm ² [12 AWG]		
VFD7A5ME23ANNA VFD7A5ME23ANSAA			
VFD1A5ME43AFNAA VFD1A5ME43AFSAA		0.75mm ² [18AWG]	
VFD2A7ME43AFNAA VFD2A7ME43AFSAA			
VFD4A2ME43AFNAA VFD4A2ME43AFSAA		2.5mm ² [14 AWG]	
VFD4A2ME43AFNAA VFD4A2ME43AFSAA			
VFD4A2ME43AFNAA VFD4A2ME43AFSAA			
VFD4A2ME43AFNAA VFD4A2ME43AFSAA			
VFD4A2ME43AFNAA VFD4A2ME43AFSAA			
VFD4A2ME43AFNAA VFD4A2ME43AFSAA			
VFD4A2ME43AFNAA VFD4A2ME43AFSAA			
VFD4A2ME43AFNAA VFD4A2ME43AFSAA			

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 $>4\text{mm}^2$).
- Short cables or cable for lower current can be thinner (but in this case not $<0.75\text{mm}^2$).

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.

Q Pr00-22=0 Coast to Stop. Why do we get ovD error?

A Coasting happens only when the drives receives a STOP command.
If the load has high inertia and you give a frequency command lower than the actual frequency then it does not matter that the drive is set to coast. The drive will still follow the programmed deceleration ramp to get to the new frequency command and if the regenerated energy is too big then it will trip on ovD.

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.

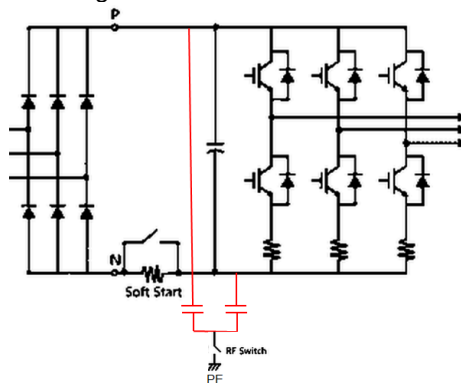
If you use 400V drives, you should select them based on the motor's rated current.

Q Preset speeds and master frequency via Modbus

A When Frequency command by RS485 and preset speeds are active all drives will accept a change of the master frequency via RS485 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?

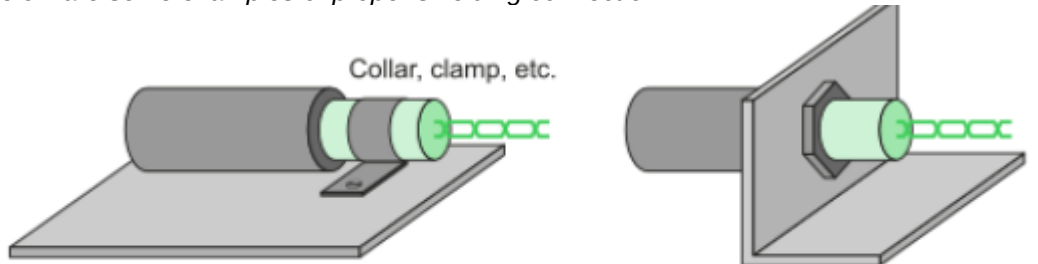
A When you use a brake resistor (brake chopper built-in or external brake unit) you have to **disable** OV-stall prevention. It will interfere with the braking action, resulting in longer deceleration ramps than expected.

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.

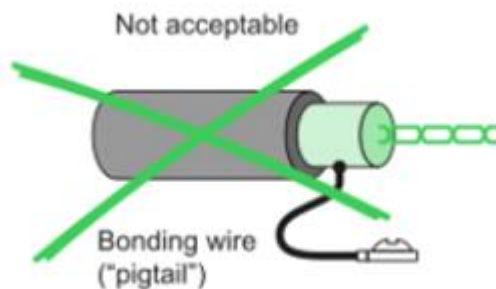
Below are some examples of proper shielding connection:



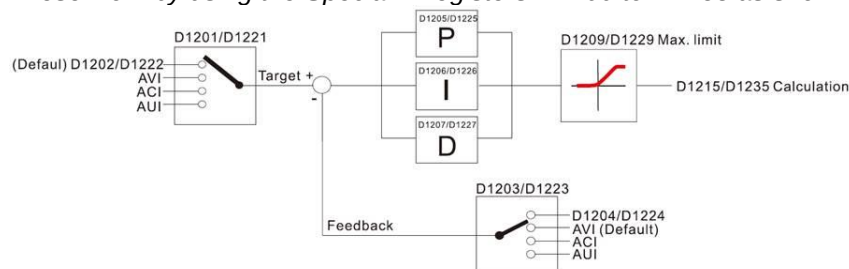
This should be on the same metal plane with the VFD

Use a metal gland to connect the shield to the motor case

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:

Folder: Customer-Service\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.

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

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		
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		

1.1.2 VFD-V

Q What is the difference between Process Control Operation Mode (Pr04-33) and Multi-Step Speed Operation Mode (Pr04-34).
A Pr04-33 (Process Control Operation Mode) sets the operation control using the multi-speed steps and duration. It is enabled/disable via a digital input (Pr02-01~02-06=22 and/or 23). Pr04-34 (Multi-step Speed Operation Mode) sets the operation control using the multi-speed steps, which are selected by the digital inputs (Pr02-01~02-06=1,2,3,4).

Q In Pr08-00 you can select PID terminal. If you select Pr08-00=4 or 5, where does the clock signal come from?
A The clock signal comes from the PG-card.

Q I want an output signal when the current is above a certain value? How?
A The VFD-V has no direct setting for this function for the outputs Pr02-11 to 02-14.

The OL3 warning can, however, be used to realize this function.

Pr02-11 to 02-14 = 69 to select OL3

Pr06-09 = 3 for detection during operation and continue after detection

Pr06-10 = xxx% acc. to the desired level (100% means rated drive output current)

Pr06-11 = xxx sec acc. to the desired detection time

(too low value gives maybe nervous output switching around the set current level,
too high gives delayed response)

Q Is it possible to switch between Speed Control and Torque Control via a Digital Input?

- A *No, this can't be done. To change between Speed Control and Torque Control you need to change Pr00-10.
Note: With VFD-VE it is possible!*

1.1.3 VFD-B

- Q Can VFD-B be used for hi-speed operation, e.g. for spindles?**
A *Yes, with firmware 4.08 it is possible to operate VFD-B up to 2000Hz.
Please ask for the application note "VFD-B high-speed.pdf."*
- Q Can the EF input be used as a PTC input?**
A *The EF input of VFD-B (and also all other drives) cannot be used to connect a PTC. It is a digital input with only an "on" and "off" state.
It can, however, be used to connect a clixon.

(VFD-E is the first Delta drive with a true PTC-input.)*
- Q Can the Modbus addresses 2203H, 2204H and 2205H be read, even if the analogue inputs AVI, ACI, and AUI respectively, are not used?**
A *Yes, this is possible. They can always be read.*
- Q Mode "H" doesn't show the actual output frequency. Why not?**
A *If Pr00-05 is set to e.g. 2.00, the output frequency in MODE "H" is displayed as 2x Frequency command when RUN. For example if F=50.00, then H shows a value 100.00. This is not right, MODE "H" should show actual output frequency independent of Pr00-05 setting. It will be corrected in the next firmware.*
- Q How can I switch over between potentiometer on AVI and 0-10V signal on AUI?**
A *Set one of Pr04-04 to Pr04-09=22 to use a digital input MI1~MI6 to select AVI or AUI. (Pr02-00 and Pr02-13 are disabled in this case). See also the user manual.*
- Q Is there a parameter in VFD-B to show the time the drive has been powered?**
A *No, there are only parameters to show the total RUN time, Pr07-14 (minutes) and Pr07-15 (days).*
- Q EF-input: NO or NC ?**
A *The designated EF-input is always NO which cannot be changed.
To have an EF-input that is NC, please set one of the digital inputs MI1~6 (Pr04-04 to 04-09) to 19=Emergency Stop (NO) or 20=Emergency Stop (NC). When activated, the display shows "EF1" and after clearing the fault or deactivating the input you can perform a RESET.*
- Q Can we do master slave with the B drive**
A *No, not possible. PG02 doesn't have a Channel 2 input for pulse signals, nor the required parameters.*
- Q How to read MI status and MO status via Modbus?**
A *This info is not in the user manual and is only applicable to the latest firmware.
2207hex is same as Pr04-26 (MI) in VFD-E*
- | b15 | b14 | b13 | b12 | b11 | b10 | b9 | b8 | b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0 | |
|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0 | 0 | 0 | 0 | 0 | 0 | EF | REV | FWD | TRG | JOG | MI6 | MI5 | MI4 | MI3 | MI2 | MI1 |
- 2208hex is as Pr03-13 (MO) in VFD-E.*

1.1.4 VFD-F

- Q Can PU06 be used with VFD-F?**
A *Yes, the PU06 can also be used with VFD-F series. The PU-06 is the copy keypad and can be used to read/write/save parameters for all VFD-series except VFD-L. This is easy when many drives have to identically set up.*

Q VFD-F with PID gives vibrations. Why?

A Set the frequency limit > maximum frequency to give the PID controller some regulation room beyond the maximum frequency. This applies also to the other VFD-series.

Q What does error "PHL" mean and when does it occur?

A Error "PHL" means Phase Loss Error and it is generated when a mains input phase is disconnected.

The PHL error is detected via the DC-bus voltage. The ripple voltage is measured and when it is too high (>60V) and the ripple frequency is 2*50Hz and this lasts longer than 15s, the PHL error is displayed.

In STOP mode, because the output current is 0, the ripple voltage will not be high, so there is no PHL error displayed.

In RUN mode it can happen when the current is high that, when one input phase is missing, the DC-bus voltage drops below the Low Voltage level before the 15s have elapsed. When it trips then on Low Voltage, the output current is 0 and the DC-bus voltage immediately comes above the Low voltage level, this happens within the 15s time frame. In that case you don't get PHL error and also no LV error.

In general phase loss detection via DC-bus voltage is not 100% "waterproof" and all done in software without extra hardware. Unfortunately it shows these disadvantages.

Q What does the fault message "cF3.6" mean?

A If the DC-bus during initialisation is too high or too low, this fault message appears. Please check the mains voltage and if possible, the DC-bus voltage.

Q How to switch NPN/PNP ?

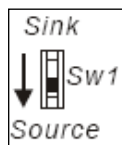
A Refer to manual FE07 Chapter 3.1

Both Basic Wiring Diagrams on page 3-2 and 3-3 contain an error, the position of SW1 is wrong.

On page 3-4 it is correct.



Wrong



Correct

Q How can I read the status of the digital and analogue outputs via serial communication?

A The digital outputs can be read in 83E0h.

The sequence is b15-b0 = x... R1 R2 R3 R4 R5 R6 R7 R8

The analogue outputs can be read as follows:

AFM1: 83D9h (high byte) b15-b8=AFM1, b7-b0=0

AFM2: 83DAh (low byte) b15-b8=0, b7-b0=AFM2

Their ranges are from 00 to FFh.

Q What is 100% current in Pr06-01, Pr06-02 and Pr06-08?

A In these parameters, 100% current is the drive's rated current acc. to the specification table in Appendix A.

Q How to read the values of AVI, ACI1, ACI2 directly via Modbus?

A You can read them at the following addresses:

83C0hex-8301hex AVI AD value (0~1023)

83C2hex-83C3hex: ACI1 AD value (0~1023)
 83C4hex-83C5hex: ACI2 AD value (0~1023)

Q Do VFD1850F43A and VFD2200F43A have built-in AC input reactors?
A Yes, they have. Please refer to the VFD-F datasheet which you can download from our ftp-site.

Q How to read the status of the digital inputs and outputs via serial communication?
A Address 83E0h contains the status of the digital outputs (relays) in a word.
 Format b15~b0 = X X X X X X X R1 R2 R3 R4 R5 R6 R7 R8

Address 83E5h contains the status of the digital inputs in a byte.
 Format b7~b0 = M8 ~ M1

Address 83E8h contains the status of the digital inputs EF, FWD, REV in a byte.
 Format b7~b0 = EF REV FWD X X X X X

1.1.5 VFD-M

Q How to set very short (<0.1s) Acc/Dec times?
A Refer to parameter Pr147.
 Pr.147=00 Acc/Dec time in 0.1s units. Default setting.
 Pr.147=01 Acc/Dec time in 0.01s units.

The setting is valid for Acc/Dec Time 1 (Pr.10 ~ 11) and Acc/Dec Time 2 (Pr.12 ~ 13). It allows Acc/Dec times down to 0.01s.

Q How to clear the status of M2 when 3-wire operation is selected (Pr38=2)?
A When M2 is on (active) when Pr38=2 to select 3-wire operation, M2 keeps its status. To clear this, please power off and on again.

1.1.6 VFD-S

Q How to improve the linearity of the analogue AFM output?
A If a high-impedance voltmeter is connected to AFM, the linearity is influenced at low output. It can be improved by connecting a 5~10kΩ resistor between AFM and GND.

Q Can the digital inputs be used at 24VDC?
A The manual indicates 17V voltage because that is the internal available voltage, which supplies the inputs. It is, however, no problem to use an external 24VDC power supply to operate the digital inputs.

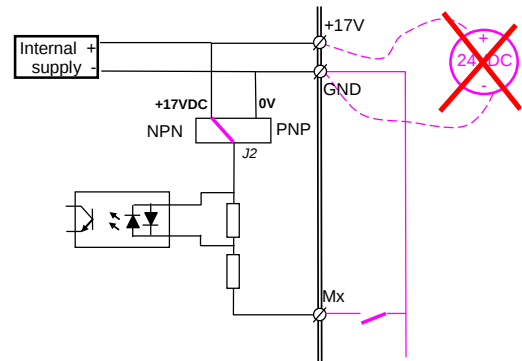
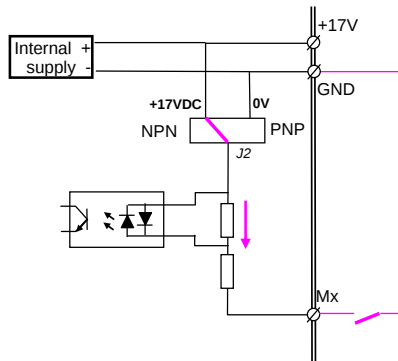
The optocoupler ON current is 1.6mA (the manual indicates 16mA but that is typing error) so if you use $(24V-2V)/1.6mA=13.75k\Omega$ resistors it's OK.
 (The subtracted 2V is for the estimated forward voltage drop over the LED in the optocoupler and you could use 12kΩ, the value is not very critical).

Make sure the 24VDC power supply can supply sufficient current. The Delta DVPPS01 can supply 1A and could be used.

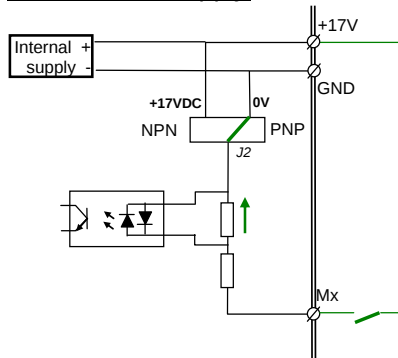
Q Can the digital inputs handle 24VDC and how to connect an external 24VDC supply?
A Yes, the digital inputs M0~M5 can be operated from 24VDC, see the connection diagrams. In NPN mode (see below) it is not possible to use an external supply; it would damage the internal power supply. It wouldn't make sense anyway, since the inputs are switched to GND.

NPN: Internal supply

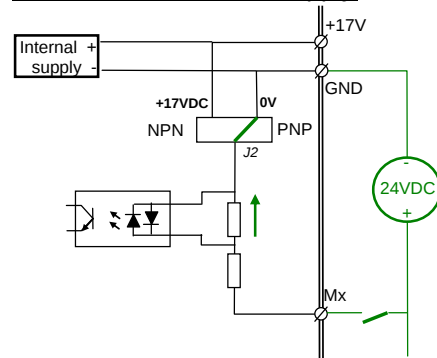
NPN: External 24VDC supply



PNP: Internal supply



PNP: External 24VDC supply



Q When Pr4-08=28, the keys **PROG/DATA** and **MODE** do not work anymore. Why?

A When Pr4-08=28, input M5 is NC and used to select FWD and REV control by the **^** and **v** keys. In that case these keys cannot be used for parameter setting; therefore **PROG/DATA** and **MODE** are blocked. Remember that in this case M5 is NC and if left open, it is active. To unblock them again please close M5-GND and reprogram Pr4-08 or reprogram Pr4-08 via VFDSOft.

Q What is “analog overlap plus” (see Pr2-00) ?

A When Pr2-00≠1or2 (so not AVI or ACI selected) you can set Pr2-06=1 or 2.

When Pr2-06=1, it will add frequency command source from Pr2-00 and AVI

When Pr2-06=2, it will add frequency command source from Pr2-00 and ACI

In both cases still up to F_{max} acc. to Pr1-00 only.

1.1.7 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 On the VFD-E can an option card be used together with a fieldbus option?

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

Q
A

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

Dipswitch 123



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

If you use keypad it's 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. It's 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 dipswitches NPN/PNP?

A Dipswitch NPN/PNP

To select the Digital Inputs to be NPN (sink) or PNP (source).

Dipswitch NPN/PNP=PNP

The Digital Inputs are PNP (source), see manual page 2-10, figure 3.

Dipswitch NPN/PNP=NPN

The Digital Inputs are NPN (sink), see manual page 2-10, figure 3.

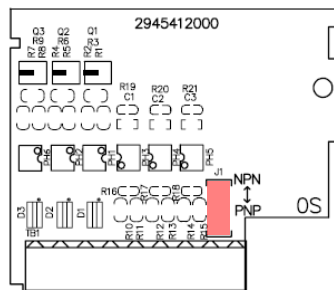
The delivery condition is NPN.



Q Has the option card EME-D33A 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 Parameter group 11 is 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. Remember to switch off power when installing option cards!

Q When I read AVI in a PLC program, it doesn't work for frequency command

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

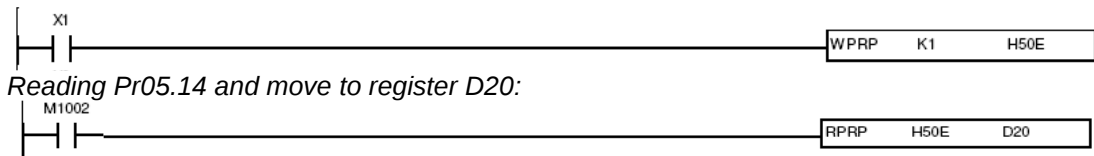
If for example Pr02.00=1 (frequency command via AVI) and AVI is read in the PLC program by reading D1028, then it doesn't work for frequency command anymore. In that case the PLC program needs to include functionality to let the AVI input also function for frequency command.

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

A The VFD-E PLC doesn't have the possibility to save variables at 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 See Pr02-07.

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 Pr00.04=6 shows 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) when Pr04.02=2 to select 3-wire operation, MI3 keeps its status. To clear this, please power off and on again.

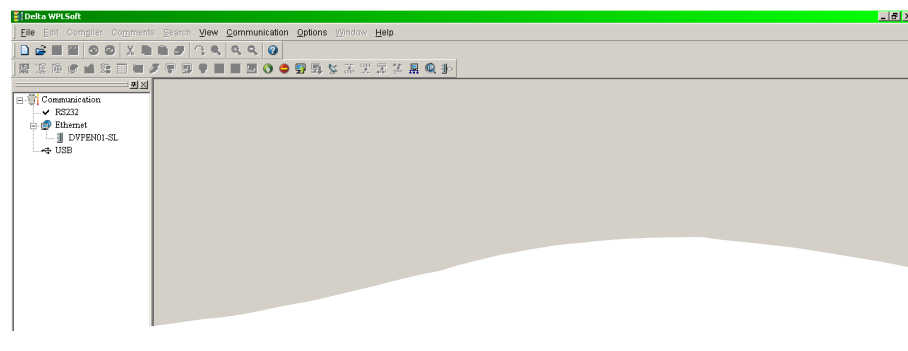
Q

How to connect the new PLC editor WPL2.10 to VFD-E?

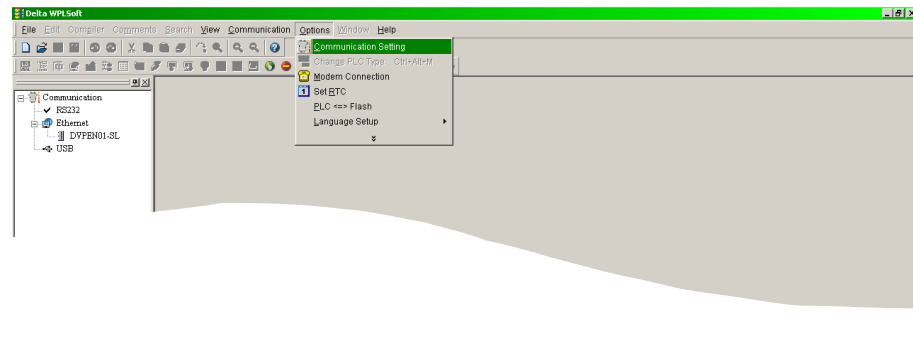
A

If you haven't done so, please download WPL2.10 from our website or from our ftp-site and install it.

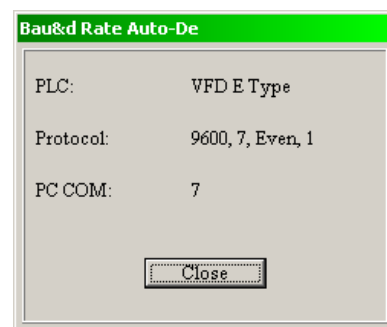
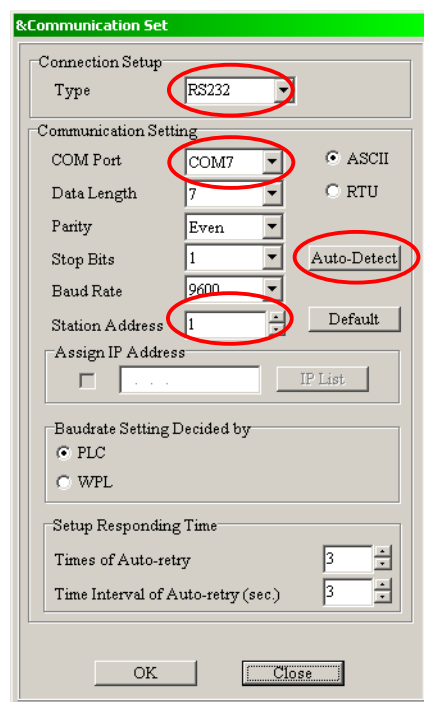
1) Start the program.



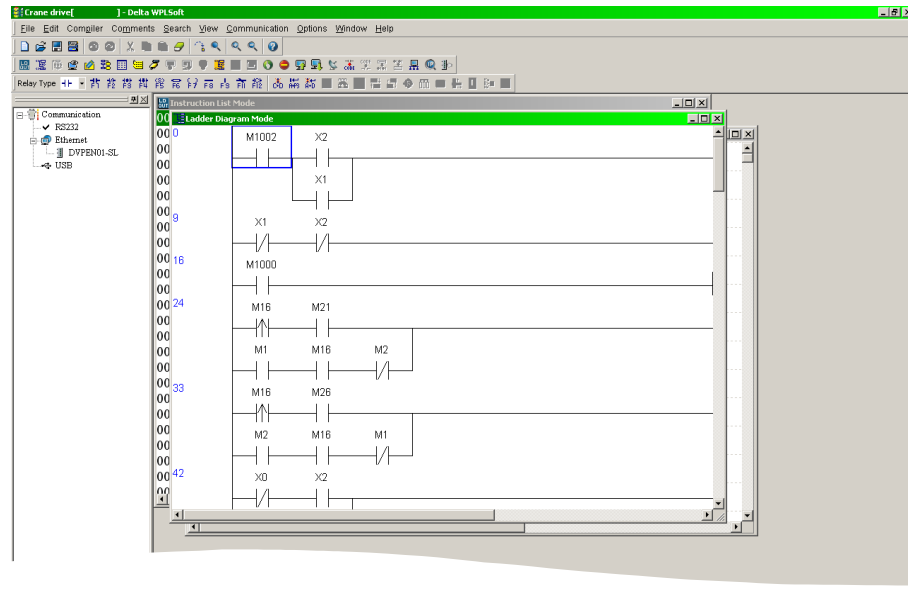
2) Open **Options/Communication Setting**



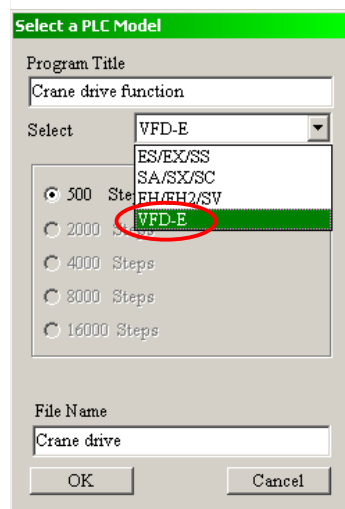
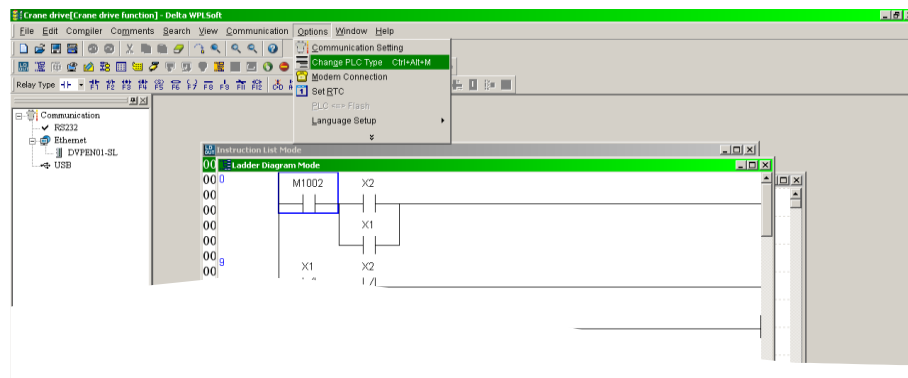
- 3) Select **RS232**, *also if you use VFD-USB01!!*
Make the connection to between computer and VFD-E.
- 4) Select the right COM port, this depends on your computer.
- 5) Select the right Station Address. It must be equal to VFD-E Pr09.00.
- 6) Press Autodetect. The communication settings are now automatically detected and the message as shown on the right appears.



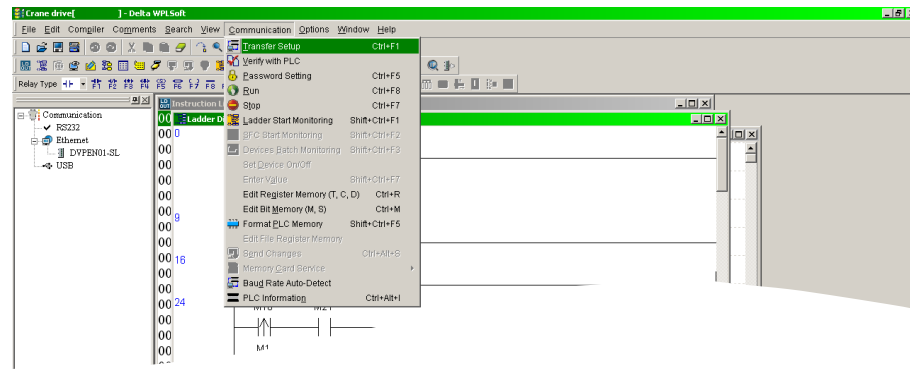
- 7) Open a project with. **File/Open**.



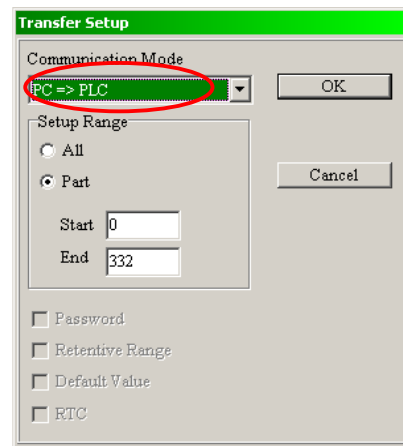
- 8) Select **Options/Change PLC Type** and select **VFD-E** and press OK.
Note: VFRD-Eplus now has 500steps (was 350)



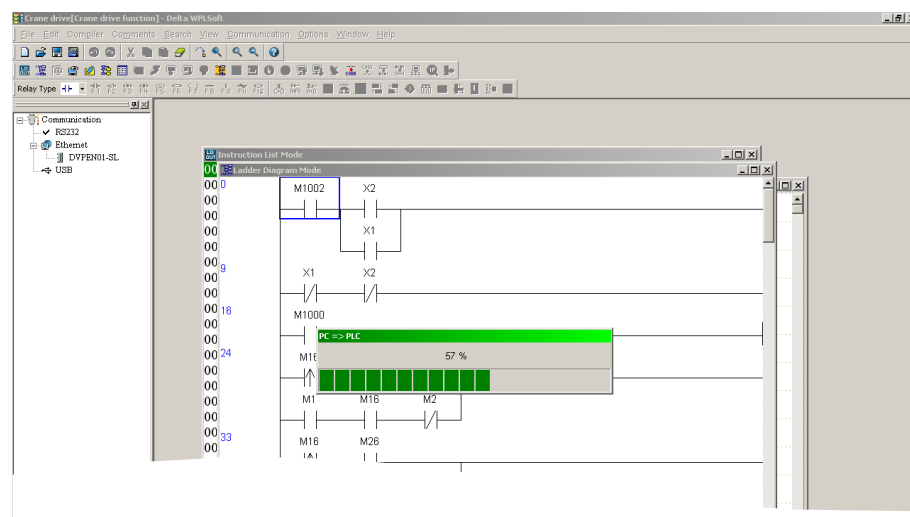
- 9) On VFD-E press the **MODE** key several times until the display shows [PLC0].
 With the **▲** or **▼** keys change to [PLC2] and press **ENTER**.
 VFD-E is now ready to receive a PLC-program.
- 10) Select **Communication/Transfer Setup**.



11) Select PC => PLC and press OK



12) The transfer progress is shown as follows:



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 for further details.

Q
A

Can individual inputs be inverted, so they can be operated from NC contacts?
Yes, refer to the user manual, Pr04-09. Normally they are set for NO (Normally Closed) contacts (input is activated when contact is closed).

Example:

Inputs MI2 and MI5 too be set for NC (Normally Closed) contacts, e.g. when used for EF.
Pr04-09=18 (=010010 binary).

Q Must Pr07-03 Slip Compensation 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.

Of course, 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?

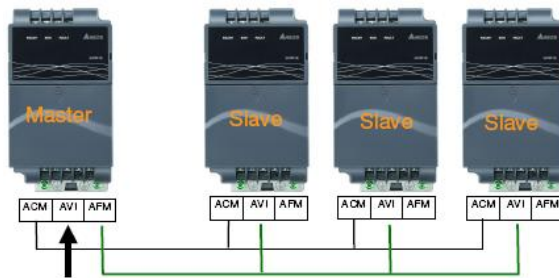
A When VFD-E works in PLC2 mode and OL is displayed, it will be reset after power off/on.

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

A One VFD-E, the master, needs to control 3 VFD-E, the slaves.

The best way is:

Connect the AFM output the master to all AVI inputs of the slaves, which are thus all connected in parallel.



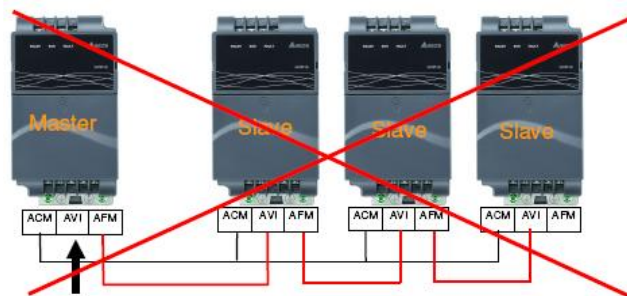
The VFD-E AFM output can do 10V/2mA, so the maximum load resistance is $10V/2mA=5k\Omega$. The AVI input impedance is $47k\Omega$. If you put 3 inputs in parallel, the total resistance is $47k/3=15.67k\Omega$. (Or, each input takes $10V/47k=0.2mA$. Three inputs in parallel take $3 \times 0.2mA = 0.6mA$, well below 2mA).

Best is to tune the AFM output to have exactly 10V at 50Hz (or max freq) by Pr03.04. Then tune each AVI input to give 50Hz at 10V by using Pr04-13 and Pr04-14.

This way gives much better performance and linearity!

The non-recommended way is:

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. Therefore this way is **not** recommended!



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 setting range of Pr03-11 and Pr03-12 ?**
A *The setting range for both parameters is 0.00~20.00Hz, contrary to what's written in the user manual. It will be corrected in the next user manual.*
- Q** **What is the maximum voltage on analogue input AVI ?**
A *The maximum voltage in AVI is 15VDC.*
- 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 Mlx 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
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.
“CP10” means communication error between power board and control board in RUN mode.*
- Q** **The display shows PLSn error. Why?**
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 manual Appendix D, Chapter D6.
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/CANopen CME-COP01/EDS for CME-COP01].*
- 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** **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 (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. 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.
It will be corrected in the next version of the user manual.*
-

Q Register D1029 in the PLC shows wrong info

A This is an error in the manual. When ACI 4-20mA is selected, the range of 4-20mA corresponds to 205-1023. 0-20mA corresponds to 0-1023. It will be corrected in the next version of the user manual.

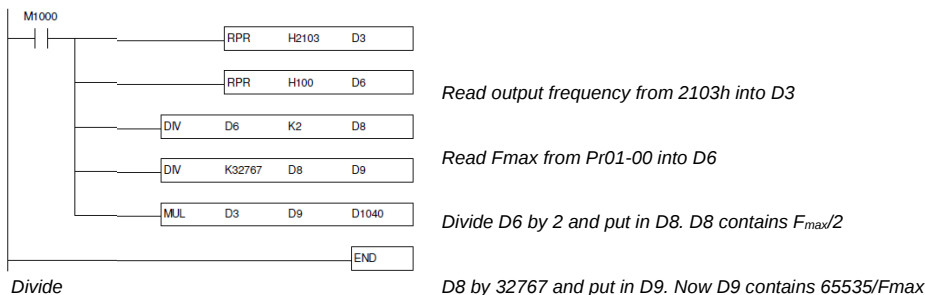
Q How to read a PLC register via Modbus?

A Directly this is not possible but via a "trick" it can be done. 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 speeds 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. E.g. 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:

<i>Bit0</i>	<i>EF on</i>
<i>Bit1</i>	<i>Reset</i>
<i>Bit2</i>	<i>BaseBlock on. (This is not in the manual, it will be updated)</i>
<i>Bit3–Bit15</i>	<i>Unused. When writing, best set to 0.</i>

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 (RS485 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, provided they are not used in their original function of course:

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.

Example:

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?

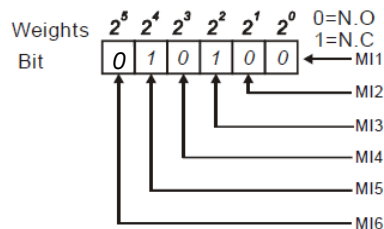
A Normally the digital inputs are activated when the input is closed (to DCM for NPN inputs or to 24V for PNP inputs).

Sometimes it is useful to activate an input when its contact is opened (NC operation), e.g. 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=20same.

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.

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, see Pr03-05 and 03-06, has a maximum input frequency of 250Hz (2ms high, 2ms low).

The hi-speed counter in the PLC uses the signal from the encoder card, it cannot use normal inputs. On page D-23 of the manual (version 07EE) you see that for a single pulse signal the frequency can be 500kHz and for 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 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.

Have also a look at other drives manuals for available types. Remember the total resistance must never be lower than the indicated minimum and the power maybe higher of course

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

A *In the past it was not possible.
In 1.15/2.15 it is possible in a normal way.
Pr04-11=0, Pr04-12=100%, Pr04-13=10, Pr04-14=0.*

Q What is the format of D1029?

A *The format is 0~20mA = 0~1023.*

The manual says 4~20mA but this is wrong. It will be corrected.

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 2 parameters, P09-05 and P09-06, for temporary buffer. The user can use WPR to always write to these parameters. However, these parameters are never written to EEPROM at power off.

Q Is it possible to use CME-USB01 to connect to WPL and at the same time use RS485 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, press and hold the ENTER key for 5 seconds to temporarily unlock the keypad.
Then set Pr00-02=0 to unlock the keypad.*

Or 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 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.

“Restart works perfectly, even with short power interruptions.”

Remark: 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.

Example:

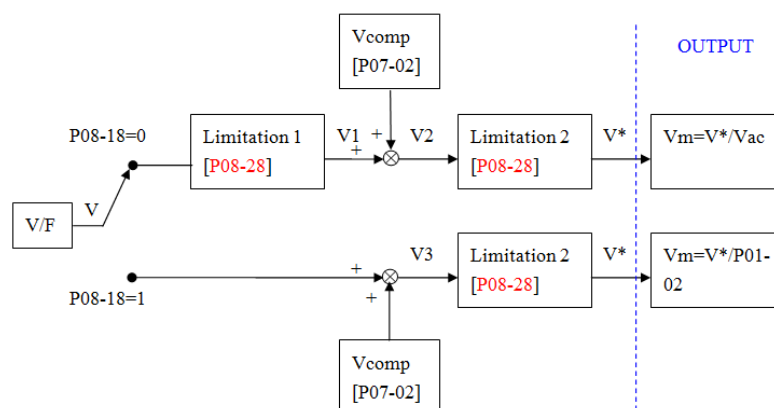
Pr10-12=10%, Setpoint is 50%. When feedback is <40% or >60% a signal is generated after the time in Pr10-13.

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?

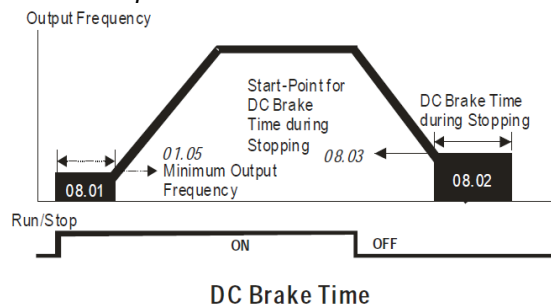
- A *Pr01-17 must be smaller than Pr01-09/01-11.
Pr01-18 must be smaller than Pr01-10/01-12.*

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



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.

In the next manual a note will be made.

- Q When is OH1 (de)activated?**

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

- Q Restart after LV**

- A *In the latest firmware 1.22/2.22 the setting of Pr02-05 has been extended.
When Pr02-05=4, the drive restarts also when powered again during "LV" and also when 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:*

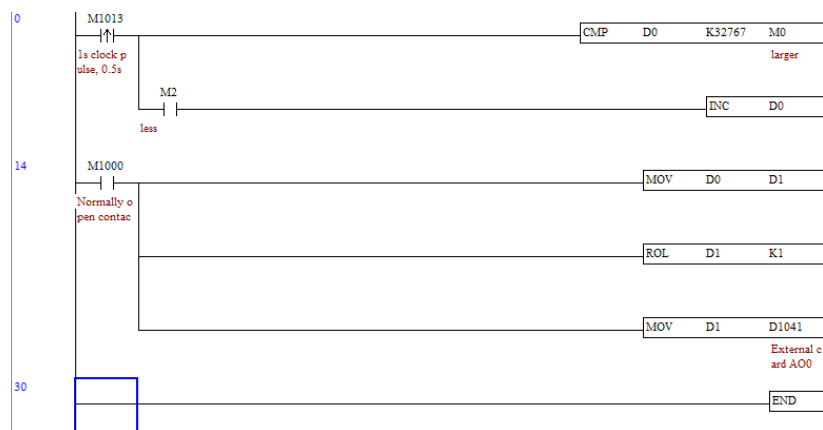
Set switch to 0~10V:

*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's 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 2 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 setpoint can be switched between AVI and Preset1 (value in Pr05-00 and active via MI3)

Q **Preset speeds and master frequency via Modbus**
A When Pr02-00=3 (Frequency command by RS485) and preset speeds 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 RS485 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 RS485.

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

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



Q 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.

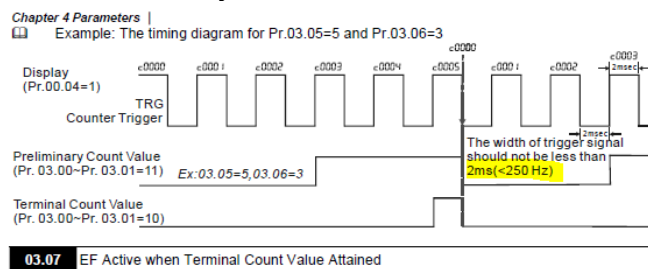
Q VFD-E brake units

A In the 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*				total Braking current (A)	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 ****		Min. resistor value (Ω)	Peak Power (kW)

Q What is the max counting speed on Mlx?

A In the manual it says 250Hz.



This is an error, the max counting frequency is ca. 80Hz. It is limited by the Mlx response time (longer due to 2-CPU structure) plus Pr04-10 setting.

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 it by uploadin a a simple program with only 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 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

36 dEv: unusual PID feedback deviation

10.12	PID Feedback Level	Unit: 0.1
Settings	0.0 to 100.0%	Factory Setting: 10.0
☐ 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
☐ This parameter is used to set detection of the offset between set point and feedback.		
☐ 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.

See also the user manual.

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 however but only the display value is wrong.

It will be corrected in the next firmware

Q Why does Pr07-01 go back to default after power off/on?

A When Pr07-01 is changed it will be set to default value after power off/on. This is a bug in 1.23/2.23 and will be solved in the next version.

Q How does OPL work and which parameters to set?

A See 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	

will be done by DC-braking. Ramping

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

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

"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.

This is

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's 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
A

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

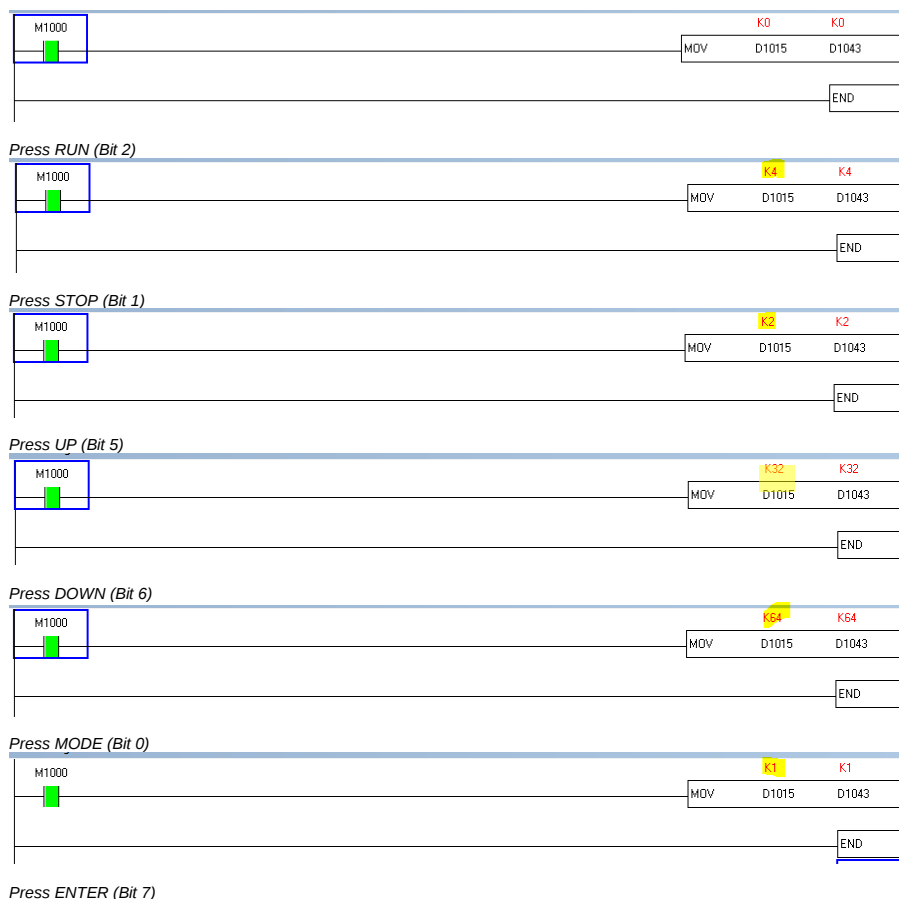
Yes, see D1015.

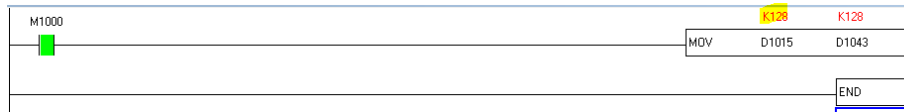
D1015	Keypad Status: Bit0: MODE; Bit1: STOP; Bit2: RUN; Bit5: UP; Bit6: DOWN; Bit7: ENTER;	R
-------	---	---

As long as the button is pressed, the relevant bit in D1015 is set.

The buttons keep their original function.

Example





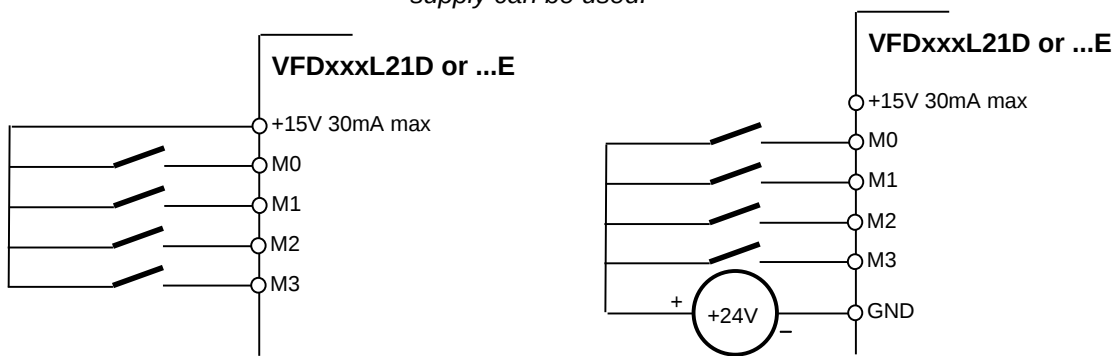
1.1.8 VFD-L

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.



Using internal 15V/30mA supply

Using external 24V supply

Q What does error code “23” mean?

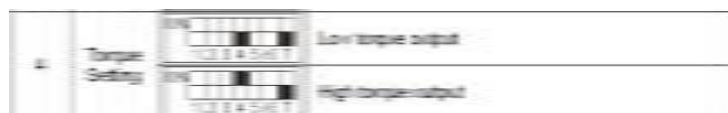
A The fault codes have been extended; this info is not in the manual:

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.

So the solution is always check 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 between A, B, D, E versions of VFD-L?**

A 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 230VAC with a max current of 1A.

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

A VFD-L2



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 manual is wrong:

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.		

This parameter has no function.

1.1.9 VFD-VE

Q

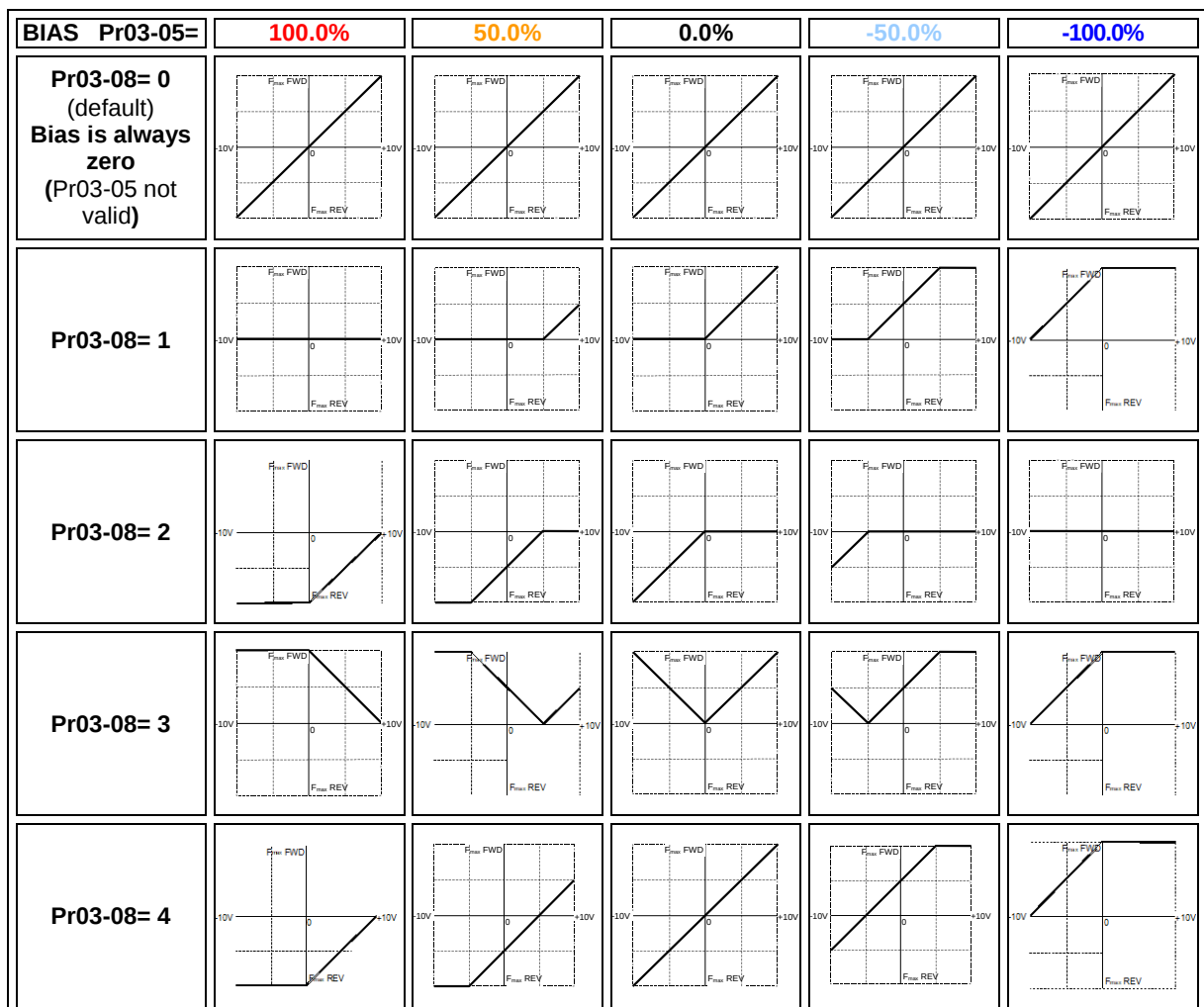
Influence of Bias of AUI

A

To use AUI (-10V to +10V) as frequency command input, please set Pr00-20=2 to select an external Analogue Input and set Pr03-00=0 (AUI no function), Pr03-01=0 (ACI no function) and Pr02-02=1 (AUI Frequency command).

Pr03-05 sets the bias. It is easy to remember that it is like a shift in horizontal direction.

Pr03-08 sets what should happen if the input command is lower or higher than the bias value. Please refer also to the manual.



Q

What is the difference between Mlx (Pr02-0x) settings 11, 12 and 40?

A

Mlx=11: Base Block. When activated, the VFD-VE will coast to stop and go into "bb" status. The display shows "bb". After deactivation it waits acc. to Pr07-08 and performs a speed

search to the set frequency.

Please refer also to the manual, Pr07-08 to 07-10.

Mlx=12: Output stop. When activated, the VFD-VE will coast to 0Hz but not stop. Upon deactivation, the VFD-VE immediately accelerates to the set frequency.

Mlx=40: Forced stop. When an input with this function is activated, the VFD-VE coasts to stop. After deactivation a new RUN command is needed, upon which the drive starts again without speed search.

Q
A

What is the difference between the 3 encoder cards for VFD-VE?

All 3 cards are suitable for **positioning** and **closed loop speed regulation**.

EMV-PG01O

The "O" stands for "Open collector". It's to be used for **5V or 12V open-collector encoders**. Because it also has a pulse output, it can be used in master-slave systems, both as **master or slave**.

EMV-PG01L

The "L" stands for "Line driver". It's to be used for **5V line-driver encoders**. Because it also has a pulse output, it can be used in master-slave systems, both as **master or slave**.

EMV-PG01X

The "X" stands for "no output". It's to be used for **5V/12V open collector encoders**. Because it also has no output, it can be used in master-slave systems, only as **slave**.

Q
A

Where to read the conditions when a fault is saved?

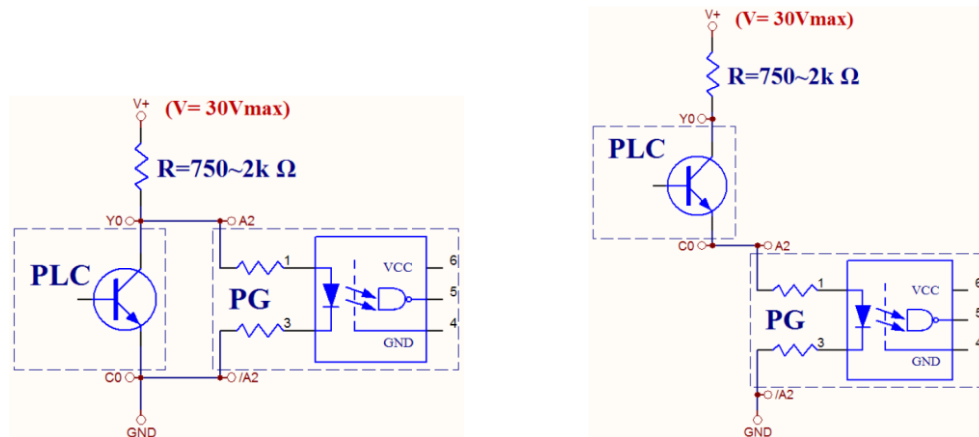
When a fault occurs and is saved in Pr06-17, the conditions at the time of the fault are saved in Pr06-32 ~ 06-36:

- Pr06-32 Output frequency
- Pr06-33 Output voltage
- Pr06-34 DC-bus voltage
- Pr06-35 Output current
- Pr06-36 IGBT temperature

This only applies to the present fault as indicated on the display and saved in Pr06-17. As soon as a new fault occurs, Pr06-32 ~ 06-36 are overwritten.

Q
A

How to connect pulse train input to VFD-VE with EMV-PG01□?



Max voltage 30VDC, resistor $R=750\sim 2k\Omega$.

Q
A

How to set VFD-VE with EMV-PG01□ for pulse train operation?

The drive needs to be controlled by a pulse train signal $0\sim 1kHz=0\sim F_{MAX}$

1. Install the encoder card.

2. Pr00-10=0 or 2 (no PG mode because motor doesn't have encoder)
3. Pr00-20=4 or 5 (depending on your pulse train signal.
(If it is just one signal without direction, select 4)
4. Pr10-00=20 (1kHz/50Hz=20 if F_{MAX} is 50Hz). If different, also set Pr01-00 and 01-01.
5. Pr10-15=3 or 4 (depending on how you control FWD/REV)

Rest of parameters acc. to application.

1.1.10 VFD-EL

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

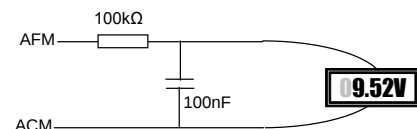
A There is a difference in the settings for Pr00-03 in the Summary of Parameter Settings and in the Description of Parameter Settings. The latter is correct. It will be corrected in the next version of the user manual.

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 manual; Chapter 6, page 6-4. 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 100kΩ/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

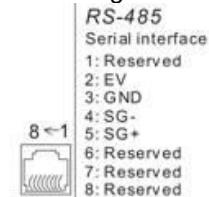
Q Why can the carrier frequency not be set >8kHz?

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 then 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 40 Reserved

10.12	PID Feedback Level	Unit: 0.1
Settings	0.0 to 100.0%	Factory Setting: 10.0
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
This parameter is used to set detection of the offset between set point and feedback.		
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.
 See also the user manual.

1.1.11 C2000/CP2000/CFP2000

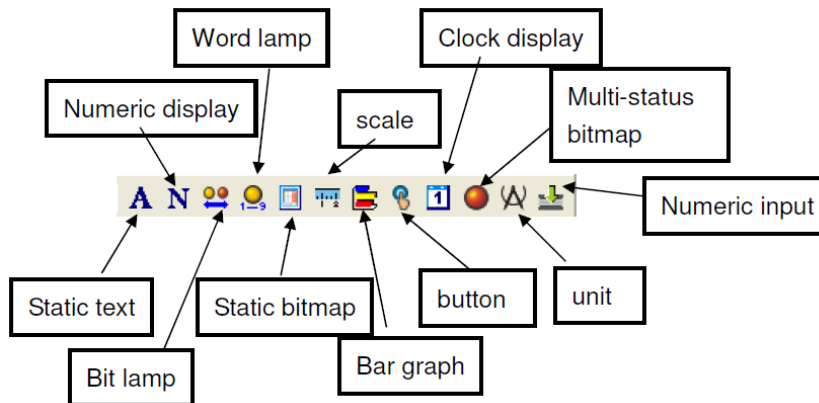
- Q** WPL cannot make connection to C2000. Why?
A See Pr09-35. The station address for PLC is default 2.
 So you need to select also station address 2 when setting up the connection to WPL

VFDSoft uses station address 1 (as set in Pr09-00).

Q
A

Which elements are supported by KPC-CC01?

In the latest firmware KPC1021-20110720 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
A

How to connect a PT100 temperature sensor?

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.

Q
A

How to connect an ECMA servo motor to C2000?

Please see the application note **C2000 PM_EN 20100513 .pdf** on the ftp-site.

Q Write to EEPROM: Yes or no?

A In 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.
 =1 Use Pr03-51 to Pr03-56 to set AVI by 3 points

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

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?

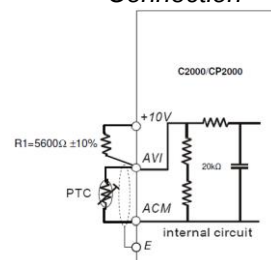
A The following parameters are only saved in EEPROM at power off (and can be used in a PLC program to avoid frequent writing by serial communication or WPR instruction:

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 How to connect a PTC?

A

Connection



Parameters

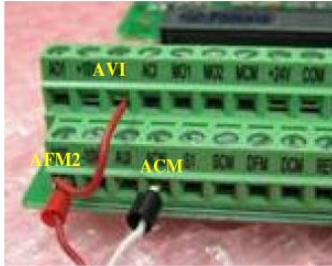
Parameter	Description	Range/Setting	Unit	Setting
03-00~03-02	AVI, ACI, AUI function	0~17		6 *
03-15~03-17	AVI Filter Time Selects the AVI filter time (in noisy environment).	0.00~20.00	0.01s	5.00~10.00s
06-30	PTC Level	0.0~100.0%	0.1%	50.0%
06-29	PTC Detection Selection	0=Warn and Ramp to stop 1=Warn and Coast to stop 2=Warn and keep running 3=No warning		User selection

Please download the application note from our ftp-site.

Q How to connect a PT100?

A

Connection



Parameters

Parameter	Description	Setting
Pr03-00	AVI	11
Pr03-23	AFM2	23
SW2 AFM2	Select AFM2 current or voltage	0~20mA
Pr03-31	AFM2 output selection	0
Pr03-33	AFM2 Output Level	45% (=9mA)
Pr06-29	PTC/PT100 Alarm action	See 1.3.5
Pr06-56	PT100 Level1	See 1.3.3
Pr06-57	PT100 Level2	See 1.3.4
Pr06-58	PT100 Level1 Frequency	See 1.3.3

Connect the PT100 sensor to AFM2 and ACM.
Connect AFM2 to AVI.

Please download the application note from our ftp-site.

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

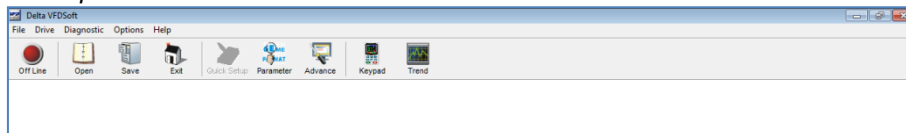
Connect the keypad via IFD6530.

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

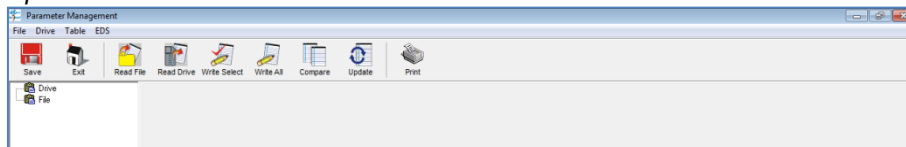
Select the file you want. Press **ENTER**.

The display shows Waiting 0%

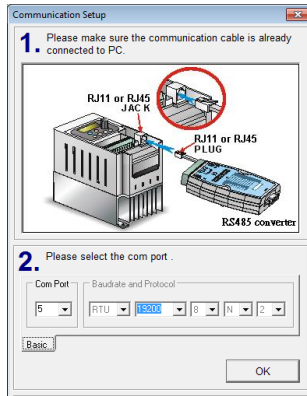
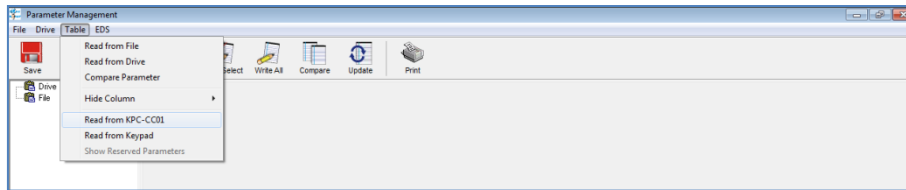
Now open VFDSOft.



Open Parameter



Select Table: Read from KPC-CC01



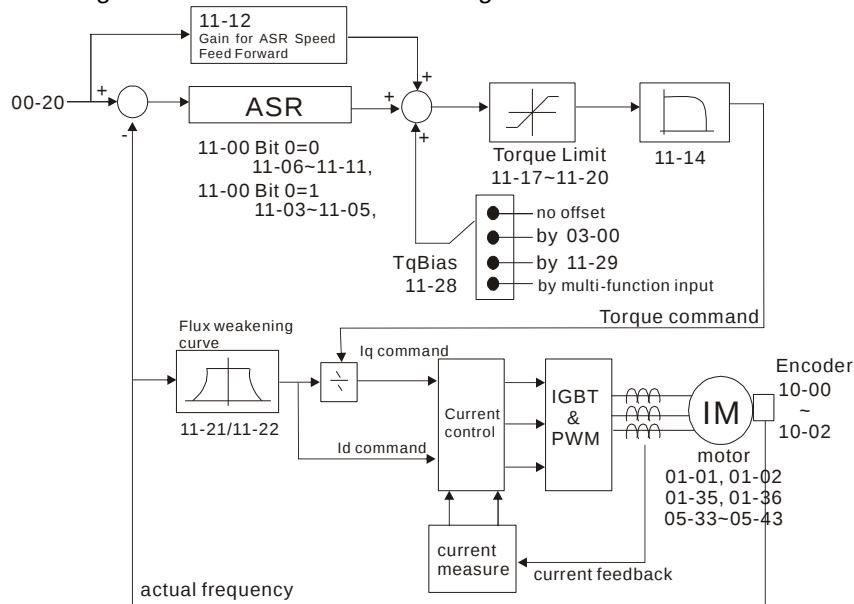
Select the right COM port and press **OK**.
If a table is already loaded, you're asked if you want to save it.
Then the transfer begins and the table is read into VFDSOft until Completed 100%.

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
A

What is the control diagram for Pr00-11-4?

The diagram of Pr00-11=4 is as following. It will be added to the manual of C2000 series.



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 motor rated current is $\geq 10\%$ 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 Is the setting range of Pr08-01 in CP2000 correct?

A The current version of firmware is as follows:
The setting range is 0.0~500.0 = 0~ 50000%
Default = 1.0 = 100%

The maximum value is too high to use. It will be modified in the next firmware and manual to be in line with the other drives.

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

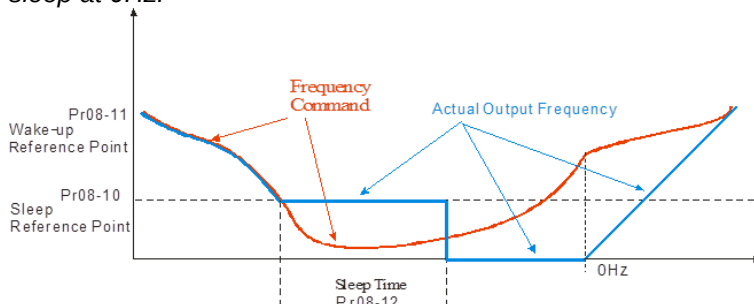
A The relevant parameters are:

✎ 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.



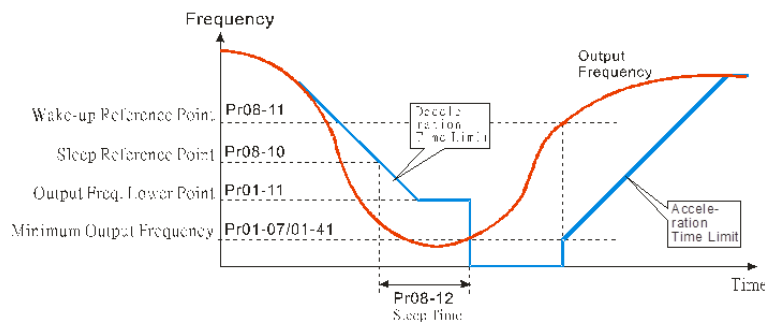
2. Internal PID calculated frequency command (PID on, Pr08-00≠0)

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

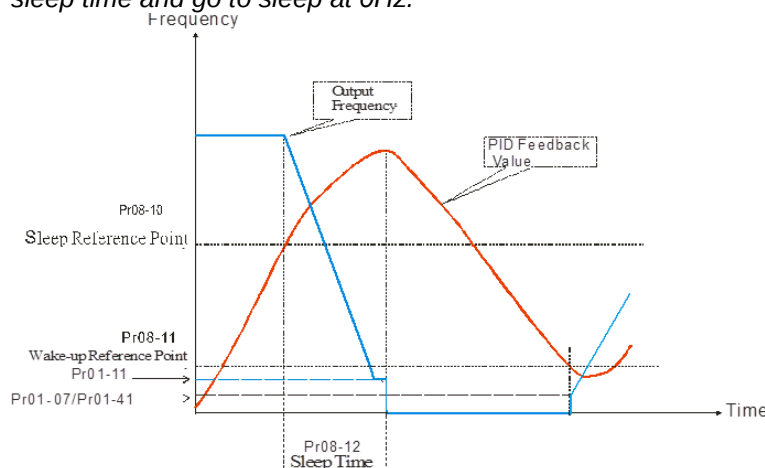
for the sleep time to elapse, then goes to sleep at 0Hz.

Internal PID Calculation Frequency Command



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 Which filter for VFD370CP43A in light duty mode?

A According to the table it should be KMF370A, it is capable to provide the current up to 70A. However the rated input current of VFD370CP43A in light duty mode is 76A. VFD370CP43A can use MIF3180, same as VFD450CP43A. Also KMF3100A can be used, which is cheaper than MIF 3180.

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. Refer to the manual for recommended values. Delta doesn't 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:
- Use a motor with enhanced insulation
 - Connect an output reactor (optional) to the output terminals of the AC motor drive
 - The length of the cable between AC motor drive and motor should be as short as possible (10 to 20 m or less)

≥5.5kW (7.5hp):

Insulation level of motor	1000V	1300V	1600V
460VAC input voltage	66 ft (20m)	328 ft (100m)	1312 ft (400m)
230VAC input voltage	1312 ft (400m)	1312 ft (400m)	1312 ft (400m)

≤3.7kW (5hp):

Insulation level of motor	1000V	1300V	1600V
460VAC input voltage	66 ft (20m)	165 ft (50m)	165 ft (50m)
230VAC input voltage	328 ft (100m)	328 ft (100m)	328 ft (100m)

Please refer to the user manual Chapter 7.

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

A Yes, it is.
So 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.

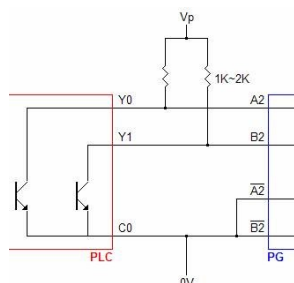
Subtraction is possible by inverting an input.

Examples: 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 C2000 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 2 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 2 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

Ordering 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 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 Chapter 7 of the manual 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 How to modify the rate of change of the up/down key?
A There is a hidden parameter in C2000 V1.20.
 Pr11-42 Bit 8 = 0, Rate of change 0.01Hz/ms
 Pr11-42 Bit 8 = 1, Rate of change 0.001Hz/ms

Later they will be released as a normal parameter in the next firmware (C2000 V1.21 and CP2000 V1.22)

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

Q How to clear the alarm via the STO connector on CP2000?
A An error can occur as a result of incorrect connection of the STO connector of the CP2000 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 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 clear the alarm via the STO connector on C2000?
A An error can occur as a result of incorrect connection of the STO connector of the 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.



Correct

Incorrect

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:

- 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 Pr08-01in CP2000?

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

The setting range is 0.0~100.0. This will be corrected in the next manual.

Q How can we read that the drive is in a fault condition in the PLC of 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 $\pm 2\text{Hz}$. 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

```

XXXXXXXXXXXXXXXX XXXXXXXXXXXXXXXXXXXX
    high word          low word
    Pr05-29           Pr05-30
  
```

So the reading

Pr05-29= 4.060,8 means 40608kWh

Pr05-30= 1,1 means $11 \times 65535 = 720885 \text{ kWh}$

Total $720885 + 40608 = 761493 \text{ kWh}$

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,B have on/off fan control.

Frame C and up have PWM fan control.

When the ID is (re)set on a Frame A,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,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 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/RV10	Pr02-36	2016-41 Bit5

MO11/R11	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

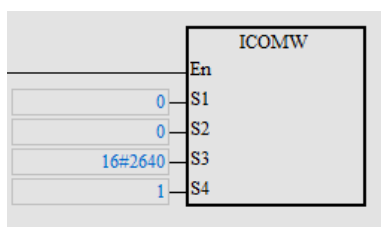
Fieldbus option

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/R10	Pr02-36	H2640 Bit5
MO11/R11	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/R10	Pr02-36	H2640 Bit5
MO11/R11	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: Customer-Service\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.
----	--------------------	---

Q What is the function of Pr08-15?

A

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

Q What is the function of Pr08-15?

A

This parameter has no function (reserved). The manual is wrong and will be corrected.

Q What is the function of Pr06-49 in CP2000?

A

In the CP2000 manual Pr06-49 is not described.

06 - 49 Reserved

It has the same function as in C2000

06 - 49 Lvx Auto Reset

Factory Setting: 0

Settings 0: Disable
1: Enable

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 then you will get a positive gain.

If you put a positive value to the negative input then 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.

The steps are as follows:

1. Disable PLC

On the keypad, go to Menu #4 PLC

Select 1=Disable PLC

2. Upload PLC program

On the keypad, go to Menu #5 Copy PLC

Select the file (001, 002, etc)

Press ENTER

Select 2:VFD->Keypad (for uploading to keypad)

Enter a password if desired, otherwise skip

Press ENTER and uploading starts

Q **C2000 Pr10-42 setting?**

A Parameter 10-42 has two different setting in manual. Which one is correct and what is the default setting?

Page 12.1-10-8

✓ **10-42** Initial Angle Detection Time Factory Setting: 5

Settings 0.0~3.0

 **PM Sensorless (I/f + FOC) Adjustment Procedure**

1. When executing Static test for PM(IPM) (05-00=13), VFD software can be used to monitor adjustment procedure. To download VFD Software go to:

Page 12.2-00-10

✓ **10-42** Voltage pulse width Factory Setting: 10

Settings 0~50 ms

 The angle detection is 3:6-pulse. The parameter influences the value of pulse during the angle detection. The larger the pulse is, the higher of the accuracy of rotator's position. But it might cause oc easily.

 Increase the parameter when the running direction and the command are opposite while start-up. If oc occurs in the start-up moment, then decrease the parameter.

The info on page 12.1-10-8 is correct and on 12.2-00-10 it is wrong, it will be corrected in the next manual.

The default setting is 1 which also will be corrected (it is correct in the firmware).

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)

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 **What fan option kit to use for VFD075CP43B-21 or VFD075CP4EB-21?**

A The manual says MKC-AFKM2 but this number is wrong.

It should be MKCB-AFKM2 (it is the same fan as used on VFD075CB43A-20/-21/-21M)

Q **AFM shows wrong values, why?**

A In CP2000 FW 2.03 and C2000 FW 2.02, when Pr03-31/Pr03-34=1 (AFM is 4~20mA) the AFM output has an offset of ca. 0.8mA (output is 0.8mA too high).
This will be corrected in the next firmware versions.

You can compensate this offset only for AFM2 by setting Pr03-27 AFM2 Bias.
To compensate 0.8mA (subtracting) set Pr03-27= -4.00% (0.8/20=4%)

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, 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 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 This is possible.
- 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 **Why has Pr02-33 no effect in CP2000?**

A Pr02-33 Output Current Level Setting for Multi-function Output Terminals (Pr02-13 / 02-14 / 02-15).
Before firmware version 2.02, Pr02-33 was set as integer.
In firmware version 2.02 and 2.03, Pr02-33 is set as floating xx.xx%.
But internally it is still an integer in calculations.
If you set Pr02-33=50.00%, internally it is 5000%. Therefore the current level will never be reached.

This will be corrected in firmware version 2.04.

Until that time (in 2.02 and 2.03) please set Pr02-33=0.50% if you want 50% level, etc.

Q

Can the status of HAND/AUTO and LOCAL/REMOTE be read in the PLC?

A

In C2000 this is already implemented. Later CP2000 will follow.

	HOA mode		LOC/REM mode		HOA mode
	HAND-ON	AUTO-ON	LOC-ON	REM-ON	OFF
M1090=	0	0	0	0	1
M1091=	1	0	0	0	0
M1092=	0	1	0	0	0
M1100=	0	0	1	0	0
M1101=	0	0	0	1	0

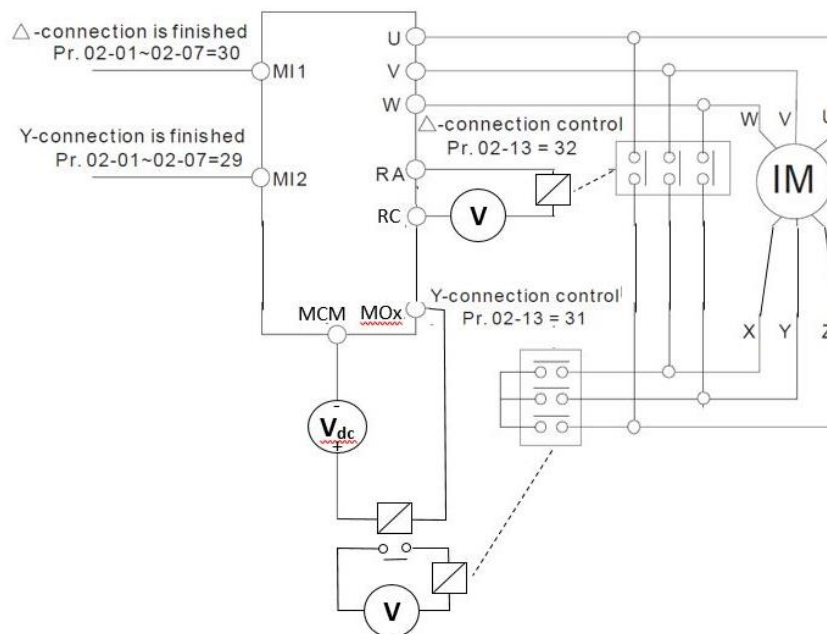
Q

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

When using EMC-BPS01 I get STL3 alarm. Why?

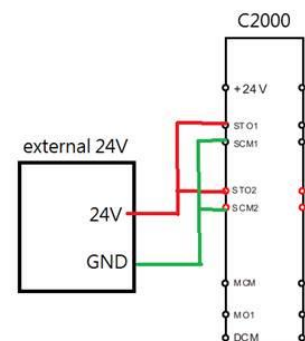
A

If an EMC-BPS01 is used in order to maintain communication then it is necessary to also supply the STO circuit with 24V. This is because the EMC-BPS01 does not provide 24V to the STO terminals

If the drive is switched off by removing the mains supply but the 24V is maintained on the EMC-BPS01 then the drive displays alarm "STL3" (STO loss 3) without the possibility to reset it. The only way to clear STL3 is to power cycle the drive.

At the moment the workaround is:

1. Disconnect the 2 red short pins on CP2000 control board



(so STO1, STO2, 24V, SCM1, SCM2, DCM terminal are in open circuit)

2. Connect external 24V to STO1 and STO2
3. Connect external GND to SCM1 and SCM2

This is solved Firmware 2.04 (for C2000 and later for CP/CFP2000).

Q

Pr06-80 setting

A

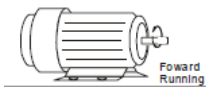
The CP2000 manual shows:

06-80 Fire Mode
Factory Setting: 0.00

Settings 0: Disable
1: Forward Operation
2: Reverse Operation

 This parameter needs to work with multi-input function terminal #58 or #59 and multi-output function terminal #53 and #54.
Setting is 0: Fire mode is disabled.
Setting is 1: When there is a fire, motors will operate clock wisely (U, V, W).
Setting is 2: When there is a fire, motors will operate counter-clock wisely.

This contradicts the definition in Chapter 5.



It will be corrected as follows in the next user manual:

Setting 1: Forward (CCW)

Setting 2: Reverse (CW).

Q

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

A

There is a compatibility issue between newer CMC-EIP01/CMC-MOD01 cards and 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 get 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.

	CP2000 Firmware version	
CMC-MOD01 CMC-EIP01 Firmware version	V2.03 and older	V2.06
V1.06	OK	OK
V1.08 and newer	NOT OK	OK

Q

C2000 In firmware 2.06 I cannot find Pr11-17~Pr11-20 and Pr06-12 anymore?

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

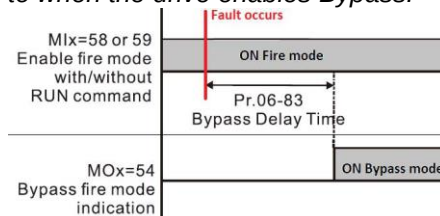
✓	06-82	Enable bypass on fire mode	0: Disable bypass 1: Enable bypass	0
✓	06-83	Bypass delay time on fire mode	0.0–6550.0 sec.	0.0

- 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.
----	-----------------------------	---

- 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.

Q
A

Why is my new CP2000 no longer following the deceleration ramp set in pr01-13?

For models 220V/440V 160kW and above the default setting of pr06-02 is 1.

6. Parameter default setting has modify (above 160kW)

06-02	Selection for Stall Prevention	Default: 0
Settings	0: Traditional over-voltage and traditional over-current stall prevention	
	1: Smart over-voltage and traditional over-current stall prevention	
	2: Traditional over-voltage and smart over-current stall prevention	
	3: Smart over-voltage and smart over-current stall prevention	

When this setting is active the drive tries to decelerate as quickly as possible based on the DC Bus voltage. In order for the drive to follow the set deceleration ramp pr06-02 has to be set to 0 or 2.

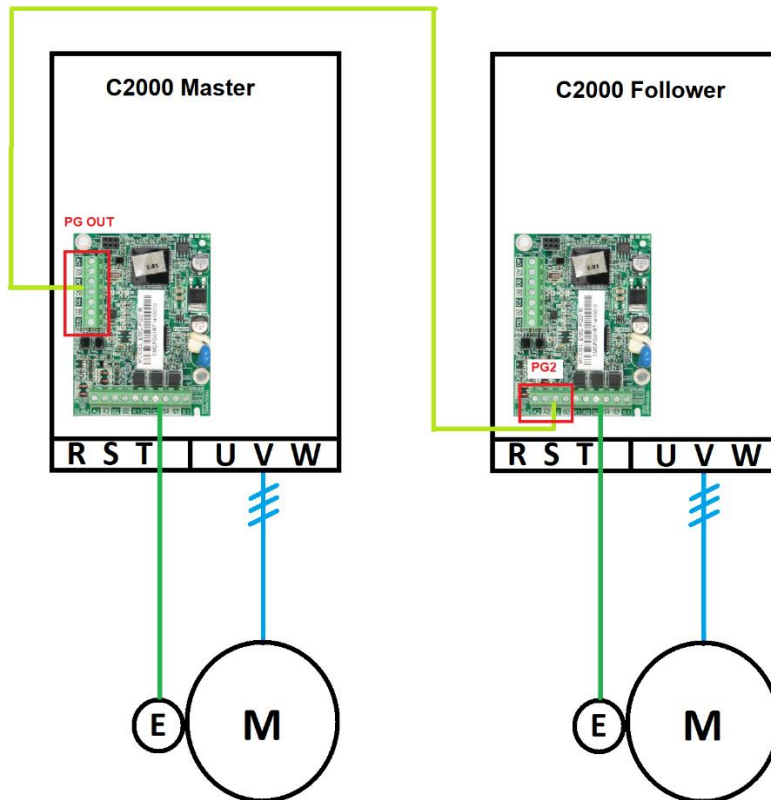
This change was implemented starting with firmware V2.06

Q
A

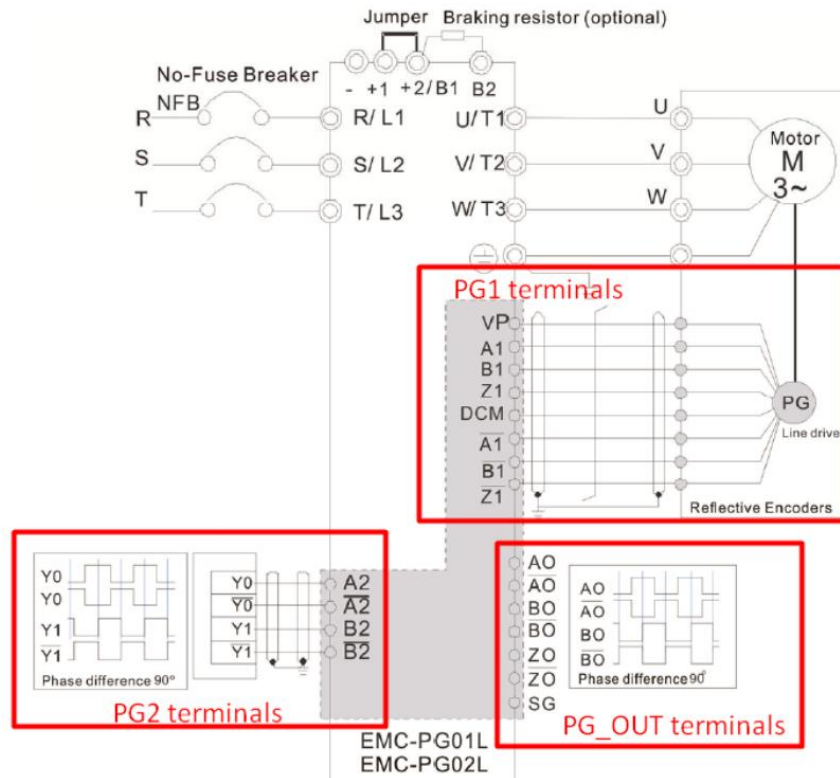
Can I configure two C2000 drives in a Master/Follower setup?

Yes, there are a number of ways that this can be done.

Below is one example in which two C2000 drives can be synchronized either in Speed or in Position. In this example both C2000 drives have a PG card connected to their Slot 2 and both are running a motor in FOC PG mode. The PG OUT terminals of the Master are wired directly to the PG2 terminals on the Follower.



Every PG encoder card comes with the following terminals:



PG1 are input terminals for getting the encoder signal from the motor so that you can control it in FOCPG mode (closed-loop vector)

PG2 are input terminals for getting encoder pulses from external devices into the drive. The drive can use those pulses as a frequency command or as a position command. Or, if the onboard PLC is used, it can also be used internally for other purposes.

PG_OUT are output terminals. The drive takes what it gets through the PG1 terminals and outputs it on the PG_OUT terminals so that they can be sent to other devices.

Once the wiring shown above is done there are still a few parameter settings which have to be made on the C2000 Follower drive:

- frequency source pr00-20=5
- pulse type pr10-16 = 1 or 2
- electrical gear pr10-17 and pr10-18 will set the ratio between the master and follower
- acceleration/deceleration and S-ramps pr01-12, pr01-13, pr01-24 ~ pr01-27. This will prevent the follower drive from having any delay
-

1.1.12 C200

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

A Yes it is.

But when encoder feedback is used (Pr10-02≠0) Pr02-11 is disabled for MI7&8.

Q How to select RS485 Modbus or CANopen?

A

When Pr09-36=0, CANopen is disabled and RS485 Modbus is enabled.

When Pr09-36≠0, CANopen is enabled by assigning a CANopen slave address and RS485 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 automatically MI7/8 are 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 user manual (PG-Function Explanation).

Q Which PLC registers in C200 are latched?

- A The register D0~D99.

The manual says D0~399, this will be corrected.

Q What does fault cd3.1 mean?

- A The C200 user manual only mentions cd1, cd2 and cd3.
But in reality the display shows cd3.1(=cd1), cd3.2(=cd2) and cd3.3(=cd3).

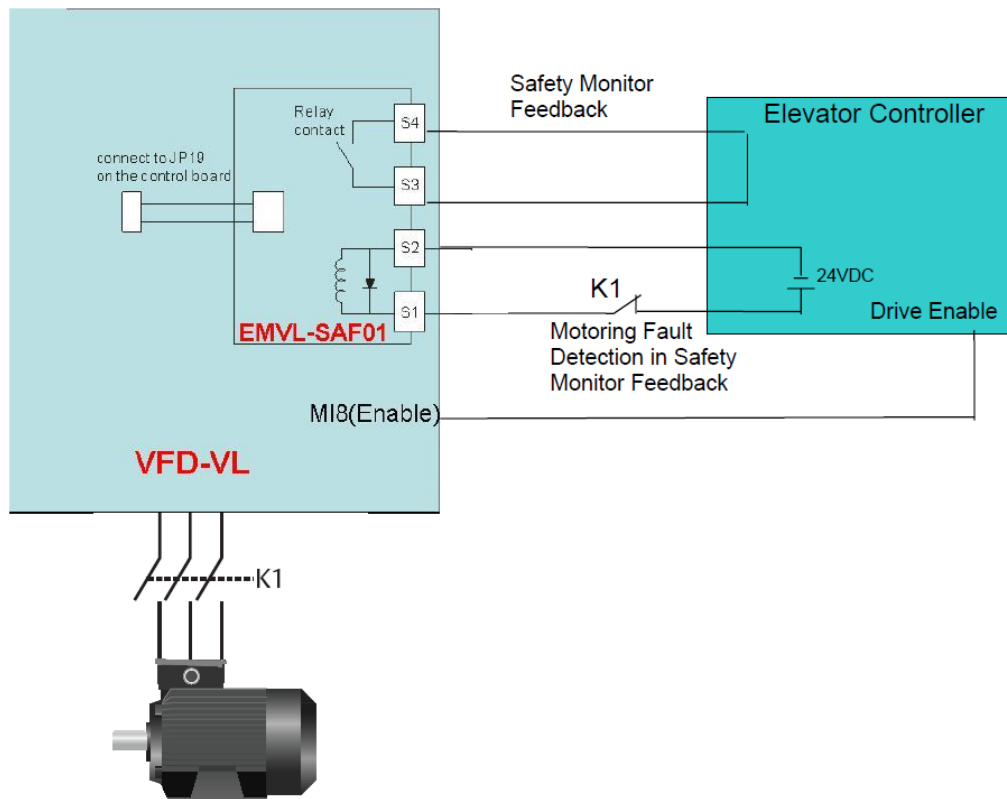
33	cd1	Fault cd1 las sensor err	U-phase error Corrective Actions: Re-power on to try it. If fault code is still displayed on the keypad, please return to the factory.
34	cd2	Fault cd2 lbs sensor err	V-phase error Corrective Actions: Re-power on to try it. If fault code is still displayed on the keypad, please return to the factory.
35	cd3	Fault cd3 lcs sensor err	W-phase error Corrective Actions: Re-power on to try it. If fault code is still displayed on the keypad, please return to the factory.

1.1.13 VFD-VL

Q
A

Safestop features

1. To meet EN954-1 and EN ISO 13849-1 which needs two independent hardware circuits for the safety circuit, the control board of the VFD-VL series is designed with MI8 and Safety Relay (EMVL-SAF01).
2. Design approaching compliance with IEC61508
3. One contactor solution according to EN81-1 (under development/certification)



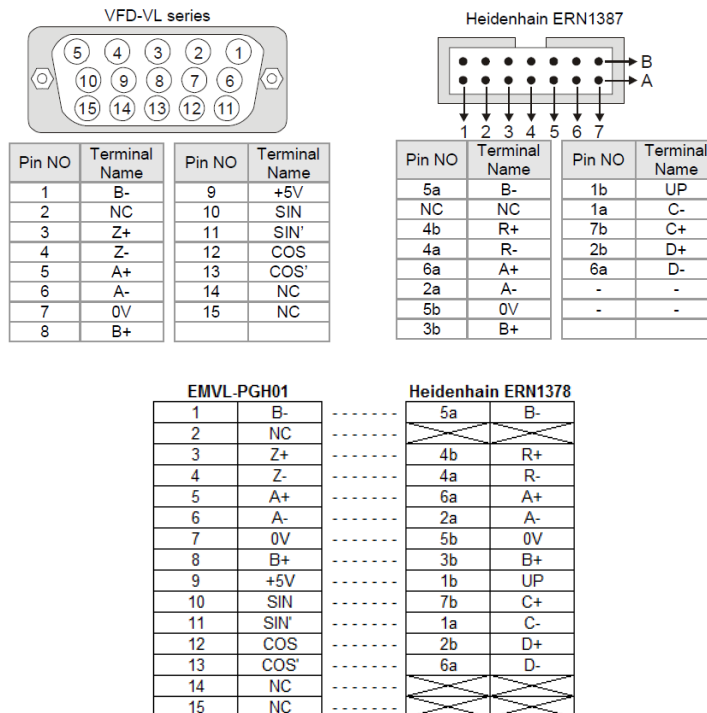
Q

How to connect a Heidenhain ERN1387 encoder to the EMVL-PGH01 encoder option card?

A

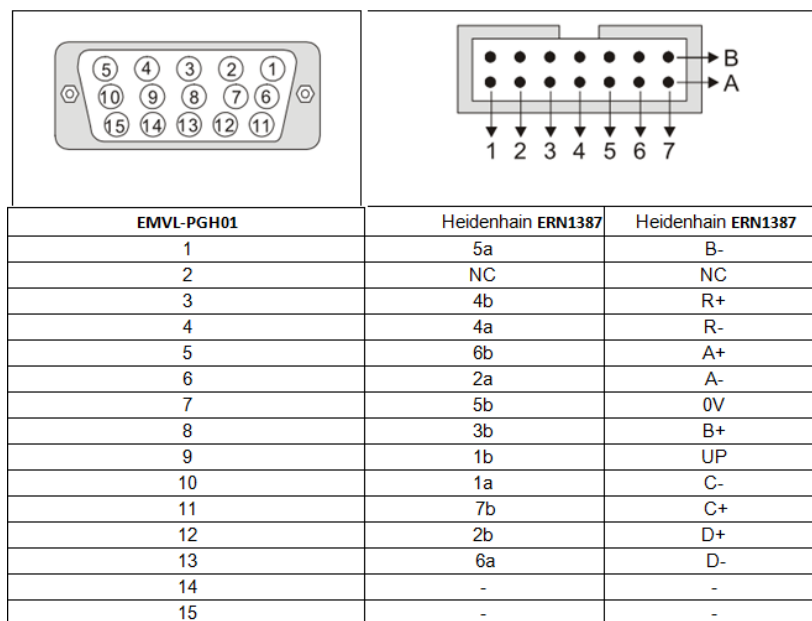
Please see below for the pin-to-pin connection of encoder to encoder card:

EMVL-PGH01



Q
A

How to connect a Heidenhain ERN1387 to encoder card EMVL-PGH01?



1.1.14 MS300

Q
A

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

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

Pr07-20	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	
	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.	

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

Q
A

What is the crane function (MO=42)?

The crane function is as follows (the info in the manual will be corrected).

42	Crane function	The crane function is to control a mechanical brake. It works together with Pr02-34 and Pr02-58. 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. See following diagram: Example of crane application: It is recommended to use it together with the dwell function which is then active after STOP command and output frequency $<$ Pr02-58: In heavy load conditions using Dwell function can keep the output frequency stable and prevent OC or OV.
----	----------------	---

Pr02-34	Frequency Setting for Multi-function Output	Factory Setting: 0.00Hz
Setting range	0.00~599.0Hz	
	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.	
	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).	
	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.	
	When using MO=42, Pr02-34 must be $>$ Pr02-58.	

Pr02-58	Frequency Setting for Multi-function Output Crane Function	Factory Setting: 0.00Hz
Setting range	0.00~599.0Hz	
	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
A

How to set pulse train frequency command?

Set the following parameters to use a pulse train as frequency command:

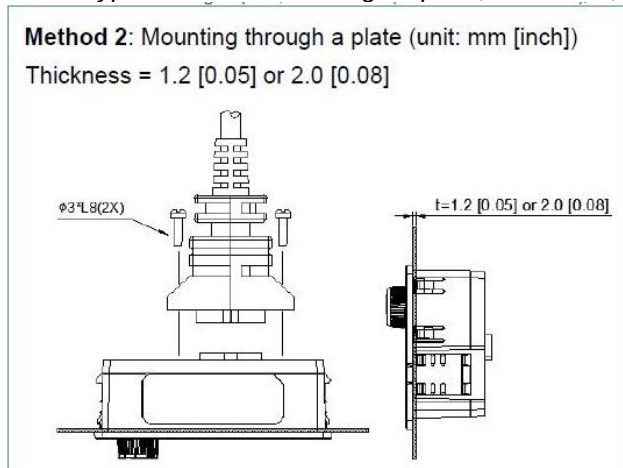
- Pr02-07=0 (MI7 no function, therefore can be used for pulse train input.)
- Connect a 24VDC pulse train signal to MI7 (PNP or NPN depending on wiring).

- 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 $f=0\sim 10\text{kHz}$.
Pr10-01=100. Then $F_{out}(H) = f/100$
Note: F_{max} must be $\geq f/100$

Q
A

What is the IP of the keypad?

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



Q
A

Why is MS300 unstable at 0Hz frequency command?

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		MI1 "OPEN": STOP "CLOSE": FWD MI2 "OPEN": STOP "CLOSE": REV DCM
Setting value: 2 2-wire RUN / STOP REV / FWD		MI1 "OPEN": STOP "CLOSE": RUN MI2 "OPEN": FWD "CLOSE": REV DCM
Setting value: 3 3-wire		MI1 "CLOSE": RUN MI3 "OPEN": STOP MI2 REV/FWD: "OPEN": FWD "CLOSE": REV DCM
Setting value: 4 2-wire Quick Start		MI1 "OPEN": STOP "CLOSE": FWD MI2 "OPEN": STOP "CLOSE": REV DCM
Setting value: 5 2-wire Quick Start		MI1 "OPEN": STOP "CLOSE": RUN MI2 "OPEN": FWD "CLOSE": REV DCM
Setting value: 6 3-wire Quick Start		MI1 "CLOSE": RUN MI3 "OPEN": STOP MI2 REV/FWD: "OPEN": FWD "CLOSE": REV DCM

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.
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 the output phase cuirrents >Pr06-47*Rated current for Pr06-46 time, OPL fault is generated.

Example:

VFD rated current: 10A

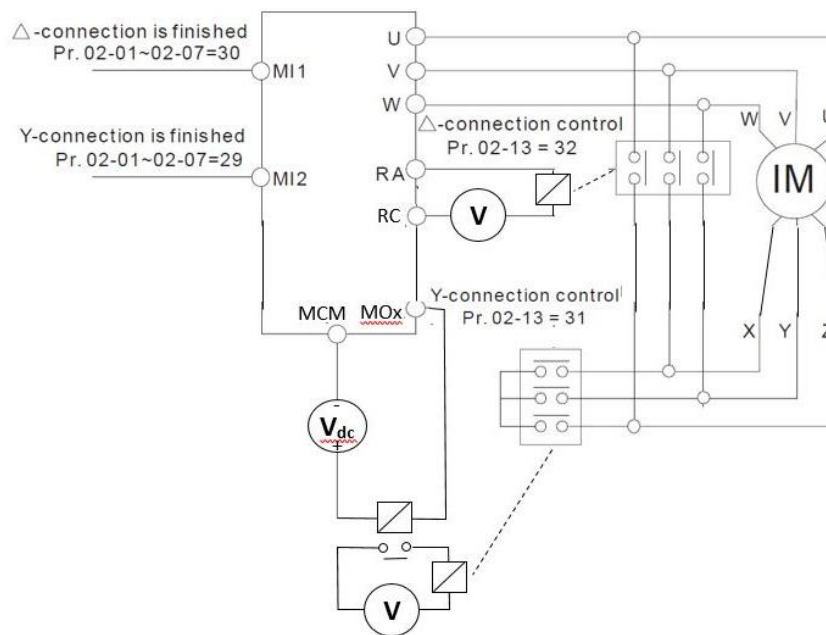
Pr06-47=10%

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 inm the user manual is for indication only and is not complete.

Here's how it shpould be connected.



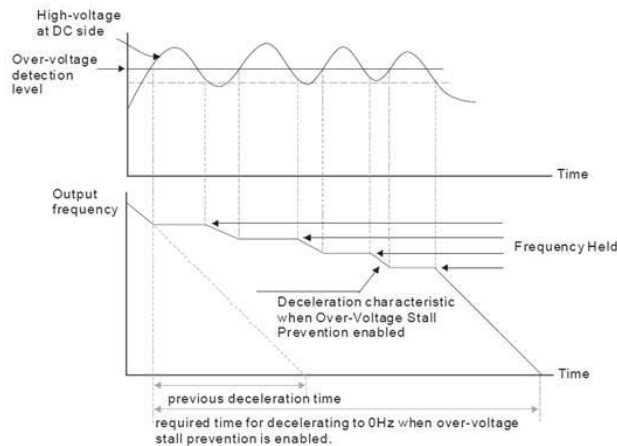
This applies also to C/CP/CFP2000.

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

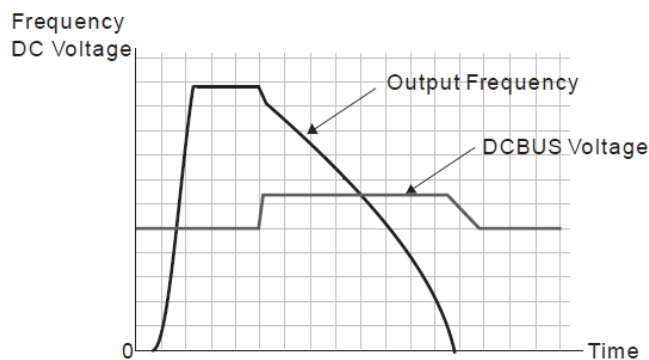
A Over Voltage stall prevention is a function commonly used in applications where the goal is to decelerate the motor as quickly as possible without using a braking resistor. To enable this function parameter Pr06-01 needs to be ≠0.

- 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 = constant)



- In smart OV stall, during Acceleration/Deceleration/Normal state, the drive will maintain and/or increase the output frequency when the $V_{DC} > Pr06-01$.
When $V_{DC} < Pr06-01$ 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 $Pr01-49=1$.

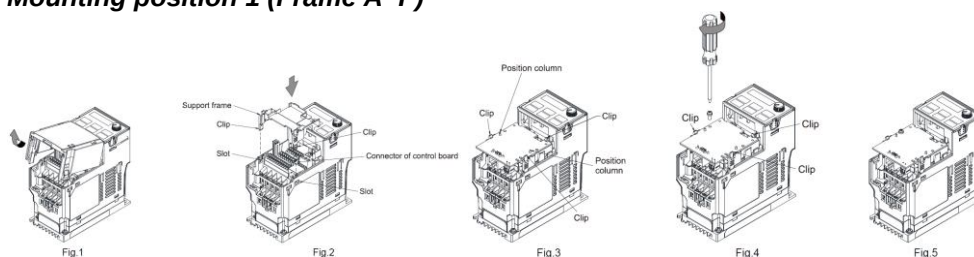
Q How does Pr00-02=8 work?

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.

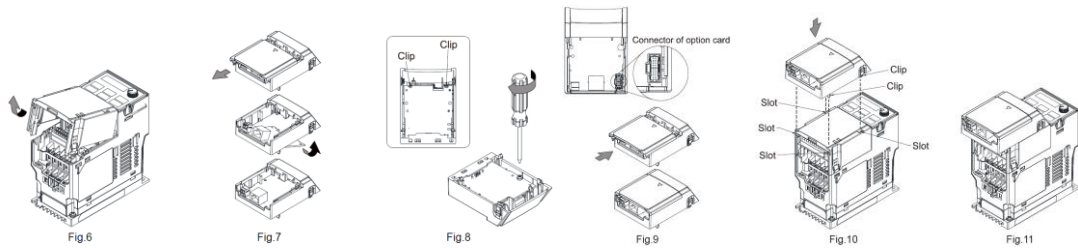
Q How to install a fieldbus option card on MS300?

A There have been some changes, please refer to this document: [MS300_Comm card_installation.pdf](#) which you can find on our ftp-site folder: Customer-Service\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

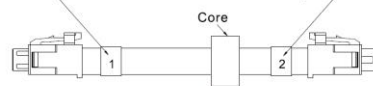


Fig. 14

This info will be in the next user manual.

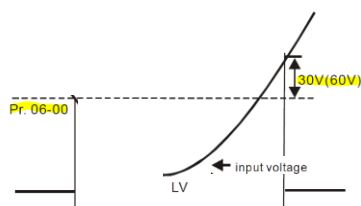
Q Why do I get LV-error even if the voltage is >LV-level (supplying 230VAC to a 400V drive)?

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 $230 \times \sqrt{2} = 325\text{VDC}$ which is higher than 300VDC so LV is not expected.

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



****** (For 230V drives, this value is +30VDC).

Q What is the function of MOx=42 (the description in manual is wrong)?

A In MS300 when MOx=42:

- MOx active when output frequency >Pr.02-34.

- MOx deactivated when output frequency <Pr.02-58 after STOP command.

If Pr.02-34 ≤ Pr.02-58: MOx deactivated when output frequency < Pr.02-34 after STOP command.

The next user manual will be updated.

Q How to use the TORQ command in the PLC?

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

The info will be added in the next version of the user manual.

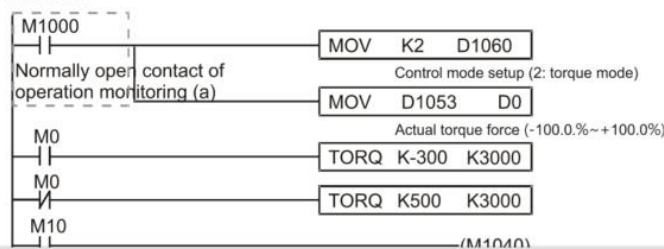
Chapter 16 PLC Function Applications | C2000

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

- M104U: 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.



**Q Can KPMS-LE01 be replaced by KPE-LE02?
(cabinet doors already prepared for KPE-LE02)**

A KPMS-LE01 and KPE-LE02 have different dimensions.

The pin-out is the same.

But KPMS-LE01 has 5 digits, whereas KPE-LE02 has 4 digits.

So they cannot be interchanged.

Q Can I set Time and Ripple for OrP Input Phase Loss detection?

A *There are no parameters to set Input Phase Loss detection. They are fixed in the firmware and cannot be changed.*

The user manual will be corrected.

ID#	Display on LCD Keypad	Fault Name	Fault Descriptions
15		Phase loss protection (orP)	Phase loss of power input
Action and Reset			
Action level		When DC bus ripple is higher than the protection level, and the output current exceeds 50% of the rated current, the drive starts counting. When the counting value reaches the upper limit, an orP error occurs.	
Action time		The action time varies with different output current.	
Fault treatment parameter		Pr-D5-53	
Reset method		Manual reset	
Reset condition		Immediately reset when DC bus is higher than Pr-D7-00	
Record		Yes	
Cause		Corrective Actions	
Phase loss of input power		Correctly install the wiring of the main circuit power.	
Single phase power input to three-phase model		Choose the model whose power matches the voltage.	
Power voltage changes		If the main circuit power works normally, verify the main circuit. Cycle the power after checking the power, if orP error still exists, return to the factory for repair.	
Loose wiring terminal of input power		Tighten the terminal screws according to the torque specified in the user manual.	
The input cable of three-phase power is cut off		Wire correctly. Replace the cut off cable.	
Input power voltage changes too much		Verify the starting voltage for Pr-D5-50 time for input phase loss detection and reset.	

Q Which parameters get written directly to EEPROM and how can I avoid damaging the drive memory by writing too many times into it?

A Almost all drive parameters are written directly into the EEPROM memory. There are only a few exceptions to this rule, which are mentioned below:

C Series:

Pr00-10: Control method
 Pr00-11: Speed mode selection
 Pr00-13: Torque mode select
 Pr00-27: User-defined value
 Pr01-12: Acceleration time 1
 Pr01-13: Deceleration time 1
 Pr01-14: Acceleration time 2
 Pr01-15: Deceleration time 2
 Pr01-16: Acceleration time 3
 Pr01-17: Deceleration time 3
 Pr01-18: Acceleration time 4
 Pr01-19: Deceleration time 4
 Pr02-12: Select MI Conversion Time mode
 Pr02-18: Select MO Conversion Time mode
 Pr04-50~Pr04-69: PLC register parameter 0—19
 Pr08-04: Upper limit of integral control
 Pr08-05: PID output upper limit
 Pr10-17: Electronic gear A
 Pr10-18: Electronic gear B
 Pr11-34: Torque command
 Pr11-43: P2P highest frequency
 Pr11-44: Position control acceleration time
 Pr11-45: Position control deceleration time

M300 Series:

Pr00-10: Control method
 Pr00-11: Speed mode selection
 Pr00-27: User-defined value
 Pr02-12: Select MI Conversion Time mode
 Pr02-18: Select MO Conversion Time mode
 Pr04-50~Pr04-69: PLC register parameter 0—19

Extra attention must be given when writing into the drive parameters that are not mentioned above. It is very easy to exceed the maximum number of EEPROM write times when using a communication protocol or when using the WPR function block of the onboard PLC. When this happens, a cF2 fault will appear indicating that the drive is no longer able to read the damaged section of the EEPROM memory.

For communication protocols we recommend that drive parameters are written via acyclic communication.

For the onboard PLC it is recommended to use the WPR function in combination with a rising-edge contact:

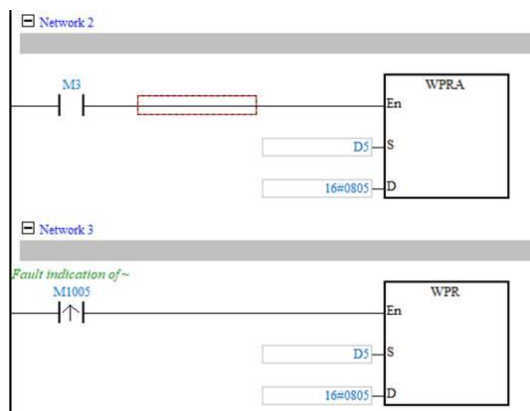
Network 2



Or to use WPRP function instead:



In some cases this might not be acceptable since the value that is being written needs to be updated continuously. For these cases we've created a new function block called WPRA. This function block only writes into the RAM memory, not directly in EEPROM. This means that the values written with WPRA do not get saved after a power down. If this is needed then it's possible to use the special M relay function M1005 as shown below:



In this program the value in Pr08-05 is being continuously updated through WPRA function block. As soon as a fault occurs (for example LvS when the drive is switched off) the drive will write once into the EEPROM memory the value of parameter Pr08-05. The WPRA function was added in the MS300 firmware V1.09 (C/CP2000 already have it).

1.1.15 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.

1.1.16 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.

1.1.17 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?

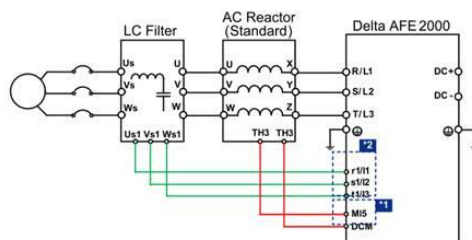
A Yes, AFE2000 does not only reduce harmonics, correct the power factor and regenerate braking energy back into the mains power supply, but also stabilises its DC output voltage. For all these functions the reactor is necessary (think of it as a switched-mode power supply).

Q How to connect the AFE LC filter?

A

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).

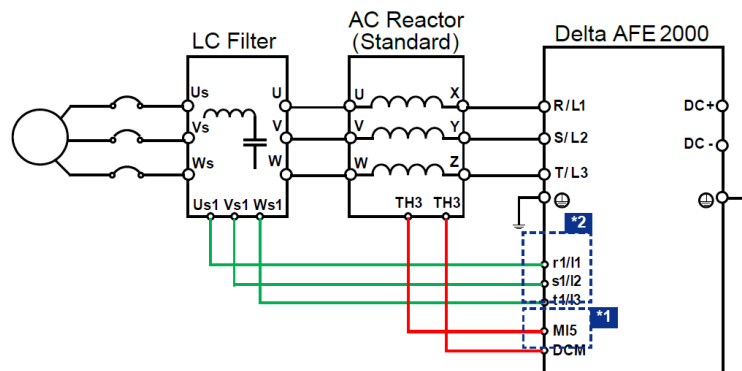
Q Why do we get ocn fault?

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 What fuses are recommended?

A

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

AFE2000 Reactor

Q Can a non-Delta reactor be used in combination with AFE2000?

A *It is possible to use non-Delta reactors, provided they have the same inductance and current rating as AF-RC.*

However, you then have to take care of the connections r1, s1, t1 by extra wiring to the mains power (it's needed to synchronize). Delta reactors already have a terminal for these connections, making it easier and more reliable.

Also Delta's AF-RC reactors have a connection TH3 for thermal protection. With non-Delta reactors you won't have this protection and you have to check if the non-Delta reactors can provide such protection.

All in all we strongly recommend using AF-RC reactors in combination with AFE, ensuring max reliability and ease of use.

1.1.18 EMC-PG01O

Q How to connect an encoder with OC outputs to EMC-PG01O?

A *The encoder outputs A, /A, B, /B, Z, /Z should be connected to the following pins of EMC-PG01O: 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

1.1.19 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's 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 190VAC (380VAC). It is shorted by inside circuit. It means dip-switch 190VAC (380VAC) is always ON.
This is because of safety.*

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 master, it responds to the DC-bus voltage*
- *When 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.

1.1.20 CMM-EIP01

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

A *The explanation in the 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

It will be added to the next version of the manual.

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



1.2 ASDA Servo drives

1.2.1 ASDA series

Q **What does the alarm ALE17 mean and how can it be prevented?**

A *The alarm ALE17 happens when the EEPROM cannot be written, this happens when the maximum number of write operations is exceeded.*
Most customers use the communication control mode with our drive for positioning and speed control. In that case the parameters are written in the EEPROM at each communication write operation. But after several years of operation ,the drive almost certainly reaches the EEPROM write life time and will show ALE 17 if the user doesn't set P2-30=5.
After power off/on, this parameter, however, is set back to P2-30=0. Therefore it is recommended, if communication is used to control the drive, to always set P2-30=5 after power on.
In the manuals for ASDA-A, -B, -AB and -A2 you'll find a note about this.

1.2.2 ASDA-A series Servo drive

Q **How can ALE11 error be reset?**

A *The ALE11 error means that the encoder signal is not correct. It occurs e.g. when the motor is disconnected.*
It can only be reset by power off and on.

Please check Chapter 10-3 of the manual for info about how to reset faults.

Q **Why is the ratio of load inertia and motor inertia as adjusted by the user not equal to the measured value?**

A *Ensure that the following conditions are met when estimating the ratio of load and motor inertia:*

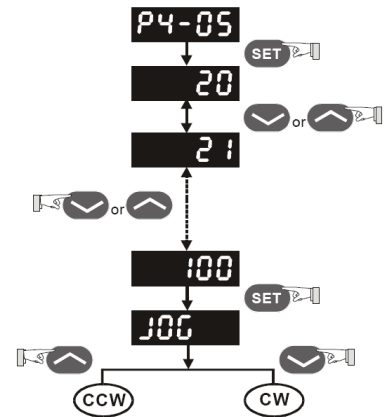
- *The acc and dec times to reach 2000rpm must be $\leq 1s$.*
- *The speed must be $\geq 200rpm$.*
- *The load inertia **cannot** be more than 100x motor inertia.*
- *External forces should be kept to a minimum and the load inertia shouldn't change too much during measurement.*
- *In Auto Mode (Pr2-32=3 or 5) ASDA-A will stop measuring the load inertia value.*

Q What is the meaning of the symbols with which the parameters are marked in the manual?

A (★) Read only
 (▲) Parameter cannot be set when Servo On
 (●) Parameter change only effective when ASDA-A is powered off and on again
 (■) Parameter value not saved at power off.

Q How to use the keypad of ASDA-A to perform JOGging?

A - Enter Pr4-05
 - Press [SET] key. Jogspeed is displayed. Default value 20rpm.
 - Press [▲] UP or [▼] DOWN key to change the JOG speed. Example value 100rpm,
 - Press [SET] key. Display shows "JOG".
 - Press [▲] UP or [▼] DOWN key to jog the motor CCW or CW. The motor only rotates as long as one of these keys is pressed



Q What does ALE23 mean?

A This is an alarm message. It was not explained in the previous manual but in the latest manual HE05, see **Error! Reference source not found.** in this newsletter, it is explained on page 10-2.

ALE23 is a Pre-Overload Warning. If it shows on the display the servo drive and motor are going in overload condition. The level can be set in P1-56. As soon as this level is reached, the display shows ALE23 and output OLV is active. When t_{OL} , the permissible overload time has elapsed, ALE06 is displayed and output ALRM is activated.

Q When to use regenerative resistor (brake resistor) and how to connect it?

A When the shaft torque is in the opposite direction of the shaft speed, regenerative power is fed back to the drive, resulting in a fast increase of the DC-bus voltage, which can become too high and cause damage to the drive. The regenerative energy can be dissipated in the brake resistor.

ASDA-A has a built-in brake resistor and if it is too small, an external brake resistor can be connected.

Built-in brake resistor: Connect output [P] to [D] and leave [P]-[C] open.

External brake resistor: Connect between [P]-[C] and leave [P]-[D] open.

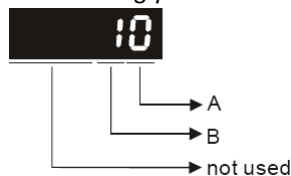
See ASDA-A manual, chapter 6.6.3 for more info about brake resistors with calculation examples and set P1-52/P1-53 accordingly when using an external brake resistor.

When the fault message "ALE05" appears, the regenerative power is too high and an external brake resistor should be considered.

Q How to enable the torque limit function in Speed Mode?

A There are two methods for enabling the torque limit function.

One is using parameter P1-02:



B=0: Disable torque limit function

B=1: Enable torque limit function

(It is available in position and speed mode)

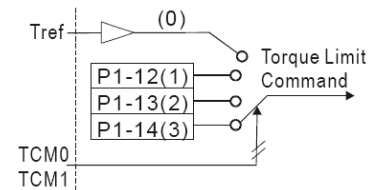
The other one is using a digital input:

The user can use digital input TRQLM (DI code is 09).

When it is activated to be ON in Position and Speed Mode, the motor torque limit function is enabled.

Q When the torque limit function is enabled, what is the torque limit command?

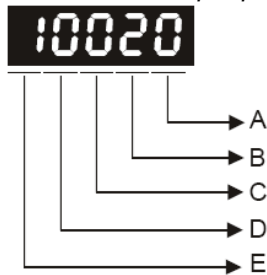
A The torque limit command is either internal parameter or analog voltage command. The source of the torque limit is determined by the torque command TCM0 and TCM1 of DI signal.



Command No.	DI signal of CN1		Command Source		Content	Range
	TCM1	TCM0				
T1	OFF	OFF	Mode	T	Analog command	Voltage between V-REF and GND
				Tz	None	Torque command is 0
T2	OFF	ON	Internal parameter		P1-12	0 ~ 300 %
T3	ON	OFF			P1-13	0 ~ 300 %
T4	ON	ON			P1-14	0 ~ 300 %

Q How to set the encoder output pulse number on OA, /OA, OB, /OB and OZ, /OZ?

A The encoder output pulse number can be set in parameter P1-46.



Set a divider

E=0

DCBA=divider (range 1~125)

The divider divides the motor encoder pulse number of 2500ppr.

Example: If you want 500ppr on the output, the divider must be 2500/500=5.
Please set P1-46=**0**0005
If you want 1250ppr on the output, the divider must be 2500/1250=2.
Please set P1-46=**0**0002

Note: The divider can only be an integer so the output pulse number cannot be set to all values.

Set a pulse number

E=1

DCBA=pulse number (range 20~2500)

Example: If you want 1024ppr on the output, set P1-46=**1**1024
If you want 512ppr on the output, set P1-46=**1**0512

Q How to set the responsiveness (=bandwidth) of the Speed and Position loops?

A P2-00 KPP The Position Loop Responsiveness in Hz is $\frac{KPP}{2\pi}$

P2-04 KVP The Speed Loop Responsiveness in Hz is $\frac{KVP}{2\pi(1 + J_L / J_M)}$

To get stable operation, estimate J_L/J_M and set in P1-37 or measure in Auto Mode PI (P2-32=2) or Auto Mode PDFF (P2-32=4) and read value in P1-37 and subsequently calculate KPP and KVP so that Speed Loop responsiveness is 4~6 times Position Loop responsiveness.

Please refer also to the manual Chapter 5.6.8.

Q For connecting 2 ASDA-A to an HMI with RS485 protocol, do I need to use 2 RS422/RS485 converters?

A No converters are needed. Connect the HMI to both servo drives as indicated below:

RS-485

DOP Series 9 pin D-SUB male (RS-485)	Controller CN3 cable connector (RS-485)	Controller CN3 cable connector (RS-485)
RXD+ (2) ——— (3) 485+ TXD+ (3) ——— (5) 485+ RXD- (1) ——— (4) 485- TXD- (4) ——— (6) 485-		 Top View

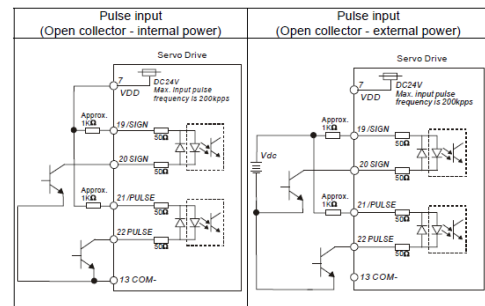
Both servo drives CN3 can be connected in parallel. Please assign a different slave address to each servo drive (P3-00) and set the correct communication (P3-05=2).

1.2.3 ASDA-B series Servo drive

Q How to connect open-collector signals to SIGN and PULSE inputs?

A When using open collector signals for pulse input, please ensure to connect a 1kΩ current limit resistor before Pin 19(/SIGN) and Pin 21(/PULSE) respectively to protect the internal circuit when using 24VDC (500Ω at 12VDC). They are included in a small plastic bag. See the diagram.

$$I = \frac{V_{DC} - 2}{R + 100} \approx 20\text{mA}$$



1.2.4 ASDA-A2 series Servo drive

Q Which item should I order if I need the battery for the servo motor with an absolute encoder?

A The PN of the battery is ASD-CLBT0100 and the specification is listed in Chapter 12.1.1 in the ASD-A2 user manual.

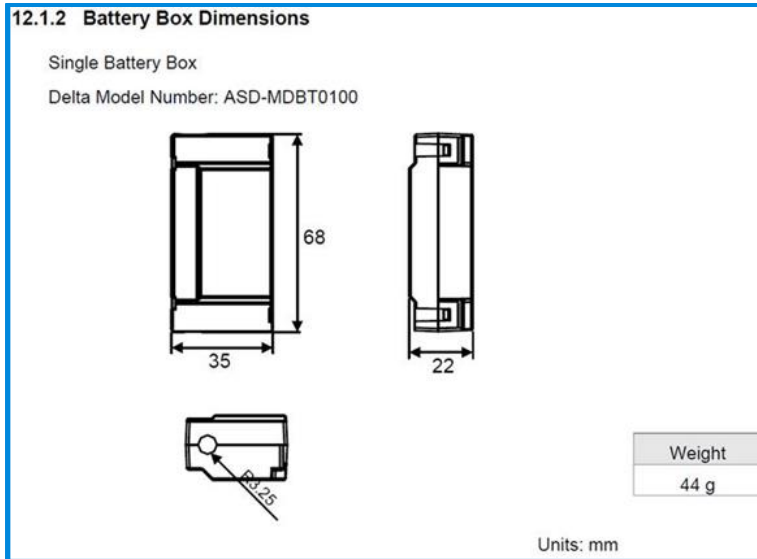
However, it's not possible to connect it to the encoder cable directly.

Therefore, we suggest to order the battery box below with either 1pc battery or 2pcs batteries included, so it's more convenient for the connection.

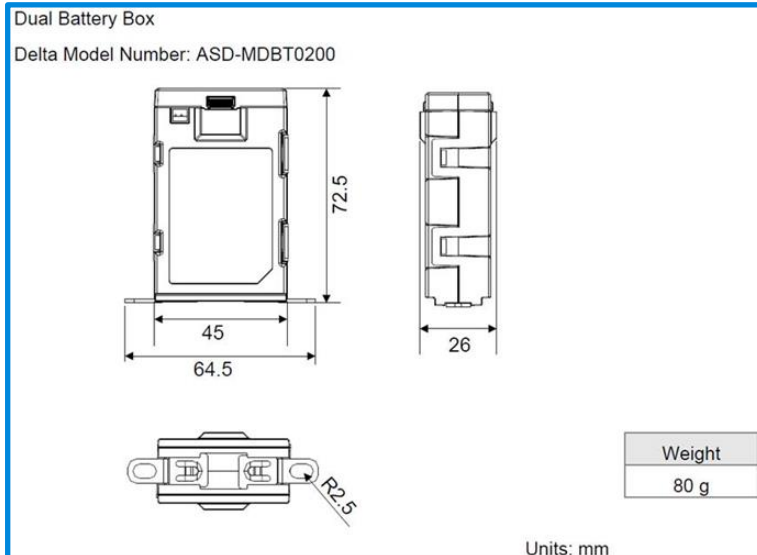
Battery box with 1pc battery: ASD-MDBT0100

Battery box with 2pcs batteries: ASD-MDBT0200

ASD-MDBT0100



ASD-MDBT0200



1.3 ASMT & ECMA series

Q When do you need ASMT or ECMA servo motors with oil seal?

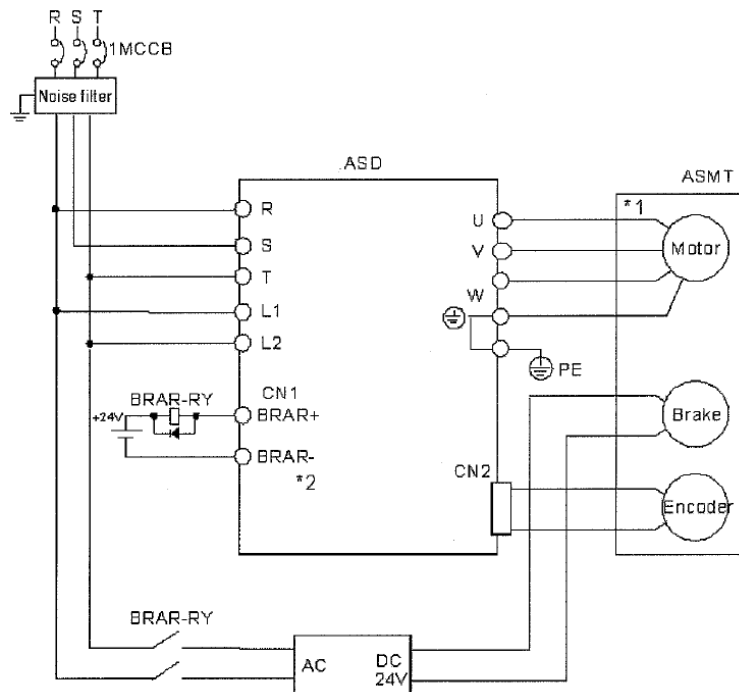
A The ASMT and ECMA series of servo motors are available with an oil seal as option. The advantage of the oil seal is that it gives the shaft an IP65 protection. This is recommended especially when the motors are mounted vertically with the shaft faced upwards. The disadvantage is that the available torque decreases with 5~10%.

Q Where can I find CAD drawings of the ASMT and ECMA motor series?

A On our ftp-site you can find for each ASMT and ECMA servo motor series a folder with 2D CAD drawings, both in .dwg and .pdf format. For easy downloading there's also one .zip file per ASMT and ECMA series (separate for with brake and without brake).

1.3.1 ASMT Servo Motors

Q How to connect the brake for motors with brake ASMTxxx250Bx
A Please refer to the following diagram:



The polarity of the 24VDC that supplies the brake is not important.

Brake power consumption:

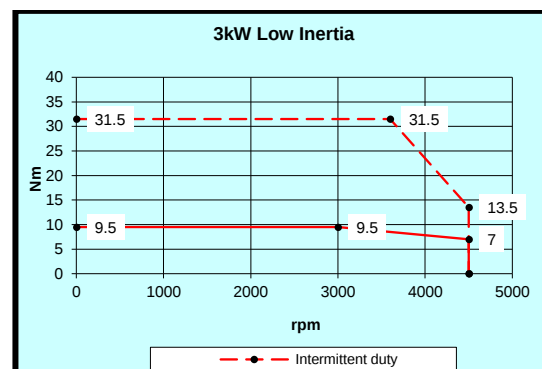
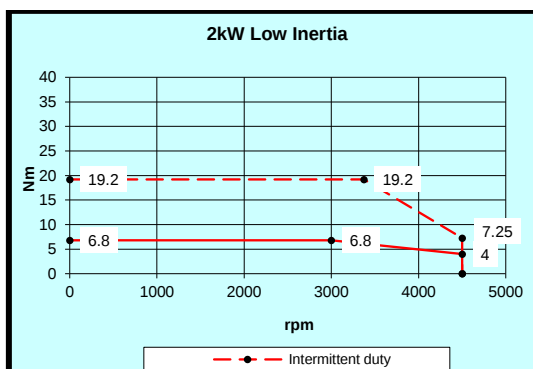
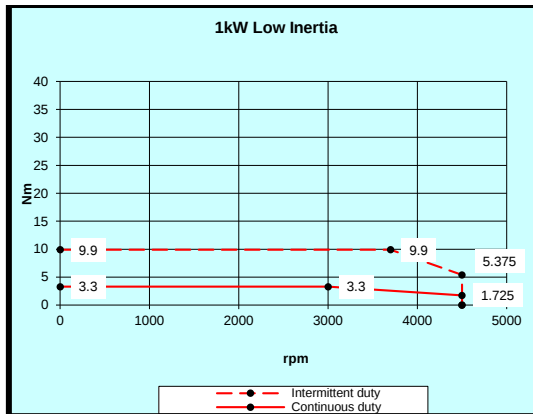
Motor type	Brake power at 24VDC $\pm 10\%$ and 20 °C	Brake current *)
ASMT01L250Bx	5W	0.35A
ASMT02L250Bx	9W	0.63A
ASMT04L250Bx	9W	0.63A
ASMT07L250Bx	9.5W	0.66A
ASMT10L250Bx	17.9W	1.24A
ASMT20L250Bx	17.9W	1.24A
ASMT30L250Bx	30W	2.08A
ASMT10M250Bx	20W	1.39A
ASMT15M250Bx	30W	2.08A
ASMT20M250Bx	34.7W	2.41A
ASMT30M250Bx	40W	2.78A

*) with 50% safety tolerance to compensate for voltage tolerance, temperature, etc.

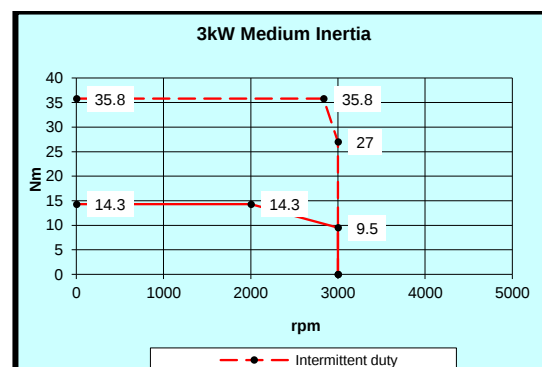
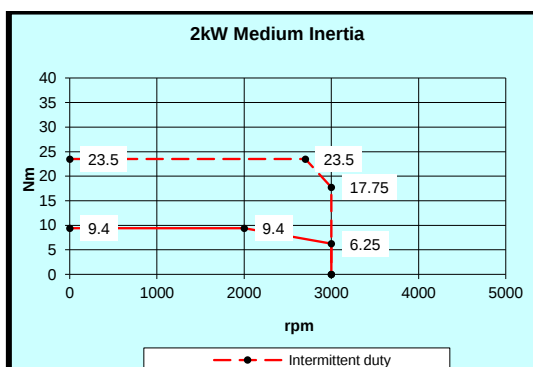
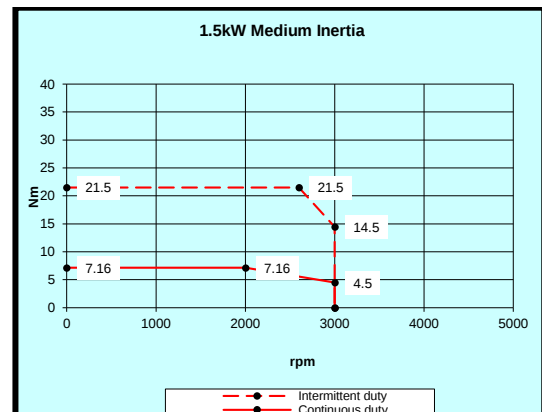
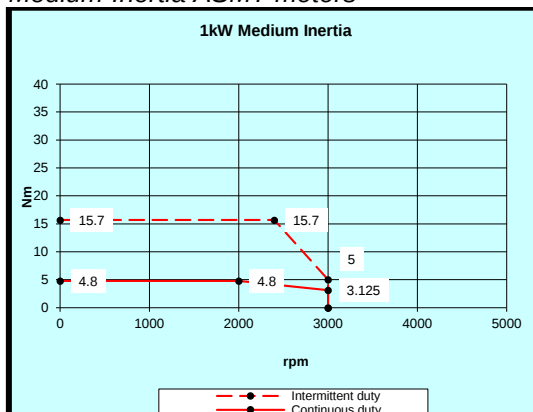
For <1A the DVPPS01 can be used and for <2A DVPSS02.

Q What are the values in the speed-torque curves (too small to read in the manual)?
A See below for the Low and Medium Inertia motors of $\geq 1kW$.

Low Inertia ASMT motors



Medium-Inertia ASMT motors



1.3.2 ECMA Servo Motors

- Q** ECMA servo motors are marked with “110V” on the label. Are they suitable for 230V operation?
- A** *Acc. to UL requirements, the values on the label should either be all rated values (rated voltage, rated speed, rated current, etc) or maximum values (max voltage, max speed, max current, etc). Delta has chosen to put the rated values on the label. The rated voltage of the ECMA motors is 110V at rated speed 3000rpm. The maximum voltage is 220V at max speed 5000rpm. But you don't need to worry; the motor is perfectly matched to the servo drive.*

1.4 DVP-series PLC

- Q** Which programming software is available for Delta DVP series of PLC? How to get it?
- A** *The free programming software for PLC DVP series is WPL Soft.
Users can access the following website to download the free software:
<http://www.delta.com.tw/tw/products/plc.htm>*
- Q** Which Human Machine Interface supports the PLC DVP series? And how is the communication setting?
- A** *The HMI's from Fuji, HiTech, EasyView, Digital (GP) and Delta DOP support Delta's DVP series of PLCs.
Please choose the communication mode as 9600, E, 7, 1 and set the Station No=1 of DVP PLC series*
- Q** What are the advantages of selecting Delta PLC DVP series if users have already Delta AC Motor Drive, AC Servo system or temperature controller?
- A** *Most Delta products are designed with a built-in RS-485 interface with Modbus ASCII/RTU communication protocol, thus reducing the need for extra communication extension modules or converters and saving users the cost. Moreover, DVP series have convenient built-in Modbus commands or with the PLC Easy Link function, users can easily design the Read and Write program for one or more than one communication device to make the complicated conversion during data exchange easier.*
- Q** There are 2 built-in communication ports RS-232 and RS-485 for PLC DVP series. Is it possible to connect these 2 ports with both computer and Human Machine Interface simultaneously? If it is possible, what should you be aware of?
- A** *It is possible to connect both RS-232 and RS-485 to external devices simultaneously, but users shall be aware of Slave or Master mode for the communication ports. Basically, RS-232 is used to connect a Slave device for the PLC, and in this case, the commands like RS, MODWR, or MODRW are available for RS485. In another case, once both RS-232 and RS-485 are used to connect to one or more than one Master devices, commands like RS, DODRD, or MODRW will no longer be available.*
- Q** If DVP-ES series is already in use, can its program be written directly into other higher-class models, such as SA or EH series?
- A** *The program of DVP series is designed to be compatible with higher-class models. For example, a program for the model with 4K program capacity (EX/SS) can be used in the models of 8K (SA/SX/SC) and 16K(EH). Similarly, a program for 8K (SA/SX/SC) PLC can be used in 16K (EH) PLC.*
- Q** There are 2 built-in communication ports RS-232 and RS-485 for PLC DVP series. Is it possible to connect these 2 ports with both computer and Human Machine Interface simultaneously? If it is possible, what should you be aware of?
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485 are used to connect to one or more than one Master devices, commands like RS, DODRD, or MODRW will no longer be available.

Q The special extension module of the PLC is up to 8 units. Is it possible to extend the module more than 8 units if situation needed?

A Delta is the first one to design RS-485 interface built inside the special extension modules (AD/DA/XA/PT/TC, etc.) for the PLC DVP series. This design enables the special extension modules to work similarly as an independent MPU or as system operation of separate Remote IO without connection to PLC MPU's extension ports. Through the built-in RS-485 of PLC DVP series and its convenient Modbus commands or PLC Easy Link function, users can easily Read and Write the data in the special extension modules. If the master controller is PC or HMI, Modbus SSCII/RTU communication protocol can be selected for directly connecting to special extension modules.

Q In what situation can the PLC not read the input signals?

A The PLC's total reaction time from the input signal to the output operation is decided by input filter/delay time (in order to prevent signal misinterpretation from noise and switching spikes) and program scan time. For example, the factory default for X0~X17 input filter/delay time of the DVP series is 10ms (D1020 and D1021 are equal to K10). In this case, if the program scan time is 5ms, the width for one cycle total reaction time must be at least 15ms or greater (Reaction time = input filter/delay time + program scan time). If faster reaction time is required, users can adjust the values of D1020 and D1021 to increase the response time of the input terminal in the MPU or use the external stop command and function to immediately read the input signal.

Q What is the maximum high speed counter frequency in all DVP series?

A Refer to the following tables.

Spec. Model	1 phase 1 input		1 phase 2 input		2 phase 2 input	
	Points	Bandwidth	Points	Bandwidth	Points	Bandwidth
ES/EX/SS	7	20kHz	3	20kHz	3	4kHz
SA/SX	9	20kHz	3	20kHz	3	4kHz
SC	2/4/2	20kHz/10kHz/100kHz	1/1	20kHz/100kHz	1/1	4kHz/50kHz

Spec. Model	General		Hardware high-speed counter					
	1 phase 1 input		1 phase 1 input		1 phase 2 input		2 phase 2 input	
	Points	Bandwidth	Points	Count frequency	Points	Count frequency	Points	Count frequency
EH	6	20kHz	4(2/2)	200kHz/30kHz	4(2/2)	200kHz/30kHz	4(2/2)	100kHz/30kHz

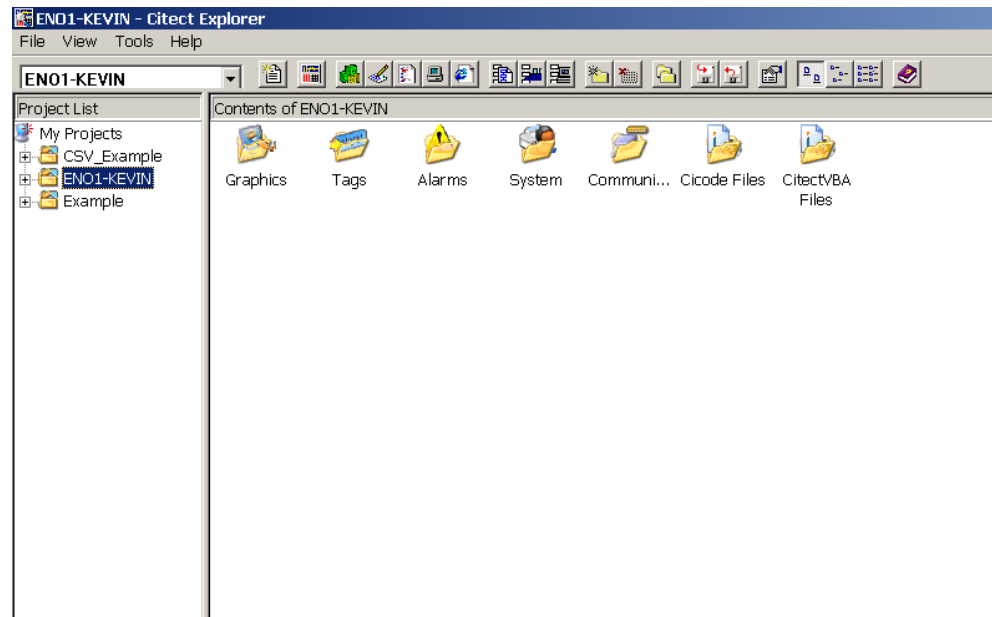
Q If DVP-ES series is already in use, can its program be written directly into other higher-class models, such as SA or EH series??

A The program of DVP series is designed to be compatible with higher-class models. For example, a program for the model with 4K program capacity (EX/SS) can be used in the models of 8K (SA/SX/SC) and 16K(EH). Similarly, a program for 8K (SA/SX/SC) PLC can be used in 16K (EH) PLC's.

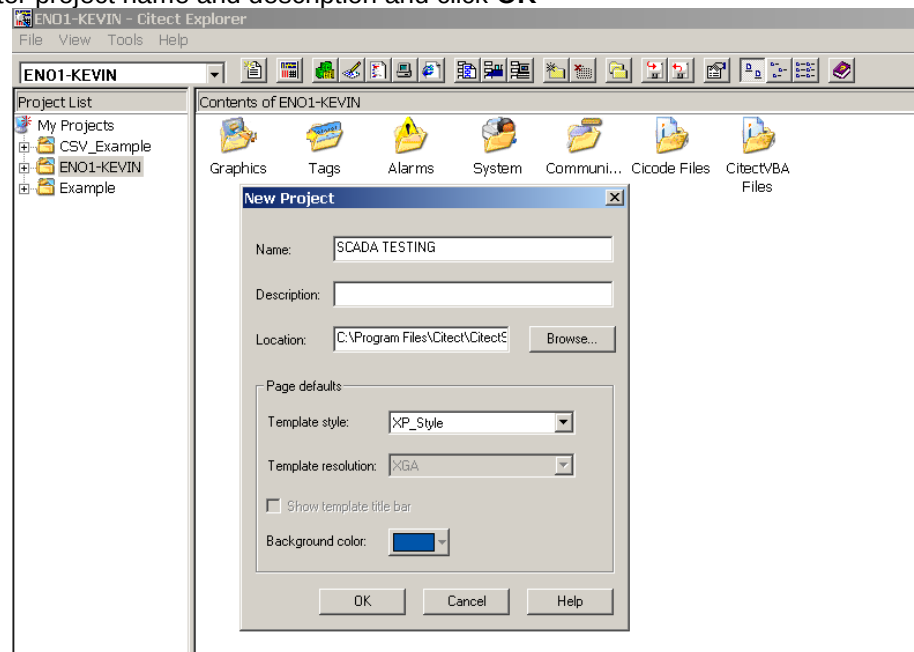
Q How to setup SCADA communication with DVP28SV by RS-485

A Example –Citect SCADA

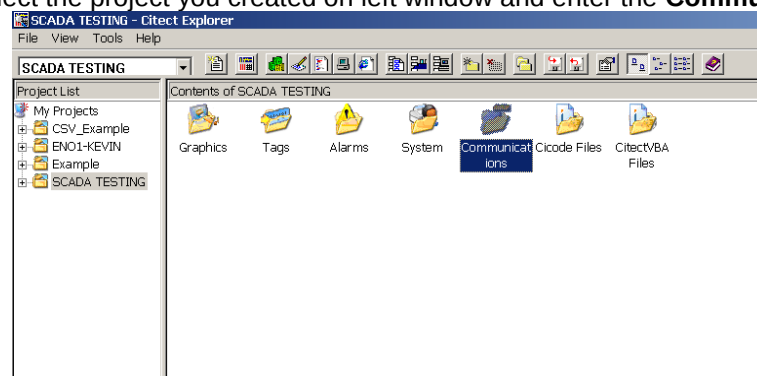
1) Open **Citect Explorer** after installation



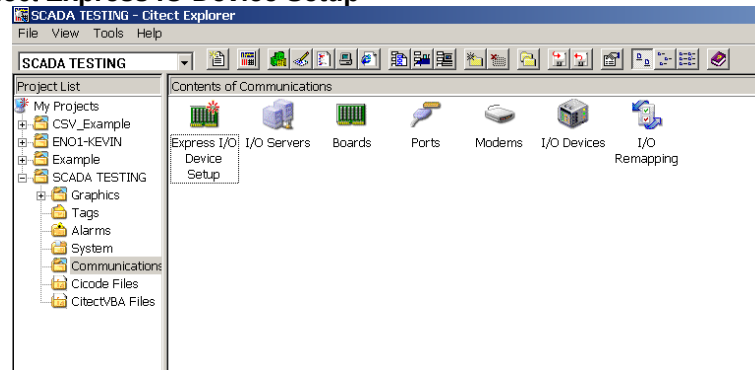
2) Enter project name and description and click **OK**



3) Select the project you created on left window and enter the **Communication** folder

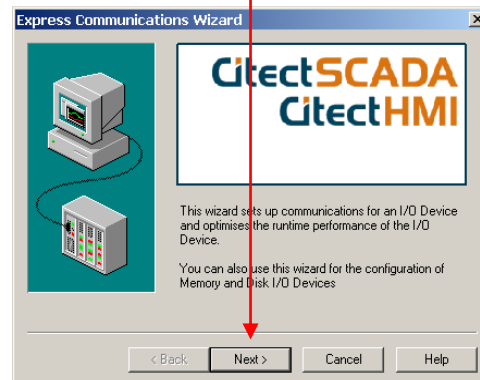


4) Select Express IO Device Setup

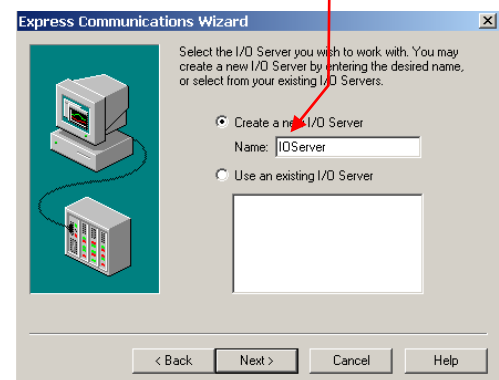


5) IO device setting

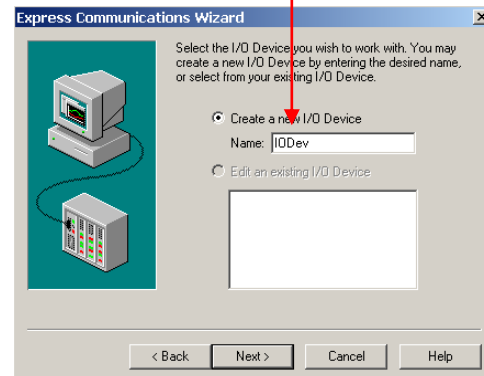
a. Click Next



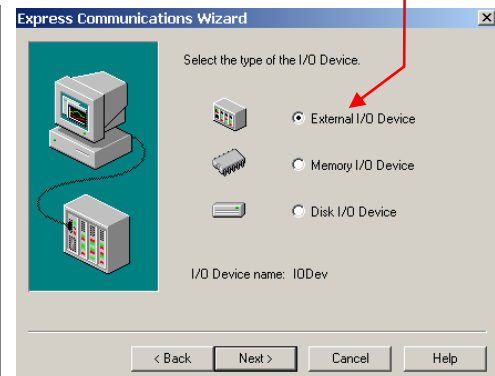
b. Enter I/O server name



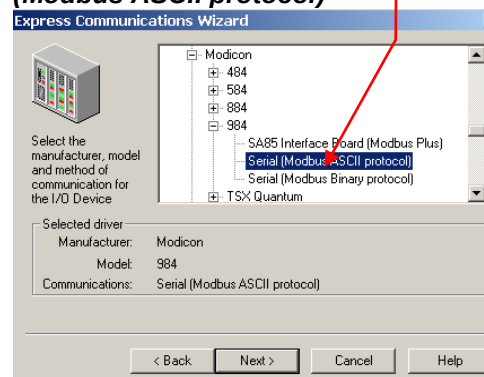
c. Enter I/O Device



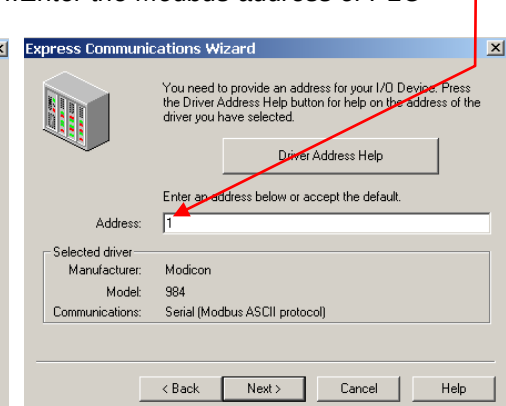
d. Select **External I/O Device**



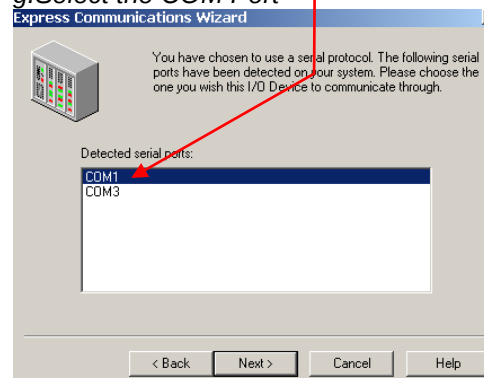
e. Select **Modicon/984/Serial (Modbus ASCII protocol)**



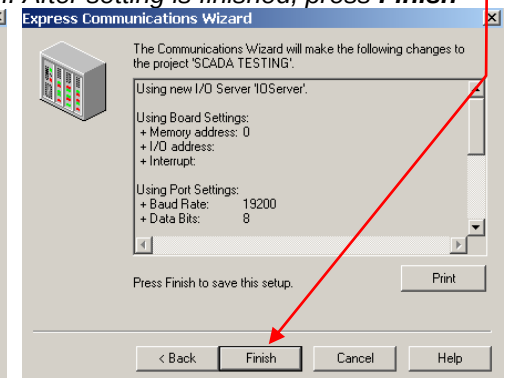
f. Enter the Modbus address of PLC



g. Select the COM Port



h. After setting is finished, press **Finish**



6) Follow the SCADA operation procedure to create new topic and setup I/O.

7) Appendix: Modbus address table of Delta DVP series PLC.

Device	Range	Type	Address	Effective		
				ES/EX/SS	SA/SX/SH	EH
S	000~255	bit	0000~00FF	0~127	0~1023	0~1023
S	246~511	bit	0100~01FF			
S	512~767	bit	0200~02FF			
S	768~1023	bit	0300~03FF	0~177	0~177	0~377
X	000~377 (Octal)	bit	0400~04FF			
Y	000~377 (Octal)	bit	0500~05FF			
T	000~255	bit	0600~06FF	0~127	0~255	0~255
M	000~255	bit	0800~08FF	0~1279	0~4095	0~4095
M	256~511	bit	0900~09FF			
M	512~767	bit	0A00~0AFF			
M	768~1023	bit	0B00~0BFF			
M	1024~1279	bit	0C00~0CFF			

Device	Range	Type	Address	Effective		
				ES/EX/SS	SA/SX/SH	EH
M	1280~1535	bit	0D00~0DFF			
M	1536~1791	bit	B000~B0FF			
M	1792~2047	bit	B100~B1FF			
M	2048~2303	bit	B200~B2FF			
M	2304~2559	bit	B300~B3FF			
M	2560~2815	bit	B400~B4FF			
M	2816~3071	bit	B500~B5FF			
M	3072~3327	bit	B600~B6FF			
M	3328~3583	bit	B700~B7FF			
M	3584~3839	bit	B800~B8FF			
M	3840~4095	bit	B900~B9FF			
C	0~199	16bit	0E00~0EC7	0~127	0~199	0~199
	200~255	32bit	0EC8~0EFF	232~255	200~255	200~255
D	000~256	word	1000~10FF	0~1311	0~4999	0~9999
D	256~511	word	1100~11FF			
D	512~767	word	1200~12FF			
D	768~1023	word	1300~13FF			
D	1024~1279	word	1400~14FF			
D	1280~1535	word	1500~15FF			
D	1536~1791	word	1600~16FF			
D	1792~2047	word	1700~17FF			
D	2048~2303	word	1800~18FF			
D	2304~2559	word	1900~19FF			
D	2560~2815	word	1A00~1AFF			
D	2816~3071	word	1B00~1BFF			
D	3072~3327	word	1C00~1CFF			
D	3328~3583	word	1D00~1DFF			
D	3584~3839	word	1E00~1EFF			
D	3840~4095	word	1F00~1FFF			
D	4096~4351	word	9000~90FF			
D	4352~4607	word	9100~91FF			
D	4608~4863	word	9200~92FF			
D	4864~5119	word	9300~93FF			
D	5120~5375	word	9400~94FF			
D	5376~5631	word	9500~95FF			
D	5632~5887	word	9600~96FF			
D	5888~6143	word	9700~97FF			
D	6144~6399	word	9800~98FF			
D	6400~6655	word	9900~99FF			
D	6656~6911	word	9A00~9AFF			
D	6912~7167	word	9B00~9BFF			
D	7168~7423	word	9C00~9CFF			
D	7424~7679	word	9D00~9DFF			
D	7680~7935	word	9E00~9EFF			
D	7936~8191	word	9F00~9FFF			
D	8192~8447	word	A000~A0FF			
D	8448~8703	word	A100~A1FF			
D	8704~8959	word	A200~A2FF			
D	8960~9215	word	A300~A3FF			
D	9216~9471	word	A400~A4FF			
D	9472~9727	word	A500~A5FF			
D	9728~9983	word	A600~A6FF			
D	9984~9999	word	A700~A70F			

Q
A

How many ways I have to up/download programs to Delta PLC?

To connect the PC directly to the PLC we have 3 ways:

1. Via the PC RS232 port with cable DVPACAB2A30 (programming via RS232 port).
2. Via a PC USB port with converter IFD6500 (programming via RS485 port).
3. Via the PC Ethernet port with DVPEN01-SL (need high-speed parallel port compatibility).

To connect the PC to the PLC through the HMI (direct link) we have 3 ways too:

1. Using standard USB wiring (DOPCAUSBAB) and direct link function. Monitoring the PLC and HMI at the same time is also allowed.
2. Using HMI with Ethernet and direct link function (only ISPSoft 1.00.08 and up). Monitoring the PLC and HMI at the same time is also allowed.
3. Using the USB Host port to download the program to the PLC (for now only DVP files).

Q

Which phased out DVPs are replaced with which new DVPs?

A See the overview:

New DVP-S Delta Range			
	DVP Models	Description	Availability
S Series (Slim)	DVP14SS2	Basic PLC for sequential applications	Stock
	DVP12SA2	Mid-range PLC for sequential applications	Stock
	DVP20SX2	Mid-range PLC for analog control applications	Stock
	DVP12SE	Mid-range PLC with Ethernet embeded	Stock
	DVP28SV2	High performance PLC	Stock
E Series	DVP-EC3	Simple PLC	Not Available
	DVP-ES2	Basic PLC for sequential applications	Few Pcs (*)
	DVP32ES2-C	Basic PLC for sequential applications with CANopen embeded	BTO
	DVP-EX2	Basic PLC for analog control applications	Few Pcs
	DVP30EX2	Basic PLC for analog control applications with Temperature input	BTO
	DVP-EH3	High performance PLC	BTO
Motion	DVP12SC	Step and direction one axis Motion Controller	Not Available
	DVP-PM	Step and direction 2-3 axis Motion Controller	Not Available
	DVP10MC11T	CANOpen Motion Controller	2013
Middle Size	AH500	Middle Size PLC 512 I/O	Not Available
	AH510	Middle Size PLC 1024 I/O	Not Available
	AH520	Middle Size PLC 2048 I/O	Not Available
	AH530	Middle Size PLC 4096 I/O	Not Available
* Only DVP24ES200R, DVP32ES200R and DVP32ES200T			

1.5 DOP and TP series HMI

1.5.1 DOP

Q Which is the edit software for DOP series of HMI? How do I get it?

A The free software editor for HMI DOP series is Screen Editor. Users can download it for free at the website:
http://www.delta.com.tw/product/em/hmi/hmi_software.asp

Q Which controllers are compatible with and support Delta HMI?

A Delta HMI's support all Delta industrial automation product series, including DVP PLC series, VFD AC motor drives, DTx Temperature Controllers and ASDA Servo drives.

Other compatible controllers are:

Allen Bradley	Delta
Danfoss	Facon PLC
Festo	GE
Hust CNC	Koyo
LG	Li Yan
M2i	Matsushita
Mirle	Mitsubishi
MKS	Modbus
Modicon	NIKKIDENSO
Omron	Siemens
Taia	Ti
Vigor	YOKOGAWA

Q How is the upload/download speed of Delta HMI products?

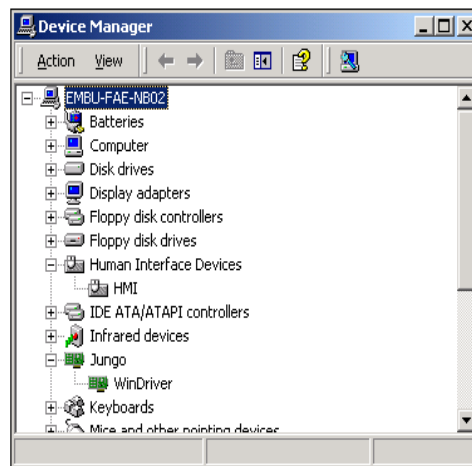
A For Delta HMI products, user can upload/download program via built-in COM or USB port in best speed. It is much faster to use USB port when downloading editing program than use traditional COM port.

Q How many languages does Delta HMI software support?

A While installing the software, it is available to select traditional Chinese, simplified Chinese or English for language. If the software is installed already, it is also able to change the language with resuming the software after changing language.

Q How is the upload/download speed of Delta HMI products?

- A ~~The software editor for TP series is called "TPEditor". The user can download it for free at our web site via link~~ For Delta HMI products, user can upload/download program via built-in COM or USB port in best speed. It is far faster to use USB port when downloading editing program than use traditional COM port.
- Q **Can data be saved when instantaneous power cut occurs to Delta HMI products?**
- A Yes. Choose "Non-volatile" in the HMI software editor the Screen Editor ("Option" → "History setup" → "Append" → choose "Non-volatile" in dialogue box "Buffer Properties" to save history and alarm record when the power is cut. Use SMC card to output data.
- Q **Is it possible to simultaneously use different communication protocols when Delta HMI products are connected to other external devices?**
- A There are two types of communication ports for Delta HMI products, one for COM ports and the other for USB port. USB port is used to upload/download program. The other two COM ports are used to control two different communication protocols: COM1 for RS-232 and COM2 for RS-232/422/485.
- Q **How many languages does Delta HMI software support?**
- A During software installation, the language can be selected: traditional Chinese, simplified Chinese or English.
If the software is already installed already, it is also possible to change the language followed by resuming the software.
- Q **Why can't the PC read USB port (PC→HMI)?**
- A After installing Delta HMI software editor, the Screen Editor system will automatically come up with Jungo WinDriver device when the software is activated for the first time. Then the user needs to indicate a USB port in PC and activate it to read HMI. After the USB port is activated, the user can see "HMI" under "Human Interface Devices" in "Device Manager" from PC. For details please refer to the screen below, the ports are used to control two different communication protocols, COM1 for RS-232 and COM2 for RS-232/422/485.



- Q **Is it possible to simultaneously use different communication protocols when Delta HMI products connect to other external devices?**
- A There are two types of communication ports for Delta HMI products, one is for COM ports and the other is for USB port.
USB port is used to upload/download program.
COM1 - RS-232
COM2 - RS-232/422/485

AE/AS Series HMI can extend to 3 COM Ports.
- Q **How to set USB Disk Mode in DOP-A?**

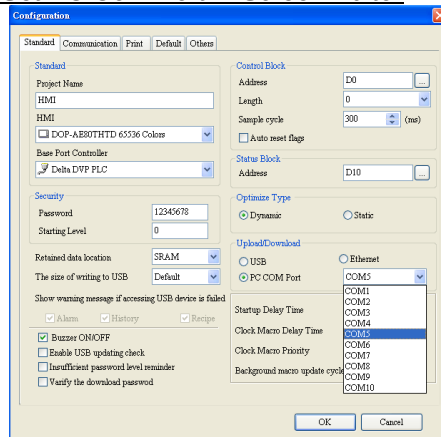
- A The USB DISK Mode is added to Screen Editor 1.05.83 (Firmware 1.089) and is compatible with Windows XP / Windows Vista / Windows 7. When using an old version in Windows Vista / Windows 7, it is not possible to upload/download a program from PC to HMI via USB. So we have to update the firmware of the HMI via the PC com port. After updating to the new version, the user can upload/download a program from PC to HMI via USB in Windows XP / Windows Vista / Windows 7.

Follow the instructions hereafter:

1. Check your PC Com Port

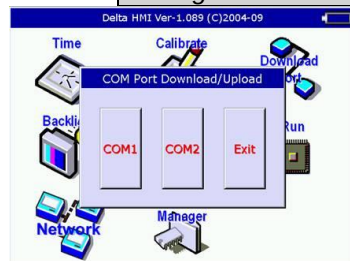


2. Set PC Com Port in Screen Editor

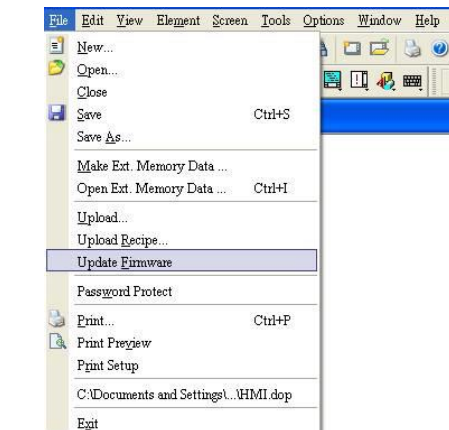


3. Select which HMI com port you want to use.

Enter System Menu, press Download Port, and choose which port on the HMI you want to use. After that the Bypass Mode Selection will pop up, press No, and then the HMI will show the message **Waiting to download/Upload**. When updating the firmware, you should keep this window **Waiting to download/Upload** on.



4. Press File / Update Firmware in Screen Editor.



Don't close the HMI **Waiting to download/Upload** window when updating!

5. After updating the firmware to version 1.089, enter System menu, press Settings, and then set the "USBCommMode" to 1.



Q
A

How to set USB Disk Mode in DOP-B?

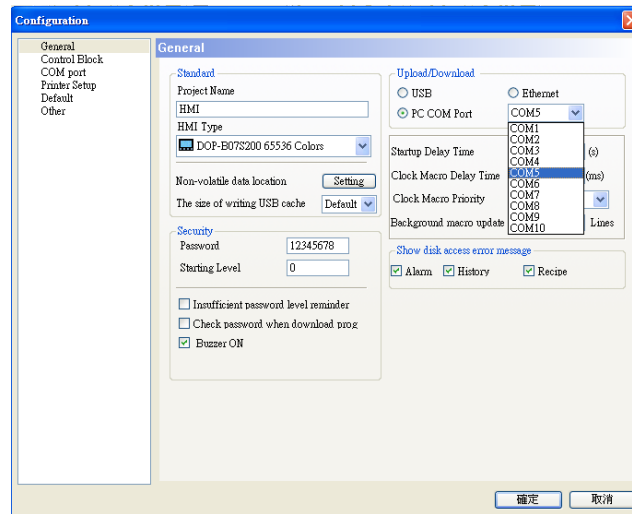
The USB DISK Mode is added to Screen Editor 2.00.17 (Firmware 2.0170) and is compatible with Windows XP / Windows Vista / Windows 7. When using an old version in Windows Vista / Windows 7, it is not possible to upload/download a program from PC to HMI via USB. So we have to update the firmware of the HMI via the PC com port. After updating to the new version, the user can upload/download a program from PC to HMI via USB in Windows XP / Windows Vista / Windows 7.

Follow the instructions hereafter:

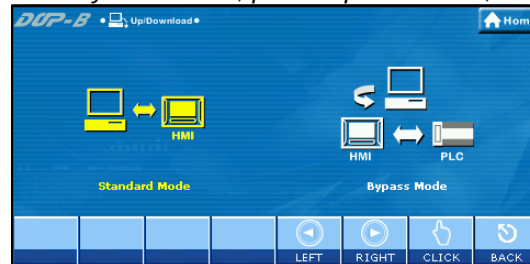
1. Check your PC Com Port



2. Set PC Com Port in Screen Editor



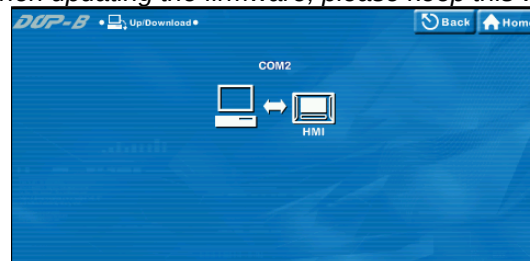
3. Select which HMI com port you want to use.
Enter System Menu, press Up/Download, and select Standard Mode.



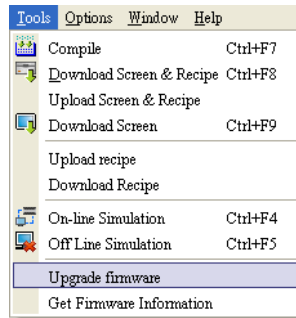
Choose which port on the HMI you want to use.



When updating the firmware, please keep this window open.

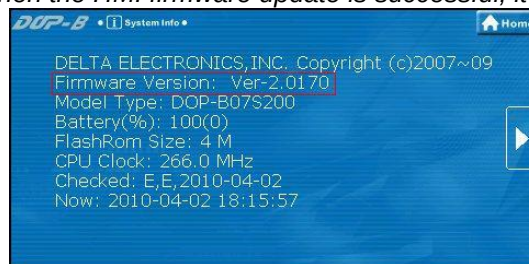


4. Press Tools / Update Firmware in Screen Editor.

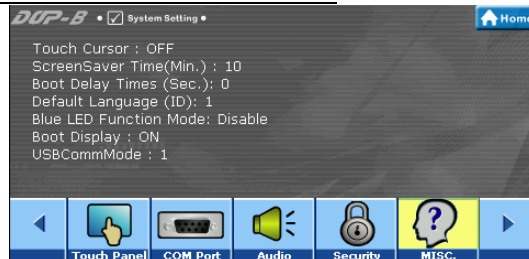


Don't close the HMI Upload/Download Transfer window when updating!

When the HMI firmware update is successful, it is shown on the screen



5. After updating the firmware to version 2.0170, enter System menu, press Misc, and then set the "USBCommMode" to 1.



Q Which new DOP replaces which old DOP?
A See the overview:

New DOP-B Delta Range						
	DOPA Phased out models	New DOP-B model	New DOP-B models With Ethernet	Same Pannel CUT	Square or Wide Screen	Avaliability
3.5"	DOPAS38BSTD	DOPAS35THTD	none	Yes	Square	Avaliable
4"	none	DOPB04	none	Yes	Wide	Avaliable
5"	DOPA57XXXX DOPAE57XXXX DOPAS57XXXX	DOPB05S101	DOPB07E515	Yes	Square	Avaliable
7"	DOPB07S2XX	DOPB07S415	DOPB07E415	Yes	Wide	Avaliable
8"	DOPA80THTD DOPAE80THTD	DOPB08S515	DOPB08E515	No	Square	BTO
10"	none	DOPB10S615	DOPB10E615	-	Wide	Avaliable
10"	DOPA10THTD DOPAE10THTD	DOPB10S515	DOPB10E515	Yes	Square	Planned 2012
12"	none	none	DOPB12	-	Square	Planned 2012
15"	none	none	DOPB15	-	Square	Planned 2012

DOP-B

Q How to set e-Remote session with DOP-B Ethernet HMI's?

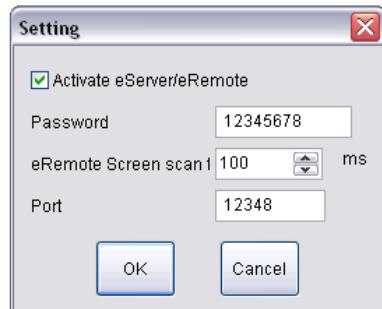
A eRemote is a PC software that is used to help customers view and check the same screen as shown on the HMI at the production site, and to control the manufacturing process via Ethernet. No matter where you are, remote controlling is not an arduous task at all.

1. Download and Install e Remote

eRemote

2. Activate eRemote in your HMI program

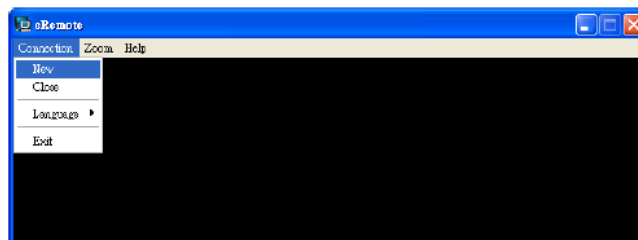
Before downloading your Screen Editor Program to your HMI, select in the Menu Option > Network Setting and activate it with your desired password.



3. Start eRemote

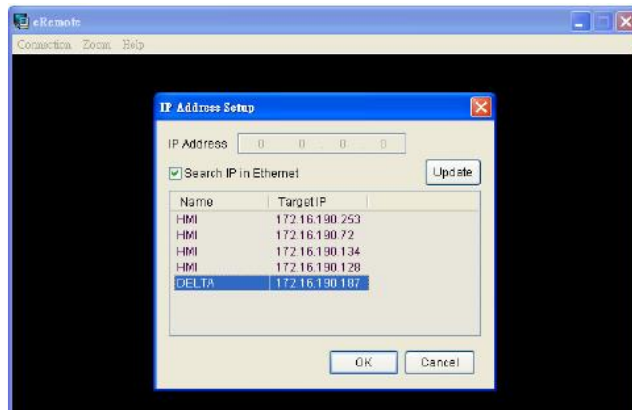


4. After starting eRemote, click Connection > New from the menu bar to create a new connection



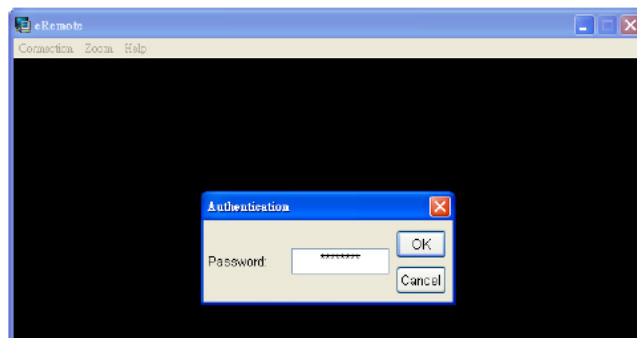
4. Auto IP searching

The following IP Address Setup dialog box will appear, and the system will search and show automatically all connected HMIs via Ethernet. Select the desired HMI and press the OK button.



5. Security password

Before connecting, the password is required. Please enter the correct password and press the OK button.



1.5.2 TP

- Q** Which editing software do I need for the TP series and how do I get it?
A The software editor for TP series is called "TPEditor". The user can download it for free from our website via the link http://www.delta.com.tw/product/em/hmi/hmi_software.asp
- Q** Where to get the manual and the document of the TP series?
A The user can download it for free from our website via the link http://www.delta.com.tw/product/em/hmi/hmi_manual.asp
- Q** What controllers compatibly support Delta TP series?
A Delta TP series support all the series of Delta Industrial Automation products, including PLC, AC Motor Drive, Temperature Controller, HMI and Servo system.

Other compatible controllers are:

Allen Bradley	MicroLogix PLC
Facon PLC	FB Series
Koyo	DL/SU Series
LG	Master K120S/200S PLC
Mitsubishi	FX
	FX2N
	A Series/J71UC24
Modbus	ASCII (Master)
	RTU(Master)
Modicon	TSX Micro (Uni-TelWay)
	NEZA (Uni-TelWay)
Omron	C Series

Siemens	TPM1A
	S7-200
	S7_300_PLC_without_PC_adaptor
	S7_300_PLC_with_PC_adaptor
Vigor	M Series

1.6 Delta Temperature Controllers: DTA, DTB, DTC

- Q** **What is the difference between ON-OFF control and PID control?**
A When using ON-OFF control, the output control is executed by switching ON(full output) of OFF. The output is OFF when the process value reaches the set value, and ON when the process value is lower than the set value. With this method there always will be a small temperature fluctuation.
 Contrary to the ON-OFF method, with PID control the output is controlled by continuous proportional calculation to compensate for changes in the system. When the process value is close to the set value, PID control will adjust the output in small percentage steps to reach a stable temperature. For PID operation a voltage or current output is required.
- Q** **What is the difference between Relay outputs and Voltage outputs on the Temperature Controllers?**
A The Control Period parameter is used when the PID control method is selected and allows you to set or adjust the time between the ON cycles of the output. A shorter control period provides better control performance, but in the case of Relay outputs a short control period is not recommended because of the switching life time limitation of 100,000 times for Relay outputs. Therefore, to protect the Relay we recommend setting the control period to 20s or more with 20s as factory default to protect the Relay.
 Compared to the Relay output, the Voltage output allows shorter control periods (the factory default is 4s) to achieve accurate control performance. To control high loads in this way, an SSR (Solid State Relay) is to be connected to the Voltage output.
- Q** **Which sensing element in the application enables the controller to reach the most accurate and reliable performance?**
A The controller can work accurately in the system of quick temperature transmission by quickly calculating the output in response to the input from the application.
 For example, an application with liquid as transmission medium is easier controlled than one with air as transmission medium, because liquid temperature is comparatively more stable while air temperature tends to be unsteady due to the slow transmission speed and external air turbulence.
- Q** **What is CT (Current Transformer) function used for?**
A The current in wire will activate the system when the controller performs outputs.
 By using the CT function, it is possible to check if the current value is within allowable range. If the current value is lower or higher than the set value, CT function can be used with alarm output function to warn the users when the current exceeds the set value.

1.6.1 DTA

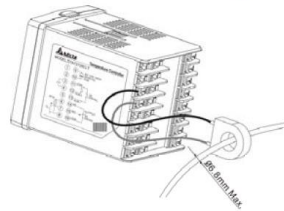
1.6.2 DTB

1.6.3 DTC

- Q** **What are the current transformers for DTC?**
A They are the same as for DTB and DT3.

DT3-CT30A	30A CT Ring	Max. power wire diameter 7.0mm, max 30A
DT3-CT100A	100A CT Ring	Max. power wire diameter 19.5mm, max 100A

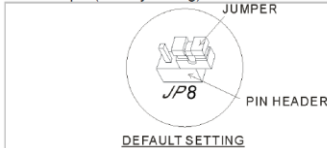
CT Wiring Method (if CT function is selected)



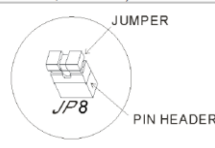
● How to Set Up Current Input

Remove the temperature controller cover and set JP8 to short. JP8 jumper locates near the sensor input area on PCB board.

Normal Input (Factory Setting)



Current Input (4 ~ 20mA, 0 ~ 20mA)



1.7 Delta Timer/Counter/Tachometer: CTA

Q What main functions does Delta CTA offer?

A The 3-in-1 timer/counter/tachometer allows you to switch among the functions of timer, counter and tachometer by altering parameters and wiring. And, the unique mixed mode allows you to enable the functions of timer and counter at the same time.

Q Does Delta CTA series offer internal power supply for external sensor input?

A CTA offers DC12V/100mA for the external sensor, e.g. the encoder so that you do not have to buy extra power supply for the sensor.

Q Does Delta CTA offer fast parameter setup?

A The external DIP switches allow you to alter the parameters following the instructions in the user's manual. If you choose to use the DIP switches for setting up the parameters, you can only read part of the functions in the parameter menu.

Q What types of input signals does Delta CTA accept?

A CTA accepts non-voltage input (NPN) and voltage input (PNP).

Q What input/output modes does Delta CTA offer in timer function?

A There are 2 input modes, UP and DOWN, and 14 output modes for you to select according to the control method you require.

Q What counter functions does Delta CTA offer?

A There are 5 modes: 1-stage counting, 2-stage counting, batch counting, total counting and dual counting.

Q What input/output modes does Delta CTA offer in counter function?

A There are 5 input modes: UP, DOWN, UD_A (command), UD_B (individual), and UD_C (quadrature) and 11 output modes for you to select according to the control methods you require.

Q What is batch counting?

A In batch counting, you have to set up two values, the "set value" and "batch set value". When the present value equals set value, output 2 will be enabled and the batch present value will plus 1. This will repeat until the batch present value reaches batch set value and output 1 is enabled.

Q What is total counting?

A *There is only one set value in total counting.
When the present value equals set value, output 1 and 2 are enabled at the same time and the present value will be accumulated into the total counter.*

Q What is dual counting?

A *There is only one set value in dual counting.
CP1 and CP2 are independent counters with maximum counting speed of 5KHz and can perform addition and subtraction with each other. If you select "subtraction" mode, it means $CP1 - CP2 \geq \text{set value}$ and output 1 and output 2 will be enabled at the same time.*

Q How to calculate the pre-scale value of the CTA tachometer?

A *CTA tachometer only accepts a single-phase input signal. Therefore, when CTA is connected to a Delta encoder and one of the phases of the encoder is 2,500ppr, the pre-scale of CTA tachometer can be obtained from the following equations:*

$$n = \frac{f}{2500} * 60 \quad \begin{array}{l} n = \text{encoder speed in rpm} \\ f = \text{encoder signal frequency in Hz} \end{array}$$

*Example: At $f=10\text{kHz}$, $n=(10000/2500)*60=240\text{rpm}$.*

The pre-scale value is therefore $\frac{60}{2500} = 0.024$. In general, the pre-scale factor is $\frac{60}{\text{ppr}_{\text{encoder}}}$.

*Fill in "0.024" in the **PSCALE** parameter and CTA will synchronously display the encoder rpm.*

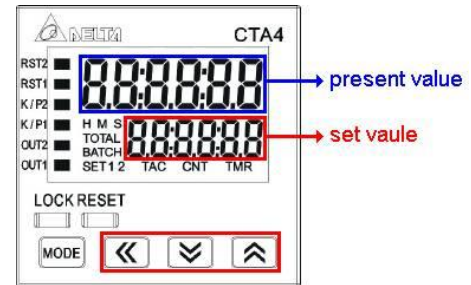
Q How to debounce the CTA counter input signal?

A *Debounce by using an R-C circuit at the CP1 input, see example below*



Recommended values: $R=100\sim 1\text{k}\Omega$, $C=0.01\mu\text{F}$.

- Q** How to change the setpoints for a speed or frequency output signal?
- A** If you have on the display **Func** (in red) and **Tach** (in green), press **MODE** for long time. Then it shows on lower line in display **SET1** and **TAC**. Press **<<** and then the value in green starts blinking. With **<<** and **>** and **v** keys you can change its value. Confirm by **MODE**. Press **MODE** again and it changes to **SET 2** and **TAC**. Press **<<** and then the value in green starts blinking. With **<<** and **>** and **v** keys you can change its value. Confirm by **MODE**. Then press **MODE** again long time until you have **Func** (in red) and **Tach** (in green) again. Then proceed acc. to Chapter 2.3.1 to set everything (Output LoLo, LoHi, HiLo, HiHi, Pscale, etc.)

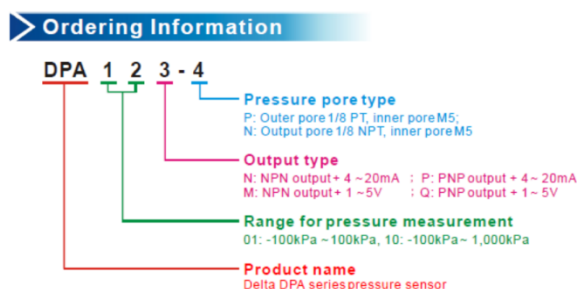


1.8 DPA Digital Pressure Sensor

- Q** Can Delta pressure sensors DPA measure gas pressure and water pressure?
- A** DPA currently only supports the measurement of pressure of non-corrosive gasses.
- Q** What is the measuring range of DPA?
- A** DPA01: -100 ~ 100kPa
DPA10: -100 ~ 1,000kPa.
- Q** Does DPA support communication functions?
- A** No, DPA does not support communication... yet!
- Q** It is a lot of work to set up parameters one by one. If there are many pressure sensors used at the same time, what can I do?
- A** DPA offers a parameter copy function. You can easily copy parameters from one sensor (master) to another (slave).
- Q** Which Delta DPA pressure sensors are available?
- A** See the overview:

DPA Models	Characteristics	Availability
DPA01P-P	from -100 to +100 kPa / PNP / 4-20mA / R1/8 PT + inner M5	Stock
DPA10P-P	From -100 to +1000 kPa / PNP / 4-20mA / R1/8 PT + inner M5	Stock
DPA01Q-P	From -100 to +100 kPa / PNP / 1-5V / R1/8 PT + inner M5	few pcs
DPA10Q-P	From -100 to +1000 kPa / PNP / 1-5V / R1/8 PT + inner M5	few pcs
DPA01N-P	From -100 to +100 kPa / NPN / 4-20mA / R1/8 PT + inner M5	BTO
DPA10N-P	From -100 to +1000 kPa / NPN / 4.20mA / R1/8 PT + inner M5	BTO
DPA01M-P	From -100 to +100 kPa / NPN / 1-5V / R1/8 PT + inner M5	BTO
DPA10M-P	From -100 to +1000 kPa / NPN / 1-5V / R1/8 PT + inner M5	BTO
DPA-PFKit	Panel Install	Stock
DPA-PMKit	Frame Install	Stock

- Q** What is Delta DPA pressure sensor's order information (type number)?
- A**



1.9 Photo-electric sensors

Q Which models have a reflector or a mounting bracket in the package?

A clear and simple:

1. Only retro-reflective sensors have **Reflector**.
2. Only **PS-R trimmer** type sensors have **Mounting Bracket**

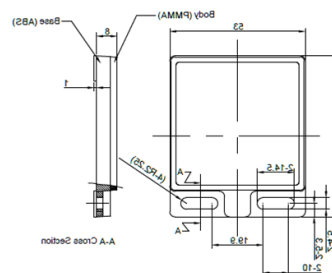
	Reflector	Mounting Bracket
PS-FB1-PDB2	N	N
PS-FB1-PLB2	N	N
PS-FL3-PDB2	Y	N
PS-FL3-PLB2	Y	N
PS-FR2-PDB2	N	N
PS-FR2-PLB2	N	N
PS-FT3-PDB2	N	N
PS-FT3-PLB2	N	N
PS-LL3-USB2	Y	N
PS-LR2-USB2	N	N
PS-LT3-USB2	N	N
PS-ML4-US22	Y	N
PS-ML4-US2D	Y	N
PS-MR1-USB2	N	N
PS-MR1-USBD	N	N
PS-MR3-NS22	N	N
PS-MR3-US22	N	N
PS-MR3-US2D	N	N
PS-MR9-US22	N	N
PS-MR9-US2D	N	N
PS-MT5-USB2	N	N
PS-MT5-USBD	N	N
PS-RL4-PS12	Y	Y
PS-RL4-US22	Y	N
PS-RL4-US2B	Y	N
PS-RR3-PS12	N	Y
PS-RR3-US22	N	N
PS-RR3-US2B	N	N
PS-RR9-PS12	N	Y
PS-RR9-US22	N	N
PS-RR9-US2B	N	N
PS-RS1-US22	N	N
PS-RS1-US2B	N	N
PS-RT9-PS12	N	Y
PS-RT9-USB2	N	N
PS-RT9-USBB	N	N

Of course we can supply separate mounting brackets and reflectors:

Universal mounting bracket **BK-PSR02**



Universal reflector, type: **RM-01**



1.10 Power supplies

Q Is it allowed to connect 2 power supplies in series to double the output voltage?

A Yes, provided both power supplies are identical.

Q Is it allowed to supply the 400V power supplies with single-phase voltage?

A Yes, provided the input voltage is not lower than 380VAC. You can connect to L1-L2, L2-L3, L1-L3.

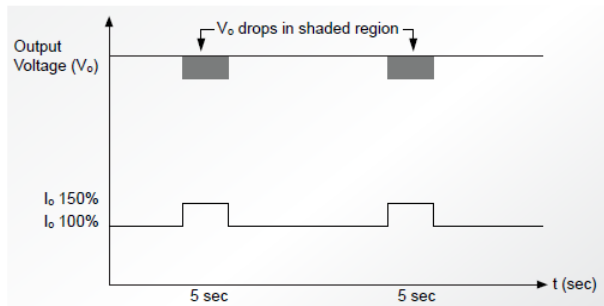
Q To have 72VDC can 3 power supplies be connected in series?

A Yes, when 3 power supplies of 24VDC are connected in series it is possible to have 72VDC. The power supplies must be of the same current, however!

Q What is power boost, which power supplies have it and how can it be used?

- A *It is the constantly available reserve power that allows reliable startup of loads with high inrush current.*
In our product portfolio there are two DIN-Rail series CliQ & CliQ II. Both series have this feature.

- CliQ has 150% boost for 3 seconds
- CliQ II has the same 150% boost for 5 seconds



Such feature is especially useful for applications where loads are active, the high current can cause the power supply unit (PSU) output to dip down if the PSU does not have the capability to withstand this surge current. Consequently, this could reset the system and result in equipment downtime.

For example, in an EV charging terminal, the power supply is powering all the controls and safety electronics. In such a system there could be up to ten DC/DC converters and POLs. Each converter has an inrush current and all DC/DC converters are connected in parallel. There for the total inrush currents is the multiple of all the DC/DC converters. Delta's Power Boost of 150% up to 5 seconds helps to reduce the need for active inrush limiters and/or avoid sequence power on.

Q What is the output current of DRC-24V100W1AZ?

- A *DRC-24V100W1AZ is designed to meet according to Class 2 output or LPS requirements. For output voltage 24V, output power has to be limited at <100W even in conditions of continuous operating or fault happened (ex: OLP, OCP, etc..). Therefore we decided to design 3.8A (91.2W) for continuous operating and < 4.104A (~98.5W) for fault condition. But still keep the 100W power class.*

Future power supplies without Class 2 output will be 4.17A (100W).

Q What is the inrush current of DVP-PS01 and DVP-PS02 and how to select the circuit breaker?

- A DVP-PS02:
Steady state input current: 1A (typ.) @ 115VAC, 0.6A (typ.) @ 230VAC
Inrush current: 35A max/1ms @ 115VAC, 70A max/1ms @ 230VAC
Suggested NFB circuit breaker: 5~10A

DVP-PS01:
Steady state input current: 0.5A (typ.) @ 115VAC, 0.25A (typ.) @ 230VAC
Inrush current: 35A max/5~10ms @ 230VAC
Suggested NFB circuit breaker: 5A

Q Can the redundancy modules DRR-20A and DRR-40A handle power supplies of different current?

- A *Please note that DRR modules do not have load sharing function. Therefore both power supplies connected to DRR must be of the same current (and of course voltage).*

- Q** If the Output Ground (Gnd) and Frame Ground (FG/PE) are tied together, will it cause any safety or functional issues?
- A** Delta's PMC power supplies are designed based on the isolation concept (500Vac isolation between Sec & FG). In the event that the output GND and frame GND are shorted at the system end, this short will not damage the fuse or cause any functional damage to the power supply. However, the EMI could be affected by this.
- Q** Is there a specific orientation the power supply must be installed to operate normally?
- A** No. The power supply can be installed horizontally or vertically. However, it is recommended to have at least 20mm spacing from other equipment to ensure sufficient ventilation.
- Q** Do we need to restart the SPS if there is a sudden power outage?
- A** No. Delta's PMC power supply has a built-in auto restart function, unlike all other competitors.
- Q** Why is important to know the "Inrush Current
- A** Each time the power supply is turned on; there will be a large "Inrush Current". This is the inherent property of all Switching Power Supplies. Depending on the design, the Inrush current is limited to 40A, 60A or 80A. It will return back to its normal current rating immediately. Although the inrush current is high it will not damage the supply as the internal components are designed to handle these large pulse currents but it is not advisable to switch On/Off the PS very frequently as this may cause the AC Source circuit breaker to get into protection mode due to large Pulse current.
- Q** Which CliQII models are ATEX certified?
- A** The models with type number ending at "BA" are ATEX certified.
The models with type number ending at "BN" are not ATEX certified.

The certificate is officially valid for all types (version "Bx" where "x" can be all letters or digits) but this is an oversight that will be corrected.

Certificate Number:

EPS 13 ATEX 1 575 X

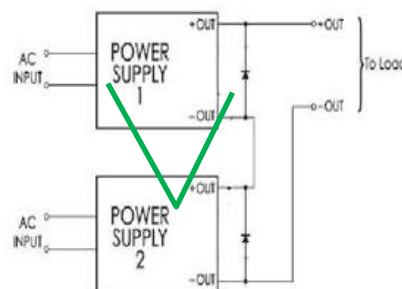
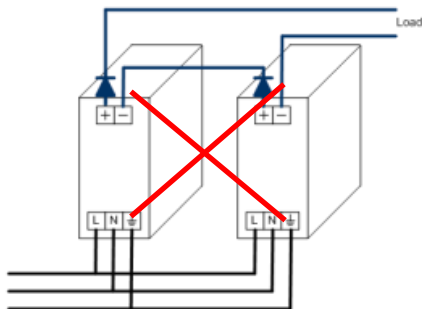
Revision 2

Equipment:

DRP024V060W3B~~X~~, DRP024V120W3B~~X~~, DRP024V240W3B~~X~~, DRP024V480W3B~~X~~

- Q** Can power supplies be connected in series for higher voltage?
- A** Yes. Use identical power supplies (current, voltage) and add a reverse biased diode across each power supply. The diode voltage rating must be at least twice the rated output voltage and its current rating must be at least twice the power supply rated current.

The diagram on the website is wrong, it will be corrected.



- Q** What is the overcurrent protection level of DVP-PSxx Power Supplies?
- A** The DVPPS01/02/05 overcurrent protection level is:
DVPPS01: 2A typ.
DVPPS02: 3A typ.

DVPPS05: 6.5A typ.

They are short-circuit proof.

Q
A

Which power supplies are marine certified?

All DRM series power supplies are DNV GL certified.

DRM-24V80W1PN(y)
DRM-24V120W1PN(y)
DRM-24V240W1PN(y)
DRM-24V480W1PN(y)
DRM-24V960W1PN(y)

Application :

Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV GL.

Location classes:

Temperature	B
Humidity	B
Vibration	A
EMC	A
Enclosure	A

1.11 DPM Power Meters

Q
A

How to set up communication on DPM-D520I?



1. There are two mode to set the settings of Modbus, such as slave ID, Baud Rate...etc.

2. USER Mode :

- ① **If users know the settings of Modbus**, they can communication with DPM-D520I directly.
- ② Or users can set the settings of Modbus directly which they want.



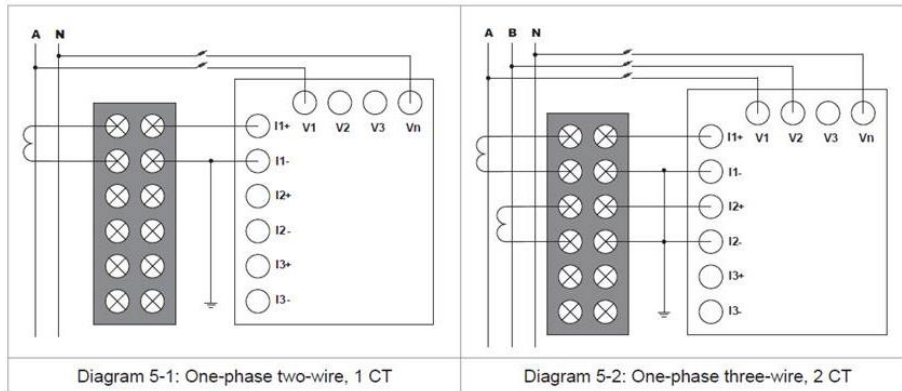
1. SETUP Mode :

- ① If users forgot the settings of Modbus which they had set before, users can reset the settings of Modbus in this mode.
- ② When switch to SETUP mode, the settings of Modbus will be set to the fixed parameters automatically as Slave ID=1, Baud Rate=9600 bps, Data Len=8 bits, Parity Bit=None, Stop Bit=1 bit.
- ③ Then, users can set Modbus parameters again which they want to be.
- ④ After finishing setup, switch to USER mode. The settings of Modbus will be what users have set just.



Q
A

Can DPM-D520I be used on 1-phase 2 wire, and 1-phase 3 wire systems?
Yes, the wiring diagram is the same as for DPM-C530A.

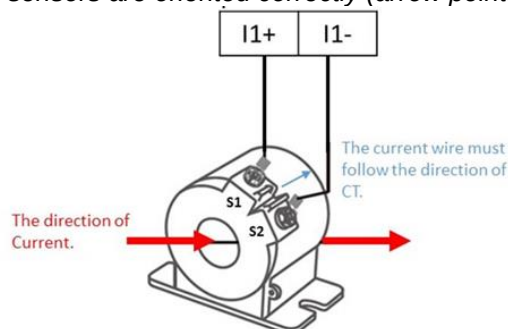


Q
A

My DPM shows unexpected negative values for power and current. Why?
Most of the time this is caused by incorrect wiring and/or current sensor orientation.

Please check in that case following (for Delta DCT current sensors):

- Make sure the current sensors for L1, L2, L3 are in the right phase L1, L2, L3.
- Make sure the current sensors are oriented correctly (arrow points to load)



- Make sure S1/S2 are connected to I1+ and I1- as indicated.

For non-Delta current sensors, please connect similarly.

Q
A

How does Unlock Function Operation work on DPM-C520?
The info is not in the user manual

1. Default page is "Home". Click "Back" to switch to option page. (Fig.1)
2. Hold "UP" or "Down" for approximate 5 seconds. (Fig.2)
3. The option (TIM & DAT) appears. Option can be changed by clicking "Next". (Fig.3)



Fig. 1



Fig. 2



Fig. 3

1.12 Software

1.12.1 VFDSOft

Q
A

Can VFDSOft run in Win8?

Yes, provided it is executed with Win7/XP compatibility.

A general tutorial

<http://www.c-sharpcorner.com/UploadFile/7e39ca/run-programs-in-windows-8-compatibility-mode/>

1.12.2 ISPSOft

Q
A

How to avoid compilation problems with the CMP instruction on ISPSOft.

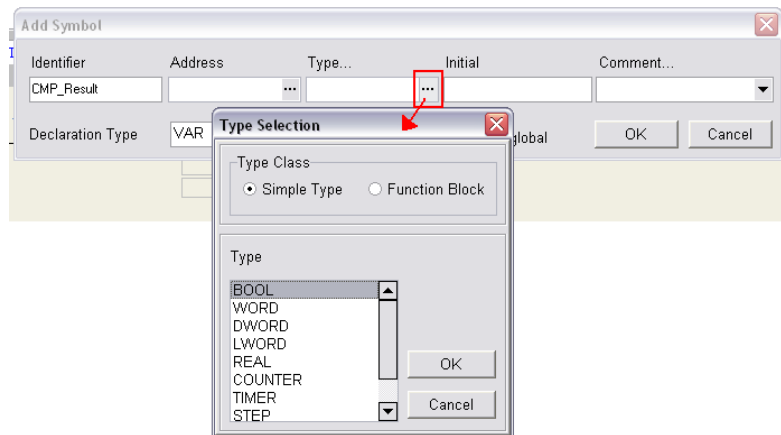
The CMP instruction needs two words (the two values to compare) and three Booleans (minor, equal and bigger).

Every time that you don't declare 3 symbols when you define the Boolean outputs, the ISPSOft gives the 240 Unknown symbol Error code.

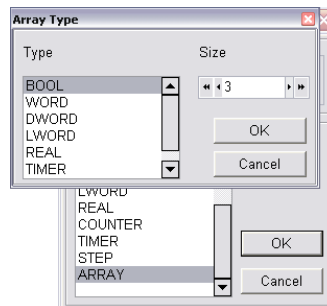
The method to solve it is using Array symbols to create a group of 2, 3 or 20 registers or Booleans to avoid that problem, so that system could be used with other instructions like PID, DDIV an many more.

To create an Array symbol of 3 Booleans, follow the next steps:

1. Click the right button and add a new symbol.
2. Put the identifier, and click on the Type menu.



3. Select ARRAY and a new wizard appears.
4. In that menu select BOOL and the size 3.

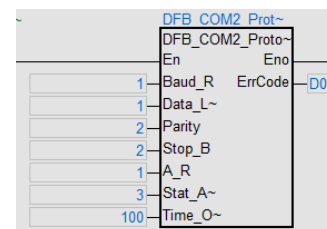
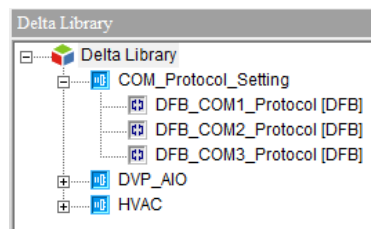


Q
A

Why can a flag in the ISPSOFT serial port function block not be reset?

The problem appears only in DVP PLC series if the com protocol settings function blocks provided by Delta library are used.

In case you setup an incorrect value at one of the input pins, an error internal M device is activated and disables the FB (Function Block). The problem is that this internal M device is defined as retentive and once it is triggered there's no way to reset it, other than resetting the PLC to factory defaults using ISPSOFT.



It will be corrected in the next ISPSOFT version. Until then there's a simple alternative solution: You only need to change the retentive range of M devices on your PLC from the original M2000~M4095 to a new M2000~M2999 (device auto allocation range used by function blocks uses to start at M3000...).

