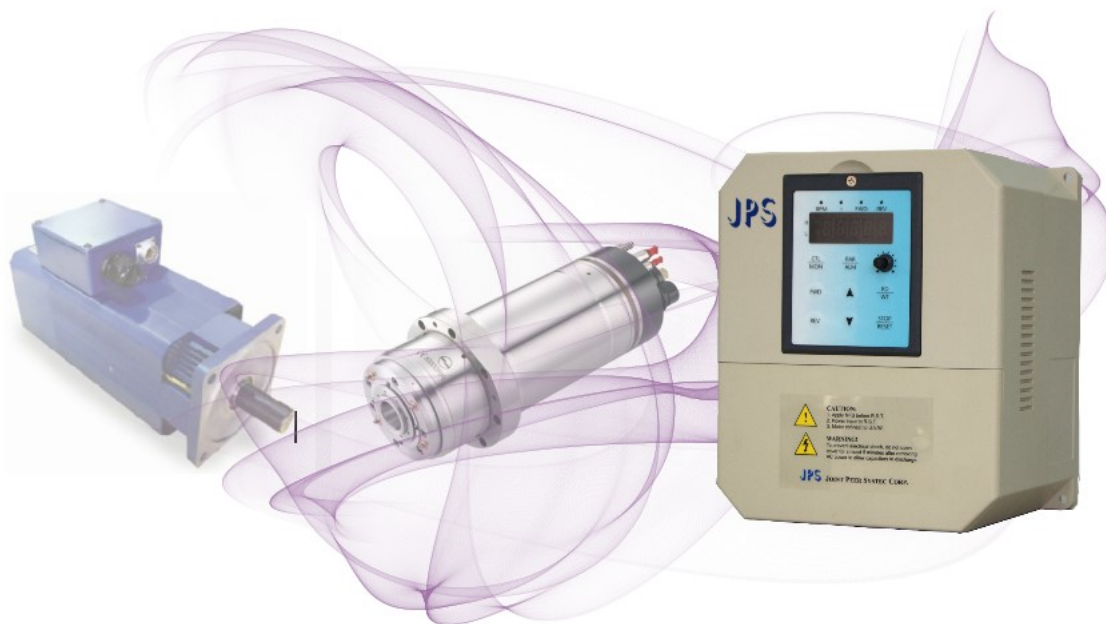




# AURORA J Type-IMSV USER MANUAL



VERSION : 2015/11/14

## Foreword

AURORA series Induction servo drive , Designed for CNC machine tool design , Built suitable tool spindle, milling spindle, spindle speed straight knot , Spindle machining center , CNC Lathe Spindle , Spindle drilling and tapping... °

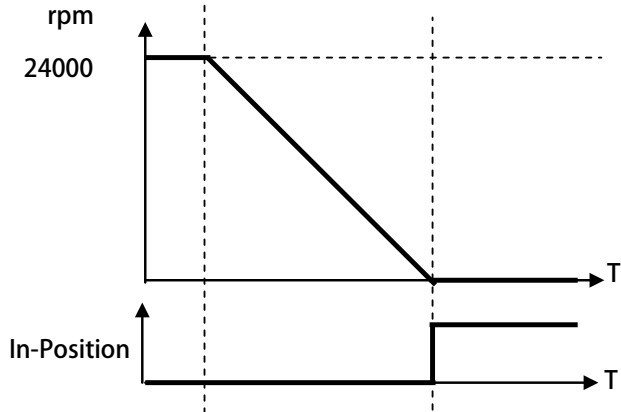
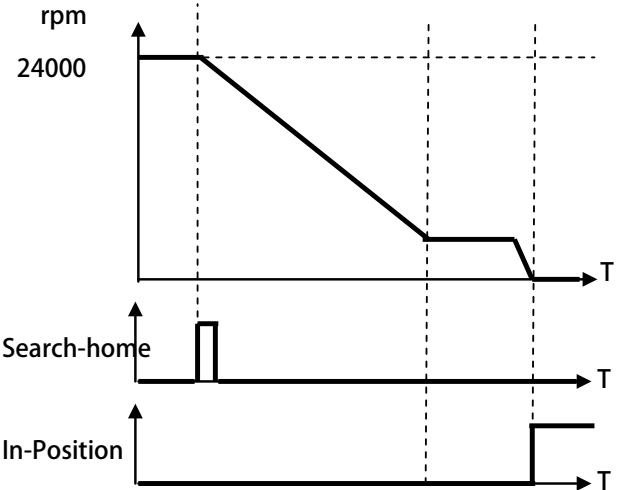
- ◎ 0 ~ 24000rpm high-speed acceleration slope
- ◎ 24000rpm , Autonomous accurate positioning stop (As shown below)
- ◎ 6000rpm High Speed Tapping
- ◎ Built Rigid tapping module , can be simulated immediately tracking error rigid tapping without master
- ◎ Receive Master Controller(Pcmd) , High-speed pulse command (500kHz) , include 2 sets PID gain
- ◎ Receive Master Controller (Vcmd) , Voltage command(-10V ~ +10V) , with 12bitResolution , include 2 sets PID gain
- ◎ Built-in KTY84 temperature detection interface , with parameter setting can protect the motor

Suitable application :

Tools machine washable bed machine , Lathe machine , Carving machine , Drilling and Tapping Machine ,

Built-in 0 ~ 24000rpm high-speed acceleration slope and Autonomous accurate positioning stop

Not need to search origin-point , stop position can be set by parameter(0 ~ 360 deg) °

|                                                                                                                               |                                                                                                            |
|-------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
|                                              |                         |
| <p><b>JPS-AURORA Series</b><br/>Autonomous accurate positioning stop<br/>Duty cycle is short , advance enhance efficiency</p> | <p><b>Other Brand Drive</b><br/>General deceleration stop + Search-origin-point<br/>Duty cycle is long</p> |

## Safety Precautions and Warnings!

### CAUTION! WARNING!

Pay attention to these  CAUTION, WARNING, and  signals on the device or instruction documents. They indicate danger to human body or damage to the device. Before installing and putting the device into operation, please read the safety precautions and warnings following this page.

1. Make sure that the warning signs are kept in a legible condition and replace missing or damaged signs.
2. Before starting, familiarize yourself with the operation of the inverter. It may be too late if you start working with the inverter before read this instruction manual.
3. Never permit unqualified personnel to operate the inverter.

### WARNING!

- This inverter produces dangerous electrical voltages and controls rotating mechanical parts.
- Death, severe injury or substantial damage to property can occur if the instructions in this operating manual are not completed with.
- Only personnel with appropriate qualifications should work with this inverter. These personnel must be familiar with all the warning signs and precautions laid out in these operating instructions for the transport, installation and operation of this device.
- The successful and safe use of this inverter depends on the correct installation, commissioning, operation and maintenance of the device.
- This device operates at high voltages.

### CAUTION!

- The DC-link capacitors remain charged to dangerous voltages even the power is removed. For this reason it is not permissible to open the inverter cover until five (5) minutes after the power has been turned off.
- When handling the open inverter it should be noted that live parts are exposed. Do not touch these live parts.
- The terminals R, S, T, U, V, W, P, N, B, PR, and BR can carry dangerous voltages even if the motor is inoperative.
- Only qualified personnel may connect, start the system up and repair faults. These personnel must be thoroughly acquainted with all the warnings and operating procedures contained with this manual.
- Certain parameter settings may cause the device to start up automatically after power on or power recover.

## DEFINITIONS

- **Qualified Person**

For the purposes of this manual and product labels , a qualified person is one who is familiar with the installation , construction , operation and maintenance of this device and with hazards involved. In addition , the person must be:

- Trained and authorized to energize , de-energize , clear , ground and tag circuits and equipment in accordance with established safety practices.
- Trained in the proper care and use of protective equipment in accordance with established safety practices.
- Trained in rendering first aid.

- **DANGER**

For the purposes of this manual and product labels ,DANGER indicates that loss of life , severe personal injury or substantial property damage WILL result if proper precautions are not taken.

- **WARNING**

For the purposes of this manual and product labels , WARNING indicates that loss of life , severe personal injury or substantial property damage CAN result if proper precautions are not taken.

- **CAUTION**

For the purpose of this manual and product labels , CAUTION indicates that minor personal injury or property damage CAN result if proper precautions are not taken.

- **NOTE**

For the purpose of this manual and product labels , NOTES merely call attention to information that is especially significant in understanding and operating the inverter.



### DANGER and WARNING

- Make sure that the location selected for installation is safe , protected from moisture and splash and drip-proof!
- Children and the general public must be prevented from accessing or approaching the equipment!
- The equipment may only be used for the purpose specified by the manufacturer. Unauthorized modifications and the use of spare parts and accessories that are not sold or recommended by the manufacturer of the equipment can cause fires , electric shocks and injuries.
- Keep these operating instructions within easy reach and give them to all users!



### WARNING

- This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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## 1. Product Introduction

### 1.1 Check Items

To avoid the carelessness during packing and delivery , please check the list below carefully .

| Items      | Amount | Contents                                                                                                                                                                                        |
|------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Driver     | 1 set  | Check the spec. of the device with the case label is same or not.<br>Check the out looking of the device to make sure that there is no defect on it.<br>All screws should be tighten and exist. |
| Cable/wire |        | In accordance with the feedback version check for missing (in this connection in the factory have been tested).                                                                                 |

If any miss or defect happened , please contact with the agency to get resolve of the problem.

### 1.2 Description of Nameplate Content

#### 1.2.1 The Label on the Packing Case

**AURORA-J1-IMSV-2022-D-STD-R**  
**220V**

The contents of indication:

1. J1 → J1 Type .
2. IMSV → Suit for Induction servo motor .
3. 2022 → Indicates that this driver should access 220V , and the rated output is 2.2KW .
4. D → Brake transistor type
5. STD → Fireware description
6. R → Indicates that the control panel of this driver .

| Description of Control Panel |         |                                                                                     |
|------------------------------|---------|-------------------------------------------------------------------------------------|
| R                            | R-Panel |  |



### 1.2.2 The Driver Rating Label

The figure below is a sample of the rating label that is put on the outside of the driver.

|                                                                                                                                                                                    |                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| MODEL                                                                                                                                                                              | AURORA-J1-IMSV-2022-D-STD-R  |
| INPUT                                                                                                                                                                              | AC 3 $\psi$ 220V / 50/60HZ   |
| OUTPUT                                                                                                                                                                             | 3 $\psi$ 11A/ 4KVA/ 0~1000HZ |
| Serial NO                                                                                                                                                                          | 080A0001                     |
|  MADE IN TAIWAN  |                              |

The contents of rating label are showed below:

MODEL : AURORA - J1 - IMSV - 2022 - D - STD - R

|  |            |                              |
|--|------------|------------------------------|
|  | Series     | AURORA                       |
|  | Type       | J1                           |
|  | Motor      | IMSV : Induction servo motor |
|  | Voltage    | 2 : 220VAC                   |
|  |            | 4 : 380VAC                   |
|  | Watt       | 022 : 2.2KW                  |
|  | Transistor | D : include                  |
|  |            | X : not include              |
|  | Function   | STD : standard               |
|  | Panel      | R Panel                      |

INPUT : AC3~~Ø~~220 / 50/60HZ

|                 |                             |
|-----------------|-----------------------------|
| Power-Type      | A.C. 1 or 3 Phase, 220Volt. |
| Power Frequency | 50Hz/60Hz                   |

OUTPUT : 3~~Ø~~11A 4KVA / 0~1000Hz

|                        |            |
|------------------------|------------|
| Phase / Current        | 3Phase/11A |
| Capacitance (KVA)      | 4KVA       |
| Output Frequency Range | 0 ~ 1000HZ |

## 1.3 The Specification

### 1.3.1 The Rating

| Model                      |      | 2022                                   | 2037    | 2055    | 2075    | 2110     | 2150     | 2225     | 2300     |
|----------------------------|------|----------------------------------------|---------|---------|---------|----------|----------|----------|----------|
|                            |      | 4022                                   | 4037    | 4055    | 4075    | 4110     | 4150     | 4225     | 4300     |
| Horse Power(HP)            |      | 3                                      | 5       | 7.5     | 10      | 15       | 20       | 30       | 40       |
| Rated Power (KW)           |      | 2.2                                    | 3.7     | 5.5     | 7.7     | 11       | 15       | 22.5     | 30       |
| Rated Capacity (KVA)       |      | 4.0                                    | 6.5     | 9.5     | 13      | 19       | 25       | 34       | 45       |
| Brake Transistor           |      | Include                                | Include | Include | Include | Optional | Optional | Optional | Optional |
| Dimension                  |      | P1                                     |         | P2      |         | P3       |          |          |          |
| Current<br>(Amp rms)       | 2XXX | 11                                     | 17      | 24      | 33      | 46       | 61       | 90       | 120      |
|                            | 4XXX | 5.5                                    | 8.5     | 12      | 17      | 23       | 31       | 45       | 60       |
| Voltage 、Fregence          |      | 220V Type : 1 $\psi$ /3 $\psi$ 50/60Hz |         |         |         |          |          |          |          |
|                            |      | 380V Type : 3 $\psi$ 50/60Hz           |         |         |         |          |          |          |          |
| Allow Voltage<br>changed   |      | -30% ~ +30%                            |         |         |         |          |          |          |          |
| Allow Frequency<br>changed |      | $\pm 8\%$ (47~64.8Hz)                  |         |         |         |          |          |          |          |

### 1.3.2 Hardware Specification :

|                         |                                  |                                                            |
|-------------------------|----------------------------------|------------------------------------------------------------|
| Type                    | J1                               |                                                            |
| Max Output Voltage      | Match 3 phase    Input Voltage   |                                                            |
| Output Freq (Hz)        | 0.0Hz ~ 1000.0Hz                 |                                                            |
| Carrier Freq (Hz)       | 2kHz~18kHz                       |                                                            |
| Feedback Interface      | QEP Differential 5V , Line Drive |                                                            |
| Cooling method          | Cooling by FAN                   |                                                            |
| Interfacr description   |                                  |                                                            |
| Hardware                | Set                              | Description                                                |
| Digital Input           | 8                                | NPN / PNP                                                  |
| Digital Output          | 4                                | NPN / PNP ; include 1 set Relay(1C)                        |
| Analog Input            | 2                                | -10V ~ +10V ; 12bit                                        |
| Analog Output           | 1                                | -10V ~ +10V                                                |
| Communication Interface | 2                                | RS-485(Mode-Bus RTU) , anoither one RS485 for Remote Panel |
| Thermo Detection        | 1                                | KTY84 Sensor detection                                     |
| Pulse input interface   | 1                                | QEP Differential 5V , Line Drive (Max speed 500kHz)        |
| Pulse output interface  | 1                                | A 、 B 、 Z , QEP interface (1 : 1 )                         |

|                                 |                                                    |                                                          |
|---------------------------------|----------------------------------------------------|----------------------------------------------------------|
| Type                            | J3                                                 |                                                          |
| Max Output Voltage              | Match 3 phase    Input Voltage                     |                                                          |
| Output Freq (Hz)                | 0.0Hz ~ 1000.0Hz                                   |                                                          |
| Carrier Freq (Hz)               | 8kHz                                               |                                                          |
| Feedback Interface              | CPU board：Tamagawa multi-turn absolute feedback    |                                                          |
|                                 | OPTboard：ABCUVW、RESOLVER、According actual needs    |                                                          |
| Cooling method                  | Cooling by FAN                                     |                                                          |
| Interfacr description           |                                                    |                                                          |
| Hardware                        | Set                                                | Description                                              |
| Digital Input                   | 8                                                  | NPN / PNP                                                |
| Digital Output                  | 4                                                  | NPN / PNP；include 1 set Relay(1C)                        |
| Analog Input                    | 3                                                  | -10V ~ +10V；12bit                                        |
| Analog Output                   | 2                                                  | -10V ~ +10V                                              |
| Communication Interface         | 2                                                  | RS-485(Mode-Bus RTU)，anoither one RS485 for Remote Panel |
| Thermo Detection                | 1                                                  | KTY84 Sensor detection                                   |
| OPT board interface description |                                                    |                                                          |
| ABCUVW                          | A、B、Z，Differential 5V，Line Drive                   |                                                          |
| RESOLVER                        | Suitable type：BRX、7Vrms 10KHz、Conversion Rate =0.5 |                                                          |
| Public                          | Pulse input interface                              | QEP Differential 5V，Line Drive (Max speed 500kHz)        |
|                                 | Pulse output interface                             | A、B、Z，QEP interface (1：1)                                |

|                                 |                                                          |                                                            |
|---------------------------------|----------------------------------------------------------|------------------------------------------------------------|
| Type                            | J6                                                       |                                                            |
| Max Output Voltage              | Match 3 phase    Input Voltage                           |                                                            |
| Output Freq (Hz)                | 0.0Hz ~ 1000.0Hz                                         |                                                            |
| Carrier Freq (Hz)               | 8kHz                                                     |                                                            |
| Feedback Interface              | CPU board : Tamagawa multi-turn absolute feedback        |                                                            |
|                                 | OPTboard : Twin ABCUVW                                   |                                                            |
| Cooling method                  | Cooling by FAN                                           |                                                            |
| Interfacr description           |                                                          |                                                            |
| Hardware                        | Set                                                      | Description                                                |
| Digital Input                   | 8                                                        | NPN / PNP                                                  |
| Digital Output                  | 4                                                        | NPN / PNP ; include 1 set Relay(1C)                        |
| Analog Input                    | 3                                                        | -10V ~ +10V ; 12bit                                        |
| Analog Output                   | 2                                                        | -10V ~ +10V                                                |
| Communication Interface         | 2                                                        | RS-485(Mode-Bus RTU) , anoither one RS485 for Remote Panel |
| Thermo Detection                | 1                                                        | KTY84 Sensor detection                                     |
| OPT board interface description |                                                          |                                                            |
| ABCUVW                          | A 、 B 、 Z , Differential 5V , Line Drive                 |                                                            |
| RESOLVER                        | Suitable type : BRX 、 7Vrms 10KHz 、 Conversion Rate =0.5 |                                                            |
| Public                          | Pulse input interface                                    | QEP Differential 5V , Line Drive (Max speed 500kHz)        |
|                                 | Pulse output interface                                   | A 、 B 、 Z , QEP interface (1 : 1 )                         |

## 2. Condition of Storage Environment

This driver should be contained in the packing case. If do not use this driver temporarily , in order to ensure this driver in our warranty scope , please follow the items below:

- ambient temperature must be in the scope - 20°C to +65°C , relative humidity 0% to 95% , and no dew clings.
- Must be preserved in the environment that is dustless , stainless , and dry.
- Avoid to store under the environment that has caustic gas or liquid.

## 3. Attention of Installation

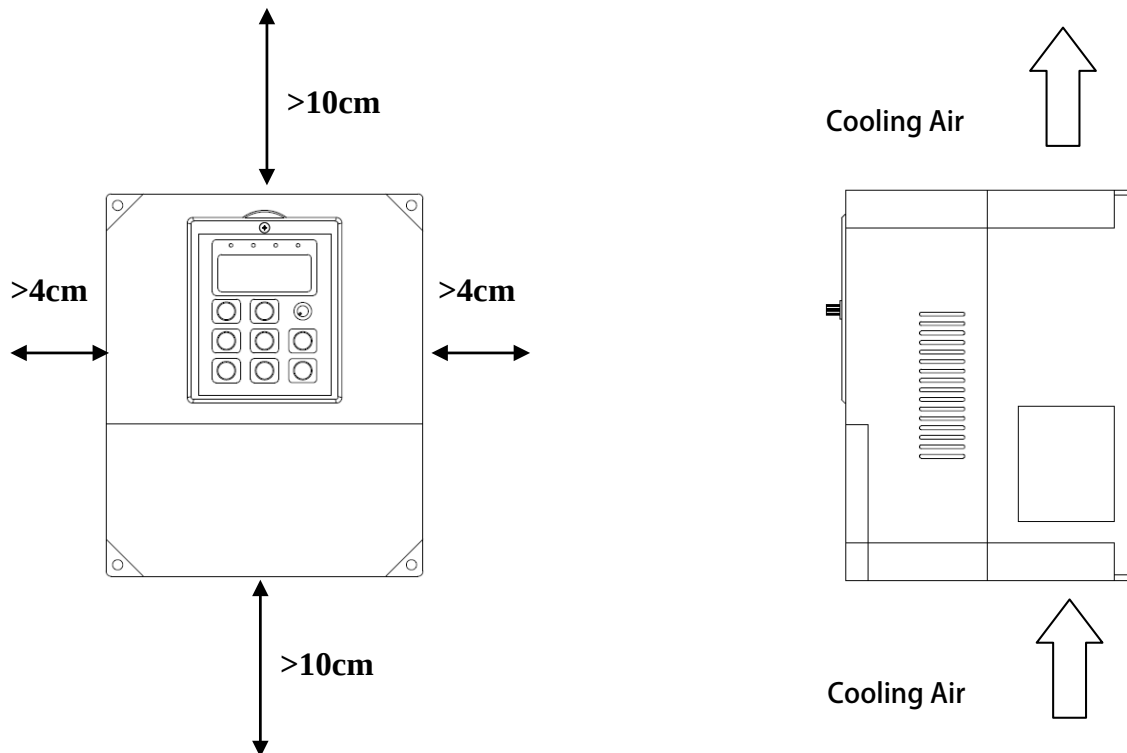
### WARNING

To guarantee the safe operation of the equipment it must be installed and commissioned properly by qualified personnel in compliance with warnings laid down in these operating instructions.

Take particular note of the general and regional installation and safety regulations regarding work on high voltage regulations , as well as the relevant regulations regarding the correct use of tools and personal protective gear.

Make sure unobstructed clearance for each cooling inlets and outlets above and below inverter at least 100mm.

Make sure space of 40mm is kept free at the sides of inverter to permit the cooling air to escape from the side slits.



Ensure that the temperature does not exceed the specified level when the inverter is installed in cubicle. Avoid excessive vibration and shaking of the equipment.

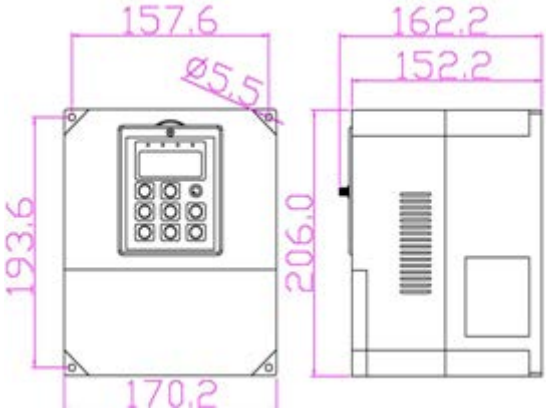
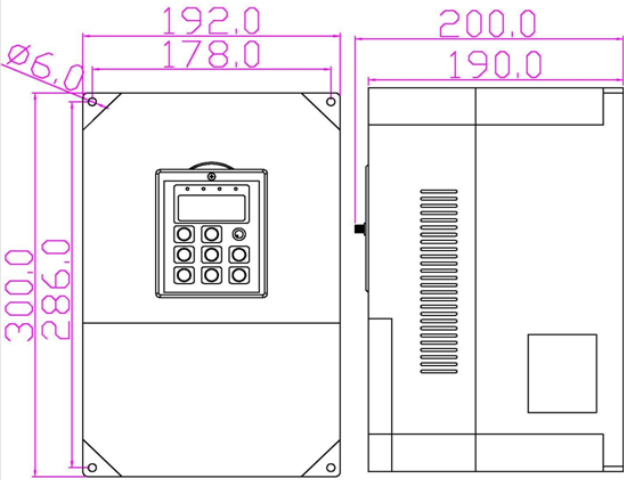
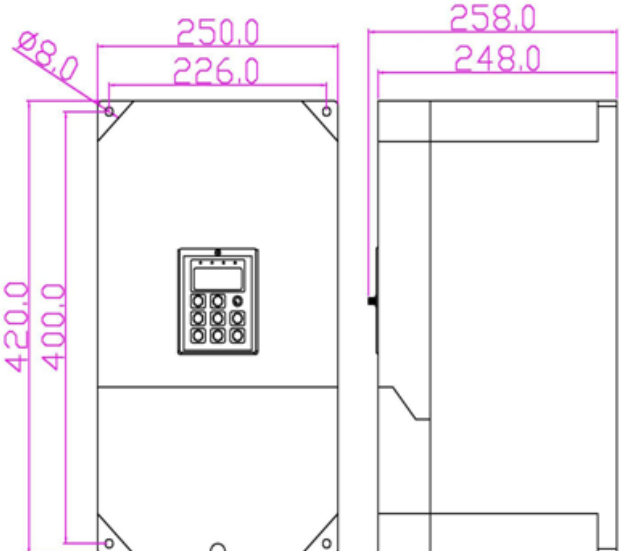
Do not be obstructing the cooling fan that installed on the inverter , it is used to build proper airflow for heat sink thermo dissipation. And do not touch the fan hole when it is running.

Please consider the possible use of options , such as RFI suppression filters at the planning stage.

### WARNING

To prevent electrical shock , do not open cover for at least 5 minutes after removing AC power to allow capacitors to discharge.

## 4. Outline Dimension

| P1 : 3HP~5HP Unit : mm                                                             | P2 : 7.5 HP~10HP Unit : mm                                                         |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|   |  |
| P3 : 15HP~40HP Unit : mm                                                           |                                                                                    |
|  |                                                                                    |

## 5. Description of Wiring

The upper cover must be removed in order to connect the electrical leads.

### 5.1 Power Terminal

The power terminals are divided into three portions:

1. The power input terminals (R , S , T) receives power for the operation of the inverter.
2. The output terminals (U , V , and W) deliver output power to motor.
3. Brake resistor should be connects to icon .

 NOTE: The terminal has icon  should be connected to Earth properly.

 WARNING: Never connect power source line to U , V , W , P , N , B terminals.

#### 5.1.1 The Power Input Terminals (R , S , T)

 WARNING! NOTE!

- The power input terminals are R , S , and T. Never connect power source line to U , V , W , P , N , B terminals.
- Between the power source and driver , add NFB for system protection.
- There are static sensitive components inside the Printed Circuit Board. Avoid touching the boards or components with your hands or metal objects.
- Make sure to connect the power terminals tight and correctly.
- Make sure that the power source supplies the correct voltage and is designed for the necessary current.
- The terminal has icon  should be connected to Earth properly.

#### 5.1.2 The Output Terminals (U , V , W to Motor)

- Make sure the motor' s rated voltage and current are suitable with driver' s specification.

 WARNING: Do not insert contactors between driver and motor; the U , V , W terminals should be connected to motor directly.

### 5.2 The Control Signal Terminals

 WARNING! NOTE!

All the input/output control signal lines , or remote panel lines and communication lines must be laid separately from the high current power/motor/brake lines. They must not be fed through the same cable conduit/trucking.

### 5.3 Brake Resistor Terminals

⚠ NOTE: This driver contains braking discharge circuits. The terminals have icon  are used to connect external resistor to discharge the re-generating energy when in braking condition.

Refer to the list below when choosing resistor for braking discharge. The wattage of resistor can be increased for heavier re-generating energy or higher discharge duty.

| Model                      | Resistance (ohm) | Wattage (W) |
|----------------------------|------------------|-------------|
| 2007                       | 200              | 80          |
| 2015                       | 100              | 150         |
| 2022                       | 60               | 250         |
| 2037                       | 40               | 300         |
| 2055                       | 30               | 500         |
| 2075                       | 20               | 600         |
| 2110                       | 15               | 1000        |
| 2150                       | 10               | 1500        |
| 2225                       | 10               | 2000        |
| 4022                       | 250              | 250         |
| 4037                       | 150              | 300         |
| 4055                       | 100              | 500         |
| 4075                       | 75               | 750         |
| 4110                       | 50               | 1000        |
| 4150                       | 40               | 1500        |
| 4225                       | 30               | 2000        |
| The discharge duty is 10 % |                  |             |



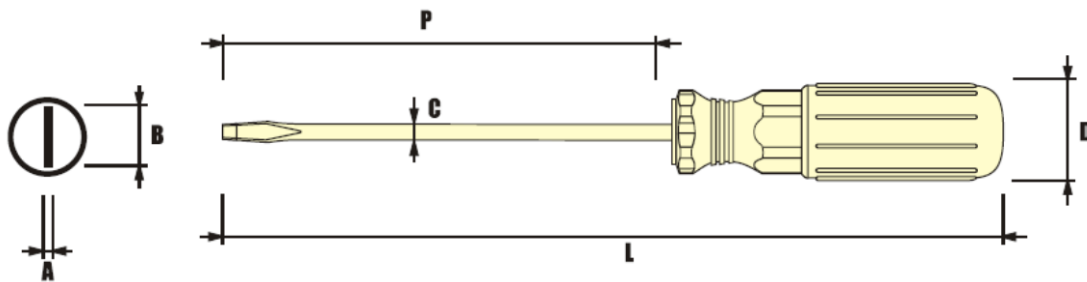
## 5.4 The Input Reactor

When power supply capacity is larger than 500KVA and /or using thyrister , phase advance capacitor etc. from same power supply , must fit an A.C.L. in front of R.S.T. power input to curb instantaneous current and to improve power efficient ratio. Refer to the list below to choose proper reactance.

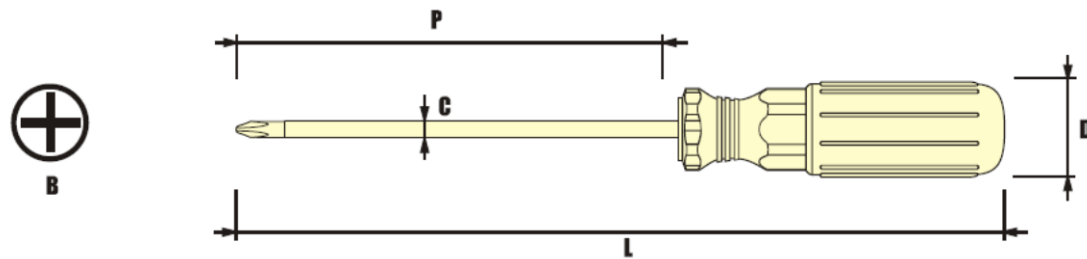
| Voltage (V) | Model | Current (A) | Inductance |
|-------------|-------|-------------|------------|
| 220         | 2007  | 6           | 1.8        |
|             | 2015  | 10          | 1.1        |
|             | 2033  | 11          | 0.71       |
|             | 2037  | 17          | 0.53       |
|             | 2055  | 24          | 0.35       |
|             | 2075  | 33          | 0.26       |
|             | 2110  | 46          | 0.18       |
|             | 2150  | 61          | 0.13       |
|             | 2225  | 120         | 0.09       |
| 380         | 4022  | 7.5         | 3.6        |
|             | 4037  | 10          | 2.2        |
|             | 4055  | 15          | 1.42       |
|             | 4075  | 20          | 1.0        |
|             | 4110  | 30          | 0.7        |
|             | 4150  | 40          | 0.53       |
|             | 4225  | 60          | 0.36       |

## 5.5 The Proper Screw Drive for Power Terminals

It is necessary to choose proper tool for wiring connection to avoid screw stripped or burst. Please refer to the list below to choose a proper screw drive for driving power terminals.



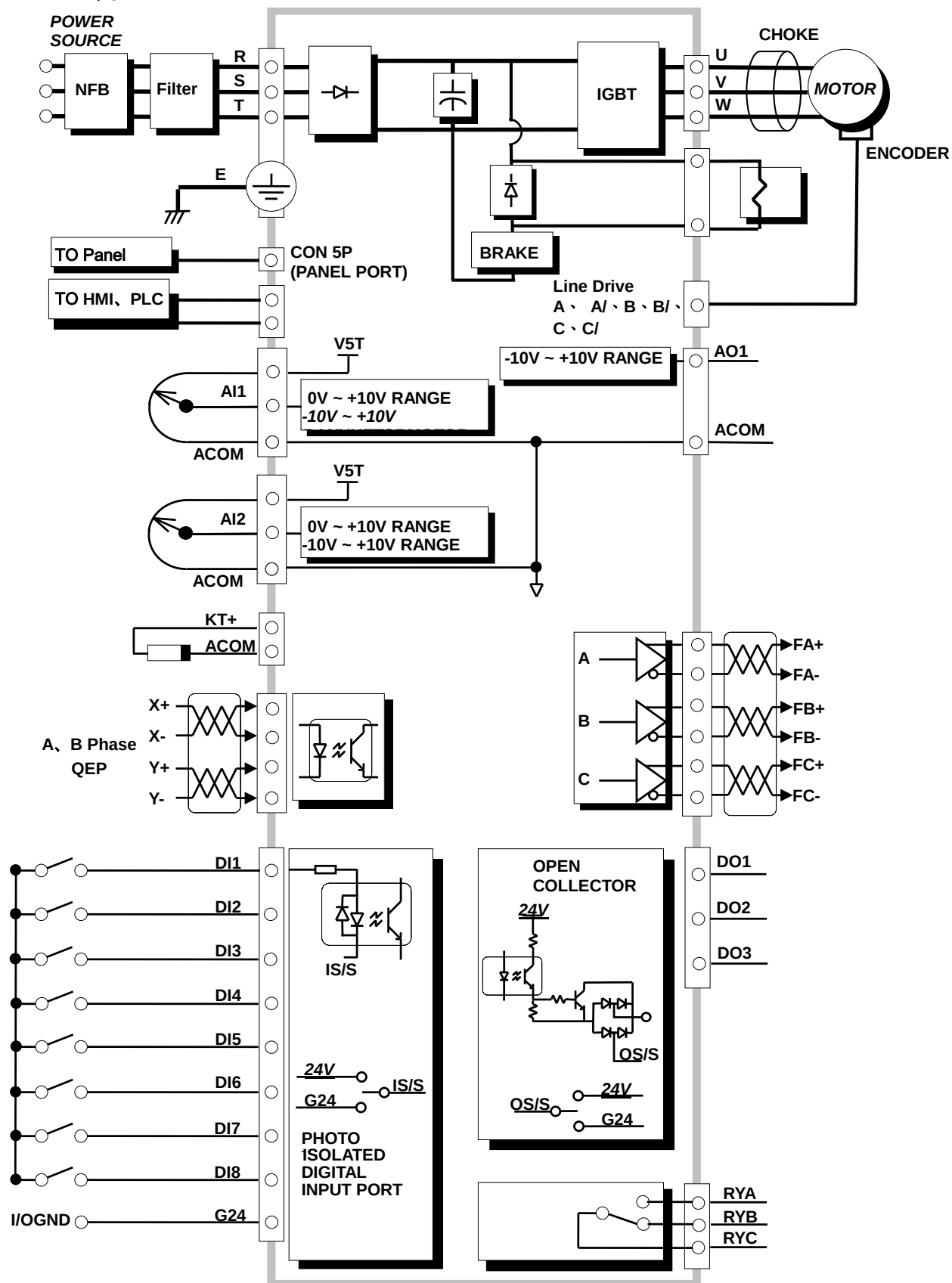
| A - B mm  | C mm | D mm | P mm | L mm |
|-----------|------|------|------|------|
| 0.6 - 3.3 | 3.3  | -    | -    | -    |



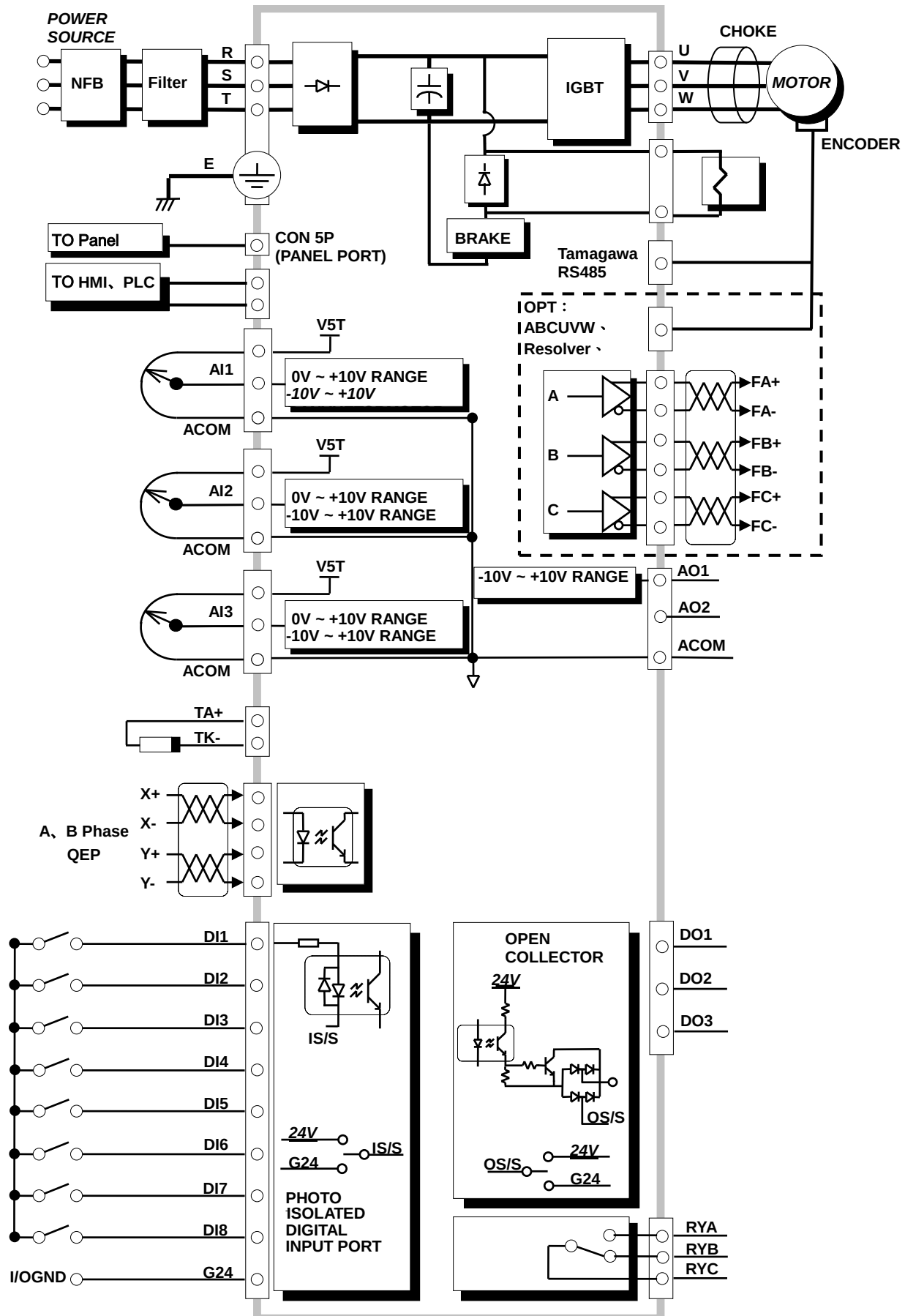
| B  | C mm | D mm | P mm | L mm |
|----|------|------|------|------|
| #0 | 3.3  | -    | -    | -    |

## 6. Basic Wiring Diagram

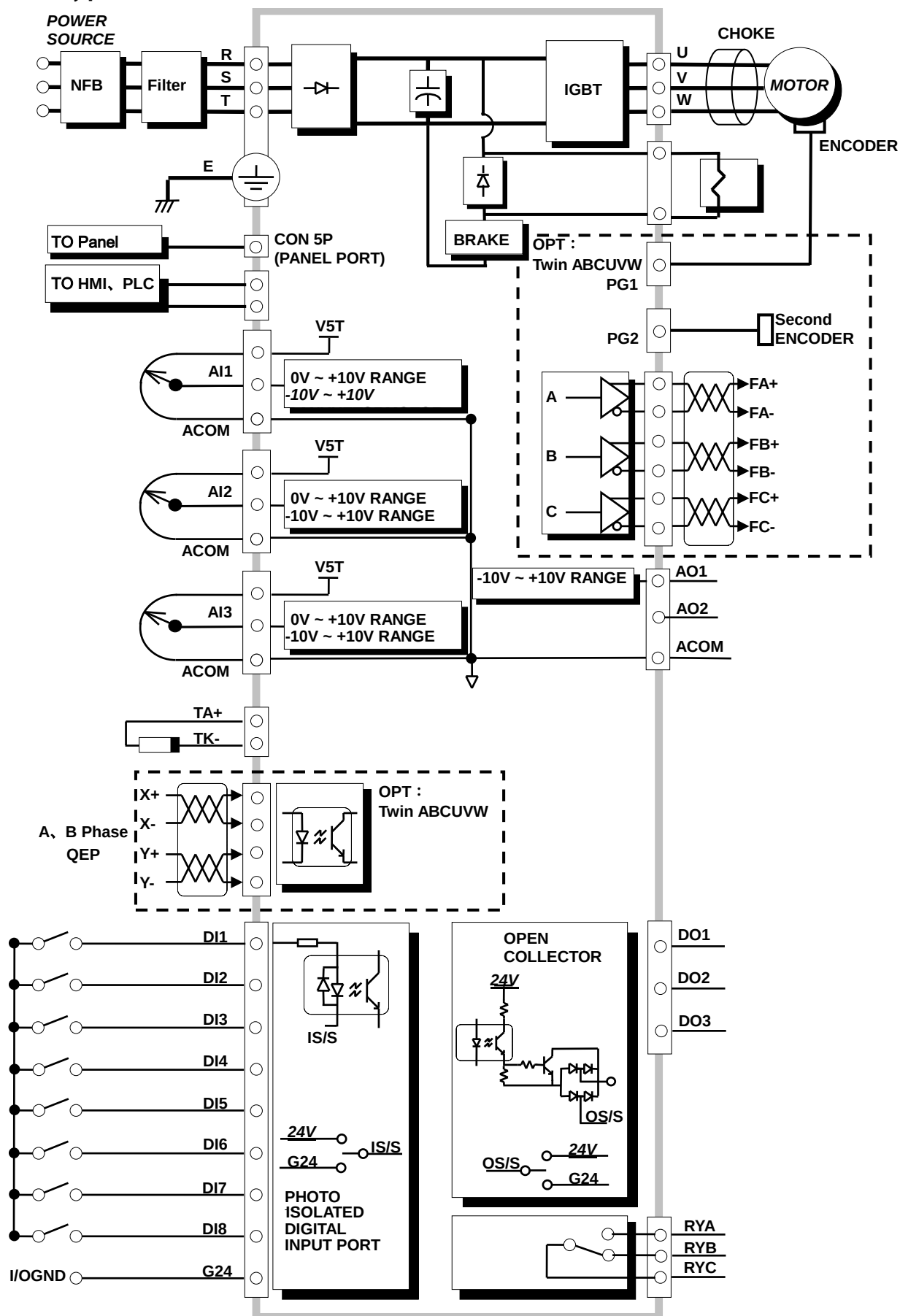
### 6.1 J1 Type



## 6.2 J3 Type



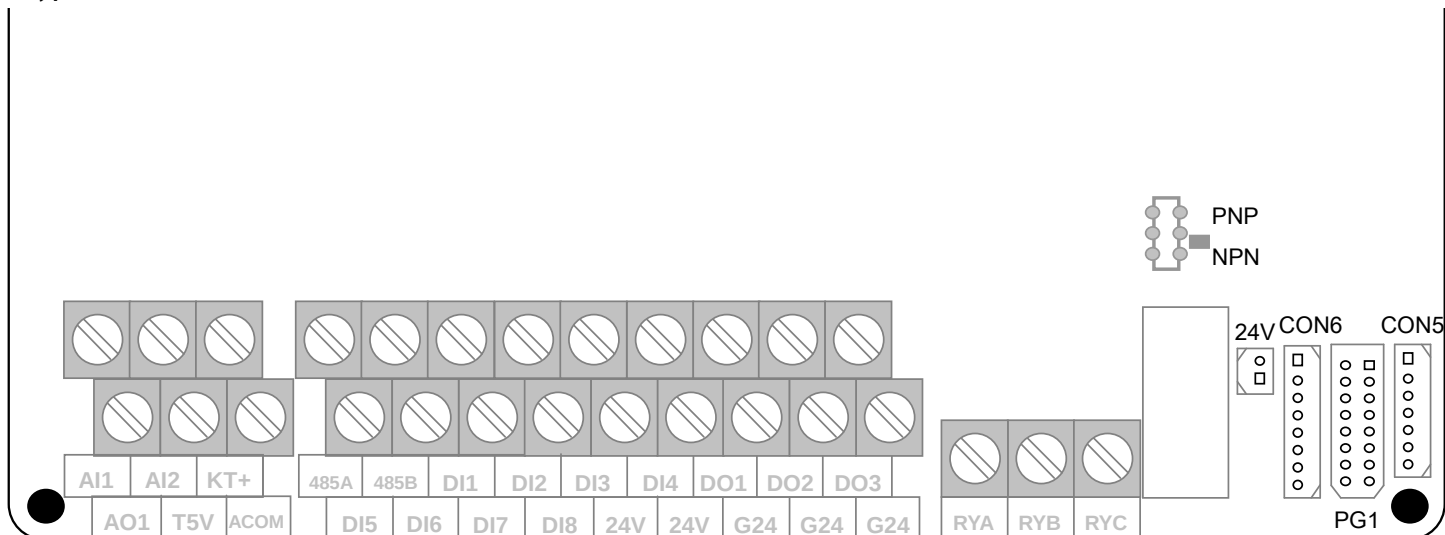
### 6.3 J6 Type



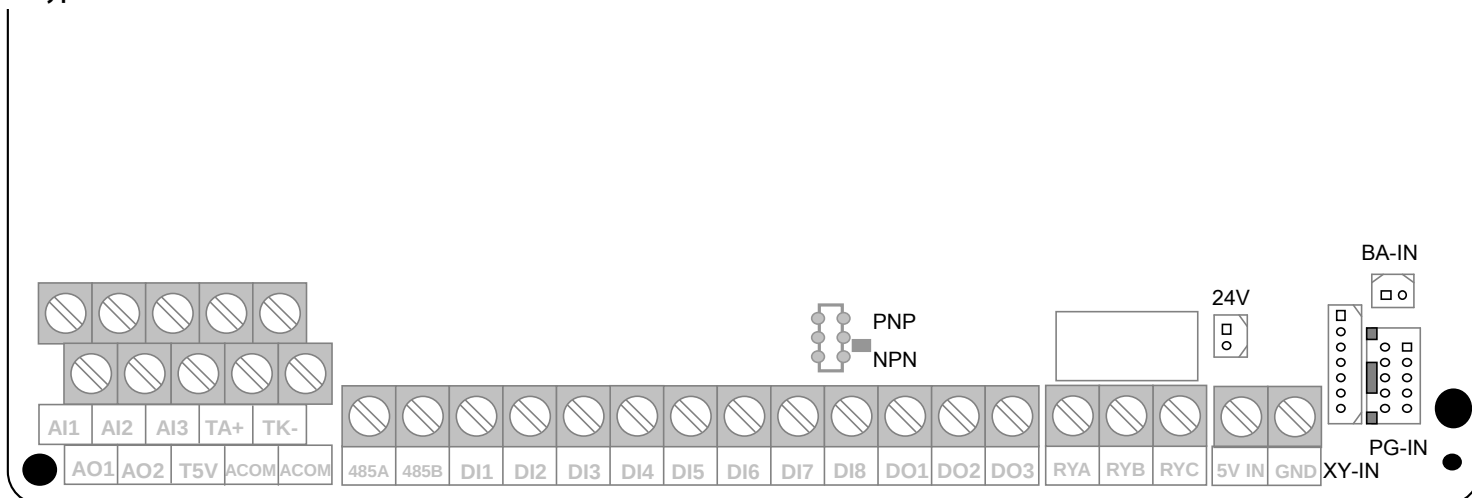
## 7. I/O Interface

### 7.1 The Map of I/O Terminal Position

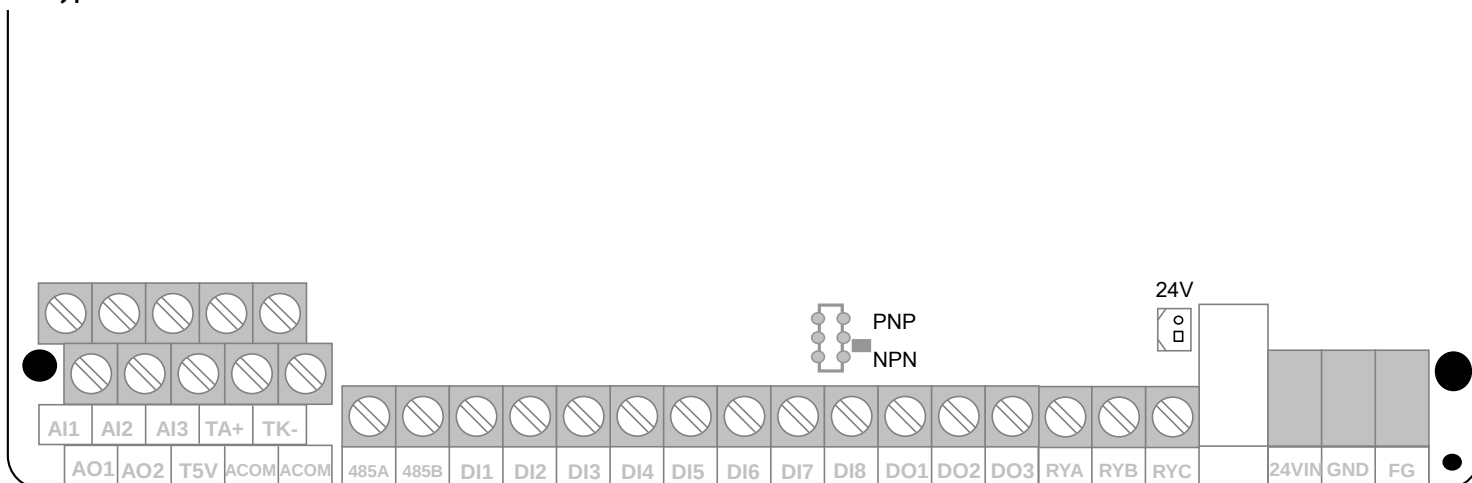
J1 Type



J3 Type



J6 Type



J1 Type

CON5

| XY_IN       |              |        |
|-------------|--------------|--------|
| CON5<br>PIN | D-sub<br>PIN | Signal |
| 1           | 1            | X+     |
| 2           | 2            | X-     |
| 3           | 3            | Y+     |
| 4           | 4            | Y-     |
| 5           | 7            | 5V     |
| 6           | 8            | PGND   |
| 7           | FG           | SHIELD |

CON6

| AB_OUT      |              |        |
|-------------|--------------|--------|
| CON6<br>PIN | D-sub<br>PIN | Signal |
| 1           | 1            | AOut   |
| 2           | 2            | /AOut  |
| 3           | 3            | BOut   |
| 4           | 4            | /BOut  |
| 5           | 5            | COut   |
| 6           | 6            | /COut  |
| 7           | 8            | PGND   |
| 8           | 9            | SHIELD |

PG1

| PG_IN      |              |        |
|------------|--------------|--------|
| PG1<br>PIN | D-sub<br>PIN | Signal |
| 1          | 1            | A+     |
| 2          | 2            | A-     |
| 3          | 3            | B+     |
| 4          | 4            | B-     |
| 5          | 5            | C+     |
| 6          | 6            | C-     |
| 7          | --           | --     |
| 8          |              |        |
| 9          |              |        |
| 10         |              |        |
| 11         |              |        |
| 12         |              |        |
| 13         | 13           | 5V     |
| 14         | 14           | PGND   |
| 15         | 15           |        |
| FG         | FG           | SHIELD |

TM3~5 : Terminal Spec. IEC 130V , 8A

⊙ Digital Input : DI1 ~ DI8 °

⊙ Digital Output : DO1 ~ DO3 °

⊙ Voltage Ground : G24 °

TM2 : Terminal Spec. IEC 130V , 8A

⊙ Voltage Output : 24V °

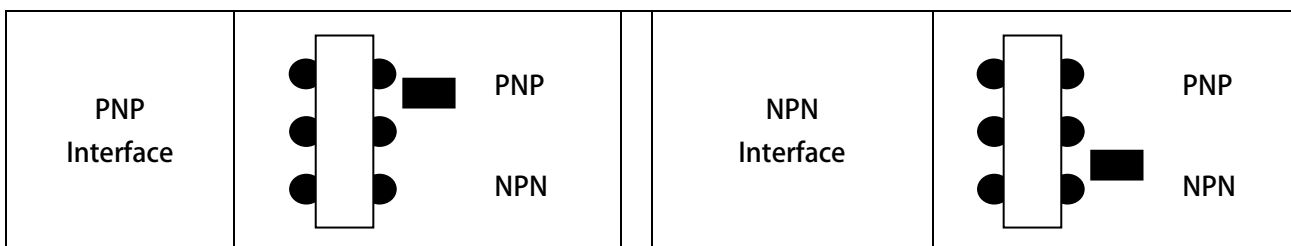
⊙ Analog Output : A01 <-10V~+10V> °

⊙ Analog Input : AI1 、 AI2 °

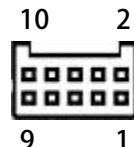
⊙ Voltage Output : T5V 、 (ACOM) °

⊙ RS485 Communication( 485-A , 485-B) °

SW1 : NPN/PNP Switch



J3 Type

| Connector                            | PG1 On Board | 9 Pin D-sub | Signal   | Description                                                                                                                                                                                                                                                                          |
|--------------------------------------|--------------|-------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PG1 / D-Sub9<br>(Male)<br>Definition | Pin1         | Pin1        | 5V       | When the motor is running in closed loop mode operation , Motor encoder feedback signal Feedback via the attached wiring thus access 。 Connector pin assignment follows feedback wiring :<br><br> |
|                                      | Pin2         | Pin2        | 0V       |                                                                                                                                                                                                                                                                                      |
|                                      | Pin3         | Pin3        | 485A     |                                                                                                                                                                                                                                                                                      |
|                                      | Pin4         | Pin4        | 485B     |                                                                                                                                                                                                                                                                                      |
|                                      | Pin5         | Pin5        | VB+      |                                                                                                                                                                                                                                                                                      |
|                                      | Pin6         | Pin6        | VB-      |                                                                                                                                                                                                                                                                                      |
|                                      | Pin7         | Pin7        |          |                                                                                                                                                                                                                                                                                      |
|                                      | Pin8         | Pin8        |          |                                                                                                                                                                                                                                                                                      |
|                                      | Pin9         | Pin9+case   | (Shield) |                                                                                                                                                                                                                                                                                      |
|                                      | Pin10        | -           |          |                                                                                                                                                                                                                                                                                      |

CON5

| XY_IN       |              |        |
|-------------|--------------|--------|
| CON5<br>PIN | D-sub<br>PIN | Signal |
| 1           | 1            | X+     |
| 2           | 2            | X-     |
| 3           | 3            | Y+     |
| 4           | 4            | Y-     |
| 5           | 7            | 5V     |
| 6           | 8            | PGND   |
| 7           | FG           | SHIELD |

TM3~7 : Terminal Spec. IEC 130V , 8A

- ◎ Digital Input : DI1 ~ DI8 。
- ◎ Digital Output : DO1 ~ DO3 。
- ◎ Voltage Ground : G24 。
- ◎ RS485 Communication(485-A , 485-B) 。

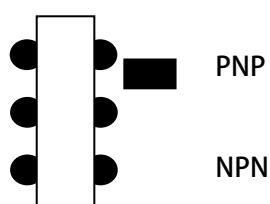
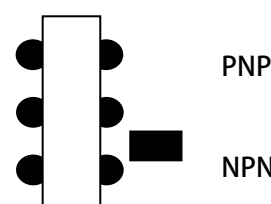
TM1/8 : Terminal Spec. IEC 130V , 8A

- ◎ KTY Thermo Input : TA+ 、TK- 。
- ◎ Analog Output : AO1 、AO2<-10V~+10V> 。
- ◎ Analog Input : AI1 、AI2 、AI3 。
- ◎ Voltage Output : T5V 、(ACOM) 。

TM9 : Terminal Spec. IEC 130V , 8A

- ◎ ECAT External Voltage Input : 5V IN+GND

SW1 : NPN/PNP Switch

|                  |                                                                                     |  |                                                                                       |
|------------------|-------------------------------------------------------------------------------------|--|---------------------------------------------------------------------------------------|
| PNP<br>Interface |  |  |  |
|                  |                                                                                     |  |                                                                                       |



## J6 Type

TM3~7 : Terminal Spec. IEC 130V , 8A

- ◎ Digital Input : DI1 ~ DI8 °
- ◎ Digital Output : DO1 ~ DO3 °
- ◎ Voltage Ground : G24 °
- ◎ RS485 Communication(485-A , 485-B) °

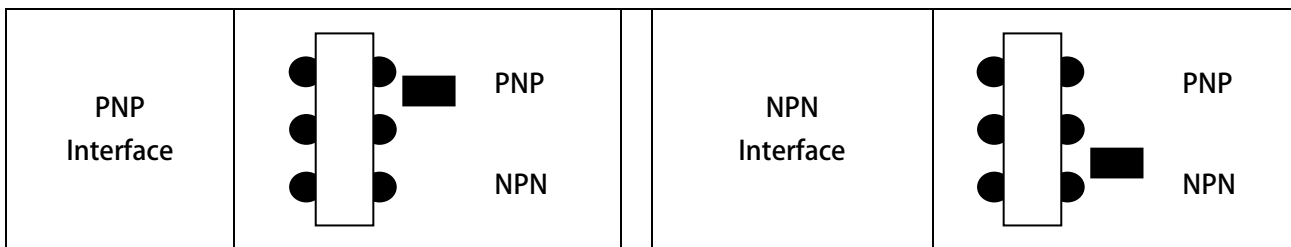
TM1/8 : Terminal Spec. IEC 130V , 8A

- ◎ KTY Thermo Input : TA+ 、TK- °
- ◎ Analog Output : A01 、AO2<-10V~+10V> °
- ◎ Analog Input : AI1 、AI2 、AI3 °
- ◎ Voltage Output : T5V 、(ACOM) °

TM9 : Terminal Spec. IEC 130V , 8A

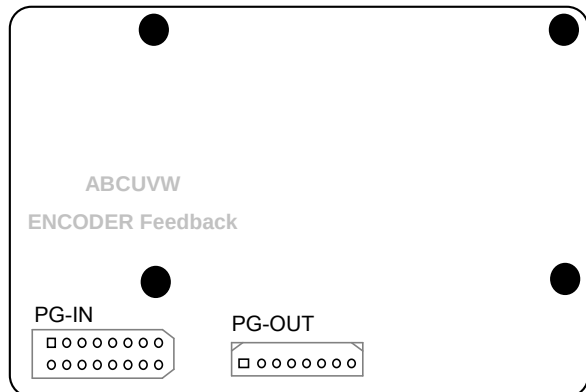
- ◎ ECAT External Voltage Input : 5V IN+GND

SW1 : NPN/PNP Switch

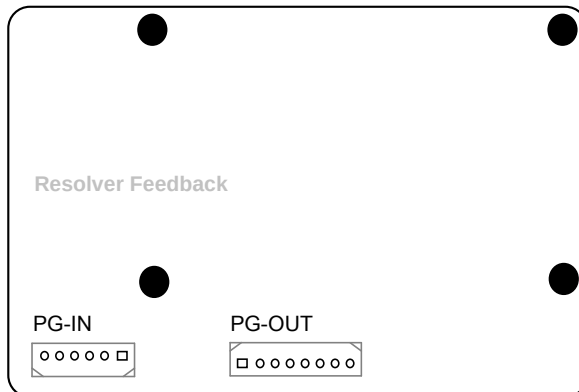


## 7.1.2 【J3-CPU OPT】 Feedback Card

OPT : ABCUVW For Standard 5V Line Drive



OPT : RDC For Resolver



PG-OUT

PG-IN

PG-OUT

PG-IN

| AB_OUT       |              |        |
|--------------|--------------|--------|
| CON11<br>PIN | D-sub<br>PIN | Signal |
| 1            | 1            | AOut   |
| 2            | 2            | /AOut  |
| 3            | 3            | BOut   |
| 4            | 4            | /BOut  |
| 5            | 5            | COut   |
| 6            | 6            | /COut  |
| 7            | 8            | PGND   |
| 8            | 9            | SHIELD |

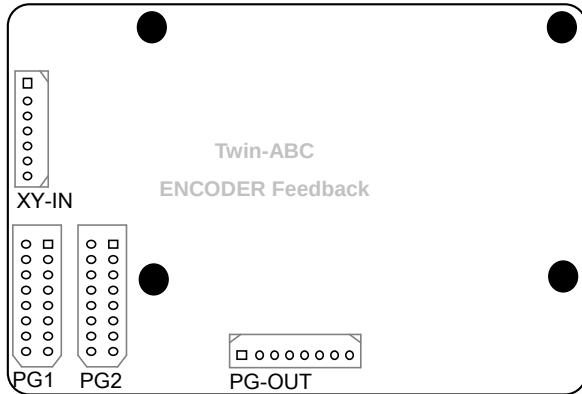
| PG_IN      |              |        |
|------------|--------------|--------|
| PG1<br>PIN | D-sub<br>PIN | Signal |
| 1          | 1            | A+     |
| 2          | 2            | A-     |
| 3          | 3            | B+     |
| 4          | 4            | B-     |
| 5          | 5            | C+     |
| 6          | 6            | C-     |
| 7          | 7            |        |
| 8          | 8            |        |
| 9          | 9            |        |
| 10         | 10           |        |
| 11         | 11           |        |
| 12         | 12           |        |
| 13         | 13           | 5V     |
| 14         | 14           | PGND   |
| 15         | 15           |        |
| FG         | FG           | SHIELD |

| AB_OUT       |              |        |
|--------------|--------------|--------|
| CON11<br>PIN | D-sub<br>PIN | Signal |
| 1            | 1            | AOut   |
| 2            | 2            | /AOut  |
| 3            | 3            | BOut   |
| 4            | 4            | /BOut  |
| 5            | 5            | COut   |
| 6            | 6            | /COut  |
| 7            | 8            | PGND   |
| 8            | 9            | SHIELD |

| PG_IN      |              |        |
|------------|--------------|--------|
| PG1<br>PIN | D-sub<br>PIN | Signal |
| 1          | 1            | R1     |
| 2          | 2            | R2     |
| 3          | 3            | S1     |
| 4          | 4            | S3     |
| 5          | 5            | S2     |
| 6          | 6            | S4     |
|            | 7            |        |
|            | 8            |        |
|            | 9            |        |
|            | FG           | SHIELD |

### 7.1.3 【J6-CPU OPT】 Feedback Card

OPT : Twin ABCUVW For Standard 5V Line Drive



PG-OUT

| AB_OUT      |              |        |
|-------------|--------------|--------|
| CON1<br>PIN | D-sub<br>PIN | Signal |
| 1           | 1            | AOut   |
| 2           | 2            | /AOut  |
| 3           | 3            | BOut   |
| 4           | 4            | /BOut  |
| 5           | 5            | COut   |
| 6           | 6            | /COut  |
| 7           | 8            | PGND   |
| 8           | 9            | SHIELD |

PG1

| PG1        |              |        |
|------------|--------------|--------|
| PG1<br>PIN | D-sub<br>PIN | Signal |
| 1          | 1            | A+     |
| 2          | 2            | A-     |
| 3          | 3            | B+     |
| 4          | 4            | B-     |
| 5          | 5            | C+     |
| 6          | 6            | C-     |
| 7          | 7            | U+     |
| 8          | 8            | U-     |
| 9          | 9            | V+     |
| 10         | 10           | V-     |
| 11         | 11           | W+     |
| 12         | 12           | W-     |
| 13         | 13           | 5V     |
| 14         | 14           | PGND   |
| 15         | 15           |        |
| FG         | FG           | SHIELD |

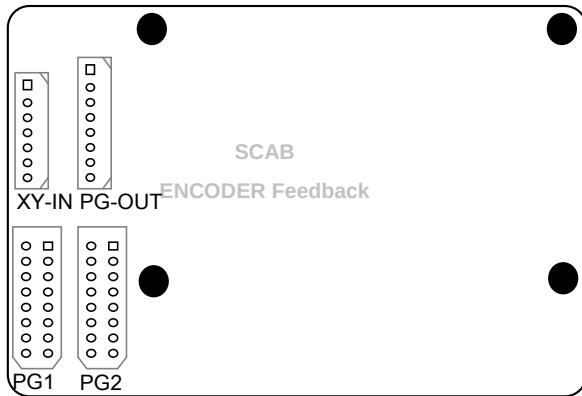
PG2

| PG2        |              |        |
|------------|--------------|--------|
| PG2<br>PIN | D-sub<br>PIN | Signal |
| 1          | 1            | A+     |
| 2          | 2            | A-     |
| 3          | 3            | B+     |
| 4          | 4            | B-     |
| 5          | 5            | C+     |
| 6          | 6            | C-     |
| 7          | 7            |        |
| 8          | 8            |        |
| 9          | 9            |        |
| 10         | 10           |        |
| 11         | 11           |        |
| 12         | 12           |        |
| 13         | 13           | 5V     |
| 14         | 14           | PGND   |
| 15         | 15           |        |
| FG         | FG           | SHIELD |

XY-IN

| XY_IN       |              |        |
|-------------|--------------|--------|
| CON4<br>PIN | D-sub<br>PIN | Signal |
| 1           | 1            | X+     |
| 2           | 2            | X-     |
| 3           | 3            | Y+     |
| 4           | 4            | Y-     |
| 5           | 7            | 5V     |
| 6           | 8            | PGND   |
| 7           | FG           | SHIELD |

OPT : SCAB For SIN\_COS & 標準 5V Line Drive



PG-OUT

| AB_OUT      |              |        |
|-------------|--------------|--------|
| CON3<br>PIN | D-sub<br>PIN | Signal |
| 1           | 1            | AOut   |
| 2           | 2            | /AOut  |
| 3           | 3            | BOut   |
| 4           | 4            | /BOut  |
| 5           | 5            | COut   |
| 6           | 6            | /COut  |
| 7           | 8            | PGND   |
| 8           | 9            | SHIELD |

PG1

| ABCUVW     |              |        |
|------------|--------------|--------|
| PG1<br>PIN | D-sub<br>PIN | Signal |
| 1          | 1            | A+     |
| 2          | 2            | A-     |
| 3          | 3            | B+     |
| 4          | 4            | B-     |
| 5          | 5            | C+     |
| 6          | 6            | C-     |
| 7          | 7            | U+     |
| 8          | 8            | U-     |
| 9          | 9            | V+     |
| 10         | 10           | V-     |
| 11         | 11           | W+     |
| 12         | 12           | W-     |
| 13         | 13           | 5V     |
| 14         | 14           | PGND   |
| 15         | 15           |        |
| FG         | FG           | SHIELD |

PG2

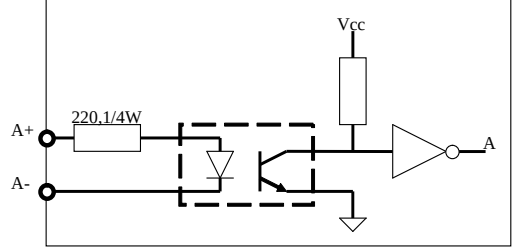
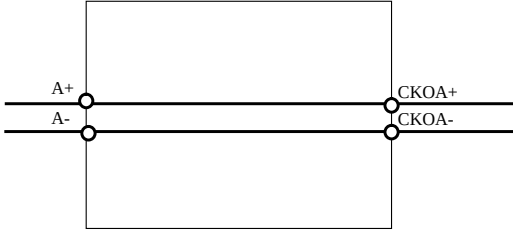
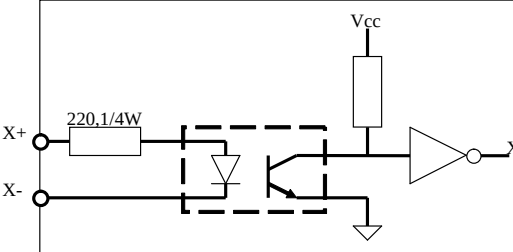
| SIN_COS    |              |        |
|------------|--------------|--------|
| PG2<br>PIN | D-sub<br>PIN | Signal |
| 1          | 1            | A+     |
| 2          | 2            | A-     |
| 3          | 3            | B+     |
| 4          | 4            | B-     |
| 5          | 5            | R+     |
| 6          | 6            | R-     |
| 7          | 7            |        |
| 8          | 8            |        |
| 9          | 9            |        |
| 10         | 10           |        |
| 11         | 11           |        |
| 12         | 12           |        |
| 13         | 13           | 5V-A   |
| 14         | 14           | GND-A  |
| 15         | 15           |        |
| FG         | FG           | SHIELD |

XY-IN

| XY_IN       |              |        |
|-------------|--------------|--------|
| CON4<br>PIN | D-sub<br>PIN | Signal |
| 1           | 1            | X+     |
| 2           | 2            | X-     |
| 3           | 3            | Y+     |
| 4           | 4            | Y-     |
| 5           | 7            | 5V     |
| 6           | 8            | PGND   |
| 7           | FG           | SHIELD |

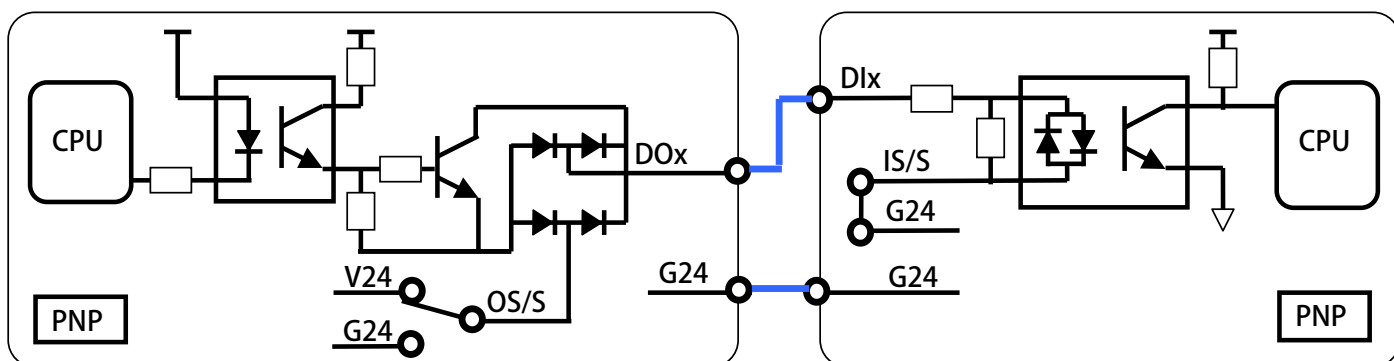
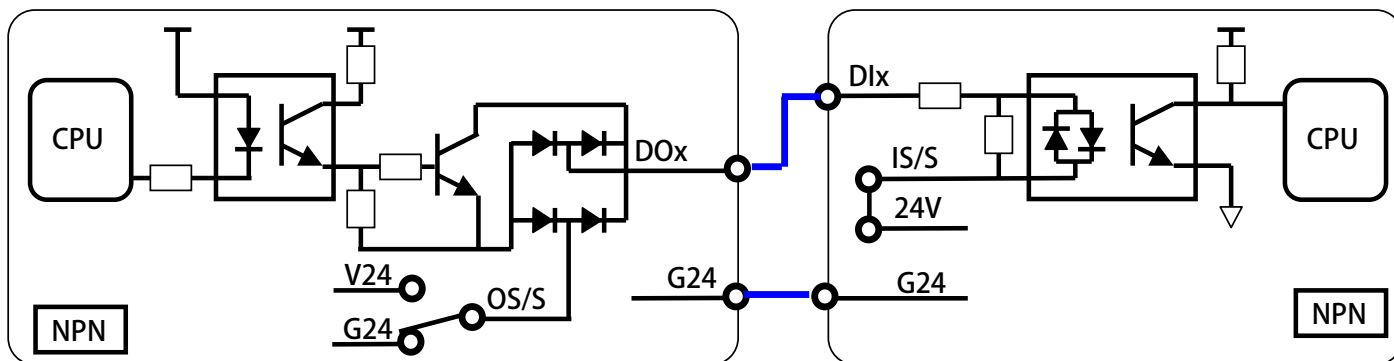
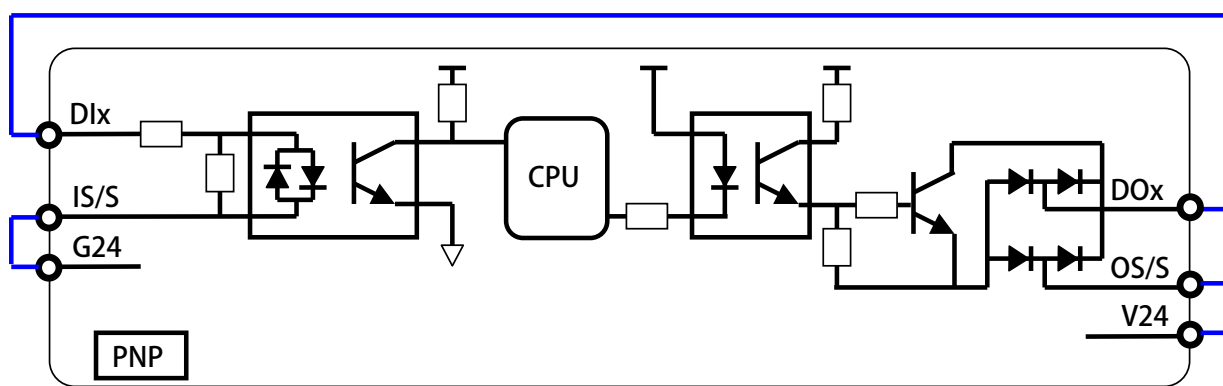
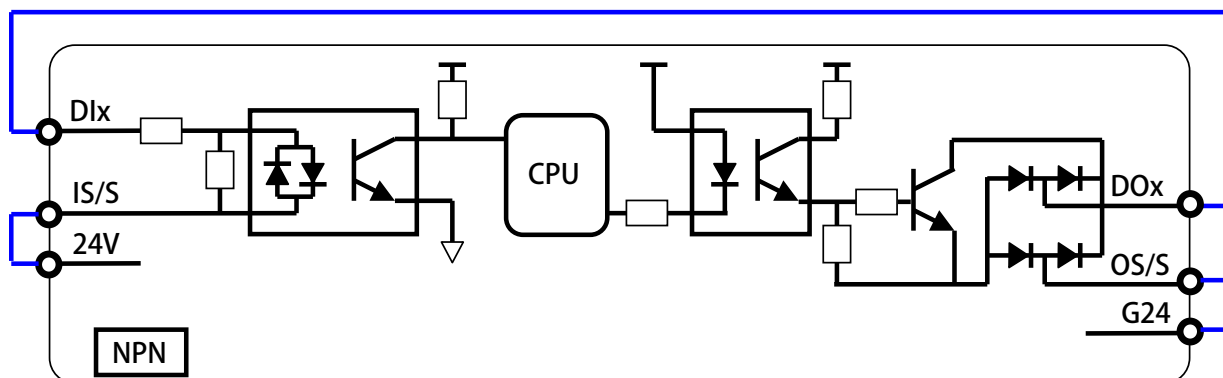
## 7.2 Hardware Description

| Name      | Function                                                                                                                                                          | Hardware construction                                                                                                                                                                                                                                                                                                         |
|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| PLC 485-A | RS485 communication port<br>(photo coupler isolated)                                                                                                              |                                                                                                                                                                                                                                                                                                                               |
| PLC 485-B |                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                               |
| AO1       | Analog output<br>(refer to ACOM)                                                                                                                                  |                                                                                                                                                                                                                                                                                                                               |
| AO2*      |                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                               |
| AI1       | Analog Input<br>(refer to ACOM)                                                                                                                                   | <p>12Bit Resolution Analog Input</p>                                                                                                                                                                                                                                                                                          |
| AI2       |                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                               |
| AI3*      |                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                               |
| T5V       | 5V reference voltage<br>(refer to ACOM)                                                                                                                           | <p><b>NOTE</b></p> <ol style="list-style-type: none"> <li>1. ACOM and G24 are not the same electric level.</li> <li>2. 5V is used to be a voltage reference for analog signal; 24V is used for digital input / output signal connection; do not use both these two voltage as power supplier to external circuits.</li> </ol> |
| ACOM      | The reference ground of Analog signal system.                                                                                                                     |                                                                                                                                                                                                                                                                                                                               |
| 24V       | 24V output power (refer to G24).                                                                                                                                  |                                                                                                                                                                                                                                                                                                                               |
| G24       | The reference ground of digital I/O system.                                                                                                                       |                                                                                                                                                                                                                                                                                                                               |
| DO1 ~ DO3 | Digital output terminals.<br>(reference ground is G24)<br>Only be used under 24V voltage level to keep system stable.<br>Programmable by setting parameter value. | <p>Digital Output Open Collector G24</p>                                                                                                                                                                                                                                                                                      |
| DI1~DI8   | Digital input terminals.<br>(reference ground is G24)<br>Only be used under 24V voltage level to keep system stable.<br>Programmable by setting parameter value.  | <p>Digital Input</p>                                                                                                                                                                                                                                                                                                          |

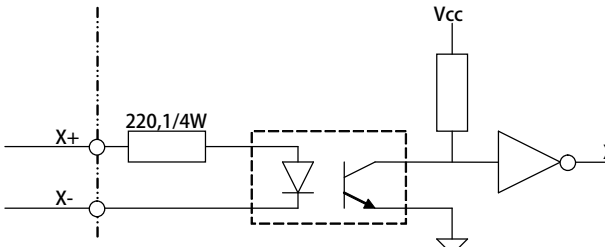
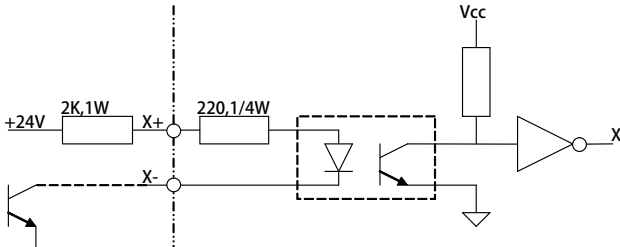
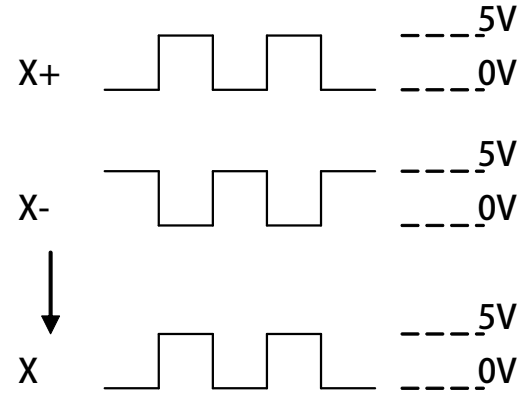
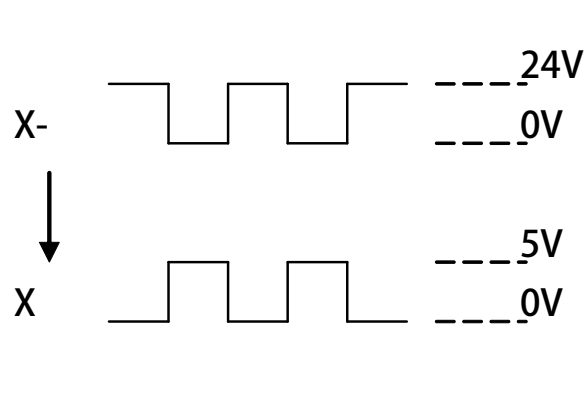
|        |                                                                                                                                                  |                                                                                     |
|--------|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| PG_IN  | The input hardware structure of signal B & C is same as signal A.<br>The Encoder type must be 5V Line Driver.                                    |   |
| PG_OUT | Inside the IRIS drive PG_OUT and PG_IN signal is directly connected.<br>The input hardware structure of signal OB+-、OC+- is same as signal OA+-. |   |
| XY_IN  | The XY pulse input hardware structure is designed as 5V Line Drive type input.<br>The input hardware structure of signal Y is same as signal X.  |  |

【Note】：\* only for J3/J6 type

I/O connection :



### 7.3 XY Signal Input Description

| 5V Line Driver Type Signal                                                                                                                                                                                                                              | +24V Open Collector Type Signal                                                                                                                                                                                                                                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>If use 5V Line Driver signal as digital input ,<br/>Just connect to terminal ◦</li> </ul>  <p>ps : Y signal &amp; X signal ◦</p> | <ul style="list-style-type: none"> <li>If use 24V Open Collector signal as digital input ,<br/>Need to connect limit resistance(2K , 1W) ◦</li> </ul>  <p>ps : Y signal &amp; X signal ◦</p> |
| Use 5V Line Driver signal , please refer to :                                                                                                                                                                                                           | Open Collector Signal , please refer to :                                                                                                                                                                                                                                      |
|                                                                                                                                                                       |                                                                                                                                                                                             |



## 8. Quick Start

### 8.1 CloseLoop Running

Step1 Set Drive Operation mode  
Pr.003=0 → Drive Operation mode = IMAC, Open Loop V/F mode (set Hz)

Step2 Set V/F Pattern  
Pr.260=Follow example → MAX\_FREQUENCY  
Pr.261 = Follow example → MAX\_VOLTAGE  
Pr.262= Follow example → BASE\_FREQUENCY  
Pr.263= Follow example → BASE\_VOLTAGE  
Pr.264= Follow example → START FREQUENCY

【Example】 follow SOLPPower brand spindle motor : SVM-75M-60-24

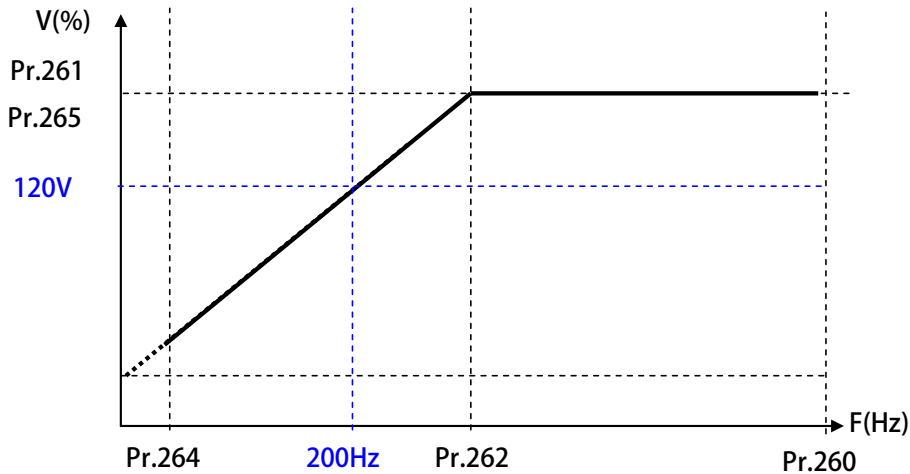
System Power : 220VAC  
Motor wiring :  $\Delta$  type  
Rated voltage : 120V  
Rated current : 23.9A  
N-max rpm : 24000rpm /F-max ; Max Frequency 805Hz<4 pole>  
Nn No-load speed : 6000rpm<200Hz>  
Slip rpm : 180rpm

#### Motor information

|                                                                                     |  |                              |                 |                                                                                     |  |
|-------------------------------------------------------------------------------------|--|------------------------------|-----------------|-------------------------------------------------------------------------------------|--|
|  |  | 3-PHASE                      |                 |  |  |
| IP-54 Asynchronous servo motor                                                      |  |                              |                 |                                                                                     |  |
| TYPE :SVM-75M-60-24                                                                 |  |                              | S/N : 13123001C |                                                                                     |  |
| KW : 3/4.5                                                                          |  | KW                           |                 | NM : 4.7/7.1 nt-m                                                                   |  |
| V <sub>y</sub> 208 V                                                                |  | I <sub>y</sub> 13.8/20.7 MAX |                 | V <sub>Δ</sub> 120 V I <sub>Δ</sub> 23.9/35.9 MAX                                   |  |
| Nn 6000 RPM                                                                         |  | Fn 203 Hz                    |                 | N <sub>MAX</sub> 24000 RPM F <sub>MAX</sub> 806 Hz                                  |  |
| Induct 2.59 mH                                                                      |  | Resist 0.17 Ω                |                 | Slip 180 RPM                                                                        |  |
| EN 60034-1                                                                          |  | Class F                      |                 | Power Factor : 0.83                                                                 |  |
| IM B35                                                                              |  | DE brg 6205                  |                 | NDE brg 6205                                                                        |  |
| Wgt 20 Kg                                                                           |  |                              |                 |                                                                                     |  |
| FAN 1                                                                               |  | Ph 220 V                     |                 | 0.3 A 50/60 Hz                                                                      |  |
| Encoder 1024                                                                        |  | PPR +5                       |                 | Vdc                                                                                 |  |
| BRAKE NM                                                                            |  | Vdc                          |                 | W Vdc                                                                               |  |

#### Connector specification

| ENCODER |     | L. V. Δ H. V. λ                             |  |
|---------|-----|---------------------------------------------|--|
| 1 2 3   |     | Z X Y Z - X - Y                             |  |
| 4 5 6 7 |     | U V W U V W                                 |  |
| 8 9 10  |     | 120V 208V                                   |  |
| 1       | +5V | Thermal Cooling sys<br>Protection (NC) 220V |  |
| 2       | +0V |                                             |  |
| 3       | A   |                                             |  |
| 4       | Ā   |                                             |  |
| 5       | B   |                                             |  |
| 6       | B̄  |                                             |  |
| 7       | Z   |                                             |  |
| 8       | Z̄  |                                             |  |
| 9       | 接地  |                                             |  |



※ VF curve need to be set to the start frequency to the base frequency is a slash, the base frequency to the maximum frequency of a horizontal line

※ In the motor nameplate data, rated voltage 120V, rated frequency is 200Hz, calculated when the maximum voltage output 220V output frequency of 366Hz

|                            |                                                                                                   |
|----------------------------|---------------------------------------------------------------------------------------------------|
| Pr.116=4                   | → Motor pole no.                                                                                  |
| Pr.260=800                 | → MAX_FREQUENCY (Hz)                                                                              |
| Pr.261=100                 | → MAX_VOLTAGE(%)                                                                                  |
| Pr.262=366.6               | → BASE_FREQUENCY (Hz)                                                                             |
| Pr.263=100                 | → BASE_VOLTAGE(%)                                                                                 |
| Pr.264=5                   | → START FREQUENCY (Hz)                                                                            |
| Pr.202=10980               | → No-Load Speed $\{120 \times (\text{Pr.262}) / (\text{Pr.116})\} = 10980\text{rpm}$              |
| Pr.210=Follow Actual Value | → Full Load Current(% of AMP-Rating-Current)<br>(Motor Rated current/ Drive Rated current) × 100% |
| Pr.203=180                 | → Full-Load SLIP-RPM                                                                              |

### Step3 OpenLoop Running

- Pr.270=10 → VF-HZset 0
- Pr.061=210 → DI1 function select =SERVO\_ON
- Pr.062 =213 → DI2 function select =Forward Running
- ☒ Enable DI-2 to run Forward Running
  - ☛ When Forward Run condition , motor rotating in CCW direction (face to the motor axis)
    - ◆ If thr direction not match ; change motor wire V , W , to change motor direction .
  - ☛ Set feedback group parameters
    - ◆ Pr.188=1 → ENCODER DIRECTION =1 : B Lead A
    - ◆ Check Pr.190 : A/B ENCODER COUNTER =Up counter  
If down counter , please change A , /A signal
  - ☛ Under V/F Mode , runing to Ns : No-Load speed =6000rpm(200Hz) , observations :
    - ◆ Pr.013=120 → Drive Output Voltage(rms)
    - ◆ Pr.205 → Output-Current (% of motor rated)  
This parameter shows Pr.211 : Field Current(% of Full-Load-Current)
    - ◆ Pr.211=Pr.205 → set Field Current(% of Full-Load-Current)

Step4 Closeloop Running

- ☛ Pr.003=0 → Drive Operation mode = IMAC, Open Loop V/F mode (set Hz)
- ☛ Pr.278=0 → Select Speed Source when SWx=000= Speed set by EARM-0
- ☛ Pr.194=0 → ENCODER TYPE = IM motor, ABZ Encoder
- ☛ Pr.188=1 → ENCODER DIRECTION =(B Lead A)
- ☛ Pr.190= up counts → A/B ENCODER COUNTER , use lower speed to check °  
When Forward condition= CCW direction (face to the motor axis) ,  
Check Pr.190 : A/B ENCODER COUNTER =Up counts  
If down counter , please change A , /A signal
- ☛ Pr.189=Follow actual → ENCODER PPR  
Fireware version : E214 suitable 256 、 512 、 1024 、 2048ppr
- ☛ Pr.192=2 → ENCODER DATA FILTER BUFFER =Buffer-Size = 4 (Encoder)
- ☛ Please Reset the drive
- ☒ Enable DI-2 to run Forward Running , and Observe upper parameters

- 
- ☛ Pr.003=2 → Drive Operation mode = IMSV/PMSV, Close Loop A/B QEP feedback
  - ☛ Pr.278=0 → Select Speed Source when SWx=000= Speed set by EARM-0
  - ☛ Pr.120=100 → Speed Set0
  - ☛ Pr.061=210 → DI1 function select =SERVO\_ON
  - ☛ Pr.062 =213 → DI2 function select =Forward Running
  - ☛ Please Reset the drive
  - ☒ Enable DI-1 to run Servo-On
  - ☒ Enable DI-2 to run Forward Running , Now running100rpm
-

## 9. Parameter Description

### 9.1 Parameter List

| Driver Specification Group <Refer to Chapter-10.1> *There is different setting for different model. |                                |         |      |        |          |          |         |
|-----------------------------------------------------------------------------------------------------|--------------------------------|---------|------|--------|----------|----------|---------|
| No.                                                                                                 | Name                           | Default | Min. | Max.   | Unit     | Type     | Version |
| 071                                                                                                 | Unit Address                   | 1       | 1    | 63     | --       | FR/W ; R |         |
| 097                                                                                                 | Driver system software version | 0000    | 0000 | FFFF   | Version  | F        |         |
| 130                                                                                                 | AC power input voltage         | 220     | 10   | 1000   | Vac(rms) | FR/W     |         |
| 209                                                                                                 | Rated output current           | 5.0     | 1.0  | 6000.0 | Ampere   | FR/W     |         |
| 239                                                                                                 | Carrier frequency              | 16.0    | 2.0  | 18.0   | Khz      | FR/W ; R |         |
| 337                                                                                                 | Special Function               | 0       | 0    | 65535  | --       | F        |         |
| 348                                                                                                 | Motor type                     | 1       | 0    | 5      | --       | F        |         |
| 368                                                                                                 | EAROM Lock                     | 0       | 0    | 1      | --       | FR/W     |         |

| Digital Input Group <Refer to Chapter-10.2>                                                                   |                                                     |         |      |       |      |      |         |
|---------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|---------|------|-------|------|------|---------|
| No.                                                                                                           | Name                                                | Default | Min. | Max.  | Unit | Type | Version |
| 011                                                                                                           | Dlx Status                                          | 0       | 0    | 65535 | --   | M    |         |
| 059                                                                                                           | SERVO_ON type Select                                | 0       | 0    | 3     | --   | R/W  |         |
| 061                                                                                                           | DI1 function select                                 | 0       | 0    | 255   | --   | R/W  |         |
| 062                                                                                                           | DI2 function select                                 | 0       | 0    | 255   | --   | R/W  |         |
| 063                                                                                                           | DI3 function select                                 | 0       | 0    | 255   | --   | R/W  |         |
| 064                                                                                                           | DI4 function select                                 | 0       | 0    | 255   | --   | R/W  |         |
| 065                                                                                                           | DI5 function select                                 | 0       | 0    | 255   | --   | R/W  |         |
| 066                                                                                                           | DI6 function select                                 | 0       | 0    | 255   | --   | R/W  |         |
| 067                                                                                                           | DI7 function select                                 | 0       | 0    | 225   | --   | R/W  |         |
| 068                                                                                                           | DI8 function select                                 | 0       | 0    | 225   | --   | R/W  |         |
| 475                                                                                                           | DI-15 function Select(virtual input, links to DO15) | 0       | 0    | 255   | --   | R/W  |         |
| 476                                                                                                           | DI-16 function Select(virtual input, links to DO16) | 0       | 0    | 255   | --   | R/W  |         |
| 【NOTE】 Digital input function definition can't be repeated. Check this point after finish setting this group. |                                                     |         |      |       |      |      |         |

| Digital Output Group <Refer to Chapter-10.3> |                                                     |         |      |       |      |      |         |
|----------------------------------------------|-----------------------------------------------------|---------|------|-------|------|------|---------|
| No.                                          | Name                                                | Default | Min. | Max.  | Unit | Type | Version |
| 012                                          | DOx Status                                          | 0       | 0    | 65535 | --   | M    |         |
| 111                                          | DO1 function select                                 | 0       | 0    | 255   | --   | R/W  |         |
| 112                                          | DO2 function select                                 | 0       | 0    | 255   | --   | R/W  |         |
| 113                                          | DO3 function select(L-Series is 1C Relay)           | 0       | 0    | 255   | --   | R/W  |         |
| 114                                          | DO4 function select (Only for J -Series)            | 0       | 0    | 255   | --   | R/W  |         |
| 165                                          | DO15 function select(virtual output, links to DI15) | 0       | 0    | 255   | --   | R/W  |         |
| 166                                          | DO16 function select(virtual output, links to DI16) | 0       | 0    | 255   | --   | R/W  |         |

Analog Input Group <Refer to Chapter-10.4>

| No. | Name                            | Default | Min.    | Max.   | Unit | Type    | Version |
|-----|---------------------------------|---------|---------|--------|------|---------|---------|
| 226 | AI-1 MAX RPM-1(Dix(16)=OFF))    | 0       | 0       | 60000  | Rpm  | R/W     |         |
| 227 | AI-1 MAX RPM-2(Dix(16)=ON))     | 0       | 0       | 60000  | Rpm  | R/W     |         |
| 229 | AI-1 Adc data                   | 0       | 0       | 4095   | --   | M       |         |
| 230 | AI-1 Positive Maximum Reference | 4095    | 0       | 4095   | --   | FR/W    |         |
| 231 | AI-1 Zero(/Middle) Reference    | 2048    | 0       | 4095   | --   | FR/W    |         |
| 232 | AI-1 Negative Minimum Reference | 0       | 0       | 4095   | --   | FR/W    |         |
| 233 | AI-1 TYPE                       | 0       | 0       | 1      | --   | R/W ; R |         |
| 234 | AI-1 Command Value              | 0.00    | -100.00 | 100.00 | %    | M       |         |
| 235 | AI-1 D-band Value               | 0       | 0       | 1000   | --   | R/W     |         |
| 477 | AI-2 Adc data                   | 0       | 0       | 4095   | --   | M       |         |
| 481 | AI-2 Positive Maximum Reference | 4095    | 0       | 4095   | --   | FR/W    |         |
| 482 | AI-2 Zero(/Middle) Reference    | 2048    | 0       | 4095   | --   | FR/W    |         |
| 483 | AI-2 Negative Minimum Reference | 0       | 0       | 4095   | --   | FR/W    |         |
| 484 | AI-2 TYPE                       | 0       | 0       | 1      | --   | R/W ; R |         |
| 485 | AI-2 Command Value              | 0.00    | -100.00 | 100.00 | %    | M       |         |
| 486 | AI-2 D-band Value               | 0       | 0       | 1000   | --   | R/W     |         |
| 487 | AI-2 Compare Set Value          | 50      | 0.00    | 100.00 | %    | R/W     |         |
| 488 | AI-1 Compare Set Value          | 50.00   | 0.00    | 100.00 | %    | R/W     |         |
| 500 | AI-3 Adc data                   | 0       | 0       | 4095   | --   | M       |         |
| 501 | AI-3 Positive Maximum Reference | 4095    | 0       | 4095   | --   | FR/W    |         |
| 502 | AI-3 Zero(/Middle) Reference    | 2048    | 0       | 4095   | --   | FR/W    |         |
| 503 | AI-3 Negative Minimum Reference | 0       | 0       | 4095   | --   | FR/W    |         |
| 504 | AI-3 TYPE                       | 0       | 0       | 1      | --   | R/W ; R |         |
| 505 | AI-3 Command Value              | 0.00    | -100.00 | 100.00 | %    | M       |         |
| 506 | AI-3 D-band Value               | 0       | 0       | 1000   | --   | R/W     |         |
| 507 | AI-3 Compare Set Value          | 50.00   | 0.00    | 100.00 | %    | R/W     |         |

Analog Output Group <Refer to Chapter-10.5>

| No. | Name                              | Default | Min. | Max.  | Unit  | Type    | Version |
|-----|-----------------------------------|---------|------|-------|-------|---------|---------|
| 370 | AO1-Select Data                   | 0       | 0    | 24    | --    | R/W ; R |         |
| 371 | AO1-Test Data( 0~100% Full scale) | 0.0     | 0.0  | 100.0 | %     | RAM     |         |
| 372 | AO1_OFFSET                        | 2048    | 0    | 4095  | count | R/W     |         |
| 373 | AO1_SPAN                          | 75.0    | 0.0  | 100.0 | %     | R/W     |         |
| 374 | AO2-Select Data                   | 0       | 0    | 24    | --    | R/W ; R |         |
| 375 | AO2-Test Data( 0~100% Full scale) | 0.0     | 0.0  | 100.0 | %     | RAM     |         |
| 376 | AO2_OFFSET                        | 2048    | 0    | 4095  | Count | R/W     |         |
| 377 | AO2_SPAN                          | 75.0    | 0.0  | 100.0 | %     | R/W     |         |
| 382 | AOx_Hx                            | 0       | 0    | 300   | Hz    | R/W     |         |

| QEP A/B/Z Encoder Sensor Group(Only for feedback type) < Refer to Chapter-10.6.1> |                              |          |          |          |      |          |         |
|-----------------------------------------------------------------------------------|------------------------------|----------|----------|----------|------|----------|---------|
| No.                                                                               | Name                         | Default  | Min.     | Max.     | Unit | Type     | Version |
| 187                                                                               | A/B ENCODER TURNS            | 0000     | 0000     | FFFF     | --   | M        |         |
| 188                                                                               | ENCODER DIRECTION            | 0        | 0        | 1        | --   | FR/W ; R |         |
| 189                                                                               | ENCODER PPR                  | 0        | 0        | 60000    | --   | FR/W ; R |         |
| 190                                                                               | A/B ENCODER COUNTER          | 00000000 | 00000000 | FFFFFFFF | --   | M        |         |
| 192                                                                               | ENCODER DATA FILTER BUFFER   | 2        | 0        | 6        |      | FR/W ; R |         |
| 193                                                                               | ENCODER CHECK TIME           | 0        | 0        | 30000    | ms   | R/W      |         |
| 194                                                                               | ENCODER TYPE                 | 0        | 0        | 13       | --   | FR/W;R   |         |
| 196                                                                               | ENCODER PG CHECK             | 1        | 0        | 1        | --   | R/W;R    |         |
| 354                                                                               | Actual Counts Per Revolution | 0        | 0        | 65535    | Cks  | M        |         |

| XY Pulse Command Group (Only for feedback type)< Refer to Chapter-10.6.2> |                            |         |        |       |      |      |         |
|---------------------------------------------------------------------------|----------------------------|---------|--------|-------|------|------|---------|
| No.                                                                       | Name                       | Default | Min.   | Max.  | Unit | Type | Version |
| 398                                                                       | X/Y Pulse Counter          | 0000    | 0000   | FFFF  | cks  | M    |         |
| 399                                                                       | X/Y Input DIRECTION        | 0       | 0      | 1     | --   | R/W  |         |
| 450                                                                       | X/Y MUL1                   | 1000    | 0      | 65535 | --   | R/W  |         |
| 451                                                                       | X/Y DIV1                   | 1000    | 1      | 65535 | --   | R/W  |         |
| 452                                                                       | X/Y Commad Type            | 0       | 0      | 3     | --   | R/W  |         |
| 453                                                                       | X/Y Pcmd Filter Level      | 6       | 0      | 7     | --   | R/W  |         |
| 454                                                                       | X/Y Pcmd Feed forward Gain | 0       | 0      | 100   | %    | R/W  |         |
| 455                                                                       | X/Y Input Status           | 0       | 0      | 65535 | --   | M    |         |
| 456                                                                       | X/Y MUL2                   | 1000    | 0      | 65535 | --   | R/W  |         |
| 474                                                                       | X/Y Vcmd                   | 0       | -32768 | 32767 | --   | M    |         |

| TAMAGAWA Group (Only for feedback type) < Refer to Chapter-10.6.3> |                         |          |          |           |      |         |         |
|--------------------------------------------------------------------|-------------------------|----------|----------|-----------|------|---------|---------|
| No.                                                                | Name                    | Default  | Min.     | Max.      | Unit | Type    | Version |
| 379                                                                | Tamagawa Resolution     | 17       | 12       | 24        | --   | R/W ; R |         |
| 380                                                                | Tamagawa Direction      | 0        | 0        | 1         | --   | R/W ; R |         |
| 385                                                                | Tamagawa Error Status   | 0000     | 0000     | FFFF      | --   | M       |         |
| 386                                                                | Tamagawa Position(cks)  | 00000000 | 00000000 | FFFFFFFF  | Cks  | M       |         |
| 388                                                                | Tamagawa ReferenceOK    | 0        | 0        | 1         | --   | M       |         |
| 508                                                                | Tamagawa Home Reference | 00000000 | 80000000 | 7FFFFFFFF | --   | M       |         |

| Sin/Cos Encoder Group(Only for feedback type)< Refer to Chapter-10.6.4> |                               |          |          |          |      |         |         |
|-------------------------------------------------------------------------|-------------------------------|----------|----------|----------|------|---------|---------|
| No.                                                                     | Name                          | Default  | Min.     | Max.     | Unit | Type    | Version |
| 295                                                                     | Sin/Cos Direction             | 0        | 0        | 1        | --   | R/W ; R |         |
| 296                                                                     | Sin/Cos Resolution            | 10       | 1        | 16       | --   | R/W ; R |         |
| 297                                                                     | Sin/Cos Counter Resolution    | 0000     | 0000     | FFFF     | --   | M       |         |
| 350                                                                     | Sin/Cos Cpunts Per Revolution | 00000000 | 00000000 | FFFFFFFF | cks  | M       |         |
| 389                                                                     | Sin/Cos Teeth No              | 128      | 1        | 16387    | --   | R/W ; R |         |



| RDCResolver Group(Only for feedback type) < Refer to Chapter-10.6.5> |                   |         |      |      |      |         |         |
|----------------------------------------------------------------------|-------------------|---------|------|------|------|---------|---------|
| No.                                                                  | Name              | Default | Min. | Max. | Unit | Type    | Version |
| 243                                                                  | RDC-Direction     | 0       | 0    | 1    | --   | R/W ; R |         |
| 244                                                                  | RDC-Resolution    | 1       | 0    | 2    | --   | R/W ; R |         |
| 245                                                                  | RDC-EXT Carrier   | 10.0    | 3.0  | 20.0 | KHz  | R/W     |         |
| 247                                                                  | RDC-Fault Status  | 0000    | 0000 | FFFF | --   | M       |         |
| 248                                                                  | RDC-Counter Value | 0000    | 0000 | FFFF | --   | M       |         |

| PLC PORT |                                   |         |      |      |      |      |         |
|----------|-----------------------------------|---------|------|------|------|------|---------|
| No.      | Name                              | Default | Min. | Max. | Unit | Type | Version |
| 071      | Unit Address                      | 1       | 0    | 63   | --   | R/W  |         |
| 077      | BaudRate (8bits,1 stop,no parity) | 2       | 1    | 4    | --   | R/W  |         |
| 078      | Parity                            | 2       | 2    | 2    | --   | R/W  |         |
| 079      | Data Bits                         | 8       | 8    | 8    | --   | R/W  |         |
| 080      | Stop Bits                         | 1       | 1    | 2    | --   | R/W  |         |

| Motor Group <Refer to Chapter-10.7> |                                            |         |       |        |            |          |         |
|-------------------------------------|--------------------------------------------|---------|-------|--------|------------|----------|---------|
| No.                                 | Name                                       | Default | Min.  | Max.   | Unit       | Type     | Version |
| 116                                 | Motor pole no.                             | 8       | 2     | 128    |            | FR/W ; R |         |
| 194                                 | ENCODER TYPE                               | 0       | 0     | 13     | --         | R/W      |         |
| 198                                 | Motor KE(Back Emf constant)                | 0       | 0     | 10000  | Volts/krpm | R/W      |         |
| 202                                 | No-Load Speed                              | 1800    | 0     | 30000  | rpm        | R/W      |         |
| 203                                 | Full-Load SLIP-RPM                         | 60      | 0     | 1000   | rpm        | R/W      |         |
| 210                                 | Full Load Current(% of AMP-Rating-Current) | 50      | 0     | 200    | %          | FR/W     |         |
| 211                                 | Field Current(% of Full-Load-Current)      | 30      | 0     | 200    | %          | FR/W     |         |
| 215                                 | Electronic Over-Load Thermal Relay Time    | 3       | 0     | 120    | sec        | R/W      |         |
| 216                                 | RESISTANCE(between V&W, U phase open)      | 1.000   | 0.000 | 60.000 | Ohm        | FR/W     |         |
| 217                                 | INDUCTANCE(between V&W, U phase open)      | 1.00    | 0.00  | 60.00  | mH         | FR/W     |         |
| 218                                 | Specific Frequency                         | 2.00    | 0.00  | 120.00 | Hz         | FR/W     | D822    |
| 240                                 | Slip Gain                                  | 100.0   | 0.0   | 300.0  | %          | R/W ; R  |         |

| Control Group <Refer to Chapter-10.8> |                            |         |      |       |      |         |         |
|---------------------------------------|----------------------------|---------|------|-------|------|---------|---------|
| No.                                   | Name                       | Default | Min. | Max.  | Unit | Type    | Version |
| 003                                   | Drive Operation mode       | 2       | 0    | 63    | --   | R/W ; R |         |
| 004                                   | Current loop P-gain        | 0       | 0    | 30000 | --   | R/W     |         |
| 005                                   | Current loop I-gain        | 0       | 0    | 30000 | --   | R/W     |         |
| 006                                   | Current loop R-Gain        | 0       | 0    | 30000 | --   | R/W     |         |
| 008                                   | Current loop filter level  | 0       | 0    | 3     | --   | R/W     |         |
| 095                                   | Current Compare Leve       | 100     | 0    | 300   | %    | R/W     |         |
| 221                                   | SLIP Compensation Response | 0       | 0    | 3     | --   | R/W     |         |

Control Group <Refer to Chapter-10.8>

| No. | Name                                           | Default | Min.   | Max.  | Unit               | Type    | Version |
|-----|------------------------------------------------|---------|--------|-------|--------------------|---------|---------|
| 003 | Drive Operation mode                           | 2       | 0      | 63    | --                 | R/W ; R |         |
| 004 | Current loop P-gain                            | 0       | 0      | 30000 | --                 | R/W     |         |
| 005 | Current loop I-gain                            | 0       | 0      | 30000 | --                 | R/W     |         |
| 006 | Current loop R-gain                            | 0       | 0      | 30000 | --                 | R/W     |         |
| 008 | Current loop filter level                      | 0       | 0      | 3     | --                 | R/W     |         |
| 016 | Torque (% motor)                               | 0.0     | 0.0    | 300.0 | %                  | M       |         |
| 018 | Speed loop P/I gain select                     | 1       | 1      | 10    | --                 | R/W     |         |
| 029 | 1'st Speed Loop Switch point                   | 100     | 0      | 30000 | rpm                | R/W     |         |
| 031 | 1'st speed loop P-gain                         | 100     | 0      | 10000 | --                 | R/W     |         |
| 032 | 1'st speed loop I-gain                         | 10      | 10     | 10000 | --                 | R/W     |         |
| 033 | DIF Gain                                       | 0.0     | 0.0    | 300.0 | --                 | R/W     |         |
| 086 | Torque control mode                            | 0       | 0      | 11    | --                 | R/W     |         |
| 087 | Torque Limit-I                                 | 100.0   | 0.0    | 300.0 | %                  | R/W     |         |
| 088 | Torque Limit-II                                | 100.0   | 0.0    | 300.0 | %                  | R/W     |         |
| 089 | Torque Limit-III                               | 100.0   | 0.0    | 300.0 | %                  | R/W     |         |
| 090 | Torque Limit-IV                                | 100.0   | 0.0    | 300.0 | %                  | R/W     |         |
| 095 | Current Compare Level (%of Motor Rated Current | 100     | 0      | 300   | %                  | R/W     |         |
| 096 | Random Torque Command Setting (RAM)            | 0.0     | -300.0 | 300.0 | %                  | RAM     |         |
| 108 | Torque Droop Range                             | 10      | 0      | 100   | %                  | R/W     |         |
| 160 | 2'nd Speed Loop Switch point                   | 100     | 0      | 30000 | rpm                | R/W     |         |
| 161 | 2'nd speed loop P-gain                         | 100     | 0      | 10000 | --                 | R/W     |         |
| 162 | 2'nd speed loop I-gain                         | 10      | 0      | 10000 | --                 | R/W     |         |
| 391 | 1'st Servo Gain                                | 100     | 0      | 10000 | Hz((rev/s)/<br>rev | R/W     |         |
| 392 | 2'nd Servo Gain                                | 0       | 0      | 10000 | Hz((rev/s)/<br>rev | R/W     |         |



| Multi-Speed Setting Group <Refer to Chapter-10.9> |                                  |         |        |       |      |         |         |
|---------------------------------------------------|----------------------------------|---------|--------|-------|------|---------|---------|
| No.                                               | Name                             | Default | Min.   | Max.  | Unit | Type    | Version |
| 010                                               | JOG Rpm                          | 60      | 0      | 30000 | rpm  | R/W     |         |
| 119                                               | Actual RPM Set Command           | 0       | -32768 | 32767 | rpm  | M       |         |
| 120                                               | Speed Set0                       | 0       | 0      | 60000 | rpm  | R/W     |         |
| 121                                               | Speed Set1                       | 0       | 0      | 60000 | rpm  | R/W     |         |
| 122                                               | Speed Set2                       | 0       | 0      | 60000 | rpm  | R/W     |         |
| 123                                               | Speed Set3                       | 0       | 0      | 60000 | rpm  | R/W     |         |
| 124                                               | Speed Set4                       | 0       | 0      | 60000 | rpm  | R/W     |         |
| 125                                               | Speed Set5                       | 0       | 0      | 60000 | rpm  | R/W     |         |
| 126                                               | Speed Set6                       | 0       | 0      | 60000 | rpm  | R/W     |         |
| 127                                               | Speed Set7                       | 0       | 0      | 60000 | rpm  | R/W     |         |
| 128                                               | Maximum RPM Limit                | 1800    | 0      | 30000 | rpm  | FR/W    |         |
| 180                                               | Random speed setting (RAM)       | 0       | 0      | 30000 | rpm  | RAM     |         |
| 278                                               | Select Speed Source when SWx=000 | 0       | 0      | 30    | -    | R/W ; R |         |

| Acc/Dec/S-curve Group <Refer to Chapter-10.10> |                               |         |      |        |          |      |         |
|------------------------------------------------|-------------------------------|---------|------|--------|----------|------|---------|
| No.                                            | Name                          | Default | Min. | Max.   | Unit     | Type | Version |
| 053                                            | ACC Time-1                    | 5.00    | 0.00 | 650.00 | Sec/Krpm | R/W  |         |
| 054                                            | DEC Time-1                    | 5.00    | 0.00 | 650.00 | Sec/Krpm | R/W  |         |
| 055                                            | Scurve T1 time                | 1.00    | 0.00 | 5.00   | Sec      | R/W  |         |
| 056                                            | Scurve T2 time                | 1.00    | 0.00 | 5.00   | Sec      | R/W  |         |
| 057                                            | Scurve T3 time                | 1.00    | 0.00 | 5.00   | Sec      | R/W  |         |
| 058                                            | Scurve T4 time                | 1.00    | 0.00 | 5.00   | Sec      | R/W  |         |
| 110                                            | Directional Limitation        | 0       | 0    | 3      | --       | R/W  |         |
| 289                                            | START OPTION SELECT           | 0       | 0    | 2      | --       | R/W  |         |
| 290                                            | START DELAY TIME              | 0.00    | 0.00 | 60.00  | Sec      | R/W  |         |
| 291                                            | BRAKE HOLD TIME               | 1.00    | 0.00 | 60.00  | Sec      | R/W  |         |
| 293                                            | Ctrl-Mode1 : ACC Time-2       | 10.0    | 0.0  | 6500.0 | Sec      | R/W  |         |
| 294                                            | Ctrl-Mode1 : DECC Time-2      | 10.0    | 0.0  | 6500.0 | Sec      | R/W  |         |
| 457                                            | Ctrl-Model : JOG ACC/DEC Time | 10.0    | 0.0  | 100.0  | Sec/Krpm | R/W  |         |
| 458                                            | Ctrl-Model : EMS DEC Time     | 1.0     | 0.0  | 10.0   | Sec/Krpm | R/W  |         |
| 459                                            | STOP OPTION SELECT            | 0       | 0    | 1      | --       | R/W  |         |

| DC-BUS adjust Group <Refer to Chapter-10.11> |                             |         |      |      |      |      |         |
|----------------------------------------------|-----------------------------|---------|------|------|------|------|---------|
| No.                                          | Name                        | Default | Min. | Max. | Unit | Type | Version |
| 131                                          | DC bus measurement adjust   | 100     | 50   | 200  | %    | FR/W |         |
| 132                                          | DC bus voltage              | 0       | 0    | 1000 | Vdc  | M    |         |
| 151                                          | Over-Discharge-Protect time | 5.0     | 0.0  | 60.0 | sec  | R/W  |         |
| 159                                          | UP Recovery                 | 0       | 0    | 1    |      | R/W  |         |

| THERMISTOR adjust Group <Refer to Chapter-10.12> |                                |         |      |      |        |      |         |
|--------------------------------------------------|--------------------------------|---------|------|------|--------|------|---------|
| No.                                              | Name                           | Default | Min. | Max. | Unit   | Type | Version |
| 140                                              | Heat sink temperature ( degC)  | 0       | 0    | 250  | degC   | M    |         |
| 150                                              | OVER-Temperature Protect LEVEL | 80      | 50   | 100  | degree | R/W  |         |

| FAN adjust Group <Refer to Chapter-10.13> |                  |         |      |      |      |      |         |
|-------------------------------------------|------------------|---------|------|------|------|------|---------|
| No.                                       | Name             | Default | Min. | Max. | Unit | Type | Version |
| 146                                       | FAN control type | 0       | 0    | 1    | --   | R/W  |         |

| KTY84/130 Thermo detect Group< Refer to Chapter-10.14> |                                     |         |      |       |       |      |         |
|--------------------------------------------------------|-------------------------------------|---------|------|-------|-------|------|---------|
| No.                                                    | Name                                | Default | Min. | Max.  | Unit  | Type | Version |
| 170                                                    | KTY1 Temperature                    | 0       | 0    | 65535 | Deg C | M    |         |
| 171                                                    | KTY1 Calibration                    | 100.0   | 100  | 120.0 | %     | R/W  |         |
| 172                                                    | KTY1 Warning Level Setting(DOx(58)) | 0       | 0    | 300   | Deg C | R/W  |         |

| Rigid Tapping Group |               |         |      |       |          |      |         |
|---------------------|---------------|---------|------|-------|----------|------|---------|
| No.                 | Name          | Default | Min. | Max.  | Unit     | Type | Version |
| 174                 | Tapping Speed | 1000    | 0    | 30000 | Rpm      | R/W  |         |
| 175                 | Tapping ACC   | 1.00    | 0.00 | 10.00 | Sec/Krpm | R/W  |         |

| Timer Group <Refer to Chapter-13.3> |                      |         |      |        |      |      |         |
|-------------------------------------|----------------------|---------|------|--------|------|------|---------|
| No.                                 | Name                 | Default | Min. | Max.   | Unit | Type | Version |
| 249                                 | TIMER-A, Type Select | 2       | 0    | 2      | --   | R/W  |         |
| 250                                 | TIMER-A, T1 Period   | 1.00    | 0.01 | 600.00 | Sec  | R/W  |         |
| 251                                 | TIMER-A, T2 Period   | 1.00    | 0.01 | 600.00 | Sec  | R/W  |         |
| 252                                 | TIMER-B, Type Select | 2       | 0    | 2      | --   | R/W  |         |
| 253                                 | TIMER-B, T1 Period   | 1.00    | 0.01 | 600.00 | Sec  | R/W  |         |
| 254                                 | TIMER-B, T2 Period   | 1.00    | 0.01 | 600.00 | Sec  | R/W  |         |

| Speed Compare Group <Refer to Chapter-13.4> |                                |         |      |       |      |      |         |
|---------------------------------------------|--------------------------------|---------|------|-------|------|------|---------|
| No.                                         | Name                           | Default | Min. | Max.  | Unit | Type | Version |
| 206                                         | SPEED_ZERO_REFERENCE           | 30      | 0    | 30000 | Rpm  | R/W  |         |
| 207                                         | SPEED_EQUAL_REFERENCE          | 1000    | 0    | 30000 | Rpm  | R/W  |         |
| 208                                         | SPEED_EQUAL_RANGE              | 30      | 0    | 30000 | Rpm  | R/W  |         |
| 222                                         | SPEED Feedback Filter(For DOx) | 1000    | 50   | 1000  | ms   | R/W  |         |

| MONITOR |                                   |         |         |        |        |      |         |
|---------|-----------------------------------|---------|---------|--------|--------|------|---------|
| No.     | Name                              | Default | Min.    | Max.   | Unit   | Type | Version |
| 013     | Drive Output Voltage(rms)         | 0       | 0       | 32767  | Vac    | M    |         |
| 019     | RPM Actual Value(rpm)             | 0       | -32768  | 32767  | Rpm    | M    |         |
| 030     | HZ Output                         | 0.0     | 0.0     | 3000.0 | Hz     | M    |         |
| 034     | Alarm Status                      | 0000    | 0000    | FFFF   | --     | M    |         |
| 035     | Alarm Record                      | 0000    | 0000    | FFFF   | --     | M    |         |
| 132     | DC-BUS Voltage                    | 0       | 0       | 1000   | Vdc    | M    |         |
| 140     | Heat Sink Temperature(degC)       | 0       | 0       | 250    | Deg C  | M    |         |
| 204     | Output-Current(xxx.xx)            | 0.00    | 0.00    | 300.00 | ampere | M    |         |
| 205     | Output-Current (% of motor rated) | 0.0     | 0.0     | 300.0  | %      | M    |         |
| 213     | Output-Current (xxx.x)            | 0.0     | 0.0     | 3000.0 | ampere | M    |         |
| 214     | DC-Bus Current                    | 0.0     | -3000.0 | 3000.0 | ampere | M    |         |

## 9.2 Monitor Type Parameters' Address

The table showed below list the Monitor parameters , and there address. User can read it by communication °

| Name                       | Unit     | Address (Pr.) |
|----------------------------|----------|---------------|
| Driver' s output voltage   | V        | 013           |
| Motor' s actual speed      | rpm      | 019           |
| Driver' s output frequency | Hz       | 030           |
| Alarm message              | --       | 035           |
| Driver' s output current   | rms(Amp) | 213           |

## 9.3 Parameter' s Type

The table showed below describing the different type of all the parameter of this manual:

| Type | Description                                                                                                                                                                                                                     |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| R/W  | The parameter is Readable and Writable, and can be stored in EARAM.<br>All this type parameters can be initialized by the Pr.369 function.                                                                                      |
| FR/W | The parameter is Readable and Writable, and can be stored in EARAM.<br>This type of parameter is specially set by Factory and not for user normally usage.<br>This type of parameter only can be modified by authorized person. |
| RAM  | The parameter is Readable and Writable, but it uses the RAM to temporally store the change of parameter. After power on or reset it will be recover to be default value.                                                        |
| M    | The parameter is Monitor type. Only readable and no effect for writing this parameter.                                                                                                                                          |
| F    | Factory set parameter, and should not be changed.                                                                                                                                                                               |
| R    | To indicate that any change of this type of parameter have to Reset the driver to enable the change.                                                                                                                            |

## 10. Driver Parameter Description

### 10.1 Driver Specification Group

- Pr.071 → Unit Address (for communication)  
This parameter can be set from 1 to 63. If there are above 2 driver connected to the communication line, the unit address should be set for individual number.  
【NOTICE】 The communication port format should be 19200bps、8bits、1stop、no parity.
- Pr.097 → System software version  
Indicate the CPU software version.
- Pr.130 → Input AC power voltage  
This parameter defines the input AC power voltage level:  
For 220V driver, it should set 220;  
For 380V driver, it should set 380.  
【NOTE】  
This parameter has been defined well before leaving factory. User should not change it.  
If necessary to adjust it, please measure the R, S, T voltage and get the average to write into this parameter.  
※ If the R, S, T input voltage is different from the designed level exceed 10%, please contact with the agency or producer to confirm. Rashly change this parameter may cause damage to this driver or public danger.  
The driver will follow this parameter's setting to calculate the followed voltage check level:  
※ Over Potential trip level =  $1.414 * \text{Pr.130} * 130\%$ 。  
※ OP recover level =  $1.414 * \text{Pr.130} * 120\%$ 。  
※ Under Potential trip level =  $1.414 * \text{Pr.130} * 70\%$ 。  
※ UP recover level =  $1.414 * \text{Pr.130} * 80\%$ 。  
※ CONTACTOR ON level =  $1.414 * \text{Pr.130} * 69\%$ 。  
※ CONTACTOR OFF =  $1.414 * \text{Pr.130} * 65\%$ 。  
【NOTE】 The Contactor is inside the driver to short the charging resistor.  
Brake Discharge start level =  $1.414 * \text{Pr.130} * 117\%$ 。
- Pr.209 → Rated Output Current  
This parameter defines the rated output current of driver.  
【NOTE】 This parameter is set as the specification of driver, and there is no need to change it.

- Pr.239 → Carrier Frequency

This parameter defines the PWM carrier frequency. The range can be set from 2 KHz~16 KHz.

If setting higher carrier frequency, the output waveform will be less distortion for sinusoidal, and the human ear will hear less noise, but the electronically interference to the environment will be larger, and generate more switching loss on power module.

If setting lower carrier frequency, the output waveform there will be more distortion for sinusoidal, and the human ear will hear more noise, but the electronically interference environment will be less, and the switching loss on power module will be less too.

- Pr.337 → Special function select

This parameter shows firmware of this driver.

- Pr.348 → Motor Type

This parameter shows motor type of this control.

- Pr.368 → EAROM Lock

| Value | Description                                                 |
|-------|-------------------------------------------------------------|
| 0     | The parameter value can be changed and stored into EAROM.   |
| 1     | The change of parameter value will not be stored into EAROM |

【NOTE】The value of Pr.368 will not be changed after reset.

If Pr.368=0, after reset the Pr.368=0.

If Pr.368=1, Pr.368=1.

- Pr.369 → Recover Parameters to Default

If setting Pr.369 to be 1, all the R/W type parameters in EAROM will be initialized to default value. After changing the value of this parameter, must reset the driver.

## 10.2 Digital Input Group

- Pr.011 → Status of DI1~DI16

This parameter shows the DI1 ~ DI16 status by hexadecimal numerical data. Converting this data to be binary format, status of DI1 ~ DI16 will be presented from LSB to MSB of the data.

For example:

if Pr.011=0 → Converting to binary is "0000 0000 0000 0000". The DI1 ~ DI16 are OFF.

If Pr.011=5 → Converting to binary is "0000 0000 0000 0101". The DI1 and DI3 are ON, and others are OFF.

- Pr.059 → SERVO\_ON type Select °

| Value | Function                              | Description                                                                           |
|-------|---------------------------------------|---------------------------------------------------------------------------------------|
| 0     | Servo ON by Dix(210)                  | Standard Mode :<br>Need to enable Dix(210) : Servo-On                                 |
| 1     | Servo ON & IndexStop By Dix           | JPS Mode :<br>JPS Locate+IndexStop Function                                           |
| 2     | Auto Servo ON                         | Brand Mode1 :<br>Brand Mode1 Locate+IndexStop Function<br>Without Dix(210) : Servo-On |
| 3     | Servo ON by Dix(210)With ORI Function |                                                                                       |

- Pr.061 → DI1 Function Select

- Pr.062 → DI2 Function Select

- Pr.063 → DI3 Function Select

- Pr.064 → DI4 Function Select

- Pr.065 → FWD (DI5) Function Select

FWD terminal has been set to be → Forward Run.

- Pr.066 → REV (DI6) Function Select

REV terminal has been set to be → Reverse Run.

- Pr.067 → DI7 Function Select

- Pr.068 → DI8 Function Select

- Pr.475 → DI15 Function Select (virtual input, links to DO15)

- Pr.476 → DI16 Function Select (virtual input, links to DO16)

DI15 and DI16 are virtual inputs, and are directly links to DO15 and DO16 respectively.

【NOTE】 The digital input function definition can't be repeated. Check this point after finish setting this group.

## 10.3 Digital Output Group

- Pr.012 → Status of DO1~DO16

This parameter shows the DO1 ~ DO16 status by hexadecimal numerical data. Converting this data to be binary format, status of DI1 ~ DI16 will be presented from LSB to MSB of the data.

For example:

if Pr.012=0 → Converting to binary is "0000 0000 0000 0000" . The DO1 ~ DO16 are OFF.

If Pr.012=5 → Converting to binary is "0000 0000 0000 0101" . The DO1 and DO3 are ON, and others are OFF.

- Pr.111 → DO1 Function Select

- Pr.112 → DO2 Function Select

- Pr.113 → DO3 Function Select

DO1~DO3 are reality output terminals. The function of these terminals can be selected by setting these parameters.

- Pr.114 → DO4 Function Select

DO4 actual output terminals are the RYA and RYB of TM1. It is a 1C-type relay output. The function of this terminal can be selected by setting this parameter.

- Pr.165 → DO15 Function Select (virtual output, links to DI15)

- Pr.166 → DO16 Function Select (virtual output, links to DI16)

DO15 and DO16 are virtual outputs, and are directly links to DI15 and DI16 respectively.

## 10.4 Analog Input Group

### 10.4.1 Analog Input : AI1

- Pr.226 → AI1 MAX RPM-1(Dlx(16)=OFF)
- Pr.227 → AI1 MAX RPM-2(Dlx(16)=ON)

Dlx(16) : AI-1 Max Rpm Select ; can switch analog signal corresponding to the maximum speed

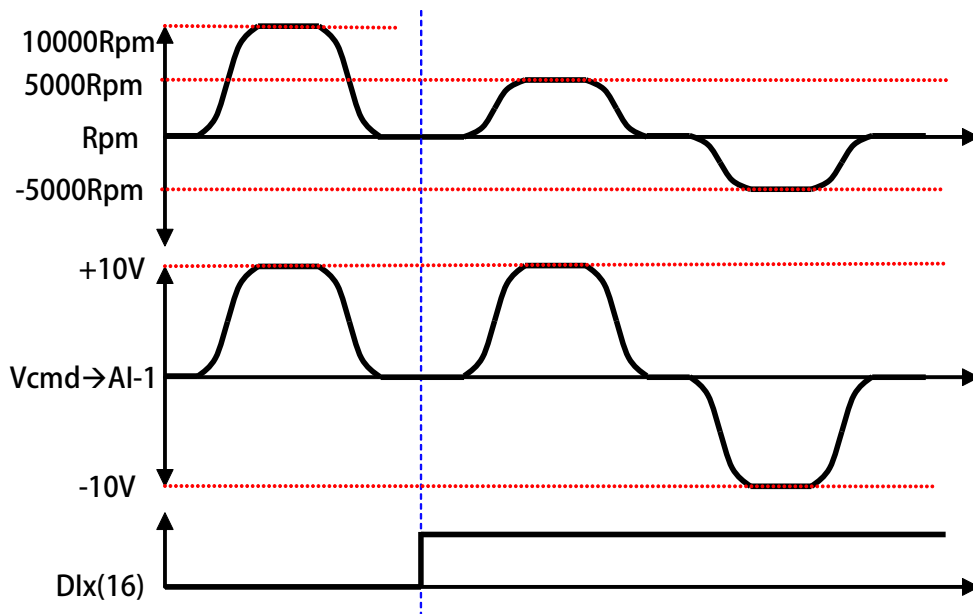
[Example] Pr.226 : 10000 rpm

Pr.227 : 5000 rpm

When Dlx(16) =OFF , AI-1 maximum voltage corresponding to the maximum speed =10000 rpm

When Dlx(16) =ON , AI-1 maximum voltage corresponding to the maximum speed =5000 rpm

※ Tapping mode for analog signals, the speed increase the voltage resolution





- Pr.229 → AI-1 Adc data  
This parameter displays the A/D value of AI1 input.
- Pr.230 → AI-1 Positive Maximum Reference  
Applying the maximum input voltage to AI1 read the data from Pr.229 and set into this parameter as the AI1 input maximum limit.
- Pr.231 → AI-1 Zero(/Middle) Reference  
Applying 0V to AI1 read the data from Pr.229 and set into this parameter as the AI1 0V input reference.
- Pr.232 → AI-1 Negative Minimum Reference  
Applying the minimum input voltage to AI1 read the data from Pr.229 and set into this parameter as the AI1 input minimum limit.
- Pr.233 → AI1 Input Type  
Select the AI1 input type of voltage range.  

| Value | Description                             |
|-------|-----------------------------------------|
| 0     | The input voltage range is 0 ~ +10V.    |
| 1     | The input voltage range is -10V ~ +10V. |
- Pr.234 → AI-1 Command Value  
The displayed data = (AI1 actually input voltage / AI1 input range) x 100 %.  
The AI1 input range is adjusted by Pr.230 ~ Pr.232.
- Pr.235 → AI-1 D-band Value  
If Pr.233 select type 0, the AI1 input in the range of Pr.232 +/- Pr.235 will be negated.  
【NOTE】 Only when Pr.233 select type 1, the function of Pr.235 is available.
- Pr.488 → AI-1 Compare Set Value  
Setting Pr.488 to compare with Pr.234 AI-1 Command Value °  
Unit : %

### 10.4.2 Analog Input : AI2

- Pr.477 → AI-2 Adc data  
This parameter displays the A/D value of AI2 input.
- Pr.481 → AI-2 Positive Maximum Reference  
Applying the maximum input voltage to AI2 read the data from Pr.477 and set into this parameter as the AI2 input maximum limit.
- Pr.482 → AI-2 Zero(/Middle) Reference  
Applying 0V to AI2 read the data from Pr.477 and set into this parameter as the AI2 0V input reference.
- Pr.483 → AI-2 Negative Minimum Reference  
Applying the minimum input voltage to AI2 read the data from Pr.477 and set into this parameter as the AI2 input minimum limit.
- Pr.484 → AI2 Input Type  
Select the AI2 input type of voltage range.  

| Value | Description                             |
|-------|-----------------------------------------|
| 0     | The input voltage range is 0 ~ +10V.    |
| 1     | The input voltage range is -10V ~ +10V. |
- Pr.485 → AI-2 Command Value  
The displayed data = (AI2 actually input voltage / AI2 input range) x 100 %.  
The AI2 input range is adjusted by Pr.481 ~ Pr.483.
- Pr.486 → AI-2 D-band Value  
If Pr.484 select type 0 , the AI2 input in the range of Pr.482 +/- Pr.486 will be negated.  
【NOTE】 Only when Pr.484 select type 1 , the function of Pr.486 is available.
- Pr.487 → AI-2 Compare Set Value  
Setting Pr.487 to compare with Pr.485 AI-2 Command Value °  
Unit : %

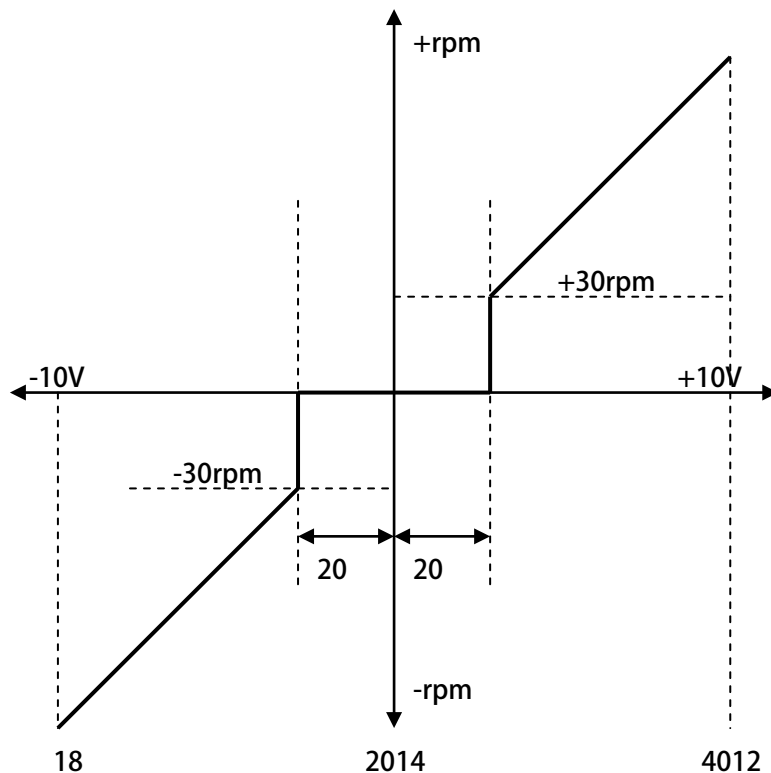
### 10.4.3 Analog Input : AI3

- Pr.500 → AI-3 Adc data  
This parameter displays the A/D value of AI3 input.
- Pr.501 → AI-3 Positive Maximum Reference  
Applying the maximum input voltage to AI3 read the data from Pr.500 and set into this parameter as the AI3 input maximum limit.
- Pr.502 → AI-3 Zero(/Middle) Reference  
Applying 0V to AI3 read the data from Pr.500 and set into this parameter as the AI3 0V input reference.
- Pr.503 → AI-3 Negative Minimum Reference  
Applying the minimum input voltage to AI3 read the data from Pr.500 and set into this parameter as the AI3 input minimum limit.
- Pr.504 → AI-3 Input Type  
Select the AI3 input type of voltage range.  

| Value | Description                             |
|-------|-----------------------------------------|
| 0     | The input voltage range is 0 ~ +10V.    |
| 1     | The input voltage range is -10V ~ +10V. |
- Pr.505 → AI-3 Command Value  
The displayed data = (AI3 actually input voltage / AI3 input range) x 100 %.  
The AI3 input range is adjusted by Pr.501 ~ Pr.503.
- Pr.506 → AI-3 D-band Value  
If Pr.504 select type 0 , the AI3 input in the range of Pr.502 +/- Pr.506 will be negated.  
【NOTE】 Only when Pr.504 select type 1 , the function of Pr.506 is available.
- Pr.507 → AI-3 Compare Set Valu  
Setting Pr.507 to compare with Pr.505 AI-3 Command Value °  
Unit : %

Example 1: AI1 input range -10V ~ +10V

AI1 input range is -10V ~ +10V , and rated speed of motor is 3000rpm. Setting Pr.233 = 1 , and Pr.235 = 20. Please following the situation listed below to learn how to use the parameters.



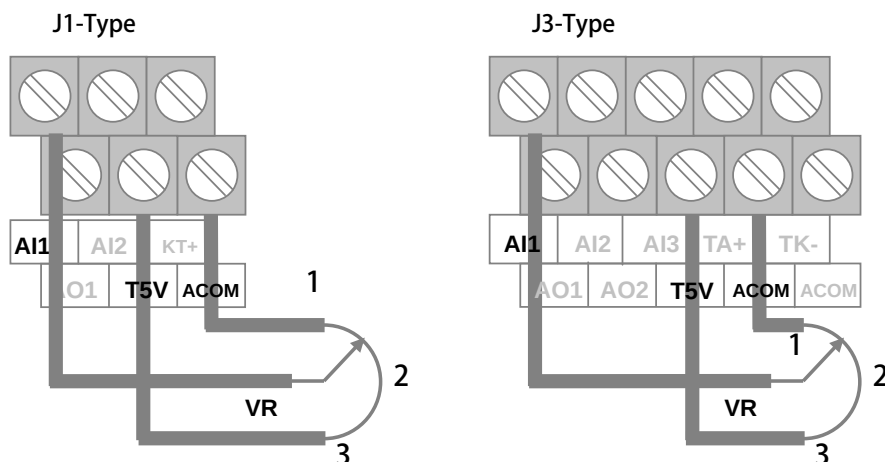
- ※ Input +10V to AI1 , and read Pr.229 = 4012.
- ※ Set Pr.230 = 4012.
- ※ Input 0V to AI1 , and read Pr.229 = 2014.
- ※ Set Pr.231 = 2014.
- ※ Input -10V , and read Pr.229 = 18.
- ※ Set Pr.232 = 18.
- ※ By the equation  $3000 \div (4012 - 2014) \approx 1.5$  to know that one A/D count is about 1.5rpm.
- ※ By the equation  $20 \times 1.5 = 30$  to know the range of Blind Zone is +/-30rpm.

If the input voltage of AI1 is in the range of  $2014 \pm 20$  , the motor will not run.

If the input voltage of AI1 exceeds f the range of  $2014 \pm 20$  , the motor will run , and the min. start speed of motor will be about 30rpm.

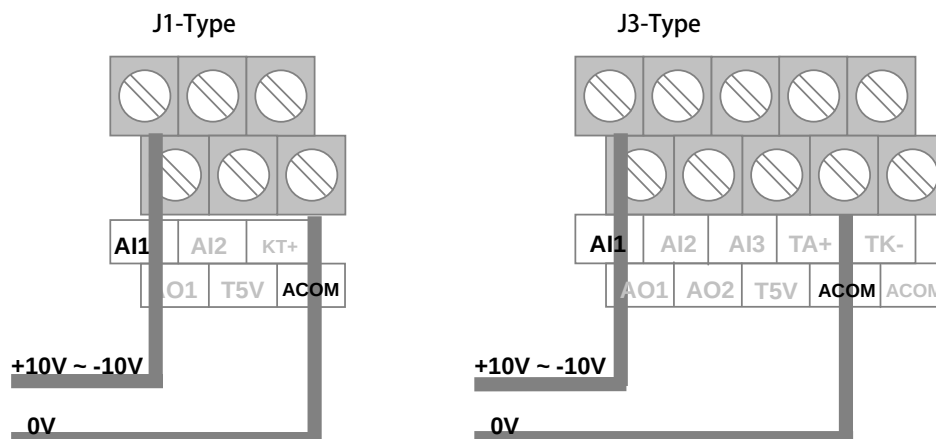
Example 2: Simply using a variable resistor to set the running speed

1. Wiring the variable resistor (VR) to control input terminals as the figure showed below.
2. Setting Pr.233 = 0. → Select AI1 input range (0 ~ 10V).
3. Turn the VR to the maximum input position and read Pr.229.
4. Write the Pr.229 value into Pr.230 → Setting AI1 maximum value.
5. Turn the VR to the min. input position and read Pr.229.
6. Write the Pr.229 value into Pr.231. → Setting AI1 0V value.
7. Write the Pr.229 value into Pr.232 → Setting AI1 min. value.
8. Setting Pr.278 (Speed Command Select)=1 → Select AI1 input as speed command.
9. Reset the driver. → Change Pr.278 , must reset driver.



Example 3: Using external +10V ~ -10V signal as speed command.

1. Wiring the input signal lines to control terminals as the figure showed below.
2. Setting Pr.233 = 1 → Select AI1 input range (-10V ~ +10V).
3. Input maximum voltage to AI1 , read Pr.229.
4. Write Pr.229 value into Pr.230. → Setting AI1 maximum value.
5. Input 0V to AI1 , read Pr.229.
6. Write Pr.229 value into Pr.231. → Setting AI1 0V value.
7. Input min. voltage to AI1 , read Pr.229.
8. Write Pr.229 value into Pr.232. → Setting AI1 min. value.
9. Setting Pr.278 (Speed Command Select) =1 → Select AI1 input as speed command.
10. Reset the driver. → Change Pr.278 , must reset driver.



## 10.5 Analog Output Group

【NOTE】 The output signal of AO is -10V ~ +10V °

- Pr.370 → AO1-Select Data
- Pr.374 → AO2-Select Data

| Value | Description                                 |
|-------|---------------------------------------------|
| 0     | No output.                                  |
| 1     | Output Frequency.                           |
| 2     | Output Current                              |
| 3     | Output Voltage                              |
| 4     | Motor' s Actual Speed                       |
| 5~13  | Reserved.                                   |
| 14    | For AO1 The output of AO1 is set by Pr.371. |
| 15    | For AO2 The output of AO2 is set by Pr.375. |
| 16    | +10V                                        |
| 17    | -10V                                        |
| 23    | 10V SIN wave(Hz=Pr.382)                     |
| 24    | 10V COS wave. (Hz=Pr.382)                   |

Description:

- Select =0 → has no output.
- Select =1 → The output of presents the driver' s output frequency. The accuracy is 0.01Hz.
- Select =2 → The output of presents the driver' s output current. The accuracy is 0.1A.
- Select =3 → The output of presents the driver' s output voltage. The accuracy is 1V.
- Select =4 → The output of presents the motor' s actual speed. The accuracy is 1rpm.
- Select =5~13 → All these are reserved. Should not select these function numbers for operation safety.
- Select =14 → The output of AO1 is set by Pr.371.
- Select =15 → The output of AO2 is set by Pr.375.
- Select =16 → The output is set to +10V.
- Select =17 → The output is set to -10V.
- Select =23 → The output is set to 10V SIN wave , Hz is set by Pr.382.
- Select =24 → The output is set to 10V COS wave , Hz is set by Pr.382.

【NOTE】 After change this parameter, the driver should be reset to let the changes be effect.

- Pr.371 → AO1-Test Data(0~100% Full scale adjust)

- Pr.375 → AO2-Test Data(0~100% Full scale adjust)

This parameter is used to set AO1/ AO2 output voltage , Range=0.0% ~ 100.0%

- Pr.372 → AO1\_OFFSET

- Pr.376 → AO2\_OFFSET

This parameter is used to set AO1/ AO2 OFFSET.

【Example】 When AOx-Select Data=0 : 0V output , use meter to measure (AOx to ACOM)=0V ,

When > 0V ; adjust AOx\_OFFSET lower , to get 0V voltage output

When < 0V ; adjust AOx\_OFFSETupper , to get 0V voltage output

※ x is mean AO-number

※ AOx\_OFFSETdefault value = 2048

- Pr.373 → AO1\_SPAN

- Pr.377 → AO2\_SPAN

This parameter is used to set AO1/ AO2 SPAN gain.

【Example】 When AOx-Select Data=16 : +10V output , use meter to measure (AOx to ACOM)=10V

When > 10V ; adjust AOx\_SPAN lower , to get +10V voltage output

When < 10V ; adjust AOx\_SPAN upper , to get +10V voltage output

※ x is mean AO-number

※ AOx\_SPAN default value =75%

- Pr.382 → AOx\_Hx

This parameter is used to set AO1 / AO2 output frequency

## 10.6 Encoder Feedback Group

### 10.6.1 QEP A/B/Z Encoder Sensor Group

- Pr.187 → A/B ENCODER TURNS  
This parameter displays turns of the encoder , Range=0000 ~ FFFF °
- Pr.188 → ENCODER DIRECTION  
If observe the signals A and B (of the Encoder Sensor output):
  - If motor is running in forward direction , A signal leads B signal , then Pr.188 should set 0.
  - If the A signal lags the B signal , then Pr.188 should set 1.If observe Pr.190 (Encoder Sensor Counter Status) status:
  - If motor is running in forward direction counter value is increased , and then Pr.188 should set 0.
  - If the counter value is decreased , then Pr.188 should set 1.
  -
- Pr.189 → ENCODER PPR  
Input the Encoder Sensor ppr value in this parameter.
- Pr.190 → A/B ENCODER COUNTER  
This parameter displays the encoder sensor counter status. The counter will increase when receive a forward direction pulse , and decrease when receive a reverse direction pulse. The range of the counter is 00000000 ~ FFFFFFFF °
- Pr.192 → ENCODER DATA FILTER BUFFER  
If using 256 pps sensor , Pr.192 should set 6.  
If Using 1024 pps sensor , Pr.192 should set 2.
- Pr.193 → ENCODER CHECK TIME  
This parameter is used to set the check time for driver to check the PG signal at every time the speed command be send to check if the encoder sensor is in good condition. Every time the driver send a speed command to motor , and after the time which is set in this parameter the driver will check the motor' s speed by checking the encoder sensor feedback , if the speed is not match the command the driver will show PG alarm message. This function can be disabled by setting 0 into this parameter.



- Pr.194 ➔ ENCODER TYPE

This parameter is used to select proper encoder type for used.

| Value | Function                                    |
|-------|---------------------------------------------|
| 0     | IM Motor , ABZ Encoder                      |
| 7     | IMSV Servo Motor , with Tamagawa Multi-turn |
| 9     | IMSV Servo Motor , with RDC board           |
| 11    | IMSV Servo Motor , with Sin/Cos board       |
| 13    | IMSV Spindle Motor , with Sin/Cos board     |

【Note】Function 7 , 9 , 11 , 13 need to use OPT board ◦

- Pr.196 ➔ ENCODER PG CHECK

This parameter is used to check Pg feedback ◦

| Value | Function               |
|-------|------------------------|
| 0     | Disable Feedback Check |
| 1     | Enable Feedback Check  |

- Pr.354 ➔ Actual Counts Per Revolution

This parameter displays encoder feedback pules per revolution , range = 0 ~ 65535 ◦

## 10.6.2 XY Pulse Command Group

- Pr.398 → X/Y Pulse Counter

This parameter contains the XY input pulse counts; the input pulse counts will be increased by positive direction pulse and decreased by negative direction pulse.

- Pr.399 → X/Y Input DIRECTION

For changing the XY pulse direction.

【Note】After change the value of this parameter , the drive should be resetted

| Value | Function |
|-------|----------|
| 0     | X Lead Y |
| 1     | Y Lead X |

- Pr.450 → X/Y MUL1

- Pr.451 → X/Y DIV1

The above two parameters are used to modify the speed rate for XY input pulse and motor. °

【Note】After change the value of this parameter , the drive should be resetted. °

If the input pulses are 10000 and wish motor to move 1024 pulses ,  
Pr.450 should be 1024 and Pr.451 should be 10000.

- Pr.452 → X/Y Command Type

Can set the format of XY input pulse.

| Setting | X/Y Command Type                                                 |
|---------|------------------------------------------------------------------|
| 0       | <p>4 phase pulse train.</p> <p>1 2 3 4 5 6 7 8 9 A 9 8 7 6 5</p> |

- Pr.453 → X/Y Pcmd Filter Level

If set lower : Faster response but may cause motor noise °

If set upper : Slower reaction but may cause a delay follow °

- Pr.454 → X/Y Pcmd Feed forward Gain

If setting 50% to this parameter and the speed feed volumn is 1000 rpm , then the actual feed volumn is 500 rpm.

※ for normal condition , the value 100% for this parameter is recommended.

- Pr.455 → X/Y Input Status

This parameter displays X/Y input status , status = 0 、 1 、 2 、 3 °

【Note】 if value=2 , mean X signal is on status ; if value=1 , mean Y signal is on status °

- Pr.456 → X/Y MUL2

XY input pulse Multiplier set value-2 °

【Note】 After change the value of this parameter , the drive should be resetted °

- Pr.474 → XY Vcmd

XYpulse input exchange to corresponding to the speed command voltage observations °

### 10.6.3 TAMAGAWA Group

- Pr.379 ➔ Tamagawa Resolution  
This parameter is Tamagawa multi-turn absolute encoder resolution, in accordance with the encoder setting °
  
- Pr.380 ➔ Tamagawa Direction  
Setting the right direction in accordance with the motor running direction °  
After finishsetting , please check when motor is forwardruning , speed value is positive °  
【Note】 After change the value of this parameter , the drive should be resetted °
  
- Pr.385 ➔ Tamagawa Error Status
- Pr.386 ➔ Tamagawa Position(cks)  
This parameter displays Tamagawa feedback position / Error status information ,  
When forward ; the result counter will be +1  
When reverse ; the result counter will be -1 , Range=00000000 ~ FFFFFFFF °  
Upper 4 number of the result=Position turns  
Lower 4 number of the result=Positions cks °
  
- Pr.388 ➔ Tamagawa ReferenceOK  
This parameter displays the reference is ok or not °  
If the result=OK , the value will be =1  
If the result=NG , the value will be =0
  
- Pr.508 ➔ Tamagawa Home Reference  
This parameter displaysthe home reference value °

#### 10.6.4 Sin/Cos Encoder Group

- Pr.295 ➔ Sin/Cos Direction

For changing the Sin/Cos pulse direction ◦

| Value | Function     |
|-------|--------------|
| ◦ 0   | COS Lead SIN |
| 1     | SIN Lead COS |

【Note】 After change the value of this parameter , the drive should be resetted

- Pr.296 ➔ Sin/Cos Resolution

Input the Sin/Cos Resolution value in this parameter.

【Note】 After change the value of this parameter , the drive should be resetted

- Pr.297 ➔ Sin/Cos Counter Resolution

This parameter displays the Sin/Cos Analytical observations ◦

- Pr.350 ➔ Sin/Cos Cpunts Per Revolution

This parameter displays Sin/Cos feedback counter after Analys , Range=00000000 ~ FFFFFFFF ◦

- Pr.389 ➔ Sin/Cos Teeth No

This parameter is used to set Sin/Cos Teeth value.

### 10.6.5 RDC Resolver Group

- Pr.243 ➔ RDC-Direction

This parameter is used to set Resolver feedback direction °

| Value | Function               |
|-------|------------------------|
| ° 0   | RDC DIR (COS Lead SIN) |
| 1     | RDC DIR (SIN Lead COS) |

【Note】 After change the value of this parameter , the drive should be resetted °

- Pr.244 ➔ RDC-Resolution

This parameter is used to set Resolver Resolution value °

| Value | Function              |
|-------|-----------------------|
| 0     | RDC 10Bits Resolution |
| 1     | RDC 12Bits Resolution |
| 2     | RDC 14Bits Resolution |

【Note】 After change the value of this parameter , the drive should be resetted °

- Pr.245 ➔ RDC-EXT Carrier

This parameter is used to set Resolver Excitation output.

【Note】 default value=10KHz °

- Pr.247 ➔ RDC-Fault Status

This parameter displays the RDC feedback status °

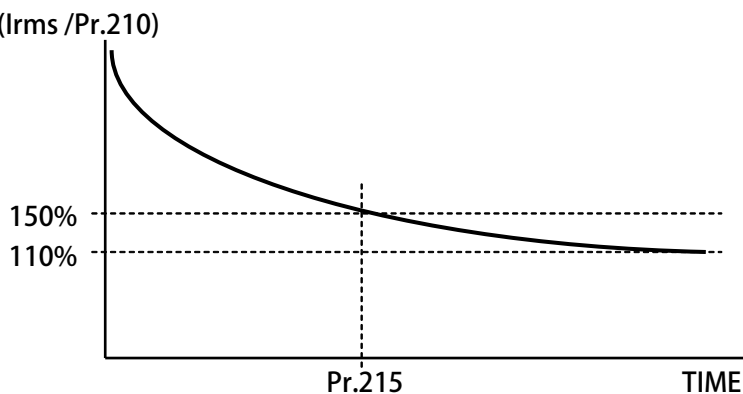
- Pr.248 ➔ RDC-Counter Value

This parameter displays the RDC feedback signal counter value °

## 10.7 Motor Group

- Pr.116 → Motor pole no.  
According to the data of the motor's manufacturer, set correct value.
- Pr.194 → ENCODER TYPE
 

| Value | Function                     |
|-------|------------------------------|
| 0     | IM Motor , A 、 B 、 Z Encoder |
- Pr.198 → Motor KE(Back Emf constant)  
According to the KE data of the motor's manufacturer
- Pr.202 → No-Load Speed  
According to the rated speed data of the motor's manufacturer °
- Pr.203 → Full-Load SLIP-RPM  
According to the slip rpm data of the motor's manufacturer °
- Pr.210 → Motor Full Load Current Ratio (%)  
Set the ratio of the motor's rating to the driver's rating.  
Motor Full Load Current ratio (%) = (motor's full load current / driver's rating current) x100% °
- Pr.211 → Fied Current(?% of Full-Load-Current)  
Set the ratio of the motor's exciting current to the motor's full load current.  
Motor Exciting Current Ratio (%) = (motor's exciting current / motor's full load current) x100% °
- Pr.215 → Electronic Thermo Relay Time  
This Driver has built an electronic thermo function. If the driver volume is large then the motor which is used, this function can prevent the motor overload. If this parameter sets to be 0, the Electronic Thermo protect function is disabled.  
(Irms /Pr.210)



- Pr.216 → RESISTANCE(between V&W, U phase open)
- Pr.217 → INDUCTANCE(between V&W, U phase open)  
These two parameters should refer to the moto dtat, or can be auto tuned by driver.
- Pr.240 → Slip Gain  
Set the parameters change in the slip region proportional gain speed after a given horsepower.  
Range=0.0 ~ 300.0% °

## 10.8 Control Group

### 10.8.1 Control Group : OpenLoop Control

- Pr.003 → Drive Operation mode

Please select 0, and don't choice another function number.

Refer to the followed table to set the operation mode. Don't select other value!

| Value | Description                                                                                                                                       |
|-------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| 0     | V/F mode.<br>This is standard operation mode for this driver. To operate in this mode, the motor and feedback signal should be connect correctly. |

【NOTE】 After change this parameter, the driver should be reset then the change is effect. If select wrong mode may cause damage to driver and motor or the facility that use this driver and motor.

- Pr.004 → Current Loop P-gain

- Pr.005 → Current Loop I-gain

Set the current loop P gain / I gain of the driver.

【NOTE】 This parameter is auto set by executing Auto Current Gain Tuning.

Pr.004 should keep larger then Pr.005.

- Pr.008 → Current Loop Filter Level

Define the current loop filter level.

- Pr.095 → Torque Compare Level (% of Motor Rated Torque)

Set the compared torque value for Over-torque-warning in this parameter.

- Pr.221 → Slip Compensation Mode Select

| Value | Name                        |
|-------|-----------------------------|
| 0     | No Slip Compensation        |
| 2     | Vectorize Slip Compensation |

## 10.8.2 Control Group : CloseLoop Control

- Pr.003 → Drive Operation mode

Refer to the followed table to set the operation mode. Don't select other value!

| Value | Description                                 |
|-------|---------------------------------------------|
| 0     | IMAC, Open Loop V/F mode (set Hz)           |
| 2     | IMSV/PMSV, Close Loop with A/B QEP feedback |
| 4     | IMSV/PMSV, Constant Current Mode (set Rpm)  |
| 6     | IMSV/PMSV, ACR P/I Gain Tuning              |
| 7     | IMSV/PMSV, R&L Tuning                       |
| 8     | IMAC, CT Balance adjust ( connect motor )   |
| 40    | Detect POLE & ENCODER PPR & DIR             |

【NOTE】After change this parameter , the driver should be reset then the change is effect. If select wrong mode may cause damage to the driver and motor or the facility that use this driver and motor.

- Pr.004 → Current Loop P-gain
- Pr.005 → Current Loop I-gain

Set the current loop P gain / I-gain of the driver.

【NOTE】This parameter is auto set by executing Auto Current Gain Tuning.

P gain should keep larger then I gain.

- Pr.006 → Current Loop R-gain °

Set the current loop R gain / I-gain of the driver.

- Pr.008 → Current loop filter level

This parameter is used to set the level of the current loop filter °

- Pr.016 → IQ=Output Torque(%motor)

This parameter displays the Output Torque(%motor)

- Pr.018 → Speed Loop P/I Gain Select

| Value | Description                                                                                          |
|-------|------------------------------------------------------------------------------------------------------|
| 1     | Only use the 1' st Gain                                                                              |
| 2     | According to the motor' s speed , the driver will use 1' st or 2' nd Gain for different speed range. |

- Pr.029 → 1'st Speed Loop Switch point
- Pr.031 → 1'st Speed Loop Pgain
- Pr.032 → 1'st Speed Loop Igain
- Pr.033 → 1'st Speed Loop Filter

These are the 1' st PI tuning parameter for close loop control.

【NOTE】If Pr.033 set too large , the response will be low , and the system will be unstable.  
Pr.031 should keep larger then Pr.032.



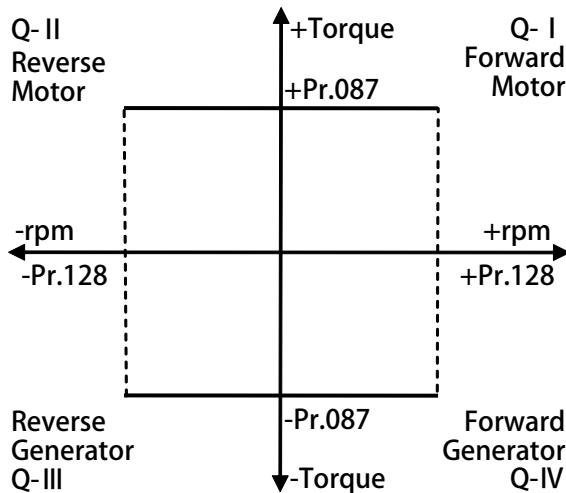
● Pr.086 → Torque Control Mode

Define the torque control mode.

| Value | Description                                                                                                                                     |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| 0     | Only use torque limit-quadrant I setting in any operation condition.                                                                            |
| 1     | When operate in different quadrant , the driver use different torque limit respectively. Refer to Pr.087 ~ Pr.090 for detail in this paragraph. |
| 2     | Use AI1 input as the torque limit with maximum speed limit and direction.                                                                       |
| 3     | The torque limit and run direction are set by (AI1) x (Pr.087 Torque Limit-quadrant I).                                                         |
| 4     | Direct Torque Control by RAM(Pr.096) with Speed Limit                                                                                           |
| 8     | Torque Limit By Rotary-Switch ( TL-I * Pr.137/Pr.152 )                                                                                          |
| 9     | Torque Limit By AI2 * TL-I                                                                                                                      |

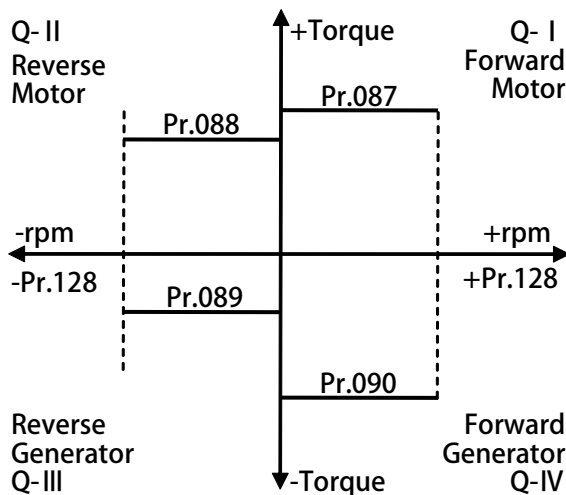
※ If Pr.086 select 0:

The driver uses only Torque Limit-quadrant I setting as torque limit.



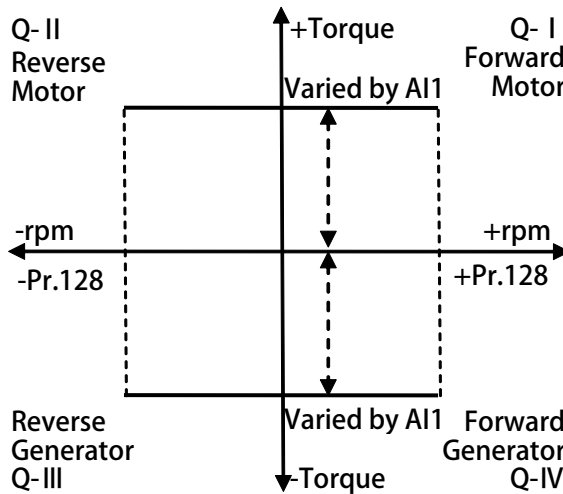
※ If Pr.086 select 1:

When the motor runs in different guardant , the driver will use different torque limit setting respectively.



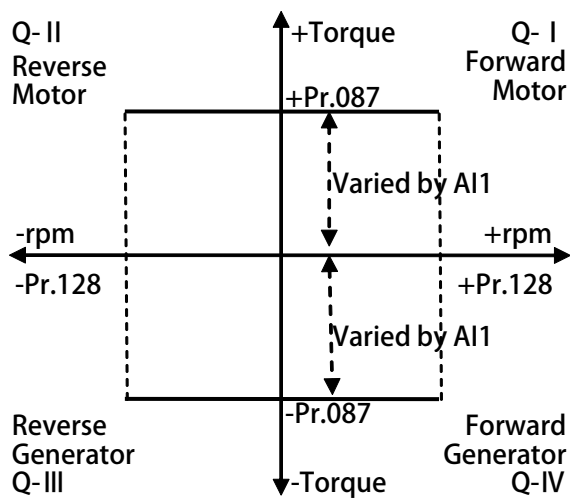
※ If Pr.086 select 2:

Use AI1 input as torque limit , and motor will run in the direction of AI1 input with the limit of max speed.



※ If Pr.086 select 3

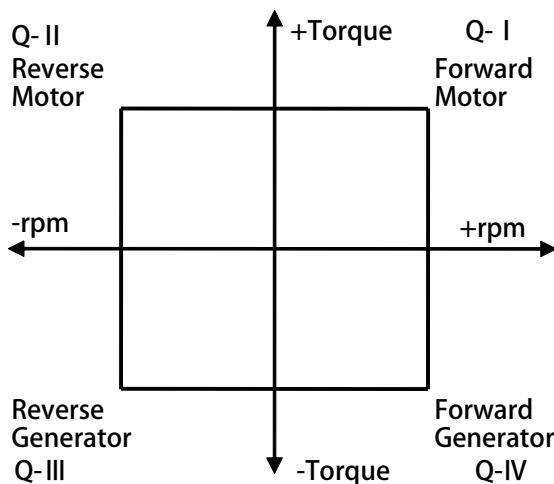
The torque is set by AI1 x (Pr.087 Torque Limit-quadrant I).



※ If Pr.086 select 9

Torque-limit source=AI2 , similar Pr.086 = 1 °

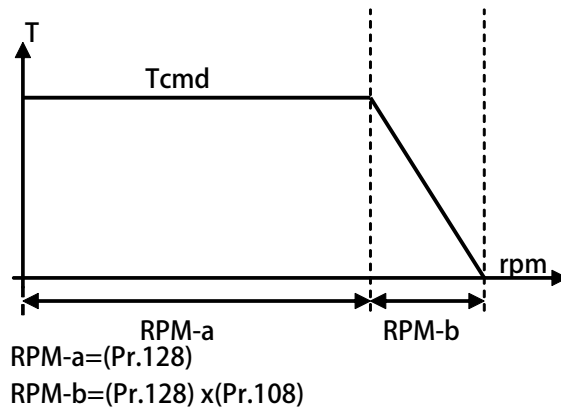
- Pr.087 → Torque Limit-I  
Set the torque limit value when motor is running in quadrant me.  
In this guardant the motor is running in forward direction and output positive torque to load.
- Pr.088 → Torque Limit-II  
Set the torque limit value when motor is running in quadrant II.  
In this guardant the motor is running in reverse direction and output positive torque to load.  
【Note】PID SW SET(%) Should be used with PID Function , please refer to ch13.7
- Pr.089 → Torque Limit-III  
Set the torque limit value when motor is running in quadrant III.  
In this guardant the motor is running in reverse direction and there is negative torque comes from load.  
【Note】PID SW SET(%) Should be used with PID Function , please refer to ch13.7
- Pr.090 → Torque Limit-IV  
Set the torque limit value when motor is running in quadrant IV.  
In this guardant the motor is running in forward direction and there is negative torque comes from load.  
【Note】PID SW SET(%) Should be used with PID Function , please refer to ch13.7



- Pr.095 → Torque Compare Level (% of Motor Rated Torque)  
Set the compared torque value for Over-torque-warning in this parameter.  
【NOTE】About the detail , please refer to Chapter 0 Digital Output Function.
- Pr.096 → Random Torque command Setting (RAM)  
This parameter can set torque-limit percentage  
【Note】parameter write to the RAM , reset or off will be default.

● Pr.108 → Torque Droop Range

Set the Torque Drooping Range (% ratio of max. speed) to prevent the motor vibrate at the maximum speed.



Example:

If motor's maximum speed is 1000rpm, and set  $\text{Pr.128} = 1000$ ,  $\text{Pr.108} = 10(\%)$ , the torque limit will droop to zero by linear manner when speed is in the range of 1000 ~ 1100rpm.

- Pr.160 → 2' nd Speed Loop Gain Switch Point
- Pr.161 → 2' nd Speed Loop P-gain
- Pr.162 → 2' nd Speed Loop I-gain
- Pr.163 → 2' nd Speed Loop Filter Level

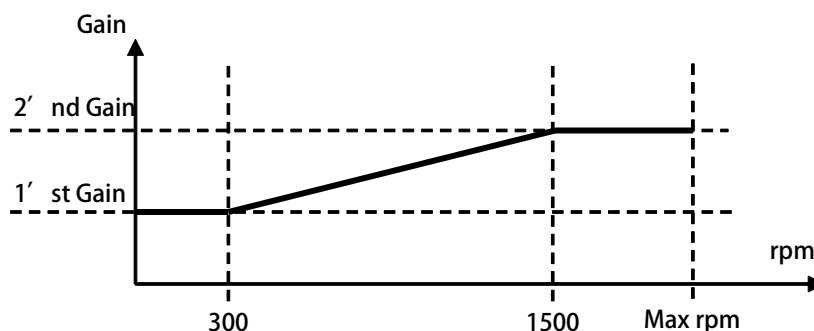
These are the 2' nd PI tuning parameter for close loop control.

【NOTE】 If Pr.163 set too large, the response will be low, and the system will be unstable.

Pr.161 should keep larger than Pr.162.

Example: If set

- Pr.029=300rpm
- Pr.160=1500rpm



1. When speed start from 0rpm to 300rpm (under the 1' st gain switch point), the driver uses the 1' st PI tuning parameters for close loop control.
2. When speed is in the range of 300 ~ 1500rpm, the driver will change the PI tuning parameters' value from 1' st to 2' nd by linear manner.
3. When speed exceeds 1500rpm, the driver uses 2' nd PI tuning parameters for close loop control.

- Pr.391 → 1'st Servo Gain
- Pr.392 → 2'nd Servo Gain

Upper two parameters are used to set position gain.

## 10.9 Multi-Speed Setting Group

- Pr.010 → JOG Rpm / Locate position Rpm

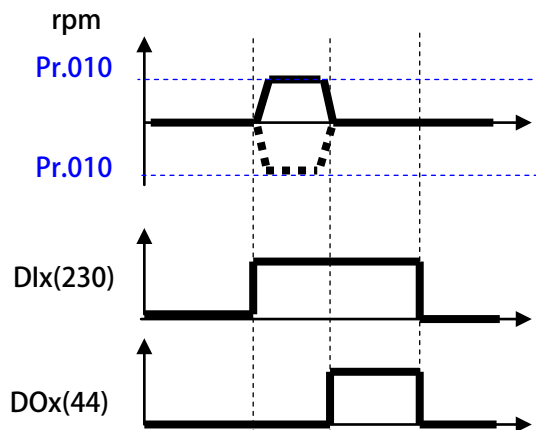
This parameter set Jog Rpm , switch 【DIx(009) : Jog Speed】 can start this function ◦

When Pr.059 : SERVO\_ON type Select=2 : Auto Servo ON

This parameter is the maximum speed of the spindle positioning

※ when positioning , Automatic Location Identification take the shortest distance , but the Motor must first run through more than one revolution ◦

※ when positioning , Acc/Dec Ramp from Pr.053/Pr.054 ◦



- Pr.119 → Actual RPM Set Command

This parameter display actually speed command ◦

- Pr.120 → Speed Set0

- Pr.121 → Speed Set1

- Pr.122 → Speed Set2

- Pr.123 → Speed Set3

- Pr.124 → Speed Set4

- Pr.125 → Speed Set5

- Pr.126 → Speed Set6

- Pr.127 → Speed Set7

The parameters can set 8 sets different speed , and can be selected by digital input terminals.

【NOTE】 the parameter Pr.278 must set 0.

- Pr.128 → Maximum RPM Limit

Refer to the data from motor' s manufacturer to get correct setting value.

- Pr.180 → Random speed setting (RAM)

This parameter is Random speed setting , reference DIx(24).

【NOTE】 parameter write to the RAM , reset or off will be default

- Pr.278 → Select Speed Source when SWx=000

| Value | Description                                                  |
|-------|--------------------------------------------------------------|
| 0     | The speed command select from Pr.120 ~ Pr.127 setting.       |
| 1     | The speed command set from AI1 input. (Direction by FWD/REV) |
| 8     | The speed command set from AI1 input.(-10V ~ +10V)           |
| 9     | The speed command set from Pcmd °                            |
| 10    | The speed command set from Pcmd , (Direction by FWD/REV)     |
| 11    | The speed command set from Pr.180 (RAM memory) °             |

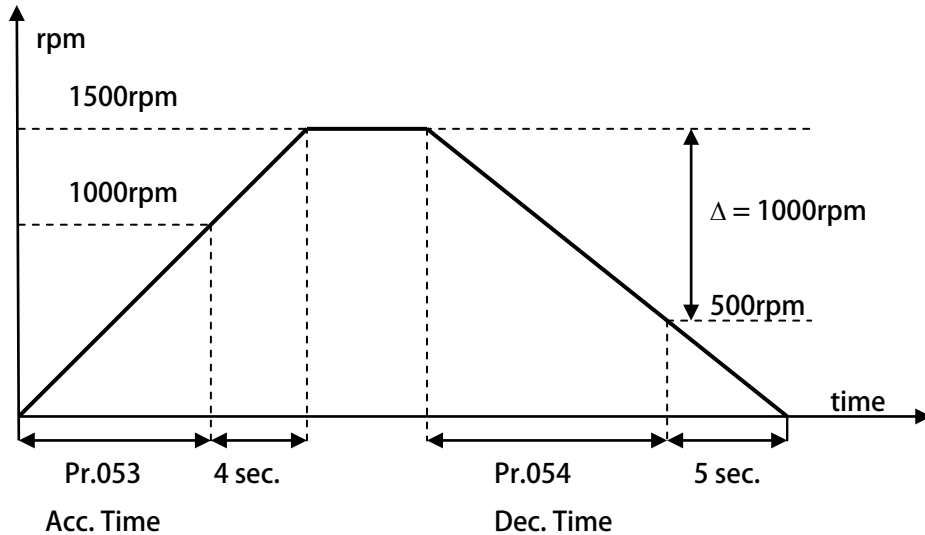
## 10.10 Acc/Dec/S-curve Group

- Pr.053 → Acc. Time (0~1000rpm)

Set the speed rising ramp time , calculated from 0 to 1000rpm. Unit precision is 0.01sec.

- Pr.054 → Dec. Time (1000~0rpm)

Set the speed falling ramp time , calculated from 1000 to 0rpm. Unit precision is 0.01sec.



According to the front figure:

Acc. Time Pr.053 = 8.00sec , Dec. Time Pr.054 = 10.00sec.

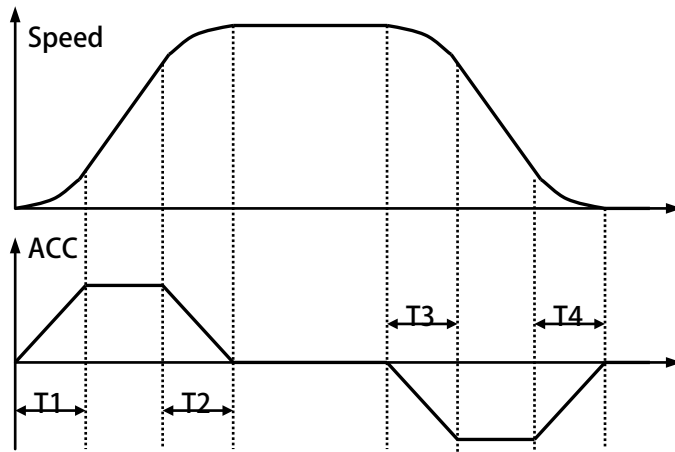
The slope of rising ramp is 1000rpm/8sec; the slope of falling ramp is 1000rpm/10sec.

Therefore , from 0 to 1000rpm need 8+4 = 12sec; from 1500 to 0rpm need 10+5 = 15sec.

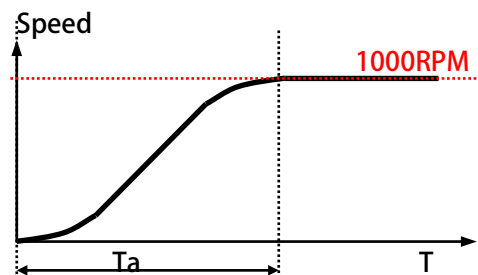


- Pr.055 → S-curve T1 Time
- Pr.056 → S-curve T2 Time
- Pr.057 → S-curve T3 Time
- Pr.058 → S-curve T4 Time

The S-curve can smooth the vibration of machine at the period of motor's speed change. To set the s-curve time longer can get more effect of smoothing, but it causes timing extends for actual acc. time and deceleration time.



Example: Explain how the S-curve affects the Acc. and Dec. timing.



If setting Pr.053 (Acc. Time) = 1.00 (Sec/Krpm), and Pr.055 (S-curve T1 Time) = 1.00sec, Pr.056 (S-curve T2 Time) = 1.00sec.

$T_a$  (totally acc. time) =  $(0.5 \times \text{S-curve T1 Time}) + (\text{Acc. Time}) + (0.5 \times \text{S-curve T2 Time}) = 2\text{sec.}$

● Pr.110 → Direction Limit

| Value | Description                                                                                                |
|-------|------------------------------------------------------------------------------------------------------------|
| 0     | Permit forward and reverse direction run command.                                                          |
| 1     | Only forward direction run command is permitted.<br>The reverse direction run command will stop the motor. |
| 2     | Only reverse direction run command is permitted.<br>The forward direction run command will stop the motor. |

● Pr.289 → START OPTION SELECT

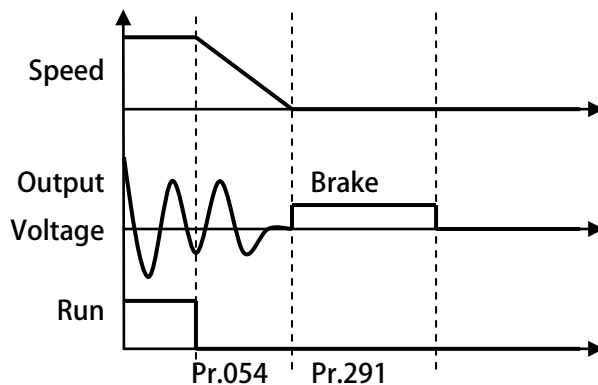
| Value | Description                             |
|-------|-----------------------------------------|
| 0     | Start from ZERO speed                   |
| 2     | DC-Injection Brake then Start from Zero |

● Pr.290 → START DELAY TIME

Setting START DELAY TIME

● Pr.291 → Brake Hold Time

This parameter sets the brake hold time for brake period. Refer to the figure below.  
When driver decelerate to 0 speed , it will send a brake voltage to motor and hold for a period of time to make sure the motor actually stopped. This time is called Brake Hold Time.



● Pr.293 → Ctrl-Mode1 : ACC Time-2

● Pr.294 → Ctrl-Mode1 : DEC Time-2

This parameter set second accelerate/decelerate time  
please refer to the relevant I/O : DIx(212)

● Pr.457 → Ctrl-Mode1 : JOG ACC/DEC Time

This parameter set Jog ramp time , please refer to the relevant I/O : DIx(215) / DIx(216) 。  
Set speed from [0rpm to 1000rpm] / [1000rpm to 0rpm] speed time required

● Pr.458 → Ctrl-Mode1 : EMS\_DEC Time

This parameter set EMS time , please refer to the relevant I/O : DIx(211) 。  
Set speed from 1000rpm down to 0rpm speed time required 。

● Pr.459 → Stop Option Select

| Value | Description                              |
|-------|------------------------------------------|
| 0     | Ramp Down Stop, Start DC Injection Brake |
| 1     | IGBT OFF, Free Run Stop                  |

## 10.11 DC-BUS Adjust Group

- Pr.131 → DC Bus Measurement Adjust

This parameter used to adjust the Pr.132 displayed DC Bus Voltage.

【NOTE】 This parameter is pre-adjust in the factory , user don't have the necessary to adjust it

【WARNING】 This parameter can be modified only by trained person , otherwise may cause damage to the driver.

Adjust method:

1. Set Pr.131 to be 100.
2. Read the value of Pr.132 (DC Bus Voltage). The value is 290 for example.
3. Check the actual input AC input power. The measured voltage is 220Vac for example.
4. The DC power will be  $220 \times 1.414 = 311(\text{Vdc})$ .
5. The adjust value is calculated by the equation  $311 / 290 \times 100(\%) = 107(\%)$ .
6. Set Pr.131 to be 107 , then check Pr.132 will get correct voltage display for DC bus.

- Pr.132 → DC Bus Voltage

This parameter will display the measured DC bus voltage.

The relation of input AC power and DC bus voltage is  $V_{dc} = 1.414 * V_{ac}(\text{input power})$  °

- Pr.151 → Over Discharge Protect Time

This parameter can set the Over Discharge Protect Time to protect the discharge resistor. If the discharge time exceeds this setting , the driver will tip and show the Od alarm message.

【NOTE】 When  $\text{Pr.132} > (\text{Pr.130} \times 1.17)$  the driver will start to discharge.

- Pr.159 → UP Recovery

This parameter set UP alarm recovery , switch on/off : UP recovery

| Value | Description          |
|-------|----------------------|
| 0     | Disabled UP Recovery |
| 1     | Enabled UP Recovery  |

## 10.12 Thermistor Adjust Group

- Pr.140 → Heat Sink Temperature (centigrade)

This parameter displays the temperature of the driver' s heat sink.

- Pr.150 → Over Heat Protect Temperature (centigrade)

When the heat sink temperature (displays in Pr.140) exceeds the setting of this parameter , the driver will trip and show the OH alarm message.

## 10.13 FAN Adjust Group

- Pr.146 → FAN Control Type

| Value | Description                                                   |
|-------|---------------------------------------------------------------|
| 0     | According to the temperature of heat sink to control the FAN. |
| 1     | Always run.                                                   |

If  $\text{Pr.146} = 0$  , the FAN will turn to run when the temperature of heat sink exceeds 40 centigrade , and will turn off until the temperature is lower then 35 centigrade.

If  $\text{Pr.146} = 1$  , the FAN will be on all the time.

## 10.14 KTY 84/130 Thermo Group

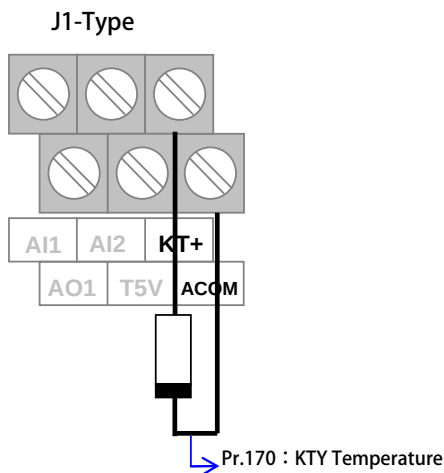
- Pr.170 → KTY1 Temperature  
This parameter display KTY temperature actual value , unit : DegC °  
【Note】 This parameter can not change because of belong to monitor type.
- Pr.171 → KTY1 Calibration  
This parameter set the factor of KTY temperature , to adjust KTY display value.
- Pr.172 → KTY1 Warning Level Setting(DOx(58))  
This parameter set the factor of KTY temperature , to adjust KTY display value.

### 10.14.1 KTY 84/130 Thermo Group : J1 Type

【Note】KTY84 is directional semiconductor temperature sensing element, please note that the wiring polarity.

【Example1】: Use KTY Component

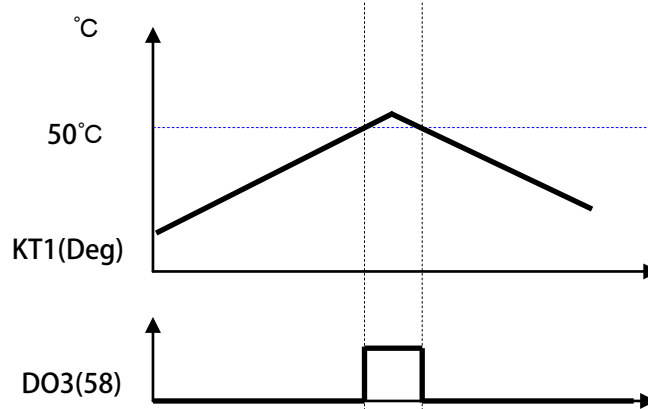
There is a high frequency spindle motor, in front of the motor bearings, Motor coil, respectively, after the bearing assembly KTY84/130 Temperature detection element for protection :  
Front bearing



● Pr.172=50 → KTY1 Warning Level 【Front bearing】

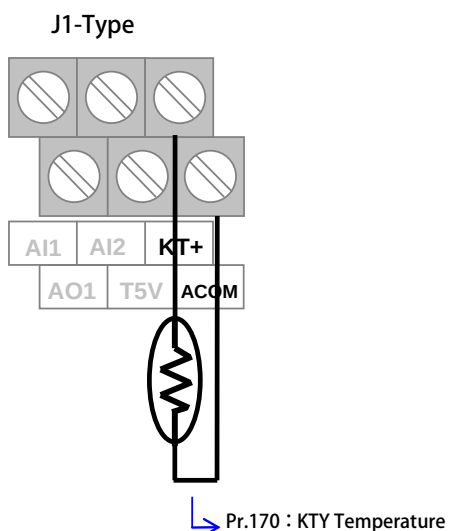
● Pr.113 =58 → DO3 function=KTY Warning

when KTY temperature > KTY Warning level , then DO3 is activated



【Example2】: Use PTC Component

Suppose there is a motor, motor coil a PTC temperature detection element, used to protect motor windings  
※ When the PTC's assumption of 1K ohm resistor, you need to output an alarm

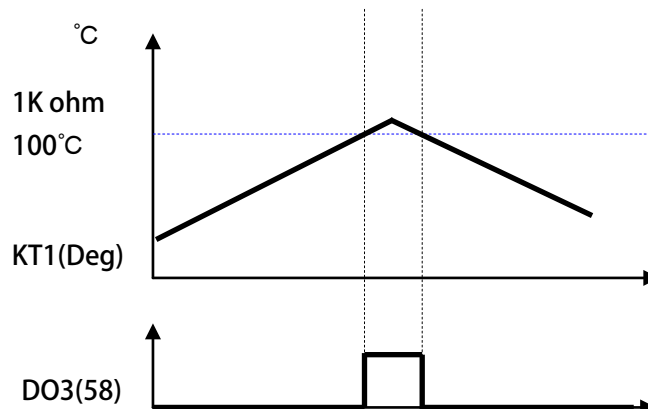


● Pr.172=50 → KTY1 Warning Level Setting(DOx(58))

● Pr.113=58 → DO3 function=KTY Warning

※ display when the terminal to empty a temperature of about 225 °C, will be useless to the two groups of KTY Alarm temperature is set to 300 °C, to avoid malfunction

When the PTC is 1K ohm resistor, the temperature read 100 degrees when KTY temperature > KTY Warning level , then DO3 is activated

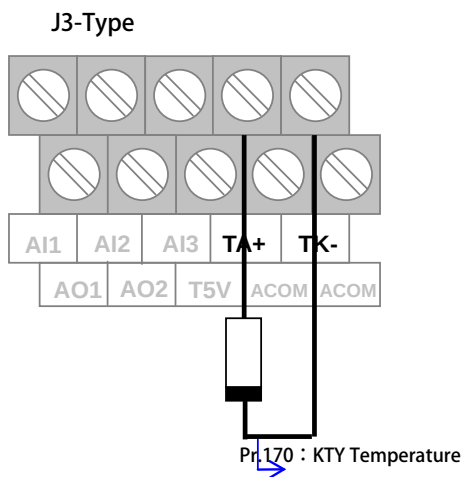


### 10.14.2 KTY 84/130 Thermo Group : J3&J6 Type

【Note】KTY84 is directional semiconductor temperature sensing element, please note that the wiring polarity.

【Example1】: Use KTY Component

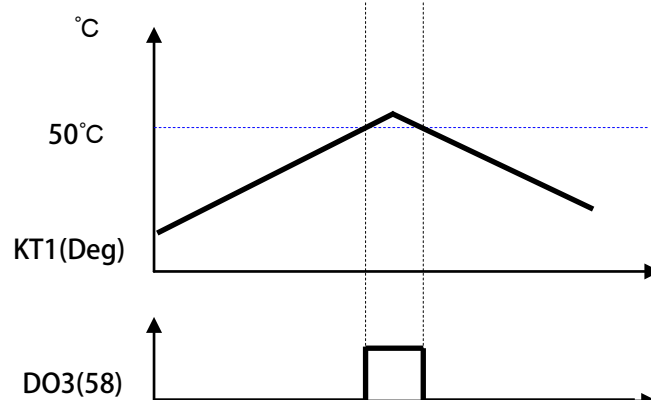
There is a high frequency spindle motor, in front of the motor bearings, Motor coil, respectively, after the bearing assembly KTY84/130 Temperature detection element for protection :  
Front bearing



● Pr.172=50 → KTY1 Warning Level 【Front bearing】

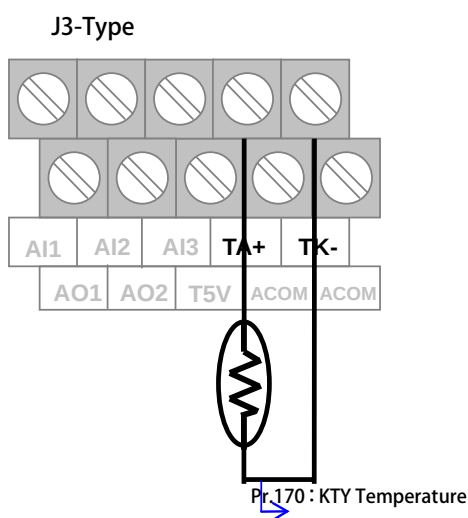
● Pr.113 =58 → DO3 function=KTY Warning

when KTY temperature > KTY Warning level , then DO3 is activated



【Example2】: Use PTC Component

Suppose there is a motor, motor coil a PTC temperature detection element, used to protect motor windings  
※ When the PTC's assumption of 1K ohm resistor, you need to output an alarm

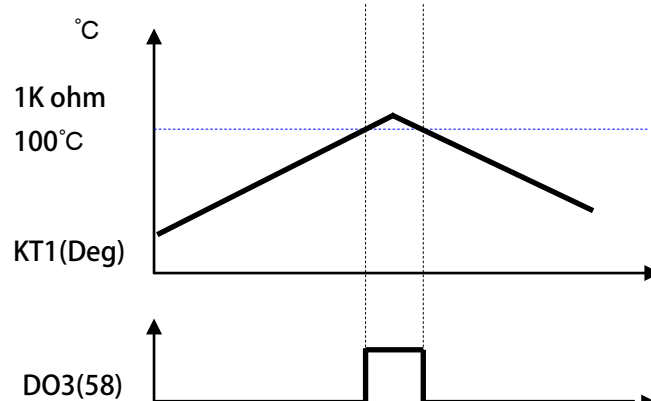


● Pr.172=50 → KTY1 Warning Level Setting(DOx(58))

● Pr.113=58 → DO3 function=KTY Warning

※ display when the terminal to empty a temperature of about 225 °C, will be useless to the two groups of KTY Alarm temperature is set to 300 °C, to avoid malfunction

When the PTC is 1K ohm resistor, the temperature read 100 degrees when KTY temperature > KTY Warning level , then DO3 is activated



## 11. Digital Input Function

【Note】Version : if function version  $\geq$  version , the function can be used .

Example : CA23  $\rightarrow$  C=2012 year / A=10 month /23 day

| Function | Function Description                            | Version        | Chapter |
|----------|-------------------------------------------------|----------------|---------|
| 006      | Over Heat Protect (OH)                          |                |         |
| 007      | Negative Output of Over Heat Protect (/OH)      |                |         |
| 010      | Speed Select SW0                                | 8 Speed Select |         |
| 011      | Speed Select SW1                                |                |         |
| 012      | Speed Select SW2                                |                |         |
| 016      | AI-1 Max Rpm Select                             |                |         |
| 023      | RESET                                           |                |         |
| 025      | Torque SW : OFF= AI2 , ON= Pr.96 (by Pr.086=9 ) |                |         |
| 060      | TIMER-A "TRIG/START" input                      |                | 13.3    |
| 061      | TIMER-B "TRIG/START" input                      |                |         |
| 209      | Ctrl Mode1 : / QUICK_STOP                       |                |         |
| 210      | SERVO_ON                                        |                |         |
| 211      | Ctrl Mode1 : QUICK_STOP                         |                |         |
| 212      | Ctrl Mode1 : 2'nd ACC/DEC                       |                |         |
| 213      | Forward Run                                     |                |         |
| 214      | Reverse Run                                     |                |         |
| 215      | JOG Forward                                     |                |         |
| 216      | JOG Reverse                                     |                |         |
| 217      | Ctrl Mode1 : INDEX_STOP                         |                |         |
| 221      | Servo-Pcmd(fromX/Y input pulse)                 |                |         |
| 222      | Servo-Vcmd(fromAI-1 , +/-10V)                   |                |         |
| 223      | PCMD-> Pcmd Direction Select                    |                |         |
| 226      | XY-MUL OFF=MUL1<-->ON=MUL2                      |                |         |
| 227      | Clear POS Errir                                 |                |         |
| 228      | Rigid-Tapping (Tap once by Trig.)               |                |         |
| 230      | Ctrl Mode1 : ORI_CMD                            |                |         |
| 231      | Simulation Forward PulseCommand                 |                |         |
| 232      | Simulation Reverse PulseCommand                 |                |         |
| 249      | Emergency Stop (will cause E5trip)              |                |         |

- Dlx \_ Select → 000, No function  
When select number, the output will be OFF all the time.
  - Dlx \_ Select → 006, Over Heat Protect (OH)  
The input terminal can accept external A type output thermo-relay signal to let driver to trip and show *OH* alarm message.
  - Dlx \_ Select → 007, Negative Output of Over Heat Protect (/OH)  
The input terminal can accept external B type output thermo-relay to let driver to trip and show *OH* alarm message.
  - Dlx \_ Select → 010 , Speed Select SW0
  - Dlx \_ Select → 011 , Speed Select SW1
  - Dlx \_ Select → 012 , Speed Select SW2
- These 3 functions are used to select the pre-set speed Pr.120 ~ Pr.127. To use the 8 sets pre set speed function , the Pr.278 must set to be 0.

Usage of SW0 ~ SW2:

| Parameter | Selected Speed | SW2<br>Dlx(12) | SW1<br>Dlx(11) | SW0<br>Dlx(10) | NOTE                               |
|-----------|----------------|----------------|----------------|----------------|------------------------------------|
| 120       | Speed Set0     | 0              | 0              | 0              | 0 : DI non active<br>1 : DI active |
| 121       | Speed Set1     | 0              | 0              | 1              |                                    |
| 122       | Speed Set2     | 0              | 1              | 0              |                                    |
| 123       | Speed Set3     | 0              | 1              | 1              |                                    |
| 124       | Speed Set4     | 1              | 0              | 0              |                                    |
| 125       | Speed Set5     | 1              | 0              | 1              |                                    |
| 126       | Speed Set6     | 1              | 1              | 0              |                                    |
| 127       | Speed Set7     | 1              | 1              | 1              |                                    |

- Dlx \_ Select → 023 , Reset  
If the input is active , the driver will be reset by this signal.  
【NOTE】 This function only can be selected only by actual terminal ,  
for virtual terminal can not select this function.
- Dlx \_ Select → 025 , Torque SW : OFF= AI2 , ON= Pr.96 (by Pr.086=9 )  
If this function is ON , torque SW=Pr.96  
If this function is OFF , torque SW = AI2  
【NOTE】 This function is suitable for Pr.86=9



- Dlx\_Select → 209 , Ctrl Mode1 : / QUICK\_STOP

When not select the function , will follow deceleration stop as fast as possible °

- Dlx\_Select → 210 , Ctrl Mode1 : SERVO\_ON

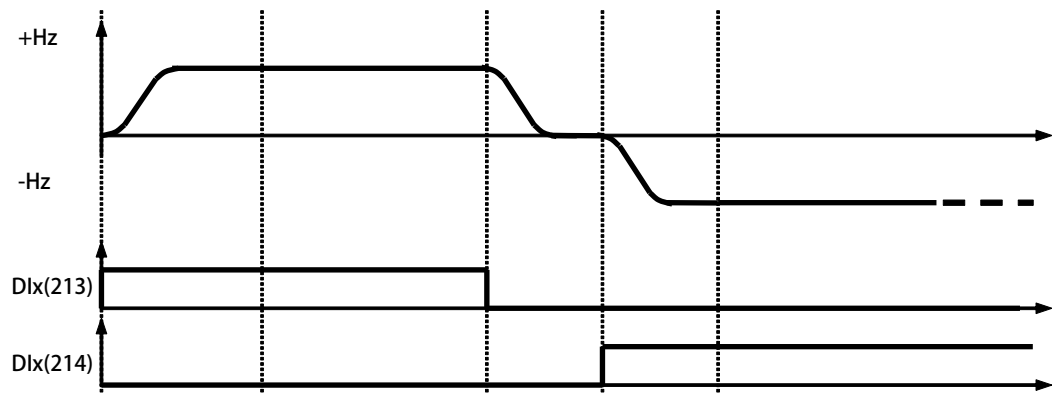
Pr.059 : SERVO\_ON type select

| ← Pr.059 = 0 : Servo ON by Dix(210)                       | ← Pr.059 = 1 : Servo ON by Dix(210) & Auto IndexStop       |
|-----------------------------------------------------------|------------------------------------------------------------|
| <p>rpm</p> <p>Dlx(210)</p> <p>Dlx(213)</p>                | <p>rpm</p> <p>Dlx(210)</p> <p>Dlx(217)</p> <p>Dlx(213)</p> |
| ← Pr.059=2 : Auto Servo ON with ORI function              |                                                            |
| <p>rpm</p> <p>Dlx(213)</p> <p>Dlx(230)</p> <p>DOx(44)</p> |                                                            |

- Dlx \_ Select → 211 , Ctrl Mode1 : QUICK\_STOP  
When select the function , will follow deceleration stop as fast as posible °
- Dlx \_ Select → 212 , Ctrl Mode1 : 2'nd ACC/DEC  
When select the function , will follow :  
Pr.293 : ACC Time-2  
Pr.294 : DEC Time-2 , ramp to run/stop °

- Dlx \_ Select → 213, Forward Run
- Dlx \_ Select → 214, Reverse Run

If the input is active, the driver will drive motor to forward / reverse direction.



- Dlx \_ Select → 215, Jog Fordward
- Dlx \_ Select → 216, Jog Reverse

If the input is active, the driver will drive motor to forward / reverse Jog runing.

● Dlx\_Select → 217, Ctrl Mode1 : INDEX\_STOP

When Pr.059 : SERVO\_ON type select=1 : Servo ON by Dlx(210) & Auto IndexStop °

Running condition is base on Dlx(210) is activated °

When Dlx(213)=ON , follow Pr.278 : Select Speed Source when SWx=000.

When Dlx(214)=ON , follow Pr.278 : Select Speed Source when SWx=000.

When Dlx(215)=ON , follow Pr.010 : JOG Rpm / Locate position Rpm

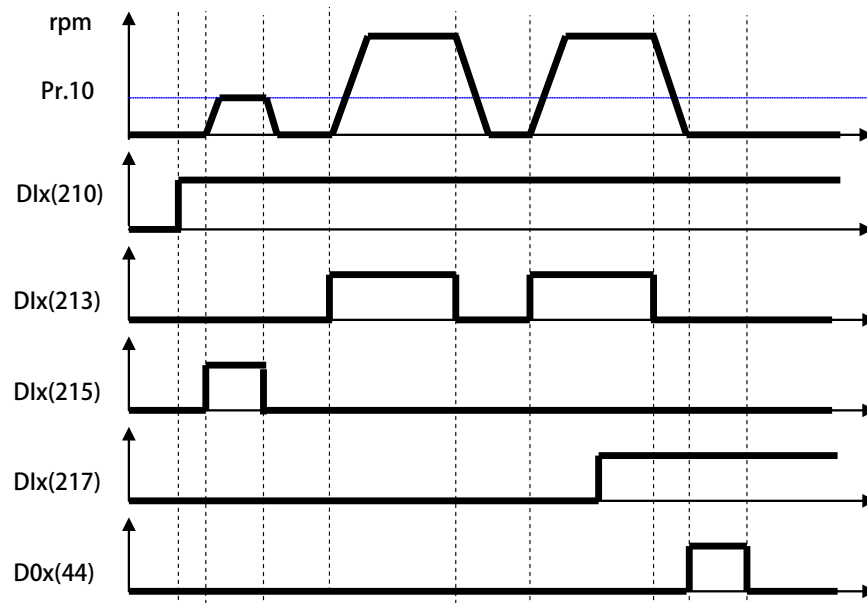
When Dlx(216)=ON , follow Pr.010 : JOG Rpm / Locate position Rpm

When Dlx(217)=ON , follow Pr.054 : DEC Time-1 to stop with

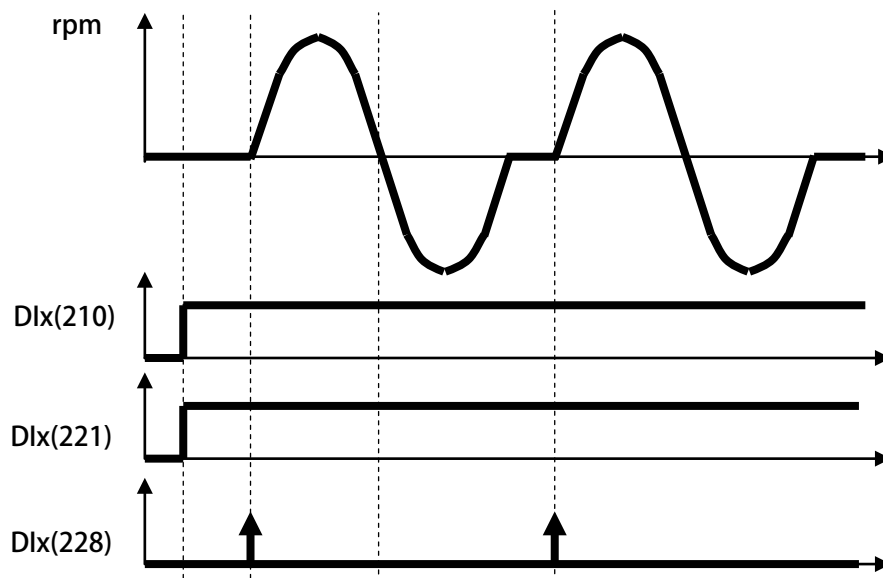
Pr.384 : CNCSpindle index angle ,

Then DOx(44) : INDEX STOP OK will be output °

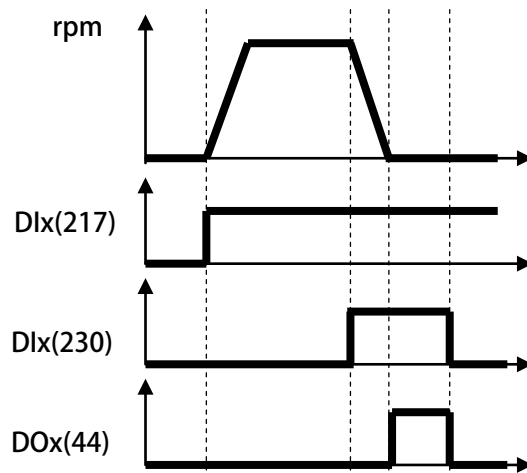
Action sequence is as follows :



- Dlx \_ Select → 221 , Servo-Pcmd(from X/Y input pulse)  
When select the function , get into Pcmd mode for running without ramp  
Suitable Pcmd Rigid Tapping application .
- Dlx \_ Select → 222 , Servo-Vcmd(from AI-1 , +/-10V)  
When select the function , get into Vcmd mode for running without ramp  
Suitable Vcmd Rigid Tapping application .
- Dlx \_ Select → 223 , PCMD-> Pcmd Direction Select  
When select the function , change XY counter direction .
- Dlx \_ Select → 226 , XY-MUL OFF=MUL1↔ON=MUL2  
XY multiliper factor , change XY multiliper factor  
When =OFF , XY multiliper factor=Pr.450  
When =ON , XY multiliper factor=Pr.456
- Dlx \_ Select → 227 , Clear POS Errir  
When select the function , clear position error .
- Dlx \_ Select → 228 , Rigid-Tapping (Tap once by Trig.)  
When select the function , each trigger to run Rigid tappingmodify command .  
Pr.174 : Tapping Speed  
Pr.175 : Tapping ACC/DEC Ramp  
Action sequence is as follows :



- Dlx\_Select → 230 , Ctrl Mode1 : ORI\_CMD



【Note】 this function is suitable :

Pr.059 : SERVO\_ON type select=2 : Auto Servo ON with ORI function ◦

- Dlx\_Select → 231 , Simulation Forward PulseCommand
- Dlx\_Select → 232 , Simulation Reverse PulseCommand  
When select the function , Simulation Forward / Reverse PulseCommand ◦
- Dlx\_Select → 249 , Emergency Stop (will cause ES trip)  
If the input is active , the driver will:
  - ◆ The driver will immediately trip and stop output to motor.
  - ◆ Motor will have no power and free run to stop.
  - ◆ The driver will show ES alarm message.

## 12. Digital Output Function

【Note】Version : if function version  $\geq$  version , the function can be used .

Example : CA23  $\rightarrow$  C=2012 year / A=10 month /23 day

| Function | Function Description                                                   | Version | Chapter |
|----------|------------------------------------------------------------------------|---------|---------|
| 000      | Always OFF                                                             |         |         |
| 001      | Always ON                                                              |         |         |
| 002      | In Running                                                             |         |         |
| 003      | Over Load Warning(Irms >50%)                                           |         |         |
| 004      | Alarm                                                                  |         |         |
| 005      | No Alarm                                                               |         |         |
| 006      | Forward Run and Speed $\geq$ Pr.206 (speed compared value).            |         | 13.4    |
| 007      | Reverse Run and Speed $\geq$ Pr.206 (speed compared value).            |         |         |
| 009      | SPZ (Speed Zero), Speed $\leq$ Pr.206.                                 |         |         |
| 010      | NSPZ (Not Speed Zero), Speed > Pr.206.                                 |         |         |
| 012      | SPA: Speed Arrive (Pr.19: Actual speed — Speed Cmd) <Pr.208            |         |         |
| 013      | SPNA: Speed Not Arrive (Pr.19: Actual speed — Speed Cmd) $\geq$ Pr.208 |         |         |
| 014      | SPO (Speed Over compared value), Speed $\geq$ (Pr.207+Pr.208)          |         |         |
| 015      | SPU (Speed Under compared value), Speed $\leq$ (Pr.207-Pr.208)         |         |         |
| 016      | SPE (Speed Equal), the different between Speed and Pr.207 < Pr.208.    |         |         |
| 017      | INDEX( 5ms PGC )                                                       |         |         |
| 020      | INDEX( $0 \pm 5\text{deg}$ )                                           |         |         |
| 022      | Resistor Discharging                                                   |         |         |
| 023      | DC Injection Dynamic Braking                                           |         |         |
| 036      | SERVO READY                                                            |         |         |
| 041      | EMS STOPPING                                                           |         |         |
| 042      | JOG RUNNING                                                            |         |         |
| 043      | INDEX STOP RAMPDOWN                                                    |         |         |
| 044      | INDEX STOP OK                                                          |         |         |
| 058      | KTY_WARNING                                                            |         |         |
| 088      | ACCing                                                                 |         |         |
| 089      | DECing                                                                 |         |         |
| 104      | Timer A output "Q" .                                                   |         | 13.3    |
| 105      | Timer A output "/Q" .                                                  |         |         |
| 106      | Timer B output "Q" .                                                   |         |         |
| 107      | Timer B output "/Q" .                                                  |         |         |
| 170      | SYNC0 PLL Ready                                                        |         |         |

- DOx \_ Select ➔ 000 , Always OFF  
The output terminal is always non active.
- DOx \_ Select ➔ 001 , Always ON  
The output terminal is always active.
- DOx \_ Select ➔ 002 , In Running  
If the driver is in running the terminal will be active.  
If the driver is not in running the terminal will be non active.
- DOx \_ Select ➔ 003 , Over Load Pre-Alarm  
If electronic thermo accumulate to 50% of setting time, the terminal will be active.
- DOx \_ Select ➔ 004 , Alarm  
In normal condition, the output terminal is non active. If there is any kind of alarm happened, the output terminal will be active ◦
- DOx \_ Select ➔ 005 , No Alarm  
In normal condition, the output terminal is active. If there is any kind of alarm happened, the output terminal will be non active ◦
- DOx\_Select ➔ 017 , INDEX( 5ms PGC )  
If select this function , this function is activity when C signal of encoder switch on ◦  
【Note】 this signal keep on status 5ms ◦
- DOx\_Select ➔ 020 , INDEX(  $0 \pm 5 \text{deg}$  )  
If select this function , this function is activity when angle of C signal in 5 degree ◦
- DOx\_Select ➔ 022 , Resistor Discharging  
If select this function , this function is activity when Discharging ◦
- DOx\_Select ➔ 023 , DC Injection Dynamic Braking  
If select this function , this function is activity when DC Injection Dynamic Braking ◦
- DOx\_Select ➔ 036 , SERVO READY  
If select this function , this function is activity when Servo ready ◦
- DOx\_Select ➔ 041 , EMS STOPPING  
If select this function , this function is activity when EMS ramp down ◦
- DOx\_Select ➔ 042 , JOG RUNNING  
If select this function , this function is activity when JOG running ◦
- DOx\_Select ➔ 043 , INDEX STOP RAMPDOWN  
If select this function , this function is activity when INDEX function is activated ◦
- DOx\_Select ➔ 044 , INDEX STOP OK  
If select this function , this function is activity when INDEX function is finish ◦
- DOx\_Select ➔ 058 , KTY\_WARNING  
If select this function , the function is scivity when below condition :  
【Note】 Pr.170 : KTY1 Temperature > Pr.172 : KTY1 Warning Level Setting(DOx(58))
- DOx\_Select ➔ 088 , ACCing  
If select this function , when drive is accerating , output status will be active ◦
- DOx\_Select ➔ 089 , DECIing  
If select this function , when drive is decelerating , output status will be active ◦

## 13. Embedded Multi-function Module

### 13.3.1 Timer Group Parameters

The drive has embedded two timer module (Timer A , Timer B); below section will describe the function and application of these two timer.

- Pr.249 → Type of Timer A

This parameter can set the operation type of Timer A.

| Value | Description              |
|-------|--------------------------|
| 0     | Timer A Delay Off Mode   |
| 1     | Timer A Delay On Mode    |
| 2     | Timer A Auto On/Off Mode |

- Pr.250 → T1 time of Timer A.
- Pr.251 → T2 time of Timer A.

- Pr.252 → Type of Timer B.

This parameter can set the operation type of Timer B.

| Value | Description              |
|-------|--------------------------|
| 0     | Timer B Delay Off Mode   |
| 1     | Timer B Delay On Mode    |
| 2     | Timer B Auto On/Off Mode |

- Pr.253 → T1 time of Timer B.
- Pr.254 → T2 time of Timer B.

### 13.3.2 Timer Group Digital-Input

- DIx\_Select → 60 , TIMER-A "TRIG/START" input
- DIx\_Select → 61 , TIMER-B "TRIG/START" input

### 13.3.3 Timer Group Digital-Output

- DOx\_Select → 104 , Timer A output "Q"
- DOx\_Select → 105 , Timer A output "/Q"
- DOx\_Select → 106 , Timer B output "Q"
- DOx\_Select → 107 , Timer B output "/Q"

Description of the usage :

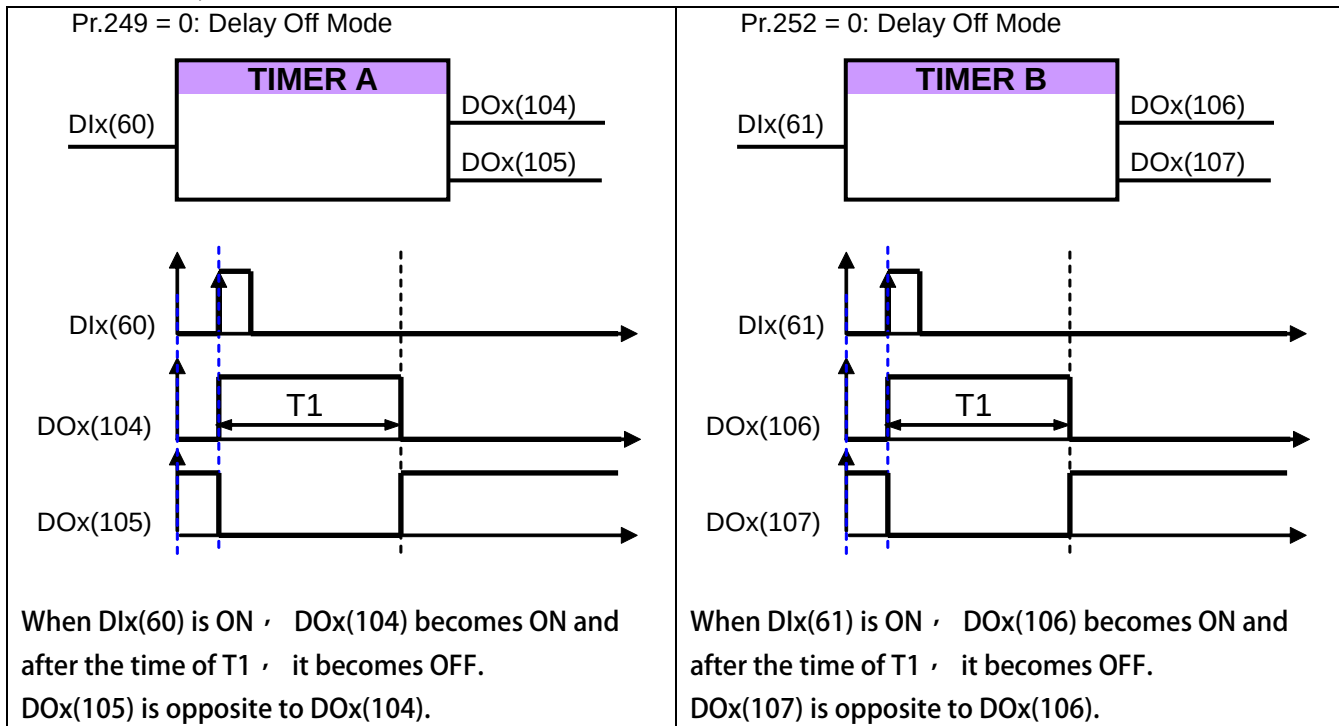
Below section will description the way to set and start the timer. All the two timers are individual and have there own parameter group for setting.

1. Select the function type of timer; for Timer A use Pr.249 , for Timer B use Pr.252.
2. Define the action time of the timer; for Timer A use Pr.250 and Pr.251 , for Timer B use Pr.253 and Pr.254.
3. Define a DI to be the Enable input of timer.
4. Define a DO to be the output of timer.



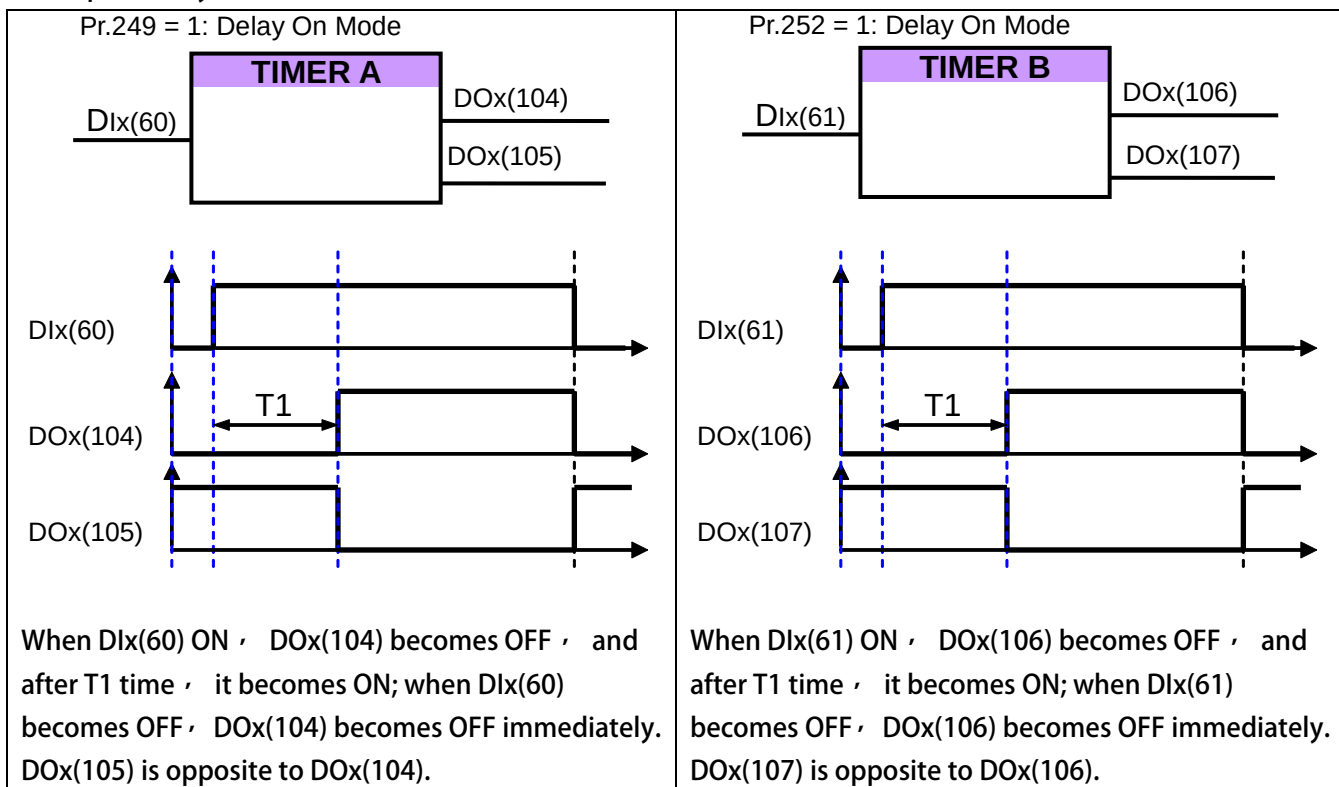
### 13.3.4 Timer Function (Delay Off Mode)

Example : Delay off Mode Timer



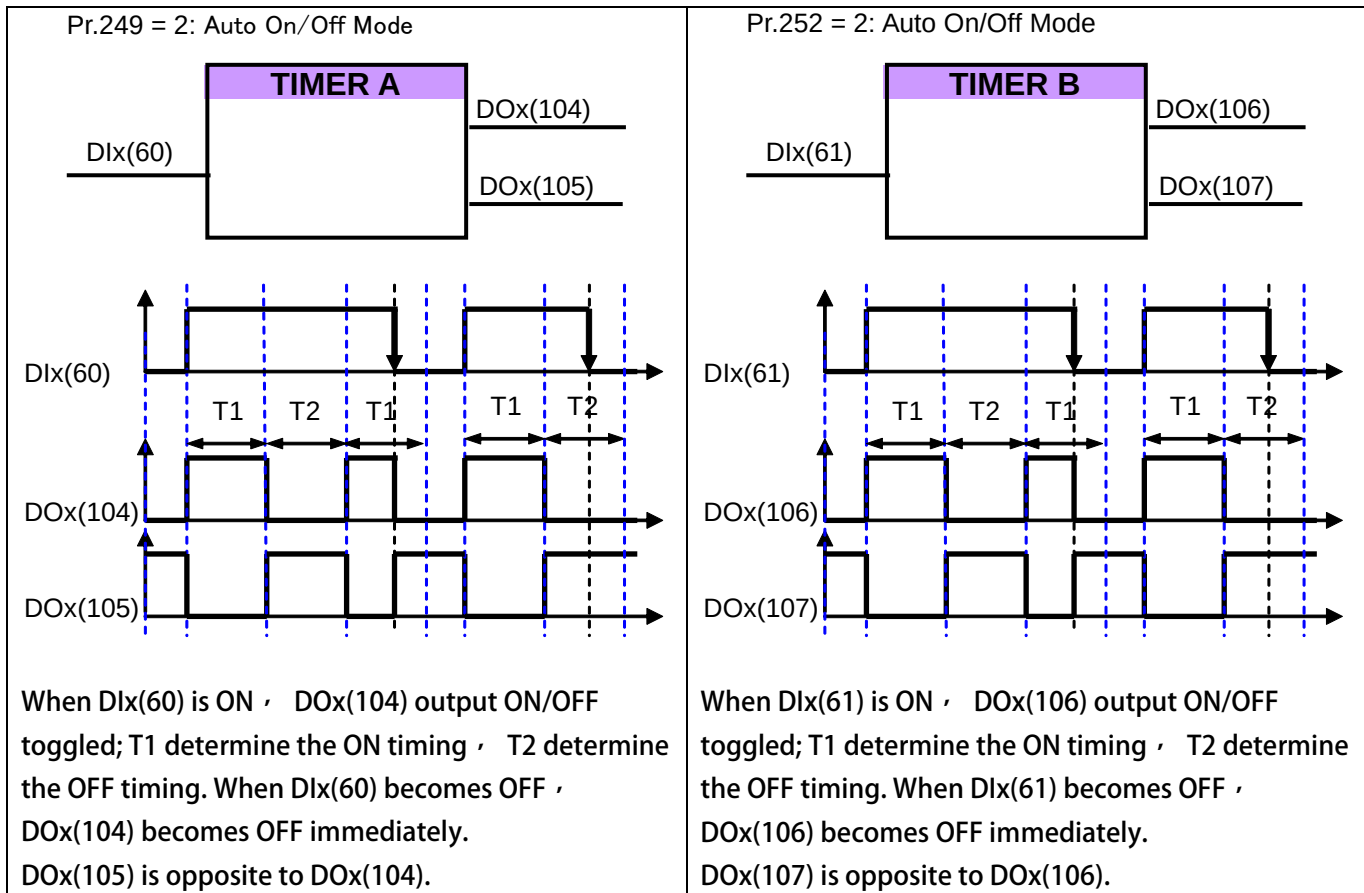
### 13.3.5 Timer Function (Delay On Mode)

Example : Delay On Mode



### 13.3.6 Timer Function (Auto On/Off Mode)

#### Example 3: Auto On/Off Mode



## 13.4 Speed Compare Group

### 13.4.1 Speed Compare Group Parameters

- Pr.206 → Speed Compare Value
- Pr.207 → Speed Arrive Setting
- Pr.208 → Speed Arrive Range
- Pr.222 → Speed Feedback Filter(For DOx)

This parameter decides speed feedback filter factor ,

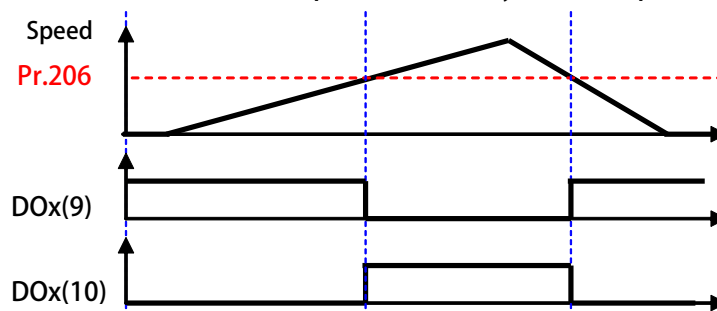
When filter factor larger , the speed will be stable better ◦

【Note】【Version=CB16】：This parameters is suitable for exceed than CB16 version

### 13.4.2 Speed Compare Group Digital-Input

### 13.4.3 Speed Compare Group Digital-Ouput

- DOx \_ Select → 006 , Forward Run and Speed  $\geq$  Pr.206 (speed compared value)  
If motor runs in forward direction and the speed  $\geq$  Pr.206 , output will be active ◦  
【Note】This function speed effected by Pr.222 : speed feedback filter factor
- DOx \_ Select → 007 , Reverse Run and Speed  $\geq$  Pr.206 (speed compared value)  
If motor runs in reverse direction and the speed  $\geq$  Pr.206 , output will be active ◦  
【Note】This function speed effected by Pr.222 : speed feedback filter factor
- DOx \_ Select → 009 , SPZ (Speed Zero) , Speed  $\leq$  Pr.206  
If the motor' s speed  $\leq$  Pr.206 , the output terminal will be active.  
【Note】This function speed effected by Pr.222 : speed feedback filter factor
- DOx \_ Select → 010 , NSPZ (Not Speed Zero) , Speed  $>$  Pr.206  
If the motor' s speed  $>$  Pr.206 , the output terminal will be active.  
【Note】This function speed effected by Pr.222 : speed feedback filter factor



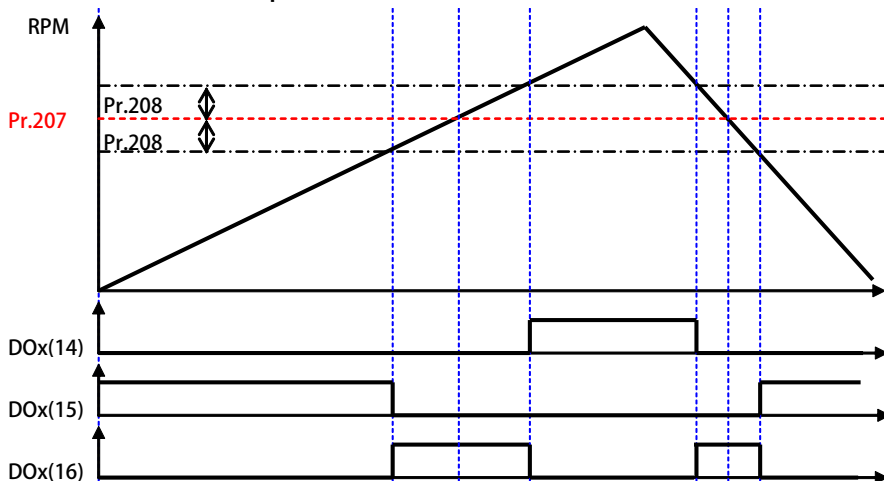
- DOx \_ Select → 012 , SPA: Speed Arrive (Pr.19: Actual Speed - Set speed) <Pr.208  
When the output terminal function selection mode , the function of the SPA (Speed Arrive) The terminal must start forward or reverse the state , and when the drive Pr.19: the actual speed - Set the speed <Pr.208 , the terminal output ON.
- DOx \_ Select → 013 , SPNA: Speed Not Arrive (Pr.19: the actual speed - the speed setting) > = Pr.208  
When the output terminal function selection mode , function SPNA (Speed Not Arrive: ) The terminal must start forward or reverse the state , and when the drive Pr.19: actual speed - Set the speed > = Pr.208 , the terminal output ON.
- DOx \_ Select → 014 , SPO (Speed Over compared value) , Speed >= (Pr.207+Pr.208)
- DOx \_ Select → 015 , SPU (Speed Under compared value) , Speed <= (Pr.207-Pr.208)
- DOx \_ Select → 016 , SPE (Speed Equal) , the different between Speed and Pr.207 < Pr.208  
【Note】 This three functions speed effected by Pr.222 : speed feedback filter factor

Description: Refer to the figure below.

If the motor' s speed reaches or exceeds Pr.207+Pr.208 , the output terminal DOx(14) will be active.

If the motor' s speed is equal or under "Pr.207 - Pr.208" , the output DOx(15) will be non active.

If the motor' s speed is between Pr.207-Pr.208 and Pr.207+Pr.208 , the output DOx(16) will be active.



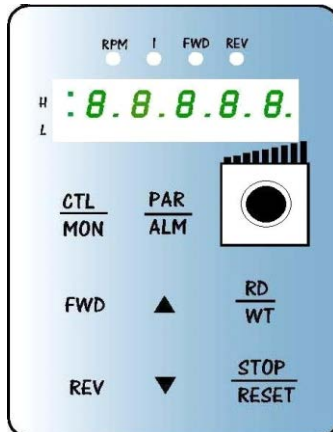
## 17. Control Panel Description

### 17.2 R-PANEL Operational

There are 5 Seven-segment displays , 6 LEDs , 8 buttons , and 1 AIP on this PANEL.

All control modes will be introduced below :

#### 17.2.1 Control Mode 【CTL MODE】



Press “CTL/MON” button to change between CTL and MON mode.

After pressing “CTL/MON” button , if neither “RPM” nor “I” LED lights up , means it’ s now under “CTL MODE , ” user can control the motor directly.

The function description of buttons and AIP is as below:

【AIP】 : Rotate the VR to provide a voltage to CPU , the resolution is form 0 to 4095(12bits)

【FWD】 : Motor RUN Forward command (DI5 ON; DI6 OFF)

【REV】 : Motor RUN Reverse command (DI5 OFF; DI6 ON)

【STOP】 : Motor STOP command (DI5 OFF; DI6 OFF)

#### 17.2.2 Monitor Mode 【MON MODE】

Press “CTL/MON” button to change between CTL and MON mode.

Press down and Hold “CTL/MON” button , if "RPM" lights up , the drive is under “MON MODE , ” user can monitor some status of Drive like speed “RPM , ” frequency “RPM” and current “I , ” and can control motor RUN Forward , Reverse , and Stop.

【Caution】 : 『When R-PANEL connect to: JMD-SERIES-DRIVER』

- " Neither "RPM" nor "I" light up , the drive is under “CTL MODE , ” the display shows Pr.056: RPM.
- Only "RPM" light up , the drive is under “MON MODE , ” the display shows Pr.056: RPM.
- Only "I" light up , the drive is under “MON MODE , ” the display shows Pr.018: I\_RMS (Ampere).

【Caution】 : 『When R-PANEL connect to: IRIS-SERIES-DRIVER』

- Neither "RPM" nor "I" light up , the drive is under “CTL MODE , ” the display shows Pr.019: RPM.
- Only "RPM" light up , the drive is under “MON MODE , ” the display shows Pr.019: RPM.
- Only "I" light up , the drive is under “MON MODE , ” the display shows Pr.204: AMP (%).

The function description of buttons is as below:

【FWD】 : Motor RUN Forward command (DI5 ON; DI6 OFF)

【REV】 : Motor RUN Reverse command (DI5 OFF; DI6 ON)

【STOP】 : Motor STOP command (DI5 OFF; DI6 OFF)

【▲】 : Change monitor parameter.

【▼】 : Change monitor parameter.

### 17.2.3 Parameter Editing Mode 【PAR MODE】

Press "PAR/ALM" button to change between PAR and ALM mode.

Press "PAR/ALM , " if display shows "Pr.nnn , " the drive is under "PAR MODE , " both "RPM" and "I" light up.

User can Edit or Monitor all parameters under this mode. The operate steps is as follows:

【Step1】 : Press "PAR/ALM , " the display shows "Pr.nnn." (nnn means parameter number: 000~999)

【Step2】 : Press ▲ or ▼ to change parameter number , press "STOP" to change the digital position.

【Step3】 : Press "RD/WT" to read the value of selected parameter.

【Step4】 : Press ▲ or ▼ to verify the value , press "STOP" to change the digital position.

【Step5】 : Press "RD/WT" to write down the parameter.

Repeating step 1 ~ 5 to verify other parameters.

### 17.2.4 ALARM MODE 【ALM MODE】

Press "PAR/ALM , " to change between "PAR MODE" and "ALM MODE."

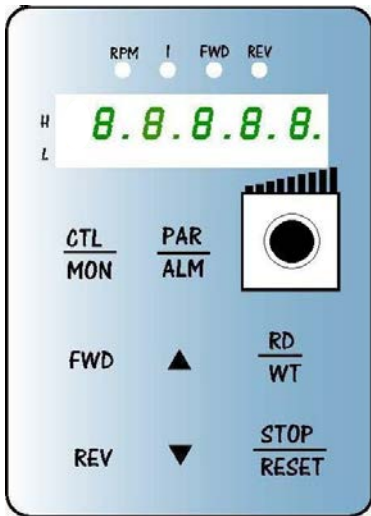
Continuously press "PAR/ALM , " if the display shows "A0-xx , " the drive is under "ALM MODE."

User can observe last four alarm record or RESET drive under this mode.

Press ▲ or ▼ to see historical alarm record.

Press "STOP/RESET , " to reset drive.

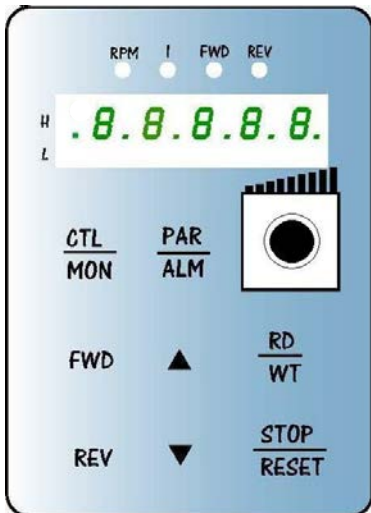
## 17.2.5 RD / WT 【Single-Word】 / 【Double-Word】 Parameters



### 【Parameters belong to Single-Word】

※ R-PANEL connect to JMD-SERVO

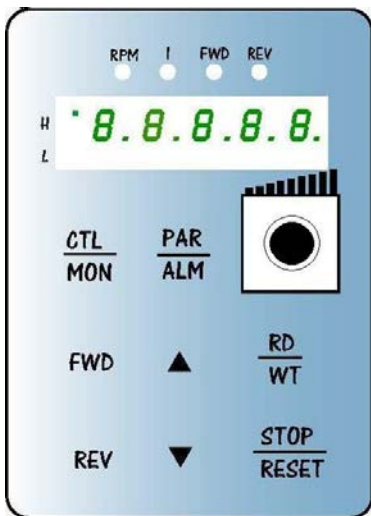
- Press "PAR/ALM" button to enter "PAR MODE," press ▲ or ▼ to change parameter number.  
Press "RD/WT" button, to read parameter value.
- If the parameter is belong to 【Single Word】 , the panel shows as the picture.
- Press ▲, ▼, or "STOP" button to change the value.  
The display is flashing on this time.
- After deciding the value, press "RD/WT" button to write down the value. The display stop flashing means the value written down.



### 【Parameters belong to Double-Word display of low word】

※ R-PANEL connect to JMD-SERVO

- Press "PAR/ALM" button to enter "PAR MODE," press ▲ or ▼ to change parameter number. Press "RD/WT" button, to read parameter value.
- If this parameter belongs to low word of a Double Word, the panel shows as the picture.
- To change to high word, press 【FWD】 .
- Press ▲, ▼, or "STOP" button to change the value.  
The display is flashing on this time.
- After deciding the value, press "RD/WT" button to write down the value. The display stop flashing means the value written down.



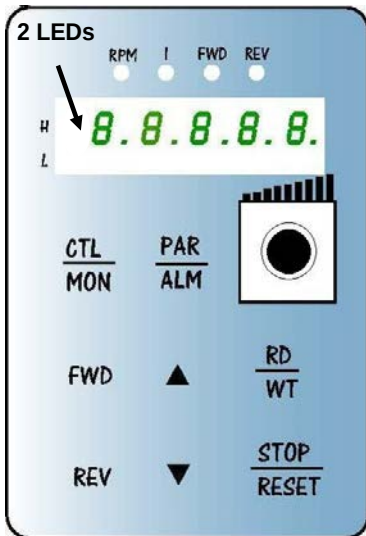
### 【Parameter belong to Double-Word display of high word】

※ R-PANEL connect to JMD-SERVO

- Press "PAR/ALM" button to enter "PAR MODE," press ▲ or ▼ to change parameter number. Press "RD/WT" button, to read parameter value.
- If this parameter belongs to high word of a Double Word, the panel shows as the picture.
- To change to high word, press 【REV】 .
- Press ▲, ▼, or "STOP" button to change the value.  
The display is flashing on this time.
- After deciding the value, press "RD/WT" button to write down the value. The display stop flashing means the value written down.
-

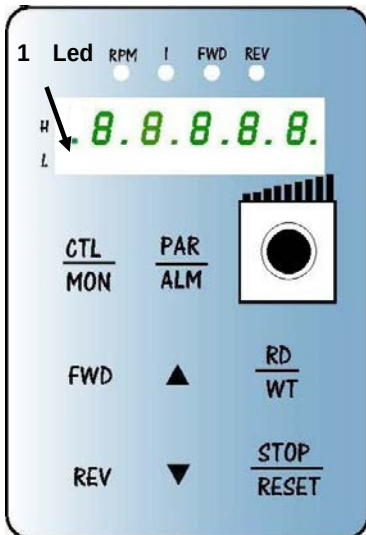


## 17.2.6 Single-Word】 / 【Double-Word】 Negative Numbers



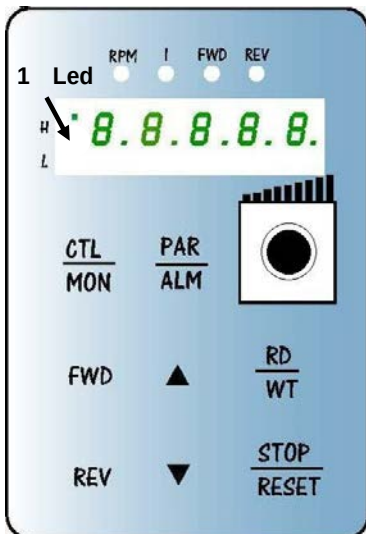
【Parameters belong to signed Single-Word】

- Refer to previous chapter, read or write parameters.
- To change between Positive and Negative, press “STOP” button for one second under “EDIT” status.
  - Only under “EDIT” status can change the sign.
  - Under this status, if the value is negative 2 LEDs flash.
  - Under this status, if the value is positive 2 LEDs lit up.
  - ※ Edit status means one of the seven-segment displays flashing.
  - ※ STOP button works only when parameters are signed.
  - ※ If 2 LEDs not lit up, the value is positive single word.
  - ※ If 2 LEDs flashing, the value is negative single word.
  - ※ Belong to 【minus】 【Single Word】



【Parameters belong to signed Double-Word low word】

- Refer to previous chapter, read or write parameters.
- To change between Positive and Negative, press “STOP” button for one second under “EDIT” status.
  - Only under “EDIT” status can change the sign.
  - Under this status, if the value is negative 1 LED flash.
  - Under this status, if the value is positive 1 LED lit up.
  - ※ Edit status means one of the seven-segment displays flashing.
  - ※ STOP button works only when parameters are signed.
  - ※ If 1 Led lit up, the value is positive.
  - ※ If 1 Led flashing, the value is negative.



【Parameters belong to signed Double-Word high word】

- Refer to previous chapter, read or write parameters.
- To change between Positive and Negative, press “STOP” button for one second under “EDIT” status.
  - Only under “EDIT” status can change the sign.
  - Under this status, if the value is negative 1 LED flash.
  - Under this status, if the value is positive 1 LED lit up.
  - ※ Edit status means one of the seven-segment displays flashing.
  - ※ STOP button works only when parameters are signed.
  - ※ If 1 Led lit up, the value is positive.
  - ※ If 1 Led flashing, the value is negative.



### 17.2.7 Alarm Mode of R-Panel 【ALM Code Description】

|    |    |    |    |    |    |   |   |   |   |     |    |    |     |   |    |     |
|----|----|----|----|----|----|---|---|---|---|-----|----|----|-----|---|----|-----|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5   | 4  | 3  | 2   | 1 | 0  | BIT |
| OC | UP | OP | OH | OL | OD | x | x | x | x | END | SE | CF | EMS | x | PG | ALM |

【Attention】

- X : undefine alarm °
- 【Current Alarm】 parameter is Pr.034 °
- BIT is mean binary method °
- This parameter belong to 1 Word °
- Example :

■ Assume Pr.034 = 4000 (Hex) ; So Pr.034 = 0100 0000 0000 0000 ( Binary)

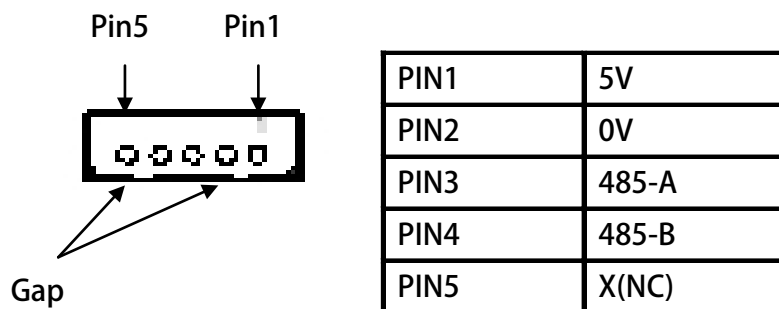
|    |    |    |    |    |    |   |   |   |   |     |    |    |     |   |    |        |
|----|----|----|----|----|----|---|---|---|---|-----|----|----|-----|---|----|--------|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5   | 4  | 3  | 2   | 1 | 0  | BIT    |
| OC | UP | OP | OH | OL | OD | x | x | x | x | END | SE | CF | EMS | x | PG | ALM    |
| 0  | 1  | 0  | 0  | 0  | 0  | 0 | 0 | 0 | 0 | 0   | 0  | 0  | 0   | 0 | 0  | Binary |
| 4  |    |    |    | 0  |    |   |   | 0 |   |     |    | 0  |     |   |    | Hex    |

| ALARM CODE | DESCRIPTION and TROUBLESHOOTING                                                                        |
|------------|--------------------------------------------------------------------------------------------------------|
| A0 - no    | A0 — no → No Error<br>No Error                                                                         |
| A0 - PG    | A0 — PG → PG Error<br>Motor encoder signal feedback error                                              |
| A0 — SE    | A0 — SE → Memory Error<br>EEPROM memory error                                                          |
| A0 — ES    | A0 — ES → Emergency Stop<br>Drive received emergency stop command form digital input or communication. |
| A0 — OD    | A0 — Od → Discharge Overtime<br>Drive electrical discharge time over protection time.                  |
| A0 - OL    | A0 — OL → Over Load<br>Drive over load time over protection time                                       |
| A0 - OH    | A0 — OH → Over Heat<br>Temperature of heat sink over heat                                              |
| A0 - OP    | A0 — OP → Over Power<br>Voltage over capacitance too high.                                             |
| A0 - UP    | A0 — UP → Low Power<br>Voltage over capacitance too low , please check the power source.               |

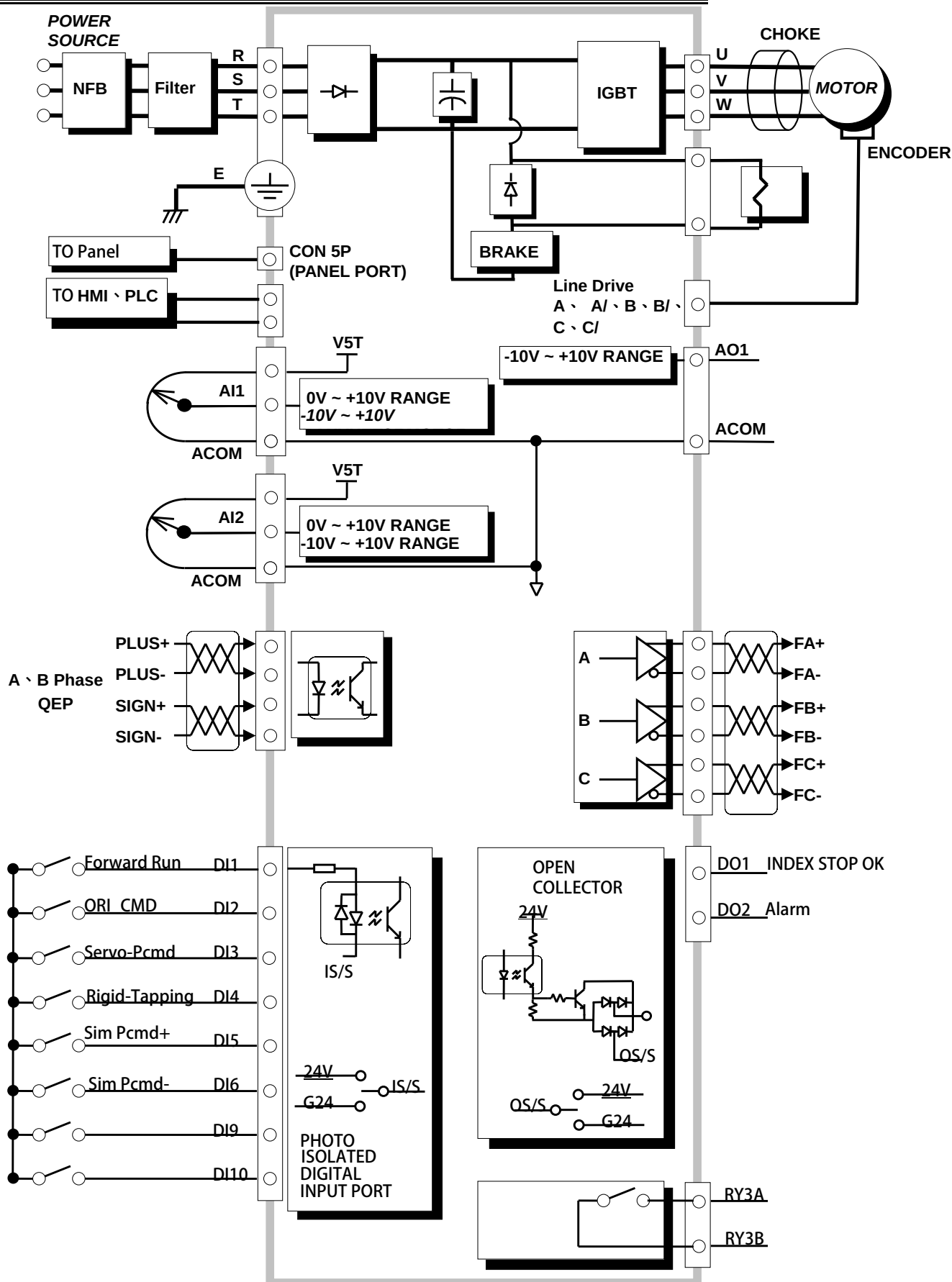
|          |                                                                               |
|----------|-------------------------------------------------------------------------------|
| A0 - OC  | A0 — OC → Over Current<br>Current output over protection level                |
| A0 — Er. | A0 — Er. → Communication Fail<br>Communication between panel and drive failed |

### 17.2.8 【Definition of Cables】

JAM SC-5P Connector :



## Example. Syntec Brand CNC Spindle(Rigid tapping)



【Example1】 AURORA-IMSV-2150 (Rigid Tapping Servo drive)(Rated Specification : 220V ; 15KW ; 46A)

Step1 Set Drive Operation mode  
Pr.003=0 → Drive Operation mode = IMAC, Open Loop V/F mode (set Hz)

Step2 Set V/F Pattern  
Pr.260=Follow example → MAX\_FREQUENCY  
Pr.261 = Follow example → MAX\_VOLTAGE  
Pr.262= Follow example → BASE\_FREQUENCY  
Pr.263= Follow example → BASE\_VOLTAGE  
Pr.264= Follow example → START FREQUENCY

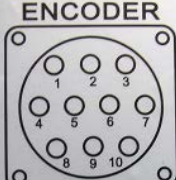
【Example】 follow SOLPPPOWER brand spindle motor : SVM-75M-60-24

System Power : 220VAC  
Motor wiring :  $\Delta$  type  
Rated voltage : 120V  
Rated current : 23.9A  
N-max rpm : 24000rpm /F-max ; Max Frequency 805Hz<4 pole>  
Nn No-load speed : 6000rpm<200Hz>  
Slip rpm : 180rpm

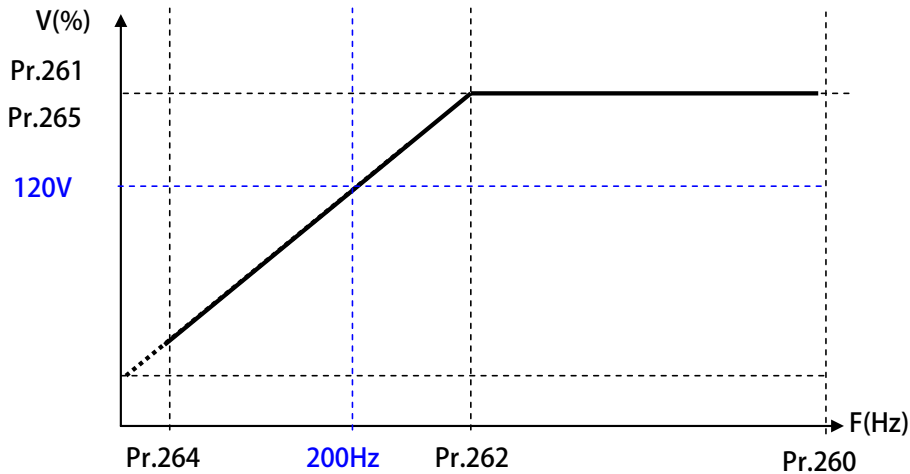
#### Motor information

|                                                                                     |                              |                            |                              |                                                                                     |  |
|-------------------------------------------------------------------------------------|------------------------------|----------------------------|------------------------------|-------------------------------------------------------------------------------------|--|
|  |                              | 3-PHASE                    |                              |  |  |
| IP-54 Asynchronous servo motor                                                      |                              |                            |                              |                                                                                     |  |
| TYPE :SVM-75M-60-24                                                                 |                              |                            | S/N : 13123001C              |                                                                                     |  |
| KW : 3/4.5                                                                          |                              | KW                         |                              | NM : 4.7/7.1    nt-m                                                                |  |
| V <sub>y</sub> 208 V                                                                | I <sub>y</sub> 13.8/20.7 MAX | V <sub>Δ</sub> 120 V       | I <sub>Δ</sub> 23.9/35.9 MAX |                                                                                     |  |
| Nn 6000 RPM                                                                         | F <sub>n</sub> 203 Hz        | N <sub>MAX</sub> 24000 RPM | F <sub>MAX</sub> 806 Hz      |                                                                                     |  |
| Induct 2.59 mH                                                                      | Resist 0.17 Ω                | Slip 180 RPM               |                              |                                                                                     |  |
| EN 60034-1                                                                          |                              | Class F                    |                              | Power Factor : 0.83                                                                 |  |
| IM B35                                                                              | DE brg 6205                  | NDE brg 6205               | Wgt 20 Kg                    |                                                                                     |  |
| FAN 1 Ph                                                                            | 220 V                        | 0.3 A                      | 50/60 Hz                     |                                                                                     |  |
| Encoder 1024 PPR                                                                    |                              | +5 Vdc                     |                              |                                                                                     |  |
| BRAKE NM                                                                            |                              | Vdc                        | W                            | Vdc                                                                                 |  |

#### Connector specification

| ENCODER                                                                              |           |                                                                                                                                                                                                                                                                                                         |           |       |          |       |           |   |   |   |           |   |   |   |       |      |      |  |  |
|--------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|-------|----------|-------|-----------|---|---|---|-----------|---|---|---|-------|------|------|--|--|
|  |           | <table border="1"> <tr> <td>L. V.</td><td><math>\Delta</math></td><td>H. V.</td><td><math>\lambda</math></td></tr> <tr> <td>Z</td><td>X</td><td>Y</td><td>Z - X - Y</td></tr> <tr> <td>U</td><td>V</td><td>W</td><td>U V W</td></tr> <tr> <td>120V</td><td>208V</td><td colspan="2"></td></tr> </table> |           | L. V. | $\Delta$ | H. V. | $\lambda$ | Z | X | Y | Z - X - Y | U | V | W | U V W | 120V | 208V |  |  |
| L. V.                                                                                | $\Delta$  | H. V.                                                                                                                                                                                                                                                                                                   | $\lambda$ |       |          |       |           |   |   |   |           |   |   |   |       |      |      |  |  |
| Z                                                                                    | X         | Y                                                                                                                                                                                                                                                                                                       | Z - X - Y |       |          |       |           |   |   |   |           |   |   |   |       |      |      |  |  |
| U                                                                                    | V         | W                                                                                                                                                                                                                                                                                                       | U V W     |       |          |       |           |   |   |   |           |   |   |   |       |      |      |  |  |
| 120V                                                                                 | 208V      |                                                                                                                                                                                                                                                                                                         |           |       |          |       |           |   |   |   |           |   |   |   |       |      |      |  |  |
| 1                                                                                    | +5V       |                                                                                                                                                                                                                                                                                                         |           |       |          |       |           |   |   |   |           |   |   |   |       |      |      |  |  |
| 2                                                                                    | +0V       |                                                                                                                                                                                                                                                                                                         |           |       |          |       |           |   |   |   |           |   |   |   |       |      |      |  |  |
| 3                                                                                    | A         |                                                                                                                                                                                                                                                                                                         |           |       |          |       |           |   |   |   |           |   |   |   |       |      |      |  |  |
| 4                                                                                    | $\bar{A}$ |                                                                                                                                                                                                                                                                                                         |           |       |          |       |           |   |   |   |           |   |   |   |       |      |      |  |  |
| 5                                                                                    | B         |                                                                                                                                                                                                                                                                                                         |           |       |          |       |           |   |   |   |           |   |   |   |       |      |      |  |  |
| 6                                                                                    | $\bar{B}$ |                                                                                                                                                                                                                                                                                                         |           |       |          |       |           |   |   |   |           |   |   |   |       |      |      |  |  |
| 7                                                                                    | Z         |                                                                                                                                                                                                                                                                                                         |           |       |          |       |           |   |   |   |           |   |   |   |       |      |      |  |  |
| 8                                                                                    | $\bar{Z}$ |                                                                                                                                                                                                                                                                                                         |           |       |          |       |           |   |   |   |           |   |   |   |       |      |      |  |  |
| 9                                                                                    | 接地        |                                                                                                                                                                                                                                                                                                         |           |       |          |       |           |   |   |   |           |   |   |   |       |      |      |  |  |

Thermal Cooling sys  
Protection (NC) 220V



※ VF curve need to be set to the start frequency to the base frequency is a slash, the base frequency to the maximum frequency of a horizontal line

※ In the motor nameplate data, rated voltage 120V, rated frequency is 200Hz, calculated when the maximum voltage output 220V output frequency of 366Hz

|              |                                                                                                           |
|--------------|-----------------------------------------------------------------------------------------------------------|
| Pr.116=4     | → Motor pole no.                                                                                          |
| Pr.260=800   | → MAX_FREQUENCY (Hz)                                                                                      |
| Pr.261=100   | → MAX_VOLTAGE(%)                                                                                          |
| Pr.262=366.6 | → BASE_FREQUENCY (Hz)                                                                                     |
| Pr.263=100   | → BASE_VOLTAGE(%)                                                                                         |
| Pr.264=5     | → START FREQUENCY (Hz)                                                                                    |
| Pr.202=10980 | → No-Load Speed $\{120 \times (\text{Pr.262}) / (\text{Pr.116})\} = 10980\text{rpm}$                      |
| Pr.210=52    | → Full Load Current(% of AMP-Rating-Current)<br>$(23.9/46) \times 100\% = 51.9(\text{Approximately } 52)$ |
| Pr.203=180   | → Full-Load SLIP-RPM                                                                                      |

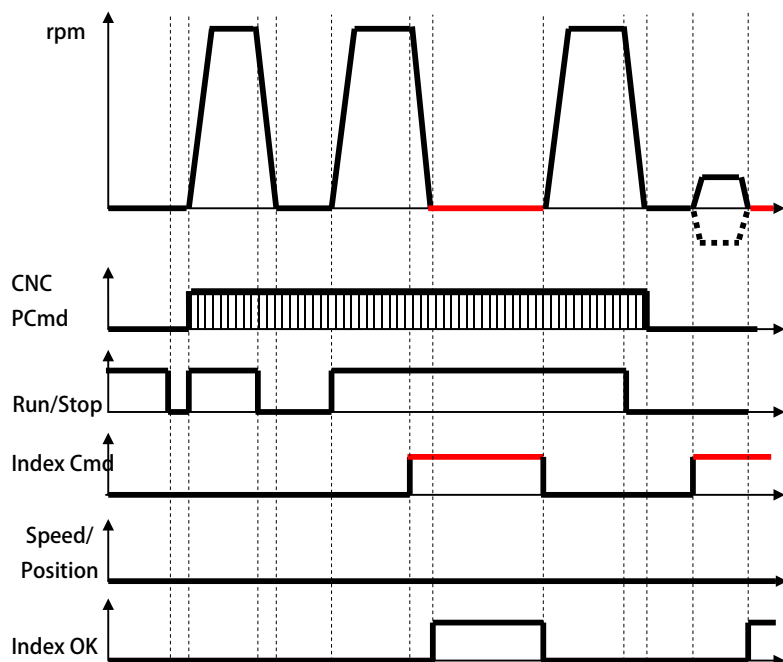
### Step3 OpenLoop Running

- Pr.270=10 → VF-HZset 0
- Pr.061=210 → DI1 function select =SERVO\_ON
- Pr.062 =213 → DI2 function select =Forward Running
- ☒ Enable DI-2 to run Forward Running
  - ☛ When Forward Run condition , motor rotating in CCW direction (face to the motor axis)
    - ◆ If thr direction not match ; change motor wire V , W , to change motor direction .
  - ☛ Set feedback group parameters
    - ◆ Pr.188=1 → ENCODER DIRECTION =1 : B Lead A
    - ◆ Check Pr.190 : A/B ENCODER COUNTER =Up counter  
If down counter , please change A , /A signal
  - ☛ Under V/F Mode , runing to Ns : No-Load speed =6000rpm(200Hz) , observations :
    - ◆ Pr.013=120 → Drive Output Voltage(rms)
    - ◆ Pr.205 → Output-Current (% of motor rated)  
This parameter shows Pr.211 : Field Current(% of Full-Load-Current)
    - ◆ Pr.211=Pr.205 → set Field Current(% of Full-Load-Current)

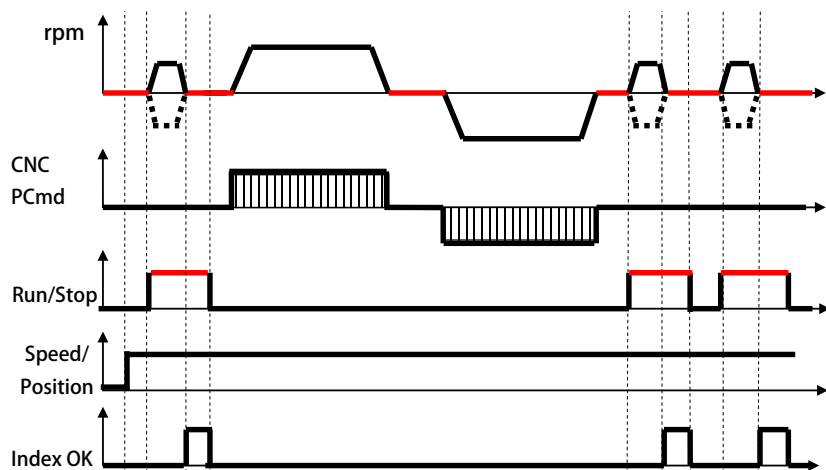
- Step4 Closeloop Running
- ☛ Pr.003=2 → Drive Operation mode = IMSV/PMSV, Close Loop A/B QEP feedback
  - ☛ Pr.278=9 → Select Speed Source when SWx=000=peed set by PCMD
  - ☛ Pr.010=100 → JOG Rpm / Locate position Rpm
  - ☛ Pr.194=0 → ENCODER TYPE = IM motor, ABZ Encoder
  - ☛ Pr.188=1 → ENCODER DIRECTION =(B Lead A)
  - ☛ Pr.190= up counts → A/B ENCODER COUNTER , use lower speed to check °  
When Forward condition= CCW direction (face to the motor axis) ,  
Check Pr.190 : A/B ENCODER COUNTER =Up counts  
If down counter , please change A , /A signal
  - ☛ Pr.189=1024 → ENCODER PPR  
Fireware version : E214 suitable 256 、 512 、 1024 、 2048ppr
  - ☛ Pr.192=2 → ENCODER DATA FILTER BUFFER =Buffer-Size = 4 (Encoder)
  - ☛ Pr.061=213 → DI1 function select =Forward Run
  - ☛ Pr.062=230 → DI2 function select = Ctrl Mode1 : ORI\_CMD
  - ☛ Pr.063=221 → DI3 function select = Servo-Pcmd(fromX/Y input pulse)
  - ☛ Pr.064=228 → DI4 function select = Rigid-Tapping (Tap once by Trig.)
  - ☛ Pr.065=231 → DI5 function select = Simulation Forward PulseCommand
  - ☛ Pr.066=232 → DI6 function select = Simulation Reverse PulseCommand
  - ☛ Pr.111=44 → DO-1 function select = INDEX STOP OK
  - ☛ Pr.112=4 → DO-2 function select =Alarm
  - ☛ Please Reset the drive
-

Step6 Operation Sequence

-----Pcmd speed command Mode



-----Pcmd Rigid Tapping Mode





【Example2】AURORA-IMSV-4150 (Rigid Tapping Servo drive)(Rated Specification : 380V ; 15KW ; 25A)

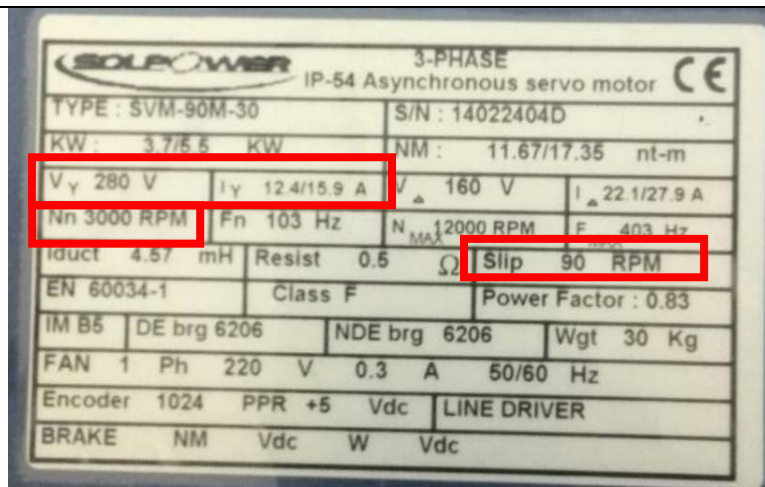
Step1 Set Drive Operation mode  
Pr.003=0 → Drive Operation mode = IMAC, Open Loop V/F mode (set Hz)

Step2 Set V/F Pattern  
Pr.260=Follow example → MAX\_FREQUENCY  
Pr.261 = Follow example → MAX\_VOLTAGE  
Pr.262= Follow example → BASE\_FREQUENCY  
Pr.263= Follow example → BASE\_VOLTAGE  
Pr.264= Follow example → START\_FREQUENCY

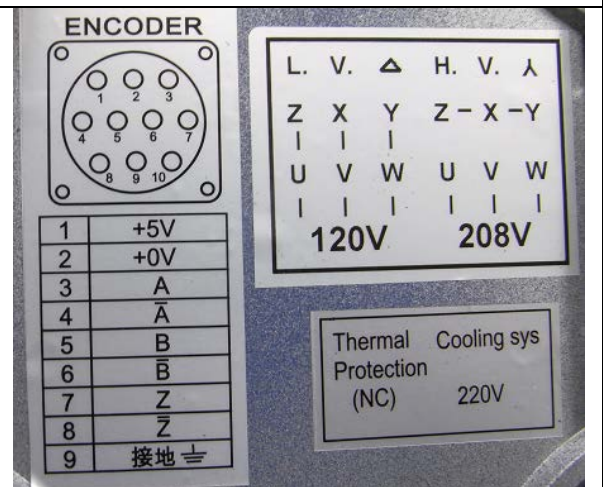
【Example】follow SOLPPPOWER brand spindle motor : SVM-90M-30

System Power : 380VAC  
Motor wiring : Y type  
Rated voltage : 280V  
Rated current : 12.4A  
N-max rpm : 12000rpm /F-max ; Max Frequency 403Hz<4 pole >  
Nn No-load speed : 3000rpm<100Hz>  
Slip rpm : 90rpm

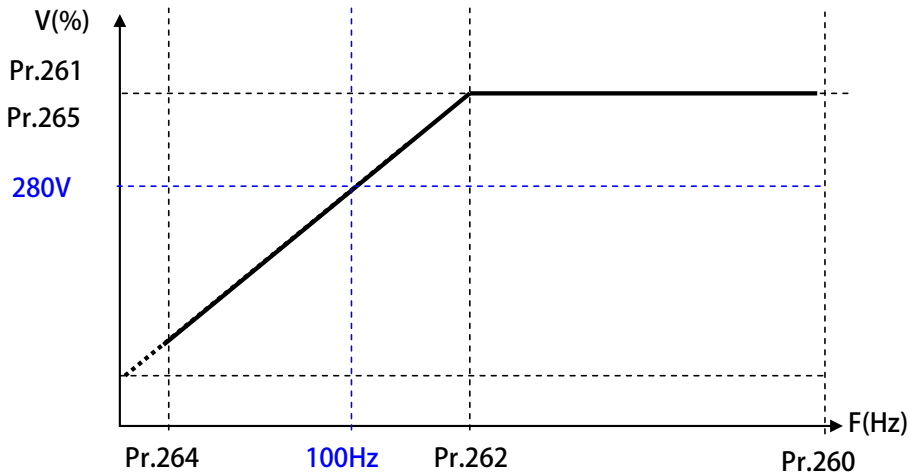
#### Motor information



#### Connector specification







※ VF curve need to be set to the start frequency to the base frequency is a slash, the base frequency to the maximum frequency of a horizontal line

※ In the motor nameplate data, rated voltage 280V, rated frequency is 100Hz, calculated when the maximum voltage output 380V output frequency of 135.7Hz

|              |                                                                                                    |
|--------------|----------------------------------------------------------------------------------------------------|
| Pr.116=4     | → Motor pole no.                                                                                   |
| Pr.260=400   | → MAX_FREQUENCY (Hz)                                                                               |
| Pr.261=100   | → MAX_VOLTAGE(%)                                                                                   |
| Pr.262=135.7 | → BASE_FREQUENCY (Hz)                                                                              |
| Pr.263=100   | → BASE_VOLTAGE(%)                                                                                  |
| Pr.264=5     | → START FREQUENCY (Hz)                                                                             |
| Pr.202=4071  | → No-Load Speed $\{120 \times (\text{Pr.262}) / (\text{Pr.116})\} = 4071\text{rpm}$                |
| Pr.210=50    | → Full Load Current(% of AMP-Rating-Current)<br>$(12.4/25) \times 100\% = 49.6$ (Approximately 50) |
| Pr.203=60    | → Full-Load SLIP-RPM                                                                               |

### Step3 OpenLoop Running

|             |                                        |
|-------------|----------------------------------------|
| Pr.270=10   | → VF-HZset 0                           |
| Pr.061=210  | → DI1 function select =SERVO_ON        |
| Pr.062 =213 | → DI2 function select =Forward Running |

☒ Enable DI-2 to run Forward Running

☛ When Forward Run condition , motor rotating in CCW direction (face to the motor axis)  
◆ If thr direction not match ; change motor wire V , W , to change motor direction .

☛ Set feedback group parameters

- ◆ Pr.188=1 → ENCODER DIRECTION =1 : B Lead A
- ◆ Check Pr.190 : A/B ENCODER COUNTER =Up counter

If down counter , please change A , /A signal

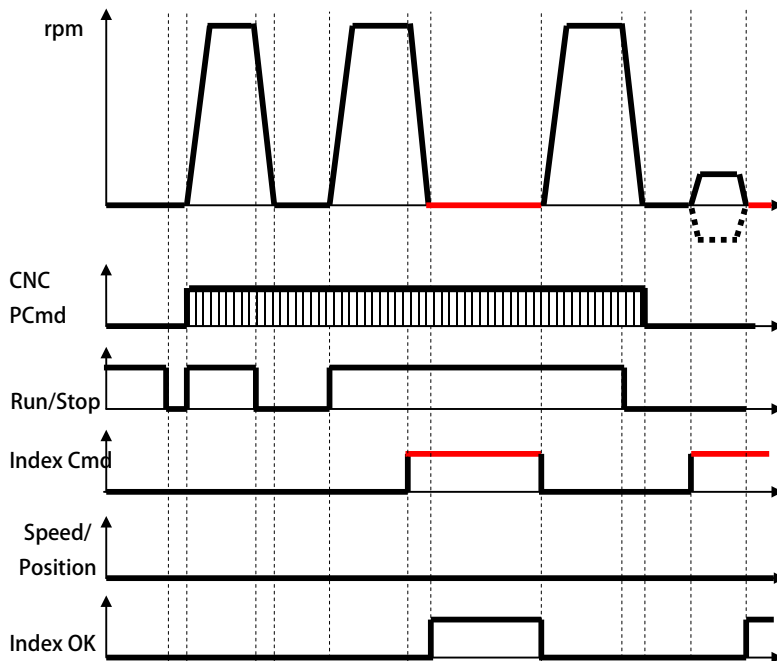
☛ Under V/F Mode , runing to Ns : No-Load speed =3000rpm(100Hz) , observations :

- ◆ Pr.013=280 → Drive Output Voltage(rms)
- ◆ Pr.205 → Output-Current (% of motor rated)  
This parameter shows Pr.211 : Field Current(% of Full-Load-Current)
- ◆ Pr.211=Pr.205 → set Field Current(% of Full-Load-Current)

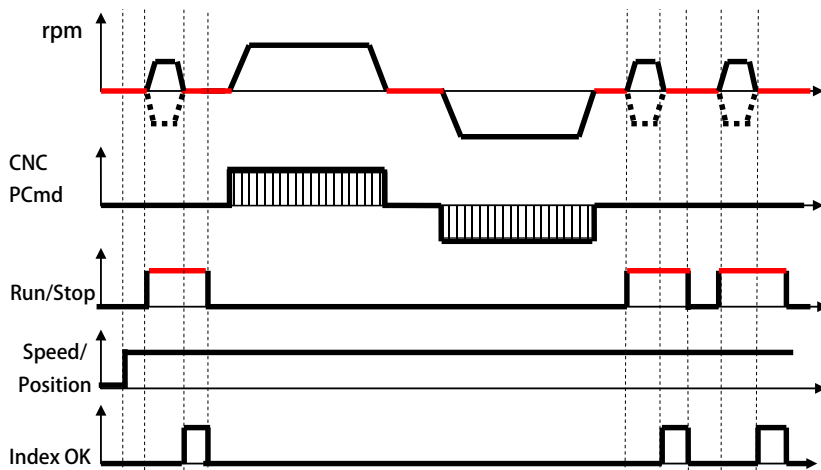
|       |                        |                                                                                                                                                                                                                          |
|-------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Step4 | Closeloop Running      |                                                                                                                                                                                                                          |
| ☛     | Pr.003=2               | → Drive Operation mode = IMSV/PMSV, Close Loop A/B QEP feedback                                                                                                                                                          |
| ☛     | Pr.278=9               | → Select Speed Source when SWx=000=peed set by PCMD                                                                                                                                                                      |
| ☛     | Pr.010=100             | → JOG Rpm / Locate position Rpm                                                                                                                                                                                          |
| ☛     | Pr.194=0               | → ENCODER TYPE = IM motor, ABZ Encoder                                                                                                                                                                                   |
| ☛     | Pr.188=1               | → ENCODER DIRECTION =(B Lead A)                                                                                                                                                                                          |
| ☛     | Pr.190= up counts      | → A/B ENCODER COUNTER , use lower speed to check °<br>When Forward condition= CCW direction (face to the motor axis) ,<br>Check Pr.190 : A/B ENCODER COUNTER =Up counts<br>If down counter , please change A , /A signal |
| ☛     | Pr.189=1024            | → ENCODER PPR<br>Fireware version : E214 suitable 256 、 512 、 1024 、 2048ppr                                                                                                                                             |
| ☛     | Pr.192=2               | → ENCODER DATA FILTER BUFFER =Buffer-Size = 4 (Encoder)                                                                                                                                                                  |
| ☛     | Pr.061=213             | → DI1 function select =Forward Run                                                                                                                                                                                       |
| ☛     | Pr.062=230             | → DI2 function select = Ctrl Mode1 : ORI_CMD                                                                                                                                                                             |
| ☛     | Pr.063=221             | → DI3 function select = Servo-Pcmd(fromX/Y input pulse)                                                                                                                                                                  |
| ☛     | Pr.064=228             | → DI4 function select = Rigid-Tapping (Tap once by Trig.)                                                                                                                                                                |
| ☛     | Pr.065=231             | → DI5 function select = Simulation Forward PulseCommand                                                                                                                                                                  |
| ☛     | Pr.066=232             | → DI6 function select = Simulation Reverse PulseCommand                                                                                                                                                                  |
| ☛     | Pr.111=44              | → DO-1 function select = INDEX STOP OK                                                                                                                                                                                   |
| ☛     | Pr.112=4               | → DO-2 function select =Alarm                                                                                                                                                                                            |
| ☛     | Please Reset the drive |                                                                                                                                                                                                                          |

Step6 Operation Sequence

-----Pcmd speed command Mode



-----Pcmd Rigid Tapping Mode





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