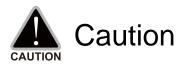


# VFD-C2000 PROFINET Communication Card

**Operation Manual** 

20181106



- ✓ This operation manual provides information on specifications, installation instructions, basic operations/configurations, and details on network communication protocols.
- ✓ The AC motor drive is a sophisticated product powered by electricity. For the safety of the operator and your mechanical equipment, only qualified electrical engineers are allowed to perform the installation/test runs and make parameter adjustments. If you have any question or concern, please contact your local Delta distributor. Our professional staff will be very glad to help you.
- Please read this manual carefully and follow the instructions completely to avoid device damage or personal injury.

# **Table of Contents**

1	Introd	luction	4
	1.1	Introduction to PROFINET IO Communication	4
	1.2	Features	4
	1.3	Network Functions and Specifications	4
2	Produ	ict Appearance and Components	6
	2.1	Exterior Dimensions	6
	2.2	Introduction to Each Component	6
	2.3	LED Indicators	7
	2.4	Definition of RJ45 Pin	7
	2.5	MAC Address Label	8
3	Instal	lation and Wiring	9
	3.1	Installation	9
	3.2	Unloading	9
	3.3	Connecting to the Network1	0
4	VFD-C	C2000 Drive Settings1	1
5	PROF	INET Communication Profile1	2
	5.1	Synchronous Parameter Access in Delta-specific Mode (Tables for Control Word and Statu	s
		Word)1	2
	5.2	Asynchronous Parameter Access1	6
	5.3	Identification and Maintenance Functions (I&M)1	7
	5.4	Disconnection Treatment1	7
6	Conne	ection Configuration to Host Controller1	8
	6.1	Basic Configuration1	8
	6.2	Speed Mode DEMO (S7-300 + STEP 7)	3
	6.3	Speed Mode DEMO (S7-1500 + TIA PORTAL)	3
	6.4	Demonstration of Reading/Wrting Synchronous and Asynchronous Parameters (S7-300 + TIA PORTAL)4	2

## 1 Introduction

## **1.1 Introduction to PROFINET IO Communication**

PROFINET IO is a fieldbus, a family of industrial computer network protocols, and serves as a communication between programmable logic controllers (PLC) and distributed field equipment for EtherNet. This protocol recognizes three classes of devices, IO Controllers, IO Supervisors and IO Devices, and uses three different communication channels to exchange data: Standard UDP/IP & TCP/IP Channel, Real-Time (RT) Channel, and Isochronous Real-Time (IRT) Channel. **Standard UDP/IP & TCP/IP Channel** is used to parameterize and configure device and asynchronous operation; **RT Channel** is used for synchronous data transmission and warning; **IRT Channel** is applied to motion control.

#### 1.2 Features

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:

- 1. Control the drive through PROFINET
- 2. Modify the drive's parameters through PROFINET
- 3. Monitor the drive's status through PROFINET

### **1.3 Network Functions and Specifications**

	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

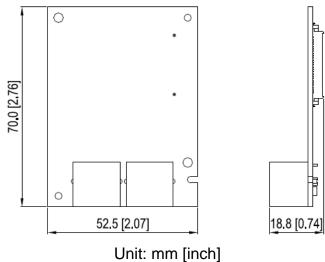
#### Environmental Conditions

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

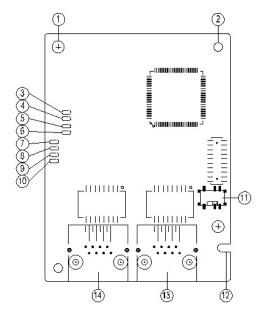
Electrical Specifications			
Item	Specifications		
Power supply voltage	5 V <sub>DC</sub>		
Power consumption	0.8 W		
Insulation voltage	500 V <sub>DC</sub>		
Weight (g; approx.)	27 (g)		

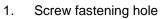
# 2 **Product Appearance and Components**

## 2.1 Exterior Dimensions

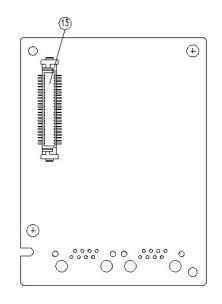


## 2.2 Introduction to Each Component





- 2. Positioning hole for communication card
- 3. Ready out indicator
- 4. MT out indicator
- 5. SD indicator
- 6. BF out indicator
- 7. ACT PHY2 indicator (Port 2)
- 8. Link PHY2 indicator (Port 2)



9. ACT PHY1 indicator (Port 1)

10.	Link PHY1 indicator (Port 1)
11.	ON/OFF Switch
12.	Fool-proof groove on the communication card
13.	RJ45 connection port (Port 2)
14.	RJ45 connection port (Port 1)
15.	Control panel connection port

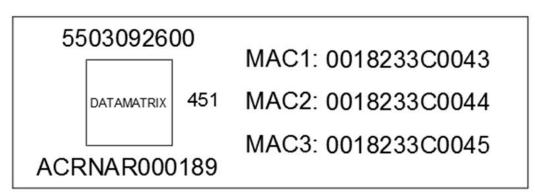
## 2.3 LED Indicators

Name	Indic	ator Status	Indication
		Always on	PN Stack normal activation
Ready out indicator	Yellow LED	Flashing	PN Stack normal activation, waiting for synchronizing with MCU.
		Off	PN Stack abnormal activation
MT out indicator	Green LED	-	-
SD indicator	Red LED	-	-
		Always on	Disconnected with PROFINET Controller
BF out indicator	Red LED	Flashing	Normal connection, but abnormal communication with PROFINET Controller.
		Off	Normal connection with PROFINET Controller
	Orange LED	Always on	Connected and is exchanging data with Master regularly
ACT PHY1 indicator		Flashing	Not connected but is handshaking data with Master
		Off	Initial status
LINK PHY1	Green LED	Always on	Normal network connection
indicator		Off	Not connected to network
	Orange LED	Always on	Connected and is exchanging data with Master regularly
ACT PHY2 indicator		Flashing	Not connected but is handshaking data with Master
		Off	Initial status
LINK PHY2	Green LED	Always on	Normal network connection
indicator	Green LED	Off	Not connected to network

## 2.4 Definition of RJ45 Pin

RJ45 Pinout Diagram	PIN	Definition	Description
	1	Tx+	Positive pole for data transmission
	2	Tx-	Negative pole for data transmission
12345678	3	Rx+	Positive pole for receiving data
	4		N/C
	5		N/C
	6	Rx-	Negative pole for receiving data
	7		N/C
	8		N/C

## 2.5 MAC Address Label



Definition	Description
MAC1	Port 1 MAC Address
MAC2	Port 2 MAC Address
MAC3	Interface MAC Address

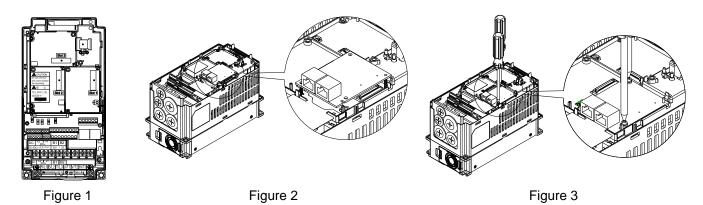
# 3 Installation and Wiring

This section introduces how CMC-PN01 connects to VFD-C2000 and to network.

#### 3.1 Installation

How to connect CMC-PN01 to VFD-C2000:

- Shut off the power supply to the AC motor drive.
- Open the front cover of the AC motor drive.
- Place the insulation spacer into the positioning pin at Slot 1 (see Figure 1), and line-up the two holes on the PCB at the positioning pin. Press the pin to clip the holes on the PCB (see Figure 2).
- Ensure the PCB is securely placed, and then fix the screws with 6–8 kg-cm of torque (5.21–6.94 lb-in.) as shown in Figure 3.



#### 3.2 Unloading

How to detach CMC-PN01 from VFD-C2000:

- Shut off the power supply to the AC motor drive.
- Open the front cover of the AC motor drive.
- Remove the two screws (see Figure 4).
- Pull to open the card clip and put a flat-head screwdriver into the groove to pry the PCB off the card clip (see Figure 5).
- Release the other card clip to remove the PCB (see Figure 6).

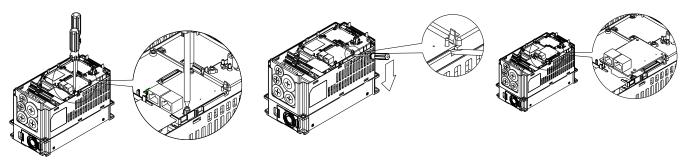


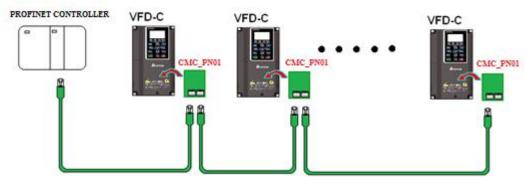
Figure 4

Figure 5

Figure 6

## 3.3 Connecting to the Network

The wiring of CMC-PN01 shows as follows:



When the installation is finished, supply electricity to the drive. The Pr.09-60 of the drive should be able to display "PROFINET" with a current value of 12. If not, make sure your version of the drive is correct (C2000 needs 2.04 or later versions) and the communication card is correctly connected.

09-60
12
PROFINET
0~12 ADD

# 4 VFD-C2000 Drive Settings

When you operate VFD-C2000 through CMC-PN01, you should set the communication card as the source of VFD-C2000 controls and settings. You need to use the keypad to configure the following parameter addresses to the corresponding values:

Keypad Parameter No.	Settings/ Displayed Value	Description of Function
Pr.00-20	8	Set communication card as the source of frequency command.
Pr.00-21	5	Set communication card as the source of control.
Pr.09-30	1	Decoding method is either 60xx or 20xx.
Pr.09-60	12	Communication card identification: When CMC-PN01 communication card is connected, the value of this parameter displays "12".

Note: To make PLC or the host controller identify CMC-PN01, it is necessary to load the product description file (GSDML). You can download it directly from Delta's official website.

# **5 PROFINET Communication Profile**

- 1. Synchronous parameter access in Delta-specific mode
- 2. Asynchronous parameter access
- 3. Identification & Maintenance functions (I&M)
- 4. Disconnection Treatment

# 5.1 Synchronous Parameter Access in Delta-specific Mode (Tables for Control Word and Status Word)

Bytes	Order	Address	Attribute	bit	Value	bit	User Rights	Speed Mode	Position Mode	Home Mode	Torque Mode	Notes
					0			fcmd=0	None	Stop Home	Tcmd=0	
					Pulse 0							
				0	1	CMD_ACT	4	fcmd=Fset(Fpid)			Tcmd=Test	Requires SERVO_ON=1
					Pulse 1				POScmd=	Execute		Requires
					1 0100 1				POSset	Home once		SERVO_ON=1
					0			FWD run	Change when			
				1	-	EXT_CMD1	4	command	drive stops			
					1	_		REV run	Immediate			
								command	change			
					0				Absolute			
				2		EXT_CMD2	4		movement			
					1				Relative			
								daine anna 610	movement	Quality to	Fred	
					0			drive runs till	drive runs till	Continue to	Feed	
					0			target speed	target position	return to home	(Continue to run	
0								reaches	reaches	drive store et	to target torque)	
0	LSB			3		HALT	3	drive stops by declaration	Lock (drive	drive stops at	Lock (torque	
					1			setting	stops at current position by	current position by	stops at current speed)	
					'			setting	declaration	declaration	speeu)	
									setting)	setting		
								drive runs till	oottiing)	County		
					0			target speed				
								reaches				
		6000h	RW	4		LOCk	4	frequency stops				
					1			at current				
								frequency				
					0			JOG OFF	JOG OFF	JOG OFF	JOG OFF	
				5	1	JOG	4					
					Pulse 1			JOG RUN	JOG RUN	JOG RUN	JOG RUN	
					0	00705		None	None	None	None	
				6	1	QSTOP	2	Quick Stop	Quick Stop	Quick Stop	Quick Stop	
				-	0	SERVO_ON	4	Servo OFF	Servo OFF	Servo OFF	Servo OFF	
				7	1	SERVU_UN	1	Servo ON	Servo ON	Servo ON	Servo ON	
					0000			Main speed	Main position		Main torque	
				11–8	0001-	GEAR	4	1 <sup>st</sup> –15 <sup>th</sup> speed	1 <sup>st</sup> –15 <sup>th</sup> position			
				11-0	1111	JEAN	-	and frequency	selection			
								selection				
					00			1st Acceleration	1st Acceleration			
								time	time			
								2nd Acceleration	2nd			
1	MSB				01			time	Acceleration			
				13–12		ACC/DEC	4		time		<u> </u>	
					10			3rd Acceleration	3rd Acceleration			
								time	time			
					11			4th Acceleration	4th Acceleration			
							<u> </u>	time Multi-stop	time		Multistee	
				14	0	EN_SW	4				-	
				14	0	EN_SW	4	Multi-step command and	Multi-step command and		Multi-step command and	

											1	
								acceleration/	acceleration/		acceleration/	
								deceleration time	deceleration		deceleration time	
								switching are not	time switching		switching are not	
								allowed	are not allowed		allowed	
								Multi-step	Multi-step		Multi-step	
								command and	command and		command and	
					1			acceleration/	acceleration/		acceleration/	
					I			deceleration time	deceleration		deceleration time	
								switching are	time switching		switching are	
								allowed	are allowed		allowed	
				45	Dulas 4	DOT			01	Clear error		
				15	Pulse 1	RST	4	Clear error code	Clear error code	code	Clear error code	
2	LSB	00041	DW				Mode					
3	MSB	6001h	RW				Cmd					
4	LSB							Speed command	Profile velocity		Profile velocity	
_	MSB	6002h	RW			Velocity	Velocity	(without	(without		(without	
5						Cmd	Cmd	numbers)	numbers)		numbers)	
6	LSB											
7	MSB	6003h	RW									
8	LSB											
9	MSB	6004h	RW				Pos		Position			
10	LSB					Pos Cmd	Cmd		command			
11	MSB	6005h	RW						(with numbers)			
12	LSB						_				Torque	
	MSB	6006h	RW			Torq Cmd	Torq				command	
13							Cmd				(with numbers)	
14	LSB									_		
15	MSB	6007h	RW					Reserved	Reserved	Reserved	Reserved	
16	LSB											
17	MSB	6008h	RW					Reserved	Reserved	Reserved	Reserved	
18	LSB											
19	MSB	6009h	RW					Reserved	Reserved	Reserved	Reserved	
10						I		l	l		l	

#### Table 2: 61xx Input Message (Drive→Host Controller) (Pr.09-30=1)

Bytes	Order	Address	Attribute	bit	Value	bit	Speed Mode	Position Mode	Home Mode	Torque Mode	Notes	
				0	0	ARRIVE	Frequency command not reached	Position command not reached	Zero command unfinished	Torque command not reached		
					1		Frequency command arrival	Position command reached	Zero command completed	Torque command reached		
					0	i	FWD	FWD	FWD	FWD		
				1	1	DIR	REV	REV	REV	REV		
					0		No warning	No warning	No warning	No warning		
0	LSB			2	1	WARN	Warning occurred	Warning occurred	Warning occurred	Warning occurred		
					0		No error	No error	No error	No error		
		6100h	6100h	R	3	1	ERROR	Error occurred	Error occurred	Error occurred	Error occurred	
					0		None	None	None	None		
				5	1	JOG	On JOG	On JOG	On JOG	On JOG		
					0		None	None	None	None		
				6	1	QSTOP	On Quick Stop	On Quick Stop	On Quick Stop	On Quick Stop		
				7	0	SERVO_ON	PWM OFF	PWM OFF	PWM OFF	PWM OFF		
					1		PWM ON	PWM ON	PWM ON	PWM ON		
					0		Ready OFF	Ready OFF	Ready OFF	Ready OFF		
1	MSB			8	1	Ready	Ready ON	Ready ON	Ready ON	Ready ON		
				15–9								
2 3	LSB MSB	6101h	R			Mode Cmd						
4	LSB MSB	6102h	R			Velocity cmd	Actual output	Actual	Actual output	Actual		
Э	IVIOD					CITIU	υτιραί	output	υτιραί	output		

						frequency	frequency	frequency	frequency	
6	LSB	6103h	R							
7	MSB	61030	ĸ							
8	LSB	6104h	R			Astual	Astual	Astual	Astual	
9	MSB	010411	К		Pos Cmd	Actual position	Actual	Actual position	Actual position	
10	LSB	6105h	R		FUS CITIQ	(absolute)	position (absolute)	(absolute)	(absolute)	
11	MSB	61050	К			(absolute)	(absolute)	(absolute)	(absolute)	
12	LSB	6106h	R		Torg Cmd	Actual	Actual	Actual	Actual	
13	MSB	010011	К			torque	torque	torque	torque	
14	LSB	6107h	R			Reserved	Reserved	Reserved	Reserved	
15	MSB	010711	К			Reserved	Reserveu	Reserved	Reserved	
16	LSB	6108h	R			Reserved	Reserved	Reserved	Reserved	
17	MSB	01000	К			Reserved	Reserved	Reserved	Reserved	
18	LSB	6109h	R			Reserved	Reserved	Reserved	Reserved	
19	MSB	01090	ĸ			Reserved	Reserved	Reserved	Reserved	

## Table 3: 20xx Output Message (Host Controller→Drive) (Pr.09-30=0)

Dit	Out	0	A -1 -2		Jeage			Description
Bytes	Order	Command	Address	Attribute		Value	Definition	Description
						00: No function	Operation command unchanged	<ol> <li>Bits in this column are used for</li> </ol>
						01: Stop	Stop operation command	operating actions. The commands are
						10: Run	Normal command operation	one-shot and run only when VFD
						IU. RUII	Normal command operation	
					b1–10	11: JOG+Run	JOG command	receives commands. Therefore, Master only needs to issue the command once. VFD always runs the command issued by Master unless new commands are issued. 2. Bits in this column work only when VFD sets parameter selection operation command source as communication.
					b3–b2	Not used		
						00: No function	Direction command unchanged	1. Bits in this column are used for
						01: FWD	FWD direction command	operating actions. The commands are
						10: REV	REV direction command	one-shot and run only when VFD
0	LSB				b5–b4	11:Change direction	Change current direction command	receives commands. Therefore, Master only needs to issue the command once. VFD always runs the command issued by Master unless new commands are issued. 2. Bits in this column work only when VFD sets parameter selection operation command source as communication.
						00: 1st Accel./Decel. time	1 <sup>st</sup> acceleration/deceleration time selection	Bits in this column are used for switching acceleration or deceleration time through
					b7–b6	01: 2nd Accel./Decel. time	2 <sup>nd</sup> acceleration/deceleration time selection	communication when VFD operates. Parameter VFD can provide four kinds of
						10: 3rd Accel./Decel. time	3 <sup>rd</sup> acceleration/deceleration time selection	settings for acceleration or deceleration time and use one-shot method to switch
		Operation Command	2000h	h W		11: 4th Accel./Decel. time	4 <sup>th</sup> acceleration/deceleration time selection	by bits in this column.
1	MSB				b11-b8 b12	0000: Main speed           0001: 1st step speed           0010: 2nd step speed           0010: 3rd step speed           0100: 4th step speed           0101: 5th step speed           0110: 6th step speed           0111: 7th step speed           0100: 8th step speed           1010: 6th step speed           1010: 6th step speed           1000: 8th step speed           1010: 10th step speed           1010: 10th step speed           1101: 11th step speed           1101: 12th step speed           1101: 13th step speed           1111: 13th step speed           1111: 15th step speed           1111: 15th step speed           1111: 15th step speed           1111: 15th step speed	Multi-step speed and frequency switching selection Enable multi-step speed and frequency and acceleration or deceleration time switching function	<ol> <li>Bits in this column are used for switching VFD's operation frequency through communication. Parameter VFD can provide 15 kinds of settings for operating speed and use one-shot method to switch by bits in this column.</li> <li>You have to set 2000h b12=1 or you cannot use this multi-step speed and frequency switching function through communication.</li> <li>If you want to know the current running speed of this multi-step speed and frequency switching function, check address 2017h.</li> </ol>
						00: No function         01: Operation command controlled         by PU         10: Operation command by Pr.         setting         11: Switch between PU and Pr.         setting	Switching for operation command source	Bits in this column are used for enforcedly switching operation command source through communication. If VFD operation source setting is not controlled by communication, you can use the bits in this column to enforcedly switch to communication or restore to parameter setting.
					b15		1	
3	LSB MSB	Speed Set Point Command	2001h	w	b15-b0	VFD Set Point Command	VFD multi-unit setup command	1. Bits in this column are used for issuing setting commands to VFD through communication. The default unit for this setting is Hz or otherwise (can be known from 211Dh bit12). If the units are Desc, address 2123h–2124h can be read. 2. Bits in this column work only when VFD frequency source parameter is set as the

								way of communication.
					b0	1:EF (external fault) ON	External Fault (EF) enabled	<ol> <li>This bit is used for triggering an external fault to VFD to stop the running status. The method for stopping can be set by VFD parameter.</li> <li>This bit operates by on-shot method and this fault can only be restored by Fault Reset command.</li> </ol>
4	LSB	VFD Fault/Control	00001		b1	1: Reset	Fault Reset command	This bit is used for resetting the status from Fault to Ready.
		Command	2002h W	vv	b2	1: b.b. ON	External B.B. (Base Block) enabled	This bit is used for triggering an external B.B. to VFD to pause the running status. When bit=0 (BB is dismissed), VFD immediately returns to its former status.
					b3 1: HAND-ON/LOC-ON command		HAND/LOCAL frequency operation source enabled	Whether switching HAND/AUTO or LOC/REM would lead to running STOP
					b4	1: AUTO-ON/REM-ON command operation source enabled settings.		depends on motor drive's parameter settings.
5	MSB				b15–b5	Not used		
6 7	LSB MSB		2003h	W	b15–b0	Reserved	Reserved	Reserved
8	LSB							
9	MSB		2004h	W	b15–b0	Reserved	Reserved	Reserved
10	LSB		2005h	w	b15-b0	Reserved	Reserved	Reserved
11	MSB		200511	٧V	013-00	Reserved	i ceselved	i vesei veu
12	LSB		2006h	w	b15–b0	Reserved	Reserved	Reserved
13	MSB				2.2 50			
14	LSB		2007h	W	b15–b0	Reserved	Reserved	Reserved
15 16	MSB LSB							
16	MSB		2008h	W	b15–b0	Reserved	Reserved	Reserved
18	LSB							
19	MSB		2009h	W	b15–b0	Reserved	Reserved	Reserved

## Table 4: 21xx Input Message (Drive→Host Controller) (Pr.09-30=0)

Bytes	Order	Command	Address	Attribute		Value	Definition	Description																											
0	LSB	Fault	2100h	R	b7–b0	Error Code	Fault codes	Bits in this column are used for checking if VFD occurs any fault, and using the fault codes to substitute 32XXh to obtain the description strings for the fault.																											
1	MSB	Status	210011	ĸ	b15–b8	Warn Code	Warning codes	Bits in this column are used for checking if VFD occurs any warnings, and using the warning codes to substitute 33XXh to obtain the description strings for the fault.																											
					b1–b10	00: RUN LED light off, STOP LED light up (Drive Stop) 01: RUN LED blink, STOP LED light up (Drive Decelerate during the drive stopping) 10: RUN LED light up, STOP LED blink (Drive standby) 11: RUN LED light up, STOP LED light off (Drive Run)	Run and stop status	Bits in this column are used for checking VFD's running status in order to control its LED display.																											
													b2	1: JOG active	JOG running status																				
2	LSB					b4–b3	00: REV LED light off, FWD LED light up (Forward) 01: REV LED blink, FWD LED light up (Reverse to Forward) 10: REV LED light up, FWD LED blink (Forward to Reverse) 11: REV LED light up, FWD LED light off (Reverse)	Operation direction status	Bits in this column are used for checking VFD's running direction status in order to control its LED display.																										
		Operation Status	2101h	R	b5	1: Factory parameters opened	Factory parameter ON/OFF status (not used)																												
					b6	Reserved																													
																	1															b7	1: Operation command controlled by external terminal		Bits in this column are used for checking whether VFD's current operation command source is external terminal or not. If bit=1, external terminal has the highest processing priority. Master communication can obtain control rights only when it switches operation command source by 2000h b14–13.
					b8	1: Main Freq. controlled by																													
					b9	communication 1: Main Freq. controlled by external terminal (AI)		Bits in this column are used for checking the current VFD frequency command source.																											
										b10	1: Operation command controlled by Communication		Bits in this column are used for checking whether the current VFD operation command source are communication or not.																						
3	MSB				b11	1: Parameters been locked	Parameter Lock ON/OFF status	Bits in this column are used for checking whether VFD's parameters are locked or not. If bit=1, the values for reading parameters are always 0.																											
				b12	0: AC drive stop, 1: AC drive run	VFD actual running output status (RUNNING=1)																													
					b13	Jog command	JOG running																												

					r		command	
							status	
							(CMDJOG=1)	
					b14		(0	
					b15			
4	LSB							Bits in this column are used for displaying VFD's
5	MSB		2102h	R	b15–b0	Frequency Command		current running frequency command values (2dot value) with its unit Hz.
6	LSB							Bits in this column are used for displaying VFD's
7	MSB		2103h	R	b15–b0	Output Frequency		current output frequency values (two-dot value) with its unit Hz.
8	LSB							Bits in this column are used for displaying VFD's
9	MSB		2104h	R	b15–b0	Output Current		current output current values (one-dot value) with its unit A.
10	LSB							Bits in this column are used for displaying VFD's
11	MSB		2105h	R	b15–b0	DC BUS Voltage		current DC BUS voltage values (one-dot value) with
								its unit V.
12	LSB							Bits in this column are used for displaying VFD's
13	MSB		2106h	R	b15–b0	Output Voltage		current output voltage values (one-dot value) with its unit V.
14	LSB	VFD	2107h	R	b15–b0	Multi-step speed		Bits in this column are used for displaying VFD's
15	MSB	Variable						current multi-step speed and frequency values.
16	LSB	Monitor	2108h	R	b15–b0			
17 18	MSB LSB							
18	MSB		2109h	R	b15–b0	Value of the counter		
20	LSB					Power factor angle (0–180.0		
21	MSB		210Ah	R	b15–b0	degree)		
22	LSB		04001	P	145 h0			
23	MSB		210Bh	R	b15–b0	Torque (xxxx.x N-M)		
24	LSB		210Ch	R	b15-b0	Motor speed (rpm)		
25	MSB		21001	ĸ	010-00			
26	LSB		210Dh	R	b15–b0	PG feedback pulse count		
27	MSB		210211		5.0.00			
28 29	LSB MSB		210Eh	R	b15–b0	PG reference pulse count		
30 31	LSB MSB		210Fh	R	b15–b0	Output Power (xx.xxkW)		
31	INI2R							

#### Table 5: Disconnection Treatment (CMC-PN01→Drive)

Address	Attribute	Value		Definition	Description	
2505h	R	P9-63	Card Fault	This section is only allowed to be written by the card.	This address can correspond to VFD's communication parameter.	

#### **5.2 Asynchronous Parameter Access**

Host controller PROFINET sends a write request first, then CMC-PN01 determines whether the host controller needs to read or write in accordance with the Operation field in the packet, and read or write drive's parameters through the contents of Data Block.

If there is no problem for the packet and CMC-PN01 is not in a busy mode, CMC-PN01 sends a write response to make the host controller be aware that CMC-PN1 has received the packet delivered and performed corresponding actions accordingly.

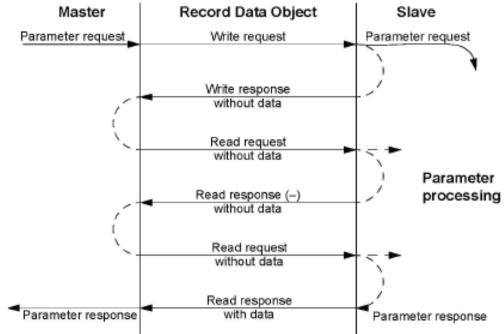
If the host controller requests to read the parameters, CMC-PN01 needs to send a read request after sending a write response. Then CMC-PN01 reads the corresponding parameters of the drive and replies to the host controller in the packet of read response.

The table below shows the definitions of the packet:

Field(s)	Description	Range	Туре
Service	Request or Response service.	Request (0x00) Response (0x80)	UI8
Operation	Read or Write operation.	Write (0x08) Read (0x09)	UI8
Block Length	Length of the block.	00xFFFF	UI16
ARUUID	Identifier - time low - time mid - time high and version – clock – node	-	UI32 UI16 UI16 Qctet[2] Qctet[6]
API	Application Process Identifier	Device Access Point (0x000) PROFIdrive (0x3A00)	UI32
Slot	Slot of the Module Access Point (MAP/PAP)	0x01	U16
Sub-slot	Sub-slot of the Module Access Point (MAP/PAP)	0x01	U16
Padding	2 bytes		
Index	Index of the Record Data Object	0x0001–0x7FFF 0xB02E	U16
Data length	Length of the data block	00xFFFFFFF	UI32

Additional value 1 (response only)	Field for transferring additional data	-	UI16
Additional value 2 (response only)	Field for transferring additional data	-	UI16
Padding	24 bytes for request; 20 bytes for response.		
Data block	Used only with request and read response.		

The timing diagram of parameter access shows as follows:



#### 5.3 Identification and Maintenance Functions (I&M)

Identification and maintenance (I&M) is to provide you with supports in adjustment, test, parameterization and repair.

CMC-PN01 supports I&M0 functions and access by read requests that record data objects.

The table below shows the data structure of I&M0 functions:

Content	Size	Description
Header	10 bytes	-
Vendor ID	2 bytes	PROFINET Vendor ID of Delta, which is 0x03BF.
Order ID	20 bytes	Order number
Serial number	16 bytes	Serial number
Hardware revision	2 bytes	Hardware revision
Software revision	4 bytes	Revision of the software
Revision counter	2 bytes	Number of revision
Profile ID	2 bytes	0x00
Profile specific type	2 bytes	No profile specific type (0x0000)
I&M version	2 bytes	Version 1.1 (0x0101)
Supported I&M functions	2 bytes	I&M0 is supported (0x0001).

#### **5.4 Disconnection Treatment**

When PROFINET is disconnected, CMC-PN01 performs the following settings to ensure safety.

- 1. Set  $2505H = 81 \rightarrow Ecto$  indicates CMC-PN01 occurs a disconnection failure
- 2. Set 6000H = 0
- 3. Set 2000H = 1

When PROFINET connection restores, it resumes performing commands from the host controller.

# 6 Connection Configuration to Host Controller

This section introduces how Siemens STEP 7 and TIA PORTAL PLC integral software, as well as Siemens PLC S7-300 and S7-1500 use PROFINET to connect C2000 drive. The connection configuration shows as the figure below. Siemens PLC connects CMC-PN01 communication card of C2000 drive through the EtherNet.



## 6.1 Basic Configuration

- The Settings for Communication
- 1. Start your PC and set IP address configuration as static IP address. It is recommended to set the address to 192.168.xxx.xxx in the red box as the figure below shows.

Internet P	Protocol (TCP/IP) P	Properties	?
General			
this capa		d automatically if your network supp sed to ask your network administral	
Оы	ain an IP address auton	natically	
r ⊙ Use	e the following IP addres	\$\$.	
IP add	dress:	192 . 168 . 16 . 201	
Subne	et mask:	255 . 255 . 255 . 0	
Defau	lt gateway:		
Оры	ain DNS server address	s automatically	
🕞 Use	e the following DNS serv	ver addresses:	
Prefer	red DNS server:		
Altern	ate DNS server:		
		Advan	ced
		ОК	Cancel
		ОК	C

 Use Siemens STEP 7 to look up the host controller's IP address. In the screen of HW Config, perform the function under PLC→EtherNet→Edit EtherNet Node as the figure below shows.

🔩 HW Config - [SIM					1]						
DI Station Edit Insert	PLC V	ew Options	<u>W</u> indow <u>H</u>	elp							- 8 ×
🗅 🗃 🔓 🖓 🖌		load		Ctrl+L							
	Uploa							Hardwar	re Catalog		×
➡ (0) UR			dentifi <u>c</u> ation ntification to PC					<u>F</u> ind:			mt mi
2 CPU		107 - 20 - 100		<u></u>				Profile:	Standard		•
XI MPL		Modules									
X2 PN-1 X2 PI Port	1 1100.0	le Information	L	Ctrl+D Ctrl+I	ai ai	n a a		- # i	PROFIBUS DP PROFIBUS-PA PROFINET IO		
X2 P2 Port	Dhera	ting Mode <u>R</u> eset		CUIH			T (1) Delta	E THE	PROFINET IO SIMATIC 300		
3		me of Day						🛨 🎆 🗧	SIMATIC 400		
	Monit	or/Modify							SIMATIC PC Based Conta SIMATIC PC Station	rol 300/400	
	Updat	e Firmware							SIMATIC IC SMUDI		
	Save I	)e <u>v</u> ice Name b	o Memory Can	la.							
	Etherr	iet		Þ	Edit Ethen	et Node					
	PROF	3.567		•	Verify Dev						
		Service Data				rice Name					
<	Pave 5	ervice Data									
(1) Delta											
Slot M. Order		I address	Q address	Diagnostic a	1.1	Comment	Access				
0 Delta 12342		1 address	Qauttess	2042*	luless.	Comment	Fall				
XI PH-IC				2041*			Fall	1			
XI A Port 1 XI A Port 2				2040* 2039*		-	Fall Fall				
I IN/OL		256575	256575				Full				
								PROFIB	SUS-DP slaves for SIMA TI	C S7, M7, and C7 (distributed )	rack) €≤
1											
Displays the address of the	-		-								
💾 開始 🛛 🙆	6	SIMA T	IC Manager - :	S 📴 HV	V Config - [SI]	MAT			🖮 🛛 🗘	10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	≽ 搹 下午 01:28

#### Click Browse button to search the available device on the Internet.

IIW Config - [SIMATIC 300 Station (Configuration) - S	7_PN_Test]	🖃 🖻 🔀
🛤 Shinon Edit Inset ELC Yew Options Mindow Help		- 7 3
	N?	
🗩 (0) UR	Edit Ethernet Node	x a
1 2 CPU315-2 PN/DP	Ethemet node	Personal Antonio Antoni
XI MPI/DP	Nodes accessable online	e:  Standard
X2 PI Pvt I	MAC gddzess: [] Browse	PROFIBUS-PA
X2 P2 Rovt 2	Set IP configuration	PROFINET IO
	(* Use I2 parameters	E Delta Development Toolkit
	Gateway	🕀 🚡 Delta IO Template VI.0
	IP address: © Do not use router	Molex I/O Device     TPS-1 Development Toolkit
	Subnet madg. C Use mutter	e 🚰 Gateway e 🦳 HMI
	Addagas	a 🧰 10
	← Obtain IP address from a DHCP server	e i internationalità i Internationalità internationalità international
<	Constitute by     Constitute Constitute Constitute Constitute     Constitute Constitactitute Constitute Constitute Constitute Constitute Constitute C	+ 🔄 Switching devices SIMATIC 300
(1) Delta	Cliegt ID:	SIMATIC 400
		SIMATIC PC Based Control 300/400 SIMATIC PC Station
0 To Delta 1234567 204	Z*	
XI RVJC 204 XI A Port I 204		
X1 / Port2 2007 1 10/01 255.575 256.575	P* Device name: Anign Name	
1 1000 200-312 200-312		
	- Reset to factory settings	
	Reat	
	<u>Close</u> Help	
	1234	1567 Electronics, Inc.
	Delta	a Electronics, Inc
Press F1 to get Help.	losp	901-74.31-Dens-10-10mpa8-201703073mL
	🙀 Edit Ethemet Node J. 🕒 0524 📴 HW Config - (SIMA 🕓 8965/819	田田ご 参照もなら、MO>話 1年031

When it finishes searching, a screen displays as shown in the figure below. The IP address displays 192.168.16.26.

If the IP address of your computer is set as a different one, it is recommended to reset your PC's IP address to make it consistent with PLC's domain.

1999 [Index: Batz Baset BLC Yew Optimum Hindow Help □ ゆ 学 및 場 (1991 日本語) (1991 日本語) (1991 日本語) (1991 日本語)	- # X
Edit Ethernet Node	2 At 10
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2 CPU315-2 PM/DP X7 AdD/DP Nodes accessible online Standard	•
A2 ROFIBUS DP	
X2 PI Profiles-PA PROFILES-PA PROFILES-PA PROFILES-PA	
A2 P2 Revi2 3 Browse Network - 1 Nodes Browse Network - 1 Nodes	
Start MC address During https://www.startic.PC Based Control 300400	
Stop	
🖙 Fast search	
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(I) Della	
Shot M. Order number I address Q address Diagnostic a	
0 Defe 1234567 2042* X/ PH-4C 204/* Each MAC address: 229-63-36-39-60-E4	
X1 A Port 1 2040*	
XI / Port2 2039* 7 J JWOU 256575 256575 OK Cancel Help	
Reset to factory settings	
Brot	
Close	
PROFIBUS-DP slaves for SIMATIC S7, M7, and C7 (distributed rach	k) Es
Press F1 to get Help.	
🛃 🛲 🖉 🕫 🖉 SIMATIC Mesager - S. 📑 HW Config - [SIMAT. 🔅 📰 🕀 S.	

Note: If the IP address of your computer is different from PLC's domain, you are unable to download the program to PLC.

3. Using Siemens TIA PORTAL to search PLC IP address. Start TIA PORTAL, select

Online&Diagnostics, and then click Project view.

M Siemens		_ # X
		Totally Integrated Automation PORTAL
Start 🦃		
Devices & State		
PLC	Online status	
Matter A Technology	20	
Drive parameterization	Accessible devices	
Visialization 1		
Online & Andrew Online & Andre		
	Help	
	1.50	
Project view		

Select **Online access**, choose your PC network interface card, and then click **Update accessible devices** continuously to search PLC.

Project tree		Tasks	
Devices		Options	
900	-+-		0
		✓ Find and replace	C
Online access			
1 Displayhide interfaces		Find:	
<ul> <li>TwinCAT-Intel PCI Ethernet Adapter (Giga</li> </ul>	n and a second s		
Update accessible devices		Whole words only	
Image: plc_1.profinet interface_2 [192.168.1.1]		Match case	
Intel(R) Wireless-N 7260		Find in substructures	
PC Adapter [MPI]     DPC internal [Local]		and the second se	
PLCSIM [PN/E]		Find in hidden texts	
• US8 [S7US8]		Use wildcards	
TeleService [Automatic protocol detection]		Use regular expressions	
Card Reader/US8 memory		O Whole document	
		0.	
	Properties Diagnostics		
	General Cross-references Compile	C Selection	
	😧 👍 🚺 Show all messages 💌	Down	
		O Up	
	Go to 7	Find	
	Scanning for devices on interface TwinCAT-Intel PCI Ethernet Adapter (Gigabit) was started.	1	
Details view	Scanning for devices completed for interface TwinCAT-Intel PCI Ethernet Adapter (Gigabit). F	Replace with:	
Name		Replace Replace all	
	<	> > Languages & resources	

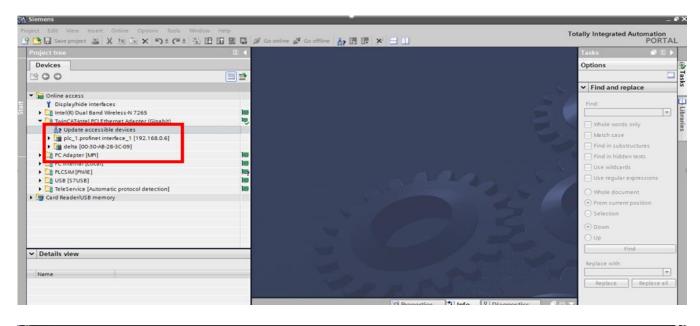
- When you start TIA PORTAL, do not enable wireless network because it may lead to TIA PORTAL's false detection. If it happens (physical interface card cannot be found), close the wireless network connection first and then restart TIA PORTAL.
- 4. Modify the name of CMC-PN01. The steps are the same as those for setting PLC address.

For STEP7, set the drive name as the figure below shows.

🙀 H W Config - [SIMATIC 300 Station (Configuration) S7_PN_	Test]	
📬 Station Edit Insert PLC View Options Window Help		- # ×
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XI MPI/DP X2 PN-IO	MaC address 74 00 50 00 PC EL	
X2 PI Port I	PROFIDUS-PA	
X2 P2 Port 2	Set IP configuration 🗧 🛄 Additional Field Devices	
	© Use IP parameters □ □ Delta Development Tool	11-24
	Gateway 🖽 🖬 Delta IO Template V	
	IP address: 192.168.0.2       Do not use router      Molex I/O Device      TPS-1 Development Too	alkit
Set IP Address	Subnet mask: 255.255.255.0 C Use router 🕂 🔄 Gateway	JINA
	Address: 192.168.0.2	
$\backslash$	C Obtain IP address from a DHCP server	
	Identified by +	
<	Chent ID C MAC address C Device name SIMATIC 300	
(1) Delta	Cliegt ID: III SIMATIC 400	10
Slot M. Order number I address Q address Diagnostic	SIMATIC PC Station	
0 Delta 1234567 2042*	Aşsign IP Configuration	
XI PN-IC 2041* XI F Port I 2040*	Assign device name	
X1 Port 2 2039*	Device name: delta Assign Name	
1 INOL 256575 256575	License Assign wante	
	Reset to factory settings	
	Reset	
	These	
	Close Help	
	Help	
	1234567 Delta Electronics, Inc.	<u>ح</u> ۲
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' Press F1 to get Help.	Osbabita 31-benator tempore 201000	
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		A A S ALLAN IN TIME

For TIA PORTAL, set the device name of the host controller or CMC-PN01 as the figure below shows.

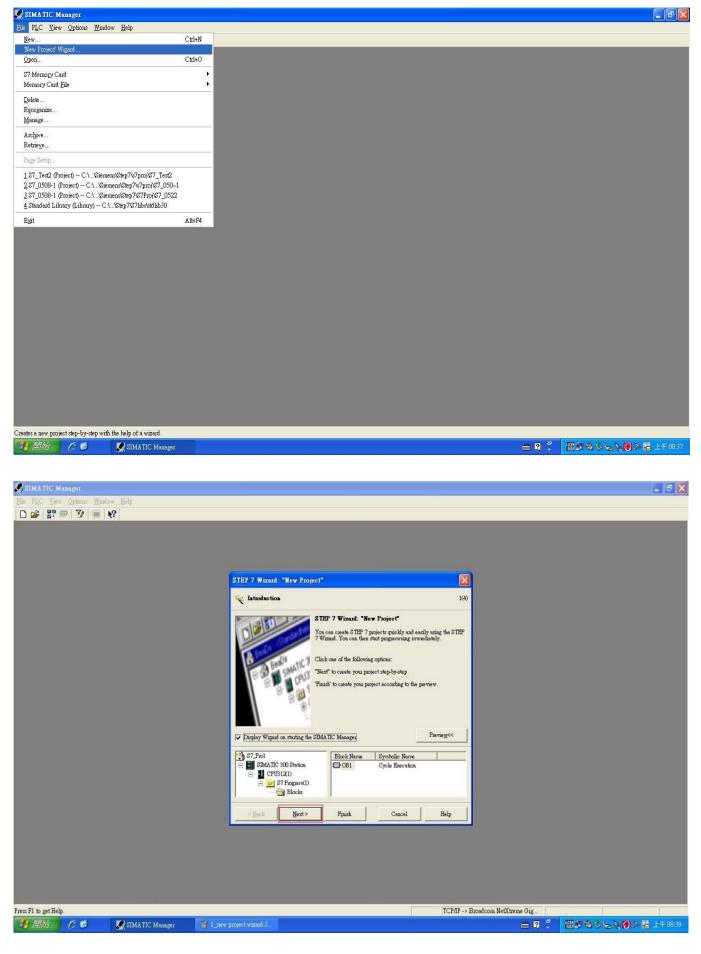
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	Grogram blocks     Grogram blocks     Grogram blocks	▼ Functions				Mode selector: RUN	
	Leg PLC data types	Assign IP address	Rack: 0		_	1	Libraries
	Online card data	Set time	Slot: 1		_	1	rari
	Intel(R) Wireless-N 7260 XIII	Firmware update	- 5101.		_	1	es
	🕨 🎦 PC Adapter [MPI]	Assign name	▶ 			1	
	🕨 问 PC internal [Local]	Reset to factory settings Format memory card				1	
	PLCSIM [PN/IE]	Save service data	Module information			1	
	• 🛄 USB [S7USB] 📃	Save service data				1	
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	Card Reader/USB memory		Module name:	PLC_1		1	
	< III >		Plant designation:			1	
	✓ Details view		Location ID:			1	
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						> Memory	
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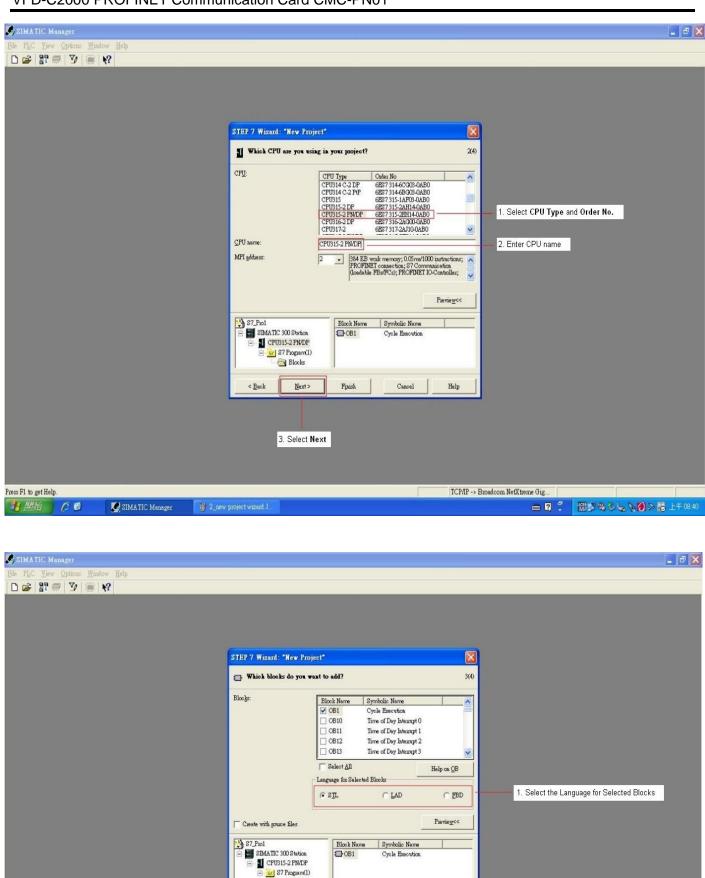


Project tree	II <b>∢</b>	aemer Adapter (Gigabit). *	oeus (nn-pr-vo-pr-na) 🤞 neus (nn-pr-vo-sc-pr-na)	Online tools 🛛 🗊 🗈 🕨
Devices				Options
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		General	Band and an a state of the stat	<ul> <li>CPU operator panel</li> </ul>
• See Online access		Functions	Module	
Y Display/hide interfaces		Assign IP address	and the second	Not supported
Intel(R) Dual Band Wireless-N 7265		Assign name	Short designation: Delta-IO	
<ul> <li>TuinCéTiotel PCI Ethernet édanter (Ginahit)</li> </ul>	10	Reset to factory settings		
47 Update accessible devices			Module information	
plc_1.profinet interface_1 [192.168.0.6]				
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😵 Online & diagnostics				
C Adapter [NP1]			Manufacturer information	
PC internal [Local]				
PLCSIM (PNRE)	P 2		Manufacturer description:	
USB [S7USB]     TeleService [Automatic protocol detection]			Module role: Device	✓ Cycle time
	PED 1			· Cycle dille
Card Reader/USB memory				Not supported

## 6.2 Speed Mode DEMO (S7-300 + STEP 7)

■ Using Siemens STEP 7 to finish PLC setting, connection test, and speed mode DEMO





Blocks

Next >

2. Select Next

Finish

Cancel

Help

TCP/IP -> Broadcom NetXtreme Gig ...

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SIMATIC Manager

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	Project name:	S7_FN_Test	1. E	Enter Project name		
	Existing projects:	Molex-TI-Mazous \$7_0120 \$7_0306				
		Check your new project in the preview. Click "Finish" to create the project with the	3-1-2-4-4-			
		Click "Finish" to create the project with the	displayed structure.			
			Pievie <u>w</u> <<			
	LA					
	S7_PN_Test	Block Name Symbolic Name Block Name Cycle Execution				
	E ST CPU315-2 PN/DP					
	Blocks					
	< Back Next>	Finish Cancel	Help			
	. East	- plan				
	2.	. Click <b>Finish</b> button to complete p	project settings			
Press F1 to get Help.			TCP/IP -> Broadcom NetX			
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#### In HW Config, install GSDML and set up PROFINET framework as the figure below shows.

MATIC Manager - S7_PN_Test Edit Insert PLC View Options M	lindow Help Q Q = 20 17- III IIII C < No Filter	> ■ 30 號 @ 등 E E (1) k?		
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ST PN_Test     ST ST PN_Test     ST	)P (1)	DP.		
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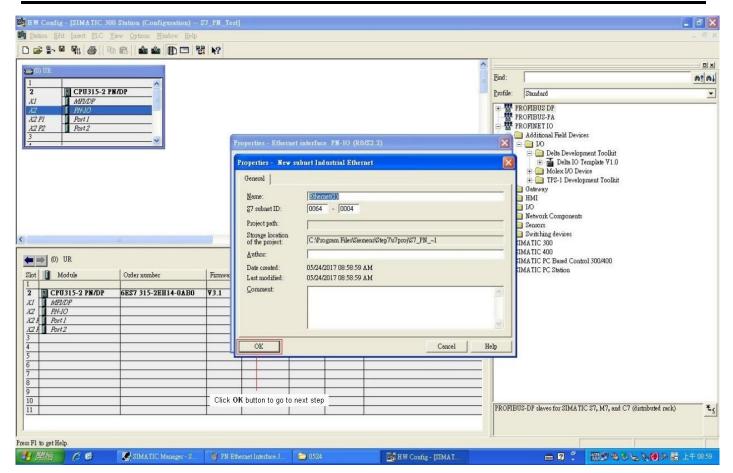
	300 Station (Configuration)	S7_PN_Test	]					ı 🗙
Station Edit Insert PLC	View Options Window Help						-	a ×
	Customige	Ctrl+A	lt+E					
0) UR 1 2 CPU315-2	Specify Module Configure Network Symbol Table PM/DP Report System Error	Ctrl+A	lt+T				Eud: A	□×   mi
XI MPI/DP X2 PN-IO X2 PI Port I	Edit Catalog Profile Update Catalog						PROFIBUS DP     PROFIBUS-PA	_
X2 F2 Port 2							🗄 📅 PROFINET IO	
3	Install <u>H</u> W Updates Install <u>G</u> SD File			- Select GS	DML-V2.31	Delta-ACMD_C2000-20171018.xml	SIMATIC 300     SIMATIC 400	
	Find in Service & Suppo	ort					III SIMATIC PC Based Control 300/400     IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	
	Create GSD file for I-De	Vice						
(0) UR Slot Module	Order number	Firmware	MPI address	I address	Q address	Comment		
2 CPU315-2 PN/DP	6ES7 315-2EH14-0AB0	₹3.1	2					
XI MPI/DP			2	2047*				
X2 RV-10 X2 F Port 1			-	2046* 2045*				
X2 F Port 2				2044*				
3 4				_				
5		-						
6								
7 8								
9								
10							PROFIBUS-DP slaves for SIMATIC \$7, M7, and C7 (distributed rack)	₹
								-5
Installs new GSD files in the system	and updates the contents of the catal	og.					- M	
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## When the installation of GSDML is completed, the right side in the figure below displays.

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1 2 CPU315-2 PW/DP	Profile: Standard	
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	🛓 🚊 SIMATIC PC Station	
(l) Delta		
Slot II M. Order number I address Q address Diagnostic address: Comment Access	_	
Ø         Delta 1234567         2042*         Full           X1         PN-IQ         2041*         Full		
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	1234567 Delta Electronics, Inc. Delta Development Toolkit GSDML-V2.31-Delta-ACMD_C2000-20171018.cml	<u>∧</u> € <u>≺</u>
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(0) UR				
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XI MPIDP	2	2047*		
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3 4				
4 5				
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10				PROFIBUS-DP slaves for SIMATIC S7, M7, and C7 (distributed rack)
				PROFIBUS-DP slaves for SIMATIC S7, M7, and C7 (distributed rack)
I Inserts a PROFINET IO system at the highlighted Ethemet slot.				
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and Station Edit Insert PLC View Options Window Help		_ # ×
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1         1           2         CPU315-2 PM/DP           X1         MADDP           X2         PN/D           X2 PI         Port I           X2 P2         Port 2           3         3	Note: As the host controller's IP address depends on this IP address setting, you must use the IP address in the same domain to connect your PC to the host controller.	Eud: Fund: Profile: Standard PROFIBUS DP PROFIBUS PA PROFIBUS PA PROFIBUS PA Additional Field Devices
3         Y           Image: State of the state of	Properties - Ethernet interface PN-IO (RD/S2.2)         General       Parameters         If a subnet is selected, the next available addresses are suggested.         IP address:       ISS 255 255 0         Subnet:       © to not use router	<ul> <li>○ Dela Development Toolkit</li> <li>○ Dela IO Template V1.0</li> <li>○ Molex I/O Device</li> <li>○ TFS-1 Development Toolkit</li> <li>○ Aleway</li> <li>○ HMI</li> <li>○ Network Components</li> <li>○ Sensors</li> <li>○ Switching devices</li> <li>SIMATIC 400</li> <li>SIMATIC PC Based Control 300/400</li> <li>SIMATIC PC Station</li> <li>按下New按鍵進行下一步</li> </ul>
Press F1 to get Help.	10 Template V1 🎓 0524 📑 HW Config- [SIMAT	□ 図 ? 認知なると、 (図 > は 1+ 08.57



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	General Parame	ters		- 1	🛨 🚡 Delta IO Template V1.0 포 🧰 Molex I/O Device	
					TPS-1 Development Toolkit	
			If a subnet is selected, the next available addresses are suggested.		🛅 Gateway	
			The next available addresses are suggested.		🛄 HMI 🛄 I/O	
					Network Components	
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(0) UR	Subnet		Terror 1		SIMATIC PC Based Control 300/400	
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Right-click the mouse and drag Delta IO Template V1.0 to PROFINET-IO-System until the plus sign (a) appears. When it is completed, the figure below shows.	HW Config - [SIMATIC 30			[_Test]					لحال	
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X Note: The host controller in PROFINET communication is identified by the name in communication cards. Therefore, if it does not match to the settings of the host controller, the communication fails.

Then, you can use **Compile** and **Download** icon to compile and download programs.



i Download

When the program finishes downloading, you have to switch S7-300 to STOP Mode to be back at RUN Mode. If there is no problem with CMC-PN01 communication, the status of LED indicators for S7-300 shows as the figure below.



#### Testing the Start and Stop of the Drive

To verify if the host controller can control the drive through CMC-PN01, you must write the PLC program.

For STEP 7, the	program-editing	screen	below	illustrates	an	example	of	writing	а	program	by
using 60xx messa	ige format.										

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—_∭ Multiple instances ∓∭ Libraries	OB1 : "Main Program St	eep (Cvcl	le)"						^
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- 1. PIW260 means 6102H (actual output frequency).
- 2. PQW256 means 6000H (control word).
- The writing of the program explains as follows.
   OB1 Program (Main Loop) is explained as follows:
  - a. Judging if PIW260 (6102H) equals to 6000. If YES, PQW256 (6000H) equals to 128 (0x80), which means the drive stops running; if NO, go to RES label;
  - b. Judging if PIW260 (6102H) equals to 0. If YES, PQW256 (6000H) equals to 129 (0x81); if NO, go to END label;

Therefore, the drive performs continuous actions of running until stop, and then starts running again.

Below is the STEP 7 program-editing screen and an example of writing a program by using 20xx message format.

K LAD/STL/FBD - [0B1 "Cycle Execution	\$7, 0508-1\\$1M & TIC, 300	Station/CPII315-2 PW/DP\ \OB11				
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	L 6000 ==I					
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	L PIW 282					
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	tanagar - S	BD - [OB 🖉 OBI_00xx.rG - 小量				Teleform

- 1. PIW282 means 2103H (output frequency).
- 2. PQW276 means 2000H (control word).
- 3. The writing of the program explains as follows.
  - OB1 Program (Main Loop) is explained as follows:
    - a. Judging if PIW282 (2103H) equals to 6000. If YES, PQW276 (2000H) equals to 1, which means the drive stops running; if NO, go to RES label;
    - b. Judging if PIW282 (2103H) equals to 0. If YES, PQW276 (2000H) equals to 2, which means the drive starts running; if NO, go to END label;

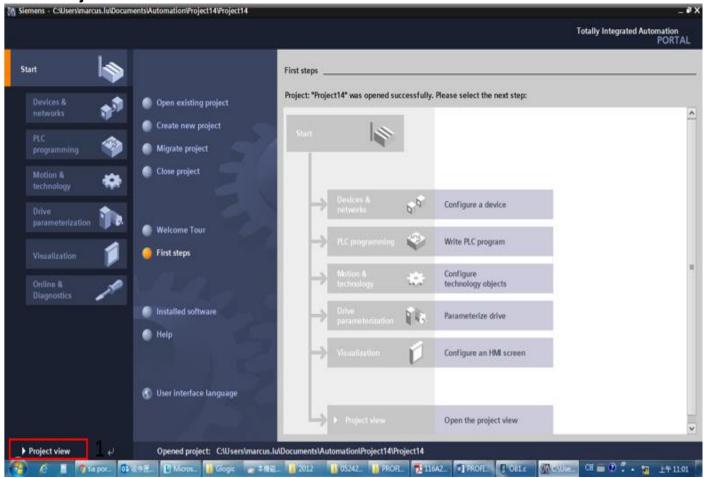
Therefore, the drive performs continuous actions of running until stop, and then starts running again.

### 6.3 Speed Mode DEMO (S7-1500 + TIA PORTAL)

Create Project.

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						Totally Integrat	ed Automation PORTAL
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#### Select Project view.



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# Select the path to save the GSDML file, select the GSDML file required to install, and then click **Install** button.

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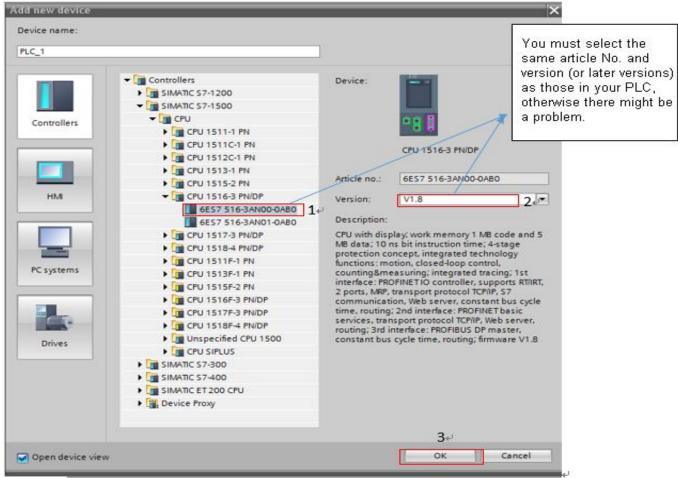
When the installation is completed, select **Devices & networks** and double-click it to check if the screen below displays. If the following screen displays, the installation is completed. If not, you must install again.

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#### Select and double-click Add new device, the figure below displays.

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#### Select PLC's article No. and firmware version.



## After you click **OK** button, a screen displays as shown in the figure below.

roject tree	🗉 📢 Pro	ject14 → PLC_1 [CP	U 1516-3 P	N/DP]	Hardware catalog					
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PLC data types					0	7		► Al/AQ		
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#### In the screen above, select **Network view**, a screen displays as shown in the figure below.

#### When the dragging is completed, a screen displays as shown in the figure below.

M Siemens - C:\Users\marcus.lu\Documents\Auto	nation\3an01\3an01	_ # X
Project Edit View Insert Online Options		ally Integrated Automation
	(* ± 🖥 🗓 🖬 🖳 🖉 Goonline 🖉 Gooffline 🏭 🖫 🖷 🗴 🚍 🛄	PORTAL
Project tree 🔲 🖣	3an01 > Devices & networks	Hardware catalog 📑 🔳 🕨
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	💦 Network 🔢 Connections HMI connection 💌 📅 🖏 🔛 🔍 ±	Options
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≩ ▼ <u>3</u> 3an01	S71500/ET2	
Add new device	PLC_1 Delta PLC_1	🖌 Filter
8 → 1 PLC_1 [CPU 1516-3 PN/DP]	CPU 1516-3 PN Delta IO Templa	Controllers
Vnassigned devices	Not assigned Delta	→ 🛅 HMI
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Documentation settings     G Languages & resources		Network components
Canguages & resources		Detecting & Monitoring
Card Reader/USB memory		Distributed I/O
		ricid devices
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	General 1 Cross-references Compile	
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		> Information
Portal view 🗮 Overview	Devices & ne 🗸 Project 3an0	1 opened.

As the figure below shows, move the mouse to position 1 and drag it to draw a line to position 2.

Siemens - C:\Users\marcus.Iu\Documents\Autor	nation/3an01/3an01	_ <b>-</b> ×
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SanD1     Add new device     Devices & networks     Devices & n	PLC_1 CPU 1516-3 PNL. 1 Delta Not assigned PLC_1 Vot assigned PLC_1 Vot assigned PLC_1 Vot assigned Vot ass	Options     Uiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii
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Then, a screen displays as shown in the figure below. If not, remove the drawing line and try another network interface. (It must be exactly the same as the figure below shows so the PROFINET framework is successfully completed.)

🔁 🔒 Save project 🔒 🐰 🗎 🗊	X ∣⊃±			₩ 🖪 🖪 🗶 🖃 🗌				PORTAL
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<ul> <li>PLC tags</li> </ul>							Distributed I/O	
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Now you can start to test the connection. Follow the steps as shown in the figure below to compile and download.

M Siemens - C:\Users\marcus.lu\Documents\Automation\Project12	roject12				_ # X	×
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► 🙀 Technology obj					C systems     C systems     Drives & starters     Drives & starters     Drives & starters     Detecting & Monitoring     Distributed I/O     Distributed I/O	i.
External source Copy Ctrl+C					Detecting & Monitoring     Distributed I/O	5
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Details view     Online & diagnostics     Ctrl+D	Software (reset memory reserve)		GOTO	errors warnings		2
🔍 🔍 Snapshot of the monitor values						۲
Name Apply snapshot values as start values						
Device configuration						
Reason blocks						
Call structure						
External source files	_				> Information	
■ Print Ctrl+F		III				
					Project12 opened.	
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When S7-1500 is successfully connected, the status of LED and LCD panel shows as the figure below.



Testing the Start and Stop of the Drive

To verify if the host controller can control the drive through CMC-PN01, you must write PLC program.

For TIA PORTAL,	, the program-editing scree	n below illustrates	an example of	writing a program
by using 60xx me	essage format.			

₩ Siemens - C:\Users\marcus.lu	\Documents\Autor	mation\3an01_	_20xx\3an(	)1_20xx									-	×
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Devices												Options		
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Add new device					Í.		•					Name	ciono	5
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PLC_1 [CPU 1516-3 PN/	DP]												ions	🍮 Testing
Device configuration	n 😑	l '									^	the operation operati	rations	e l
🐫 Online & diagnostic	s	<ul> <li>Netwo</li> </ul>	rk 2:									Comparator	operations	stii
🔻 😓 Program blocks		Comme	nt									the second	operations	<u></u>
📑 Add new block												Move operat		
📲 Main [OB1]		1	L	"Tag_4"					%IW260			Conversion of	nerations	📑 Tasks
Technology objects		2	L	6000					6000			Program con	trol operati	a
External source files		3	==I									Word logic operation	nor operations	sks
🕨 🔚 PLC tags		4	JCN L	RES 128					128			tro Legacy	Serutions	
E PLC data types		6	Т	"Tag 5"					\$QW256			STL Mnemon	ie.	m
Watch and force tab	les		RES: NOP						021200			F Sie Witerrion	ic .	Libraries
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🕨 🔀 Traces		9	L	0					0					rie
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Device proxy data		11	JCN	END										H
PLC alarms	~	12	L	129					129					
✓ Details view		13 14 B	T	"Tag_5"					%QW256					
• Details view		14 1	END: NOP	0										
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		[					- Toperaes	1.54.00		ignostics			uucuons	1
		General	-	s-references	Compile	Syntax						> Technology		
		🖸 🚹 🔂 [	Show all m	essages	-							Communicat	on	1
												> Optional pac	kages	
Portal view	Overview 🔹	Main								<	Project 3an0*	_20xx opened.		

- 1. IW260 means 6102H (actual output frequency).
- 2. QW256 means 6000H (control word).
- 3. The writing of the program explains as follows.

OB1 Program (Main Loop) is explained as follows:

- a. Judging if IW260 (6102H) equals to 6000. If YES, PQW256 (6000H) equals to 128 (0x80), which means the drive stops running; if NO, go to RES label;
- b. Judging if PIW260 (6102H) equals to 0. If YES, PQW256 (6000H) equals to 129 (0x81); if NO, go to END label;

Therefore, the drive performs continuous actions of running until stop, and then starts running again.

Below is the TIA PORTAL program-editing screen and an example of writing a program by using 20xx message format.

🔁 🖬 Save project 💄 🐰 🗐 🗎 🗙 🕨										RT/
roject tree	■	_20xx   PLC_1	I [CPU 1516-3 PN/DP] →	Program blocks 🕨	Main [OB1]		_ 7 = >	< In	structions 🗖	
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3an01_20xx	^ N	Name	Data type	Default value	Comment			×	Basic instructions	
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🚠 Devices & networks		/⊢ –O– 1?? •	ц <u>т</u>						General	
PLC_1 [CPU 1516-3 PN/DP]									Bit logic operations	
Device configuration	=						1		<ul> <li>Timer operations</li> </ul>	
😨 Online & diagnostics	▼ N	etwork 2:							+1 Counter operations	
<ul> <li>Program blocks</li> </ul>	Co	mment							Comparator operati	
🗳 Add new block									1 Math functions	
📲 Main [OB1]		1 L 2 L	"Tag_3" 6000			%IW282 6000		•	Move operations	
Technology objects		2 L 3 ==I	6000			6000		•	Conversion operatio	ons
External source files		4 JCN	RES					•	Program control op	erati
PLC tags		5 L	1			1			Word logic operatio	ns
PLC data types		6 <b>T</b>	"Tag_2"			\$ <u>0</u> ₩276			😝 Shift and rotate	
Watch and force tables		7 RES: NOP							ETC Legacy	
🕨 🙀 Online backups		8 L	"Tag_3"			%IW282				
Traces		9 L	0			0	E	=		
Program info		10 ==I 11 JCN	END							
Device proxy data		12 L	2			2				
PLC alarms		12 L 13 T	"Tag_2"			%QW276				
Details view	1	14 END: NOP								
	1	15						-		
Name Address					1	00%	I	Ľ_		
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	Gene	ral 👔 Cross	-references Compil	e Syntax				>	Technology	
		Show all me	essages 🔻					>	Communication	
								1	Optional packages	_

- 1. IW282 means 2103H (output frequency).
- 2. QW276 means 2000H (control word).
- The writing of the program explains as follows.
   OB1 Program (Main Loop) is explained as follows:
  - a. Judging if IW282 (2103H) equals to 6000. If YES, QW276 (2000H) equals to 1, which means the drive stops running; if NO, go to RES label;
  - b. Judging if IW282 (2103H) equals to 0. If YES, QW276 (2000H) equals to 2, which means The drive stars running; if NO, go to END label;

Therefore, the drive performs continuous actions of running until stop, and then starts running again.

# 6.4 Demonstration of Reading/Writing Synchronous and Asynchronous Parameters (S7-300 + TIA PORTAL)

■ Settings for Reading and Writing Synchronous Parameters of the Drive

The following example is demonstrated by using Siemens CPU315-2 PN/DP and TIA Portal V13 SP1.

1. Follow the four steps as shown in the figure below to open Module Parameters.

Project Edit View Insert Online Opt 🕂 🎦 🔒 Save project 🝶 💥 🗐 🗊 🗙		💋 Go online 🖉 Go offline 🗼 🖪 🖪 🗴	3 11	Totally Integ	rated Automation PORTAL
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Devices & networks			IN/OUT	e riter	
▼ 1 PLC_1 [CPU 315-2 PN/DP]				P _ nead modu	le
Device configuration			1 4	2	
😵 Online & diagnostics					
Program blocks			• • • • •		
Technology objects					
External source files				1	
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Eg PLC data types			100 Com		
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Online backups	100 000				
Device proxy data	< m		3	>	
Program info	IN/OUT_1 [Mod	ule] Pro	operties 🚺 Info 🔢 🗓 Diagnost	tics 📑 🖃 🔽	
PLC alarms	General	IO tags System constants Texts			
Text lists		System constants Texts			
Local modules	✓ General	Module parameters		<u>^</u>	
Distributed I/O	Catalog info	mation			
🕨 🙀 Common data	Inputs	Device Specific Parameters			
Documentation settings	Module parame		T		
Languages & resources	I/O addresses	<ul> <li>Data Input1 (VFD-&gt;PN01):</li> </ul>	65535		
Online access		Data Input2:	65535		
Card Reader/USB memory		Data Input3:	65535		
		Data Input4:	- There are a second se		
		Data Input5:	65535		
> Details view		< m	- 6-	> > Information	
Portal view     Overview	- Main Watch	table_1 🔥 delta		Project Acyclic_Write_Te	

2. The figure below shows a complete parameter table. You can synchronously read or write the parameters of the drive by setting up this table. If the value of the parameters is 65535(0xFFFF), there is no parameter reading or writing.

IN/OUT_1 [M	lodule]		Real Pro	perties	🗓 Info 😧 🗓 Diagnostics	
General	IO tags	System constants	Texts			
▼ General		Module parameter	'S			^
Inputs	nformation	Device Specific	Parameters			=
Module para		Data Input	1(VFD->PN01):	65535		
no addresse			Data Input2:	65535		
			Data Input3:	65535		
			Data Input4:	65535		
			Data Input5:	65535		
			Data Input6:	65535		
			Data Input7:	65535		
			Data Input8:	65535		
		Data Output	1(PN01->VFD):	65535		
		[	Data Output2:	65535		
			Data Output3:	65535		
			Data Output4:	65535		
			Data Output5:	65535		
			Data Output6:	65535		
		[	Data Output7:	65535		
			Data Output8:	65535		
						~
		< III				>

3. The figure below shows that you read Pr.01-00, Pr.01-10 and Pr.09-00 and write Pr.01-00 and Pr.09-00.

Device Specific Parameters		
Data Input1(VFD->PN01):	256	01-00(0x0100)
Data Input2:	266	01-10(0x010A)
Data Input3:	65535	
Data Input4:	65535	
Data Input5:	65535	
Data Input6:	65535	
Data Input7:	65535	
Data Input8:	2304	09-00(0x0900)
Data Output1(PN01->VFD):	256	01-00(0×0100)
Data Output2:	65535	
Data Output3:	65535	
Data Output4:	65535	
Data Output5:	65535	
Data Output6:	65535	
Data Output7:	65535	
Data Output8:	2304	09-00(0x0900)

Thus, to synchronously read or write the drive parameters through the PLC program, simply add 40 bytes to the start address of the I/O address. The added value is the home position of the parameter table. Take the figure above as an example, to read the values from Pr.01-00 in the PLC program, read %IW296:P. Similarly, to write the values in Pr.01-00 in the PLC program, write %QW296:P.

If you do not know the start address of the I/O address, refer to the figure below and follow the four steps to open the I/O Address.

		Go online 🖉 Go offline  🛔 🖪 3					PORTA
roject tree	□	5-2 PN/DP]  Distributed I/O  PROI			_ # # X	Hardware catalog	<b>a</b> 10 <b>b</b>
Devices		🗗 To	pology view 🛔 Net	twork view 🛛 🕅 De	evice view	Options	
3 <b>0 0</b>	🔲 🔡 👪 delta	🔽 🖬 🔛 🔍 ±		Device overview	1		L
			^	Wodule		✓ Catalog	
CMC-PN01_Cyclic_Read_Write			=	✓ delta		<search></search>	ini jini
Add new device				► PN-IO		Filter	
Devices & networks		13		IN/OUT_1	1	Head module	
PLC_1 [CPU 315-2 PN/DP]		80	1	2	•	P La neso module	
Device configuration				2			
😟 Online & diagnostics			-				
Program blocks							
Technology objects							
External source files			T T				
PLC tags							
PLC data types							
Watch and force tables							
Online backups		4	~				
Device proxy data	< Ⅲ	> 100%	)	< m			
Program info	and the second se	and the second se	the state of the s			1	
PLC alarms	IN/OUT_1 [Module]	9	Properties 🗓 Info	1 Diagnostics			
Text lists	General 10 ta	ags System constants Texts	3				
Local modules	✓ General						
Distributed I/O	Catalog information	I/O addresses				1	
Gommon data	Inputs	Input addresses					
Documentation settings	Module parameters	input addresses					
Canguages & resources	I/O addresses 4	• Start addre	1551 256				
Online access	4	-					
Card Reader/USB memory		End addre	And a second				
		Process ima	ge: None		*		
		Interrupt OB num	ber: 40				

- After you finish setting up the parameter table, recompile the programs and download them to the PLC program, and then reboot the drive to make CMC-PN01 receive the updated parameter settings.
- 5. When CMC-PN01 is connected to the PLC program successfully, you can test the reading or writing of the set parameter by using the Watch Table. The Watch Table shows as the figure below.

Follow the four steps as shown below to verify if the settings for the parameter table are workable and if reading or writing the drive parameters is successful (can be used with the keypad to verify).

roject tree		-	Goonlin 🖉 🔛 Goonlin				ch table_1		_ # = X	Testing 🗊 🗓
Devices			1							Options
00	•	# # 10 Lo 91	8 27 m m							✓ CPU operator .
		i Name 4	Address	Display format	Monitor value	Aonitor with trig	Modify with trigge	Modify value 🔗	Co	✓ CPU operator
CMC-PN01_Cyclic_Read	× 1	1	%IW296:P	Hex	16#1338	ermanent	Permanent		6 11	
Add new device		2	%IW298:P	Hex	16#E9FC	ermanent	Permanent		- 1° 01	PLC_1 [CPU 315-2
Devices & networks		3	%IW310:P	Hex	16#0002	ermanent	Permanent		- ゎ 09	Error
▼ 🚰 PLC_1 [CPU 315-2 P	<b>V</b>	4	%IW312:P	Hex		ermanent	Permanent		🗌 % Rea	RUN
Device configurati		5	%QW296:P	Hex	50	ermanent	Permanent	16#1338	🗹 🦺 01	
😵 Online & diagnosti		6	%QW310:P	Hex	8	ermanent	Permanent	16#0002	🗹 🦺 09	STOP
Program blocks	•	7	<add new=""></add>				-	3		FORCE
Technology objects	=			Modify				5		
🕨 🐻 External source files										Mode selector: F
PLC tags				Monitor all						
Ce PLC data types										
🔻 🎑 Watch and force ta				📑 Insert row						
Add new watc				Add row						
El Force table		<		X Cut	Ctrl+X				>	
Watch table_1				Сору	Ctrl+C	Q Prope	the total	i) & Diagnostics		1
Online backups				Paste	Ctrl+V	Prope	rues Linto	Diagnostics		
Device proxy data		General Cross-	references Comp	× Delete	De					
Program info		Show all m	essanes V	Rename	FZ					
PLC alarms				C	information Shift+F11					
Text lists		! Message				) Go to	Date	Time		
Local modules	<b>~</b>		een deleted successfully	Expanded Mod	e	2 40 10	7/15/2018	2:19:06 PM		
Distributed I/O	<b>~</b>		een deleted successfully.					2:19:06 PM	<u>^</u>	
🕨 🙀 Common data			) was loaded successfully.					2:19:06 PM		
Documentation settin		PLC_1 star	and the second state of the second	F-				2:19:19 PM		
Languages & resources			ices completed for interfa	ce Intel(R) Ethernet	Connection 1217 / Four	nd 1 d		2:18:56 PM	=	
Doline access	~		ed (errors: 0; warnings: 0		Connection 12 17-V. Fou	14 1 4		2:19:19 PM		
881	>		_1, address IP=192.168.0					2:19:52 PM		

※ Note: The figure above shows that %IW312 is the status value returned when the

parameter table reads or writes the parameters. Low byte is the status value of reading, whereas high byte is the status value of writing. Take the figure above as an example, if the status value is 0x8183, the values of 1, 2, and 8 in the parameter table are successfully read and the values of 1 and 8 are successfully written. Thus, as can be seen, the success or failure of the parameter reading/writing depends on this status value.

- % %IW312 = I/O start address + 56 (the I/O start address in this example is 256).
- ※ If you do not need to write the parameters synchronously (with time constraint), it is suggested to write the parameters asynchronously (without time constraint).

Settings for Reading and Writing Asynchronous Parameters of the Drive 

#### Asynchronous writing: Follow the steps as

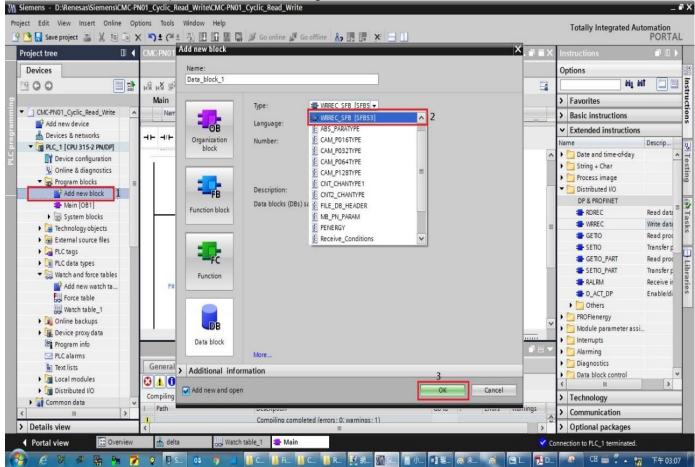
t Edit View Insert Online O 🖥 🔜 Saveproject 🔳 💥 💷 🗎	2	01_Cyclic_Read_Write	Å? 🖪 🖪 🗶 🖃 🛛		Tota	Ily Integrated Auton	nation PORTAI
oject tree	CMC-PN01_Cyclic_Rea	d_Write Define tag	Ctrl+Shift+I h bloc	ks ▶ Main [OB1]	_ # #×	Testing	
Devices		Rename tag	Ctrl+Shift+T			Options	
00	IIII IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	X cut	Ctrl+X			> CPU operator pa	nel
CMC-PN01_Cyclic_Read_Write	Name	Copy	Ctrl+C Ctrl+V value	Comment		> Call environmen	
Devices & networks		Go to	Del			<ul> <li>&gt; Breakpoints</li> <li>&gt; PLC register</li> </ul>	_
Device configuration	▼ Block title: *Main Pr Comment	Cross-reference inf	ormation Shift+F11			✓ Call hierarchy	
Add new block	Comment	Insert network       Insert STL network       11 Insert empty box       12 Insert comment       Generate ENO       Do not generate EN	Ctrl+R Shift+F5				
<ul> <li>▶ Constant PLC data types</li> <li>★ Watch and force tables</li> <li>▲ Add new watch table</li> </ul>	Main [OB1]		S Pro	perties	Diagnostics	No call path avail	lable
Eii, Force table UR Watch table_1 ▶ 12 Online backups ▶ 12 Device proxy data	General General Information Time stamps	General					
Program info PLC alarms Text lists  Comp Local modules  Comp Distributed I/O	Compilation Protection Attributes	-	Name: Main Type: OB Language: LAD Number: 1	\$			
Gommon data  Details view	~		🔵 manual				

Enter the commands below into STL Network, and then a screen displays as shown in the figure below. Then, click OK button.

"WRREC", DB53 CALL REQ :=M41.7 :=2042 ID INDEX :=16#4d2 LEN :=6 DONE :=M41.1 BUSY :=M41.2 ERROR := M41.3 STATUS:=MD46 RECORD:=P#DB2.DBX 2.0 BYTE 6

Niemens         D:Renesas/Siemens/CMC-PN01_Cyt           Project         Edit         View         Insert         Online         Options <u>1             1           </u>	Tools Window Help		_ ■ × Totally Integrated Automation PORTAL
Project tree		PLC_1 [CPU 315-2 PN/DP] > Program blocks > Main [OB1]	_ 🖬 🖬 🗙 Testing 📰 🗈 🕨
Devices			Options
	🖬 🖬 🖬 🍓 🐑 🕅		CPU operator panel
	Main		> CPU operator panel
▼ CMC-PN01_Cyclic_Read_Write	Name	Data type Offset Default value Comment	> Call environment
Add new device	- L		
Devices & networks	Call options	×	> Breakpoints
■ PLC 1 [CPU 315-2 PN/DP]		Data block	> PLC register
Configuration			→ PLC register 및
Conline & diagnostics	DB		st.
▼ 🙀 Program blocks	Single	Number 1	5
Add new block	instance	🔘 Manual	=
Aain [OB1]		Automatic	
▼ System blocks	▼ 🕄 Network 2:	The called function block saves its data in its own instance	iiì) Tasks
Program resources	Comment	data block.	5
Technology objects	Comment		
External source files	1		\$DB53
PLC tags	2	More	\$DB53
PLC data types	3		· ·
Watch and force tables		-	
Add new watch table	Main [OB1]		) 🕃 Diagnostics 💦 🔍 No call path available 🤴
Force table	General	OK Cancel	
Watch table_1	General		
Online backups	Information	General	
Device proxy data	Time stamps		
Program info	Compilation	Name: Main	
PLC alarms	Protection		
Text lists	Attributes	Туре: ОВ	
Local modules	A conducts	Language: LAD	
Distributed I/O		Number: 1	
🕨 🏹 Common data 🛛 🗸		) manual	
> Details view		C Ministra	*
Portal view 🔛 Overview	delta 😛 Watch table_1	🖶 Main	Connection to PLC_1 terminated.

#### 2. Follow the three steps as shown in the figure below to add DB.



#### ※ Note: The two DB values in red boxes as shown in the figure below should match.

Project tree		≜ 🖥 🛄 🚰 🔛 🙀 💋 Goonline 🖉 Gooffline 🦣 🖪 🕞 🐺 📕 🗶 😑 🛄 K-PN01_Cyclic_Read_Write → PLC_1 [CPU 315-2 PN/DP] → Program blocks → Main [OB1]	_∎≡×	Testing	<b>a</b> 11 (
Devices				Options	
300		₩ ♥ ♥ ♥ ⋿ 目 ■ ♥ 월 ± 월 ± 日 龄 ♥ € 6 6 9 9 4 1 1 1 8 9 8			[L
		Main		> CPU ope	rator panel
CMC-PN01_Cyclic_Read_Write	^	Name Data type Offset Default value Comment		> Call envi	ironment
Add new device			н. 1	Milli Researchieshiesh	
Devices & networks		L		> Breakpoi	
<ul> <li>PLC_1 [CPU 315-2 PN/DP]</li> </ul>				> PLC regis	ster
Device configuration			^	✓ Call hier	archy
😼 Online & diagnostics		Network 2:			
🔻 🙀 Program blocks	=				
Add new block		Comment			
Hain [OB1]		1 CALL WRREC , "DB53"	\$DB1		
🔻 🔄 System blocks		2 Any		1	
<ul> <li>Program resources</li> </ul>			M41.7		
🔰 Data_block_2 [DB2]		4 ID :=2042	2042		
📑 DB53 [DB1]			.6≢4d2 =		
Technology objects		6 LEN :=6	6		
External source files			M41.1		
PLC tags			M41.2		
PLC data types			M41.3 MD46	No call	path available
<ul> <li>Watch and force tables</li> </ul>			BX2.0 BYTE 6		
Add new watch table		12	~		
Force table		100%	·	1	
Watch table_1		in [OB1] 🛛 Properties 🗓 Info 🕕 🖞 Diagn	nostics 🛛 🗐 = 🔽	1	
🕨 🙀 Online backups		Seneral		1	
Device proxy data			1.00		
Program info		General General	^		
PLC alarms		ntormation			
Text lists		ime stamps =			
Local modules	~	Compilation Name: Main		1	
Details view		Type: OB			

- 3. Recompile the programs and download them to the PLC program.
- 4. Test if the programming is workable by using the Watch Table. Refer to the settings in the figure below.

		CMC			_1 [CPU 315-2 P					_ 📲 🖬 🗙	Testing	
Devices											Options	
000		-	# 1 <b>9</b> 10 <b>9</b> 1	<b>% 𝔅</b> 💁 🕺								
			Address	Display format	Monitor value	Monitor with trig	Modify with trigge	Modify value	4	Comment	✓ CPU operator	nanel
CMC-PN01_Cyclic_Read_Write	<b>×</b>	1	%IW296:P	Hex	16#0000	Permanent	Permanent			01-00		
Add new device	-	2	%IW298:P	Hex	16#E9A0	Permanent	Permanent			01-10	PLC_1 [CPU 315-2	PN/DP]
A Devices & networks		3	%IW310:P	Hex	16#0008	Permanent	Permanent		0 %		Error	
PLC_1 [CPU 315-2 PN/DP]		4	%IW312:P	Hex	16#0183	Permanent	Permanent		1 %		RUN	RUN
Device configuration		5	%QW296:P	Hex	<b>0</b> 0	Permanent	Permanent	16#1338		01-00	- KON	RUN
Q. Online & diagnostics		6	%QW310:P	Hex	000	Permanent	Permanent	16#0002	Ă	09-00	STOP	STOP
<ul> <li>Program blocks</li> </ul>		7	%M41.7	Bool	TRUE	Permanent	Permanent	TRUE			FORCE	MRES
Add new block		8	%DB2.DBB2	Hex	16#FF	Permanent	Permanent	16#FF				
Main [OB1]		9	%DB2.DBB3	Hex	16#06	Permanent	Permanent	16#06			Mode selector:	RUN P
<ul> <li>System blocks</li> </ul>		10	%DB2.DBB4	Hex	16#01	Permanent	Permanent	16#01				
<ul> <li>Program resources</li> </ul>		11	%DB2.DBB5	Hex	16#0A	Permanent	Permanent	16#0A				
Data_block_2 [D		12	%DB2.DBB6	Hex	16#E9	Permanent	Permanent	16#E9				
BB68_00000_2 (0		13	1 V 2 12 10 10 10 10		<ul> <li>16#A0</li> </ul>	12 The second	Contraction of the second	<ul> <li>16#A0</li> </ul>	1 🗹 👗			
Technology objects		14	<add new=""></add>		100710							
External source files												
PLC tags												
PLC data types												
<ul> <li>Watch and force tables</li> </ul>												
Add new watch table												
Force table			<			8				>		
Watch table_1						0	Properties 1	Info 🛛 🗓 Diagr	ostics	1		
Online backups			_				inopercies []	, mo Diagi	1031103		1	
Device proxy data		Ge	eneral Cros	s-references	Compile							
Program info		0	🔒 📵 Show all	messages								
PLC alarms												
Text lists			Message				Got	o ? Date	Time			
E TEXCIIS (S	>	$\bigcirc$		PLC_1, address IP=192			GOL	7/15/20		c 0:03 PM		

The example of writing the drive parameters above is demonstrated by FF 06 YY YY XX XX.
 (YY YY indicates the parameter group and parameter number. For example, 01-00 means parameter group 01 and parameter number 00.)
 (XY XY means the written values. For example, 12.88 – 0x1288.)

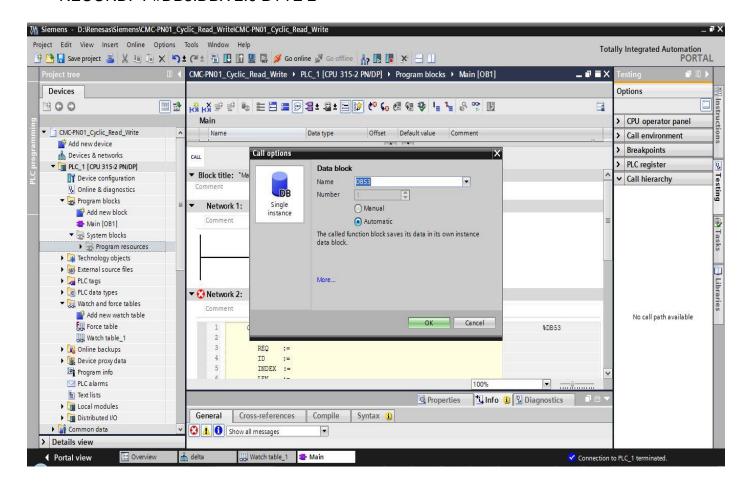
- (XX XX means the written values. For example, 13 88 = 0x1388.)
- ※ You can choose to write the values or not by setting REQ.

Asynchronous reading:

1. Open OB1 and Insert STL Network. Enter the commands below into STL Network, and then a screen displays as shown in the figure below. Then, click **OK** button.

CALL "WRREC", DB53 REQ :=M41.7 ID :=2042 INDEX :=16#4d2 LEN :=4 DONE :=M41.1 BUSY :=M41.2 ERROR :=M41.3 STATUS:=MD46 RECORD:=P#DB4.DBX 2.0 BYTE 4

CALL "RDREC", DB52 REQ :=M31.7 ID :=2042 INDEX :=16#4d2 MLEN :=2 VALID :=M31.1 BUSY :=M31.2 ERROR :=M31.3 STATUS:=MD36 LEN :=MW34 RECORD:=P#DB3.DBX 2.0 BYTE 2



2. After you click **OK** button, a screen displays as shown in the figure below. Note the values in red boxes.

oject tree			1 🖳 🔛 💋 Goonline 🖉 Go ic_Read_Write 🕨 PLC_1 [CPU				■×	Testing 🗖 🛛
Devices								Options
00		Hồi HỜi 学 👻	🎭 🖿 🚍 💬 📲 🕿 s	:= 😥 🤭 💊 🕮 🥬	a 🕹 🖣 🐂 🔗 🕾 🛽	2	2	
		Main						> CPU operator panel
CMC-PN01_Cyclic_Read_Write	^	Name	Data type	Offset De	fault value Comment			> Call environment
Add new device				Print Print	•//			
Devices & networks		CALL						> Breakpoints
- T PLC 1 [CPU 315-2 PN/DP]		12000						> PLC register
Device configuration		4	ID :=2042			2042	^	✓ Call hierarchy
V Online & diagnostics		5	INDEX :=16#4d2			16#4d2		Can merarchy
Regram blocks		6	LEN :=4 DONE :="Tag 2"			4 \$M41.1		
Add new block	=	8	BUSY :="Tag 3"			*M41.2		
Main [OB1]		9	ERROR :="Tag 4"			\$M41.3		
<ul> <li>Main [Ob 1]</li> <li>System blocks</li> </ul>		10	STATUS :="Tag 5"			\$MD 46		
System blocks     Program resources		11	RECORD :=P#DB4.DBX2.0	BYTE 4		P#DB4.DBX2.0 BYTE 4		
Technology objects		12						
	-	13	CALL RDREC , "DB52"			\$DB2		
External source files		14	Any					
PLC tags		15	REQ :="Tag_6"			\$M31.7		
C data types		16	ID :=2042			2042		
<ul> <li>Watch and force tables</li> </ul>		17	INDEX :=16#4d2			16#4d2		
Add new watch table		18	MLEN :=2			2	=	No call path available
Force table		19	VALID :="Tag_7"			\$M31.1		
Watch table_1		20 21	BUSY :="Tag_8"			%M31.2 %M31.3		
🕨 🙀 Online backups		21	ERROR :="Tag_9" STATUS :="Tag 10"			\$M31.3 \$MD36		
Device proxy data		22	LEN :="Tag_10"			8MU 36 8MW 34		
Program info		24	RECORD :=P#DB3.DBX2.0	BYTE 2		P#DB3.DBX2.0 BYTE 2	~	
PLC alarms			Out: Any	X ALL O	100%	P#003.000 0112 2		
Text lists			iou. niy		Q Properties			
Iocal modules		0			Properties 11		504	
Distributed I/O		General	Cross-references Compil	e Syntax				
Common data		Sho	w all messages					

3. Follow the three steps as shown in the figure below to add DB for RDREC and DB for WRREC.

ject tree 🛛 🕮	< CN	Add new block				× _ = = ×	Testing 📑 🛛
levices		Name:					Options
00	ibi 🖆	Data_block_2					
a checking of the shuth			Type:	🔹 RDREC_SFB [SFB5 👻			> CPU operator panel
CMC-PN01_Cyclic_Read_Write	^		Language:	BRDREC_SFB [SF852]	^ 2		> Call environment
Devices & networks	-	-OB	S. 5	WRREC_SFB [SFB53]	2	-	> Breakpoints
Devices & networks     PLC_1 [CPU 315-2 PN/DP]	CAL	Organization		ABS_PARATYPE			> PLC register
Device configuration		block		CAM_P016TYPE		42	and the second se
Conline & diagnostics				CAM_P032TYPE	=	4d2	✓ Call hierarchy
Grine & diagnostics     Second and a grostics				E CAM_P064TYPE			
Add new block	=		Description:	CAM_P128TYPE		1.1	
the second se		-rB	Data blocks (DBs) se	CNT_CHANTYPE1		1.2	
Amin [OB1]		Function block				46	
▼ 🛃 System blocks				FILE_DB_HEADER		O BYTE 4	
Program resources				E PENERGY	~		
Technology objects		-		E PENERGT		82	
External source files		FC					
PLC tags						1.7	
C data types		Function				42	
<ul> <li>Watch and force tables</li> </ul>						4d2	
Add new watch table						=	No call path available
Force table						1.1	
Watch table_1		DB				1.2	
🕨 🙀 Online backups						136	
Device proxy data		Data block				34	
Program info			More			.0 BYTE 2	
M PLC alarms		> Additional info	rmation		2		
Text lists						tics	1
🕨 🧃 Local modules		Add new and open	n		OK Car	ncel	
Distributed I/O	0						
Common data	~ 🖸	🛕 📵 Show all mess	sages				

#### After you finish adding DB, a screen displays as shown in the figure below.

M Siemens - D:\Renesas\Siemens\CMC-PN01_C	Сус	lic_Read_Write	ACMC-PN01_Cyclic_R	ead_Write							_ • ×
Project Edit View Insert Online Options									Tot	ally Integrated Autom	
📑 🛅 🔚 Save project 📑 🐰 🗐 🛱 🗙 📉	) ±	(≈ ± 🖥 🔛	🔟 🖳 🕅 🎽 Go o	nline 🚀 Go offli	ine 🔥 🖪 🖪 者						PORTAL
Project tree	4	CMC-PN01_Cy	rclic_Read_Write →	PLC_1 [CPU 3	15-2 PN/DP] ▶ Pro	gram blocks 🕨 Ma	ain [OB1]	_ 7	∎×	Testing	
Devices										Options	
	•	⊷ ਦੇ ਵੱ	) 🐁 🖹 🚍 🖉	🔊 📲 ± 🖀 ± 🖹	= 😥 🥙 🖕 🕖	🤬 🤯 🧤 🍾 🔗	° II				nel t
2		Main								> CPU operator par	nel
CMC-PN01_Cyclic_Read_Write	^	Name		Data type	Offset De	efault value Comm	nent			> Call environment	
🗧 📑 Add new device					· • · · ·	<b>*</b>		j.	<u> </u>		5
Devices & networks		CALL								> Breakpoints	
PLC_1 [CPU 315-2 PN/DP]			ID :=20	10				2042		PLC register	8
Device configuration		5	ID :=20 INDEX :=16					16#4d2	^	✓ Call hierarchy	⇒ Testing
V. Online & diagnostics		6	LEN :=4	9 4 C Z				109402			sti.
Program blocks		7		ag 2"				\$M41.1			6
Add new block		8		ag 3"				\$M41.2			
Main [OB1]		9	ERROR :="T					%M41.3			
System blocks		10	STATUS :="T	'ag_5"				\$MD 4 6			1
Program resources		11	RECORD :=P#	DB4.DBX2.0 BY	TE 4			P#DB4.DBX2.0 BYTE 4			Tasks
Data_block_2 [DB3]		12									
Data_block_3 [DB4]		13	CALL RDREC ,	"DB52"				%DB2			Libraries
B52 [DB2]		14	Any REQ :="T					\$M31.7			<b>E</b>
DB53 [DB1]		16	ID :=20	ag_6"				*M31.7 2042	_		bra
Technology objects		17	INDEX :=16					16#4d2			arie
External source files		18	MLEN :=2	11102				2	=	No call path availa	
PLC tags		19	VALID :="T	ag 7"				\$M31.1		No can patri avana	JDie
PLC data types		20	BUSY :="T					%M31.2			
Watch and force tables		21	ERROR :="T					\$M31.3			
Add new watch table		22	STATUS :="T	ag_10"				\$MD 3 6			
Force table		23		ag_11"				%MW 3 4			
Watch table_1		24	RECORD :=P#	DB3.DBX2.0 BY	TE 2		100%	P#DB3.DBX2.0 BYTE 2	~		
Online backups	- 1								_		
Device proxy data						Reporties	🔄 🛄 Info	L Diagnostics			
Program info		General	Cross-references	Compile	Syntax						
PLC alarms					oynax						
Details view	Ť	🖸 🚹 🔂 SI	now all messages	•							
	*	delta	Watch table_1	📲 Main	👌 Data_block_2	Data_block_3		Conn	ection	to PLC_1 terminated.	
	Juc		00			100			cealon	to rec_r terminated.	

- 4. Recompile the programs and download them to the PLC program.
- 5. Test if the programming is workable by using the Watch Table. Refer to the settings in the figure below.

ject Edit View Insert Online Optio				🛙 Go online 📓 Go of	fline 🙏 🌆 🖪	< ⊣ 11				Totally Integr	ated Automation PORT
Project tree				PLC_1 [CPU 315-2 P			Watch table_1	-	. 🗆 🗆 🗙	Testing	<b>1</b>
Devices										Options	
<u> </u>		· 🥩 🗃	🖗 🕪 🗓 🔗 🌶	76 🛷 약 📬							
		i	Name	Address	Display format	Monitor value	Modify value	9	Comment	✓ CPU operato	r panel
<ul> <li>Acyclic Read Test</li> </ul>	· · · ·	1	"Tag_1"	%M41.7	Bool	TRUE	TRUE	🗹 🔺			
🗳 Add new device		2	"Tag_6"	%M31.7	Bool	TRUE	TRUE	🗹 🔺		PLC_1 [CPU 315-2	2 PN/DP]
Devices & networks		3		%DB4.DBB2	Hex	16#FF	16#FF	🗹 🔺		Error	
PLC_1 [CPU 315-2 PN/DP]		4		%DB4.DBB3	Hex	16#03	16#03	🗹 🔺		RUN	RUN
Device configuration		5		%DB4.DBB4	Hex	16#01	16#01	🖂 🚹			
Online & diagnostics		6		%DB4.DBB5	Hex	16#0A	16#0A	🖂 🚹		STOP	STOP
🔻 🛃 Program blocks		≣ 7		%DB3.DBB2	Hex	16#E9				FORCE	MRES
Add new block		8		%DB3.DBB3	Hex	16#A0					
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As shown in the example above, before reading the parameters, you must call WRREC functional block to write FF 03 YY YY to change the mode of communication card, and then call RDREC functional block to read the drive parameters (YY YY indicates the parameter group and parameter number. For example, 01-00 means parameter group 01 and parameter number 00.).

※ You can choose to read the parameters or not by setting REQ.

## X Note: The ID values in the above-mentioned STL commands can be changed. Refer to the figure below to find the ID setting values.

M Siemens - D:\Renesas\Siemens\S7-Projekt\Acyclic_Wr	te_Test\Acyclic_Write_Test					- 1	٩X
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### Note: For the PLC program in Siemens 1200 or 1500 Series, refer to the figure below to find the ID setting values in the above-mentioned STL commands. Siemens - C.Wserstmarcus.lu/Documents/Automation/SFB53\_15163\_TestSFB53\_15163\_Test

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