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Eaton Logic Controller

Ethernet Distributed I/O Adapter Module

INSTRUCTION SHEET

[Applicable Distributed I/O Adapter Module]

- ELC-CAENET

IL05006001E
002-1214120-01

Thank you for choosing the Eaton Logic Controller (ELC) series products.

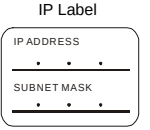
The ELC-CAENET is an Ethernet distributed I/O adapter module that connects ELC I/O modules to Modbus TCP or EtherNet/IP networks. The adapter provides I/O and module diagnostic information to Modbus TCP or EtherNet/IP scanners.

- This instruction sheet provides information on the electrical specifications, functionality, installation and wiring for this module. It should be read and understood before attempting to install or use the module.
- Additional information can be found in the ELC series Programming Manual.
- The ELC should be kept in an enclosure away from airborne dust, humidity and vibration.
- DO NOT disconnect equipment unless power has been switched off or the area is known to be non hazardous.
- DO NOT connect AC power to any of the DC input / output terminals, as it will damage them. Check all wiring prior to power up.
- Ensure that the ground terminal ⏚ is correctly grounded in order to prevent electromagnetic interference.

■ Functions

- ❖ Supports MODBUS TCP
- ❖ Supports EtherNet/IP
- ❖ Supports maximum 256 input and/or output points
- ❖ Supports maximum 14 extension modules
- ❖ Supports maximum 8 specialty modules
- ❖ Supports smart PLC functions
- ❖ Supports counter, timer and RTC
- ❖ Supports MODBUS TCP/Modbus gateway
- ❖ Supports RS-232/Ethernet Configuration
- ❖ Parameters can be set up on webpage
- ❖ Transmission Speed: 10/100 Mbps

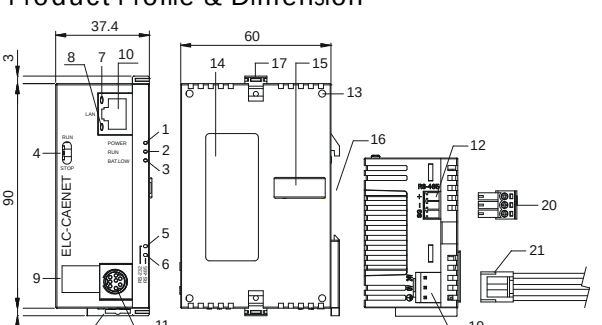
IP Label



MAC Address

00D0AF100022

■ Product Profile & 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	

◆ Switch Definition: RUN/STOP

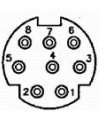
Status	Explanation
RUN	1. RUN indicator on ELC-CAENET is ON. 2. Analog I/O modules in RUN status. 3. Smart PLC function is running
RUN → STOP	1. Analog I/O modules switch from RUN to STOP status. 2. Output points on digital I/O modules are all OFF.
STOP	1. RUN indicator on ELC-CAENET is OFF. 2. Analog I/O modules in STOP status. 3. Smart PLC function stops.
STOP → RUN	1. ELC-CAENET re-detects the number of digital I/O points and the number of analog I/O modules. 2. Analog I/O modules switch from STOP to RUN status.

◆ Ethernet PIN Definition : RJ-45

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

◆ RS-232 PIN Definition : Mini-Dim

PIN	Signal	Definition
1	--	N/C
2	--	N/C
3	--	N/C



PIN	Signal	Definition
4	Rx	Receive data
5	Tx	Transmit data
6	--	N/C
7	--	N/C
8	GND	Ground

◆ RS-485 PIN Definition: Feed-through Terminal

PIN	Signal	Definition
1	SG	Signal Ground
2	D-	Negative pole for data
3	D+	Positive pole for data

■ Function Specifications

◆ Network Interface

Interface	RJ-45 with Auto MDI/MDIX
Number of ports	1 Port
Transmission method	IEEE 802.3, IEEE 802.3u
Transmission cable	Category 5e (TIA/EIA-568-A,TIA/EIA-568-B)
Transmission Rate	10/100 Mbps Auto-Detect
Protocol	ICMP, IP, TCP, UDP, DHCP, NTP, HTTP, MODBUS TCP, EtherNet/IP

◆ RS-232 Interface

Interface	RS-232
Number of Ports	1 Port
Transmission Cable	ELC-CBPCELC3

◆ RS-485 Interface

Interface	3 PIN feed-through terminal
Number of Ports	1 Port
Transmission 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
Protocol	MODBUS RTU, MODBUS ASCII

◆ Electrical Specifications

Power supply voltage	24VDC (-15% ~ 20%)
Power fuse capacity	1.85A/30VDC, Polyswitch
Power Consumption	2W
Insulation voltage	500VDC
Weight (g)	116 (g)

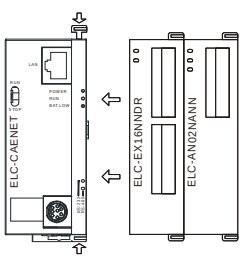
◆ Environmental Specifications

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 Input: ±2KV, Communication I/O: ±2KV 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
Environment	Operation: 0°C ~ 55°C (temperature), 50 ~ 95% (humidity), pollution degree 2; Storage: -25°C ~ 70°C (temperature), 5 ~ 95% (humidity)
Vibration/ Shock Resistance	Standard: IEC61131-2, IEC 68-2-6 (TEST Fc)/IEC61131-2 & IEC 68-2-27 (TEST Ea)
Certificates	CE cULus

■ Installation

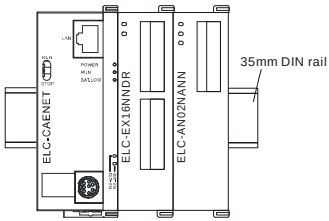
◆ How to connect extension modules to the ELC-CAENET:

1. Adjust the extension clip on the right side of the ELC-CAENET.
2. Meet the extension port of the ELC-CAENET with extension module and connect them as the figure shown below. Fasten the extension clip.



◆ Install ELC-CAENET on DIN Rail

1. Please use the standard 3mm DIN Rail.
2. Adjust the DIN rail clip on the back side of the ELC-CAENET and extension modules. Meet the ELC-CAENET and extension modules on the DIN rail. Fasten the DIN rail clip.



■ Modbus Parameter

◆ Function Codes Supported

Function code	Explanation	Devices supported
0x01	Read Coil	RX, RY, T, R, C
0x02	Read discrete input	RX, RY, T, R, C
0x03	Read holding register	BR, T, C, RCR
0x05	Write Single coil	RY, T, R, C
0x06	Write single holding register	BR, T, C, RCR
0x0F	Write multiple coils	RY, T, R, C
0x10	Write multiple holding registers	BR, T, C, RCR
0x17	Read/write multiple holding registers	BR, T, C, RCR

◆ Exception Codes Supported

Exception code	Explanation
0x01	Illegal function
0x02	Illegal data address
0x03	Illegal data value
0x04	Slave device failure
0x0A	Gateway path unavailable
0x0B	Gateway target device failed to respond.

◆ Device Type & Device Address

Discrete input				
Device type	Explanation	Modbus address (Hex)	6-digit Modbus address (Dec)	Number
RX	Discrete Input	0x0400 ~ 0x04FF	101025 ~ 101280	256
Coil				
Device type	Explanation	Modbus address (Hex)	6-digit Modbus address (Dec)	Number
RY	Discrete Output	0x0500~0x05FF	001281~001537	256
T	Timer (bit)	0x1600~0x160F	005633~005649	16
R	RTC (bit)	0x1900~0x190F	006401~006416	16
C	Counter (bit)	0x1E00~0x1E0F	007681~007696	16

Holding Register				
Device type	Explanation	Modbus address (Hex)	6-digit Modbus address (Dec)	Number
BR	Basic Register	0x0000~0x0040	400001~400064	64
T	Timer (word)	0x1600~0x160F	405633~405649	16
C	Counter (word)	0x1E00~0x1E0F	407681~407696	16
RCR	CR of extension modules	0x3000~0x3190	412289~412689	400

■ EtherNet/IP Parameters

◆ 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 Output Object BR Object RCR Object TCP/IP Interface Object Ethernet Link Object
0x10	Set Attribute Single	Assembly Object Discrete Output Object BR Object RCR Object
0x4E	Forward Close	Connection Manager Object
0x54	Forward Open	Connection Manager Object

◆ Object and Instance Supported

Object	Class Code	Instance Code	Explanation
Identity Object	0x01	#1 ~ #7	CIP Identity*
Message Router Object	0x02	#1	Application message router*
Assembly Object	0x04	#100	Input point assembly
		#101	Output point assembly
		#102	RCR read mapping assembly
		#103	RCR 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 manager*

Discrete Input Object	0x08	#1 ~ #256	256 Input points*
Discrete Output 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 ~ #6	TCP/IP Parameters*
Ethernet Link Object	0xF6	#1 ~ #3	Ethernet Link Parameters*

*Please refer to ODVA.org for “THE CIP NETWORKS LIBRARY, Volume 1, Common Industrial Protocol (CIP™) “

■ LED Indication and Troubleshooting

◆ LED Indication

LED	LED Status	Indication	How to deal with
POWER	Green constantly ON	Power supply is normal	None
	Green constantly OFF	No power supply	Check if the module is powered.
RUN	Green constantly ON	Status is RUN	None
	Green constantly OFF	Status is STOP	Check if the RUN/STOP switch is switched to RUN.
BAT.LOW	Red constantly OFF	The battery is normal.	None
	Red flashes	The battery is in low voltage.	Check the battery.
RS-232	Yellow flashes	Data is being transmitted in the serial port	None
	Yellow constantly OFF	No data transmission	Check if the RS-232 cable is connected when using RS-232 communications.
	Yellow constantly ON	Improper RS-232 connection	Check if the RS-232 cable is connected when using RS-232 communications.
RS-485	Yellow flashes	Data is being transmitted in the serial port	None
	Yellow constantly OFF	No data transmission	Check if the RJ-45 cable is properly connected.
	Yellow constantly ON	Improper RS-485 connection	Switch D+ and D-.
LINK/ACK	Green constantly ON	Network is working normally	None
	Green flashes	Network is working	None
	Green constantly OFF	Network is not connected	Check if the RJ-45 cable is properly connected.
SPEED	Yellow constantly ON	Transmission speed: 100Mbps	None

LED	LED Status	Indication	How to deal with
	Yellow constantly OFF	Transmission speed: 10Mbps	Check if the RJ-45 cable is properly connected.

◆ Codes in Digital Display

Code	Status	Indication	Solution
0 ~ FF	ON	Node address of ELC-CAENET is operating normally	--
F0	Flash	Returning to default settings	--
F1	Flash	ELC-CAENET is booting.	--
F2	Flash	Power supply low voltage detected	Check the power source.
F3	Flash	Internal memory error	1. Re-power ELC-CAENET. If the error still exists, try step 2. 2. Re-set ELC-CAENET. If the error still exists, return it to the manufacturer for replacement.
F4	Flash	Internal error caused by manufacturing in the factory	Replace the module
F5	Flash	Network connection error	Check if ELC-CAENET is properly connected to the network.
F6	Flash	Insufficient TCP connection	Check if the number of connections exceeds the maximum.
F7	Flash	RS-485 setting error	Check if the RS-485 communication format is correct.
F8	Flash	IP setting error	1. DHCP request failure 2. IP configuration error 3. MASK configuration error 4. Gateway does not exist in the same subnet. 5. Returning to default setting
F9	Flash	Extension module error	Check if the I/O points or the number of extension modules exceeds the maximum.
FA	Flash	Syntax check error	1. Check if errors occur in TS, CS, AL, RT registers. 2. Read the BR#85 when the error occurs.
04	Flash	Slave error from the station	1. Check if ELC-CAENET and RS-485 is connected normally. 2. Check that the serial data rate is consistent with that of other nodes on the network.

◆ Troubleshooting

Abnormality	Cause	How to deal with
POWER LED OFF	ELC-CAENET is not powered	Check if the ELC-CAENET is properly powered.
LINK LED OFF	Not connected to the network	Check if the RJ-45 cable is correctly connected to the network.

Abnormality	Cause	How to deal with
	RJ-45 poor contact	Check that the RJ45 connector is properly connected to the Ethernet RJ-45 port.
100M LED OFF	The module is not connected to the network	Check if the RJ-45 cable is correctly connected to the network.
	Transmission speed: 10M	Check if the network transmission speed is 100Mbps.
	RJ-45 poor contact	Check if the RJ45 connector is properly connected to the Ethernet RJ-45 port.
Unable to locate a module	Not connected to the network	Check if ELC-CAENET is correctly connected to the network.
Unable to locate a module	The computer is blocked by the firewall.	Search by IP address or use RS-232 for settings.
Unable to open ELC-CAENET setup screen	Not connected to the network	Check if ELC-CAENET is correctly connected to the network.
	The computer is blocked by the firewall.	Use RS-232 for settings.
Unable to detect extension modules	Not connected to extension modules	Check if ELC-CAENET is properly connected to the extension modules.
	Extension modules are not powered	Check that the extension modules are powered.