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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, data sheets, application notes, presentations, software, 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 SPS Innovation & Smart Automation

Delta just participated in SPS/IPC/Drives/Nuremberg 2018 (SPS 2018), a highly focused industrial event in Germany, from November 27th to 29th, and presented its smart automation products and solutions with the theme of “Innovation & Smart Automation for Industrial Upgrades”. Delta announced a new partnership with CODESYS Group at the exhibition and unveiled its upgraded motion solution with the CODESYS motion control platform and the new PC-Based Motion Controller MH2 Series. Delta’s industrial solutions highlighted a high-end PC-based motion controller, PLC-based EtherCAT motion controller, and motion systems for woodworking and packaging machines. For high-end smart equipment and production monitoring, Delta’s new Human Machine Interface (HMI) DOP-100 Series is featured in an interactive live streaming car racing demo with a user-friendly operation interface and multimedia functions. For process automation, Delta presented a highly reliable, energy-saving, and automated water treatment solution based on its successes in Europe and Asia.



Mr. Andy Liu, general manager of Delta’s Industrial Automation Business Group, indicated that global manufacturers of all industries have started to apply smart manufacturing solutions to enhance their competitiveness in recent years. In response, world-class automation companies are focusing on industry-specific equipment and solutions with in-depth industrial know-how, high-end products and software. “Delta, with over twenty years’ of experience in the automation field and strong R&D and manufacturing capabilities, adheres to providing smart, flexible, and the most suitable automation solutions for different industries,” said Mr. Liu.

Andy pointed out that Delta’s cooperation with CODESYS would bring motion solutions that satisfy the needs of many top automation players in Europe, and could also make CODESYS available to the large Delta customer base in Asia. For applications in different industries, Delta successfully applied its water treatment solution to the Komotini Water Plant in Greece and helped to build a highly automated, high quality water processing and treatment system in 2013. This experience helped Delta achieve another success story by providing a wastewater treatment solution for a well-known Taiwanese textile company’s factory in China. Delta is also launching more automation products and solutions for different industries such as packaging, food processing, and woodworking in the EMEA regions based on its abundant field experience in Taiwan and China.

Delta and CODESYS Announce Partnership with Brand New Motion Control Solution

To enhance the expanding progress of Delta’s motion control solutions and fulfil customer needs, Delta held a press conference during SPS 2018 and announced its new partnership with 3S-Smart Software Solution GmbH, a member of the CODESYS Group and creator of the market-leading IEC 61131-3 industrial software CODESYS. Mr. Dieter Hess, CEO of the CODESYS Group, participated in the press conference to release this exciting news together with Delta.

Mr. Dieter Hess said, “We’re very excited to welcome Delta to the CODESYS community, which now includes some 400 hardware manufacturers and over 10,000 developers. Delta is an established name in the world of industrial automation, so this is a significant partnership for both sides. We look forward to working with Delta to help them serve their customers and make the most out of their hardware portfolio.”

CODESYS is one of the most widely used manufacturer IEC 61131-3 development systems on the market. CODESYS offers the complete functionalities of a modern IEC 61131-3 development tool; including an integrated visualization with different clients, integrated connection to all standard fieldbus systems, motion functionality, safety solutions and communication interfaces.

Mr. Patrik Hug, head of business development & product management, EMEA at Delta’s IABG, indicated that additional costs are generated when a manufacturer adds a new automation platform. By integrating CODESYS, Delta aims to reduce the amount of engineering costs that this requires.

“Switching to different motion platforms or adding a new one means you have to write new code. The goal is to reduce the initial switching time when adding a new platform. By standardizing on CODESYS, we are making it much easier for customers to use Delta automation products. Instead of having different software to program each of their platforms, they will be able to write code on the same platform for all of their Delta products. And the great thing about CODESYS is that you have an entire community of application developers. There is a lot of expertise out there to draw from,” said Patrik.

Delta launched its new CODESYS-enabled scalable IPC, the MH2 Series at SPS IPC Drives 2018. The CODESYS platform integrates the control functions of three major industrial controllers: programmable logic controllers (PLC), human machine interfaces (HMI), and motion control, enhancing the motion control capabilities of the MH2 Series and constructing a high speed, high precision EtherCAT motion control solution with peripheral products. With CODESYS, the MH2 Series provides a user-friendly motion control interface and features strong motion control functions that allow up to 64 axes synchronous control of AC Servo Drives ASDA-A2-E Series, Standard Compact Drives MS300 Series, and Remote I/O Modules R1-EC via EtherCAT.

Delta plans to keep rolling out CODESYS-enabled products in the future and will continue to support its existing motion and automation platforms as well. With motion control solutions using CODESYS, Delta will open new doors to the Asian market for European industrial equipment makers.

With the theme of “Innovation & Smart Automation for Industrial Upgrades”, Delta highlighted solutions with success stories for industrial upgrades at this year’s SPS, including:

- **Machining Center Solution for Woodworking:** adopts the PC-Based Panel Controller MP1 Series as core controller. The MP1 Series’ built-in gantry control function allows up to six axes control, and performs precise gantry control and motion for processing when matched with four sets of AC Servo Drive ASDA-A2-E Series and motors. This solution also applies the Standard Compact Drive MS300 Series for variable frequency control of the spindle axis to execute stable, high-speed milling, drilling, edging and more. All the key components support EtherCAT communication to construct a high precision machining system for woodworking.
- **Water Treatment Solution:** provides stable, reliable integrated automation systems for water treatment processes, including: water inflow, sedimentation, filtering, and water outlet. Delta’s solution covers: the DIAView SCADA system and Industrial Panel PC IPC Series for real-time water treatment station / equipment monitoring & management; the Hot-swappable Mid-range PLC AH500 Series and Industrial Ethernet Switch DVS Series for field control and communication network among stations; the IP55 Pump & Fan Drive CFP2000 Series for variable frequency control of fan and pump operation speed; the HMI DOP-100 Series for on-site parameter settings and monitoring.

Delta’s water treatment solutions have been applied to:

- The Komotini Water Plant in Greece in 2013, providing automated water processing systems to achieve a stable, high quality water supply for 70,000 local residents.
- The wastewater treatment facilities of a Taiwanese textile company’s plants in China. As one of the worlds’ top five textile companies, this customer adopted Delta’s water treatment solution to process 6,000~10,000 tons of wastewater for textile processing and production in its China plant, and implemented remote monitoring via the DIAView SCADA system.
- **Car-racing with HMI Live Streaming demo:** Based on the concepts of smart production lines, this demo was built for real applications and fun. It highlights Delta’s latest advanced 12”/15” DOP-100 Series HMIs, which feature multimedia functions, multi-language input, and Ethernet communication. Equipped with the high-performance ARM7 Dual Core MCU and a high-brightness, high-resolution, LCD display, the DOP-100 HMIs are suitable for highly integrated, flexible production processes, and equipment control and monitoring.

This demo applies three DOP-100 Series HMIs for participants to operate and control the progress of three race cars by answering questions in Q&A games. Each car carries a prize that a participant wins when arriving at the finish line. The DOP-100s also control the IP and analog cameras installed above the race lanes to monitor and record key moments of the race when

triggered by smart sensors for playback. The overall race is monitored for live streaming on the introduction stand with the other four DOP-100 Series.

During the 3-day event, Delta's booth attracted hundreds of experts, customers, and media to visit and find out more about Delta's state-of-the-art smart solutions. Many manufacturers showed great interest in cooperating with Delta for machine or factory upgrades, resulting in outstanding success for Delta's exhibition.

2 Product update

2.1 UPDATE – Firmware of DVP04AD-S, DVP04PT-S, DVP02DA-S and DVP06XA-S is updated

Series	Models	Firmware Version	Release Date
Slim	DVP04AD-S	V4.10→ V4.12	Nov. 9, 2018 (W1845)
	DVP04PT-S	V4.18→ V4.20	
	DVP02DA-S	V4.06→ V4.08	
	DVP06XA-S	V4.14→ V4.16	

Newly added functions for DVP04AD-S

- Added the resetting function for control registers (CRs). Write 0x4352 into CR#0 and then have the power of CPU and module turned off and then turn the powers on again; all parameters in CRs, including communication parameters are restored to factory defaults.
- Added new RS485 communication format settings, including data length selections, 7/8 and Stop bit 1/2; see the following part in red for more information.

#32	H'40E8	○	R/W	Communication format settings	Communication baud rate: 4,800 / 9,600 / 19,200 bps / 38,400 bps / 57,600 bps / 115,200 bps						
					Communication formats: ASCII: 7,E,1 / 7,O,1 / 8,E,1 / 8,O,1 / 8,N,1						
					RTU: 8,E,1 / 8,O,1 / 8,N,1						
					Factory defaults: ASCII,9600,7,E,1 (CR#32=H'0002)						
					<table><tr><th>b15 ~ b12</th><th>b11 ~ b8</th><th>b7 ~ b0</th></tr><tr><td>ASCII/RTU, exchange low and high byte of CRC check code</td><td>Data format</td><td>Baud rate</td></tr></table>	b15 ~ b12	b11 ~ b8	b7 ~ b0	ASCII/RTU, exchange low and high byte of CRC check code	Data format	Baud rate
					b15 ~ b12	b11 ~ b8	b7 ~ b0				
					ASCII/RTU, exchange low and high byte of CRC check code	Data format	Baud rate				
					Description						
					H'0	ASCII	H'0	7,E,1*1	H'01	4800 bps	
					H'8	RTU, do not exchange low and high byte of CRC check code	H'1	8,E,1	H'02	9600 bps	
H'2	reserved	H'04	19200 bps								
H'C	RTU, exchange low and high byte of CRC check code	H'3	8,N,1	H'08	38400 bps						
		H'4	7,O,1*1	H'10	57600 bps						
		H'5	8,O,1	H'20	115200 bps						
Note											
*1: This is only available for ASCII format.											
Ex: Write H'C310 into CR#32 for a result of RTU, exchange low and high byte of CRC check code, 8,N,1 and baud rate at 57600 bps.											

Modified functions

- DVP04AD-S, DVP04PT-S, DVP02DA-S, DVP06XA-S
Added write protection for the control registers (CRs) to fix the issue that before the communication between modules and the PLC is established, the internal parameters may be affected by interfering signals.

2.2 NEW – CMC-EC01 Launch Announcement

The application layer of the C2000's EtherCAT communication interface uses the standard DS402 protocol and complies with the CoE (CAN Application Protocol over EtherCAT) definition. Therefore, all of C2000's application layer protocols that comply with the CANopen DS402 standard can be used on top of EtherCAT.

C2000's EtherCAT card currently supports standard DS402 Velocity (Index 6060 = 2). This mode is asynchronous control mode.

C2000 supports EtherCAT communication card from v2.02.



■ Specification

Item	Specifications
Connection	RJ-45
Ports	2 Port
Interface	IEEE802.3, IEEE802.3u
Cable	Category 5e shielding 100 M
Speed	10 / 100 Mbps Auto-Defect
Protocol	EtherCAT

■ Environment

Item	Specifications
Noise Immunity	ESD (IEC 61800-5-1, IEC 6100-4-2)
	EFT (IEC 61800-5-1, IEC 6100-4-4)
	Surge Test (IEC 61800-5-1, IEC 6100-4-5)
	Conducted Susceptibility Test (IEC 61800-5-1, IEC 6100-4-6)
Operation Temperature	-10 °C ~ 50 °C (Temperature) · 90 % (Humidity)
Storage Temperature	-25 °C ~ 70 °C (Temperature) · 95 % (Humidity)
Vibration / Shock Immunity	IEC 61800-5-1, IEC 60068-2-6 / IEC 61800-5-1, IEC 60068-2-27

■ Electrical Specification

Item	Specifications
Power Supply	5 V _{dc}
Power Consumption	0.8 W
Insulation Voltage	500 V _{dc}
Weight	27 (g)

Launch

Region	Launch Date
Worldwide	November 29 th , 2017

2.3 NEW – CMC-PN01 Launch Announcement

CMC-PN01 connects C2000 drive to PROFINET to exchange data with the host controller easily. This simple network solution saves cost and time for connection and installation of factory automation. Moreover, its components are compatible with suppliers'.



By installing CMC-PN01 in C2000 through the main PROFINET device, you can:

- Control the drive through PROFINET
- Modify the drive's parameters through PROFINET
- Monitor the drive's status through PROFINET

C2000 supports PROFINET communication card from v2.05.

■ EtherNet Specifications

Item	Specifications
Interface	RJ45
Number of ports	2 ports
Communication Mode	IEEE 802.3
Cable	Category 5e shielding 100 M
Transmission speed	10/100 Mbps auto-negotiate
Communication protocol	PROFINET

■ Environmental Conditions

Item	Specifications
Noise immunity	ESD (IEC 61800-5-1, IEC 6100-4-2) EFT (IEC 61800-5-1, IEC 6100-4-4) Surge Test (IEC 61800-5-1, IEC 6100-4-5) Conducted Susceptibility Test (IEC 61800-5-1, IEC 6100-4-6)
Operating temperature	-10–50°C (temperature), 90% (humidity)
Storage temperature	-25–70°C (temperature), 95% (humidity)
Vibration/Shock resistance	International standards IEC 61800-5-1, IEC 60068-2-6/IEC 61800-5-1, IEC 60068-2-27

■ Electrical Specifications

Item	Specifications
Power supply voltage	5 V _{DC}
Power consumption	0.8 W
Insulation voltage	500 V _{DC}
Weight (g; approx.)	27 (g)

Launch

Region	Launch Date
Worldwide	November 26 th , 2018

2.4 UPDATE – Firmware for DVP01PU-S, DVP01PU-H2, and DVP01HC-H2 is updated

The IC used in modules (DVP01PU-S, DVP01PU-H2, and DVP01HC-H2) is EOL. After implementing the new IC, the hardware and firmware version are updated as shown below.

Series	Model Name	Old Version		New Version	
		Firmware Version	Hardware Version	Firmware Version	Hardware Version
Slim	DVP01PU-S	V4.40	A0	V5.10	A1
EH	DVP01PU-H2	V4.60		V5.10	
	DVP01HC-H2	V1.30		V1.40	

Please note the new/old versions of hardware and firmware should be corresponding to one another. Release date: March 28, 2018. (week 18)

- A0, the old version of hardware should go with the old firmware versions V4.40 / V4.60 / V1.30, but NOT the later versions (V5.10 / V1.40 or later).
- 2. A1, the new version of hardware should go with the new firmware versions V5.10 / V1.40 or later, but NOT the previous versions (V4.40 / V4.60 / V1.30).

2.5 UPDATE – Intel processor in DIAVH IPC/PPC changed from 4th to 6th generation

- **Changed the Intel Processor**
 - i3 Series products: changed Intel® Core i3-4030U to the main source i3-6100U and second sources i3-6006U and i3-7100U.
 - i5 Series products: changed Intel® Core i5-4200U to the main source i5-6200U second sources i5-6300U, i5-6260U, i5-6360U, i5-7200U, and i5-7260U.

- **Changed serial port design on IPC series**

Refer to the table below for the changed parts (in red):

	The 4 th Generation CPU (production date: before week 46, 2018)	The 6 th Generation CPU (production date: after week 46, 2018)
COM 1	RS-232	RS-232
COM 2	RS-232	RS-232
COM 3	RS-232	RS-485
COM 4	RS-232	RS-485
COM 5	RS-232	RS-232
COM 6	RS-485	RS-232

- **Changed I/O placement on IPC/PPC series**

- Front view of IPC I/O placement



The 4th Generation IPC



The 6th Generation IPC

- Rear view of IPC I/O placement



The 4th Generation IPC



The 6th Generation IPC

- View of PPC I/O placement



The 4th Generation PPC



The 6th Generation PPC

- **Free trial OS from IPC/PPC series removed**

From a legal perspective, a free trial OS is no longer available for the 6th generation IPC/PPC series.

Last 2 digits	The 4 th Generation CPU (production date: before week 46, 2018)	Last 2 digits	The 6 th Generation CPU (production date: after week 46, 2018)
01	Simplified Chinese Free Trial OS	01	Without free trial OS
03	Traditional Chinese Free Trial OS		
05	English Free Trial OS		

- **Third party one-key-copy function related software from IPC/PPC series removed**

From a legal perspective, free one-key-copy function related software is no longer available for the 6th generation IPC/PPC series.

- **Release Date:** November 12, 2018 (Week 1846)

You can find the serial number on the product label of the IPC/PPC. If the serial number is IPC/PPCxxxxxxW18460001 (indicating year 2018, week 46) or later, it means it is a 6th generation product.

2.6 UPDATE – MS300 communication option cards released again

Please kindly be informed that the MS300 communication option cards are released again, which means you can start to place orders again

This time we release 3 popular models first. While the others are still under verification or field test phase, we will inform you once we get green light from Taiwan

Due to no sales history records in the past few months, it will be difficult to prepare enough stock.

Therefore please provide your forecast to Steven Shih (STEVEN.SHIH@DELTAWWW.COM) if you have some opportunity or promising orders in next 3 months

We will then prepare stock according to the forecast.

Release status

Option cards	Part Number	Function	Status
Communication card	CMM-DN01	DeviceNet	Blocked
	CMM-EIP01	EtherNet/IP	Ready for sale
	CMM-PD01	Profibus DP	Blocked
	CMM-MOD01	Modbus TCP	Ready for sale
	CMM-COP01	CANopen	Ready for sale
	CMM-EC01	EtherCAT	Not released

Release highlights:

- All CMM-EIP01, CMM-MOD01 and CMMCOP01 in stock are the new version
- Major changes are to improve communication interference immunity (find technical announcement for more details on our ftp-site)
 - Cable line optimization
 - Hardware layout optimization
 - Firmware communication mechanism optimization
- In order to achieve optimal anti-high frequency interference performance, the latest version of the upper control board of drive must be used.
 - For EIP and MODbus application, suggest to use MS300 S/N with date code later than W1835 (2018 week35)
 - For CANOpen application, MS300 S/N must be later than W1835

Should you have any questions, please kindly let us know.

2.7 UPDATE – DPM-C520 changes (firmware and hardware)

Firmware version of DPM-C520 is updated to V1.0004.

- Added a screen lock function

Before	While the device is in the HOME page, press the BACK button to see the 1 st setting option.
After	While the device is in the HOME page, after pressing the BACK button, you need to press UP and DOWN buttons simultaneously for 5 seconds to unlock the screen to see the 1 st setting option.
Operational steps	<ol style="list-style-type: none"> While the device is in the HOME page, press the BACK button. (Fig. 1) Press UP and DOWN buttons simultaneously for 5 seconds to unlock the screen lock. (Fig. 2) After the screen is unlock, the 1st setting option (TIM&DAT) appears and you can use the NEXT button to select other setting options.



Fig. 1



Fig. 2



Fig. 3

Hardware and mechanism versions of DPM-C520 are updated to V1.0.

- Passed SGS test of IEC 62053-22:2003 Clause 8.1 and certificated by UL, according to the standards of IEC/EN 61010-1:2010, IEC 61010-2-030: 2010, and EN 61010-1:2010.
- Modified the terminal block design to comply with the UL standards

SGS	
TEST REPORT	
Report No.:	SHE180601135202
Product Name:	Multi-functional Power Meter
Product Type:	DPM-C520
Rating:	220V, 5A, 50/60Hz, 0.5S
Applicant:	Zhongda Electronic Parts And Components (Wujiang) Co., Ltd
Address:	No.1688 East Jiangxing Road, Yundong Development Zone, Songling Town, Wujiang, Suzhou, Jiangsu, China
Manufacturer:	As the above
Address:	As the above
Testing Laboratory:	SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd
Address:	No. 588 West Jinling Road, Songjiang District, Shanghai, China
Number of Samples received:	2
Date of samples reception:	Sep. 27 th , 2018
Date Test Conducted:	Oct. 12 th , 2018 to Oct. 16 th , 2018
Test Requested:	Variation of error due to current variation
Test standards:	IEC 62053-22:2003 Clause 8.1
Test result:	see Clause 3
CONCLUSION:	Pass
ISSUED BY:	CHECKED BY:
Kevin Chen	Linda Nie

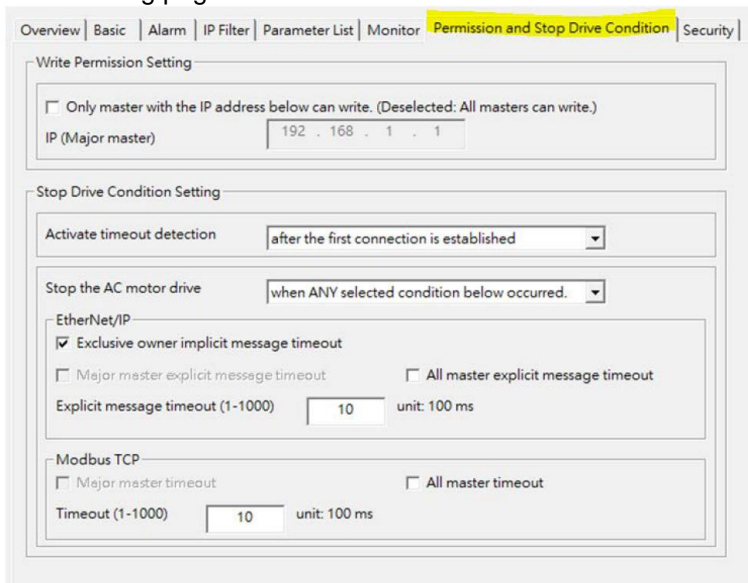
Underwriters Laboratories (UL LLC) Safety Certification Body (CB) Report	
Model:	DPM-C510, DPM-C520, DPM-C520W, DPM-C530
Device Description:	Power meter
Applicant:	Delta Electronics, Inc. 31-1, Shien Pan Road, Kuei Shan Ind. Zone Taoyuan Hsien, 333 Taiwan
Manufacturer:	Same as Applicant
Manufacturing Facility(ies):	Delta Electronics Components (Wujiang) Ltd. 1688 JIANGXING E RD WUJIANG ECONOMY DEVELOPMENT ZONE WUJIANGJIANG SU 215200 CHINA
Report No.:	E476819-D1000-1/AD/C1-CB
Report (Re)issue Date:	2018-02-05
Base Standard(s):	IEC/EN 61010-1:2010 (Third Edition)
Additional Standards:	IEC 61010-2-030: 2010 (First Edition), EN 61010-1:2010 (Third Edition)
Report Types:	This report consists of the following report types: - CB Report & Certificate
This report covers the Safety evaluation of the referenced model(s) according to the standard(s) specified above.	
The CB Certificate is provided as a separate enclosure to this report and not provided in the body of this report.	

Feature Difference	New DPM-C520	DPM-C520
Wiring		
Certification	CE, UL	CE

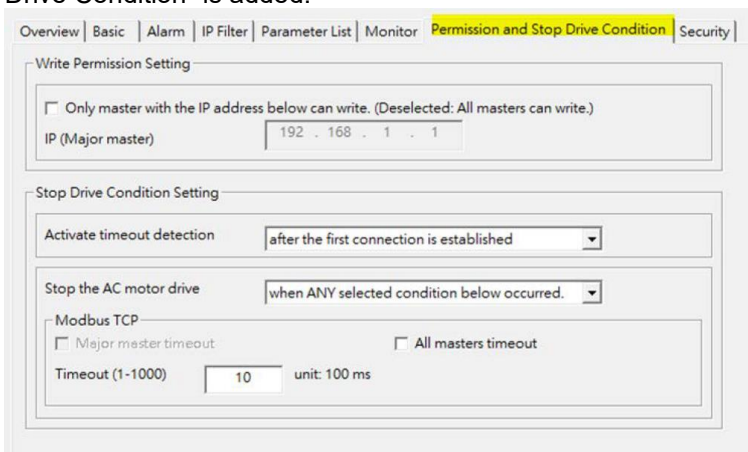
2.8 UPDATE – DCISoft is updated to V1.20

Changes

- SCMSoft is a software embedded in DCISoft. Upgrade SCMSoft version to V1.24.06.
 - Added a function supporting AH15SCM to switch to COMRS mode.
 - Fixed the issue that COM History cannot be uploaded.
 - Added a function supporting AHRTU to support SCM modules.
 - Removed the "open old file icon" from the UI of AH and AS series.
- When the communication card CMC-EIP01 with firmware V1.08 or later and CMM-EIP01 with firmware V1.04 or later is connected and detected, one more setting page "Permission and Stop Drive Condition" is added. And the setting option "Loss Connection Handling" is removed from the Basic setting page.



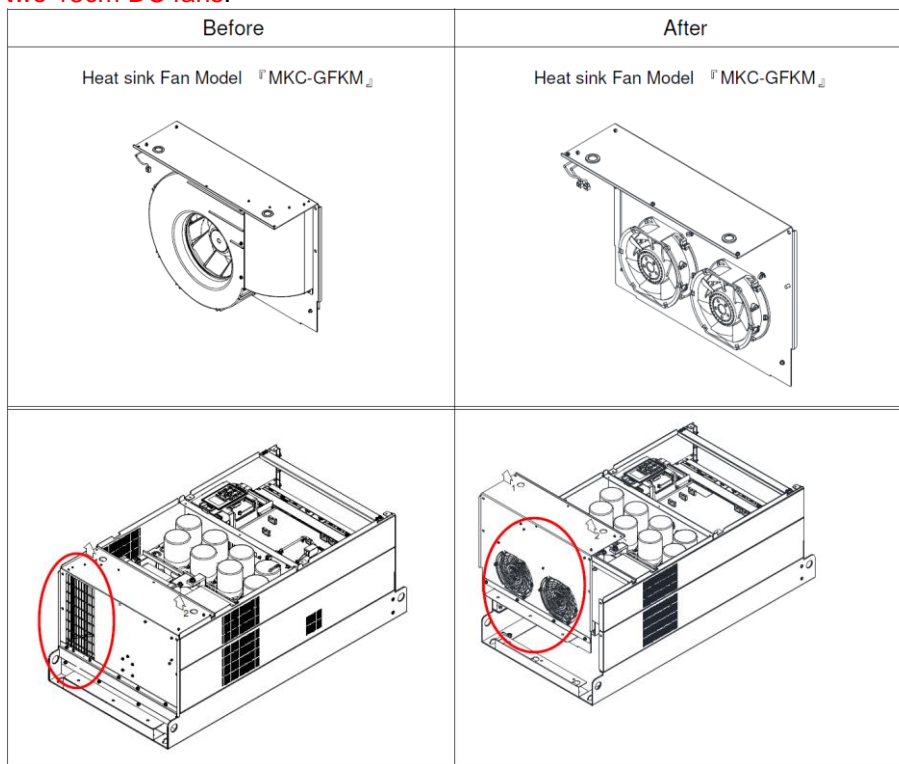
- When the communication card CMC-MOD01 with firmware V1.08 or later and CMM-MOD01 with firmware V1.04 or later is connected and detected, one more setting page "Permission and Stop Drive Condition" is added.



You can download the software from our ftp-site in the folder:
Customer-Service\Industrial Automation Products\PLC Programmable Logic Controllers\PLC Software

2.9 UPDATE – C-family hardware changes (fan and magnetic contactor)

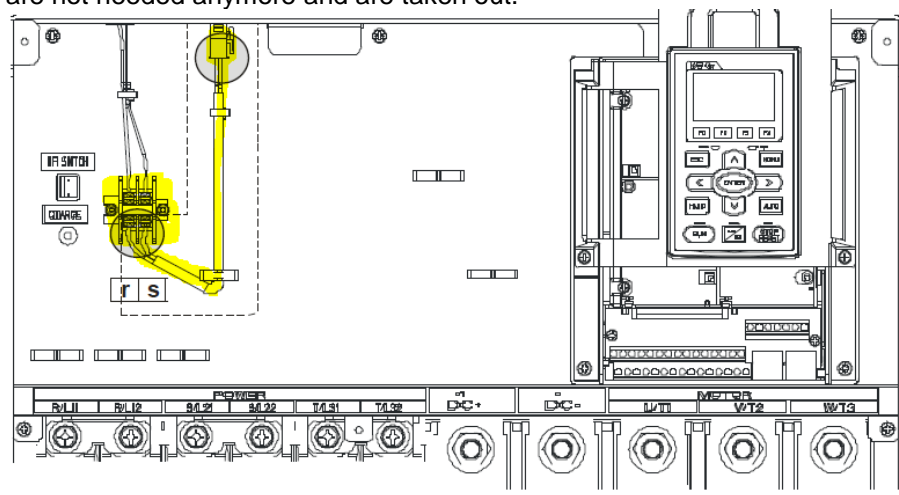
- The **heatsink fan** of Frame G of the C-family (C/CP/CH2000) has change from one DC blower into **two 15cm DC fans**.



With the new fans a conversion kit is included.

Factory	Changed week	
TW	Frame G	T1740
WJ	Frame G	W1745

- The **electromagnetic contactor** (charge relay) of Frame E~H of the C-family (C/CP/CH/CFP) has been changed from an AC contactor into a **DC relay**. Therefore the contacts "r-s" (that are used to supply the AC contactor in case of DC-bus supply) are not needed anymore and are taken out.



It also means that in case of DC-bus supply you don't have to take care of this anymore as is still in the user manual.

Factory	Changed week	
TW	Frame E~H	T1728
WJ	Frame EF	W1748
WJ	Frame G	W1741
WJ	Frame H	W1739

2.10 NEW – Product Introduction Barcode Readers

DAH2000-USB



Features

- Robust design
- Easy command for users to set up.
- Fast code capture speed without aiming precisely
- Easy read barcodes, also barcodes with low contrast, optical noise or damaged conditions
- CE certification
- Application: Food & Beverage, Packaging, Pharmaceutical industry, Electronic devices, Plastic Industry, Warehousing, Machine tool industry

Electrical Specifications

Handheld Barcode Reader	
Model Name	DAH2000-USB
Dimensions	W:74 x H: 186 x D: 91 mm
Weight	300 g
Power Voltage	5Vdc +/- 5%
Rated current consumption	500 mA
Light source aimer	650 nm Laser diode (LD)
Light source	White light
Field of View (FOV)	21.2° (V) x 32.9° (H)
Communication Interface	USB 2.0
Sensor	1280 * 960 Global shutter sensor
Certifications	CE
Operating system	Windows XP, Windows 7 or above
Operating Temperature	0 °C ~ 50 °C
Storage Temperature	- 40 °C ~ 85 °C
Relative Humidity	30 ~ 90 % RH (Not condensation)
Indicator	LED and beeper
Vibration Resistance	No error: 3-axis 10 ~ 50 Hz, 10 m/s ² (1.0 G); 10 minutes No damage: 3-axis 10 ~ 50 Hz, 20 m/s ² (2.0 G); 2 hours
Operating Height	below 2000 m
Drop Impact Resistance	Drop at 1 m / 5 ft on concrete

DAH1000S-USB



Features

- It is a lightweight anti-static (ESD) design
- Easy command for users to set up.
- Perform 360° omni-directional reading
- Supports a lot of different type of bar codes.
- Build in LED lighting source
- CE certification
- Application: Food & Beverage, Packaging, Pharmaceutical industry, Electronic devices, Plastic Industry, Warehousing, Machine tool industry

Electrical Specifications

Handheld Barcode Reader	
Model Name	DAH1000S-USB
Dimensions	W 71 x L 166 x H 84 mm
Weight	172g
Power Voltage	5Vdc +/- 5%
Rated current consumption	210 mA
Light source aimer	640 nm visible red light LED
Light source	White light
Scan rate	30 frames / sec.
Field of View (FOV)	28.8° (V) x 37.8° (H)
Communication Interface	USB HID / USB VCP
Sensor	Area Image Sensor
Resolution	5mil (Code39/ 1D barcode) 6.67mil (PDF417/ 2D barcode)
Pitch/Skew/Roll Angle	±45°/±45°/360°
Print Contrast Ratio	30%
Width of Field	116mm (13Mil Code39)
D.O.F	5 Mil Code 39 : 50 ~ 120mm, 20 Mil Code39 : 55 ~ 370mm, 13 Mil UPC: 55 ~ 270mm, 6.67Mil PDF417: 50 ~ 115mm, 10Mil DataMatrix: 50 ~ 120mm, 20Mil QR Code: 40 ~ 220mm
Certifications	CE
Operating system	Windows XP, Windows 7 or above
Operating Temperature	-10 °C ~ 40 °C
Storage Temperature	- 20 °C ~ 65 °C
Relative Humidity	0 ~ 95 % RH (Not condensation)
Indicator	LED, Buzzer, Vibrator
Vibration Resistance	No error: 3-axis 10~ 50 Hz, 10 m/s ² (1.0 G); 10 minutes No damage: 3-axis 10~ 50 Hz, 20 m/s ² (2.0 G); 2 hours
Operating Height	below 2000 m
Drop Impact Resistance	Drop at 1.5 m on concrete

DFS131



Features

- Design is made for variety fixed mounting options.
- Supports a lot of different type of bar codes.
- The built-in infrared sensor and high quality CCD sensor also ensure your 2D barcode scanning tasks can be conducted under any lighting conditions
- CE certification
- Application: Food & Beverage, Packaging, Pharmaceutical industry, Electronic devices, Plastic Industry, Warehousing, Machine tool industry

Electrical Specifications

Fixed Mounted Barcode Reader	
Model Name	DFS131
Dimensions	W 56 x L 41 x H 20 mm
Weight	120 g
Power Voltage	5Vdc +/- 5%
Rated current consumption	< 350mA
Light source aimer	Aiming Red LED Dot Aimer
Light source	White light
Field of View (FOV)	28.8° (V) x 37.8° (H)
Communication Interface	USB/RS-232
Sensor	Area Image Sensor
Certifications	CE
Operating system	Windows XP, Windows 7 or above
Operating Temperature	-10 ~ 55°C
Storage Temperature	-20 ~ 65°C
Relative Humidity	0% ~ 95%RH (Non-condensing)
Indicator	LED, Buzzer
D.O.F (@ 800 Lux)	5 Mil Code 39 : 64 ~ 127mm, PDF417: 57 ~ 122mm, 10Mil DataMatrix: 57 ~ 127mm, 20Mil QR Code: 53 ~ 227mm
Print Contrast Ratio	35%

Order information

Series	Order code	Communication type
Handheld	DAH2000-USB	USB
	DAH1000S-USB	USB
Fixed Mounted	DFS131-USB	USB
	DFS131-232	RS 232


2.11 UPDATE – WPLSoft version 2.47 is released**Modified and added functions:**

1. Fixed the issue that even when the ladder segment comment is left empty, while editing there is still a "0>" shown in the area.
2. Fixed the issue that while editing the ladder in the inserting mode, the system crashes.
3. When using the parameters Y/M/S, the index register E/F can be used to modify the instruction RST.
4. Fixed the issue that if the instruction PLF/PLS is included in the program, when uploading or downloading the program to the EH3/SV2 Series, the garbled messages appeared in WPLSoft.
5. Fixed the issue that when using the inner program, the ladder diagram, in SFC (Sequential Function Chart), the ladders cannot be presented correctly. Especially, when there are multiple outputs and the length exceeds 2 rows in the ladder diagram.
6. Fixed the issue that the usage states of labels P and I are shown incorrectly.
7. Fixed the issue that users cannot run AIO wizard in Windows 10.
8. WPLSoft V2.47 now supports VFD-HVAC.
9. Increased the D device number to 999 in the AC motor drive VFD-C2000 Series.
10. Added an "exception.log" file to store the communication log in the user directory if a communication error occurs.
11. Updated the LCSoft version to V1.12.
 - "Device Type Setting" can be found in the context menu of "Option".
 - "IO settings" is added for DVP211LC-SL.
 - New functions "Upload" and "Download" are added in "Calibration".

2.12 NEW – EMC-A22A

Analog Input and output card.

Can also be used as Pt100 input, like the standard available analog inputs.

 Analog I/O extension card	Terminals	Description
	AVI10 AVI11	Refer to Pr. 14-00 ~ Pr. 14-01 for function selection (input), and Pr. 14-18 ~ Pr. 14-19 for mode selection. There are two sets of AVI port, SSW3(AVI10) and SSW4(AVI11), which can be switched to AVI or ACI. AVI: Input 0 ~ 10V ACI: Input 0 ~ 20mA / 4 ~ 20mA
	AFM10 AFM11	Refer to Pr. 14-12 ~ Pr. 14-13 for function selection (output), and Pr. 14-36 ~ Pr. 14-37 for mode selection. There are two sets of AFM port, SSW1(AFM10) and SSW2(AFM11), which can be switched to AVO or ACO. AVO: Output 0 ~ 10.00V ACO: Output 0 ~ 20.0mA / 4.0 ~ 20.0mA
	ACM	Analog signal common terminal

This option card can be used in the C/CP/CFP 2000 with firmware version 2.04 or higher.

2.13 NEW – %D- EZVFD BACnet-IP option card.

This card is developed by our sister company Delta Controls for our CP and CFP drives..

This option card can be used in the CP/CFP 2000 with firmware version 2.04 or higher.



2.14 NEW – New firmware 1.06 for AS200 and AS300 released

Modified functions:

All the issues below can be fixed by upgrading firmware to V.1.05.50 or above (no tools are required.). Contact the company or the technicians from the agents for a firmware upgrade for AS series.

- Issue:** When operating in DS301 mode, the following errors may occur.
 - When the slave is Delta AC motor drive, sometimes the master will send out data with wrong data length and that leads to Delta AC motor drive sending CPtn error message.
 - When the master sends a SDO message with 0 in its ID, this message cannot be sent.
 - When the master sends a TxPDO message with an 8-byte object in it, this message cannot be downloaded.
- Issue:** When DPIDE instruction is in auto control mode (PID_MODE=0), once the MV output values exceed the upper/lower limit, even if the MV output values have been modified to be within the output range, the MV value still cannot be outputted.
- Issue:** If a PLC (with a battery inside) executes TRD instruction in every cycle, after the PLC is supplied with power, the BAT.LOW goes blinking and even after the power is OFF and then ON again, the blinking persists.
- Issue:** PLC error indicator will be ON when executing INCN or DRAMP instruction.
- Issue:** TPO instruction uses position planning table to control the output but sometimes the output stays in the same section.

6. **Issue:** Problems related to positioning output instructions.
 - When DDRVI/DDRVA instructions use odd output points, e.g., Y0.1, Y0.3, or Y0.11 as high-speed output points, the positioning may be inaccurate.
 - When DZRN instruction is in the mode of returning to the zero point and then output a specified number of pluses, the output direction may be incorrect.
7. **Issue:** When the high-speed counter, HC234 or HC238 is in one time frequency mode, the counting may be incorrect.

Modified functions

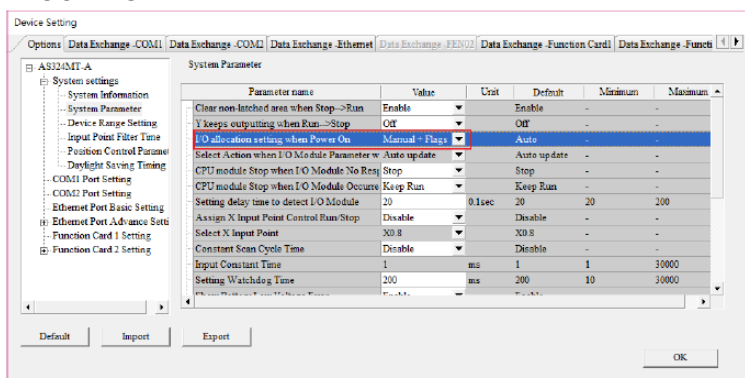
1. A new working mode "Delta Special Driver & CANopen DS301 mode" is added in AS-FCOPM Working Mode for using AS-FCOPM card in Function Card 2. And a new option "Auto" can be selected in Communication data sampling position.

Parameter name	Value	Unit	Default	Minimum	Maximum
F2AD Average Times	10		10	1	15
AS-FCOPM Working mode	AS Remote Com		AS Remote Com	-	-
AS-FCOPM mode ID	AS Remote Communication		AS Remote Com	1	127
AS Remote module No.	Delta Special Driver & AS Remote mode		AS Remote Com	1	15
Select Run mode after detect remote module	CANopen DS301		AS Remote Com	-	-
AS CPU module keep or Stop when slave no	Only Show Error		Only Show Error	-	-
Remote and CANopen communication time	100	ms	100	0	3000
Re-connected Retry number after time out	60		60	0	255
Auto Retry connection after Disconnected	60	sec	60	0	255
AS-FCOPM Bit Rate	125k	bps	125k	-	-
Communication data sampling position	Auto		Auto	-	-
DS301 PDO Data Exchanged	Start after power		Start after power	-	-

2. Add a new selection "Manual + Flags" for the setting option "I/O module allocation setting when Power ON". Select this option, you need to use it with flags SM230-SM261. For less module applications, you can simply use special flags to mark which I/O module will NOT be used to meet the actual I/O module placement. In this mode, you can use the same PLC program and download the I/O allocation table once for various I/O applications.

Example:

Step 1: Select "Manual + Flags" for the setting option "I/O module allocation setting when Power ON" in HWCONFIG



Step 2: Plan an entire module allocation and download the I/O allocation table to HWCONFIG

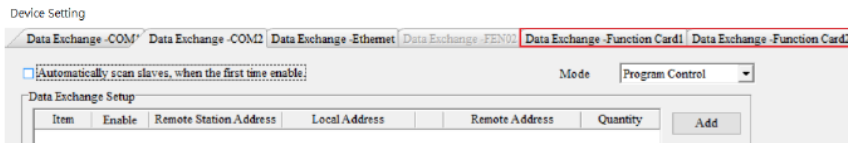
Step 3: When 08AD and 04TC are not needed in the application, you can set the flags SM236 (indicating 08AD) and SM239 (indicating 04TC) to OFF to meet the actual I/O module placement.



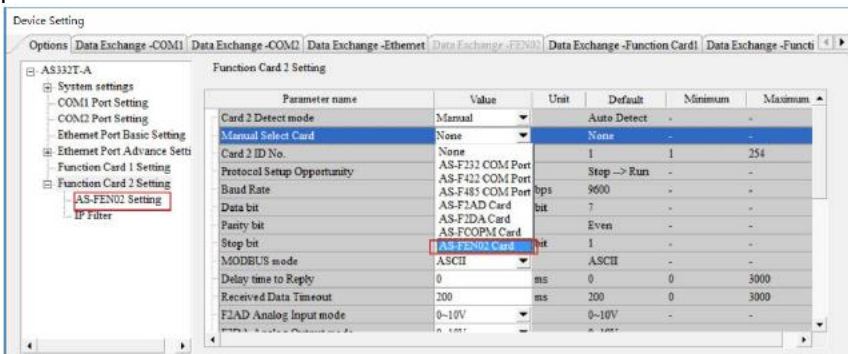
Actual I/O module placement



- Data Exchange setting sheets are added for Function Card 1 and 2.



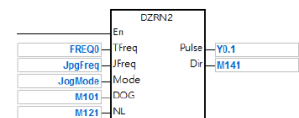
- Add AS-FEN02 Card for the setting option "Manual Select Card" and Ethernet/IP communication protocol is also added.



- Added SM36 and SR36 to control PLC programs, parameter backup as well as restoration to a SD card.
- Added SM976 -- SM990 to show the AS remote module connection status. Added SR1559 -- SR1692 to show the PLC and the number of its connected modules and module codes.
- Added new instructions for 2-axis synchronization output control (e.g., linear interpolation and arc interpolation); pausing and restoring output controls are also included.
- NTP (network time protocol) now supports DST (daylight saving time).
- Added SM1111 flag for switching between upper and lower byte of Ethernet/IP communication data.

New functions

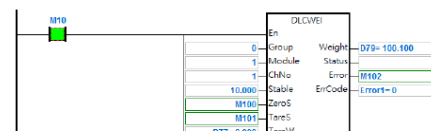
- DZRN2: Zero return instruction; specifying odd high-speed output points (Y0.1, Y0.3 and so on) to perform zero return. Do NOT change values in "DOG", "NL", "Pulse", or "Dir" during operation. Suggested to use high-speed input points (X0.0-X0.15) in "DOG" and "NL" to have immediate responses. If using non-high-speed input points such as X1.0 or later or M devices, any action can only be effective when a scan cycle is complete.
- DSFL and DSFR: Moving registers (32-bit device) forward or backward.
- MDEL: Deleting files in a memory card.
- REFF: Changing the filter time of the current input point.



- DSUNRS: Calculating the time of a specific date to sunrise and sunset. Enter the latitude, longitude, year, month, and date of the requested location and DSUNRS instruction calculates the local time to sunrise and sunset.



- EMCONF1 and EMCONF2: Modifying email related parameters.
- DLCWEI: Reading the current weight of a load cell module or subtracting the tare weight.

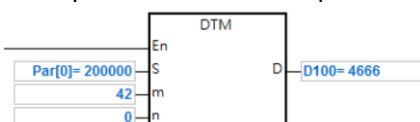


- RSTD: Notifying the slave to reset the status.

9. EMER: Reading emergency message from the slave.
10. INITC: Initialization instruction for Delta Special Driver & AS Remote Mode has added new functions for users to check the torque value of the axis and the DI status value. You can also name which parameters are for data exchange.

Servo Parameter Codes	R/W	ID. 1	ID. 2	ID. 3	ID. 4	ID. 5	ID. 6	ID. 7	ID. 8
DI status (P4-07)	R	SR731	SR732	SR733	SR734	SR735	SR736	SR737	SR738
Current torque (P0-11) (unit 0.1%)	R	SR741	SR742	SR743	SR744	SR745	SR746	SR747	SR748
Self-defined (P0-12)	R	SR791	SR793	SR795	SR797	SR799	SR801	SR803	SR805
Work with SM1685 Enable/Disable		SR792	SR794	SR796	SR798	SR800	SR802	SR804	SR806

11. DCSFOC: Catch speed from MPG and proportional output via CANopen communication to notify servo motor to operate.
12. DTM: Catch speed and proportional output instruction has added 2 functional parameters. When the value in S3 is 42, it calculates the operation time on 2-axis position clockwise arc interpolation. When the value in S3 is 43, it calculates the operation time on 2-axis position anti clockwise arc interpolation.
Example: The calculated operation time is 4666 ms.



13. CSFO: Modify the instruction execution and improve the output speed.
14. Arc interpolation instructions (API 2712 ~ 2717) have added 1° arc resolution as the basic angle for better motion output.

Setting value in S _s	Function in S _s	Description
0	Shift of the circle center (32-bit integer)	The arc resolution uses a 10° arc as the basic angle for motion.
1	Shift of the center of the circle (32-bit integer)	The arc resolution uses a 5° arc as the basic angle for motion.
2	Shift of the center of the circle (32-bit integer)	The arc resolution uses a 1° arc as the basic angle for motion. (Available for FW V1.04.60 or later)
10	Central angle (floating-point value)	The arc resolution uses a 10° arc as the basic angle for motion. (Available for FW V1.04.40 or later)
11	Central angle (floating-point value)	The arc resolution uses a 5° arc as the basic angle for motion. (Available for FW V1.04.40 or later)
12	Central angle (floating-point value)	The arc resolution uses a 1° arc as the basic angle for motion. (Available for FW V1.04.60 or later)
Others	Shift of the circle center (32-bit integer)	Treated as the setting value is 0 in S _s .

15. DDRVM:
 - Mark alignment positioning instruction has added 3 more modes for users to deploy after marking.
 - Added SR652 and SR653 to show the number of pulses in the ramp-up process.
 - Added SR654 and SR655 to show the number of pulses in the ramp-down process.

New instructions should work with ISPSOFT V3.06.06 or later and PLC firmware version 1.05.50 or later.

S _r (Output pulse number in ramp-down)	Description
>0	The ramp-down process is performed according to the restricted target frequency. A. If S _r is greater than the number of pulses output within the ramp-down time, the instruction outputs the number of redundant pulses with the same output frequency when the interrupt is triggered, and then performs the ramp-down process. B. If the setting value in S _r is not enough to achieve the ramp-down stop within the ramp-down time, the instruction restricts the target frequency and performs the ramp-down stop in accordance with the set ramp-down time.
=0	The ramp-down after marking is performed according to the ramp-down time. After the mark signal is received, the ramp-down stop is performed based on the ramp-down time.
=-1	After the mark signal is received, the output immediately stops. The ramp-down process is performed according to the number of pulses. Remove the negative sign of the number of pulses for actual pulse number during ramp-down process.
<-1	A. If S _r is greater than the number of pulses output within the ramp-down time, the instruction outputs the number of redundant pulses with the same output frequency when the interrupt is triggered, and then performs the ramp-down process. B. If the setting value in S _r is not enough to achieve the ramp-down stop within the ramp-down time, the instruction does not restrict the target frequency and performs the ramp-down stop in accordance with the number of pulse (S _r).

Release date: Week 1903

2.15 NEW – IES Catalogue

A new IES (Delta Industrial Ethernet Products and Solutions) has been published:
[DELTA_IA-IES_C_EN_20181114_Web.pdf](#)

You can find it on our ftp-site in the folder:
 Customer-Service\Industrial Automation Products\Industrial Ethernet Switches\DVS Brochure

2.16 NEW – CMC-PN01 ProfiNET Option Card

The much anticipated Profinet Card will be available for sales starting 2019 WK3.

Key information

CMC-PN01 connects C2000 drive to ProfiNET to exchange data with the host controller easily. This simple network solution saves cost and time for connection and installation of factory automation. Moreover, its components are compatible with suppliers'.



Features

- Connect through ProfiNET to the C-family of drives
- Control and monitor the drive through ProfiNET
- Modify the drive's parameters through ProfiNET

VFDs that support CMC-PN01:

- C2000 starting with firmware v2.04, with datecode below:
 Taiwan: 1834 Wujiang: 1832
- CP/CFP2000: CMC-PN01 will be supported in the next firmware release (v.2.05).
 This FW version is expected in Feb 2019.
 A temporary firmware for testing is available upon request.

■ EtherNet Specifications

Item	Specifications
Interface	RJ45
Number of ports	2 ports
Communication Mode	IEEE 802.3
Cable	Category 5e shielding 100 M
Transmission speed	10/100 Mbps auto-negotiate
Communication protocol	PROFINET

■ Environmental Conditions

Item	Specifications
Noise immunity	ESD (IEC 61800-5-1, IEC 6100-4-2) EFT (IEC 61800-5-1, IEC 6100-4-4) Surge Teat (IEC 61800-5-1, IEC 6100-4-5) Conducted Susceptibility Test (IEC 61800-5-1, IEC 6100-4-6)
Operating temperature	-10~50°C (temperature), 90% (humidity)
Storage temperature	-25~70°C (temperature), 95% (humidity)
Vibration/Shock resistance	International standards IEC 61800-5-1, IEC 60068-2-6/IEC 61800-5-1, IEC 60068-2-27

■ Electrical Specifications

Item	Specifications
Power supply voltage	5 V _{DC}
Power consumption	0.8 W
Insulation voltage	500 V _{DC}
Weight (g; approx.)	27 (g)

3 Application

3.1 NEW – Application Notes

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

- Application note - Torque Homing Mode_20190114.pdf
- DOPSoft program download and upload to HMI via COM Port and USB disk.pdf
- DOPSoft program download and upload to HMI via Ethernet communication.pdf
- Breeding Industry Notification - Automatic Layer Battery Cage Solution V1811-05003.pdf
- Machine Tool Industry Notification - 3-Axis Machining Center Solution.pdf
- Metal Assembly Industry Notification - Specialized Hydraulic Pressing.pdf
- Robotics Industry Notification - Application of Delta IA Products in Shoe Upper Latex Spraying Machines.pdf
- Wet Wire Drawing Machine Control Solution.pdf
- Delta M-R Controller Stator Winding Machine Solution.pdf
- IoT Industry Notification - Delta Plastic Injection Machine IoT Solution.pdf
- Robotics Industry Notification - Application of Delta IA Products In Machine Tool Automatic Feeding and Discharging.pdf
- Warehousing & Logistics Industry Notification - CNC Production Line.pdf
- Food and Pharmaceutical Industry Notification - Chocolate Balls Deposititing Solution.pdf
- RubberPlastics Industry Notification - Delta Semi-Electric Injection Molding.pdf

3.2 Beckhoff motion controller

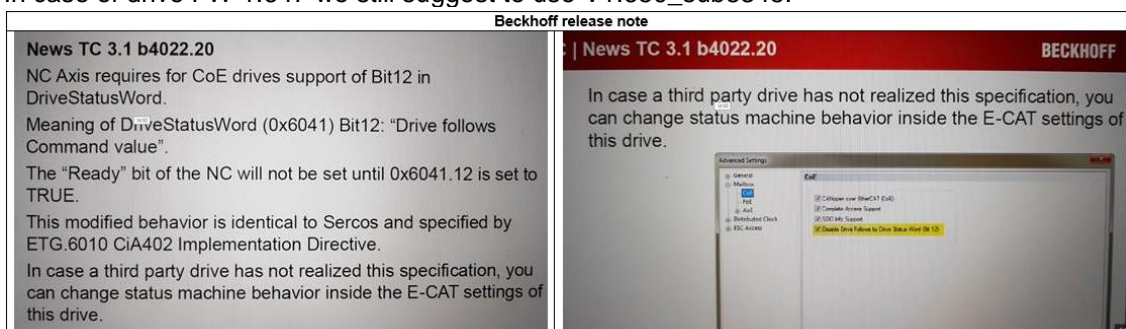
We discovered an integration issue with Beckhoff motion controller.

Info from the last Beckhoff release shows they introduced checking of bit12 in the status word.

Delta doesn't use it in ASD-A2-E.

In order to make the system running the user has to disable this control in the advanced setting of the drive in the Twincat system manager.

In case of drive FW 1.647 we still suggest to use V1.650_sub8345.



Jack Tsai (jtsai@deltaww.com) and Davide Bagnacani (dbagnacani@deltaww.com) can give you further details.

4 FAQ

4.1 VFD Series AC Motor Drives

VFD-ED

Q How and when to use the cores that are supplied with VFD-ED?

A With VFD-ED 3 ferrite cores are supplied without plastic housing. They are zero-phase reactors and are to be used acc. to

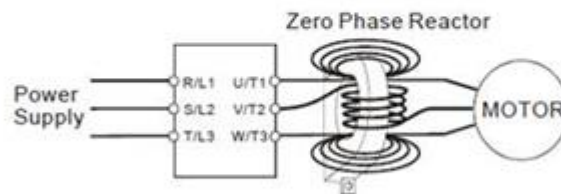
Zero Phase Reactor (Choke)

Interferences can also be suppressed by installing a zero phase reactor at the power supply side and/or the AC Motor Drive's output, depending on where the interference is. Since currents are large at the power input and the AC Motor Drive's output, please carefully select the magnetic core with suitable current handling capability. An ideal magnetic material for large currents is compound magnetic powder. It has a higher current handling capability and higher impedance compared to pure metallic magnetic cores. It is therefore suitable to implement in a high frequency environment. The impedance can also be enhanced by increasing the turn ratio.

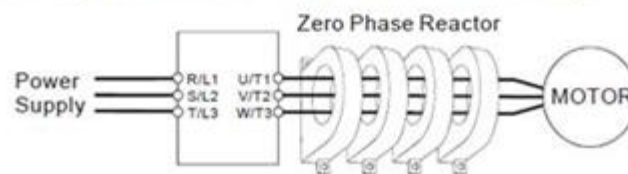
Zero Phase Reactor Installation

There are two installation methods, depending on the size of the zero phase reactor and the motor cable length.

1. Wind the motor cable through the middle of a zero-phase reactor 4 times. Place the reactor and the AC Motor Drive as close to each other as possible.



2. Place all wires through the middle of four zero-phase reactors without winding.



The next user manual will contain more information about use and installation.

AFE2000

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.

C/CP/CFP2000

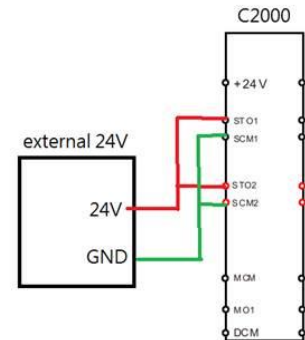
Q When using EMC-BPS01 I get STL3 alarm. Why?

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

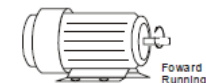
☐ This parameter needs to work with multi-input function terminal #58 or #59 and multi-output function terminal #53 and #54.

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).

4.2 Power supplies

CLiQII series

Q Which 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~~

4.3 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

