■Warning and Alert:

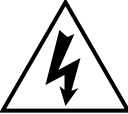| ⚡ **Warning** |
|---|
| • **Do not proceed to the assembly of the line while electrifying.**

 • **Before doing any maintenance or repair always wait until CHARGE LED goes off and supply power is totally separation from the drive.**

 • **The output terminal of Servo drive [U, V, W] must NOT touch the AC power.** |

⚠ **Alert**
• **Install the cooling fan for the Servo drive while the environment temperature is too high. Ex. Servo driver is installed in the control panel.**   • **Do not proceed to the Anti-Pressure-Test to the Servo driver.**   • **Confirm the quick stop function is available before operate servo drive.**   • **Matching up machine to change the user parameter setting before machine performs. If there is no according correct setting number, it could lead to out of control or breakdown.**

Safety proceeding:

Check the covering letter detail before installing, running, maintaining and examining. Furthermore, only the profession-technician can proceed to assemble and repair.

Safety proceeding in the covering letter discriminate between "Warning" & "Alert".

⚡ **Alarm**	**Indicating the possibility dangerous situation. It could cause the death or serious damage if being ignored.**
⚠ **Warning**	**Indicating the possibility dangerous situation. It could cause smaller or lighter human injured and damage of equipment.**

Read this covering letter detail before using Servo driver.

TECO Industrial Product & System Automation Division

First of all, thank you for using TECO Servo Driver JSDE Series ("JSDE" for short) and Servo Motors. JSDE can be controlled by digital control board ,PC or HMI, and provide excellent performance for a wide range of applications and different requirement from customers.

Read this Installation guide before using JSDE. Contents of the letter comprises:

- Servo System checking, installing and procedure of assembly line.

- Keypad operation method and procedure , DI status display, unusual alarm and alarm reset process.

- Servo System control function, trial operation and performance adjusted.

- Explanation for all parameters of Servo Driver.

- Standard specification of JSDE Series.

In order to daily examine, maintain and understand the reason of unusual situation and handle unexpected problem, please put this manual in a nearby place for reference.

P.S: Teco corporation reserve the rights for update and modify this manual. User can check our web site for latest version manual.

http://www.teco.com.tw/SA/en/teco_product.asp?teco_cat_id=6

Contents

Chapter 1   Checking and Installing

Chapter 2   Wiring

TECO Industrial Product & System Automation Division

Chapter 3   Panel Operator / Digital Operator

Chapter 4 Parameter Function

Chapter 5 Troubleshooting

TECO   Industrial Product &
System Automation Division

Chapter 1 Checking and Installing

1-1 Checking Products

Our Servo Pack have already completely been functionally examined before leaving the factory. In order to protect the products from the damage during transportation, please check the items below before open the pack:

- Check if the models of servo driver and motor are the same with the models of ordering.
  (About the model explanation, please check the chapters below)
- Check if there are damage or scrape of the servo driver and motor.
  (If there is any damage during transportation, do not power ON)
- Check if there are any assembly problem or loose parts in the Servo Drive and Motor
- Check if the Motor's rotor and shaft can be rotated smoothly by hand
  (The Servo Motor with Mechanical-Brake can not be rotated directly)
- There must be the "QC" pass seal in each servo drive, if not, please do not proceed Power ON.

If there is any question under the situation above, please contact TECO's Local sales representative or distributor for more information.

1-1-1 Servo Drives Model Designation

$$JSD \quad E-15 \quad A \quad \square$$

TECO AC Servo drive No.

Drive Series:
Series E

Drive Model:
10 / 15 / 20 / 30

Input voltage phase:
□：Single / Three
3：3 Phase input

AC Input Voltage
A : AC 220V

P.S : Maximum output power
10 : 200 W   20 : 750 KW
15 : 400 W   30 : 1 KW

TECO Industrial Product & System Automation Division
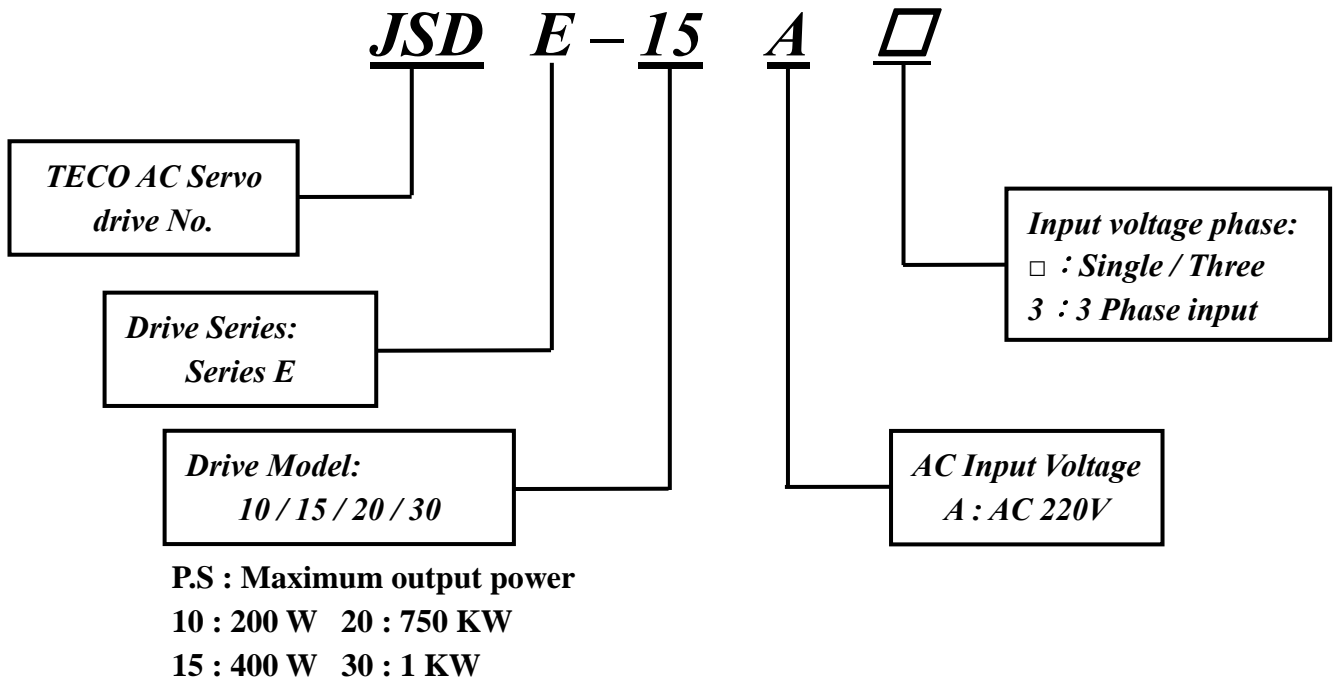
1-1-2 Servo Motors Model Designation

$$JSM \quad A - S \quad C \quad 30 \quad A \quad H \quad K \quad B$$

TECO AC Servo Motor No.

Motor Series:
Series A

Motor inertia:
S/T: Extra low
L: Low
M: Middle

Motor Speed:
A: 1000 rpm
B: 2000 rpm
C: 3000 rpm
H: 1500 rpm

Motor rate power
P5 : 50 W
01 : 100 W
02 : 200 W
03 : 300 W
04 :400W
05 : 550W
08 : 750W
10 : 1 KW
15 : 1.5 KW
20 : 2 KW
30 : 3 KW

AC input voltage
A：AC 220V

Encoler:
F: 2000 ppr
B : 2500 ppr
H : 8192 ppr

M:Machinery BK
□: No BK
B:Mech. brake

Encode	Spline	Grease Seal
□	No	No
K	Yes	No
O	No	Yes
A	Yes	Yes

⚠ **Warning**

Make sure parameter CN030 is setting correctly before start operate this drive.

Setting method reference 1-1-3 .

TECO Industrial Product & System Automation Division

1-1-3 Servo motor Model Code display

dn-08 (Servo motor Model Code display)

Use dn-08 to display servo motor code and find Cn030 setting code for your servo drive and motor according to table list below. If the dn08 code is not list below then contact to area distributor.

Ex. JSDE-15 servo drive with JSMA-SC02AF motor the setting code of Cn030 is [H0130].

dn-08 Display Cn030 Setting	Drives Model	Motor Model	Motor Standards		Encoder Specification
			Watt (W)	Speed (rpm)	
H1011	JSDE-10	JSMA-SCP5AB	50	3000	2500
H1021		JSMA-SC01AB	100	3000	2500
H0030		JSMA-SC02AF	200	3000	2000
H1043		JSMA-TC02AB			2500
H0121	JSDE-15	JSMA-LC03AB	300	3000	2500
H0130		JSMA-SC02AF	200	3000	2000
H1133		JSMA-TC02AB			2500
H0140		JSMA-SC04AF	400	3000	2000
H1141		JSMA-SC04AB			2500
H1143		JSMA-TC04AB			2500
H0211	JSDE-20	JSMA-LC08AB	750	3000	2500
H0220		JSMA-SC04AF	400	3000	2000
H1221		JSMA-SC04AB			2500
H1223		JSMA-TC04AB			2500
H0230		JSMA-SC08AF	750	3000	2000
H1233		JSMA-TC08AB			2500
H0241		JSMA-MA05AB	550	1000	2500
H0251		JSMA-MH05AB		1500	2500
H0310	JSDE-30	JSMA-SC08AF	750	3000	2000
H1313		JSMA-TC08AB			2500
H0321		JSMA-MA10AB	1000	1000	2500
H0331		JSMA-MB10AB		2000	2500
H0341		JSMA-MH10AB		1500	2500
H0351		JSMA-MC10AB		3000	2500

TECO   Industrial Product & System Automation Division

1-2 The Brief Introduction for Different Control Modes.

There are many kinds of control modes. The detail description shown as below:

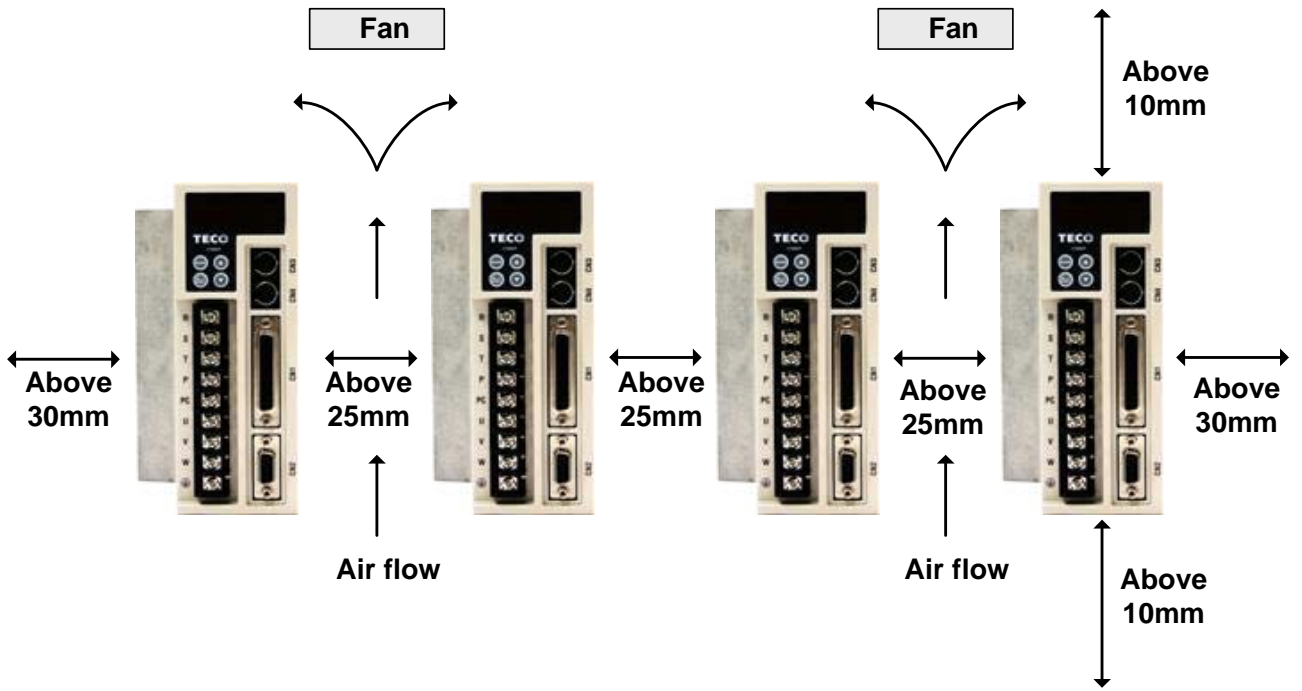| Name		Symbol	Explanation
Single Mode	Position Mode (External Pulse Command)	Pe	Position control for the servo motor is achieved via an external pulse command. Position command is input from CN1. Refer to diagram of chapter 2-3-1
	Position Mode (Internal Position Command)	Pi	Position control for the servo motor is achieved via by 16 commands stored within the servo controller. Execution of the 16 positions is via Digital Input signals. Refer to diagram of chapter 2-3-3
	Speed Mode	S	Speed control for the servo motor can be achieved via parameters set within the controller or from an external analog -10 ~ +10 Vdc command. Control of the internal speed parameters is via the Digital Inputs. A maximum of three steps speed can be stored internally. Refer to diagram of chapter 2-3-4
	Torque Mode	T	Torque control for the servo motor can be achieved via parameters set or from an external analog -10 ~ +10 Vdc command. Refer to diagram of chapter 2-3-5
Multiple Mode		Pe-S	Pe and S can be switched by digital input contact.
		Pe-T	Pe and T can be switched by digital input contact.
		S-T	S and T can be switched by digital input contact.

TECO Industrial Product & System Automation Division

1-3 Conditions for Installation of Drives

1-3-1 Environmental Conditions

The product should be kept in the shipping carton before installation. In order to retain the warranty coverage, the AC drive should be stored properly when it is not to be used for an extended period of time. Some storage suggestions are:

- Ambient Temperature: 0 ~ + 55 ℃; Ambient Humidity: Under 85% RH (Under the condition of no frost).

- Storage Temperature: - 20 ~ + 85 ℃; Stored Humidity: Under 85%RH (Under the condition of no frost).

- Vibrating: Under 0.5 G.

- Do not mount the servo drive or motor in a location where temperatures and humidity will exceed specification.

- To avoid the direct sunlight,

- To avoid the erosion of grease, salts and dust.

- To avoid the corrosive gases and liquids.

- To avoid the invading of airborne dust or metallic particles.

- When several Drives are installed in control panel, make sure the ventilation space for each drive to prevent the heat; the fan also must be installed, to keep the ambient temperature under 55 ℃.

- Please Install the drive in a vertical position, face to the front, in order to prevent the heat.

- To avoid the metal parts or other unnecessary things falling into the drive when installing.

- The drive must be stable by M5 screws.

- When there were the vibrating items nearby, please using vibration-absorber or installing anti-vibration- rubber, if the vibration is irresistible.

- When there is any big-size magnetic switch, welding machines or other source of interference. Please install the filter. When the filter is installed, we must install the insulation transformer.

TECO Industrial Product & System Automation Division

1-3-2 Direction and Distance

TECO Industrial Product & System Automation Division

1-4 Conditions for Installation of Servo Motors

1-4-1 Environmental Conditions

• Ambient Temperature: 0 ~ + 40 ℃; Ambient humidity: Under 90% RH (No Frost).

• Storage Temperature: - 20 ~ + 60 ℃; Storage temperature: Under 90%RH (No Frost).

• Vibration: Under 2.5 G.

• In a well-ventilated and low humidity and dust location.

• Do not store in a place subjected to corrosive gases, liquids, or airborne dust or metallic particles.

• Do not mount the servo motor in a location where temperatures and humidity will exceed specification.

• Do not mount the motor in a location where it will be subjected to high levels of electromagnetic radiation.

1-4-2 Method of Installation

1. Horizontal Install: Please let the cable-cavity downside to prevent the water or oil or other liquid flow into the servo motor.
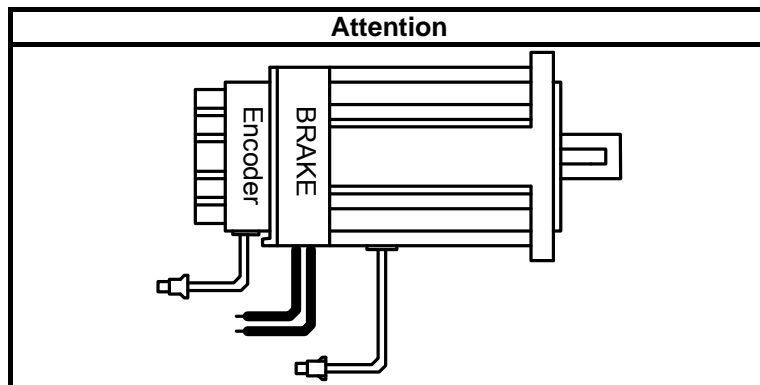

2. Vertical Install: If the motor shaft is side-up installed and mounted to a gear box, please pay attention to and avoid the oil leakage from the gear box.

TECO Industrial Product & System Automation Division

1-4-3 Notice for install motor

1. Please using oil seal motor to avoid the oil from reduction gear flowing into the motor through the motor shaft.

2. The cable need to be kept dry.

3. Please fixing the wiring cable certainly, to avoid the cable ablating or breaking.

4. The extending length of the shaft shall be sufficient, otherwise that will cause vibration of the motor.

Wrong Example	Correct Example
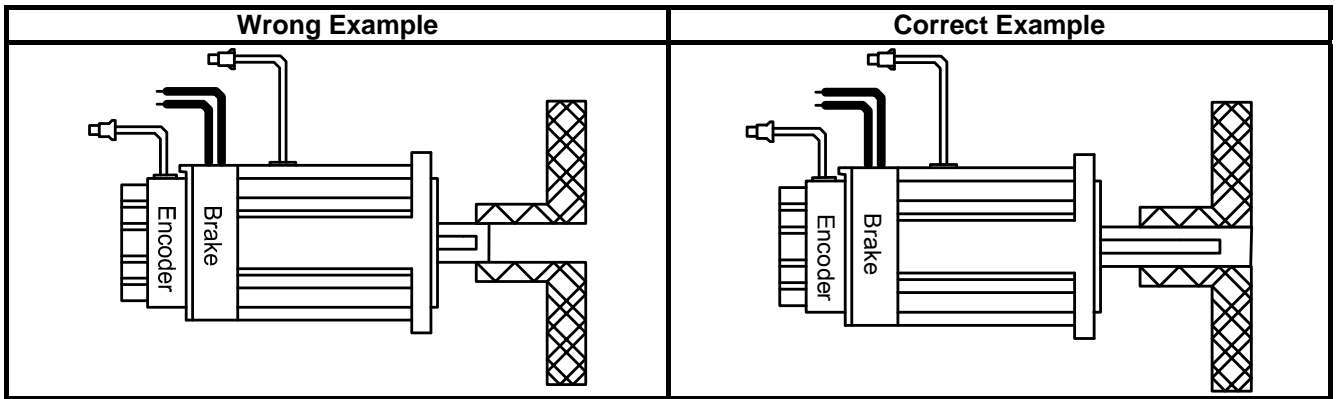
5. Please do not press the motor too hard when installation or separate from coupling. Otherwise the shaft and encoder will be damaged.

Attention:
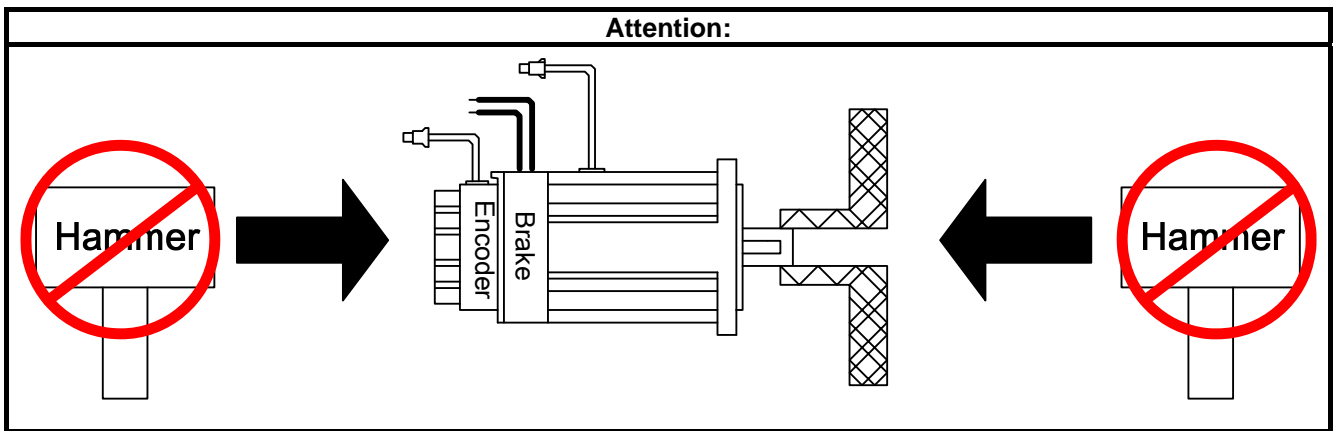
Chapter 2 Main Circuit Wiring Diagram

2-1 Main Circuit Wiring for Servo System

2-1-1 Wiring for Main Circuit and Peripheral Devices

Power
50W~1KW Single Phase or AC 200~230V 3 Phase

No Fuse Break (NFB)

Noise Filter

Magnetic Contactor (MC)

External braking resistor is connected to P and PC Circuit

JSDE

TECO

RS485

R
S
T
P
PC
U
V
W

CN3

CN4
For Communication

TECO Servo PC software RS-232 / RS-485

CN1
For I/O Connection

PLC / PC or motion controller

CN2
For Encoder Connection

Servo motor JSMA

TECO Industrial Product & System Automation Division

2-1-2 Wiring rules for Servo Drives

- The wire material must rule by "Wiring Specifications."

- Cable Length: CN1 I/O cable : Less than 3m.

    Motor Encoder cable: Less than 20m.

    Select the shortest distance for wire connection.

- Don't connect to un-programmable I/O contacts.

- Motor output terminal (U,V,W) must be connected correctly. Otherwise it might defect the servo motor.

- Shielded cable must be connected to FG terminal.

- Don't install the capacitor or Noise Filter at the output terminal of servo drive.

- At the control-output-signal relay, the direction of surge absorb diode must be correctly connected, otherwise it can not output signal, and cause the protect loop of emergency-stop abnormal.

- Please do these below to avoid the wrong operation from noise:

    Please install devices such as the insulated transformer and noise filter at the input power.

    Keep more than 30 cm between Power wire (power cable or motor cable…etc.) and signal cable, do not install them in the same conduit.

- Please set "emergency-stop switch" to prevent abnormal operation.

- After wiring, check the connection-situation of each joint (ex: loose soldering, soldering point short, terminal order incorrect…etc.). Tighten the joints to confirm if surly connected to the servo drive, if the screw is tight. There can not be the situations such as cable break, cable pulled and dragged, or be heavily pressed.

    * Especially pay attention to the polarity between servo motor wiring and encoder.

- It is not necessary to add extra regeneration resistance under general situation. When application required drastic deceleration in a short period and over voltage fault occurred, please connect to distributor or manufacturer for install external regeneration resistor.

2-1-3 Specifications of Wiring

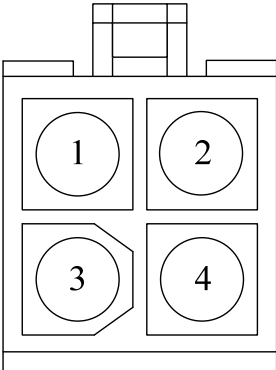| Connection Terminal			Servo Drives and Cable Specifications			
Connector	**Mark (Sign)**	**Connect Terminal Name**	**JSDE-10**	**JSDE-15**	**JSDE-20**	**JSDE-30**
TB Terminal	R, S, T	Main Power Terminal	2.0mm² A.W.G.14	2.0mm² A.W.G.14	2.0mm² A.W.G.14	2.0mm² A.W.G.14
	U, V, W	Motor Cable Terminal	2.0mm² A.W.G.14	2.0mm² A.W.G.14	2.0mm² A.W.G.14	2.0mm² A.W.G.14
	P, Pc	Regeneration Resistor Terminal	2.0mm² A.W.G.14	2.0mm² A.W.G.14	2.0mm² A.W.G.14	2.0mm² A.W.G.14
	⏚	Ground	2.0mm² A.W.G.14	2.0mm² A.W.G.14	2.0mm² A.W.G.14	2.0mm² A.W.G.14
Connector	**Connect Pin No.**	**Connect Terminal Name**	**JSDE-10**	**JSDE-15**	**JSDE-20**	**JSDE-30**
CN1 Joint Control Signal	12,25	Analog command input (SIN、PIC)	0.2mm² or 0.3mm² , Twisted pair cable connecting to the Analog Grounding wire (including shield cable)			
	13	Analog Ground Terminal(AG)				
	1~3 14~16	Digital input Terminal(DI)	0.2mm² or 0.3mm² , Twisted pair cable connecting to the I/O Grounding wire (including shield cable)			
	18~20	Digital output terminal(DO)				
	8	Output 24V (IP24)				
	17	Input 24V (DICOM)				
	24	Digital Ground terminal(IG24)				
	4~7	Position Command Input (Pulse、Sign)	0.2mm² or 0.3mm² -> Twisted-pair-cable (including shield cable)			
	9~11 21~23	Encoder Signal Output (PA、/PA PB、/PB、PZ、/PZ)				
CN2 Joint of encoder	5	Output 5V (+5E)	0.2mm² or 0.3mm² -> Twisted-pair-cable (including shield cable)			
	4	Output Grounding wire of power supply(GND)				
	1~3 7~9	Encoder Signal Input (A、/A、B、/B、Z、/Z)				
CN3 Joint of Communication	5,7	RS-485 Communication	0.2mm² or 0.3mm² -> Twisted-pair-cable (including shield cable)			
CN4 Joint of Communication	1,4	RS-232 Communication				
	3	Communication Ground				
	5,7	RS-485 Communication				

P.S.: 1. Select a proper capacity for NFB and noise filter when several Servo drives is connected.
2. CN1 is 25 Pins D-SUB connector ; CN2 is 9 Pins D-SUB connector
3. CN3, CN4 are 8 Pins MINI DIN JACK.

TECO　Industrial Product & System Automation Division

2-1-4 Motor Terminal Layout

A Table of Motor Terminal Wiring
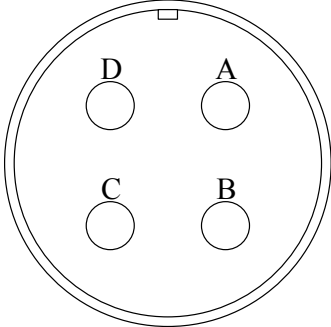
(1) General Joint:

Terminal Symbol	Cable Color	Signal
1	Red	U
2	White	V
3	Black	W
4	Green	FG
Brake control wire	Fine red	DC +24V
	Fine yellow	0V
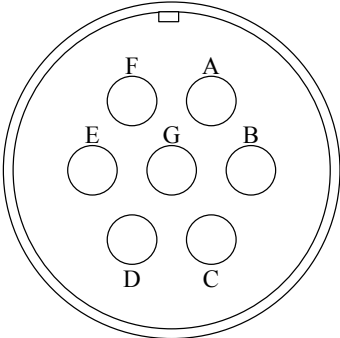
(2)Military Specifications Joint (Without Mechanical Brake):

Terminal Symbol	Cable Color	Signal
A	Red	U
B	White	V
C	Black	W
D	Green	FG

(3)Military Specifications Joint(With Mechanical Brake):

Terminal Symbol	Cable Color	Signal
B	Red	U
G	White	V
E	Black	W
C	Green	FG
A	Fine red	DC +24V (Brake control)
F	Fine yellow	0V (Brake control)

16
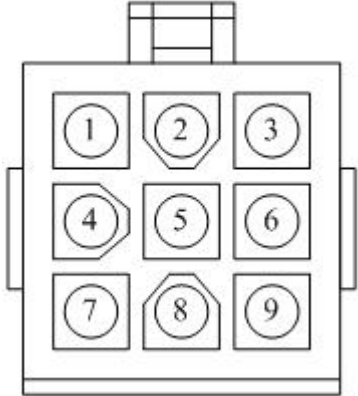
Table of Motor Encoder wiring
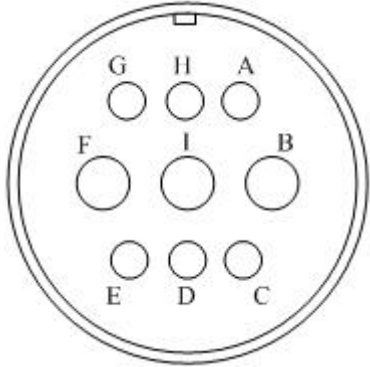
(1)General Joint:

Terminal Symbol	Cable Color	Signal	
1	White	+5V	
2	Black	0V	
3	Green	A	
4	Blue	/A	
5	Red	B	
6	Purple	/B	
7	Yellow	Z	
8	Orange	/Z	
9	Shield	FG	

(2) Military Specifications Joint

Terminal Symbol	Cable Color	Signal	
B	White	+5V	
I	Black	0V	
A	Green	A	
C	Blue	/A	
H	Red	B	
D	Purple	/B	
G	Yellow	Z	
E	Orange	/Z	
F	Shield	FG	

2-1-5 Typical Wiring for Motor and Main Circuit

* The Wiring Example of Single Phase Main Power (Less than 1KW)
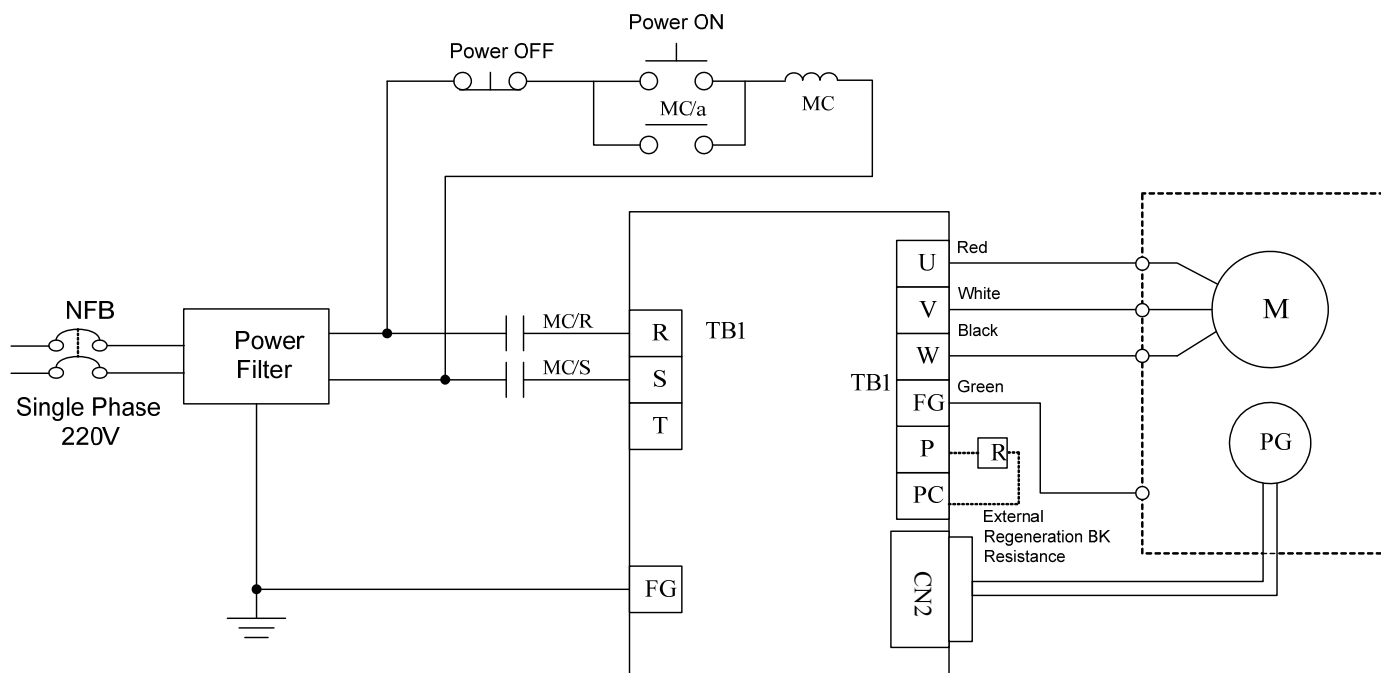
* The Wiring Example of 3 Phase Main Power (More than 1KW)

2-1-6 TB Terminal

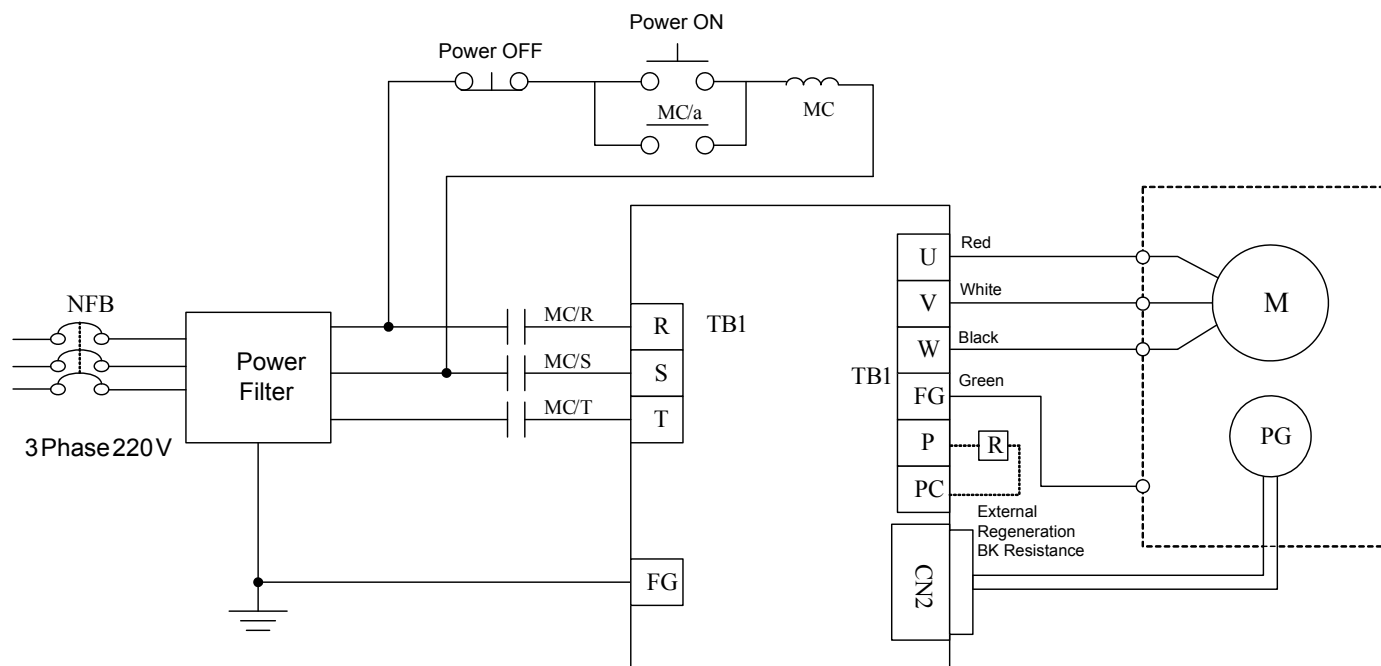| Name	Terminal Sign	Detail
Main circuit power input terminal	R	Connecting to external AC Power. Single / 3 Phase 200~230VAC, +10 ~ -15% 50/60Hz ±5%
	S	
	T	
External regeneration resistance terminal	P	When using external regeneration, set the resistance power in Cn012. Please refer to manual to see resistance value
	PC	
Motor-power output terminal	U	Motor terminal wire is **red**
	V	Motor terminal wire is **white**
	W	Motor terminal wire is **black**
Motor-case grounding terminal	⏚	Motor terminal wire is **green or yellow-green.**

2-1-7 Wiring for Mechanical Brake

Uninstall BRAKE:

- 50/100/200/300/400/750W series: Use Red wire and yellow wire connecting to DC +24V voltage**(No polarity)**

- 550/1KW series: BK outputs from A & F of **Motor Power Joint**, servo motor can operate normally after uninstalling.
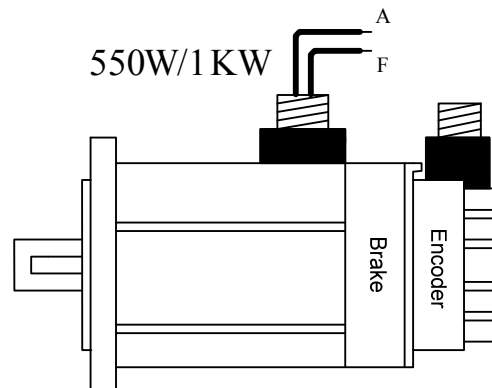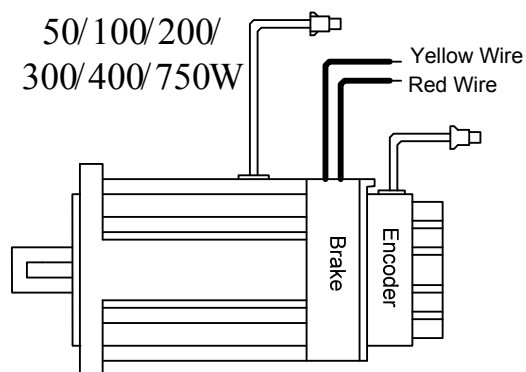
2-2 I/O Terminal

There are 4 groups of terminal, which contain CN3 and CN4 communication terminal, CN1 control I/O signal terminal and CN2 encoder terminal. The diagram below displays all positions for the terminal.

CN3,CN4 (8 Pins female)
Communication Connector

CN1 (25 Pins female)
Control I/O Signal

CN2 (9 Pins female)
Encoder connector

TECO Industrial Product &
System Automation Division
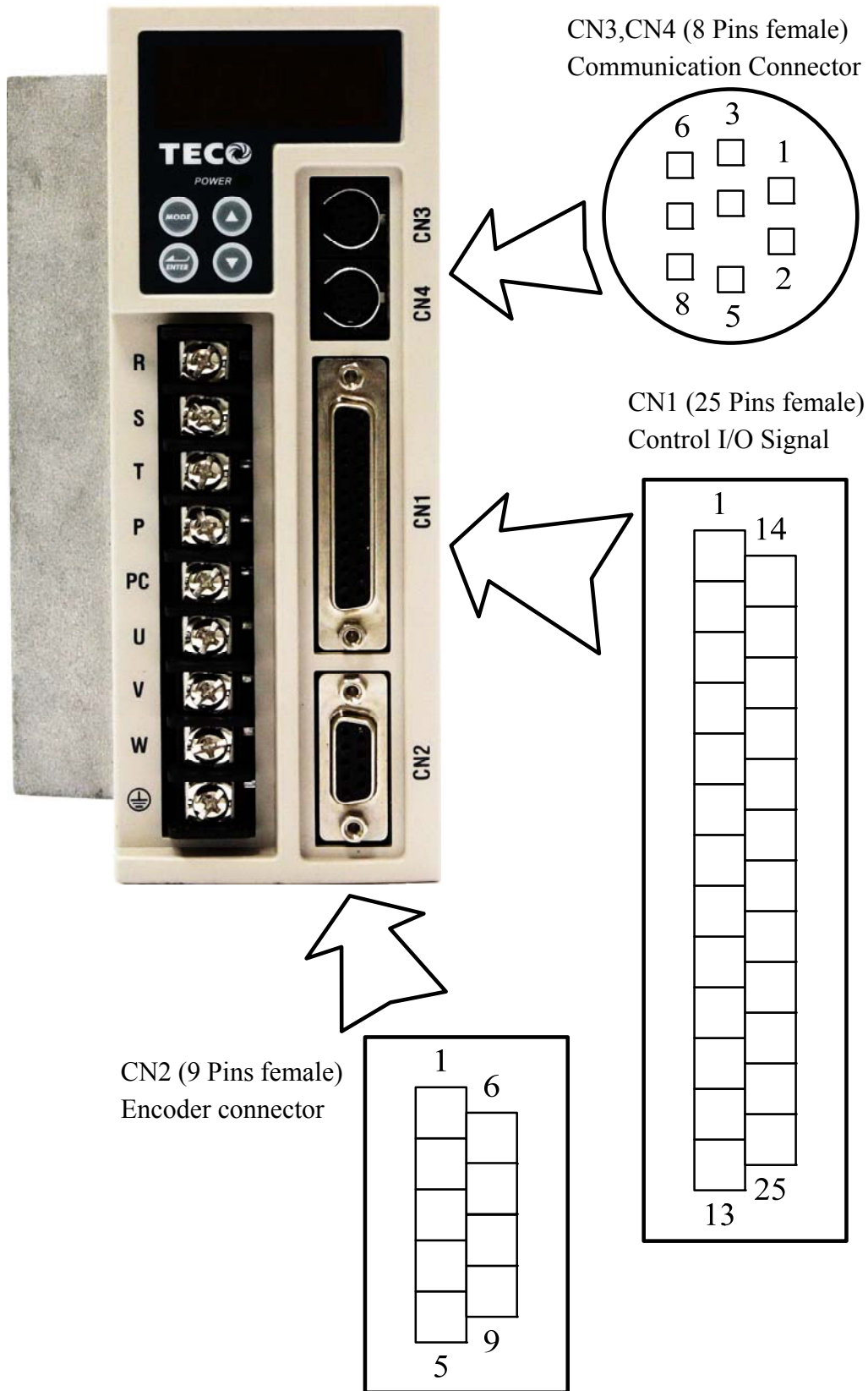
2-2-1 Output Signals from the Servo pack

(1) CN1 Terminal Layout:

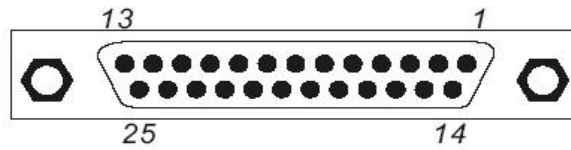| Pin NO.	Name	Function
1	DI-1	Digital Input Terminal 1
2	DI-3	Digital Input Terminal 3
3	DI-5	Digital Input Terminal 5
4	Pulse	Pulse command input(+)
5	/Pulse	Pulse command input(-)
6	Sign	Position Symbol command input(+)
7	/Sign	Position Symbol command input(+)
8	IP24	+24V power output
9	/PA	Encoder output /A phase
10	/PB	Encoder output /B phase
11	/PZ	Encoder output /Z phase
12	SIN	Speed or Torque analog command input
13	AG	Analog signal ground

Pin NO.	Name	Function
14	DI-2	Digital Input Terminal 2
15	DI-4	Digital Input Terminal 4
16	DI-6	Digital Input Terminal 6
17	DICOM	+24V Input
18	DO-1	Digital output terminal 1
19	DO-2	Digital output terminal 2
20	DO-3	Digital output terminal 3
21	PA	Encoder output A phase
22	PB	Encoder output B phase
23	PZ	Encoder output Z phase
24	IG24	+24V Ground
25	PIC	Torque command speed limited

P.S.

1. Digital input and Digital output is programmable, setting method refer to parameter Hn501 ~ Hn 509.

2. Digatal input and Digital output shield signal should connect to FG ⊥ terminal.

2-2-2 Encoder Connector (CN2) Terminal Layout

(1) Diagram of CN2 Terminal:
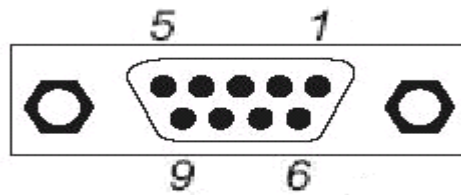
Pin NO.	Name	Function
1	B	Encoder B phase input
2	/A	Encoder /A phase input
3	A	Encoder A phase input
4	GND	+5V GND
5	+5E	+5V output

Pin NO.	Name	Function
6	—	_____
7	/Z	Encoder /Z phase input
8	Z	Encoder Z phase input
9	/B	Encoder /B phase input

P.S. Do not connect wire to unassignment terminal.

2-2-3 Communication Connector (CN3/CN4) Terminal Layout

Diagram of CN3/CN4 Terminal :
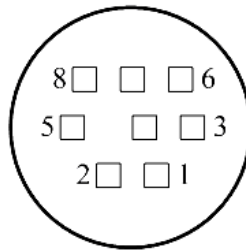
CN3 for RS-485		
Pin NO.	Name	Function
1	—	_____
2	—	_____
3	—	_____
4	—	_____
5	Data+	RS-485 Serial data communication (+)
6	—	_____
7	Data-	RS-485 Serial data communication (-)
8	—	_____

CN4 for RS232 and RS-485		
Pin NO.	Name	Function
1	RxD	RS-232 Serial data receive
2	—	_____
3	GND	RS-232 Signal Ground
4	TxD	RS-232 Serial data transmit
5	Data+	RS-485 Serial data communication (+)
6	—	_____
7	Data-	RS-485 Serial data communication (-)
8	—	_____

P.S. Do not connect wire to unassignment terminal.

TECO Industrial Product & System Automation Division

2-3 Typical Circuit Wiring Examples
2-3-1 Position Control Mode (Pe Mode) (Line Driver)

Digital input and output terminal are programmable.

Industrial Product &
System Automation Division

TECO
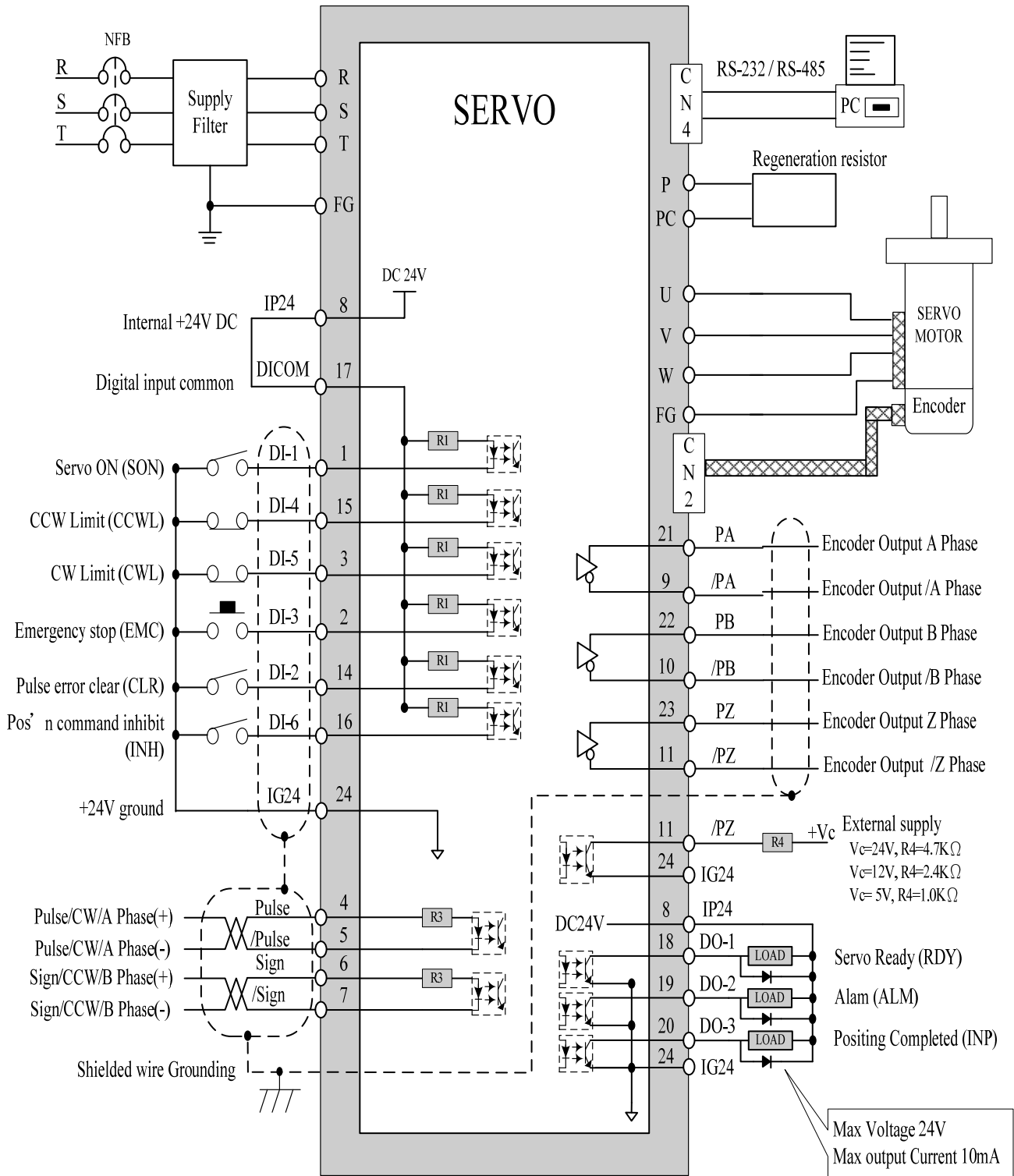
2-3-2 Position Control Mode (Pe Mode) (Open Collector)

NFB

R
S
T

Power Filter

R
S
T
FG

SERVO

C N 4 RS-232 / RS-485

PC

Regeneration resistor

P
PC

U
V
W
FG

SERVO MOTOR

Encoder

DC 24V

Internal +24V DC — IP24 — 8

Digital input common — DICOM — 17

Servo ON (SON) — DI-1 — 1 — R1

CCW Limit (CCWL) — DI-4 — 15 — R1

CW Limit (CWL) — DI-5 — 3 — R1

Emergency stop (EMC) — DI-3 — 2 — R1

Pulse error clear (CLR) — DI-2 — 14 — R1

Pos'n command inhibit (INH) — DI-6 — 16 — R1

+24V ground — IG24 — 24

C N 2

21 — PA — Encoder Output A Phase
9 — /PA — Encoder Output /A Phase
22 — PB — Encoder Output B Phase
10 — /PB — Encoder Output /B Phase
23 — PZ — Encoder Output Z Phase
11 — /PZ — Encoder Output /Z Phase

Vcc	24V	12V	5V
R	2KΩ	750Ω	100Ω

Vcc

Pulse/CW/A Phase — R — Pulse — 4 — R3
/Pulse — 5

Controller

Sign — 6 — R3
/Sign — 7

Sign/CCW/B Phase

Shield ground

11 — /PZ — R4 — +Vc — External supply
24 — IG24 — Vc=24V, R4=4.7KΩ
Vc=12V, R4=2.4KΩ
Vc=5V, R4=1.0KΩ

8 — IP24
DC24V
18 — DO-1 — LOAD — Servo Ready (RDY)
19 — DO-2 — LOAD — Alam (ALM)
20 — DO-3 — LOAD — Positioning completed (INP)
24 — IG24

Max Voltage 24V
Max Output Current 10mA

Digital input and output terminal are programmable.

Industrial Product & System Automation Division
TECO
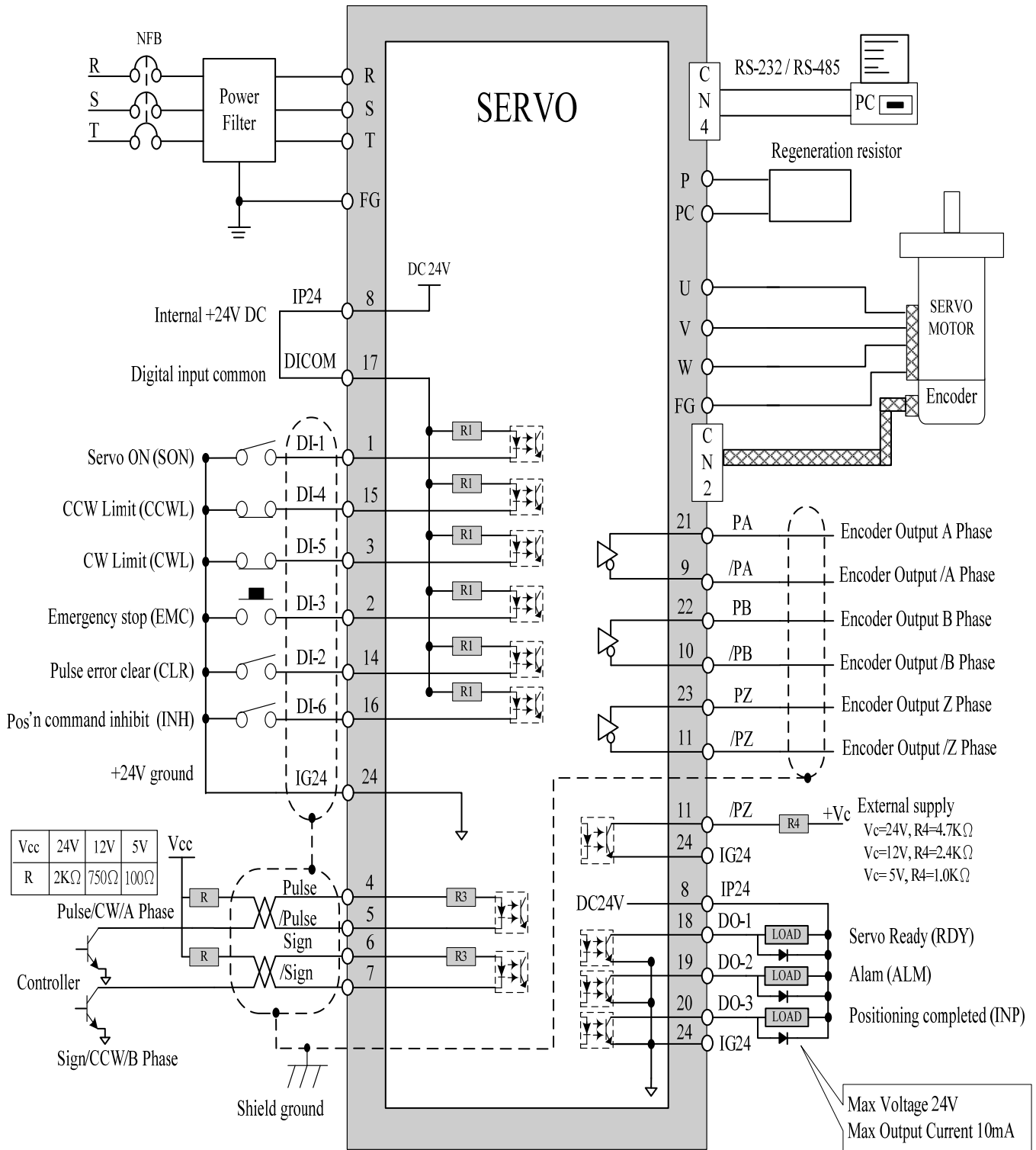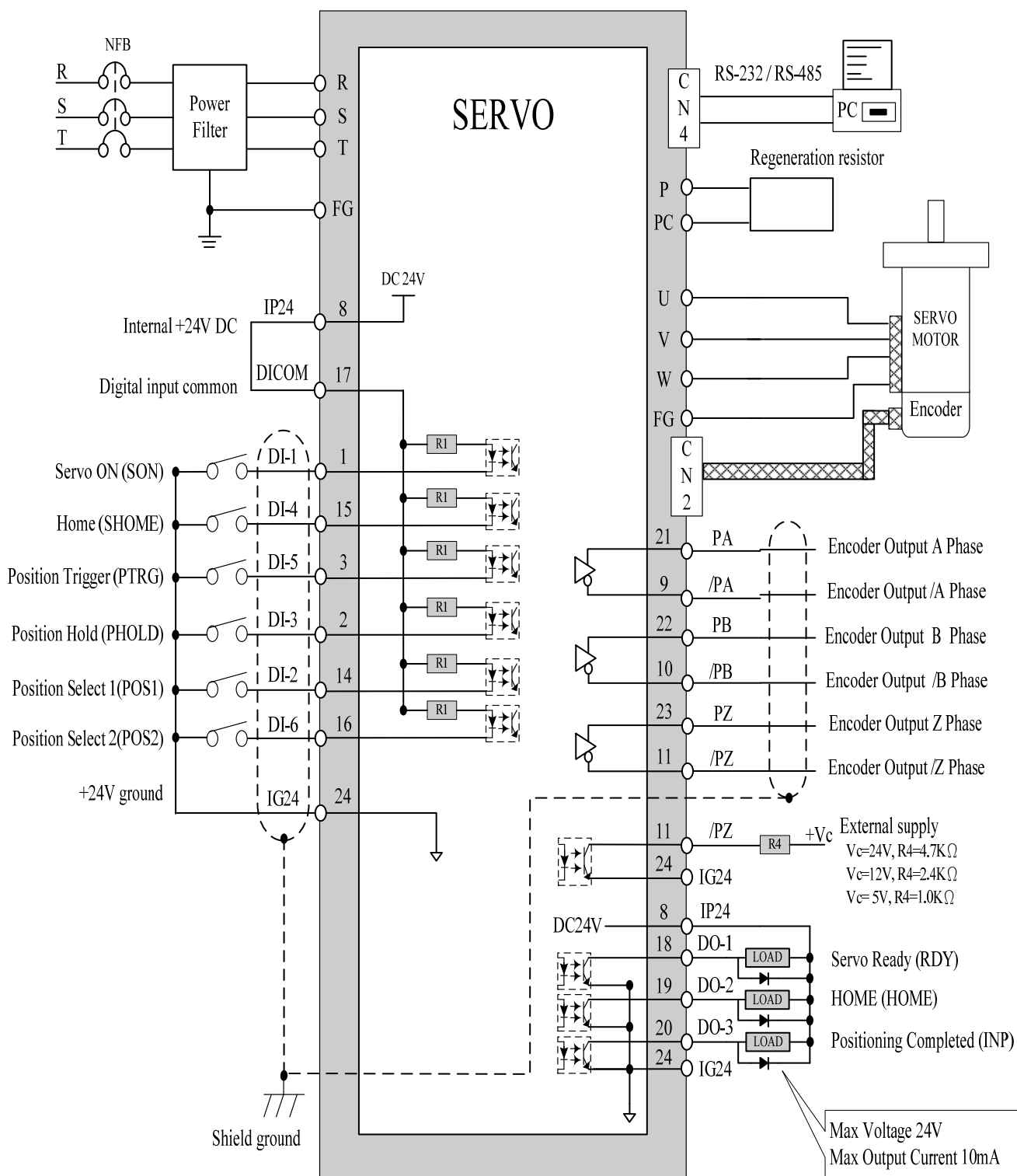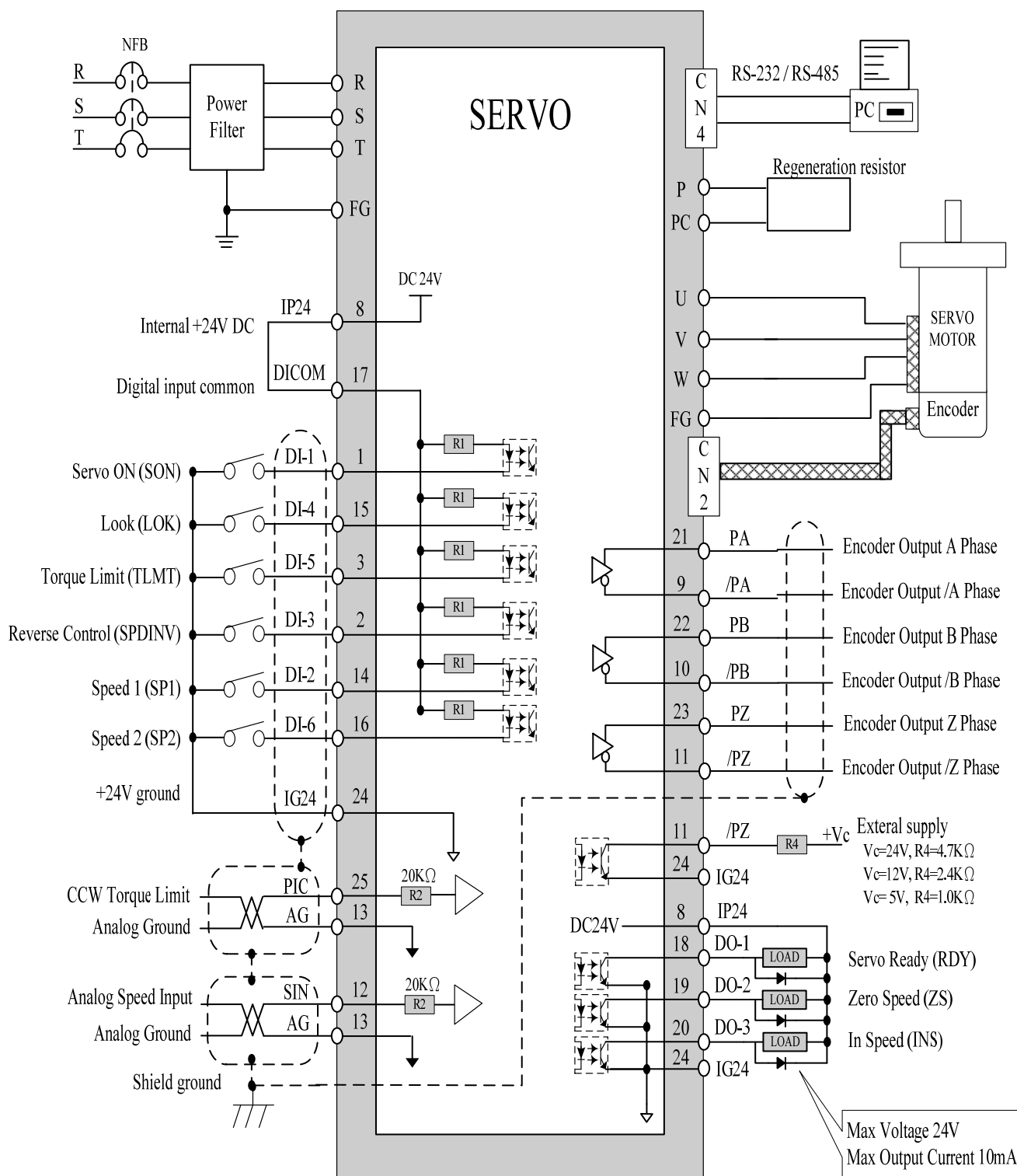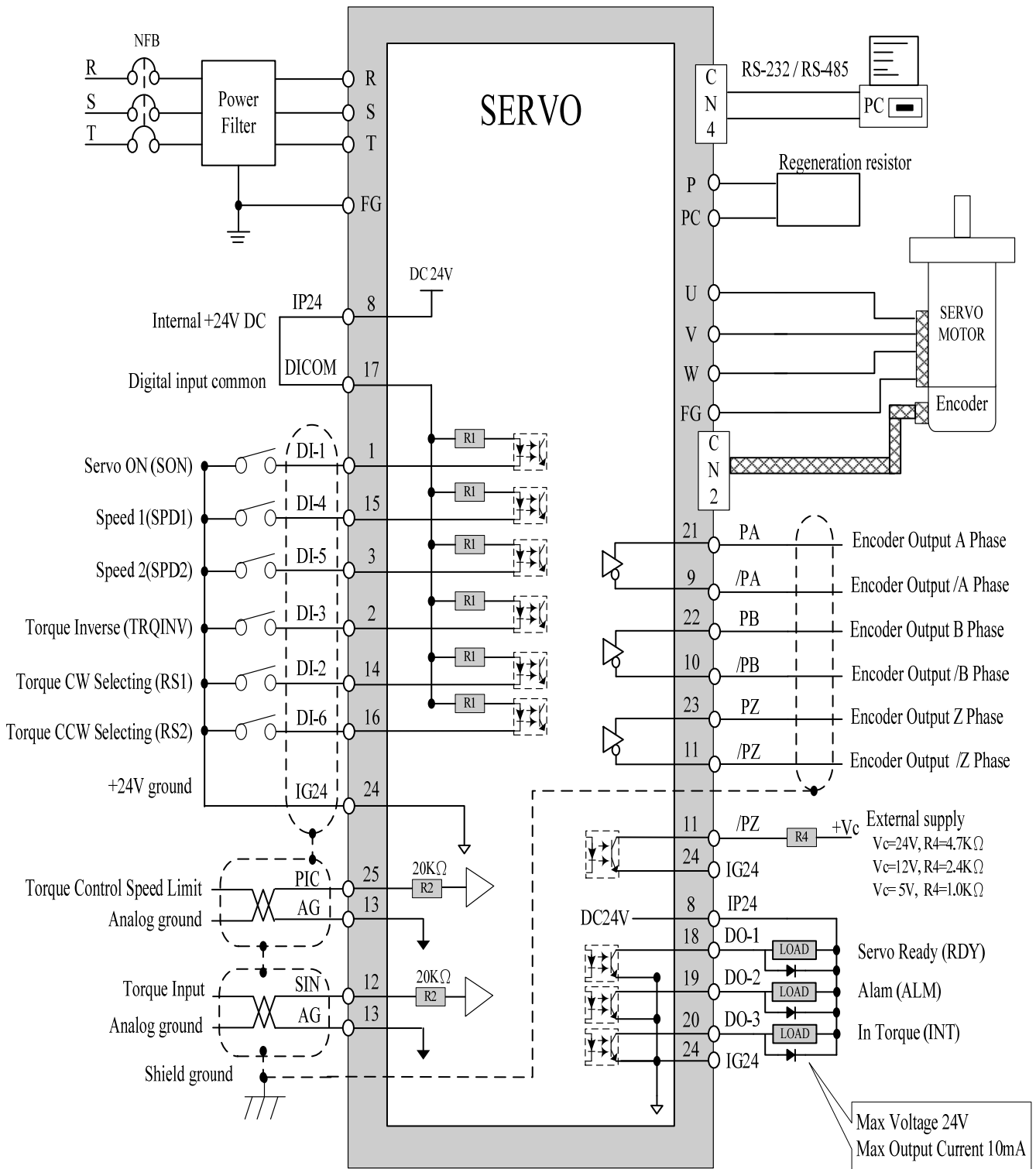
2-3-3 Position Control Mode (Pi Mode)

Digital input and output terminal are programmable.

2-3-4 Speed Control Mode (S Mode)

Digital input and output terminal are programmable.

2-3-5 Torque Control Mode (T Mode)

Digital input and output terminal are programmable.

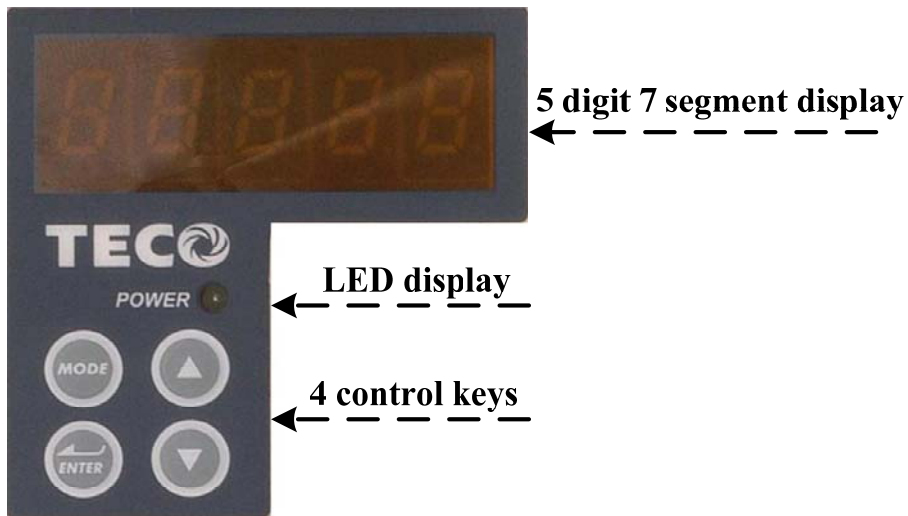**TECO** Industrial Product & System Automation Division

Chapter 3 Operation Panel / Digital Operator

3-1 Operation Panel of the Drives

The operator keypad & display contains a 5 digit 7 segment display, 4 control keys

and one Power status LED (Green) is lit when the power is applied to the unit.

Power on to light up charge LED and gradually dark when internal main circuit discharge accomplished.

Do NOT connect or assemble the servo drive before Power LED is off.

5 digit 7 segment display

LED display

4 control keys
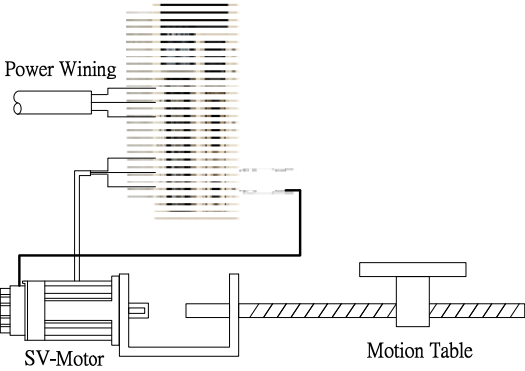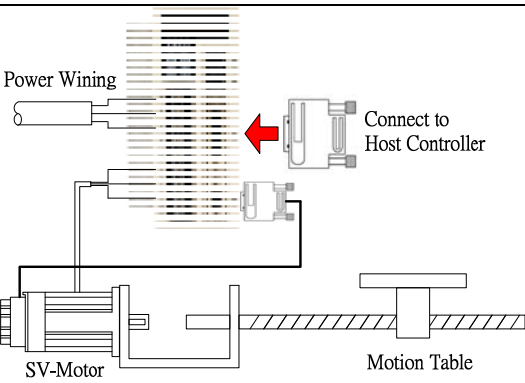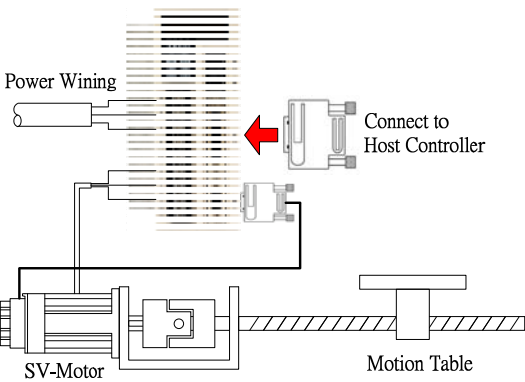
Key	Name	Function Keys Description
MODE	MODE/SET	1. To select a basic mode, such as the status display mode, utility function mode, parameter setting mode, or monitor mode. 2. Returning back to parameter selection from data-setting screen.
▲	INCREMENT	1. Parameter Selection. 2. To increase or decrease the set value. 3. Press ▲ and ▼ at the same time to **RESET ALARM**.
▼	DECREMENT	
ENTER	DATA SETTING & DATA ENTER	1. To confirm data and parameter item. 2. To shift to the next digit on the left. 3. To enter the data setting (press 2 sec.)

3-2 Trial Operation

Before proceeding with trial run, please ensure that all the wiring is correct.

Trial operation display as below include trial run with external controller speed control loop (analog voltage command) and position control loop (external pulse command).

(1) No-load servo motor.	
A. Servo Drive wiring and motor installation	B. Purpose of trial run
Power Wining, SV-Motor, Motion Table	Confirm if the items below are correct: . Drives power cable wiring . Servo Motor wiring . Encoder wiring . Setting servo motor rotation direction and speed
(2) No-load servo motor with a host controller.	
A. Servo drive wiring and motor installation	B. Purpose of trial run
Power Wining, Connect to Host Controller, SV-Motor, Motion Table	Confirm if the items below are correct: . Control signal wiring between host controller and servo drive. . Servo motor rotation direction, speed and rotating number . . Brake function, operation limit function and protection function.
(3) Servo motor connected to load and controlled by a host controller.	
A. Servo drive wiring and motor installation	B. Purpose of trial run
Power Wining, Connect to Host Controller, SV-Motor, Motion Table	Confirm if the items below are correct: . Servo motor rotation direction, speed and mechanical operation range. . Set related control parameters.

Industrial Product & System Automation Division

Chapter 4   Parameter

4-1 Explanation of Parameter groups.

There are 9 groups of parameters as listed below.

Alarm Code	Description
Un-xx	Status Display Parameters.
dn-xx	Diagnostics Parameters.
AL-xx	Alarm Parameters
Cn-xx	System Parameters
Tn1xx	Torque Control Parameters
Sn2xx	Speed Control Parameters
Pn3xx	Position Control Parameters
qn4xx	Quick Set-up Parameters
Hn5xx	Multi-function I/O parameters

Control Mode Code

Signal	Control Mode
ALL	All Control Mode
Pi	Position Control Mode(Internal Positional Command)
Pe	Position Control Mode(External Pulse Command)
S	Speed Control Mode
T	Torque Control Mode

Definition of Symbols.

Symbol	Explanation
★	Parameter becomes effective after recycling the power.
◆	Parameter is Effective without pressing the **Enter** key.

4-2 Parameter Display Table

Diagnosis Parameter
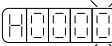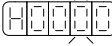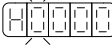
Parameter	Name & Function
dn-01	Selected control mode
dn-02	Output terminal signal status.
dn-03	Input terminal signal status.
dn-04	CPU Software version
dn-05	JOG mode operation
dn-06	Reserve parameter
dn-07	Auto offset adjustment of external analog command voltage.
dn-08	Servo model code.
dn-09	ASIC Software version display

TECO Industrial Product & System Automation Division
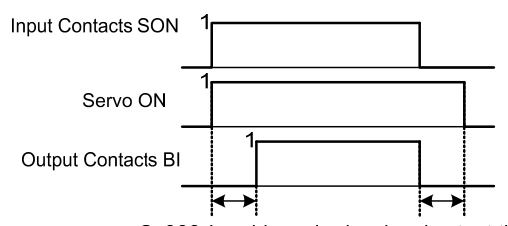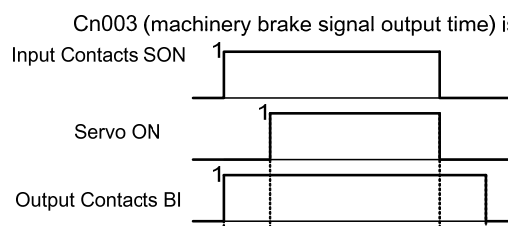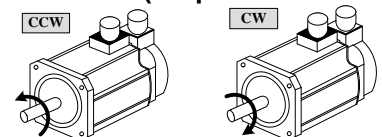
Status Display Parameter

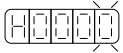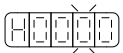| Parameter Signal	Display	Unit	Explanation
Un-01	Actual Motor Speed	rpm	Motor Speed is displayed in rpm.
Un-02	Actual Motor Torque	%	It displays the torque as a percentage of the rated torque. Ex: 20 are displayed. It means that the motor torque output is 20% of rated torque.
Un-03	Regenerative load rate	%	Value for the processable regenerative power as 100% . Displays regenerative power consumption in 10-s cycle.
Un-04	Accumulated load rate	%	Value for the rated torque as 100%. Displays effective torque in 10-s cyle.
Un-05	Max load rate	%	Max value of accumulated load rate
Un-06	Speed Command	rpm	Speed command is displayed in rpm.
Un-07	Position Error Value	pulse	Error between position command value and the actual position feedback.
Un-08	Position Feed-back Value	pulse	The accumulated number of pulses from the encoder.
Un-09	External Voltage Command	V	External analog voltage command value in volts.
Un-10	(Vdc Bus)Main Loop Voltage	V	DC Bus voltage in Volts.
Un-11	External Speed Limit Command Value	rpm	External speed limit value in rpm.
Un-12	External CCW Torque Limit Command Value	%	Ex: Display 100. Means current external CCW torque limit command is set to 100 %.
Un-13	External CW Torque Limit Command Value	%	Ex: Display 100. Means current external CW toque limit command is set to 100%.
Un-14	Motor feed back – Rotation value (absolute value)	rev	After power on, it displays motor rotation number as an absolute value.
Un-15	Motor feed back – Less then 1 rotation pulse value(absolute value)	pulse	After power on, it displays the number of pulses for an incomplete revolution of the motor as an absolute value.
Un-16	Pulse command – rotation value(absolute value)	rev	After power on, it displays pulse command input rotation number in absolute value.
Un-17	Pulse command – Less then 1 rotation pulse value(absolute value)	pulse	After power on, it displays pulse command input for an incomplete rotation. pulse value is an absolute value.
Un-18	Torque command	%	It displays the torque command as a percentage of the rated torque. Ex: Display. 50.Means current motor torque command is 50% of rated torque.
Un-19	Load inertia	x0.1	When Cn002.2=0(Auto gain adjust disabled), it displays the current preset load inertia ratio from parameter Cn025. When Cn002.2=1(Auto gain adjust enabled), it displays the current estimated load inertia ratio.

System Parameters

Parameter	Name & Function		Default	Unit	Setting Range	Control Mode	Chapter
★Cn001	**Control Mode selection**		2	X	0 | 6	ALL	5-1
	Setting	Explanation					
	0	Torque Control					
	1	Speed Control					
	2	Position Control (external pulse Command)					
	3	Position/Speed Control Switching					5-6-2
	4	Speed/Torque Control Switching					
	5	Position/Torque Control Switching					
	6	Position Control (internal position Command)					
★Cn002.0	**SON (Servo On) Input contact function**		0	X	0 | 1	ALL	5-6-3
	Setting	Explanation					
	0	Input Contact, Enables SON (Servo On).					
	1	Input Contact has no function. (SON is enabled when Power on).					
Cn002.1	**CCWL & CWL Input contact function.**		1	X	0 | 1		
	Setting	Explanation					
	0	CCWL and CWL input contacts are able to control the drive inhibit of CCW and CW.					
	1	CCWL & CWL input contacts are not able to control CCW and CW drive inhibit. CCW and CW drive inhibit is disable.					
Cn002.2	**Auto Tuning**		0	X	0 | 1	Pi Pe S	5-5-1
	Setting	Explanation					
	0	Continuously Auto Tuning is Disable					
	1	Continuously Auto Tuning is Enabled.					
★Cn002.3	**EMC reset mode selection**		0	X	0 | 1	ALL	
	Setting	Explanation					
	0	Reset EMC signal is only available in Servo Off condition (SON contact is open) and reset AL-09 by ALRS signal. P.S.) It is NOT allow to reset when SON is applied.					
	1	When EMC status is released, AL-09 can be reset on both Servo ON and Servo OFF conditions. Attention! Ensure that the speed command are removed before the alarm is reset to avoid motor unexpected start.					

TECO — Industrial Product & System Automation Division
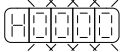
Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
Cn003	Output time setting for Mechanical Brake Signal Brake Signal Timing Sequence： Cn003 (machinery brake signal output time) is positive Input Contacts SON Servo ON Output Contacts BI Cn003 (machinery brake signal output time) Cn003 (machinery brake signal output time) is negative Input Contacts SON Servo ON Output Contacts BI Cn003 (machinery brake signal output time) Implementation a pin for dynamic brake signal (BI) as a output signal before to perform this function. Refer to sequence diagram above. Note: Signal logic level status: 1 = ON.　　0 = OFF. Refer to Hn501.2 ~ Hn506.2 for setting contact high & Low logic levels.	0	msec	-2000 | 2000	ALL	5-6-5
Cn004	**Motor rotate direction.(Inspect from the load side)** CCW　　CW When Torque or Speed Command value is Positive, the setting of Motor rotation direction are:	0	X	0 | 3	S T	5-2-4 5-3-7

Table within Cn004:

Setting	Explanation	
	Torque Control	Speed Control
0	Counter ClockWise(CCW)	Counter ClockWise (CCW)
1	ClockWise (CW)	Counter ClockWise (CCW)
2	Counter ClockWise (CCW)	ClockWise(CW)
3	ClockWise (CW)	ClockWise (CW)
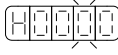
Parameter	Name & Function		Default	Unit	Setting Range	Control Mode	Chapter
★Cn005	**Encoder pulse output scale (Dividend)**		1	X	1 | 63	ALL	5-3-5
	For default set to the rated encoder number of pulses per revolution, such as 2500ppr. Encoder ppr can be scaled by setting a ppr in the range of 1 to the rated ppr of the encoder for scaling purpose. *PPR = Pulse per revolution.* **Ex:encorder rated precision is 2000 ppr, If you setting Cn005 =2, the output is 1000ppr.**						
Cn006	Reserve parameter		—	—	—	—	—
Cn007	**Speed reached preset.** Speed preset level for **CW** or **CCW** rotation. When the speed is greater then preset level in Cn007 the Speed reached output signal INS will be activated..		Rated rpm × 1/3	rpm	0 | 4500	S T	5-3-12
Cn008	**Brake Mode** Selectable Brake modes for Servo off, EMC and CCW/CW drive inhibit.		0	X	0 | 1	ALL	5-6-4
	Setting	Explanation					
		Dynamic brakes	Mechanical brakes				
	0	No	No				
	1	No	Yes				
★Cn009	**CW/CCW drive inhibit mode**		0	X	0 | 2	ALL	5-6-6
	Setting	Explanation					
	0	When torque limit reached the setting value of (**Cn010, Cn011**), servo motor deceleration to stop in the zero clamp condition.					
	1	Reserve parameter					
	2	Once max torque limit (± 300%) is detected then deceleration to stop, zero clamp is applied when stop.					

Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
Cn010	**CCW Torque command Limit.** Ex: For a torque limit in CCW direction which is twice the rated torque , set Cn10=200.	300	%	0 | 300	ALL	5-2-5 5-3-10
Cn011	**CW Torque command Limit.** Ex: For a torque limit in CW direction which is twice the rated torque , set Cn11=-200.	-300	%	-300 | 0	ALL	5-2-5 5-3-10
Cn012	**Power setting for External Regeneration Resistor** Refer to section 5-6-7 to choose external Regeneration resister and set its power specification in Watts of Cn012.	0	W	0 | 10000	ALL	5-6-7
Cn013	**Frequency of resonance Filter (Notch Filter).** Enter the vibration frequency in Cn013, to eliminate system mechanical vibration.	0	Hz	0 | 1000	Pi Pe S	5-3-9
Cn014	**Band Width of the Resonance Filter.** Adjusting the band width of the frequency, lower the band width value in **Cn014**, restrain frequency Band width will be wider.	7	X	1 | 100	Pi Pe S	5-3-9

Cn015.0

PI/P control switch mode.

Setting	Explanation
0	Switch from PI to P if the *torque* command is greater than **Cn016**.
1	Switch from PI to P if the *speed* command is greater than **Cn017**.
2	Switch from PI to P if the *acceleration* rate is greater than **Cn018**.
3	Switch from PI to P if the *position error* is greater than **Cn019**.
4	Switch from PI to P be the input contact *PCNT*. Set one of the multi function terminals to active.

Default: 4 Unit: X Setting Range: 0 | 4

Cn015.1

Automatic gain 1& 2 switch

Setting	Explanation
0	Switch from gain 1 to 2 if *torque* command is greater than **Cn021**.
1	Switch from gain 1 to 2 if **speed** command is greater than **Cn022**.
2	Switch from gain 1 to 2 if *acceleration* command is greater than **Cn023**.
3	Switch from gain 1 to 2 if *position error* value is greater than **Cn024**.
4	Switch from gain 1 to 2 by input contact **G-SEL**.

Default: 4 Unit: X Setting Range: 0 | 4 Control Mode: Pi Pe S Chapter: 5-3-11

Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
Cn016	**PI/P control mode switch by Torque Command** Set the **Cn015.0=0** first. If Torque Command is less than Cn016 PI control is selected. If Torque Command is greater than Cn016 P control is selected.	200	%	0 | 399	Pi Pe S	5-3-11
Cn017	**PI/P control mode switch by Speed Command** Set the **Cn015.0=1 first.** If Speed Command is less than **Cn017** PI control is selected. If Speed Command is greater than **Cn017** P control is selected.	0	rpm	0 | 4500	Pi Pe S	5-3-11
Cn018	**PI/P control mode switch by accelerate Command** Set the **Cn015.0=2 first.** If Acceleration is less than **Cn018** PI control is selected. If Acceleration is greater than **Cn018** P control is selected.	0	rps/s	0 | 18750	Pi Pe S	5-3-11
Cn019	**PI/P control mode switch by position error number** Set the **Cn015.0=3 first**. If Position error value is less than **Cn019** PI control is selected. If Position error value is greater than **Cn019** P control is selected.	0	pulse	0 | 50000	Pi Pe S	5-3-11
Cn020	**Automatic gain 1& 2 switch delay time.** Speed loop 2 to speed loop 1, Change over delay, when two control speed loops (P&I gains 1 & 2) are used.	0	x02 msec	0 | 10000	Pi Pe S	5-3-11
Cn021	**Automatic gain 1& 2 switch condition (Torque command)** Set **Cn015.1=0 first.** When torque command is less than **Cn021** , Gain 1 is selected. When torque command is greater than **Cn021,** Gain 2 is selected When **Gain 2** is active and torque command becomes less than **Cn021** setting value, system will automatically switch back to **Gain 1** switch time delay can be set by Cn020.	200	%	0 | 399	Pi Pe S	5-3-11
Cn022	**Automatic gain 1& 2 switch condition (Speed Command)** Set the **Cn015.1=1 first.** When speed command is less than Cn022 Gain 1 is selected. When speed command is greater than Cn022 Gain 2 is selected. When **Gain 2** is active and speed command becomes less than **Cn022** setting value, system will automatically switch back to **Gain 1** the switch time delay can be set by Cn020.	0	rpm	0 | 4500	Pi Pe S	5-3-11

TECO   Industrial Product & System Automation Division

Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
Cn023	**Automatic gain 1& 2 switch condition (Acceleration Command)** Set **Cn015.1=2** first. When acceleration command is less than Cn023 Gain 1 is selected. When acceleration command is greater than Cn023 Gain 2 is selected. When **Gain 2** is active and acceleration command becomes less than **Cn023** system will automatically switch back to **Gain 1** the switch time delay can be set by Cn020.	0	rps/s	0 | 18750	Pi Pe S	5-3-11
Cn024	**Automatic gain 1& 2 switch condition (Position error value)** Set **Cn015.1=3** first. When position error value is less than Cn024 Gain 1 is selected. When position error value is greater than Cn024 Gain 2 is selected. When **Gain 2** is active and position error value becomes less than **Cn024** system will automatically switch back to **Gain 1** and the switch time delay can be set by Cn020.	0	pulse	0 | 50000	Pi Pe S	5-3-11
Cn025	**Load-Inertia ratio** $$LoadInertiaRatio = \frac{LoadInertiaToMotor(J_L)}{MotorRotorInertia(J_M)} \times 100\%$$	40	x0.1	0 | 1000	Pi Pe S	5-5
Cn026	**Rigidity Setting** When Auto tuning is used, set the Rigidity Level depending on the various Gain settings for applications such as those listed below:	4	X	1 | A	Pi Pe S	5-5-1

Table within Cn026:

Setting	Explanation		
	Position Loop Gain **Pn310 [1/s]**	Speed Loop Gain **Sn211 [Hz]**	Speed Loop Integral-Time Constant **Sn212 [x0.2msec]**
1	15	15	300
2	20	20	225
3	30	30	150
4	40	40	100
5	60	60	75
6	85	85	50
7	120	120	40
8	160	160	30
9	200	200	25
A	250	250	20

Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
Cn027	**Reserve parameter**	—	—	—	—	—
Cn028	**Reserve parameter**	—	—	—	—	—
★**Cn029**	**Reset parameters.** Setting — Explanation 0 — Disabled 1 — Reset all Parameters to default (Factory setting)	0	X	0 | 1	ALL	5-6-10
★**Cn030** ⌸⌸⌸⌸⌸	**Servo motor model code** Servo model code can be display and checked with parameter dn-08, refer **3-2-2 dn-08** table for more information. (refer to chapter 1-1-3) Attention : Before operate your servo motor., check this parameter setting is compatible for servo drive and motor. If there has any incompatible problem contact supplier for more information.	Default	X	X	ALL	3-2-2
Cn031	**Cooling fan running modes** **(Only available for the model which equip with fan.)** Setting — Explanation 1 — Run when Servo ON. 2 — Always Running. 3 — Disabled.	1	X	1 | 3	ALL	5-6-8
Cn032	**Speed feed back smoothing filter** Restrain sharp vibration noise by the setting and this filter also delay the time of servo response.	500	Hz	1 | 1000	Pe Pi S	5-3-12
Cn033	**Speed Feed-forward smoothing filter** Smooth the speed feed-forward command.	40	Hz	1 | 100	Pe Pi	5-4-6
Cn034	**Torque command smoothing filter** Restrain sharp vibration noise by the setting and this filter delay the time of servo response.	0	Hz	0 | 1000	ALL	5-2-7
Cn035	**Panel display content selection** Select display content for LED panel for power on status. Setting — Explanation 0 — Display data set and drive status parameter. Refer 3-1 1 | 19 — Display Un-01 ~ Un-19 content. Refer 3-2-1 for more information. Ex : Set Cn035=1, when power on it display the actual speed of motor. (content of Un-01)	0	X	0 | 19	ALL	3-1 3-2-1

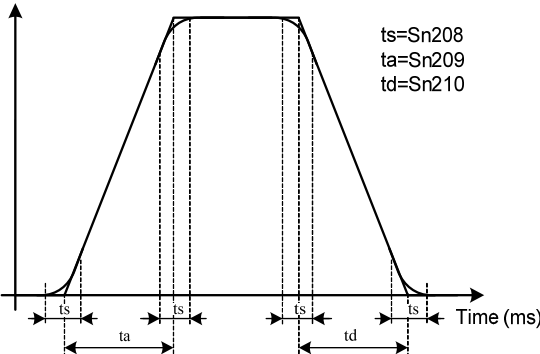| Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
Cn036	**Servo ID number** When using Modbus for communication, each servo units has to setting a ID number. When two or more drive ID overlap will lead to communication fail.	1	X	0 | 254	ALL	7
Cn037.0 ⌂⌂⌂⌂⌂	**Modbus RS-485 braud rate setting** Setting | Explanation 0 | 4800 1 | 9600 2 | 19200 3 | 38400 4 | 57600 5 | 115200	1	bps	0 | 5	ALL	7
Cn037.1 ⌂⌂⌂⌂⌂	**PC Software RS-232 braud rate setting** Setting | Explanation 0 | 4800 1 | 9600 2 | 19200 3 | 38400	1	bps	0 | 3	ALL	7
Cn038	**Communication protocol** Setting | Explanation 0 | 7 , N , 2 (Modbus , ASCII) 1 | 7 , E , 1 (Modbus , ASCII) 2 | 7 , O , 1 (Modbus , ASCII) 3 | 8 , N , 2 (Modbus , ASCII) 4 | 8 , E , 1 (Modbus , ASCII) 5 | 8 , O , 1 (Modbus , ASCII) 6 | 8 , N , 2 (Modbus , RTU) 7 | 8 , E , 1 (Modbus , RTU) 8 | 8 , O , 1 (Modbus , RTU)	0	X	0 | 8	ALL	7
Cn039	**Communication time-out detection** Setting non-zero value to enable this function, communication Time should be in the setting period otherwise alarm message of communication time-out will show. Setting a zero value to disable this function.	0	sec	0 | 20	ALL	7
Cn040	**Communication response delay time** Delay Servo drive communication response time to master control unit.	0	0.5 msec	0 | 255	ALL	7

Torque-Control Parameter

Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
★Tn101	**Linear acceleration/deceleration method** | Setting	Explanation	 | 0	Disabled.	 | 1	Enabled.		0	X	0 | 1	T	5-2-3
★Tn102	**Linear accel/decel time period.** Time taken for the torque-command to linearly accelerate to the rated torque level or Decelerate to zero torque . Torque Command Rate Torque Command Torque Command setting Tn102 Time(ms)	1	msec	1 | 50000	T	5-2-3
Tn103	**Analog Torque Command Ratio** Slope of voltage command / Torque command can be adjusted. Torque Command (%) 300 200 100 -10 -5 5 10 Input Voltage (V) -100 -200 -300 Slope set by Tn103	300	% 10V	0 | 300	T	5-2-1

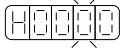| Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
Tn104	**Torque Command, analog input voltage offset** The offset amount can be adjusted by this parameter. 	0	mV	-10000 | 10000	T	5-2-2
Tn105	**Preset Speed Limit 1. (Torque control mode)** In Torque control, input contacts SPD1 and SPD2 can be used to select Preset speed limit 1. As follows: | Input Contact SPD2	Input Contact SPD1 | | 0 | 1 | Note: Input contacts status "1" (ON) and "0" (OFF). Refer to 5-6-1 to set high or low input logic levels.	100	rpm	0 | 3000	T	5-2-6
Tn106	**Preset Speed Limit 2. (Torque control mode)** In Torque control, input contacts SPD1 and SPD2 can be used to select Preset speed limit 2. As follows: | Input Contact SPD2	Input Contact SPD1 | | 1 | 0 | Note: Input contacts status "1" (ON) and "0" (OFF) Refer to 5-6-1 to set high or low input logic levels.	200	rpm	0 | 3000	T	5-2-6
Tn107	**Preset Speed Limit 3. (Torque control mode)** In Torque control, input contacts SPD1 and SPD2 can be used to select Preset speed limit 3. As follows: | Input Contact SPD2	Input Contact SPD1 | | 1 | 1 | Note: Input contacts status "1" (ON) and "0" (OFF) Refer to 5-6-1 to set high or low input logic levels.	300	rpm	0 | 3000	T	5-2-6
Tn108	**Torque output monitor value** When the torque level in CW or CCW direction become greater then this value setting, the output contact INT is active.	0	%	0 | 300	ALL	5-2-7

Speed-Control Parameter

Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
Sn201	**Internal Speed Command 1** In Speed control, input contacts SPD1 and SPD2 can be used to select 3 sets of internal speed command, select for speed command 1 contact status shows below: <table><tr><td>Input Contact SPD2</td><td>Input Contact SPD1</td></tr><tr><td>0</td><td>1</td></tr></table>Note: Input contacts status "1" (ON) and "0" (OFF) Refer to 5-6-1 to set high or low input logic levels.	100	rpm	-3000 | 3000	S	5-3-1
Sn202	**Internal Speed Command 2** In Speed control, input contacts SPD1 and SPD2 can be used to select 3 sets of internal speed command, select for speed command 2 contact status shows below: <table><tr><td>Input Contact SPD2</td><td>Input Contact SPD1</td></tr><tr><td>1</td><td>0</td></tr></table>Note: Input contacts status "1" (ON) and "0" (OFF) Refer to 5-6-1 to set high or low input logic levels.	200	rpm	-3000 | 3000	S	5-3-1
Sn203	**Internal Speed Command 3** In Speed control, input contacts SPD1 and SPD2 can be used to select 3 sets of internal speed command, select for speed command 3 contact status shows below: <table><tr><td>Input Contact SPD2</td><td>Input Contact SPD1</td></tr><tr><td>1</td><td>1</td></tr></table>Note: Input contacts status "1" (ON) and "0" (OFF). Refer to 5-6-1 to set high or low input logic levels.	300	rpm	-3000 | 3000	S	5-3-1
Sn204	**Zero Speed selection Enable or Disable the zero speed preset parameter Sn215.** <table><tr><td>Setting</td><td>Explanation</td></tr><tr><td>0</td><td>No Action. (Sn215 zero preset is not effective).</td></tr><tr><td>1</td><td>Set the preset value in Sn215 as zero speed.</td></tr></table>	0	X	0 | 1	S	5-3-12
Sn205	**Speed command accel/decel smooth method.** <table><tr><td>Setting</td><td>Explanation</td></tr><tr><td>0</td><td>Disable this function.</td></tr><tr><td>1</td><td>Smooth Acceleration/deceleration according to the curve defined by Sn206.</td></tr><tr><td>2</td><td>Linear accel/decel time constant .Defined by Sn207</td></tr><tr><td>3</td><td>S curve for Acceleration/deceleration. Defined by Sn208.</td></tr></table>	0	X	0 | 3	S	5-3-6

TECO **Industrial Product &** System Automation Division

Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
Sn206	**Speed command smooth accel/decel time Constant.** Set **Sn205=1** to enable this function then set the time period for the speed to rise to 63.2% of the full speed. Speed Command (%) 100 ··· Speed Command 63.2 50 Sn206 → Time (ms)	1	msec	1 | 10000	S	5-3-6
Sn207	**Speed command linear accel/decel time constant.** Set **Sn205=2** to enable this function then set the time period for the speed to rise linearly to full speed. Speed Command (%) 100 ··· Rate Speed Speed Command 50 Sn207 → Time (ms)	1	msec	1 | 50000	S	5-3-6

TECO Industrial Product & System Automation Division

Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
Sn208	**S curve speed command acceleration and deceleration time setting.** Set **Sn205=3 to enable this function.** In the period of Accel. and Decel. , drastic speed changing might cause vibration of machine. S curve speed command Accel. and Decel. time setting has the effect to smooth Accel. and Decel. curve. Speed Command (rpm) ts=Sn208 ta=Sn209 td=Sn210 ts ts ts ts Time (ms) ta td **Rule for the setting :** $\dfrac{t_a}{2} > t_s$, $\dfrac{t_d}{2} > t_s$	1	msec	1 | 1000	S	5-3-6
Sn209	**S curve speed command acceleration time setting.** Refer **Sn208**	200	msec	0 | 5000	S	5-3-6
Sn210	**S curve speed command deceleration time setting.** Refer **Sn208**	200	msec	0 | 5000	S	5-3-6
Sn211	**Speed loop Gain 1** Speed loop gain has a direct effect on the frequency response bandwidth of the Speed-control loop. Without causing vibration or noise Speed-loop-gain can be increased to obtain a faster speed response. If **Cn025 (load Inertia ratio)** is set correctly, the speed-loop-bandwidth will equal to speed-loop-gain.	40	Hz	10 | 450	Pi Pe S	5-3-8 5-5
Sn212	**Speed-loop Integral time 1** Speed loop integral element can eliminate the steady speed error and quick response for speed variations. Decreasing Integral time can improve system rigidity. The formula below shows the relationship between Integral time and Speed loop Gain. $SpeedLoopIntegrationTimeCons\tan t \geq 5 \times \dfrac{1}{2\pi \times SpeedLoopG}$	100	x0.2 ms	1 | 500	Pi Pe S	5-3-8 5-5

Parameter	Name & Functions	Default	Unit	Setting Range	Control Mode	Chapter
Sn213	**Speed loop Gain 2** Refer to **Sn211**	40	Hz	10 | 450	Pi Pe S	5-3-8 5-5
Sn214	**Speed loop Integral time 2** Refer to **Sn212**	100	x0.2 msec	1 | 500	Pi Pe S	5-3-8 5-5
Sn215	**Value of zero speed** Set the zero speed range in Sn215 When the actual speed is lower than **Sn215** value, Output contact **ZS** is activated.	50	rpm	0 | 4500	S	5-3-12
Sn216	**Analog Speed Command Ratio** Slope of voltage command / Speed command can be adjusted. 	Rate rpm	rpm /10V	100 | 4500	S	5-3-2
Sn217	**Analog Speed Command offset adjust** The offset amount can be adjusted by this parameter. 	0	mV	-10000 | 10000	S	5-3-3
Sn218	**Analog speed command upper limited** Setting Sn218 for limit the highest speed command of analog input.	Rate rpm x 1.02	rpm	100 | 4500	S	5-3-4
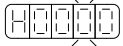
Position Control Parameter

Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
★Pn301.0 ⬚⬚⬚⬚	**Position pulse command selection** Setting / Explanation 0 — (Pulse)+(Sign) 1 — (CCW)/(CW) Pulse 2 — AB-Phase pulse x 2 3 — AB-Phase pulse x 4	0	X	0 | 3	Pe	5-4-1
★Pn301.1 ⬚⬚⬚⬚	**Position- Pulse Command Logic** Setting / Explanation 0 — Positive Logic 1 — Negative Logic	0	X	0 | 1		
★Pn301.2 ⬚⬚⬚⬚	**Selection for command receive of drive inhibit mode** Setting / Explanation 0 — When drive inhibit occurs, record value of position command input coherently. 1 — When drive inhibit occurs, ignore the value of position command.	0	X	0 | 1	Pi Pe	5-4-1
Pn302	**Electronic Gear Ratio Numerator 1** Use input contacts GN1 & GN2 to select one of four electronic Gear Ratio Numerators. To select Numerator 1, the statue of the input-contacts GN1 & GN2 should be as follows: Input Contact GN2 = 0, Input Contact GN1 = 0 Note: Input contacts status "1" (ON) and "0" (OFF). Refer to 5-6-1 to set high or low input logic levels.	1	X	1 | 50000	Pi Pe	5-4-3
Pn303	**Electronic Gear Ratio Numerator 2** Use input contacts GN1 & GN2 to select one of four electronic Gear Ratio Numerators. To select Numerator 2, the statue of the input-contacts GN1 & GN2 should be as follows: Input Contact GN2 = 0, Input Contact GN1 = 1 Note: Input contacts status "1" (ON) and "0" (OFF). Refer to 5-6-1 to set high or low input logic levels.	1	X	1 | 50000	Pi Pe	5-4-3
Pn304	**Electronic Gear Ratio Numerator 3** Use input contacts GN1 & GN2 to select one of four electronic Gear Ratio Numerators. To select Numerator 3, the statue of the input-contacts GN1 & GN2 should be as follows: Input Contact GN2 = 1, Input Contact GN1 = 0 Note: Input contacts status "1" (ON) and "0" (OFF). Refer to 5-6-1 to set high or low input logic levels.	1	X	1 | 50000	Pi Pe	5-4-3

Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
Pn305	**Electronic Gear Ratio Numerator 4** Use input contacts GN1 & GN2 to select one of four electronic Gear Ratio Numerators. To select Numerator 4, the statue of the input-contacts GN1 & GN2 should be as follows: <table><tr><th>Input Contact GN2</th><th>Input Contact GN1</th></tr><tr><td>1</td><td>1</td></tr></table>Note: Input contacts status "1" (ON) and "0" (OFF). Refer to 5-6-1 to set high or low input logic levels.	1	X	1 | 50000	Pi Pe	5-4-3
★Pn306	**Electronic Gear Ratio Denominator** Set the calculated Electronic Gear Ratio Denominator in Pn 306. (Refer to section 5-4-3). Electronic Gear Ratio should comply with the formula below. $$\frac{1}{200} \le ElectronicGearRatio \le 200$$	1	X	1 | 50000	Pi Pe	5-4-3
Pn307	**Position complete value** Set a value for In position output signal. When the Position pulse error value is less then **Pn307** output-contact **INP (In position output signal)** will be activated.	10	pulse	0 | 50000	Pi Pe	5-4-9
Pn308	**"Incorrect position" Error band Upper limit.** When the Position error value is higher then number of pulses set in **Pn308**, an Alarm message **AL-11**(Position error value alarm) will be displayed.	50000	pulse	0 | 50000	Pi Pe	5-4-9
Pn309	**"Incorrect position" Error band lower limit.** When the Position error value is lower then number of pulses set in **Pn309**, an Alarm message **AL-11**(Position error value alarm) will be displayed.	50000	pulse	0 | 50000	Pi Pe	5-4-9
Pn310	**Position Loop Gain 1** Without causing vibration or noise on the mechanical system the position loop gain value can be increased to increase system response and shorten the positioning time. Generally, the position loop bandwidth should not be higher then speed loop bandwidth. The relationship is according to the formula below: $$PositionLoopGain \le 2\pi \times \frac{SpeedLoopGain}{5}$$	40	1/s	1 | 450	Pi Pe	5-4-6 5-5
Pn311	**Position Loop Gain 2** Refer to **Pn310**	40	1/s	1 | 450	Pi Pe	5-4-6 5-5
Pn312	**Position Loop Feed Forward Gain** It can be used to reduce the track error of position control and speed up the response. If the feed forward gain is too large, it might cause speed overshoot and **INP** contact repeatedly switch ON/OFF. **INP**("In Position" output signal).	0	%	0 | 100	Pi Pe	5-4-6 5-5

TECO Industrial Product & System Automation Division

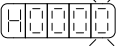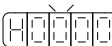| Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
★Pn313	**Position command smooth Acceleration/Deceleration Time Constant** Set the time period for the Position command pulse frequency to rise from 0 to 63.2%. Position Pulse Command Frequency (%) Position Pulse Command Frequency 100 63.2 50 Time (ms) Pn313	0	msec	0 | 10000	Pi Pe	5-4-4
★Pn314	**Positioning Command Direction Definition** CCW CW	1	X	0 | 1	★Pi Pe	5-4-5
★Pn314	Setting / Explanation 0 — (CW) .Clockwise 1 — (CCW). Counter Clockwise					
Pn315	**Pulse Error Clear Modes.**	0	X	0 | 2		5-4-7
	Setting — Explanation					
	0 — Once **CLR** signal is activated, it eliminates, the Pulse error amount.				Pe	
	1 — Once CLR signal is activated, following takes place: • The position command is cancelled. • Motor rotation is interrupted • Pulse error amount is cleared. • Machine home reference is reset				Pi Pe	
	2 — Once CLR signal is activated, following takes place:- • The position command is cancelled.. • Motor rotation is interrupted Pulse error amount is cleared.				Pi	

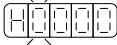| Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
★Pn316.0	**Internal Position Command Mode** Setting / Explanation 0 / Absolute Position 1 / Incremental Position	0	X	0 | 1	Pi	5-4-2
★Pn316.1	**Internal Position Command Hold (PHOLD) program select** Setting / Explanation 0 / When PHOLD is active then received PTRG signal. servomotor will be proceed internal position command from PHOLD position. 1 / When PHOLD is active then received PTRG signal. Servomotor will operate internal position command of current selection.	0	X	0 | 1	Pi	5-4-2
Pn317	**Internal Position Command 1 – Rotation Number** Set the Rotation number of the internal Position Command 1 Use input contacts POS1~POS4 to select Refer to 5-4-2.	0	rev	-30000 | 30000	Pi	5-4-2
Pn318	**Internal Position Command 1 - Pulse Number** Set the rotation pulse number of internal position Command 1 **Internal Position Command 1 =Pn317(Rotation Number) x** **Pulse number of One Rotate x 4 + Pn318(Pulse number)**	0	pulse	-32767 | 32767	Pi	5-4-2
Pn319	**Internal Position Command 1 - Move Speed** Setting the Move Speed of internal Position Command 1	0	rpm	0 | 3000	Pi	5-4-2
Pn320	**Internal Position Command 2-Rotation Number** Please refer to **Pn317**	0	rev	-30000 | 30000	Pi	5-4-2
Pn321	**Internal Position Command 2-Pulse Number** Please refer to **Pn318**	0	pulse	-32767 | 32767	Pi	5-4-2
Pn322	**Internal Position Command 2-Move Speed** Please refer to **Pn319**	0	rpm	0 | 3000	Pi	5-4-2
Pn323	**Internal Position Command 3-Rotation Number** Please refer to **Pn317**	0	rev	-30000 | 30000	Pi	5-4-2
Pn324	**Internal Position Command 3-Pulse Number** Please refer to **Pn318**	0	pulse	-32767 | 32767	Pi	5-4-2
Pn325	**Internal Position Command 3-Move Speed** Please refer to **Pn319**	0	rpm	0 | 3000	Pi	5-4-2
Pn326	**Internal Position Command 4 -Rotation Number** Please refer to **Pn317**	0	rev	-30000 | 30000	Pi	5-4-2
Pn327	**Internal Position Command 4-Pulse Number** Please refer to **Pn318**	0	pulse	-32767 | 32767	Pi	5-4-2
Pn328	**Internal Position Command 4-Move Speed** Please refer to **Pn319**	0	rpm	0 | 3000	Pi	5-4-2

Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
Pn329	**Internal Position Command 5 -Rotation Number** Please refer to **Pn317**	0	rev	-30000 | 30000	Pi	5-4-2
Pn330	**Internal Position Command 5-Pulse Number** Please refer to **Pn318**	0	pulse	-32767 | 32767	Pi	5-4-2
Pn331	**Internal Position Command 5-Move Speed** Please refer to **Pn319**	0	rpm	0 | 3000	Pi	5-4-2
Pn332	**Internal Position Command 6 -Rotation Number** Please refer to **Pn317**	0	rev	-30000 | 30000	Pi	5-4-2
Pn333	**Internal Position Command 6-Pulse Number** Please refer to **Pn318**	0	pulse	-32767 | 32767	Pi	5-4-2
Pn334	**Internal Position Command 6-Move Speed** Please refer to **Pn319**	0	rpm	0 | 3000	Pi	5-4-2
Pn335	**Internal Position Command 7 -Rotation Number** Please refer to **Pn317**	0	rev	-30000 | 30000	Pi	5-4-2
Pn336	**Internal Position Command 7-Pulse Number** Please refer to **Pn318**	0	pulse	-32767 | 32767	Pi	5-4-2
Pn337	**Internal Position Command 7-Move Speed** Please refer to **Pn319**	0	rpm	0 | 3000	Pi	5-4-2
Pn338	**Internal Position Command 8 -Rotation Number** Please refer to **Pn317**	0	rev	-30000 | 30000	Pi	5-4-2
Pn339	**Internal Position Command 8-Pulse Number** Please refer to **Pn318**	0	pulse	-32767 | 32767	Pi	5-4-2
Pn340	**Internal Position Command 8-Move Speed** Please refer to **Pn319**	0	rpm	0 | 3000	Pi	5-4-2
Pn341	**Internal Position Command 9 -Rotation Number** Please refer to **Pn317**	0	rev	-30000 | 30000	Pi	5-4-2
Pn342	**Internal Position Command 9-Pulse Number** Please refer to **Pn318**	0	pulse	-32767 | 32767	Pi	5-4-2
Pn343	**Internal Position Command 9-Move Speed** Please refer to **Pn319**	0	rpm	0 | 3000	Pi	5-4-2
Pn344	**Internal Position Command 10 -Rotation Number** Please refer to **Pn317**	0	rev	-30000 | 30000	Pi	5-4-2
Pn345	**Internal Position Command 10-Pulse Number** Please refer to **Pn318**	0	pulse	-32767 | 32767	Pi	5-4-2

Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
Pn346	**Internal Position Command 10-Move Speed** Please refer to **Pn319**	0	rpm	0 | 3000	Pi	5-4-2
Pn347	**Internal Position Command 11 -Rotation Number** Please refer to **Pn317**	0	rev	-30000 | 30000	Pi	5-4-2
Pn348	**Internal Position Command 11-Pulse Number** Please refer to **Pn318**	0	pulse	-32767 | 32767	Pi	5-4-2
Pn349	**Internal Position Command 11-Move Speed** Please refer to **Pn319**	0	rpm	0 | 3000	Pi	5-4-2
Pn350	**Internal Position Command 12-Rotation Number** Please refer to **Pn317**	0	rev	-30000 | 30000	Pi	5-4-2
Pn351	**Internal Position Command 12-Pulse Number** Please refer to **Pn318**	0	pulse	-32767 | 32767	Pi	5-4-2
Pn352	**Internal Position Command 12-Move Speed** Please refer to **Pn319**	0	rpm	0 | 3000	Pi	5-4-2
Pn353	**Internal Position Command 13 -Rotation Number** Please refer to **Pn317**	0	rev	-30000 | 30000	Pi	5-4-2
Pn354	**Internal Position Command 13-Pulse Number** Please refer to **Pn318**	0	pulse	-32767 | 32767	Pi	5-4-2
Pn355	**Internal Position Command 13-Move Speed** Please refer to **Pn319**	0	rpm	0 | 3000	Pi	5-4-2
Pn356	**Internal Position Command 14 -Rotation Number** Please refer to **Pn317**	0	rev	-30000 | 30000	Pi	5-4-2
Pn357	**Internal Position Command 14-Pulse Number** Please refer to **Pn318**	0	pulse	-32767 | 32767	Pi	5-4-2
Pn358	**Internal Position Command 14-Move Speed** Please refer to **Pn319**	0	rpm	0 | 3000	Pi	5-4-2
Pn359	**Internal Position Command 15 -Rotation Number** Please refer to **Pn317**	0	rev	-30000 | 30000	Pi	5-4-2
Pn360	**Internal Position Command 15-Pulse Number** Please refer to **Pn318**	0	pulse	-32767 | 32767	Pi	5-4-2
Pn361	**Internal Position Command 15-Move Speed** Please refer to **Pn319**	0	rpm	0 | 3000	Pi	5-4-2
Pn362	**Internal Position Command 16 -Rotation Number** Please refer to **Pn317**	0	rev	-30000 | 30000	Pi	5-4-2

Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
Pn363	**Internal Position Command 16-Pulse Number** Please refer to **Pn318**	0	pulse	-32767 | 32767	Pi	5-4-2
Pn364	**Internal Position Command 16-Move Speed** Please refer to **Pn319**	0	rpm	0 | 3000	Pi	5-4-2
Pn365.0	**Setting for HOME routine.**	0	X	0 | 5	Pi Pe	5-4-8

Pn365.0 sub-table:

Setting	Explanation
0	Once the home routine is activated, motor will s for Home Position switch in 1st speed in **CCW direction.** Input contacts **CCWL** or **CWL can be used as** the Home Reference Switch. Once Home reference switch is detected, then input Contacts **CCWL** and **CWL** will act as normal Max limits again. **Note:** When using this function, **Pn365.1** can not be set to **1** or **2**. **Cn002.1 (selection for CCWL and CWL) must be set to 0.**
1	Once the home routine is activated, motor will search for Home Position switch in 1st speed in **CW direction.** Input contacts **CCWL** or **CWL can be used as** the Home Reference Switch. Once Home position is detected, then input contacts **CCWL** and **CWL** will act as normal max. limits again. **Note:** When using this function, **Pn365.1** can not be set to **1** or **2**. **Cn002.1 (selection for CCWL and CWL) must be set to 0.**
2	Once the home routine is activated , motor will search for Home position switch in 1st speed in **CCW direction** and sets the Home reference position as soon as the input contact **ORG is activated.** If **Pn365.1=2**, it will directly find the closest Rising-Edge of **ORG** to be the Home position (without a need for Home Reference), then it stops in accordance with **Pn365.3** setting.
3	Once the home routine is activated , motor will search for Home Position switch in 1st speed in **CW direction** and sets the reference Home position as soon as the input contact **ORG is activated.** If **Pn365.1=2**, it will directly find the closest rising -Edge of **ORG** to be the Home position (without a need for Home reference), then it stops in accordance with **Pn365.3** setting.

53

TECO Industrial Product & System Automation Division

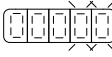| Parameter	Name & Functions		Default	Unit	Setting Range	Control Mode	Chapter
Pn365.0 ⬚⬚⬚⬚⬚	4	Once the home routine is activated , motor will search for Home position in 1st speed in **CCW direction** and sets the Home reference position as soon as the nearest Z (marker pulse) is detected. When using this function, set **Pn365.1=2** . After setting the **Z** Phase to be the Home, it stops in accordance with the setting of **Pn365.3.**	0	X	0 | 5	Pi Pe	5-4-8
	5	Once the home routine is activated , motor will search for Home position in 1st speed in **CW direction** and sets the Home reference position as soon as the nearest Z (marker pulse) is detected. When using this function, set **Pn365.1=2** . After setting the **Z** Phase to be the Home, it stops in accordance with the setting of **Pn365.3.**					
Pn365.1 ⬚⬚⬚⬚⬚	**Once Reference Home switch or Signal, is found it sets the search method for the Home position.**		0	X	0 | 2	Pi Pe	5-4-8
	Setting	Explanation					
	0	Once the Home Reference switch or signal is detected, motor **reverses direction** in 2nd speed to find the nearest **Z.** Phase pulse and sets this as the Home position, then stops in accordance with **Pn365.3** setting method.					
	1	Once the Home Reference switch or signal is detected, motor **Continues in its direction** in 2nd speed to find the nearest **Z** Phase pulse and sets this as the Home position, then stops in accordance with **Pn365.3** setting method.					
	2	When **Pn365.0=2** or **3**, it finds the rising edge of ORG to be the Home position, then stops in accordance with **Pn365.3.** When **Pn365.0=4** or **5**, it finds **Z** Phase pulse to be the Home, then stops in accordance with **Pn365.3**.					
Pn365.2 ⬚⬚⬚⬚⬚	**Setting of Home Routine Start method**		0	X	0 | 2		
	Setting	Explanation					
	0	Homing routine is **Disabled.**					
	1	On power up and activation of **Servo on** the home routine is started automatically. This method is useful for applications that do not require repeated home routines. No external home reference switch is required.					
	2	Use **SHOME** input contact to start a home routine. In position mode, **SHOME** can be used to start a home routine at any moment.					

Parameter	Name & Function		Default	Unit	Setting Range	Control Mode	Chapter
Pn365.3 H□□□□	**Setting of stopping mode after finding Home signal.**		0	X	0 | 1	Pi Pe	5-4-8
	Setting	Explanation					
	0	After detecting the Home signal, it **sets** this position to be the Home reference (**Un-14** encoder feed back rotating number and **Un-15** encoder feed back pulse number are all 0), motor decelerates and stops. Then it reverses direction in 2nd speed to detect the Home Position again then it decelerates and stops..					
	1	After detecting the Home signal, it **sets** this position to be the Home reference (**Un-14** encoder feed back rotating number and **Un-15** encoder feed back pulse number are all 0), motor decelerates and stops.					
Pn366	**Machine Home reference search speed. 1st speed (Fast)** HOME **Refeence** search speed . Speed 1.		100	rpm	0 | 2000	Pi Pe	5-4-8
Pn367	**Machine Home position search speed. 2nd Speed (Slow)** Home **position** search speed . Speed 2.		50	rpm	0 | 500	Pi Pe	5-4-8
Pn368	**Home position offset . Number of revolutions.** Once the searched home position is found in accordance with Pn365 (Home routine mode), then it will search by a number of revolutions and pulses set in parameters Pn368 and Pn 369 to find the new (off set) Home position.		0	rev	-30000 | 30000	Pi Pe	5-4-8
Pn369	**Home position offset . Number of Pulses.** **Home Offset position = Pn368(Rotate Number) x Number of Encoder Pulse per Rotation x 4 + Pn369(Pulse Number)**		0	pulse	-32767 | 32767	Pi Pe	5-4-8

Quick Set-up Parameters

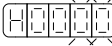| Parameter	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
◆qn401	**Speed Loop Gain 1. (Same function as Sn211)** Speed loop gain has a direct effect on the frequency response bandwidth of the Speed-control loop. Without causing vibration or noise Speed-loop-gain can be increased to obtain a faster speed response. If **Cn025 (load Inertia ratio)** is correctly set, the speed-loop-bandwidth will equal to speed-loop-gain.	40	Hz	10 | 450	Pi Pe S	5-3-8 5-5
◆qn402	**Speed-loop Integral time 1. (Same function as Sn212)** Speed loop integral element can eliminate the steady speed error and react to even slight speed variations. Decreasing Integral time can improve system rigidity. The formula below shows the relationship between Integral time and Speed loop Gain. $$SpeedLoopIntegrationTimeCons\tan t \geq 5 \times \frac{1}{2\pi \times SpeedLoopGain}$$	100	x0.2 ms	1 | 500	Pi Pe S	5-3-8 5-5
◆qn403	**Speed Loop Gain 2. (Same function as Sn213)** Refer to **qn401**	40	Hz	10 | 450	Pi Pe S	5-3-8 5-5
◆qn404	**Speed Loop Integration Time Constant 2. (Same function as Sn214)** Refer to **qn402**	100	x0.2 ms	1 | 500	Pi Pe S	5-3-8 5-5
◆qn405	**Position Loop Gain 1. (Same function as Pn310)** Without causing vibration or noise on the mechanical system the position loop gain value can be increased to speed up response and shorten the positioning time. Generally, the position loop bandwidth should not be higher then speed loop bandwidth. The relationship is according to the formula below: $$PositionLoopGain \leq 2\pi \times \frac{SpeedLoopGain}{5}$$	40	1/s	1 | 450	Pi Pe	5-4-6 5-5
◆qn406	**Position Loop Gain 2 (Same function as Pn311)** Please refer to **qn405**	40	1/s	1 | 450	Pi Pe	5-4-6 5-5
◆qn407	**Position Loop Feed Forward Gain** It can be used to reduce the follow up error of position control and speed up the response. If the feed forward gain is too large, it might cause speed Overshoot and in position oscillations which result in the repeated ON/OFF operation of the output contact **INP**("In Position" output signal).	0	%	0 | 100	Pi Pe	5-4-6 5-5

Multi-Function Input Parameters

Parameter	Name & Function			Default	Unit	Setting Range	Control Mode	Chapter
★Hn501.0 ★Hn501.1 ⎕⎕⎕⎕⎕	**DI-1 Programmable Digital input Selection**			01	X	01 | 26	ALL	5-6-1
	Seting	Explanation						
		Signal	Functions					
	01	**SON**	Servo On					
	02	**ALRS**	Alarm Reset					
	03	**PCNT**	PI/P Switching					
	04	**CCWL**	CCW Limit					
	05	**CWL**	CW Limit					
	06	**TLMT**	External Torque Limit					
	07	**CLR**	Clear Pulse Error Value					
	08	**LOK**	Servo Lock					
	09	**EMC**	Emergency Stop					
	0A	**SPD1**	Speed 1					
	0B	**SPD2**	Speed 2					
	0C	**MDC**	Control Mode Switch					
	0D	**INH**	Position Command Inhibit					
	0E	**SPDINV**	Speed Inverse					
	0F	**G-SEL**	Gain Select					
	10	**GN1**	Electronic Gear Ratio Numerator 1					
	11	**GN2**	Electronic Gear Ratio Numerator 2					
	12	**PTRG**	Position Trigger					
	13	**PHOLD**	Position Hold					
	14	**SHOME**	Start Home					
	15	**ORG**	Home Position Reference (Origin)					
	16	**POS1**	Internal Position select 1					
	17	**POS2**	Internal Position select 2					
	18	**POS3**	Internal Position select 3					
	19	**POS4**	Internal Position select 4					
	1A	**TRQINV**	Torque Inverse					
	1B	**RS1**	Torque CW Selecting					
	1C	**RS2**	Torque CCW Selecting					
★Hn501.2 ⎕⎕⎕⎕⎕	**DI-1 Logic State. NO/NC Selection**			0	X	0 | 1		
	Setting	Explanation						
	0	Input contact state. NO (Normally Open). Connecting (IG24) to inputs, enables the selected function.						
	1	Input contact state. NC (Normally Closed). Disconnecting (IG24) from inputs, enables the selected function.						

★*New setting will become effective after re-cycling the power.*

Warning! If any of programmable Inputs of DI-1 ~ DI-6 are set for the same type of function then the logic state selection (NO or NC selection) for these inputs must be the same type. Otherwise an Alarm will be displayed. AL-07 (Abnormal DI/DO programming).

TECO Industrial Product & System Automation Division

Parameter Signal	Name & Function			Default	Unit	Setting Range	Control Mode	Chapter
★Hn502	**DI-2 Programmable Digital input Selection** Please refer to **Hn501**			002	X	001 | 11C	ALL	5-6-1
★Hn503	**DI-3 Programmable Digital input Selection** Please refer to **Hn501**			003	X	001 | 11C	ALL	5-6-1
★Hn504	**DI-4 Programmable Digital input Selection** Please refer to **Hn501**			104	X	001 | 11C	ALL	5-6-1
★Hn505	**DI-5 Programmable Digital input Selection** Please refer to **Hn501**			105	X	001 | 11C	ALL	5-6-1
★Hn506	**DI-6 Programmable Digital input Selection** Please refer to **Hn501**			006	X	001 | 11C	ALL	5-6-1
★Hn507.0 ★Hn507.1	**DO-1 Programmable Digital Output Selection**			007	X	001 | 11C	ALL	5-6-1
	Setting		Explanation					
		Signal	Functions					
	01	**RDY**	Servo Ready	01	X	01 | 08	ALL	5-6-1
	02	**ALM**	Alarm					
	03	**ZS**	Zero Speed					
	04	**BI**	Brake Signal					
	05	**INS**	In Speed					
	06	**INP**	In Position					
	07	**HOME**	HOME					
	08	**INT**	In Torque					
★Hn507.2	**DO-1 Digital Output Logic State.**			0	X	0 | 1		
	Setting		Explanation					
	0		Close, when the output is activated.					
	1		Open, when the output is activated.					
★Hn508	**DO-2 Programmable Digital Output Selection** Please refer to **Hn507**			002	X	001 | 108	ALL	5-6-1
★Hn509	**DO-3 Programmable Digital Output Selection** Please refer to **Hn507**			003	X	001 | 108	ALL	5-6-1

★*New setting will become effective after re-cycling the power.*

Warning! If any of programmable Inputs of DO-1 ~ DO-3 are set for the same type of function

then the logic state selection (NO or NC selection) for these inputs must be the same type.

Otherwise an Alarm will be displayed. AL-07 (Abnormal DI/DO programming).

TECO Industrial Product & System Automation Division

| Parameter Signal	Name & Function	Default	Unit	Setting Range	Control Mode	Chapter
★Hn510	**Digital input control method selection.** Select digital input (6 pins) control method by external terminal or communication. Convert Binary code to Hex code for setting this parameter. DI and binary bits table as below. Binary code representation： →" 0 " Digital input control by external terminal. →" 1 " Digital input control by communication. Set H0000 for Hn510 represent DI-1,DI-3, DI-6 are controlled by external terminal and set H0003F represent all terminal is controlled by communication. The corresponding binary code is :[10 0101] convert to Hex code is : [H 0025]for entering parameter. For the setting Bit0 (DI-1) is control by communication and Bit1 (DI-2) is control by external terminal ….etc	H0000	X	H0000 | H003F (HEX)	ALL	5-6-1
★Hn511	**Setting digital input status in communication mode** Change Hn511 Hex code for setting digital input status of communication control mode; Setting method refer Hn510. Binary code representation： "0"：digital input contact OFF "1"：digital input contact ON Set H0000 for Hn510 represent H0000 are controlled by external terminal and set H0003F represent all terminal is controlled by communication. **P.S.)This parameter should co-operate with Hn510.**	H0000	X	H0000 | H003F (HEX)	ALL	5-6-1

Chapter 5 Troubleshooting

5-1 Alarm functions

The Alarm codes are displayed in a format such as that shown below. For any Alarm messages , refer to this section for identify the cause and dispel the error. to reset the Alarm message by following pages description.

If this is not possible for any reason then contact your local supplier for assistance.

Alarm Status Display：

Alarm status   **Alarm code**
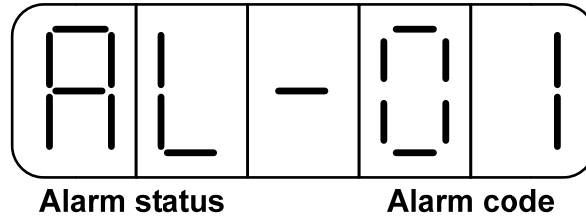
For Alarm List refer to the section 5-2. In the example above AL-01 indicate (Under Voltage)

There is also an Alarm history which can record ten entry of alarm record.

History record is listed as alarm history record table shows.

Alarm Reset Methods

1. carry out the suggestions below to reset Alarm.

   (a) **Reset by input signal:** Once the cause of Alarm is rectified,
   disable **SON** signal (Switch off Servo ON), then activate input signal **ALRS.**
   Alarm condition should be cleared and the drive will be ready for operation.
   Reference 5-6-1 for setting SON and Alarm signal.

   (b) **Reset from Keypad :** Once the cause of Alarm is rectified,

   disable **SON** signal (Switch off Servo ON), then press the buttons ▲ and ▼ at the same time to reset Alarm and the drive will be ready for operation.

2. Power reset: Once the cause of Alarm is rectified, disable **SON** signal (Switch off Servo ON) and re-cycling power. Alarm condition can be reset and the drive will be ready for operation.

 Waning!

1) **Before applying power reset, ensure that SON is off (SON signal is removed first) to prevent danger.**

2) **Ensure that the speed commands are removed before the alarm is reset, otherwise the motor may run abruptly once the alarm signal is reset.**

5-2 Troubleshooting of Alarm and Warning

Alarm Code	Alarm Name and Description	Corrective Actions	Reset Method
00	Normal	—	—
01	Under-voltage **The main circuit voltage is below its minimum specified value. (190Vac)**	Use multi-meter to check whether the input voltage is within the specified limit. If it can not be solved, there may be failure inside the Drive.	Turn ALRS(DI) ON
02	Over-voltage (Regeneration error) 1. The main circuit voltage is exceeded maximum allowable value. (410V) 2. Regeneration voltage is too high.	1. Use multi-meter to check whether the input voltage is within the specified limit. 2. Check the Parameter **Cn012** if it is setting correctly. 3. If this alarm appears during operation. Extend ac/deceleration time or reduce load ratio in the permitted range. Otherwise, an external regeneration resistor is needed. (Please contact your supplier for assistance.)	Turn ALRS(DI) ON
03	Motor Over-load The drive has exceeded its rated load during continuous operation. When the loading is equal to 2 times of rated loading, alarm occurs within 10sec.	1. Check connection for Motor terminal s (U,V,W) and Encoder. 2. Adjust the Drive gain, If gain is not correctly adjusted, it would cause motor vibration and large current will lead to motor over load. 3. Extend acc/deceleration time or reduce load ratio in the permitted range.	Turn ALRS(DI) ON
04	Drive Over-current Transistor error Drive main circuit Over current or Transistor error.	1. Check connection of the motor cable (U,V,W) and encoder. Check power cable connection. Refer to the diagram in Chapter 2. 2. Turn off the power, and turn on again after 30 min. If the alarm still exists, there may be power module malfunction or noise consider the drive for test and repair.	Reset Power Supply
05	Encoder ABZ phase signal error Motor's encoder failure or encoder connection problem.	1. Check the motor's encoder connections. 2. Check the encoder if short circuit, poor solder joints or break. 3. Check the encoder signal terminals CN2-4and CN2-5 (power cable 5v)	Reset Power Supply
06	Communication error Communication protocol setting error or Communication time-out is detected.	1. Check parameter setting of communication function. 2. Check wire connection between drive and controller. 3. Set a correct value for parameter Cn039 communication time-out or set "0" to disable communication time-out function.	Reset Power Supply
07	Multi-function contact setting error Input/output contacts function setting error.	1. Check parameters Hn501~Hn506 trigger level selected by 2nd digit of Hn 501 to 506should be the same for all inputs **DI-1~DI-6** 2. Check parameters setting of **Hn507~Hn509** hould NOT be the same for outputs contact **DO-1~DO-3**	Reset Power Supply
08	Memory Error Parameter write-in error	Disconnect all command cable then re-cycle the power. If alarm still occurs, it means the Drive was failure.	Reset Power Supply

Alarm Code	Alarm Name and Description	Corrective Actions	Reset Method
09	Emergency Stop When the input contact point EMC is activated. Alarm 09 appears.	1. Disable Emergency stop signal input. 2. Internal mal-function. Ensure that all connection are correct, refer to Chapter 2 Power and motor circuit diagrams connection. Control wiring diagrams.	Turn ALRS(DI) ON
10	Motor over-current Motor current is 4 times greater than rated current.	1.Check if the motor wiring U,V,W)and encoder wiring correct or not. 2.Internal interference and mal-function. Ensure that all connection are correct ,refer to Chapter 2 Power and motor circuit diagrams.	Turn ALRS(DI) ON
11	Position error The deviation between Pulse command and encoder feed back (position error) is greater than the setting of **Pn308** or **Pn309**.	1. Increase the position loop gain (**Pn310** and **Pn311**) setting value. 2. Increase in position tolerance value by (**Pn312** for a better motor response. 3. Extend the time of ac/deceleration or reduce load inertia in the permitted range. 4. Check if the motor wiring (U,V,W) is correct.	Turn ALRS (DI) ON
12	Motor over speed Motor's speed is 1.5 times more then motor's rated speed.	1. Reduce the speed command. 2. Electronic gear ratio is incorrect check and set correctly. 3. Adjust speed loop gains (**Sn211** & **Sn213**) for a better motor response.	Turn ALRS (DI) ON
13	CPU Error Control system Mal-function.	Turn off the power. Turn on again after 30 min. If error alarm still exists, this may be due to external interference. Refer to the chapter 2 Motor, power cable and control signals connections.	Reset Power Supply
14	Drive disable When input contacts **CCWL** & **CWL** are operated at the same time this alarm occurs.	1. Remove input contact signal **CCWL** or **CWL.** 2. Check all input wiring for correct connections.	Turn ALRS (DI) ON
15	Drive overheat Power transistor temperature exceed 90°C.	Over-load for a long duration will cause driver overheat, check and reset operation system.	Turn ALRS (DI) ON