

IN2000 Injection Molding Machine Controller

# ***Maintenance Manual***

2012/10 Ver. : V01.00 (4408030031)

***Leading Numerical Controller***



LNC Technology Co., Ltd.

---



## Table of Content

|          |                                            |          |
|----------|--------------------------------------------|----------|
| <b>1</b> | <b>Hardware .....</b>                      | <b>1</b> |
| 1.1      | Specification.....                         | 1        |
| 1.2      | Product.....                               | 2        |
| 1.3      | Wiring & Precautions .....                 | 7        |
| 1.4      | LCDOP-2870 Usage.....                      | 9        |
| 1.4.1    | IPC Interface .....                        | 9        |
| 1.4.2    | Power Contact.....                         | 10       |
| 1.4.3    | Axes Control Interface.....                | 10       |
| 1.4.4    | L-NET Communication Interface.....         | 11       |
| 1.4.5    | Key Switch & Emergency Button .....        | 12       |
| 1.5      | ELC-6100 Usage .....                       | 13       |
| 1.5.1    | Power Contact.....                         | 13       |
| 1.5.2    | L-NETCommunication Interface.....          | 13       |
| 1.5.3    | ELC-6100 Indicator Light .....             | 14       |
| 1.5.4    | Japan Terminal-Fixed Current Port .....    | 14       |
| 1.5.5    | Japan Contact-Output Port .....            | 15       |
| 1.5.6    | Japan Contact –Input Port .....            | 16       |
| 1.5.7    | Japan Contact-Analog Output Port .....     | 17       |
| 1.5.8    | Expansion-Analog Output Port .....         | 17       |
| 1.5.9    | Analog InputPort .....                     | 18       |
| 1.5.10   | Temperature Port .....                     | 19       |
| 1.5.11   | REL-1805 Relay Expansion Contact .....     | 19       |
| 1.5.12   | DIO-1216 IO Expansion Contact.....         | 20       |
| 1.5.13   | ADC-7510 TemperatureExpansion Contact..... | 20       |
| 1.6      | Expansion Board REL-1805Module .....       | 21       |
| 1.7      | Expansion Board DIO-1216Module .....       | 22       |
| 1.8      | Expansion Board ADC-7510Module .....       | 23       |



# 1 Hardware

## 1.1 Specification

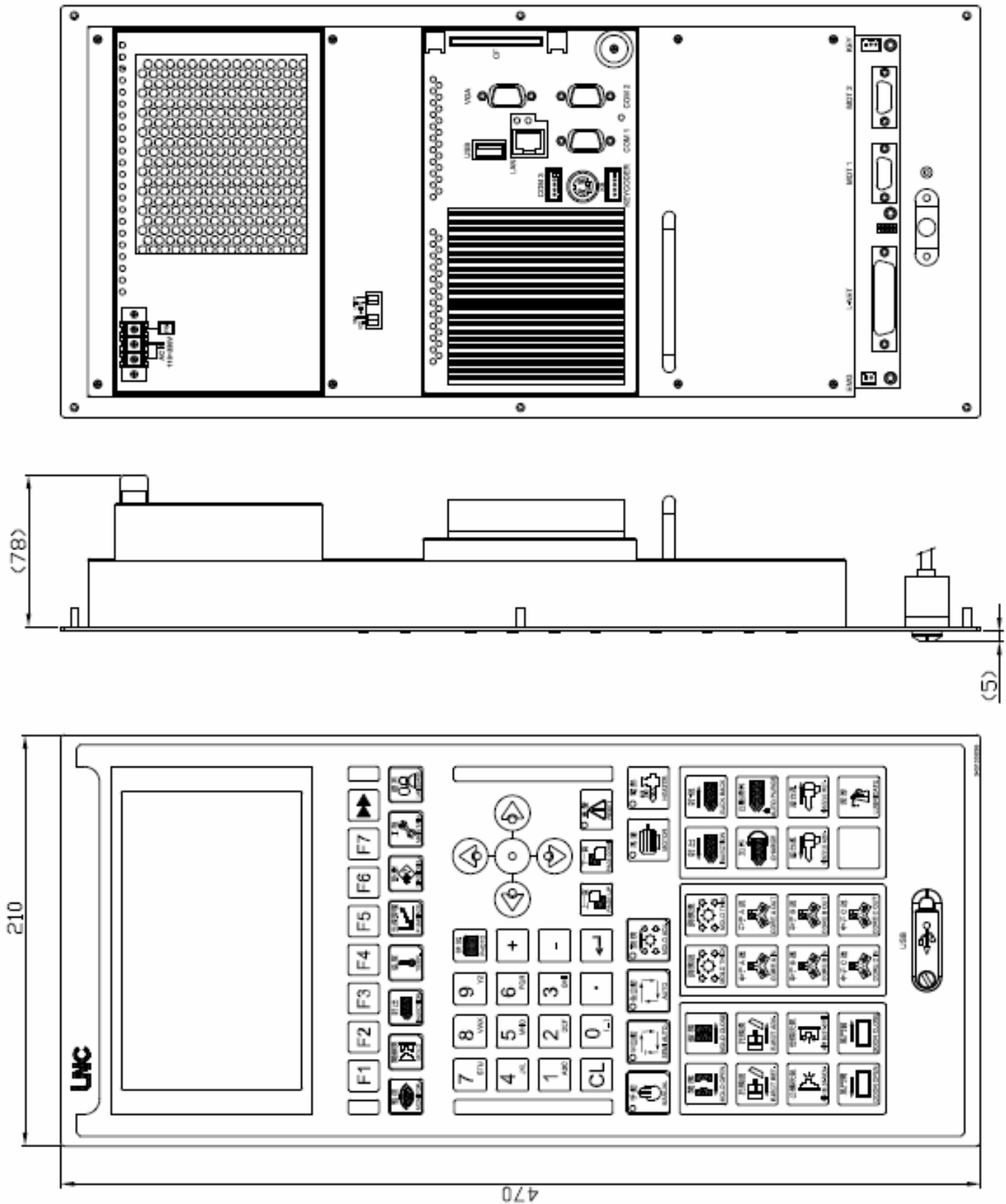
As below :

| Model                 | Item                       | Description                                                                                                  |
|-----------------------|----------------------------|--------------------------------------------------------------------------------------------------------------|
| LCDOP-2870            | Monitor                    | 7" TFT LCD                                                                                                   |
|                       | SDRAM                      | 256MB                                                                                                        |
|                       | Save Interface             | 1G CF CARD                                                                                                   |
|                       | Communication Interface    | RS232 / RS422 / RS485 / USB / Ethernet                                                                       |
|                       | Axes Control               | Can add 2 sets                                                                                               |
|                       | OP power                   | AC 110V/240V 50Hz/60Hz input power                                                                           |
| ELC-6100              | Temperature (Analog Input) | 9(Material Temperature) (K、J type)+1(Room Temperature) ; Can add 9(Material Temperature)+1(Room Temperature) |
|                       | Analog Input               | 4 ; Can add 4                                                                                                |
|                       | Analog Output              | 2( 0~1A ) / 2( 0~10V ) ; Can add4( 0~10V ) / 2( $\pm 10V$ )                                                  |
|                       | IO Output/Input            | 28 / 24( NPN ) ; Can add16IN/16OUT+ 5RELAY                                                                   |
|                       | Controller Power           | ELC-6100 Power Module (24V/ 100W、24V/ 350W)                                                                  |
| ELC-6100 Power Module | Supply DC 24V              | 24V / 100W : System Power( Can not add other load )<br>24V / 350W : Power for External IO                    |
| DIO-1216              | IO Output/Input            | 16IN / 16OUT<br>( Expansion Module )                                                                         |
| ADC-7510              | Temperature (Analog Input) | 9(Material Temperature) (K、J type)+1(Room Temperature)<br>( Expansion Module )                               |
| REL-1805              | IO Output                  | 5 RELAY single contact<br>( Expansion Module )                                                               |

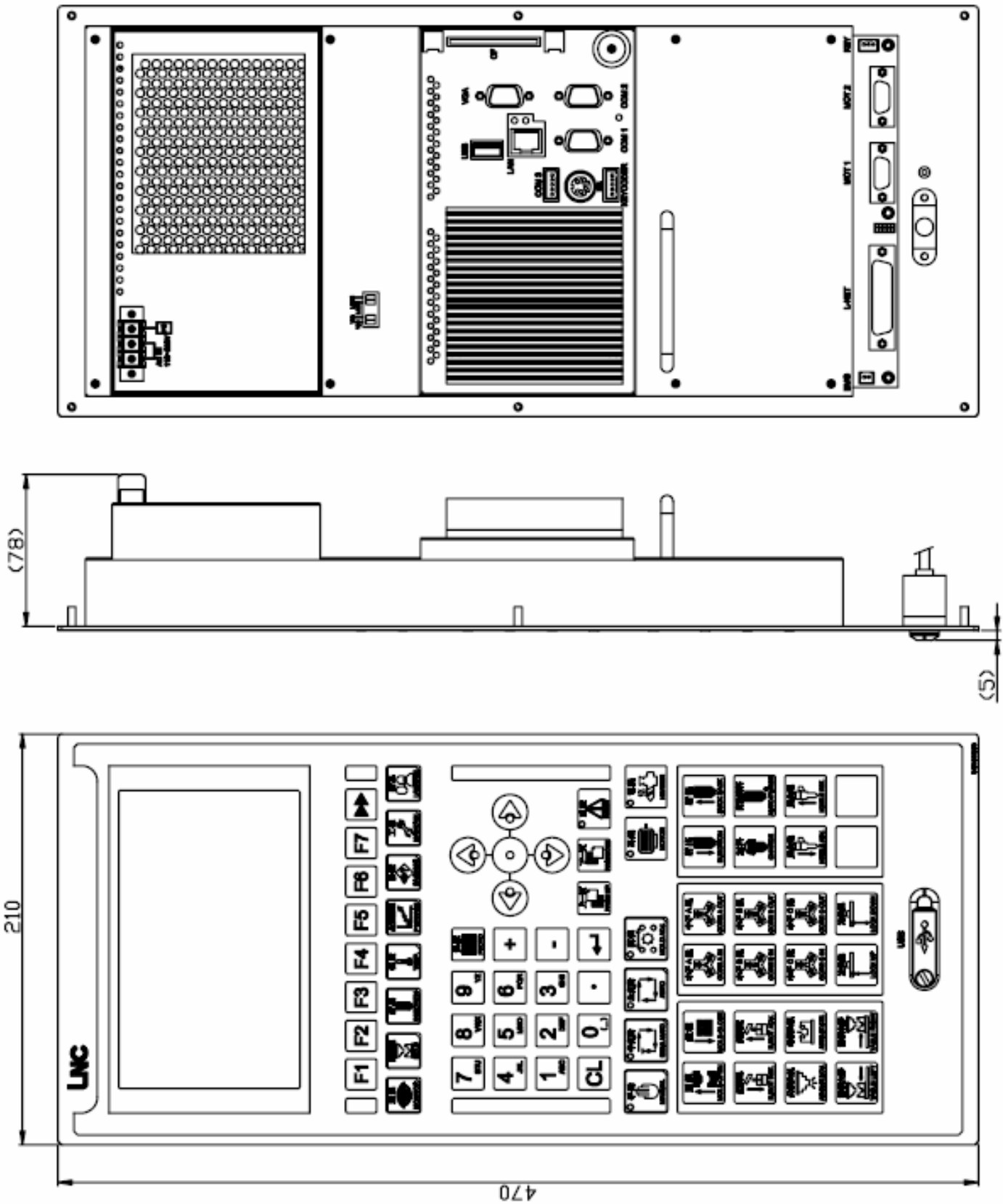


- **Controller Power-ELC-6100 Power Module** : Users need to use AC 110V/ 220V, connect it's plug directly to controller power port, it's not allowed to change 24V plug definition.

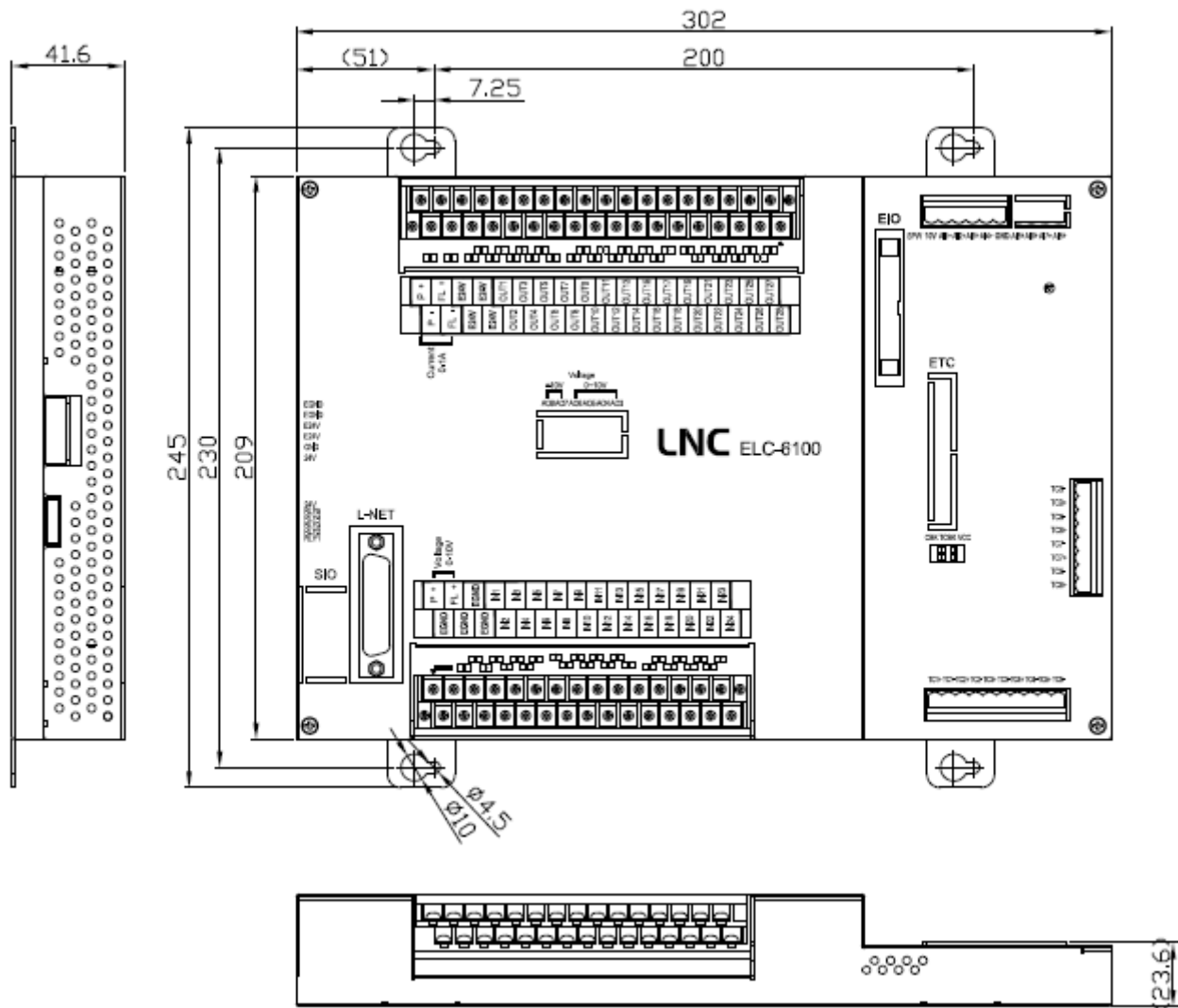
## 1.2 Product



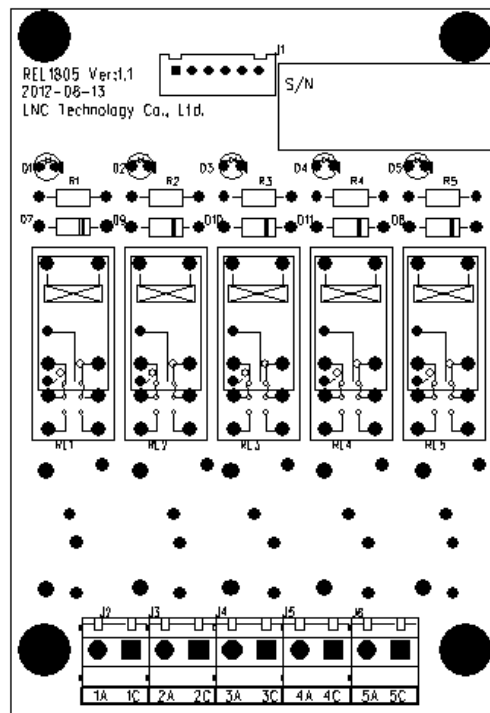
LCDOP-2870 Horizontal



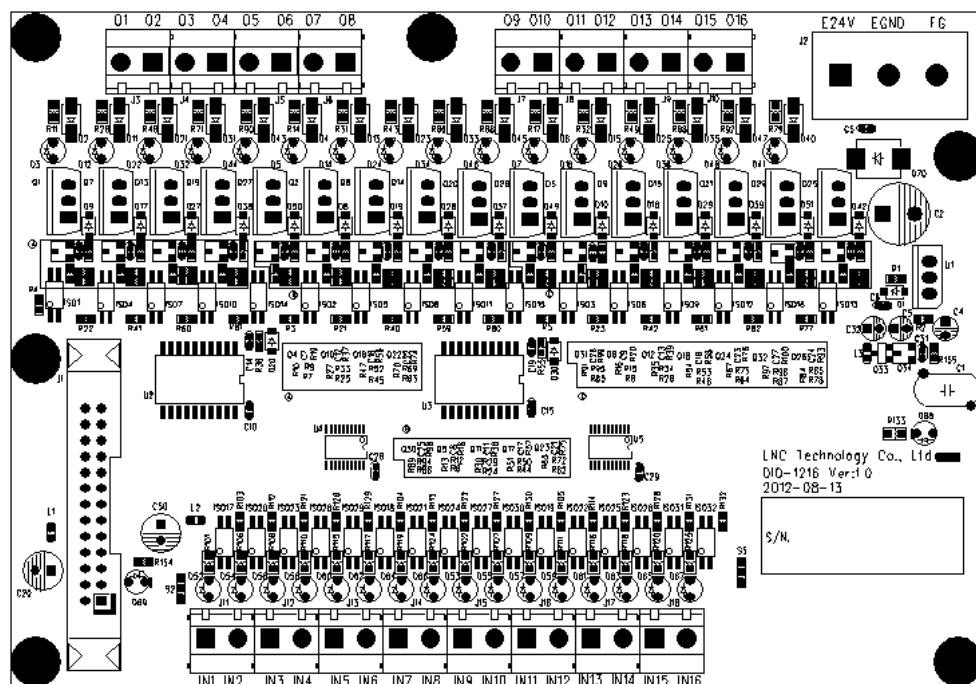
LCDOP-2870 Vertical



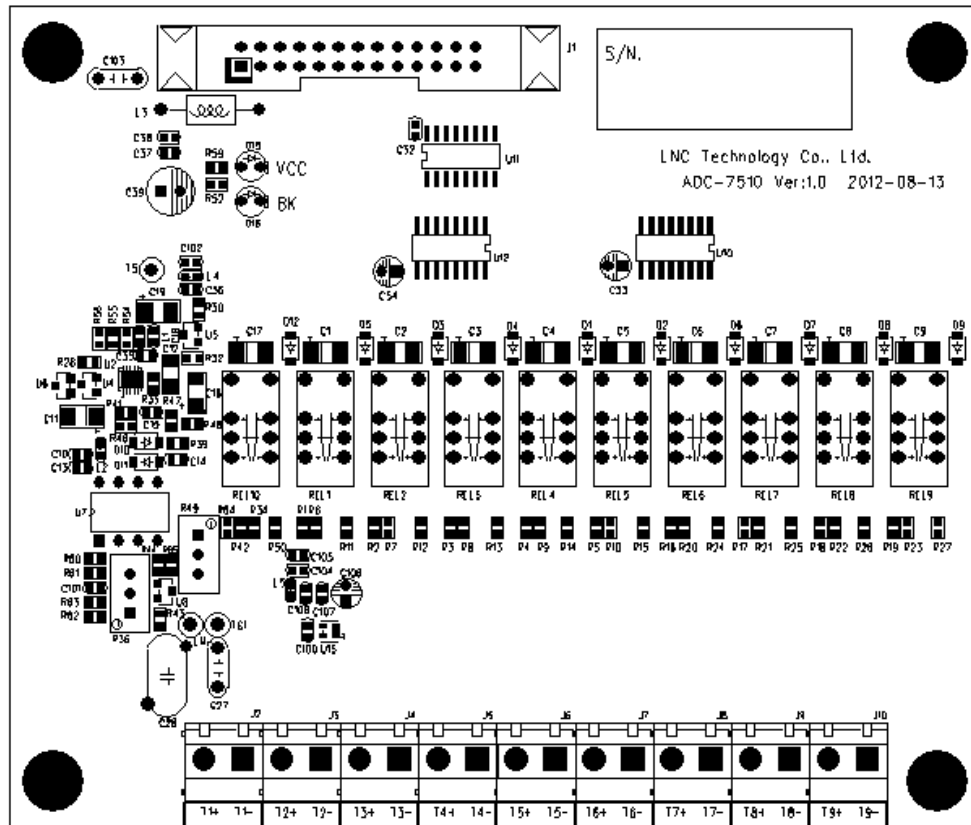
ELC-6100



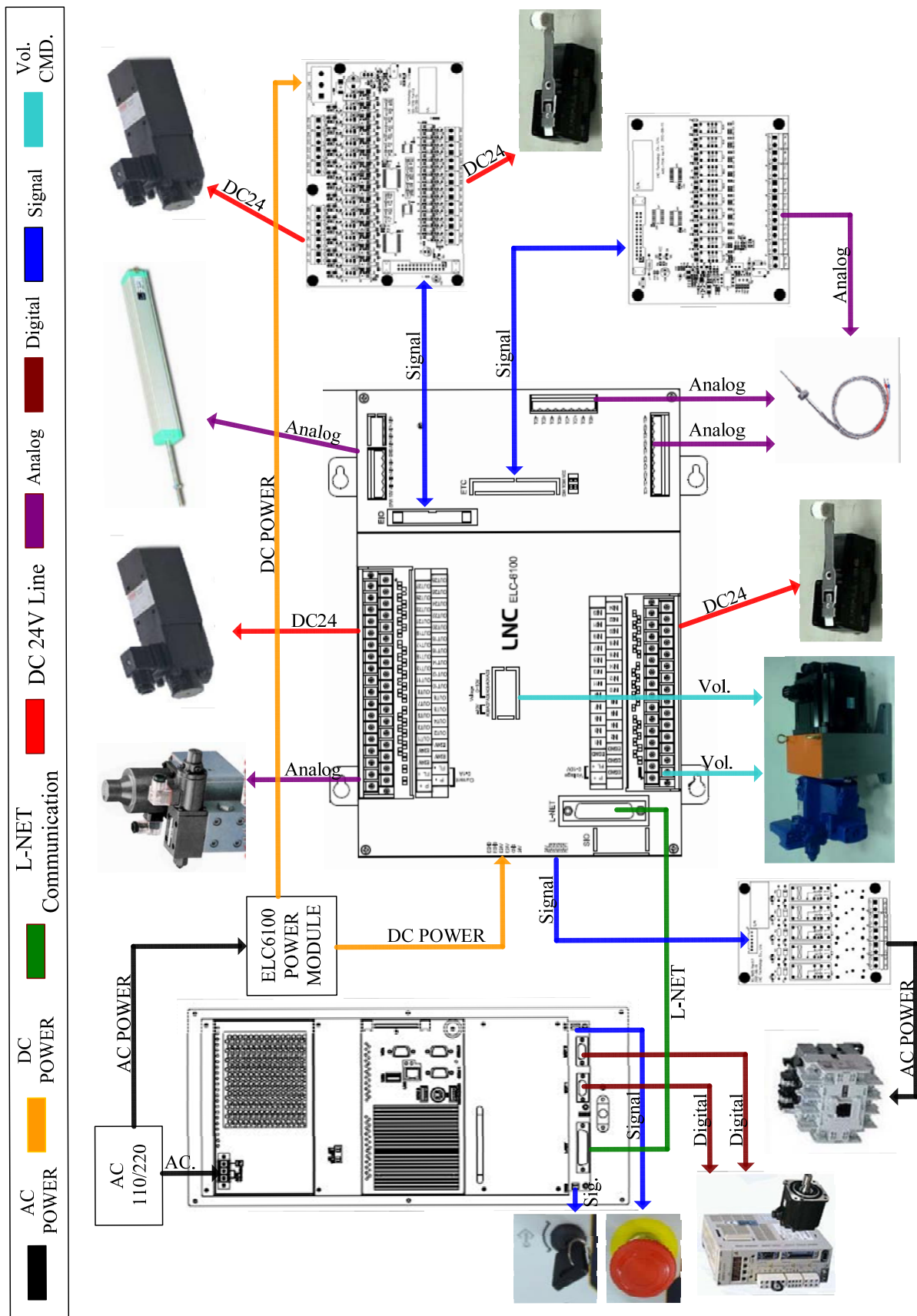
REL-1805 Card( 74\*107 mm )



DIO-1216 Card( 154\*107 mm )



### 1.3 Wiring & Precautions

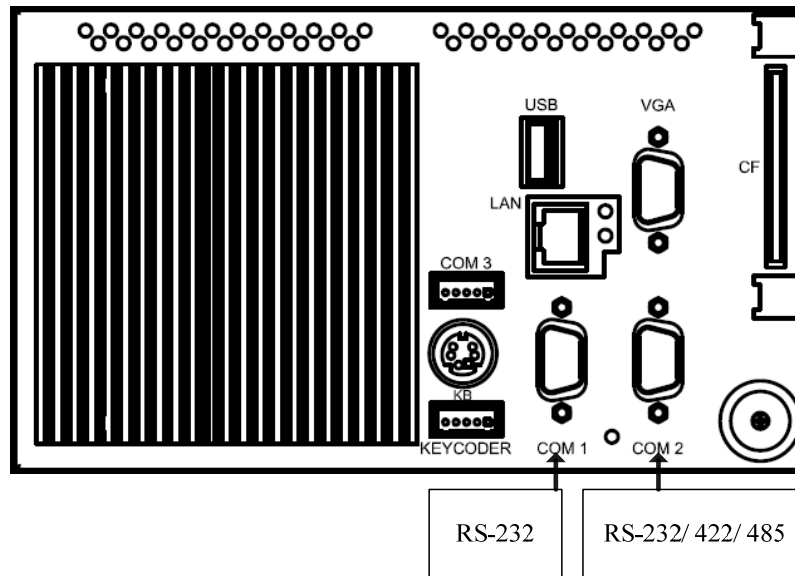


System wiring & peripheral load wiring

| Cable Color                                                                                           | Wiring & precautions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  AC POWER            | Offer AC 110V / 220V, we recommend you use power filter ( EMI Filter ) for system to use.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|  DC POWER            | From ELC-6100 power module to offer 24V :<br>1. 24V / 100W : For system inner power to use independently, can not be used to other peripherals.<br>2. E24V / 350W : Definition is E24V, supply for External IO load.<br>(1) Power for external IO loading, can be connected from ELC-6100 Japan terminal E24V & EGND.<br>(2) Use expansion board DIO-1216, card power can be connected by ELC-6100 Japan terminal E24V & EGND or ELC-6100Power Module E24V/350W.<br>(3) When all the loading is over E24V/350W, must add more capacity of E24V/350W power. <b>Must not add another set of 24V Power.</b> |
|  L-NET Communication | OP & controller connection cable : LCDOP-2870 & ELC-6100 communication cable                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|  DC 24V Line         | Wiring is E24V level :<br>1. Input device : one to E24V, one to IN<br>2. Output load : one to E24V, one to OUT<br>Above are all ELC-6100 E24V from Japan terminal                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|  Analog            | Analog wiring :<br>1. Resistance scale : A10V 、 AI+ 、 GND<br>2. Thermocouple : TC+ 、 TC-<br>3. Pressure/flow valve : FL+ 、 FL- to flow valve ; P+ 、 P- to pressure valve                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|  Digital           | Axes control or encoder function, according definition to do wiring                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|  Signal            | We offer below special cables :<br>1. Key switch<br>2. Emergency Button<br>3. Expansion Board REL-1805<br>4. Expansion Board DIO-1216<br>5. Expansion Board ADC-7510                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|  Vol. CMD.         | Analog voltage command wiring, must be noted :<br>1. Voltage ( P+ 、 FL+ ) & current(±P 、 ±FL ) the same command<br>2. AO3 、 AO4 、 AO5 、 AO6 Output 0~10V<br>3. AO7 、 AO8 Output ±10V                                                                                                                                                                                                                                                                                                                                                                                                                     |

## 1.4 LCDOP-2870 Usage

### 1.4.1 IPC Interface

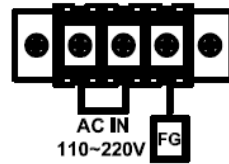


- ◎ Specification: (1). COM1 : RS-232
- (2). COM2 : Support RS-232 / RS-422 / RS-485 Communication Interface
- (3). COM3 : Support RS-422 / RS-485 Communication Interface

#### ◎ Pin Definition

| COM1 |      |                     | COM2 |      |                  | COM3 |      |                  |
|------|------|---------------------|------|------|------------------|------|------|------------------|
| PIN  | Name | Specification       | PIN  | Name | Specification    | PIN  | Name | Specification    |
| 1    | DCD  | Data Carrier Detect | 1    | -    | -                | 1    | TXD- | Differential TX- |
| 2    | RD   | Receive Data        | 2    | RD   | Receive Data     | 2    | TXD+ | Differential TX+ |
| 3    | TD   | Transmit Data       | 3    | TD   | Transmit Data    | 3    | RXD+ | Differential RX+ |
| 4    | DTR  | Data Terminal Ready | 4    | -    | -                | 4    | RXD- | Differential RX- |
| 5    | SG   | Signal Ground       | 5    | SG   | Signal Ground    | 5    | FG   | FG               |
| 6    | DSR  | Data Set Ready      | 6    | TXD- | Differential TX- |      |      |                  |
| 7    | RTS  | Request to Send     | 7    | TXD+ | Differential TX+ |      |      |                  |
| 8    | CTS  | Clear to Send       | 8    | RXD+ | Differential RX+ |      |      |                  |
| 9    | RI   | Ring Indicator      | 9    | RXD- | Differential RX- |      |      |                  |

#### 1.4.2 Power Contact



◎ Specification : For controller kernel power

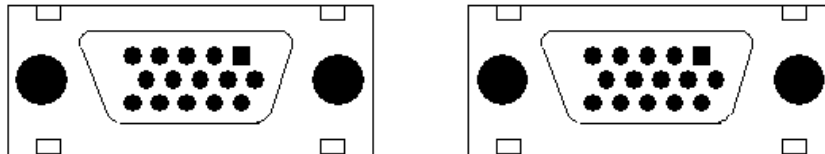
◎ Contact Specification : Contact definition as picture :

Connect AC110V/240V Power to controller power 's AC IN, power will be directed into controller to boot ; FG is housing ground, connect with metal housing(GND).



- **AC Power Input cable** : We recommend you use PVC cable with diameter of 0.75 mm<sup>2</sup> and above(with length within 5m)
- **Always check wiring before send electricity**, must not connect AC Power to FG, wrong wiring will burn out controller.
- **We recommend you add one power filter on AC110V/220V Power(EMI Filter)** to make it stable.

#### 1.4.3 Axes Control Interface



◎ Specification : (1). There are 2 sets of axes control : Pulse output 、 encoder feedback 、 servo ON contact 、 servo alarm contact.

(2). Encoder feedback is differential signal.

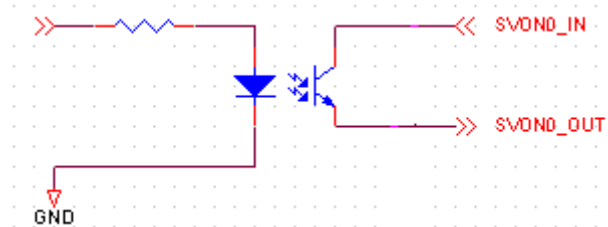
◎ Contact Definition :

| MOT1 & 2 |           |                 |
|----------|-----------|-----------------|
| PIN      | Name      | Specification   |
| 1        | /PA       | Pulse Output /A |
| 2        | /PB       | Pulse Output /B |
| 3        | ENC-/A    | Encoder /A      |
| 4        | ENC-/B    | Encoder /B      |
| 5        | ENC-/C    | Encoder /C      |
| 6        | PA        | Pulse Output A  |
| 7        | PB        | Pulse Output B  |
| 8        | ENC-A     | Encoder A       |
| 9        | ENC-B     | Encoder B       |
| 10       | ENC-C     | Encoder C       |
| 11       | SERON_IN  | Servo ON IN     |
| 12       | SERON_OUT | Servo ON OUT    |

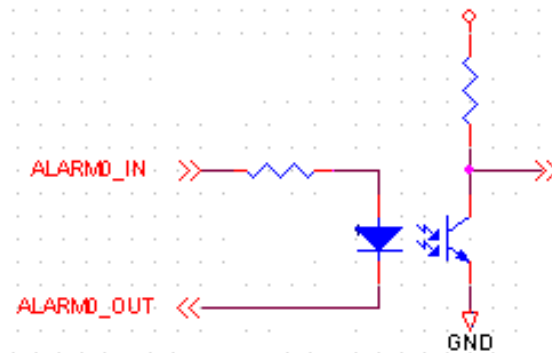
|    |           |                 |
|----|-----------|-----------------|
| 13 | -         | -               |
| 14 | ALARM_IN  | Servo Alarm IN  |
| 15 | ALARM_OUT | Servo Alarm OUT |

◎ Servo ON & Alarm contact :

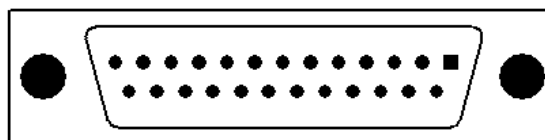
(1). Start Contact : OutputSpecificationVCE = 70V / Ic = 50mA



(2). Alarm Contact : Power can only be 24V level, otherwise limit resistor power will be over.



#### 1.4.4 L-NET Communication Interface

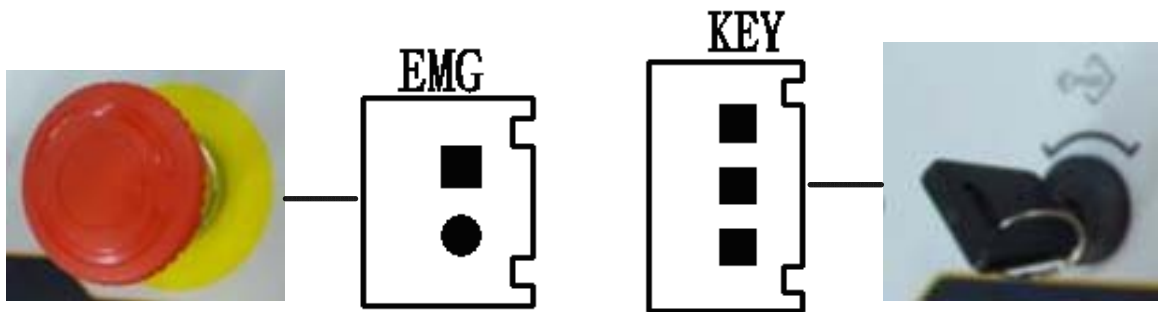


◎ This is the communication Interface between OP & control box, need to use special cable to connect to ELC-6100 L-NET port.



- This is the communication Interface between OP & controller, must avoid mechanism or human reason to cause damage on cable.
- This is not anti-winding cable, must avoid constant winding.
- Communication cable L-NET : Must avoid binding with heavy electricity or AC power to prevent error.

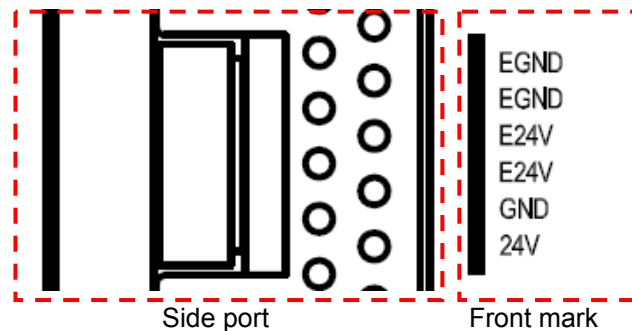
#### 1.4.5 Key Switch & Emergency Button



- ◎ This is special plug, we offer special cable to connect.
- ◎ Cable length 25CM ( Do not attempt to extend )

## 1.5 ELC-6100 Usage

### 1.5.1 Power Contact

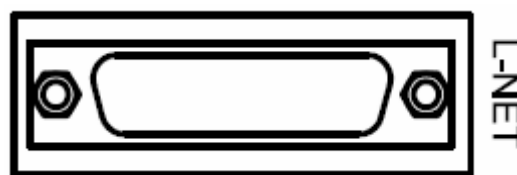


- ◎ Contact Definition : Use ELC-6100 power module connection cable plug.
  - (1). 24V & GND : Use 24V / 100W power supply, for inner system to use only.
  - (2).E24V & EGND : Total 4PIN, using 24V / 350W power supply for external IO load to use.
    - \* External IO load power, connected by ELC-6100 Japan terminal E24V & EGND.
    - \* Use expansion board DIO-1216, card power can be connected by ELC-6100 Japan terminal E24V & EGND or ELC-6100 power module's E24V/350W.
    - \* When all the loading is over E24V/350W, enlarge the power capacity of E24V/350W. **Must not** add one more set of 24V power to use.



- **ELC-6100 Power module connection cable plug( connect with ELC-6100 power contact ), must not change plug randomly.**
- **When all the loading is over E24V/350W, must not add one more set of 24V power to use**

### 1.5.2 L-NETCommunication Interface



- ◎ This is the communication interface between OP & controller, need to use special cable to connect with LCDOP-2870, L-NET port.



- **This is the communication interface between OP & controller, must avoid mechanism or human reason to cause damage on cable.**
- **This is not anti-winding cable, must avoid constant winding.**
- **Communication cable L-NET : Must avoid binding with heavy electricity or AC Power to prevent error.**

### 1.5.3 ELC-6100 Indicator Light

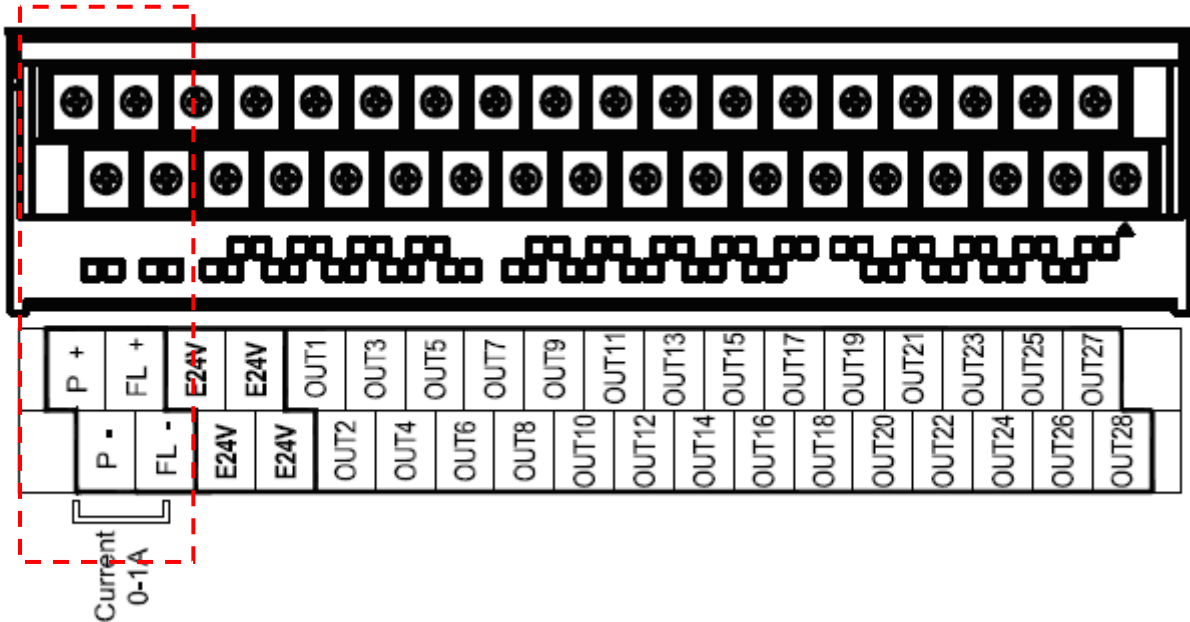


- ◎ VCC System Power Light : If system has normal electricity, this light is always ON(Green).
- ◎ CBK System Communication Light : When system starts running, this light will be off(Red).
- ◎ TCBK Temperature Break Indicator Light : If any of thermocouple brakes, this light will be ON(Red).

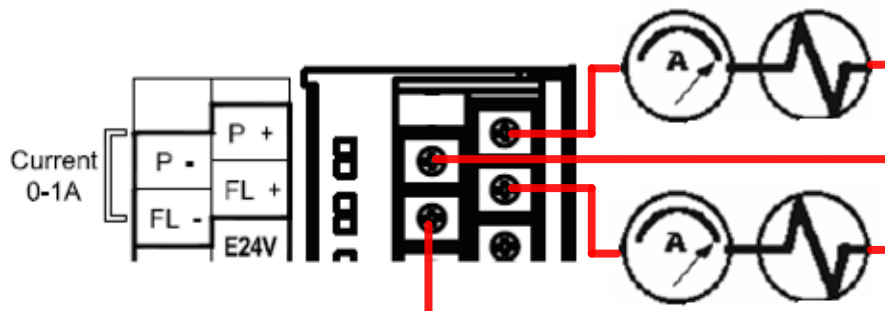


- When VCC is always OFF, check ELC-6100 power module contact connection and power.
- When CBK is always ON, check communicationconnection between LCDOP-2870 & ELC-6100 and power from both sides.
- When TCBK is flashing, some sections of temperature may be brake, check connections of all temperature.

### 1.5.4 Japan Terminal-Fixed Current Port



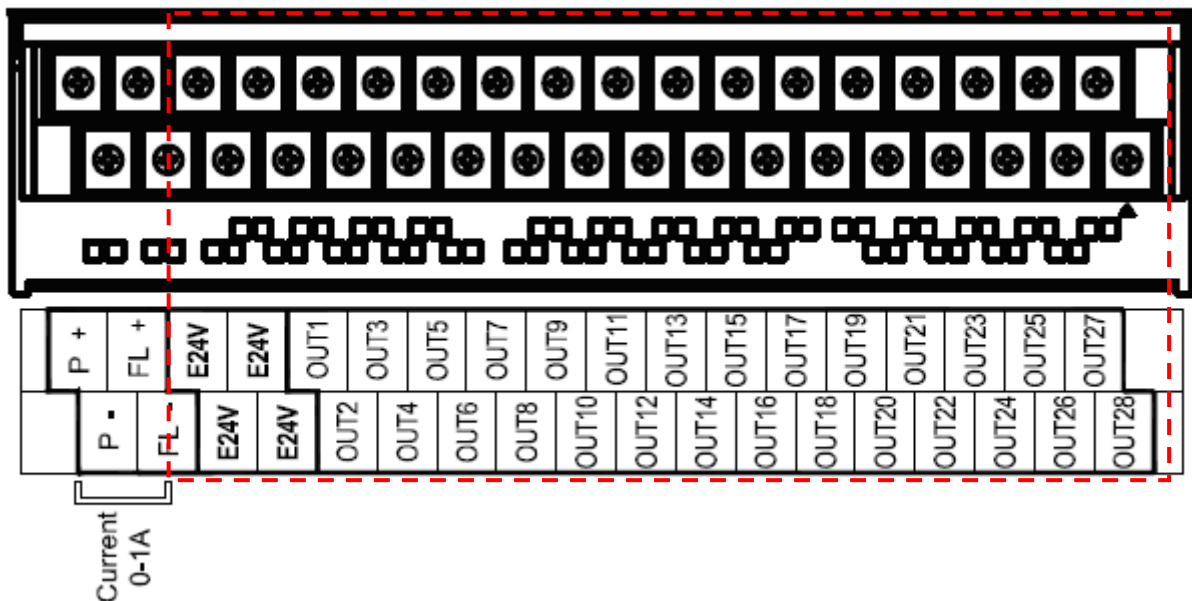
- ◎ Specification : Offer 2 sets of fixed current control( 0~1A ) for pressure/flow valve drive.
- ◎ Pressure Valve Coil Resistance Specification : 10Ω(Maximum 20Ω), to ±P port.
- ◎ FlowValve Coil Resistance Specification : 43.5Ω(Maximum 47Ω), to ±FL port.
- ◎ Connection :



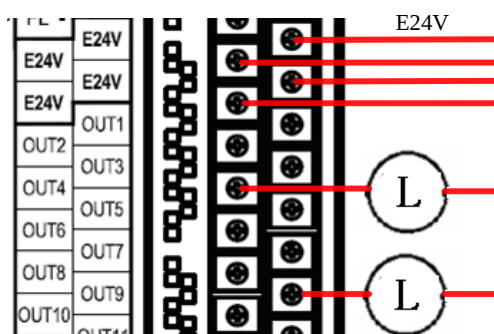


- Must not make  $\pm P$  or  $\pm FL$  port shorted.

### 1.5.5 Japan Contact-Output Port

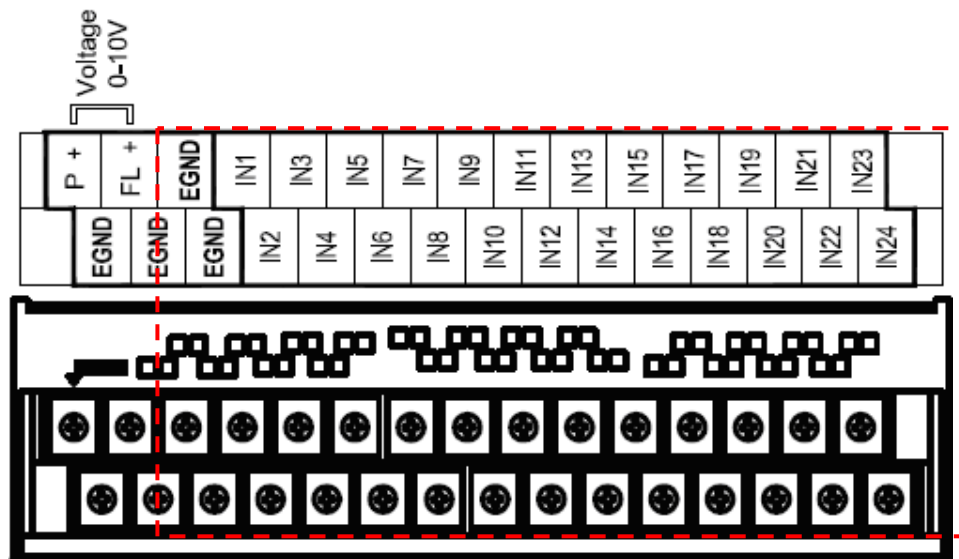


- ◎ Specification : Output, has output LED.
- ◎ OutputSpecification : 28 sets of MOSFET output( SINK )
- ◎ Output Capacity : Can be up to 2A.
- ◎ Connection :

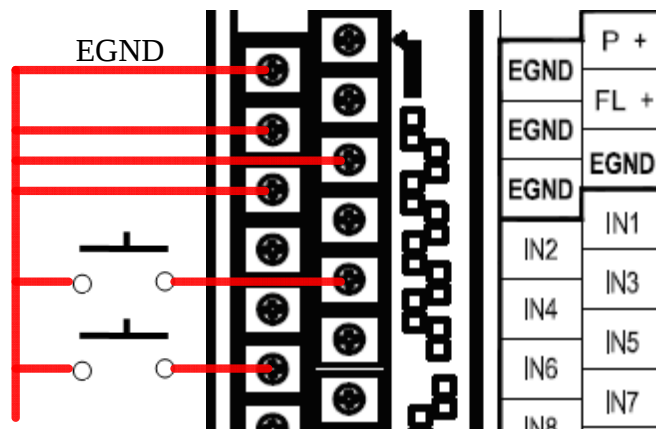


- All external loading capacity must be within 24V/350W.
- Loading power must be the same system with E24V、EGND.
- If single output controls 2 solenoids, must use additional REL to control indirectly.

### 1.5.6 Japan Contact –Input Port

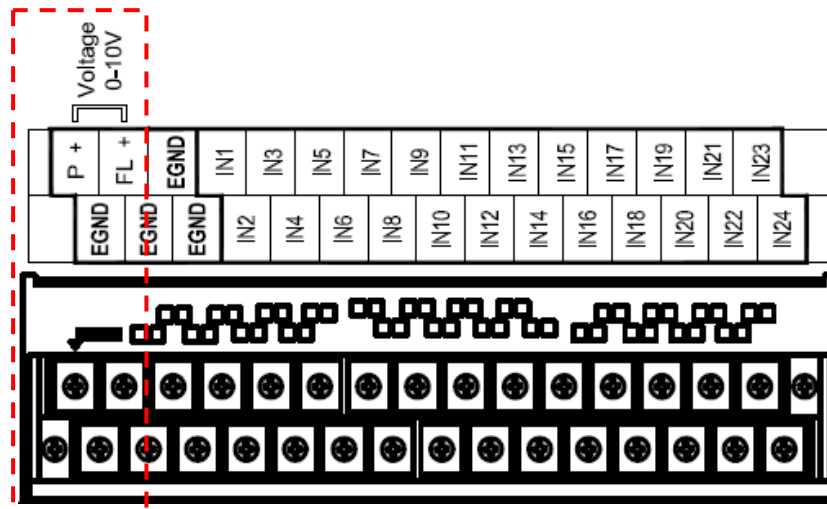


- ◎ Specification : Input, with input LED.
- ◎ Input Specification : 24 Input ( NPN type )
- ◎ Connection : Limit switch



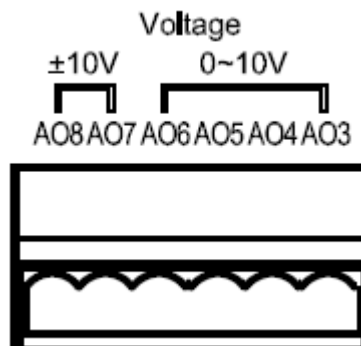
- Switch component power has be the same system with E24V 、 EGND.

### 1.5.7 Japan Contact-Analog Output Port

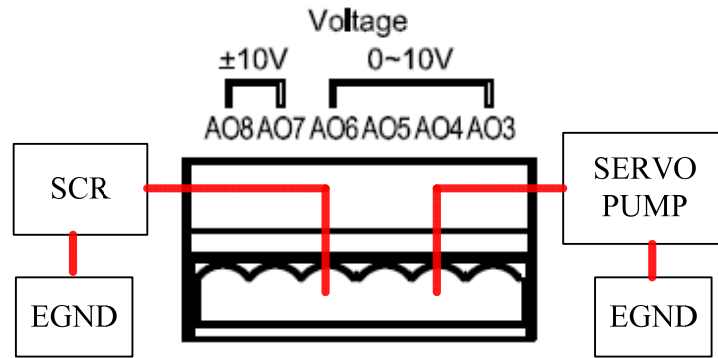


- ◎ Specification : Analog voltage output( 0 ~ 10V ) , the same with fixed current port control command( $\pm P$ 、 $\pm FL$ )
- ◎ P+Port : Pressure command & EGND to proportion pressure valve.
- ◎ FL+Port : Flow command & EGND to proportionflow valve.

### 1.5.8 Expansion-Analog Output Port



- ◎ Specification : Analog voltage output.
- ◎ AO3~AO6Specification : Analog voltage output 0 ~ 10V scale.
- ◎ AO7~AO8Specification : Analog voltage output  $\pm 10V$  scale.
- ◎ Connection : SCR、SERVO PUMP.

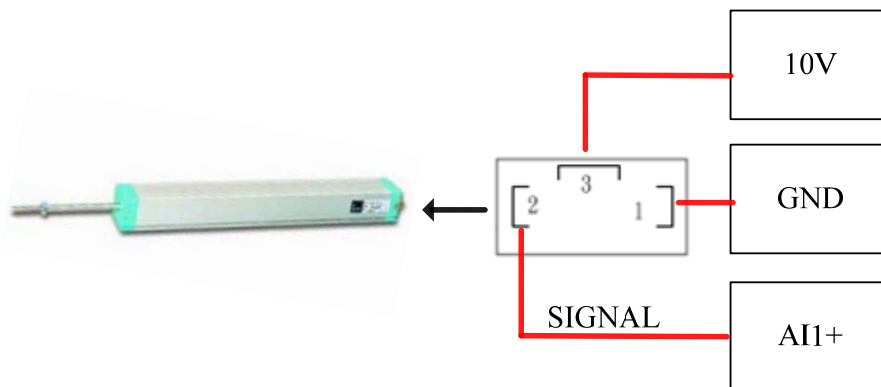


### 1.5.9 Analog InputPort

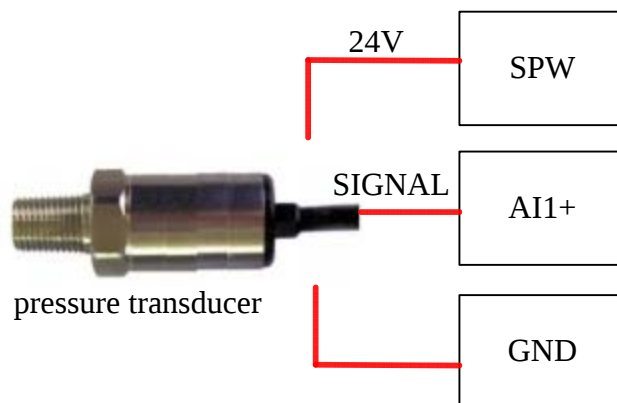


- ◎ Specification : Analog voltage input, include analog 10V voltage.
- ◎ Specification : Total 4( 0~10V ), can add 4( 0~10V )
- ◎ Connection :

(1). Position scale( 3 cables type ), when extending is maximum value, retracting is minimum value. If the direction is on the contrary, need to switch 1、3 PIN (positive and negative switch )



(2). Pressure transducer( 24V level )



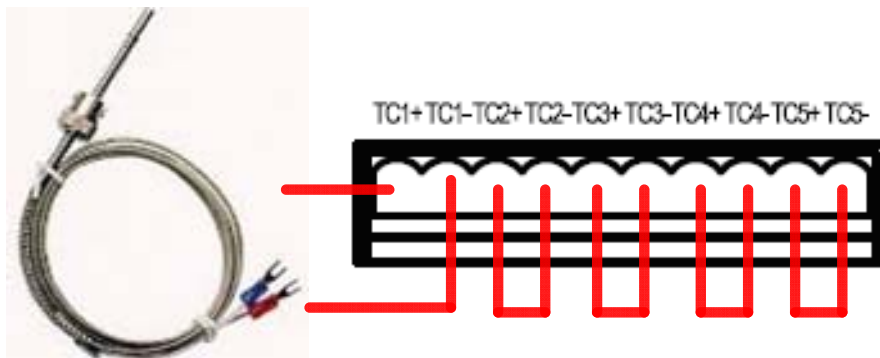


- Position scale PIN( SIGNAL )must not be inserted wrongly, otherwise may lead position scale burn out.
- Signal SPW is 24V level, must follow picture to do wiring.

#### 1.5.10 Temperature Port

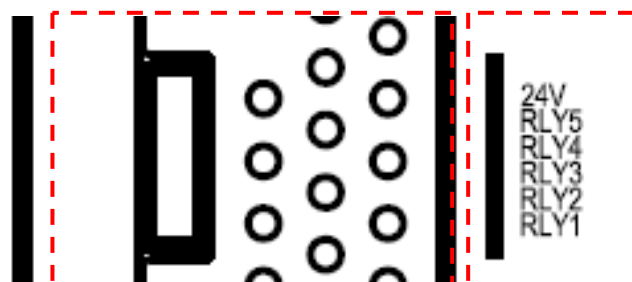


- ◎ Specification : Temperature-Analog Input
- ◎ Temperature section : 9( Material Temperature ) + 1( Room Temperature )
- ◎ Thermocouple : K、J type
- ◎ Measure range : Room Temperature ~ 800℃
- ◎ Connection : Thermocouple ( unused segments must be shorted )



- When using expansion module, need to be EIO Port to ADC-7510 Card, otherwise system can not work.
- Unused temperature segments must be shorted, when TCBK is ON, check if there is any brake on temperature thermocouple.

#### 1.5.11 REL-1805 Relay Expansion Contact



Side Port

Front Mark

◎ This is RELAY expansion port, use special cable to connect to expansion board REL-1805 Card to have 5 points of RELAY contact to control.

#### 1.5.12 DIO-1216 IO Expansion Contact



◎ This is IO expansion port, use special cable to expansion board DIO-1216 Card, 16 IN / 16 O.



- When using expansion module, need to be EIO Port to DIO-1216 Card, otherwise system can not work.

#### 1.5.13 ADC-7510 TemperatureExpansion Contact

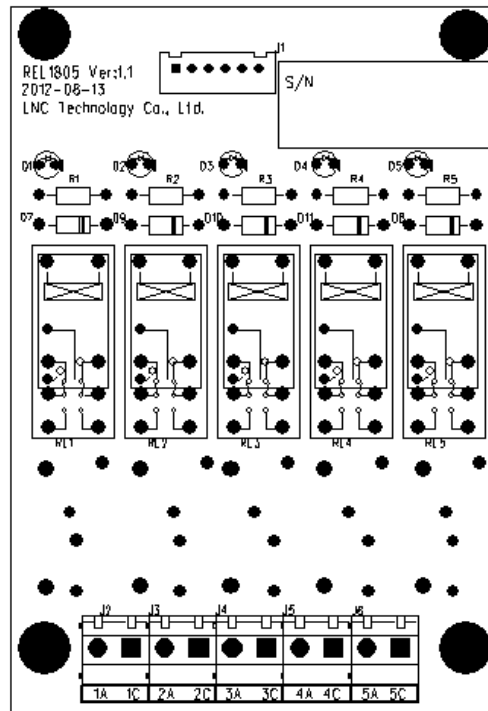


◎ This is temperature expansion port, need to use special cable to connect to expansion board ADC-7510 card, can be 9(Material Temperature)+1(Room Temperature)temperature monitor.

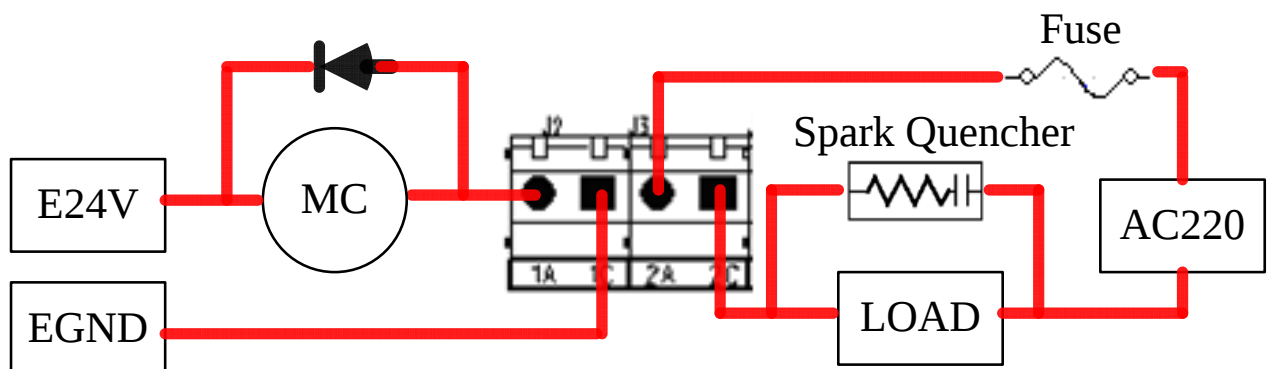


- When using expansion module, need to be EIO Port to ADC-7510 Card, otherwise system can not work

## 1.6 Expansion Board REL-1805Module

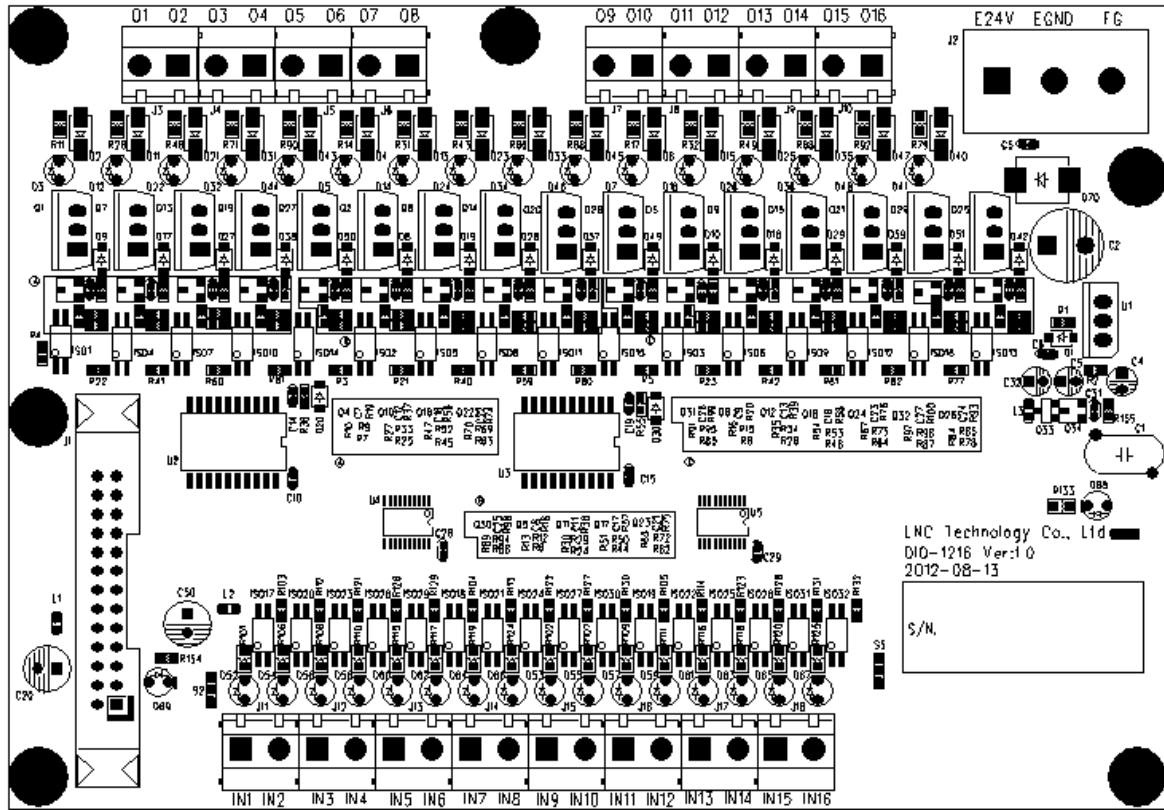


- ◎ Specification : This is RELAY expansion board, total is 5 sets of RELAY contact.
- ◎ Size : 74 mm \* 107 mm
- ◎ Control Contact : J4, has special cable to connect with ELC-6100 RELAY port.
- ◎ ContactSpecification : NO / NC : 10A / 5A 120VAC( 50,000 ops )  
NO / NC : 7A / 5A 240VAC
- ◎ Connection : Electromagnetic contactor coil( DC 24V ), AC loading



- Control electromagnetic contactor coil, we recommend you add flywheel diode 1N4007 to protect RELAY contact.
- Control AC loading, we recommend you add fuse & spark quencher to protect RELAY contact.

## 1.7 Expansion Board DIO-1216Module

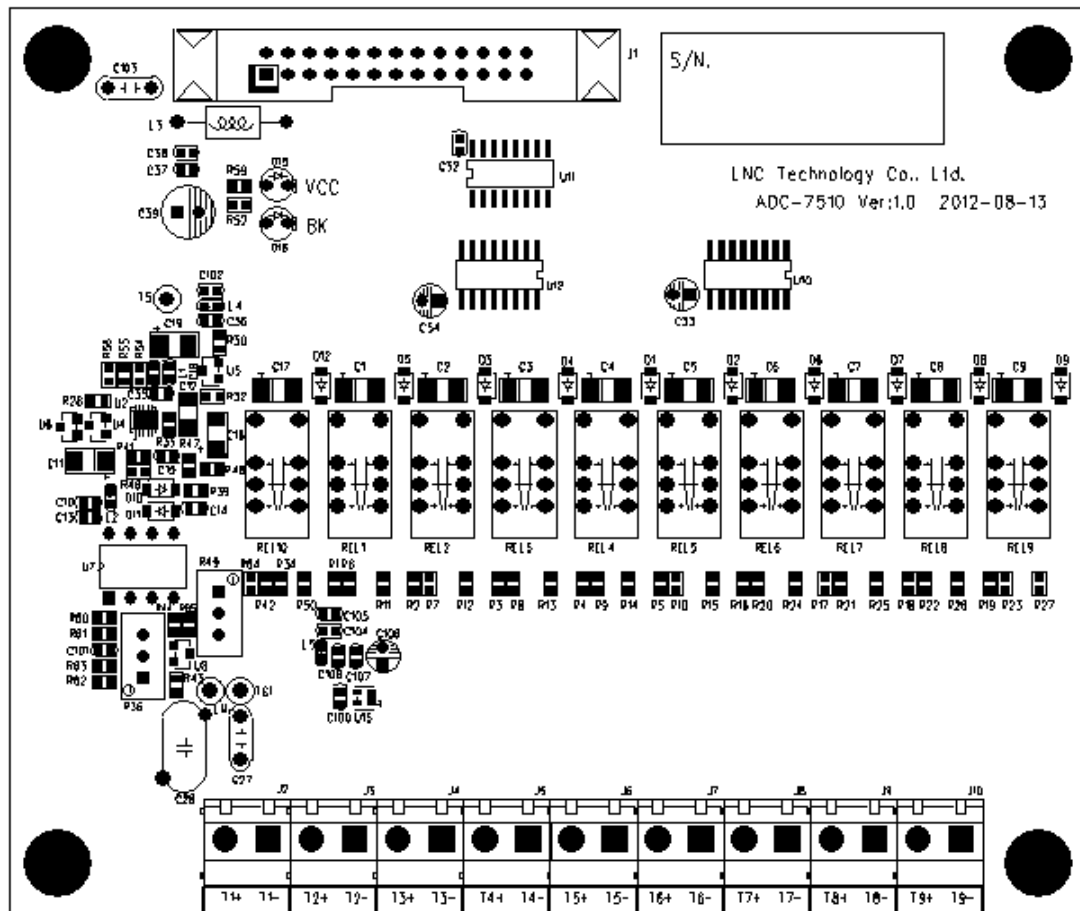


- ⊙ Specification : This is IO expansion board, 16IN / 16OUT, has LED.
- ⊙ Size : 154 mm \* 107 mm
- ⊙ Power Contact : J2, connected by ELC-6100 Japan terminal E24V & EGND or ELC-6100 power module E24V/350W.
- ⊙ Control Contact : J1, special cable, connect with & ELC-6100 EIOPort.
- ⊙ InputSpecification : 24 sets of Input( NPN type )
- ⊙ OutputSpecification : 28 sets of MOSFET Output( SINK )
- ⊙ OutputCapacity : Can be up to 2A.
- ⊙ Input/OutputConnection : Refer to 1.5.5 & 1.5.6 connection



- When using expansion module, need to be EIO Port to DIO-1216 Card, otherwise system can not work.
- If single output controls 2 solenoids, must use additional REL to control indirectly.

## 1.8 Expansion Board ADC-7510Module



- ⊙ Specification : This is temperature expansion board
- ⊙ Size : 126 mm \* 107 mm
- ⊙ Temperature Sections : 9(Material Temperature) +1(Room Temperature)
- ⊙ Thermocouple : K、J type
- ⊙ Measure Range : Room Temperature ~ 800℃
- ⊙ Break Indicator : BK, if any of thermocouple brakes, this light will be ON (Red)
- ⊙ Power Indicator : VCC & controller connected, will be eternal ON(Green)
- ⊙ Control Port : J1, special cable & connect with ELC-6100 ETCPort.
- ⊙ Input/OutputConnection : Refer to 1.5.10



- When using expansion module, need to be EIO Port to ADC-7510 Card, otherwise system can not work.
- Unused temperature segments must be shorted, when BK is ON, check if there is any brake of temperature thermocouple from expansion board ADC7510.