Powering Business Worldwide™

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5011699101-MEX1

Eaton Logic Controller

ELCM Digital Input Output Modules

INSTRUCTION SHEET

[Applicable Digital I/O modules]

- ELCM-EX08NNDN
- ELCM-EX08NNDR
- ELCM-EX08NNDT
- ELCM-EX08NNNR
- ELCM-EX08NNNT
- ELCM-EX16NNDN
- ELCM-EX16NNDR
- ELCM-EX16NNDT
- ELCM-EX16NNNR
- ELCM-EX16NNNT

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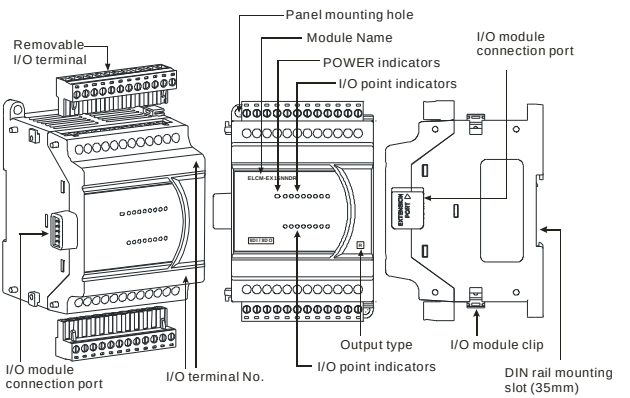
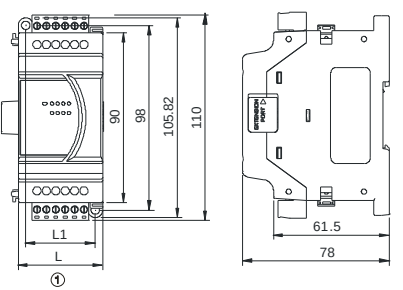
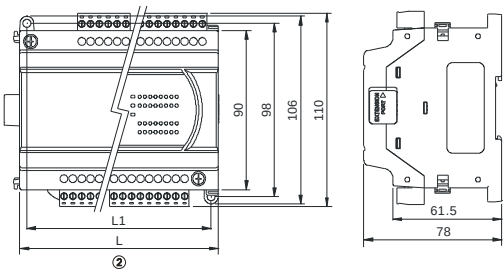
- This instruction sheet provides only information on the electrical specification, general functions, installation and wiring. It should be read and understood before attempting to install or use the modules.
- Further information can be found in the ELC series Programming Manual.
- These digital I/O modules are part of an OPEN TYPE control system. The ELCM should be kept in an enclosure away from airborne dust, humidity, electric shock risk and vibration. Your application may require that the enclosure be locked to prevent non-maintenance staff from operating the controller (e.g. key or specific tools that are required for opening the enclosure) in cases where danger and damage to equipment or personnel may occur.
- Do not connect AC power to any of the DC input / output terminals, as it will damage the ELCM. Check all wiring prior to power up.
- Ensure that the ground terminal ⏚ is correctly grounded in order to prevent electromagnetic interference.
- This manual is subject to change without notice.

■ Product Profile & Dimension







Unit: mm

ELCM-	EX08 NNDN	EX08 NND□	EX08 NNN□	EX16 NNDN	EX16 NND□	EX16 NNN□
L	45			70		
L1	37			62		
Type	①			②		

■ Digital Input/Output Modules

ELCM-	Power input	Input		Output	
		Points	Type	Points	Type
EX08NNDN	Supplied by bus power from controller	8	24VDC Sink or Source	-	-
EX08NNDR		4		4	Relay
EX08NNDT		4		4	Transistor - sink
EX08NNNR		-		8	Relay
EX08NNNT		-		8	Transistor - sink
EX16NNDN		16		-	-
EX16NNDR	24VDC	8		8	Relay
EX16NNDT		8		8	Transistor - sink
EX16NNNR		-		16	Relay
EX16NNNT		-		16	Transistor - sink

■ Electrical Specifications

ELCM- / Item	EX08 NNDN	EX08 NND□	EX08 NNN□	EX16 NNDN	EX16 NND□	EX16 NNN□
Power supply voltage	Supplied by bus power from controller				24VDC (-15% ~ 10%)	
Power consumption	1.2W	R:1.2W T:1W	R:1.2W T:0.5W	2.4W	R:2.4W T:1.6W	R:2.4W T:1W
DC24V current output	-					

ELCM- / Item	EX08 NNDN	EX08 NND□	EX08 NNN□	EX16 NNDN	EX16 NND□	EX16 NNN□
Power supply protection	-				Power reverse protection	
Voltage withstand	1,350VAC (Primary-secondary) 1,350VAC (Primary-PE) 500VDC (Secondary-PE)					
Insulation resistance	> 5MΩ at 500VDC (between all I/O points and ground)					
Noise immunity	ESD: 8KV Air Discharge EFT: Power Line: 2KV, Digital I/O: 1KV RS: 26MHz ~ 1GHz, 10V/m					
Environment	Operation: 0°C~55°C (temperature), 50~95% (humidity), pollution degree2 Storage: -25°C~70°C (temperature), 5~95% (humidity)					
Vib. / shock resistance	International standards: IEC61131-2, IEC 68-2-6 (TEST Fc)/ IEC61131-2 & IEC 68-2-27 (TEST Ea)					
Weight (g)	105	R: 120 T: 107	R: 135 T: 109	148	R: 179 T: 149	R: 209 T: 143

■ I/O Terminal Specifications

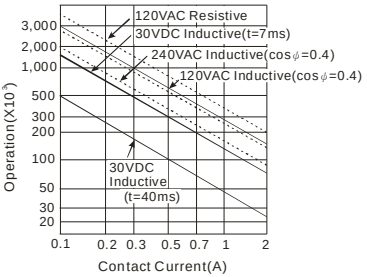
Input point electrical specifications		
Input point type		Digital input
Input type		DC (SINK or SOURCE)
Input current		24VDC, 5mA
Active level	Off → On	>15VDC
	On → Off	< 5VDC
Response time	Off → On	10ms ± 10%
	On → Off	15ms ± 10%
Input impedance		4.7KΩ

Output point electrical specifications			
Output point type		Relay-R	Transistor-T
Voltage specification		Below 250VAC, 30VDC	5~30VDC #2
Maximum load	Resistive	2A/1 point (5A/COM)	0.5A/1 point (4A/COM)
	Inductive	#3	12W (24VDC)
	Lamp	20WDC/100WAC	2W (24VDC)
Switching frequency #1		≦1Hz	≦1kHz
Response time	Off → On	Approx .10ms	50μs
	On → Off		200μs

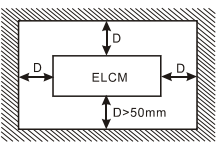
#1: The actual frequency will be affected by the scan period.

#2: UP, ZP must work with external auxiliary power supply 24VDC (-15% ~ +20%), rated consumption approx. 1mA/point.

#3: See life curves (below)



■ Installation



Please install the ELCM in an enclosure with sufficient space around it to allow heat dissipation, as shown in the figure.

- **DIN Rail Mounting:** When mounting the ELCM to 35mm DIN rail, be sure to use the retaining clip to stop any side-to-side movement of the ELCM and reduce the chance of wires becoming loose. The retaining clip is at the bottom of the ELCM. To secure the ELCM to DIN rail, pull down the clip, place it onto the rail and gently push it up. To remove the ELCM, pull the retaining clip down with a flat screwdriver and gently remove the ELCM from DIN rail.

■ Wiring

1. Use 12-28 AWG single-core bare wire or multi-core (stranded) wire for the I/O wiring. The ELCM terminal screws should be tightened to 4.75 kg-cm (4.12 in-lbs) and please use 60/75°C copper conductor only.
2. DO NOT wire empty terminals. DO NOT place input signal wire and output power wire in the same wiring circuit.
3. DO NOT drop tiny metallic conductor into the ELCM while installing the controller or other equipment.
   - Please attach the dustproof sticker to the ELCM before installing the controller or other equipment to prevent conductive objects from dropping in.
   - Tear off the sticker before running the ELCM to ensure proper ventilation.

◆ I/O Point Serial Sequence

40-point ELCM-PH series controllers start their input expansion addressing from X30 and output expansion addressing from Y20. Other modules start their input expansion addressing from X20 and output expansion addressing from Y20. The expansion I/O addresses are defined in groups of 8. Modules with fewer than 8 I/O points will be regarded as 8. See the

example below.

1. When using controllers with fewer than 32 points, the first expansion input address will start at X20. The first expansion output address will start at Y20. Please refer to the following example for more details:

System application example 1:

System Configuration	ELCM	Input points	Output points	Input number	Output number	Power consumption
Controller	PH32NNDR	16	16	X0~X17	Y0~Y17	30VA
1st exp. module	EX08NNDR	4	4	X20~X23	Y20~Y23	1.2W
2nd exp. module	EX16NNDR	8	8	X30~X37	Y30~Y37	2.4W
3rd exp. module	EX16NNNR	0	16	-	Y40~Y57	2.4W

- X24 to X27 are not used in ELCM-EX08NNDR.
- The 1st digital I/O module ELCM-EX08NNDR only has 4 inputs and 4 outputs but is addressed as an 8 input / 8 output module. The highest 4 input addresses and highest 4 output addresses have no physical I/O points associated with them. For the 2nd digital I/O module ELCM-EX16NNDR, the input points start from X30, and output points start from Y30.
- Output current supplied from 24VDC on the controller is 500mA(12W). Remaining applicable power: 12 - (1.2 + 2.4 + 2.4) = 6W

◆ Power Supply

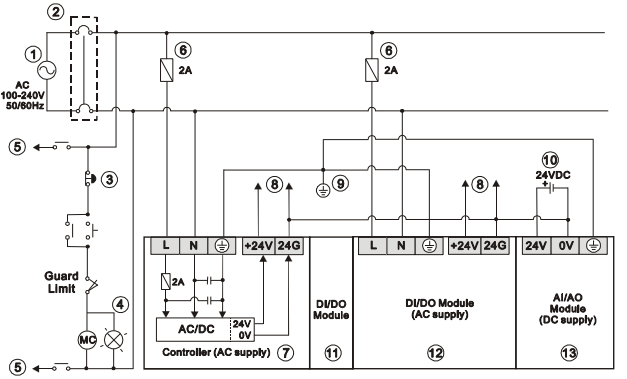
Please note the following when using ELCM-EX Digital Input and Digital Output (DIDO) with the ELCM-PH/PA series controllers:

1. The AC power supply voltage range for ELCM-PH/PA series controllers is 100 ~ 240VAC. Please connect the AC power supply to L and N terminals and note that connecting 110VAC or 220VAC to +24V output terminals or digital input terminals will damage the ELCM or its expansion I/O.
2. The power supply for digital I/O points is 24VDC. Please make sure the power supply polarity is correctly connected.
3. It is highly suggested that the DC power supplies for the controllers and ELCM-EX DIDO switch ON and OFF at the same time.
4. Use 1.6mm wire (or larger) for grounding.
5. A power loss of less than 10ms will not affect the operation of the ELCM. However, a power loss that is too long, or a sustained drop of power supply voltage will stop the running of the ELCM. All outputs will turn “OFF”. When proper power is restored, the ELCM will resume normal operation. (Please keep this in mind when you use latched auxiliary relays and registers in your ELCM program.)

◆ Safety Wiring

In ELCM control systems, many devices are controlled at the same time

and actions of any device could influence each other, i.e. breakdown of the entire auto-control system. Therefore, we suggest you wire a protection circuit at the power supply input terminal. See the figure below.



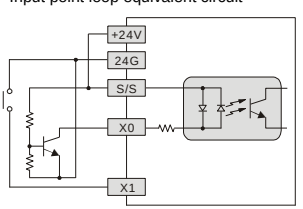
① AC Power supply: 100 ~ 240VAC, 50/60Hz	② Breaker
③ Emergency stop: This button may be used to cut off the system power supply when accidental emergency takes place.	
④ Power indicator	⑤ AC power supply load
⑥ Power supply circuit protection fuse (2A)	⑦ ELCM (main processing unit)
⑧ DC Power supply Output: 24VDC, 500mA	⑨ Grounding resistance: < 100Ω
⑩ DC Power supply: 24VDC	⑪ Digital I/O module (DC supply)
⑫ Digital I/O module (AC supply)	⑬ Analog I/O module (DC supply)

◆ I/O Point Wiring

There are 2 types of DC inputs, SINK and SOURCE. (Below is an example. For detailed wiring configuration, please refer to specifications of each module.)

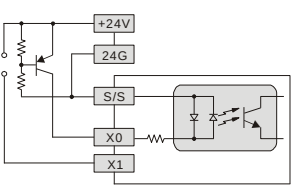
- DC Signal IN – SINK mode

Input point loop equivalent circuit

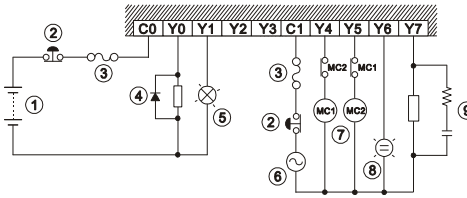


- DC Signal IN – SOURCE mode

Input point loop equivalent circuit



- Relay (R) output circuit wiring

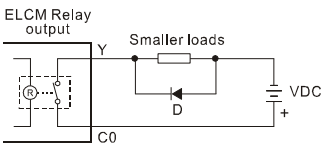


① DC power supply ② Emergency stop: Used an external switch

③ Fuse: Use 5 ~ 10A fuse at the shared terminal of output contacts to protect the output circuit

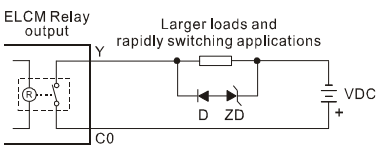
④ Transient voltage suppressor: To extend the life span of relay contacts.

1. Diode suppression of DC load: Used for smaller loads.



D: 1N4001 diode or equivalent component

2. Diode + Zener suppression of DC load: Used for larger loads and for rapidly switching applications.



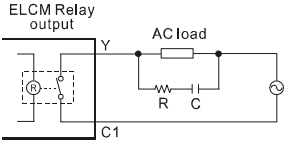
D: 1N4001 diode or equivalent component
ZD: 9V Zener, 5W

⑤ Incandescent light (resistive load) ⑥ AC power supply

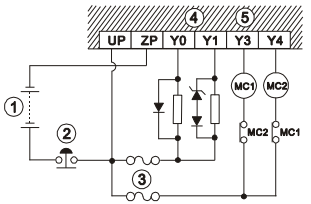
⑦ Mutually exclusive output: For example, Y4 and Y5 control the forward running and reverse running of the motor, forming an interlock for the external circuit, together with the ELCM internal program, to ensure safe protection in case of any unexpected errors.

⑧ Neon indicator

⑨ Suppressor: To reduce the interference on AC load.



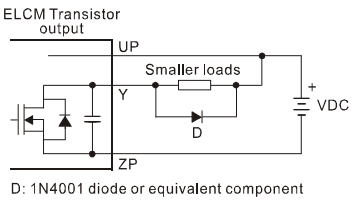
- Transistor (T) output circuit wiring



① DC power supply ② Emergency stop ③ Circuit protection fuse

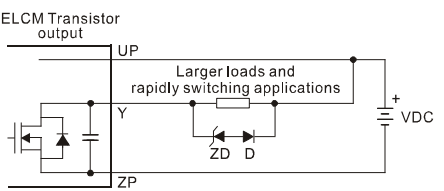
④ The output of the transistor is “open collector”.

1. Diode suppression: Used for smaller loads.



D: 1N4001 diode or equivalent component

2. Diode + Zener suppression: Used for larger loads and for rapidly switching application.

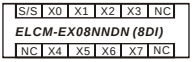


D: 1N4001 diode or equivalent component
ZD: 9V Zener, 5W

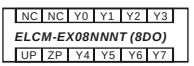
⑤ Mutually exclusive output: For example, Y3 and Y4 control the forward running and reverse running of the motor, forming an interlock for the external circuit, together with the ELCM internal program, to ensure safe protection in case of any unexpected errors.

■ I/O Terminal Layouts

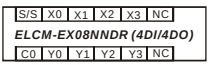
- ELCM-EX08NNDN

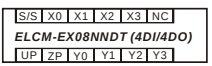


- ELCM-EX08NNNR/T



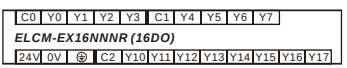
- ELCM-EX08NNDR/T





- ELCM-EX16NNDN

- ELCM-EX16NNNR/T



- ELCM-EX16NNDR/T