# DELTA Newsletter

## Industrial Automation Products

## Contents

# 1    News

## 1.1    ftp-site link

Just to let you know (again), you can find the latest info about our products (manuals, pictures, catalogues, application notes, presentations, etc) on our ftp-site.

ftp://den-eindhoven:BuPd2175@ftp2.delta-europe.com/deltronics-eindhoven/customer-service

Name and password are included in the link.
Name:            den-eindhoven
Password:        BuPd2175

## 1.2    Delta Electronics at 2016 Hannover Messe



Delta showcased innovative technologies and solutions in line with carbon reduction trends emphasized by the recent COP21 Paris Agreement at Hannover Messe 2016. Delta's integrated solutions include smart manufacturing, building automation, renewable energy, energy storage, and EV charging.

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**New industrial automation product highlights are:**

- **Programmable Logic Controller AS Series** is Delta's new advanced modular-design controller for automation machinery.
- **Industrial PCs** the whole new compact fanless industrial PC IPC Series and Panel PC PPC Series feature high performance with low-consumption Intel CPU core and 4G RAM.
- **AC Motor Drives MH300 and MS300 Series** are Delta's new compact drives
- **Industry-specific fan/pump drive CFP2000 Series** is Delta's brand new High Durability Vector Control Drive for fan and pump applications.
- Delta's Integrated Factory Control Platform integrates the **mid-range PLC AH500 Series** as host controllers, the SCADA System **DIAView** and the industrial energy management system **DIAEnergie** for real-time manufacturing process monitoring.
- **Multiple Water Pumps Control Solution** performs pump management with several control modes
- Delta offers embedded and **PC-Based CNC Solutions** for engraving machines, wood carving machines and other machine tools.
- **Food Packaging Solution** delivers high-speed packaging efficiency with good quality for food and beverage packaging machines.
- **Elevator Solution** is able to save up to 40% energy for elevator systems through power regeneration provided by the Power Regenerative Unit **REG2000 Series**. The elevator system also delivers smooth rides and door open/close with Delta's Elevator Drive ED Series and Door Control Drive **VFD-DD Series**.
- **Power Quality Solutions** offer enhanced power factor and fast compensation of harmonics, reactive power and unbalanced loads with the Active Power Filter **APF2000 Series**, the Static Var Generator **SVG Series** and the Active Front End **AFE2000 Series**.

On the opening day of the exhibition Delta held a press conference to meet with the global media. Mr. Yancey Hai, Delta's chairman, personally introduced Delta's development and progress in green energy, as well as the excellent results from delta's energy saving solutions.

This year's partner country for Hannover Messe was the U.S.A and president Barak Obama visited Hall 11, where Delta's booth was located, to see the state-of-art automation technologies. His visit brought even more visitors to Hall 11 and many of them came to Delta's booth and showed great interest in Delta's smart factory solutions, robot stations and complete range of industrial automation products. The exhibition ended with many new business opportunities and it was a great success for Delta.

### 1.3 UL marking

In newsletter Edition 2016-03 we announced the change of the product and packaging labelling.
The UL marking will be as follows:



### 1.4 VFD-ED now certified

VFD-ED is now certified by the Dutch Liftinstituut (Elevator Institute) acc. to the
- Lifts Directive 201 4133/EU

and Standards
- EN-81 -1 :1998+43:2009 clause 12.7 .2.2 b)
- EN-81 -20:2014 clause 5.9.2.5.4 b)



| 2. Description component |
| --- |

The Delta VFD-ED drive is a drive which is suitable for lift applications. The drive has a Safe Torque Off (STO) function built in. Due to this, the system is suitable for a 1 contactor solution as described in EN 81-1 and EN 81-20.
The STO input has dual inputs which are monitored for differences. When the inputs have a different value, the system goes into an error state.
The drive can also handle brake monitoring: when a fault occurs the drive will go into an error state which is not resettable by switching the power off and on. The drive Is only suitable for A.C. motors.

The certificate F23-02-22 type exam cert Delta VFD-ED 1002-210-01.pdf can be found on our ftp-site, folder Customer-Service\Industrial Automation Products\_Delta Company info\Certificates.

## 2 Product update

### 2.1 NEW – User manuals for E, EL, C2000, CMC-EIP01, CMC-MOD01

New user manuals have been published recently on our ftp-site:

- DELTA_IA-MDS_VFD-E_UM_EN_20160321.pdf
- DELTA_IA-MDS_VFD-EL_UM_EN_20160308.pdf
- DELTA_IA-MDS_VFD-C2000_UM_EN_20160314.pdf
- DELTA_IA-MDS_VFD-C-Optional-CMC-EIP01_OM_EN_20140423.pdf
- DELTA_IA-MDS_VFD-C-Optional-CMC-MOD01_OM_EN_20130524.pdf

## 2.2   UPDATE – VFD-E upgraded from 1.22/2.22 to 1.23/2.23

| Function correction | |
|---|---|

| | Errors in v2.22 | Solutions in v2.23 |
|---|---|---|
| 1. | Set MI=27 , 28 to perform the auto-tuning on parameters. But those auto-tuned parameters cannot be saved and the setting value of parameters goes back to the factory setting once the motor drive is restarted. | Set MI=27 , 28 to perform motor auto-tuning on parameters. Those auto-tuned parameters can be saved after restarting the motor drive. |
| 2. | Record of operation time might be longer than the actual power-on time. | Record of operation time is shorter than or equal to the power-on time. |

| Function modify |
|---|

1.  Modify < Electronic Thermal Overload Relay Selection (OL1)> to comply with UL regulation.
    To comply with the two UL regulation below:
    43.3 Thermal memory retention test (shutdown) and
    43.4 Thermal memory retention test (loss of power)
    which require the second action time of OL1 must be shorter than the first action time of OL1.
2.  ACI Disconnection Detecting Level modified
    Make the ACI disconnection detecting level less sensitive so that the AErr message doesn't pop up. For example, when the detecting level is lower than 2mA (half of the factory setting of Pr04-15), the AErr message will pop up.
    Disconnection Detecting Level= Min ACI Input Current(04-15/12-06/12-16 )/2

| Parameter | Explanation | Settings | Factory Setting |
|---|---|---|---|
| 04.15 | Min ACI Input Current | 0.0~20.0 mA | 4.0 |
| 12.06 | Min ACI2 Input Current | 0.0~20.0 mA | 4.0 |
| 12.16 | Min ACI3 Input Current | 0.0~20.0 mA | 4.0 |

3. To comply with the rules and regulation in Taiwan, China, the United States, European Union, and Japan government regarding international strategic products import/export, the maximum frequency of Delta E series motor drive will be modified from 600Hz to 599Hz.
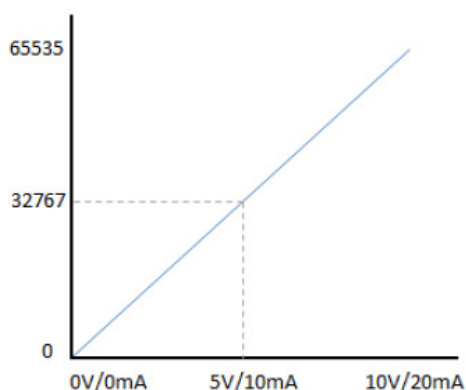The related parameters follow.

| Parameter | Explanation | Settings | Factory Setting |
|---|---|---|---|
| 01.00 | Maximum Output Frequency (Fmax) | 0.10~599.00Hz | 60.00 |
| 01.01 | Maximum Voltage Frequency (Fbase) (Motor 0) | 0.10~599.00Hz | 60.00 |
| 01.03 | Mid-Point Frequency (Fmid) (Motor 0) | 0.10~599.00Hz | 1.50 |
| 01.05 | Minimum Output Frequency (Fmin) (Motor 0) | 0.10~599.00Hz | 1.50 |
| 01.28 | Mid-Point Frequency (Fmid) (Motor 1) | 0.10~599.00Hz | 1.50 |
| 01.30 | Minimum Output Frequency (Fmin) (Motor 1) | 0.10~599.00Hz | 1.50 |
| 01.32 | Maximum Voltage Frequency (Fbase) (Motor 2) | 0.10~599.00Hz | 60.00 |
| 01.34 | Mid-Point Frequency (Fmid) (Motor 2) | 0.10~599.00Hz | 1.50 |
| 01.36 | Minimum Output Frequency (Fmin) (Motor 2) | 0.10~599.00Hz | 1.50 |
| 01.38 | Maximum Voltage Frequency (Fbase) (Motor 3) | 0.10~599.00Hz | 60.00 |
| 01.40 | Mid-Point Frequency (Fmid) (Motor 3) | 0.10~599.00Hz | 1.50 |
| 01.42 | Minimum Output Frequency (Fmin) (Motor 3) | 0.10~599.00Hz | 1.50 |
| 02.11 | Keypad Frequency Command | 0.00~599.00Hz | 60.00 |
| 02.12 | Communication Frequency Command | 0.00~599.00Hz | 60.00 |
| 02.15 | Initial Frequency Set point (for keypad & RS485/USB) | 0.00~599.00Hz | 60.00 |
| 03.02 | Desired Frequency 1 Attained | 0.00~599.00Hz | 0.00 |
| 03.14 | Desired Frequency 2 Attained | 0.00~599.00Hz | 0.00 |
| 05.00 | 1st Step Speed Frequency | 0.00~599.00Hz | 0.00 |
| 05.01 | 2nd Step Speed Frequency | 0.00~599.00Hz | 0.00 |
| 05.02 | 3rd Step Speed Frequency | 0.00~599.00Hz | 0.00 |
| 05.03 | 4th Step Speed Frequency | 0.00~599.00Hz | 0.00 |
| 05.04 | 5th Step Speed Frequency | 0.00~599.00Hz | 0.00 |
| 05.05 | 6th Step Speed Frequency | 0.00~599.00Hz | 0.00 |
| 05.06 | 7th Step Speed Frequency | 0.00~599.00Hz | 0.00 |
| 05.07 | 8th Step Speed Frequency | 0.00~599.00Hz | 0.00 |

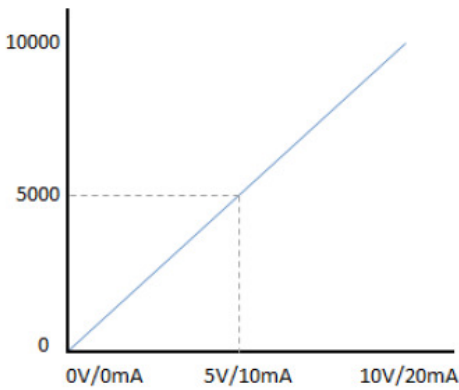| 05.08 | 9th Step Speed Frequency | 0.00~599.00Hz | 0.00 |
|---|---|---|---|
| 05.09 | 10th Step Speed Frequency | 0.00~599.00Hz | 0.00 |
| 05.10 | 11th Step Speed Frequency | 0.00~599.00Hz | 0.00 |
| 05.11 | 12th Step Speed Frequency | 0.00~599.00Hz | 0.00 |
| 05.12 | 13th Step Speed Frequency | 0.00~599.00Hz | 0.00 |
| 05.13 | 14th Step Speed Frequency | 0.00~599.00Hz | 0.00 |
| 05.14 | 15th Step Speed Frequency | 0.00~599.00Hz | 0.00 |
| 08.03 | Start-Point for DC Brake | 0.00~599.00Hz | 0.00 |
| 08.09 | Skip Frequency 1 Upper Limit | 0.00~599.00Hz | 0.00 |
| 08.10 | Skip Frequency 1 Lower Limit | 0.00~599.00Hz | 0.00 |
| 08.11 | Skip Frequency 2 Upper Limit | 0.00~599.00Hz | 0.00 |
| 08.12 | Skip Frequency 2 Lower Limit | 0.00~599.00Hz | 0.00 |
| 08.13 | Skip Frequency 3 Upper Limit | 0.00~599.00Hz | 0.00 |
| 08.14 | Skip Frequency 3 Lower Limit | 0.00~599.00Hz | 0.00 |
| 10.11 | Source of PID Set point | 0.00~599.00Hz | 0.00 |
| 10.15 | Sleep Frequency | 0.00~599.00Hz | 0.00 |
| 10.16 | Wakeup Frequency | 0.00~599.00Hz | 0.00 |

4. Analog Output Scale Selection
   By switching between bit 0 and bit 1 of M1010, there are two ranges, 0~65535 and 0~10000, of Analog Output Scale to select.

| M1010 setting | D1040 range | D1041 range | D1042 range | Ref. |
|---|---|---|---|---|
| 0 | 0~65535 | 0~65535 | 0~65535 | Figure 01 |
| 1 | 0~10000 | 0~10000 | 0~10000 | Figure 02 |

| Special M | Function | R/W |
|---|---|---|
| M1010 | Switch AFM Setting Range (0: 0~65536  1: 0~10000) | R/W |
| Special D | Function | R/W |
| D1040 | AFM Analog Output Value | R/W |
| D1041 | Extension card AO1 analog output:<br>0~10V or 0~20mA correspond to (0~65535), bit status of M1010 is disabled.<br>0~10V or 0~20mA correspond to (0~10000), bit status of M1010 is enabled. | R/W |
| D1042 | Extension card AO2 analog output:<br>0~10V or 0~20mA correspond to (0~65535), bit status of M1010 is disabled.<br>0~10V or 0~20mA correspond to (0~10000), bit status of M1010 is enabled. | R/W |

(Figure 01)

(Figure 02)

5. Modify DEB function
   Increase DEB operation level and return level (unchangeable) and MO=25 (DEB operation indication)

**`08.24`** DEB Function

Factory Setting : 0

Settings  0 : Disable

1 : DEB Enable (return after the power recovery)

📖 The DEB (Deceleration Energy Backup) function is the AC motor drive decelerates to stop after momentary power loss. When the momentary power loss occurs, this function can be used for the motor to decelerate to 0 speed with deceleration stop method. When the power is on again, motor will run again after DEB return time. (for high-speed axis application)

📖 Related parameter: Pr.08.04(Momentary Power Loss Operation Selection)

📖 Related parameters: Pr03-00 Multi-function Output Relay (RA1, RB1, RC1),
        Pr03-01 Multi-function Output Terminal MO1

**`03.00`** Multi-function Output Relay (RA1, RB1, RC1)

Factory Setting: 8

**`03.01`** Multi-function Output Terminal MO1
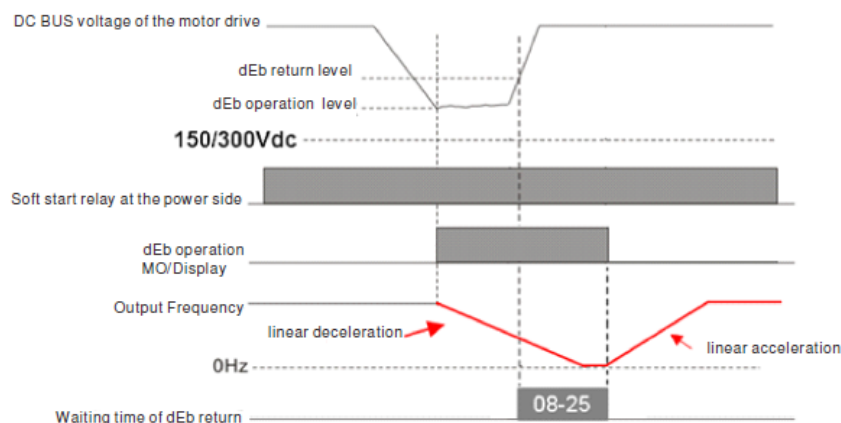
Factory Setting: 1

Setting:  0~25

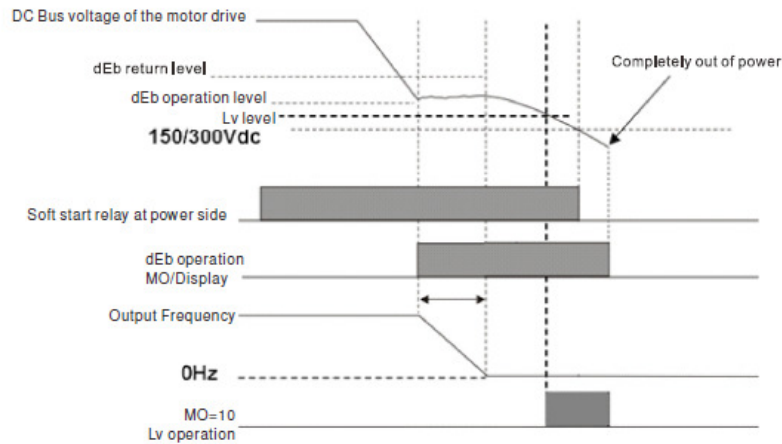| Setting | Function | Description |
|---------|----------|-------------|
| 25 | DEB Operation Indication | When the DC BUS voltage of the motor drive decreases to DEB Operation Level, the MO will be on |

Example of DEB Operation Indication

When DC BUS voltage drops lower than the DEB operation level, DEB will start to operate and soft start relay will remain closed, the motor drive will start the linear deceleration. When the power recovers, the motor drive will follow the setting at Pr08-24 and Pr08-25 to restart or stop the motor.

Situation 1: Momentary power loss/ power supply too low and unstable/ power supply sliding down because of the sudden heavy load.
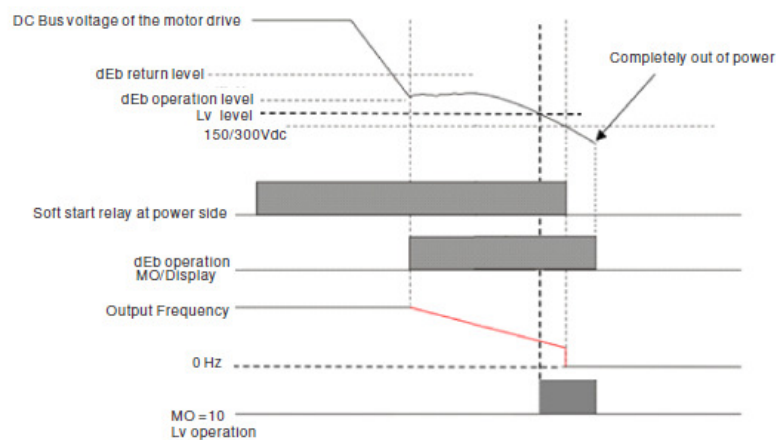
Pr08-24=1 and power recovery. When the motor drive is in deceleration stage(including 0Hz operation), and the voltage is higher than DEB return level, the motor drive will start to decelerate linearly until reaching minimum operation frequency. If the power recovers and continues to the setting time of 08-25, the motor drive will re-accelerate, and the dEb message on the keypad will disappear.

Situation 2: Power supply unexpected shut down/power loss
Pr08-24=1 and power will not recover. The keypad will display "dEb" warning and decelerated to 0Hz and stop. When the DCBUS voltage is lower than 150/300 Vdc level,
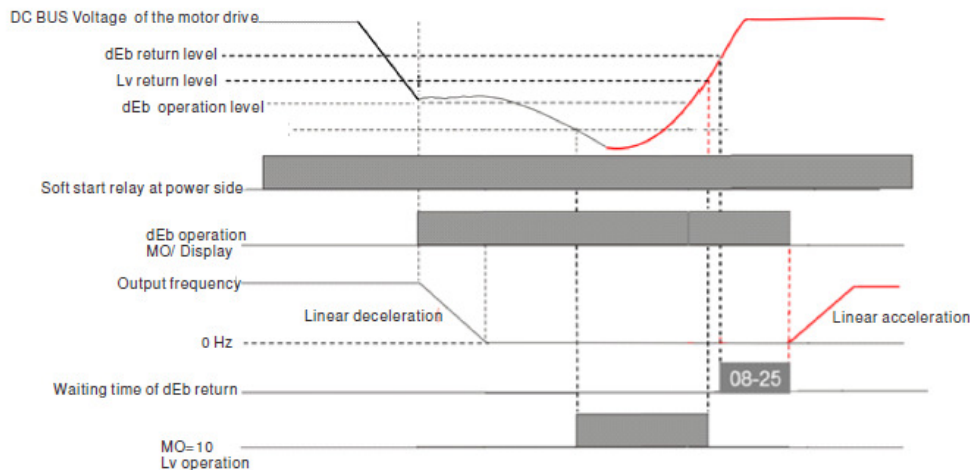The soft-start relay of drive inside will disconnect and be completely out of power.



Exception: If the output frequency doesn't decrease to 0Hz yet and DC Bus voltage has lower than 150/300Vdc, the motor drive start to free run immediately and soft start relay is disconnected. When this situation happens, "dEb" will be displayed on the keypad and needs to be reset manually.

Situation 3: Power recovers after power loss
Pr08-24=1 and power recover after DCBUS voltage has smaller than Lv level.
When the motor drive decelerates to 0 Hz and when DC BUS voltage continues to decrease until it is lower than Lv level, and then power recovers. Wait until the DC BUS voltage increases to be higher than the dEb return level and the motor drive follows the setting time at Pr08-25, the motor drive will re-begin linear acceleration. The dEb message will disappear on the keypad at this moment.



**08.25** DEB Return Time

Factory Setting: 0

Setting    0~25 sec

6.  Modification of engraving characters on the plastic control module
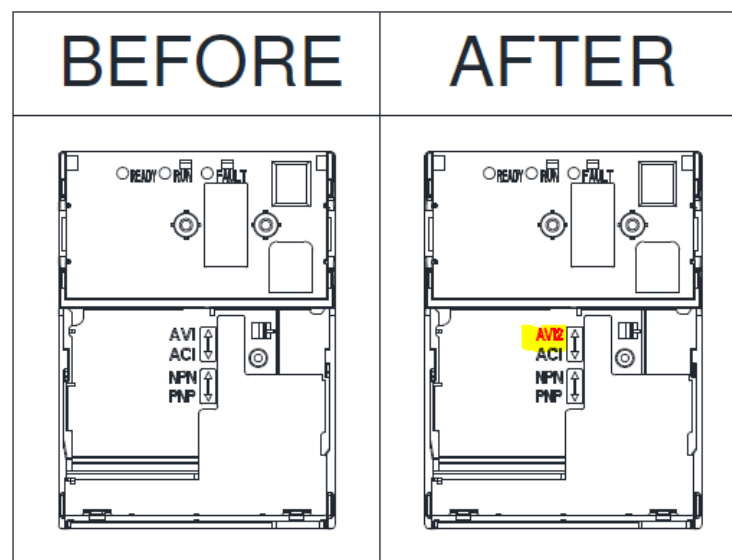    The E series has AVI and ACI analogue input terminals
    AVI: For voltage input only
    ACI: For current input and voltage input (preset). Use dip switch ACI -> AVI to change function and set Pr04-19.

| 04.19 | ACI Terminal mode selection | 0: Accept ACI 4~20mA analogue current signal | 0 |
|---|---|---|---|
| | | 1: Accept AVI2 0~10V analogue voltage signal | |

As shown in the image below, by dip switching ACI terminal, ACI can work as AVI
The original AVI terminal is modified to be AVI2 terminal and engraved as AVI2.

**New function**

1. Pr00-05 User Defined Coefficient K: the decimal place can be changed.
   Use Pr08-29 =2 (Bit1 = ON) to adjust to two decimal places.
   Pr08-29 is defined as in the table below.

| 8.29 | Bit15~3 | Bit2 | Bit1 | Bit0 |
|---|---|---|---|---|
| Special bit control parameter | X | Enable low voltage LvX fault recording function. | Set Pr00-05 to two decimal places. | Cancel internal frequency command filtering. |

2. Add low voltage LvX fault recording function.
   Set Pr08-29=4 (Bit2 =ON) to enable low voltage LvA(430, Lvn(44) and Lvd(45) warning recording function. Pr08-29 is defined as in the table above.

3. Add the KPE-LE02 keypad button status
   The KPE-LE02 keypad button status information will feedback after reading the register of D1015
   Data register is defined as in the table below.

| D1015 | Bit15~8 | Bit7 | Bit6 | Bit5 | Bit4 | Bit3 | Bit2 | Bit1 | Bit0 |
|---|---|---|---|---|---|---|---|---|---|
| Keypad Status | X | ENTER | DOWN | UP | X | X | RUN | STOP | MODE |

**Date codes of production:** T1632 (for both changes) and W1610 (firmware), W1611 (hardware).

## 2.3   UPDATE – C/CP2000 housing

Since December 2015 the screws of the C/CP2000 control board cover are finished with black gum.
It is to prevent the cover from opening and having evidence the cover has been opened. If needed the gum can easily be removed for that purpose.



## 2.4   NEW – Delta Standard Power Supplies catalogue

The new Delta Standard Power Supplies catalogue, the April 2016 Edition, is now available.
You can download it from http://www.deltapsu.com/marketing-resources or from our ftp-site.

# 3   Application

## 3.1   NEW – Application Notes

New application notes have been published recently on our ftp-site:

- C-CP2000 PID set-up.pdf
- CNC Industry Notification - High Speed Gantry Type Machine Center.pdf
- Electronics Industry Notification- Automatic Glue-spraying Machine.pdf
- Energy Industry Notification - Delta Industrial Ethernet Solution for Wind Power.pdf
- Logistics and Warehousing Industry Notification-Delta Automatic Stereoscopic Warehouse System.pdf
- Robot Industry Notification--Robot arm for Injection Molding Machine.pdf

- Rubber and Plastic Industry Notification_Horizontal Blown-film Extruder Control Solution_v01.pdf

# 4   FAQ

## 4.1   VFD-series AC Motor drives

<u>C/CP2000</u>
**Q**      **What is the function of the settings 50, 51, 52 for the digital outputs and relays?**
*A*      *In the slave these settings assign the outputs to bits in a special register, depending on the communication. By sending the bits to the register, the assigned outputs can be controlled.*
*- The actual MO or RY depends on the drive series and option card*
*- The bits (1 or 0) in this register set the outputs active/inactive.*
*- Some bits are not available depending on drive series and option cards.*

*CANopen*

| Output | Setting 50 for: | Register |
|---|---|---|
| RY1 | Pr02-13 | 2016-41 Bit0 |
| RY2 | Pr02-14 | 2016-41 Bit1 |
| RY3 (CP2000 only) | Pr02-15 | 2016-41 Bit2 |
| MO1 (C2000 only) | Pr02-16 | 2016-41 Bit3 |
| MO2 (C2000 only) | Pr02-17 | 2016-41 Bit4 |
| MO10/RY10 | Pr02-36 | 2016-41 Bit5 |
| MO11/RY11 | Pr02-37 | 2016-41 Bit6 |
| RY12 | Pr02-38 | 2016-41 Bit7 |
| RY13 | Pr02-39 | 2016-41 Bit8 |
| RY14 | Pr02-40 | 2016-41 Bit9 |
| RY15 | Pr02-41 | 2016-41 Bit10 |

*Fieldbus option*

| Output | Setting 52 for: | Register |
|---|---|---|
| RY1 | Pr02-13 | H2640 Bit0 |
| RY2 | Pr02-14 | H2640 Bit1 |
| RY3 (CP2000 only) | Pr02-15 | H2640 Bit2 |
| MO1 (C2000 only) | Pr02-16 | H2640 Bit3 |
| MO2 (C2000 only) | Pr02-17 | H2640 Bit4 |
| MO10/RY10 | Pr02-36 | H2640 Bit5 |
| MO11/RY11 | 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/RY10 | Pr02-36 | H2640 Bit5 |
| MO11/RY11 | 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*