

AURORA J Type-IMSV USER MANUAL



VERSION : 2015/08/03

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... °

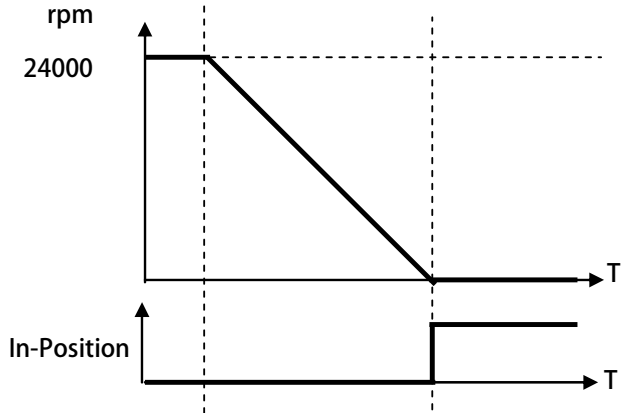
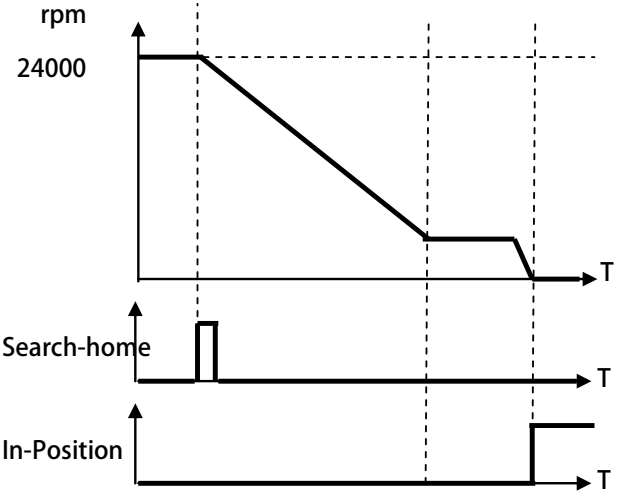
- ◎ 0 ~ 24000rpm high-speed acceleration slope
- ◎ 24000rpm , Autonomous accurate positioning stop (As shown below)
- ◎ 6000rpm High Speed Tapping
- ◎ Built Rigid tapping module , can be simulated immediately tracking error rigid tapping without master
- ◎ Receive Master Controller(Pcmd) , High-speed 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>JPS-AURORA Series Autonomous accurate positioning stop Duty cycle is short , advance enhance efficiency</p>	<p>Other Brand Drive General deceleration stop + Search-origin-point 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
Manual	1 book	Please read carefully and keep with care for referring usage.
Driver	1 set	Check the spec. of the device with the case label is same or not. Check the out looking of the device to make sure that there is no defect on it. 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 ψ 220V / 50/60HZ
OUTPUT	3 ψ 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~~0~~220 / 50/60HZ

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

OUTPUT : 3~~0~~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
		4022	4037	4055	4075	4110	4150	4225
Horse Power(HP)		3	5	7.5	10	15	20	30
Rated Power (KW)		2.2	3.7	5.5	7.7	11	15	22.5
Rated Capacity (KVA)		4.0	6.5	9.5	13	19	25	34
Brake Transistor		Include	Include	Include	Include	Optional	Optional	Optional
Dimension		P1		P2		P3		
Current (Amp rms)	2XXX	11	17	24	33	46	61	90
	4XXX	5.5	8.5	12	17	23	31	45
Voltage 、Frequence		220V Type : 1 ψ /3 ψ 50/60Hz						
		380V Type : 3 ψ 50/60Hz						
Allow Voltage changed		-30% ~ +30%						
Allow Frequency 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)

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

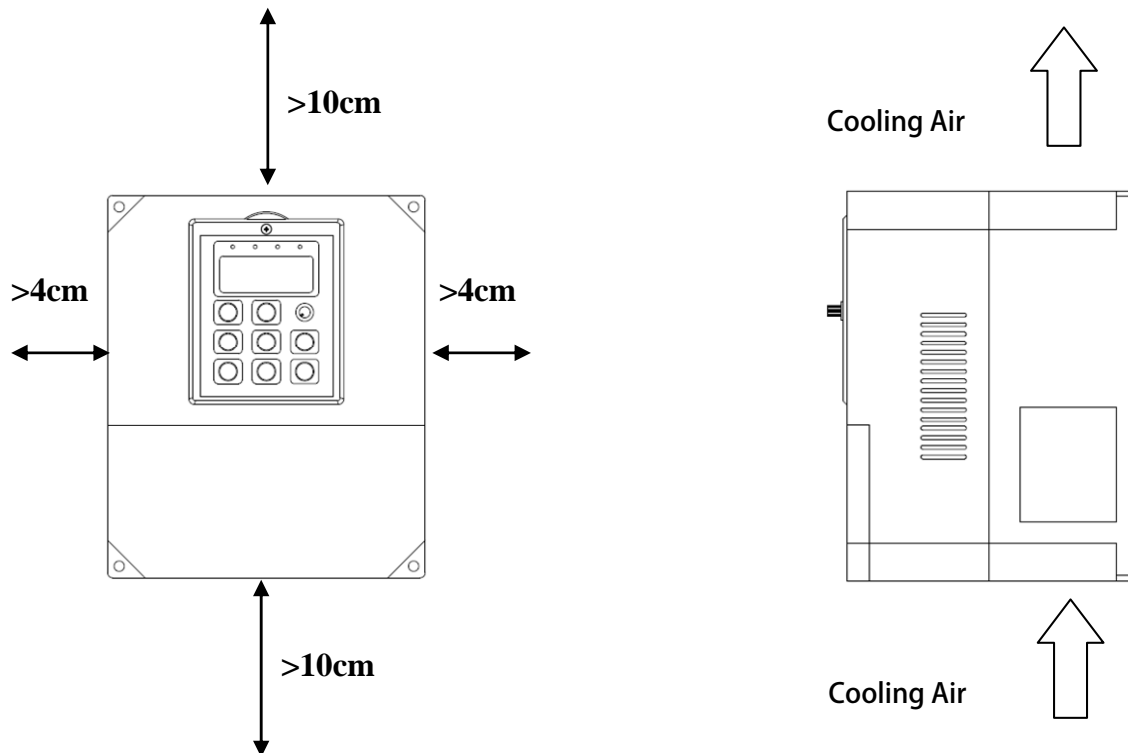
WARNING

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.

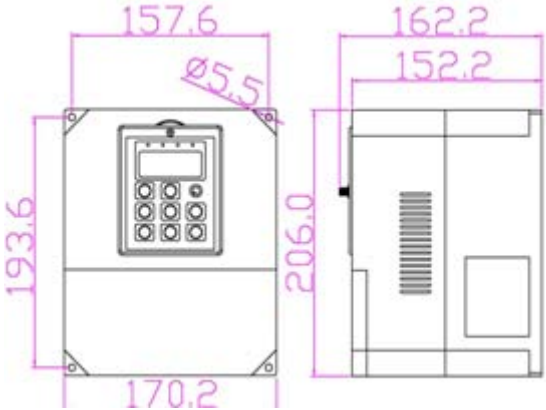
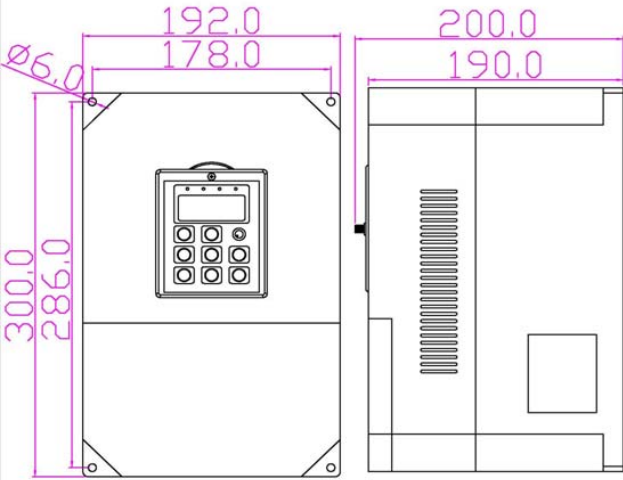
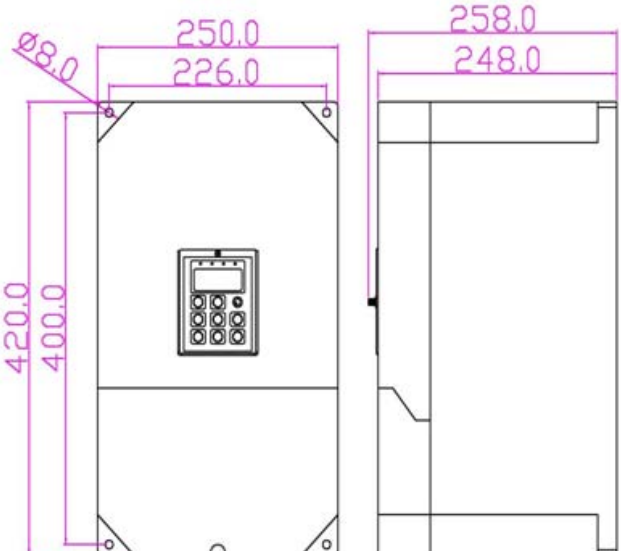
Do not be obstructing the cooling fan that installed on the inverter , it is used to build proper airflow for heat sink thermo dissipation. And do not touch the fan hole when it is running.

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	40	2000
The discharge duty is 10 %		

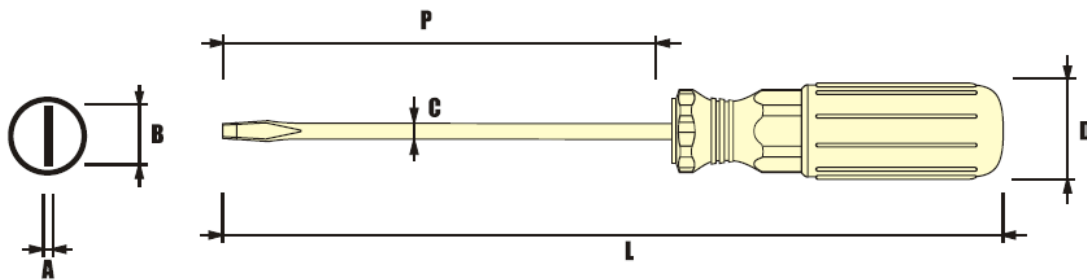
5.4 The Input Reactor

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.

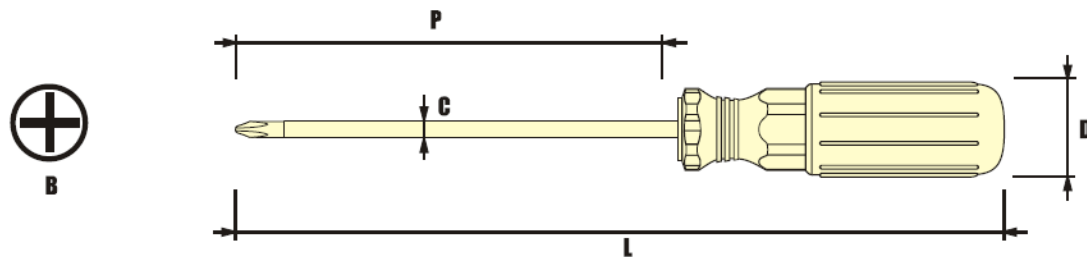
Voltage (V)	Model	Current (A)	Inductance
220	2007	6	1.8
	2015	10	1.1
	2033	11	0.71
	2037	17	0.53
	2055	24	0.35
	2075	33	0.26
	2110	46	0.18
	2150	61	0.13
	2225	120	0.09
380	4022	7.5	3.6
	4037	10	2.2
	4055	15	1.42
	4075	20	1.0
	4110	30	0.7
	4150	40	0.53
	4225	60	0.36

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.



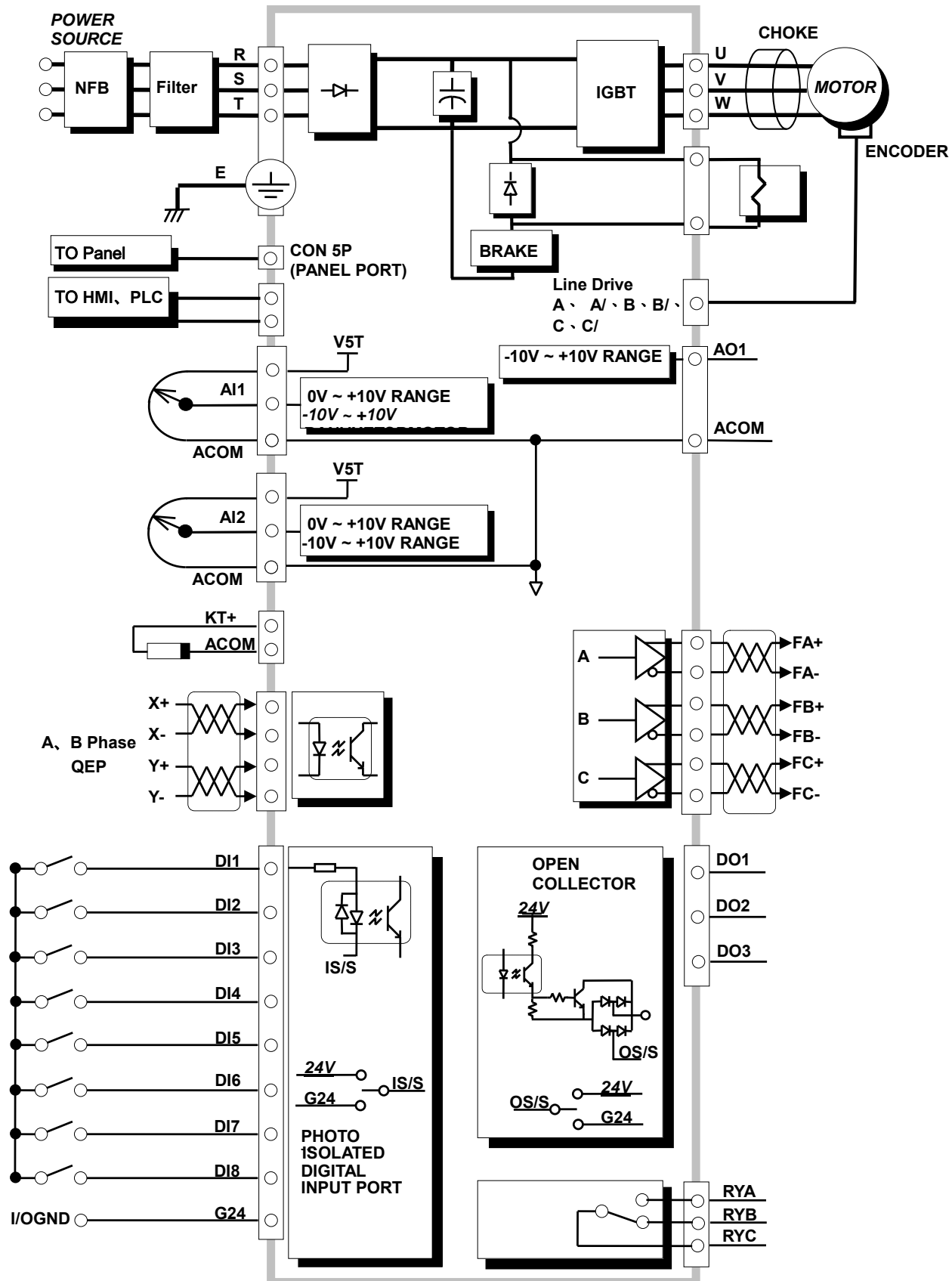
A - B mm	C mm	D mm	P mm	L mm
0.6 - 3.3	3.3	-	-	-



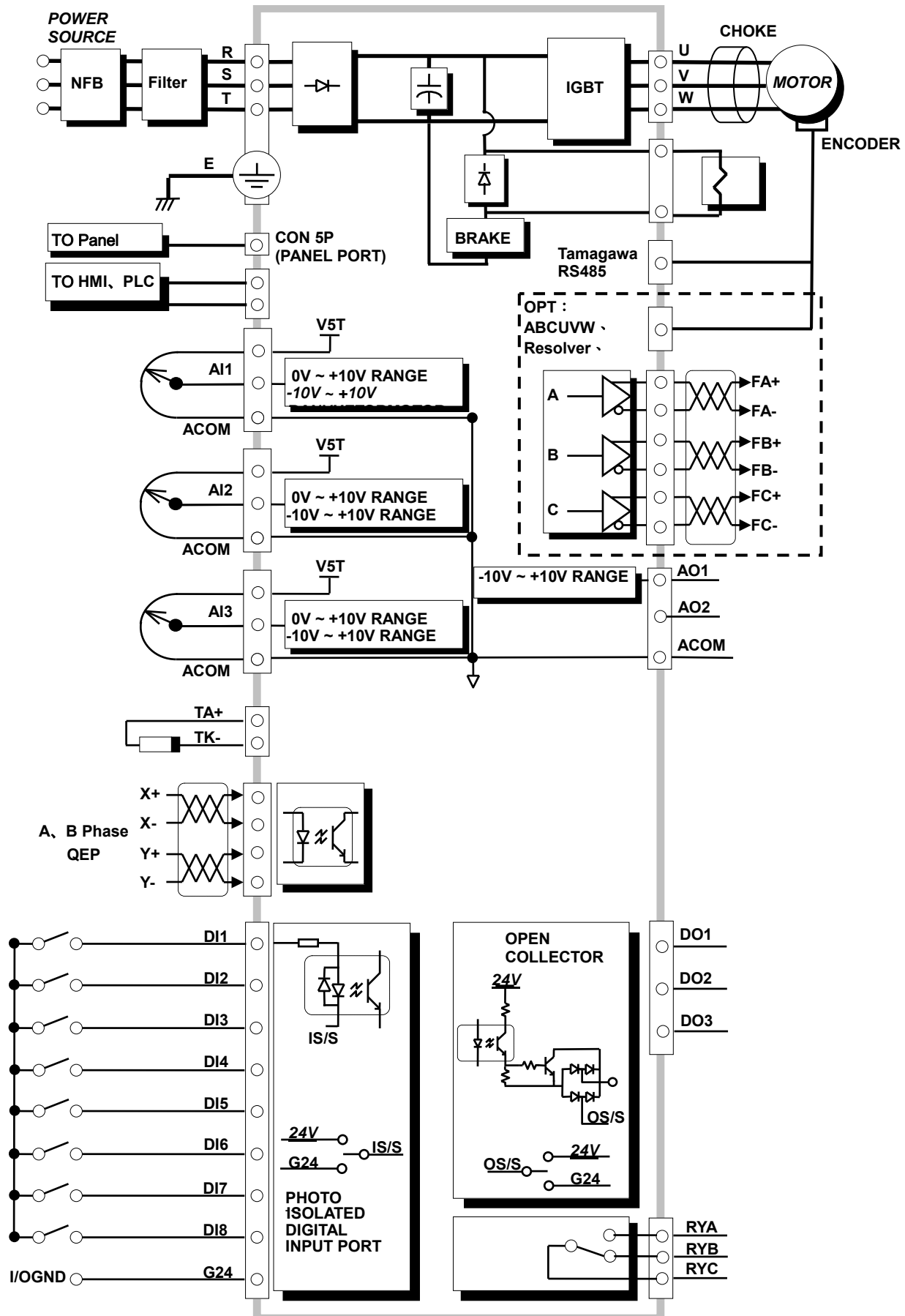
B	C mm	D mm	P mm	L mm
#0	3.3	-	-	-

6. Basic Wiring Diagram

6.1 J1 Type



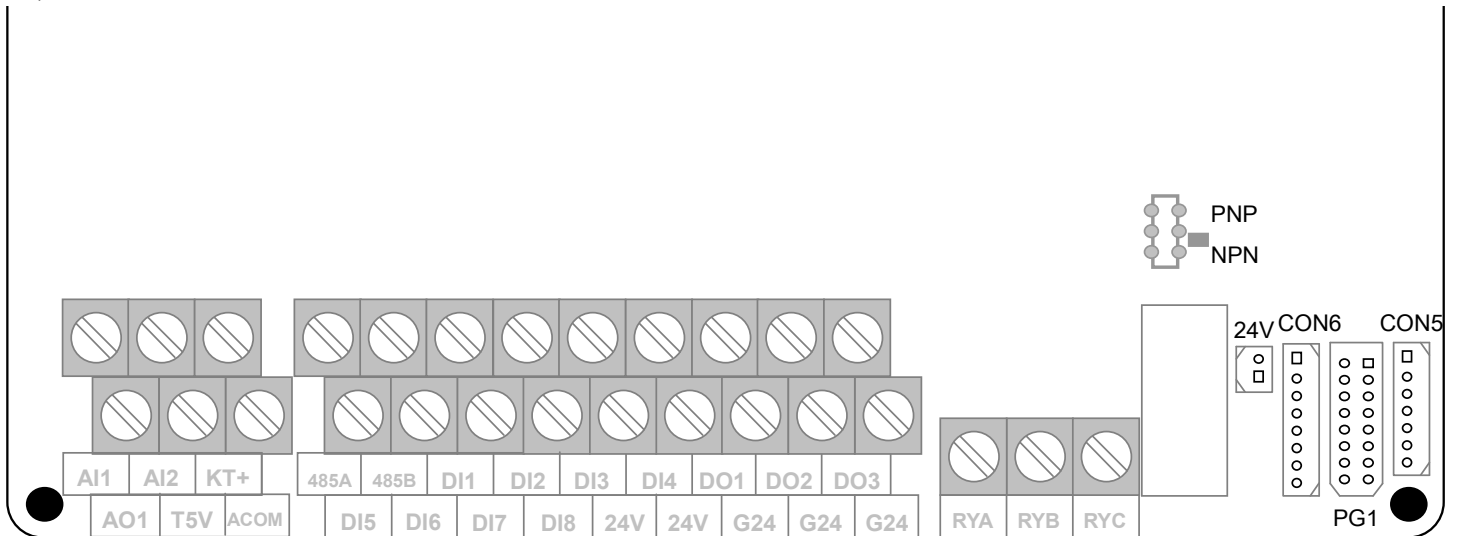
6.2 J3 Type



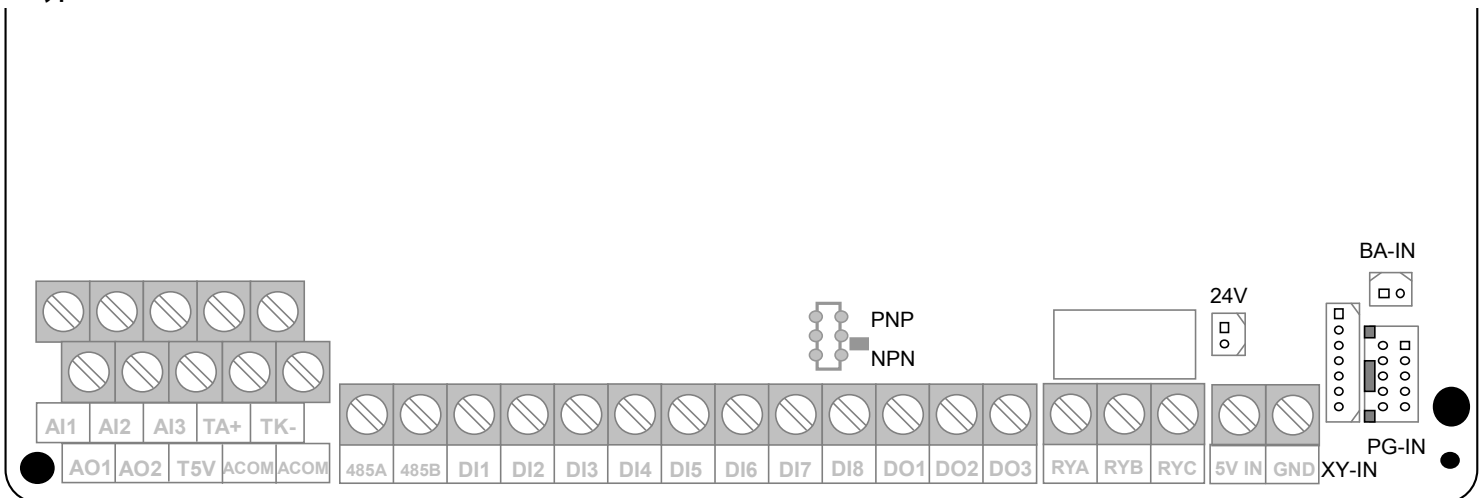
7. I/O Interface

7.1 The Map of I/O Terminal Position

J1 Type



J3 Type



J1 Type

CON5

XY_IN		
CON5 PIN	D-sub 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 PIN	D-sub 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 PIN	D-sub 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

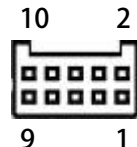
TM3~5 : Terminal Spec. IEC 130V , 8A

- ◎ 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) °

J3 Type

Connector	PG1 On Board	9 Pin D-sub	Signal	Description
PG1 / D-Sub9 (Male) 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 : 
	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 PIN	D-sub 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) 。

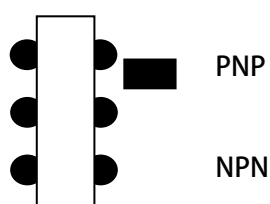
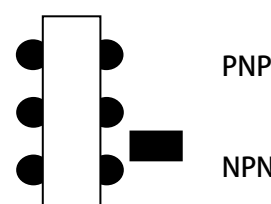
TM1/8 : Terminal Spec. IEC 130V , 8A

- ◎ 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

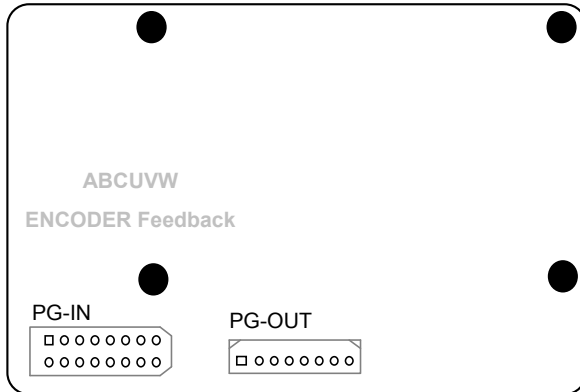
- ◎ ECAT External Voltage Input : 5V IN+GND

SW1 : NPN/PNP Switch

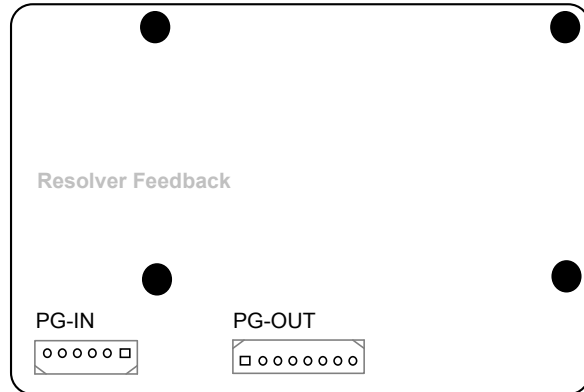
PNP Interface			

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 PIN	D-sub 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

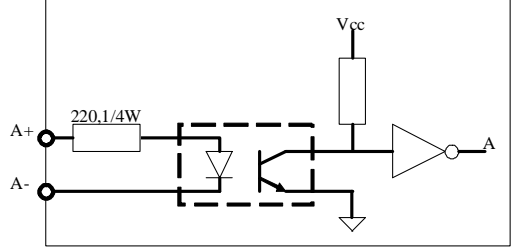
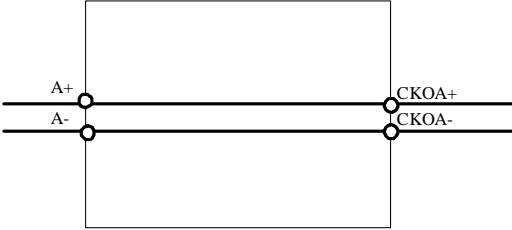
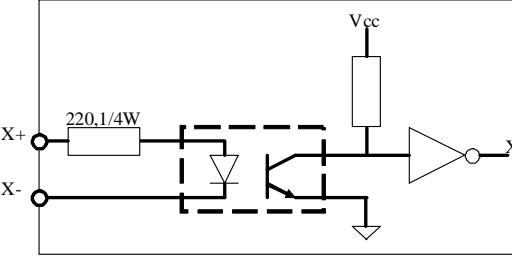
PG_IN		
PG1 PIN	D-sub PIN	Signal
1	1	A+
2	2	A-
3	3	B+
4	4	B-
5	5	C+
6	6	C-
7	7	
8	8	
9	9	
10	10	
11	11	
12	12	
13	13	5V
14	14	PGND
15	15	
FG	FG	SHIELD

AB_OUT		
CON11 PIN	D-sub 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 PIN	D-sub 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

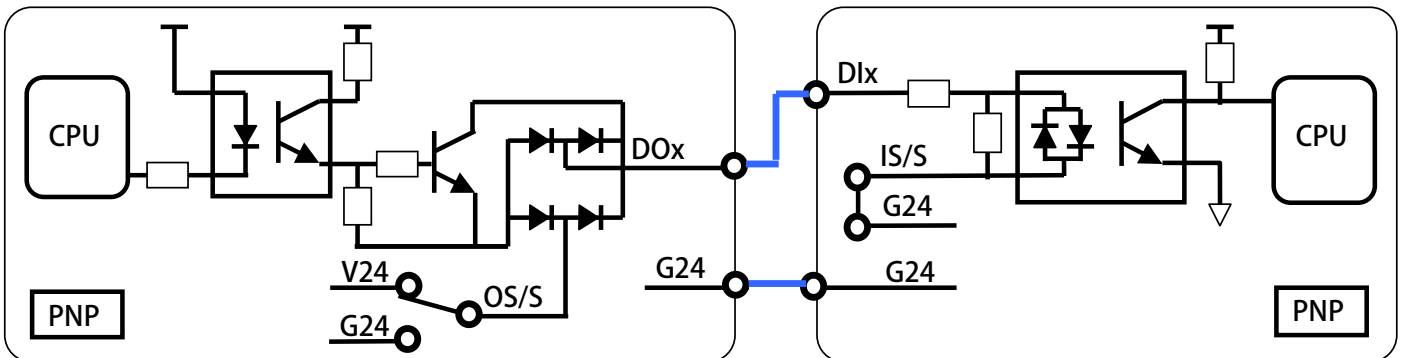
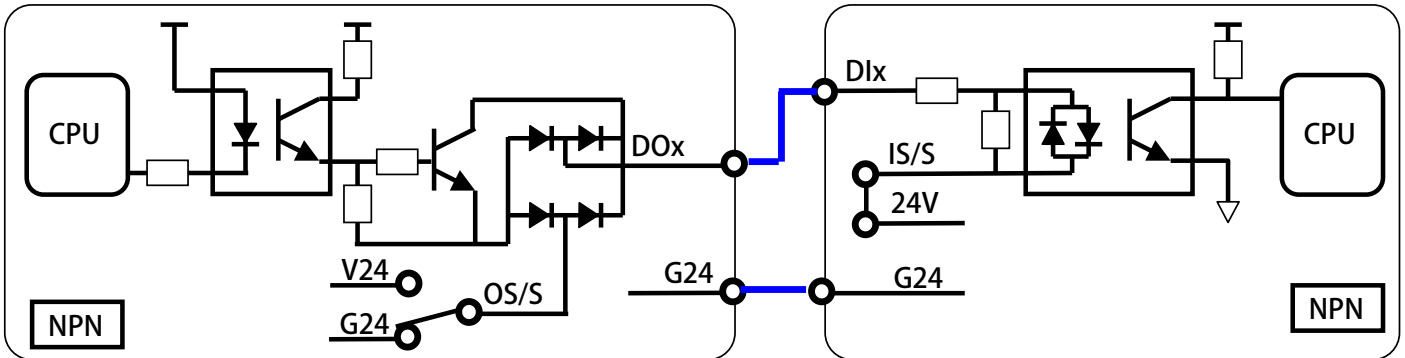
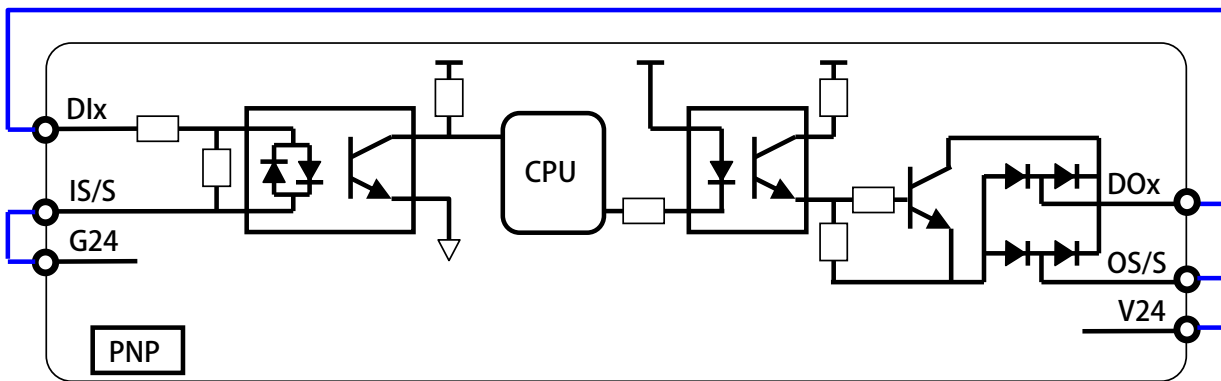
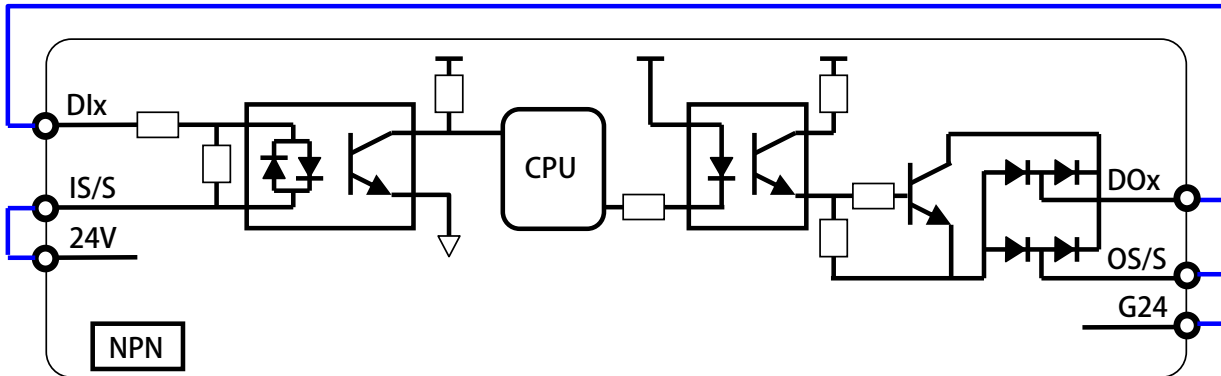
7.2 Hardware Description

Name	Function	Hardware construction
PLC 485-A	RS485 communication port (photo coupler isolated)	
PLC 485-B		
AO1	Analog output (refer to ACOM)	
AO2*		
AI1	Analog Input (refer to ACOM)	
AI2		
AI3*		
T5V	5V reference voltage (refer to ACOM)	<p>NOTE</p> <ol style="list-style-type: none"> 1. ACOM and G24 are not the same electric level. 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.
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. (reference ground is G24) Only be used under 24V voltage level to keep system stable. Programmable by setting parameter value.	
DI1~DI8	Digital input terminals. (reference ground is G24) Only be used under 24V voltage level to keep system stable. Programmable by setting parameter value.	

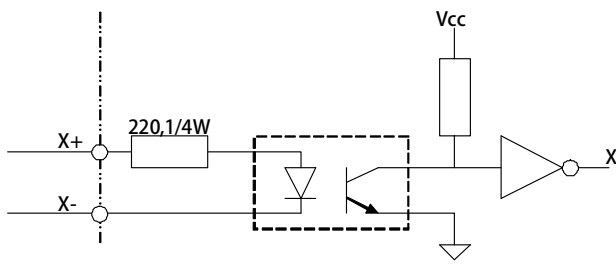
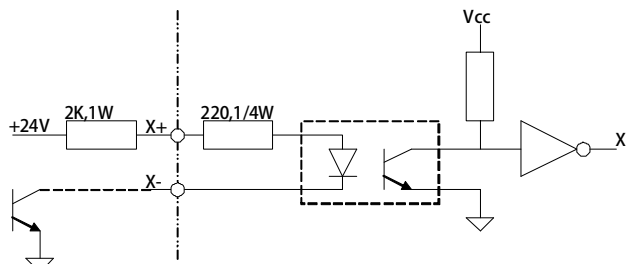
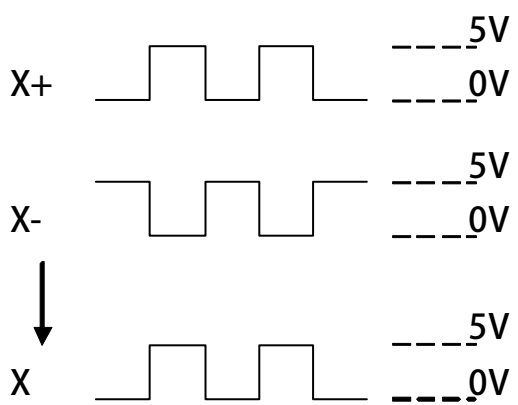
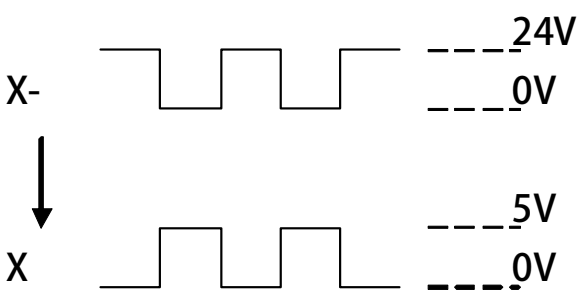
PG_IN	The input hardware structure of signal B & C is same as signal A. The Encoder type must be 5V Line Driver.	
PG_OUT	Inside the IRIS drive PG_OUT and PG_IN signal is directly connected. The input hardware structure of signal OB+、OC+ is same as signal OA+.	
XY_IN	The XY pulse input hardware structure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

【Note】：* only for J3 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"> If use 5V Line Driver signal as digital input , Just connect to terminal °  <p>ps : Y signal & X signal °</p>	<ul style="list-style-type: none"> If use 24V Open Collector signal as digital input , Need to connect limit resistance(2K , 1W) °  <p>ps : Y signal & 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

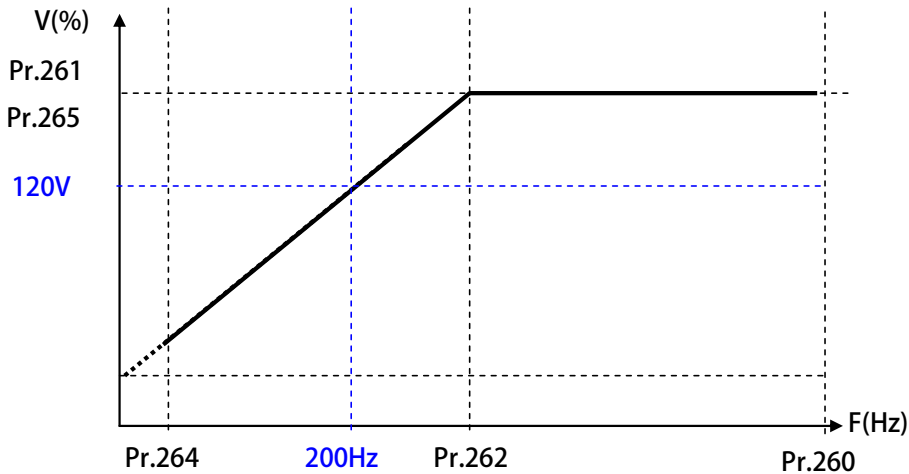
System Power : 220VAC
Motor wiring : Δ type
Rated voltage : 120V
Rated current : 23.9A
N-max rpm : 24000rpm /F-max ; Max Frequency 805Hz<4 pole>
Nn No-load speed : 6000rpm<200Hz>
Slip rpm : 180rpm

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 _y 208 V	I _y 13.8/20.7 MAX	V _Δ 120 V	I _Δ 23.9/35.9 MAX		
Nn 6000 RPM	Fn 203 Hz	N _{MAX} 24000 RPM	F _{MAX} 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 4 5 6 7 8 9 10		Z X Y Z - X - Y	
		U V W U V W	
		120V 208V	
1	+5V	Thermal Cooling sys 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) (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)/ rev	R/W	
392	2'nd Servo Gain	0	0	10000	Hz((rev/s)/ 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. 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. This type of parameter is specially set by Factory and not for user normally usage. 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 : Need to enable Dix(210) : Servo-On
1	Servo ON & IndexStop By Dix	JPS Mode : JPS Locate+IndexStop Function
2	Auto Servo ON	Brand Mode1 : Brand Mode1 Locate+IndexStop Function 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

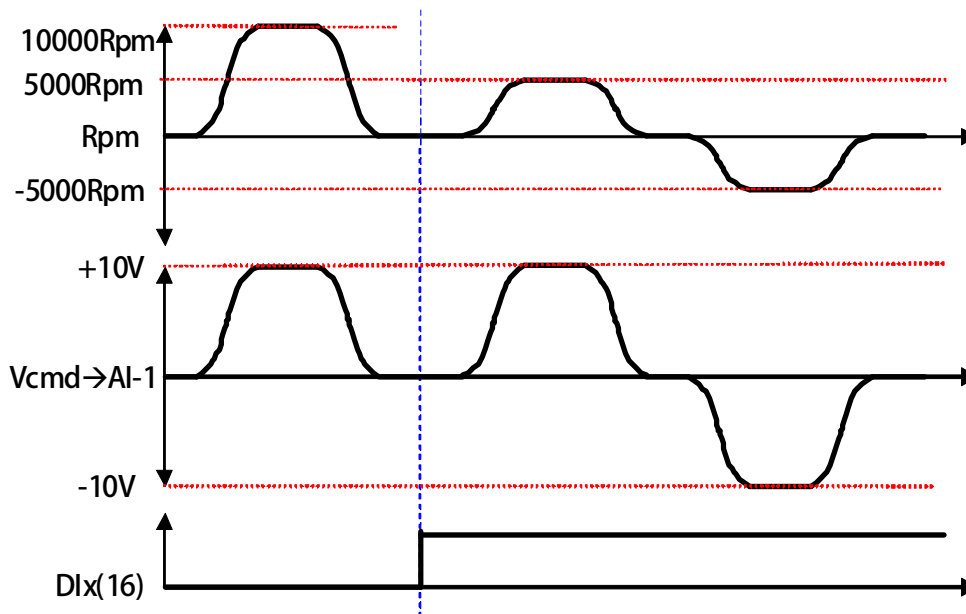
[Example] Pr.226 : 10000 rpm

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 : %

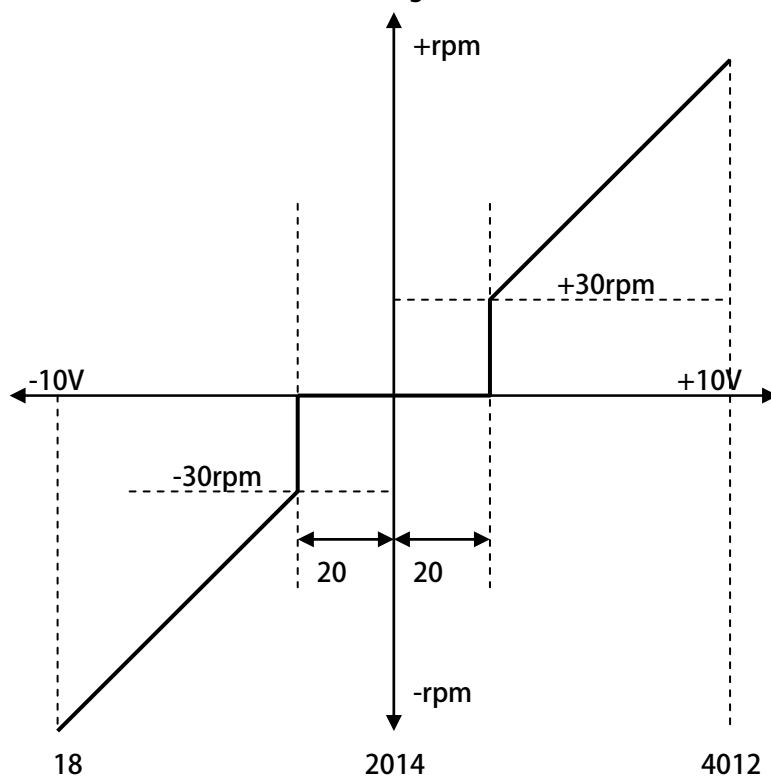
10.4.3 Analog Input : AI3

- 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.



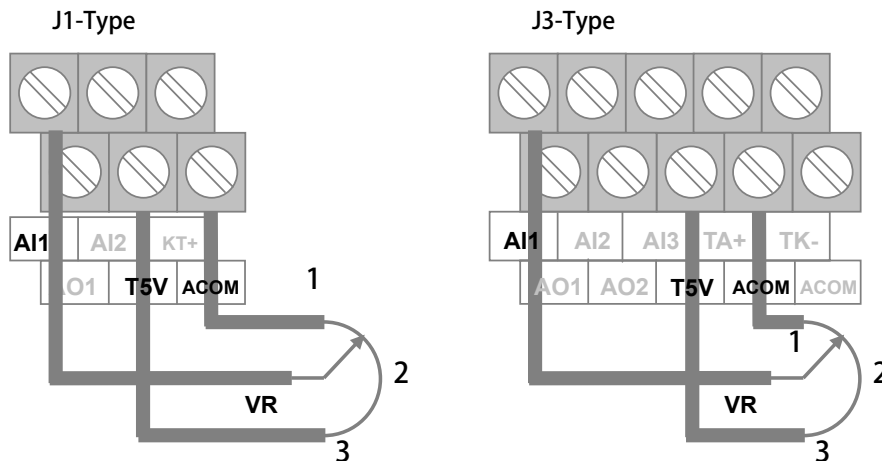
- ※ Input +10V to AI1 , and read Pr.229 = 4012.
- ※ Set Pr.230 = 4012.
- ※ Input 0V to AI1 , and read Pr.229 = 2014.
- ※ Set Pr.231 = 2014.
- ※ Input -10V , and read Pr.229 = 18.
- ※ Set Pr.232 = 18.
- ※ By the equation $3000 \div (4012 - 2014) \times 1.5$ to know that one A/D count is about 1.5rpm.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

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

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

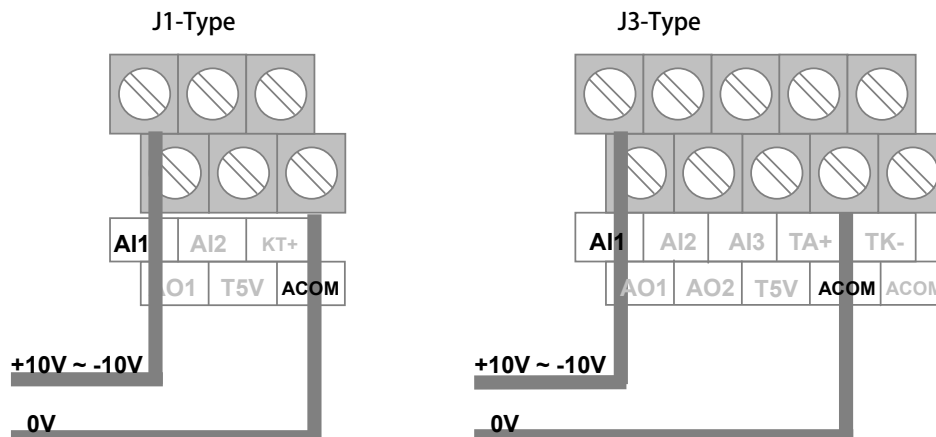
Example 2: Simply using a variable resistor to set the running speed

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 °

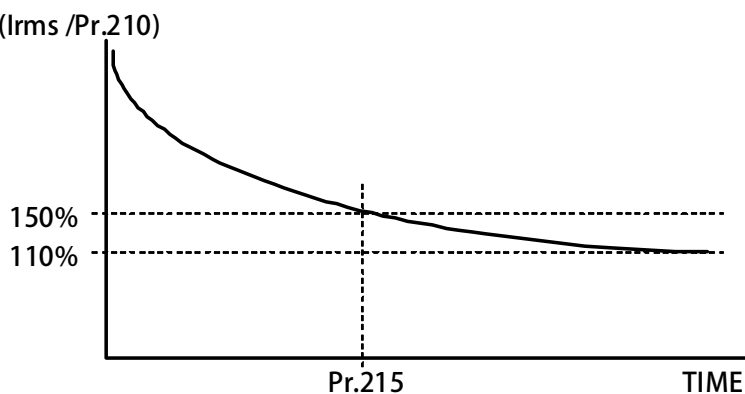
- Pr.248 ➔ RDC-Counter Value

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. 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.

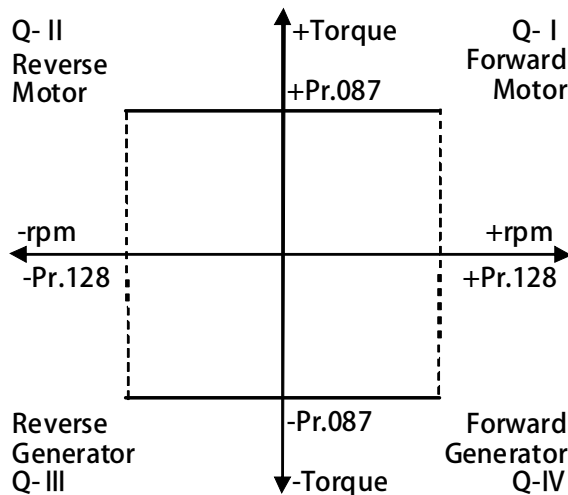
● Pr.086 → Torque Control Mode

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

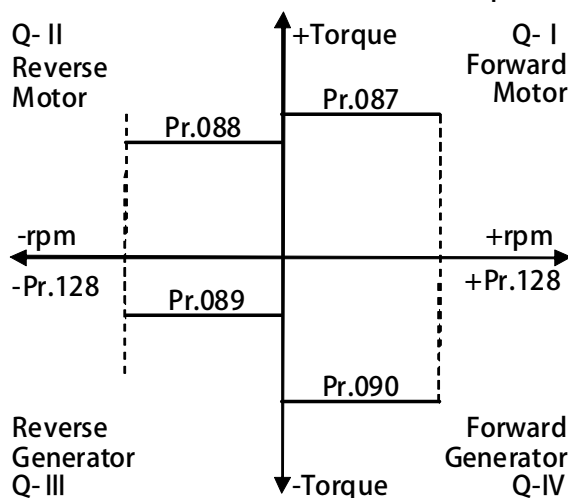
※ If Pr.086 select 0:

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



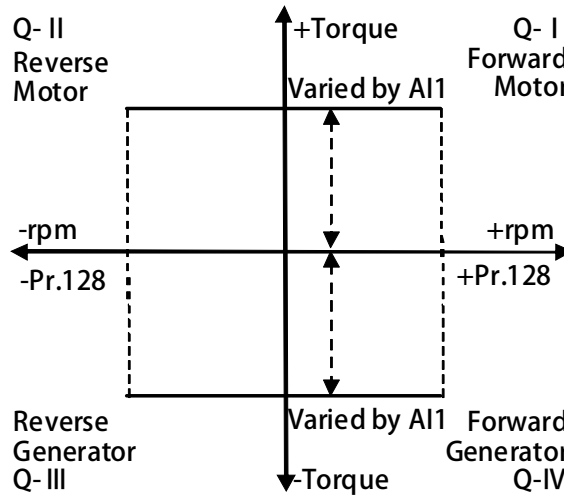
※ If Pr.086 select 1:

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



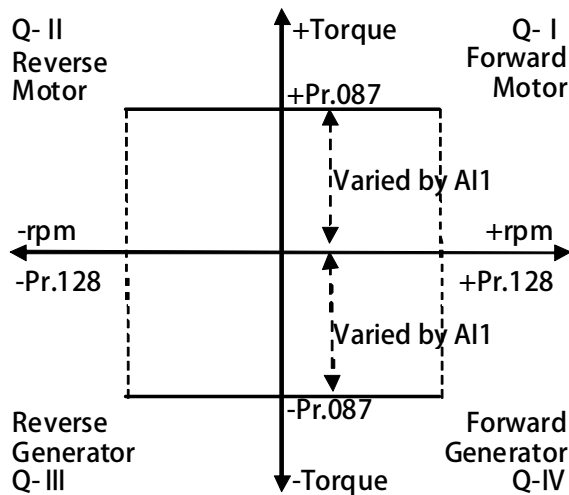
※ If Pr.086 select 2:

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

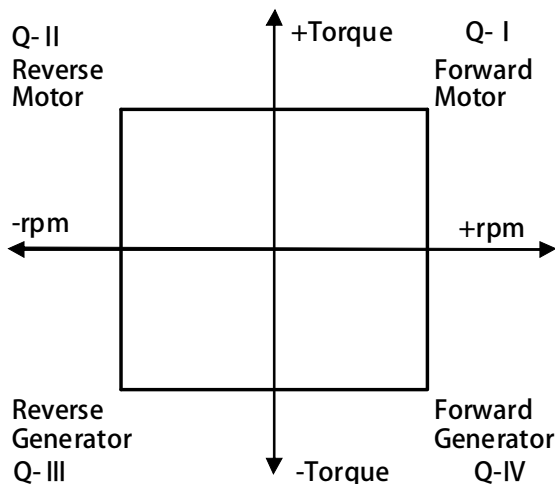
The torque is set by $AI1 \times (Pr.087 \text{ Torque Limit-quadrant I})$.



※ If Pr.086 select 9

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

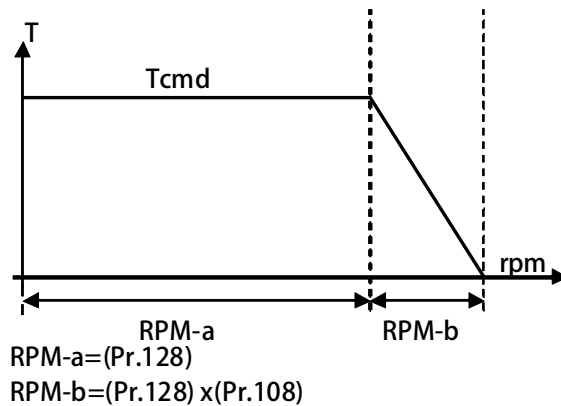
- Pr.087 → Torque Limit-I
Set the torque limit value when motor is running in quadrant me.
In this guardant the motor is running in forward direction and output positive torque to load.
- Pr.088 → Torque Limit-II
Set the torque limit value when motor is running in quadrant II.
In this guardant the motor 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 Pr.128 = 1000, 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

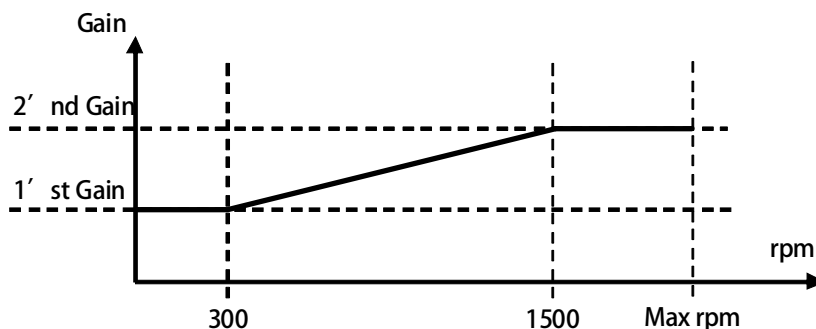
These are the 2' nd PI tuning parameter for close loop control.

【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

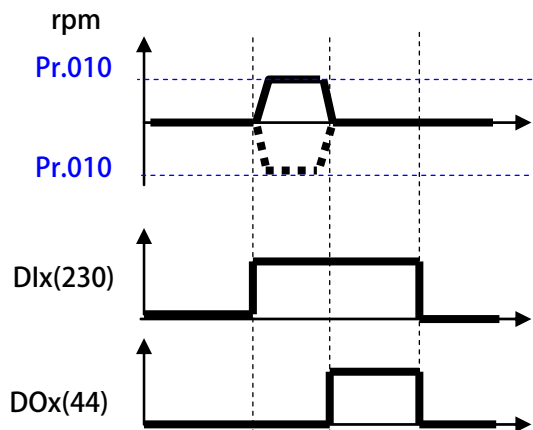
This parameter set Jog Rpm , switch 【DIx(009) : Jog Speed】 can start this function ◦

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) °

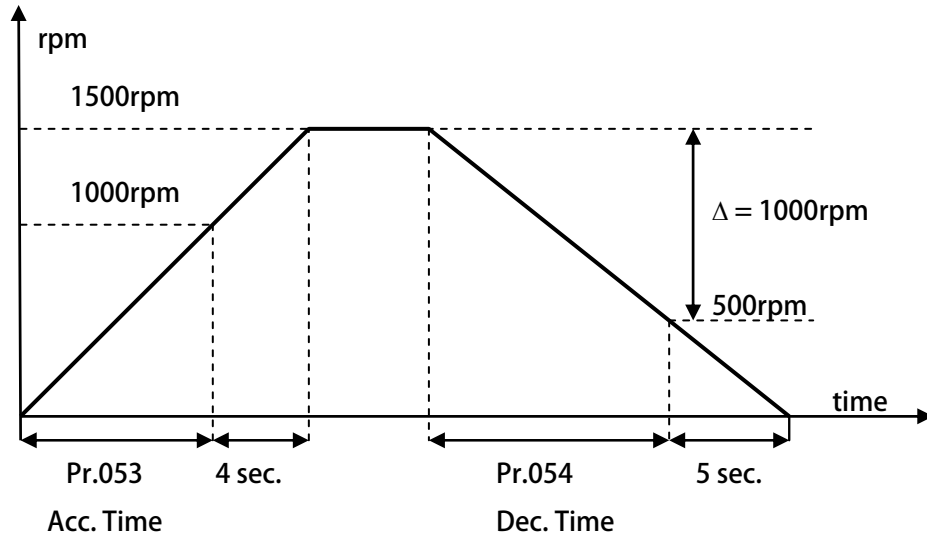
10.10 Acc/Dec/S-curve Group

- 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:

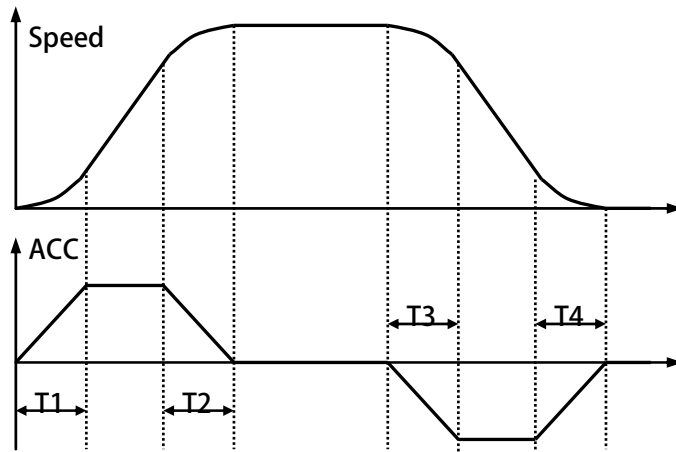
Acc. Time Pr.053 = 8.00sec , Dec. Time Pr.054 = 10.00sec.

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

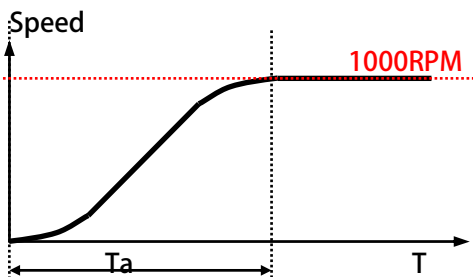
Therefore , from 0 to 1000rpm need 8+4 = 12sec; from 1500 to 0rpm need 10+5 = 15sec.

- 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. The reverse direction run command will stop the motor.
2	Only reverse direction run command is permitted. The forward direction run command will stop the motor.

● Pr.289 → START OPTION SELECT

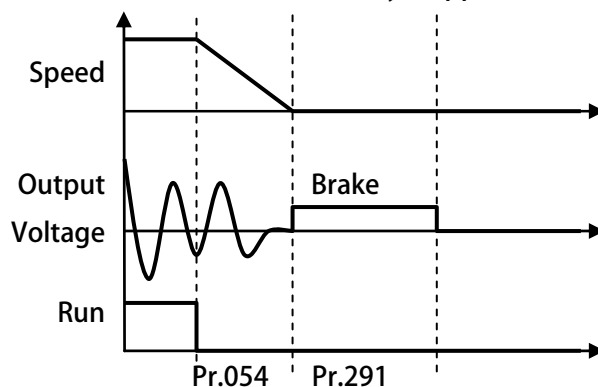
Value	Description
0	Start from ZERO speed
2	DC-Injection Brake then Start from Zero

● 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

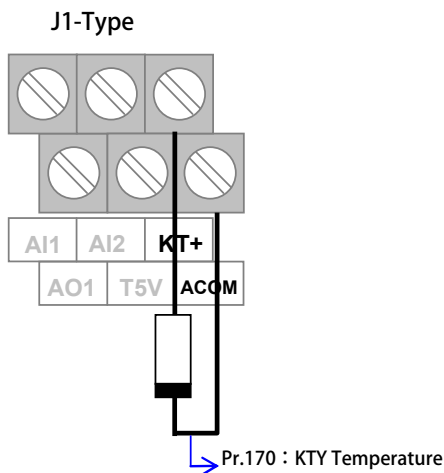
- Pr.170 → KTY1 Temperature
This parameter display KTY temperature actual value , unit : DegC °
【Note】 This parameter can not change because of belong to monitor type.
- Pr.171 → KTY1 Calibration
This parameter set the factor of KTY temperature , to adjust KTY display value.
- Pr.172 → KTY1 Warning Level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

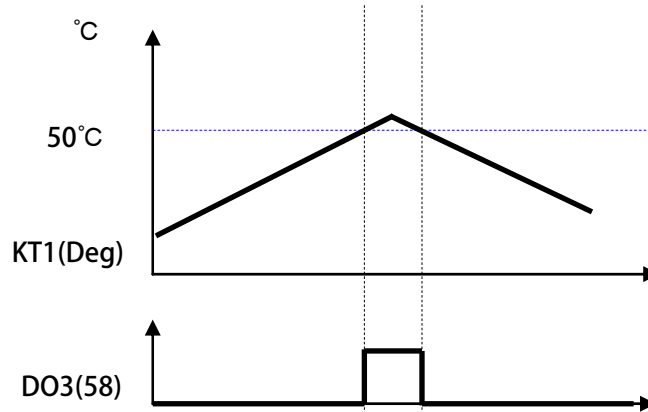
There is a high frequency spindle motor, in front of the motor bearings, Motor coil, respectively, after the bearing assembly KTY84/130 Temperature detection element for protection :
Front bearing



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

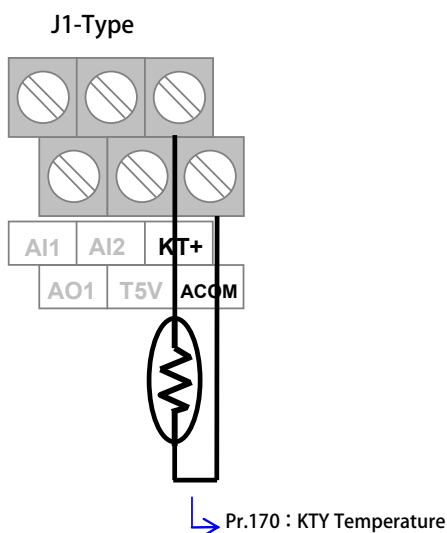
● Pr.113 =58 → DO3 function=KTY Warning

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

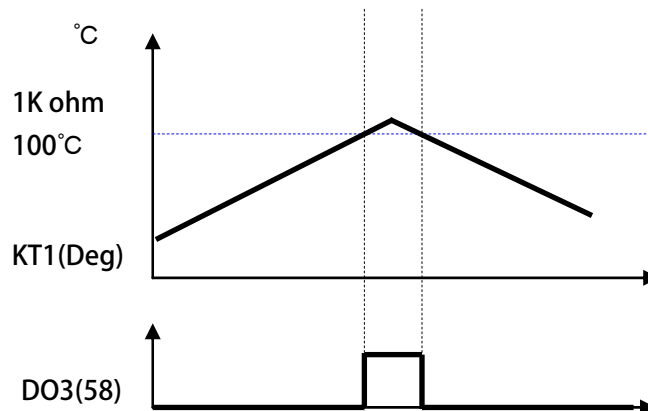


● Pr.172=50 → KTY1 Warning Level Setting(DOx(58))

● 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

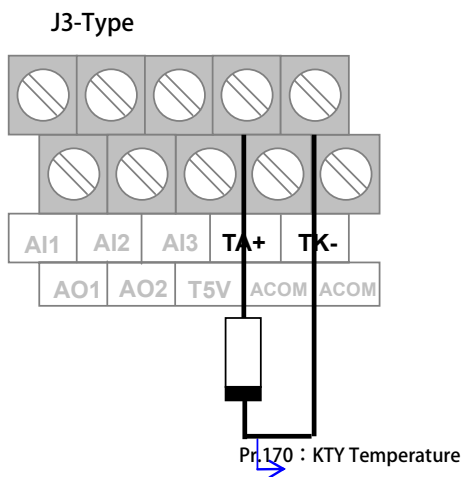


10.14.2 KTY 84/130 Thermo Group : J3 Type

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

【Example1】: Use KTY Component

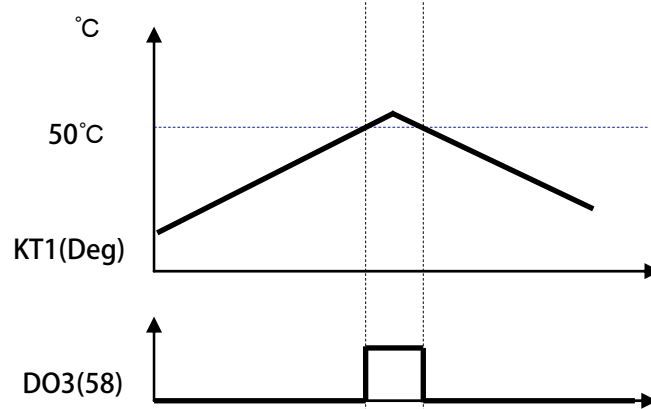
There is a high frequency spindle motor, in front of the motor bearings, Motor coil, respectively, after the bearing assembly KTY84/130 Temperature detection element for protection :
Front bearing



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

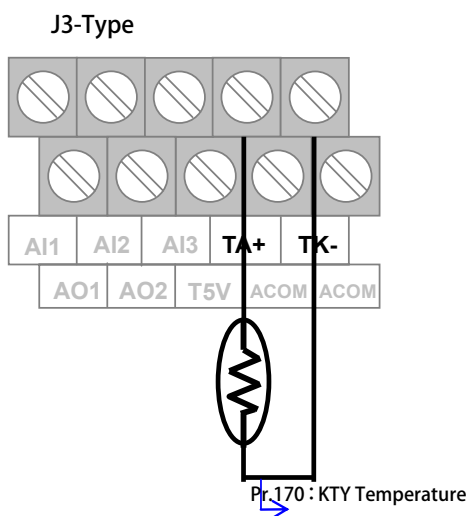
● Pr.113 =58 → DO3 function=KTY Warning

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

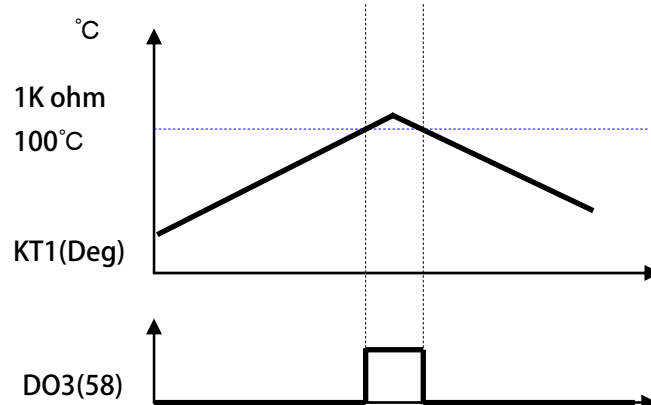


● Pr.172=50 → KTY1 Warning Level Setting(DOx(58))

● 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 Dlx(12)	SW1 Dlx(11)	SW0 Dlx(10)	NOTE
120	Speed Set0	0	0	0	0 : DI non active 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	

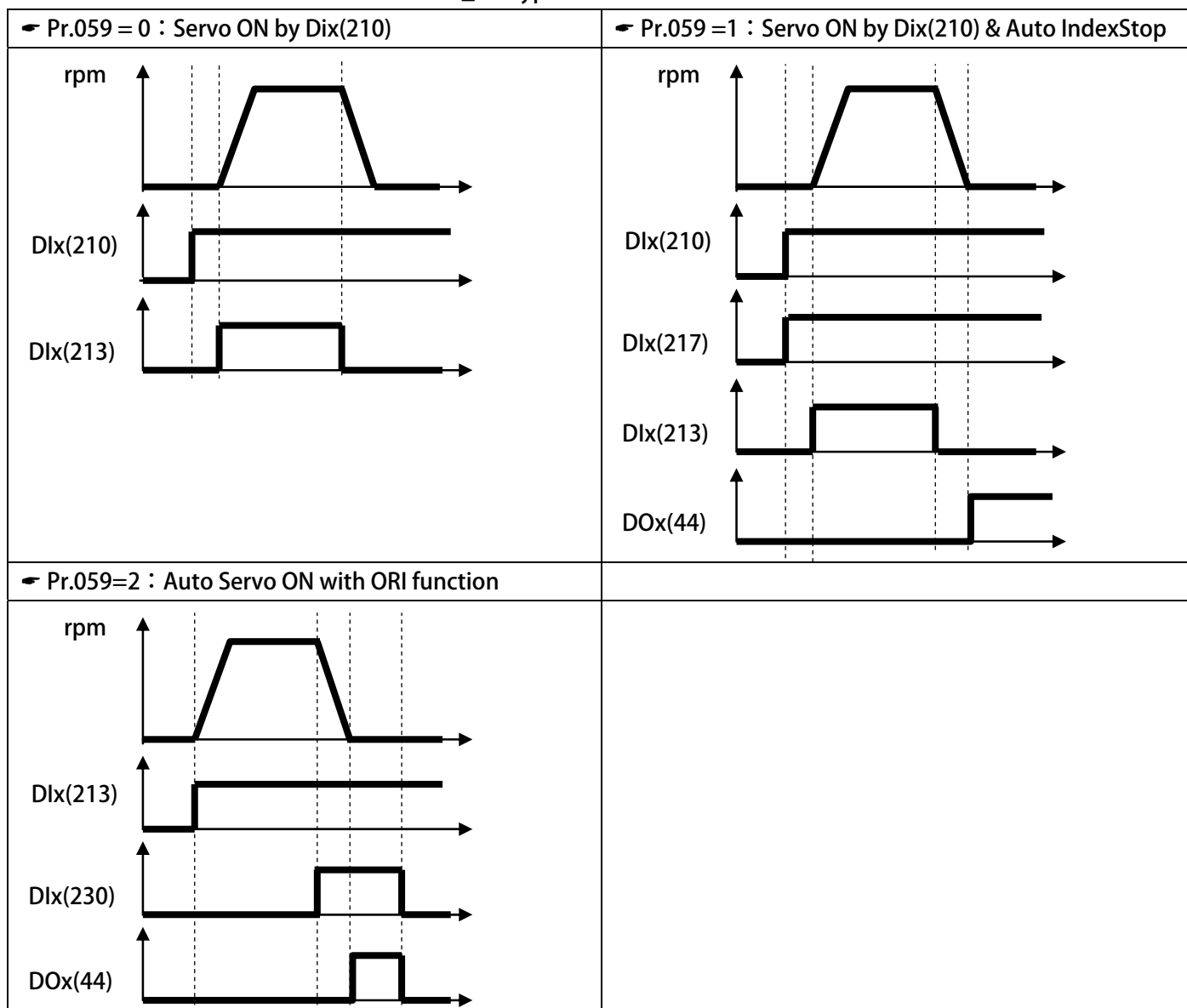
- Dlx _ Select → 023 , Reset
If the input is active , the driver will be reset by this signal.
【NOTE】 This function only can be selected only by actual terminal ,
for virtual terminal can not select this function.
- Dlx _ Select → 025 , Torque SW : OFF= AI2 , ON= Pr.96 (by Pr.086=9)
If this function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

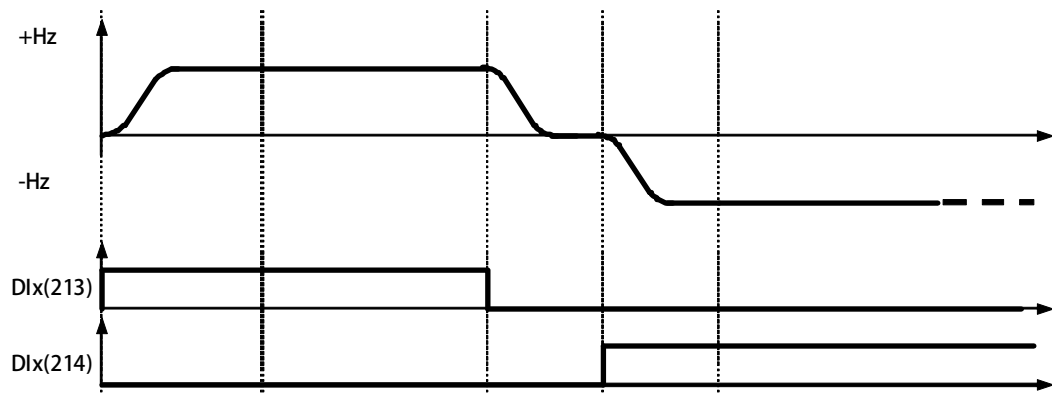
- Dlx_Select → 210 , Ctrl Mode1 : SERVO_ON

Pr.059 : SERVO_ON type select



- 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

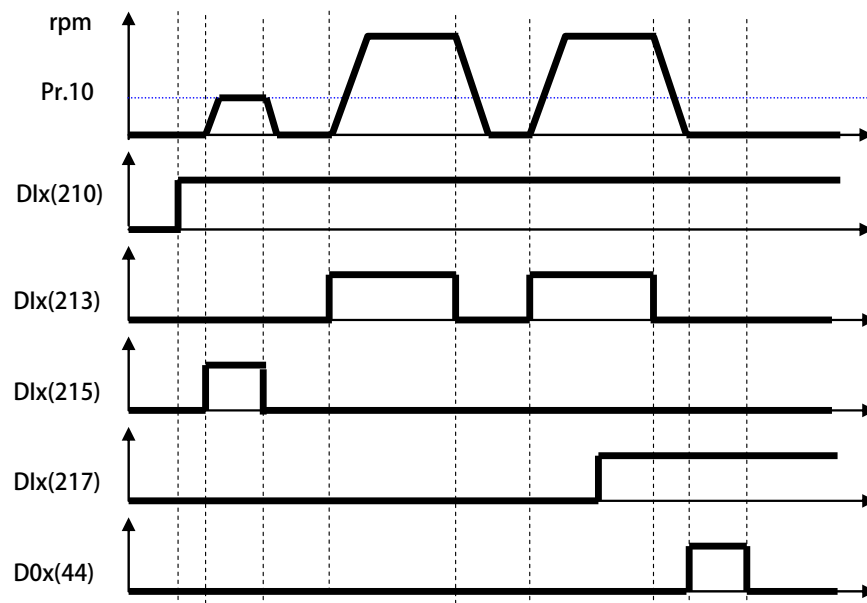
When Dlx(216)=ON , follow Pr.010 : JOG Rpm / Locate position Rpm

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

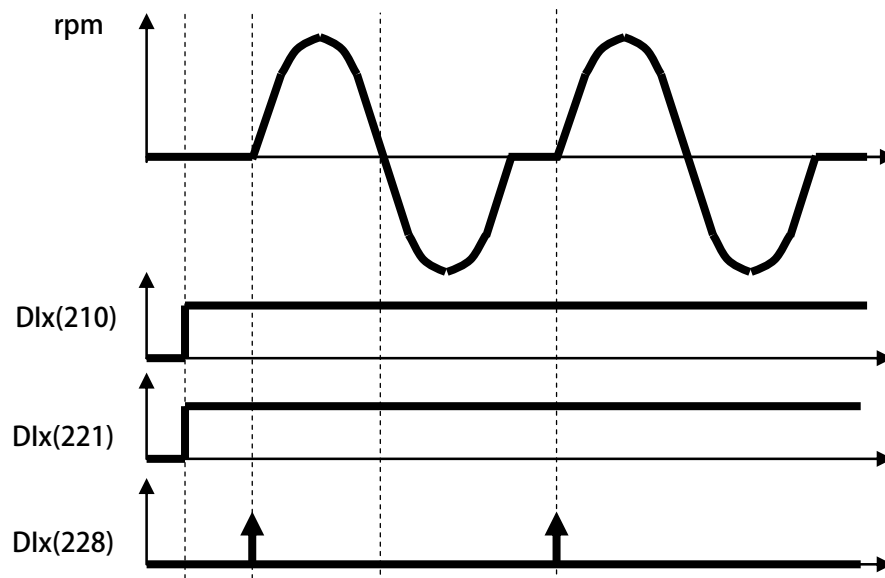
Pr.384 : CNCSpindle index angle ,

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

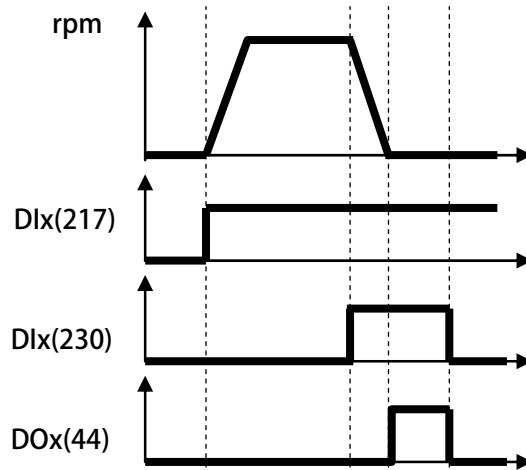
Action sequence is as follows :



- 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) $> =$ 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 , DECing
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"

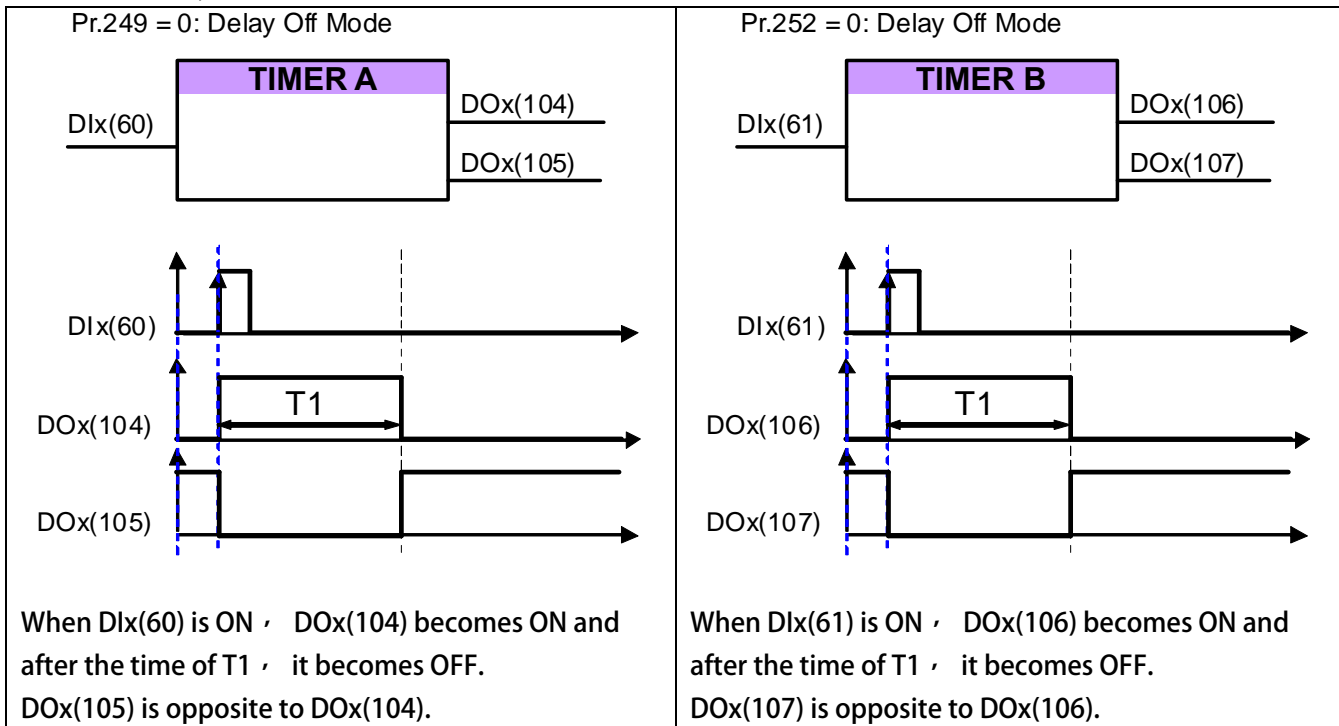
Description of the usage :

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.

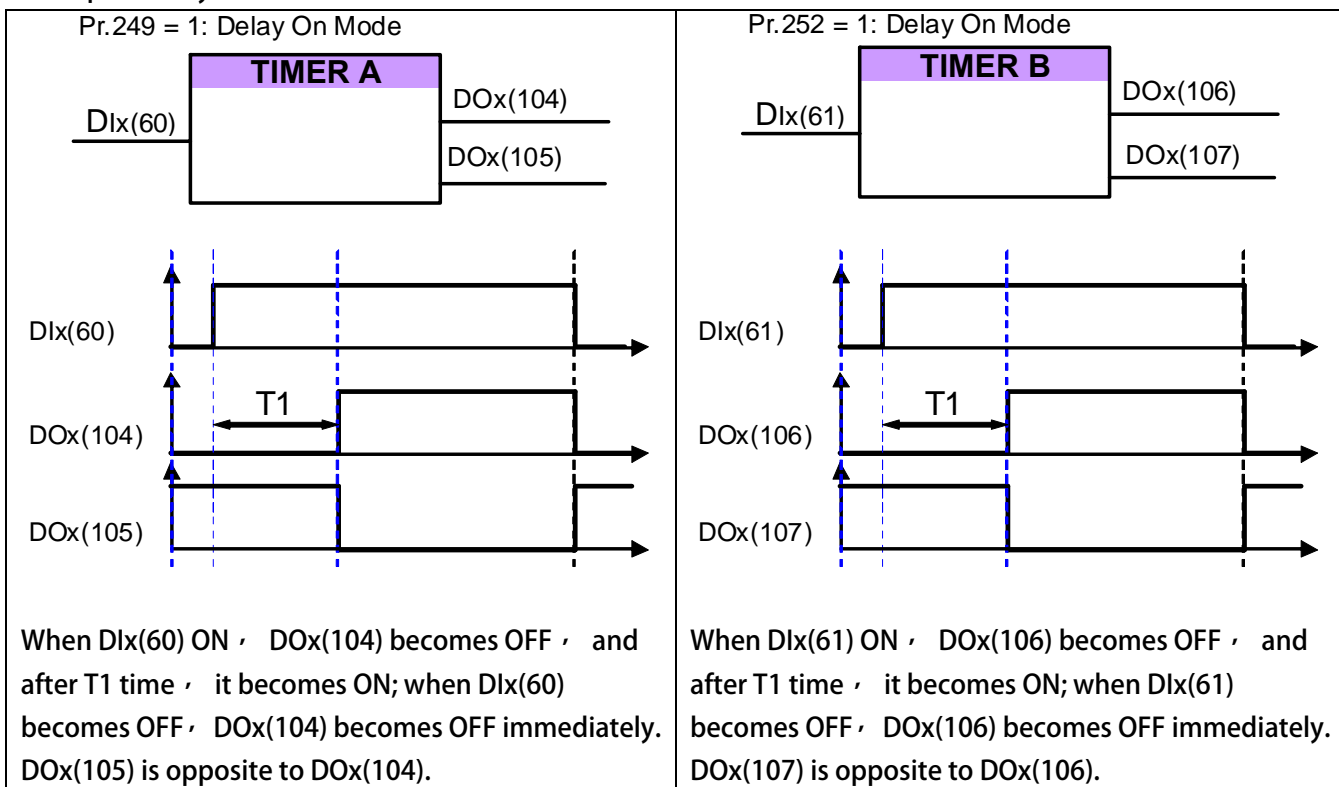
13.3.4 Timer Function (Delay Off Mode)

Example : Delay off Mode Timer



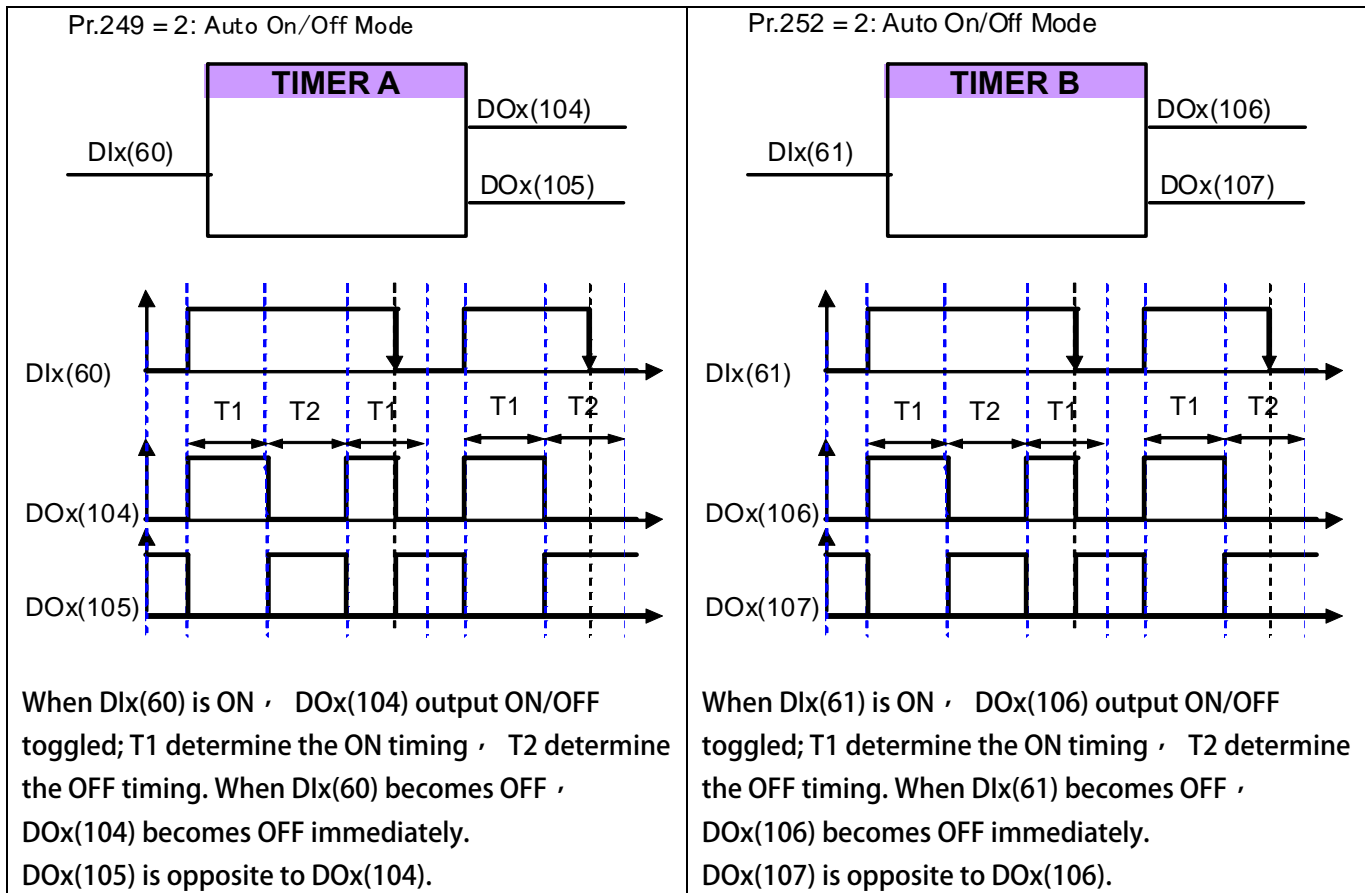
13.3.5 Timer Function (Delay On Mode)

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 ,

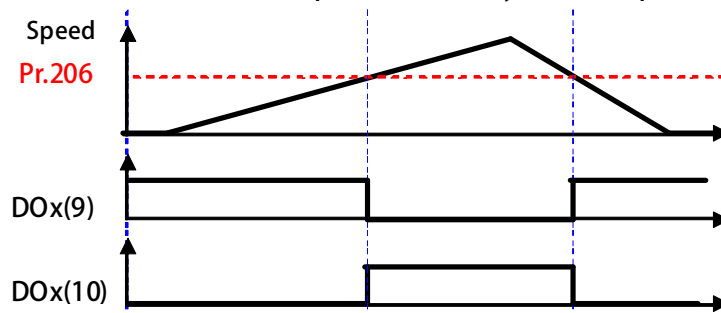
When filter factor larger , the speed will be stable better .

【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



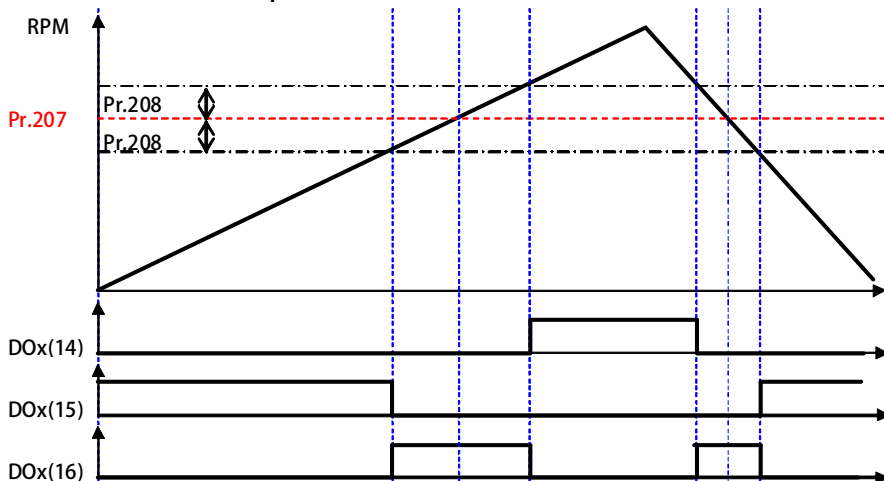
- DOx _ Select → 012 , SPA: Speed Arrive (Pr.19: Actual Speed - Set speed) <Pr.208
When the output terminal function selection mode , the function of the SPA (Speed Arrive) The terminal must start forward or reverse the state , and when the drive Pr.19: the actual speed - Set the speed <Pr.208 , the 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.



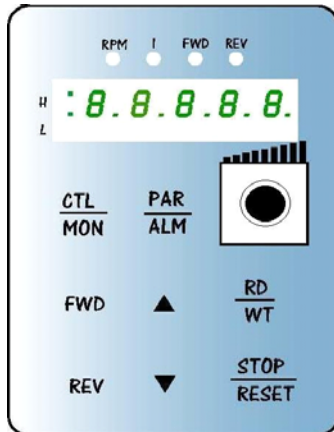
17. Control Panel Description

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."

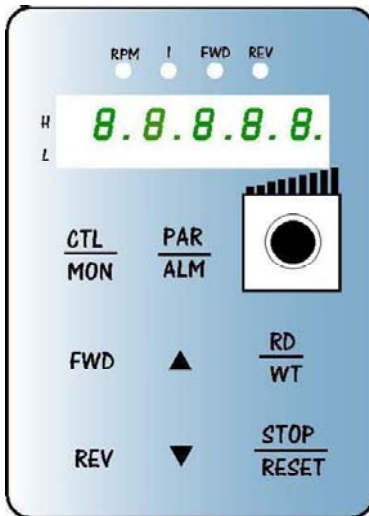
Continuously press "PAR/ALM , " if the display shows "A0-xx , " the drive is under "ALM MODE."

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.

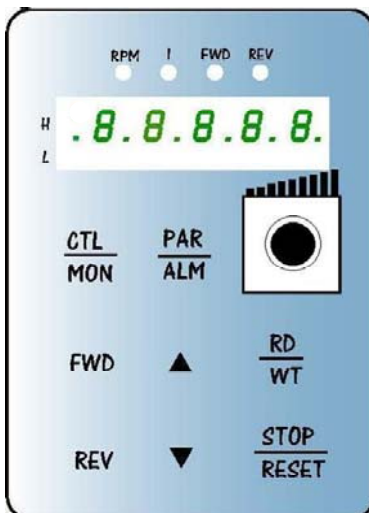
17.2.5 RD / WT 【Single-Word】 / 【Double-Word】 Parameters



【Parameters belong to Single-Word】

※ R-PANEL connect to JMD-SERVO

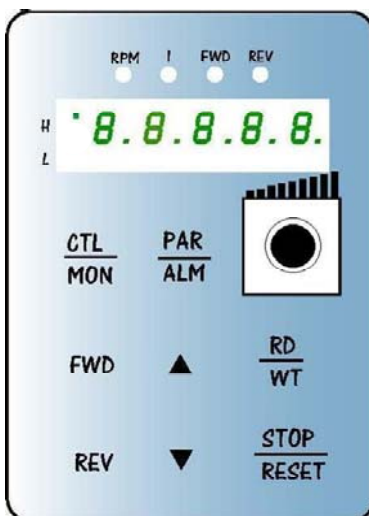
- Press "PAR/ALM" button to enter "PAR MODE," press ▲ or ▼ to change parameter number.
Press "RD/WT" button, to read parameter value.
- If the parameter is belong to 【Single Word】 , the panel shows as the picture.
- Press ▲, ▼, or "STOP" button to change the value.
The display is flashing on this time.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

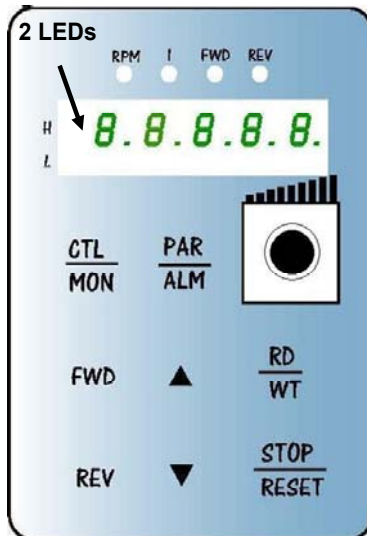


【Parameter belong to Double-Word display of high word】

※ R-PANEL connect to JMD-SERVO

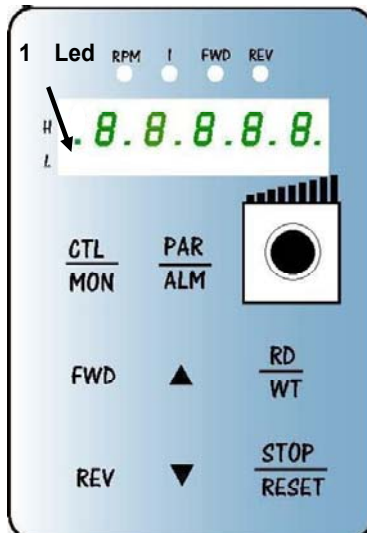
- Press "PAR/ALM" button to enter "PAR MODE," press ▲ or ▼ to change parameter number. Press "RD/WT" button, to read parameter value.
- If this parameter belongs to high word of a Double Word, the panel shows as the picture.
- To change to high word, press 【REV】 .
- Press ▲, ▼, or "STOP" button to change 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



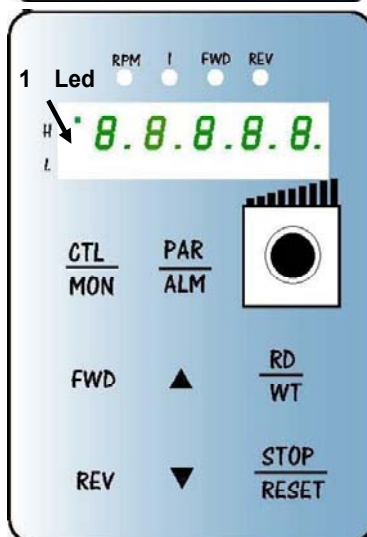
【Parameters belong to signed Single-Word】

- 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	PE	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)

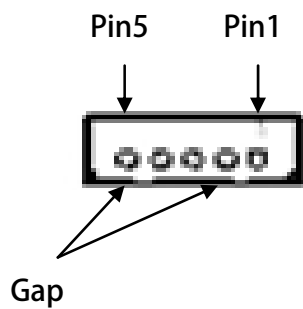
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	BIT
OC	UP	OP	OH	OL	OD	x	PE	x	x	END	SE	CF	EMS	x	PG	ALM
0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Binary
4				0				0				0				Hex

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

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

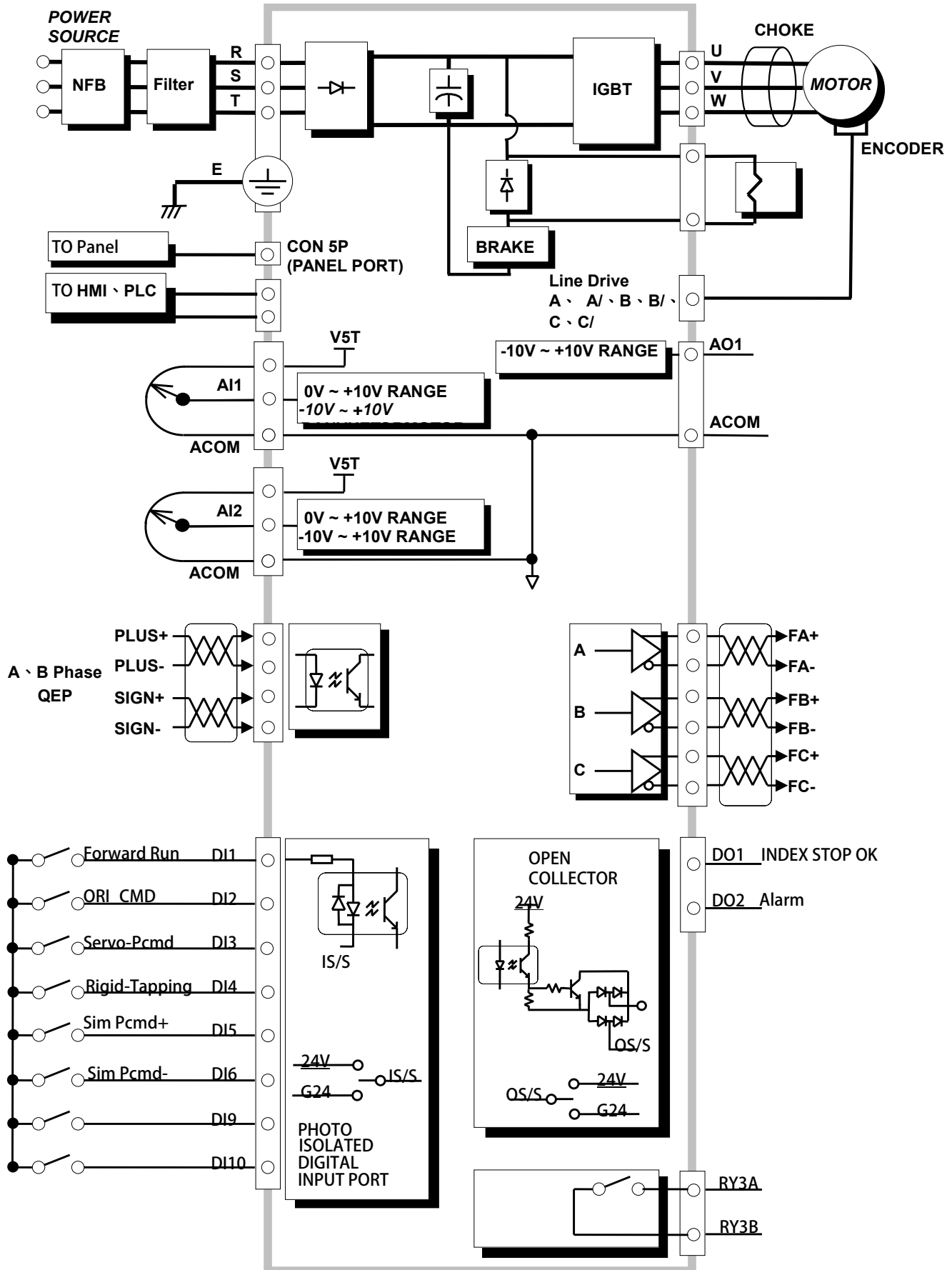
17.2.8 【Definition of Cables】

JAM SC-5P Connector :



PIN1	5V
PIN2	0V
PIN3	485-A
PIN4	485-B
PIN5	X(NC)

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

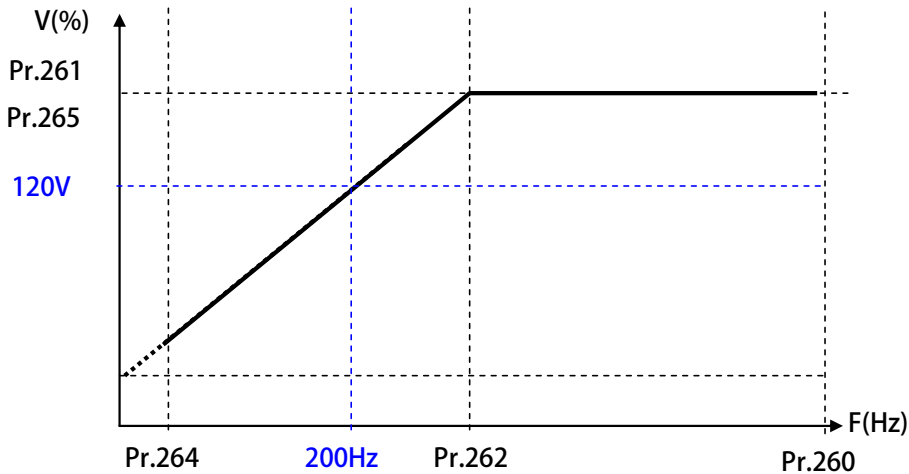
System Power : 220VAC
Motor wiring : Δ type
Rated voltage : 120V
Rated current : 23.9A
N-max rpm : 24000rpm /F-max ; Max Frequency 805Hz<4 pole>
Nn No-load speed : 6000rpm<200Hz>
Slip rpm : 180rpm

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 _y 208 V	I _y 13.8/20.7 MAX	V _Δ 120 V	I _Δ 23.9/35.9 MAX		
Nn 6000 RPM	F _n 203 Hz	N _{MAX} 24000 RPM	F _{MAX} 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. Δ	
1	+5V	Z	X - Y
2	+0V	I	I
3	A	U	V W
4	A	I	I
5	B	120V	208V
6	B	Thermal Cooling sys Protection (NC) 220V	
7	Z		
8	Z		
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=52	→ Full Load Current(% of AMP-Rating-Current) $(23.9/46) \times 100\% = 51.9(\text{Approximately } 52)$
Pr.203=180	→ Full-Load SLIP-RPM

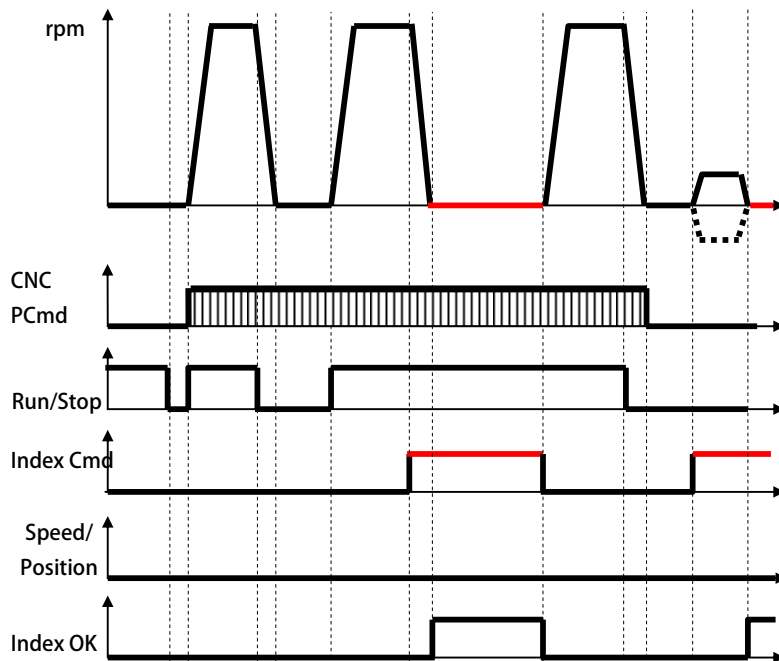
Step3 OpenLoop Running

- 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)

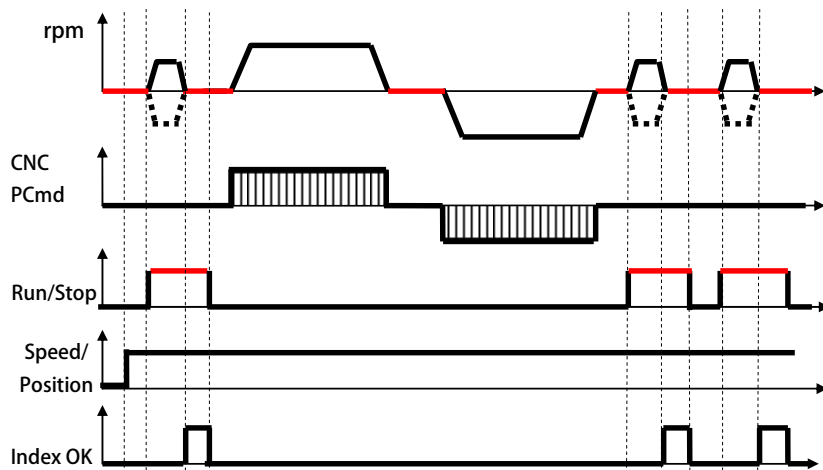
Step4	Closeloop Running	
☛	Pr.003=2	→ Drive Operation mode = IMSV/PMSV, Close Loop A/B QEP feedback
☛	Pr.278=9	→ Select Speed Source when SWx=000=peed set by PCMD
☛	Pr.010=100	→ JOG Rpm / Locate position Rpm
☛	Pr.194=0	→ ENCODER TYPE = IM motor, ABZ Encoder
☛	Pr.188=1	→ ENCODER DIRECTION =(B Lead A)
☛	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)

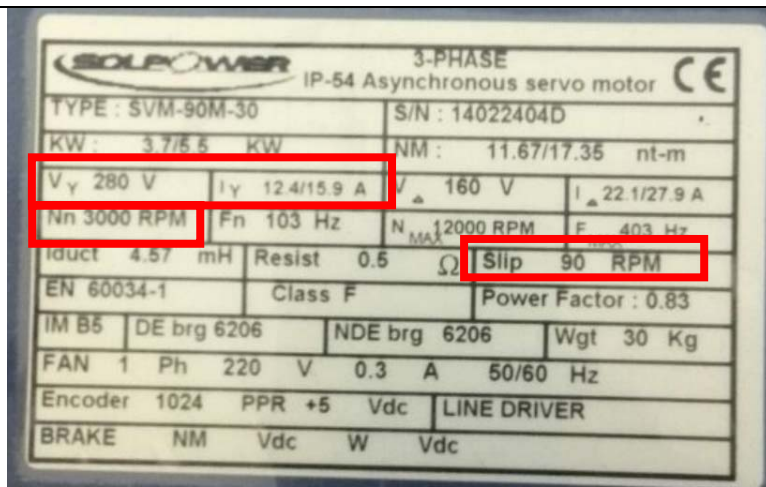
Step1 Set Drive Operation mode
Pr.003=0 → Drive Operation mode = IMAC, Open Loop V/F mode (set Hz)

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

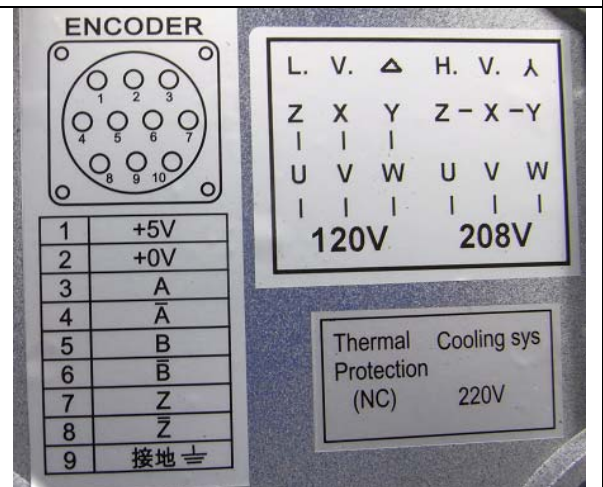
【Example】follow SOLPPPOWER brand spindle motor : SVM-90M-30

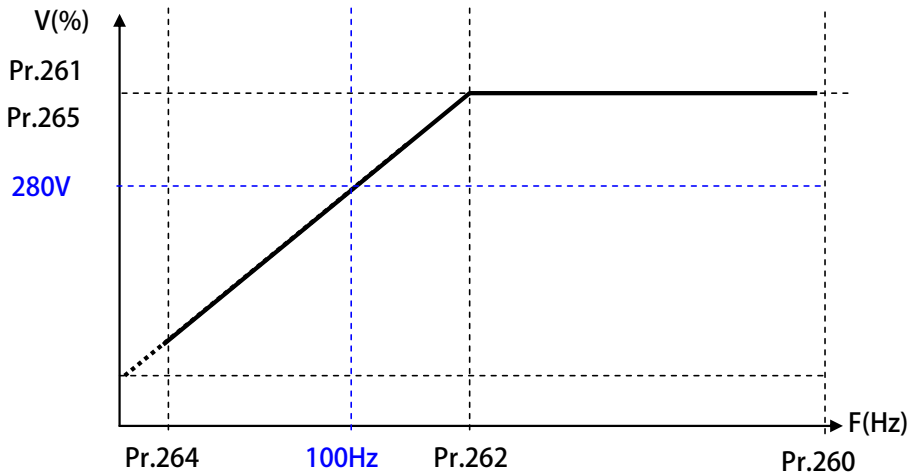
System Power : 380VAC
Motor wiring : Y type
Rated voltage : 280V
Rated current : 12.4A
N-max rpm : 12000rpm /F-max ; Max Frequency 403Hz<4 pole >
Nn No-load speed : 3000rpm<100Hz>
Slip rpm : 90rpm

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) $(12.4/25) \times 100\% = 49.6$ (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

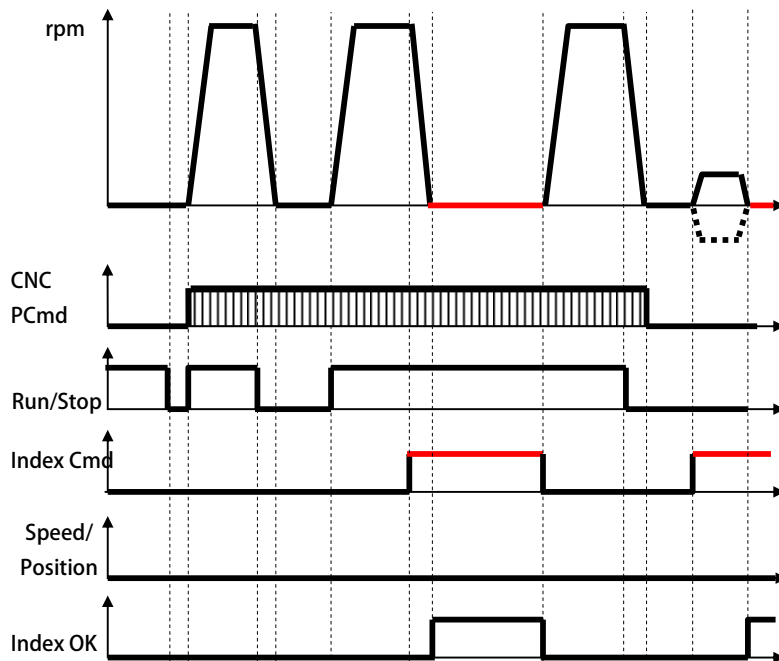
☛ Under V/F Mode , runing to Ns : No-Load speed =3000rpm(100Hz) , observations :

- ◆ 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)

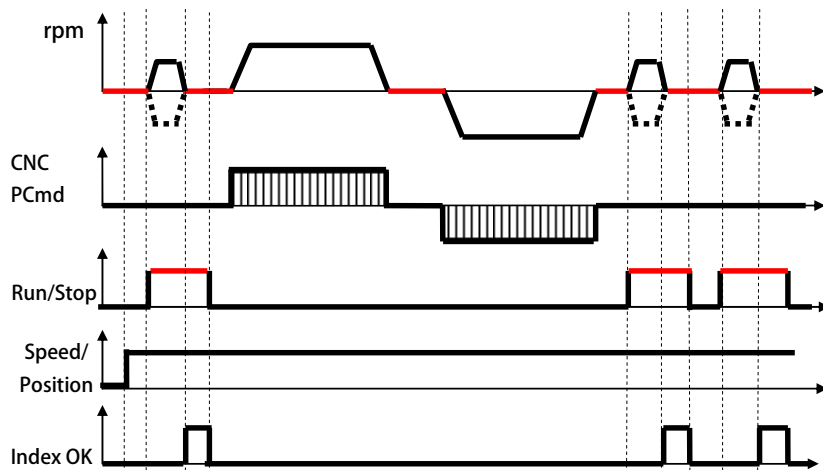
Step4	Closeloop Running	
☛	Pr.003=2	→ Drive Operation mode = IMSV/PMSV, Close Loop A/B QEP feedback
☛	Pr.278=9	→ Select Speed Source when SWx=000=peed set by PCMD
☛	Pr.010=100	→ JOG Rpm / Locate position Rpm
☛	Pr.194=0	→ ENCODER TYPE = IM motor, ABZ Encoder
☛	Pr.188=1	→ ENCODER DIRECTION =(B Lead A)
☛	Pr.190= up counts	→ A/B ENCODER COUNTER , use lower speed to check ° 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





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