DELTA Newsletter

Industrial Automation Products

Edition 2018-05

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, 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 Hannover Messe 2018

Delta, a world-class provider of industrial automation solutions, unveiled at Hannover Messe 2018 its integrated Smart Factory and Energy Management solutions to enable higher productivity and energy efficiency at the equipment, production line, and factory layers.

Mr. Andy Liu, general manager of Delta's Industrial Automation Business Group, said, "Smart manufacturing is not only a trend but an imperative way for companies to sharpen their competitive edge. Delta remains focused on strengthening the capabilities of its industrial automation solutions and their underlying software and hardware platforms. We help customers attain superior performance and lower carbon emissions through smart manufacturing in their operations. Our showcase at Hannover Messe 2018 is specifically designed to prove how our next-generation solutions and integration expertise converge to turn smart manufacturing into a reality."

Mr. Patrik Hug, Delta EMEA IABG Senior Director of Business Development & Product Management, indicated the importance of smart manufacturing and shared the success stories of Delta's programmable logic controller (PLC) smart model line at Delta's press conference held on 4/24. Mr. Hug indicated that after implementing Delta's smart production solutions, this PLC model line in Delta's WJ plant is able to deliver 138 different parts with only 23 production processes. The capacity of the model line has increased by 40% and reached 35k/month while saving 76% on space usage. This model line also allows operators and managers to monitor the real-time production process and machine status with a digitalization and monitoring platform.

Delta's highlights at this year's Hannover Messe included:

- **Integrated factory automation, digitalization and energy management solutions** facilitate smart, green factories. Our **smart factory solution** contains the key elements of smart manufacturing, including machine automation, networking and communication, real-time equipment / production monitoring and management, and energy management. This solution highlights overall factory data collection and management via a **SCADA system (DIAView), manufacturing execution system (DIAMES), overall equipment effectiveness management (DIAOEE)**, and **industrial energy management system (DIAEnergie)**. The **DIAEnergie system** also appears in an energy management solution with our power meters that collect power consumption data for real-time monitoring, analysis, and management.
- The new **High-Flexibility Multi-Tasking Smart Production Line** integrates the innovative idea of onsite production for customized gifts with flexible robot workstations, smart conveyor, IIoT technology, and a monitoring platform. This 4-meter fully-integrated manufacturing platform has Delta's cutting-edge industrial automation solutions and a smart conveyer at its core:
  1. Customers place orders for customized products via on-site PC, tablet and smartphone devices. A cloud system channels the orders into the Delta Manufacturing Execution System (DIAMES) which subsequently issues an order-tracking QR code.
  2. The newly-developed **Smart Conveyor** analyses production status data and sends in-process products to idle robot workstations to optimize time and production efficiency.
  3. Two **6-axis articulated robots DRV90L series** execute high-precision pick & place, stocking and delivery of

multiple product types as well as one SCARA robot arm DRS60L to perform swift product packaging. The robots identify products via Delta's DMV2000 machine vision system, which discerns varying positions, shapes and colors.
4. The **Delta Manufacturing Management Platform (DIAMMP)** carries out real-time visualized monitoring of order status and production performance data.
5. For customers that request later pickup of their product, the newly-launched **Industrial Barcode Scanner DAH Series** will read the QR code in their SMS notification to identify the product in the storage area, which is retrieved by one of the 6-axis articulated robots.

Over a thousand visitors came to Delta's booth and ordered their personal gifts during the 5-day event. Many were amazed by Delta's rapid development and results in smart manufacturing.

- Another key attraction at our booth was a live demo of Delta's new **3D Machine Vision Solutions**, **including the stereo vision sensor and 3D scanner**. These newly- developed 3D vision inspection systems have been conceived to boost efficiency and reduce operating costs in logistics applications through rapid and precise identification of product packages' shapes as well as height, length and width dimensions, which are displayed in real-time for visitors.
- Delta also presented a broad range of advanced industrial automation products for **smart equipment**, including drives, motion systems, sensors, measurement devices, machine vision and 3D vision detection systems, robots, industrial controllers, industrial networking devices, and equipment IoT platform, along with robot workstations and machine automation solutions.

1.3 Delta Solutions for Smart Manufacturing at SPS IPC Drives in Parma, Italy 2018

For the fourth consecutive year Delta Industrial Automation has presented their wide range of products and integrated solutions at SPS in Parma (May 22nd - 24th, 2018)
The highlights of this year included the motion control Gearwheel demo, the conveyor Tracking Glue Dispensing Robot workstation and our Digitalised Factory Control and Management Solution. We had many visitors throughout the 3 days and hope to continue growing in the Italian Market.

2 Product update

2.1 PHASE OUT – VFD-VL will be phased out

VFD-VL will be phased out worldwide and replaced by VFD-ED series.

Last orders can be accepted until 30-6-2018.
Last shipments from factory will be on 31-10-2018

Drives

Discontinued model	Substitute model
VFD055VL23A	VFD055ED23S
VFD075VL23A	VFD075ED23S
VFD110VL23A	VFD110ED23S
VFD150VL23A	VFD150ED23S
VFD185VL23A	VFD185ED23S
VFD220VL23A	VFD220ED23S
VFD300VL23A	VFD300ED23S
VFD370VL23A	VFD370ED23S

Discontinued model	Substitute model
VFD055VL43A	VFD055ED43S
VFD075VL43A	VFD075ED43S
VFD110VL43A	VFD110ED43S
VFD150VL43A	VFD150ED43S
VFD185VL43A	VFD185ED43S
VFD220VL43A	VFD220ED43S
VFD300VL43A	VFD300ED43S
VFD370VL43A	VFD370ED43S
VFD450VL43A	VFD450ED43S
VFD550VL43A	VFD550ED43S
VFD750VL43A	VFD750ED43S

Options

Discontinued model (Used on VFD-VL)	Substitute model (Used on VFD-ED)	Description
KPVL-CC01	KPC-CC01	VFD-ED with built-in keypad KPED-CC01. External keypad KPC-CC01 also available.
EMVL-PGABL-1	EMED-PGABD-1	EMED-PGABD-1 supports line drive, open-collector, output voltage, push-pull
EMVL- PGABO-1		
EMVL- PGABO		
EMVL-PGH01	EMED-PGHSD-1	Another EMED-EGHSD-2 could supports terminal block connection to encoder
EMVL-PGS01		
EMVL-IODA01	NA	Built-in IO could satisfy most of the elevator application
EMVL-SAF01	NA	VFD-ED with STO SIL2 built-in and certificated by TUV & EN81-20

Hardware

Item	Discontinued Series VFD-VL	Substitute Series VFD-ED	Description
Input Voltage & Power rating	230V 3-p: 5.5~37kW 460V 3-p: 5.5~75kW	230V 1-p: 2.2~3.7kW 230V 3-p: 4~37kW 460V 3-p: 4~75kW	New added in VFD-ED : 230V 1-p: 2.2~3.7kW 230V 3-p: 4kW 460V 3-p: 4kW
Built-in Brake Chopper	230V: 5.5~22kW 460V: 5.5~22kW	230V: 2.2~22kW 460V: 4~30kW	VFD-ED expands built-in 460Vac model to 30kW
Built-in DC Reactor	230V: 30~37kW 460V: 30~75kW	230V: 30~37kW 460V: 37~75kW	
Built-in Keypad	X	O	
Relay Output	2 sets	4 sets	2 sets new added in VFD-ED (Share Common type)
Serial Communication	1 port	2 ports	1ports new added in VFD-ED for CAN/RS485
STO	X	O	VFD-ED supports STO SIL2

Software

Item	Discontinued Series VFD-VL	Substitute Series VFD-ED	Description
Auto reset	X	O	Selected fault could be auto retry& reset
CAN Communication	X	O	VFD-ED supports private CAN
Direct Landing	X	O	VFD-ED supports Direct Landing via private CAN
PWM mode selection	X	O	New added parameters in VFD-ED could let user select DPWM or SVPWM
Over acceleration Protection	X	O	3 parameters new added in VFD-ED for over acceleration protection
Star sealed contactor	X	O	New function code in MI for Star sealed contactor
Encoder feedback interference index	X	O	Checking encoder signal loss rate by keypad in available on VFD-ED

Item	Discontinued Series VFD-VL	Substitute Series VFD-ED	Description
Auto reset	X	O	Selected fault could be auto retry& reset
CAN Communication	X	O	VFD-ED supports private CAN
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PWM mode selection	X	O	New added parameters in VFD-ED could let user select DPWM or SVPWM
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2.2 NEW – New firmware version 1.04 for AS332T-A, AS332P-A, and AS324MT-A

A. Issues and solutions:

All the issues below can be fixed by upgrading firmware to V.1.04. Contact the company or the technicians from the agents for a firmware upgrade for AS300 series (V1.02.30 or later versions).

1. **Issue:** When using COMMGR software to detect connected IP addresses via Ethernet communication, the search will fail.

   Before firmware upgrade, what users can do: Specify the IP address manually.

2. **Issue:** When AS300 is set as the slave via CANopen DS301 communication, the heartbeat time is not as accurate and that will cause communication errors.

3. **Issue:** When data mapping between COM1 and COM2 is in operation and the slave communication time seems not that fast, this situation cannot be improved by shortening the setting value in HWCONFIG -> AS300 -> Device Setting -> Data Mapping -> The shortest Update Cycle (ms).

4. **Issue:** The instruction DPIDE cannot be executed if users use the constant value (in floating number) as the setting value.

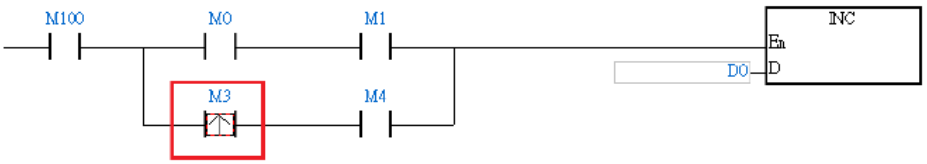
   Before firmware upgrade, what users can do: Declare the variable symbol and then input the setting value in the variable.

5. **Issue:** Once the instruction DHSCS is executed, users cannot modify the values to be compared.

6. **Issue:** A function block can call another function block, but the executions of the function blocks may be incorrect.

7. **Issue:** During the execution of the instructions PLSY, PLSR, or PLSV, when the pulse number reaches the maximum (2^{32}), an error occurred in the output frequency (not be same as the set output frequency), even when the number of the pulse output is set to be unlimited.

8. **Issue:** If there is an instruction LDP in the PLC program and the structure is as shown below, the execution result will be incorrect.



Before firmware upgrade, what users can do: Exchange the execution order of the instruction LDP M3 and the other instruction (M4) in the PLC program as the image shown below.

9. **Issue:** When the DANopen DS301 communicaiton mode is used, if there are more than 8 slaves are connected, a hardware communicaiton error may occur in the slaves.
10. **Issue:** When the instruciton CCONF is used to edit parameters in the data mapping table, the parameters in S6 and S10 cannot be modified accordingly.

B. Functions that are modified

1. Modified CSFO instruction and have the input points to be used repeatedly.
2. Users now can input file name string to read and write instructions from SD card.
3. While using COM1 and COM2 to do data mapping, the PLC writes first and then read. (older version is first read and then write) and PLC controls which station to start communication.

SM	Attribute	Description
SM752 - SM783	R/W	Connection1-32 for data exchange through COM1 started
SM864 - SM895	R/W	Connection1-32 for data exchange through COM2 started

4. Modified the position planning table and use variables to assign target position and speed.

C. Functions that are added

1. Add new devices SR640-SR651 to set the outputting time 0-20ms sooner (unit: 1ms) to work with the Y0.0-Y0.11 output pulse and make sure the outputting only happens when switching to the direction outputs.
2. When using AS-FCOPM card in Function Card 2, its working mode can be set as AS Remote Communication, Delta Special Driver & AS Remote Mode, CANopen DS301 and it can support Delta AC Servo Drive & Motor ASDA-A3 series.
3. You can change the target position or speed during the execution of the DDRVI and DDRVA instructions.
4. A new data recording function is added. You can set the trigger for PLC to record the triggered action.
5. You can refresh the current position of the designated high-speed output axis or stop high-speed output immediately during the execution of the REF instruction.
6. You can use Y0.1, Y0.3, Y0.5, Y0.7, Y0.9, Y0.11 as high-speed outputs during execution of the PLSV instruction.
7. The backlash compensation pulse function is added. You can input the pulse number to be compensated in the SR for the corresponding axes.
8. You can use any input as the zero point when executing DZRN instruction.

D. New instructions

1. CANRS: User-defined CAN communication sending and receiving
2. SCLM: Multi-point area ratio operation
3. IETS: The start of the instruction execution time measurement
   IETE: The end of the instruction execution time measurement
4. XCMP: Setting up to compare the inputs of multiple work stations
   YOUT: Comparing the outputs of multiple work stations
5. SPLIT: Splitting a string
   Merge: Merging strings
6. COPWL: Writing multiple CANopen parameter values
7. DHSRF: Immediate refresh of a high-speed comparative value
8. DTM: Data conversion and move
9. INFO: Reading the system data

Note: New instructions should work with ISPSoft V3.03 or later and for more information on new instructions, refer to

DELTA_AS300_V1.04_EN_20180508-ATT1.pdf on our ftp-site.

2.3 NEW – AH15SCM-5A , the AH series communication module

We are happy to announce the release of the new AH series communication module, the AH15SCM-5A.

The AH15SCM-5A is a network module, which now will allow you to connect more than two devices with the RS-232 interface. Therefore, the integration ability of AH series PLC is increased.

Please see the technical features below:

- Built-in two RS-232 ports
- Supports MODBUS (master/slave)
- Supports PLC Link function
- Supports BACnet slave function

Please also check product-related documentation on the FTP Server.
The AH15SCM is on stock and ready to be ordered.

2.4 MS300 firmware updated from V1.05 to V1.06

Function correction

	Version 1.05 problem	Version V1.06
1	Set analogue input as the source of frequency command. When the frequency decreases to zero and goes to standby mode, there will be frequency interference. This interference will make the motor drive to switch non-stop between RUN mode and Standby mode	The switching process between RUN mode and Standby mode has been optimized. The endurance to resist analogue frequency interference has been increased to keep the motor drive running and outputting frequency.
2	The KPC-CC01 keypad which is installed on MS300 doesn't display <11: PT100 Input).	The KPC-CC01 keypad which is installed on MS300 now displays <11: PT100 Input).
3	Pr08-21 =1 <Allow PID control to change the running direction>. This setting doesn't set correctly the running direction.	The address 2101H to display drive status shows the correct bit.
4	Pr08-21 =1 <Allow PID control to change the running direction>. Running direction cannot be controlled by PID.	Pr08-21 =1 <Allow PID control to change the running direction>. Running direction can be controlled by PID now.
5	After resetting Pr00-02= 9 or 10, the user defined value in parameter group 13 doesn't not reset	After resetting Pr00-02= 9 or 10, the user defined value in parameter group 13 now resets.
6	The error code pops up after copying parameters via USB port.	Optimize the internal communication mechanism to prevent errors while copying parameters via USB port.
7	Pr00-11, when changing control mode, the default carrier frequency doesn't change simultaneously.	Pr00-11, when changing control mode, the default carrier frequency will change simultaneously.
8	CPU in the motor drive might stop functioning when PLC sends large number of WPR commands and writes several addresses at the same time.	A protection mechanism has been added to the internal communication to prevent malfunction of CPU caused by massive PLC commands.
9	Pr00-52, the number of times of power-on: Wrong number of times of Power On.	Pr00-52, the number of times of power-on: Right number of times of Power On.
10	The displaying bit is incorrect when the monitoring the register #2101H	The displaying bit is correct when the monitoring the register #2101H
11	The setting range of AVI voltage proportional lowest point (Pr03-64 ~ Pr03-74) is -100~100%. In v1.05, the setting range can only be 0~100% and -100% ~0.	In v1.06, the setting range of AVI voltage proportional lowest point (Pr03-64 ~ Pr03-74) is -100 ~100%.

12	The frequency displayed on the U page of the keypad is incorrect.	The frequency displayed on the U page of the keypad is now correct.
13	Set Pr00-23 = 2 (disable forward), then repower on. The setting of this parameter goes back to 0: Enable forward/ reverse.	Set Pr00-23 = 2 (disable forward), then repower on. The setting of this parameter remains 2: disable forward.
14	The over torque detection doesn't follow the setting at multi-motor selection.	The over torque detection now follows the setting at multi-motor selection.
15	When using auxiliary and master frequency, the source of master frequency is the keypad. But the main frequency value cannot be displayed on the keypad.	When using auxiliary and master frequency, the source of master frequency is the keypad. The main frequency value can now be displayed on the keypad.
16	The recording values of DC Bus at malfunction don't reach the standard.	The accuracy of recording DC bus values when malfunction.
17	The calculation of the power angle of OOB (Out Of Balance Detection) function is not accurate enough.	Enhanced the accuracy of calculating the power angle of OOB function
18	The display value of DC brake's current is not accurate enough at activation.	The accuracy of display value of DC brake's current at activation has been enhanced.
19	Average sampling angle. The update value of this angle cannot be displayed instantly on the keypad.	Pr07-48 OOB average sampling angle. The update value of this angle can now be displayed instantly on the keypad.
20	The APP application parameter combination page of keypad can set read only parameters.	The APP application parameter combination page of keypad cannot set read only parameters.
21	Pr00-04 Content of Multi-function Display (User Defined) 1. Display Pr00-04 =21 <Actual location of motors> (not support by MS300 2. Display Pr00-04=23 <Pulse input position (q.)> (not support by MS300) 3. Pr00-04= 25 < Overload counting> with an incorrect character "h". 4. Display Pr00-04=40 <Torque Command> (not support by MS300) 5. Pr00-04 =46 <Display auxiliary frequency value (U.) (Unit: Hz)>. This function cannot be displayed on the KPC-CC01 keypad. 6. Pr00-04 =47 < Display master frequency value (A.) (Unit: Hz)> This function cannot be displayed in the KPC-CC01 keypad	Correcting Pr00-04 Content of Multi-function Display (User Defined) 1.Not displaying Pr00-04 =21 <Actual location of motors> (not support by MS300) 2. Not display Pr00-04=23 <Pulse input position (q.)> (not support by MS300) 3. Pr00-04= 25 < Overload counting> with the correct character "o". 4.Not displaying Pr00-04=40 <Torque Command> (not support by MS300) 5. Pr00-04 =46 <Display auxiliary frequency value (U.) (Unit: Hz)>. This function can now be displayed on the KPC-CC01 keypad. 6. Pr00-04 =47 < Display master frequency value (A.) (Unit: Hz)> This function can now be displayed in the KPC-CC01 keypad.

	7. Pr00-04 =48 <Display frequency value after addition and subtraction of auxiliary and master frequency (L.) (Unit: Hz)>. This function cannot be displayed on the KPC-CC01 keypad. 8. It shows the setting range is between 0 and 49. However, it's 0 to 48.	7. Pr00-04 =48 <Display frequency value after addition and subtraction of auxiliary and master frequency (L.) (Unit: Hz)>. This function can now be displayed on the KPC-CC01 keypad.
22	The factory setting doesn't change with 220V modes or 440V models.	The factory setting varies with 220V modes or 440V models

Function modify

1	A new delay operation mechanism is added to free to stop function. Set Pr7-08 B.B. (Base Block) to determine the time to interrupt.
2	Modify DC brake output current to enhance braking ability.
3	Pr08-01 <Proportional Gain (P)>, change its decimal point from 1 to 2.
4	In Pr07-54, Pr07-55, users cannot set the KP and KI of automatic acceleration/ deceleration.
5	Modification on copying parameters: 1. Pr00-07 <Parameter Protection Password Input: When the motor drive is in operation, you cannot input 9999 to unlock the password. You have to stop the motor drive before input 9999. 2. Set Pr00-08 to set up a password, and then use Pr00-07 to unlock the password. Once the password is unlocked, you can duplicate the parameters. Once the duplication is done, the password will be effective again. 3. When the password is unlocked, Pr00-07 will be 0. 4. If you enter consecutively the wrong password 3 times, an error code Pcod will pop up and you will not be able to set up password. Then the motor drive will stop outputting. Resetting the motor drive is not allowed, you have to shut down the power and the repower on the motor drive. 5. When the password is unlocked, if you enter 3 consecutive times the wrong password at Pr00-07, the error code Pcod will not pop up. 6. Change to "Cannot Reset" when warning code SE1 <Keypad COPY error1> or SE2 <keypad COPY error2> pops up.
6	Pr00-21 Source of the Operation Command (AUTPO): change function 4 to Reserve and cannot be set.

7	Change the factory setting of V/F curve: Middle frequency 2 of the motor: 1.50Hz. Middle voltage frequency 2 of the motor: 5.0/ 10.0 Minimum frequency of the motor: 0,50Hz Minimum voltage frequency of the motor: 1.0/2.0V
8	Add a new protection mechanism. When duplicating parameters, when setting Pr09-01 <COM1 transmission speed> or when setting Pr09-04 <COM1 communication protocol >, the communication will still be on.

New function

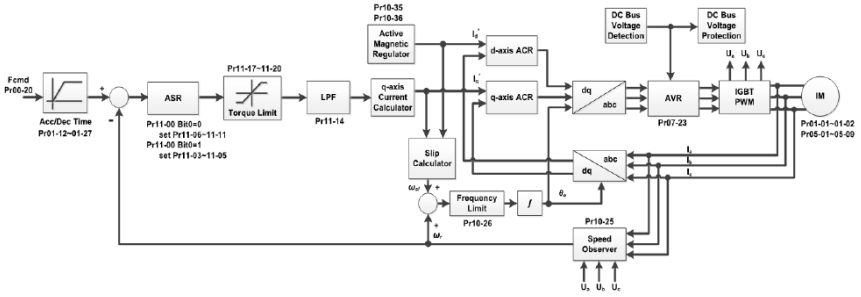
List of New Functions:

1.	Pr11-00 <System Control>: Add FOC Sensorless control
2.	DC brake can be controlled by PLC program.
3.	Pr00-02 <Parameter Reset>: 11: All parameters are reset to factory settings except the user defined parameters at (base frequency is 50 Hz) (saving the setting value of user defined parameter 13-01~13-50) 12: All parameters are reset to factory settings except the user defined parameters at (base frequency is 60 Hz) (saving the setting value of user defined parameter 13-01~13-50)
4.	IGBT temperature is added to the monitoring list in VFD-Explorer
5	Add read and write to Special D to support PID function in PLC MS: D1200 ~ D1215

New Functions description:

1. Adding FOC sensor less control to firmware V1.06: This control method can control separately the motor's magnetic field and torque. When controlling the torque, the magnetic field won't be interfered and a quick feedback from torque will be given to make a more stable operation. With an optimized current control, the maximum torque can be reached by just outputting the minimum current. And then the motor's temperature will decrease and the system efficiency will increase. FOC sensor less control is suitable for an application which requires an activation of torque at low frequency, a quick feedback on speed chasing, a stable rotation speed and torque force.

   1.1 Diagram of the complete control architecture



1.2 Related parameter list

Pr. no.	Pr. Name	Setting Range	Factory Setting
✓00-04	Content of multi-function display (User defined)	8: Display output torque estimated by the drive, the rated torque of the motor is 100 % (t) (Unit: %) 35: Control mode display 38: Torque command (t.) 39: Display output positive / nega-tive torque estimated by the drive, t 0.0 means positive tor-que, and - 0.0 means negative torque (C.) (Unit: Nt-m) 40: Torque command (L) (Unit: %)	3
00-10	Control mode	0: Speed mode 2: Torque mode	0
00-11	Control of speed mode	0: VF (IM V/F control) 1: VFPG (IM V/F control+Encoder) 2: SVC (Pr. 05-33 set as IM or PM) 5: FOC Sensorless (IM field orient-ed sensorless vector control)	0
00-17	Carrier frequency	Normal load: 2~15 KHz Heavy load: 2~15 KHz When Pr0-11 =5 (FOC Sensorless control mode) the maximum value of the carrier frequency is 10k. Same value for heavy duty and normal duty.	4
00-19	PLC command mask	bit0: Control command is compul-sively controlled by PLC bit1: Frequency command is com-pulsively controlled by PLC bit3: Torque command is compul-sively controlled by PLC	Read only
02-01	Multi-function input command 1 (MI1)	26: TQC / FOC mode selection 27: ASR1 / ASR2 selection 31: High torque command bias (Pr. 11-30) 32: Middle torque command bias (Pr. 11-31) 33: Low torque command bias (Pr. 11-32) 39: Torque command direction	0
02-02	Multi-function input command 2 (MI2)		0
02-03	Multi-function input command 3 (MI3)		1
02-04	Multi-function input command 4 (MI4)		2
02-05	Multi-function input command 5 (MI5)		3
02-06	Multi-function input command 6 (MI6)		4
02-07	Multi-function input command 7 (MI7)		0
✓03-00	Analog input selection (AVI)	2: Torque command (Torque limit in speed mode) 3: Torque compensation command 7: Positive torque limit 8: Negative torque limit 9: Regenerative torque limit 10: Positive / negative torque limit	1
✓03-01	Analog input selection (ACI)		0
✓03-20	Multi-function output (AFM)	8: Output torque 18: Torque command 19: PG2 frequency command 20: CANopen analog output 21: RS-485 analog output 22: Communication card analog outptut 23: Constant voltage output	0
05-00	Motor parameter auto-tuning	0: No function 1: Dynamic test for induction motor (IM) 2: Static test for induction motor (IM) 12: FOC Sensorless inertia estimation 13: High frequency stall test for PM synchronous motor	0
✓06-12	Current limit	0~250 %	150
06-39	Torque command at malfunction	-32767~32767	Read only
✓10-24	FOC & TQC function control	0~65535	Read only
✓10-25	FOC bandwidth of speed observer	20.0~100.0 Hz	40.0
✓10-26	FOC minimum stator frequency	0.0~10.0 %	2.0
✓10-27	FOC low-pass filter time constant	1~1000 ms	50
✓10-28	FOC excitation current rise time	33~100 %	100
✓10-35	AMR (Kp)	0.00~3.00	1.00
✓10-36	AMD (Ki)	0.00~3.00	0.20
11-00	System control	bit0: Auto-tuning of ASR and APR bit3: Dead time compensation is off bit7: Selection to save or not save the frequency	0
11-01	Per-unit value of system inertia	1~65535 (256 = 1 pu)	256
✓11-02	ASR1 / ASR2 switching frequency	5.00~599.00 Hz	7.00
✓11-03	ASR1 low-speed bandwidth	1~40 Hz	Read only
✓11-04	ASR2 high-speed bandwidth	1~40 Hz	Read only
✓11-05	Zero-speed bandwidth	1~40 Hz	Read only
✓11-08	Gain of ASR2	0~40 Hz	10
✓11-09	Integral time of ASR2	0.000~10.000 sec.	0.100
✓11-10	Zero-speed gain of ASR	0~40 Hz	10
✓11-11	Zero-speed integral time of ASR	0.000~10.000 sec.	0.100
✓11-12	Gain of ASR speed feed forward	0~200 %	0
✓11-13	Gain of PDFF	0~200 %	30
✓11-14	Low-pass filter time of ASR output	0.000~0.350 sec.	0.008
✓11-15	Depth of notch filter	0~20db	0
✓11-16	Frequency of notch filter	0.00~200.00 Hz	0.00
✓11-17	Forward motor torque limit	0~500 %	500
✓11-18	Forward regenerative torque limit	0~500 %	500
✓11-19	Reverse motor torque limit	0~500 %	500
✓11-20	Forward regenerative torque limit	0~500 %	500
✓11-21	Gain of flux-weakening curve (Motor 1)	0~200 %	90
✓11-22	Gain of flux-weakening curve (Motor 2)	0~200 %	90
✓11-23	Acc. / Dec. response in flux-weakening area	0~150 %	65
✓11-27	Max. torque limit	0~500 %	100
✓11-28	Source of torque command bias	0: Disabled 1: Analog signal input 2: RS-485 (Pr. 11-29) 3: Controlled by external terminal (Pr. 11-30~11-32)	0
✓11-29	Setting of torque command bias	0.0~100.0 %	0.0
✓11-30	High torque command compensation	0.0~100.0 %	30.0
✓11-31	Middle torque command compensation	0.0~100.0 %	20.0
✓11-32	Low torque command compensation	0.0~100.0 %	10.0
✓11-33	Source of torque command	0: Digital keypad 1: RS-485 (Pr. 11-34) 2: Analog signal input (Pr. 03-00) 5: CANopen	0
✓11-34	Torque command	-100.0~100.0 %	0.0
✓11-35	Filter time of torque command	0.000~1.000 sec.	0.000
11-36	Speed limit selection	0: Follow the setting of Pr. 11-37 (Forward speed limit) and Pr. 11-38 (Reverse speed limit) 1: Follow the setting of Pr. 00-20 (Source of frequency command, AUTO) and Pr. 11-37, 11-38 2: Follow the setting of Pr. 00-20	0
✓11-37	Forward speed limit (Torque mode)	0~120 %	10
✓11-38	Reverse speed limit (Torque mode)	0~120 %	10

2. Add read and write to Special D to support PID function in PLC.

D1200	PID 1 mode: 0: Basic mode
D1201	Selection of PID 1 target 0: Refer to D1202 1: AVI 2: ACI 3: AUI
D1202	PID target value (0.00% ~ 100.00%)
D1203	Selection of PID 1 feedback 0: Refer to D1204 1: AVI 2: ACI 3: AUI
D1204	PID 1 feedback value (0.00% ~ 100.00%)
D1205	PID 1 Proportional gain (P) (2nd decimal place.)
D1206	PID 1 Integral time (I) (2nd decimal place.)
D1207	PID 1 Derivative time (D) (2nd decimal place.)
D1208	reserve
D1209	PID 1 output command limit (positive limit)
D1210	reserve
D1211	reserve
D1212	reserve
D1213	reserve
D1214	reserve
D1215	PID 1 Calculation results

Production:

Version	Series number	
V1.06	Taiwan	T1814

Version	Series number	
V1.06	WJ	W 1814

2.5 UPDATE – Firmware of DVP slim type PLC (S2 series) is updated

Series	Models	Firmware Version	Release Date
Slim	DVP04AD-S2 DVP04DA-S2 DVP06XA-S2	V4.14→ V4.16	April 02, 2018 (W1814)

Added functions:

1. 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.
2. 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 / 7,N,1 / 8,E,1 / 8,O,1 / 8,N,1 / 7,E,2 / 7,O,2 / 7,N,2 / 8,E,2 / 8,O,2 / 8,N,2

RTU: 8,E,1 / 8,O,1 / 8,N,1 / 8,E,2 / 8,O,2 / 8,N,2
Factory defaults: ASCII,9600,7,E,1 (CR#32=H'0002)

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
		H'6	7,E,2*1		
		H'7	8,E,2		
		H'8	7,N,2*1		
		H'9	8,N,2		
		H'A	7,O,2*1		
		H'B	8.O,2		

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

1. The value in CR is under protection and not affected when incorrect parameters are used in RS485 or baudrate.
2. DVP04AD-S2 and DVP06XA-S2:
   When trying to write an invalid value into CR2-CR5 (sampling average times), the system ignores this action and the value in the CR stays the same.
3. DVP04AD-S2 and DVP0DA-S2: Fixed the issue that the latched value in CR1 (channel mode setting) cannot be retained after the power is OFF and ON again.

2.6 UPDATE – DCISoft V1.19 is released

Modified and added functions:

1. RTU-EN01 is now available for DVP02TUL-S, DVP02TUN-S, and DVP02TUR-S.
2. SCMSoft updates to version 1.24.04:
   A. Fixed the device address, D26300, input error in UDLink AS300 Card 2.
   B. Fixed the UDLink packet editing and saving error in AS00SCM Series.
3. Fixed the problem that DCISoft cannot be opened when all network cards are disabled in Windows 10.

You can find it on our ftp-site.

2.7 NEW – User manual for VFD-DD

A new manual has been released for VFD-DD: DELTA_IA-MDS_VFD-DD_UM_EN_20180509.pdf
You can find it on our ftp-site.

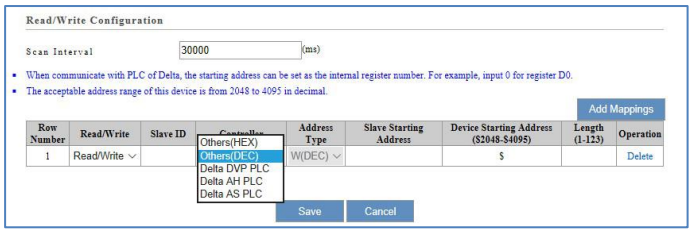
2.8 UPDATE – DX series software/firmware upgrade

- DX-2100RW-WW upgrades firmware to V1.4.0.18
- DX-2300LN-WW upgrades firmware to V1.4.0.18
- DX-3001H9-V upgrades firmware to V1.3.0.14
- DIACom/DIADevice upgrades software to V1.4.0.6
- DIACloud APP (Andriod/iOS) upgrades software to V1.2.1
- DIACloud Web upgrades to V1.1.0
- DIACloud revised data plans

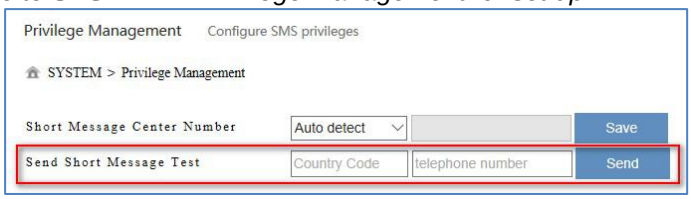
DX-2100RW-WW and DX-2300LN-WW upgrade firmware to V1.4.0.18

1. Changes the default IP address from 192.168.1.1 to 192.168.5.5
2. Adds a new function to increase security. Users can specify the time from 10 to 1440 minutes for an automatica logout after a set period of inactivity.
   Go to SYSTEM -> User Management for set up.

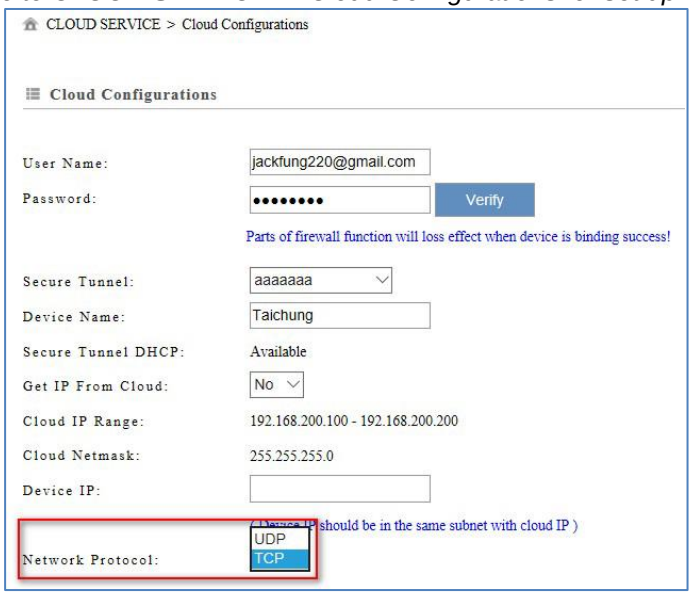
3. Registers now can be added in decimal format when DX-2100RW-WW or DX-2300LN-WW communicates through RS485 or Modbus TCP in Master mode or Modbus TCP Client mode.
   Go to SYSTEM -> RS485 or Modbus TCP -> Master mode or Modbus TCP Client for set up.



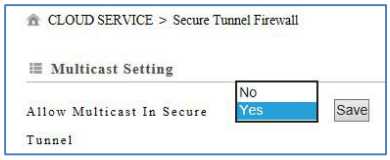
4. Adds a new function to verify if the SIM card can receive messages sent from DX-2100RW-WW or DX-2300LN-WW.
   Go to SYSTEM -> Privilege Management for set up.



5. Adds a new netwrok protocol, TCP, for network communication.
   Go to CLOUD SERVICE -> Cloud Configurations for set up.

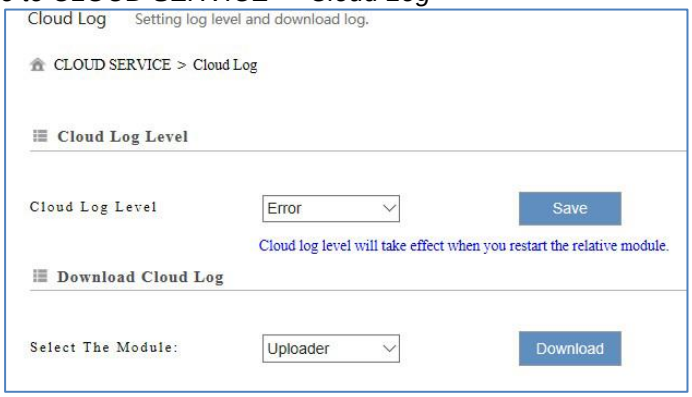


6. Adds a new firewall protection.
   - Allow or not allow multicast in secure tunnel
     Go to CLOUD SERVICE -> Secure Tunnel Firewall for set up.

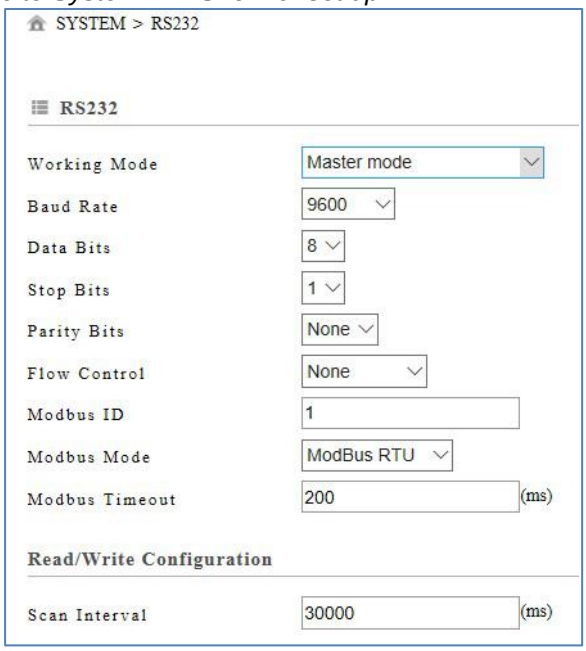


   - Allow or not allow device data from specific MAC addresses to be transmitted in secure tunnel
     Go to CLOUD SERVICE -> Secure Tunnel Firewall for set up.

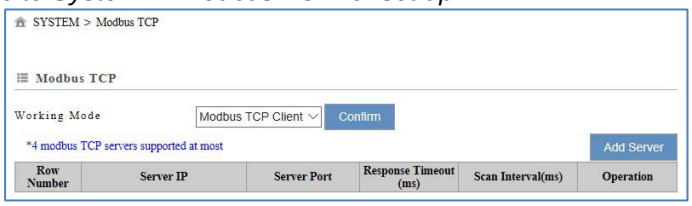
7. Adds a new log concerning actions between a device and the cloud. Users can export the log if required.
   Go to CLOUD SERVICE -> Cloud Log



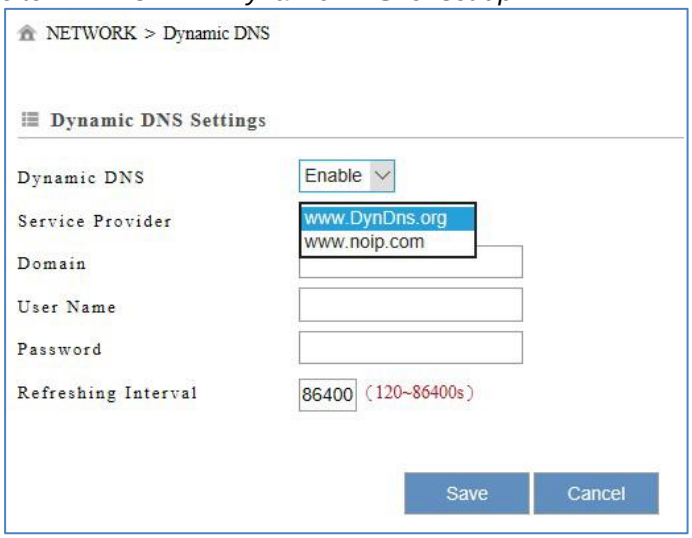
8. RS232 communiction now supports MODBUS Master mode.
   Go to System -> RS232 for set up.



9. Now users can operate Modbus TCP Server + Client simultaneously.
   Go to System -> Modbus TCP for set up.



10. Adds a new Service Provider NOIP in DDNS service.
    Go to NETWORK -> Dynamic DNS for set up.

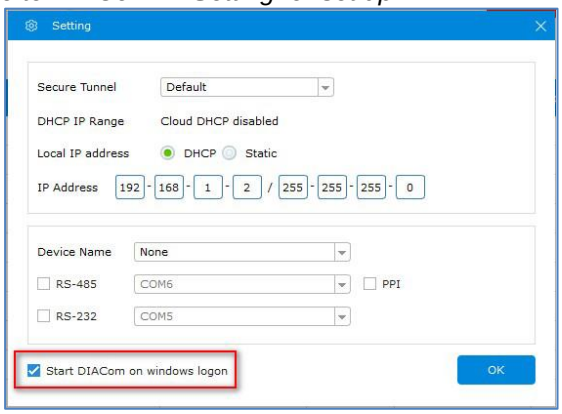


DX-3001H9-V upgrades firmware to V1.3.0.14

1. Fixes an issue that when the SD card is being read, the SD Card window freezes.
2. Fixes an issue that when the connection cannot be established through 3G dialing, the system cannot redial automatically.

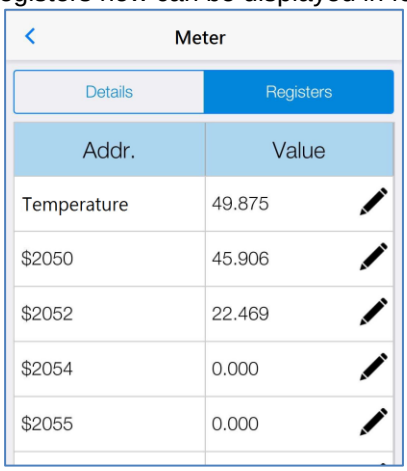
DIACom / DIADevice upgrades Software to V1.3.0.1

1. Adds a function that DIACom can run automatically at Startup.
   Go to DIACom -> Setting for set up.



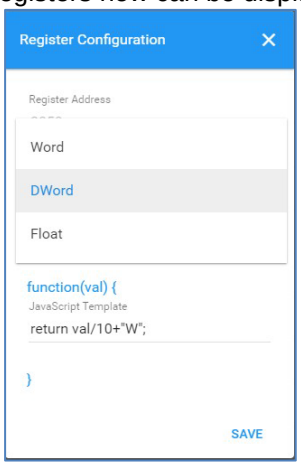
DIACloud APP (Android/iOS) upgrades software to V1.2.1:

1. Registers now can be displayed in formats of double word and floating point.

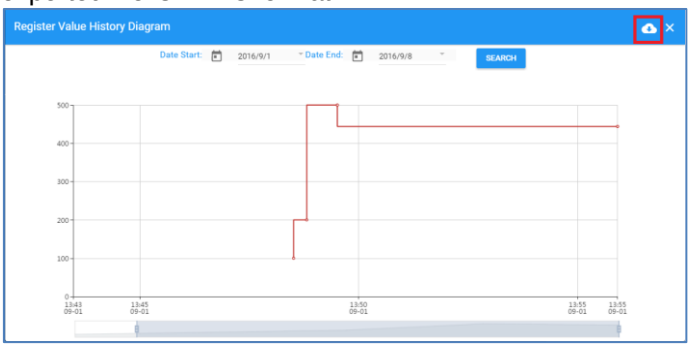


DIACloud Web upgrades to V1.1.0:

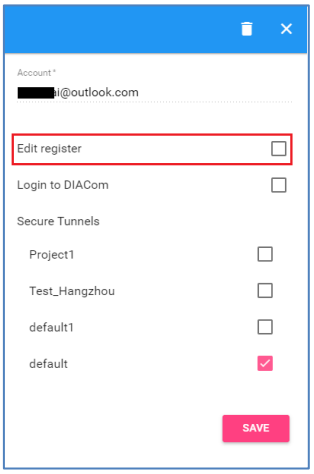
1. Registers now can be displayed in formats of double word and floating point.



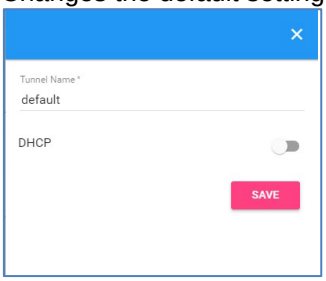
2. Data uploaded to the DIACloud can be exported from the graph as the example shown below. The exported file is in .xls format.



3. Main account user now can grant and revoke permission on editing registers for sub-account users.



4. Changes the default setting from OFF to ON in Secure Tunnel DHCP.



DIACloud revised data plans:

1. Data plan revised

	Cloud Data Plan			
	Basic data plan		Additional data plan	
	Old plan	New plan	Old plan	New plan
Data Amount	1GB/month	12GB/year	1GB/month	12GB/year
Pricing	Free	Free	48USD	48USD
Term of Service	Lifetime	Lifetime	1 year	1 year
Restricted to	Device	Device	Device	Account
Note	➢ Data amount: ● Old plan: free access to 1GB of data per month. New plan: free access to 12GB of data per year and no limit on the amount of data for each month ● Data plan starts from the first access to the binding account on DIACloud through DX-2100RW-WW or DX-2300LN-WW. ● If not all the data is used in the current year, the remaining amount cannot be added to the next year's data amount. ● If all the data is used before current year ends, users need to purchase an additional data plan for more data amount. ➢ Registration: ● Device: data can only be used for the registered device. ● Account: data can be used for devices that shared the same account. ➢ Priority: Device > Account: a device has a prior claim on data usage right.			

	Cloud Storage Plan			
	Basic storage plan		Additional storage plan	
	Old plan	New plan	Old plan	New plan
Storage Space	10MB	10MB	200MB	200MB
Pricing	Free	Free	120USD	120USD
Term of Service	Lifetime	Lifetime	5 years	5 years
Restricted to	Device	Device	Account	Account
Note	➢ Storage: ● New plan includes 10MB of free cloud storage for a lifetime. ● If all the storage space is full, users need to purchase an addition storage plan for more storage space. ➢ Registration: ● Device: cloud storage space can only be used for the registered device. ● Account: cloud storage space can be used for devices that shared the same account. ➢ Priority: Device > Account: a device has a prior claim on storage usage right.			

2. Notes:

- New data plan takes effect on March 01, 2018.
- For current users with either a basic data plan or an additional data plan, they will be granted with free access up to 12GB of data from 1st March 2018 to the expiry date of the original data plan. For those with two or more than two data plans, only up to 12GB of free data access will be granted once.

Example 1: This user has been using DIACloud since 1st June 2017and has a binding account.

Date	Data Usage	Basic Data Plan (free)	
		Remaining Data Amount	Expiry Date
2017/6/1	**Started using DIACloud**	**12GB**	**2018/6/1**
2018/2/28	Used 9GB of data (old plan, 1GB/mo.)	3GB	2018/6/1
2018/3/1	**Granted with up to 12GB of free data access and new data plan takes effect**	**12GB**	**2018/6/1**
2018/5/31	Used 5GB of data (new plan, 12GB/yr.)	7GB	2018/6/1
2018/6/1	**Renew data plan**	**12GB**	**2019/6/1**

Example 2: This user has been using DIACloud since 1st February 2017and has a binding account.

Date	Data Usage	Basic Data Plan (free)	
		Remaining Data Amount	Expiry Date
2017/2/1	**Started using DIACloud**	**12GB**	**2018/2/1**
2018/1/31	Used 11GB of data (old plan, 1GB/mo.)	1GB	2018/2/1
2018/2/1	**Renew data plan**	**12GB**	**2019/2/1**
2018/2/28	Used 1GB of data (old plan, 1GB/mo.)	11GB	2019/2/1
2018/3/1	**Granted with up to 12GB of free data access and new data plan takes effect**	**12GB**	**2019/2/1**
2019/1/31	Used 11GB of data (new plan, 12GB/yr.)	1GB	2019/2/1
2019/2/1	**Renew data plan**	**12GB**	**2020/2/1**

Example 3: This user has been using DIACloud since 1st June 2017and has a binding account and an additional data plan.

Date	Data Usage	Basic Data Plan (free)		Additional Data Plan	
		Remaining Data Amount	Expiry Date	Remaining Data Amount	Expiry Date
2017/6/1	**Started using DIACloud**	**12GB**	**2018/6/1**	**-**	**-**
2017/6/5	**Purchased an additional data plan**	**12GB**	**2018/6/1**	**12GB**	**2018/6/5**
2018/2/28	Used 18GB of data (old plan, 1GB/mo. for basic and additional data plan respectively)	3GB	2018/6/1	3GB	2018/6/5
2018/3/1	**Granted with up to 12GB of free data access and new data plan takes effect**	**12GB**	**2018/6/1**	**3GB**	**2018/6/5**
2018/5/31	Used 13GB of data (new plan, 12GB/yr.)	0GB	2018/6/1	2GB	2018/6/5
2018/6/1	**Renew data plan**	**12GB**	**2019/6/1**	**2GB**	**2018/6/5**

New software and firmware will take effect on 1st March 2018 (week1809).

2.9 UPDATE – Firmware of AS series extension modules (04RTD and 04TC) is updated

Series	Models	Firmware Version	Release Date
AS	AS04RTD-A AS04TC-A	V1.00 → V1.02	W1820

Modified functions

- AS04RTD-A

Status			Channel setting value		
L+	L-	I-	Specifications shown in manual	V1.00	V1.02
●	●	●	Maximum	Minimum	Meet the specifications as required
●	●		Maximum	Maximum	
●		●	Maximum	Minimum	
●			Maximum	Maximum	
	●	●	Maximum	Minimum	
	●		Maximum	Minimum	
		●	Minimum	Minimum	
Note: ● : disconnected Words in red: not meeting the specifications as required					

- AS04TC-A

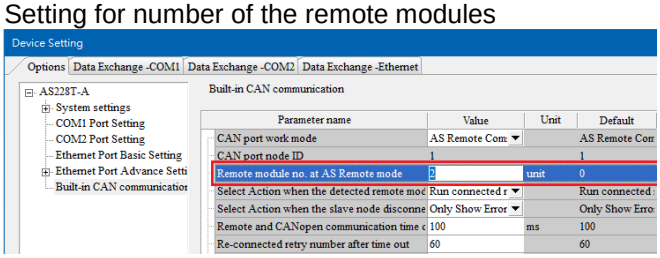
1. Fixed the issue that the measured temperature may be incorrect, if you use a type B thermocouple for AS04TC-A and the operating temperature is less than 20℃.
2. Upgraded firmware to meet the temperature specification.

Sensor Type	Measuring Range		
	Specificaiton	V1.00	V1.02
J	-100°C~1200°C	-210°C~1200°C	-100°C~1200°C
K	-100°C~1,350°C	-250°C~1,350°C	-100°C~1,350°C
R	0°C~1,750°C	-50°C~1,760°C	0°C~1,760°C
S	0°C~1,750°C	-50°C~1,760°C	0°C~1,760°C
T	-150°C~400°C	-250°C~400°C	-150°C~400°C
E	-150°C~980°C	-250°C~1000°C	-150°C~1000°C
N	-150°C~1,300°C	-250°C~1,300°C	-150°C~1,300°C
B	200°C~1,800°C	200°C~1,820°C	200°C~1,820°C
Note: Words in red: not meeting the specifications as required			

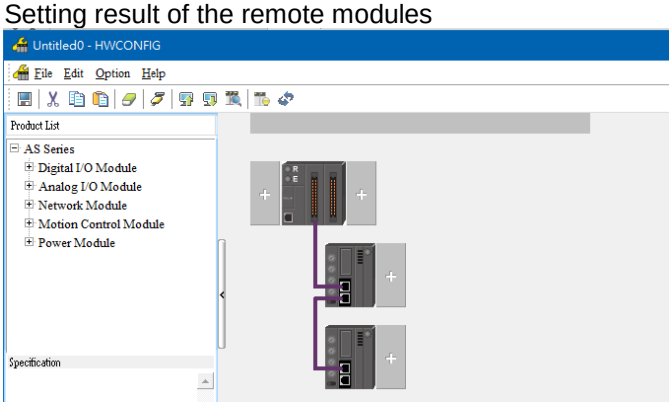
2.10 UPDATE – ISPSoft version 3.05 is released

1. ISPSoft V3.05 now supports the following models AS200 Series (AS228T, AS228P, AS228R, AS218TX, AS218PX, AS218RX) AS300 Series (AS320T, AS320P, AS300N) AH5x1 Series (AHCPU501-RS2, AHCPU521-RS2, AHCPU531-RS2, AHCPU501-EN)
2. HWCONFIG from ISPSoft V3.05 now provides CAN communication settings for AS200 Series. AS200 Series is built with CAN communication interface and now you can set up module remotely through HWCONFIG from ISPSoft V3.05.
   The example below shows that you can set up the number of remote modules that you need to create in AS Remote Mode.

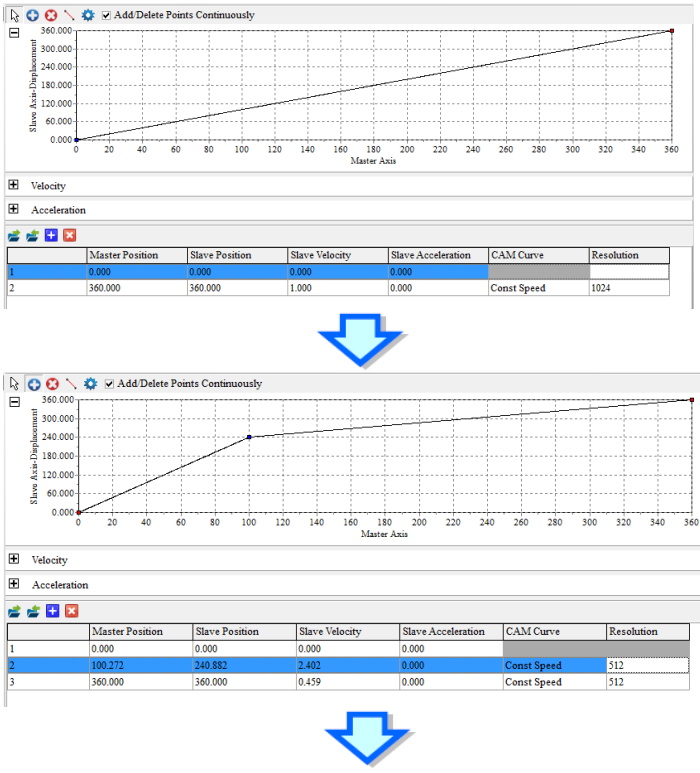
- Setting for number of the remote modules

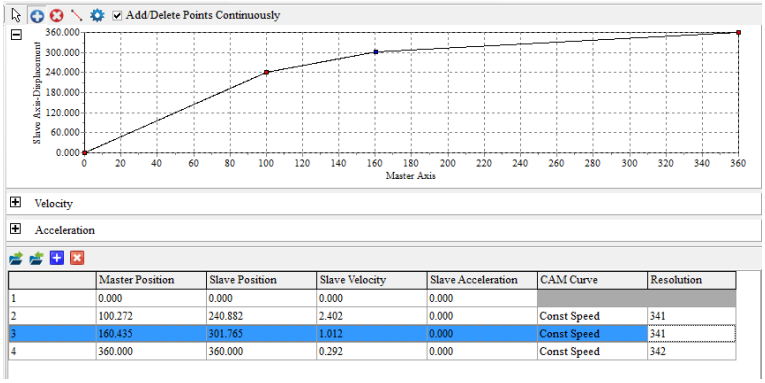


- Setting result of the remote modules



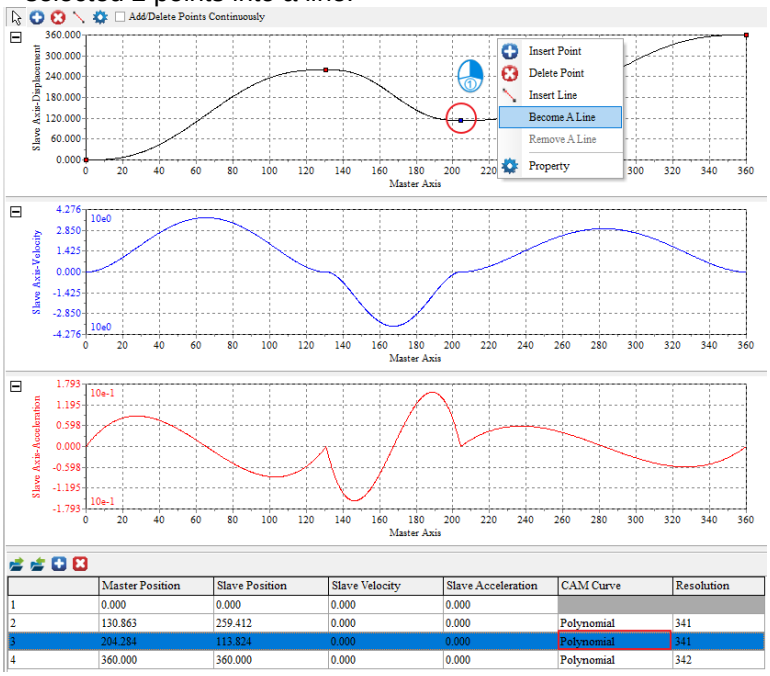
3. ECAM function optimized
   - ADD/Delete Points Continuously Once the option “Add/Delete Points Continuously” is checked, you can simply use the buttons including  (add a point, delete a point, insert a line) to edit the created ECAM curve.





	Master Position	Slave Position	Slave Velocity	Slave Acceleration	CAM Curve	Resolution
1	0.000	0.000	0.000	0.000		
2	100.272	240.882	2.402	0.000	Const Speed	341
3	160.435	301.765	1.012	0.000	Const Speed	341
4	360.000	360.000	0.292	0.000	Const Speed	342

- You can select any 2 points from the polynomial curve and make the curve between the selected 2 points into a line.



	Master Position	Slave Position	Slave Velocity	Slave Acceleration	CAM Curve	Resolution
1	0.000	0.000	0.000	0.000		
2	130.863	259.412	0.000	0.000	Polynomial	341
3	204.284	113.824	0.000	0.000	Polynomial	341
4	360.000	360.000	0.000	0.000	Polynomial	342

4. The following issues are fixed:
(1): a certain delay may occur, if there is a large amount of programs in one section of the Ladder Diagram program and you input instructions in this section.
(2): E registers cannot be used for modification when PED or NED instructions is used in function blocks; for example, PED M0@E1 M1@E2.
(3): an error may occur if DFAND< instruction is used in the Ladder Diagram program.
(4): when executing MMOV or MMOVP instruction, if the output contact is DWORD, the result may be incorrect.
(5): SM devices cannot be used for comparison in If then condition in ST language for AS Series.
(6): an error may occur if a transmission begins in the middle of editing file register in the editing table.
(7): an insufficient permissions error may occur when calling CANopen Builder from HWCONFIG in Windows 10.
(8): the maximum range for D devices is incorrect in HWCONFIG for AH560.
(9): temperature unit error in the DVP 04PT-E2 main setting page of the AIO Wizard.

You can download it from our ftp-site:
Folder: Customer-Service\Industrial Automation Products\PLC Programmable Logic Controllers\PLC Software

2.11 DRU- 24V10ACZ 10A UPS module

Delta has added a new DC-UPS module for security and industrial applications. The DRU- 24V10ACZ module requires less installation space due to its flat body measuring only 55.6 mm thick and 91 mm tall. The tough plastic case has flame retardant properties certified to UL 94V-0 specification. The DC-UPS module provides backup support to 24Vdc system using an external battery capacity from 3.3AH to 12AH for backup time up to 37 mins typ. with 10A load, 12AH battery. Potential free contacts provides various battery management signals and a LED indicator for battery operating status. The highly efficient convection cooling design has a wide operating temperature range from -20°C to +60°C and certify to major safety approvals including IEC/EN/UL 60950-1 for ITE and UL 508 for Industrial.

Highlights & Features

- Suitable for 24V system up to 10A
- Zero switch over time from loss of DC input to battery operation
- Built-in diagnostic monitoring for DC OK, Discharge and Battery Fail by relay contacts
- Full power over entire operating temperature range from -20°C to +60°C
- LED indicator for DC OK, Battery Charging, Battery Discharging, Battery Fail and Battery Reverse Polarity
- Overvoltage / Overcurrent / Over temperature / Short circuit protections

3 Application

3.1 NEW – Application Notes

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

- C/CP/CFP2000 AND MS300 SENSORLESS CONTROL OF PERMANENT MAGNET MOTORS.pdf
- Food industry notification - Automatic noodle packaging machine solution_EN.pdf
- Breeding Industry Notification-Smart Environment Control System for Sing....pdf
- Printing industry notification - Wallpaper laminating solution.pdf
- Robot Industry Notification - Camera Lens Assembling Solution.pdf
- Robotics Industry Notification - Screen-printed Cellphone Glass Pick-and....pdf
- Rubber Plastics Industry Notification Two-step blow molding machine solution.pdf
- Construction Materials Inline wire drawing machine solution.pdf
- Logistics & Warehousing Industry Notification - Matrix Sorting Line Solution.pdf
- Electronics Industry Notification - Auto Accessories Insertion machine.pdf

3.2 Application CP2000: PID and current limit

- Pr06-03 and Pr06-04 set OC stall prevention during acceleration and operation respectively. The drive recovers from stall prevention when the current is 5% lower again.
- Pr06-12 sets a current limit with no hysteresis for recovery. It has priority over Pr06-03/06-04.

When these are set to 83% (because customer requires a current limit for VFD450CP43A-21 with 91A rated current in LD →0.83*91A=75.5A) the drive “stalls” at 47Hz. Customer wonders why?
The drive works in PID mode.

Test

- PID setpoint by keypad.
- Feedback by potmeter on AVI.
- Pr06-03 and 06-04=120% (default).
- Pr06-12=83% (→0.83*91A=75.5A)

PID works normal.

- Setpoint to 25Hz (50%).
  When feedback <50%, output frequency goes up to 50Hz. Normal.
  When feedback >50%, output frequency goes down to 0Hz. Normal.
- Feedback=49%. Output frequency goes up. OK. When current >75.5A (set 81A), the output frequency first goes slowly up to 50Hz due to PID action. But after that it goes down due to current limit action. The feedback would also go down, in this case further down. Therefore output frequency wants to go up but cannot due to current limit.
- Feedback=51%. Output frequency goes down. The feedback would also go down, simulated by turning the feedback pot. The output frequency would go up again by PID but the current limit in the end drags it down.

It is like having your car on cruise control. When the engine power is not enough (compare this to setting the current limit) to keep the speed when driving up a slope, the speed goes down because the car cannot maintain its speed due to too little engine power.

There is no way around this. It's caused by physics and its laws.
This application with PID sometimes requires more current than the set limit. When the limit is too low (as in this case) PID and current limiting start to interfere with each other.
Apparently it then reaches an equilibrium at around 47Hz. With slightly different motor, pressure sensor and feedback, and/or perhaps with different acc/dec times, the equilibrium frequency would probably be slightly different.

The solution is to set a higher current limit.

4 FAQ

4.1 VFD Series AC Motor Drives

C/CP2000

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.