2007-05-08

5011629903-A603

ELC-AN06AANN

Analog to Digital/Digital to Analog Converter Mixed Module

Instruction Sheet

⚠ WARNING

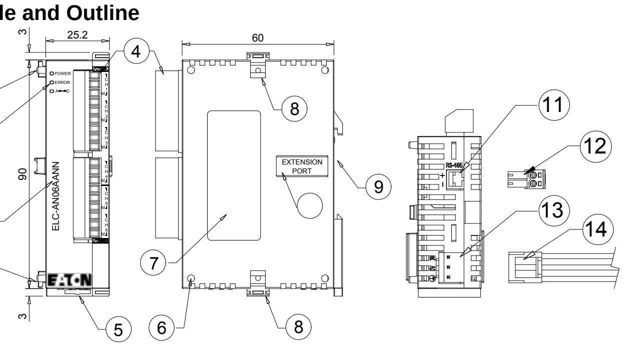
- This Instruction Sheet only provides descriptions for electrical specifications, general specifications, installation & wiring, troubleshooting and peripherals. For more information about the optional peripherals, please see ELC Application Manual.
- This is an OPEN TYPE Controller. The ELC should be kept in an enclosure away from airborne dust, humidity, electric shock risk and vibration. Also, it is equipped with protective methods such as some special tools or keys to open the enclosure, so as to avoid the hazard to users and the damage to the ELC. Do NOT touch terminals when power on.
- Never connect the AC main circuit power supply to any of the input/output terminals, as it will damage the ELC. Check all the wiring prior to power up. To avoid any electromagnetic noise, make sure the ELC is properly grounded ⏚.
- Warning – Do not disconnect while circuit is live unless area is known to be non-hazardous.
- Power, input and output (I/O) wiring must be in accordance with Class 1, Div. 2 wiring methods - Article 501-10(B)(1) of the National Electrical Code.
- Suitable for use in Class 1, Division 2, Groups A, B, C, D or Non-Hazardous locations only.
- Warning – Explosion hazard - Substitution of components may impair suitability for Class 1, Division 2.
- Warning – Explosion Hazard - Do not disconnect equipment unless power has been switched off or the area is known to be Non-Hazardous.

1 INTRODUCTION

1.1 Model Explanation and Peripherals

Thank you for choosing Eaton Logic Controller (ELC) series products. The ELC-AN06AANN allows the connection of four analog inputs and 2 groups 12 bits digital outputs (voltage/current). The ELC transforms the input into a 12 bit digital signal and the output into a 2 points analog signal, which may then be manipulated using TO and FROM commands in the ladder logic program. There are 49 Controlled Registers (CR) in each module (each register is 16 bits). The Analog Input/Output Mixed Module of ELC-AN06AANN can read/write the data of analog input module by using commands FROM / TO via ELC program.

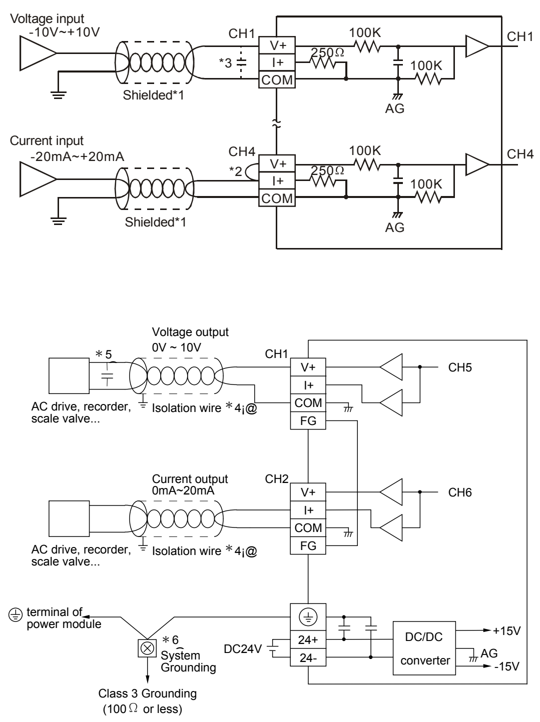
1.2 Product Profile and Outline



Units: mm

1. Status indicator (Power, RUN and ERROR)	2. Model Name
3. Extension unit clip	4. Input/output terminal
5. DIN rail clip	6. Mounting hole of the extension unit
7. Nameplate	8. Extension unit clip
9. DIN rail (35mm)	10. Extension port
11. RS-485 Communication port	12. 2 pin removable terminal (standard accessory)
13. DC power input	14. Power input cable (standard accessory)

1.3 External Wiring



Note 1: Please isolate analog input and other power wiring.

Note 2: If input connected current signal, please short circuit between V+ and I+ terminals.

Note 3: If wave of input terminal of loaded is too big that noise interferes wiring, please connect capacitance with 0.1~0.47μF 25V.

Note 4: Please isolate analog output and other power wiring.

Note 5: If wave of output terminal of loaded is too big that noise interferes wiring, please connect capacitance with 0.1~0.47μF 25V.

Note 6: Please connect ⏚ terminal of power module and ⏚ terminal of analog output module to system earth point and make system earth point be grounding or connects to machine cover.

Warning: DO NOT wire to the No function terminal. Use Copper Conductor Only, 60/75 °C.

2 STANDARD SPECIFICATIONS

2.1 Specifications

FOUR CH. (A/D) CONVERTER	VOLTAGE INPUT	CURRENT INPUT
Power Supply Voltage	24 VDC(20.4VDC~28.8VDC) (–15%～+20%)	
Analog Input Channel	4 channels per module	
Analog Output Range	±10V	±20 mA
Digital Data Range	±2,000	±1,000
Resolution	12 bits(1$_{LSB}$=5 mV)	11 bits (1$_{LSB}$=20 μA)
Input Impedance	200 KΩ and above	250Ω
Overall Accuracy	±0.5% of full scale of 25℃(77℉) ±1% of full scale during 0~55℃ (32~131℉)	
Response Time	3 ms × channels	
Isolation Method	There is no Isolation between digital and analog circuitry.	
Isolation	Field to Digital Area: 500V Field to Analog Area: 500V Analog area to Digital Area: 500V Field to 24VDC: 500V	
Absolution Input Range	±15 V	±32 mA
Digital Data Format	2's complement of 16-bit, (11 Significant Bits)	
Average Function	Yes (CR#2~CR#5 can be set and the range is K1~K100)	
Self Diagnostic Function Self Detection	Upper bound and lower bound detection per channel	

TWO CH. D/A CONVERTER	VOLTAGE OUTPUT	CURRENT OUTPUT
Analog Signal Output Channels	2 channel per module	
Analog Output Range	0~10V	0~20 mA
Digital Data Range	0~4,000	0~4,000
Resolution	12 bits (1$_{LSB}$=2.5 mV)	12 bits (1$_{LSB}$=5 μA)
Output Impedance	0.5Ω or lower	
Overall Accuracy	±0.5% of full scale at 25℃(77℉) ±1% of full scale during 0~55℃ (32~131℉)	
Response Time	3 ms × Channels	
Max. Output Current	10 mA(1KΩ~2MΩ)	—
Tolerance Carried Impedance	—	0～500Ω
Digital Data Format	2's complement of 16-bit, (11 Significant Bits)	
Isolation Method	There is no Isolation between digital and analog circuitry.	
Isolation	Field to Digital Area: 500V Field to Analog Area: 500V Analog area to Digital Area: 500V Field to 24VDC: 500V	
Protection	Voltage output has short circuit protection but short circuit for a long time may cause inner wiring damage and open circuit protection.	
Communication Mode (RS-485)	MODBUS ASCII/RTU Mode. Communication baud rate of 4,800 / 9,600 / 19,200 / 38,400 / 57,600 / 115,200 bps. For ASCII mode, date format is 7Bits, even, 1 stop bit (7 E 1). For RTU mode, date format is 8Bits, even, 1 stop bit (8 E 1). The RS-485 is disabled when the ELC-AN06AANN is connected in series to an ELC.	
Connect to ELC MPU in Series	When ELC-AN06AANN modules are connected to an ELC, the modules are numbered from 0 - 7. 0 is the closest to the MPU and 7 is the furthest. The Maximum number of modules is 8 modules and they do not occupy any digital I/O points of the MPU.	

2.2 Other Specifications

Maximum Power Consumption	2W at 24 VDC (20.4VDC~28.8VDC) (-15 % ~ +20 %)
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 RS(IEC 61131-2, IEC 61000-4-3): 26MHz~1GHz, 10V/m
Grounding	The diameter of the grounding wire cannot be smaller than that of terminals 24V and 0V (if numerous ELCs are used at the same time, make sure that each ELC is grounded respectively to the ground poles)
Vibration/Shock Immunity	International Standard Regulations: IEC61131-2, IEC 68-2-6 (TEST Fc)/ IEC61131-2 & IEC 68-2-27 (TEST Ea)
Operation/Storage Environment	Operation: 0℃~55℃ (temperature), 50~95% (humidity), pollution degree: 2; Storage: -25℃~70℃(temperature), 5~95% (humidity)
Agency Approvals	UL508 UL1604, Class1,Div2 Operating temperature code: T5 European community EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC

3 CR(CONTROLL REGISTER)

ELC-AN06AANN					EXPLANATION
CR No	Parameter Comm. address	Latched		Register Name	b15 | b14 | b13 | b12 | b11 | b10 | b9 | b8 | b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0
#0	H 40C8	O	R	Model type	Data length is 8 bits (b7~b0). ELC-AN06AANN model code= H CC
#1	H 40C9	O	R/W	Mode setting	CH6 | CH5 | CH4 | CH3 | CH2 | CH1 Input mode setting: (CH1~CH4) Mode 0: input voltage mode (-10V~+10V). Factory Setting is H0000. Mode 1: input voltage mode (-6V~+10V). Mode 2: input current mode (-12mA~+20mA). Mode 3: input current mode (-20mA~+20mA). Mode 4: Reserved Output mode setting: (CH5~CH6) Mode 0: output voltage mode (0V~10V). Mode 1: output voltage mode (2V~10V). Mode 2: output current mode (4mA~20mA). Mode 3: output current mode (0mA~20mA).
#2	H 40CA	O	R/W	CH1 average number	Average numbers setting of channel CH1~CH4. Setting range is K1~K100 and factory setting is K10.
#3	H 40CB	O	R/W	CH2 average number	
#4	H 40CC	O	R/W	CH3 average number	
#5	H 40CD	O	R/W	CH4 average number	
#6	H 40CE	X	R	Average value of CH1 input signal	Display average value of CH1~CH4 input signal
#7	H 40CF	X	R	Average value of CH2 input signal	
#8	H 40D0	X	R	Average value of CH3 input signal	
#9	H 40D1	X	R	Average value of CH4 input signal	
#10	H 40D2	X	R/W	CH5 output signal value	Output value of CH5~CH6, the setting range is K0~K4,000. The factory setting is K0 and the unit is LSB.
#11	H 40D3	X	R/W	CH6 output signal value	
#12	H 40D4	X	R	Present value of CH1 input signal	Display present value of CH1~CH4 input signal
#13	H 40D5	X	R	Present value of CH2 input signal	
#14	H 40D6	X	R	Present value of CH3 input signal	
#15	H 40D7	X	R	Present value of CH4 input signal	
#16~ #17					Reserved
#18	H 40DA	O	R/W	To adj. OFFSET value of CH1	Offset setting of CH1~CH4. Factory setting is K0 and unit is LSB. Voltage input: setting range is K-1,000 ~K1,000 Current input: setting range is K-1,000 ~K1,000
#19	H 40DB	O	R/W	To adj. OFFSET value of CH2	
#20	H 40DC	O	R/W	To adj. OFFSET value of CH3	
#21	H 40DD	O	R/W	To adj. OFFSET value of CH4	
#22	H 40DE	O	R/W	To adj. OFFSET value of CH5	Offset setting of CH5~CH6. Factory setting is K0 and unit is LSB. The setting range is K-2,000~K2,000
#23	H 40DF	O	R/W	To adj. OFFSET value of CH6	
#24	H 40E0	O	R/W	To adj. GAIN value of CH1	GAIN setting of CH1~CH4. Factory setting is K1,000 and unit is LSB.

ELC-AN06AANN					EXPLANATION
#25	H 40E1	O	R/W	To adj. GAIN value of CH2	Voltage input: setting range is K-800 ~K4,000 Current input: setting range is K-800 ~K2,600
#26	H 40E2	O	R/W	To adj. GAIN value of CH3	
#27	H 40E3	O	R/W	To adj. GAIN value of CH4	
#28	H 40E4	O	R/W	To adj. GAIN value of CH5	GAIN setting of CH5~CH6. Factory setting is K2,000 and unit is LSB. The setting range is K-1,600~K8,000
#29	H 40E5	O	R/W	To adj. GAIN value of CH6	
#30	H 40E6	X	R	Error status	Data register stores the error status, refer to fault code chart for details.
#31	H 40E7	O	R/W	Communication address setting	RS-485 communication address. Setting range is K1~K255 and factory setting is K1
#32	H 40E8	O	R/W	Communication baud rate setting	Communication baud rate (4,800, 9,600, 19,200, 38,400, 57,600 and 115,200 bps). For ASCII mode, date format is 7Bits, even, 1 stop bit (7,E,1). For RTU mode, date format is 8Bits, even, 1 stop bit (8, E,1). b0: 4,800 bps (bit/sec), b1: 9,600 bps (bit/sec). (factory setting) b2: 19,200 bps (bit/sec), b3: 38,400 bps (bit/sec). b4: 57,600 bps (bit/sec), b5: 115,200 bps (bit/sec). b6~b13: Reserved, b14: switch between low bit and high bit of CRC code (only for RTU mode), b15: RTU mode.
#33	H 40E9	O	R/W	Reset to factory setting and set characteristics adjustable priority	b15 b14: CH6; b13 b12: CH5; b11 b10 b9: CH4; b8 b7 b6: CH3; b5 b4 b3: CH2; b2 b1 b0: CH1 Example: Setting of CH1 1. When b0=0, user can set OFFSET and GAIN value of CH1 (CR#18, CR#24). When b0=1, inhibit user to adjust OFFSET and GAIN value of CH1. 2. b1 means if characteristic register is latched. b1=0 (factory setting, latched), b1=1 (not latched). 3. b2: Set to 1 and ELC-AN06AANN will be reset to factory settings. The setting of CH5~CH6, give CH5 setting for example: b13, b12: 00: can be adjusted, latched, 01: can be adjusted, non-latched. 10: inhibit adjust, 11: reset to factory settings and clear b12, b13 to 0.
#34	H 40EA	O	R	System Version	Display software version in hexadecimal. Example: H 010A = version 1.0A.
#35~#48					System used

O means latched. X means non-latched.
R means can read data by using FROM command or RS-485. W means can write data by using TO command or RS-485.
LSB (Least Significant Bit): 1. Voltage input: 1_{LSB}=10V/2,000=5mV. 2. Current input: 1_{LSB}=20mA/1,000=20μA.
3. Voltage output: 1_{LSB}=10V/4,000=2.5mV. 4. Current output: 1_{LSB}=20mA/4,000=5μA.

Explanation:

1. CR#0: The ELC model type.
2. CR#1: b11~b0 is used to set 4 inner channels working mode of analog input module (AD). b12~b15 is used to set 2 channels working mode of analog output module (DA). Every channel has four modes to set and can be set individually. For example: if setting CH1 to mode 0 (b2~b0=000), CH2 to mode 1(b5~b3=001), CH3: mode2 (b8~b6=010), CH4: mode 3(b11~b9=011). It needs to set b0~b11 to H688. If setting CH5: mode 2 (b13~b12=10), CH6: mode 1 (b15~b14=01), it needs to set b12~b15 to H5. The factory setting is H0000.
3. CR#2 ~ CR#5: Used to set the number of input readings used for the average temperature calculation. The available range is K1~K100 and factory setting is K10.
4. CR#6 to CR#9: they are used to save the average value of input signal of CH1~CH4.
5. CR#10 ~ CR#11 are used to set the output value of CH5 and CH6. The setting range is K0~K4,000. The factory setting is K0 and unit is LSB.
6. CR#12 ~ CR#15: they are used to save the present value of input signal of CH1~CH4.
7. CR#16, CR#17, CR#28, CR#29 are reserved.
8. CR #18~ CR #21: the content is the value of adjusting OFFSET value of CH1~CH4 if analog input voltage or current is 0 after it transfers from analog to digital. Voltage setting range: -5V~+5V(-1,000$_{LSB}$~+1,000$_{LSB}$). Current setting range: -20mA~+20mA (-1,000$_{LSB}$~+1,000$_{LSB}$).
9. CR #22~ CR #23: the content is the value of adjusting OFFSET value of CH5~CH6 if analog input voltage or current is 0 after it transfers from analog to digital. The factory setting is K0 and the unit is LSB. The setting range is -2,000~+2,000. Voltage setting range: -5V~+5V(-2,000$_{LSB}$~+2,000$_{LSB}$). Current setting range: -10mA~+10mA (-2,000$_{LSB}$~+2,000$_{LSB}$).
10. CR #24~ CR #27: That is the value of adjust GAIN value of CH1~CH4. That is the value of analog input voltage or current when conversion value from analog signal to digital is 4,000. Voltage setting range: -4V~+20V(-800$_{LSB}$~+4,000$_{LSB}$). Current setting range: -16mA~+52mA (-800$_{LSB}$ ~+2,600$_{LSB}$). But it needs to notice that GAIN VALUE – OFFSET VALUE = +200$_{LSB}$~+3,000$_{LSB}$ (voltage) or +200$_{LSB}$~+1,600$_{LSB}$ (current). When this value under this range, the resolution of the input signal will be thin and the variation of value will be larger. When this value exceeds this range, the resolution of input signal will be thick and the variation of value will be smaller.
11. CR #28~ CR #29: That is the value of adjust GAIN value of CH5~CH6. That is the value of analog input voltage or current when conversion value from analog signal to digital is 2,000. Voltage setting range: -4V~+20V(-1,600$_{LSB}$~+8,000$_{LSB}$). Current setting range: -8 mA ~+40 mA (-1,600$_{LSB}$~+8,000$_{LSB}$). But it needs to notice that GAIN VALUE – OFFSET VALUE = +400$_{LSB}$ ~+6,000$_{LSB}$ (voltage/current). When this value under this range, the resolution of the input signal will be thin and the variation of value will be larger. When this value exceeds this range, the resolution of input signal will be thick and the variation of value will be smaller.
12. CR#30 is fault code. Please refer to the following chart.

Fault description	Content	b15~b8	b7	b6	b5	b4	b3	b2	b1	b0
Power source abnormal (Low voltage alarm)	K1(H1)	Reserved	0	0	0	0	0	0	0	1
User setting D/A output exceeds range	K2(H2)		0	0	0	0	0	0	1	0
Setting mode error	K4(H4)		0	0	0	0	0	1	0	0
Offset/Gain error	K8(H8)		0	0	0	0	1	0	0	0
Hardware malfunction	K16(H10)		0	0	0	1	0	0	0	0
Digital range error	K32(H20)		0	0	1	0	0	0	0	0
Average times setting error	K64(H40)		0	1	0	0	0	0	0	0
Command error	K128(H80)		1	0	0	0	0	0	0	0

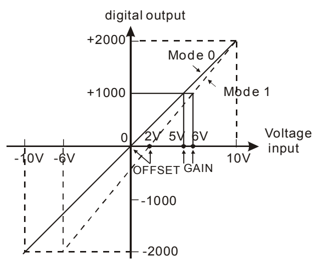
Note: Each fault code will have corresponding bit (b0~b7). Two or more faults may happen at the same time. 0 means normal and 1 means having fault.

13. CR#31: RS-485 communication address. Setting range is 01~255 and factory setting is K1.
14. CR#32: RS-485 communication baud rate: 4,800, 9,600, 19,200, 38,400, 57,600 and 115,200. b0:4,800bps, b1:9,600bps (factory setting), b2:19,200bps, b3:38,400 bps, b4:57,600 bps, b5:115,200 bps, b6~b13: Reserved, b14: switch between low bit and high bit of CRC code (only for RTU mode) b15: ASCII / RTU mode. For ASCII mode, date format is 7Bits, even, 1 stop bit (7,E,1). For RTU mode, date format is 8Bits, even, 1 stop bit (8,E,1).
15. CR#33 is used to set the inner function priority. For example: characteristic register. Output latched function will save output setting in the inner memory before loss power.
16. The corresponding parameters address H 40C8~H 40EA of CR#0~CR#34 can provide user to read/write data by RS-485.
    a) Communication baud rate: 4,800, 9,600, 19,200, 38,400, 57,600, 115,200 bps.
    b) Communication format: ASCII mode is 7Bit, even bit, 1 stop bit (7,E,1). Communication format of RTU mode is 8Bit, even bit, 1 stop bit (8,E,1).
    c) Function code: 03H—read data from register. 06H—write a WORD into register. 10H—write many WORDs into register.

4 ADJUST A/D CONVERSION CHARACTERISTIC CURVE

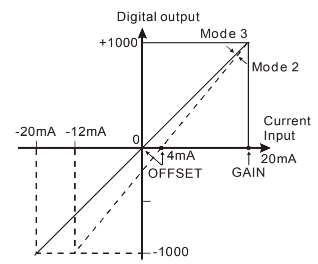
4.1 Adjust A/D Conversion Characteristic Curve of CH1~CH4

Voltage input mode



Mode 0 of CR#1:	GAIN=5V(1,000$_{LSB}$), OFFSET=0V (0$_{LSB}$).
Mode 1 of CR#1:	GAIN=6V(1,200$_{LSB}$), OFFSET=2V (400$_{LSB}$).
GAIN:	Voltage input value when digital output is 1,000. Setting range is -4V~+20V(-800$_{LSB}$~ +4,000$_{LSB}$)
OFFSET:	Voltage input value when digital output is 0. Setting range: -5V~+5V(-1,000$_{LSB}$ ~ +1,000$_{LSB}$)
GAIN－OFFSET:	Setting range is +1V~+15V (+200$_{LSB}$~ +3,000$_{LSB}$)

Current input mode:



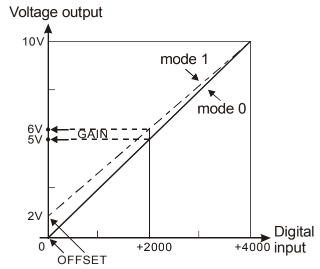
Mode 2 of CR#1:	GAIN = 20mA(1,000$_{LSB}$), OFFSET=4mA (200$_{LSB}$).
Mode 3 of CR#1:	GAIN = 20mA(1,000$_{LSB}$), OFFSET=0mA (0$_{LSB}$).
GAIN:	Current input value when digital output is +1,000. Setting range is -16 mA ~+52 mA (-800$_{LSB}$ ~ +2,600$_{LSB}$)
OFFSET:	Current input value when digital output value is 0. Setting range is -20 mA~+20 mA (-1,000$_{LSB}$ ~ +1,000$_{LSB}$)
GAIN－OFFSET:	Setting range is +4mA ~ +32mA (200$_{LSB}$~ +1,600$_{LSB}$)

The chart above is to adjust A/D conversion characteristic curve of voltage input mode and current input mode. Users can adjust conversion characteristic curve by changing OFFSET values (CR#18~CR#21) and GAIN values (CR#24~CR#27) depend on application.

Voltage input: 1_{LSB}=10V/2,000=5mV. Current input 1_{LSB}=20mA/1,000= 20μA.

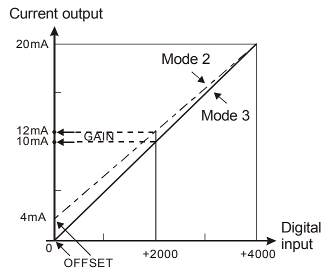
4.2 Adjust D/A Conversion Characteristic Curve of CH5~CH6

Voltage output mode



Mode 0 of CR#1:	GAIN = 5V(2,000$_{LSB}$), OFFSET=0V (0$_{LSB}$)
Mode 1 of CR#1:	GAIN = 6V(2,400$_{LSB}$), OFFSET=2V (800$_{LSB}$).
GAIN:	Voltage output value when digital input is K2,000. Setting range is -4V~+20V(-1,600$_{LSB}$ ~+8,000 $_{LSB}$).
OFFSET:	Voltage output value when digital input is K0. Setting range: -5V~+5V(-2,000$_{LSB}$ ~ +2,000 $_{LSB}$).
GAIN－OFFSET:	Setting range is +1V~+15V(+400$_{LSB}$ ~ +6,000 $_{LSB}$)

Current output mode:



Mode 2 of CR#1:	GAIN = 12mA(2,400$_{LSB}$),OFFSET=4mA (800$_{LSB}$).
Mode 3 of CR#1:	GAIN = 10mA(2,000$_{LSB}$), OFFSET=0mA (0$_{LSB}$).
GAIN:	Current output value when digital input value is K2,000. Setting range is -8 mA ~ +40 mA (-1,600$_{LSB}$ ~+8,000$_{LSB}$).
OFFSET:	Current output value when digital input is K0. Setting range is -10 mA ~ +10 mA (-2,000$_{LSB}$ ~+2,000$_{LSB}$).
GAIN－OFFSET:	Setting range is +2mA~+30mA(+400$_{LSB}$ ~+6,000$_{LSB}$)

The chart above is to adjust D/A conversion characteristic curve of voltage output mode and current output mode. Users can adjust conversion characteristic curve by changing OFFSET values (CR#14~CR#15) and GAIN values (CR#18~CR#19) depend on application.

Voltage output: 1_{LSB}=10V/4,000=2.5mV., Current output: 1_{LSB}=20mA/4,000=5μA.

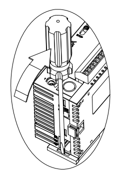
5 INSTALLATION & WIRING

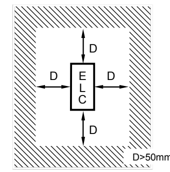
1. Installation of the DIN rail

The ELC can be secured to a cabinet by using the DIN rail that is 35mm high with a depth of 7.5mm. When mounting the ELC on the DIN rail, be sure to use the end bracket to stop any side-to-side motion of the ELC, thus to reduce the chance of the wires being pulled loose. At the bottom of the ELC is a small retaining clip. To secure the ELC to the DIN rail, place it onto the rail and gently push up the clip.

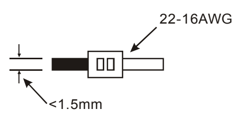
To remove it, pull down the retaining clip and gently pull the ELC away from the DIN rail. As shown on the right:

When installing the ELC, make sure that it is installed in an enclosure with sufficient space (as shown on the right) to its surroundings so as to allow heat dissipation.





2. Wiring



Notes:

1. Please use 22-16AWG (1.5mm) wiring (either single or multiple core) for I/O wiring terminals. The specification for the terminals is as shown on the left. ELC terminal screws should be tightened to 1.95 kg-cm (1.7 lb-in). Use Copper Conductor Only, 60/75 °C.
2. I/O signal wires or power supply should not run through the same multi-wire cable or conduit.

6 INITIAL ELC START-UP

Lamp display:

1. Upon power-up, the ERROR LED will light for 0.5 seconds the POWER LED will light continuously.
2. No errors= POWER LED on and ERROR LED off.
   Low Voltage error (lower than 19.5V), ERROR LED will blink continuously till the power supply rises above 19.5V.
3. ELC-AN06AANN connected to ELC in series = RUN LED on MPU will be lit and A/D

LED or D/A LED should blink.

4. After receiving the first RS-485 command the A/D LED or D/A LED will blink.
5. If the input or output exceeds the upper or lower bounds, then the ERROR LED will blink.
6. When main ELC and extension unit communicate time-out or abnormal interrupt, LED ERROR of extension unit will keep lighting.