# ELC Distributed I/O Adapters

**Effective December 2010** 

Users Manual ELC-CADNET ELC-CAPBDP ELC-CAENET ELC-CARS485





# Introduction

- ✓ The ELC communications adapters are OPEN-TYPE devices and therefore should be installed in an enclosure free of airborne dust, excessive humidity, shock and vibration. The enclosure should prevent non-maintenance staff from operating the device (e.g. key or specific tools are required to open the enclosure) to avoid potential equipment damage or personal injury. DO NOT touch any terminal when the power is switched on.
- ✓ Please read this manual carefully and follow the instructions to avoid damage to the product or personal injury.

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## 1 Introduction

The modules described in this manual attach to ELC I/O modules to allow them to be used as distributed I/O. The distributed I/O can be used with ELC processors or with controllers from many different vendors.

Module	Description	Chapter
ELC-CADNET	DeviceNet slave I/O	2
ELC-CAPBDP	Profibus DP Slave I/O	3
ELC-CAENET	Modbus TCP and EtherNet/IP I/O	4
ELC-CARS485	Modbus RTU (serial) I/O	5

## 2 ELC-CADNET

The ELC-CADNET is a distributed I/O adapter that connects ELC I/O modules to DeviceNet. The adapter provides I/O and module diagnostic information.

#### 2.1 Features

- Supports Group 2 I/O polling
- Supports explicit connection via predefined Master/Slave connection set
- Supports EDS files configuration in DeviceNet network configuration tools.
- Supports up to 256 digital I/O points
- Supports up to 8 analog/specialty modules

Feature	Description
Graphic configuration interface	ELC-CADNET supports graphic configuration interface in DeviceNet network configuration tools.
Data retention	The user can choose either to retain or clear the data in the register when ELC-CADNET is offline.
Auto I/O module identification	The user can automatically identify the specialty I/O modules and the number of points on the ELC digital I/O modules connected to the ELC-CADNET through the DeviceNet network configuration tool.
Diagnostics	The ELC-CADNET is able to diagnose the status of the special I/O modules connected to it. When an error occurs, The ALARM LED on ELC-CADNET will flash red.
Status information	ELC-CADNET monitors the connection status between itself and the extension modules in the DeviceNet network configuration tool.
Error detection	The user can monitor errors through the DeviceNet network configuration tool.
Error correction	The user can correct common errors through the DeviceNet network configuration tool.
Flexible configuration	The user can configure the control registers (CR) in the speciatyl I/O modules via the I/O mapping data for DeviceNet.

# 2.2 Specifications

# Functions Specification

DeviceNet Connection			
Transmission method	CAN		
Electrical isolation	500VDC		
Туре	Removable connector (5.08mm)		
Transmission cable	2-wire twister shielded cable with 2-wire bus power and drain		
Communication			
Message type I/O polling, explicit			
Baud rate	125kbps; 250kbps; 500kbps		

## Electrical Specification

Power supply voltage	11 ~ 25VDC (DeviceNet Power)	
Power supply current	28mA (typical), 125mA impulse current (24VDC)	
Noise Immunity	ESD (IEC 61131-2, IEC 61000-4-2): 8KV Air Discharge EFT (IEC 61131-2, IEC 61000-4-4): Power Line: 2KV, Digital I/O: 1KV Analog & Communication I/O: 1KV	
	Damped-Oscillatory Wave: Power Line: 1KV, Digital I/O: 1KV RS (IEC 61131-2, IEC 61000-4-3): 26MHz ~ 1GHz, 10V/m	
Operation/storage temperature	Operation: 0°C ~ 55°C (temperature), 50 ~ 95% (humidity), pollution degree 2; Storage: -25°C ~ 70°C (temperature), 5 ~ 95% (humidity)	
Vibration/Shock Immunity	Standard: IEC61131-2, IEC 68-2-6 (TEST Fc)/IEC61131-2 & IEC 68-2-27 (TEST Ea)	
Certification	CE 🗐 , Operating temperature code: T5	

# 2.3 Product Profile and Outline



1. Extension I/O interface	2. Address setup switch
3. Function setup switch	4. RUN/STOP switch
5. POWER indicator	6. MS (Module Status) indicator
7. NS (Network Status) indicator	8. RUN indicator
9. ALARM indicator	10. DeviceNet connector
11. DIN rail mounting slot	12. DIN rail clip

#### Dimension



Unit: mm

# 2.4 Installation and Wiring

#### How to Connect the extension modules to the ELC-CADNET

- 1. Open the extension clip on the right side of the ELC-CADNET.
- 2. Connect the extension port of the ELC-CADNET with the extension module and close the extension clips.
- 3. The colors on the pins on the DeviceNet connection port match the colors of the connection cables. Make sure you connect the cable to the right pins.



#### Switch Definition : RUN/STOP

RUN	Status	Explanation
	RUN	1. RUN indicator on ELC-CAENET is ON.
		2. Analog input/output modules are in RUN status.
	RUN → STOP	<ol> <li>Analog input/output module switches from RUN to STOP status.</li> </ol>
		2. Y points on digital input/output module are all OFF.
	STOP	1. RUN indicator on ELC-CAENET is OFF.
		2. Analog input/output modules are in STOP status.
	STOP → RUN	1. ELC-CADNET re-detects the modules on the I/O bus.
		<ol><li>Analog input/output modules switch from STOP to RUN status.</li></ol>

#### DeviceNet Port:

The DeviceNet removable terminal block is included with the ELC-CADNET

PIN	Signal	Color	Definition
1	V-	Black	0VDC
2	CAN_L	Blue	Signal-
3	SHIELD	-	Shielded cable
4	CAN_H	White	Signal+
5	V+	Red	24VDC

#### Address Setup Switch:

Settings	Description	<u>ع</u> مُثْنُ عام عام الم
00 ~ 63	Valid DeviceNet node address	
64 ~ 99	Invalid DeviceNet node address	ğ ۣ ۣ کُې از x10

The address setup switches  $x10^{0}$  and  $x10^{1}$  set up the node address on the DeviceNet network in decimal form. Setup range: 00 ~ 63 (64 ~ 99 are invalid)

**Example:** If you need to set the node address of ELC-CADNET to 26, simply switch the corresponding switch of  $x10^{1}$  to 2 and the corresponding switch of  $x10^{0}$  to 6.

#### Note:

- 1. Set up the node address when the power is off. After the setup is completed, re-power ELC-CADNET.
- 2. When ELC-CADNET is operating, changing the setting of the node address will be invalid.

#### Function Setup Switch:

The function setup switches are for

- 1. Setting I/O data hold function (IN0)
- 2. Setting the baud rate of DeviceNet network (DR0 ~ DR1)

DR1	DR0	Baud rates	
OFF	OFF	125kbps	
OFF	ON	250kbps	
ON	OFF	500kbps	
ON	ON	Incorrect setting	
	OFF	When the DeviceNet connection is interrupted, the content in the buffer area will be cleared.	
IINU	ON When the DeviceNet connection is interrupted, the content in the buffer area will hold last state.		
IN1	Reserved		



#### Note:

1. Set up the dip switches when the power is off. Then, re-power the ELC-CADNET.

2. When ELC-CADNET is operating, changing the setting of the dip switches will be invalid.

#### ■ I/O Module Connection Port

The I/O module connection port is used to connect the ELC-CADNET to ELC digital I/O modules and special I/O modules.

#### Supported Extension Module



#### • ELC digital I/O extension units supported by the ELC-CADNET

Digital I/O modules (model name)	I/O mapping data (DeviceNet → ELC-CADNET)	I/O mapping data (ELC-CADNET → DeviceNet)
ELC-EX08NNDN	N/A	8 bits
ELC-EX08NNNR/T	8 bits	N/A
ELC-EX08NNDR/T	8 bits	8 bits
ELC-EX16NNDR/T	8 bits	8 bits
ELC-EX08NNSN	N/A	8 bits

#### • Specialty I/O modules supported by the ELC-CADNET

Special I/O module	Default I/O m	apping data	I/O mapping data	
	$(DeviceNet \rightarrow ELC-CADNET)$		(ELC-CADNET $\rightarrow$ DeviceNet)	
(moder name)	Start CR	Length (words)	Start CR	Length (words)
ELC-AN02NANN	CR#10	2	N/A	N/A

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Special I/O module	Default I/O m (DeviceNet →	happing data ELC-CADNET)	I/O mapping data (ELC-CADNET $\rightarrow$ DeviceNet)	
(model name)	Start CR	Length (words)	Start CR	Length (words)
ELC-AN04NANN	CR#6	4	N/A	N/A
ELC-AN04ANNN	N/A	N/A	CR#12	4
ELC-TC04ANNN	N/A	N/A	CR#14	4
ELC-PT04ANNN	N/A	N/A	CR#18	4
ELC-AN06AANN	CR#10	2	CR#12	4
ELC-MC01	CR#42	4	CR#33	4

#### Note:

While connected to a special I/O module, the starting CR number and length of the upload/download data for the ELC-CADNET can be set up in the DeviceNet network configuration tool.

#### Example DeviceNet connection

- 1. The DeviceNet master (such as the ELC-CODNETM) sends the output data to the ELC output modules connected to the ELC-CADNET).
- 2. ELC-CADNET sends the input data from ELC input modules to the DeviceNet master.

#### **Connection Example:**



#### 2.5 DeviceNet Data access

#### 2.5.1 I/O Mapped Data

The I/O data is accessed via the polled I/O connection from the DeviceNet master.

- (1) Control word and status word in ELC-CADNET
  - Control word

bit	Status value	Explanation					
0	0	Setting ELC-CADNET to STOP mode					
0	1	Setting ELC-CADNET to RUN mode					
1 ~ 14	0/1	Reserved					
15 0		Disable control word					
15	1	Enable control word					

Status word

bit	Status value	Explanation					
0	0	ELC-CADNET detects I/O modules.					
0	1	ELC-CADNET does not detect I/O modules.					
1	0	The configurations of ELC-CADNET and the I/O module connected to it are consistent.					
I	1	The configurations of ELC-CADNET and the I/O module connected to it are inconsistent.					
C	0	No error occurs in the special I/O module.					
2	1	There is an error in a special I/O module.					
S	0 The special I/O module is operating normally.						
5	1	The special I/O module is offline.					
0		The configuration data is valid.					
4	1	The configuration data is invalid.					
F	0 ELC-CADNET is operating normally.						
5	1	The power of ELC-CADNET is in low voltage.					
6	0	ELC-CADNET is operating normally.					
6 1 ELC-CADNET detects		ELC-CADNET detects unidentifiable special I/O module.					
	0	ELC-CADNET is operating normally.					
7	1	More than 8 special I/O modules connected to ELC-CADNET, or the number of digital I/O points exceeds 128.					
8 ~ 15	0/1	Reserved					

(2) I/O data mapping

• If the I/O data does not include the control word and status word of ELC-CADNET, the I/O data mapping between the DeviceNet master and the ELC-CADNET will be:

#### DeviceNet master → ELC-CADNET

Master (byte)	ELC-CADNET				
0		Low byte of the 1 <sup>st</sup> special I/O module output channel 1			
1	Special I/O module	High byte of the 1 <sup>st</sup> special I/O module output channel 1			
2		Low byte of the 1 <sup>st</sup> special I/O module output channel 2			
3	Special I/O module	High byte of the 1 <sup>st</sup> special I/O module output channel 2			
N		Y0 ~ Y7 on the 1 <sup>st</sup> ELC digital O I/O module			
N+1	ELC digital I/O module	Y0 ~ Y7 of the 2 <sup>nd</sup> ELC digital I/O module			

#### $\underline{\mathsf{ELC}\text{-}\mathsf{CADNET}} \rightarrow \underline{\mathsf{DeviceNet}} \text{ master}$

Master (byte)	ELC-CADNET					
0		Low byte of the 1 <sup>st</sup> special I/O module input channel 1				
1		High byte of the 1 <sup>st</sup> special I/O module input channel 1				
2	Special I/O module	Low byte of the 1 <sup>st</sup> special I/O module input channel 2				
3		High byte of the 1 <sup>st</sup> special I/O module input channel 2				
N		X0 ~ X7 on the $1^{st}$ ELC digital I/O module				
N+1	ELC digital I/O module	X0 ~ X7 on the 2 <sup>nd</sup> ELC digital I/O module				

If the I/O data includes the control word and the status word of ELC-CADNET, the I/O data mapping between the DeviceNet master and the ELC-CADNET will be:
 <u>DeviceNet master</u> → ELC-CADNET

Master (byte)	ELC-CADNET				
0		Low byte of control word of ELC-CADNET			
1	LLC-CADINET	High byte of control word of ELC-CADNET			
2		Low byte of the 1 <sup>st</sup> special I/O module output channel 1			
3	Special I/O module	High byte of the 1 <sup>st</sup> special I/O module output channel 1			
4		Low byte of the 1 <sup>st</sup> special I/O module output channel 2			

Master (byte)	ELC-CADNET				
5	Special I/O module	High byte of the 1 <sup>st</sup> special I/O module output channel 2			
N		Y0 ~ Y7 of the 1 <sup>st</sup> ELC digital I/O module			
N+1	ELC digital I/O module	Y0 ~ Y7 of the 2 <sup>nd</sup> ELC digital I/O module			

 $\underline{\text{ELC-CADNET}} \rightarrow \underline{\text{DeviceNet master}}$ 

Master (byte)	ELC-CADNET				
0		Low byte of status word of ELC-CADNET			
1	ELC-CADNET	High byte of status word of ELC-CADNET			
2		Low byte of the 1 <sup>st</sup> special I/O module output channel 1			
3		High byte of the 1 <sup>st</sup> special I/O module output channel 1			
4	Special I/O module	Low byte of the 1 <sup>st</sup> special I/O module output channel 2			
5		High byte of the 1 <sup>st</sup> special I/O module output channel 2			
Ν		X0 ~ X7 of the $1^{st}$ ELC digital I/O module			
N+1	ELC digital I/O module	X0 ~ X7 of the 2 <sup>nd</sup> ELC digital I/O module			

#### Note:

 If you choose to include the control word and status word of ELC-CADNET in the I/O data, the first word in the I/O data area will automatically be assigned to control word and status word.

#### 2.5.2 Explicit Message access

In addition to polled I/O connection, additional information can be accessed using explicit messaging. The following vendor specific classes are implemented in the ELC-CADNET, and they can be accessed using explicit messages.

• Class 0x9A – ELC-CADNET setup parameter object

Class attribute

Attribute ID Access rule		Name	Data type
1	Get	Revision	UINT

## Instance 1

Attrib. ID	Access rule	Name	Range	Data Type	Default	Explanation
1	Get	Length of input I/O data	N/A	UINT	N/A	The sum of the length of the status word of ELC-CADNET and the input data of the module connected to it. (Units: byte)
2	Get	Length of output I/O data	N/A	UINT	N/A	The sum of the length of the control word of ELC-CADNET and the output data of the module connected to it. (Units: byte)
3	Get	Number of digital input points (X)	0~128	UINT	N/A	The number of digital input points. This will be a multiple of 8. If fewer then 8 digital input points are present, the value will be set to 8. If more then 8, but less then 16 points are present, it will be set to 16. (Units: byte)
4	Get	Number of digital output points (Y)	0~128	UINT	N/A	The number of digital output points. This will be a multiple of 8, If fewer then 8 digital output points are present, the value will be set to 8. If more then 8, but less then 16 points are present, it will be set to 16. (Units: byte)
5	Get	Number of special I/O modules	0~8	UINT	N/A	The number of special I/O modules connected to ELC-CADNET. (Units: byte)
6	Get	Length of analog input	N/A	UINT	N/A	The length of input data of the special I/O module connected to ELC-CADNET. (Units: word)
7	Get	Length of analog output	N/A	UINT	N/A	The length of output data of the special I/O module connected to ELC-CADNET. (Units: word)
8	Get	Status word	0 ~ 255	UINT	N/A	Displaying the status of ELC-CADNET.
9	Get/ Set	Control word	N/A	UINT	N/A	For setting up the mode of ELC-CADNET, e.g. "H8000" for STOP mode and "H8001" for RUN mode.
10	Get/ Set	Diagnostic interval time	1 ~ 65 sec.	UINT	5 sec.	The interval when ELC-CADNET executes diagnosis.
11	Get/ Set	Special I/O module offline treatment	0~2	UINT	1	How ELC-CADNET will react when the special I/O module connected to it is offline. 0: Ignored. 1: Alarm. 2: Stop DeviceNet IO

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Attrib. ID	Access rule	Name	Range	Data Type	Default	Explanation
12	Get/ Set	Special I/O module error treatment	0~2	UINT	1	How ELC-CADNET will react when it detects errors. 0: Ignored. 1: Alarm. 2: Stop DeviceNet IO
13	Get/ Set	ELC-CAD NET configurati on validation	N/A	UINT	0	Validating the configuration of ELC-CADNET when set to "11"
14	Get/ Set	Reset ELC-CAD NET	N/A	UINT	0	Resetting ELC-CADNET when set to"10". After it, the parameter will change to "0" automatically.

• Class 0x9B – Special I/O module setup parameter object

Class attribute

Attribute ID	Access rule	Name	Data type
1	Get	Revision	UINT

Attrib. ID	Access rule	Name	Range	Data Type	Default	Explanation		
1	Get	Model name	N/A	UINT	N/A	Model code for the special I/O module		
2	Get	Length of input data	N/A	UINT	N/A	The spec (Unit	sur cial t: w	m of the input data length of I/O modules connected. vord)
3	Get	Length of output data	N/A	UINT	N/A	The sum of the output data length of special I/O modules connected. (Unit: word)		m of the output data length ial I/O modules connected. /ord)
						<b>Ь</b> 0	0	Special I/O module online
						00	1	Special I/O module offline
							0	Special I/O module normal
						b1	1	Special I/O module in error
						h2	0	Special I/O module and configuration consistent
4	Get	Status	0 ~ 63	UINT	N/A	U2	1	Special I/O module and configuration inconsistent
						b3	0	Configuration data valid
						b3	1	Configuration data invalid
						h4	0	Special I/O module identified
					D4	1	Special I/O module unidentified	
						b5~ b15		Reserved

Instance 2	1 ~ 8	(parameters	for the	1st ~ 8th	special I/O	modules)
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Attrib. ID	Access rule	Name	Range	Data Type	Default	Explanation
5	Get/Set	Mapping mode	0~1	UINT	0	Mapping mode of special I/O module 0: auto 1: custom
6	Get/Set	Number of input data	0~8	UINT	N/A	Number of bytes of input data for the special I/O modules connected
7	Get/Set	Number of output data	0~8	UINT	N/A	Number of bytes of output data for the special I/O modules connected
	8				Rese	erved
9	Get	Error code		UINT	N/A	Error code in special I/O module
10	~ 19				Rese	erved
20	Get/Set	Starting CR for module 1 input data	N/A	UINT	N/A	Starting CR for the input data of special I/O module 1
21	Get/Set	Input data length for module 1	N/A	UINT	N/A	Length of input data of special I/O module 1
22	Get/Set	Starting CR for module 2 input data	N/A	UINT	N/A	Starting CR for the input data of special I/O module 2
23	Get/Set	Input data length for module 2	N/A	UINT	N/A	Length of input data of special I/O module 2
24	Get/Set	Starting CR for module 3 input data	N/A	UINT	N/A	Starting CR for the input data of special I/O module 3
25	Get/Set	Input data length for module 3	N/A	UINT	N/A	Length of input data of special I/O module 3
26	Get/Set	Starting CR for module 4 input data	N/A	UINT	N/A	Starting CR for the input data of special I/O module 4
27	Get/Set	Input data length for module 4	N/A	UINT	N/A	Length of input data of special I/O module 4
28	Get/Set	Starting CR for module 5 input data	N/A	UINT	N/A	Starting CR for the input data of special I/O module 5
29	Get/Set	Input data length for module 5	N/A	UINT	N/A	Length of input data of special I/O module 5
30	Get/Set	Starting CR for module 6 input data	N/A	UINT	N/A	Starting CR for the input data of special I/O module 6
31	Get/Set	Input data length for module 6	N/A	UINT	N/A	Length of input data of special I/O module 6
32	Get/Set	Starting CR for module 7 input data	N/A	UINT	N/A	Starting CR for the input data of special I/O module 7

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Attrib. ID	Access rule	Name	Range	Data Type	Default	Explanation
33	Get/Set	Input data length for module 7	N/A	UINT	N/A	Length of input data of special I/O module 7
34	Get/Set	Starting CR for module 8 input data	N/A	UINT	N/A	Starting CR for the input data of special I/O module 8
35	Get/Set	Input data length for module 8	N/A	UINT	N/A	Length of input data of special I/O module 8
36	~ 49				Rese	erved
50	Get/Set	Starting CR for module 1 output data	N/A	UINT	N/A	Starting CR for the output data of special I/O module 1
51	Get/Set	Output data length for module 1	N/A	UINT	N/A	Length of output data of special I/O module 1
52	Get/Set	Starting CR for module 2 output data	N/A	UINT	N/A	Starting CR for the output data of special I/O module 2
53	Get/Set	Output data length for module 2	N/A	UINT	N/A	Length of output data of special I/O module 2
54	Get/Set	Starting CR for module 3 output data	N/A	UINT	N/A	Starting CR for the output data of special I/O module 3
55	Get/Set	Output data length for module 3	N/A	UINT	N/A	Length of output data of special I/O module 3
56	Get/Set	Starting CR for module 4 output data	N/A	UINT	N/A	Starting CR for the output data of special I/O module 4
57	Get/Set	Output data length for module 4	N/A	UINT	N/A	Length of output data of special I/O module 4
58	Get/Set	Starting CR for module 5 output data	N/A	UINT	N/A	Starting CR for the output data of special I/O module 5
59	Get/Set	Output data length for module 5	N/A	UINT	N/A	Length of output data of special I/O module 5
60	Get/Set	Starting CR for module 6 output data	N/A	UINT	N/A	Starting CR for the output data of special I/O module 6

Attrib. ID	Access rule	Name	Range	Data Type	Default	Explanation
61	Get/Set	Output data length for module 6	N/A	UINT	N/A	Length of output data of special I/O module 6
62	Get/Set	Starting CR for module 7 output data	N/A	UINT	N/A	Starting CR for the output data of special I/O module 7
63	Get/Set	Output data length for module 7	N/A	UINT	N/A	Length of output data of special I/O module 7
64	Get/Set	Starting CR for module 8 output data	N/A	UINT	N/A	Starting CR for the output data of special I/O module 8
65	Get/Set	Output data length for module 8	N/A	UINT	N/A	Length of output data of special I/O module 8

• Class 0x9C – Special I/O module parameter object

#### Class attribute

Attribute ID	Access rule	Name	Data type
1	Get	Revision	UINT
2	Get	Max Instance	UINT

Instance 1 ~ 8 (CR for the 1st ~ 8th special I/O module)

Attribute ID	Access rule	Name	Data type
1	Get	Contents of CR#0	UINT
2	Get/Set	Contents of CR#1	UINT
3	Get/Set	Contents of CR#2	UINT
			UINT
9	Get/Set	Contents of CR#8	UINT
10	Get/Set	Contents of CR#9	UINT
			UINT

#### Note:

- When you modify the contents of a CR for a special I/O module through DeviceNet, read back the contents (Get\_Attribute\_Single) after the write message to confirm that it has been modified successfully.
- The content in some CRs of the special I/O module cannot be modified. Consult the user documentation for the target specialty modules.

# 2.6 Application example: ELC-PV with ELC-CODNETM master

For this application example an ELC-PV processor with a CODNETM DeviceNet scanner module is the DeviceNet Master. Distributed ELC I/O is connected through the ELC-CADNET module.



- Configuration using ELCSoft / DeviceNetConfigurator software
  - Open DeviceNetConfigurator software from ECISoft by clicking the DNETCONFIG button and the following screen will open.

DNETCONFIG - Untitled		
File Edit Yiew Network Iools Setup   D 😂 🖬 🙀 🐰 🐿 🛍 🚟 🔍 🍜   P 🚽 🖶 🛊 👢 🐴 🔁 🖉 🍞 📖 🚼	Help ?	
Device List     Device Type     AC Drives     Communications Adapter     Connector     General Device     General Device     Device Limit Switch     Motor Overload     Motor Stater     Photelectric Sensor     Prematic Value(s)     SEW-Device Profile		
× Time Message Code	Description	
<		
Ready		Offline CAP NUM SCRL

 Select "Setup" => "Communication Setting" => "System Channel", and the "Serial Port Setting" dialog box will appear.

Serial Port Settin	ıg	X			
COM Port:	COM3	~			
Address:	0				
Baud rate:	9600	~			
Data Bits:	7	~			
Parity:	Even Parity	~			
Stop Bit:	1	~			
Mode:	ASCII	~			
OK Cancel					

 Set up the communication parameters in the PC and ELC-PV28, e.g. the communication port, address, baud rate and communication format. The DeviceNetConfigurator software will access the DeviceNet network via the programming port on the ELC-PV controller.

Item	Function	Default
COM Port	COM port on the PC to be used to communicate with ELC-PV28	COM1
Address	Communication address of ELC-PV28	01
Baud rate	Communication speed between the PC and ELC-PV28	9,600 (bps)
Data Bits		7
Parity	Communication protocol between the PC and ELC-PV28	Even Parity
Stop Bit		1
Mode	Communication mode between the PC and ELC-PV28	ASCII

• Click on "OK" and return to the main page.

na DNETCONFIG - Untitled	
Ede Edit Yiew Metwork. Iools Setup Help □ ☞ 및 및 ↓ % ™ ® ™ ♀ ↓ ⊕ □ □ ? - ⊕ ♥ = 1 = 1 → 1 → 19 7 □ 11 ₩ 9	
Device List     Device Type     AC Drives     Connector     General Device     General Device     General Device     Motor Overload     Motor Overload     Motor Overload     Motor Overload     Phematic Value(s)     Phematic Value(s)     Phematic Value(s)     Phematic Value(s)     StW-Device Profile	
× Time Message Code Description	
	>
Ready Offline CAP NUM	SCRL

 Select "Network" => "Online" and the "Select Communication Channel" dialog box will appear.

elect Co	mmunication Cha	nnel		
elect the	communication cl	hannel from	n the following list:	
Unit	Name	Mode	Input Mapping Device	Output Mapping Device
1	DNET Scanner	Master	D6000 - D6226	D6250 - D6476
Simila	ted online		OK	Cancel

• Click on "OK", and DeviceNetConfigurator will start to scan the entire network.

	Σ	K
Browsing Node 4		
	OK	

If the bar on the dialog box does not progress, it means the connection between the PC and ELC-PV28 is not correctly configured, or there are other programs also using the COM port on the PC. After the scan is completed, the dialog box will tell you that the scan is completed, and the icons and device names of all the nodes scanned on the network will be shown on the screen. See the figure below, in which the node address of ELC-CODNETM is 01 and the node address of the ELC-CADNET is 2.



 Double click on ELC-CADNET (node 02), and the "Node Configuration...dialog box will appear.

Node Configuratio	n		×
Address: 2	Name:	ELC-CADNE	Т
Node infomation Vendor ID: Device Type:	68 12	Key Paramet	Fype
Product Code: Major Rev: Min Rev:	12288 1 1	<ul> <li>✓ Product</li> <li>✓ Major R</li> <li>✓ Min Rev</li> </ul>	Code e∨ ∙
Polled Setting Input Size: 0 Output Size: 0	Bytes Bytes	COS/CC Set COS Input Size: Output Size:	ting OCC 0 Bytes 0 Bytes
Bit-Strobe Set	ting Bytes	Heartbeat: Ack Timeout: Inhibit Time:	250 ms 16 ms 1 ms
IO Configure		OK	Cancel

• Click on "IO Configure..." button in "Node Configuration" dialog box, and you will then see "RTU Configuration" page.

CADNET Configura	tion								
IO Modules	None	×:0 Y:0	Scan IO Download Reset Diagnostic IO Mapping						
Diagnostics								×	OK Cancel

• Click on "Scan IO", and the "Warning" dialog box will appear.

Warnin	2	
⚠	Scan the current IO module from remote device, it will clear all setting before start. Do you want to continue?	
	OK Cancel	

 Click on "OK". DeviceNetConfigurator will then detect the special I/O module connected to ELC-CADNET and the number of points in the ELC digital I/O module and display the information on "RTU Configuration" page.

CADNET Configuration	None TTO4 02NA	None None	None	Scan IO Download Reset Diagnostic IO Mapping
Diagnostics Operation finished!			<ul> <li>N</li> </ul>	OK Cancel

• Double click on ELC-CADNET icon, and you will then see "RTU Setup" dialog box.

CADNET Setup			X
─IO Module Information ───			
Input IO Data Length:	26		
Output IO Data Length:	5		
DI Module Points(X):	16		
DO Module Points(Y):	8		
Special Module Number:	4		
Error Control			
Diagnostic Interval Time:		5	Seconds
Special Module Offline Tre	eament:	Alarm	~
Special Module Error Treat	tment:	Alarm	~
Add control word and s	tatus wo	rd to IO data	
OK		Cancel	

• Set up the parameters in ELC-CADNET and confirm its I/O information.

Item	Function	Default
Input IO Data Length	The sum of the length of the status word of ELC-CADNET and the input data of the I/O module connected to it. The status word of ELC-CADNET occupies 2 bytes. One input channel of the special I/O module occupies 2 bytes. 8 points of the digital input are counted as 1 byte.	N/A
Output IO Data Length	The sum of the length of the control word of ELC-CADNET and the output data of the I/O module connected to it. The control word of ELC-CADNET occupies 2 bytes. One output channel of the special I/O module occupies 2 bytes. 8 points of the digital output are counted as 1 byte.	N/A
DIDO Input Points (X)	The digital input points shall be multiples of 8. The number will be regarded as 8 when it is less than 8 and regarded as 16 when it is larger than 8 but less than 16.	N/A
DIDO Output Points (Y)	The digital output points shall be multiples of 8. The number will be regarded as 8 when it is less than 8 and regarded as 16 when it is bigger than 8 but less than 16.	N/A
Number of Analog Modules	The number of special I/O modules connected to ELC-CADNET. Range: 0 ~ 8	N/A

Item	Function	Default
Diagnostic Interval Time	The interval when ELC-CADNET executes diagnosis. Range: 1~ 65 sec.	5 (sec)
IO Module Offline Treatment	How ELC-CADNET will react when the special I/O module connected to it is offline. You can choose "Ignored", "Alarm" or "stop DeviceNet IO".	Alarm
IO Module Error Treatment	How ELC-CADNET will react when it detects errors. You can choose "Ignored", "Alarm" or "Stop DeviceNet IO".	Alarm
Add control word and status word to IO data	For you to decide whether to add control word and status word to I/O data. When you choose not to do it, the I/O data in ELC-CADNET and DeviceNet master will not include control word and status word. If you choose to add them in, the I/O data in ELC-CADNET and DeviceNet master will include control word and status word.	Not to add

• Confirm all the configurations are correct and click on "Download" to download the configuration to ELC-CADNET. After the download is completed, click on "OK".

#### Configuration of the ELC-CODNETM

• Double click on DNET Scanner (node 01), and the "Scan Module Configuration..." dialog box will appear. You can find the currently available node, ELC-CADNET, in the list on the left side. On the right side, there is an empty "Scan List".

vailable No	ides:		Scan List:		
Address	Node Name		Address	Node Name	
02	ELC-CADNET		>		
			<		
utout Tabl	e		Innut Table		
Register	Device Image	~	Register	Device Image	~
D6287 H			D6037 H		
D6287_I			D6037_1		
D6282 H		_	D6038 H		
D6288 L			D6038 L		
D6289 H			D6039 H		
D6289 L			D6039 L		
D6290 H			D6040 H		
D6290 L			D6040 L		
D6291 H			D6041 H		
D6291 L			D6041 L		
D6292 H			D6042 H		
D6292 L			D6042 L		
D6293 H			D6043 H		
D6293 L			D6043 L		
D6294 H			D6044 H		
D6204 T		×	D6044 T		×
/		>	<		>

 Move the slave devices on DeviceNet in the "Available Nodes" list on the left side to the "Scan List" on the right side. Select a node and click on . Follow the steps to move all the nodes to the scan list.

Available No	odes:			Scan List:		
Address	Node Name			Address	Node Name	
			$\geq$	02	ELC-CADNET	
			<			
			1			
Output Tabl	le			Input Table		
Register	Device Image	^		Register	Device Image	
D6287 H	[Poll]02-ELC-CADNET			D6037 H	[Poll]02-ELC-CADNET	
D6287 L	Poll02-ELC-CADNET			D6037 L	Poll02-ELC-CADNET	
D6288 H	Poll02-ELC-CADNET			D6038 H	Poll02-ELC-CADNET	
D6288 L	Poll02-ELC-CADNET			D6038 L	Poll02-ELC-CADNET	
D6289 H	Poll02-ELC-CADNET			D6039 H	Poll02-ELC-CADNET	
D6289 L				D6039 L	Pol102-ELC-CADNET	
D6290 H				D6040 H	Pol102-ELC-CADNET	
D6290 L				D6040 L	Pol102-ELC-CADNET	
D6291 H				D6041 H	Pol102-ELC-CADNET	
D6291 L				D6041 L	Poll02-ELC-CADNET	
D6292 H				D6042 H	Poll02-ELC-CADNET	
D6292 L				D6042 L	Pol102-ELC-CADNET	
D6293 H				D6043 H	Pol102-ELC-CADNET	
D6293 L				D6043 L	Pol102-ELC-CADNET	
D6294 H		_		D6044 H	Pol102-ELC-CADNET	
		~		D (0 ( ) 7	TO MICO DI O OL DIVIDI	-1

 Confirm all the settings and note the D-register addresses the I/O data is mapped to and click on "OK". Next, download the configuration to ELC-CODNETM. If ELC-PV28 is in RUN mode while you are downloading the configuration, a "Warning" dialog box will appear.

Warning	3	×
⚠	Cannot perform this operation when PLC is in RUN mode! Do you wish to continue if this instruction will affect the state of the connected PLC?	
	OK Cancel	

 Click on "OK" to continue the download. Make sure ELC-PV28 is in RUN mode. The MS LED and NS LED on ELC-CADNET turn green.

DNETCONFIG - Untitled			
Ele Edit Yiew Network Iools Setup D 🚅 🖬 🙀 🐰 🖻 🛍 🚟 🔍 🍜 🚽 🕀 😝 🖣 🐴 🎒 🔗 🌾 📰 🛐	Help C C S		
Device List     Device Type     AC Drives     Communications Adapter     Contector     General Purpose Discrete I/O     Human-Mechnica Interface     Limit Switch     Motor Overload     Motor Stater     Photoelectric Sensor     Phonelectric Sensor     Phonelectric Sensor     Phonelectric Sensor     SE W-Device Profile	01 02 ELC-CODNET ELC-CADN Scanner	VET	
× Time Message Code	Description		
<			>
Ready	System Channel Unit:1	9600, <7,E,1> ASCII	Online CAP NUM SCRL

- (1) Follow the steps given above to configure other devices on the DeviceNet network. If the I/O data does not include the control word and status word of ELC-CADNET, the I/O data mapping of ELC-CODNETM and ELC-CADNET will be:
  - ELC-CODNETM Master → ELC-CADNET Slave

ELC-CODNETM		Digital/Analog Extension Module		
D6282H		Analog Extension Module	High byte of the content of CH1 in ELC-AN02NANN	
D6282L			Low byte o Analog Extension in ELC-AN	Low byte of the content of CH1 in ELC-AN02NANN
D6283H			High byte of the content of CH2 in ELC-AN02NANN	
D6283L			Low byte of the content of CH2 in ELC-AN02NANN	
D6284H		Digital Extension Module	Y0 ~ Y7 of ELC-EX16NNDR	

• ELC-CADNET Slave  $\rightarrow$  ELC-CODNETM Master

ELC-CODNETM		Digital/A	nalog Extension Module	
D6032H				High byte of the content of CH1 in ELC-AN04ANNN
D6032L			Low byte of the content of CH1 in ELC-AN04ANNN	
D6033H			High byte of the content of CH2 in ELC-AN04ANNN	
D6033L			Low byte of the content of CH2 in ELC-AN04ANNN	
D6034H			High byte of the content of CH3 in ELC-AN04ANNN	
D6034L			Low byte of the content of CH3 in ELC-AN04ANNN	
D6035H		High ELC-	High byte of the content of CH4 in ELC-AN04ANNN	
D6035L		Analog Extension Module	Low byte of the content of CH4 in ELC-AN04ANNN	
D6036H				High byte of the content of CH1 in ELC-TC04ANNN
D6036L			Low byte of the content of CH1 in ELC-TC04ANNN	
D6037H			High byte of the content of CH2 in ELC-TC04ANNN	
D6037L			Low byte of the content of CH2 in ELC-TC04ANNN	
D6038H			High byte of the content of CH3 in ELC-TC04ANNN	
D6038L			Low byte of the content of CH3 in ELC-TC04ANNN	
D6039H			High byte of the content of CH4 in ELC-TC04ANNN	

ELC-CODNETM		Digital/Analog Extension Module			
D6039L			Low byte of the content of CH4 in ELC-TC04ANNN		
D6040H		-	High byte of the content of CH1 in ELC-PT04ANNN		
D6040L			Low byte of the content of CH1 in ELC-PT04ANNN		
D6041H			High byte of the content of CH2 in ELC-PT04ANNN		
D6041L		Analog Extension Module	Low byte of the content of CH2 in ELC-PT04ANNN		
D6042H	Ų		High byte of the content of CH3 in ELC-PT04ANNN		
D6042L			Low byte of the content of CH3 in ELC-PT04ANNN		
D6043H		-	High byte of the content of CH4 in ELC-PT04ANNN		
D6043L			Low byte of the content of CH4 in ELC-PT04ANNN		
D6044H		Digital Extension	X0 ~ X7 of ELC-EX08NNSN		
D6044L		Module	X0 ~ X7 of ELC-EX16NNDR		

- (2) When the I/O data contains the control word and status word of ELC-CADNET, the I/O data of ELC-CODNETM (master) and ELC-CADNET (slave) are mapped as the tables listed in the next column.
  - ELC-CODNETM Master  $\rightarrow$  ELC-CADNET Slave

ELC-CODNETM		Digital/Analog Extension Module		
D6282H		ELC-CADNET	High byte of the control word in ELC-CADNET	
D6282L		control word	Low byte of the control word in ELC-CADNET	
D6283H			High byte of the content of CH1 in ELC-AN02NANN	
D6283L		Analog Extension Module	Low byte of the content of CH1 in ELC-AN02NANN	
D6284H			High byte of the content of CH2 in ELC-AN02NANN	
D6284L			Low byte of the content of CH2 in ELC-AN02NANN	
D6285H		Digital Extension Module	Y0 ~ Y7 of ELC-EX16NNDR	

ELC-CODNETM		Digital/Ar	nalog Extension Module	
D6032H		ELC-CADNET	High byte of the status word in ELC-CADNET	
D6032L		status word	Low byte of the status word in ELC-CADNET	
D6033H			High byte of the content of CH1 in ELC-AN04ANNN	
D6033L			Low byte of the content of CH1 in ELC-AN04ANNN	
D6034H			High byte of the content of CH2 in ELC-AN04ANNN	
D6034L			Low byte of the content of CH2 in ELC-AN04ANNN 的 CH2	
D6035H			High byte of the content of CH3 in ELC-AN04ANNN	
D6035L			Low byte of the content of CH3 in ELC-AN04ANNN	
D6036H			High byte of the content of CH4 in ELC-AN04ANNN	
D6036L			Low byte of the content of CH4 in ELC-AN04ANNN	
D6037H			High byte of the content of CH1 in ELC-TC04ANNN	
D6037L			Low byte of the content of CH1 in ELC-TC04ANNN	
D6038H			Analog Extension Module	High byte of the content of CH2 in ELC-TC04ANNN
D6038L				
D6039H			High byte of the content of CH3 in ELC-TC04ANNN	
D6039L			Low byte of the content of CH3 in ELC-TC04ANNN	
D6040H			High byte of the content of CH4 in ELC-TC04ANNN	
D6040L			Low byte of the content of CH4 in ELC-TC04ANNN	
D6041H			High byte of the content of CH1 in ELC-PT04ANNN	
D6041L			Low byte of the content of CH1 in ELC-PT04ANNN	
D6042H			High byte of the content of CH2 in ELC-PT04ANNN	
D6042L			Low byte of the content of CH2 in ELC-PT04ANNN	
D6043H			High byte of the content of CH3 in ELC-PT04ANNN	

#### $\bullet \quad \mathsf{ELC}\text{-}\mathsf{CADNET}\ \mathsf{Slave} \to \mathsf{ELC}\text{-}\mathsf{CODNETM}\ \mathsf{Master}$



# 2.7 Application Example: Custom Specialty I/O Data Mapping

(1) Assume the I/O modules connected to the ELC-CADNET are:

0 0 0 0 0 0 0 000 000 000 000 0 Õ r**i** 0 ELC-EX16NNDR ELC-AN04ANNN ELC-TC04ANNN ELC-AN02NANN ELC-PT04ANNN C-EX08NNSN r**h** ELC-CADNET ш 

If the I/O data does not include control word and status word of ELC-CADNET, the information of the I/O module connected to ELC-CADNET are as follows:

Item	Content	Software screen
DIDO Input Points (X)	16 bits	CADNET Setup
DIDO Output Points (Y)	8 bits	Input IO Data Length:     26       Output IO Data Length:     5       DI Module Points(X):     16
Number of Analog Modules	4	DU Module Points(Y): 8 Special Module Number: 4 Error Control Disensatic Interval Time: 5 Seconds
Input IO Data Length	26 bytes	Special Module Offline Treatment: Alarm
Output IO Data Length	5 bytes	Add control word and status word to IO data

If the I/O data does include the control word and status word of ELC-CADNET, the information of the I/O module connected to ELC-CADNET are as follows:

Item	Content	Software screen
DIDO Input Points (X)	16 bits	CADNET Setup
DIDO Output Points (Y)	8 bits	Input IO Data Length: 28 Output IO Data Length: 7 DI Module Points(X): 16 DO Madule ReintadO: 8
Number of Analog Modules	4	Error Control
Input IO Data Length	28 bytes	Special Module Error Treatment: Alarm
Output IO Data Length	7 bytes	Add control word and status word to IO data

(2) How to change the I/O mapping relation between ELC-CADNET and special I/O module.



For the configuration above, if you need to read the average Celsius degree temperature at CH1 ~ CH4 on ELC-PT04ANNN, follow the steps below:

a. Scan DeviceNet by using DeviceNetBuilder software. After the scan is completed, the nodes on DeviceNet will be displayed on the screen.

DNETCONFIG - Untitled		
File Edit Yiew Network Icols Setup D 🎯 🖬 🙀 🐰 🖻 🛍 🦉 🚇 🥮 🖓 🖶 🏺 🖺 💾 🏠 🖉 7 🏢 🚼	Help ?	
■ Device List     ■ Device Type     ● A C Drives     ● C Communications Adapter     ● WAGO 750-306 V02.0     ■ WAGO 750-306 V02.1     ■ WAGO 750-306 V04.1     ■ WAG	01 02 ELC-CODNET ELC-CADNET Scanner	
× Time Message Code	Description	
▲ 2010/02/08 16:34:28 108	Cannot change the work mode to Online.	>
Ready	System Channel Unit:1 9600, <7,E,1> ASCII Online CAP NUM	SCRL

b. Double click on ELC-CADNET icon, and the "Node Configuration..." dialog box will appear.

Node Configuration				×
Address: 2	Name:	ELC-CADNE	Т	
-Node infomation -		-Key Paramet	ters setting	
Vendor ID:	68	Vendor 🗸		
Device Type:	12	🗹 Device 🤇	Гуре	
Product Code:	12288	Product	Code	
Major Rev:	1	🗹 Major R	ev	
Min Rev:	1	🗹 Min Rev	7	
Polled Setting		COS/CC Set	ting	
Input Size: 0	Bytes	⊙ cos	Occ	<b>D</b> .
Output Size: 0	Bytes	Input Size:	0	Bytes
comparizzo:	2,000	Output Size:	0	Bytes
Bit-Strobe Setti	ng	Heartbeat:	250	ms
Innut Sime 0	Derton	Ack Timeout:	16	ms
mput Size.	Dytes	Inhibit Time:	1	ms
IO Configure		OK	Cancel	

c. Click on "IO Configure..." button in "Node Configuration..." dialog box, and you will then see "RTU Configuration" page.



d. Click on "Scan IO", and the "Warning" dialog box will appear.



e. Click on "OK". DeviceNetConfigurator will then display the special I/O modules

connected and the number of digital I/O points on the "RTU Configuration" page.



f. Double click on "04TC" icon, and you will then see the "AIAO Module Configuration" dialog box, as below. The content in Input Data >> Link 1 column is "CR14-Present temperature of CH1(C)".

Special M	oudle Configuration					X
Input I	Data	_	1		Model Name:	
Link 1:	CR14 - Present temperature of CH1(C)	*	Number:	4	TC04	*
Link 2:		V	Number:		Work Mode:	
Link 3:		v	Number:		Auto	*
Link 4:		v	Number:		Input Link Number	s
Link 5:		v	Number:		1	
Link 6:		v	Number:		Output Link Numb	er:
Link		v	Number:		0	
Link 8:		v	Number:		Input Data Length	:
Output	t Data				4	
Link 1:		~	Number:		Output Data Leng	th:
Link 2:		~	Number:		0	
Link 3:		v	Number:			
Link 4:		v	Number:			
Link 5:		v	Number:			
Link 6:		v	Number:			
Link 7:		~	Number:		OK	
Link 8:		~	Number:			
					Cancel	

g. Set the Work Mode to "Custom" and Input Data >> Link 1 to "CR6-CH1 average degree(C)".

Input I	Data			Model Name:
Link 1: Link 2: Link 3: Link 4: Link 4:	CR6 - CH1 average degress(C)	× × ×	Number: 4 Number: 1 Number: 1 Number: 1	TC04 Work Mode: Custom Input Link Number:
Link 6: Link Link Link 8:		*	Number: Number: Number:	1  Output Link Numbe 0 Input Data Length:
Output	t Data			4
Link 1: Link 2: Link 3: Link 4: Link 5:		> > > > > >	Number: Number	Output Data Length
Link 0: Link 7:		×	Number:	ОК

h. Click on "OK" in "AIAO Module Configuration" page and return to "RTU Configuration" page.



i. Click on "Download" to download the configuration to ELC-CADNET.



j. After the download is completed, click on "OK".

## 3 ELC-CAPBDP

The ELC-CAPBDP is a PROFIBUS DP Slave Communication Module. To ensure correct installation and operation of the product, please read this operation information below carefully before using it. ELC-CAPBDP is a PROFIBUS DP slave communication module for connecting ELC series special I/O modules, digital I/O modules and standard Modbus devices to PROFIBUS DP network.

#### 3.1 Features

- Supports PROFIBUS DP cyclic data transmission.
- Auto-detects baud rates; supports max. 12Mbps.
- Self-diagnosis
- Able to connect to max. 8 special I/O modules (i.e. analog I/O, temperature measurement, counter and positioning modules) and 16 digital I/O modules (max. 256 digital I/O points).
- The RS-485 COM port is able to connect to max. 16 standard Modbus slave stations.

#### 3.2 Specifications

#### PROFIBUS DP Port

Interface	DB9 connector	
Transmission method	High-speed RS-485	
Transmission cable	Shielded twisted pair cable	
Electrical isolation	500VDC	

#### Communication

Message type	Cyclic data exchange	
Module name	ELC-CAPBDP	
GSD file	EATN09B9.GSD	
Product ID	09B9 (HEX)	
Serial transmission speed supported (auto-detection)	9.6kbps; 19.2kbps; 93.75kbps; 187.5kbps; 500kbps; 1.5Mbps; 3Mbps; 6Mbps; 12Mbps (bits per second)	

#### Environment

	ESD (IEC 61131-2,IEC 61000-4-2): 8kV Air Discharge EFT (IEC 61131-2,IEC 61000-4-4): Power Line:±2kV,Digital Input:±2kV
Noise immunity	Communication I/O: ±2kV
	Conducted Susceptibility Test (EN61000-4-6, IEC 61131-2 9.10): 150kHz ~ 80MHz,10V/m
	KS (IEC 01131-2, IEC 01000-4-3): 2010HZ ~ 1GHZ, 10V/M
Storage/operation	Operation: $0^{\circ}$ C ~ 50°C (temperature), 50 ~ 90% (humidity), pollution degree 2 Storage: -25°C ~ 70°C (temperature), 5 ~ 95% (humidity)
	Storage25 C 70 C (temperature), 5 95% (number)

Shook/wibration	International standards: IEC 61121 2 IEC 68 2 6 (TEST
Shock/vibration	International standards: IEC 61131-2,IEC 68-2-6 (TEST
immunity	Fc)/IEC 61131-2& IEC 68-2-27 (TEST Ea)

#### Electrical specification

Power supply voltage	24VDC
Insulation voltage	500VDC
Power consumption	2.5W
Weight	90g

# 3.3 Product Profile and Outline



Unit: mm

1.	POWER indicator	10. Nameplate
2.	NET indicator	11. I/O module connection port
3.	RS-485 indicator	12. DIN rail (35mm)
4.	RUN/STOP switch	13. I/O module fixing clip
5.	RUN indicator	14. DIN rail fixing clip
6.	ALARM indicator	15. RS-485 COM port
7.	Address setup switch	16. I/O module fixing notch
8.	PROFIBUS DP COM port	17. DC24V power supply interface
9.	I/O module positioning hole	

# 3.4 Installation and wiring

## Definition of PROFIBUS DP Port

PIN	PIN name	Definition
1		N/C
2		N/C
3	RxD/TxD-P	Sending/receiving data P(B)
4		N/C
5	DGND	Data reference potential (C)
6	VP	Power voltage – positive
7		N/C
8	RxD/TxD-N	Sending/receiving data N(A)
9		N/C



#### ■ Connecting to PROFIBUS DP Port

Connect the PROFIBUS DP bus connector to the PROFIBUS DP port on the ELC-CAPBDP (see the figure below) Screw it tight to ensure ELC-CAPBDP and PROFIBUS DP bus are properly connected.



#### ■ Installing ELC-CAPBDP and I/O Module on DIN Rail

- Use 35mm DIN rail.
- Open the DIN rail clips on ELC-CAPBDP and I/O module. Insert ELC-CAPBDP and I/O module on the DIN rail.
- Clip up the DIN rail clips on ELC-CAPBDP and I/O module to fix them on the DIN rail (see the figure below).


## RUN/STOP Switch

	Status	Description
RUN	RUN => STOP	1. Special I/O module switches from RUN to STOP.
		2. All Y points on digital output module turn OFF.
		3. Modbus function disabled
		4. RUN LED turns off.
	STOP => RUN	1. ELC-CAPBDP re-detects the number of digital I/O points and special I/O modules.
		2. Special I/O module switches from STOP to RUN.
		3. Enable digital I/O modules.
		4. Enable Modbus function.
		5. RUN LED turns on.

## Address Setup Switch

The two rotary address setup switches,  $x16^{0}$  and  $x16^{1}$ , set up the node address of ELC-CAPBDP on PROFIBUS DP network in hex form. The range for rotation is 0 ~ F.

Address	Definition	
H'1~ H'7D	Valid PROFIBUS address	ADDRESS
H'0 or H'7E ~ H'FF	Invalid PROFIBUS address. NET LED will flash in red color if the node address falls within this range.	NOD

**Example:** If you need to set the node address of ELC-CAPBDP to 26 (decimal), simply switch  $x16^{1}$  switch to "1" and  $x16^{0}$  to "A". 26 (decimal) = 1A (hex) =  $1x16^{1} + Ax16^{0}$ . **Note:** 

- Switch off the power supply before setting up the node address of ELC-CAPBDP. Re-power the module after the setup is completed.
- Changing the value on the switch during the operation of ELC-CAPBDP is invalid.
- Use slot type screwdriver to set up the switch.

### ■ Connecting to a PROFIBUS DP Network

See the figure below for the connection of ELC series I/O modules and Modbus devices into a PROFIBUS DP network.



#### Transmission Distance and Baud Rate

The baud rate range for PROFIBUS DP is 9.6kbps ~ 12Mbps, and the length of transmission cable varies with the transmission speed. The cable length ranges from 100m to 1,200m. See the table below for the baud rates ELC-CAPBDP supports and their corresponding cable lengths.

Baud rate (bps)	9.6k	19.2k	93.75k	187.5k	500k	1.5M	3M	6M	12M
Cable Length (m)	1,200	1,200	1,200	1,000	400	200	100	100	100

## 3.5 ELC-CAPBDP Settings and Configurations

The GSD file is a text file used to describe a PROFIBUS DP device (master or slave). A GSD file usually contains the supplier's information, baud rates supported and applicable I/O messages. When using the ELC-CAPBDP, import the ELC-CAPBDP GSD file into the configuration software for the PROFIBUS DP master you are using. After the file is imported, the configuration software for the master will display the ELC-CAPBDP and its configuration settings.

### ELC-CAPBDP Settings

When you set up the ELC-CAPBDP in the configuration software for PROFIBUS DP master, you will be presented with multiple configuration settings, which adds flexibility to the use of the ELC-CAPBDP. See the figure below for ELC-CAPBDP settings.

Properties - DP slave				
General Parameter Assignment	,			
Parameters  Station parameters  Comparameters  Comparameters  Comparameters  Comparameters  Comparameters  Comparameter  Compara	Value         Disable         8,N,2         19200 bps         RTU         Hold I/O data         Ignore & continue I/O exchange         Ignore & continue I/O exchange         Ignore & continue I/O exchange         10			
OK	Cancel Help			

Definitions of settings:

Setup item	Setting	Definition
Acceleration mode	Enable	When the Modbus device is configured with many addresses and the addresses are consecutive, all contents in the consecutive addresses can be read or written at a time.
	Disable	When the Modbus device is configured with many addresses, only contents in a single address can be read or written.
Modbus protocol	7, E, 1 7, O, 2 8, N, 1 7, O, 1 8, E, 1 8, N, 2 7, E, 2 8, O, 1	Modbus communication format (including data bit, stop bit and parity bit)
Modbus Baudrate	1,200bps19,200bps2,400bps38,400bps4,800bps57,600bps9,600bps115,200bps	Modbus serial transmission speed
Modbus mode RTU/ASCII		Modbus communication mode
Loss	Hold I/O data	ELC-CAPBDP retains the I/O data last received from the master.
communication with master	Clear I/O data	ELC-CAPBDP reset all the I/O data to 0 after communication from the master is lost.

Setup item	Setting	Definition
Modbus slave	Ignore & continue I/O exchange	ELC-CAPBDP continues exchanging data with the master even when Modbus read/write error occurs.
error	Stop I/O exchange &report fault	ELC-CAPBDP stops exchanging data with the master when Modbus read/write error occurs.
	Ignore & continue I/O exchange	ELC-CAPBDP continues exchanging data with the master even when the Modbus slave is disconnected.
Loss Modbus slave	Continue & report alarm	ELC-CAPBDP continues exchanging data with the master and alarms it when there is Modbus slave getting disconnected.
	Stop I/O exchange & report fault	ELC-CAPBDP stops exchanging data with the master and reports error to it when there is Modbus slave getting disconnected.
	Ignore & continue I/O exchange	ELC-CAPBDP continues exchanging data with the master even when error occurs in the right-side special I/O module.
	Continue & report alarm	ELC-CAPBDP continues exchanging data with the master and alarms it when error occurs in the right-side special I/O module.
IO module error	Stop I/O exchange & report fault	ELC-CAPBDP stops exchanging data with the master and reports error to it when error occurs in the right-side special I/O module.
Modbus timeout setting (ms)	0 ~ 65535	Modbus communication timeout. Unit: ms
Diagnose cycle (s)	1 ~ 20	Cycle for ELC-CAPBDP to diagnose the right-side special I/O module. Unit: s

## Configuration Items

ELC-CAPBDP offers flexible configuration when being configured in PROFIBUS DP master configuration tool, for example, you can configure digital I/O modules or special I/O modules by the actual name of the module, or self-define the configuration.

Configuration item	Configurable device	Configuration method	
Modbus 1 read address			
Modbus 2 read address			
Modbus 4 read address	Modbus devices connected to ELC-CAPBDP	Modbus	
Modbus 8 read address			
Modbus 1 write address			
Modbus 2 write address	Modbus devices connected to ELC-CAPBDP	Modbus	

Configuration item	Configurable device	Configuration method	
Modbus 4 write address		Modbus	
Modbus 8 write address			
Modbus 1 read & write address	Modbus devices connected to		
Modbus 2 read & write address	ELC-CAPBDP		
Modbus 4 read & write address			
Modbus 8 read & write address			
ELC-EX08NNDN	ELC-EX08NNDN connected to ELC-CAPBDP		
ELC-EX08NNNT	ELC-EX08NNNR or ELC-EX08NNNT connected to ELC-CAPBDP		
ELC-EX08NNDR/T	ELC-EX08NNDR or ELC-EX08NNDT connected to ELC-CAPBDPStandard configura method for digital i moduleELC-EX16NNDR or ELC-EX16NNDT connected to ELC-CAPBDPELC-EX16NNDT connected to ELC-CAPBDP		
ELC-EX16NNDR/T			
ELC-EX08NNSN	ELC-EX08NNSN module connected to ELC-CAPBDP		
8 DI			
8 DO			
8 DIDO			
16 DI			
16 DO			
16 DIDO	Digital I/O modules connected to	Self-defined configuration	
32 DI	ELC-CAPBDP	method for digital I/O module	
32 DO			
32 DIDO			
64 DI			
64 DO			
64 DIDO			
ELC-AN04ANNN	ELC-AN04ANNN connected to ELC-CAPBDP	Standard configuration method for special I/O module	
ELC-AN06ANNN	ELC-AN06ANNN connected to ELC-CAPBDP		
ELC-AN02NANN	ELC-AN02NANN connected to ELC-CAPBDP		
ELC-AN04NANN	ELC-AN04NANN connected to ELC-CAPBDP	Standard configuration method for special I/O	

Configuration item	Configurable device	Configuration method	
ELC-AN06AANN	ELC-AN06AANN connected to ELC-CAPBDP	module	
ELC-PT04ANNN	ELC-PT04ANNN connected to ELC-CAPBDP		
ELC-TC04ANNN	ELC-TC04ANNN connected to ELC-CAPBDP		
1 AI			
2 AI			
4 AI			
8 AI			
1 AO		Self-defined configuration	
2 AO	Special I/O modules connected to		
4 AO	ELC-CAPBDP	module	
8 AO			
1 AIAO			
2 AIAO			
4 AIAO			
8 AIAO			

#### Settings of Configuration Items

• Settings of Configuration Items for Digital I/O Modules

There are 2 types of configuration items for digital I/O modules, standard configuration and self-defined configuration. By standard configuration, the digital I/O module is named after its actual name, whereas it is named after the number of points by self-defined configuration. You do not have to set up parameters in the configuration. The digital I/O can correspond to the master directly after the configuration

- Settings of Configuration Items for Special I/O Modules
   The special I/O module is named after its actual name in the configuration. You can
   configure special I/O module by standard configuration items. Detailed configuration
   methods will be explained in the following paragraphs.
  - (1) Configuration method for ELC-AN06ANNN and ELC-AN04ANNN Refer to the figure below for the relevant parameters to configure ELC-AN06ANNN. ELC-AN04ANNN and ELC-AN06ANNN have the same parameters to set, except that ELC-AN06ANNN has two more parameters for output channels to set than does ELC-AN04ANNN (Therefore, only the parameter settings for ELC-AN06ANNN are introduced in this section).

Properties - DP slave		
Address / ID Parameter Assignment	1	
Parameters = 🔄 Station parameters	Value	
Device-specific parameters     Device-specific parameters     Device-specific parameters	0	
_≝ CH1 input mode _≝ CH2 input mode	-10V~+10V -10V~+10V -10V~+10V	
-딸 CH3 input mode -딸 CH4 input mode -딸 CH5 input mode	-10V~+10V -10V~+10V	
– ≝ CH6 input mode – ≝ Input value mode	-10V~+10V Current value	
LIII Average times 	10	
OK Cancel Help		

Definitions of configuration items:

Parameter	Value	Definition
Location	0 ~ 7	The location of ELC-AN06ANNN at the right side of ELC-CAPBDP. The location of the first special I/O module at the right side of ELC-CAPBDP is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.
	-10V ~ +10V	The input channel on ELC-AN06ANNN is set to mode 0: Voltage input mode. Input range: -10V ~ +10V
CH1 input mode CH2 input mode CH3 input mode	-6V ~ +10V	The input channel on ELC-AN06ANNN is set to mode 1: Voltage input mode. Input range: $-6V \sim +10V$ .
CH4 input mode CH5 input mode CH6 input mode	-12mA ~ +20mA	The input channel on ELC-AN06ANNN is set to mode 2: Current input mode. Input range: -12mA ~ +20mA
	-20mA ~ +20mA	The input channel on ELC-AN06ANNN is set to mode 3: Current input mode. Input range: -20mA ~ +20mA
Input value	Current value	Current value of the input signal in all channels on ELC-AN06ANNN
mode	Average value	Average value of the input signals in all channels on ELC-AN06ANNN
Average times	1 ~ 4,096	The average times

(2) Configuration method for ELC-AN04NANN and ELC-AN02NANN

Refer to the figure below for the relevant parameters to configure ELC-AN04NANN. ELC-AN04NANN and ELC-AN02NANN have the same parameters to set, except that ELC-AN04NANN has two more parameters for input channels to set than does ELC-AN02NANN (Therefore, only the parameter settings for ELC-AN04NANN are introduced in this section).

Properties - DP slave 🔀				
Address / ID Parameter Assignment				
Parameters         □       Station parameters         □       □	Value           0           0V~10V           0V~10V           0V~10V			
<ul> <li>□□ CH3 output mode</li> <li>□□ CH4 output mode</li> <li>□□ Hex parameter assignment</li> </ul>	0V~10V 0V~10V			
OK Cancel Help				

Definitions of configuration items:

Parameter	Value	Definition
Location	0 ~ 7	The location of ELC-AN04NANN at the right side of ELC-CAPBDP. The location of the first special I/O module at the right side of ELC-CAPBDP is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.
CH1 output mode CH2 output mode CH3 output mode CH4 output mode	0V ~ 10V	The output channel on ELC-AN04NANN is set to mode 0: Voltage output mode. Output range: 0V ~ +10V
	2V ~ 10V	The output channel on ELC-AN04NANN is set to mode 1: Voltage output mode. Output range: 2V ~ 10V
	4mA ~ 20mA	The output channel on ELC-AN04NANN is set to mode 2: Current output mode. Output range: 4mA ~ 20mA
	0mA ~ 20mA	The output channel on ELC-AN04NANN is set to mode 3: Current output mode. Output range: 0mA ~ 20mA

(3) Configuration method for ELC-AN06AANN

Refer to the figure below for the relevant parameters to configure ELC-AN06AANN.

Properties - DP slave	
Address / ID Parameter Assignment	
Parameters	Value
	0 -10V~~+10V
<ul> <li>□ CH2 input mode</li> <li>□ CH3 input mode</li> <li>□ CH4 input mode</li> <li>□ CH4 input mode</li> </ul>	-10V~+10V -10V~+10V -10V~+10V
<ul> <li>□ CHS output mode</li> <li>□ CH6 output mode</li> <li>□ Input value mode</li> <li>□ Input value mode</li> </ul>	0V~10V 0V~10V Current value
OK	Cancel Help

Parameter	Value	Definition
Location	0~7	The location of ELC-AN06AANN at the right side of ELC-CAPBDP. The location of the first special I/O module at the right side of ELC-CAPBDP is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.
	-10V ~ +10V	The input channel on ELC-AN06AANN is set to mode 0: Voltage input mode. Input range: -10V ~ +10V
CH1 input mode CH2 input mode	-6V ~ +10V	The input channel on ELC-AN06AANN is set to mode 1: Voltage input mode. Input range: -6V ~ +10V
CH3 input mode CH4 input mode	-12mA ~ +20mA	The input channel on ELC-AN06AANN is set to mode 2: Current input mode. Input range: -12mA ~ +20mA
	-20mA ~ +20mA	The input channel on ELC-AN06AANN is set to mode 3: Current input mode. Input range: -20mA ~ +20mA
CH5 output mode CH6 output mode	0V ~ 10V	The output channel on ELC-AN06AANN is set to mode 0: Voltage output mode. Output range: 0V ~ +10V
	2V ~ 10V	The output channel on ELC-AN06AANN is set to mode 1: Voltage output mode. Output range: 2V ~ 10V
	4mA ~ 20mA	The output channel on ELC-AN06AANN is set to mode 2: Current output mode. Output range: 4mA ~ 20mA
	0mA ~ 20mA	The output channel on ELC-AN06AANN is set to mode 3: Current output mode. Output range: 0mA ~ 20mA

Parameter	Value	Definition
Input value mode	Current value	Current value of the input signal in CH1 ~ CH4 on ELC-AN06AANN
	Average value	Average value of the input signals in CH1 ~ CH4 on ELC-AN06AANN
Set average times	1 ~ 4,096	The average times

(4) Configuration method for ELC-PT04ANNN

Refer to the figure below for the relevant parameters to configure ELC-PT04ANNN.

Properties - DP slave		
Address / ID Parameter Assignment		
Parameters Station parameters Device-specific parameters Temperature mode Temperature mode Temperature mode Hour value mode Hex parameter assignment	Value 0 Centigrade (°C ) Current value 10	
ОК	Cancel Help	

Parameter	Value	Definition
Location	0~7	The location of ELC-PT04ANNN at the right side of ELC-CAPBDP. The location of the first special I/O module at the right side of ELC-CAPBDP is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.
Temperature mode	Centigrade (°C)	Collecting temperature in Centigrade by CH1 ~ CH4 on ELC-PT04ANNN
	Fahrenheit (°F)	Collecting temperature in Fahrenheit by CH1 ~ CH4 on ELC-PT04ANNN
Input value	Current value	Current value of the collected temperature at CH1 ~ CH4 on ELC-PT04ANNN
mode	Average value	Average value of the collected temperatures at CH1 ~ CH4 on ELC-PT04ANNN
Average times	1 ~ 4,096	The average times.

(5) Configuration method for ELC-TC04ANNN

Refer to the figure below for the relevant parameters to configure ELC-TC04ANNN.

Properties - DP slave	$\mathbf{X}$
Address / ID Parameter Assignment	
Parameters         Station parameters         ■ Device-specific parameters         ■ Location         ■ CH1 input mode         ■ CH2 input mode         ■ CH3 input mode         ■ CH4 input mode         ■ Nput value mode         ■ Average times         ■ Temperature mode         ■ Hex parameter assignment	Value  0 J-type J-type J-type Current value 10 Centigrade (°C')
OK	Cancel Help

Parameter	Value	Definition
Location	0~7	The location of ELC-TC04ANNN at the right side of ELC-CAPBDP. The location of the first special I/O module at the right side of ELC-CAPBDP is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.
CH1 input mode	J, K, R, S, T	Thermocouple type for CH1 on ELC-TC04ANNN
CH2 input mode	J, K, R, S, T	Thermocouple type for CH2 on ELC-TC04ANNN
CH3 input mode	J, K, R, S, T	Thermocouple type for CH3 on ELC-TC04ANNN
CH4 input mode	J, K, R, S, T	Thermocouple type for CH4 on ELC-TC04ANNN
Input value	Current value	Current value of the collected temperature at CH1 ~ CH4 on ELC-TC04ANNN
mode	Average value	Average value of the collected temperatures at CH1 ~ CH4 on ELC-TC04ANNN
average times	1 ~ 4,096	The average times
Temperature mode	Centigrade (°C)	Collecting temperature in Centigrade by CH1 ~ CH4 on ELC-TC04ANNN
	Fahrenheit (°F)	Collecting temperature in Fahrenheit by CH1 ~ CH4 on ELC-TC04ANNN

- Self-Defined Configuration Settings for Special I/O Modules
   In self-defined configuration, special I/O modules are named after their configurable
   number of control registers (CR). You can choose the CR in the special I/O module to
   be read or written when configuring. See the following paragraphs for the meanings of
   each configuration item.
  - (1) Configuration method for 8AI, 4AI, 2AI and 1AI modules

Refer to the figure below for the relevant parameters to configure an 8AI module. 8AI, 4AI, 2AI and 1AI modules have the same parameters to set, except that the number of configurable CRs in 1AI, 2AI and 4AI modules is different from that of 8AI module (Therefore, only the parameter settings for 8AI are introduced in this section).

Properties - DP slave		
Address / ID Parameter Assignment		
Parameters	Value	
	0	
IEI Module IEI Input CR number 1:Slave->Master	ELC-AN04ANNN 0	
– (≝) Input CR number 2 – (≝) Input CR number 3	1 2	
- 🗐 Input CR number 4	3	
- Input CR number 6	11 12	
□ Input CR number 8	13	
OK	Cancel Help	

Parameter	Value	Definition
Location	0 ~ 7	The location of the special I/O module at the right side of ELC-CAPBDP. The location of the first special I/O module at the right side of ELC-CAPBDP is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.
Module	ELC-AN04ANNN ELC-AN06ANNN ELC-AN02NANN ELC-AN04NANN ELC-AN06AANN ELC-PT04ANNN ELC-TC04ANNN ELC-TC04ANNN ELC-MC01	Special I/O module in use

Parameter	Value	Definition
Input CR number 1: Slave $\rightarrow$ Master	0 ~ 48	
Input CR number 2	0 ~ 48	
Input CR number 3	0 ~ 48	
Input CR number 4	0 ~ 48	No. of the CR in special I/O module to
Input CR number 5	0 ~ 48	be read by PROFIBUS DP master
Input CR number 6	0 ~ 48	
Input CR number 7	0 ~ 48	
Input CR number 8	0 ~ 48	

(2) Configuration method for 8AO, 4 AO, 2AO and 1AO modules

Refer to the figure below for the relevant parameters to configure an 8AI module. 8AO, 4AO, 2AO and 1AO modules have the same parameters to set, except that the number of configurable CRs in 1AO, 2AO and 4AO modules is different from that of 8AO module (Therefore, only the parameter settings for 8AO are introduced in this section).

Properties - DP slave	X
Address / ID Parameter Assignment	
Decembers	Mahar
	0
Module     Module     Master > Slave	
Output Ch number 1.Master25lave	7
	0
Output CR number 3     Sector 4	
Output CR number 4	10
Compare CP number 5	10
Output Ch number 6	13
	20
OK	CancelHelp

Parameter	Value	Definition
Location	0~7	The location of the special I/O module at the right side of ELC-CAPBDP. The location of the first special I/O module at the right side of ELC-CAPBDP is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.

Parameter	Value	Definition	
Module	ELC-AN04ANNN ELC-AN06ANNN ELC-AN02NANN ELC-AN04NANN ELC-AN06AANN ELC-PT04ANNN ELC-TC04ANNN ELC-TC04ANNN ELC-MC01	Special I/O module in use	
Output CR number 1: Master $\rightarrow$ Slave	0 ~ 48		
Output CR number 2	0 ~ 48		
Output CR number 3	0 ~ 48		
Output CR number 4	0 ~ 48	to be written by PROFIBUS DP	
Output CR number 5	0 ~ 48	master	
Output CR number 6	0 ~ 48		
Output CR number 7	0 ~ 48		
Output CR number 8	0 ~ 48		

(3) Configuration method for 8AIAO, 4AIAO, 2AIAO and 1AIAO modules Refer to the figure below for the relevant parameters to configure an 8AIAO module. 8AIAO, 4AIAO, 2AIAO and 1AIAO modules have the same parameters to set, except that the number of configurable CRs in 1AIAO, 2AIAO and 4AIAO modules is different from that of 8AIAO module (Therefore, only the parameter settings for 8AIAO are introduced in this section).

Properties - DP slave		×	
Address / ID Parameter Assignment			
	0.1		
	Value		
E Station parameters			
	-		
- E Location	0		
– <u>≡</u> Module	ELC-AN04NANN		
– Input CR number 1:Slave-≻Master	0		
– Input CR number 2	1		
– Input CR number 3	6		
– Input CR number 4	7		
– Input CR number 5	8		
–  Input CR number 6	9		
_ Input CR number 7	33		
–  Input CR number 8	34		
–  Output CR number 1:Master->Slave	6		
Output CR number 2	7		
Output CR number 3	8		
Output CB number 4	9		
Cutput CB number 5	1	<b>Y</b>	
UK	Cancel He.	ιp	

Definitions of configuration items:

Parameter	Value	Definition		
Location	0~7	The location of the special I/O module on the right side of ELC-CAPBDP. The location of the first special I/O module on the right side of ELC-CAPBDP is 0, the second is 1 and so forth. This rule is only applicable on special I/O modules.		
Module	ELC-AN04ANNN ELC-AN06ANNN ELC-AN02NANN ELC-AN04NANN ELC-AN06AANN ELC-PT04ANNN ELC-TC04ANNN ELC-TC04ANNN	Special I/O module in use		
Input CR number 1: Slave $\rightarrow$ Master	0 ~ 48			
Input CR number 2	0 ~ 48			
Input CR number 3	0 ~ 48			
Input CR number 4	0 ~ 48	to be read by PROFIBUS DP		
Input CR number 5	0 ~ 48	master		
Input CR number 6	0 ~ 48			
Input CR number 7	0 ~ 48			
Input CR number 8	0 ~ 48			
Output CR number 1: Master $\rightarrow$ Slave	0 ~ 48			
Output CR number 2	0 ~ 48			
Output CR number 3	0 ~ 48			
Output CR number 4	0 ~ 48	to be written by PROFIBUS DP		
Output CR number 5	0~48	master		
Output CR number 6	0 ~ 48			
Output CR number 7	0~48			
Output CR number 8	0 ~ 48			

### Modbus Configuration Settings

In Modbus configuration, parameters are named after the address of configurable Modbus device. See the following paragraphs for the meanings of each configuration item.

(1) Configuration method for Modbus 8 read address, Modbus 4 read address, Modbus 2 read address and Modbus 1 read address

Refer to the figure below for the relevant parameters to configure Modbus 8 read address. Modbus 8 read address, Modbus 4 read address, Modbus 2 read address

and Modbus 1 read address have the same parameters to set, except that the addresses of configurable Modbus device for Modbus 4 read address, Modbus 2 read address and Modbus 1 read address are different from that of Modbus 8 read address (Therefore, only the parameter settings for Modbus 8 read address are introduced in this section).

Pro	perties - DP slave	X
A	ddress / ID Parameter Assignment	1
	Parameters	Value
	🖃 🔄 Station parameters	
	🔁 🔄 Device-specific parameters	
	– Node ID	1
	–🗒 Read address 1:Slave->Master	0
	–📺 Read address 2	0
	—📺 Read address 3	0
	—📺 Read address 4	0
	—🖹 Read address 5	0
	– 🖺 Read address 6	0
	–🖺 Read address 7	0
	L∭ Read address 8	0
	🗄 🧰 Hex parameter assignment	
'		
	OK	Cancel Help

Definitions of configuration items:

Parameter	Value	Definition
Node ID	1 ~ 254	Address of Modbus device connected to ELC-CAPBDP
Read address 1: Slave $\rightarrow$ Master	0 ~ 65535	
Read address 2	0 ~ 65535	
Read address 3	0 ~ 65535	
Read address 4	0 ~ 65535	Parameter address of Modbus device to
Read address 5	0 ~ 65535	be read by PROFIBUS DP master
Read address 6	0 ~ 65535	
Read address 7	0 ~ 65535	
Read address 8	0 ~ 65535	

(2) Configuration method for Modbus8 write address, Modbus 4 write address, Modbus2 write address, and Modbus 1 write address

Refer to the figure below for the relevant parameters to configure Modbus 8 write address. Modbus 8 write address, Modbus 4 write address, Modbus 2 write address and Modbus 1 write address have the same parameters to set, except that the addresses of configurable Modbus device for Modbus 4 write address, Modbus 2 write address and Modbus 1 write address are different from that of Modbus 8 write address (Therefore, only the parameter settings for Modbus 8 write address are introduced in this section).

Properties - DP slave	×
Address / ID Parameter Assignment	
Parameters	Value
🖃 🔄 Station parameters	
Device-specific parameters	
–≝ Node ID	1
– Write address 1:Master->Slave	0
–📺 Write address 2	0
–📺 Write address 3	0
— 🗐 Write address 4	0
— 🗐 Write address 5	0
— 🕮 Write address 6	0
— 🗐 Write address 7	0
└── Write address 8	0
🕀 🧰 Hex parameter assignment	
OK	Cancel Help

Definitions of configuration items:

Parameter	Value	Definition
Node ID	1 ~ 254	Address of Modbus device connected to ELC-CAPBDP
Write address 1 : Master $\rightarrow$ Slave	0 ~ 65535	
Write address 2	0 ~ 65535	
Write address 3	0 ~ 65535	
Write address 4	0 ~ 65535	Parameter address of Modbus device to
Write address 5	0 ~ 65535	be written by PROFIBUS DP master
Write address 6	0 ~ 65535	
Write address 7	0 ~ 65535	
Write address 8	0 ~ 65535	

(3) Configuration method for Modbus 8 read & write address, Modbus 4 read & write address, Modbus 2 read & write address and Modbus 1 read & write address Refer to the figure below for the relevant parameters to configure Modbus 8 read & write address. Modbus 8 read & write address, Modbus 4 read & write address, Modbus 2 read & write address and Modbus 1 read & write address have the same parameters to set, except that the addresses of configurable Modbus device for Modbus 4 read & write address, Modbus 2 read & write address, Modbus 2 read & write address and Modbus 2 read & write address (Therefore, only the parameter settings for Modbus 8 read & write address are introduced in

# this section).

Ртор	erties - DP slave		×
Ado	dress / ID Parameter Assignment		1
	Parameters	Value 🔨	
E	🖃 🔄 Station parameters		
	🛱 🔄 Device-specific parameters		
	– Node ID	1	
	– Read address 1:Slave->Master	0	
	– Read address 2	0	
	– Read address 3	0	
	– Read address 4	0	
	– Read address 5	0	
	–🖺 Read address 6	0	
	– Read address 7	0	
	– Read address 8	0	
	– Write address 1:Master->Slave	0	
	–🗐 Write address 2	0	
	—🗐 Write address 3	0	
	—🗐 Write address 4	0	
	–≝) Write address 5	0	
	f≊] Write address R	0	
	OK	Cancel Help	

Parameter	Value	Definition
Node ID	1 ~ 254	Address of Modbus device connected to ELC-CAPBDP
Read address 1: Slave $\rightarrow$ Master	0 ~ 65535	
Read address 2	0 ~ 65535	Parameter address of Modbus device to
Read address 3	0 ~ 65535	be read by PROFIBUS DP master
Read address 4	0 ~ 65535	
Read address 5	0 ~ 65535	
Read address 6	0 ~ 65535	Parameter address of Modbus device to
Read address 7	0 ~ 65535	be read by PROFIBUS DP master
Read address 8	0 ~ 65535	
Write address 1: Master $\rightarrow$ Slave	0 ~ 65535	
Write address 2	0 ~ 65535	
Write address 3	0 ~ 65535	
Write address 4	0 ~ 65535	Parameter address of Modbus device to
Write address 5	0 ~ 65535	be written by PROFIBUS DP master
Write address 6	0 ~ 65535	
Write address 7	0 ~ 65535	
Write address 8	0 ~ 65535	

# 3.6 Application example: Exchange data with Siemens S7-300 PLC

S7-300 as the PROFIBUS DP master; ELC-CAPBDP as the slave. See the PROFIBUS DP network in the figure below.



- 1. Set the PROFIBUS address of ELC-CAPBDP to "1".
- Connect ELC-CAPBDP to ELC-EX16NNDT, ELC-EX08NNDT, ELC-AN04ANNN and ELC-AN02NANN in order at its right hand side. Make sure the connection and wiring between ELC-CAPBDP and the special I/O modules and to the entire network is correct.

## 3.6.1 Configuring the ELC-CAPBDP (software configuration):

■ Create a new project

Open SIMATIC Manager.

SIMATIC Manager	
File PLC View Options Window Help	
🗅 🖆   🏭 🐖   🎾   😂   📢	
Press F1 to get Help.	11

1. Select "File" => "New Project Wizard".

SIMATIC Manager			
File PLC View Options Window Help			
New	Ctrl+N		
'New Project' Wizard			
Open	Ctrl+O		
S7 Memory Card	+		
Memory Card File	+		
Delete			
Reorganize			
Manage			
Archive			
Retrieve			
Page Setup			
1 ELC-CAPBDP (Project) C:\\Siemens\Step7\s7proj\S7_Pro1			
Exit	Alt+F4		
Creates a new project step-by-step with the help of a wizard.			

2. Click "Next" in the wizard.

STEP 7 Wizard: "New Project"			
🌾 Introduction		1(4)	
Electric Conductor	STEP 7 Wizard: 'New You can create STEP 7 the STEP 7 Wizard. You immediately. Click one of the followin "Next" to create your pr "Finish" to create your p	Project" projects quickly and easily using i can then start programming ig options: oject step-by-step project according to the preview.	
Display Wizard on starting	the SIMATIC Manager	Previe <u>w</u> <<	
S7_Pro1     Block Name     Symbolic Name       Image: SimATIC 300 Station     Image: OB1     Cycle Execution       Image: S7 Program(1)     Image: S7 Program(1)       Image: S7 Program(1)     Image: S7 Program(1)			
< <u>B</u> ack <u>N</u> ext ≻	Finish	Cancel Help	

3. Select "CPU315-2 DP" for CPU as we are using the S7-300 model. Click "Next".

STEP 7 Wizard: "New Project"			
Which CPU are you usin	ng in your project?		2(4)
CP <u>U</u> :	CPU Type CPU314C-2 PtP CPU315 CPU315-2 DP CPU315-2 DP CPU316-2 DP CPU318-2 DP	Order No 6ES7 314-6BF00-0A 6ES7 315-1AF03-0A 6ES7 315-2AG10-0A 6ES7 316-2AG00-0A 6ES7 318-2AJ00-0A	.80 \80 \80 \80 \80 \80
<u>C</u> PU name: MPI <u>a</u> ddress:	CPU315-2 DP(1) 2 Vork m instruct	emory 128KB; 0.1ms/1	000 on (DP
S7_Pro1           Image: SIMATIC 300 Station           Image: SIMATIC 300 Statio	Block Name	Symbolic Name Cycle Execution	
< <u>B</u> ack <u>N</u> ext >	Finish	Cancel	Help

4. Select the block we need and click "Next".

STEP 7 Wizard: "New Project"				
🕀 Which blocks do you	want to add?		3(4)	
Bloc <u>k</u> s:	Block Name           ♥ 0B1           0B10           0B11           0B12           0B13	Symbolic Name Cycle Execution Time of Day Interrupt 0 Time of Day Interrupt 1 Time of Day Interrupt 2 Time of Day Interrupt 3	Help on <u>O</u> B	
			⊖ <u>F</u> BD	
Create with <u>s</u> ource files			Previe <u>w</u> <<	
S7_Pro2 SIMATIC 300 Station CPU315-2 DP(1) S7 Program(1 S7 Program(1)	Block Nam DB1	ne Symbolic Name Cycle Execution		
< <u>B</u> ack <u>N</u> ext >	<u>F</u> inish	Cancel	Help	

5. Enter the project name and click "Finish".

STEP 7 Wizard: "New Project"			
What do you want to call your project? 4(4			
Project name:	ELC-CAPBDP	—	
Existing projects:			
Check your new project in the preview. Click "Finish" to create the project with the displayed structure. Previe <u>w</u> <<			
ELC-CAPBDP	Block Name Symbolic Name		
SIMATIC 300 Station - 1 CPU315-2 DP(1) - 1 S7 Program(1 - 2 Blocks	OB1 Cycle Execution		
< <u>B</u> ack Next >	Finish Cancel Help		

6. A new window will appear after the project is created.

SIMATIC Manager - ELC-CAPBDP	
File Edit Insert PLC View Options Window Help	
🗅 🧀 🎥 🛲   X 🗈 🖻 🕍 🔍 🗣 🏪 🖭 🔛 🏦 💼 🔍 < No Filter >	- 🏹   器 🗐
ELC-CAPBDP C:\Program Files\Siemens\Step7\s7proj\ELC-CA-1	
ELC-CAPBDP SIMATIC 300 Station CPU315-2 DP(1) Sources Blocks	
Press F1 to get Help.	

### • Add PROFIBUS DP bus

1. Select "SIMATIC 300 Station" in the project created. Double click "Hardware" and a new window (HW-Config) will appear.



2. In the "HW Config" window, double click "DP" in the left-hand side column and a dialog box will appear.

🙀 HW Config - [SIMATIC 300 Station (Configuration) I	ELC-CAPBDP]	
🕅 Station Edit Insert PLC View Options Window Help		_ @ ×
🗅 😅 💱 🖩 🦷 🎒 🎒 🛍 🛍 📳 📼 😤	<b>N</b> ?	
1       2       CPU315-2 DP(1)       X2       DP       3       4       5       6       7		nd:
(0) UR		
Slot         I         Module         Order num         Fi         M         I           1	Q C	
2 CPU315-2 DP(1) 6ES7 315-24V2.0 2 X2 DP 224	VI PF	ROFIBUS-DP slaves for SIMATIC S7, 7, and C7 (distributed rack)
3		
Press F1 to get Help.		Chg //

3. Click "Properties" in the dialog box, leading to another dialog box.

Properties - DP - (RC	D/S2.1)	
General Addresses (	Dperating Mode Configuration	
Short Description:	DP	
		~
Name:	DP	
_ Interface		
Type: PR	OFIBUS	
Address: 2		
Networked: No	Properties	
Comment:		
		<u>^</u>
		~
<u> </u>	Cancel	Help

4. Select "Address" in the dialog box to be the address of the master. Then Click "New" to go to the next dialog box.

Properties	- PROFIBU	S interface	DP (R0/S2.1)	X
General	Parameters			
Address:		2 🗸	If a subnet is selected, the next available address is suggested.	
Subnet:				
not	networked		Properties Delete	
ОК			Cancel Hel	p

5. Select communication speed and bus type, and then click "OK".

Pro	operties - New subnet P	ROFIBUS	×
[	General Network Settings		_
	Highest PROFIBUS Address:	126 Change	
	Transmission Rate:	9.6 Kbps 19.2 Kbps 45.45 (31.25) Kbps 93.75 Kbps 187.5 Kbps 500 Kbps	
	Profile:	DP Standard Universal (DP/FMS) User-Defined Bus Parameters	
	OK ]	CancelHelp	

Confirm the communication speed and master address for PROFIBUS DP bus, then click "OK".

Properties - PROFIBUS interface DP (R0/S2	2.1)		X
General     Parameters       Address:     2       Highest address:     126       Transmission rate:     9.6 Kbps	If a subnet is selected, the next available add	ress is suggested.	
Subnet: not networked PROFIBUS(1) 9.6 Kbp	15	New Properties Delete	
	Car	ncel Help	

7. Confirm the information on the PROFIBUS DP bus in the dialog box and click "OK".

Properties - DP - (R	80/52.1)	×
General Addresses	Operating Mode Configuration	
Short Description:	DP	
		•
Name:	DP	—
- Interface		
Type: F	ROFIBUS	
Address: 2		
Networked: Y	'es Properties	
Comment:		
		~
		~
(OK)	Cancel	Help

8. Once all the parameters are set, a PROFIBUS DP bus will appear after the UR window.



## Add GSD file

1. Select "Options" => "Install GSD File" in the HW Config window.

🖳 HW Config - [SIMATIC 300 Sta	tion (Configuration) ELC-CAPBDP]	
🗓 Station Edit Insert PLC View	Options Window Help	_ 8 ×
n 🚅 🐎 🛢 🖫 🎒   🐴   🐴 r	Customize Ctrl+Alt+E	
	Specify Module Configure Network Symbol Table Ctrl+Alt+T Report System Error	
X2 DP 3 4	Edit Catalog Profile Update Catalog	PROFIBUS DP
5	Install HW Updates Install GSD File	PROFINET IO
	Find in Service & Support	SIMATIC 400 SIMATIC PC Based Control 300/400 SIMATIC PC Based Control 300/400
	Create GSD file for I-Device	SIMATIC PC Station
	>	
(0) UR		
Slot Module 0	Irder num Fi M I Q C	
2 CPU315-2 DP(1) 6E X2 DP 3	ES7 315-24V2.0 2 = = = = = = = = = = = = = = = = = = =	PROFIBUS-DP slaves for SIMATIC S7, M7, and C7 (distributed rack)
Installs new GSD files in the system and up	bdates the contents of the catalog.	Chg

2. Find the path of the GSD file, select it and click "Install" to add the GSD file needed.

Install GSD Files	
Install GSD Files: from the directory	
	Province
je:vr=enu	DIOWSe
File Release Version Languages	
ELC-CAPBDP (ELC-CAPBDP)	
Install Show Log Select All Deselect All	
Close	Help

3. We can then see ELC-CAPBDP in the right-hand side column. ELC-CAPBDP is the module added.



### Add ELC-CAPBDP slave and set up parameters

 Select PROFIBUS DP on the right-hand side column and double click "ELC-CAPBDP" to open a dialog box.



2. In the dialog box, select the address of ELC-CAPBDP slave. The address has to be the same as the setting of address setup switch on ELC-CAPBDP. Click "OK".

Properties - PROFIBUS interface ELC-CAPBDP	
General Parameters	
Address:	
Transmission rate: 9.6 Kbps	
Subnet	
not networked PROFIBUS(1) 9.6 Kbps	New
	Properties
	Delete
Ca	ancel Help

3. Add PROFIBUS DP bus to ELC-CAPBDP.

HW Config - [SIMATIC 300 Station (Configuration) ELC_CAPBDP]	
🗓 Station Edit Insert PLC Yiew Options Window Help	_ <b>B</b> ×
I         PROFIBUS(1): DP master system (1)           X2         DP           3         Image: CPU315-2 DP(1)           4         Image: CPU315-2 DP(1)           5         Image: CPU315-2 DP(1)           6         Image: CPU315-2 DP(1)           PROFIBUS(1): DP master system (1)         Image: CPU315-2 DP(1)           9         Image: CPU315-2 DP(1)           1         Image: CPU315-2 DP(1)           2         Image: CPU315-2 DP(1)           3         Image: CPU315-2 DP(1)           4         Image: CPU315-2 DP(1)           5         Image: CPU315-2 DP(1)           6         Image: CPU315-2 DP(1)           1         Image: CPU315-2 DP(1)           1         Image: CPU315-2 DP(1)           2         Image: CPU315-2 DP(1)           3         Image: CPU315-2 DP(1)           4         Image: CPU315-2 DP(1)           5         Image: CPU315-2 DP(1)           6         Image: CPU315-2 DP(1)           1         Image: CPU315-2 DP(1)	Profile Standard  PROFIBUS DP  Additional Field Devices  Additional Field Devices  IO  IO  E  IO  E  E  C  C  C  C  C  C  C  C  C  C  C
	DEC     D
(1) ELC-CAPBDP	
Slot     Module /     Order number     I Address     Q Address     Comment       0	DP V0 slaves DP/AS-i DP/ALink CCCAPBDP ELC-CAPBDP ELC-CAPBDP
Press F1 to get Help.	Chg //

- B HW Config [SIMATIC 300 Station (Configuration) -- ELC-CAPBDP] 💵 Station Edit Insert PLC View Options Window Help ъ× 🗅 😂 🖫 🖳 🎒 👘 🗈 🔛 🏜 👘 🗔 器 🕺 ~ 믜뇌 😑 (0) UF Eind: m‡ mi CPU315-2 DP(1) 2 Profile: Standard • DP X2 PROFIBUS(1): DP master system (1) Modbus 8 write addre 木 3 4 Modbus 1 read & writ 5 Modbus 2 read & writ 🚡 (1) ELC-CAI Modbus 4 read & writ 6 Modbus 8 read & writ DP-NORM ELC-EX08NNDN ELC-EX08NNNR/T ELC-EX08NNDR/T ELC-EX16NNDR/T < > ELC-EX08NNSN ELC-8 DI 🗲 📄 (1) ELC-CAPBDP ELC-8 DO Slot DP ID Order Number / Designation > I Address Q... C. ₹₹ -3 Press F1 to get Help. Chg
- 4. Select Slot 0 and double click "ELC-EX16NNDR/T" in the right-hand side column.

5. Configure ELC-EX16NNDR/T to Slot 0.



 Configure other slots as Slot 0 was configured. To configure, select one of the slots and double click on the items to be configured in the right-hand side column. Apply it to configure Slot 0 ~ Slot 4.

	нч	Config - [SIMA	TIC 300 Station (Configura	tion) EL	C_CAPBDP]				_ 🗆 ×	]
00	<u>]</u> <u>S</u> tat	ion <u>E</u> dit <u>I</u> nsert <u>I</u>	<u>PLC V</u> iew <u>Options W</u> indow	<u>H</u> elp					_ & ×	۲.
Г	٦la	; 🔐 🖬 😡 🖉	3 BIR Salah E	- IA - 188	N2					
	(U) 1 2 3 4 5 6 7	DUR  CPU315-2  DP  DP		PROFIBUS(I)	): DP master sy C-C/	stem (1)		Profile Standard	Modbus 4 read address Modbus 8 read address Modbus 1 write address Modbus 2 write address Modbus 4 write address Modbus 1 read & write ( Modbus 2 read & write ( Modbus 2 read & write ( Modbus 4 read & write (	
<							>		ELC-EX08NNDN ELC-EX08NNNR/T	
		(1) ELC-CAPB	DP						ELC-EXU8NNDR/T ELC-EX16NNDR/T	
	Slot	🚺 Module /	Order number	I Address	Q Address	Comment		l f	ELC-EXO8NNSN	
	0	8DX	ELC-EX16NNDR/T	0	0		^	I	ELC-8 DI	
	1	8DX	ELC-8 DIDO	1	1			I T	ELC-8 DO	
	2	4AI	ELC-AN04ANNN	256263			_	I	ELC-8 DIDO	
	3	2AO	ELC-2 AO		256259		_	<		
ΙL	4	113	Modbus 2 read & write address	264267	260263		_		Ŧ.	1
	5									2
	6						- ~			
Pre	∞ F1 ·	to get Help.						J	Chg	//.

7. Slot 0 and Slot 1 are for the configuration of digital I/O modules. The configuration of digital I/O modules does not require other parameter settings. When you configure digital I/O modules by self-defined method, and if the number of I/O points is less than 8, the calculation will be based on the number 8. For example, Slot 1 is configured 8DIDO, and its corresponding digital I/O module is DVP08SP (4 input points and 4 output points). See the following paragraph for detailed corresponding relations between slots and I/O modules.

8. Double click the configured Slot 2 in "HW Config" window to open the dialog box in the figure below. Refer to the configuration chapter for the definition of every parameter in this dialog box.

Properties - DP slave	2
Address / ID Parameter Assignment	
ー国 CH1 input mode 一国 CH2 input mode	0 -10V~+10V -10V~+10V -10V/→+10V
–≝ CH3 input mode –≝ CH4 input mode –≝ Input value mode	-10V~+10V -10V~+10V Current value
L⊞ Average times 	10
OK	CancelHelp

9. Double click the configured Slot 3 in "HW Config" window to open the dialog box in the figure below. Refer to the configuration chapter for the definition of every parameter in this dialog box.

Properties - DP slave	
Address / ID Parameter Assignment	
Parameters	Value
🖃 🔄 Station parameters	
🛱 🔄 Device-specific parameters	
_≝ Location	0
	ELC-AN02NANN
–≝ Output CR number 1:Master->Slave	10
Lei Output CR number 2	
OK	Cancel Help

10. Double click the configured Slot 4 in "HW Config" window to open the dialog box in the figure below. Refer to the configuration chapter for the definition of every parameter in this dialog box.

Properties - DP slave			
Address / ID Parameter Assignment			
Parameters	Value		
E Station parameters			
	-		
→ ■ Node ID	0449		
E Read address 2	8450		
– III) Write address 1:Master->Slave	8192		
→ ₩rite address 2	8193		
🕂 🧰 Hex parameter assignment			
1			
OK		Cancel	Help

11. After all the configuration items for ELC-CAPBDP are set, double click the ELC-CAPBDP slave on the PROFIBUS DP bus in "HW Config" window to open the dialog box in the figure below. Refer to 8.1 for the definition of every parameter in this dialog box.

Properties - DP slave	X
General Parameter Assignment	1
Parameters	Value
🖃 🔄 Station parameters	
🖨 🔄 Device-specific parameters	
-🚞 Acceleration mode	Disable
–≝ Modbus protocol	8,N,2
— 🕮 Modbus baudrate	19200 bps
- Modbus mode	RTU
— Loss comm with master	Hold I/O data
- Modbus slave error	Ignore & continue I/O exchange
- Loss modbus slave	Ignore & continue I/O exchange
– 🖺 IO module error	Ignore & continue I/O exchange
<ul> <li>— Modbus timeout setting (ms)</li> </ul>	200
Diagnose cycle (s)	10
🕂 🧰 Hex parameter assignment	
OK	Cancel Help

- 12. After all the parameters are set, download the parameters, and once the master is connected to ELC-CAPBDP, the NET indicator on ELC-CAPBDP will constantly be On in green color.
- Data Mapping



See the table below for the data mapping relations under the parameter settings.

Register in S7-300 master	Data transmission direction in PROFIBUS DP network	Slave devices and addresses connected to ELC-CAPBDP
QB0 bit 0 ~ bit 7		Y0 ~ Y7 on ELC-EX16NNDT
QB1 bit 0 ~ bit 3		Y0 ~ Y3 on ELC-EX08NNDT
PQW256		Output value in CH1 on ELC-AN02NANN
PQW258		Output value in CH2 on ELC-AN02NANN
PQW260		Modbus address 8192
PQW262		Modbus address 8193
IB0 bit 0 ~ bit 7		X0 ~ X7 on ELC-EX16NNDT
IB1 bit 0 ~ bit 3		X0 ~ X3 on ELC-EX08NNDT
PIW256		Input value in CH1 on ELC-AN04ANNN
PIW258	<u> </u>	Input value in CH2 on ELC-AN04ANNN
PIW260		Input value in CH3 on ELC-AN04ANNN
PIW262		Input value in CH4 on ELC-AN04ANNN
PIW264		Modbus address 8449
PIW266		Modbus address 8450

#### Program Example

- When M0.0 = ON, write 1 to Y0 ~ Y7 on ELC-EX16NNDT and Y0 ~ Y3 on ELC-EX08NNDT connected to ELC-CAPBDP.
- When M0.1 = ON, read the status on X0 ~ X7 on ELC-EX16NNDT connected to ELC-CAPBDP to MB0, and the status on X0 ~ X3 on ELC-EX08NNDT to MB1.
- You can also read or write other devices connected to ELC-CAPBDP by using MOVE instruction.

LAD/STL/FBD - [OB1 test/SIMATIC 300(1)/CPU 315-2 D	_ [	) ×
🚍 File Edit Insert PLC Debug View Options Window Help		a ×
	/ !≪≫! <b>卧 !!! </b> <u>+⊦++-○'@`∟⊐`⊢ №</u>	
Address         Declaration         Name         Type           OB1 : "Main Program Sweep (Cycle)"         Comment:         Comment:	Initial value Comment	
Network 1: Title:	Jumps E 1 Integer fct.	
Comment: M0.0 W#16#FF-IN OUT-QB0 W#16#FF-IN OUT-QB0 W#16#FF-IN OUT-QB0	<ul> <li>If losting-point fct.</li> <li>If Nosting-point fct.</li></ul>	
Network 2: Title:		
MO.1 IEO IN OUT - MRN		
		₹ <u>≺</u> ?

# 4 ELC-CAENET

To ensure correct installation and operation of ELC-CAENET, please read this chapter carefully before using your ELC-CAENET. The ELC-CAENET is an Ethernet remote I/O adapter product that connects ELC I/O modules to Ethernet networks using either EtherNet/IP or Modbus TCP protocols. To configure the ELC-CAENET module use EATON's ELCSoft and ECISoft or an embedded web page on the device.

The ELC-CAENET supports Modbus TCP server protocol and can be used as remote I/O from a PLC or other Modbus TCP client devices. The ELC-CAENET can also be used as a Modbus TCP gateway, supporting the conversion from Modbus TCP commands to Modbus ASCII/RTU. The ELC-ENET also supports EtherNet/IP adapter functionality to provide remote I/O for a PLC capable of being an EtherNet/IP scanner.

## 4.1 Features

- Supports EtherNet/IP Adapter communication with up to 8 connections.
- Supports Modbus TCP server communications with up to 16 connections.
- 10/100 Mbps transmission speed; MDI/MDI-X auto-detect.
- Supports up to 16 expansion modules, including up to 8 analog modules
- Supports a maximum of 256 digital Input and Output points.
- Integrated Modbus TCP to Modbus serial gateway (Allows a Modbus TCP client to connect to 32 devices on a local modbus serial link).
- Supports embedded "local logic functions": IF-THEN, counter, timer and real-time clock. Able to operate independently without control from a main PLC.
- Real time clock synchronized via NTP
- Configurable using embedded web page or Eaton ELCSoft/ECISoft.

## 4.2 Specifications

#### Ethernet interface

Interface	RJ-45 with Auto MDI/MDIX
Transmission method	802.3, 802.3u
Transmission cable	Category 5e, 100m (Max)
Transmission speed	10/100 Mbps Auto-Detection
Communication protocol	ICMP, IP, TCP, UDP, DHCP, SMTP, NTP, MODBUS TCP, ETHERNET/IP

#### ■ Serial communication interface (COM1)

Interface	Mini Din
Transmission method	RS-232
Communication speed	19,200 bps
Communication format	Stop bit: 1; Parity bit: None; Data bit: 8
Transmission cable ELC-CBPCELC3

## ■ Serial communication interface (COM2)

Interface	3 PIN feed-through terminal		
Transmission method	RS-485		
Transmission distance	4,000 ft (@19.2K)		
Communication speed	110, 150, 300, 600, 1,200, 2,400, 4,800, 9,600, 19,200, 38,400, 57,600, 115,200 bps		
Communication format	Stop bit: 1, 2; Parity bit: None, Odd, Even; Data bit: 7, 8		
Communication protocol	Modbus ASCII  Modbus RTU		

### Environment

	ESD (IEC 61131-2, IEC 61000-4-2): 8KV Air Discharge
	Input: ±2KV,
	Communication I/O: ±2KV
Noise immunity	RS (IEC 61131-2, IEC 61000-4-3): 80MHz ~ 100MHz, 10V/m. 1.4GHz ~ 2.0GHz, 10V/m
	Conducted Susceptibility Test (EN61000-4-6, IEC61131-2 9.10): 150kHz ~ 80MHz, 3V/m
	Surge Test (Biwave IEC61132-2, IEC61000-4-5): Power line 0.5KV DM, Ethernet 0.5KV CM, RS-485 0.5KV CM
Operation	$0^{\circ}$ C ~ 55°C (temperature), 50 ~ 95% (humidity), pollution degree 2
Storage	-25°C ~ 70°C (temperature), 5 ~ 95% (humidity)
Shock/vibration immunity	International standards: IEC61131-2, IEC 68-2-6 (TEST Fc)/IEC61131-2 & IEC 68-2-27 (TEST Ea)
Certificates	

### Electrical specification

Power supply voltage	24VDC (-15% ~ 20%) (with DC input polarity reverse protection)
Power fuse capacity	1.85A/30VDC, Polyswitch
Power consumption	2W
Insulation voltage	500VDC
Weight	116g

# 4.3 Product Profile & Outline

# 4.3.1 Dimension



Unit: mm





1. POWER indicator	12. RS-485 communication port
2. RUN indicator	13. Extension module positioning hole
3. BAT.LOW indicator	14. Nameplate
4. RUN/STOP switch	15. Extension port
5. RS-232 indicator	16. DIN rail (35mm)
6. RS-485 indicator	17. Extension module fixing clip
7. LINK/ACK indicator	18. DIN rail clip
8. SPEED indicator	19. Power supply port
9. Digital display	20. 3P terminal block (standard accessory)

- 10. Ethernet communication port
- 21. Power supply connection cable (standard accessory)
- 11. RS-232 communication port

### 4.3.3 LED Indicators

LED	Color	Function
POWER	Green	Power supply indication
RUN	Green	RUN/STOP indication
BAT.LOW	Red	Battery in low power indication
RS-232	Yellow	Displays communication status of RS-232 port
RS-485	Yellow	Displays communication status of RS-485 port
LINK/ACT	Green	Displays the status of network
SPEED	Yellow	Displays the speed of network connection

## 4.3.4 RUN/STOP Switch

	Status	Explanation
		1. RUN indicator on ELC-CAENET is ON.
	RUN	2. Analog input/output modules are in RUN status.
DUN		3. Local logic functions are running.
RUN	RUN → STOP	<ol> <li>Analog input/output module switches from RUN to STOP status.</li> </ol>
		2. Y points on digital input/output module are all OFF.
Ð	STOP	1. RUN indicator on ELC-CAENET is OFF.
STOP		2. Analog input/output modules are in STOP status.
		3. Local logic function halted.
		1. ELC-CAENET re-detects the modules on the I/O bus.
	STOP → RUN	<ol><li>Analog input/output modules switch from STOP to RUN status.</li></ol>

### 4.3.5 Ethernet RJ-45 PIN Definition

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

## 4.3.6 RS-232 PIN Definition

PIN	Signal	Definition	PIN	Signal	Definition	
1		N/C	5	Тx	Transmission data	6
2		N/C	6		N/C	50
3		N/C	7		N/C	\_2©
4	Rx	Reception data	8	GND	Ground	

### 4.3.7 RS-485 PIN Definition

PIN	Signal	Definition	RS-485
1	SG	Signal Ground	+ 5
2	D-	Negative pole for data	
3	D+	Positive pole for data	ă Ļi

## 4.4 Installation & Wiring

In this section, we will describe how to connect the ELC-CAENET module to other devices and the network.

### 4.4.1 Connecting the ELC-CAENET to ELC I/O Modules

- Open the extension clips on the top and bottom of the ELC-CAENET. Connect the extension port of the ELC-CAENET and the I/O module.
- Fasten the extension clips on the I/O module. Make sure the contact between the modules is secure.



### 4.4.2 Installing the ELC-CAENET and ELC I/O Modules onto a DIN Rail

- Use standard 35mm DIN rail.
- Open the DIN rail clips on ELC-CAENET and the I/O modules and insert the modules onto the rail.
- Press the clips to secure the modules onto the rail.



# 4.4.3 How to Connect the ELC-CAENET to the Local Area Network

Connect ELC-CAENET to the Ethernet switch using CAT-5e twisted pair cable. Since the ELC-CAENET has Auto MDI/MDIX functionality, a cross over cable is not required to connect directly to a PC. See below for the connection between the PC and ELC-CAENET modules:



# 4.5 Internal data structure for the ELC-CAENET

This section describes the internal data structure for the ELC-CAENET module. These data elements can be accessed from Modbus TCP, EtherNet/IP and the local logic features described in later sections of this manual

4.5.1 Basic Registers (BR)

BR#	Attribute	Content	Explanation	Default	Latched
0	R	Model name	Set up by the system; read only. The model code of ELC-CAENET= H'0600.	H'0600	YES

BR#	Attribute	Content	Explanation	Default	Latched
1	R	Firmware version	the current firmware verision in hex, e.g. V1.2 is indicated as high byte = 0x01 and low byte = 0x20.		YES
2	R	Release date of the version	the data in decimal form. 10,000s digit and 1,000s digit are for "month"; 100s digit and 10s digit are for "day". For 1s digit: 0 = morning; 1 = afternoon. Example: 12191 indicates the version released in the afternoon of December 19.		YES
3	R/W	Start/Stop PLC function			NO
4		Reserved			NO
5	R/W	COM2 communication settings	RS-485 communication settings. Please refer to the table of baud rate setting and communication format setting.	H'0368	YES
6	R/W	Address	For setting up the station address	K'1	YES
7	R	Number of DI points	Range: 0 ~ 256		NO
8	R	Number of DO points	Range: 0 ~ 256		NO
9	R	Error code	Displaying the errors. Please refer to the table of error codes.		NO
10		Reserved			NO
11	R/W	Communication time-out	For setting up the communication time-out (ms) in Modbus TCP mode.	K'5000	YES
12	R/W	Communication delay time	For setting up the minimum interval time between every communication datum.	K'0	YES
13	R/W	TCP connection idle time	For setting up idle time for TCP communication. Unit: second	K'30	YES
14 ~ 22		Reserved			NO
23	R	Number of analog I/O modules	Max. 8		NO
24	R	ID of the 1st analog I/O module	ID of the 1st analog I/O module		NO
25	R	ID of the 2nd analog I/O module	ID of the 2nd analog I/O module		NO
26	R	ID of the 3rd analog I/O module	ID of the 3rd analog I/O module		NO
27	R	ID of the 4th analog I/O module	ID of the 4th analog I/O module		NO
28	R	ID of the 5th analog I/O module	ID of the 5th analog I/O module		NO
29	R	ID of the 6th analog I/O module	ID of the 6th analog I/O module		NO
30	R	ID of the 7th analog I/O module	ID of the 7th analog I/O module		NO

BR#	Attribute	Content	Explanation	Default	Latched
31	R	ID of the 8th analog I/O module	ID of the 8th analog I/O module		NO
32 ~ 49		Reserved			NO
50	R/W	RTC settings	Settings of the real-time clock		NO
51	R/W	Year	Range: 1970 ~ 2099		YES
52	R/W	Week	Range: 1 ~ 7		YES
53	R/W	Month	Range: 1 ~ 12		YES
54	R/W	Day	Range: 1 ~ 31		YES
55	R/W	Hour	Range: 0 ~ 23		YES
56	R/W	Minute	Range: 0 ~ 59		YES
57	R/W	Second	Range: 0 ~ 59		YES
58 ~ 59		Reserved			NO
60		Reserved			NO
61 ~ 63		Reserved		0	NO
Symbol	"R" refers t	to ready only; "R/W'	' refers to read and write.		

## 4.5.2 Basic Registers (BR) descriptions

## BR#0: Model Name

Model code of ELC-CAENET = H'0600.

### BR#1: Firmware Version

The firmware version of ELC-CAENET is displayed in hex, e.g. H'0100 indicates version V1.00

### BR#2: Release Date of the Version

The date in decimal form 10,000s digit and 1,000s digit are for "month"; 100s digit and 10s digit are for "day". For 1s digit: 0 = morning; 1 = afternoon.

Example: 12191 indicate the version released in the afternoon of December 19.

# BR#5: COM2 Communication Settings

Description:

b0 ~ b3								
Content	Interface		Explanation					
	COM2	Data	Baud rate (bps)	Data	Baud rate (bps)	Data	Baud rate (bps)	
		0x1	110	0x6	2,400	0xB	57,600	
		0x2	150	0x7	4,800	0xC	115,200	
	RS-485	0x3	300	0x8	9,600			
		0x4	600	0x9	19,200			
		0x5	1,200	0xA	38,400			
b4 ~ b7								

	b7			b6 ~ b5				b4		
Explanation	Stop bit 0: 1 Stop bit 1: 2 Stop bits		Parity bit 00 : None parity bit 01 : Odd parity bit 11 : Even parity bit		Data 0 : 7 1 : 8	Data bit 0 : 7 Data bits 1 : 8 Data bits				
	0000 (0)	7-N-1	0011	(3)	8-0-1	1000 (8)	7-N-2	1011 (B)	8-0-2	
Content	0001 (1)	8-N-1	0110	(6)	7-E-1	1001 (9)	8-N-2	1110 (E)	7-E-2	
	0010 (2)	7-0-1	0111	(7)	8-E-1	1010 (A)	7-0-2	1111 (F)	8-E-2	
				b8	~ b15					
Content		Explanation								
0x02		Modbus RTU Master								
0x03				М	odbus AS	CII Master				

### BR#6: Address

For assigning or reading the Modbus serial address of the ELC-CAENET. The address will be displayed in the message display after being set up. Range: 1 ~ 247.

### **BR#7: Number of Digital Input Points**

Read the number of digital input points from BR#7. Range: 0 ~ 256. Max. I/O points: 256. The number of input points is autiomatically detected by the ELC-CAENET based on the connected I/O cards.

### BR#8: Number of Digital Output Points

Read the number of digital output points from BR#8. Range: 0 ~ 256. Max. I/O points: 256. The number of output points is autiomatically detected by the ELC-CAENET based on the connected I/O cards.

### BR#9: Error Code

Description:

### Error code = 0 refers to no error occurring.

Code	Indication	How to correct
F0	Returning to default setting	
F1	ELC-CAENET being powered	
F2	Power supply in low voltage	Check if the power supply of the module is functioning normally.
F3	Internal error. Manufacturing error.	<ol> <li>Check if the settings of local logic are incorrect.</li> <li>Re-power ELC-CAENET. If the error still exists, try step 3.</li> <li>Reset ELC-CAENET. If the error still exists, send the module back to the manufacturer for repair.</li> </ol>
F5	Network connection error	Check if ELC-CAENET is properly connected to the

Code	Indication	How to correct	
		network.	
F6	TCP connection limit exceeded	Check if the number of client connections exceeds the maximum. (8 EtherNet/IP or 16 Modbus TCP connections)	
F7	RS-485 setting error	Check if the RS-485 communication format is correct.	
F8	IP addressing error	<ol> <li>DHCP request failure.</li> <li>IP address invalid.</li> <li>Subnet mask invalid.</li> <li>Gateway does not exist in the same subnet.</li> <li>Returning to default setting.</li> </ol>	
F9	Extension module error	Check if the configuration of the extension module has been modified. If the error still exists, check if the number of I/O points exceeds the maximum and whether the there are more than 8 analog/specialty I/O modules connected.	
04	Slave error	1. Check if ELC-CAENET and RS-485 are properly	
0b	No response from station	<ol> <li>Check if the RS-485 transmission speed is consistent with that of other nodes on the serial network.</li> </ol>	

### BR#11: Communication Time-out (ms)

Communication time-out. Default = 5,000ms. For example, if you wish to set up the communication time-out to 7 seconds manually, write 7000 to BR#11. Range:  $5 \sim 65,535$ .

### BR#12: Communication Delay Time (ms)

Minimum interval time between every Modbus command. Default = 0ms. For example, if you wish to set up the communication delay time to 100ms manually, write 100 into BR#12. Range:  $0 \sim 65,535$ .

### BR#13: TCP Connection Idle Time (s)

TCP connection idle time. Default = 30 seconds. For example, if you wish to set up the idle time to 7 seconds manually, write 7 into BR#13. Range:  $5 \sim 65,535$ .

### BR#23: Number of Analog/Specialty I/O Modules

The number of Analog/Specialty modules detected at "go to run". Max. 8.

# BR#24 ~ #31: ID of the 1<sup>st</sup> ~ 8<sup>th</sup> Analog I/O Module

The ID of the  $1^{st} \sim 8^{th}$  analog I/O modules are read from BR#24 ~ BR#31.

### BR#50 ~ BR#57: RTC Settings

Real-time clock (RTC) set-up. When BR#9 = 1, ELC-CAENET will stop to update the RTC values to BR#10 ~ #16. Once the setup is completed, ELC-CAENET will set BR#9 to 0.

Allowed range for RTC: 1970/01/01 00:00:00 ~ 2037/12/31 23:59:59

BR#9	
0	No action
1	RTC stops
2	RTC being set

## 4.5.3 External Input Contacts (RX)

RX#	Attribute	Content	Explanation	Default	Latched				
0 ~ 255	R/W	External input contact	Input points on digital I/O module	OFF	NO				
Symbol "R'	Symbol "R" refers to ready only; "R/W" refers to read and write.								

### RX#0 ~ #255: External Input Contact

The current state of the input points. The right-side extension interface on ELC-CAENET is able to connect to ELC digital I/O modules. ELC-CAENET supports maximum 256 I/O points.

### 4.5.4 External Output Contacts (RY)

RY#	Attribute	Content	Explanation	Default	Latched			
0 ~ 255	R/W	External output contact	Output points on digital I/O module	OFF	NO			
Symbol "R'	Symbol "R" refers to ready only; "R/W" refers to read and write.							

## RY#0 ~ #255: External Output Contact

The desired output point states. The right-side extension interface on ELC-CAENET is able to connect to ELC digital I/O modules. ELC-CAENET supports maximum 256 I/O points.

### 4.5.5 Control Register for Extension Modules (RCR)

RCR#	Attribute	Content	Explanation	Default	Latched
0 ~ 49	R/W	The 1 <sup>st</sup> analog I/O module	Control register for the 1 <sup>st</sup> analog I/O module		NO
50 ~ 99	R/W	The 2 <sup>nd</sup> analog I/O module	Control register for the 2 <sup>nd</sup> analog I/O module		NO
100 ~ 149	R/W	The 3 <sup>rd</sup> analog I/O module	Control register for the 3 <sup>rd</sup> analog I/O module		NO
150 ~ 199	R/W	The 4 <sup>th</sup> analog I/O module	Control register for the 4 <sup>th</sup> analog I/O module		NO
200 ~ 249	R/W	The 5 <sup>th</sup> analog I/O module	Control register for the 5 <sup>th</sup> analog I/O module		NO
250 ~ 299	R/W	The 6 <sup>th</sup> analog I/O module	Control register for the 6 <sup>th</sup> analog I/O module		NO

RCR#	Attribute	Content	Explanation	Default	Latched		
300 ~ 349	R/W	The 7 <sup>th</sup> analog I/O module	Control register for the 7 <sup>th</sup> analog I/O module		NO		
350 ~ 399	R/W	The 8 <sup>th</sup> analog I/O module	Control register for the 8 <sup>th</sup> analog I/O module		NO		
Symbol "R" refers to ready only; "R/W" refers to read and write.							

### RCR#0 ~ #399: Control Register for Right-Side Analog I/O Modules

By reading/writing RCR in ELC-CAENET, you are able to store or retrieve the data in the control register (CR) inside the analog input/output module.

Example: RCR#0 corresponds to CR#0 in the 1<sup>st</sup> analog I/O module. RCR#260 corresponds to CR#10 in the 6<sup>th</sup> analog I/O module. Extension module closest to ELC-CAENET is regarded as the 1<sup>st</sup> module.

### 4.5.6 Word Devices & Bit Devices for Timers (T)

T#	Attribute	Register/coil name	Explanation	Default	Latched		
0	R/W	Timer 0	Timer	0/OFF	NO		
1	R/W	Timer 1	Timer	0/OFF	NO		
2	R/W	Timer 2	Timer	0/OFF	NO		
3	R/W	Timer 3	Timer	0/OFF	NO		
4	R/W	Timer 4	Timer	0/OFF	NO		
5	R/W	Timer 5	Timer	0/OFF	NO		
6	R/W	Timer 6	Timer	0/OFF	NO		
7	R/W	Timer 7	Timer	0/OFF	NO		
8	R/W	Timer 8	Timer	0/OFF	NO		
9	R/W	Timer 9	Timer	0/OFF	NO		
10	R/W	Timer 10	Timer	0/OFF	NO		
11	R/W	Timer 11	Timer	0/OFF	NO		
12	R/W	Timer 12	Timer	0/OFF	NO		
13	R/W	Timer 13	Timer	0/OFF	NO		
14	R/W	Timer 14	Timer	0/OFF	NO		
15	R/W	Timer 15	Timer	0/OFF	NO		
Symbol '	Symbol "R" refers to ready only: "R/W" refers to read and write.						

### T#0: Timer 0

When the timer is enabled, it will start to time according to the settings. When the timing reaches the target, the timer done bit, T0, will be ON. When the bit is reset, the timer value will be reset to 0 as well.

## T#1 ~ #15: Timer 1 ~ 15

Same as T#0.

### 4.5.7 Word Devices & Bit Devices for Counters (C)

C#	Attribute	Register/coil name	Explanation	Default	Latched				
0	R/W	Counter 0	Counting up/down counter	0/OFF	NO				
1	R/W	Counter 1	Counting up/down counter	0/OFF	NO				
2	R/W	Counter 2	Counting up/down counter	0/OFF	NO				
3	R/W	Counter 3	Counting up/down counter	0/OFF	NO				
4	R/W	Counter 4	Counting up/down counter	0/OFF	NO				
5	R/W	Counter 5	Counting up/down counter	0/OFF	NO				
6	R/W	Counter 6	Counting up/down counter	0/OFF	NO				
7	R/W	Counter 7	Counting up/down counter	0/OFF	NO				
8	R/W	Counter 8	Counting up/down counter	0/OFF	NO				
9	R/W	Counter 9	Counting up/down counter	0/OFF	NO				
10	R/W	Counter 10	Counting up/down counter	0/OFF	NO				
11	R/W	Counter 11	Counting up/down counter	0/OFF	NO				
12	R/W	Counter 12	Counting up/down counter	0/OFF	NO				
13	R/W	Counter 13	Counting up/down counter	0/OFF	NO				
14	R/W	Counter 14	Counting up/down counter	0/OFF	NO				
15	R/W	Counter 15	Counting up/down counter	0/OFF	NO				
Symbol	"R" refers to I	Symbol "R" refers to ready only; "R/W" refers to read and write.							

### C#0: Counter 0

When the counter is enabled, the counter wil count up or down.. When the count reaches the target, the counter will stop, and the done bit ,C0, will be set to ON. If the user resets the done bit, the count value will be reset to 0 as well.

## C#1 ~ #15: Counter 1 ~ 15

Same as C#0.

### 4.5.8 Bit Devices for Real-Time Clock (R)

The ELC-CAENET provides a set of 16 flags to be defined based on the internal Real Time Clock.

R#	Attribute	Content	Explanation	Default	Latched
0	R/W	RTC 0	Real-time clock flag 0	OFF	NO
1	R/W	RTC 1	Real-time clock flag 1	OFF	NO
2	R/W	RTC 2	Real-time clock flag 2	OFF	NO
3	R/W	RTC 3	Real-time clock flag 3	OFF	NO

R#	Attribute	Content	Explanation	Default	Latched				
4	R/W	RTC 4	Real-time clock flag 4	OFF	NO				
5	R/W	RTC 5	Real-time clock flag 5	OFF	NO				
6	R/W	RTC 6	Real-time clock flag 6	OFF	NO				
7	R/W	RTC 7	Real-time clock flag 7	OFF	NO				
8	R/W	RTC 8	Real-time clock flag 8	OFF	NO				
9	R/W	RTC 9	Real-time clock flag 9	OFF	NO				
10	R/W	RTC 10	Real-time clock flag 10	OFF	NO				
11	R/W	RTC 11	Real-time clock flag 11	OFF	NO				
12	R/W	RTC 12	Real-time clock flag 12	OFF	NO				
13	R/W	RTC 13	Real-time clock flag 13	OFF	NO				
14	R/W	RTC 14	Real-time clock flag 14	OFF	NO				
15	R/W	RTC 15	Real-time clock flag 15	OFF	NO				
Symbol '	Symbol "R" refers to ready only: "R/W" refers to read and write								

R#0: RTC 0

When the RTC function is enabled, and the assigned trigger RTC condition is true,

ELC-CAENET will set the corresponding bit flag, R0, to ON.

R#1 ~ #15: RTC 1 ~ 15

Same as R#0.

### 4.6 Modbus TCP Communications

The ELC-CAENET module supports the MODBUS TCP protocol. It acts as a MODBUS TCP server, providing access to the internal data elements described earlier in this document.

### 4.6.1 Function Codes Supported

Function code	Explanation	Devices supported
0x02	Read discrete inputs	RX, RY, T, R, C
0x03	Read holding registers	BR, T, C, RCR
0x05	Write single coil	RY, T, R, C
0x06	Write single register	BR, T, C, RCR
0x0F	Write multiple coils	RY, T, R, C
0x10	Write multiple registers	BR, T, C, RCR
0x17	Read/write multiple registers	BR, T, C, RCR

### 4.6.2 Exception Codes Supported

Exception code	Explanation
0x01	Illegal function
0x02	Illegal data address

Exception code	Explanation
0x03	Illegal data value
0x04	Slave device failure
0x0b	Gateway target device failed to respond.

## 4.6.3 Device Type & Device Address

Discrete input									
Device type	Modbus address (Hex)	6-digit Modbus address (Dec)	Number						
RX	0x0400 ~ 0x04FF	256							
Coil									
RY	0x0500 ~ 0x05FF	001281 ~ 001537	256						
Т	0x1600 ~ 0x160F	005633 ~ 005649	16						
R	0x1900 ~ 0x190F	006401 ~ 006416	16						
С	0x1E00 ~ 0x1E0F	007681 ~ 007696	16						
	Holdi	ing register							
Device	Modbus address (Hex)	6-digit Modbus address (Dec)	Number						
BR	0x0000~0x0040	400001~400064	64						
Т	0x1600~0x160F	405633~405649	16						
С	0x1E00~0x1E0F	407681~407696	16						
RCR	0x3000~0x3190	412289~412689	400						

# 4.7 EtherNet/IP Communications

The ELC-CAENET module supports the EtherNet/IP protocol. It acts as an adapter device. It provides access to internal data elements through both implicit I/O connections to the I/O assemblies, and explicit messages to data objects.

4.7.1 Instance Level Service Codes Supported

Service code	Explanation	Object supported
0x05	Reset	Identity Object
0x0E	Get Attribute Single	Identity Object Message Router Object Assembly Object Connection Manager Object Discrete Input Object Discrete Ouput Object BR Object RCR Object TCP/IP Interface Object Ethernet Link Object
0x10	Set Attribute Single	Assembly Object Discrete Ouput Object BR Object RCR Object

Service code	Explanation	Object supported
0x4E	Forward Close	Connection Manager Object
0x54	Forward Open	Connection Manager Object

# 4.7.2 Object and Instances Supported

Object	Class Code	Instance Code	Explanation
Identity Object	0x01	#1	CIP Identity*
Message Router Object	0x02	#1	Application message router*
		#100	Input point assembly
		#101	Output point assembly
		#102	CR read mapping assembly
Assembly Object	0x04	#103	CR write mapping assembly
		#104	Input point and RCR read mapping assembly
		#105	Output point and RCR write mapping assembly
Connection Manager Object	0x06	#1	Application connection mamager*
Discrete Input Object	0x08	#1 ~ #256	256 Input points*
Discrete Ouput Object	0x09	#1 ~ #256	256 Output points*
BR Object	0x64	#1 ~ #64	64 BR registers
RCR Object	0x65	#1 ~ #400	400 RCR registers
TCP/IP Interface Object	0xF5	#1	TCP/IP Parameters*
Ethernet Link Object	0xF6	#1	Ethernet Link Parameters*

# 4.7.3 Identity Object (0x01)

Instance #	Attribute ID	Name	Data Type	Description of Attribute	Default	Access Rule
	#1	Vendor ID	UINT	Identification of each vendor by number	K'799	Get
	#2	Device Type	UINT	Indication of general type of product	H'000C	Get
	#3	#3 Product UINT Identification of a pa product of an individ		Identification of a particular product of an individual vendor	H'0600	Get
	#4	Revision	STRUCT of:	Revision of the item the Identity Object represents		
#1		Major Revision	USINT			Get
		Minor Revision	USINT			
	#5	Status	WORD	Summary status of device		Get
	#6	Serial Number	UDINT	Serial number of device		Get
	#7 Product SHORT_ Name STRING		SHORT_ STRING	Human readable identification	"ELC-CAENET"	Get

# 4.7.4 Assembly Object (0x04)

Instance #	Attribute ID	Name	Data Type	Description of Attribute	Default	Access Rule
#100	#3	Data	ARRAY of BYTEs	Discrete Input points on digital Input module		Get
	#4	Size	UINT	Number of bytes in Attribute#3	32	Get
#101	#3	Data	ARRAY of BYTEs	Discrete Output points on digital Input module		Get/Set
	#4	Size	UINT	Number of bytes in Attribute#3	32	Get
#102	#3	Data	ARRAY of BYTEs	CR read mapping on externsion analog module		Get
	#4	Size	UINT	Number of bytes in Attribute#3	128	Get
#103	#3	Data	ARRAY of BYTEs	CR write mapping on externsion analog module		Get/Set
	#4	Size	UINT	Number of bytes in Attribute#3	128	Get
#104	#3	Data	ARRAY of BYTEs	Discrete Input points on digital Input module and CR write mapping on externsion analog module		Get
	#4	Size	UINT	Number of bytes in Attribute#3	160	Get
#105	#3	Data	ARRAY of BYTE	Discrete Output points on digital Input module and CR write mapping on externsion analog module		Get/Set
	#4	Size	UINT	Number of bytes in Attribute#3	160	Get

### Instance Data Format

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
#100	0	Discrete Input#8	Discrete Input#7	Discrete Input#6	Discrete Input#5	Discrete Input#4	Discrete Input#3	Discrete Input#2	Discrete Input#1
	1	Discrete Input#16	Discrete Input#15	Discrete Input#14	Discrete Input#13	Discrete Input#12	Discrete Input#11	Discrete Input#10	Discrete Input#9
	2	Discrete Input#24	Discrete Input#23	Discrete Input#22	Discrete Input#21	Discrete Input#20	Discrete Input#19	Discrete Input#18	Discrete Input#17
	31	Discrete Input#256	Discrete Input#255	Discrete Input#254	Discrete Input#253	Discrete Input#252	Discrete Input#251	Discrete Input#250	Discrete Input#249

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
#101	0	Discrete Output#8	Discrete Output#7	Discrete Output#6	Discrete Output#5	Discrete Output#4	Discrete Output#3	Discrete Output#2	Discrete Output#1
	1	Discrete Output#16	Discrete Output#15	Discrete Output#14	Discrete Output#13	Discrete Output#12	Discrete Output#11	Discrete Output#10	Discrete Output#9
	2	Discrete Output#24	Discrete Output#23	Discrete Output#22	Discrete Output#21	Discrete Output#20	Discrete Output#19	Discrete Output#18	Discrete Output#17
	31	Discrete Output#25 6	Discrete Output#25 5	Discrete Output#25 4	Discrete Output#25 3	Discrete Output#25 2	Discrete Output#25 1	Discrete Output#25 0	Discrete Output#24 9

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	
	0		ļ	Low Byte	e of CR	Read Ma	apping#1	l		
	1		High Byte of CR Read Mapping#1							
	2			Low Byte	e of CR	Read Ma	apping#2	2		
	3		ł	-ligh Byt	e of CR	Read M	apping#2	2		
#102	4		I	Low Byte	e of CR	Read Ma	apping#3	3		
	5		ŀ	-ligh Byt	e of CR	Read M	apping#3	3		
	126		Low Byte of CR Read Mapping#64							
	127		F	ligh Byte	e of CR F	Read Ma	apping#6	4		

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	0			Low Byte	e of CR	Write Ma	apping#1		
	1		High Byte of CR Write Mapping#1						
	2			Low Byte	e of CR	Write Ma	apping#2	2	
	3		ł	-ligh Byt	e of CR	Write Ma	apping#2	2	
#103	4			Low Byte	e of CR	Write Ma	apping#3	3	
	5		I	High Byt	e of CR	Write Ma	apping#3	3	
	126		Low Byte of CR Write Mapping#64						
	127		F	ligh Byte	e of CR \	Write Ma	pping#6	4	

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	0	Discrete Input#8	Discrete Input#7	Discrete Input#6	Discrete Input#5	Discrete Input#4	Discrete Input#3	Discrete Input#2	Discrete Input#1
	1	Discrete Input#16	Discrete Input#15	Discrete Input#14	Discrete Input#13	Discrete Input#12	Discrete Input#11	Discrete Input#10	Discrete Input#9
	2	Discrete Input#24	Discrete Input#23	Discrete Input#22	Discrete Input#21	Discrete Input#20	Discrete Input#19	Discrete Input#18	Discrete Input#17
	31	Discrete Input#256	Discrete Input#255	Discrete Input#254	Discrete Input#253	Discrete Input#252	Discrete Input#251	Discrete Input#250	Discrete Input#249
	32			Low	Byte of CR	Read Mappir	ng#1		
#104	33			High	Byte of CR	Read Mappi	ng#1		
	34			Low	Byte of CR	Read Mappir	ng#2		
	35			High	Byte of CR	Read Mappi	ng#2		
	36			Low	Byte of CR	Read Mappir	ng#3		
	37			High	Byte of CR	Read Mappi	ng#3		
	158		Low Byte of CR Read Mapping#64						
	159			High	Byte of CR F	Read Mappir	ig#64		

Instance	Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
	0	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete
	•	Output#8	Output#7	Output#6	Output#5	Output#4	Output#3	Output#2	Output#1
	1	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete
	I	Output#16	Output#15	Output#14	Output#13	Output#12	Output#11	Output#10	Output#9
	c	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete
	2	Output#24	Output#23	Output#22	Output#21	Output#20	Output#19	Output#18	Output#17
		Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	Discrete
	31	Output#25 6	Output#25 5	Output#25 4	Output#25 3	Output#25 2	Output#25 1	Output#25 0	Output#24 9
#105	32			Low	Byte of CR	Write Mappir	ng#1		
#100	33			High	Byte of CR	Write Mappir	ng#1		
	34			Low	Byte of CR	Write Mappir	ng#2		
	35			High	Byte of CR	Write Mappir	ng#2		
	36			Low	Byte of CR	Write Mappir	ng#3		
	37		High Byte of CR Write Mapping#3						
	158		Low Byte of CR Write Mapping#64						
	159			High	Byte of CR \	Write Mappin	g#64		

Note: See the section on Analog I/O mapping in the configuration section of this manual

# 4.7.5 Discrete Input Object (0x08)

Instance #	Attribute ID	Name	Data Type	Description of Attribute	Default	Access Rule
#1 ~ #256	#3	Value	BOOL	Discrete Input point value. 0 = OFF; 1 = ON.		Get

# 4.7.6 Discrete Output Object (0x09)

Instance #	Attribute ID	Name	Data Type	Description of Attribute	Default	Access Rule
#1 ~ #256	#3	Value	BOOL	Discrete Output point value. 0 = OFF; 1 = ON.		Get/Set

# 4.7.7 BR Object (0x64)

Instance #	Attribute ID	Name	Data Type	Description of Attribute	Default	Access Rule
#1 ~ #64	#3	Value	WORD	BR register		Get/Set

# 4.7.8 RCR Object (0x65)

Instance #	Attribute ID	Name	Data Type	Description of Attribute	Default	Access Rule
#1 ~ #400	#3	Value	WORD	RCR register		Get/Set

## 4.7.9 CIP General Status Code

General Status Code	Status Name	Description of Status
0x 00	Success	Service was successfully performed by the object specified.
0x 01	Connection failure	A connection related service failed along the connection path.
0x 02	Resource unavailable	Resources needed for the object to perform the requested service were unavailable.
0x 04	Path segment error	The path segment identifier or the segment syntax was not understood by the processing node. Path processing shall stop when a path segment error is encountered.
0x 05	Path destination unknown	The path is referencing an object class, instance or structure element that is not known or is not contained in the processing node. Path processing shall stop when a path destination unknown error is encountered.
0x 08	Service not supported	The requested service was not implemented or was not defined for this Object Class/Instance.
0x 09	Invalid attribute value	Invalid attribute data detected
0x 0E	Attribute not settable	A request to modify a non-modifiable attribute was received.
0x 13	Not enough data	The service did not supply enough data to perform the specified operation.
0x 14	Attribute not supported	The attribute specified in the request is not supported
0x 15	Too much data	The service supplied more data than was expected
0x 16	Object does not exist	The object specified does not exist in the device.
0x 20	Invalid parameter	A parameter associated with the request was invalid. This code is used when a parameter does not meet the requirements of this specification and/or the requirements defined in an Application Object Specification.
0x 26	Path Size Invalid	The size of the path which was sent with the Service Request is either not large enough to allow the Request to be routed to an object or too much routing data was included.

# 4.8 ELC-CAENET Configuration

Eaton provides software that simplifies the configuration of the ELC-CAENET including the local logic functions.

This section gives instructions on how to set up ELC-CAENET using this software and explanation on each setup page. The software uses UDP port 20006 in the set up of the

ELC-CAENET. Appropriate firewall settings will need to be in place for remote access. ECISoft is a stand alone application that manages the ELC Ethernet components on a network.

This application is integrated into the ELC programming software, ELCSoft.

An embedded web page on the ELC-CAENET also presents the set-up screens described in

this section. This provides a convenient alternative when the Eaton software is not available. The Web page can be accessed by entering the IP address of the ELC-CAENET into your browser.

4.8.1 Setting up Communications & Searching for Communication Modules with EICSoft

### Broadcast search

1. Open ECISoft on the PC and click on the "IP Search" icon (ECISoft can be accessed via a button in ELCSoft).

🔒 Faion ECISoft	
Elle View Iools Help	
□ 県 Network Type	
in the second se	

2. The communication module will be displayed when found.

📕 Eaton ECISoft - [ELC-CAENET]		
Eile View Iools Window Help	p	_8×
🗋 🖨 🖪 🎒 😫 👘	9	
S R. Network Type S P. Element S S Element S S Element S S S S S S S S S S S S S S S S S S S	ELCCAENET	

 Double-click on the module to be configured to enter the setup page. The Overview tab contains the basic status of the module and information on the connected I/O modules. This will also be the first view you would see from a web browser.

EATON ELC-CAENET					
Overview Basic Clock IP Filter Smart	PLC Analog Input/Output Module	1/0 Monitor	Gateway	Security	
Device Overview					
Module	ELC-CAENET				
IP Address	120.151.1.3				
MAC Address	00:D0:AF:0C:14:97				
Firmware Version	0.01				
Right-side Module Information					
DI / DO Point	48 / 16	_			
Number of Analog Input/Output Module	1				
1st Analog Input/Output Module	ELC-AN06AANN (H'00CC)				
2nd Analog Input/Output Module	N/A				
3rd Analog Input/Output Module	N/A				
4th Analog Input/Output Module	N/A				
5th Analog Input/Output Module	N/A				
6th Analog Input/Output Module	N/A				
7th Analog Input/Output Module	N/A				
8th Analog Input/Output Module	N/A				
				LUK	Lancel Apply

4. The next page is for basic network setup. For other settings, see BR#11 ~ BR#13.

verview Basic Clock	IP Filter    Smart PLC    Analog Input/Dutput Module    I/D Monitor    Gateway    Security
Module Name	EATON ELC-CAENET
Network Setup	
IB Caulian action	<b>Russil</b>
IP Conliguration	
IF Address	
Netmask	200, 200, 200, 0
Gateway	
Ethernet Timer Setting	
Keep Alive Time (s)	30 (5 - 65535 s)
RS-485 Timer Setting	
Timeout (ms)	5000 (5 - 65535 ms)
Delay Time (ms)	0 (0 - 65535 ms)

## 4.8.2 Recording IP Address

The IP list allows the user to select modules directly and designate a module for search. Recording IP address means to add this ELC-CAENET to the list, allowing the user to see ELC-CAENET in the search.

### Recording IP address

IP list:

In the list, you will see the network IPs already used. Click "Add" to record the known IP address into the list and next search for the module on the network by designated IP.

ommunication Sett	ing			
Communication Typ	e			Or
Type	Ethernet	<b>•</b>		
-	1			Cancel
Parameter				Default
COM Port	COM1	Ŧ		
Data Length	7	-		
Parity	Even	-		
Stop Bits	1	-		
Baud Rate	9600	-		
Station Address	1	<u>×</u>		
Modbus Mode	ASCII	-		
IP Address	255 . 255	. 255 . 255	IP List	
9 Setup				
-IP List			orr	_
IP List	. 89	Add	ОК	
IP List 192 . 168 . 1	. 89	Add	OK Cancel	
IP List 192.168.1 192.168.1.181 192.168.1.199	. 89	Add Delete	OK Cancel	
IP List 192.168.1	. 89	Add Delete Jadcast IP	OK Cancel	
IP List 192.168.11 192.168.1.181 192.168.1.199 192.168.1.4 192.168.1.4 192.168.1.5	. 89	Add Delete Dadcast IP	OK Cancel	
IP List 192.168.1181 192.168.1.181 192.168.1.199 192.168.1.4 192.168.1.6 192.168.1.66 192.168.1.85	. 89	Add Delete Dadcast IP	OK Cancel	
IP List 192.168.1.181 192.168.1.199 192.168.1.4 192.168.1.5 192.168.1.66 192.168.1.85 192.168.1.85	. 89 Bro	Add Delete adcast IP	OK Cancel	

Click the icon to search for the module.

🚆 Eaton ECISoft - [ELC-CAENET]	
Elle View Iools Window Help	_ & ×
] 술 🛯 🖉 💄 🤌 🗑 🔍 🔍 🔍 🗃 🗄 🗄 🗄 🖻 🗔 🗖	
Image: Search index of the search i	
Time Description	
Ready	R5-232 COM1

## 4.8.3 Basic Settings

The basic settings include parameters such module name, network settings and communication time.

The basic tab

uoruiouu Basic Clook	IR Filter Smot PLC Analog Input / Output Module 1/O Monitor Catoway Security	
VELVIEW DOGO CIDEK	In Files Sharrie Analog inposociapur Module 175 Monitor a alemay Security	
Module Name	EATON ELC-CAENET	
Network Setup		
IP Configuration	Static	
IP Address	120.151.1.3	
Netmask	255 . 255 . 255 . 0	
Gateway	0.0.0.	
Ethernet Timer Setting		
Keep Alive Time (s)	30 (5 · 65535 s)	
RS-485 Timer Setting		
Timeout (ms)	5000 (5 - 65535 ms)	
Delay Time (ms)	0 (0 - 65535 ms)	

1. Module name:

There can be many ELC-CAENET modules on the network. You can set up a module name for each module to identify the module when you need to use them.

2. Network setup:

Enable dynamic IP (DHCP) or static IP..

A. IP configuration:

There are 2 types of IP, static IP and DHCP.

Static IP: Preset or manually modified by the user.

DHCP: Automatically updated by a DHCP server. There must be a DHCP server in the LAN.

IP	Explanation
Static	The user enters the IP address, subnet mask and gateway.
DHCP	DHCP server offers the IP address, subnet mask and gateway.

### B. IP address:

IP address is the location of the equipment on the network. Every device connected to the network has to have a unique IP address. Incorrect IP address will result in connection failure. The default IP for ELC-CAENET is 192.168.1.5.

### C. Netmask:

Subnet mask is an important parameter for setting up the subnet, used for seeing if the destination IP and the local equipment are in the same subnet. If not, the equipment will send the packet to the gateway, and the gateway will send the packet to another subnet. Incorrect setting may cause the destination equipment unable to communicate to ELC-CAENET. To see if your setting is correct, conduct bitwise AND operations between your IP and subnet mask and destination IP and subnet mask. If the two values obtained are the same, the two IPs are in the same subnet. The default subnet mask of ELC-CAENET is 255.255.255.0.

### D. Gateway:

Gateway is the window for two different subnets, allowing the two ends in different subnets to communicate. For example, if the LAN has to be connected to a WAN, it will need a gateway to bridge the communication. The IP of the gateway has to be in the same subnet as ELC-CAENET. The default gateway of ELC-CAENET is 192.168.1.1.

3. Timer setting:

For setting up TCP connection idle time, Modbus time-out and minimum delay time for every communication data. Please refer to the explanations on BR#11, BR#12, and BR#13.

### 4.8.4 Setting up Time Server

ELC-CAENET offers real-time clock (RTC) functions. You can set up your own time for ELC-CAENET or update the time through NTP server.

Setup page

TON ELC-CAENET							
verview Basic Cl	ock IP Filter	Smart PLC	Analog Input/Output	Module 1/0 Monitor	Gateway	Security	
Time Server Setup							
Enable Time 9	erver						
Start Daylight	Saving Time						
Time Server	192	. 168 . 0	. 1				
Time Zone	(GMT)	Greenwich M	lean Time: Dublin, Edir	ıburgh, Lisbon, l 💌			
Clock Setup							
		Date	Time	Week			
ELC-CAENET	2010/	12/7	PM 02:23:10	Tuesday			
PC	2010/	12/7	PM 02:23:54	Tuesday			
O Custom	12/ 7/	/2010 🛛 😒	2:23:51 PM 👙	Tuesday			

1. Enable time server

ELC-CAENET executes automatic time correction from the NTP server on the network every 6 hours to ensure the time is correct in the RTC. To enable this function, you first have to set up the IP address of the NTP server and the time zone and daylight saving time.

- Start daylight saving time Daylight Saving Time.
- 3. Time server

IP address of the time server. You can acquire the correct time from the time server to correct the time in the MPU.

4. Time zone

There are 24 time zones on earth and follow Greenwich Mean Time (GMT) as the standard time. Select the time zone you are in and adjust the offset between the time of your city and Coordinated Universal Time (UTC).

5. Clock setup

Set up the time in ELC-CAENET. You can set the time to the same as the PC in operation, or you can set up the time manually.

### 4.8.5 IP Filter

The IP filter is used for restricting the computers or devices that can establish connection to the ELC-CAENET. Only the IP set within a certain range can establish a connection. Other IPs will be rejected.

### Setting up IP filter

verview	Basic (	Clock	IP Filter	Smart PLC	Analog Input/Output Module	1/0 Monitor	Gateway	Security		
<b>I</b> Er	able IP Fil	er (On	lv the IP a	address listed	below are allowed to access?					
- IP Filter	Satura		đ							
No.	-	Beair	) IP Addre	ss	End IP Address					
1.	0	. 0	. 0	. 0	0.0.0.0					
2.	0	. 0	. 0	. 0	0.0.0.0					
3.	0	. 0	I. 0	. 0	0.0.0.0					
4.	0	. 0	I. O	. 0	0.0.0.0					
5.	0	. 0	I. O	. 0	0.0.0.0					
6.	0	. 0	I. 0	. 0	0.0.0.0					
7.	0	. 0	. 0	. 0	0.0.0.0					
8.	0	. 0	I. O	. 0	0.0.0.0					
									 	_

1. Enable IP filter:

Check the box to enable IP filter.

2. Begin IP address:

Start IP addresses allowed to establish connection. Max. 8 IPs are allowed.

3. End IP address:

End IP addresses allowed to establish connection. Max. 8 IPs are allowed.

## 4.8.6 Local Logic Setting: IF-THEN

ELC-CAENET supports independent local logic functions. The IF-THEN function is able to excute user specified actions based on trigger conditions of counter, timer, RTC, digital I/O points and analog I/O modules. You can use AND or OR as the trigger condition. There are 16IF-THEN functions in ELC-CAENET).

### ■ IF-THEN

EATON ELC-CAENET	
Overview Basic Clock IP Filter Smart PLC Analog IF-THEN Timer Counter RTC IF Enable IF R V 0 V Off V	Input/Output Module 1/0 Monitor Gateway Security THEN RY 3 Set
Relation between conditions OR V	Add Modify Clear Delete
	Down
	OK Cancel Apply

1. Enable

Check the box to enable IF-THEN.

2. IF

For the trigger condition, you can select bit devices RX, RY, C, T, RT or word device RCR and set them to ON, OFF, Rising, Falling, >, <, =, <>, >= or <=. The trigger condition can be AND or OR. When the device is a register, the allowed trigger range will be K-32,768 ~ K32,767.

3. THEN

For the execution, you can select bit devices RY, C, T, RT or word device RCR and Set, Reset, Toggle or set up a value for them. Please refer to the explanations on IF#13 ~ IF#24. When the device is a register, the allowed trigger range will be K-32,768 ~ K32,767.

4. Add, Modify, Clear, Delete

All the settings above can be added to the IF-THEN table below, or you can modify, clear or delete the settings.

5. Up, Down

You can move the IF-THEN setting up or down to change the execution order.

## 4.8.7 Local Logic Setting: Timer

The timer function is able to time following the system time. There are 16 timers in ELC-CAENET. The timing range is  $10ms \sim 65,535s$ .

	Enable	Cyclic	Reset When	Timeout	Tick Bas	sed	
0		D		1	1s	-	
1		D	D	5	100ms	-	
2	D	D	D	1	10ms	•	
3	D	D	D	1	10ms	-	
4	D	D	D	1	10ms	-	
5	D	D	D	1	10ms	-	
6	D	D	D	1	10ms	-	
7	D	D	D	1	10ms	-	
8	D	D	D	1	10ms	•	
9	D	ם	D	1	10ms	•	
10	D	D	D	1	10ms	-	
11	D	D	D	1	10ms	-	
12	D	D	D	-1	10ms	-	
13		D	D	1	10ms	-	
14				1	10ms	-	
15				1	10ms	-	

### 1. Enable

Decide whether to enable the timer in this column.

2. Cyclic

Decide whether to reset the timer and re-start the timing when the timer reaches the target in this column.

3. Reset when STOP->RUN

Decide whether to reset the timer when the system goes from STOP to RUN.

4. Timeout bound

The time for the timer to reach the target. Range:  $10ms \sim 65,535s$ .

### 4.8.8 Local Logic Setting – Counter

The counter can be triggered by the external input points RX. When RX turns from OFF to ON, the counter will start to count. There are 16 counters in the ELC-CAENET, selectable for counting up and counting down. The counting range is -32,768 ~ 32,767.

### Counter

TL	IEN Timor				og mpulo o u put module	170 Monitor	Calcindy	Security	
.11	Enable	Count UP	/	Up Bound / Low Bound	Count Source RX NO.				
0	D	Count Up	•	0	0				
1	D	Count Up	•	0	0				
2	D	Count Up	•	0	0				
3	D	Count Up	•	0	0				
4	D	Count Up	•	0	0				
5	D	Count Up	•	0	0				
6	D	Count Up	•	0	0				
7	D	Count Up	•	0	0				
8	D	Count Up	•	0	0				
9	D	Count Up	•	0	0				
0	D	Count Up	•	0	0				
1	D	Count Up	•	0	0				
2	D	Count Up	•	0	0				
3	D	Count Up	•	0	0				
4	D	Count Up	•	0	0				
5	D	Count Up	•	0	0				

1. Enable

Decide whether to enable the counter in this column.

2. Count up/count down

Decide whether the counter will be counting up or counting down.

3. Up bound/low bound

The upper limit and lower limit for the counter. Range: -32,768 ~ 32,767.

4. Count source RX NO.

No. of the external input point RX driving the counter. Range: RX#0 ~ RX#255.

### 4.8.9 Local Logic Setting – RTC

The real-time clock (RTC) can be triggered by the system at a specific time. There are 16 RTC triggers in ELC-CAENET. You can designate the trigger time or trigger the RTC on a monthly, weekly or daily basis. Please refer to the descriptions for RS#0 ~ RS#159.

### RTC

	Enable	Output Auto-Reset	Auto-Reset	Unit		Cyclic	Year	Month	Day	Wee	k	Hour	Min.	Se
0	D	D	1	Minute	-	Daily -	2007	1	1	Tue.	-	0	0	.(
1	D	D	1	Second	•	Single 💌	2007	1	1	Mon.	-	0	0	C
2	D	D .	1	Second	•	Single 💌	2007	1	1	Mon.	•	0	0	0
3	D	D	1	Second	•	Single 💌	2007	1	1	Mon.	-	0	0	
4	D	D .	1	Second	•	Single 💌	2007	1	1	Mon.	•	0	0	0
5	D	D	1	Second	•	Single 🔻	2007	1	1	Mon.	-	0	0	C
6	D	D .	1	Second	•	Single 💌	2007	1	1	Mon.	•	0	0	1
7	D	D	1	Second	•	Single 💌	2007	1	1	Mon.	-	0	0	
8	D	D	1	Second	•	Single 💌	2007	1	1	Mon.	•	0	0	. (
9	D		1	Second	•	Single 💌	2007	1	1	Mon.	-	0	0	
10	D	D	1	Second	•	Single 💌	2007	1	1	Mon.	•	0	0	1
11	D	D	1	Second	•	Single 🔻	2007	1	1	Mon.	-	0	0	C
12	D	D .	1	Second	•	Single 💌	2007	1	1	Mon.	•	0	0	1
13	D	D	1	Second	•	Single 💌	2007	1	1	Mon.	-	0	0	(
14	D	D	1	Second	•	Single 💌	2007	1	1	Mon.	•	0	0	. ( 🗸
<					100		1					1		>

### 1. Enable

Decide whether to trigger the RTC in this column.

2. Cyclic

Decide to trigger the RTC only once, or trigger it on a daily, weekly or monthly basis.

3. Output auto-reset

After the RTC is triggered, decide whether to retain the output for a period of time and reset the RTC automatically. R (Coil) will be OFF when the time for reset is reached.

4. Auto-reset time, Units

If you select to auto-reset the RTC, the bit device for each RTC trigger will remain set for a period of time. Range: 1s ~ 24hr.

Range for seconds: 1 ~ 32,767

Range for minutes: 1 ~ 3,600

Range for hours: 1 ~ 24

5. Year, Month, Day, Hour, Minute, Second, Week

The time to trigger the RTC. If you would like to trigger it only once, the Year, Month, Day, Hour, Minute and Second need to be set. If you would like to trigger on a daily basis, only the Hour, Minute and Second need to be set. If you would like the RTC to be triggered on a weekly basis, you only need to set up Week, Hour, Minute and Second. If the RTC is triggered monthly, set up only Day, Hour, Minute and Second.

## 4.8.10 Analog Input/Output Module data mapping

ELC-CAENET offers control registers (CR) for analog I/O modules. And has built-in mapping tables for the CR numbers. The user can select the CRs to be read/written and use EATON's communication module ELC-COENETM to map the CR directly to D registers in ELC-PV controller and utilize these D registers in the program, controlling and monitoring the analog I/O modules connected to ELC-CAENET. ELC-CAENET supports a maximum of reading 64 CR values and writing 64 CR values.

- ► This function works with the ELC-COENETM, firmware V2.0 or later.
- Analog I/O modules

ELC-CAENET	Clean Mappi	ng List							
• 1: ELL-ANU64	AP	Read	Write	CR No.	R/W	Register Name	Present Value	Forma	t 🔷
	0		D	#00	R	Model type	HOOCC	Hex	-
	1	D		#01	R/W	Input mode setting	H0000	Hex	•
	2	D	D	#02	R/W	CH1 average number	H000A	Hex	•
	3	D	D	#03	R/W	CH2 average number	H000A	Hex	
	4	D	D	#04	R/W	CH3 average number	H000A	Hex	•
	> 5	D	D	#05	R/W	CH4 average number	H000A	Hex	-
Mapping List (Read)	6		D	#06	R	Average value of CH1 input si	H0005	Hex	•
M CP No	7		D	<i>#</i> 07	R	Average value of CH2 input si	H0000	Hex	•
1 #00	8		D	#08	R	Average value of CH3 input s	H0004	Hex	•
1 #06	9		D	#09	R	Average value of CH4 input s	H0000	Hex	•
1 #07	10			#10	R/W	CH5 output signal value	H0000	Hex	•
1 #09	11	D		#11	R/W	CH6 output signal value	H0000	Hex	-
1. SI	12	D	D	#12	R	Present value of CH1 input si	H0005	Hex	•
Mapping List (Write)	13	D	D	#13	R	Present value of CH2 input si	H0000	Hex	•
M CB No	14	D	D	#14	R	Present value of CH3 input si	H0004	Hex	•
1 #01	15	D	D	#15	R	Present value of CH4 input si	H0000	Hex	•
1 #10	16	D	D	#16		None	H0000	Hex	-
1 #11	17	D	D	#17		None	H0000	Hex	•
	18	D	D	#18	R/W	To adjust OFFSET value of $\overline{\mathbb{C}}$	H0000	Hex	-
	10	n	D.	<i>#</i> 10	R /117	To adjust OFFCET salus of	HUUUU	U	_ 🕙

1. Corresponding table:

Open ECISoft and it will automatically load in the control register information on the analog I/O modules. (When using the Web page for configuration, you must load the EDS file for analog I/O seperately.) Check the CR you are to read or write to establish a mapping table. ELC-COENETM will map the CR established in the table to D registers in ELC-PV PLC.

2. Read

Check the CR (read) to be added to the mapping table. Click "Apply" and the checked CR will be added.

3. Write

Check the CR (write) to be added to the mapping table. Click "Apply" and the checked CR will be added.

4. Clear mapping list

This clears all the information in the mapping table.

5. CR No.

The number of the control registers for all analog I/O modules connected to ELC-CAENET.

6. R/W

Indicating whether the CR can be read or written.

7. Register name

The name of the CR for the analog I/O modules.

8. Present value

The present value in the CR for the analog I/O modules.

9. Format

The display format for each CR value. Available formats: hex, signed decimal integer and binary integer.

### 4.8.11 I/O Monitoring Table

ELC-CAENET is able to monitor internal registers on-line. Scroll the table to monitor bit devices RX, RY, T, C, R, RCR and BR and the bit status and present value in the register. You can choose to monitor decimal or hex values.

erv	iew Basic	Cloc	:k 🛛 IP Fil	ter	Smart PLC Anal	og Input/Output Module	1/0 Moi	nitor	Gateway Security
	Device		Number		Bit Status	Present Value	Forma	t	
1	RY	•	3	•			Dec	•	
2	DV.			•				•	
8	BŶ			•				•	
L.	T			•				•	=
5	R	_		•				•	
	BR			•				•	
		•		•				•	
		•		•				•	
		•		•				-	-
0		•		•				-	-
1		•		•				-	-
2		-		-				-	-
3		-						-	-
4 5		-		-				÷	-
6		-		-				÷	-
7		-		+				-	-
•		_							- <u>×</u>
							Start M	onito	tor
							ordit M	orne	

■ I/O monitoring table

TON	ELC-CAI	ENET						
verv	iew Basic	C	lock IP Filter	Smart PLC Ana	log Input/Output Mod	ule 1/0 Mon	itor	Gateway Security
	Device		Number	Bit Status	Present Value	Format		<u> </u>
1	RCR	-	0 🔹			Dec	•	
2		•	•			Dec		
3		•	-			Inex	-	
4		-	-				•	
5		•	-				•	
6		•	-				•	
7		•	•				•	
B		•	-				•	
9		•	•				-	
0		•	-				•	
1		•	-				-	
2		-	-				-	
3		•					-	
4		-	-				-	
5		-					-	
7		-						
-								~
						Start Mi	onito	or
_		_					_	

1. Device

Select an internal register in the ELC-CAENET.

Bit devices: RX, RY, T, C, R

Registers: T, C, R, RCR, BR.

2. Number

Select the bit devices and registers to be monitored by their numbers.

RX#0 ~ RX#255, total 256 bits.

RY#0 ~ RY#255, total 256 bits.

T#0 ~ T#15, total 16 bits and 16 registers.

C#0 ~ C#15, total 16 bits and 16 registers.

R#0 ~ R#15, total 16 bits and 16 registers.

RCR#0 ~ RCR#399, total 400 registers.

BR#0 ~ BR#63, total 64 registers.

3. Format

Select the format of the register to be monitored, decimal (Dec) or hexadecimal (Hex).

► Once the number and format are set, click "Apply" to save the setting and start the monitoring.

4. Start/Stop monitor

Start or stop the saved and applied device number to be monitored. Settings not applied will be deleted.

## 4.8.12 Setting up the Modbus TCP to Modbus serial gateway

ELC-CAENET offers Modbus TCP to RS-485 gateway functions. By setting up ELC-CAENET, you can read the data in specific devices on the network. Gateway functions help you quikly store and retrieve data and offers on-line monitoring for maximum of 100 bits of data and words of data. The data can be temporarily stored in the ELC-CAENET, speeding up the write/read and response time.

TON ELC-CAENET		
Jverview Basic Clock IP Filte	Smart PLC Analog Input/Output Module 1/O Monitor Gateway	Security
COUC		
CUM Setup Bit Device Word	svice	
Communication Parameter		
COM2 Mode (RS-485)	Virtual COM	
Baudrate	9600 🖌	
Parity	Even 🖌	
Data Length	7 👻	
Stop Bits	1	
Station Address	1	

### 1. COM Setup

- COM2 Mode (RS-485):
   You can choose Modbus ASCII Master, Modbus RTU Master or Virtual COM.
- Baudrate:

The baud rate for communication.

- Parity
- Data length
- Stop bits
- Station address:

The Modbus address.

	Station Address	MODBUS (Hex)	MODBUS (Dec)	Account		Station Address	MODBUS (Hex)	MODBUS (Dec)	Bit Status	<u>^</u>
1		(/	(/		1		<b>~~~</b>	(= y		-
2					2					
3					3					
4					4					
5					5					
6					6					
7					7	-				
8					8	-				
9					9	-				
					10					
1					11	-				
2					12					
с. Л					14					
5					15	-				
6					16					
					10	6				<u> </u>

2. Bit device

For setting up the addresses for the bit type serial slave device and reading the contents from the designated slave.

Station address:

Enter the address of the slave to be monitored. (Max. 16 slaves)

■ MODBUS (Hex):

Enter the 4-digit hex Modbus address of the slave data to be monitored.

■ MODBUS (Dec):

Enter the 6-digit decimal Modbus address of the slave data to be monitored.

Account:

Enter the number of consecutive bits to be monitored (Max. 100).

3. Word device

For setting up the addresses for the word type serial slave device and reading the contents from the designated slave.

Station address:

Enter the address of slave to be monitored. (Max. 16 slaves)

MODBUS (Hex):

Enter the 4-digit hex Modbus address of the slave data to be monitored.

MODBUS (Dec):

Enter the 6-digit decimal Modbus address of the slave data to be monitored.

- Account:
   Enter the number of consecutive words to be monitored (Max. 100).
  - Once the information of slave monitoring is set, click "Apply" to save the setting and start the monitoring. Incomplete device information will be deleted.

Format:

Select the format of the register to be monitored, decimal (Dec), hexadecimal (Hex) or binary.

Start/Stop monitor
 Start or stop the saved and applied device number to be monitored.
 Unapplied saved settings will be deleted.

Note:

The default is in cache enabled mode. You can set up maximum 16 sets of slave information for the monitored bits and words (Max. 100 data). Under the cache mode, you are able to send the read data back to the registers in ELC-CAENET.



### 4.8.13 Setting up virtual Com

The virtual COM converts the data sent to the RS-232 port into Ethernet.

■ Select Virtual COM for COM2 mode (RS-485)

EATON ELC-CAENET			
Overview Basic Clock IP Filter COM Setup Bit Device Word De	Smart PLC Analog Input/Output Module 1/0 H	Ionitor Gateway Seci	unity
Communication Parameter			
COM2 Mode (RS-485) Baudrate	Virtual COM  9600		
Parity	Even		
Data Length Stop Bits	7 🛩		
Station Address	1		
			UK Cancel Apply
- The default setting for listen port is 20001.
- Open the setup page for Virtual COM.

🕂 Eaton ECISoft	
jeje Vjew Iools Help Dez ■ 4 B. 2 111 Q Q Q N Q 2 H A B B D D	
Retwork Type	
XI     Time     Description.	B5/22 COM
ready	Korzóz, Com
VirtualCOM - Configuration	- Select COM port - Search device on network o enter IP address

Press "Search", and you will see all the connected devices on the network

B	lodule				X
[	Node List				
	Module	Module Name	IP Address	Port	Mz
	RTU-EN01	RTU-EN01	192.168.1.161	20001	00:
	•				►
			OK	Can	icel

Select the device and click "OK". Information on the device will be loaded in automatically.

Press "OK" to complete the setup.

Create	X	
Parameter		
COM Port	COM4	
IP Address	192.168.1.5	
Listen Port	20001	VirtualCOM 🛛 🔀
Module Name	DELTA ENA01-EIP	Create succeed
	OK Cancel	ок

Once the setup is completed, you will then be able to see the virtual COM just set in "Computer Management".



#### 4.8.14 Security Setting

To prevent the values set in the ELC-CAENET from being modified, you can set up passwords

to lock the settings in the ELC-CAENET.

Setting up a password

	NET							
verview Basic	Clock	IP Filter	Smart PLC	Analog Input/Output Mod	ule 1/0 Monitor	Gateway	Security	
Login						7		
Password				Confirm				
Password Setu	p					- 1		
Modify								
Password	[							
Confirm Pass	word							
Load Factory D	efault							
Factory S	etting							

1. Login

Log in to check and modify parameters.

2. Password setup

Check the "Modify" box to set up the password.

- Password
   Enter maximum 4 characters. Leave it blank to clear the password.
- 4. Confirm password

Enter the new password again.

Note:

Once the password is set, none of the configuration pages can be accessed unless you enter the password. However, if you access the ELC-CAENET via RS-232, you can return the module to defaults whether the password isset or not. For example, if you have locked ELC-CAENET but forget the password, you must return the ELC-CAENET to default settings viay RS-232, and all the settings will return to default.

#### 4.8.15 Returning to Default Settings

If you need to clear all the settings and return them to defaults, check the "Factory Setting" box.

Returning to default settings

CARS485_Example[Mo	dbus MCC Cor	trol] - ELC Editor	- [Ladder Diagram Mode]				- 8 🛚
🔠 Eile Edit Congiler (	Comments Search	. Yiew Communic	ation Options Wizsed Wind	ow Help			_ # ×
	XBB	9 1 9 9	9.0				
M I 10 C 10 B	🔲 😉 🍠 🦷	5 9 🕱 🖩	iii 🖉 🖉 😨 🕲 🖾	空空宫围风风	A 9		
Relay Type HF 💌 25 23	1日本省1	用好前品角	推科林西斯斯	BA25000	a 46 🗊 i= 🕅 .		
F80 :	2.1						
M1002	J. Eaton ICI	Soft - [ILC-CAINI	n				
	Ele yer	Tools Window H					X
Bit		EATON ILC CAIN	T	and the second sec			×
	🗏 👯 Netv	Dverview Basic	Clock   IP Filter   Smart PLC   /	nalog Input/Dutput Module   1/1	Monitor Gateway Secu	×	
	8.07	1000					
	1 1	Patrust	1				-
		r dismore		Correct			
		Password Setup					
		Modity					-
		Password					
		Confirm Passes	brd				
	1	Load Factory De	a.A.	ELC-CAINET	18		
		Factory Set	ina	2)			
				Kecum to I	actory setting		
	- 1			Yes	No		
L							
1	Time						
						OK Cancel Appl	·
	Ready					RS-212	COM1
						TO LOD	
Overwrite	Row: 0, Col: 1		218/1.5872 Steps		ELC-P	V	<u>×</u>
							· 면 ×
	-		1	Cash-		C. C	
Start 🖉 🙆			C:(Documents and Se	g ELC Communications	of Elisat	Eaton ECISoft - [ELC	C 🔤 🔤 🖓 🚺 🖓 2:39 PM

Check "Factory Setting" box and click on "Yes".

Note:

If you set up the ELC-CAENET via RS-232, you can return the settings to defaults whether the password is locked or not. It will take approximately 10 seconds to return to default settings, so DO NOT switch off the power within the until it's complete.

#### 4.8.16 Web Function

ELC-CAENET offers a Web function for the user to connect through an Internet browser (e.g. Internet Explorer). You can configure and monitor the ELC-CAENET using this embedded web page.

1. Set up serial communications.



2. Open Internet Explorer and enter IP address "192.168.1.5" (default) of ELC-CAENET. You can also copy the IP address of ELC-CAENET in ECISoft and paste it to the address column in IE. Press "Enter" on keyboard to open the webpage.



3. To use the analog input/output modules tab via the web, download

"EatonR-Side-S\_ENU.eds" file from Delta's website first and import the file to the page. in the web pages will look just like the tabs in ECISoft. The webpage supports Java Runtime Environment (JRE) v1.4.2\_xx and above.

4. Webpage troubleshooting

Unable to connect:

(1) Check if Java is correctly installed. Connect to the Java page to confirm.

(2) Check Proxy settings. Close Proxy or set up exceptions.

Close Proxy:

Æ Eaton Corporation ELC-CAETIP Setup - Windows In	ernet Explorer	
		🔽 🗟 🐓 🗙 🚼 Google
Eile Edit View Favorites Iools Help	x 🔁 -	
🖕 Favorites 🛛 🚖 🏉 Suggested Sites 👻 🔊 Free Hotmail 🔊	Veb Slice Gallery 💌	
Eaton Corporation ELC-CAETIP Setup		🏠 🔹 🔝 👘 🖃 🖶 🖕 🔤 Bage 🕶 Safi
FAT-N		
Overview Basic	Clock IP Filter Smart PLC Analog Input/Output Module I/O Monitor Gateway	Security
Module Name	EATON ELC-CAENET	
Network Setup		
IP Configuration	Static 💌	
IP Address	192.168.1.5	
Netmask	255.255.255.0	
Gateway	0.0.0.0	
Timer Setting		
Keep Alive Time(s	30 (5 ~ 65535 s)	
Modbus Timeout (	ns) 5000 (5~65535 ms)	
Delay Time (ms)	0 (0~65535 ms)	
		Apply
	Copyright © 2009 Eaton (	Corporation. All Rights Reserved.

#### 1. In IE, select "Tool" => "Internet Options...".

File Edit View Favorites	Tools Help X 📆 -		
🔆 Favorites 🛛 🚖 🏉 Sugge	Delete Browsing History Ctrl+Shift+Del InPrivate Browsing Ctrl+Shift+P Reopen Last Browsing Session		🏠 🛪 🔊 🔹 📄 🔻 Page + Sa
	InPrivate Filtering Ctrl+Shift+F InPrivate Filtering Settings	-	
	Pop-up Blocker SmartScreen Filter Manage Add-ons	nart PLC Analog Input/Output Module 1/O Monitor Gateway	Security
	Compatibility View Compatibility View Settings		
	Subscribe to this Feed Feed Discovery Windows Update	C14:97	
	Developer Tools F12		
	Willouws messenger Diagnose Connection Problems Spybot - Search Destroy Configuration IE Anti-Spyware Create Mobile Favorite Sun Java Console	48/16 1 ELC-ANDRAANN/(H100CC)	
	Internet Options		
	3rd Analog Input/Output Module	N/A	
	4th Analog Input/Output Module	N/A	
	5th Analog Input/Output Module	N/A	
	6th Analog Input/Output Module	N/A	
	7th Analog Input/Output Module	N/A	
	8th Analog Input/Output Module	N/A	
		Copyright © 2009 Eaton	Corneration All Rights Reserved

2. Select "Connections" and Click "LAN Settings...".

E Setup	t up an Internet conne ),	ection, click	Set <u>up</u>
Dial-up and	Virtual Private Network	settings	
			Add
			<u>R</u> emove
Choose Sett	ings if you need to con	nfigure a proxy	Settings
○ Dial <u>w</u> he ○ Always d	never a network conn ial my default c <u>o</u> nnecti	ection is not preser ion	nt
Current	None		S <u>e</u> t Default
	letwork (LAN) settings		
Local Area N			LAN Settings
Local Area N LAN Setting:	s do not apply to dial-u	up connections.	gart ootange

3. Uncheck "Proxy server" options and click "OK".

Local Area Network (LAN) Settings 🛛 🔹 💽								
Automatic configuration Automatic configuration may override manual settings. To ensure the use of manual settings, disable automatic configuration. Automatically detect settings Use automatic configuration script								
Addgess								
Proxy server $\mathbf{V}$ Use a proxy server for your LAN (These settings will not apply to dial-up or VPN connections).								
Address: XXX.XXX Port: 000 Advanced								
OK Cancel								
Local Area Network (LAN) Settings								
Local Area Network (LAN) Settings ? X Automatic configuration Automatic configuration may override manual settings. To ensure the use of manual settings, disable automatic configuration.								
Local Area Network (LAN) Settings								
Local Area Network (LAN) Settings								
Local Area Network (LAN) Settings         Automatic configuration         Automatic configuration may override manual settings. To ensure the use of manual settings, disable automatic configuration.								

Set up exceptions:

1. Click "Advanced..." on Local Area Network (LAN) Settings page.

Local Area Network (LAN) Settings								
Automatic configuration								
Automatic configuration may override manual settings. To ensure the use of manual settings, disable automatic configuration.								
✓ <u>A</u> utomatically detect settings								
Use automatic configuration script								
Address								
Proxy server								
$\mathbf{V}$ Use a proxy server for your LAN (These settings will not apply to dial-up or VPN connections).								
Address: XXXX.XXX Port: 0000 Advanced								
Bypass proxy server for local addresses								
OK Cancel								

2. Enter the IP address "192.168.1.5" of ELC-CAENET in Exceptions.

I	туре	Proxy address to use	Port
	HTTP:	XXX.XXX	:
	<u>S</u> ecure:	XXX.XXX	:
	ETP:	XXX.XXX	:
	<u>G</u> opher:	XXX.XXX	:
	So <u>c</u> ks:		:
xcept	Use the ions Do <u>n</u> ot use	same proxy server for all pro proxy server for addresses b	tocols eginning with:
	192,168.3	1.5	

3. Click "OK".

Abnormal webpage action: In this case, please clear your temporary Internet files. Clear temporary Internet files:

1. In IE, select "Tools" => "Internet Options...".

In the "General" page, click "Delete Files..." in Temporary Internet files column.

Internet	Options					? 🛛
General	Security	Privacy	Content	Connections	Programs	Advanced
Home	Page You ca Add <u>r</u> es	in change	which pag api/redir.d	ge to use for yo Il?prd=ie&pver	ur home pag =6&ar=msr	ge.
Temp	orary Intern Pages for quic	net files you view i k viewing Delete Co	on the Inte later. okjes	rnet are stored Delete <u>F</u> iles	in a special	folder
Histor	y The Hi quick a Days to	story folde access to r o <u>k</u> eep paj	r contains ecently vi ges in histo	links to pages ; ewed pages. ory: 20 😭	you've visite	ed, for <u>fistory</u>
	lors	For	ts	Languages.	Acc <u>e</u>	essibility
			ОК	Ca	incel	Apply

2. Check "Delete all offline content" and click "OK" to start the deletion.

Delete	Files 🔀
<u>.</u>	Delete all files in the Temporary Internet Files You can also delete all your offline content stored locally.  Delete all offline contenti OK Cancel

3. Click "OK" to leave the "General" page.

#### 4.8.17 Reading the ELC-CAENET EDS file to view/edit analog data

When using the web pages to configure and view the data on the Analog I/O Module tab, click the "Read EDS File" button and browse the following path on your computer for the EDS file:

C:\Program Files\EATON\Communication\ECISoft\EDS

The filename is: EatonR-Side-S\_ENU.eds

Select the file and click Open and all the analog information available will be filled in on this page. It will also allow you to configure this page and download it to the module.

## 4.9 Using the ELC-PV Controller and the ELC-COENETM Ethernet Module to Control and Monitor I/O Data from Distributed I/O Adapter ELC-CAENET via Modbus TCP Ethernet

This application example will demonstrate how to set up an ELC-COENETM Ethernet module to read and write I/O data from an ELC-CAENET Ethernet distributed I/O adapter. The software used to configure the adapter and the COENETM module is called ECISoft and is included in ELCSoft.

The system used for this application example consists of the following:

- (1) ELC-PV28 controller
- (1) ELC-COENETM Ethernet module (Modbus TCP protocol)
- (1) ELC-CAENET Ethernet distributed I/O adapter
- (1) ELC-PS02 24vdc power supply
- (1) Ethernet switch 10/100mbps
- (3) Ethernet patch cables

Both Ethernet modules are connected to the switch along with the computer running ECISoft. The Subnet mask used for all devices is: 255.255.255.0. The IP addresses used for each device are:

- 1. ELC-COENETM 120.151.1.2
- 2. ELC-CAENET 120.151.1.3
- 3. Computer running ELCSoft/ECISoft 120.151.1.1

#### Configuring the ELC-CAENET Distributed I/O Adapter

ECISoft is used to configure the ELC-CAENET adapter. Start ELCSoft 2.0 or later, and then click the ECISoft button shown below. Note that when the curser is over the ECISoft button, it displays ECISoft. Use this to verify that you're clicking the correct button.



🚊 Eaton ECISoft	
Ele Yiew Iools Help	
日 県 Network Type	
Ime Description	
Ready	Ethernet BROADCAST

The following window will open after the ECISoft button is clicked:

The ELC programming cable (ELC-CBPCELC3) may be used to connect to and configure each Ethernet module or Ethernet may be used to connect to both modules. For this example, RS232 was used to initially configure the IP address and Subnet Mask for each Ethernet module. The Ethernet modules do support DHCP. Note: the default IP address setting for the ELC-COENETM module is IP address 192.168.1.5. The PC IP address and network mask need to be set up to reside on the same network as the ELC-COENETM. This will allow you to immediately connect to each module using ECISoft on Ethernet. If you choose to use RS232 to configure the Ethernet modules, use the ELC programming cable to connect to each Ethernet module to set the IP address and Subnet Mask. The computer and both Ethernet modules must then be connected to an Ethernet switch. Be sure the subnet mask is the same for all devices.

In ECISoft select the Tools drop down menu then choose Communication Setting. For this example the IP addresses are set up for each device as shown earlier in this document. The Communication Setting page looks like the following:

Communication Sett	Communication Setting							
Communication Type	,							
Туре	Ethernet	*		Cancel				
Parameter				Default				
COM Port	COM1	~						
Data Length	7	~						
Parity	Even	~						
Stop Bits	1	~						
Baud Rate	9600	~						
Station Address	0	A V						
Modbus Mode	ASCII	~						
IP Address	255 . 255 .	255 . 255	IP List					

Click OK after selecting Ethernet for the Type. Then in ECISoft, click the IP "magnifying glass" and the software will search for all ELC Ethernet devices connected to the same Ethernet switch. When complete, the following screen will be displayed:

Reaton ECISoft - [ELC-COENETM]	
Elle Yiew Iools Window Help	_ 8 ×
Image: Street state sta	
Time Description	
Ready	Ethernet BROADCAST

Note the two tabs at the bottom left of the main window. Both modules have been found and each type of module is located in a separate tab. Click the tab for the ELC-CAENET module, then double click its icon to open its configuration pages as follows:

EATON ELC-CAENET		
Overview Basic Clock IP Filter Smart PLC	Analog Input/Dutput Module 1/D Monitor Gateway Security	
- Device Overview		
Module	ELC-CAENET	
IP Address	120.151.1.3	
MAC Address	00:D0:AF:0C:14:97	
Firmware Version	0.01	
<ul> <li>Bight-side Module Information</li> </ul>		
DI / DO Point	40 / 8	
Number of Analog Input/Output Module	2	
1st Analog Input/Output Module	ELC-ANOBAANN (H'OOCC)	
2nd Analog Input/Output Module	ELC-AN04ANNN (H'0088)	
3rd Analog Input/Output Module	N/A	
4th Analog Input/Output Module	N/A	
5th Analog Input/Output Module	N/A	
6th Analog Input/Output Module	N/A	
7th Analog Input/Output Module	N/A	
8th Analog Input/Output Module	N/A	
		y.

The Overview window displays specifics about each module. The Basic tab allows the IP address to be changed as well as the subnet mask and gateway address. This is also where the IP address can be made static or DHCP. When finished, the Basic tab looks like the following for this example:

verview Basic Clock I	IP Filter Smart PLC Analog Input/Output Module 1/O Monitor Gateway Security
Module Name	EATON ELC-CAENET
Network Setup	
IP Configuration	Static 🖌
IP Address	120 . 151 . 1 . 3
Netmask	255 . 255 . 255 . 0
Gateway	192 . 168 . 1 . 1
Ethernet Timer Setting	
Keep Alive Time (s)	30 (5 - 65535 s)
RS-485 Timer Setting	
Timeout (ms)	5000 (5 - 65535 ms)
Delay Time (ms)	0 (0 - 65535 ms)

Select the Overview tab. Note that there are 40 digital inputs, 8 digital outputs and 2 analog modules connected to the ELC-CAENET adapter. For this application, the following modules are connected to the adapter from left to right:

ELC-EX08NNSN 8 input switch module

ELC-AN06AANN 4 input, 2 output analog module

ELC-AN04ANNN 4 input analog module

ELC-EX16NNDR 8 input, 8 output digital combo I/O module

There are a total of 40 digital inputs, 8 digital outputs and 2 analog modules, matching the totals shown on the adapter module's configuration pages (Overview tab) above.

Next we need to map the analog I/O data for each of the analog modules connected to the adapter. Each analog module contains many data words. Only those that are absolutely necessary should be mapped. Click the Analog Input/Output Module tab and the following page will be displayed:

ELC-ENETIP	An	alog Inpu	it/Output I	Module 1: E	LC-ANO6	SAANN	ſ	Clean Mapping	g List
<ul> <li>1: ELC-AN06AAN</li> <li>2: ELC-AN04ANN</li> </ul>		Read	Write	CR No.	R/W	Register Name	Present Value	Format	^
	0	D	D	#00	R	Model type	H00CC	Hex	-
	1	D	D	#01	R/W	Input mode setting	H0000	Hex	
	2	D	D	#02	R/W	CH1 average number	H000A	Hex	-
	3	D	D	#03	R/W	CH2 average number	H000A	Hex	. =
	4	D	D	#04	R/W	CH3 average number	H000A	Hex	-
	5	D	D	<b>#</b> 05	R/W	CH4 average number	H000A	Hex	
apping List (Read)	6	D	D	#06	R	Average value of CH1 input si	H0000	Hex	-
M CB No	7	D	D	#07	R	Average value of CH2 input si	H0000	Hex	
Grifto.	8	D	D	#08	R	Average value of CH3 input si	H0000	Hex	•
	9	D	D	#09	R	Average value of CH4 input si	H0000	Hex	•
	10	D	D	#10	R/W	CH5 output signal value 💦 🔪	H0000	Hex	
	11	D		#11	R/W	CH6 output signal value 💦 🔪	H0000	Hex	•
	12	D	D	#12	R	Present value of CH1 input si	H0000	Hex	-
lapping List (Write)	13	D	D	#13	R	Present value of CH2 input si	H0000	Hex	•
M CB No	14	D	D	#14	R	Present value of CH3 input si	H0000	Hex	•
	15			#15	R	Present value of CH4 input si	H0000	Hex	•
	16	D	D	#16		None	H0000	Hex	•
	17	D		#17		None	H0000	Hex	•
	18	D	D	#18	R/W	To adjust OFFSET value of $\overline{\mathbb{C}}$	H0000	Hex	-
	10	D	D .	<i>#</i> 10	R (117	To adjust OFFCFT rains of	¥0000	Uar .	. 🗠

The upper box on the left displays the two analog modules. Click the module to be mapped so the green dot appears to its left. The AN06AANN is selected, so we can begin mapping its data. For this example, the following data will be mapped for this module:

- CR#1 This is the configuration word for the analog I/O on this module (write).
- CR#6-9 These are the Average values for the 4 analog inputs. The default is to average the values over 10ms. This average value can be changed with CR#2-5 if needed (read).
- CR#10-11 These are the two analog outputs (write).

Click Apply and the chosen values are displayed in the Read and Write Mapping Lists shown on the left side of the screen.

Click the ELC-AN04ANNN in the upper left box to select it. The mapping list is cleared so parameters for this module can now be selected as follows:

- CR#1 This is the configuration word for the analog inputs on this module (write).
- CR#12-15 These are the Present Values for the four analog inputs. These were chosen for this module because the analog inputs connected to this module do not change quickly, so average values are not required.

Click Apply and the chosen values will be added to the Read and Write Mapping tables on the left side of the screen. Note that 8 input words are mapped along with 4 output words, per the

screen below. Note exactly how this data is mapped, it will be needed later when writing the program.

view B	asic Clock	IP Filt	er Smar	t PLC A	nalog Input.	/Output I	Module 1/0 Monitor Gateway	Security		
🔋 ELC-I	NETIP ELC-AN06AAN	An	alog Inpu	t/Output I	Module 2: E	LC-AN04	IANNN		Clean Mapping I	List
• 2	ELC-AN04ANN		Read	Write	CR No.	R/W	Register Name	Present Value	Format	^
		0	D	D	#00	R	Model type	H0088	Hex 🔻	
		1	D		#01	R/W	Input mode setting	H0000	Hex 🔻	
		2	D	D	#02	R/W	CH1 average times	H000A	Hex 🔹	
		3	D	D	#03	R/W	CH2 average times	H000A	Hex 🔹	
		4	D	D	#04	R/W	CH3 average times	H000A	Hex 💌	
	)) <b>)</b>	5	D	D	<b>#</b> 05	R/W	CH4 average times	H000A	Hex 🔹	
Mappin	g List (Read)	6	D	D	#06	R	Average value of CH1 input si	H0000	Hex 🔹	
м	CB No	7	D		#07	R	Average value of CH2 input s	H0000	Hex 🔹	
1	#06	8	D	D	#08	R	Average value of CH3 input s	H0000	Hex 🔹	
1	#07	9	D		#09	R	Average value of CH4 input s	H0000	Hex 🔹	
1	#08	10	D	D	#10		None	H0000	Hex 🔹	
2	#12	11	D	D	#11		None	H0000	Hex 🔹	
2	#13 🞽	12		D	#12	R	present value of CH1 input si	H0002	Hex 💌	
Mappin	g List (Write)	13			#13	R	present value of CH2 input si	HFFFC	Hex 🔹	
M	CB No.	14		D	#14	R	present value of CH3 input si	H0001	Hex 🔹	
1	#01	15			#15	R	present value of CH4 input si	H0000	Hex 🔹	
1	#10	16	D	D	#16		None	H0000	Hex 🔹	
2	#11	17	D		#17		None	H0000	Hex 🔹	
		18	D	D	#18	R/W	To adjust OFFSET value of $\overline{\mathbb{C}}$	H0000	Hex 🔹	1000
		10	n	D	#10	117) G	To adjust OEECET to ha of	THUUUU	U	

Click OK to save the configuration and exit this screen.

From the main ECISoft screen, click the tab for the ELC-COENETM module, then double click the module's icon to open its configuration pages. The Overview tab displays specifics about each module. The Basic tab allows the IP address to be changed as well as the subnet mask and gateway address. This is also where the IP address can be made static or DHCP. Be sure Modbus TCP is enabled at the bottom left portion of the Basic screen.

EA	TON	ELC-CO	ENETM									
	Overview Basic Mail Data Exchange Remote I/O IP Filter Static ARP Table Security											
	Enable Remote I/O Mapping											
	Co	mmunicatio	on Parame	ters			) Мар	oing				
	(	Communica	ation Time	out: 100	ms	BX M	1appir	ıg:	Start: M	2000	🗧 En	ıd:
	ι	Jpdate Cyc	de:	100	ms	BY N	1appir	ıg:	Start: M	3000	🗧 En	ıd:
						RCR	Read	Mapping:	Start: D	2000	🗘 En	ıd:
						RCR	Write	Mapping:	Start: D	3000	🗘 En	ıd:
	_							1				
		Enable	Slave ID	IP Address	RX	RX Mapping	RY	RY Mapping	Read	RCR Read Mapping	Write	RCR W Mapp
	0	D	1	192.168.1.1	0		0		0		0	
	1	D .	1	192.168.1.2	0		0		0		0	
	2	D	1	192.168.1.3	0		0		0		0	
	3	D	1	192.168.1.4	0		0		0		0	
									DK	Cancel		Apply

Click the Remote I/O tab to open the following screen:

Click to select Enable Remote I/O Mapping, then click the Enable column for row 0. Enter the IP address of the ELC-CAENET module (120.151.1.4 for this example). Then configure row 0 as follows:

RX (digital inputs)	= 40 bits
RY (digital outputs)	= 8 bits
Read (analog input data)	= 8 words
Write (analog outout data)	= 4 words

EATON	ELC-CO	ENETM									×
Overv	riew Basio	: Mail	Data Exchange	e Rer	note I/O	P Filter	Static ARP	Table	Security		
	Enable Remote I/O Mapping										
Co	mmunicatio	on Parame	ters			'O Map	bing				
(	Communica	ition Timed	out: 100	ms	R×	Mappin	g:	Start: N	1 2000	🗘 En	d: 20:
I	Update Cyc	:le:	100	ms	BY	Mappin	g:	Start: N	1 3000	🗘 En	d: 30
					RC	R Read	Mapping:	Start: D	2000	🗘 En	d: 201
					RC	R Write	Mapping:	Start: D	3000	🗧 En	d: 301
	Enable	Slave ID	IP Address	RX	RX Mapping	RY	RY Mapping	Read	RCR Read Mapping	Write	RCR \ Mapp
0	<b>X</b>	1	120.151.1.4	40	M2000	8	M3000	8	D2000	4	D300
1	D	1	192.168.1.2	0		0		0		0	
2	D	1	192.168.1.3	0		0		0		0	
3	D	1	192.168.1.4	0		0		0		0	
	OK Cancel Apply										

The Remote I/O tab should look like the following:

Note that the data is mapped to addresses in the ELC-PV controller connected the

ELC-COENETM module. These addresses may be changed under PLC I/O Mapping in the upper right portion of this page. Enter different starting addresses and the end address will change based on the amount of data for each. The valid ranges for the M bits and D registers are as follows:

RX Mapping: M2000 - M4095

RY Mapping: M2000 – M4095

RCR Read mapping: D2000 - D9999

RCR Write mapping: D2000 - D9999

These are actual data addresses in the ELC-PV controller. The data will be mapped based on the position of the I/O modules with respect to the ELC-CAENET module as follows:

M2000 – M2007 ELC-EX08NNSN	8 input switch module #1
M2008 – M2015 ELC-EX08NNSN	8 input switch module #2
M2016 – M2023 ELC-EX08NNSN	8 input switch module #3
M2024 – M2031 ELC-EX08NNSN	8 input switch module #4
M2032 – M2039 ELC-EX16NNDR	8 inputs digital combo module
M3000 – M3007 ELC-EX16NNDR	8 outputs digital combo module

D2000 – D2003	ELC-AN06AANN	4 analog inputs
D3000	ELC-AN06AANN	Configuration word
D3001 – D3002	ELC-AN06AANN	2 analog outputs
D2004 – D2007	ELC-AN04ANNN	4 analog inputs
D3003	ELC-AN04ANNN	Configuration word

When finished, click Apply, then OK to save all changes. Place the ELC-CAENET module into Run mode using the switch on the module. The ELC-PV controller must contain an instruction that moves a 1 to CR#15 in the COENETM module. Below is the instruction List rung of code that is required in the ELC program to instruct the Ethernet module to begin polling the ELC-CAENET module.

LD M1000	Always True bit
TO K100 K15 K1 K1	Send a 1 to CR#15 in the COENETM to begin polling

Note: The K100 in the TO instruction above is the designation for the first Communication module to the left of the ELC-PV controller. The ELC-PV controller supports up to 8 communication modules. Send a K0 to stop polling (LD K100 K15 K0 K1).

Click Apply, then OK. When the controllers are placed into the run mode, the messages will begin. When data is placed into D200-D209 in the master controller, it will be sent to D100-D109 in the remote controller. Data in D300-319 in the remote controller will be sent to D50-D69 in the master controller.

## 4.10 Using a Rockwell CompactLogix PLC and RSLOGIX5000 to Control and Monitor I/O Data from Distributed I/O Adapter ELC-CAENET via Ethernet IP

This application example will demonstrate how to set up a Rockwell CompactLogix PLC with an imbedded Ethernet IP scanner port to read and write I/O data from an ELC-CAENET Ethernet distributed I/O adapter. The software used to configure the adapter is called ECISoft and is included in ELCSoft. The software used to configure the CompactLogix PLC and its Ethernet IP port is RSLOGIX5000.

The system used for this application example consists of the following:

- (1) CompactLogix L23E controller
- (1) ELC-CAENET Ethernet distributed I/O adapter
- (1) ELC-PS02 24vdc power supply
- (1) Ethernet switch 10/100mbps

#### (3) Ethernet patch cables

Both Ethernet modules are connected to the switch along with the computer running ECISoft and RSLOGIX5000. The Subnet mask used for all devices is: 255.255.255.0. The IP addresses used for each device are:

1. CompactLogix L23E	120.151.1.2
2. ELC-CAENET	120.151.1.3
3. Computer	120.151.1.1

#### Configuring the ELC-CAENET Distributed I/O Adapter

ECISoft is used to configure the ELC-CAENET adapter. Start ELCSoft 2.0 or later, then click the ECISoft button shown below. Note that when the curser is over the ECISoft button, it displays ECISoft. Use this to verify that you're clicking the correct button.



🚊 Eaton ECISoft	
Eile View Tools Help	
Ethernet	
Time Description	
Ready	Ethernet BROADCAST

The following window will open after the ECISoft button is clicked:

The ELC programming cable (ELC-CBPCELC3) may be used to connect to and configure the ELC-CAENET module or Ethernet may be used to connect to the module. For this example, RS232 was used to initially configure the IP address and Subnet Mask for the CAENET Ethernet module. The Ethernet module does support DHCP as well. Note: the default IP address setting for the ELC-CAENET module is 192.168.1.5. The PC IP address and network mask need to be set up to reside on the same network. This will allow you to immediately connect to the ELC module using ECISoft on Ethernet. If you choose to use RS232 to configure the Ethernet modules, use the ELC programming cable to connect to each Ethernet module to set the IP address and Subnet Mask. The computer and the Ethernet module must then be connected to an Ethernet switch. Be sure the subnet mask is the same for all devices.

In ECISoft select the Tools drop down menu then choose Communication Setting. For this example the IP addresses are set up for each device as shown earlier in this document. The Communication Setting page looks like the following:

Communication Sett	ing			
Communication Type				OK
Туре	Ethernet	*		Cancel
Parameter				Default
COM Port	COM1	~		
Data Length	7	~		
Parity	Even	~		
Stop Bits	1	~		
Baud Rate	9600	~		
Station Address	0	A V		
Modbus Mode	ASCII	~		
IP Address	255 . 255 .	255 . 255	IP List	

Click OK after selecting Ethernet for the Type. Then in ECISoft, click the IP "magnifying glass" and the software will search for all ELC Ethernet devices connected to the same Ethernet switch. When complete, the following screen will be displayed:

Reation ECISoft - [ELC-CAENET]	
Eile Yiew Iools Window Help	_ & ×
Image: State of the state	
Time Description	
Ready	Ethernet BROADCAST

Note that the ELC-CAENET module has been found. Double click its icon to open its configuration pages as follows:

EATON ELC-	CAENE	Γ										
Overview B	asic (	Clock	IP Filter	Smart PLC	Analog Input/Output Module	1/0 Monitor	Gateway	Security				
- Device O	verview						-					
Module					ELC-CAENET							
IP Addr	ess				120 151 1 3							
MAC Ac	ldress				00:D0:AF:0C:14:97							
Firmwar	e Versior	n			0.01							
- Bight-side	Module	Informe	ation									
riigheado	module	nitonni	30011									
DI / DO	Point				40 / 8							
Number	of Analo	og Inpu	t/Output I	Module	2							
1st Ana	log Input	/Outpu	it Module		ELC-AN06AANN (H'00CC)							
2nd Ana	alog Inpu	it/Outp	ut Module		ELC-AN04ANNN (H'0088)	_						
3rd Ana	log Input	:/Outpu	it Module		N/A	_						
4th Ana	log Inpul	:/Outpu	it Module		N/A							
5th Ana	log Inpul	:/Outpu	it Module		N/A							
6th Ana	log Input	:/Outpu	it Module		N/A							
7th Ana	log Inpul	:/Outpu	it Module		N/A							
8th Ana	log Input	:/Outpu	it Module		N/A							
								_	OK	C		Annhu
								L	UN	Lan	Cel	SbbiA

The Overview window displays specifics about the module. The Basic tab allows the IP address to be changed as well as the subnet mask and gateway address. This is also where the IP address can be made static or DHCP. When finished, the Basic tab looks like the following for this example:

verview Basic Clock	IP Filter Smart PLC Analog Input/Output Module 1/O Monitor Gateway Security	
Module Name	EATON ELC-CAENET	
Network Setup		
IP Configuration	Static	
IP Address	120 . 151 . 1 . 3	
Netmask	255 . 255 . 255 . 0	
Gateway	192.168.1.1	
Ethernet Timer Setting		
Keep Alive Time (s)	30 (5 - 65535 s)	
RS-485 Timer Setting		
Timeout (ms)	5000 (5 - 65535 ms)	
Delay Time (ms)	0 (0 - 65535 ms)	

Select the Overview tab. Note that there are 40 digital inputs, 8 digital outputs and 2 analog modules connected to the ELC-CAENET adapter. For this application, the following modules are connected to the adapter from left to right:

- ELC-EX08NNSN 8 input switch module
- ELC-AN06AANN 4 input, 2 output analog module
- ELC-AN04ANNN 4 input analog module
- ELC-EX16NNDR 8 input, 8 output digital combo I/O module

There are a total of 40 digital inputs, 8 digital outputs and 2 analog modules, matching the totals shown on the adapter module's configuration pages (Overview tab) above.

Next we need to map the analog I/O data for each of the analog modules connected to the adapter. Each analog module contains many data words. Only those that are necessary should be mapped. Click the Analog Input/Output Module tab and the following page will be displayed:

ELC-ENETIP	An	alog Inpu	t/Output I	dodule 1: E	LC-ANO	SAANN		Clean Mappi	ng List
2: ELC-AN04AN		Read	Write	CR No.	R/W	Register Name	Present Value	Forma	t 🔷
	0	D	D	#00	R	Model type	HOOCC	Hex	-
	1	D	D	#01	R/W	Input mode setting	H0000	Hex	-
	2	D	D	#02	R/W	CH1 average number	H000A	Hex	-
	3	D	D	#03	R/W	CH2 average number	H000A	Hex	-
	4	D	D	<i>#</i> 04	R/W	CH3 average number	H000A	Hex	•
	5	D	D	#05	R/W	CH4 average number	H000A	Hex	-
lapping List (Read)	6	D	D	#06	R	Average value of CH1 input s	H0000	Hex	-
M CB No	7	D	D	#07	R	Average value of CH2 input si	H0000	Hex	-
M LH No.	8	D	D	<b>#</b> 08	R	Average value of CH3 input s	H0000	Hex	-
	9	D	D	#09	R	Average value of CH4 input si	H0000	Hex	-
	10	D	D	#10	R/W	CH5 output signal value 💦 🔪	H0000	Hex	•
	11	D	D	#11	R/W	CH6 output signal value 💦 🔪	H0000	Hex	-
	12	D	D	#12	R	Present value of CH1 input si	H0000	Hex	+
lapping List (Write)	13	D	D	#13	R	Present value of CH2 input si	H0000	Hex	-
M CB No	14	D	D	#14	R	Present value of CH3 input si	H0000	Hex	-
	15	D	D	#15	R	Present value of CH4 input si	H0000	Hex	-
	16	D	D	#16		None	H0000	Hex	•
	17	D	D	#17		None	H0000	Hex	-
	18	D	D	#18	R/W	To adjust OFFSET value of $\overline{\mathbb{C}}$	H0000	Hex	-
	10			<i>#</i> 10	107.9	To adjust OFFCET solus of	110000	U.,	

The upper box on the left displays the two analog modules. Click the module to be mapped so the green dot appears to its left. The AN06AANN is selected, so we can begin mapping its data. For this example, the following data will be mapped for this module:

- CR#1 This is the configuration word for the analog I/O on this module (write).
- CR#6-9 These are the Average values for the 4 analog inputs. The default is to average the values over 10ms. This average value can be changed with CR#2-5 if needed (read).

CR#10-11 These are the two analog outputs (write).

Click Apply and the chosen values are displayed in the Read and Write Mapping Lists shown on the left side of the screen.

Click the ELC-AN04ANNN in the upper left box to select it. The mapping list is cleared so parameters for this module can now be selected as follows:

- CR#1 This is the configuration word for the analog inputs on this module (write).
- CR#12-15 These are the Present Values for the four analog inputs. These were chosen for this module because the analog inputs connected to this module do not change quickly, so average values are not required.

Click Apply and the chosen values will be added to the Read and Write Mapping tables on the left side of the screen. Note that 8 input words are mapped along with 4 output words, per the screen below. Note exactly how this data is mapped, it will be needed later when writing the PLC program.

								ine menter endorridy			
E E	ELC-EN		An	alog Inpu	it/Output I	Module 2: El	LC-AN04	4ANNN		Clean Mappin	g List
	• 2: E	LC-AN04ANN		Read	Write	CR No.	R/W	Register Name	Present Value	Format	^
			0	D	D	#00	R	Model type	H0088	Hex	•
			1	D		#01	R/W	Input mode setting	H0000	Hex	-
			2	D		#02	R/W	CH1 average times	H000A	Hex	-
			3	D	D	#03	R/W	CH2 average times	H000A	Hex	-
			4	D	D	#04	R/W	CH3 average times	H000A	Hex	-
<	.JIII)	>	5	D	D	<b>#</b> 05	R/W	CH4 average times	H000A	Hex	-
Ma	apping L	.ist (Read)	6	D	D	#06	R	Average value of CH1 input si	H0000	Hex	-
18	м	CB No 👗	7	D	D	#07	R	Average value of CH2 input si	H0000	Hex	-
1	1	#06	8	D	D	#08	R	Average value of CH3 input si	H0000	Hex	•
2	1	#07	9	D	D	#09	R	Average value of CH4 input si	H0000	Hex	•
3	1	#08	10	D	D	#10		None	H0000	Hex	•
5	2	#12	11	D	D	#11		None	H0000	Hex	•
6	2	#13 🞽	12		D	#12	R	present value of CH1 input si	H0002	Hex	•
Ma	apping L	.ist (Write)	13		D	#13	R	present value of CH2 input si	HFFFC	Hex	•
11	м	CB No	14		D	#14	R	present value of CH3 input si	H0001	Hex	•
1	1	#01	15		D	#15	R	present value of CH4 input si	H0000	Hex	•
2	1	#10	16	D	D	#16		None	H0000	Hex	•
3	2	#01	17	D	D	#17		None	H0000	Hex	•
nd-see	~		18	D	D	#18	R/W	To adjust OFFSET value of $\overline{\mathcal{C}}$	H0000	Hex	•
_			10	D.	n	#10	717) G	To adjust OFFSET rolus of	<b>10000</b>	Uow	_ 1

Click OK to save the configuration and exit this screen.

The ELC-CAENET module creates an Input Image with all possible discrete inputs (256 bits or 16 words) followed by the analog input data. It also creates an Output Image with all possible discrete outputs (256 bits or 16 words) followed by the analog output data. The I/O data in the CAENET module will be as follows:

Input Image:

Discrete Input words 0-15: all possible discrete inputs

4 Analog Input Words for each analog module: total 8 input words

Total input words = 24 words.

Output Image:

Discrete Output words 0-15: all possible discrete outputs

3 Analog output words for the AN06 module and 1 analog output word for the AN04 module Total output words: 20 words. Now that we know the amount of data to read and write from the ELC-CAENET adapter, we can now configure the Ethernet IP scanner port on the CompactLogix PLC to poll the CAENET module for that data.

Be sure RSLinx is running. This is the communication software which will allow the computer running RSLOGIX5000 to download the program with the Ethernet IP configuration to the CompactLogix controller. Start RSLOGIX5000 by double-clicking its icon on the desktop. The following will be displayed:



To create a project in RSLOGIX5000, click the "New" button at the top left corner of the screen and choose the controller type, the revision and give the project a name as follows:

New Controlle	:r'	
Vendor:	Allen-Bradley	
<u>Т</u> уре:	1769-L23E-QB1 CompactLogix5323E-QB1 Controller 👤	ОК
Re <u>v</u> ision:	17 💌	Cancel
	<u>R</u> edundancy Enabled	Help
Na <u>m</u> e:	EIP_CAENET	
Descri <u>p</u> tion:		
<u>C</u> hassis Type:	<none></none>	
Sl <u>o</u> t:	0 📑 Safety Partner Slot:	
Cr <u>e</u> ate In:	C:\RSLogix 5000\Projects	<u>B</u> rowse

Click OK to create the project. On the left portion of the project screen, click to select the controllers Ethernet IP scanner port as shown below, then right click and choose Properties.



RSLogix 5000 - EIP_CAENET [1769-LZ3E-QB1]*	izw Help	
	u G 🔽 👰 强 📴 🖉 🖳 Select a Language 🔽 🎾	
	2 Patr. (none) 🗾 සීම	
No Forces		
	Favories & Add-On & Safety & Alarms & Bt & Timeros	
Controller EIP_CAENET Controller Tags Controller Tags Controller Tags Controller Tags Controller Tags ManTack ManTack ManTack ManTack ManTack ManTack Motion Groups Motion Gr	Madula Properties: Controller: 1 (1769-L23E-QB1 Ethernet Port 17.2)     General* Connection   RSNetVork   Module Info   Pot Configuration   Pot Diagnostics       Type: 1789-L23E-QB1 Ethernet Port 10/100 Mbps Ethernet Pot on Compact.og/6323E-QB1     Vendo: Alben Bradey     Parent: Controller     Nage: CoolerNB     CoolerNB     CoolerNB     CoolerNB     CoolerNB     Sigt: 1 Major Revision: 17     Hod Name     Sigt: 1 Major Revision: 17     Hod Name     Sigt: 0 Major Revision: 17	
Description Status Offine Module Fault		

Fill in the IP Address for the CompactLogix Ethernet IP scanner port as shown below:

Click Apply, then OK to save the configuration. On the left portion of the project screen, right click on Ethernet as shown highlighted below and choose "New Module".

	8 RSLogix 5000 - EIP_CAENET [1769-L23E-QB1]	
	He Lot Yew Search Logic Communications Loois Window Help	
Concrete Fig. CAMPT Concrete Fig. School Concrete Fig. School C		
	Image: State         Image: State	

The following window will be displayed:

Select Module				
Module • Communications • Digital • Drives • HMI	Description			Vendor
By Category	By Vendor Favo	ites	<u>F</u> ind Cancel	Add Favorite

Click the + sign to the left of Communications, then scroll down to "Ethernet-Module Generic Ethernet Module", select it and click OK. The following window will open:

New Module						$\mathbf{\times}$
Type: Vendor: Parent: Na <u>m</u> e: Descri <u>p</u> tion:	ETHERNET-MODULE Generic Etherne Allen-Bradley LocalENB	t Module Connection Para Input:	ameters Assembly Instance:	Size:	(32-bit)	
		O <u>u</u> tput:		124	(32-bit)	
Comm <u>F</u> ormat: Address / H	Data - DINT  ost Name	<u>C</u> onfiguration:		0	(8-bit)	
○ IP <u>A</u> ddre ○ <u>H</u> ost Na	ne:	<u>S</u> tatus Input: S <u>t</u> atus Output:				
🔽 Open Mode	ıle Properties	OK	Cano	cel	Help	

Provide the following information:

Name: ELC\_CAENET

Comm Format: Data-INT

IP Address: 120.151.1.3

Input: Assembly Instance 104, Size: 24 16-bit words

Output: Assembly Instance 105, Size: 20 16-bit words

**Configuration**: Assembly Instance 50, Size: 0 words (this parameter is not used, but values must be entered.)

When finished, the New Module screen should look like the following:

New Module					×
Type: ETHERNET-MODULE Generic Etherne Vendor: Allen-Bradley Parent: LocalENB Na <u>m</u> e: ELC_CAENET	t Module Connection Par	ameters Assembly	Size:		
	<u>I</u> nput: Output:	104	24	(16-bit)	
Comm Eormat: Data - INT	<u>C</u> onfiguration:	50	0		
• IP <u>A</u> ddress: 120 . 151 . 1 . 3 С <u>H</u> ost Name:	Status Input:		ļ		
✓ Open Module Properties	OK	Can	cel	Help	

Click OK to close and save this window, then OK to the Module Info Screen. From the Project screen, double click Controller Tags and the following will be displayed:

👹 RSLogix 5000 - EIP_CAENET [1769-L23E-QB1]*							- • ×
Ele Edit View Search Logic Communications Tools Window	Help						
	- <b>44</b> 1	Select a Language	- 🥪				
Offline	Path: <pre>cnone&gt;</pre>						
	Controller Tags - EIP_CAENET(controller)	~					
2 Controller Tags	Scope: TEIP_CAENET - Show Sh	wAl					_
Power-Up Handler	Name	6 Malua	Eorop Mash	e Stulo	Data Tupa	Description	
🖻 🚔 Tasks		o value	( )	( ) Signe	AD-CTUCDNET	Description	
AninTask			()	()	AD.ETHENNET		-
Inschadulad Program			()	()	AD-ETHEDNET		-
E Groups	Hidrosh1:C		()	()	AB:Embedded ID		-
Ungrouped Axes	El costiti		()	()	AP:Embedded_10		-
- Call Add-On Instructions	tid cost 20		()	()	AB:Embedded_10		-
E G Data Types	T-Local 21		()	1 1	AB:Embedded_0		-
The Strings	± local20		1	1	AB:Embedded_0		-
Ado-Un-Jerned     Mode-Durined     Mode-Durined	<u>∗ I &gt; </u> \Monifor Tags <u>/</u> Edit Tags /		74			<u>,</u>	
Ready							

Note that three sets of tags have been created for the ELC\_CAENET module. The

Data and 20 16-bit integer tags have been created for Output Data. This is where the CompactLogix program will access input data from the remote ELC input modules and write data for the ELC output modules. The first 16 words of the Input and the Output tags are for the discrete I/O, followed by the analog I/O as follows:

8 RSLogix 5000 - EIP_CAENET [1769-L23E-QB1]*					- 7 🛛
Ele Edit Yew Search Logic Communications Tools Window	/ Help				
	- 44 强 📴 🕑 🖳 🖉	Select a Language	- 🥪		
Offline 📴 RUN	Path: <none></none>	▼ **			
No Forces					
No Edits		<u>&gt;</u>			
	Favorites 🖌 Add-On 🔏 Safety 🖌 Alarms 👗 Br	Timer/C			
Controller ETD_CAENET	Controller Tree - FID CAENET/controller				
Controller Tags	Controller Tags - The Carter (controller	,			
Controller Fault Handler	Scope: DEIP_CAENET - Show SI	now All			
Power-Up Handler	Name	∆ Value ← F ← Style	Data Type	Description	
E- 🔁 Tasks	ELC CAENET:C	() (.	AB:ETHERNET		
🗄 😋 MainProgram	- ELC_CAENET:I	() (.	AB:ETHERNET		
Unscheduled Programs	ELC_CAENET:I.Data	() (. Decimal	INT[24]		
🖻 🚖 Motion Groups	ELC_CAENET:I.Data[0]	0 Decimal	INT	First 16 Discrete Inputs	
Ungrouped Axes	+ ELC_CAENET:I.Data[1]	0 Decimal	INT	Next 16 Discrete Inputs	
Add-On Instructions	+ ELC_CAENET:I.D ata[2]	0 Decimal	INT	Next 16 Discrete Inputs	
User-Defined	+ ELC_CAENET:I.Data[3]	0 Decimal	INT	Next 16 Discrete Inputs	
🗉 🙀 Strings	ELC_CAENET:I.Data[4]	0 Decimal	INT	Next 16 Discrete Inputs	
Add-On-Defined	ELC_CAENET:I.Data[5]	0 Decimal	INT	Next 16 Discrete Inputs	
Predefined	ELC_CAENET:I.Data[6]	0 Decimal	INT	Next 16 Discrete Inputs	
Trends	ELC_CAENET:I.Data[7]	0 Decimal	INT	Next 16 Discrete Inputs	
🖃 🔄 I/O Configuration	ELC_CAENET:I.Data[8]	0 Decimal	INT	Next 16 Discrete Inputs	
🗄 🔠 CompactLogix5323E-QB1 System	+ ELC_CAENET:I.Data[9]	0 Decimal	INT	Next 16 Discrete Inputs	
1769-L23E-QB1 EIP_CAENET	+ ELC_CAENET:I.Data[10]	0 Decimal	INT	Next 16 Discrete Inputs	
- Tro9-L23E-QB1 Ethernet Port LocalENB	+ ELC_CAENET:I.Data[11]	0 Decimal	INT	Next 16 Discrete Inputs	
1769-L23E-OB1 Ethernet Port LocalENB	+ ELC_CAENET:I.D ata[12]	0 Decimal	INT	Next 16 Discrete Inputs	
ETHERNET-MODULE ELC_CAENET	+ ELC_CAENET:I.D ata[13]	0 Decimal	INT	Next 16 Discrete Inputs	
🖻 🎟 CompactBus Local	+ ELC_CAENETI.Data[14]	0 Decimal	INT	Next 16 Discrete Inputs	
Gil Embedded I/O	+ ELC_CAENET:I.Data[15]	0 Decimal	INT	Final 16 Discrete Inputs	
[1] Embedded (QToP Discrete_Inputs	+ ELC_CAENET:I.Data[16]	0 Decimal	INT	AN06 Analog Input 1	
Expansion I/O	+ ELC_CAENET:I.Data[17]	0 Decimal	INT	AN06 Analog Input 2	
	+ ELC_CAENET I.D ata[18]	0 Decimal	INT	ANU6 Analog Input 3	
	+ ELC_LAENET I.D. ata[19]	U Decimal	INT	ANU6 Analog Input 4	
	+ ELC_LAENET I.D. at [20]	U Decimal	INI	ANU4 Analog Input I	
	+ ELC_CAENET I.D. at [21]	U Decimal	INI	ANU4 Analog Input 2	
	T ELC_CAENET I David22	0 Decimal	INT	AN04 Analog Input 3	
		0 Decimal		AN04 Analog Input 4	
	H cost10	() (.	AD:ETHENNET		
	H Local I.C	() (.	AP:Embedded_1Q		
4	Hill cost 20	() (.	AB:Embedded_10		
	t locat21	() (.	AB:Embedded_0		
	t locat20	(, (.	AB:Embedded_0		
		1	matempodood_0		
					<b>T</b>
	▲ Monitor Tags	•			
Enter a tag description					

Tags for the Input Data from the ELC-CAENET module:

8 RSLogix 5000 - EIP_CAENET [1769-L23E-QB1]*	Jole -							_ 7 🗙
		I Icere						
				C.,,	<u> </u>			
	m chunes							
No Edite A BAT								
	Favorites & Add-On & Safety & Alarms & Bit &	Timer/Ci						
· · · · · · · · · · · · · · · · · · ·								
Gontroller EIP_CAENET	Controller Tags - EIP_CAENET(controller)							×
Controller Tags	Scope: ThEP CAENET - Show Show.	<u>ما</u>						_
Power-Up Handler		luu a	1.5.4	Lo. J	10.7	In the		
😑 📇 Tasks 🔰 📕		Value	F F C	Style	Data Type	Description		
🖻 🤕 MainTask	I FLO_CAENET:	{	} {.		AB:ETHERNET		_	
MainProgram		(	) (.		ABIETHERNET		_	
	EFELL_CAENETIO	(	) (.	Desired	ABIETHERINET		-	
Ungrouped Axes	ELC_CAENET O David	(	} {.	Decimal	IN 1 [20]	East 10 Annals Ontaria		
- Carl Add-On Instructions	FIELC_CAENET O Davida			Decimal	INT	First 16 discrete Outputs		
🖻 🔄 Data Types	FIELD_CAENETIO David			Decimal	INT	Next 16 discrete Outputs		
User-Defined	F ELC_CAENET O David			Decimal	INT	Next 16 discrete Outputs		
Add-On-Defined	FIELC_CAENETIO Data[3]		0	Decimal	INT	Next 16 discrete Outputs		
Predefined	F ELC_CAENET O Davie		0	Decimal	INT	Next 16 discrete Outputs		
🗄 🙀 Module-Defined	FIELC_CAENETIO Data[5]		0	Decimal	INT	Next 16 discrete Outputs		
Trends	F ELC_CAENET O Data[6]		0	Decimal	INT	Next 16 discrete Outputs		
E G I/O Configuration	F ELC_CAENET O Data[7]		0	Decimal	INT	Next 16 discrete Outputs		
CompactLogix5323E-QBI System	F ELC_CAENET O David			Decimal	INT	Next 16 discrete Outputs		
- A 1769-L23E-OB1 Ethernet Port LocalENB	F ELC_CAENET-0 D-sta(10)		0	Decimal	INT	Next 16 discrete Outputs		
Ethernet	ELC CAENET-0 Davi111		0 D	Decimal	INT	Next 16 discrete Outputs		
🛷 1769-L23E-QB1 Ethernet Port LocalENB	ELC CAENET-0 David2		5 n	Decimal	INT	Next 16 discrete Outputs		
THERNET-MODULE ELC_CAENET	ELC CAENET-0 Davi121		n	Decimal	INT	Next 16 discrete Outputs		
Embedded I/O	ELC_CAENET-0.D avail41		n	Decimal	INT	Next 16 discrete Outputs		
[1] Embedded IQ16F Discrete Inputs	ELC_CAENET-0.Data[14]		n	Decimal	INT	Last 16 discrete Outputs	_	
[2] Embedded OB16 Discrete_Outputs	ELC_CAENET-0.Data[15]		n	Decimal	INT	ANDS Configuration Word	_	
Expansion I/O	E-ELC_CAENET-0.Data[10]		5 D	Decimal	INT	ANDS Apples Dutout 1		
	E-ELC_CAENET-0.Data(18)		0 D	Decimal	INT	ANDS Analog Butput 2		
	E-ELC_CAENET-0.Data[19]		n	Decimal	INT	ANDA Configuration Word		
	E-Local1:0	1	1 1	Dooma	AB:Embedded ID	Antor congulation word	•	
	E local11	(			AB:Embedded_IQ		_	
	± Local:20	(			AB:Embedded_10		_	
	± local:2	(			AB:Embedded_0		_	
	Ellocal20	(	, .		AB:Embedded 0			
			,					
x								
	. ► Monitor Tags / Edit Tags /			•			•	1.

Tags for the Output Data for the ELC-CAENET module:

Download the project to the CompactLogix controller and place the controller into the Run mode and manipulate the discrete output bits and analog output words per the following, as a test:

ELC_CAENET:O.Data[0]	16 discrete outputs for this example (Total 16)
ELC_CAENET:O.Data[16]	Configuration word for the ELC-AN06 analog module
ELC_CAENET:O.Data[17]	An06 Analog Output 1
ELC_CAENET:O.Data[18]	An06 Analog Output 2
ELC_CAENET:O.Data[19]	Configuration word for the ELC-AN04 analog module

These are the only output tags that are needed for this example.

View the discrete input bits and analog input words per the following. Analog outputs may be wired to analog inputs for test purposes:

ELC_CAENET:I.Data[0]	First 16 discrete inputs
ELC_CAENET:I.Data[1]	Second 16 discrete inputs
ELC_CAENET:I.Data[2]	Final 16 discrete inputs for this example (total 48)
ELC_CAENET:I.Data[16]	AN06 Analog Input 1
ELC_CAENET:I.Data[17]	AN06 Analog Input 2
ELC_CAENET:I.Data[18]	AN06 Analog Input 3

ELC_CAENET:I.Data[19]	AN06 Analog Input 4
ELC-CAENET:I.Data[20]	ANO4 Analog Input 1
ELC-CAENET:I.Data[21]	ANO4 Analog Input 2
ELC-CAENET:I.Data[22]	ANO4 Analog Input 3
ELC-CAENET:I.Data[23]	ANO4 Analog Input 4

These are the only input tags that are needed for this example.

### 4.11 Application Example using the Smart PLC functions

• Local Logic: IF-THEN

Application	Local Logic IF-THEN functions set up using ECISoft			
Stopp	1. When RX#0 and RX#1 are ON, turn output RY0 to ON.			
Sieps	2. When RX#2 turns from OFF to ON, change the state of RY1.			

 The system for this application example is a computer running ELCSoft and ECISoft connected to the Ethernet port on the ELC-CAENET module via an Ethernet switch and a couple of patch cables. Assume the following I/O modules are connected to the adapter:

(1) ELC-EX08NNSN	8-point switch input module
(1) ELC-EX08NNNR	8-point relay output module
(1) ELC-AN04ANNN	4 point analog input module
(1) ELC-04TCANNN	4 point thermocouple input module
(1) ELC-PT04ANNN	4 point Platinum RTD (PT100) input module

- 2. Open ECISoft with the button in ELCSoft, go online via Ethernet and double click the ELC-CAENET icon to open its Property Pages. Then, click the "Smart PLC" tab.
- 3. Select "RX 0 On" and "RX 1 On" in the IF column and select "AND" for the relation between conditions. Next, select "RY 0 Set" in the THEN column and press "Add" to add the logic into the table below.

-THEN	Timer able	Counter RTC	THEN			
RX RX RX Relati	v 0 v 1 v ion betwe	On     On     on     on     on	RY VO	Set	V Delete	
No.	Ena V	IF (RXD = On)OR(R	THEN XI = On) Set RY0;		Up Down	
0	V	(RXD=On)OR(R	XI = On)   Set RY0;		Down	

 Select "RX 2 Rising" in the IF column and "RY 1 Toggle" in the THEN column. Press "Add" to add the settings into the table below. Press "Apply" to store these settings into the ELC-CAENET module.

verview	Basic C	lock IP Filter Si	mart PLC Ana	alog Input/	/Output Module	/O Monitor	Gateway	Security		
🗹 En	nable									
IF					THEN					
RX	✓ 2	😽 Rising	~		RY 🖌 1	<b>∨</b> T	oggle	*		
	*				~					
	~				<b>~</b>					
	00000									
	*									
Relati	ion betwe	en conditions	AND	<b>~</b>	Add	Modify	Clear	Delete		
Relati No.	ion betwe	en conditions IF	AND	✓ THEN	Add	Modify	Clear	Delete		
Relati No. 0	ion betwe Ena v	en conditions IF (RXD = On) A	AND	THEN Set RYO	Add (	Modify	Clear	Delete		
Relati	ion betwe Ena V	en conditions IF (RXD = On)A (RX2 = Rising	AND ND(RX1	THEN Set RYO Toggle	Add ( 0; • RY1;	Modify	Clear	Delete Up Down		
Relati	ion betwe	en conditions IF (RXD = On)A (RX2 = Rising	AND ND ( RX1	THEN Set RY0 Toggle	Add ( 0; :RY1;	Modify	Clear	Delete Up Down		
Relati	Ena v	IF (RXD = On) A (RX2 = Rising	AND ND ( RX1	THEN Set RYO Toggle	Add (	Modify	Clear	Delete		
Relati No. 0	Ena V	en conditions IF (RXO = On) A (RXO = Rising	AND ND ( RX1	THEN Set RYO Toggle	Add ( .RY1;	Modify	Clear	Delete		
Relati	Ena	en conditions IF (RXD = On) A (RXZ = Rising)	AND ND (RX1	THEN Set RYO Toggle	Add ( RY1;	Modify	Clear	Delete Up Down		
Relati	Ena V	en conditions IF (RXD = On) A (RX2 = Rising	AND ND (RX1	THEN Set RYO Toggle	Add ( D; RY1;	Modify	Clear	Delete Up Down		
• Local Logic: Timer

Application	Local Logic Timer function in ECISoft. After RY0 is On for 1 second, it will turn Off for 500 ms. This will repeat every cycle.
Steps	<ul><li>(1) Set up the timer: Timer 0 1s, Timer 1 500ms.</li><li>(2) Set up IF-THEN: When the timing reaches the target, RY0 will be On or Off.</li></ul>

- 1. Open the setup page for the ELC-CAENET module and click the "Smart PLC" tab, then the "Timer" tab.
- Check the "Enable" box for Timer 0 and Timer 1 and set Timer 0 to "1s" and Timer 1 to "500ms". Click "Apply" to write the settings into the ELC-CAENET module.

	Enable	Cyclic	Reset When	Timeout	Tick Ba	sed	
0	<b>X</b>	D		1	1s	-	
1		D	D	5	100ms	-	
2	D	D	D	1	10ms	-	
3	D	D	D	1	10ms	-	
4	ם	D	D	1	10ms	•	
5	D	D	D	1	10ms	-	
6	D	D	D	1	10ms	-	
7	D	D	ם	1	10ms	-	
8	D	D	D	1	10ms	•	
9	D	D	D	1	10ms	•	
0	D	D	D	1	10ms	•	
1	D	D	ם	1	10ms	-	
2	D	D	D	1	10ms	-	
3	D	ם	D	1	10ms	•	
4	D	D	D	1	10ms	-	
5	D	D	ם	1	10ms	•	

• Local Logic: Counter

Application	Local Logic counters function in ECISoft. Once RX#1 toggles 5 times, output RY0 will energize
Steps	<ol> <li>Set up counter C0: RX#1 toggles 5 times and reaches the target.</li> <li>Set up IF-THEN: When the counting reaches the target, RY0 will output.</li> </ol>

- 1. Open the setup page for the ELC-CAENET module and click the "Smart PLC" tab, then the "Counter" tab.
- Check to "Enable" Counter 0, select "Count Up", set the Up Bound limit to "5" and Count Source RX NO. to RX"1". Click "Apply" to write these settings into the ELC-CAENET module.

	Enable	Count UP	/	Up Bound /	Count Source		
0	CX	Count Up	-	5	1		
1	D	Count Up	+	0	0		
2	D	Count Up	•	0	0		
3	D	Count Up	+	0	0		
4	D	Count Up	•	0	0		
5	D	Count Up	•	0	0		
6	D	Count Up	•	0	0		
7	D	Count Up	•	0	0		
8	D	Count Up	•	0	0		
9	D	Count Up	•	0	0		
10	D	Count Up	•	0	0		
11	D	Count Up	•	0	0		
12	D	Count Up	•	0	0		
13	D	Count Up	-	0	0		
14	D	Count Up	•	0	0		
15	D	Count Up	•	0	0		

3. Switch to the "IF-THEN" page and check the "Enable" box. Select "C 0 On" in the IF column and "RY 0 Set" in the THEN column. Click on "Add" to add the settings to the table below and press "OK" to save the settings into ELC-CAENET.

ATON ELC	CAENET								
Overview IF-THEN V En IF	Basic C Timer able	lock IP Filter Smar	t PLC Analog Input/C	)utput Module	1/0 Monit	or Gateway	Security		
C	v 0 v v ion betwe	On en conditions	R	RY V	1 🗸	Set	Delete		
No.	Ena	IF	THEN				Up		
0	v	(C0 = On)	Set RY1;				Down		
							ОК	Cancel	Apply

Local Logic: RTC

Application	Local Logic RTC function in ECISoft. RY0 turns On at 08:00 and Off at 09:00 every day.
Steps	<ol> <li>Set up the RTC to be On at 08:00 every day and continue to be On for 1 hour.</li> </ol>
-	(2) Set up IF-THEN: RY0 will be switched On or Off based on RT0

- 1. Open the setup page and click the "Smart PLC" tab. Then the "RTC" tab.
- 2. Check to "Enable" RTC 0 and set Cyclic to "Daily", Auto-Reset Time to "60 Minutes" and enabling time to 08:00:00. Press "Apply" to write the settings into ELC-CAENET.

	Enable	Output Auto-Reset	Auto-Reset	Unit		Cycli	c	Year	Month	Day	Wee	k	Hour	Min.	Se
0		A	60	Minute	•	Daily	•	2007	1	1	Mon.	•	8	0	(
1	D	<u>D</u>	1	Second	•	Single	*	2007	1	1	Mon.	-	0	0	C
2	D	D	1	Second	•	Single	•	2007	1	1	Mon.	•	0	0	ĩ
3	D	D	1	Second	•	Single	-	2007	1	1	Mon.	•	0	0	1
4	D	D	1	Second	•	Single	•	2007	1	1	Mon.	•	0	0	C
5	D	D	1	Second	•	Single	-	2007	1	1	Mon.	-	0	0	0
6	D	D	1	Second	•	Single	•	2007	1	1	Mon.	•	0	0	(
7	D	D	1	Second	•	Single	+	2007	1	1	Mon.	-	0	0	C
8	D	D	1	Second	•	Single	•	2007	1	1	Mon.	•	0	0	. (
9	D	D	1	Second	•	Single	+	2007	1	1	Mon.	-	0	0	(
10	D	D	1	Second	•	Single	•	2007	1	1	Mon.	-	0	0	(
11	D		1	Second	•	Single	-	2007	1	1	Mon.	-	0	0	C
12	D	D	1	Second	•	Single	•	2007	1	1	Mon.	-	0	0	(
13	D		1	Second	•	Single	-	2007	1	1	Mon.	-	0	0	(
14	D	D	1	Second	•	Single	-	2007	1	1	Mon.	•	0	0	1
<															>

- 3. Switch to the "IF-THEN" tab. Check the "Enable" box and select "R0 On" in the IF column and "RY0 Set" in the THEN column. Press "Add" to add the settings to the table below.
- 4. Select "R0 Off" in the IF column and "RY0 Reset" in the THEN column. Press "Add" to add the settings to the table below and click "APPLY" to save the settings into ELC-CAENET.

En En	lable		THEN		
	~				
	~				
	ion hetwe	en conditions OR	Add Modify	Clear Delete	
Relati					
Relat: No.	Ena	IF	THEN	Up	
Relat: No. 0	Ena	IF (R0=On)	THEN Set RYD;	Up	
Relati No. 0 1	Ena v v	IF (R0 = On) (R0 = Off)	THEN Set RYO; Reset RYO;	Down	

**Every day** when the time reaches 8:00am exactly, remote output RY0 will be set and stay set for 60 minutes, then it will be reset.

## 5 ELC-CARS485

ELC-CARS485 is a serial Modbus distributed I/O adapter module which uses the standard low cost ELC I/O. As a standard Modbus slave, ELC-CARS485 is compatible with any valid master.

### 5.1 Features

- Supports up to 256 digital I/O points
- Supports up to 8 analog / specialty modules
- Configurable interface parameters

### 5.2 Specification

#### Functions Specification

	Communication
Transmission method	RS-485
Electrical isolation	500VDC
Туре	Removable 3-pin connector
Transmission cable	2 twisted isolation cables
Valid communication address	1 ~ F0 (decimal: 1 ~ 240)
Series transmission speed	1,200/2,400/4,800/9,600/19,200/38,400/57,600/115,200 bps (bits per second)
Communication mode	7,E,1-ASCII / 7,O,1-ASCII / 7,E,2-ASCII / 7,O,2-ASCII / 7,N,2-ASCII / 8,E,1-ASCII / 8,O,1-ASCII / 8,N,1-ASCII / 8,N,2-ASCII / 8,E,1-RTU / 8,O,1-RTU / 8,N,1-RTU/ 8,N,2-RTU

#### Electrical Specification

Power supply voltage	24VDC (-15% ~ 20%) (with DC input polarity reverse protection)
Noise Immunity	ESD (IEC 61131-2, IEC 61000-4-2): 8KV Air Discharge, 4KV Contact Discharge EFT (IEC 61131-2, IEC 61000-4-4): Power Li4ne: 2KV, Digital I/O: 1KV Analog & Communication I/O: 1KV Damped-Oscillatory Wave: Power Line: 1KV, Digital I/O: 1KV RS (IEC 61131-2, IEC 61000-4-3): 80MHz ~ 1000MHz , 1.4GHz ~ 2.0GHz , 10V/m
Operation/storage temperature	Operation: 0°C ~ 55°C (temperature), 50 ~ 95% (humidity), pollution degree 2; Storage: -25°C ~ 70°C (temperature), 5 ~ 95% (humidity)
Vibration/Shock Immunity	Standard: IEC61131-2, IEC 68-2-6 (TEST Fc)/IEC61131-2 & IEC 68-2-27 (TEST Ea)
Certificates	CE 🖤 , Operating temperature code: T5

## 5.3 Product Profile and Outline



1. POWER indicator

9. Mounting hole for extension unit

2. RUN indicator	10. Nameplate
3. ALARM indicator	11. Extension port for extension unit
4. RUN/STOP switch	12. DIN rail mounting slot (35mm)
5. RS485 indicator	13. Fastening hole for extension unit
6. Address setup DIP switch	14. DIN rail clip
7. Communication mode setup DIP switch	15. Mounting rail for extension unit
8. RS-485 communication port	16. Power input

#### Dimension



Unit: mm

## 5.4 Installation and Wiring

#### Switch Definition : RUN/STOP

	Status	Explanation
	RUN	<ol> <li>RUN indicator on ELC-CARS485 is On.</li> <li>AI/AO extension unit in RUN status.</li> </ol>
RUN	RUN → STOP	<ol> <li>AI/AO extension unit switches from RUN to STOP status.</li> <li>Y points on DI/DO extension unit are all Off.</li> </ol>
STOP	STOP	<ol> <li>RUN indicator on ELC-CARS485 is Off.</li> <li>Al/AO extension unit in STOP status.</li> <li>Communication control is not allowed in Al/AO extension unit.</li> <li>Communication control is not allowed in Dl/DO extension unit.</li> </ol>
	STOP → RUN	<ol> <li>ELC-CARS485 re-detects the number of points in DI/DO unit and the number of AI/AO units.</li> <li>AI/AO extension unit switches from STOP to RUN status.</li> </ol>

#### Modbus Address Setup DIP Switch:

DIP Switch Setting	Explanation	
H'01 ~ H'F0	Valid ELC-CARS485 addresses, the dip switches are weighted as follows: ID0 ~ ID7 are: $2^0$ , $2^1$ , $2^2$ ,, $2^6$ , $2^7$ .	
H'00, H'F1 ~ H'FF	In the Modbus protocol, H'00 is defined as broadcast mode. H'F1 ~ H'FF are incorrect ELC-CARS485 addresses.	

#### ■ Communication Mode Setup DIP Switch:

PA3	PA2	PA1	PA0	A/R	Communication mode
OFF	OFF	OFF	OFF	ON	7,E,1-ASCII
OFF	OFF	OFF	ON	ON	7,0,1-ASCII
OFF	OFF	ON	OFF	ON	7,E,2-ASCII
OFF	OFF	ON	ON	ON	7,0,2-ASCII
OFF	ON	OFF	OFF	ON	7,N,2-ASCII
OFF	ON	OFF	ON	ON	8,E,1-ASCII
OFF	ON	ON	OFF	ON	8,O,1-ASCII
OFF	ON	ON	ON	ON	8,N,1-ASCII
ON	OFF	OFF	OFF	ON	8,N,2-ASCII
OFF	ON	OFF	ON	OFF	8,E,1-RTU
OFF	ON	ON	OFF	OFF	8,0,1-RTU
OFF	ON	ON	ON	OFF	8,N,1-RTU
ON	OFF	OFF	OFF	OFF	8,N,2-RTU
Other s	settings o	of PA3, F	PA2, PA1	, PA0 ar	nd A/R are invalid



DR2	DR1	DR0	Series Transmission speed
OFF	OFF	OFF	1,200 bit/s
OFF	OFF	ON	2,400 bit/s
OFF	ON	OFF	4,800 bit/s
OFF	ON	ON	9,600 bit/s
ON	OFF	OFF	19,200 bit/s
ON	OFF	ON	38,400 bit/s
ON	ON	OFF	57,600 bit/s
ON	ON	ON	115,200 bit/s

## 5.5 Modbus Register assignments

#### Discrete Input and Output register mapping

Communication address	Devices	Attribute	Data type	Length
H'0400 ~ H'047F	X: X000 ~ X177 (Octal)	R	bit	128 points
H'0500 ~ H'057F	Y: Y000 ~ Y177 (Octal)	R/W	bit	128 points

#### Specialty Module register mapping

Communication address	Devices	Attribute	Data type	Length
H'1600 ~ H'1630	1 <sup>st</sup> specialty module: CR0 ~ CR48		word	49
H'1640 ~ H'1670	2 <sup>nd</sup> specialty module: CR0 ~ CR48		word	49
H'1680 ~ H'16B0	3 <sup>rd</sup> specialty module: CR0 ~ CR48	Please refer	word	49
H'16C0 ~ H'16F0	4 <sup>th</sup> specialty module: CR0 ~ CR48	attribute of	word	49
H'1700 ~ H'1730	5 <sup>th</sup> specialty module: CR0 ~ CR48	each	word	49
H'1740 ~ H'1770	6 <sup>th</sup> specialty module: CR0 ~ CR48	module.	word	49
H'1780 ~ H'17B0	7 <sup>th</sup> specialty module: CR0 ~ CR48		word	49
H'17C0 ~ H'17F0	8 <sup>th</sup> specialty module: CR0 ~ CR48		word	49

#### Note:

A maximum of 8 specialty modules are allowed. The first specialty module is first unit installed on the right hand side of the ELC-CARS485 adapter.

#### Adapter configuration and status registers

Communication address	Attribute	Content	Explanation		
H'0000	R	Model name	Model code of the ELC-CARS485 = H'0200.		
H'0001	R	Firmware version	The current firmware version is displayed in hex, e.g. V0.1 is indicated as H'0010.		

Communication address	Attribute	Content	Explanation			
H'0002	R	Issue date	The issue data of the firmware is displayed in hex, e.g. H'1FD0 = K8150 indicates that the firmware is issued on the morning of August 15.			
H'0003	R/W	RUN/STOP ELC-CARS485	H'0003 = 1, the ELC-CARS485 RUN; H'0003 = 0, the ELC-CARS485 STOP.			
H'0004	R	Communication format	The communication parameters for the ELC-CARS485.			
H'0005	R	Baud rate	The baud rate of the ELC-CARS485.			
H'0006	R	Communication address	The communication address of ELC-CARS485.			
H'0007	H'0007 R Number of DI points		High byte stores the number of input points. Low byte stores the number of output points.			
H'0008	R	Error code	The current error. See 4.4 for the meaning of error codes.			
H'0009	R	Historical error code	The number of errors that have occurred. Range: 0 ~ 32			
H'0017	R	Number of specialty modules	The number of specialty modules detected.			
H'0018	R	Model code of the 1 <sup>st</sup> specialty module	The model code of the 1 <sup>st</sup> specialty module connected to the ELC-CARS485.			
H'0019	R	Model code of the 2 <sup>nd</sup> specialty module	The model code of the 2 <sup>nd</sup> specialty module connected to the ELC-CARS485.			
H'001A	R	Model code of the 3 <sup>rd</sup> specialty module	The model code of the 3 <sup>rd</sup> specialty module connected to the ELC-CARS485.			
H'001B	R	Model code of the 4 <sup>th</sup> specialty module	The model code of the 4 <sup>th</sup> specialty module connected to the ELC-CARS485.			
H'001C	R	Model code of the 5 <sup>th</sup> specialty module	The model code of the 5 <sup>th</sup> specialty module connected to the ELC-CARS485.			
H'001D	R	Model code of the 6 <sup>th</sup> specialty module	The model code of the 6 <sup>th</sup> specialty module connected to the ELC-CARS485.			
H'001E	R	Model code of the 7 <sup>th</sup> specialty module	The model code of the 7 <sup>th</sup> specialty module connected to the ELC-CARS485.			
H'001F	R	Model code of the 8 <sup>th</sup> specialty module	The model code of the 8 <sup>th</sup> specialty module connected to the ELC-CARS485.			

### 5.6 Supported Function Codes

ELC-CARS485 complies with the standard Modbus protocol, supporting the 7 function codes, H'01, H'02, H'03, H'05, H'06, H'0F, and H'10. Please refer to the standard Modbus protocol for the specific data format of each function code.

Function code	Function	Data type	Applicable address
H'01	Read output bit status	bit	DO area: H'0500 ~ H'057F
H'02	Read input bit status.	bit	DI area: H'0400 ~ H'047F
			Special function area: H'0000 ~ H'001F
			CR of the 1st Al/AO unit: H'1600 ~ H'1630
			CR of the 2nd Al/AO unit: H'1640 ~ H'1670
LI'02	Pood register(a)	word	CR of the 3rd Al/AO unit: H'1680 ~ H'16B0
н 03	Reau register(s)	word	CR of the 4th AI/AO unit: H'16C0 ~ H'16F0
			CR of the 5th Al/AO unit: H'1700 ~ H'1730
			CR of the 6th AI/AO unit: H'1740 ~ H'1770
			CR of the 7th AI/AO unit: H'1780 ~ H'17B0
H'03	Read register(s)	word	CR of the 8th AI/AO unit: H'17C0 ~ H'17F0
H'05	Write single bit	bit	DO area: H'0500 ~ H'057F
			RUN/STOP ELC-CARS485 module: H'0003
H'06	Write single register	word	Applicable to CR with write attribute in the 1st ~ 8th Al/AO extension unit.
H'0F	Write multiple bits	bit	DO area: H'0500 ~ H'057F
	Write multiple		RUN/STOP ELC-CARS485 module: H'0003
H'10	registers	word	Applicable to CR with write attribute in the 1st ~ 8th AI/AO extension unit.

- Example:
  - Use function code 03 to read CR0 and CR1 in the 1st Al/AO extension unit: (ASCII mode)
  - The request message sent from master ELC to ELC-CARS485 is ": 01 03 16 00 00 02 E4 CR LF"
  - The responding message sent from ELC-CARS485 to the master ELC is ": 01 03 04 00 88 00 00 70 CR LF"

#### Note:

- 1. ELC-CARS485 can only read and write one AI/AO extension unit at a time.
- 2. ELC-CARS485 is able to read/write a maximum of 16 words at a time.
- Error Codes

Code	Indication	Explanation
0001	Incorrect function code	The ELC-CARS485 does not support this function code.

		<b>–</b> 1 <i>v</i>
Code	Indication	Explanation
0002	Incorrect operand address	The function code is not valid for the operand address
0003	Incorrect data	The data read/written exceeds the maximum length.
0004	The ELC-CARS485 in STOP	The ELC-CARS485 is in STOP mode.
000B	Incorrect communication format	The length of data received by the ELC-CARS485 is too short.
000C	Incorrect communication format	The length of data received by the ELC-CARS485 is too long.

## 5.7 Application example: ELC processor as the Modbus master

As a Modbus slave, the ELC-CARS485 is compatible with any valid Modbus master. This example uses an ELC controller as the Modbus master. The PC downloads the ladder program to the ELC controller via the RS-232 programming port (COM1). When controller executes the ladder program, it will issue Modbus commands through the RS-485 communication port (COM2), monitoring inputs and controlling outputs through the ELC-CARS485 adapter. See the figure below for the system overview:



The station No. of the ELC-CARS485 is node "2". The master ELC-PV controller is node 1. Read the state of "X0 ~ X15" with the ELC-PV controller from the ELC-CARS485. Also, write to control outputs "Y0 ~ Y7" in the first ELC-EX16NNDR. Then write the value from "D500 ~ D501" in the ELC-PV controller to "CR10 ~ CR11" in the ELC-AN06AANN module. Finally, read the values in "CR6 ~ CR9" in ELC-AN06AANN.







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											MSG Done
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											MSG Write Request
										RST	M3
											MSG Read Request
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Explanations:

- (1) Set up the communication parameters at the beginning of the program, conditioned with the power-up bit. The communication parameters for the master and slave must be the same, e.g. both devices must be configured form the same baud rate, bits/byte, parity, stop bits and RTU/ASCII mode. Each device must also have a unique node address. For this example, each device is configured for: 115200 baud, 8 bits/byte, Even parity, 1 stop bit and RTU mode.
- (2) When the ELC controller transitions to run mode, the value of "D0" will be initialized to "0".
- (3) When the value of "D0" is "0", the ELC controller will read the state of "X0 ~ X15" (H400 H40F) in the ELC extension modules and save it in "D220".
- (4) When the value of "D0" is "1", the ELC controller will write to "Y0 ~ Y7" with the data in the low byte of "D400".
- (5) When the value of "D0" is "2", the ELC controller will write the values in "D500~D501" to "CR10~CR11" in the 1st special module (ELC-AN06 for this example).
- (6) When the value of "D0" is "3", the ELC controller will read the values from "CR6 ~ CR9" in

the special module (ELC-AN06) and buffer it in "D200 ~ D203". The Modbus reply header information will be written to D550-D553.

(7) When the value of "D0" is "4", and the fourth message has been executed, the ELC controller will re-initialize the value of "D0" to K0, to begin the message cycle again.

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