

## SERVO DRIVE (FARA-CSD, CSDP-XX)



1 .

1.1

1.2 SERVO

1.3

가. FARA-CSD,CSDP SERVO DRIVE

.  
1.4

가. CSD

. CSDP

1.5

가.

.

(1) SERVO MOTOR

(2) SERVO MOTOR

(3) SERVO DRIVE

(4) SERVO DRIVE

2 . CSM/CSD

2.1 CSM MOTOR

가.

. TORQUE, , (110/220V)

. CSMG Motor

2.2 CSMD MOTOR

가.

. TORQUE, , (220V)

2.3 CSMS MOTOR

가.

. TORQUE, , (220V)

2.4 CSMF MOTOR

가.

. TORQUE, , (220V)

2.5 CSMH MOTOR

가.

. TORQUE, , (220V)

2.6 CSMN MOTOR

가.

. TORQUE, , (220V)

2.7 CSMX MOTOR

가.

. TORQUE, , (220V)

2.8 CSD,CSDP SERIES SERVO DRIVE

2.9 CSM

가.

. RADIAL, THRUST LOAD

.

## 2.10 CSMD/F/S/H

가.

. RADIAL, THRUST LOAD

.

## 2.11 CSMN/X

가.

. RADIAL, THRUST LOAD

.

## 2.12 CSM

가.

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(1) CSM,CSMG

가)

)

) ( )

) ( , )

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.

## 3 . SERVO DRIVE

### 3.1 SERVO DRIVE

### 3.2 CSD,CSDP

가.

. CSD

. CSDP

### 3.3 CSD,CSDP

### 3.4 CSD,CSDP

가.

.

(1)

가)

)

(2)

가) (+24V)

(3)

. SERVO I/O

(1) CSD I/O

(2) CSDP I/O

(3) CSD I/O

(4) CSDP I/O

. SERVO DRIVE

- (1) P – CON(        )
  - 가)
    - ) Zero Clamp
    - ) /
- (2) P – CON(        )
  - 가)
    - )
- (3) P – OT,N – OT
  - 가)
    - ) DB
    - )
- (4) Servo ON
- (5) P – CN,N – CL
- (6) Alarm Reset
- (7)        data
- (8) Battery
- .SERVO DRIVE
- (1)
  - 가) Alarm
  - ) Brake
  - ) (    )
  - ) TGON
  - ) Servo Ready
  - ) Z    Open Collector
- (2) Encoder

### 3.5

가.

- . CSD& Motor        (CSM,CSMG)
  - (1)        INC.
  - (2)        INC.
- . CSDP & Motor        (CSMD,CSMF,CSMH,CSMS,CSMN,CSMX)
  - (1) 2500 p/r INC.
  - (2) 6000 p/r INC.
  - (3) 2048 p/r ABS.

## 4 .        I(        )

### 4.1

### 4.2

가.

- .
- .
- . Zero Clamp
- . ZERO        LEVEL
- .        가

.  
. DIGITAL JOG

4.3

가.

4.4 +

4.5

가.

.  
.   
.   
.   
. (PCIN)  
. I/O  
.   
. Smoothing  
. FEED FOEWARD  
. OVERFLOW  
. NM

4.6

가. P  
. P  
. I  
. -  
. -

4.7 CSM,CSM

5 .

5.1 DYNAMIC BRAKE

5.2

5.3

가.  
. SERVO ALARM  
.   
.   
. SERVO ALARM RESET  
.

5.4

가. INERTIA JL  
.   
.   
.

5.5 440V

5.6

가. NOISE

. NOISE

.

5.7

가. MOTOR

. BRAKE

6 .

6.1

6.2 CSD -SERIES

6.3 CSDP -SERIES

6.4 CSM -Series, CSM -Series

가. CSM -Series

. CSM -Series

7 . JOG

7.1

7.2 DIGITAL JOG

7.3

7.4

7.5

7.6 ERROR

가. SOTFWARE VERSION

.

( CSD -Series )

.

( CSDP -Series )

7.7 JOG

가. JOG

. AUTO TUNING

. OFFSET

. OFFSET

. ERROR DATA RESET

. D/A CONVERTER CHANNEL

8

8.1

8.2

가. AC

. CSD

.

.

9

9.1 AC

가. CSM

(1) CSM

가) CSM A3/A5/01

) CSM 02/04

) CSM 06/08/10

(2) CSM

(3)

가)

)

(4) CSMG

가)

)

(5)

가)

)

(6)

. CSMD/S/H/F

(1) CSMD

(2) CSMD

(3) CSMS/H

(4) CSMS/H

(5) CSMF

(6) CSMF                      가

(7) CSMD/F/H/S

(8) CSMD/F/H/S                      3

(9) CSMD/F/H/S                      3

. CSMN/X

(1) CSMN 03/06, CSMX 02/09

(2) CSMN 09, CSMX 13

(3) CSMN 12, CSMX 20

(4) CSMN 20/30/44, CSMX 29/44

(5) CSMN 60

(6) CSMN

(7) CSMX

(8) CSMN/X                      Key

(9) CSMN 03~06, CSMX 02~09

(10) CSMN 09, CSMX 13

(11) CSMN 12~60, CSMX 20~44

(12) CSMN/X                      3

(13) CSMD/F/H/S                      3

(14) CSDP

9.2

가. CSD

(1) CSD A3 ~ 04

- (2) CSD 06 ~ 10
- . CSDP
- (1) 800W ~ 3KW
- (2) 3.5KW ~ 6KW

9.3

가.

(1)

(2)

가) CSD

) CSDP

10

10.1

가. SERVO MOTOR

. SERVO DRIVE

10.2

가.

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10.3

가. - MOTOR

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.

- MOTOR

10.4

가. SERVO MOTOR

. SERVO DRIVE

10.5

가.

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1.

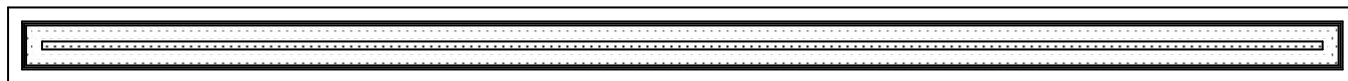
2. SI

3.

4. SERVO MOTOR

5.





1

MOTOR

SERVO DRIVE

.



## 1.1.

FARA-CSD Servo Drive 32bit Dsp , 가 가 Full Digital  
Ac Servo Motor Drive . , Drive , (CSDP )  
, I/O ,  
Drive .

FARA-CSD Servo Drive .

- 32BIT DSP , Full Digital .
- Servo Motor 가 1/3 Drive 1/5 .  
Incremental(14 ), Incremental(8 ) Encoder System
- Auto Tuning .
- 가 1:5000 가 가 .
- .

\*

SERVO DRIVE

가

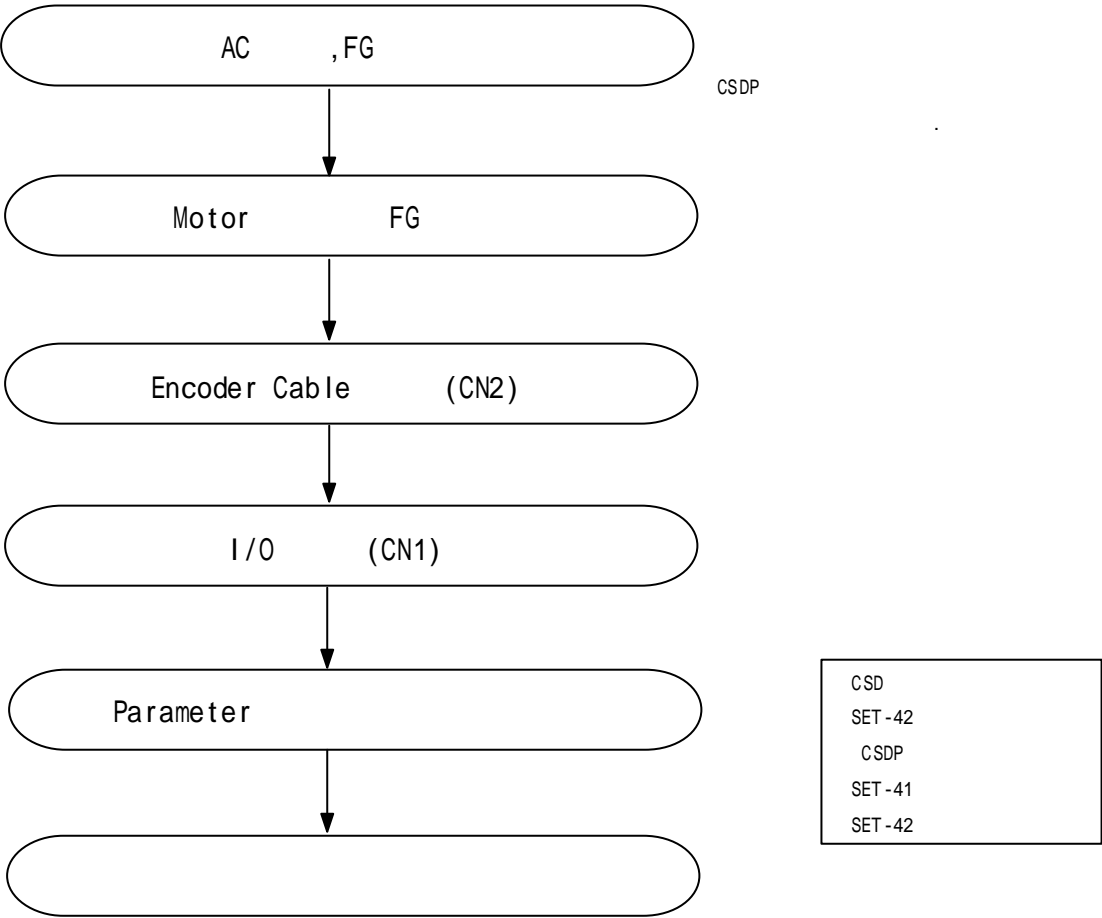
A/S

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1.2. Servo

Block

Servo Drive



## 1.3

### 가. FARA-CSD, CSDP SERVO DRIVE

Power On/off

LED DRIVE

On

Off

Error /

LED DRIVE가

Off

(Servo Error, System Error)

On

Motor On/off

LED Motor 3

On

Off

\* CSDP

7 Segment

-

Servo Off

,

Servo On

Digital Jog Connector

Digital Jog

Connector

,

'T.P'

I/O Connector

I/O Connector

.

I/O

)

Motor Feedback Connector

Motor

Encoder

(A, -A, B, -B, C, -C

A, -A, B, -B, Z, -Z, U, -U, V, -V, W, -W)

가

AC

AC 220V(AC 110V)

Motor

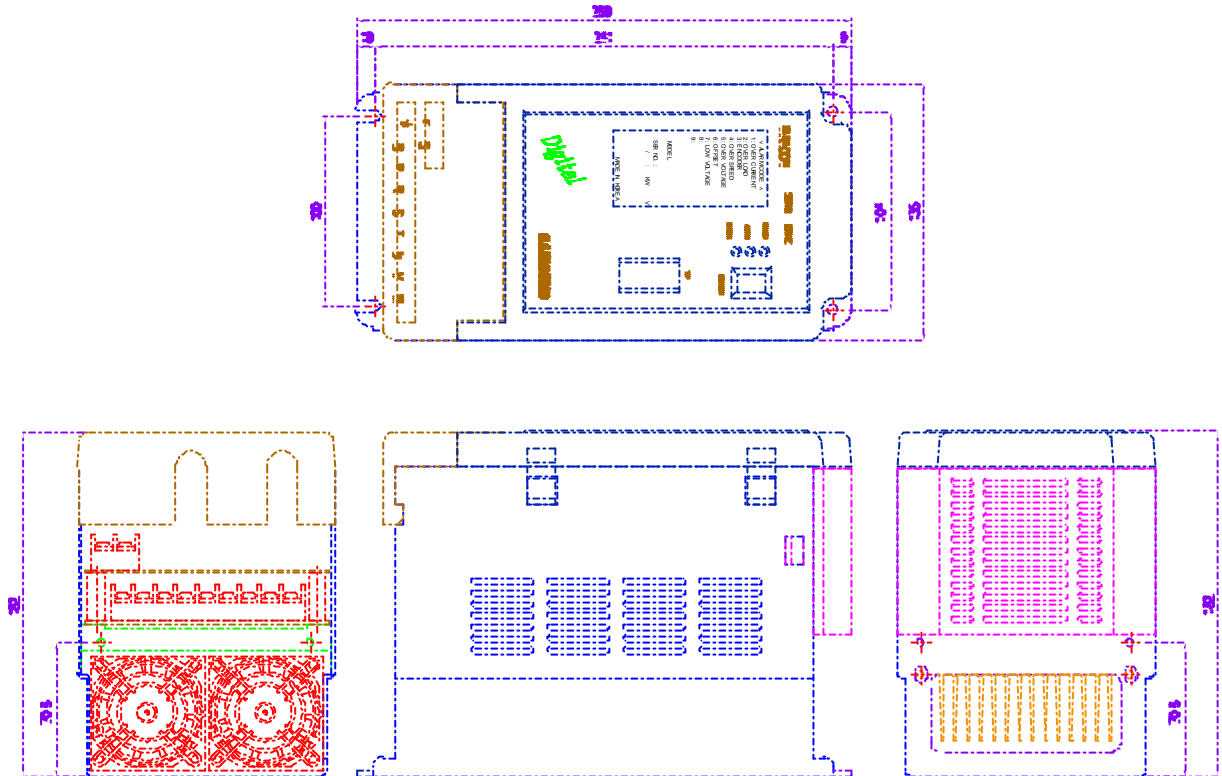
Motor

(AC 220V

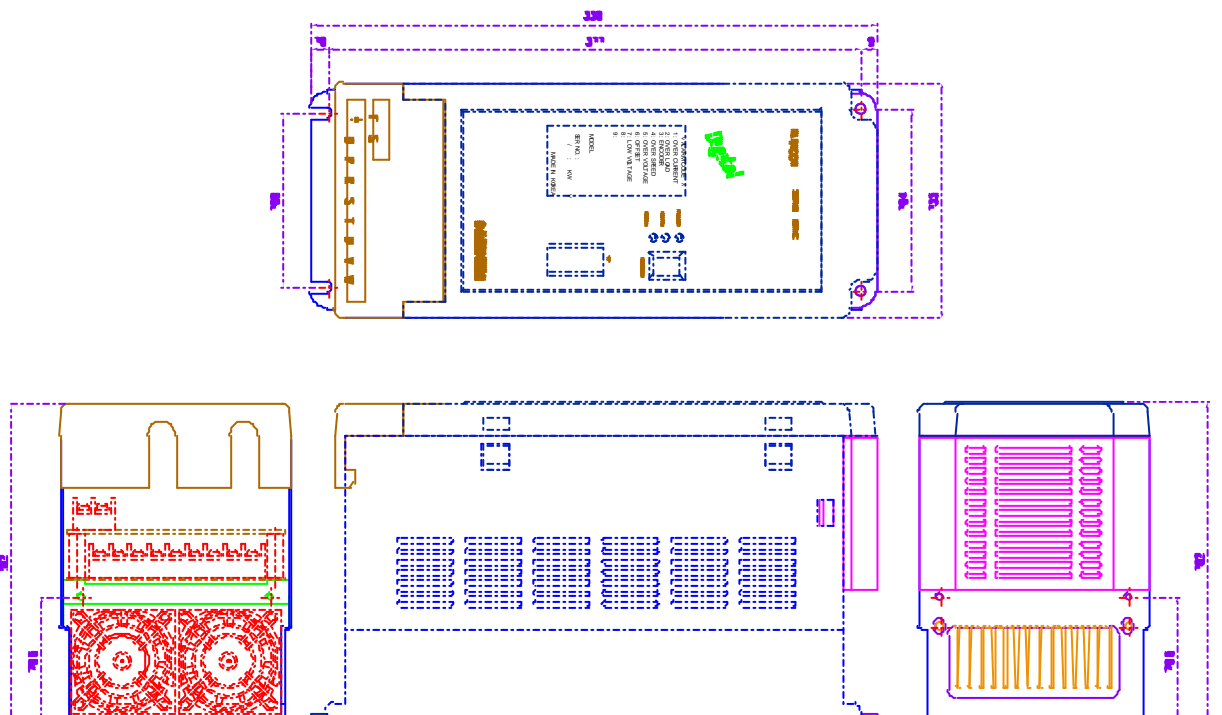
AC 110V)

6	1
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(3) CSDP : 3KW (220V)

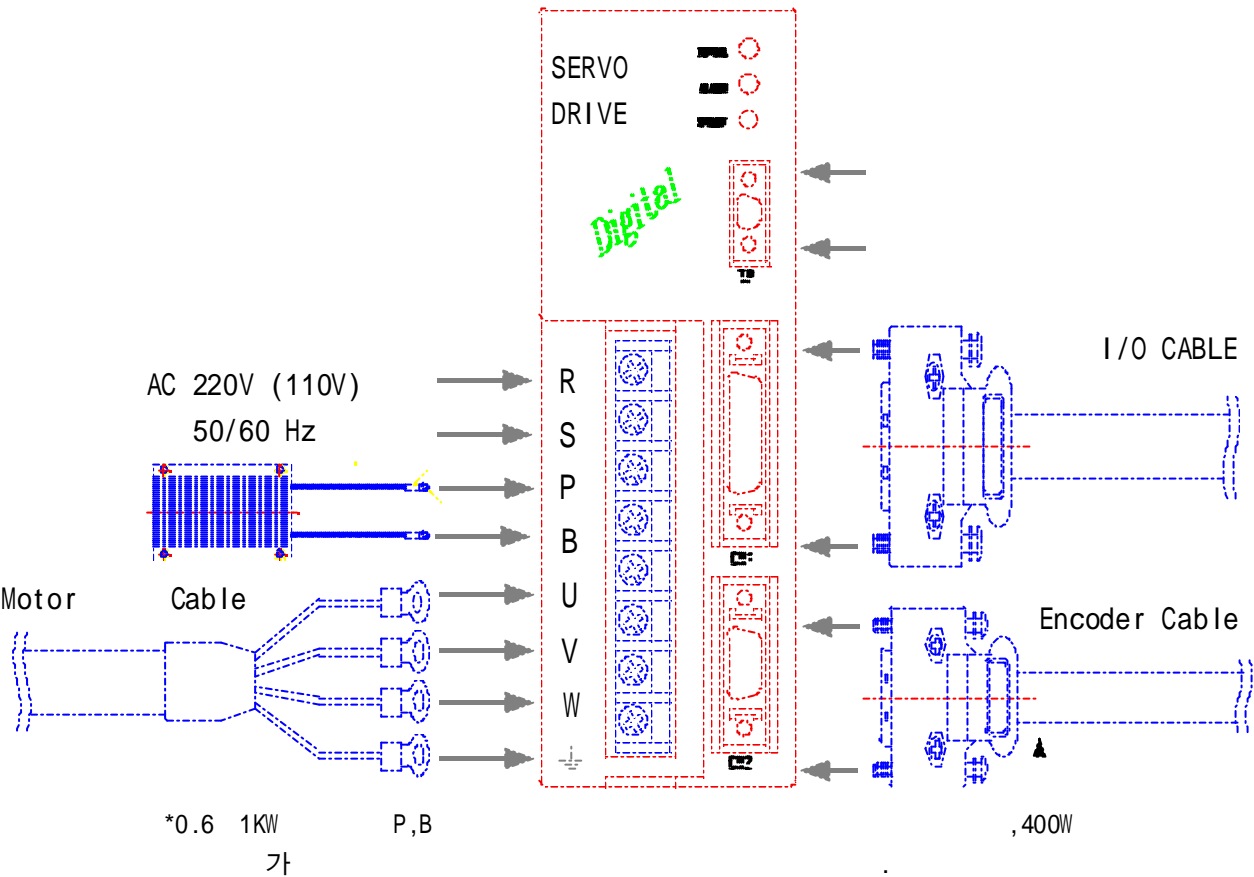


(4) CSDP : 6KW (220V)

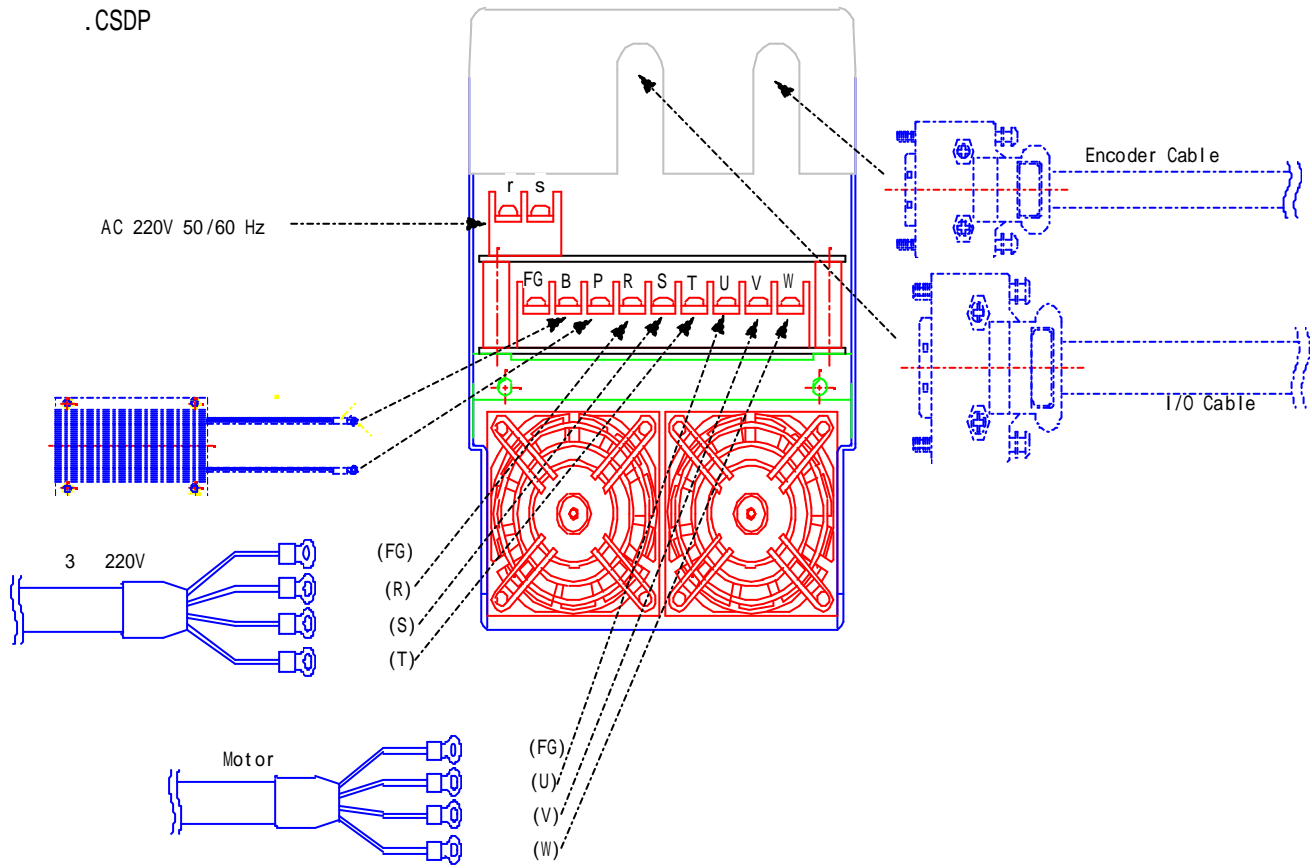


1.4

가.CSD



.CSDP





1.5

가.

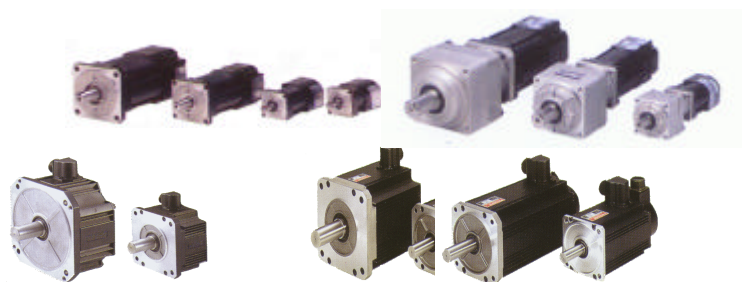
CSD Series



CSDP Series



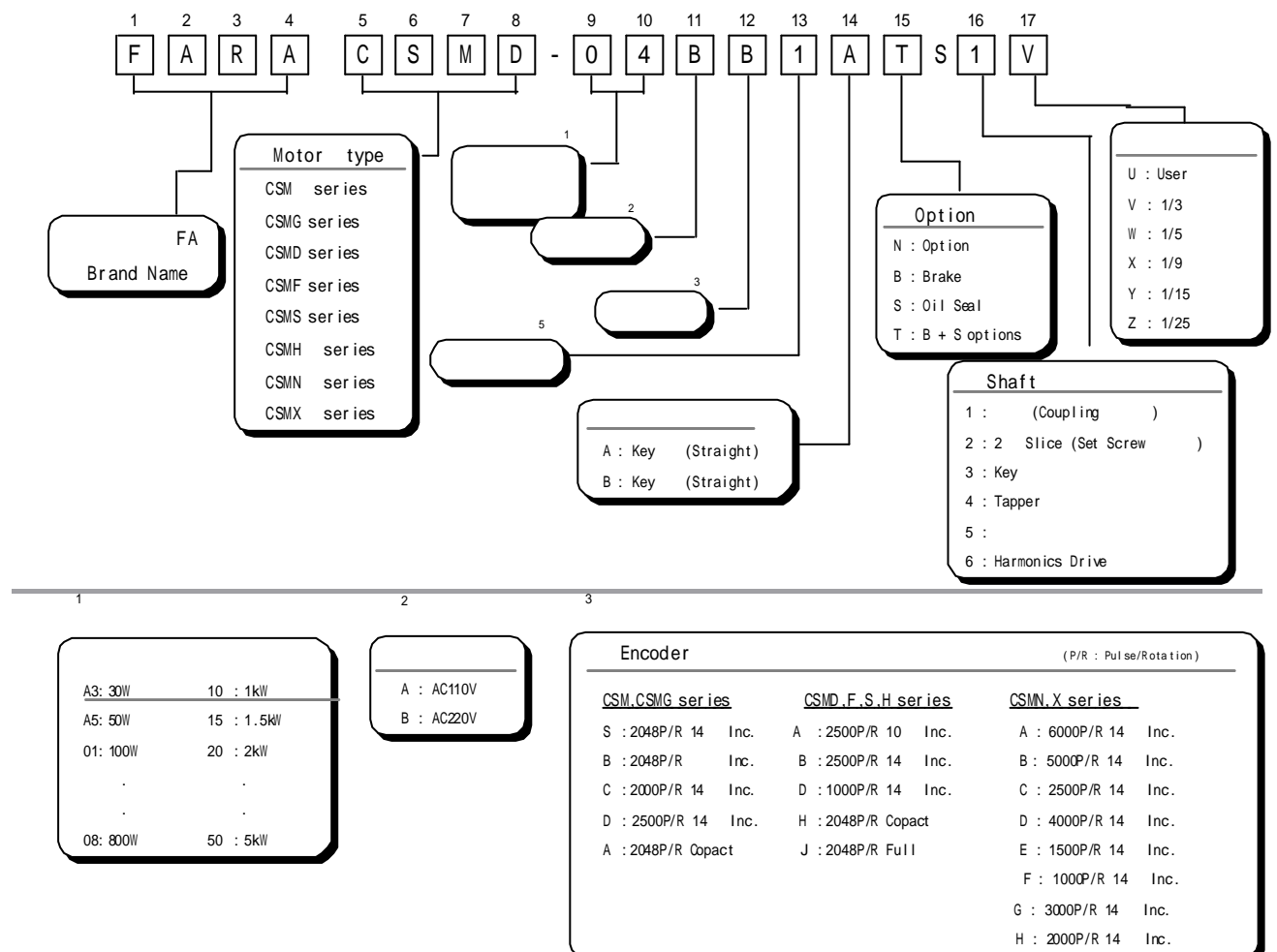
CSM Series



Digital jog



# (1) CSM Servo Motor



(2)

## CSM

	(V)		Key	Oil seal	Brake	Shaft
CSM- BB1A <sup>N</sup> T3	220V	2,048P/R INC. (8,192 )		x	x	Straight
CSM- BB1A <sup>B</sup> T3						

## CSMG

	(V)		Key	Oil seal	Brake	Shaft	) <sup>1</sup>
CSMG- BB1A <sup>N</sup> T5 ) <sup>1</sup>	220V	2,048P/R INC. (8,192 )			x	Straight	V:1/3 W:1/5 X:1/9 Y:1/15 Z:1/25
CSMG- BB1A <sup>B</sup> T5							

Oil Seal

## CSMD

	(V)		Key	Oil seal	Brake	Shaft
CSMD- BA1A <sup>S</sup> M3	220V	2,500P/R INC. (10,000 )			x	Straight
CSMD- BA1A <sup>T</sup> M3						

Oil Seal

## CSMF

	(V)		Key	Oil seal	Brake	Shaft
CSMF- BA1A <sup>S</sup> M3	220V	2,500P/R INC. (10,000 )			x	Straight
CSMF- BA1A <sup>T</sup> M3						

Oil Seal

## CSMH

	(V)		Key	Oil seal	Brake	Shaft
CSMH- BA1A <sup>S</sup> M3	220V	2500P/R INC. (10,000 )			x	Straight
CSMH- BA1A <sup>T</sup> M3						

Oil Seal

## CSMS

	(V)		Key	Oil seal	Brake	Shaft
CSMS- BA1A <sup>S</sup> M3	220V	2,500P/R INC. (10,000 )			x	Straight
CSMS- BA1A <sup>T</sup> M3						

Oil Seal

# CSMN

	(V)		Key	Oil seal	Brake	Shaft 1
CSMN - BA1A <sup>S</sup> H3 <sup>1</sup>	220V	6,000P/R INC. (24,000 )			×	3: Straight
CSMN - BA1A <sup>T</sup> H3 <sup>1</sup>						4: Tapre

Oil Seal

# CSMX

	(V)		Key	Oil seal	Brake	Shaft 1
CSMX - BA1A <sup>S</sup> H3 <sup>1</sup>	220V	6,000P/R INC. (24,000 )			×	3: Straight
CSMX - BA1A <sup>T</sup> H3 <sup>1</sup>						4: Tapre

Oil Seal

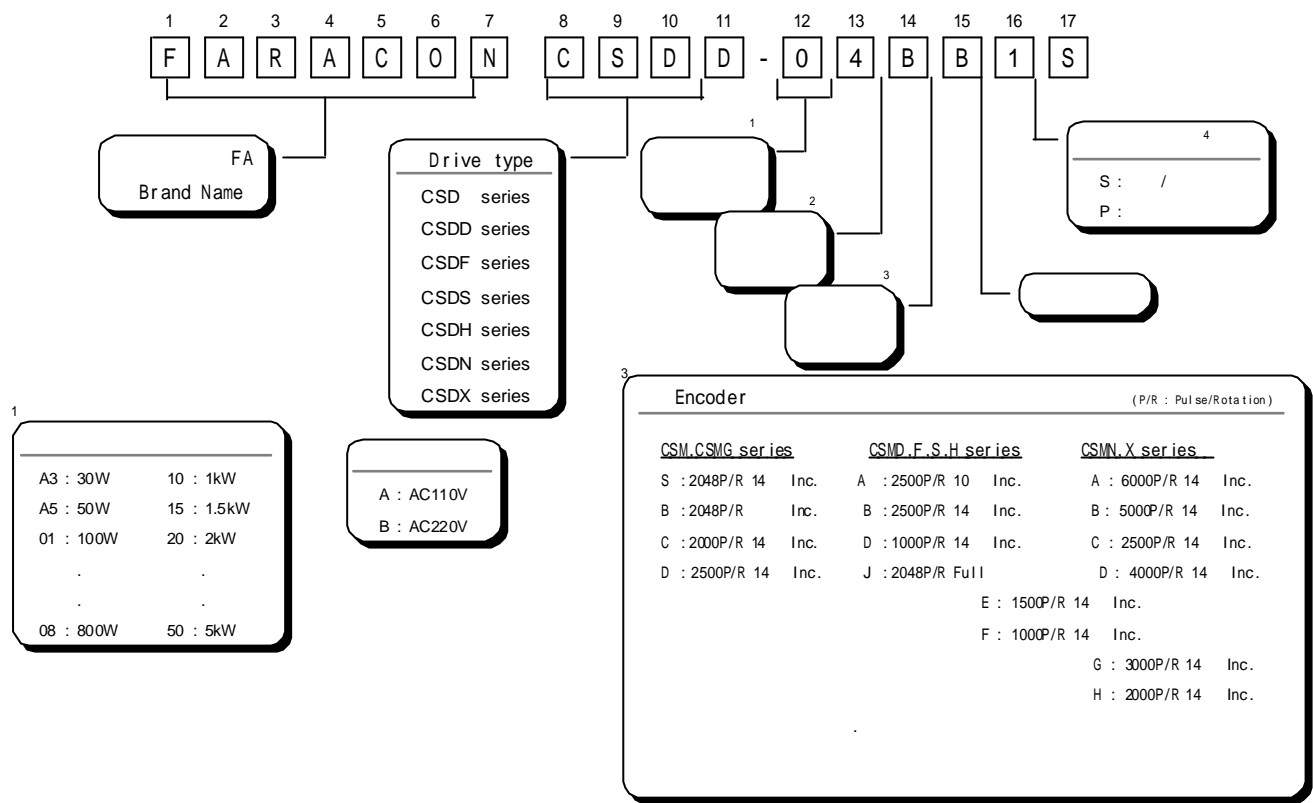
『9

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가

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(3) CSD Servo Drive



(3) CST Digital Jog

C S T - S D 1  
1 2 3

- 1.CST SERIES  
DIGITAL JOG
2. DRIVE SERIES  
SD:CSD SERVO DRIVE SERIES
3.  
1,2,3,...

(4)

CSD

( )

	(w)		(kg)		
CSD-A3BB1P( ) CSD-A3BB1S( )	30	220V	0.9	CSM, CSMG 30W	
CSD-01BB1P( ) CSD-01BB1S( )	50 100			CSM, CSMG 50W CSM, CSMG 100W	SET-42
CSD-02BB1P( ) CSD-02BB1S( )	200			CSM, CSMG 200W	
CSD-04BB1P( ) CSD-04BB1S( )	400			CSM, CSMG 400W	
CSD-10BB1P( ) CSD-10BB1S( )	600 800 1000		1.1	CSM, CSMG 600W CSM, CSMG 800W CSM, CSMG 1000W	SET-42

6.4

. (

SET-42)

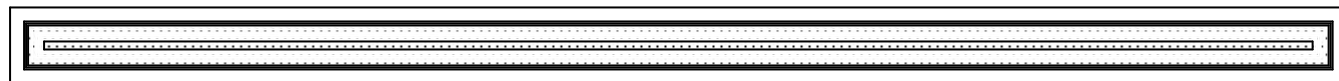
CSDP ( )

	(kW)		(kg)	(kW)
CSDP-08BX1	0.8	3 220V	4.2	CSMD:0.8 CSMF:0.4/0.8 CSMH:0.5 CSMS:- CSMN:0.3/0.6 CSMX:0.2/0.3/0.5
CSDP-10BX1	1.0			CSMD:1.0 CSMF:- CSMH:1.0 CSMS:1.0 CSMN:0.9 CSMX:0.9
CSDP-15BX1	1.5			CSMD:1.5 CSMF:1.5 CSMH:1.5 CSMS:1.5 CSMN:1.2 CSMX:1.3
CSDP-20BX1	2.0		5.0	CSMD:2.0 CSMF:- CSMH:2.0 CSMS:2.0 CSMN:- CSMX:2.0
CSDP-25BX1	2.5			CSMD:2.5 CSMF:2.5 CSMH:- CSMS:2.5 CSMN:2.0 CSMX:-
CSDP-30BX1	3.0			CSMD:3.0 CSMF:- CSMH:3.0 CSMS:3.0 CSMN:3.0 CSMX:3.0
CSDP-35BX1	3.5		6.2	CSMD:3.5 CSMF:3.5 CSMH:- CSMS:3.5 CSMN:- CSMX:-
CSDP-40BX1	4.0			CSMD:4.0 CSMF:- CSMH:4.0 CSMS:4.0 CSMN:- CSMX:-
CSDP-50BX1	5.0			CSMD:4.5/5.0 CSMF:4.5 CSMH:5.0 CSMS:4.5/5.0 CSMN:4.4/6.0 CSMX:4.4

SET-41 SET-42 .(6.4 )

1KW CSDJ-10BX1 가 .

# CSM / CSD



2

CSM SERVO MOTOR

CSD SERVO DRIVE

.





## 2.1 CSM MOTOR

가.

### 2.1 CSM MOTOR (220VAC)

	Y		
	0 +40		B
	-10 +80		AC 1500V(60sec)
	DC 500V 100M		PERMANENT MAGNET
MOTOR POLE	8		FLANGE
	15m/s <sup>2</sup>		20 80%( )

CSM-	A3B	A5B	01B	02B	04B	06B	08B	10B	A3A	A5A	01A	02A	04A
	220								110				
V													
CSDJ -	01BX1	01BX1	01BX1	02BX1	04BX1	10BX1	10BX1	10BX1	01AX1	01AX1	01AX1	02AX1	04AX1
W	30	50	100	200	400	600	800	1000	30	50	100	200	400
TORQUE Kgf ·cm	0.97	1.62	3.25	6.5	13	19.5	26	32.5	0.97	1.62	3.25	6.5	13
N ·m	0.095	0.159	0.318	0.64	1.27	1.91	2.55	3.02	0.095	0.159	0.318	0.64	1.27
TORQUE Kgf ·cm	2.9	4.9	9.7	19.5	39	58.5	78	97.5	2.9	4.9	9.7	19.5	39
N ·m	0.29	0.48	0.95	1.91	3.82	5.73	7.64	9.06	0.29	0.48	0.95	1.91	3.82
RPM	3000												
RPM	5000												
ROTOR INERTIA gf ·cm s <sup>2</sup>	0.031		0.043	0.20	0.37	1.02	1.33	1.65	0.013	0.023	0.043	0.20	0.46
POWER RATE kw/s	7.09	8.30	24.1	20.7	44.8	36.5	49.8	62.7	7.09	11.2	24.1	20.7	36.0
ms	1.3	1.2	0.7		0.5	0.6	0.5		1.3	0.9	0.7		0.6
ms	0.9	1.2	1.4	3.5	3.8	6.4	7.3	7.5	0.9	1.2	1.4	3.5	3.8
TORQUE Kgf ·cm MAX	0.5			0.7		1.6		1.0	0.5			0.7	
mm MAX	0.04												
THRUST Kgf MAX	4			7		10			4			7	
RADIAL Kgf MAX	8			20		35			8			20	
	U V W												
Kg	0.3	0.6	0.5	1.1	1.6	2.6	3.2	3.8	0.3	0.4	0.5	1.1	2.0
A(rms)	0.3	0.5	0.9	1.4	2.7	4.2	4.6	4.6	0.6	0.9	1.5	3.2	5.2
A(rms)	0.9	1.5	2.7	4.2	8.1	12.6	13.8	13.8	1.8	2.7	4.5	9.6	15.6
TORQUE Kt													
kgf ·cm/A(rms) ± 10%	3.7	3.7	3.9	4.9	4.9	4.8	5.8	7.2	1.9	1.9	2.2	2.1	2.6
Ke													
(V(rms)/RPM)x10 <sup>-3</sup> ± 10%	38.5	38.5	39.8	50.4	51	49.0	59.4	74.3	19.2	19.7	23.0	21.3	26.9
Ra ± 10%	45.3	18	7.6	2.47	1.07	0.42	0.4	0.48	11.5	4.53	2.47	0.47	0.3
La mH ± 30%	40	21	11.3	9	4.2	2.67	2.9	3.63	10	5.63	3.33	1.6	1.13
OIL SEAL													
Encoder	: 2048 p/r INC. Option 3000p/r,6000p/r,2048p/r ABS.												
	IP40												

1.

MOTOR 200\*200\*6(mm)

HEAT SINK
2.

40
3.

Typical
4.

motor seal

가

Derating

factor

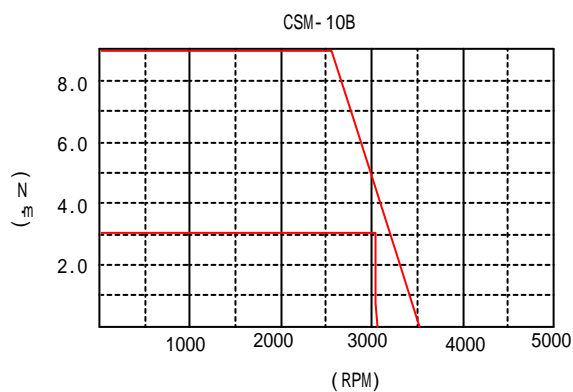
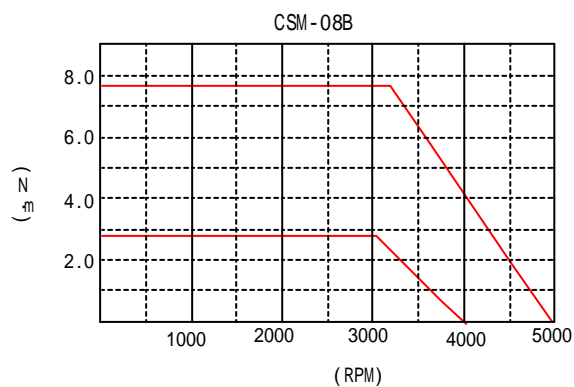
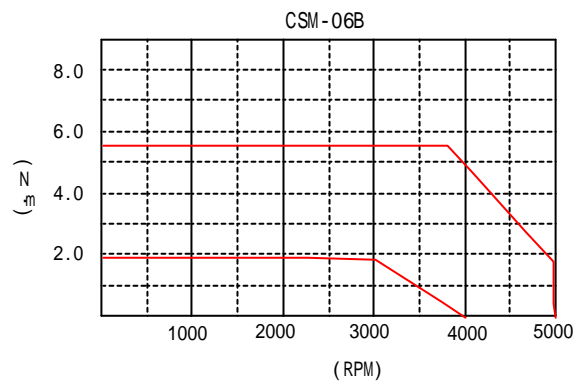
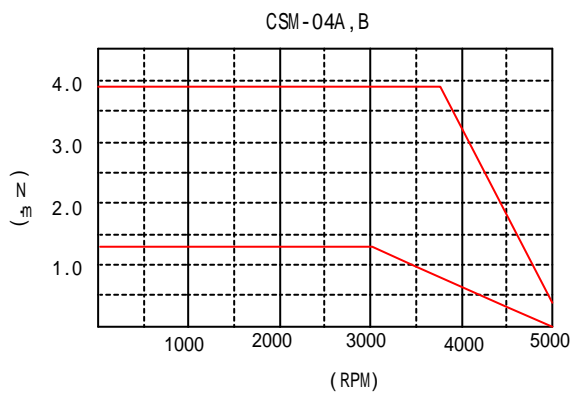
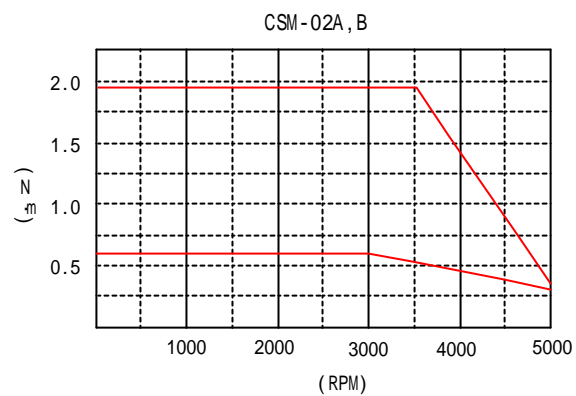
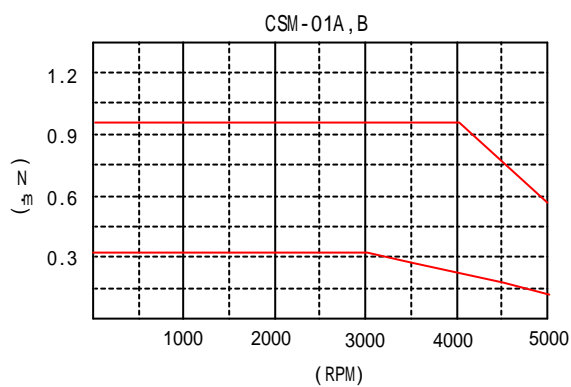
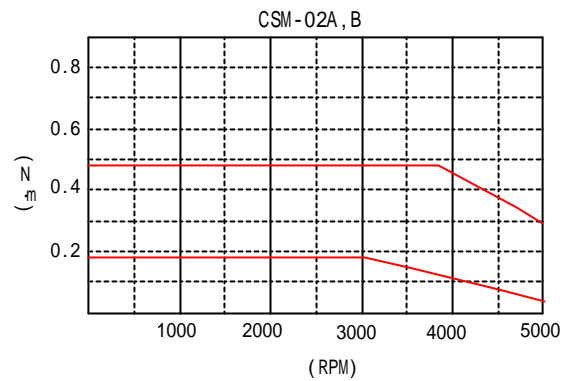
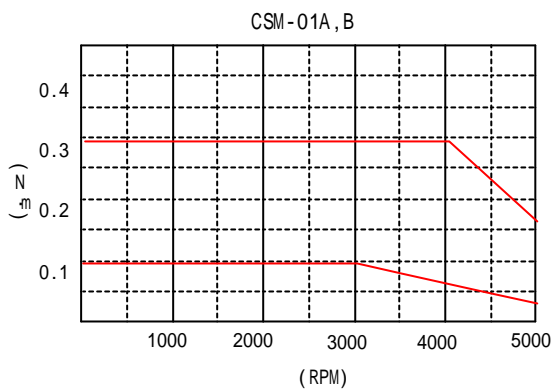
CSM - MODEL	A3A	A5A	01A, 02A	04A
Derating factor rate (%)	70	80	90	95

2.2 BRAKE

CSM MOTOR	A3	A5	01	02	04	06	08	10
V	DC 24V ± 10%							
Kgf-cm MIN	3.25		13		26			
N·m	0.32		1.27		2.55			
W 20	6		8		9			
BRAKE ms Max	20		30		50			
BRAKE ms Max	40		50		80			

- 1.BRAKE
- INERTIA 1.2
- 가

# . TORQUE , , (110/220V)



# CSMG- AC

CSM 가

MOTOR < >												
MODEL	(W)	(r/min)	(N·m)			(r/min)	(N·m)	(N·m)	radial <sup>2</sup> (N)	Thrust (N)	Inertia kg·m <sup>2</sup> ×10 <sup>-4</sup> (GD <sup>2</sup> /4)	(kg)
CSMG-A5	50	3000	0.159	B	1/3	1000	0.25	0.78	392	196	0.058	0.58
					1/5	600	0.51	1.47	490	245	0.040	0.58
					1/9	333	0.92	2.74	588	294	0.048	0.73
					1/15	200	1.67	5.00	784	392	0.035	0.73
					1/25	120	2.74	8.33	882	441	0.033	0.73
CSMG-01	100	3000	0.318	B	1/3	1000	0.72	2.06	392	196	0.058	0.58
					1/5	600	1.18	3.72	490	245	0.040	0.58
					1/9	333	2.25	6.84	588	294	0.048	0.73
					1/15	200	3.72	11.4	784	392	0.035	0.73
				C	1/25	120	6.27	19.0	1666	833	0.038	1.8
CSMG-02	200	3000	0.64	B	1/3	1000	1.47	4.51	392	196	0.145	0.73
					1/5	600	2.65	8.04	490	245	0.125	0.73
				C	1/9	333	3.72	11.3	1176	588	0.400	2.3
					1/15	200	6.27	18.8	1470	735	0.300	2.3
					1/25	120	11.1	33.3	1666	833	0.288	2.3
CSMG-04	400	3000	1.27	B	1/3	1000	3.43	10.3	392	196	0.145	0.73
				C	1/5	600	5.39	16.2	980	490	0.363	1.9
					1/9	333	9.51	28.5	1176	588	0.400	2.3
					1/15	200	15.8	47.5	1470	735	0.300	2.3
				D	1/25	120	26.4	79.2	2058	1029	0.300	3.2
CSMG-06	600	3000	1.91	C	1/3	1000	5.00	15.0	784	392	0.913	2.2
					1/5	600	8.33	24.9	980	490	0.713	2.2
				D	1/9	333	13.9	41.8	1470	735	0.988	3.8
					1/15	200	23.2	69.6	1764	882	0.700	3.8
CSMG-08	800	3000	2.55	C	1/3	1000	6.86	20.6	784	392	0.913	2.2
					1/5	600	11.5	34.3	980	490	0.713	2.2
				D	1/9	333	19.5	58.5	1470	735	0.988	3.8
					1/15	200	32.7	97.4	1764	882	0.700	3.8

1. 3,000rpm, 20 typical
- 2.
- 3.
4. B 0.7%, C/D 0.5%
5. : 1) : 10<sup>6</sup>, 2) ( 3,000RPM) : 10,000

## 2.2 CSMD MOTOR

가

### 2.3 CSMD MOTOR

(220VAC)

	Y		
	-0 +40		F
	-20 +80		AC 1500V (60sec)
	DC 500V 20M	(BRAKE )	AC 1200V (60sec)
MOTOR POLE	8		PERMANENT MAGNET
	49m/s <sup>2</sup> ( 24.5)		FLANGE
	98m/s <sup>2</sup> :3		-85%( )

CSMD -	08B	10B	15B	20B	25B	30B	35B	40B	45B	50B
Kw	0.75	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
TORQUE Kgf ·cm	36.4	49	73	97.4	121	146	169	192	219	243
CSDP -	CSDJ-10BX1	CSDJ-10BX1	15BX1	20BX1	25BX1	30BX1	35BX1	40BX1	50BX1	50BX1
TORQUE Kgf ·cm	109	147	219	292	363	438	510	576	657	729
RPM	2000									
RPM	3000									
ROTOR INERTIA gf ·cm ·s <sup>2</sup>	2.88	6.30	11.4	15.5	19.6	22.8	36.6	43.4	51.6	61.9
ROTOR INERTIA(BRAKE )	3.19	6.93	12.6	17.0	21.5	25.1	41.0	47.8	56.7	68.1
POWER RATE kw/s	45.1	37.3	45.8	60.0	73.2	91.6	76	83.2	91.1	93.5
ms	0.5	0.70	0.81	0.75	0.72	0.72	1.0	1.0	1.0	0.9
ms	15.7	18	19	21	21	20	24	24	30	32
mm MAX	0.3									
THRUST Kgf	15	20				35				
RADIAL Kgf	40	50				80				
THRUST Kgf	40	60					80			
RADIAL Kgf	70	100					170			
	U V W									
A(rms)	5.0	5.6	9.4	12.3	14	17.8	18.7	23.4	26.2	28
A( rms)	15	16.8	28.2	36.9	42	53.4	56.1	70.2	78.6	84
TORQUE Kt kgf ·cm/A(rms) ±10%	7.35	8.77	7.78	7.92	8.63	8.20	9.05	8.20	8.34	8.63
Ke (V(rms)/RPM)×10 <sup>-3</sup> ±10%	75.0	90.5	79.2	82.0	89.1	84.9	93.3	84.9	86.3	89.1
Ra ±10%	0.33	0.28	0.14	0.1	0.09	0.007	0.007	0.05	0.046	0.034
La mH ±30%	5.2	5.0	2.6	2.1	1.9	1.4	1.7	1.2	1.4	1.1
Kg	4.8	6.8	8.5	10.6	12.8	14.6	16.2	18.8	21.5	25
(Brake )	6.5	8.7	10.1	12.5	14.7	16.5	18.7	21.3	25.0	28.5
OIL SEAL										
Encoder r	: 2500p/r INC. Option 5000p/r 6000p/r 2048 p/r ABS.									
	IP55									

1. MOTOR 08:255\*240\*15,10 20:275\*260\*15,25 30:380\*350\*30  
35 50:470\*440\*30(mm) HEAT SINK  
40
2. 20
3. Typi cal
4. DRIVE

## 2.4 BRAKE

Item	Unit						
		CSMD08B	CSMD10B	CSMD15B CSMD20B	CSMD25B CSMD30B	CSMD35B CSMD40B	CSMD45B CSMD50B
	N·m (kgf·cm)	7.84 or more (80)	4.9 or more (50)	13.7 or more (140)	16.1 or more (165)	21.5 or more (220)	24.5 or more (250)
inertia	10 <sup>-4</sup> kg·m <sup>2</sup> (kgf·cm·s <sup>2</sup> )	0.33 (0.34)	1.35 (1.38)			4.25 (4.34)	9.0 (9.18)
BRAKE	ms	50 or less	80 or less	100 or less	110 or less	90 or less	80 or less
BRAKE	ms	1 15 or less	2 70 or less	2 50 or less		1 35 or less	1 25 or less
(DC)	DC,V	2 or more					
(DC)	DC,V	24 ± 2.4					
(DC)	A	0.81 ± 10%	0.59 ± 10%	0.79 ± 10%	0.90 ± 10%	1.1 ± 10%	1.3 ± 10%
brake (1 )	J(kgf·m)	392(40)	588(60)	1176(120)	1470(150)	1078(110)	1372( 140)
brake	J(kgf·m)	4.9 × 10 <sup>5</sup> (5 × 10 <sup>-4</sup> )	7.8 × 10 <sup>5</sup> (8 × 10 <sup>4</sup> )	1.5 × 10 <sup>6</sup> (1.5 × 10 <sup>5</sup> )	2 × 10 <sup>6</sup> (2.2 × 10 <sup>5</sup> )	2.4 × 10 <sup>6</sup> (2.5 × 10 <sup>5</sup> )	2.9 × 10 <sup>6</sup> (3 × 10 <sup>5</sup> )

1 By sirisuta C-5A2 20°C

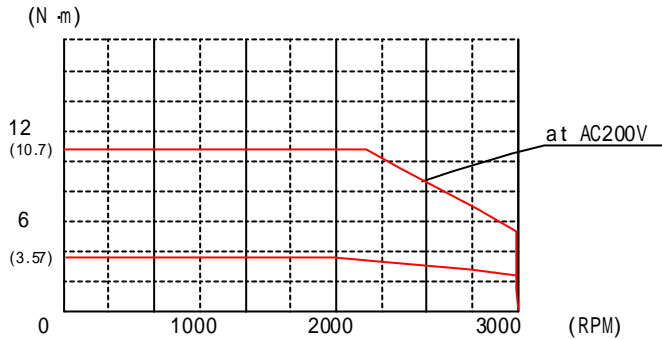
2 By barisuta TNR9G820K

1. Typical ( , )

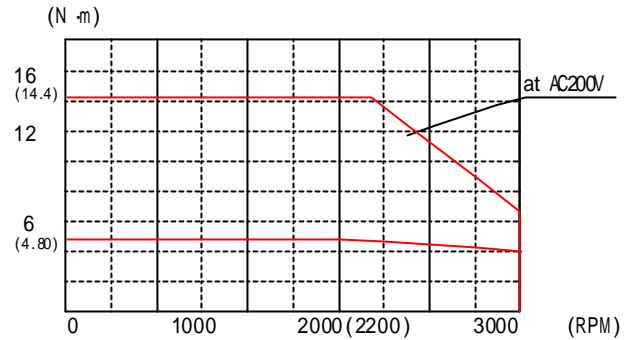
2. 20 .

. Torque, , (220V)

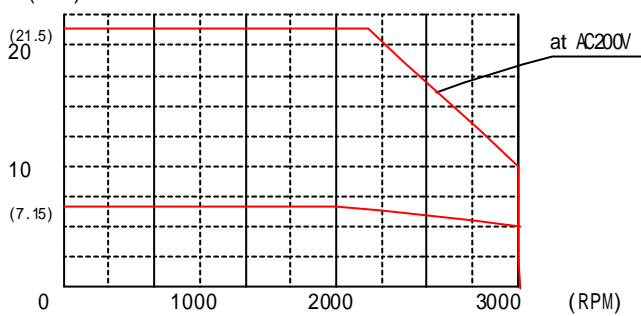
CSMD-08B



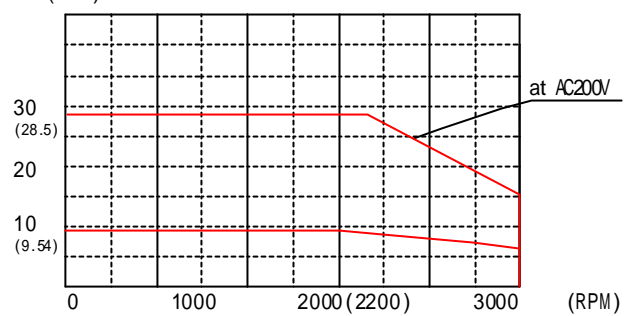
CSMD-10B



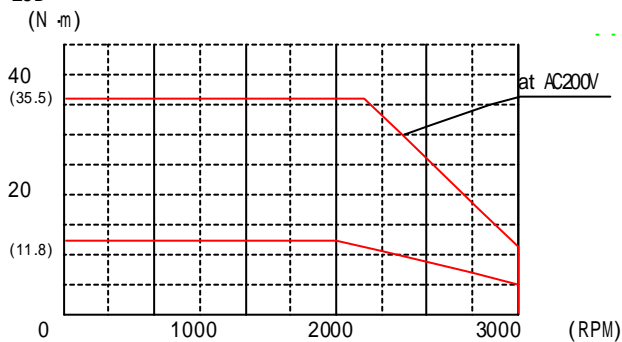
CSMD-15B



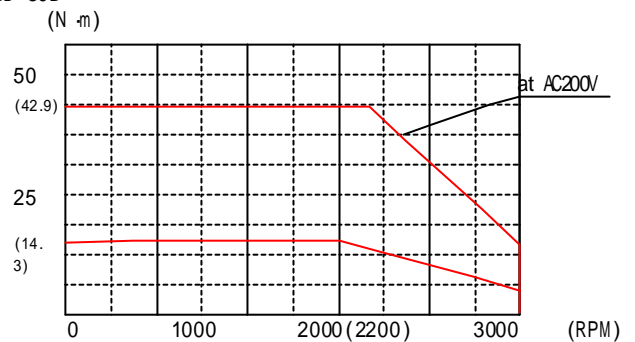
CSMD-20B



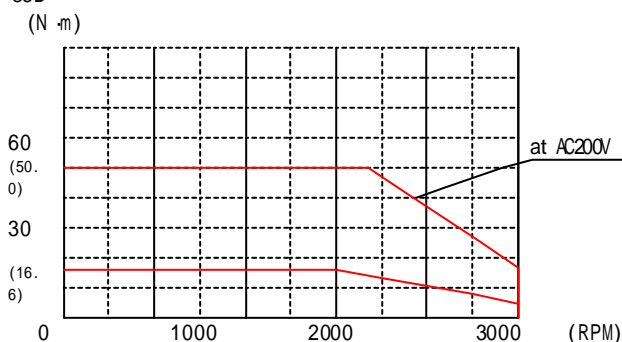
CSMD-25B



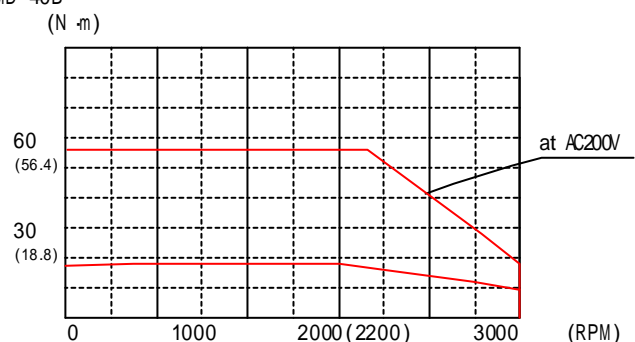
CSMD-30B



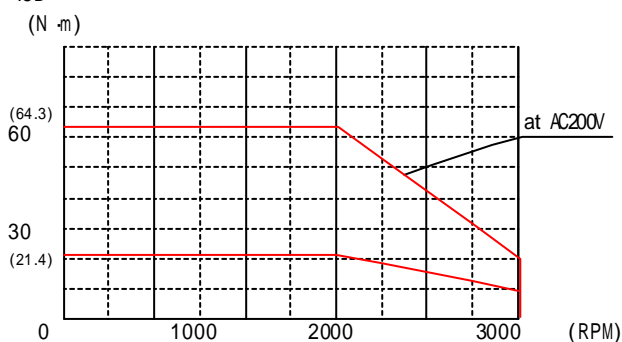
CSMD-35B



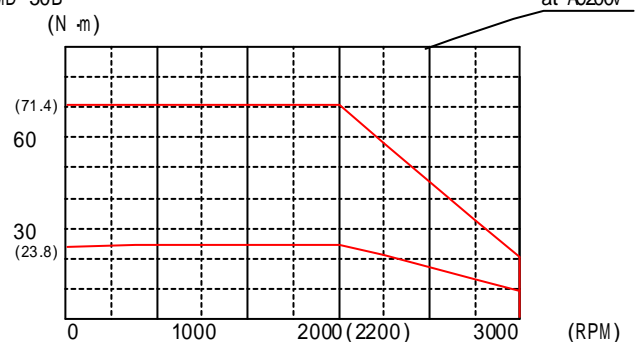
CSMD-40B



CSMD-45B



CSMD-50B



## 2.3 CSMS MOTOR

가.

### 2.5 CSMS MOTOR (220VAC)

	Y		
	-0 +40		F
	-20 +80		AC 1500V(60sec)
	DC 500V 20M	(BRAKE )	AC 1200V(60sec)
MOTOR POLE	8		PERMANENT MAGNET
	49m/s <sup>2</sup> ( 24.5 )		FLANGE
	98m/s <sup>2</sup> :3		-85%( )

CSMS -		10B	15B	20B	25B	30B	35B	40B	45B	50B
kW		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
CSDP -		CSDJ-10BX1	15BX1	20BX1	25BX1	30BX1	35BX1	40BX1	50BX1	50BX1
TORQUE	Kgf ·cm	32.4	48.7	64.9	81	97.3	113	129	146	162
TORQUE	Kgf ·cm	97	146	195	243	292	339	387	438	486
RPM		3000						3000		
RPM		5000						4500		
ROTOR INERTIA	gf ·cm · s <sup>2</sup>	1.72	2.64	3.53	4.40	6.91	8.06	13.0	15.6	18.2
ROTOR INERTIA (BRAKE )		1.92	2.90	3.89	4.84	7.60	8.88	14.4	17.3	20.1
POWER RATE	kw/s	60	88	117	146	134	155	125	134	140
	ms	0.78	0.54	0.53	0.52	0.46	0.45	0.51	0.45	0.46
	ms	6.7	10	10.8	11	17	20	20	20	20
mm MAX		0.3								
THRUST	Kgf	15	20			35				
RADIAL	Kgf	40	50			80				
THRUST	Kgf	40	60							
RADIAL	Kgf	70	100							
		U V W								
A (rms)		7.2	9.4	13	15.9	18.6	21.6	24.7	28	28.5
A (rms)		21.6	28.2	39	47.7	55.8	64.8	74.1	84	85.5
TORQUE	Kt	4.53	5.23	4.95	5.09	5.23				5.80
	kgf ·cm/A (rms) ± 10%									
Ke (V (rms) /RPM) x10 <sup>-3</sup> ± 10%		46.7	53.7	50.9	52.3	53.7				59.4
Ra	± 10%	0.27	0.18	0.12	0.10	0.06	0.05	0.035	0.026	0.028
La	mH ± 30%	1.8		1.3	1.1	1.0		0.7	0.52	0.56
Kg		4.5	5.1	6.5	7.5	9.3	10.9	12.9	15.1	17.3
(Brake )		5.1	6.5	7.9	8.9	11.0	12.6	14.8	17.0	19.2
OIL SEAL										
Encoder		: 2500p/r INC. Option 5000p/r 6000p/r 2048 p/r ABS.								
		IP55								

- MOTOR 10:172\*160\*12, 15-25:320\*300\*20, 30-50:380\*350\*30 (mm) HEAT SINK  
40
- 20
- Typical
- DRIVE



## 2.6 BRAKE

Item	Unit				
		CSMS10B	CSMS15B CSMS35B	CSMS30B CSMS35B	CSMS40B CSMS50B
	N ·m	4.9 or more (50)	7.8 or more (80)	11.8 or more (120)	16.1 or more (165)
inertia	10 <sup>-4</sup> kg ·m <sup>2</sup>	0.25 (0.26gf ·cm ·s <sup>2</sup> )	0.33 (0.33gf ·cm ·s <sup>2</sup> )	1.35 (1.38gf ·cm ·s <sup>2</sup> )	
BRAKE	ms	50 or less		80 or less	110 or less
BRAKE	ms	1 15 or less			2 50 or less
(DC)	DC,V	2 or more			
(DC)	DC,V	24 ± 2.4			
(DC)	A	0.74 ± 10%	0.81 ± 10%		0.90 ± 10%
brake (1 )	J(kgf ·m)	392 (40)			1470(150)
brake	J(kgf ·m)	2.0 × 10 <sup>5</sup> (2 × 10 <sup>-4</sup> )	4.9 × 10 <sup>5</sup> (5 × 10 <sup>4</sup> )	4.9 × 10 <sup>6</sup> (5 × 10 <sup>5</sup> )	2 × 10 <sup>6</sup> (2.2 × 10 <sup>5</sup> )

1 By sirisuta C-5A2 20°C

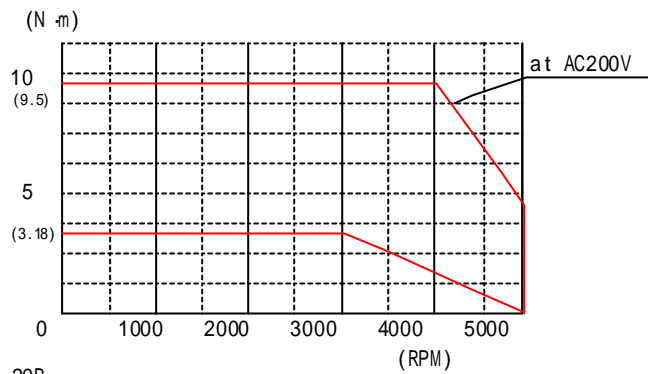
2 By barisuta TNR9G820K

1. Typical ( , )

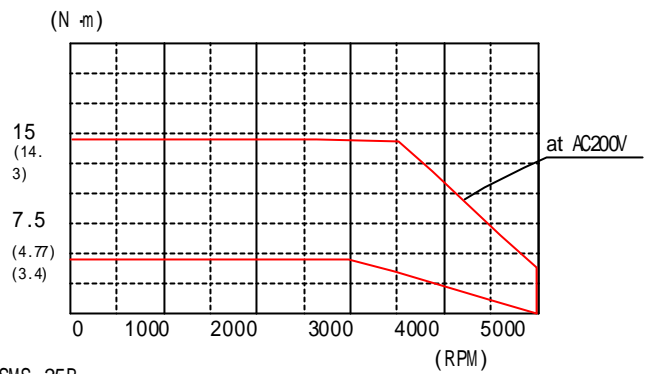
2. 20

# . Torque, , (220V)

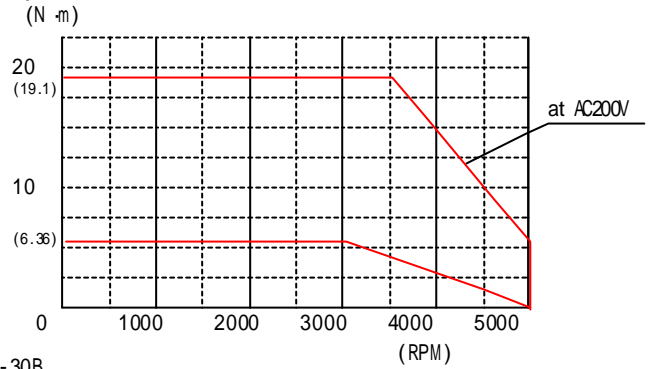
CSMS-10B



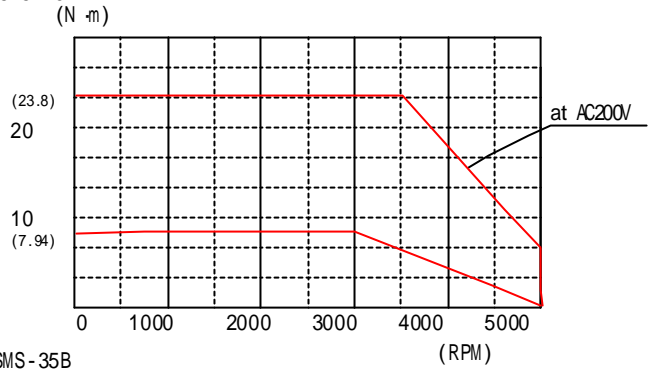
CSMS-15B



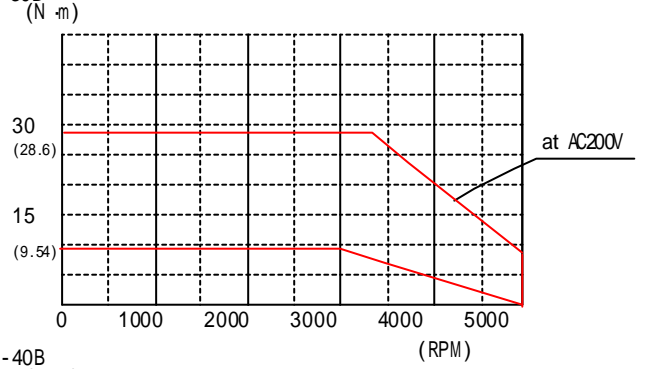
CSMS-20B



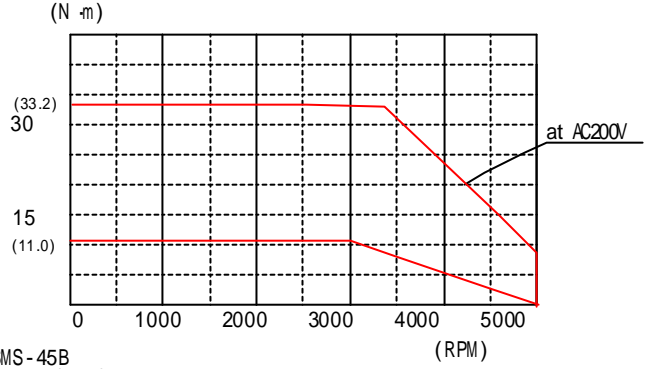
CSMS-25B



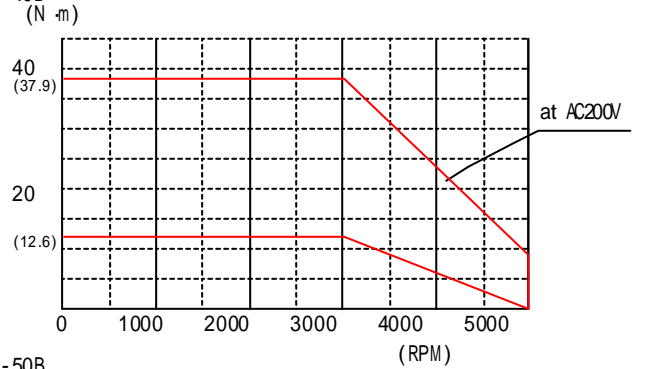
CSMS-30B



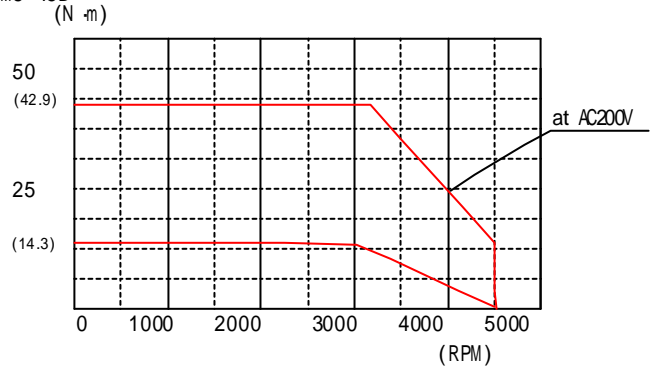
CSMS-35B



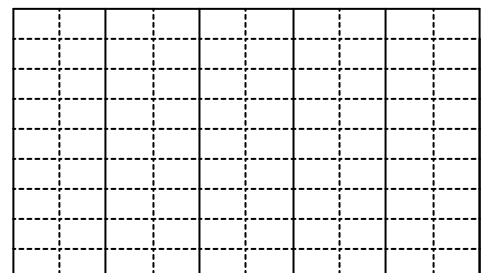
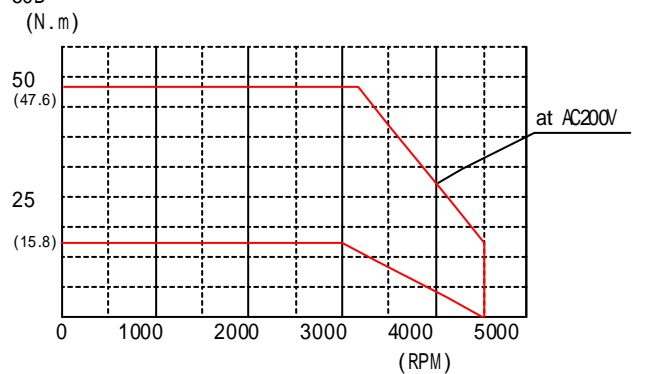
CSMS-40B



CSMS-45B



CSMS-50B



## 2.4 CSMF MOTOR

가.

### 2.7 CSMF MOTOR (220VAC)

	Y		
	-0 +40		F
	-20 +80		AC 1500V(60sec)
	DC 500V 20M	(BRAKE )	AC 1200V(60sec)
MOTOR POLE	8		PERMANENT MAGNET
	49m/s <sup>2</sup> ( 24.5)		FLANGE
	98m/s <sup>2</sup> :3		-85%( )

CSMF -	04B	08B	15B	25B	35B	45B
W	0.4	0.75	1.5	2.5	3.5	4.5
CSDP -	CSDJ-06BX1	CSDJ-10BX1	15BX1	25BX1	35BX1	35BX1
TORQUE Kgf ·cm	19.5	36.4	73	121	169	219
TORQUE Kgf ·cm	58.5	109	219	310	450	560
RPM	2000					
RPM	3000					
ROTOR INERTIA gf ·cm · s <sup>2</sup>	2.50	10.3	20.5	42.1	52.7	73.8
ROTOR INERTIA (Brake )	2.8	11.1	21.9	46.2	56.8	80.1
POWER RATE kw/s	14.9	12.6	25.5	34	53.1	63.7
ms	1.1	1.9	1.4	1.3	1.06	0.88
ms	10	21	25	35	41	41
mm MAX	0.3					
THRUST Kgf	15	20		30		
RADIAL Kgf	40	50		80		
THRUST Kgf		60		70		
RADIAL Kgf		100		190		
	U V W					
A(rms)	2.8	5.0	9.5	13.4	20	23.5
A(rms)	8.4	15	28.5	40.2	60	70.5
TORQUE Kt kgf ·cm/A(rms) ± 10%	6.79	7.35	7.78	9.05	8.63	9.33
Ke (V(rms)/RPM) x 10 <sup>-3</sup> ± 10%	70.7	75.0	79.2	91.9	89.1	96.4
Ra ± 10%	0.65	0.32	0.13	0.08	0.049	0.034
La mH ± 30%	6.7	3.2	2.8	2.0	1.4	
Kg	4.7	8.6	11	14.8	15.5	19.9
(Brake )	6.7	10.6	14	17.5	19.2	24.3
OIL SEAL						
Encoder r	: 2500p/r INC. Option 5000p/r 6000p/r 2048 p/r ABS.					
	IP55					

- MOTOR 04:275\*260\*15, 08-15:380\*350\*30, 25-45:470\*440\*30 (mm) HEAT SINK
- 20
- Typical
- DRIVE

### 2.8 BRAKE

Item	Unit				
		CSMF04B	CSMF08B CSMF15B	CSMF25B CSMF35B	CSMF45B
	N·m	4.9 or more (50)	7.8 or more (80)	21.6 or more (220)	31.4 or more (320)
inertia	10 <sup>-4</sup> kg·m <sup>2</sup>	1.35 (1.38gf·cm·s <sup>2</sup> )	9.0 (9.2gf·cm·s <sup>2</sup> )	8.75 (8.9gf·cm·s <sup>2</sup> )	8.75 (8.9gf·cm·s <sup>2</sup> )
BRAKE	ms	80 or less		150 or less	
BRAKE	ms	2 70 or less	1 35 or less	2 100 or less	
(DC)	DC,V	2 or more			
(DC)	DC,V	24±2.4			
(DC)	A	0.59±10%	0.83±10%	0.75±10%	
brake (1 )	J(kg·f·m)	588(60)	1372(140)	1470(150)	
brake	J(kg·f·m)	7.8×10 <sup>5</sup> (8×10 <sup>-4</sup> )	2.9×10 <sup>6</sup> (3×10 <sup>5</sup> )	1.5×10 <sup>6</sup> (1.5×10 <sup>5</sup> )	2×10 <sup>6</sup> (2.2×10 <sup>5</sup> )

1 By sirisuta C-5A2 20°C

2 By barisuta TNR9G820K

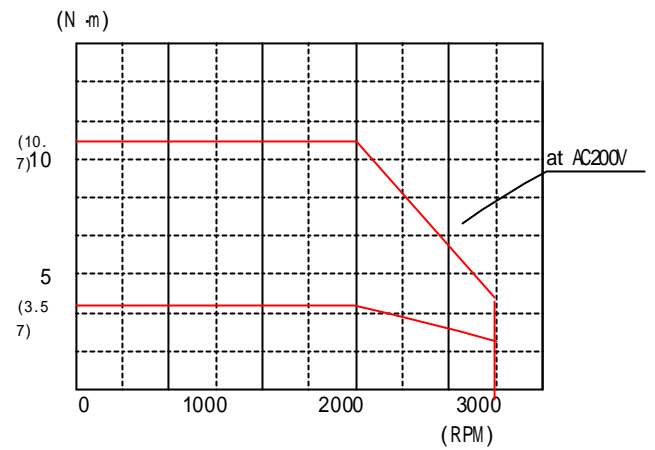
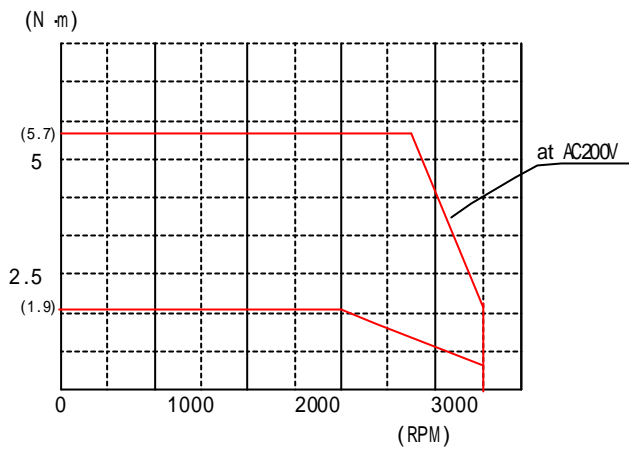
1. Typical . ( , )

2. 20

# . Torque, , (220V)

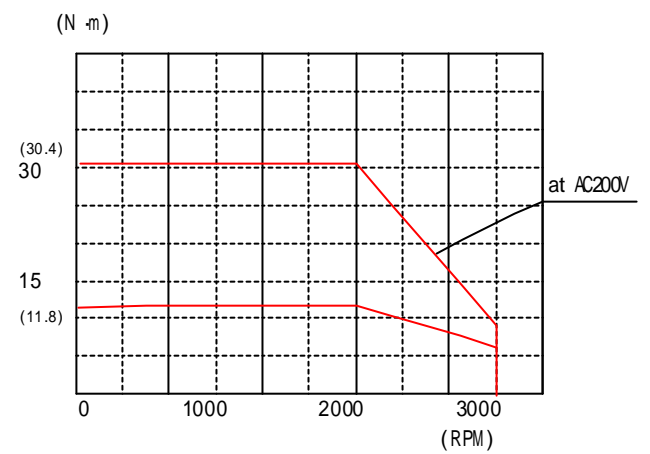
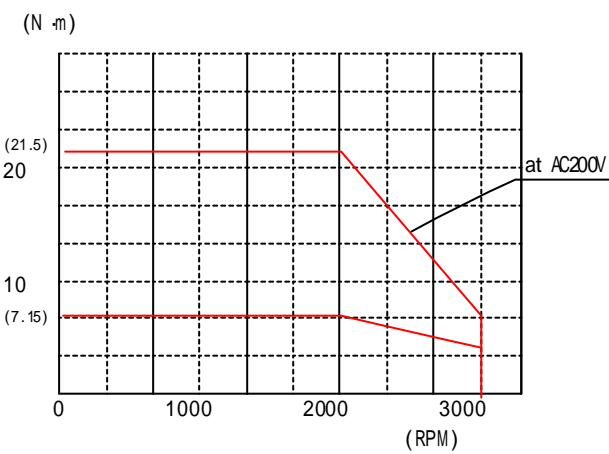
CSMF-04B

CSMF-08B



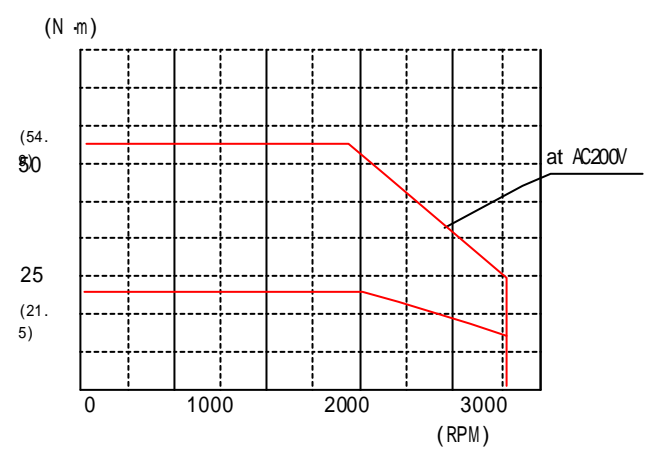
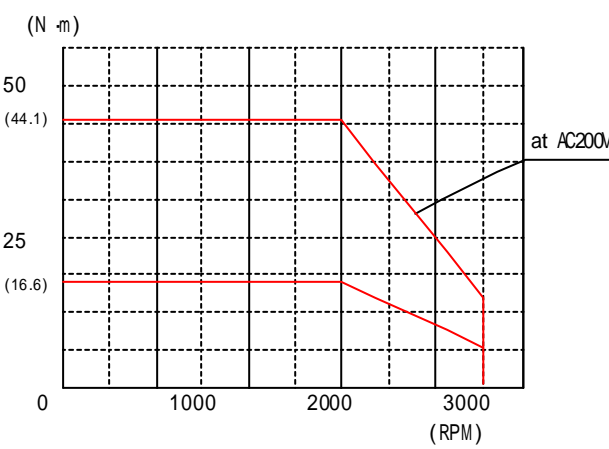
CSMF-15B

CSMF-25B



CSMF-35B

CSMF-45B



## 2.5 CSMH MOTOR

가.

### 2.9 CSMH MOTOR

(220VAC)

	Y		
	-0 +40		F
	-20 +80		AC 1500V(60sec)
	DC 500V 20M	(BRAKE )	AC 1200V(60sec)
MOTOR POLE	8		PERMANENT MAGNET
	49m/s <sup>2</sup> ( 24.5)		FLANGE
	98m/s <sup>2</sup> :3		-85%( )

CSMH-		05B	10B	15B	20B	30B	40B	50B
KW		0.5	1.0	1.5	2.0	3.0	4.0	5.0
CSDP-		CSDJ-06BX1	CSDJ-10BX1	15BX1	20BX1	30BX1	40BX1	50BX1
TORQUE	Kgf ·cm	24.3	49	73	97.4	146	192	243
TORQUE	Kgf ·cm	61.0	147	219	292	438	576	729
RPM		2000						
RPM		3000						
ROTOR INERTIA	gf ·cm · s <sup>2</sup>	14.3	26.5	43.8	63.3	96	122.4	173.5
ROTOR INERTIA (Brake )		15.5	27.8	45.0	69.3	102	128.6	17.6
POWER RATE	kw/s	4.0	8.9	11.9	14.7	21.8	29.5	33.4
ms		4	2.9	3.1	2.1	2.5	2.2	2.3
ms		15	18	19	26	26	30	31
mm MAX		0.3						
THRUST	Kgf	20			35			
RADIAL	Kgf	50			80			
THRUST	Kgf	60			80			
RADIAL	Kgf	100			170			
		U V W						
A(rms)		3.2	5.6	9.4	12.3	17.8	23.4	28.0
A(rms)		8.1	16.8	28.0	36.7	53.6	70.2	84.0
TORQUE	Kt	7.50	8.77	7.78	7.92	8.20	8.20	8.63
	kgf ·cm/A(rms) ± 10%							
Ke (V(rms)/RPM) x10 <sup>-3</sup> ± 10%		77.1	90.5	79.2	82.0	84.9	84.9	89.1
Ra	± 10%	0.52	0.28	0.14	0.07	0.057	0.04	0.032
La	mH ± 10%	7.8	5.0	2.6	1.8	1.5	1.2	1.0
Kg		5.3	8.9	10.0	16.0	18.2	22.0	26.7
(Brake )		6.9	9.5	11.6	19.5	21.7	25.5	30.2
OIL SEAL								
Encoder		: 2500p/r INC. Option 5000p/r 6000p/r 2048 p/r ABS.						
		IP55						

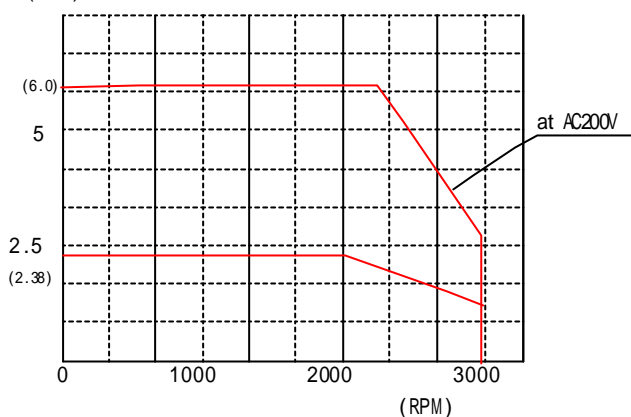
1. MOTOR 04:275\*260\*15, 08-45:380\*350\*30, 25-45:470\*440\*30(mm) HEAT SINK
2. 40
3. 20
4. Typical
5. DRIVE

## 2.10 Brake

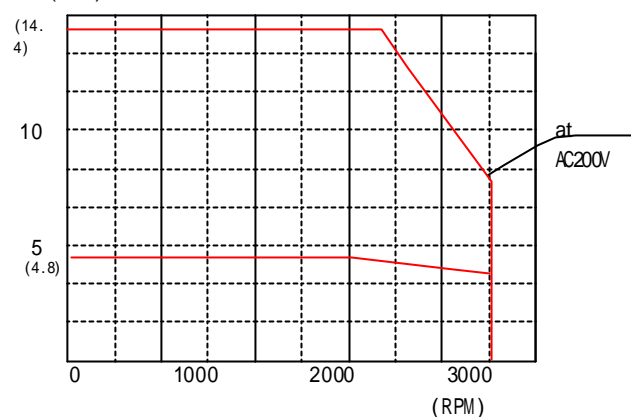
		CSMH05B, CSMH10B	CSMH15B	CSMH20B, CSMH30B CSMH40B, CSMH50B	
	N·m	4.9 or more (50)	13.7 or more (140)	24.5 or more (250)	
inertia	$10^{-4}\text{kg}\cdot\text{m}^2$	1.35 (1.38gf·cm·s <sup>2</sup> )		9.0 (9.18gf·cm·s <sup>2</sup> )	
BRAKE	ms	80 or less	100 or less	80 or less	
BRAKE	ms	<sup>2</sup> 70 or less	<sup>1</sup> 50 or less	<sup>2</sup> 25 or less	
(DC)	DC, V	2 or more			
(DC)	DC, V	24 ± 2.4			
(DC)	A	0.59 ± 10%	0.79 ± 10%	1.3 ± 10%	
brake (1 )	J (kgf·m)	588(60)	1196(120)	1372(140)	
brake	J (kgf·m)	$7.8 \times 10^5$ ( $8 \times 10^{-4}$ )	$1.5 \times 10^6$ ( $3 \times 10^{-5}$ )	$2.9 \times 10^6$ ( $1.5 \times 10^{-5}$ )	

# . Torque, , (220V)

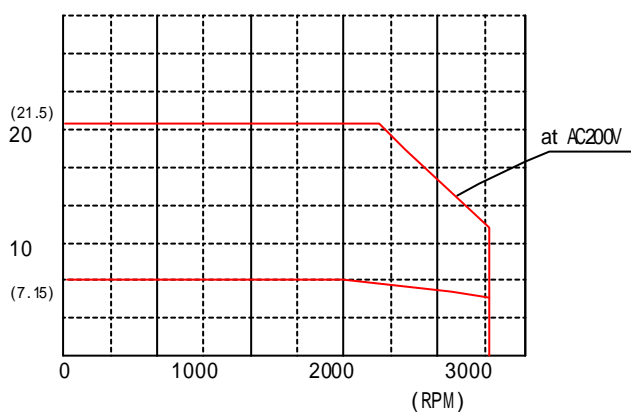
CSMH-05B  
(N·m)



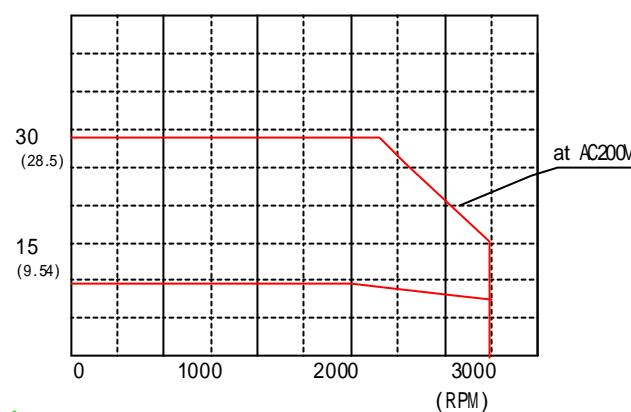
CSMH-10B  
(N·m)



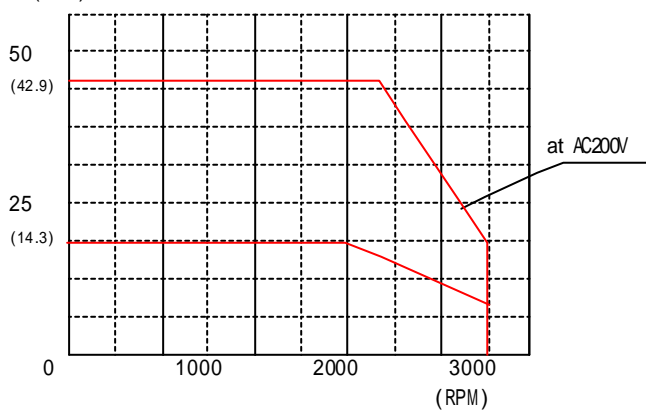
CSMH-15B  
(N·m)



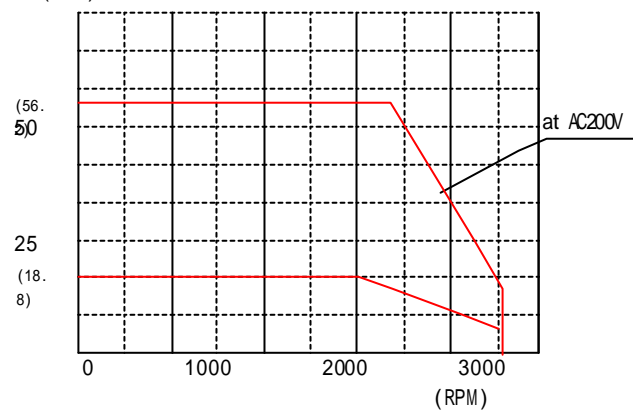
CSMH-20B  
(N·m)



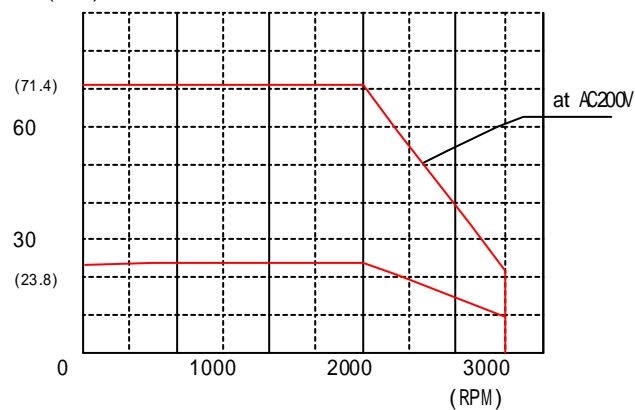
CSMH-30B  
(N·m)



CSMH-40B  
(N·m)



CSMH-50B  
(N·m)





## 2.6 CSMN MOTOR 가.

### 2.11 CSMN MOTOR (220VAC)

	Y		
	-0 +40		F
	-20 +80		AC 1500V (60sec)
	DC 500V 10M	(BRAKE )	
MOTOR POLE	8		PERMANENT MAGNET
			FLANGE
			20 -80% ( )

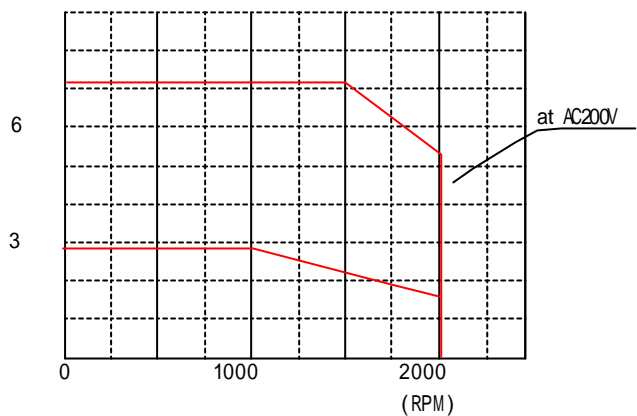
CSMN -	03B	06B	09B	12B	20B	30B	44B	60B
kW	0.3	0.6	0.9	1.2	2.0	3.0	4.4	6.0
CSDP -	CSDJ-02BX1	CSDJ-06BX1	CSDJ-10BX1	15BX1	25BX1	30BX1	50BX1	50BX1
TORQUE Kg f ·cm	29	58	88	117	195	290	428	584
TORQUE Kg f ·cm	73	144	197	286	449	650	930	1080
RPM	1000							
RPM	2000						1500	
ROTOR INERTIA gf ·cm · s <sup>2</sup>	13.5	24.8	37.4	68.2	112	146	245	245
ROTOR INERTIA (Brake )								
POWER RATE kw/s	6.1	13.3	20.3	19.7	33.2	57	74	138
ms	12.8	6.3	4.4	6.0	5.2	3.5	3.6	3.6
ms	2.7	5.1	6.5	10.4	12.9	15.3	16.2	16.2
mm MAX								
THRUST Kg f								
RADIAL Kg f								
THRUST Kg f								
RADIAL Kg f								
	U V W							
A(rms)	3.0	5.8	7.6	11.7	18.8	26.0	33.0	45.0
A(rms)	7.3	13.9	16.6	28	42	56.5	70	80.6
TORQUE Kt kgf ·cm/A(rms) ± 10%	10.3	10.6	12.3	10.4	10.9	11.8	13.6	13.6
Ke (V(rms)/RPM) x10 <sup>-3</sup> ± 10%	105.6	108.9	125.7	107.7	111.9	121.5	140.1	140.1
Ra ± 10%	2.1	1.87	0.6	0.36	0.18	0.11	0.09	0.09
La mH ± 10%	8.82	4.66	3.9	3.74	2.33	1.68	1.46	1.46
Kg	10	15	21	24	32	43	70	75
(Brake ) Kg	13	17	24	32	40	51		
OIL SEAL								
Encoder	:6000p/r INC.							
	IP55							

- 1) MOTOR 04:275\*260\*15, 08-45:380\*350\*30, 25-45: 470\*440\*30(mm) HEAT SINK
2. 20
3. Typical
4. DRIVE

# . Torque, , (220V)

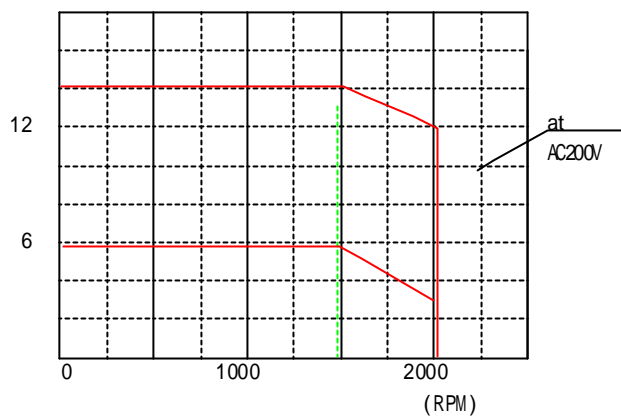
CSMN-03B

(N·m)



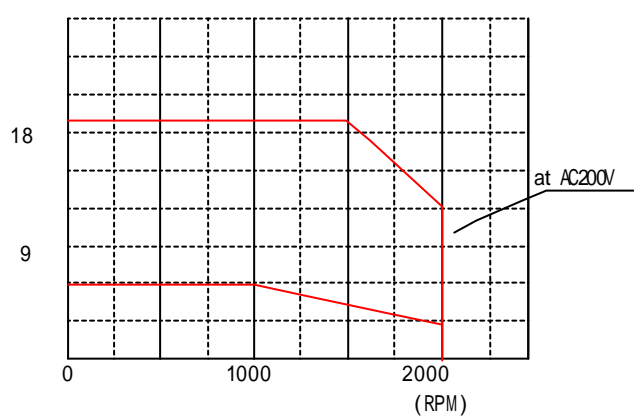
CSMN-06B

(N·m)



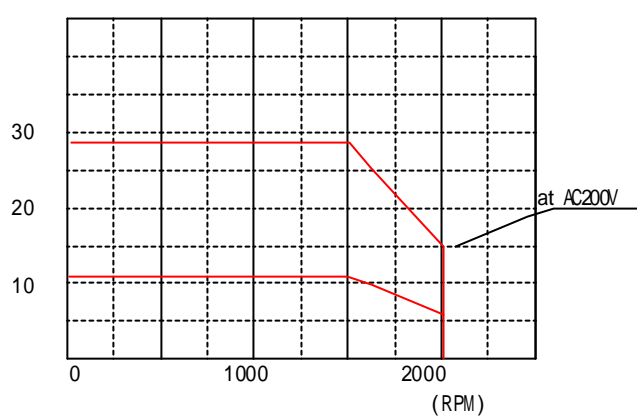
CSMN-09B

(N·m)



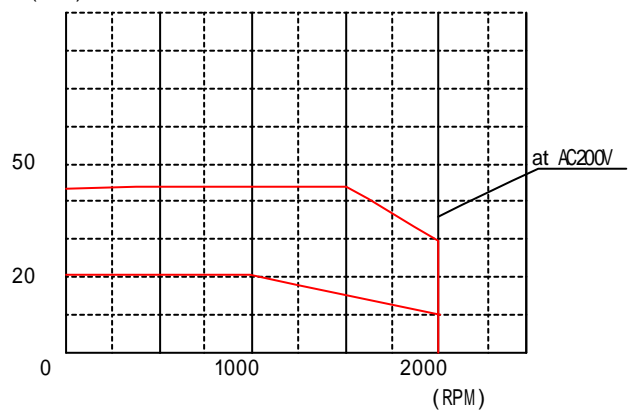
CSMN-12B

(N·m)



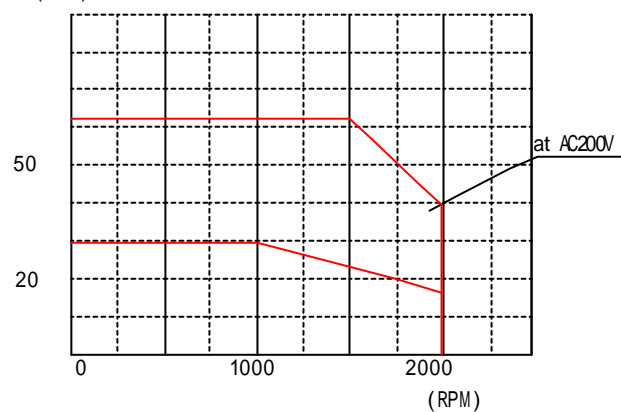
CSMN-20B

(N·m)



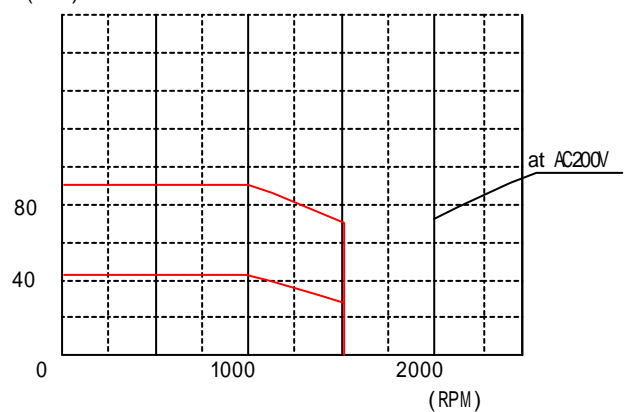
CSMN-30B

(N·m)



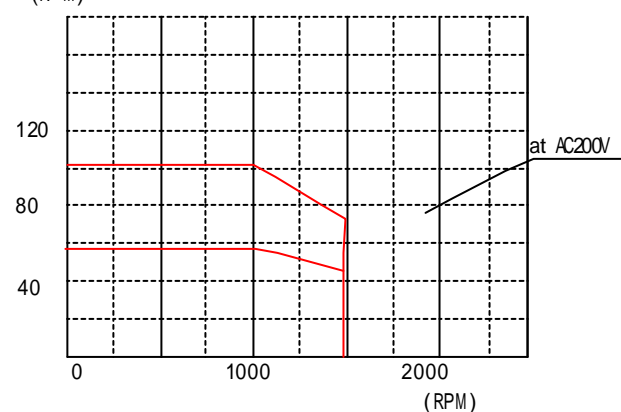
CSMN-44B

(N·m)



CSMN-60B

(N·m)



## 2.7 CSMX MOTOR

가.

### 2.13 CSMX MOTOR (220VAC)

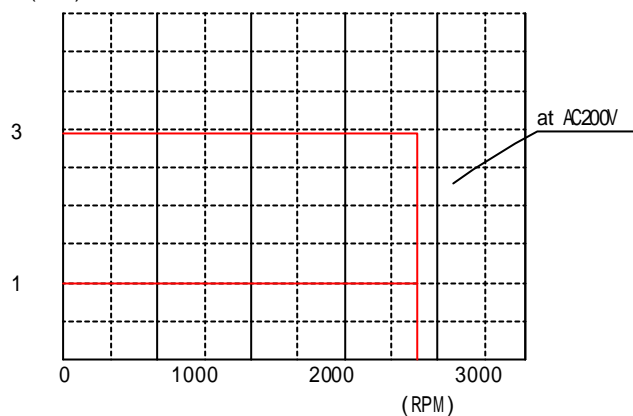
	Y		
	-0 +40		F
	-20 +80		AC 1500V( 60sec)
	DC 500V 10M		
MOTOR POLE	8		PERMANENT MAGNET
			FLANGE
			20 -80%( )

CSMX MOTOR	02B	03B	05B	09B	13B	20B	30B	44B
W	200	300	500	900	1300	2000	3000	4400
TORQUE Kgf ·cm	10	20	29	55	85	117	190	290
CSDP -	CSDJ-02BX1	CSDJ-02BX1	CSDJ-06BX1	CSDJ-10BX1	15BX1	20BX1	30BX1	50BX1
N ·m	0.98	1.96	2.84	5.39	8.33	11.5	18.6	28.4
TORQUE Kgf ·cm	29.7	59.4	91	155	252	347	552	778
N ·m	2.91	5.82	8.92	15.2	24.7	34.0	54.1	76.2
RPM	1500							
RPM	2500							
ROTOR INERTIA gf ·cm · s <sup>2</sup>	1.33	2.1	13.8	24.8	37.4	68.2	112	146
× 10 <sup>-4</sup> kgm <sup>2</sup>	1.3	2.06	13.5	24.3	36.7	66.8	110	143
ROTOR INERTIA (Brake )								
POWER RATE kw/s	7.4	18.3	6	12	18.9	19.7	31.5	57
ms	4.5	2.5	10.9	6.1	4.3	5.8	5.2	3.4
ms	3.4	4.3	3.2	5.2	6.7	10.4	13.2	15.9
mm MAX	0.3							
THRUST Kgf	20	20		35				
RADIAL Kgf	50	50		80				
THRUST Kgf	60			80				
RADIAL Kgf	100			170				
	U V W							
A(rms)	3.0	3.0	3.8	6.2	9.7	15	20	33
A(rms)	9.0	9.0	11	17	27.6	42	56.5	77
TORQUE Kt kgf ·cm/A(rms) ± 10%	3.7	7.3	8.2	9.4	9.4	8.4	10	9.7
Ke (V(rms)/RPM) × 10 <sup>-3</sup> ± 10%			84.3	96.6	96.6	90	105	102
Ra ± 10%			1.64	0.676	0.33	0.23	0.148	0.081
La mH ± 10%			6.89	3.72	2.11	2.39	1.92	1.23
Kg	3.5	4	10	15	21	24	32	43
(Brake ) Kg	4.4	5	13	17	24	32	40	51
OIL SEAL								
Encoder	:6000p/r INC.							
	IP55							

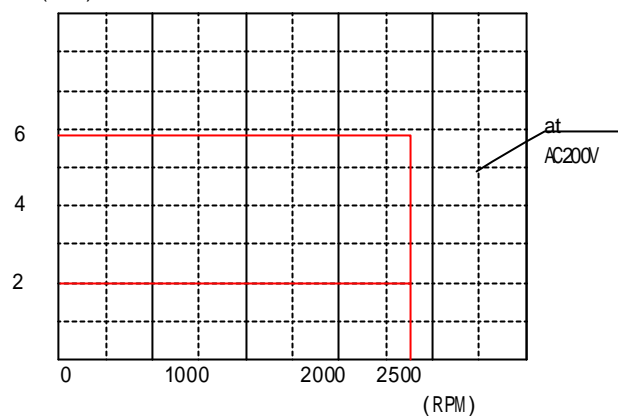
- |    |         |       |   |           |
|----|---------|-------|---|-----------|
| 1. |         | MOTOR | 04:275*260*15,08 -15:380*350*30,25 -45:470*440*30(mm) | HEAT SINK |
|    | .       | 40    | .   |           |
| 2. | 20      |       | .   |           |
| 3. | Typical |       | .   |           |
| 4. | IP 55   |       |   |           |
| 5. | DRIVE   |       | .   |           |

# . Torque, , (220V)

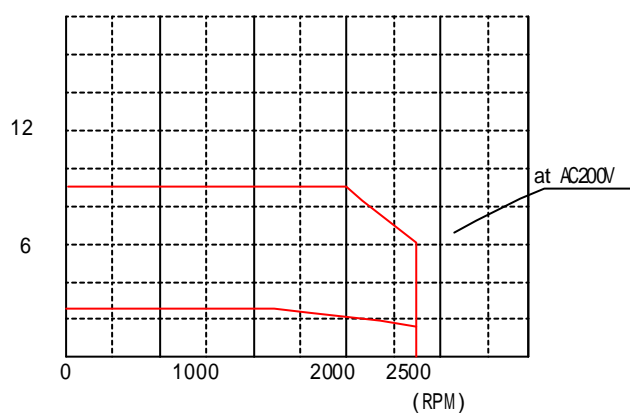
CSMX-02B  
(N·m)



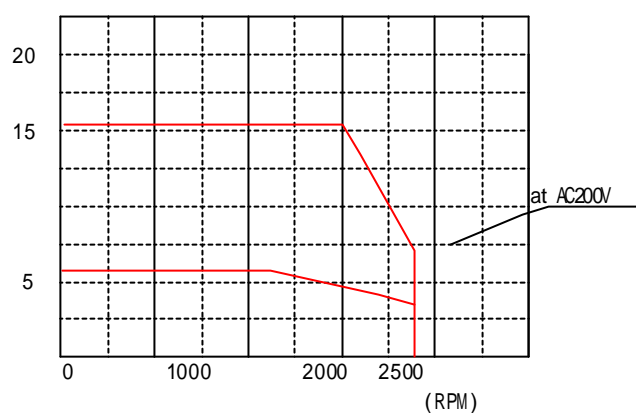
CSMX-03B  
(N·m)



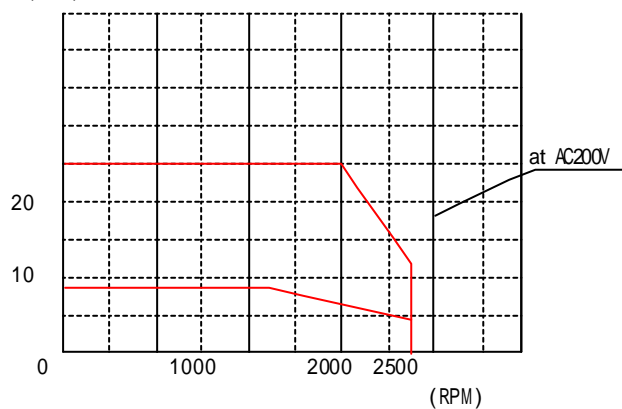
CSMX-05B  
(N·m)



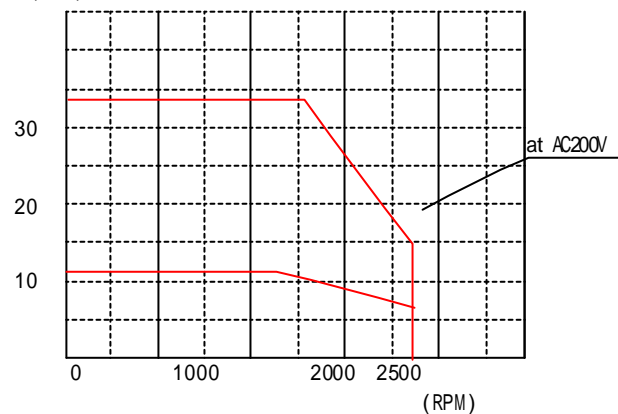
CSMX-09B  
(N·m)



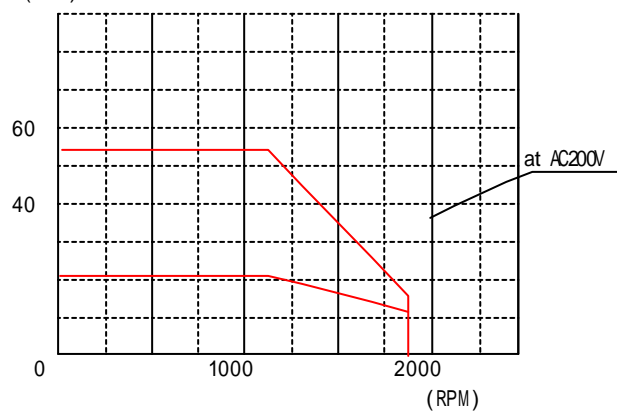
CSMX-13B  
(N·m)



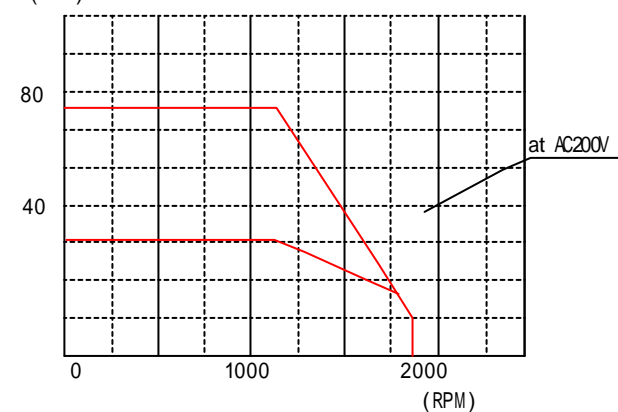
CSMX-20B  
(N·m)



CSMN-44B  
(N·m)



CSMN-60B  
(N·m)



## 2.8 CSD,CSDP SERIES SERVO DRIVE

### 2.15 CSD,CSDP SERIES /

	1	CSD				CSDP				
		110V +10,-15% 50/60Hz		220V +10,-15% 50/60Hz			3 220V +10,-15% 50/60Hz			
							220V +10,-15% 50/60Hz			
		IPM PWM ( )								
	2	2048,2000,2500p/r ( / Incremental, Encoder)								
	/	0 ~ +55 / 90% ( )								
	/	-30 ~ +85 / 90% ( )								
/	0.5G / 2G (1G 가 : 9.8m/s <sup>2</sup> )									
I/O	CSD CSDP <sup>3</sup>			Encoder A, B, Z (MC3487 Line Driver)						
				N/M (N, M 8192)						
				Servo On/Off, P , / , / , Alarm Reset						
				TG_On, Brake , Servo Alarm/Code(3bit), : , :						
				, , , , , , , Encoder , , , <sup>4</sup> ,						
	Dynamic Break			Servo/ Off, Alarm ( )						
	4	CSD		400watt 400watt 가						
		CSDP		( 가 가 가 )						
Monitoring	D/A			CSD	±1.5V/		CSDP	±6V/		
					±1.0V/			±3V/		
	Display	LED		Power On, Servo Run, Servo Alarm ( )						
		7-Segment		CSDP (Error Code Display)						
		CSD,CSDP series		Digital Jog , Monitoring 가 (Option )						

!! !!

- 1) Servo Drive Amp DC (300V) , DC 가 .  
( , I/O DC 24V )
- 2) Motor 가 Encoder Encoder spec. .
- 3) CSDP series / / Drive .
- 4) Inertia .

## 2.16 CSD, CSDP SERIES

		1		1 : 3,000
				0 ~ 100% : 0.01% ( )
				110/220V +10, -15% 50/60Hz: 0.01%
				25±25 : ±0.01% ( )
				250Hz (J <sub>L</sub> = J <sub>u</sub> )
		가/		0 ~ 10 sec
	-			DC ±6V ( 6V )
				50kΩ
				35μs
				DC ±3V ( 3V )
				50kΩ
				35μs
		Feed Forward		0 ~ 100% ( : 1%)
				Sign+Pulse, 90 ° 2 Pulse (A + B ), CCW Pulse + CW Pulse
				Line Drive (+5V), Open Collector (+5V, +12V, +24V)
				0 ~ 450 kpps;Line drive,0 200 open collector (pulse/sec)
			Clear ( )	
				Base Mounted
				, Zero-clamp Drive, Soft-start/stop, Speed , Brake , JOG , Auto Tuning, Reverse

!! !!

1)

2)

$$= \frac{\quad}{\quad} \times 100 (\%)$$

3)  $\frac{\text{Inertia CSM/MG}}{\text{Inertia 30}}$  , Power Amp , Inertia 15  
 30 ~ 200Watt , 400 ~ 4,000Watt  
 CSMD/F/S/H/N/X Inertia 10

4) CSDP- / / . CSD- /

Servo Drive Amp DC (300V) , 가  
 ( , I/O DC 24V )

## 2.9 CSM

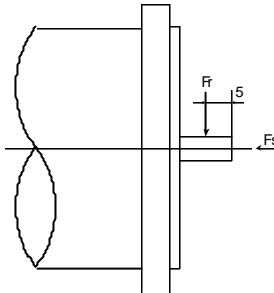
가.

CSMD

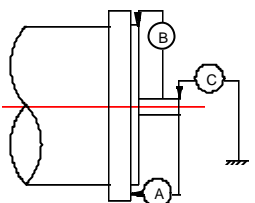
300%

RADIAL, THRUST LOAD

### 2.18 CSM SERVO MOTOR

	RADIAL Fra N(Kgf)	THRUST Fta N(Kgf)	
CSM-A3	78.4 (8)	39.2 (4)	
CSM-A5	78.4 (8)	39.2 (4)	
CSM-01	78.4 (8)	39.2 (4)	
CSM-02	196 (20)	68.6 (7)	
CSM-04	196 (20)	68.6 (7)	
CSM-06	343 (35)	98 (10)	
CSM-08	343 (35)	98 (10)	
CSM-10	343 (35)	98 (10)	

### 2.19

(T. I. R)		
(A)	0.04 (0.0016)	
(B)	0.04 (0.0016)	
RUN OUT(C)	0.02 (0.00079)	

\*T. I. R(Total Indicator Reading)



## 2.10 CSMD/F/S/H

가.

CSMD

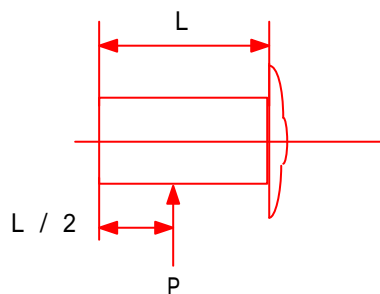
300%

### RADIAL, THRUST LOAD

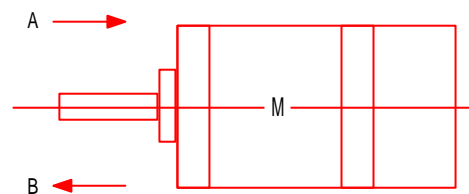
#### 2.20 CSMD/F/S/H SERVO MOTOR

Motor	Radial	Thrust		Radial	Thrust
		Direction A	Direction B		
CSMD08B CSMS10B	686 (70Kgf)	392 (40Kgf)	490 (50Kgf)	392 (40Kgf)	147 (15Kgf)
CSMF04B	980 (100Kgf)	588 (60Kgf)	686 (70Kgf)	490 (50Kgf)	196 (20Kgf)
CSMD10 20B CSMS15 25B CSMH05 15B				784 (80Kgf)	343 (35Kgf)
CSMS30 50B				490 (50Kgf)	196 (20Kgf)
CSMD25 50B CSMH20 50B	1666 (170Kgf)	784 (80Kgf)	980 (100Kgf)	784 (80Kgf)	294 (30Kgf)
CSMF08 15B	1862 (190Kgf)	686 (70Kgf)	686 (70Kgf)	490 (50Kgf)	196 (20Kgf)
CSMF25 45B				784 (80Kgf)	294 (30Kgf)

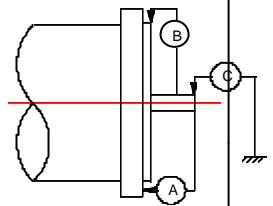
Radial load (P) position



Thrust load direction



#### 2.21

(T.I.R)		
(A)	0.08	
(B)	0.06	
RUN OUT(C)	0.03	

\*T.I.R(Total Indicator Reading)

## 2.11 CSMN/X

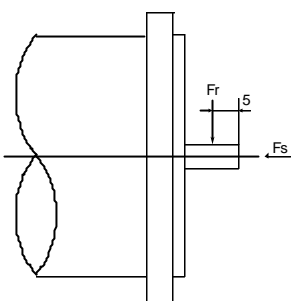
가.

CSMD

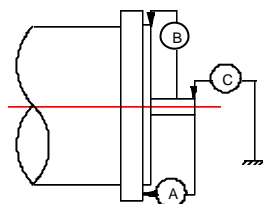
220 300%

### RADIAL, THRUST LOAD

#### 2.22 CSMN/X SERVO MOTOR

	RADIAL Fra N(Kgf)	THRUST Fta N(Kgf)	
CSMX/03B 06B	147 (15Kgf)	49 (5Kgf)	
CSMN/03B 06B CSMX/05B 09B	490 (50Kgf)	98 (10Kgf)	
CSMX/13B	686 (70Kgf)	343 (35Kgf)	
CSMN/12B 30B CSMX/20B 44B	1470 (150Kgf)	490 (50Kgf)	
CSMN/44B 60B	1764 (180Kgf)	588 (60Kgf)	

#### 2.23

(T.I.R)		
(A)	0.04	
(B)	0.04	
RUN OUT(C)	0.02	

\*T.I.R(Total Indicator Reading)

2.12 CSM

가.

CSM

2.1

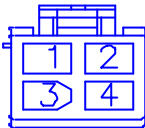
(CCW)



2.1 CSM

(1) CSM,CSMG

가)



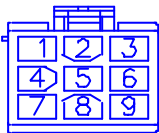
)



)

( INC. )

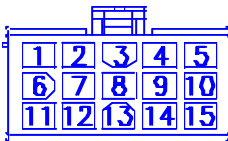
PIN NO.		
1	U	
2	V	
3	W	
4	F.G	
PIN NO.		
1	BK	
2	BK	



)

( INC. /

)



1	EA	1	EA	EA
2	<u>EA</u>	2	<u>EA</u>	<u>EA</u>
3	EB	3	EB	EB
4	<u>EB</u>	4	<u>EB</u>	<u>EB</u>
5	EC	5	EZ	EZ
6	<u>EC</u>	6	<u>EZ</u>	<u>EZ</u>
		7	EU	RX
		8	<u>EU</u>	<u>RX</u>
		9	EV	RST
		10	<u>EV</u>	CG
		11	EW	Bat +
		12	<u>EW</u>	Bat -
7	VCC (5V)	13	VCC (5V)	VCC (5V)
8	GND	14	GND	GND
9	SHIELD	15	SHIELD	SHIELD

## (2) CSM

가)

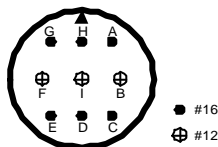
Motor	Brake	Part	Pin									
CSMD-08 ~ CSMD-25 CSMS-10 ~ CSMS-25 CSMH-05 CSMH-15		20-18P DMS 3102A	Pin	G	H	A	F	I	B	E	D	C
				BR	BR		U	V	W	FG	FG	
		20-4P DMS 3102A	Pin	A	B	C	D					
				U	V	W	FG					



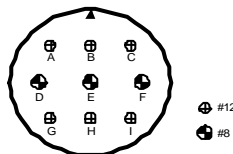
Motor	Brake	Part No	Pin									
CSMD-30 ~ CSMD-50 CSMS-30 ~ CSMS-50 CSMH-20 CSMH-50		24-11P DMS 3102A	Pin	A	B	C	D	E	F	G	H	I
				BR	BR		U	V	W	FG	FG	
		22-22P DMS 3202A	Pin	A	B	C	D					
				U	V	W	FG					



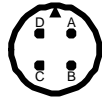
Motor	Brake	Part No	Pin										
CSMF-04 ~ CSMF-15		20-18P DMS 3102A	Pin	G	H	A	F	I	B	E	D	C	
				BR	BR		U	V	W	FG	FG		
			Pin	G	H	A	F	I	B	E	D	C	
							U	V	W	FG	FG		



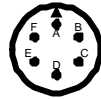
Motor	Brake	Part No	Pin										
CSMF-20 ~ CSMF-45		24-11P DMS 3102A	Pin	A	B	C	D	E	F	G	H	I	
				BR	BR		U	V	W	FG	FG		
			Pin	A	B	C	D	E	F	G	H	I	
							U	V	W	FG	FG		



Motor	Brake	Part No	Pin									
CSMX-02 ~ CSMX-03		14S-2P DMS 3102A	Pin	A	B	C	D					
				U	V	W	FG					
		14S-6P DMS 3102A	Pin	A	B	C	D	E	F			
				U	V	W	BR	BR	FG			

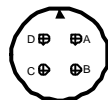


#16

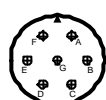


#16

Motor	Brake	Part No	Pin									
CSMN-03 ~ CSMN-09 CSMX-05 ~ CSMX-13		18-10P DMS 3102A	Pin	A	B	C	D					
				U	V	W	FG					
		20-15P DMS 3102A	Pin	A	B	C	D	E	F			
				U	V	W	BR	BR	FG			

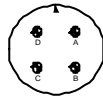


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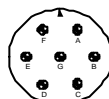


#12

Motor	Brake	Part No	Pin									
CSMN-12 ~ CSMN-30 CSMX-20 ~ CSMX-44		22-22P DMS 3102A	Pin	A	B	C	D					
				U	V	W	FG					
		24-10P DMS 3102A	Pin	A	B	C	D	E	F			
				U	V	W	BR	BR	FG			

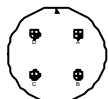


#22

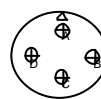


#22

Motor	Brake	Part No	Pin									
CSMN-44 ~ CSMN-60 CSMD-75 ~ CSMD-100		32-17P DMS 3102A	Pin	A	B	C	D					
				U	V	W	FG					
CSMD-150		36-5P DMS 3102A	Pin	A	B	C	D					
				U	V	W	FG					

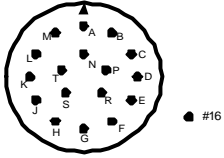


#44



#0

) (DDK )  
(CSDD/F/S/H/N/X)

Connector (DDK)		Receptacle
Receptacle	DMS 3102B20-29P	
Cable Clamp	DMS 305712A	
L Plug	DMS 3108B20-29S	
Straight Plug	DMS 3106B20-29S	
Part NO.	L Plug	CON-SHP17LN
	Straight Plug	CON-SHP17SN

Pin

(CSMD, CSMF, CSMH, CSMS )

CON A. (                      ) (DMS 3108B 20-29S)			CON B. (                      20pin                      ) Pin No.														
			3	4	5	6	7	8	1	20	SH 12	10	13	14	15	16	17
Incremental	(15 )	Pin	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R
			A	A	B	B	Z	Z	GND	+5V	FG	U	U	V	V	W	W
	(10 )	Pin	A	B	C	D	E	F	G	H	J	P	R				
			A	A	B	B	Z	Z	GND	+5V	FG	RX	RX				
(14 )		Pin	A	B	C	D	E	F	G	H	J	K	L	R	T	S	
			A	A	B	B	Z	Z	GND	+5V	FG	RX	RX	CLR	BAT (+)	BAT (-)	

(CSMN, CSMX )

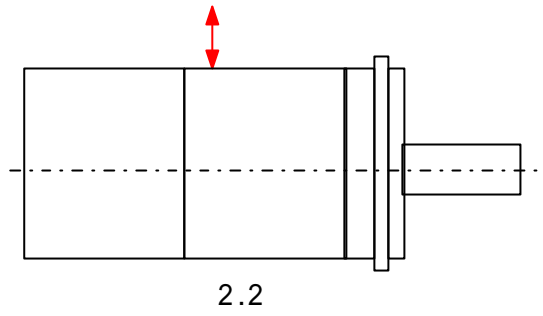
CON A. (                      ) (DMS 3108B 20-29S)			CON B. (                      20pin                      ) Pin No.														
			3	4	5	6	7	8	1	20	SH 12	10	13	14	15	16	17
Inc	(15    )	Pin	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R
			A	A	B	B	Z	Z	GND	+5V	FG	U	U	V	V	W	W
(14    )		Pin	A	B	C	D	E	F	G	H	J	K	L	R			
			A	A	B	B	Z	Z	GND	+5V	FG	RX	RX	CLR	BAT (+)	BAT (-)	

가 10G, 2

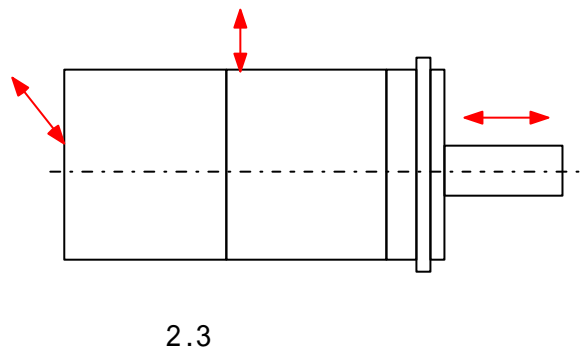
\*

가

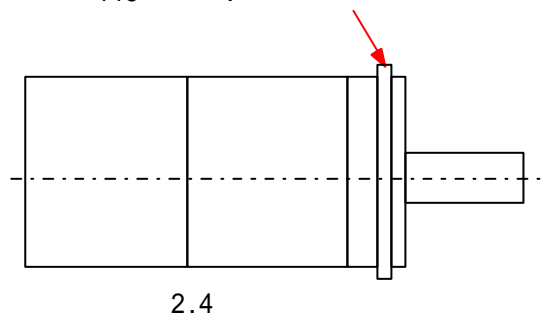
SENSOR가



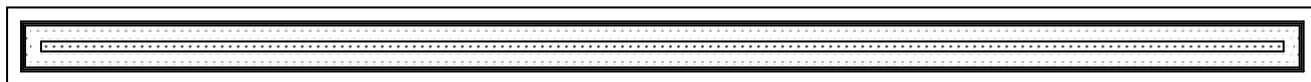
가 2.5G 가



V15



# SERVO DRIVE

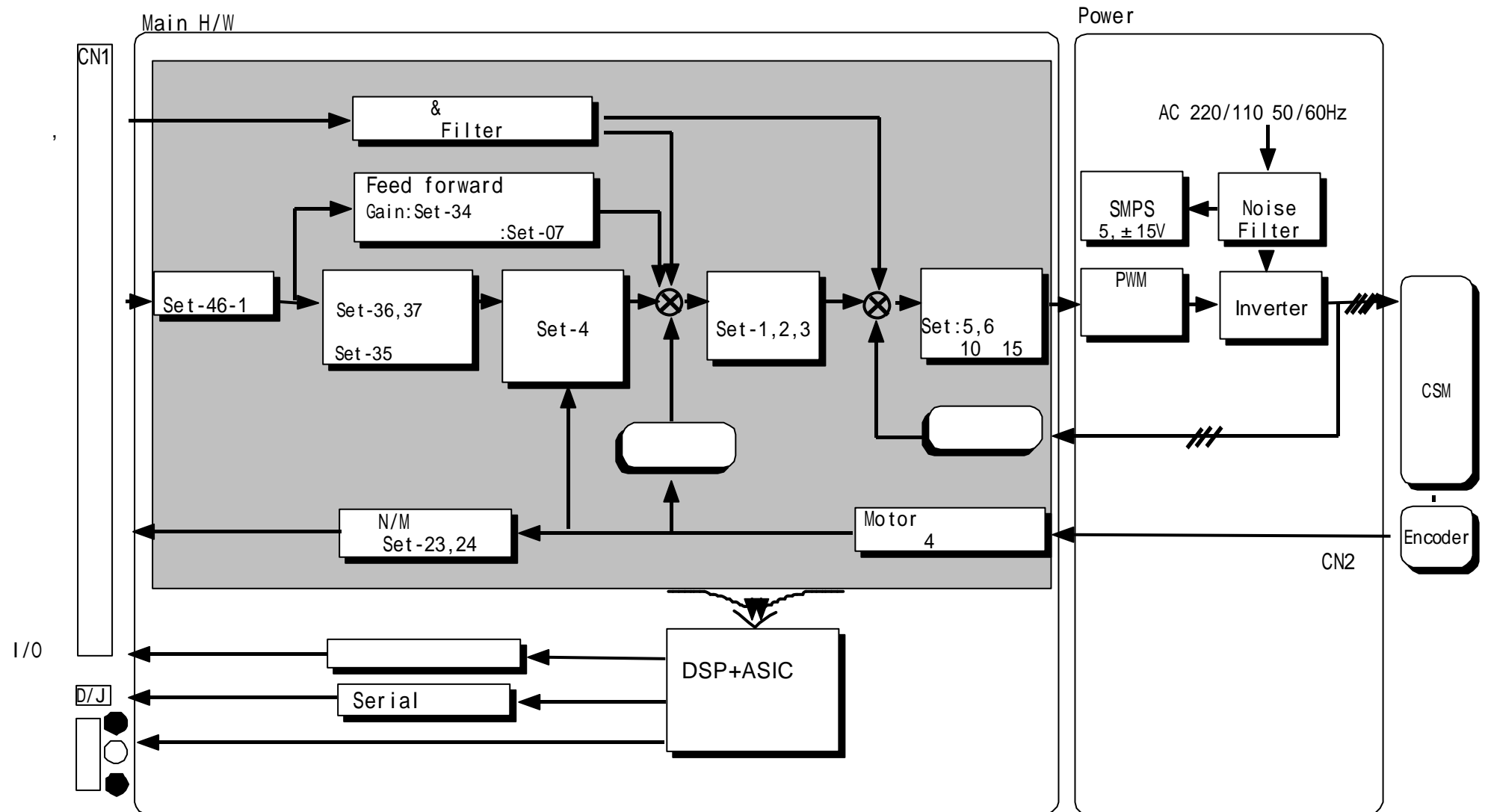


3

MOTOR SERVO DRIVE




### 3.1 SERVO DRIVE



## 3.2 CSD, CSDP

가.

R S T		CSD : 110/220V +10% -15% 50/60Hz CSDP : 3 220V +10% -15% 50/60Hz
U, V, W	MOTOR	U MOTOR , V MOTOR , W MOTOR
P, B		CSD-06 ~ CSD-10 : CSDP-XX :
P, N	DC LINK	CSD-A3 ~ CSD-04 : DC (CSD04 )
	FRAME GROUND	MOTOR /

### . CSD-SERIES CABLE

(CSD )	110V MOTOR	30 100W	200 400W	
	220V MOTOR	30 200W	400 1000W	
R S(CSD)		AWG 20 22	AWG 18-19	0 Lug
U, V, W		AWG 20 22	AWG 18-19	0 Lug
P, B, FG		AWG 20 22	AWG 18-19	0 Lug

### . CSDP SERIES CABLE

CSDP	CSDP-08	CSDP -10	CSDP -15	CSDP -20	CSDP -25	CSDP -35	CSDP -40	CSDP -50	CSDP -60
R, S, T	AWG16 (HIV1.25)	AWG14 (HIV2.0)		AWG12 (HIV3.5)			AWG10 (HIV5.5)		AWG8 (HIV8.0)
	3	5.8	7.6	18.8	24.8	28.8	32.9	37.6	45.6
MOTOR U, V, W	AWG16 (HIV1.25)	AWG14 (HIV2.0)	AWG12 (HIV3.5)		AWG12 (HIV3.5)		AWG10 (HIV5.5)		AWG8 (HIV8.0)
FG	AWG16 (HIV1.25)								
BRAKE	AWG18 (HIV0.9)								

\* HIV:

3.3 CSD, CSDP

가. I/O CONNECTOR

I/O		CONNECTOR	CONNECTOR(Receptacle) Type			
			( )	CASE		CABLE
CN1	CSD	10236-52A2JL	10136-3000VE	10136-52A0-008	DC Max -100mA	AWG 24(MAX20m),26(MAX5m),2 Shield Cable Cable Max16mm
	CSDP	10250-52A2JL	10150-3000VE	10150-52A0-008		
CN2	CSD CSDP	10220-52A2JL	10120-3000VE	10320-52A0-008	DC Max -100mA  :500mA	AWG 24(MAX20m),26(MAX5m) Shield Cable Encoder ,FG AWG 22 AWG 26  20m Cable Max16mm 가 20m

CONNECTOR : 3M

1. OPTION
2. 가 9,000
3. 35m ,GND AWG24 2 ,50m ,GND AWG24 3

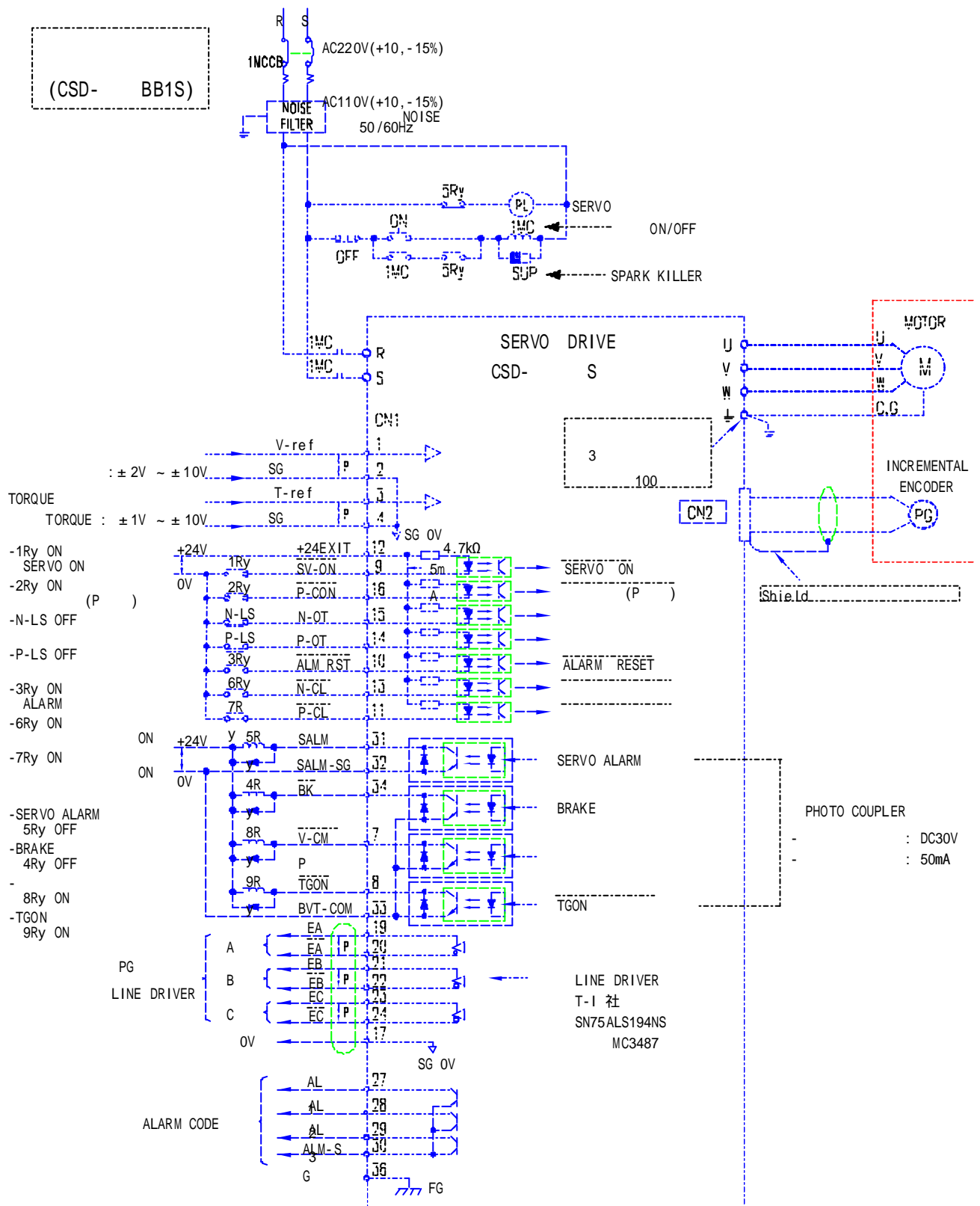
3.4

	( )
(PVC)	-
600V (IV)	60
(HIV)	70

:

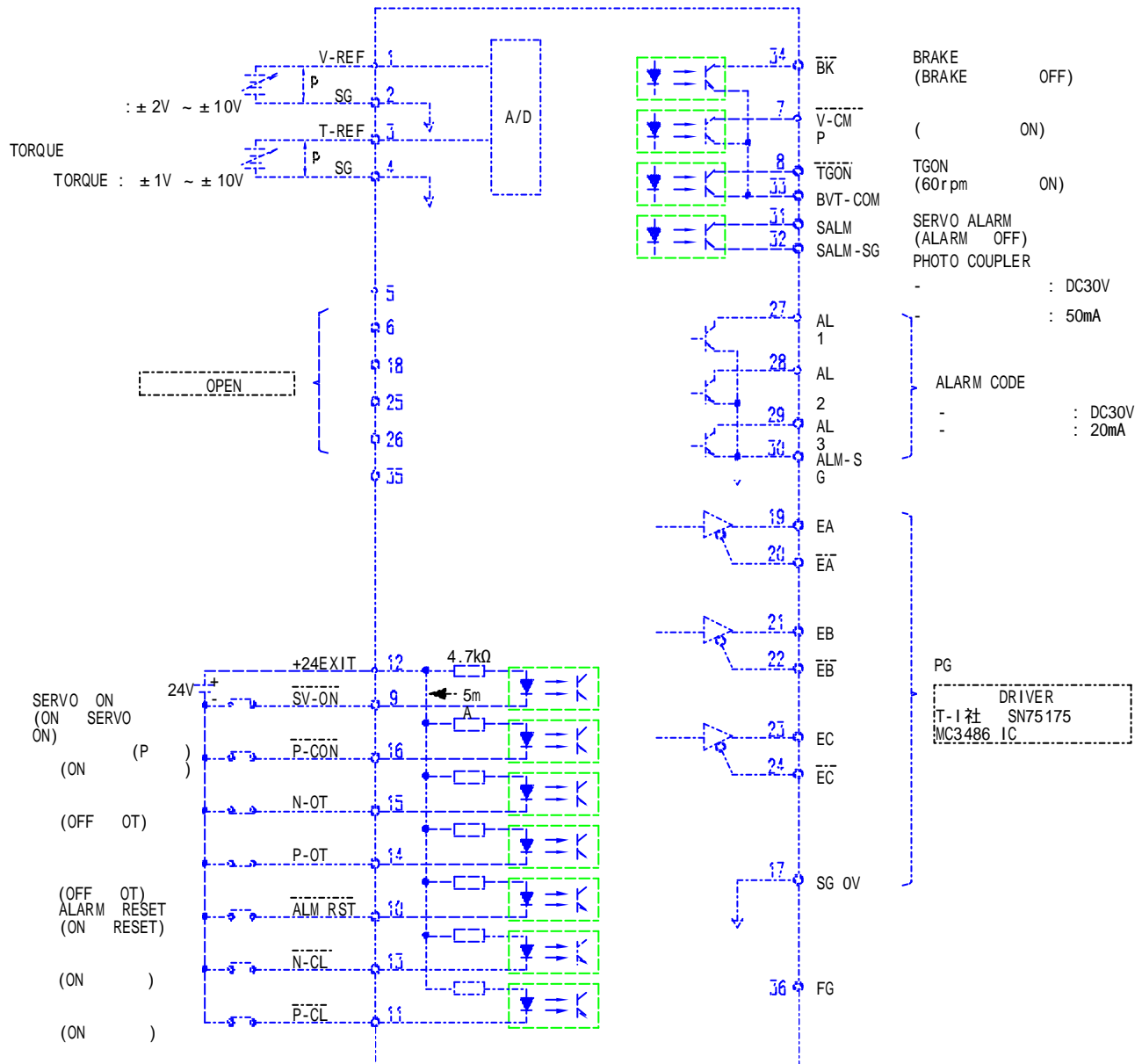
- 1) 600V
- 2) 55 ( )
- 3)

### 3.4 CSD, CSDP 가.

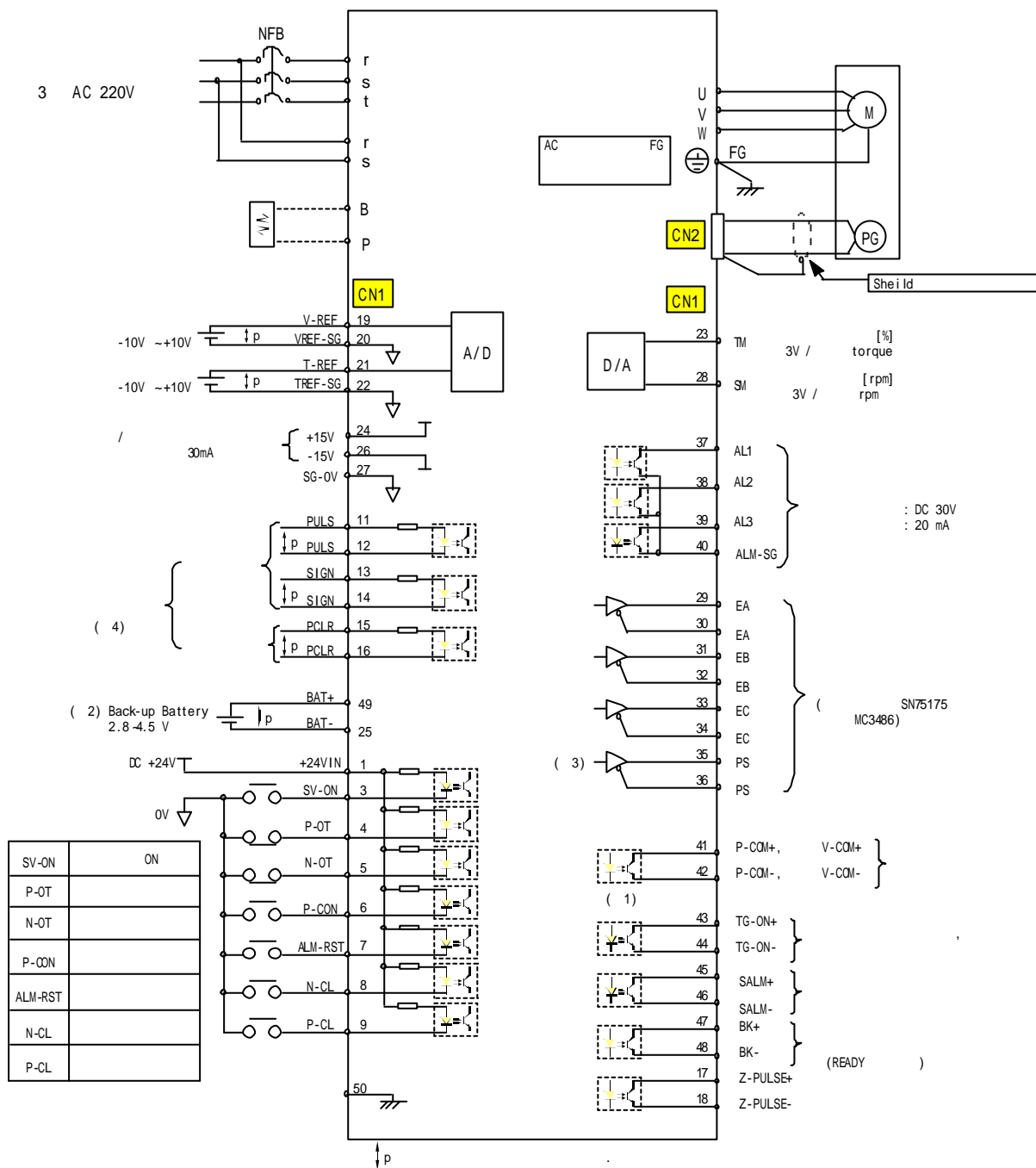




SERVO DRIVE  
CSD- BB1S







- ( ) 1. PHOTO COUPLER DC 30V 50mA
2. ENCODER
3. ENCODER
4. 5V MANUAL
- (가 24V )

■

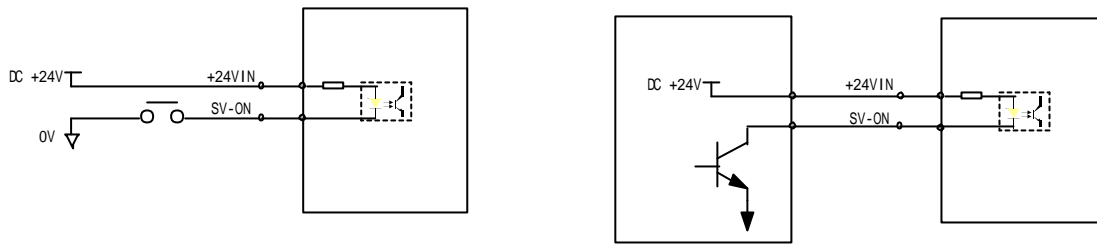


TR	ON	High
TR	OFF	Low



(2)

가) +24V



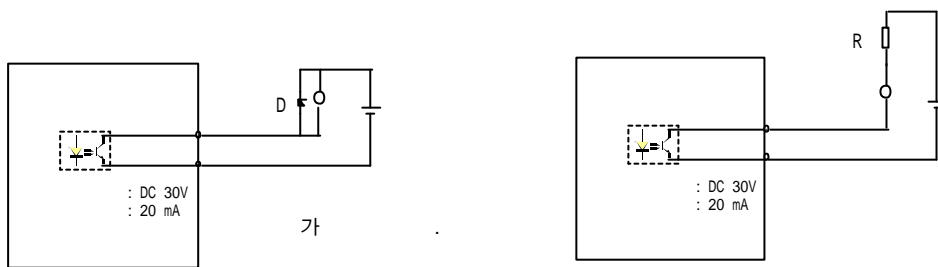
SV-ON, P-CON, ALM-RST, N-CL, P-CL  
P-OT, N-OT

(3)

,

(D)

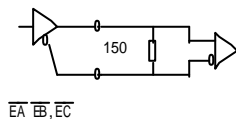
(R)



(4) Encoder

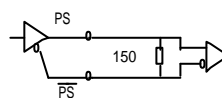
가) Interface

EA, EB, EC MC3486



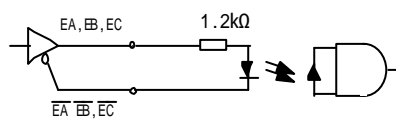
Encoder Pulse

MC3486

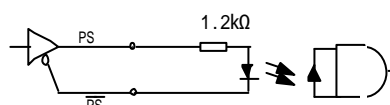


Serial  
data

) Interface



Encoder Pulse



Serial  
data

## . SERVO I/O(CN1)

### (1) CSD SERVO I/O (CN1)

PIN NO	I/O				PIN NO	I/O	
1	V-ref		PULS	PULSE	19	EA	ENCODER A PHASE
2	Vref-SG	GND	$\overline{\text{PULS}}$	PULSE (*)	20	$\overline{\text{EA}}$	ENCODER A* PHASE
3	T-ref		SIGN	SIGN	21	EB	ENCODER B PHASE
4	Tref-SG	GND	$\overline{\text{SIGN}}$	SIGN (*)	22	$\overline{\text{EB}}$	ENCODER B* PHASE
5			PCLR	COUNTER CLEAR	23	EC	ENCODER C PHASE
6			$\overline{\text{PCLR}}$	COUNTER CLEAR(*)	24	$\overline{\text{EC}}$	ENCODER C* PHASE
7	V-CMP		P-CIN		25		
8	TGON		TGON		26		
9	$\overline{\text{SV-ON}}$		SERVO ON/OFF		27	AL1	Alarm Code1
10	$\overline{\text{ARM RST}}$		ALARM RESET		28	AL2	Alarm Code2
11	$\overline{\text{P-CL}}$				29	AL3	Alarm Code3
12	+24EXIT		24V		30	ALM-SG (GND)	Alarm Code Signal ground
13	$\overline{\text{N-CL}}$				31	SALM	SERVO ALARM
14	P-OT				32	SALM-SG	SERVO ALARM GND
15	N-OT				33	BVT- COM	BK, V-CMP, TGON GND
16	$\overline{\text{P-CON}}$				34	BK	BRAKE
17	SG-0V		EABC-SG (GND)		35		
18					36	FG	FRAME GROUND

## (2) CSDP

## SERVO I/O CN1

PIN NO	I/O		PIN NO	I/O	
1	+24EXIT	24V	26	-15V	-15V
2			27	SG-0V	EABC-SG(GND)
3	$\overline{SV-ON}$	SERVO ON/OFF	28	SM	SPEED MONITOR
4	P-0T		29	EA	ENCODER A PHASE
5	N-0T		30	$\overline{EA}$	ENCODER $\overline{A}$ PHASE
6	$\overline{P-CON}$		31	EB	ENCODERB PHASE
7	$\overline{ARM RST}$	ALARM RESET	32	$\overline{EB}$	ENCODER $\overline{B}$ PHASE
8	$\overline{N-CL}$		33	EC	ENCODER C PHASE
9	$\overline{P-CL}$		34	$\overline{EC}$	ENCODER $\overline{C}$ PHASE
10	$\overline{Req}$	Encoder data	35	PS	PS PLUSE
11	PULS	PULSE (+)	36	$\overline{PS}$	$\overline{PS}$ PLUSE
12	$\overline{PULS}$	PULSE (-)	37	AL1	Alarm Code1
13	SIGN	SIGN (+)	38	AL2	Alarm Code2
14	$\overline{SIGN}$	SIGN (-)	39	AL3	Alarm Code3
15	PCLR	COUNTER CLEAR(+)	40	ALM-SG	Alarm Code Signal gruound
16	$\overline{PCLR}$	COUNTER CLEAR(-)	41	P-CIN V-CMP	{ }
17	Z	ENCODER Z Open Collector	42	PCIN-G VCMP-G	GND GND
18	$\overline{Z}$	ENCODER Z Open Collector	43	TGON	TGON
19	V-ref		44	TGON-G	TGON GND
20	Vref-SG	GND	45	SALM	SERVO ALARM
21	T-ref		46	SALM-G	SERVO ALARM GND
22	Tref-SG	GND	47	SRDY	SERVO READY(BRAKE)
23	TM		48	SRDY-G	SERVO READY(BRAKE) GND
24	+15V	+15V	49	BAT+	BATTERY +(3.6V)
25	BAT-	BATTERY -	50	FG	FRAME GROUND

10,25,35,36,49pin

Encoder

(3) CSD SERVO I/O (CN1)

	PIN NO	I/O		
	1(2)	V-ref		· ±2 ±9V ; SET-01 가 Servo Drive ±6V
	3(4)	T-ref		· ±1 ±9V ; SET-06 가 Servo Drive ±3V
	1(2)	PLUS		· 450Kpps:Line Drive, 200Kpps:Open Collector) A,B X 800Kpps
	3(4)	SIGN		· :H , :L
	5(6)	PCLR	CONUTER CLEAR	· 가 COUNTER CLEAR
	11	P-CL		· SET-45-5 가
	13	N-CL		... 3가 가 .(1 , 2 , 3 )
	12	+24EXIT	24V	· 24V CN1-9 11,13 16 50mA
	9	<u>SV-ON</u>	Servo on/off	· SERVO DRIVE DRIVE Servo Drive block Dynamic Brake가 ...SV-ON SET-43-1 가
	16	<u>P-CON</u>		· Servo Drive가 Motor
			Zero-clamp	· Servo Motor
			/	· 2Mode
				· 1 3 1 3 (N-CL P-CL)
	14	P-OT		· MOTION
	15	N-OT		· SET-43-2, 3
	10	<u>ARM-RST</u>	Alarm-Reset	· Servo Drive Alarm Reset

	PIN NO	I/O		
	7(33)	V-CMP		SET-18 ( ) 가 (ON)
		P-CIN		( )가 SET-18
	8(33)	TGON( )		가 SET-16 ON
	34(33)	BRAKE	Brake	brake SET-20, 21, 22 ON
	19 20 21 22 23 24(17)	EA EA* EB EB* EC EC*	Encoder A A* B B* Z C*	Encoder pulse MC3487 line driver line MC3486 ...encoder GND CN1, 17 GND
	27 28 29(30)	ALALM data1 ALARM data2ALARM	SERVO ALARM data (BCD data)	:DC 30 V :20 mA ... Open Collector
	31(32)	SALM	SERVO ALARM	SERVO OFF 6.1(ALARM )

: TGON CLT

SET-43-4

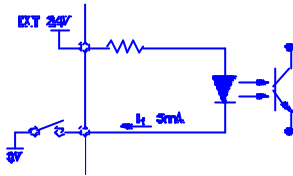
(4) CSDP      SERVO I/O      (CN1)

I/O	CN1 PIN NO		
T-ref	21(22)		·±1 ±9V ; SET-06 가 Servo Drive ±3V
V-ref	19(20)		·±2 ±9V ; SET-01 가 Servo Drive ±6V
PULS PULS	11 (12)		· 450Kpps A, B X 800Kpps
SIGN SIGN	13 (14)		· : H : L
PCLR PCLR	15 (16)	COUNTER CLEAR	· 가 COUNTER CLEAR
REQ	10	Encoder Signal Request *( encoder )	· H가 Encoder 0 5V · seial data pulse ... 가 L Encoder 5V 0
P-CL	9		· SET-45-5 가
N-CL	8		... 3가 가 .(1 , 2 , 3 )
+24EXIT	1,2	24V	· 24V CN1-9 11,13 16 50mA
SV-ON	3	Servo on/off	·SERVO DRIVE DRIVE · Servo Drive block Dynamic Brake가 ...SV-ON SET-43-1 가
P-CON	6		· Servo Drive가 Motor
			·1 3 1 3 (N-CL P-CL)
		Zero-clamp	· Servo Motor
		/	· 2Mode
P-OT	4		· MOTION
N-OT	5		· SET-43-2, 3
ARM-RST	7	Alarm-Reset	·Servo Drive Alarm Reset
BAT+	49	Battery +	· Encoder backup Battery 2.8 4.5V
BAT-	25	Battery -	...Servo Drive

	I/O	CN1 PIN NO		
	V-CMP	7(33)		· ( ) 가 SET-18 (ON)
	P-CIN	7(33)		· ( )가 SET-18
	TGON <sub>( )</sub>	43(44)		· 가 SET-16 ON
	CLT <sub>( )</sub>			·N-CL, P-CL ON 가 SET-10, SET-11 SET-12 SET-13 ON ·N-CL, P-CL OFF SET-12 SET-13 (ON)
	BRAKE	34(33)	Brake	· brake SET-20, 21, 22 ON
	EA EA* EB EB* EC EC*	29 30 31 32 33 34	Encoder A, A* B, B* Z, Z*	· Encoder pulse MC3487 line driver line MC3486 ...encoder GND CN1, 17 GND
	PS PS*	36 35	Encoder PS PS*	·PS serial data PS pulse MC3487 line driver line MC3486 ...encoder GND CN1, 17 GND
	EZopen EZopen*		ENCODE Z, Z* Open Collector	·ENCODE Z Open Collector
	ALALM data1 data2 data3	37 38 39	SERVO ALARM data (BCD data)	· :DC 30 V :20 mA ... Open Collector
	SALM	45(46)	Servo Alarm	·Servo OFF 6.1( )
	SRDY	47(48)	Servo Ready	·Servo On 가 Servo Alarm
	TM	23		· ±3V/
	SM	28		· ±6V/
	+15V -15V	24 26		·Servo Drive 10mA

## . SERVO DRIVE

, servo ON/Off, ,  
Encoder data ,Alarm .  
24V 가 3.1 .



### 3.1 SERVO

24V  
DC24  $\pm 1V$  ,50mA ( 5mA/CHNEL )

		Pin
CSD	24V	12
		9,10,11,13,14,15,16
CSDP	24V	1,2
		3,4,5,6,7,8,9,10

(1) P-CON( )

SET-44-5, SET-45-5 , zero clamp ,  
/ ,

가)  
Servo drive open loop drift  
loop PI P servo drift

Set-44-5 0  
P-CON:off(high) PI /P-CON:On(Low) P

) zero clamp  
가 . servo- 70%

) /  
Set-44-5:3

) (SET-45-5)

(2) P-CON( )

SET-44-5, SET-45-5 , zero clamp , /  
 ,



가)

Servo drive open loop drift  
loop PI P servo drift

Set-44-5 0

P-CON:off (high) PI /P-CON:On(Low) P  
) (SET-45-5)

(3) P-OT,N-OT( , )

( ,

24V

GND

CN1-4,5PIN(CSDD/S/F/N/X/C/Q),CN1-14,15(CSD)

SET-43-2, 3

S/W

SET-44-1, 2, 3

3가

가)

.(SET-44-1)

) DB

Dynamic brake

, Dynamic brake

가

.(SET-44-2)

)

SET-14, 15

0

.(SET-44-3)

(4) Servo ON( S-ON )

가

Servo Drive

가

가

( Servo off ),

off

Dynamic brake

SET-44-1,2

(5) P-CL, N-CL

SET-45-5

가) ,

( )

SET-12, SET-13

100%

(300%)

)

(1 3 )

1

3

(6) Alarm reset( ALM RST )

0      Servo alarm      Reset      ,      Alarm      0

SV\_ON      ON      ALM\_RST      .      ALM\_RST

SV\_ON      OFF      .

(7) Encoder Data

Servo Drive Low가 Encoder Data( + ) PS,PS  
Serial Data .  
Serial data Servo Off .  
Encoder가 Motor Drive 가 .

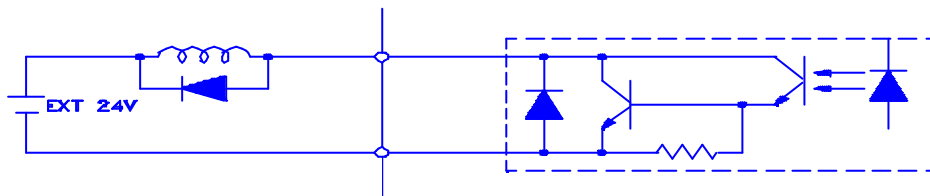
(8) Battery

Encoder                  Battery                  Pin                  . . . SERVO DRIVE

(1)

TGON, Brake, Servo Alarm, & , Alarm data, Z (open collector)  
 , Servo ready, Encoder . & tra-  
 nsistor .

가 (V Max) 30V  
(Io) 50 mA  
alarm data 1,2,3(Ip) 20mA



### 3.2 SERVO DRIVE

transistor가 photo coupler ,  
가 . 24V .  
relay flywheel

### 3.4

Gnd가

### 가) Servo Drive Alarm

Servo Drive가	가	Alarm	Drive	Motor
Alarm Data	.			
Alarm data		Alarm Reset	Servo On	

) Brake  
Servo Drive가 Alarm                      Servo Off                      Brake                      가                      .  
Set-20,21,22(CSD Series)/Set-29,30,31                      .

)                      (                      )                      ,                      .  
                    Set-18                      Pulse                      rpm                      .  
                    가                      .

) TGON  
                    : SET-16  
                    가                      TGON                      ON                      .  
ZERO                      Level                      .  
1RPM                      5000RPM                      .  
                    .

) Servo Ready  
Servo Drive가                      가                      .  
Brake                      .

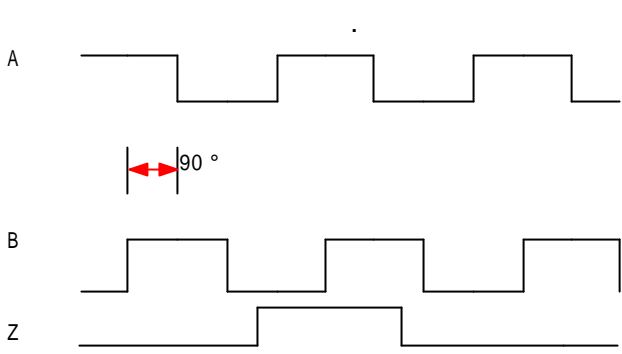
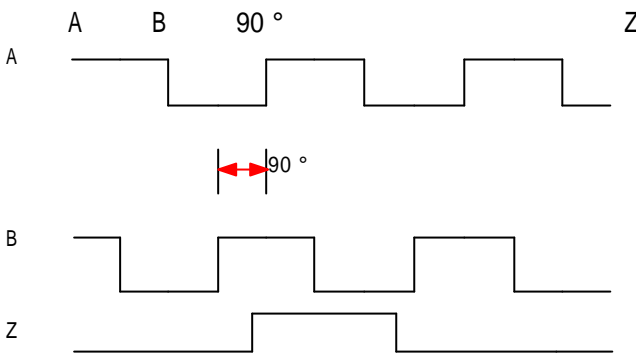
) Z    Open Collector  
Encoder Z                      Pin                      .

(2) Encoder

Encoder	Incremental	Incremental Encoder
A, -A, B, -B, Z, -Z	U, -U, V, -V, W, -W	Encoder A, -A,
B, -B, Z, -Z	U, -U, V, -V, W, -W	Encoder

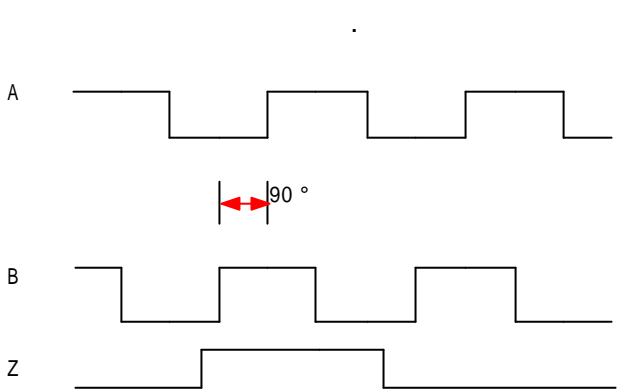
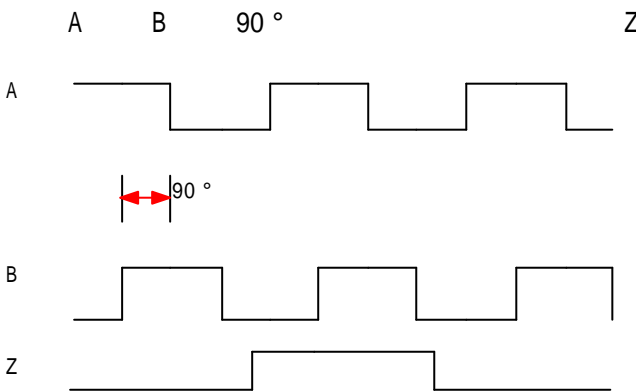
Line drive

Linedrive



3.3 90 °

A,B,Z (CSD-SERIES)



3.4 90 °

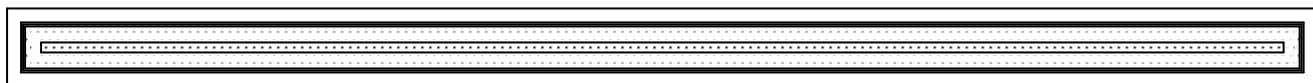
A,B,Z (CSDP SERIES)

### 3.5

가.

3.15 (CN2)

PIN NO.	CSD		CSP				
						/	
1	EOV	EOV	EOV	EOV	EOV	ENCODER 5V	GROUND
2	-	-	-	-			
3	EA	EA	EA	EA	EA	ENCODER A	
4	<u>EA</u>	<u>EA</u>	<u>EA</u>	<u>EA</u>	<u>EA</u>	ENCODER <u>A</u>	
5	EB	EB	EB	EB	EB	ENCODER B	
6	<u>EB</u>	<u>EB</u>	<u>EB</u>	<u>EB</u>	<u>EB</u>	ENCODER <u>B</u>	
7	EZ	EZ	EZ	EZ	EZ	ENCODER Z	
8	<u>EZ</u>	<u>EZ</u>	<u>EZ</u>	<u>EZ</u>	<u>EZ</u>	ENCODER <u>Z</u>	
9							
10	-	EU	RX	EU	RX	ENCODER U	Encoder RX
11	-		-			-	
12	F.G	F.G	F.G	F.G	F.G	FRAME GROUND	
13	-	<u>EU</u>	<u>RX</u>	<u>EU</u>	<u>RX</u>	ENCODER <u>U</u>	Encoder <u>RX</u>
14	-	EV		EV	( RST )	ENCODER V	Encoder Reset
15	-	<u>EV</u>		<u>EV</u>	-	ENCODER <u>V</u>	-
16	-	EW		EW	BP	ENCODER W	BATTERY+
17	-	<u>EW</u>		<u>EW</u>	BN	ENCODER <u>W</u>	BATTERY-
18	-	-					
19	-	-					
20	+5V					Encoder 5V	

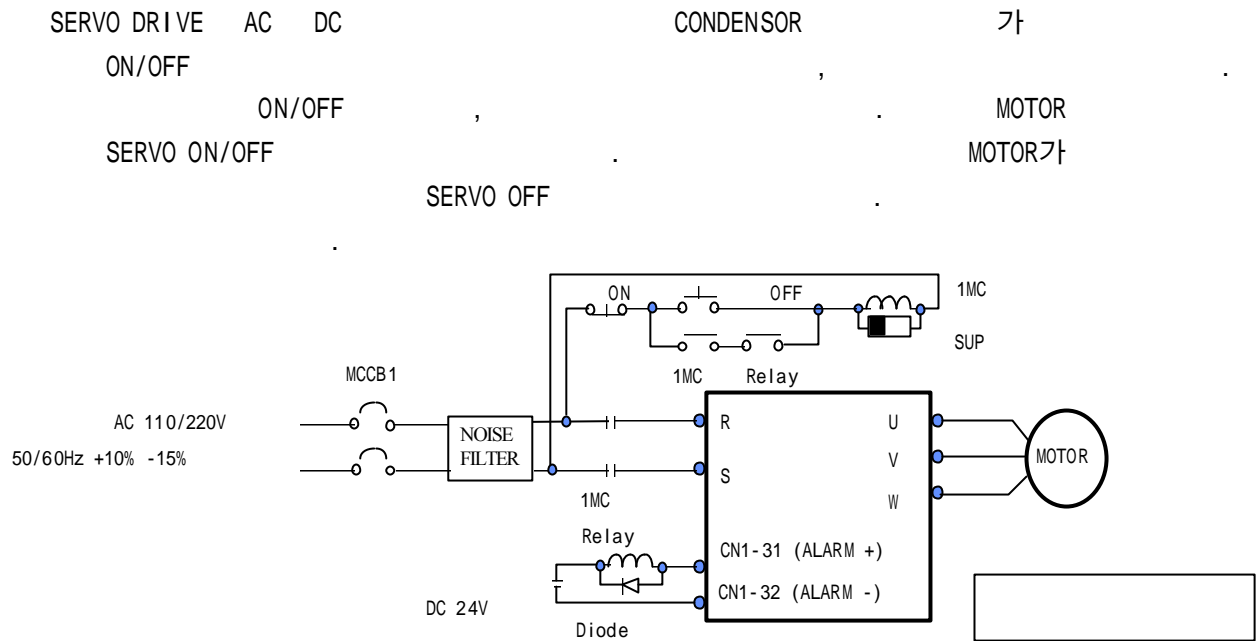


4

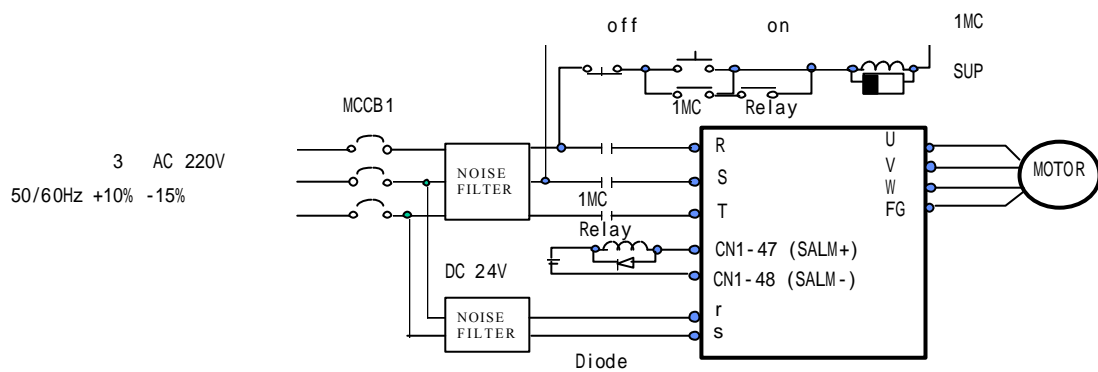
CSD SERVO DRIVE ( , )



## 4.1.



4.1 CSD



4.2 CSDP

- 1) SERVO ALARM
- 2) ALARM 7
- 3) ALARM 2 (SERVO DRIVE )
- 4) POWER FAIL
- 5) SERVO DRIVE POWER 0V가
- 6) CSDP  
SERVO ON 2 가





## 4.2.

SERVO DRIVE  
20(CSDD/S/F-Series)

CN1-1 2(CSD-Series), CN1-19

가

TURN 가

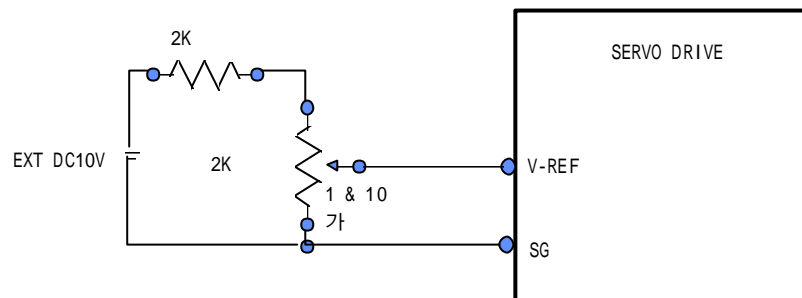
가

PORT

가 (10TURN)  
(1TURN)

가.

가



4.4

가

가

OPEN

SERVO DRIVE MOTOR

$\pm 6V$

30%

$\pm 6V$

9V

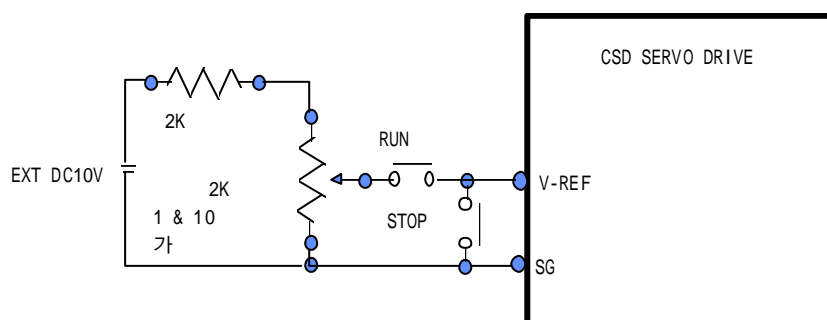
(0V)

가

0V

0V가

0V



4.5

Servo Drive

± 6V가

DIGITAL JOG

SET-01

/ (RPM/V)

$$=3000\text{Rpm}/6=500$$

)

가 10V

3000rpm

SET-01

1V가

$$\text{Set-01} = 3000/10=300$$

SET-01 = 10V

1000r/min

100

SET-01 = 6V

3000r/min

500

1) 가

가

Dijital Jog

2)

가

3) 24V Gnd

4) Set-01 , rpm

5) 가 0

:Set-18

가

) 가 100rpm

가 2000rpm

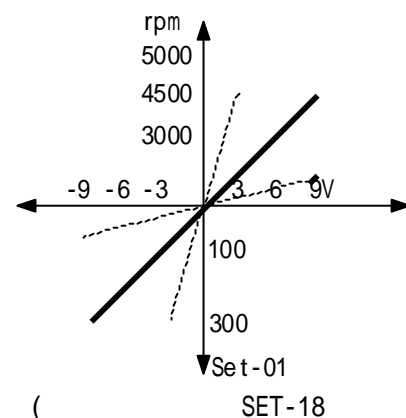
가 1900 2100rpm

가 0 100rpm

10rpm(pulse)

) 가( SET-18)

가 ( VCIN OFF )



· Zero Calmp ( 0V )

가 가 (Offset )

· Zero Clamp

SET-44-5 4 SET-17

가

SERVO 가

·

CN2 P-CON ON Zero Clamp

P-Con SET-44-5 0 P-CON P PI

Set-44-5 4 P-CON 가 Zero Clamp ON/OFF

·

SET-44-1 SET-44-5

SET-44-1	1	P-CON High:Zero Clamp off P-CON Low:Zero Clamp On	P-CON On/off Zero Clamp
SET-44-5	4		Drive가 Zero Clamp

· ZERO Level TGON

: SET-16

ZERO Level

1RPM 5000RPM

가 TGON ON

20RPM

·

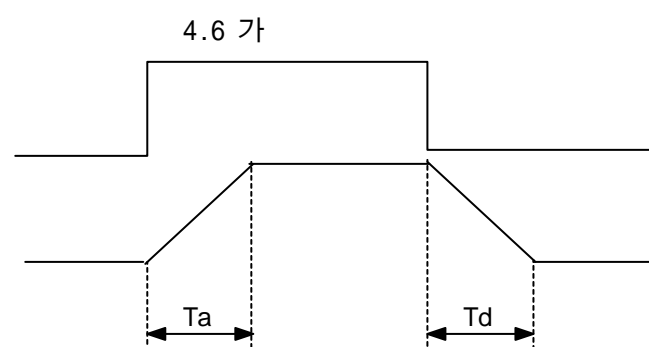
·

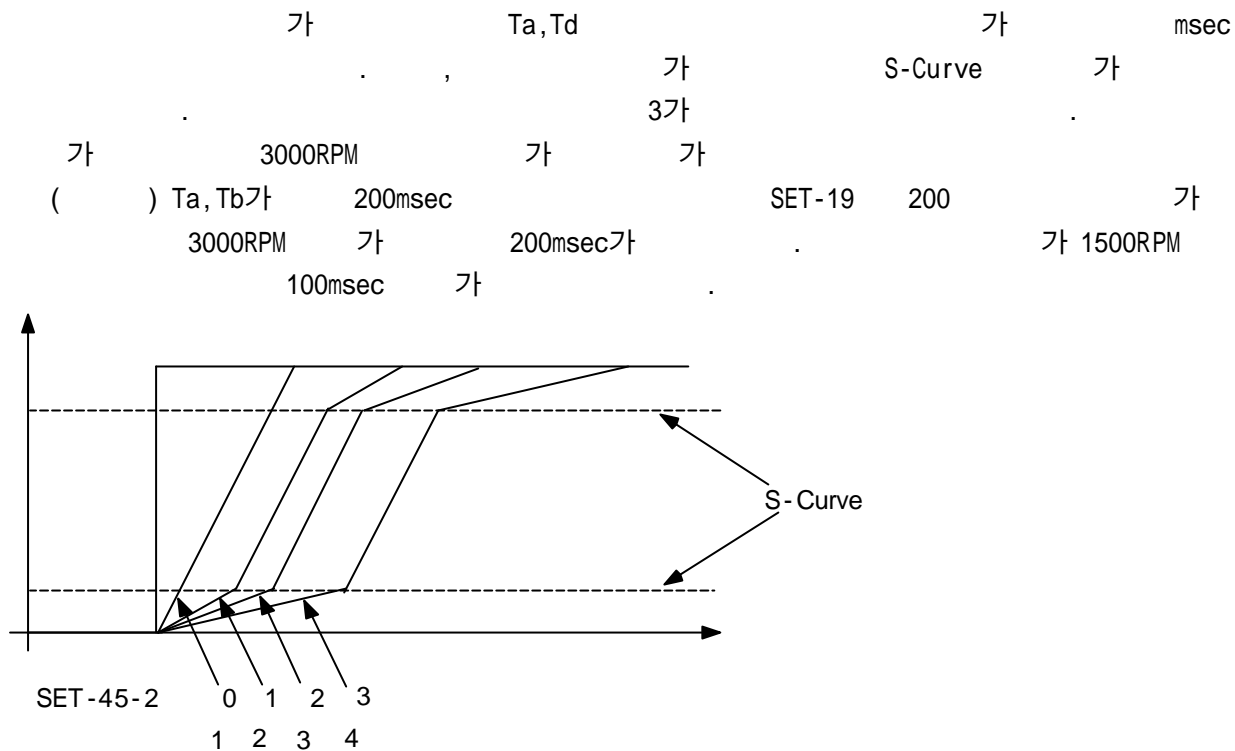
가

Step Drive

S 가

( )





#### 4.7 S-CURVE 가

CSD-Series : 가 = ( SET-19 )

S-Curve ( SET-45-2 )

S-Curve [RPM] ( SET-29 )

CSDP-Series : 가 ( SET-19 ), ( SET-20 )

S-Curve ( SET-45-2 )

S-Curve [RPM] ( SET-21 )

S-Curve 가 가 가

가 , Set-19,20 0

Servo Drive ( 3가 )

(CN2/P-CL,N-CL,P-Con)

1) SET-45-5 1

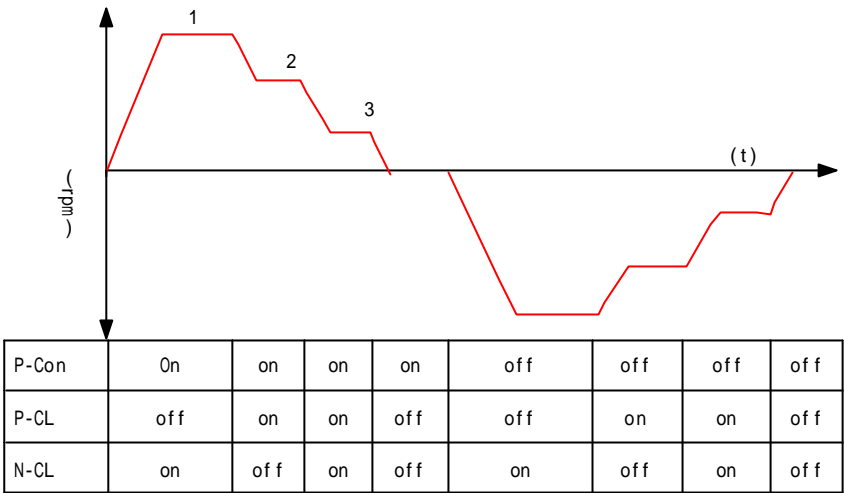
2) 1,2,3 : SET-26, SET-27, SET-28  
rpm

3) CN2 P-CL,N-CL,P-CON

	P-CL	N-CL
1	OFF	ON
2	ON	OFF
3	ON	ON
	OFF	OFF

	P-CON
	OFF
	ON

On:Low/Off:High



6.2

4.8

P/PI

가

# . Digital Jog

Digital Jog

Jog (rpm)  
(CN2)

SET-25 rpm

Servo Drive

Jog Key

Jog Key Step 가  
Jog 0

가

Servo drive open loop drift  
loop PI P servo drift

Set-44-5 0  
P-CON: off (high) PI / P-CON: On (Low) P

# . Encoder

Encoder

. (CSD 가 )

SET-44 4 LED 0  
SET-44 4 LED 1

4.3

가

SET-44-5 2

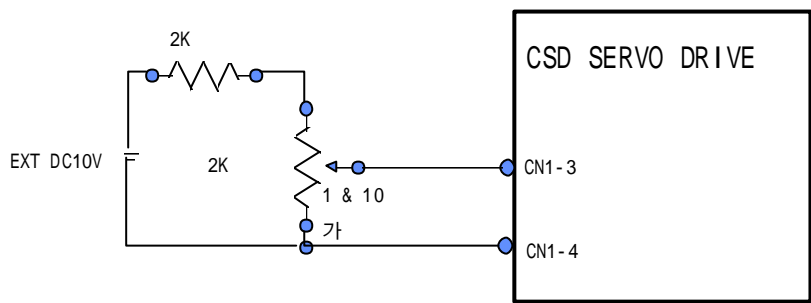
CN1 11,2: 가

CN1 3, 4 . 3V가

가 , SET-5 가

가 (10Turn)

가 (1Turn) 가



4.8 가

- 1) OPEN
- 2) MOTOR ± 3V
- 3) 300% ± 3V
- 4) ± 9V
- (0V)
- 가 0V
- Gnd 0V
- 0V가

가

Set-05					가	0	100(%/3V)
)							
100	3V	100%,6V	200%,9V	300%			
50	3V	50%,6V	100%,9V	150%			
150%							
					Motor		

Set-10 :

Set-11 : ;

0% . (100%= , 300%= )  
)  
270 가 270%  
130 가 130%

Mode , , .

Set-12 : (P-CL Low(0V) .)

Set-13 : (N-CL Low(0V) .)

0% . (100%= , 300%= )  
)  
270 가 270%  
130 가 130%

Mode , ,  
P-CL,N-CL High

Set-14 :

Set-15 :

Motor

0% . (100%= , 300%= )  
)  
270 가 270%  
130 가 130%

Mode , ,  
Brake



## 4.4 +

+

Set44-5 : 3

CN1 1,2 : 가

CN1 3,4 : 가

CN1 P-CON On/Off

1) P-Con Off(High)

Cn1-3,4 Tref Cn1 1,2 Vref ( P( ) )  
Vref Cn1-1,2 Vref (+)

2) P-Con On(Low)

Cn1-1,2 (Vref) PI  
Tref

1) + , 3V가

300%

$\pm 3V$

$\pm 9V$

2) 가

Servo Drive

Turn

가 가 (10Turn) , 가

(1Turn)

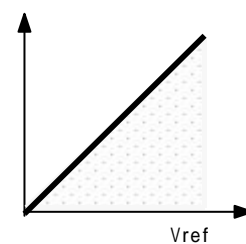
3) (0V)

가 0V 0V가

Gnd

0V

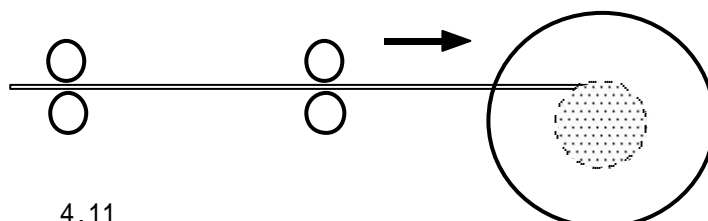
4) 가



1)

)

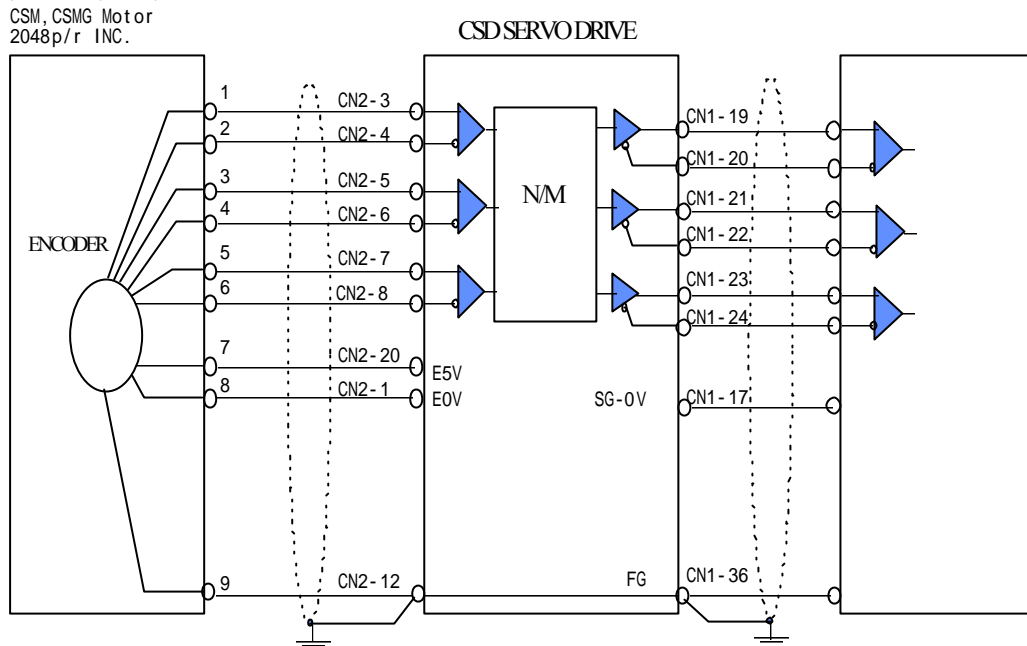
2) , , ( )



4.11

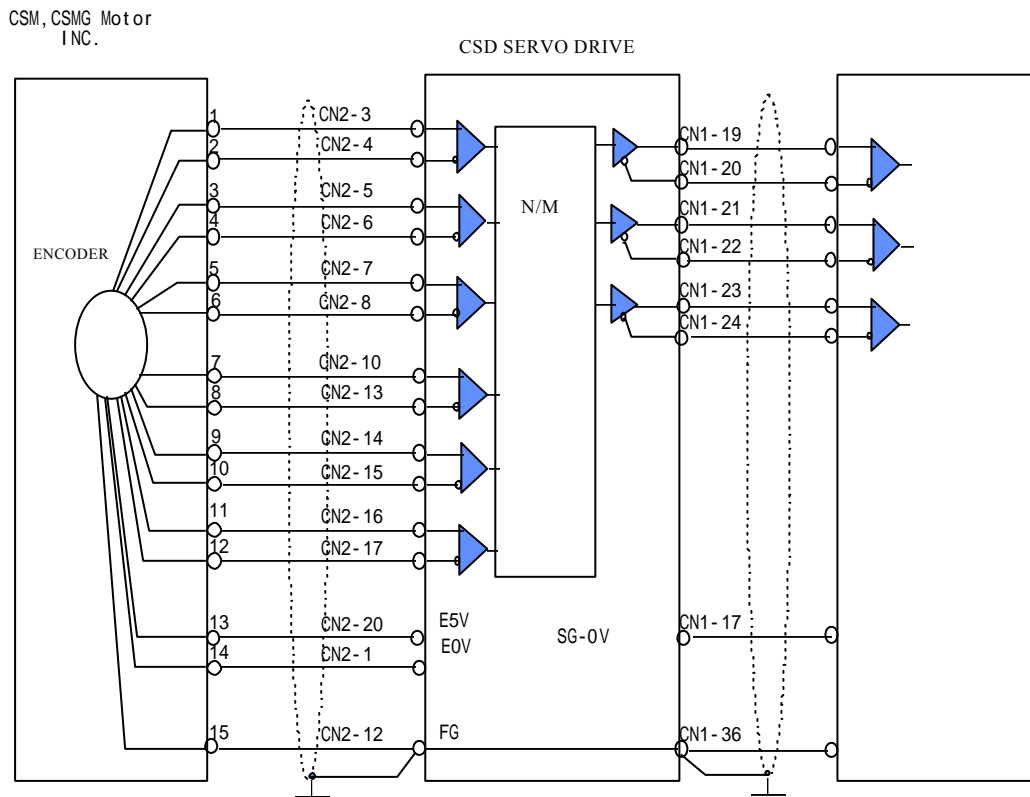
## . CSD (MOTOR & DRIVE)

### 1). INCREMENTAL ENCODER



3.8 CSD CSM,CSMG MOTOR ENCODER

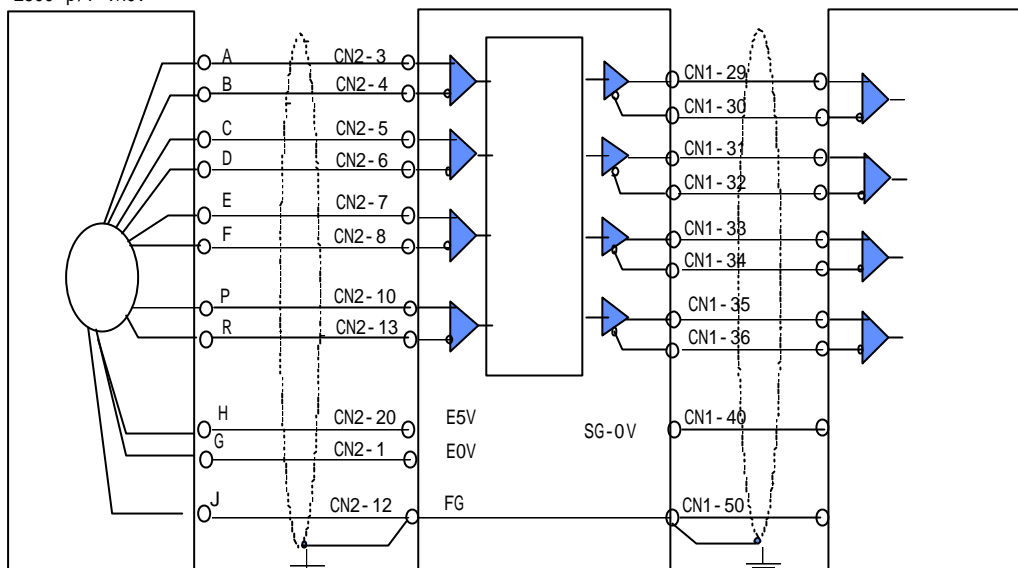
### 2). INCREMENTAL ENCODER



3.9 INCREMENTAL ENCODER MOTOR15

## . CSDP (MOTOR & DRIVE)

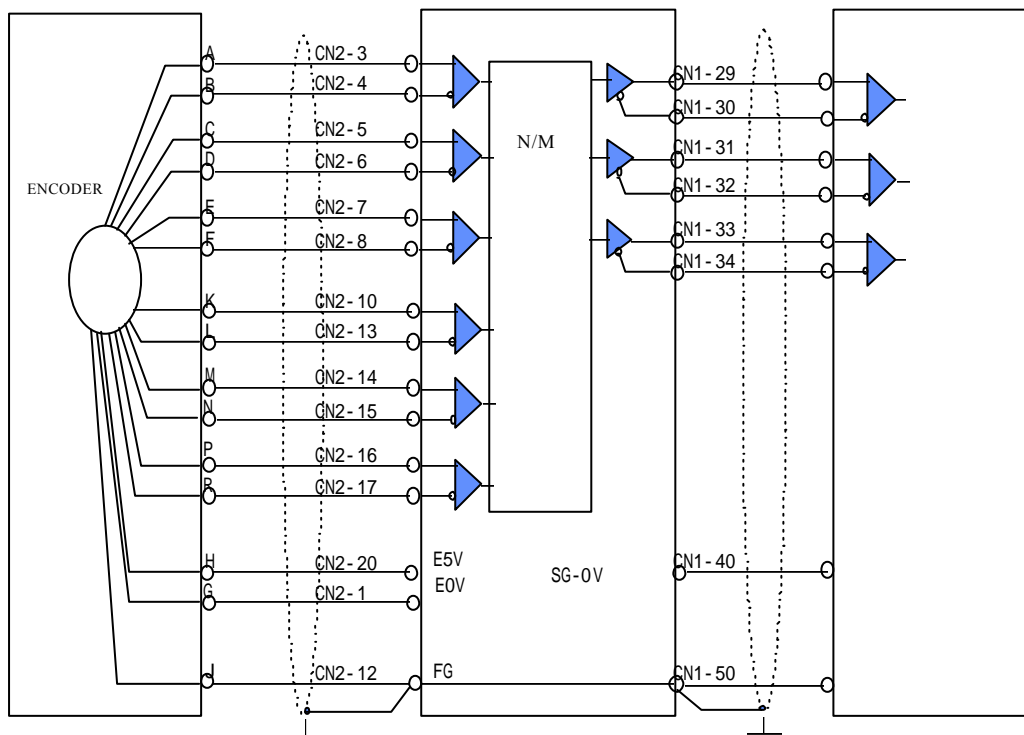
CSMD,CSMF,CSDH,CSMS Motor  
2500 p/r INC.



3.10 CSDP CSMD,CSMF,CSMH 2500 p/r ENCODER

CSMN,CSMX Motor  
6000p/r INC.

CSD SERVO DRIVE

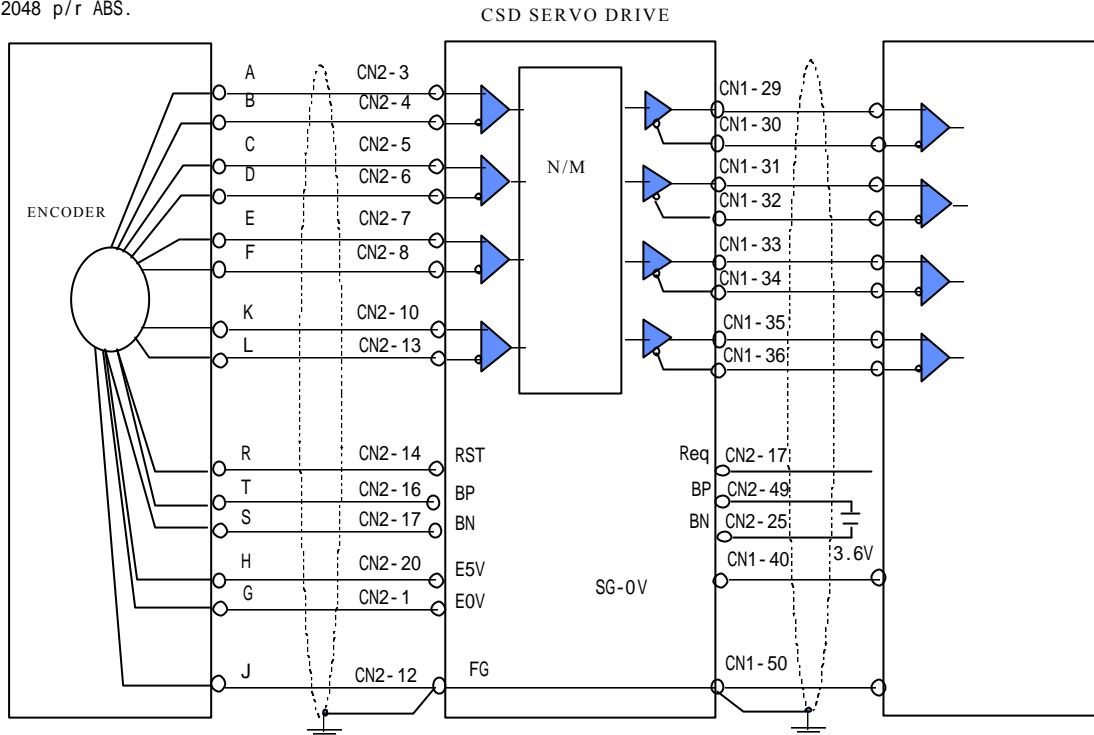


2). INCREMENTAL ENCODER

3.11 CSDP 5000 p/r ,6000 p/r Encoder

### 3). CSDP ENCODER

CSMD,CSMF,CSMH,CSDS Motor  
2048 p/r ABS.



3.12 CSMD,CSMF,CSMH,CSMS

ENCODER

MOTOR

## 4.5

CSD-Series CN1- 1(2), 3(4), CLEAR 5(6)  
 CSDP-Series 11(12), 13(14), CLEAR 15(16)  
 (+, ACTIVE H), (-, ACTIVE L)  
 SET-46-1  
 . ( : . )

가.

가 MODE . 4.2 ( :90 ° 2 A/B + ,90 ° 2 A/B,CCW +CW 3 (SET-46-1)

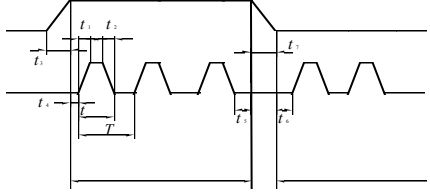
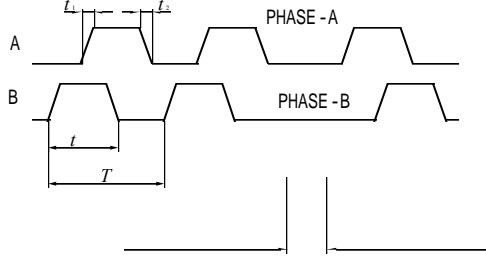
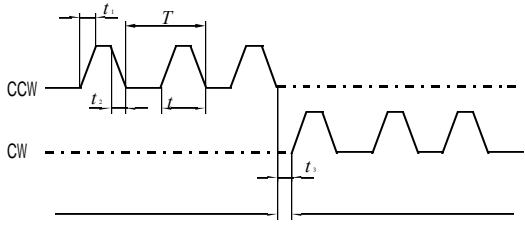
				SET-46 LED NO 1	
					0
	+				8
	A			*1	2
	B			*2	4
				*4	6
					1
	+				9
	A			1	3
	B			2	5
				4	7

4.2

### 4.3

).

( .)

<p>+</p>	 <p> <math>t_1, t_2 ? 0.1 ? s</math>      <math>? ? 1.1 ? s</math>  <math>t_3, t_7 ? 0.1 ? s</math>  <math>t_4, t_5, t_6 ? 3 ? s</math> </p>	<p>H : + reference L : - reference</p> <p>:450Kpps</p>
<p>90 ° 2 (A,B)</p>	 <p> <math>t_1, t_2 ? 0.1 ? s</math>      <math>? ? 1.1 ? s</math>  <math>\frac{?}{T} ? 100 ? 50 \%</math> </p>	<p>1 :450Kpps 2 :400Kpps 4 :200Kpps</p>
<p>CCW + CW</p>	 <p> <math>t_1, t_2 ? 0.1 ? s</math>      <math>? ? 1.1 ? s</math>  <math>t_3 ? 3 ? s</math>      <math>\frac{?}{T} ? 100 ? 50 \%</math> </p>	<p>:450Kpps</p>

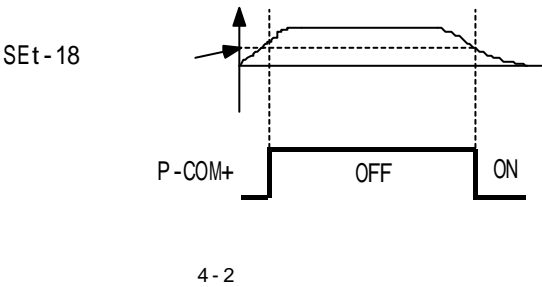
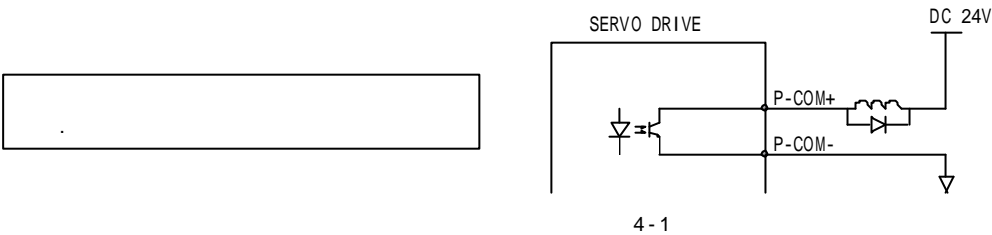
### 4.3

Counter Clear

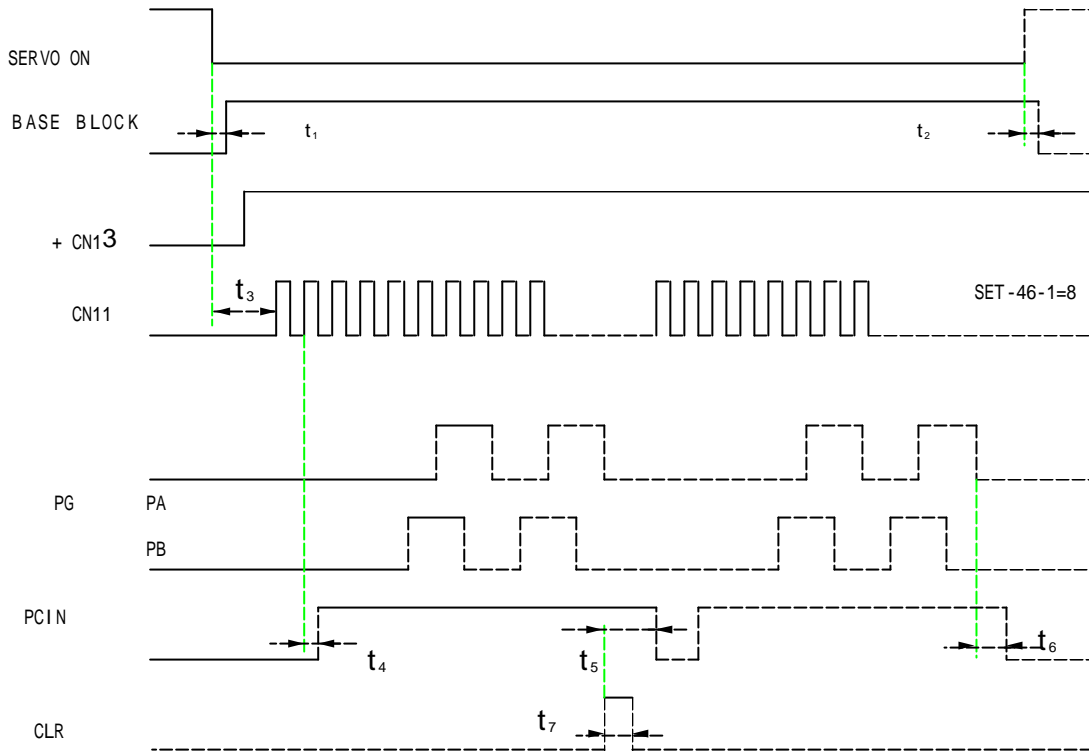
Clear (CLR) 가 ON 0가 LOOP  
CLR OFF 0

(PCIN)

가 SET-18  
가  
)  
( PCIN) OFF 가 SET-18)



## . I/O



$t_1$  30ms  
 $t_2$  6ms  
 $t_3$  40ms  
 $t_4, t_5, t_6$  2ms  
 $t_7$  20us

### 4.14 I/O



: =1:3( ) 3 가  
 : =5:1( ) 1/5 .  
 Servo Drive .  
 1  
 1

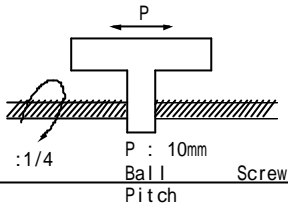
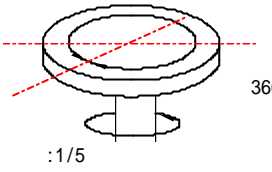
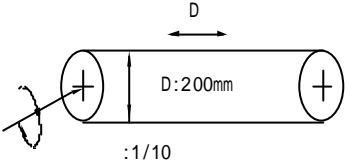
) CSM -SERIES 1 2048 가 1 가 1000Pulse  
 가 1000  
 가 1 2048puse 1puse Servo  
 Drive 2.048 pulse  
 SET - 36 1 2048  
 SET - 37 1 1000  
 SET - 37 1000/8196  
 Servo Drive

Servo Drive Motor 1 (2048) 4  
 8196 (Set - 36:2048, Set - 37:8192 )

ball screw  
 B/A(SET - 36/SET - 37) ( 1 / 1 ) .

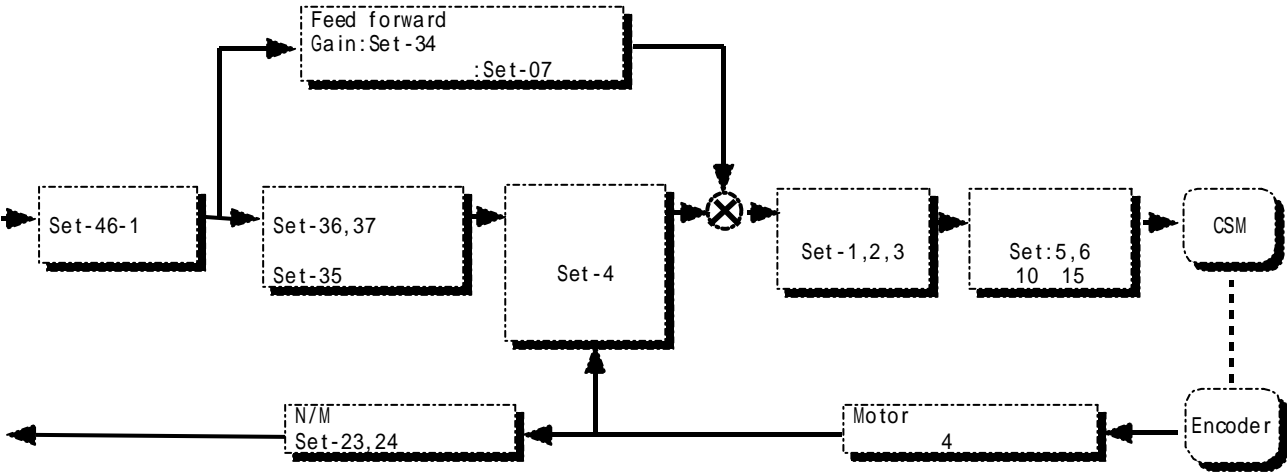
( 1) ball screw pitch가 10mm 10μm .  
 1 10mm 1 10μm 1  
 10mm/10μm = 1000 SET - 36 2048, SET - 37 1000  
 . (CSM 2048P/R )

( 2) 1 가  
 R=4(4:1 ) , R=4 1  
 10mm/4=2.5mm 1 2.5mm/10μm  
 = 250 SET - 36 2048, SET - 37 250

Ball Screw	Pitch (mm) 0.002mm	 <p>P : 10mm Ball Pitch</p>	$1$ $=10\text{mm}/0.002\text{mm}=5000$ $=A/B=2048 \times 4/5000$	Set- 36=8192 Set- 37=5000
	$360^\circ$ $0.1^\circ$	 <p><math>360^\circ</math></p>	$1$ $=360^\circ/0.1^\circ \approx 3600$ $=A/B=2048 \times 5/3600$	Set- 36=10240 Set- 37=3600
	D 0.05mm	 <p>D:200mm</p>	$1$ $=3.14 \times 200/0.05=12560$ $=A/B=2048 \times 10/12560$	Set- 36=20480 Set- 37=12560

4.4 1

$B=[(\text{SET}-36) \text{ CSM-Motor}]$   
 $A=[(\text{SET}-37) 1]$   
A, B 65355, SET-37 SET-36



4.15

## . Smoothing

가  
가  
가  
가 ( ) (10 )  
SET-35 가

## . Feed Forward

Forward SET-34(0 100%) SET-34  
가  
가  
가  
가 1  
SET-7

## .Over Flow

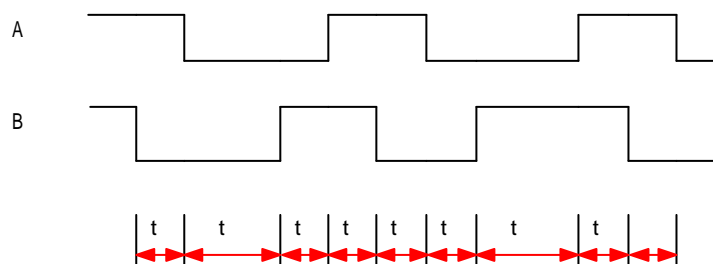
1 65535pulse

## . N/M

Encoder CSM Encoder 1 2048pulse (CSM  
가 1 2000pulse  
Motor Encoder 2000pulse N/M

Encoder

Incremental Encoder가 Encoder N/M  
N/M 가  $1/2^N$  A, B 90 ° 가  
t t ( t t 2t)  
SET-23,24



4.16 ENCODER N/M



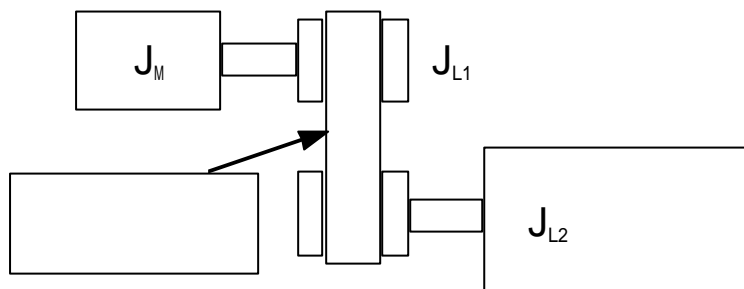
- 1) SET-06
- ( ) 250Hz , Ball Screw 150Hz ,  
50Hz 가 가  
가 가
- 2) SET-38,39 Damping Factor  
30 ~100 Damping  
Factor 70
- 3) Digital Jog . ( 7 Digital Jog )
- 4) Digital Jog Mode/set Key .
- 5) P . ( P  
.)
- 6) 가 Feedback  
(가 Feedback  
.)
- 7) Set-34 Feedforward .
- 8) 가  
(
- 6),7),8) 가  
( )
- 가  
( ) P  
I 가  
JOG  
P , I  
가 .

가 5 가

#### 4.7 CSM, CSM

CSM, CSM 가

가



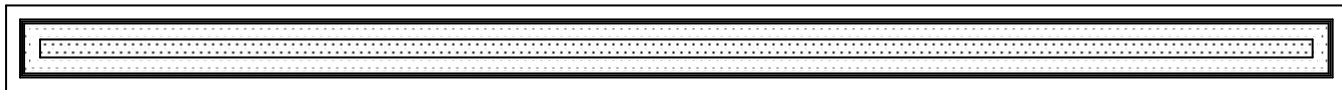
$$\frac{J_{L1} \cdot J_{L2}}{J_M} \cdot 30$$

$$\frac{J_{L2}}{J_M \cdot J_{L1}} \cdot 8$$

$J_M :$ $J_{L1} :$ $J_{L2} :$ (                      )
---

P I P

< POINT >



5





## 5.1 Dynamic Brake

CSD Servo Drive  
CSD

Dynamic Brake  
Dynamic Brake Brake

Motor  
Brake

Dynamic Brake가

- 1). Servo Alarm
- 2). Servo On Off
- 3).
- 4).

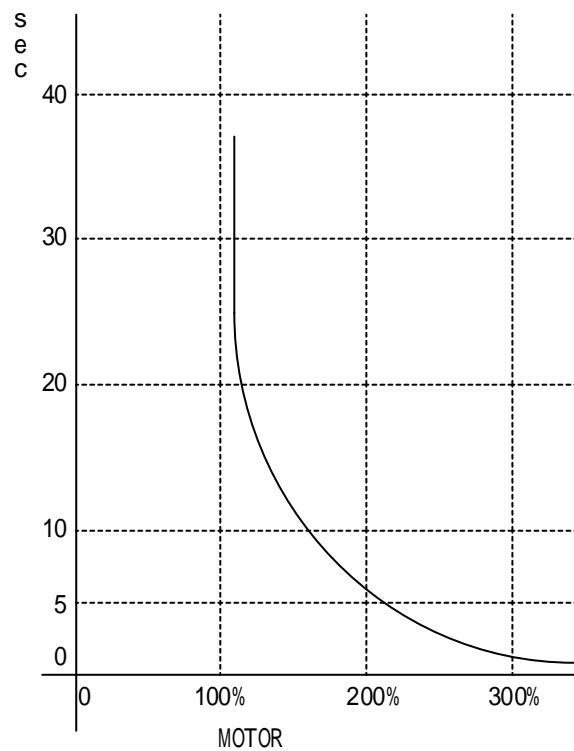
Free Run( )

## 5.2

Servo Drive

Level

Motor



5.1

5.3

CSD SERVO DRIVE    DRIVE    MOTOR

가.

SERVO DRIVE    MOTOR

가

3bit    Alram Code Data

	SALM	Aalarm code			DIGITAL JOG	
		AL3	AL2	AL1		
	1	0	0	1	1X	가 SERVO DRIVE가
	1	0	1	0	2X	가
	1	0		1	3X	CABLE
	1	1	0	0	4X	가
	1	1	0	1	5X	DC 420V ± 5%
B'D	1	1	1	0	6X	SERVO DRIVE    B'D    CHECK
	1	1		1	7X	
Parameter	0	0	0	1	9X	SERVO DRIVE    Parameter가
DJ	0	0	1	0	AX	DIGITAL JOG    SERVO DRIVE

1:data    (photo 2    Transister Off)  
0:data    (photo 2    Transister On)

5.1. Alarm

Alarm    Digital Jog    7 Segment    7.5

Servo Alarm    (ALARM,ALARN-SG)

5.1    Alarm    Csd Servo Drive

Alarm

- 1) Digital Jog가    Servo Drive    Led가
- 2) Ddigital Jog가    Alarm    Digital Jog    ( 7.5 )
- Alarm Code    AL0    AL2(open Collector Type)
- ( Alarm Code    Code    5.1 )

Alarm                      Servo Drive

Digital Jog	Error	Error	10.5
-------------	-------	-------	------

Alarm                      Servo Drive  
Reset

가

NFB

Connector  
Motor

Off

[0]

Volt

## Servo Alarm Reset

Servo Alarm      Reset  
RESET                      .

Reset

Error

### 1) Digital Jog가

Csd Servo Drive      Front Panel

.Power On:      Led On

```
.Alarm      :      Led On
```

## 2) Digital Jog가

## CSD Servo Drive

## Digital Jog

## 7 Digital Jog

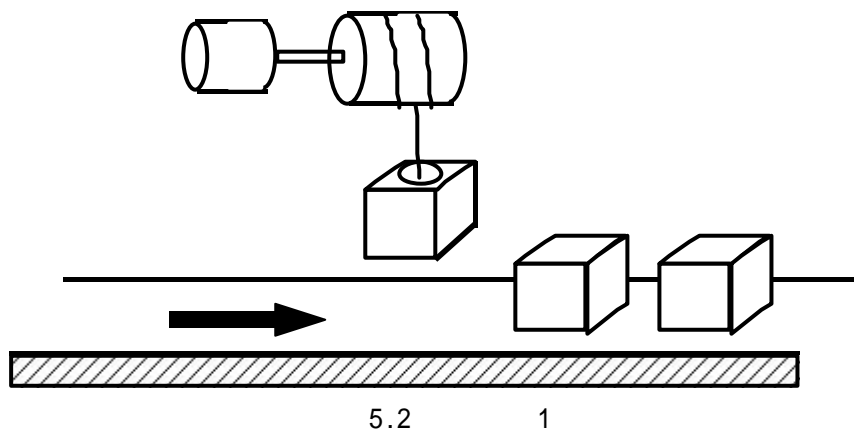
5.4

가. Inertia  $J_L$

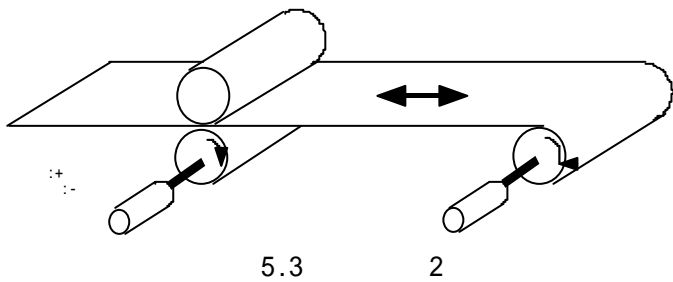
- 1) Inertia가 Rotor Inertia 5 Inertia 가 , Inertia  
가 5 Inertia 가 CSDP Series  
Inertia

- 1) 가 가 ( )

가 Counter Weight



가 Tension



MOTOR가MOTOR가CSD SERVO DRIVE400W600W

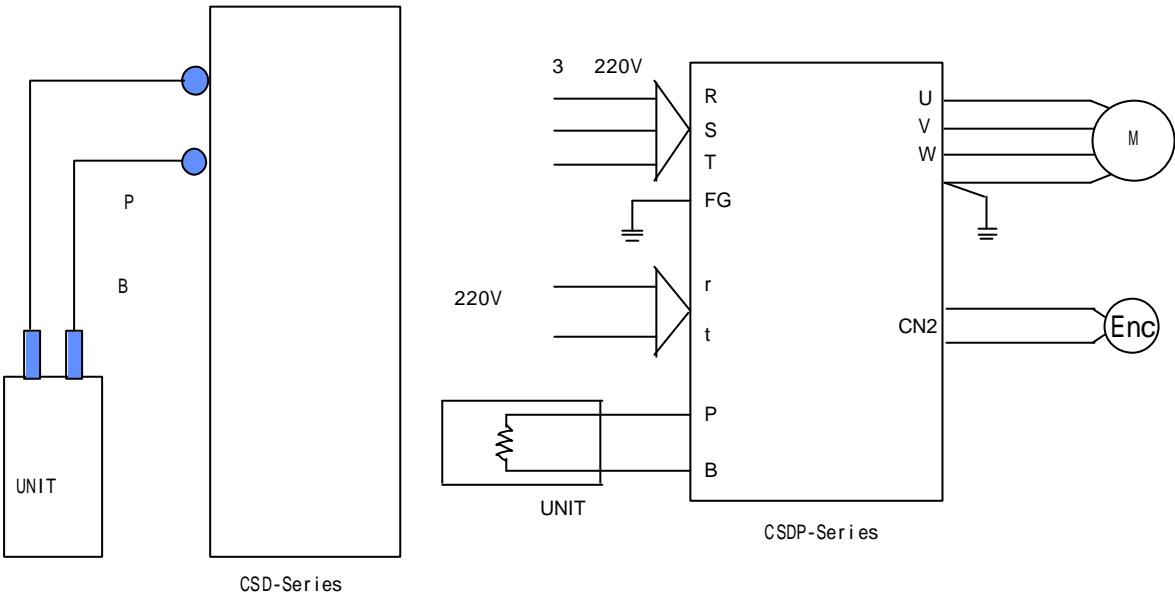
CSD SERVO DRIVE가UNIT가CSD SERVO DRIVE(600W ~1kW)

1). SPEC

Model				
	CSD,RC1	CSDP		
	0.6 1kw	1.5 kw	3.0 kw	6.0 kw
	-	50 150W	25 150W	25 250W
	50 150W	-	-	25 250W
Part No				

5.2 spec

2)

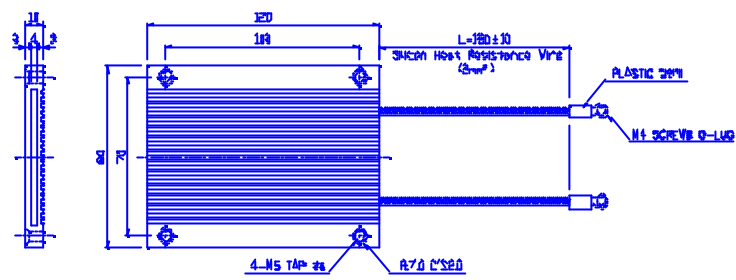


5.4

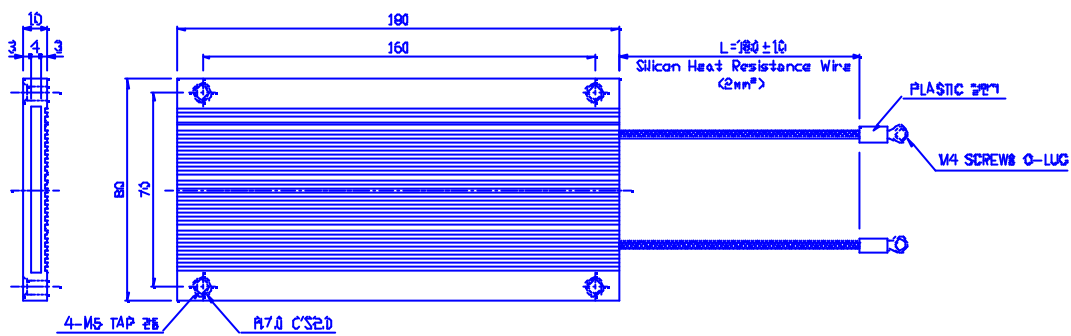
SERVO DRIVE가

( 90 )

1. 25 ,50 150W

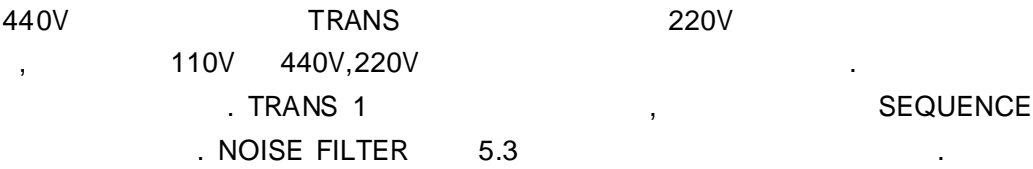


2. 25 250W



5.5

5.5 440V



## 5.6

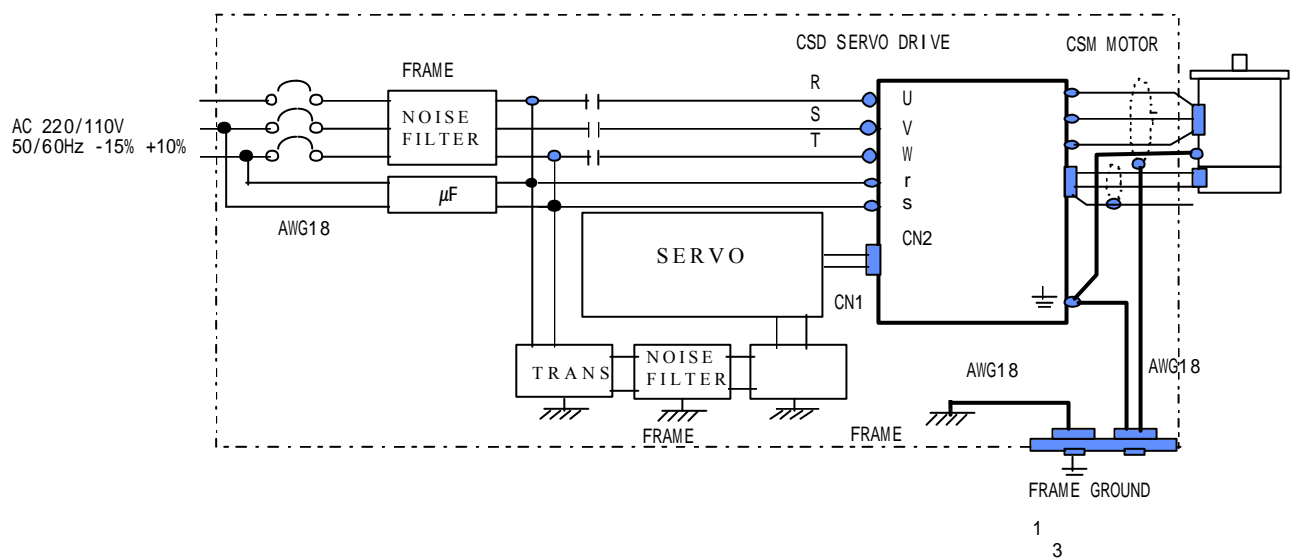
### 가. NOISE

#### 1) GROUNDING

SERVO DRIVE POWER INVERTER, SMPS  
 SWITCHING INVERTER  
 $di/dt, dv/dt$  (SWITCHING NOISE) , GROUNDING  
 MOTOR CASE가 MOTOR Cf  
 INVERTER Cf  $dv/dt$  가 MOTOR EARTH  
 (FG) SERVO DRIVE EARTH (FG) EARTH  
 EARTH NOISE 가 EARTH

#### 2) NOISE

MOTOR INVERTER POWER SWITCHING NOISE ( $dv/dt$   $di/dt$ )  
 , EARTH NOISE 가 NOISE가  
 SERVO DRIVE가 ERROR가 NOISE  
 NOISE 가 NOISE FILTER  
 NOISE NOISE FILTER NFB  
 1 NOISE FILTER 3 3  
 NOISE FILTER NOISE 5.3  
 NOISE FILTER



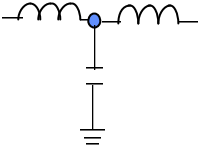
5.6

(GROUNDING )

1.PANNEL GROUNDING

2.GROUNDING 3.5mm<sup>2</sup>

3.NOISE FILTER , NOISE

	CSD SERVO DRIVE	NOISE FILTER	NOISE FILTER	
				NOISE FILTER SPEC
220VAC	CSD-A3 02B		AXC-05B/NFM-205S	250V / 5A
	CSD-04 06B		AXC-10B/NFM210S	250V / 10A
	CSD-08 10B		AXC-20B/NFM220S	250V / 20A
3 220VAC	CSDP-04 06B		TPA-10B/NFS-310	250 / 10A
	CSDP-08 15B		TPA-20B/NFS-320	250 / 15A
	CSDP-20 30B		TPA-30B/NFS-330	250 / 30A
	CSDP-35 60B		TPA-40B	250 / 40A
110VAC	CSD-A3 01A		AXC-05B/NFM-205S	250V / 5A
	CSD-02 04A		AXC10B/NFM210S	250V / 10A

5.3 NOISE FILTER

. NOISE

1) 1,2 DUCT

2) 1 GROUNDING LINE 가 DUCT

3) GROUNDING LINE GROUND PANEL

4) FILTER가 FILTER CSD SERVO DRIVE  
EARTH GROUNDING PLATE

5) 가 SHIELD CABLE GROUNDING LINE LINE  
.SHIELD CABLE SHIELD GROUNDING , 가 0

6) / MOTOR

7) NOISE 가 24V

8) NOISE Maker Cable

9) ( , , )



SERVO DRIVE (220/110V 50/60Hz) .GROUNDING ,  
 SYSTEM MCCB(MAGNET  
 CUIT CURRENT PROTECTOR) 6.4 FUSE  
 CSD SERVO DRIVE CHARGE 가 FUSE  
 NFB(NO FUSE BRAKER)

	CSD SERVO DRIVE	CSD SERVO DRIVE (KVA)	MCCB/FUSE (A)	NFB	
220VAC	CSD -A3B	0.15	220V/3A	30A	30A
	CSD -A5B	0.19			
	CSD -01B	0.34			
	CSD -02B	0.65			
	CSD -04B	1.25	220V/6A		
	CSD -06B	1.85	220V/9A		
	CSD -08B	2.45	220V/14A		
	CSD -10B	3.05			
110VAC	CSD -A3A	0.15	110V/06A	30A	
	CSD -A5A	0.19			
	CSD -01A	0.34			
	CSD -02A	0.65			
	CSD -04A	1.25	110V/12A		
3 220VAC	CSDP-05B	1.0	220V/5A	30A	30A
	CSDP-10B	2.0	220V/8A		
	CSDP-20B	4.0	220V/12A		
	CSDP-30B	5.2	220V/18A		
	CSDP-40B	6.3	220V/21A	50A	
	CSDP-50B	7.4	220V/29A		
	CSDP-60B	11.3	220V/33A		

#### 5.4 CSD SERVO DRIVE

- 1.
2. (25 ) : 200%/2sec , 700%/0.01sec
- 3.MCCB SEB 32B 3 ~30A

5.7

가. MOTOR

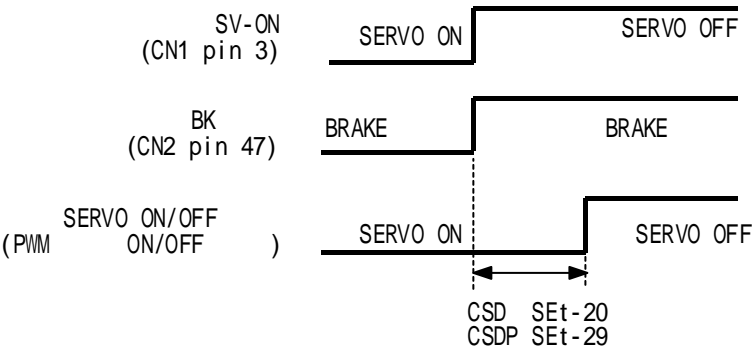
- 1) CSD Series
- SET - 45 - 4
- Encoder Feddback가
- 2) CSD Seeies
- SET - 46 - 1 ( . )
- 3) CSDP Series
- SET - 45 - 4 ( )
- SET - 44 - 4 (Encoder Feddback )
- 4) CSDP Series
- SET - 46 - 1 ( . )

. Brake

CSD SEt-20 CSDP SEt-29	SERVO OFF가 SERVO OFF	10 msec	0 ~ 1000	0
CSD SEt-21 CSDP SEt-30	SERVO OFF가 BRAKE	rpm	0 ~ 5000	100
CSD SEt-23 CSDP SEt-31	SERVO OFF가BRAKE	10 msec	0 ~ 1000	50

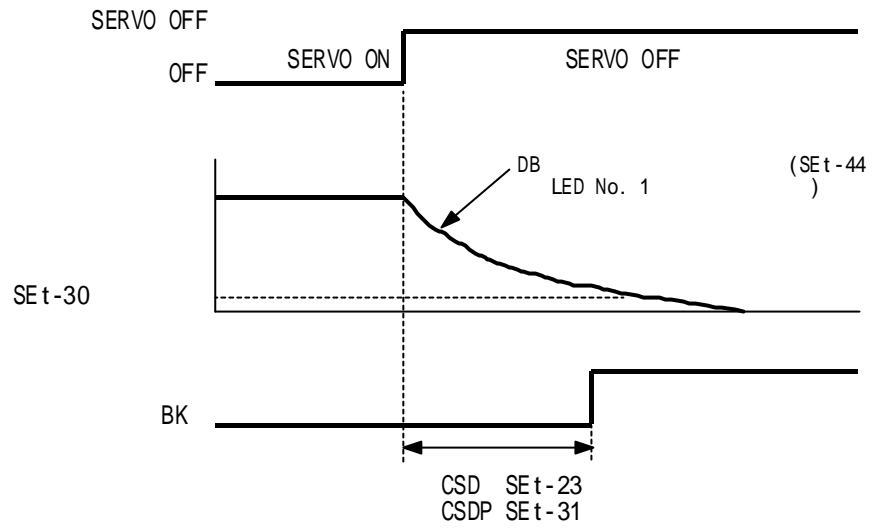
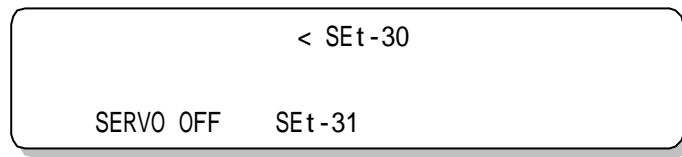
BRAKE ON      SERVO ON/OFF  
가      SERVO OFF ,      가      , SEt-29      SERVO  
OFF      가      SERVO OFF

SERVO OFF가 , BK ON ,  
SERVO OFF가 SEt-29  
SERVO ON가 SERVO OFF .

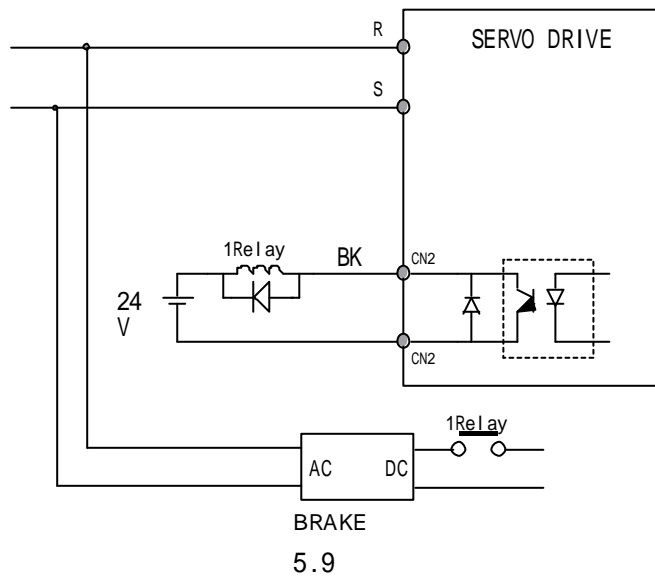


5.7 Brake

가 ,

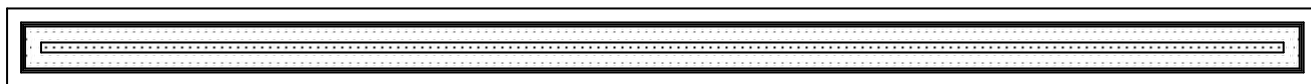


5.8 가 ,



5.9





6

SERVO DRIVE

## 6.1

### SERVO DRIVE SYSTEM

#### DIGITAL JOG

1) : SET-01

가 10 2000(RPM/V)  
500(RPM/V) 1V 500RPM

2) : SET-02

가 0 2000

3) : SET-03

가 0 10000

4) : SET-04

1 5000  
50

5) : SET-05

가 0 100(%/3V)  
30(%/3V) 1V 10%

6) : SET-06

0  
~ 10000Hz 1000Hz

7) FEEDFORWARD : SET-07

FEEDFORWARD  
0 ~ 5000Hz 200Hz

8) : SET-32(CSD - Series), SET-09(CSDP - Series)

0 ~  
5000Hz 200Hz

9) : SET-10

0%  
(100%= , 300%= )

10) : SET -11  
 0% . (100%=  
 , 300%= )

11) : SET -12  
 P-CL  
 0% . (100%= , 300%= )

12) : SET -13  
 N-CL  
 0% . (100%= , 300%= )

13) : SET -14, SET -15  
 ( % )  
 0% 300% P/N-OT가  
 MOTOR가  
 SET -44 -3  
 . (100%= , 300%= )

14) ZERO Level : SET -16  
 ZERO LEVEL  
 1RPM 5000RPM  
 가 TGON ON  
 20RPM

15) Zero - Clamp Level : SET -17  
 Zero - Clamp  
 0RPM 5000RPM  
 Zero - Clamp (SET -44 -5 ) 가  
 P-CON ON , 0  
 가 SERVO P-CON OFF

16) or : SET -18  
 가  
 가 1000RPM 가 2000RPM 가 1900RPM  
 2100RPM 가 0 100RPM  
 10RPM 가  
 , 가 SET -16 ZERO 가  
 10PULSE

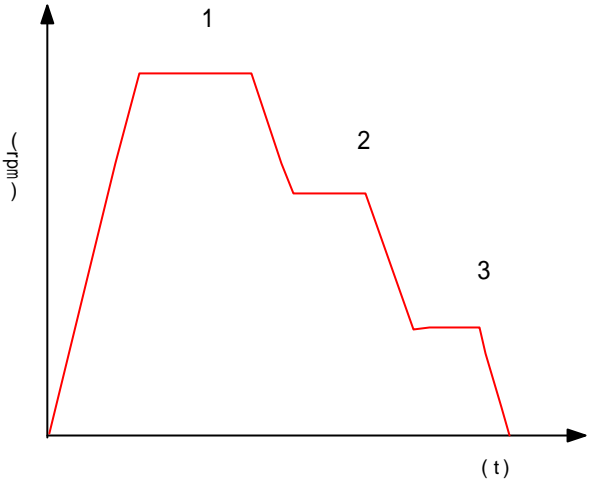
- 17) 가 : SET-19  
 CSDP Series 가 (SET-19) (SET-20)  
 0(r/min) 가 0(r/min)  
 SET-19 가  
 0ms  
 가 0ms
- 18) BRAKE : SET-20(CSD-Series), SET-29(CSDP-Series)  
 SVOFF BRAKE  
 0 1000(ms) 10ms  
 0ms
- 19) BRAKE : SET-21(CSD Series), SET-30(CSDP Series)  
 SV OFF BRAKE  
 0 5000RPM 100RPM
- 20) BRAKE : SET-22(CSD Series), SET-31(CSDP Series)  
 SVOFF BRAKE .BRAKE  
 가 SET-21(CSD Series),SET-30(CSDP Series)  
 가  
 0 1000(ms) 10ms  
 50ms
- 21) N PULSE : SET-23  
 ENCODER PULSE 가 1  
 2048 P/R - CSD Series  
 2500 P/R - CSDP Series
- 21) M PULSE : SET-24  
 ENCODER 1 PULSE  
 2048 P/R - CSD Series  
 2500 P/R -CSDP Series
- 22) JOG : SET-25  
 JOG 0RPM  
 JOG DIGITAL JOG  
 500RPM
- 23) : SET-26(1 ), SET-27(2 ), SET-28(3 )  
 가 P-CL,N-CL



	P-CL	N-CL
1	OFF	ON
2	ON	OFF
3	ON	ON
	OFF	OFF

	P-CON
	OFF
	ON



6.2

6.1

24) S 가 : SET-29(CSD-Series), SET-21(CSDP-Series)  
가 S  
0RPM 1000RPM  
500RPM

25) 가 FEEDBACK : SET-30(CSD Series), SET-22(CSDP Series)  
D  
0 1000  
0

26) : SET-31(CSD Series), SET-32(CSDP Series)  
0 1000  
0

27) : SET-33  
가  
1 65535PULSE  
8000

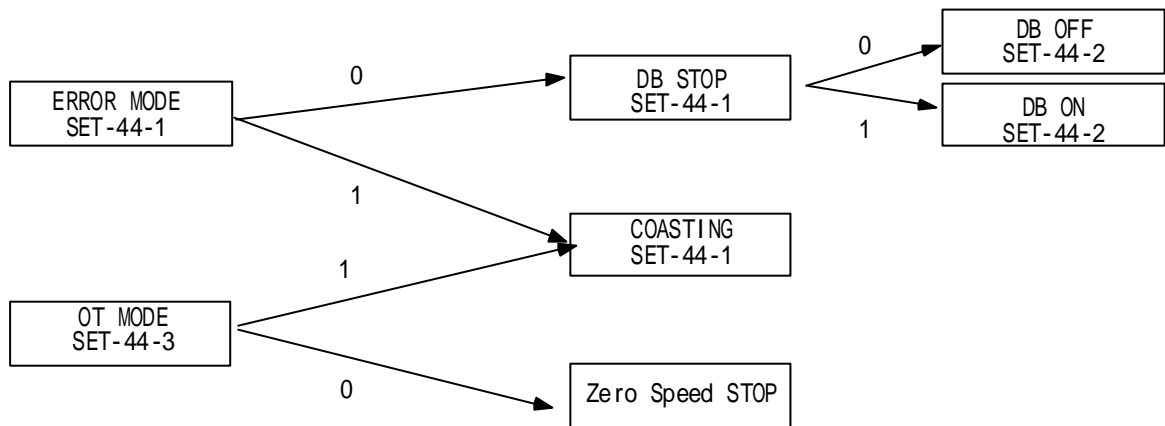
28) FEED FORWARD : SET-34  
FEED FORWARD 0 100%  
0%

29) : SET-35  
0 ~ 5000Hz  
200Hz

30) : SET-36, SET-37  
 B/A(SET-36/SET-37)  
 (1/3,1/7 ) 가 . B/A 1 가  
 B/A 가 4.5  
 1~65535  
 2048(CSD-Series), 2500(CSD-Series)

31) AUTO TUNING PARAMETER (SET-38, SET-39)  
 SET-38 rad/s 1  
 1000 가 . SET-39 DAMPING FACTOR  
 SETTLLING TIME 가 50 200 가  
 SET-38 100, SET-39 70

32) , , ,  
 SET-44  
 6.4 SET-44 . SYSTEM  
 6.2



6.2

## 6.2 CSD-Series

SET-01		RPM/V	10	2000	500		
SET-02		-	0	2000			/
SET-03		-	0	10000			/
SET-04		-	0	500	10		
SET-05		%/3V	0	100	30		
SET-06		Hz	0	10000	1000		
SET-07	FF	Hz	0	5000	200		
SET-10		%	0	300	300		
SET-11		%	0	300	300		
SET-12		%	0	300	100		
SET-13		%	0	300	100		
SET-14		%	0	300	300		
SET-15		%	0	300	300		
SET-16	Zero -	RPM	1	1000	20		/
SET-17	Zero-Clamp	RPM	1	5000	10		/
SET-18	( )	RPM (PULSE)	0	1000	10		/
SET-19	가	ms	0	10000	0		
SET-20	SVOFF SERVO OFF	10ms	0	1000	0		
SET-21	SV OFF BRAKE	RPM	0	5000	100		
SET-22	SVOFF BRAKE	10ms	0	1000	50		
SET-23	1 ENCODER	PULSE	1	65535	2048		
SET-24	ENCODER	PULSE	1	65535	2048		
SET-25	JOG	RPM	0	5000	500		
SET-26	1	RPM	0	5000	100		/
SET-27	2	RPM	0	5000	200		/
SET-28	3	RPM	0	5000	300		/
SET-29	S-가	RPM	0	1000	50		/
SET-30	가 FEEDBACK	-	0	1000	0		/
SET-31		-	0	1000	0		/
SET-32		Hz	0	5000	200		
SET-33	OVERFLOW	PULSE	0	10000	8000		
SET-34	FEEDFORWARD	%	0	100	0		
SET-35		Hz	0	5000	200		
SET-36	( )	PULSE	1	65535	2048		
SET-37	( )	PULSE	1	65535	2048		

:100% =

SET-23(ENCODER ), SET-24(ENCODER )

가 , DIGITAL JOG

가

Soft start

S- 가 SET-19, SET-29 SET-45-2

S- 가 가 가

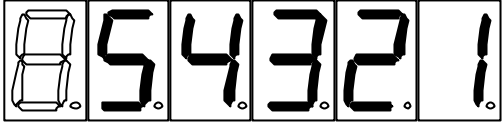
## 6.4 CSD Series

( )

SET-38	( )	RAD/SEC	0	1000	100		/
SET-39	(DAMPING FACTOR)	-	50	200	70		/
SET-42		-	-	-	-	6.4	

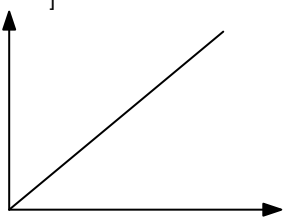
LED NO.

No.5 No.4 No.3 No.2 No.1

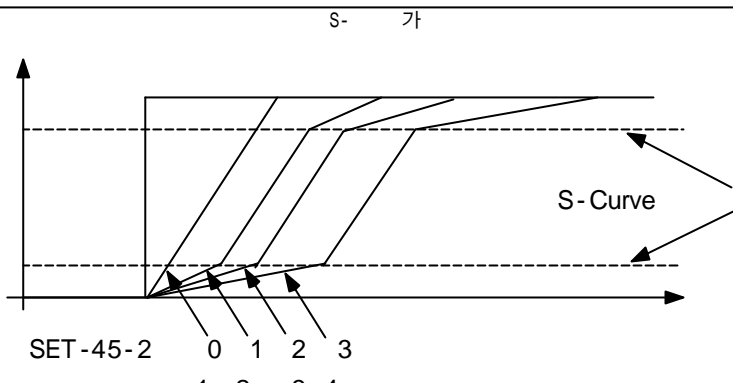


	LED No			
SET - 43	1	0	(SV -ON) SERVO ON/OFF	0
		1	SERVO DRIVE ON	
	2	0	P -OT 가	1
		1	가	
	3	0	N - OT 가	1
		1	가	
	4	0	TGON	0
		1	TGON	
	5	0	RESET SERVO ALARM	1
		1	RESET SERVO ALARM	
SET - 44	1	0	(DB ) DYNAMIC BRAKE	0
		1	( FREE ) 가 가	
	2	0	(DB DB OFF) DYNAMIC BRAKE 가 OFF	1
		1	(DB DB ON) DYNAMIC BRAKE 가 ON	
	3	0	( 0 ) SET - 14,15	0
		1	( 0 ) 0	
1) 0				
2) SET - 44 - 3 ,				
3) SET - 43,44,45,46				

## 6.4 CSD-Series ( )

	LED No					
S E T 4 4	5	0	( ) P-CON (CN1-15) P/PI	(Vref)	P-CON OFF:PI ON :P	0
		1	(Zero-Clamp ) 가 Zero-Clamp 0 SERVO 가 P-CON (CN1-15) Zero Clamp ON/OFF		P-CON OFF: Zero clamp OFF P-CON ON : Zero clamp ON	
		2	( I) Tref Vref	(Tref)		
		3	( II) P-CON (CN1-15) / (Tref) (Vref) Vref (+)  [ ] Tref Vref	: (Tref) : (Vref) (Vref) : : 가 (tension )	P-CON OFF : P-CON ON :	

6.4 CSD-Series ( )

	LED NO			
SET-45	1	0		0
		1		
	2	0		2
		1		
		2		
		3		
	3	0	INCREMENTAL 15 2048PULSE	1
		1	INCREMENTAL 9 2048PULSE	
		2	2048PULSE	
		3	INCREMENTAL 15 2500PULSE	
		4	INCREMENTAL 15 2000PULSE	
	4	0	CCW :	0
		1	CW :	
	5	0	P-CL,N-CL ON/OFF	0
		1	P-CL, N-CL (1, 2, 3 )	
SET-46	1	8	+ ( )	0
		0	CW + CCW( )	
		2	A + B (X 1)( )	
		4	A + B (X 2)( )	
		6	A + B (X 4)( )	
		9	+ ( )	
		1	CW + CCW( )	
		3	A + B (X 1)( )	
		5	A + B (X 2)( )	
		7	A + B (X 4)( )	

: OFF ON  
6.4 CSD-Series .

## 6.3 CSDP-Series

SET-01		RPM/V	10	2000	500		
SET-02		-	0	2000			/
SET-03		-	0	10000			/
SET-04		-	0	5000	50		
SET-05		%/3V	0	100	30		
SET-06		Hz	0	10000	1000		
SET-07	FF	Hz	0	5000	200		
SET-09		Hz	0	5000	200		
SET-10		%	0	300	300		
SET-11		%	0	300	300		
SET-12		%	0	300	100		
SET-13		%	0	300	100		
SET-14		%	0	300	300		
SET-15		%	0	300	300		
SET-16	Zero-	RPM	1	1000	20		
SET-17	Zero-Clamp	RPM	1	5000	10		
SET-18	( )	RPM (PULSE)	0	1000	10		/
SET-19	가	ms	0	10000	0		/
SET-20		ms	0	10000	0		/
SET-21	S-Curve	RPM	0	5000	50		/
SET-22	가 FB	-	0	1000	0		/
SET-23	1 ENCODER	PULSE	1	65535	2500		
SET-24	ENCODER	PULSE	1	65535	2500		
SET-25	JOG	RPM	0	5000	500		
SET-26	1	RPM	0	5000	100		/
SET-27	2	RPM	0	5000	200		/
SET-28	3	RPM	0	5000	300		/
SET-29	SVOFF SERVO OFF	10ms	0	1000	0		
SET-30	SV OFF BRAKE	RPM	0	5000	100		
SET-31	SVOFF BRAKE	10ms	0	1000	50		

:100% =

SET-23(ENCODER ), SET-24(ENCODER )

가 , DIGITAL JOG

가

Soft start

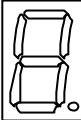
S- 가 SET-19, SET-29 SET-45-2

S- 가 가 가

## 6.5 CSDP-Series

( )

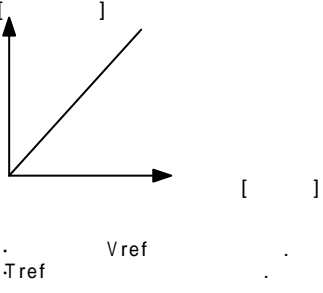
SET-32		-	0	1000	0		/
SET-33	OVERFLOW	PULSE	0	10000	8000		
SET-34	FEEDFORWARD	%	0	100	0		
SET-35		Hz	0	5000	200		
SET-36	( )	PULSE	1	65535	2500		
SET-37	( )	PULSE	1	65535	2500		
SET-38	( )	RAD/SEC	0	1000	100		/
SET-39	(DAMPING FACTOR)	-	50	200	70		/
SET-40		A/4V	-	-	-	6.4	
SET-41		-	-	-	-	6.4	
SET-42		-	-	-	-	6.4	

	No.5	No.4	No.3	No.2	No.1	
LED NO.		5	4	3	2	1

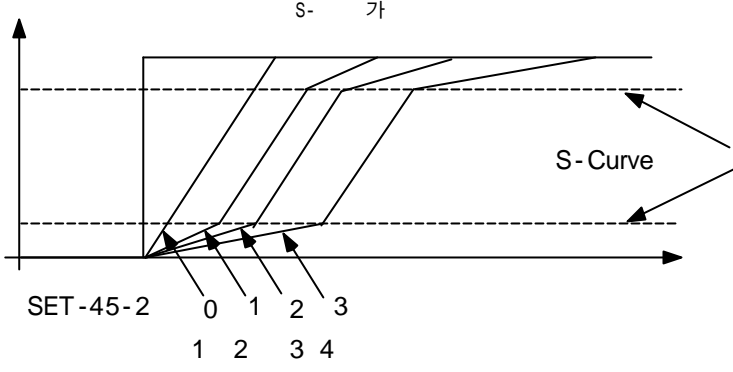
	LED No			
SET-43	1	0	(SV-ON) SERVO ON/OFF	0
		1	SERVO DRIVE ON	
	2	0	P-OT 가	1
		1	가	
	3	0	N-OT 가	1
		1	가	
	4	0	TGON	0
		1	TGON	
	5	0	RESET SERVO ALARM	1
		1	RESET SERVO ALARM	
SET-44	1	0	(DB ) DYNAMIC BRAKE	0
		1	( ) FREE 가 가	
	2	0	(DB DB OFF) DYNAMIC BRAKE 가 OFF	1
		1	(DB DB ON) DYNAMIC BRAKE 가 ON	
	3	0	( 0 ) SET-14,15	0
		1	( 0 ) 0	
	4	0	( 3 )	0
		1	( 3 )	
1) 0 2) SET-44-3 , 3) SET-43,44,45,46				

## 6.5 CSDP-Series ( )



	LED No					
S E T 4 4	5	0	( ) P-CON (CN1-15) P/PI	(Vref)	P-CON OFF:PI ON :P	0
		1	(Zero-Clamp ) 가 Zero-Clamp 0 SERVO 가 P-CON(CN1-15) ON/OFF Zero Clamp		P-CON OFF: Zero clamp OFF P-CON ON : Zero clamp ON	
		2	( I) Tref Vref	(Tref)		
		3	( II) P-CON (CN1-15) /  (Tref) (Vref) Vref (+) 	: (Tref) : (Vref) : (Vref) : 가 (tension)	P-CON OFF : P-CON ON :	
		4	( Zero Clamp ) Zero Clamp 가	Zero Clamp		

6.5 CSDP-Series ( )

	LED NO			
SET-45	1	0		0
		1		
	2	0		2
		1		
		2		
		3		
	3	0		1
		1		
	4	0	CCW :	0
		1	CW :	
	5	0	P-CL, N-CL ON/OFF .	0
		1	P-CL, N-CL (1, 2, 3 ) .	
SET-46	1	8	+ ( )	0
		0	CW + CCW( )	
		2	A + B (X 1)( )	
		4	A + B (X 2)( )	
		6	A + B (X 4)( )	
		9	+ ( )	
		1	CW + CCW( )	
		3	A + B (X 1)( )	
		5	A + B (X 2)( )	
		7	A + B (X 4)( )	

: OFF ON  
6.5 CSDP-Series .

## 6.4 CSM-Series, CSMP-Series

### 가. CSD CSM-Series (SET-42 )

220V			110		
	가	SET-42		가	SET-42
CSD-A3BB1P CSD-A3BB1S	CSM 30W	0	CSD-A3AB1P CSD-A3AB1S	CSM 30W	8
CSD-01BB1P CSD-01BB1S	CSM,CSMG 50W CSM,CSMG 100W	1 2	CSD-01AB1P CSD-01AB1S	CSM,CSMG 50W CSM,CSMG 100W	9 10
CSD-02BB1P CSD-02BB1S	CSM,CSMG 200W	3	CSD-02AB1P CSD-02AB1S	CSM,CSMG 200W	11
CSD-04BB1P CSD-04BB1S	CSM,CSMG 400W	4	CSD-04AB1P CSD-04AB1S	CSM,CSMG 400W	12
CSD-10BB1P CSD-10BB1S	CSM,CSMG 600W CSM,CSMG 800W CSM,CSMG 1kw	5 6 7			
CSD-01 SET-42	50W 100W	가	.(CSM,CSMG )		
CSD-10 SET-42	600W,800W,1KW	가	.(CSM,CSM )		

### 6.7 CSM-Series

### 나. CSMP-Series (SET-41,42 )

#### 1) SET-41

CSMD, CSMS, CSMH, CSMF Series ( : 100)	CSMN, CSMX Series ( : 300)
100 : 10 INC 2500	300 : 14 INC 6000
101 : 14 INC 2500	301 : 14 INC 5000
102 : 14 INC 1000	302 : 14 INC 2500
104 : COMPACT ABS 2048	303 : 14 INC 4000
105 : FULL ABS 2048	304 : 14 INC 1500
	305 : 14 INC 1000
	306 : 14 INC 3000
	307 : 14 INC 2000
	308 : FULL ABS 2048

## 2) SET-42

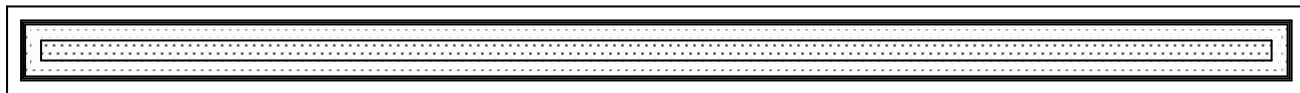
D-Series		750W	1kW	1.5kW	2kW	2.5kW	3kW	3.5kW	4kW	4.5kW	5kW
		100	101	102	103	104	105	106	107	108	109
	SET-40	10	15	20	25	50	50	50	50	50	50
S-Series		1kW	1.5kW	2kW	2.5kW	3kW	3.5kW	4kW	4.5kW	5kW	
		200	201	202	203	204	205	206	207	208	
	SET-40	15	20	25	50	50	50	50	50	50	
F-Series		400W	750W	1.5kW	2.5kW	3.5kW	4.5kW				
		300	301	302	303	304	305				
	SET-40	10	10	20	25	50	50				
N-Series		300W	600W	900W	1.2kW	2kW	3kW	4.4kW	6kW		
		400	401	402	403	404	405	406	407		
	SET-40	5	10	15	20	50	50	50	50		
X-Series		150W	300W	450W	850kW	1.3kW	1.8kW	2.9kW	4.4kW		
		500	501	502	503	504	505	506	507		
	SET-40	5	5	10	15	15	20	50	50		
H-Series		500W	1kW	1.5kW	2kW	3kW	4kW	5kW			
		800	801	802	803	804	805	806			
	SET-40	10	15	20	25	50	50	50			

### 6.8 CSM -Series

: . 가

.

# JOG (CST-SD1)



7

DIGITAL JOG

## 7.1

DIGITAL JOG 7-1

DIGITAL JOG 가

( ) 1. DIGITAL JOG

CSD SERVO PACK

2. , 10

3. 가



7.1 DIGITAL JOG

7.2 DIGITAL JOG

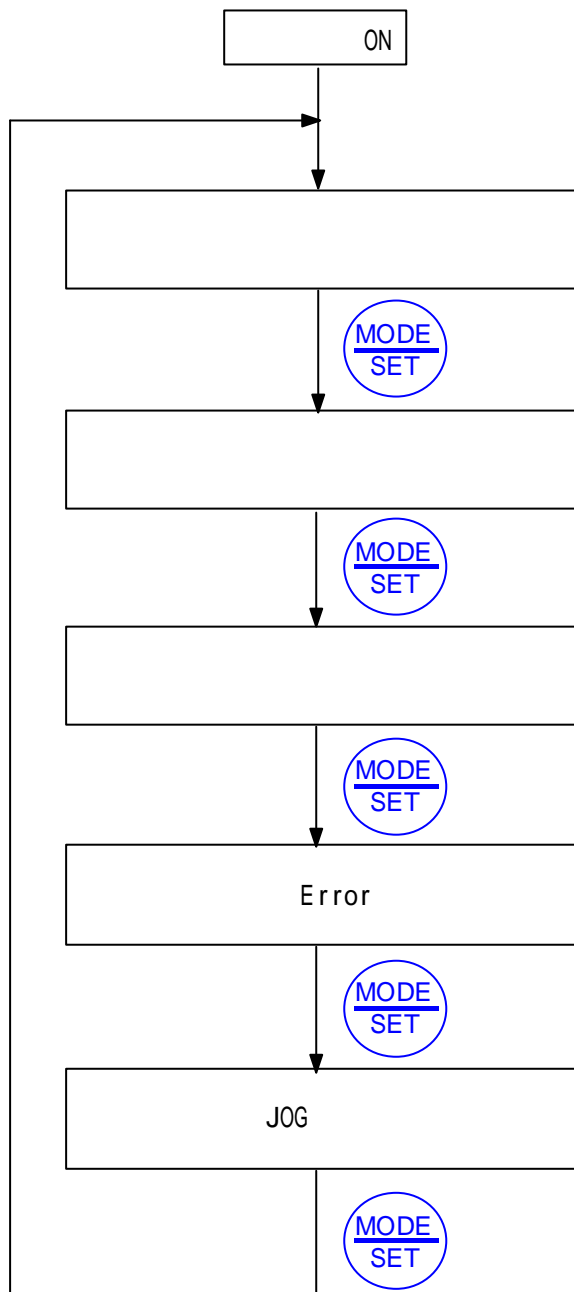
DIGITAL JOG                      7-1

7-2

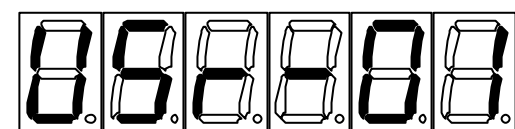
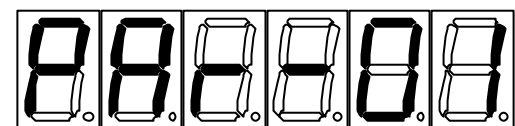
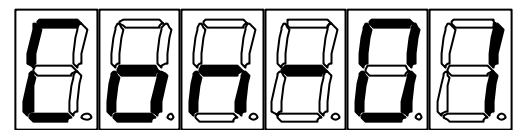
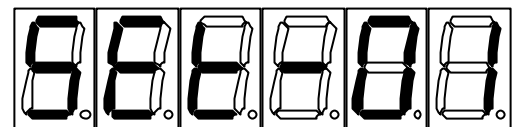
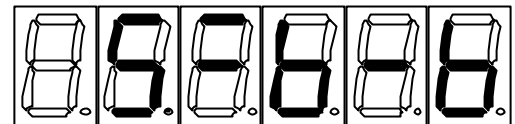


7.1 DIGITAL JOG

	<div>. BASE BLOCK</div> <div>.</div> <div>.</div>
	USER
	<div>.</div> <div>.</div> <div>.</div> <div>.</div> <div>.</div> <div>.</div> <div>.</div>
ERROR	, S/W VERSION,
JOG	<div>. JOG</div> <div>. AUTO TUNNING</div> <div>.</div> <div>.</div> <div>. ERROR DATA CLEAR</div> <div>. D/A CHANNEL</div> <div>OFFSET</div> <div>OFFSET</div>



< >



7.2



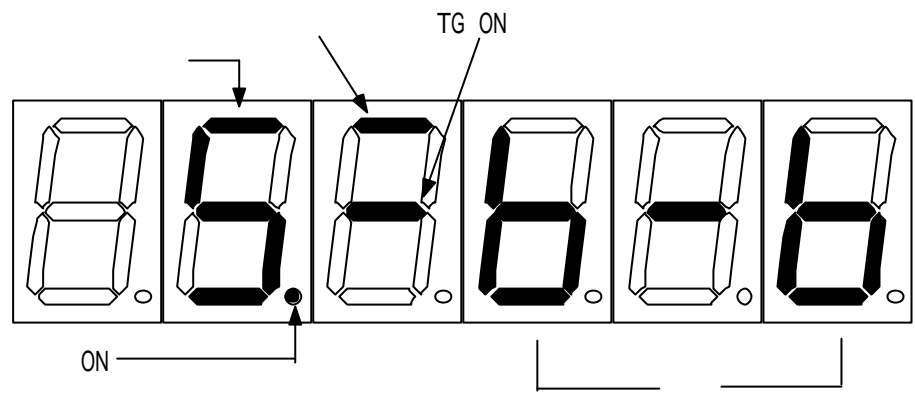
7.3

, CSD SERVO PACK      가      7.3      BIT

BIT      7.2,      7.3      .



<      >



7.3

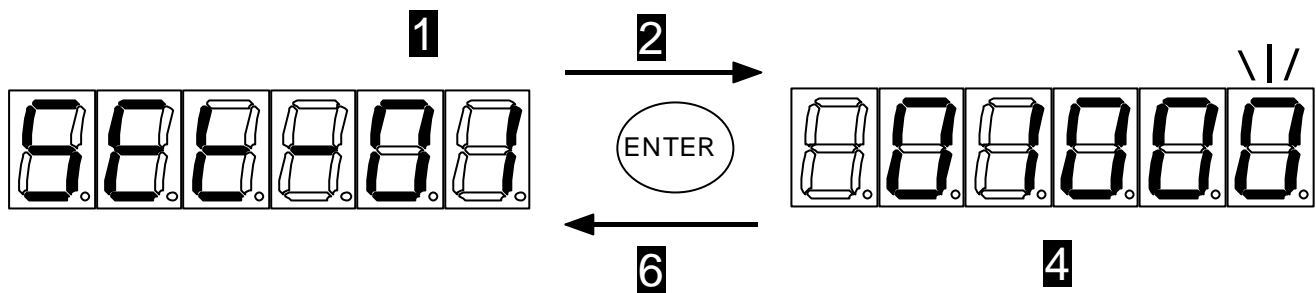
7.2 BIT

BIT	
ON	ON
	가
TGON	가 TGON      (      60r/min)
	(      )
	S :
	t :

7.3

b-b	BASE BLOCK
run	
Prn	
nrn	
E.00	ALARM (      7.5)
E.02	
ι	

7.4



< >

7.4



가 가 /



가



가

(

가 /

1

)



5 1 ~ 4



6.4, 6.5 「 ( ) 」

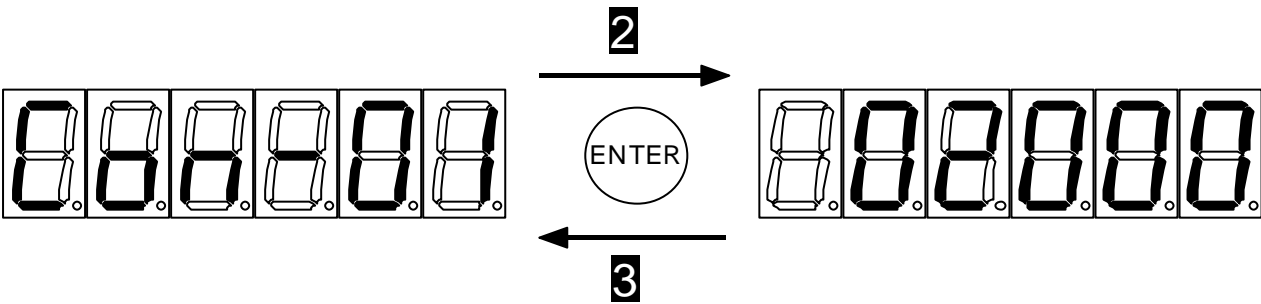
7.5

DIGITAL JOG , 가 가 .

7.4 .

7.4

NO.	
01	[RPM]
02	[RPM]
03	[ % ]
04	[PULSE(CSD)], [degree(CSD )]
05	[RPM]
06	[PULSE]
07	[degree(CSD ONLY)]



7.5



NO. .



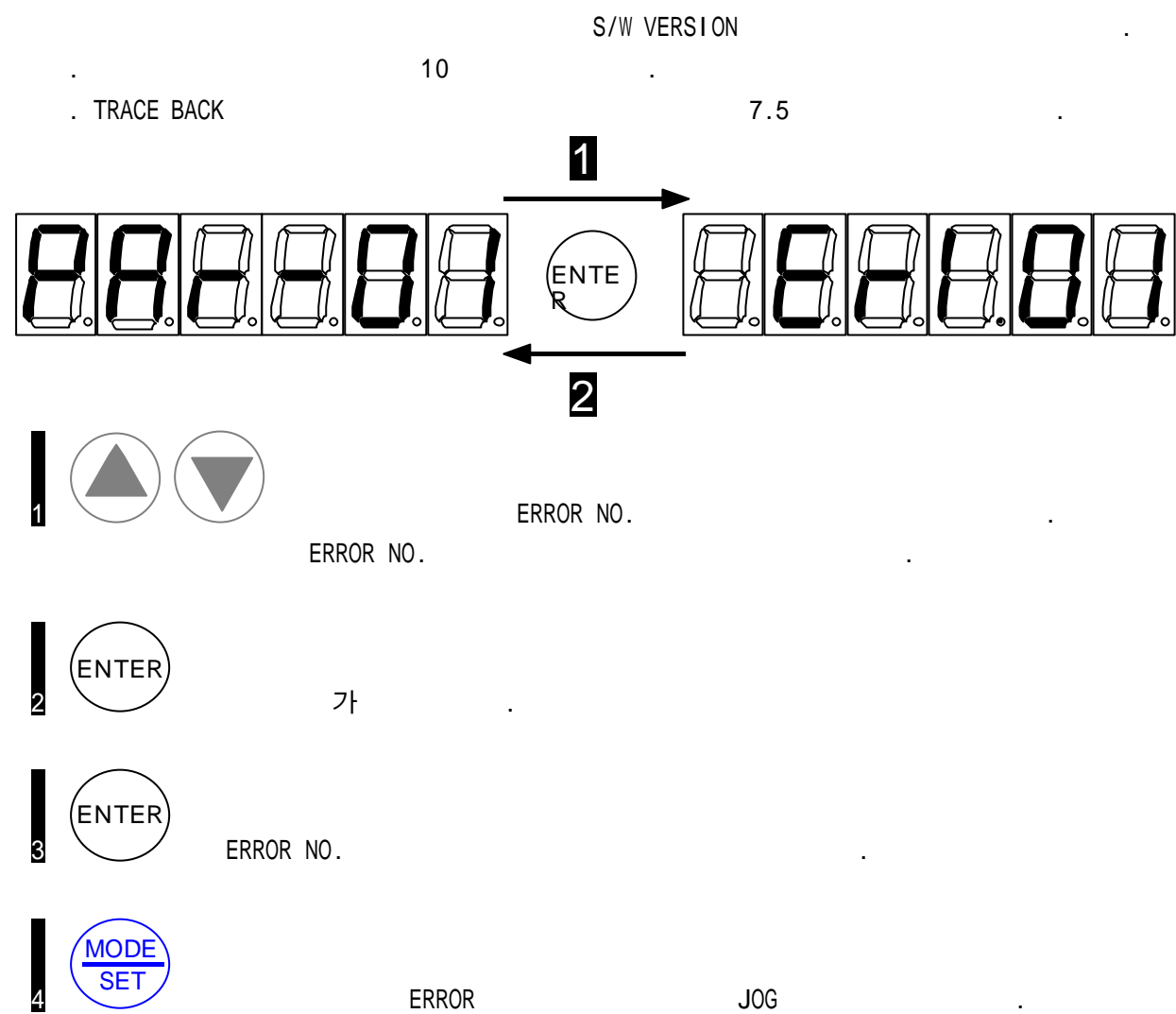
가 .



NO. .



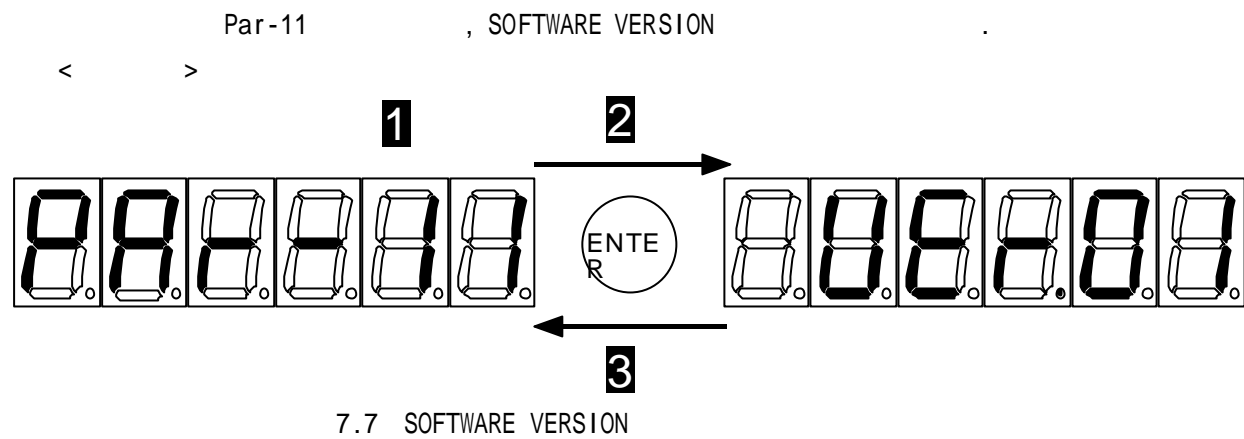
ERROR .



## 7.5 DIGITAL JOG TRACE BACK

ERROR CODE	A L A R M
10	,Servo drive Reset 가
11	가
20	.
21	
22	
23	
27	SERVO OVER HEAT
30	OPEN
31	U(OR Z)
32	INPUT OVERFLOW
33	PULSE COMMAND INPUT DATA OVERFLOW
34	
35	BATTERY
36	
40	
50	
60	CPU
62	SENSOR U OFFSET
63	SENSOR V OFFSET
64	OFFSET
65	OFFSET
70	
71	
72	
(	JOG .)
90	
91	,
92	
A0	JOG

가. SOFTWARE VERSION



11



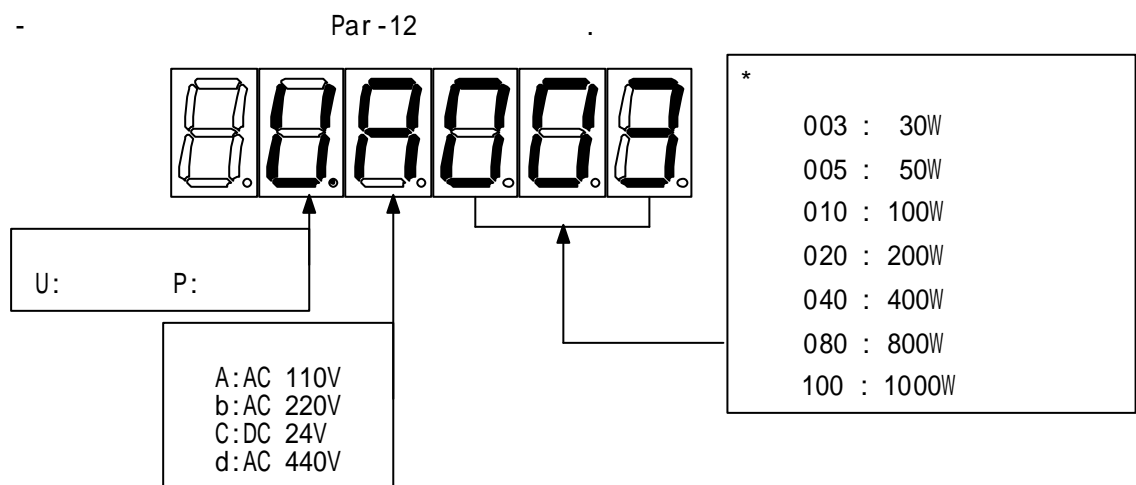
가

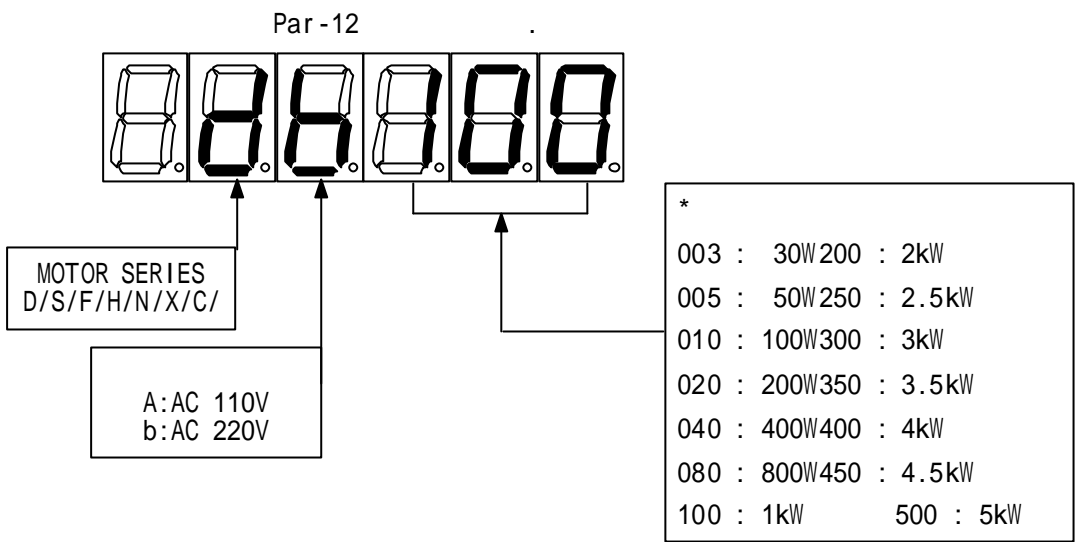


ERROR

JOG

(CSD-Series)





## 7.7 JOG

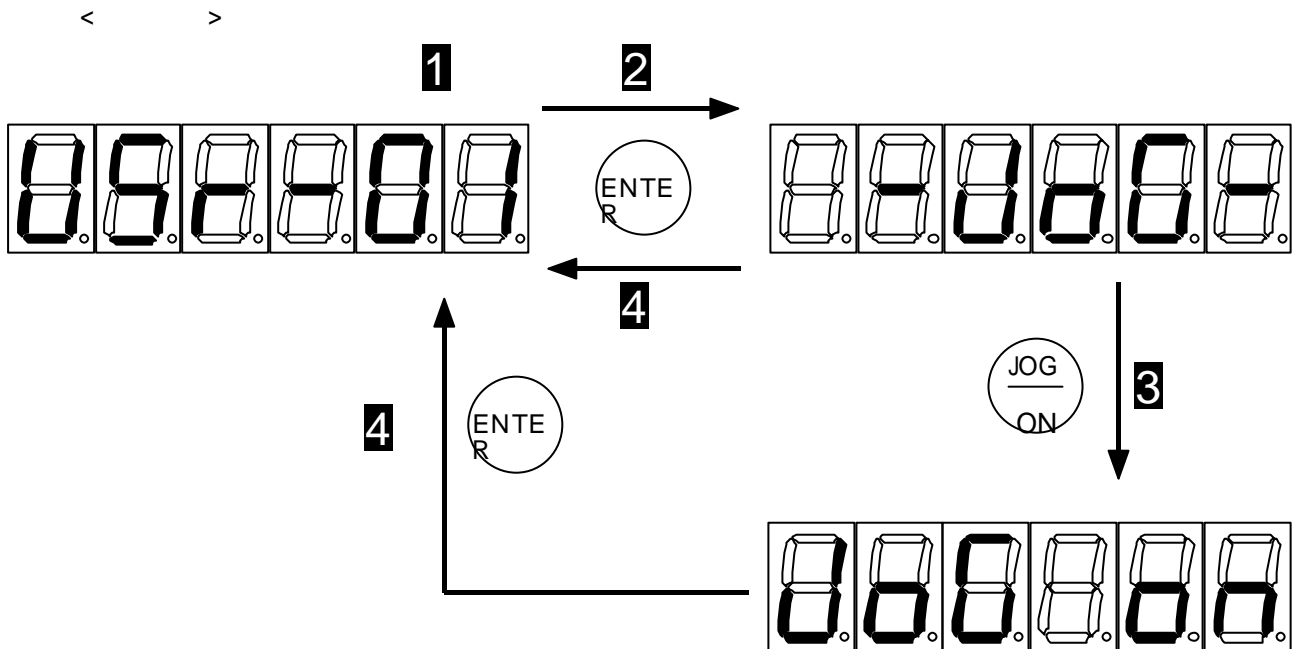
- JOG
- AUTO TUNING
- SPEED COMMAND    TORQUE COMMAND    OFFSET
- SPEED COMMAND    TORQUE COMMAND    OFFSET
- ERROR CLEAR
- DA CHANNEL

가. JOG

JOG

USr-01

SEt-25



7.8 JOG





1   JOG 01 .

2  JOG .

3  JOG 가 .

4  JOG .

5  JOG .

6 JOG  .  
 .

## . AUTO TUNNING

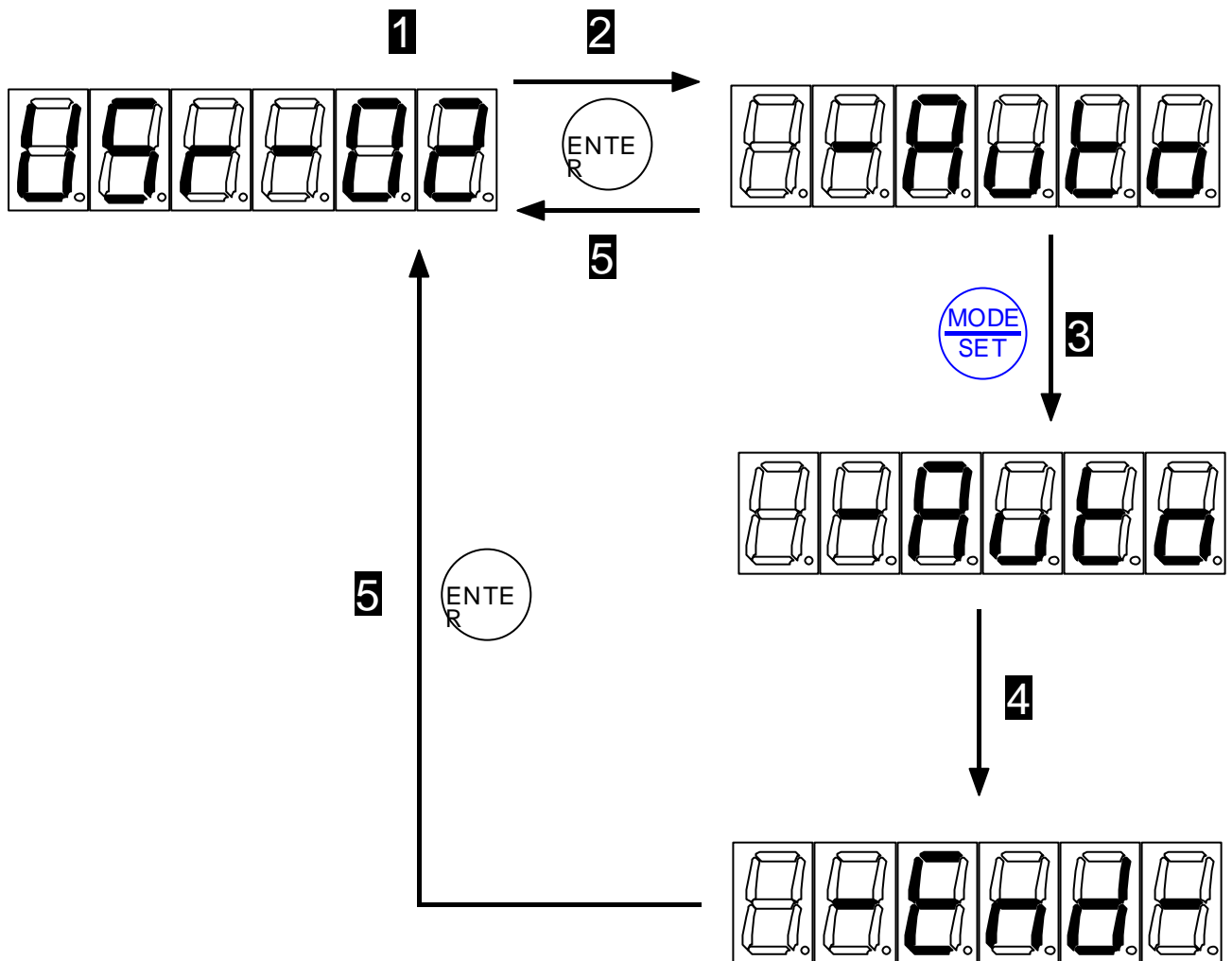
### (1) AUTO TUNNING

JOG

USr-02

AUTO TUNNING

< >




### 7.9 AUTO TUNNING

1   JOG 02 .


2  AUTO TUNING .

3  AUTO TUNING .

4 AUTO TUNING END 가 .

5  JOG .

6  JOG .

AUTO TUNING SET-02,03 , GAIN   
TUNING GAIN . AUTO  
 , SET -38,39 DAMPING  
FACTOR , AUTO TUNING GAIN .

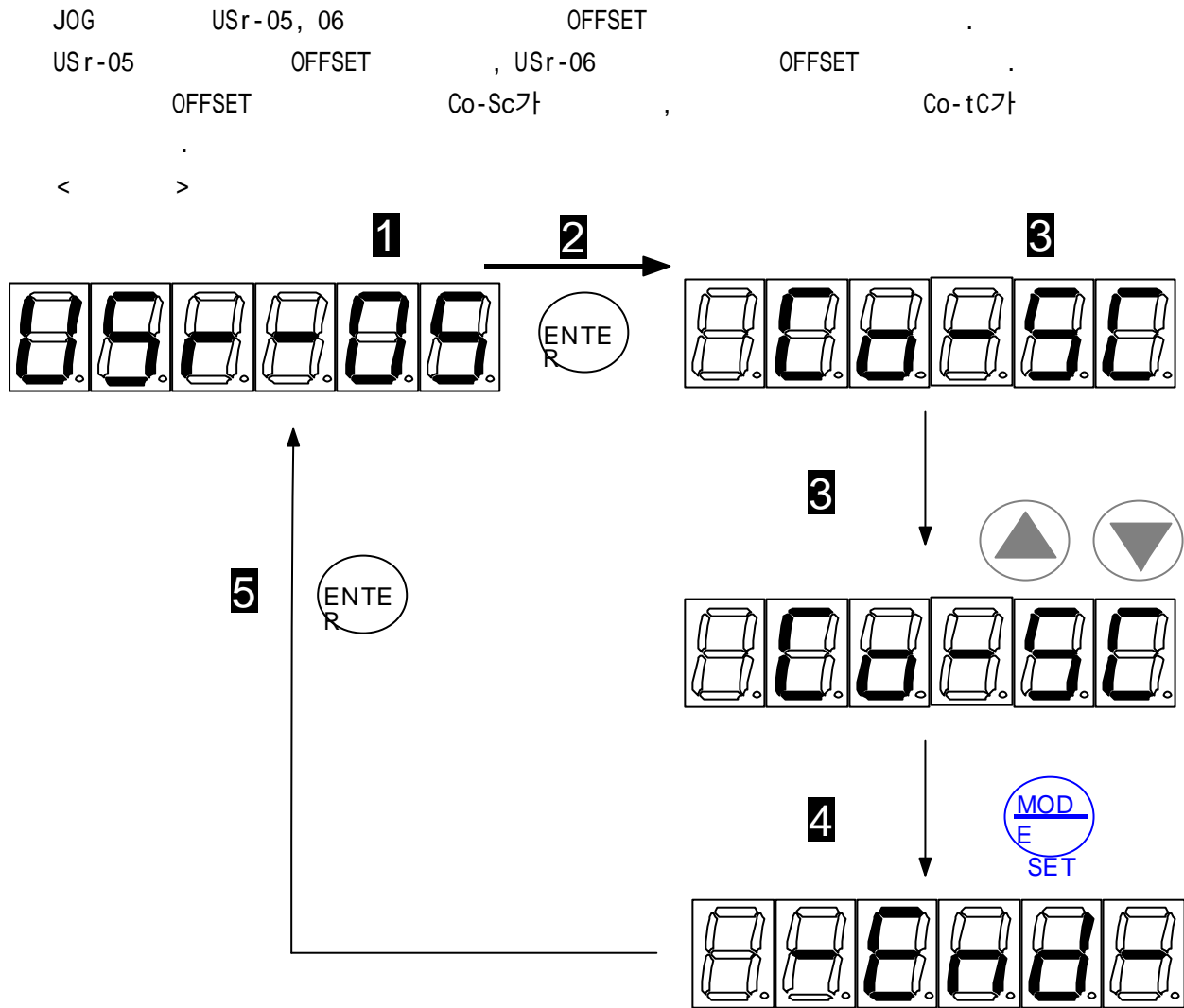
AUTO TUNING MOTOR가 . 720 °  
가 가 . AUTO TUNING  
가 AUTO TUNING  
가 JOG  
.

BODY	( )
LOAD	150
BALL SCREW	60
HARMONIC	60
TIMING BELT	50



## OFFSET

### (1) OFFSET



7.11      OFFSET



JOG

05

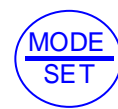
06



OFFSET



OFFSET



JOG

5  JOG .

(2) OFFSET  
,  
.

1 

OFFSET 가 .

2 

OFFSET 가 .

1 2

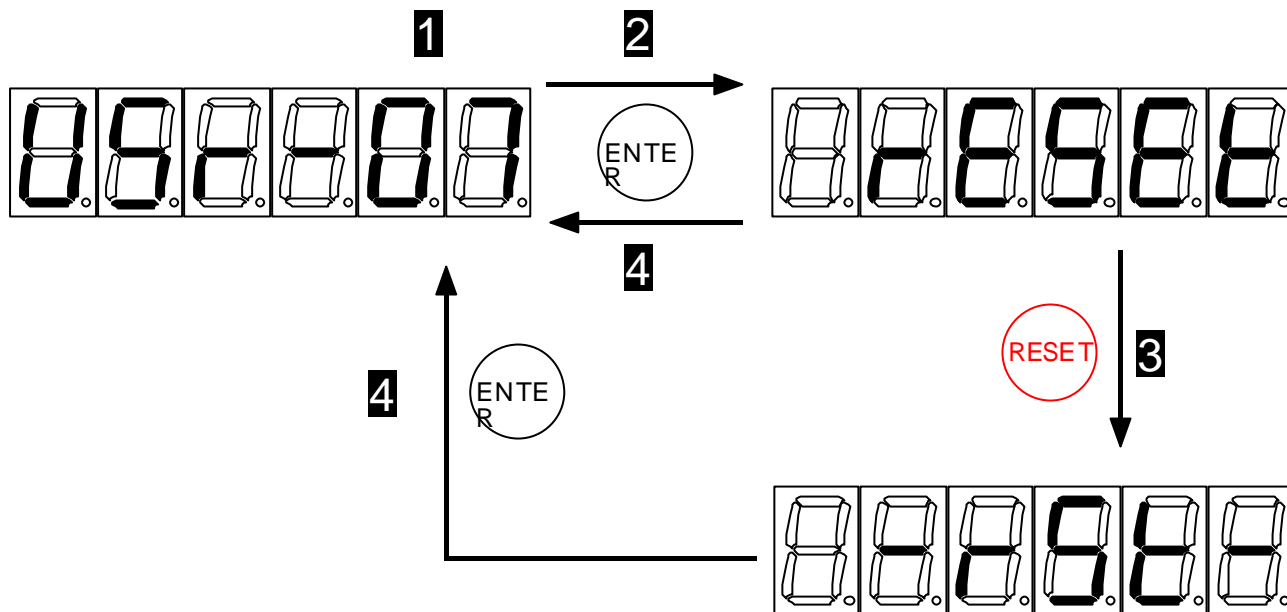
OFFSET . , OFFSET

OFFSET .

## . ERROR DATA RESET

JOG USr-07 ERROR DATA RESET .

< >



7.12 ERROR DATA RESET

**1** JOG 07 .

**2** ERROR RESET .

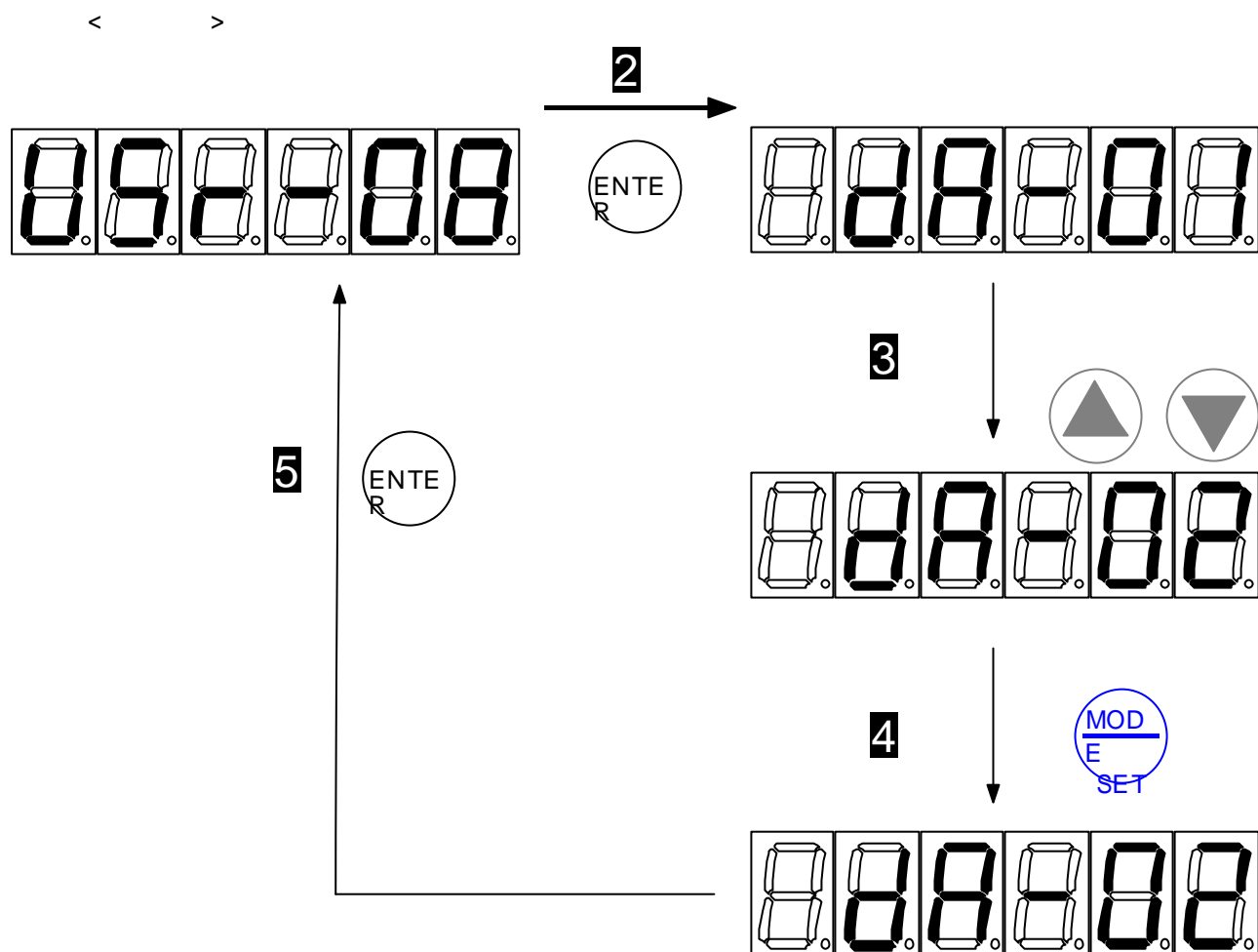
**3** ERROR DATA가 RESET .

**4** JOG .

**5** JOG .

## . D/A CONVERTER CHANNEL

JOG                      USr-08                      D/A CONVERTER CHANNEL  
D/A                      7.6



7.13 D/A CONVERTER CHANNEL



JOG

08



D/A



JOG



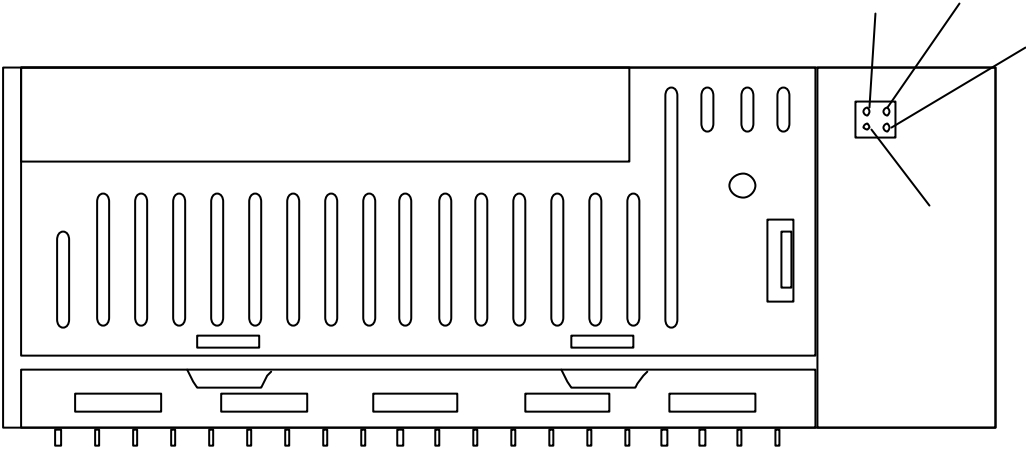


JOG

78.6 D/A

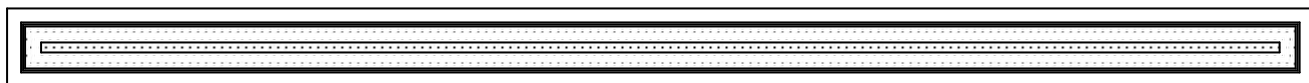
NO.				
05		FEEDBACK	GND	GND
06		TORQUE	GND	GND
07	TORQUE	FEEDBACK	GND	GND

( \* 01-04 가 )



1. CSD-Series D/A 가 , CSDP-Series CN1 D/A .

2. D/A CHANNEL DA 가 JOG 07 . ( 5 , 6 07 ) , 01-04 07 . (01-04 TEST 가)



8

,

NOISE

.



8.1

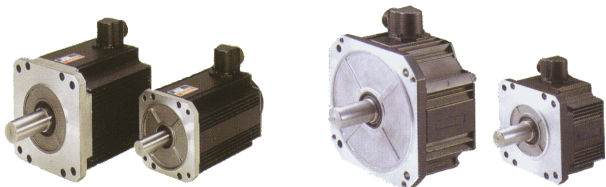
- 가 .
  - 1. 가. .
  - ( , .)
  - 2. 가.
  - 3. 가, 가.
  - 4. .
- FA

8.2

가. AC  
AC , 가 가 ,

1). - 가  
가

가 .

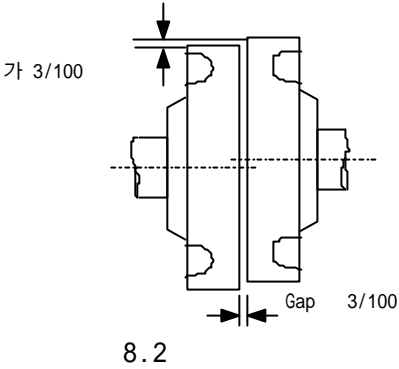


8.1 AC Servo Motor

- 2). AC
- , 가 가
  - : 0 +40
  - : -20 +80
  - : 20 80% ( )
  - , 가
  - 가

3).

가 Key  
key  
flexible  
( 9.2 )  
(50G )  
3.1

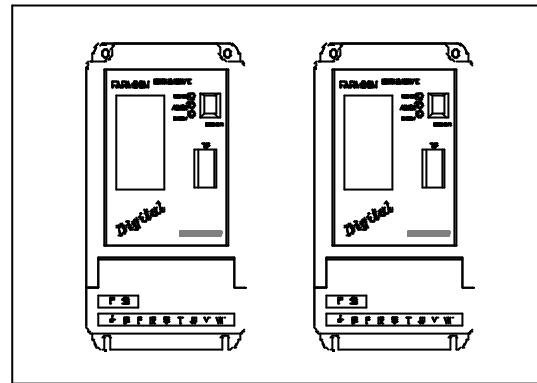
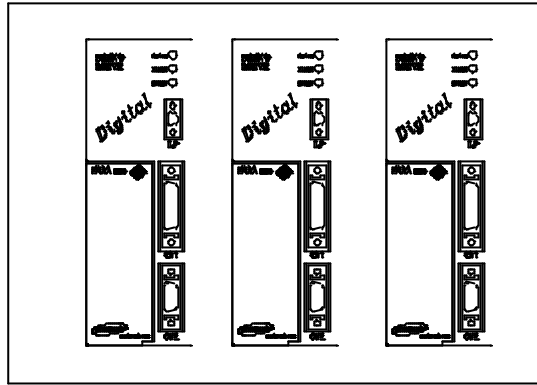


. CSD

1).

9.3 )  
( 55 )  
( 가

가 가 NFB,  
가



<CSD- >  
<CSDP >  
8.3 ( )

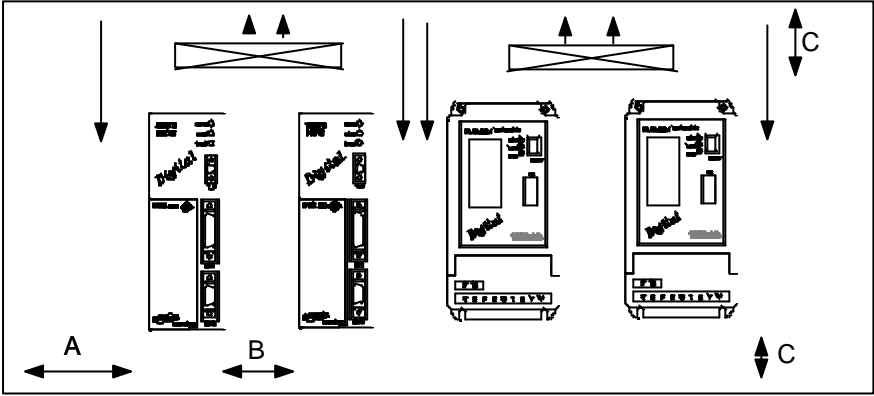
2) .

- , 가 가
- : 0 +55
- : -20 +80
- : 20 90% ( )
- : 0.5G(4.9m/s<sup>2</sup>)
- , 가
- 가

3)

- 1.
- 2.

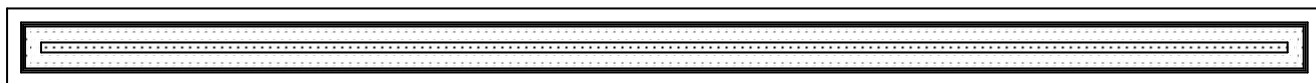
3. 가  
가 8.4



A	B	C	
30	10	50	mm

#### 8.4

- ( 3 ) ( 3 )  
 3000:1 mV  
 . (Power controller  
 .)
- 1) , (CN1, 3 ) shield , 가  
AWG26 .
  - 2) 가 1 3 .
  - 3) line(CN1), 20m  
가 가 .
  - 4) Noise .
  1. Line filter, , 가 .
  2. , , surge .
  3. , 30cm .
  4. noise filter .
  5. Box 가 +55 .
  6. ( , cooler )  
가 40 가 .
  7. , 가 noise 가 가  
Noise Filter .
  8. open .
  9. , .



9 CSD SERIES SERVO MOTOR, DRIVE JOG OPTION ( , )



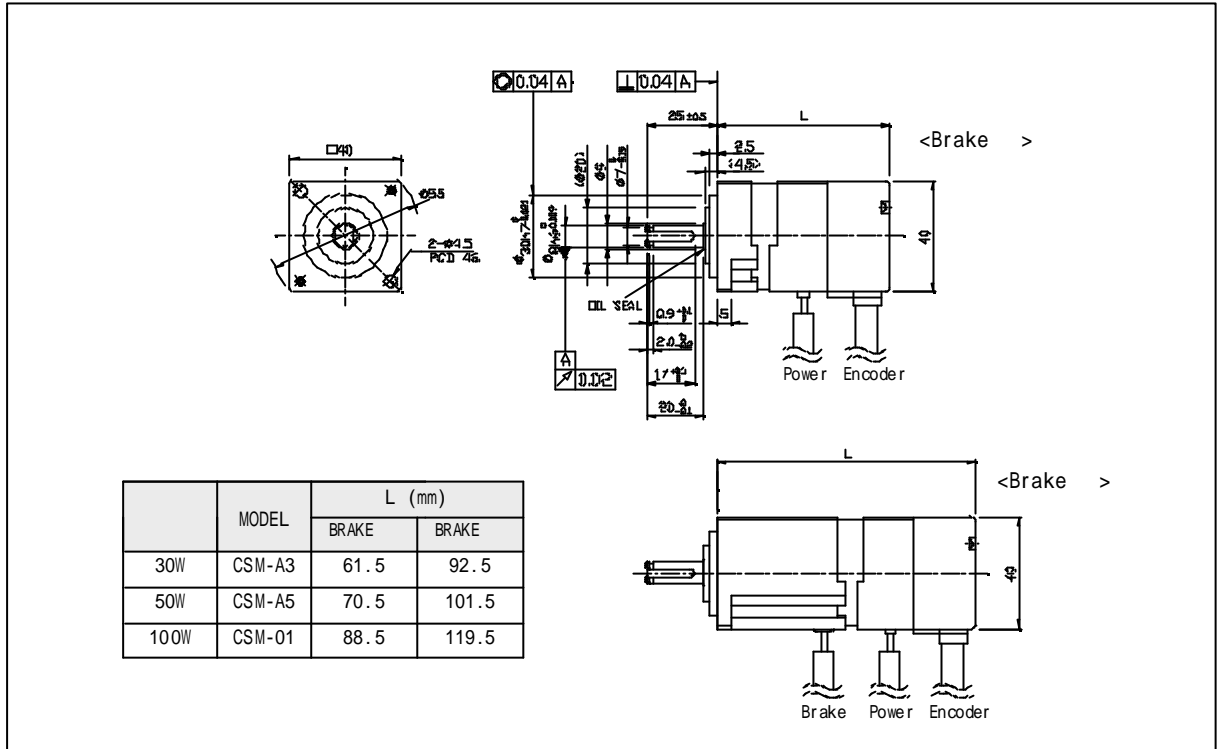


## 9.1 AC

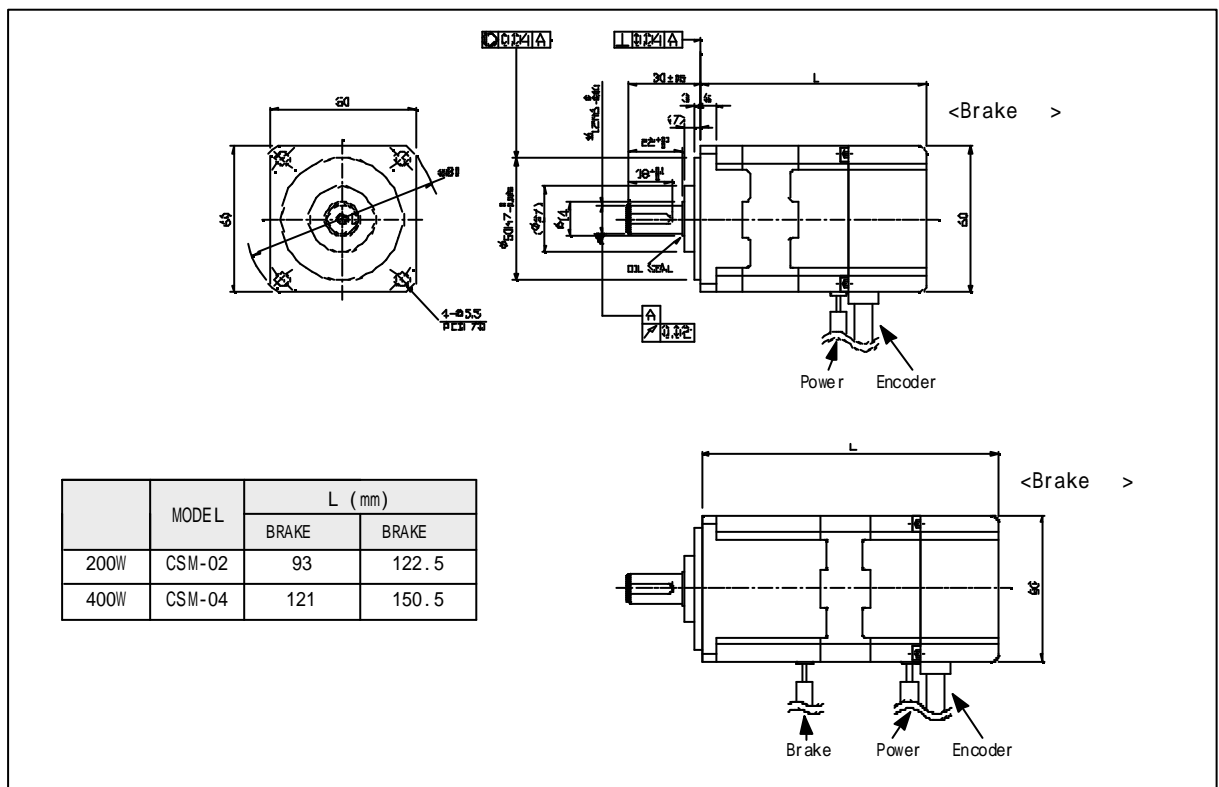
가. CSM- AC

(1)

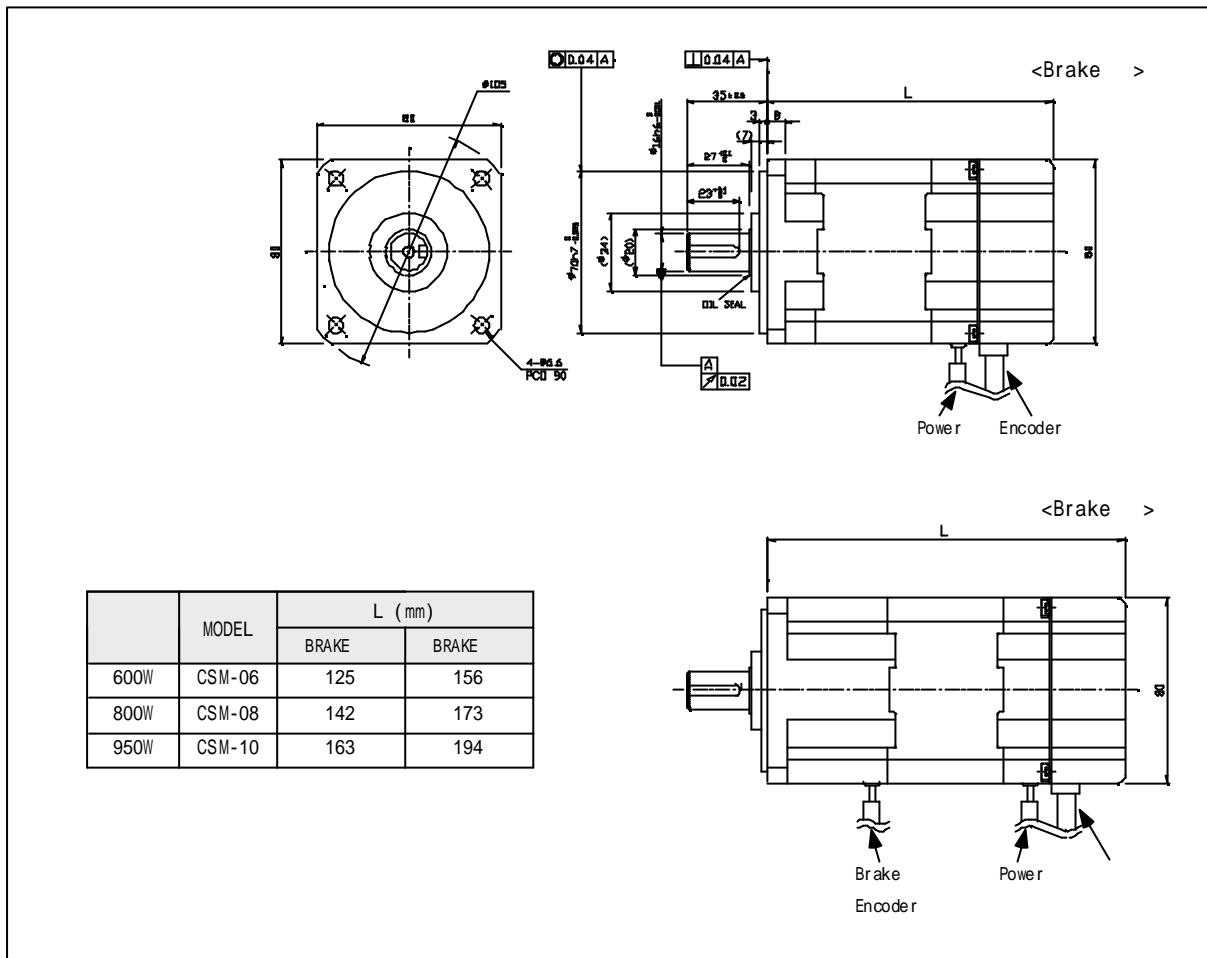
가) CSM-A3/A5/01 (30, 50, 100W)



나) CSM-02/04 (200, 400W)



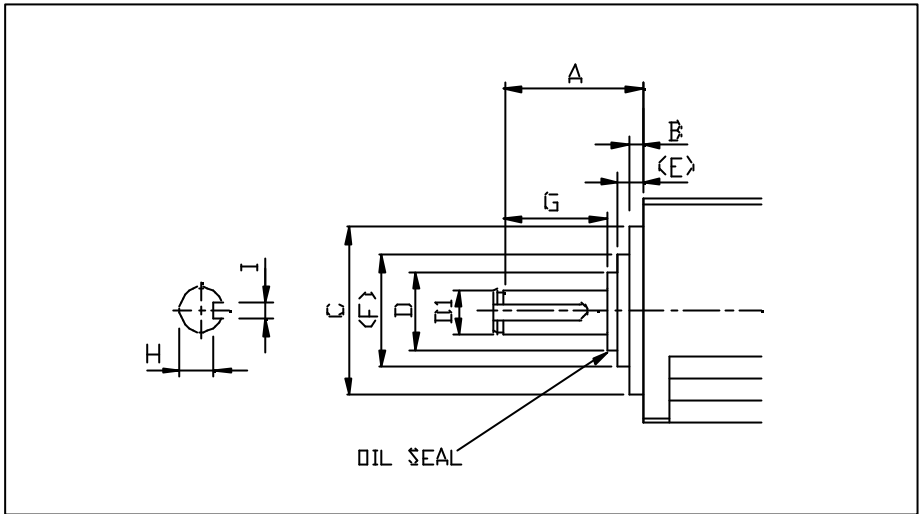
)CSM-06/08/10 (600, 800, 950W)



(2) CSM-

(W)	kg		radial N (kgf)	thrust N (kgf)
	Brake	Brake		
CSM-A3 (30)	0.3	0.5	78.4 (8)	39.2 (4)
CSM-A5 (50)	0.4	0.6		
CSM-01 (100)	0.5	0.7		
CSM-02 (200)	1.1	1.5	196 (20)	68.6 (7)
CSM-04 (400)	1.7	2.0		
CSM-06 (600)	2.6	3.5	343 (35)	98 (10)
CSM-08 (800)	3.2	4.1		
CSM-10 (950)	3.8	4.8		

(3)  
가)



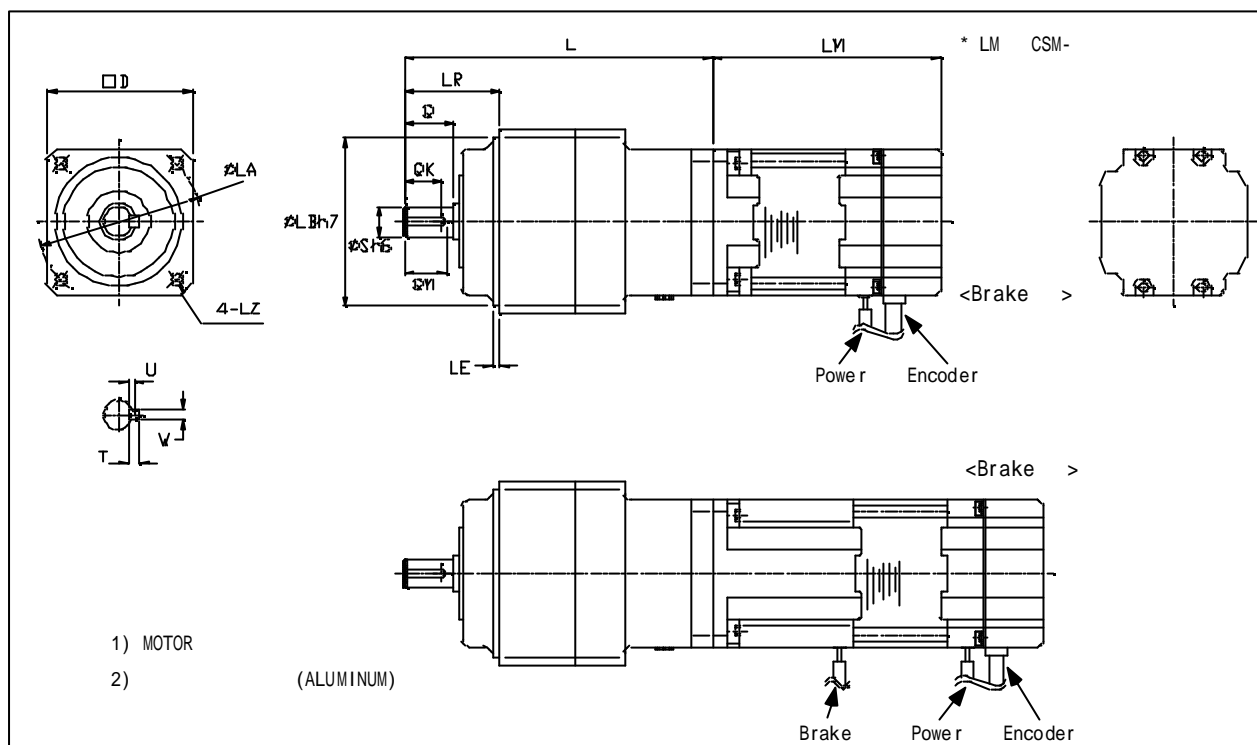
, Oil-seal D가 가 .

)

MOTOR	(mm)										KEY
	A	B	C	D	D1	E	F	G	H	I	
30, 50, 100W	25 ± 0.5	2.5	30h7 <sub>-0.021</sub>	9	8	(4.5)	( 20)	20	6.2 <sub>-0.2</sub>	3P9 <sub>-0.031</sub>	3 × 3 × 16
200, 400W	30 ± 0.5	3	50h7 <sub>-0.025</sub>	14	12	(7)	( 27)	22	9.5 <sub>-0.2</sub>	4P9 <sub>-0.042</sub>	4 × 4 × 20
600, 800, 950W	35 ± 0.5	3	70H7 <sub>-0.025</sub>	20	16	(7)	( 34)	27	13.0 <sub>-0.2</sub>	5P9 <sub>-0.042</sub>	5 × 5 × 25

#### (4) CSMG

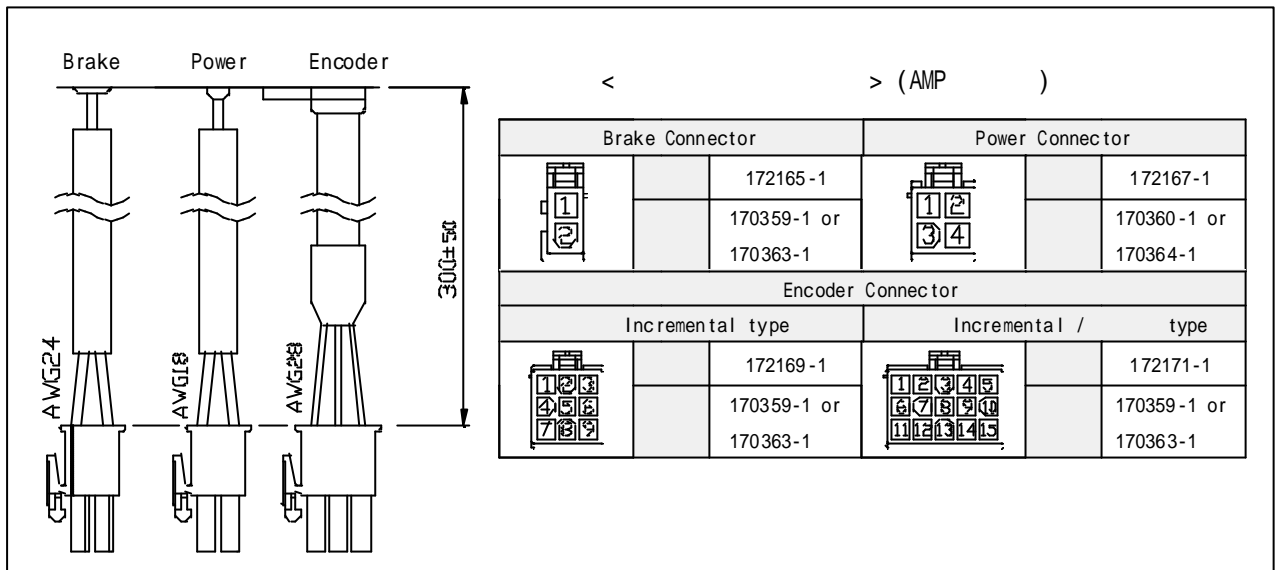
가)



)

			(mm)		(mm)						F L A N G E (mm)					
MODEL			L	LR	Q	QM	QK	S	W × U	T	LB	LA	LE	LZ	D	X
CSMG-A5	B	$\frac{1}{3}$ , $\frac{1}{5}$	99.5	32	20	18	16	12	4 × 2.5	4	50	60	3	M5	52	12
		$\frac{1}{9}$ , $\frac{1}{15}$ , $\frac{1}{25}$	110													
CSMG-01	B	$\frac{1}{3}$ , $\frac{1}{5}$	99.5	32	20	18	16	12	4 × 2.5	4	50	60	3	M5	52	12
		$\frac{1}{9}$ , $\frac{1}{15}$	110													
	C	$\frac{1}{25}$	142	50	30	26	22	19	6 × 3.5	6	70	90	3	M6	78	20
CSMG-02	B	$\frac{1}{3}$ , $\frac{1}{5}$	104.5	32	20	18	16	12	4 × 2.5	4	50	60	3	M5	52	12
	C	$\frac{1}{9}$ , $\frac{1}{15}$ , $\frac{1}{25}$	150	50	30	26	22	19	6 × 3.5	6	70	90	3	M6	78	20
CSMG-04	B	$\frac{1}{3}$	104.5	32	20	18	16	12	4 × 2.5	4	50	60	3	M5	52	12
	C	$\frac{1}{5}$	139.5	50	30	26	22	19	6 × 3.5	6	70	90	3	M6	78	20
		$\frac{1}{9}$ , $\frac{1}{15}$	150													
	D	$\frac{1}{25}$	165	61	40	35	30	24	8 × 4	7	90	115	5	M8	96	20
CSMG-06	C	$\frac{1}{3}$ , $\frac{1}{5}$	143.5	50	30	26	22	19	6 × 3.5	6	70	90	3	M6	78	20
	D	$\frac{1}{9}$ , $\frac{1}{15}$	171	61	40	35	30	24	8 × 4	7	90	115	5	M8	96	20
CSMG-08	C	$\frac{1}{3}$ , $\frac{1}{5}$	143.5	50	30	26	22	19	6 × 3.5	6	70	90	3	M6	78	20
	D	$\frac{1}{9}$ , $\frac{1}{15}$	171	61	40	35	30	24	8 × 4	7	90	115	5	M8	96	20

(5)  
가)



)

A.

	1	U	
	2	V	
	3	W	
	4	C.G	

B.

	1	BK	
	2	BK	

Brake : DC 24V

C. Incremental

	1	UE, A		4	$\overline{\text{VE, B}}$	/	7	+5V	
	2	$\overline{\text{UE, A}}$	/	5	WE, Z		8	GND	
	3	VE, B		6	$\overline{\text{WE, Z}}$	/	9	Shield	Shield

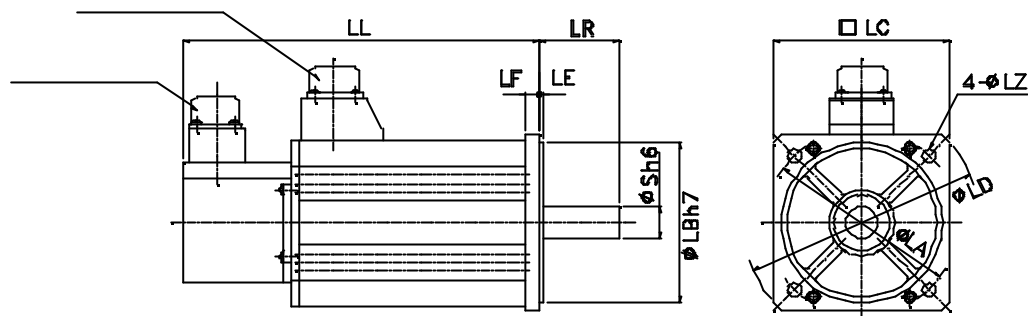
D. Incremental /

		Inc				Inc		
	1	A	A		9	V	Reset	
	2	$\overline{\text{A}}$	$\overline{\text{A}}$	/	10	$\overline{\text{V}}$	F.G	/
	3	B	B		11	W	Bat +	
	4	$\overline{\text{B}}$	$\overline{\text{B}}$	/	12	$\overline{\text{W}}$	Bat -	/
	5	Z	Z		13	+5V	+5V	
	6	$\overline{\text{Z}}$	$\overline{\text{Z}}$	/	14	GND	GND	
	7	U	Rx		15	Shield	Shield	Shield
	8	$\overline{\text{U}}$	$\overline{\text{Rx}}$	/				

(6) CSD

	I/O (CN1) 36PIN	(CN2) 20PIN
	CON-SCONN36PIN	CON-SCONN20PIN

. CSMD/S/H/F- AC  
(1) CSMD-



: mm

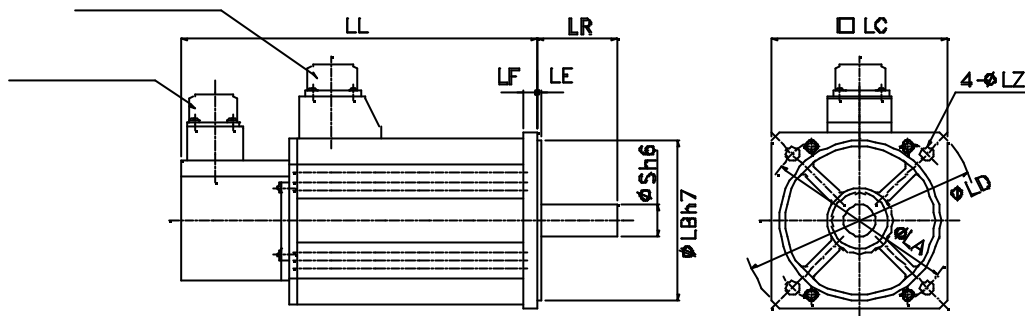
(kW)		0.75	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
LL	Incremental / Brake	144	147	172	197	222	247	229	249	202	222
	Incremental / Brake	169	172	197	222	247	272	254	274	227	247
	Absolute / Brake	173	176	201	226	251	276	258	278	231	251
	Absolute / Brake	198	201	226	251	276	301	283	303	256	276
LR		55	55	55	55	65	65	65	65	70	70
S		19	22	22	22	24	24	28	28	35	35
LA		130/145	145	145	145	145	145	165	165	200	200
LB		110	110	110	110	110	110	130	130	114.3	114.3
LC		120	130	130	130	130	130	150	150	180	180
LD		162	165	165	165	165	165	190	190	233	233
LE		3	6	6	6	6	6	3.2	3.2	3.2	3.2
LF		10	12	12	12	12	12	18	18	18	18
LZ		9	9	9	9	9	9	11	11	13.5	13.5
(kg)	Brake	4.8	6.8	8.5	10.6	12.8	14.6	16.2	18.8	21.5	25.0
	Brake	6.5	8.7	10.1	12.5	14.7	16.5	18.7	21.3	25.0	28.5

(2) CSMD-

(kW)		0.75	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
(N·m)		3.57	4.80	7.15	9.54	11.8	14.3	16.6	18.8	21.4	23.8
		10.7	14.4	21.5	28.5	35.5	42.9	50.0	56.4	64.3	71.4
(× 10 <sup>-4</sup> kgm <sup>2</sup> )		2.82	6.17	11.2	15.2	19.2	22.3	35.9	42.5	50.6	60.7
		3.13	6.79	12.3	16.7	21.1	24.6	40.2	46.8	55.6	66.7
(r/min)		3000									
		5000									
(Brake)		DC 24V 100%									
		:0 40 , :85% ( ), :56									



### (3) CSMS/H-



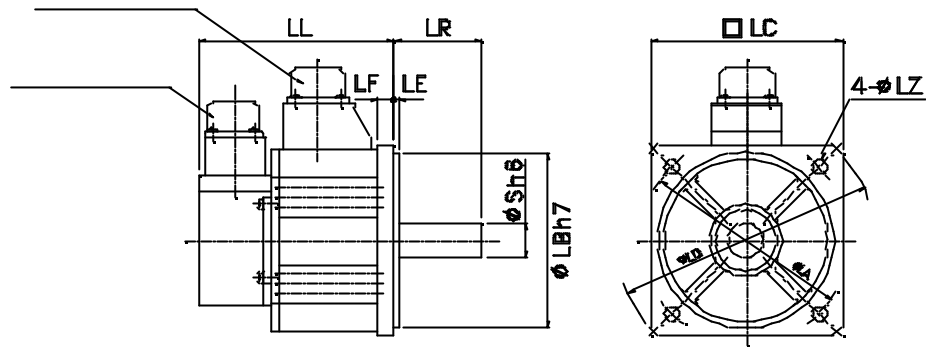
: mm

		CSMS-									CSMH-						
(kW)		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0
LL	INC. / Brake	172	177	202	227	214	234	237	257	277	147	172	197	187	202	227	252
	INC. / Brake	197	202	227	252	239	259	262	282	302	172	197	222	212	227	252	277
	ABS. / Brake	201	206	231	256	243	263	266	286	306	176	201	226	231	231	256	281
	ABS. / Brake	226	231	256	281	268	288	291	311	331	201	226	251	241	256	281	306
LR		55	55	55	55	55	55	65	65	65	70	70	70	80	80	80	80
S		19	19	19	19	22	22	24	24	24	22	22	22	35	35	35	35
LA		100	115	115	115	130	130	145	145	145	145	145	145	200	200	200	200
LB		80	95	95	95	110	110	10	110	110	110	110	110	114.3	114.3	114.3	114.3
LC		90	100	00	100	120	120	130	130	130	130	130	130	180	180	180	180
LD		120	135	135	135	162	162	165	165	165	165	165	165	233	233	233	233
LE		3	3	3	3	3	3	6	6	6	6	6	6	3.2	3.2	3.2	3.2
LF		7	10	10	10	10	10	12	12	12	12	12	12	18	18	18	18
LZ		6.6	9	9	9	9	9	9	9	9	9	9	9	13.5	13.5	13.5	13.5
(kg)	Brake	4.5	5.1	6.5	7.5	9.3	10.9	12.9	15.1	17.3	5.3	8.9	10.0	16	18.2	22	26.7
	Brake	5.1	6.5	7.9	8.9	11.0	12.6	14.8	17.0	19.2	6.9	9.5	11.6	19.5	21.7	25.5	30.2

### (4) CSMS/H-

(kW)		1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	0.5	1.0	1.5	2.0	3.0	4.0	5.0
(N·m)		3.18	4.77	6.36	7.94	9.54	11.0	12.6	14.3	15.8	2.38	4.8	7.15	9.54	14.3	18.8	23.8
		9.5	14.3	19.1	23.8	28.6	33.2	37.9	42.9	47.6	6.0	14.4	21.5	28.5	42.9	56.4	71.4
(× 10 <sup>-4</sup> kgm <sup>2</sup> )		1.69	2.59	3.46	4.31	6.77	7.90	12.7	15.3	17.8	14.0	26	42.9	62.0	94.1	120.0	170.0
		1.88	2.84	3.81	4.74	7.45	8.69	15.8	18.1	20.4	15.2	27.2	44.1	67.9	100	126.0	176.0
(r/min)		3000									2000						
		5000									3000						
(Brake)		DC 24V 100%															
		:0 40 , : 85% ( ) , :5G															

(5) CSMF-



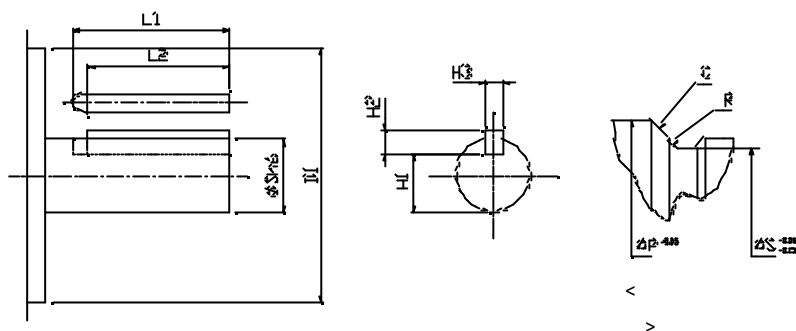
: mm

(kW)		0.4	0.75	1.5	2.5	3.5	4.5
LL	INC. / Brake	117	122	142	136	144	160
	INC. / Brake	142	147	167	163	171	191
	ABS. / Brake	146	151	171	165	173	189
	ABS. / Brake	171	176	196	192	200	220
LR		55	55	65	65	65	70
S		19	22	35	35	35	35
LA		145	200	200	235	235	235
LB		110	114.3	114.3	200	200	200
LC		130	180	180	220	220	220
LD		165	233	233	268	268	268
LE		6	3.2	3.2	4	4	4
LF		12	18	18	16	16	16
LZ		9	13.5	13.5	13.5	13.5	13.5
(kg)	Brake	4.7	8.6	11.0	14.8	15.5	19.9
	Brake	6.7	10.6	14.0	17.5	19.2	24.3

(6) CSMF-

(kW)		0.4	0.75	1.5	2.5	3.5	4.5
(N·m)		1.90	3.57	7.15	11.8	16.6	21.4
		5.7	10.7	21.5	30.4	44.1	54.9
(×10 <sup>-4</sup> kgm <sup>2</sup> )		2.45	7.59	14.1	41.3	51.6	72.3
		2.70	8.34	15.5	45.3	55.7	78.5
(r/min)		2000					
		3000					
(Brake)		DC 24V 100%					
		: 0 40 , : 85% ( ), : 56					

## (7) CSMD/S/H/F-



: mm

MOTOR /	L1	L2	D1	H1	H2	H3	C	R	P	S	
CSMS-10	45	42	80h7	15.5	6	6h9	C0.3	R0.6 1.1	19.8	19	
CSMS-15 CSMS-25			95h7								
CSMS-30 CSMS-35 CSMD-10 CSMS-20 CSMH-05 CSMH-15	45	41	110h7	18.0	7	8h9	C0.5		24.0	22	
CSMS-40 CSMS-50 CSMD-25 CSMD-30				55	51	20.0			7	8h9	No Step
CSMF-04 CSMD-08	45	42		15.5	6	6h9			24.0	19	
CSMF-08	45	41		114.3h7	18.0	7			8h9	C2.5	39.8
CSMF-15 CSMD-45 CSMD-50 CSMH-20 CSMH-50	55	50	114.3h7	30.0	8	10h9	C0.5		39.8	35	
CSMF-25 CSMF-45	55	50	200h7	30.0	8	10h9	C1.5 C2.5		R1.5	37.9	35
CSMD-35 CSMD-40	55	51	130h7	24.0	7	8h9	C0.5		R0.6 1.1	29.8	28

## (8) CSMD/S/H/F-

3

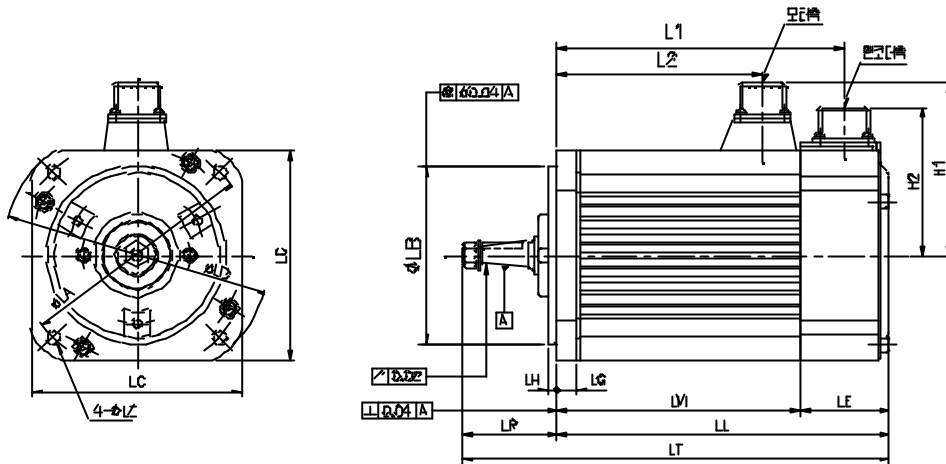
Motor /	Brake /	( DDK )				Part NO.		
		Receptacle	L type Plug	Straight type Plug	Cable Clamp	L type Plug	Straight type Plug	Cable Clamp
CSMD-08 -25		DMS 3102A20-18P	DMS 3108B20-18S	DMS 3106B20-18S	DMS 305712A	3706-001021	3706-001022	6502-001022
CSMS-10 -25		DMS 3102A20-4P	DMS 3108B20-4S	DMS-3106B20-4S	DMS 305712A	3706-001019	3706-001020	6502-001022
CSMD-30 -50		DMS 3102A24-11P	DMS 3108B24-11S	DMS 3106B24-11S	DMS 305716A	3706-001027	3706-001028	6502-001021
CSMS-30 -50		DMS 3202A22-22P	DMS 3208B22-22S	DMS 3206B22-22S	DMS 305712A	3706-001023	3706-001024	6502-001022
CSMF-04 -15	/	DMS 3102A20-18P	DMS 3108B20-18S	DMS 3106B20-18S	DMS 305712A	3706-001021	3706-001022	6502-001022
CSMF-20 -45	/	DMS 3102A24-11P	DMS 3108B24-11S	DMS 3106B24-11S	DMS 305716A	3706-001027	3706-001028	6502-001021

Motor		Brake	Part No	Pin									
CSMD-08 CSMS-10 CSMH-05	25		DMS 3102A 20-18P	Pin	G	H	A	F	I	B	E	D	C
					BR	BR		U	V	W	FG	FG	
	25		DMS 3102A 20-4P	Pin	A	B	C	D					
					U	V	W	FG					
CSMD-30 CSMS-30 CSMH-20	50		DMS 3102A 24-11P	Pin	A	B	C	D	E	F	G	H	I
					BR	BR		U	V	W			
	50		DMS 3202A 22-22P	Pin	A	B	C	D					
					U	V	W	FG					
CSMF-04 ~ 15			DMS 3102A 20-18P	Pin	G	H	A	F	I	B	E	D	C
					BR	BR		U	V	W	FG	FG	
			DMS 3102A 20-18P	Pin	G	H	A	F	I	B	E	D	C
								U	V	W	FG	FG	
CSMF-20 ~ 45			DMS 3102A 24-11P	Pin	A	B	C	D	E	F	G	H	I
					BR	BR		U	V	W			
			DMS 3102A 24-11P	Pin	A	B	C	D	E	F	G	H	I
								U	V	W			

#16  
#12

#12  
#8

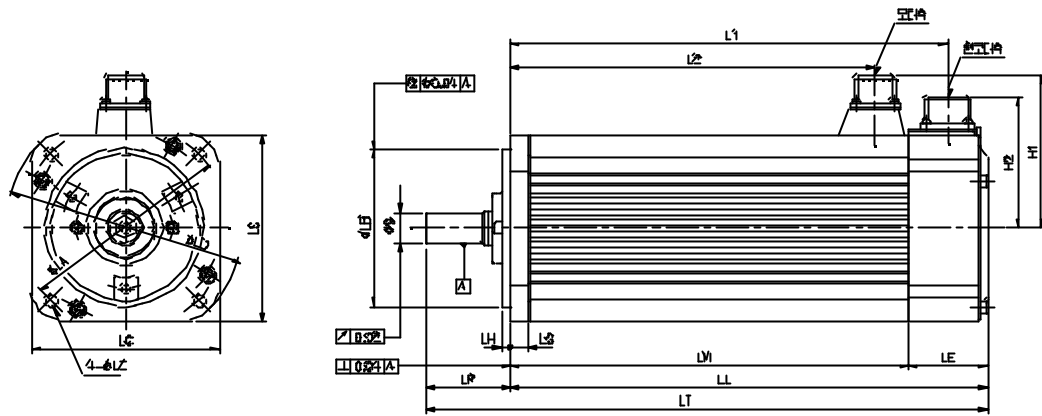
. CSMN/X- AC  
(1) CSMN-03 ~ CSMN-06 / CSMX-02 ~ CSMX-09



: mm

	CSMN		CSMX			
(kW)	0.3	0.6	0.15	0.3	0.45	0.85
L1	177	234	132	178	177	234
L2	127	184	89.5	135.5	127	184
H1	109		89		109	
H2	92		76		92	
LA	145		100		145	
LB	110 <sup>0</sup> <sub>-0.035</sub>		80 <sup>0</sup> <sub>-0.030</sub>		110 <sup>0</sup> <sub>-0.035</sub>	
LC	130		90		130	
LD	165		120		165	
LE	55		40		55	
LG	12		7		12	
LH	6		4		6	
LL	205	262	153	199	205	262
LM	150	207	113	159	150	207
LR	58		37		58	
LT	263	320	190	236	263	320
LZ	9		6.9		9	

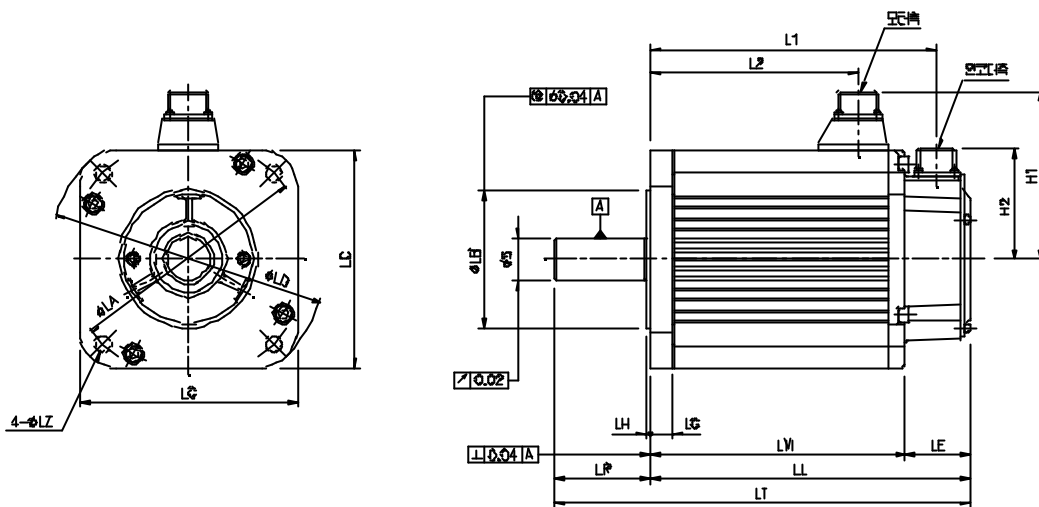
(2) CSMN-09 / CSMX-13



: mm

	CSMN	CSMX
(kW)	09	13
L1	303	
L2	253	
H1	109	
H2	92	
LA	145	
LB	$110^{+0}_{-0.035}$	
LC	130	
LD	165	
LE	55	
LG	12	
LH	6	
LL	331	
LM	276	
LR	58	
LT	389	
LZ	9	
S	$22^{+0}_{-0.013}$	

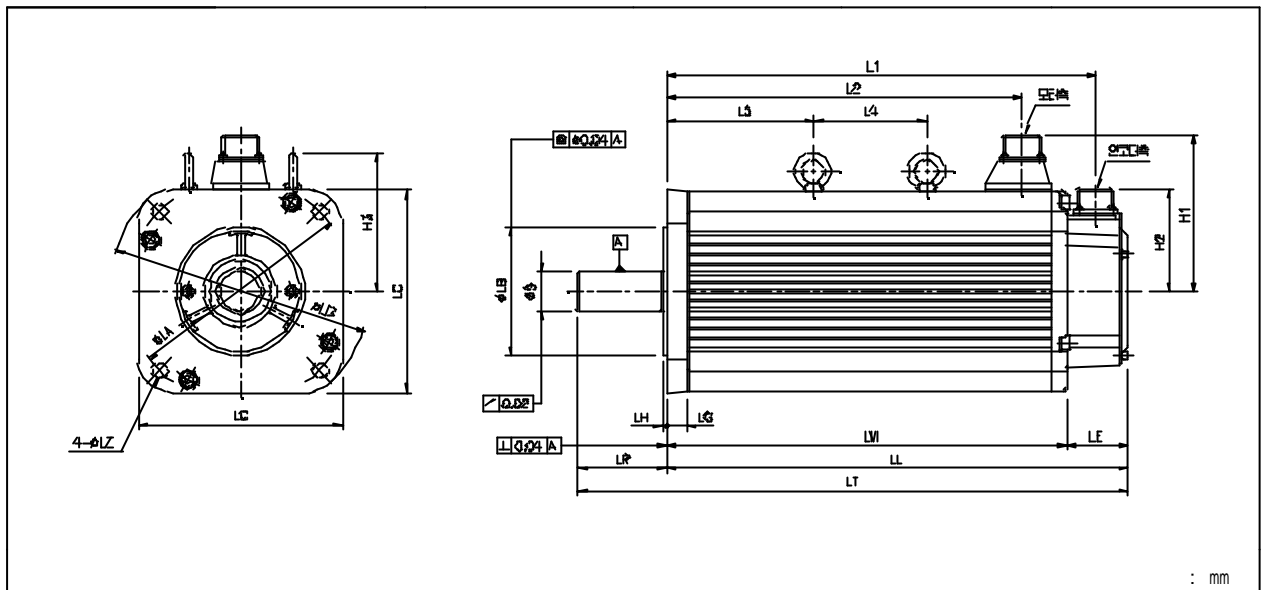
(3) CSMN-12 / CSMX-20



: mm

	CSMN	CSMX
(kW)	12	18
L1	237	
L2	172	
H1	139	
H2	92	
LA	200	
LB	114.3 <sup>0</sup> <sub>-0.025</sub>	
LC	180	
LD	230	
LE	54	
LG	18	
LH	3.2	
LL	265	
LM	211	
LR	79	
LT	344	
LZ	13.5	
S	35 <sup>+0.01</sup> <sub>0</sub>	

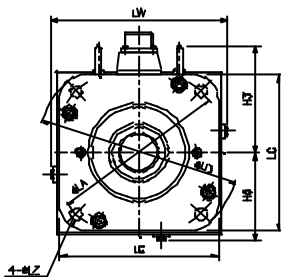
(4) CSMN-20 ~ CSMN-44 / CSMX-30 ~ CSMX-44



	CSMN			CSMX	
(kW)	20	30	44	29	44
L1	294	379	550	294	379
L2	229	314	476	229	314
L3	113	130	225	113	130
L4	50	100		50	100
H1	139		149	139	
H2	92				
H3	123				
LA	200				
LB	114.3 <sup>0</sup> <sub>-0.025</sub>				
LC	180				
LD	230				
LE	54				
LG	18				
LH	3.2				
LL	322	407	578	322	407
LM	268	353	524	268	353
LR	79		110	79	
LT	401	486	688	401	486
LZ	13.5				
S	35 <sup>+0.01</sup> <sub>0</sub>		42 <sup>0</sup> <sub>-0.015</sub>	35 <sup>+0.01</sup> <sub>0</sub>	



(5) CSMN-60



: mm

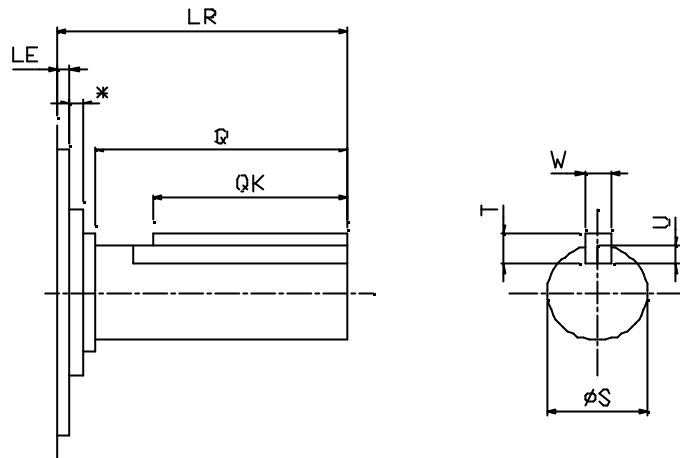
	CSMN
(kW)	60
L1	550
L2	476
L3	225
L4	100
L5	575
H1	149
H2	92
H3	123
H4	131
H5	105
LA	200
LB	114.3 <sup>0</sup> <sub>-0.025</sub>
LC	180
LD	230
LG	18
LH	3.2
LL	665
LR	110
LT	775
LW	210
LZ	13.5
S	42 <sup>0</sup> <sub>-0.016</sub>

(6) CSMN

		C S M N							
(kW)		0.3	0.6	0.9	1.2	2.0	3.0	4.4	6.0
(N ·m)		2.96	5.93	8.97	11.93	19.88	29.57	43.6	59.55
		7.46	14.68	20.09	29.16	45.78	94.83	66.28	110.1
( × 10 <sup>-4</sup> kgm <sup>2</sup> )		13.8	24.8	37.4	68.2	112	146	245	245
(r/min)		1000						1000	
		2000						1500	
(Brake)		DC 24V 100%							
(Encoder)		Incremental 2500,3000,6000P/r, Absolute 8196P/r							
		:0 40 , :85% ( ), :5G							

(7) CSMX

		C S M X							
(kW)		0.15	0.3	0.45	0.85	1.3	1.8	2.9	4.4
(N·m)		1.09	2.04	2.96	5.61	8.67	11.93	19.27	29.57
		3.03	6.06	9.28	15.81	25.7	35.38	56.29	79.33
(× 10 <sup>-4</sup> kg m <sup>2</sup> )		1.33	2.1	13.8	24.3	36.7	68.2	112	146
(r/min)		1500							
		2500							
(Brake)		DC 24V 100%							
(Encoder)		Incremental 2500,3000,6000P/r, Absolute 2048P/r							
		:0 40 , :85% ( ), :5G							



: mm

	(kW)	LR	LE											
				S	Q	QK	V	U	W					
CSMN	0.3	58	6	$19^0_{-0.003}$	40	25	5	3	5					
	0.6			$22^0_{-0.013}$			6	3.5	6					
	0.9													
	1.2	79	3.2	$35^0_{-0.01}$	76	60	8	5	10					
	2.0			$42^0_{-0.016}$										
	3.0													
	4.4	110			110	90			12					
	6.0													
CSMX	0.15	37	4	$14^0_{-0.0011}$	25	15	5	3	5					
	0.3			$19^0_{-0.0013}$										
	0.45	58	6	$22^0_{-0.0013}$	40	25				6	3.5	6		
	0.85						$35^0_{-0.01}$						76	60
	1.3													
	1.8	79	3.2	$35^0_{-0.01}$	76	60	8	5	10					
	2.9													
	4.4													

CSMN-05 09 bracket 8.0mm .

CSMX-02, 03 bracket 5.5mm .

CSMX-05, 13 bracket 8.0mm .

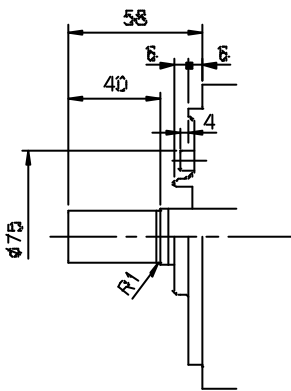
(9) CSMN-03 06 / CSMX-02 09

[illegible]

10) CSMN-09 / CSMX-13

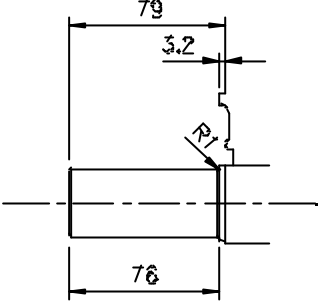
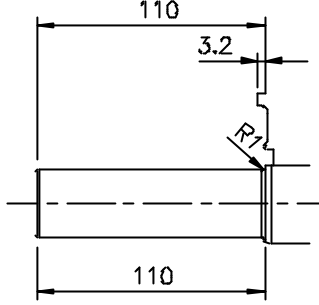
CSMN-09

CSMX-13



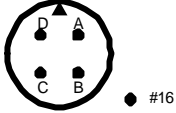
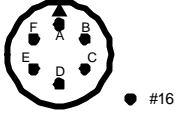
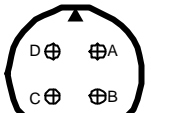

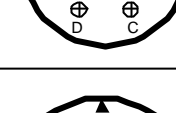
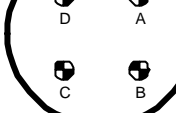

축단 상세도

(11) CSMN-12 60 / CSMX-20 44

CSMN-12 30 CSMX-20 44	CSMN-44 60
 <p>측단 상세도</p>	 <p>측단 상세도</p>

(12) CSMN/X- 3

Motor /	Brake /	( DDK )				Part NO.		
		Receptacle	L type Plug	Straight type	Cable Clamp	L type Plug	Straight type	Cable Clamp
CSMX-02 03		DMS	DMS	DMS	DMS 30576A	3706-001025	3706-001026	6502-001024
		DMS	DMS	DMS	DMS 30576A	3706-001029	3706-001030	6502-001024
CSMN-03-09 CSMX-		DMS	DMS	DMS	DMS 305710A	3706-001031	3706-001032	6502-001023
		DMS	DMS	DMS	DMS 305712A	3706-001033	3706-001034	6502-001023
CSMN-12-30 CSMX-		DMS	DMS	DMS	DMS 305712A	3706-001023	3706-001024	6502-001022
		DMS	DMS	DMS	DMS 305716A	3706-001035	3706-001036	6502-001021
CSMN-		DMS	DMS	DMS	DMS 305716A	3706-001037	3706-001038	6502-001020

Motor	Brake	Part No	Pin										
CSMX-02 ~ 03		DMS 3102A 14S-2P	Pin	A	B	C	D						
				U	V	W	FG						
		DMS 3102A 14S-6P	Pin	A	B	C	D	E	F				
				U	V	W	BR	BR	FG				
CSMN-03 ~ 09 CSMX-05 ~ 13		DMS 3102A 18-10P	Pin	A	B	C	D						
				U	V	W	FG						
		DMS 3102A 20-15P	Pin	A	B	C	D	E	F				
				U	V	W	BR	BR	FG				
CSMN-12 ~ 30 CSMX-20 ~ 44		DMS 3102A 22-22P	Pin	A	B	C	D						
				U	V	W	FG						
		DMS 3102A 24-10P	Pin	A	B	C	D	E	F				
				U	V	W	BR	BR	FG				
CSMN-44 ~ 60		DMS 3102A 32-17P	Pin		B	C	D						
				U	V	W	FG						

(14) CSDP

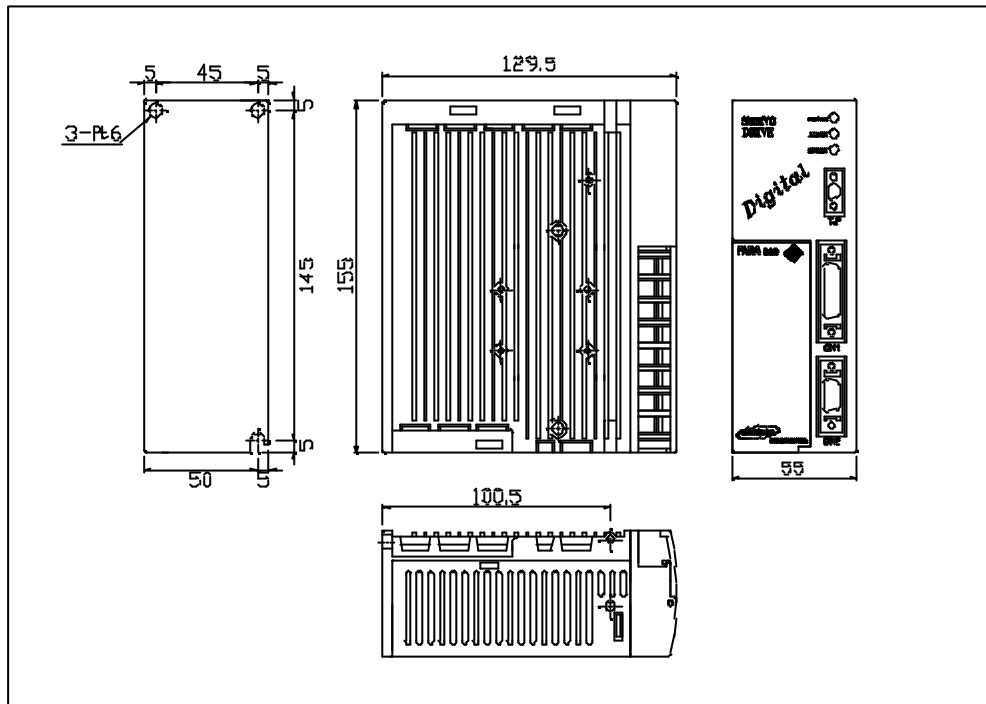
	I/O (CN1) 36PIN	(CN2) 20PIN
	CON-SCONN50PIN	CON-SCONN20PIN

## 9.2

### 가. CSD-

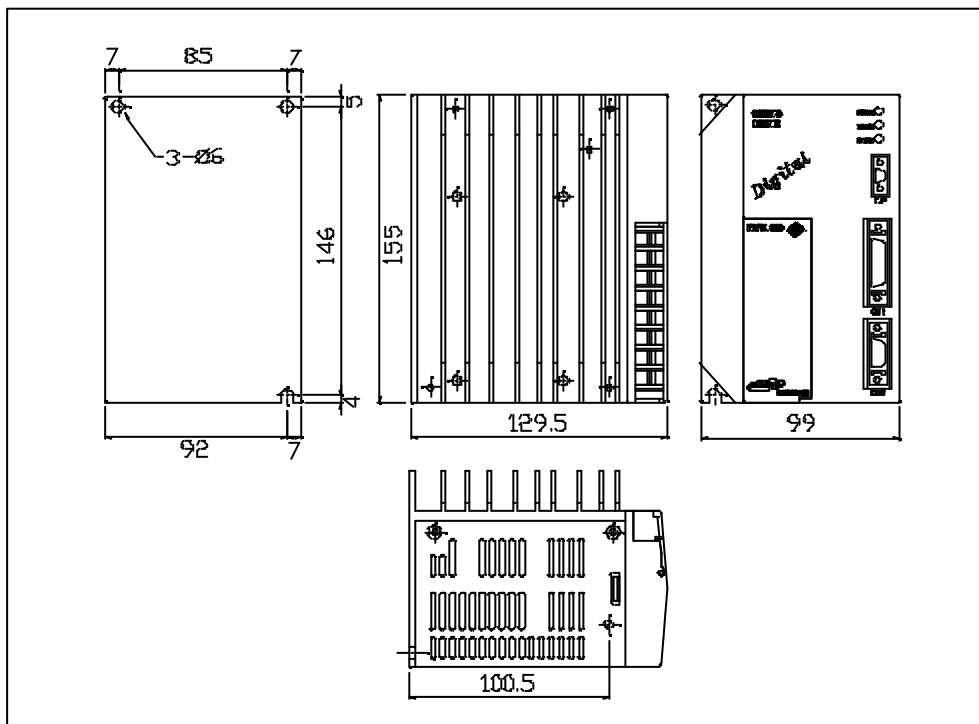
(1) CSD-A3B CSD-04B

(30W 400W)



(2) CSD-06B ~ CSD-10B

(600W 950W)

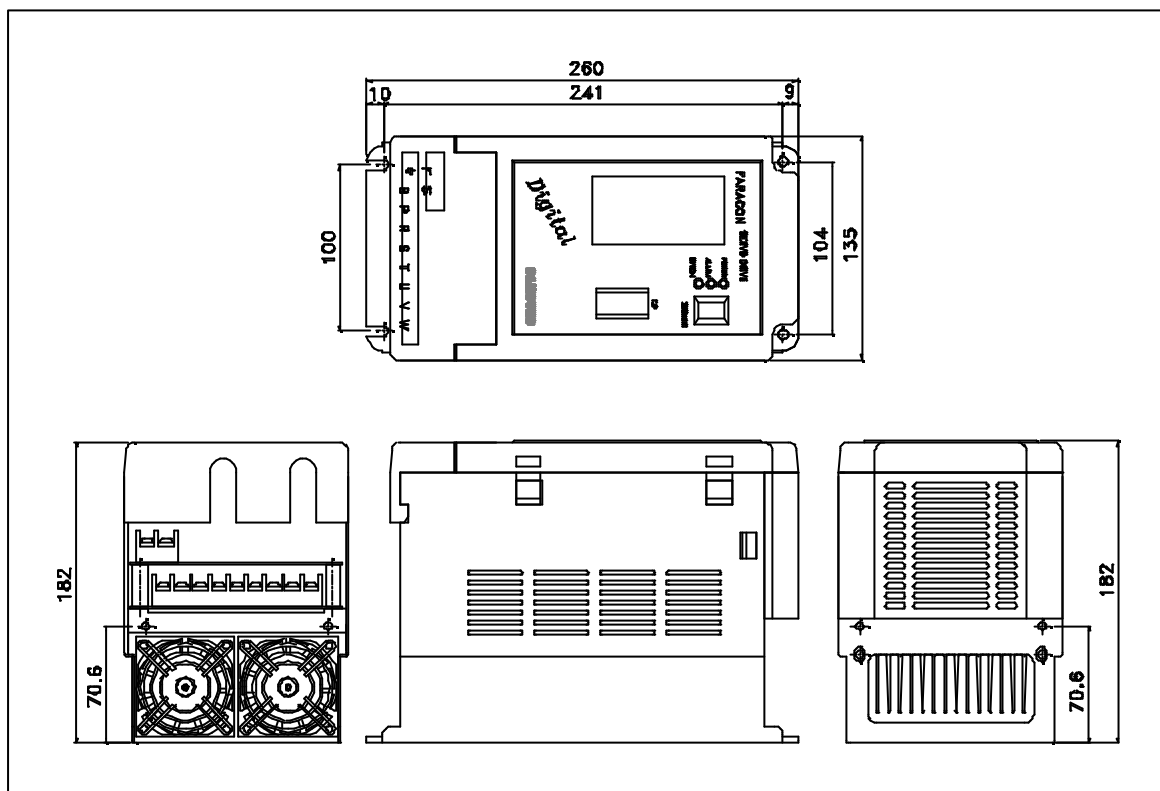




## . CSDP

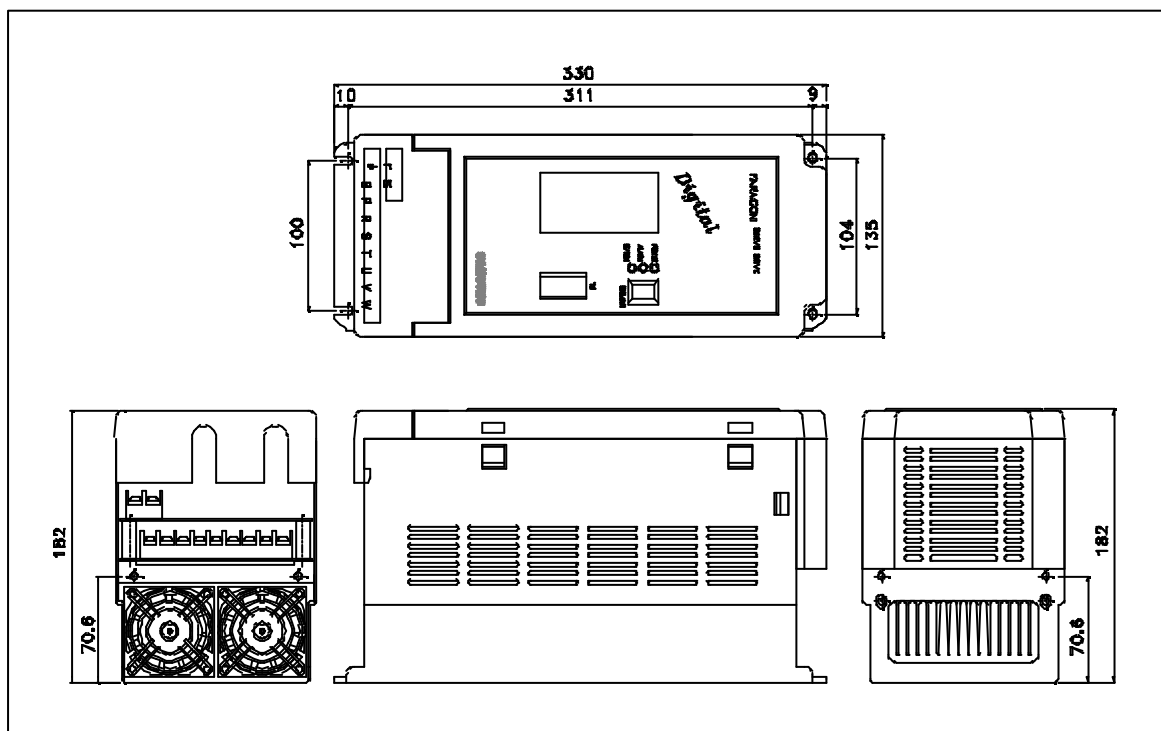
(1) CSDP

(400W 3kW)



(2) CSDP

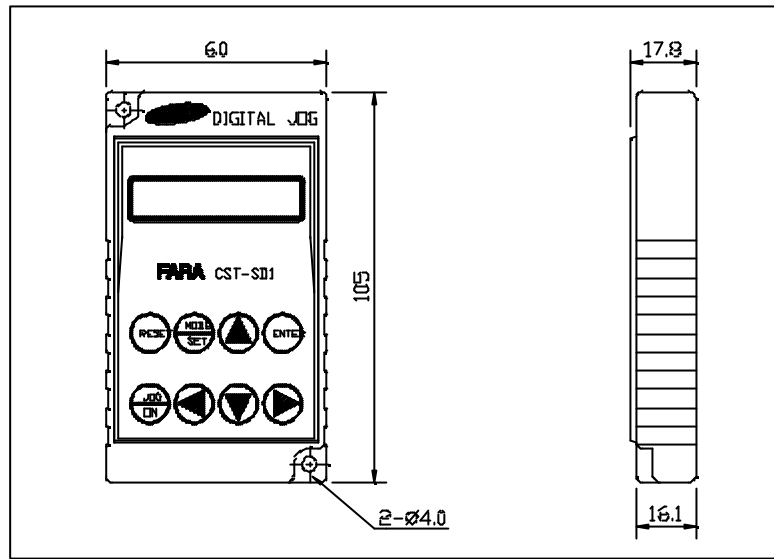
(3.5kW 6kW)



### 9.3

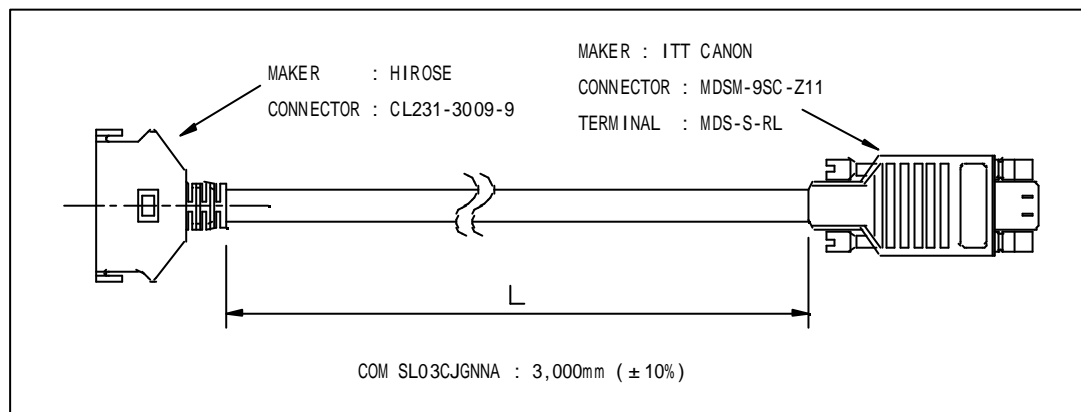
가.

(1)

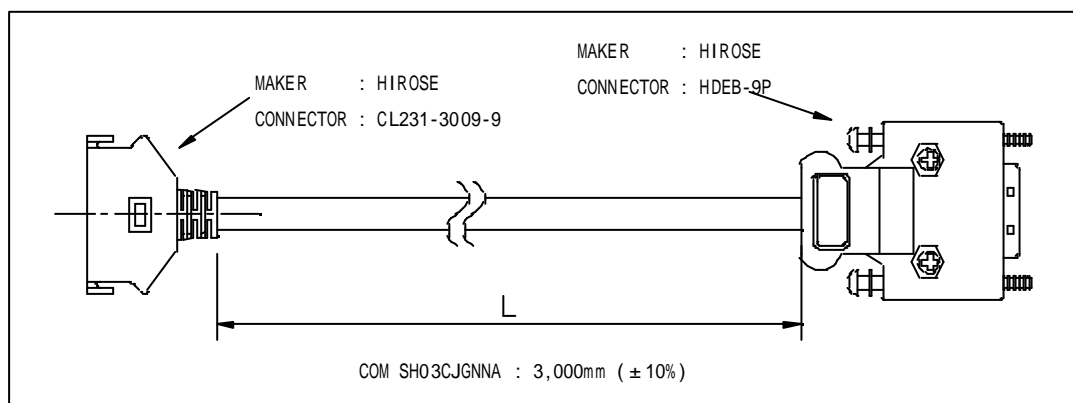


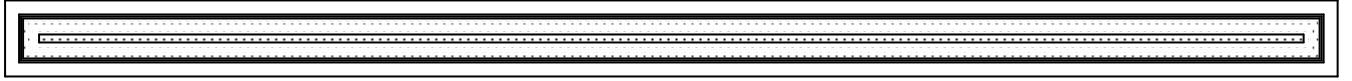
(2)

가) CSD -



) CSDP-

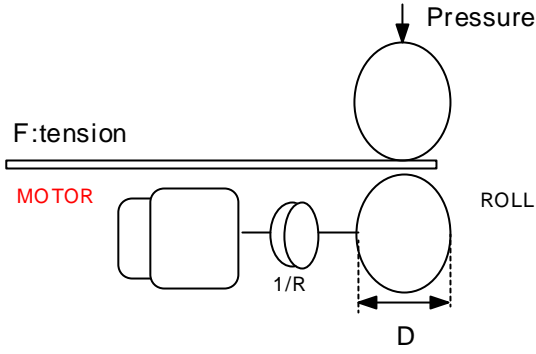
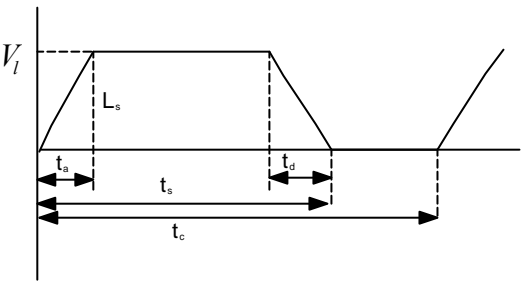






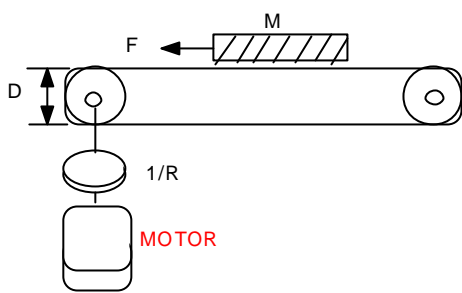
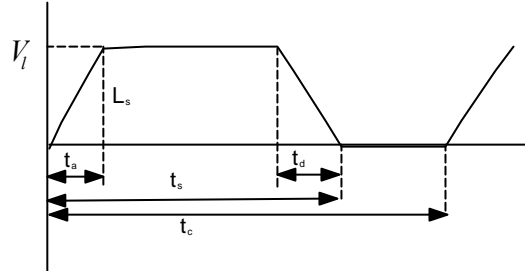
1.

## 1. Roll

(Mechanical Configuration)	 <p>The diagram shows a mechanical system for rolling. A motor is connected to a small gear with radius 1/R, which is in mesh with a larger roll of diameter D. A horizontal bar is positioned above the roll, with a downward arrow labeled 'Pressure' and a horizontal arrow labeled 'F:tension' pointing to the right. The roll is labeled 'ROLL'.</p> <p> <math>F</math> : Tension (N)                      <math>P</math> : Pressure  <math>V_l</math> :                      (m/min)                      <math>D</math> : Roll (m)  <math>1/R</math> :                      <math>\mu</math> :  <b><math>h</math></b> : </p>
(Speed Diagram)	 <p>The speed diagram shows velocity on the vertical axis and time on the horizontal axis. The velocity starts at zero, rises linearly to a peak value <math>V_l</math> over a time interval <math>t_a</math>. It then remains constant at <math>V_l</math> for a time interval <math>t_s</math>. The total time for the constant velocity portion is <math>L_s</math>. The velocity then falls linearly to zero over a time interval <math>t_d</math>. The total time for the entire cycle is <math>t_e</math>.</p>
(Motion per Cycle) m	$L_s = \frac{V_l}{60} \times \frac{2t_s - t_a - t_d}{2}$ <p>if <math>t_a = t_d</math>, <math display="block">L_s = \frac{V_l}{60} (t_s - t_a)</math></p>
r/min	$N_M = \frac{R V_l}{p D}$
( ) (Nm)	$T_L = \frac{(\mu P + F) D}{2 R h}$

kg·m <sup>2</sup>	$J_L = J_G + \frac{1}{R^2} J_R$ $J_R : \text{Roll( )} \quad , \quad J_G : \quad ,$
가 s	$t_{am} = \frac{2\mathbf{p} \times N_M (J_M + J_L)}{60(T_{PM} - T_L)}$ $J_M : \quad , \quad T_{PM} :$
s	$t_{dm} = \frac{2\mathbf{p} \times N_M (J_M + J_L)}{60(T_{PM} + T_L)}$ $J_M : \quad , \quad T_{PM} :$
Power w	$P_o = \frac{2\mathbf{p} \times N_M \times T_L}{60}$
가 Power w	$P_a = \left( \frac{2\mathbf{p} \times N_M}{60} \right)^2 \frac{J_L}{t_a} \quad (t_a \quad t_{an})$
가 N·m	$T_p = \frac{2\mathbf{p} \times N_M (J_M + J_L)}{60t_a} + T_L \quad (t_a \quad t_{an})$
N·m	$T_s = \frac{2\mathbf{p} \cdot N_M (J_M + J_L)}{60t_d} - T_L \quad (t_a ? t_{dm})$
N·m	$T_{rms} = \sqrt{\frac{T_p^2 \times t_a + T_L^2 \times (t_s - t_a - t_d) + T_s^2 \times t_d}{t_s}}$

## 2. Timing Belt

(Mechanical Configuration)	 <p> <math>M :</math> (kg)      <math>V_l :</math> (m/min)      <math>F :</math> (Thrust Force) (N)      <math>1/R :</math>      <math>D :</math> (m)      <math>\mu :</math>  <math>h :</math> </p>
(Speed Diagram)	
(Motion per Cycle) m	$L_s = \frac{V_l}{60} \times \frac{2t_s - t_a - t_d}{2}$ <p>if <math>t_a = t_d</math>, <math>L_s = \frac{V_l}{60} (t_s - t_a)</math></p>
r/min	$N_M = \frac{RV_l}{pD}$
( ) (Nm)	$T_L = \frac{(9.8\mu M + F)D}{2Rh}$

kg m <sup>2</sup>	$J_L = J_W + J_G + \frac{J_P}{R^2}$ $J_W : \quad ( \quad ) \quad , \quad J_G : \quad , \quad J_P :$ $J_W = M\left(\frac{D}{2R}\right)^2$
가 s	$t_{am} = \frac{2p \times N_M(J_M + J_L)}{60(T_{PM} - T_L)} \quad J_M : \quad , \quad T_{PM} :$
s	$t_{dm} = \frac{2p \times N_M(J_M + J_L)}{60(T_{PM} + T_L)} \quad J_M : \quad , \quad T_{PM} :$
Power w	$P_o = \frac{2p \times N_M \times T_L}{60}$
가 Power w	$P_a = \left(\frac{2p \times N_M}{60}\right)^2 \frac{J_L}{t_a} \quad (t_a \quad t_{an})$
가 N m	$T_p = \frac{2p \times N_M(J_M + J_L)}{60t_a} + T_L \quad (t_a \quad t_{an})$
N m	$T_s = \frac{2p \times N_M(J_M + J_L)}{60t_d} - T_L \quad (t_a ? t_{dm})$
N m	$T_{rms} = \sqrt{\frac{T_p^2 \times t_a + T_L^2 \times (t_s - t_a - t_d) + T_s^2 \times t_d}{t_s}}$

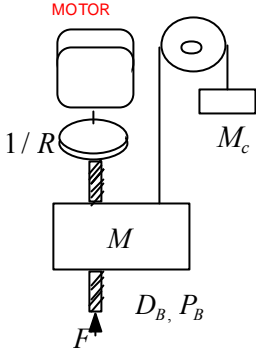
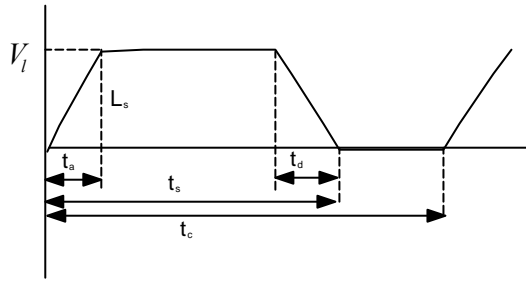


### 3. Ball Screw ( )

<p>(Mechanical Configuration)</p>	<div data-bbox="622 268 1276 593"> </div> <div data-bbox="478 683 1117 907"> <p> <math>V_l</math> : (m/min)      <math>F</math> : Thrust Force(N)  <math>1/R</math> :      <math>P_B</math> : Ball Screw Lead(m)  <math>L_B</math> : Ball Screw (m)      <math>D_B</math> : Ball Screw (m)  <math>\mu</math> :      <math>h</math> :  <math>M</math> : (kg)         </p> </div>
<p>(Speed Diagram)</p>	<div data-bbox="710 940 1236 1220"> </div>
<p>(Motion per Cycle) m</p>	$L_s = \frac{V_l}{60} \times \frac{2t_s - t_a - t_d}{2}$ <p>if <math>t_a = t_d</math>, <math display="block">L_s = \frac{V_l}{60} (t_s - t_a)</math></p>
<p>r/min</p>	$N_M = \frac{R V_l}{P_B}$
<p>( ) (Nm)</p>	$T_L = \frac{(9.8\mu M + F) P_B}{2pR h}$

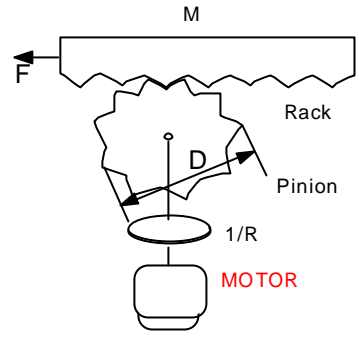
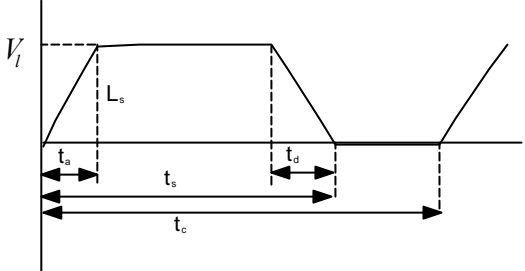
kg · m <sup>2</sup>	$J_L = J_W + J_G + \frac{J_B}{R^2}$ $J_W : \quad ( \quad ) \quad , \quad J_G : \quad , \quad J_B : \text{Ball Screw}$ $J_W = M \left( \frac{P_B}{2pR} \right)^2 \quad J_B = \frac{1}{8} M_B \times P_D^2 = \frac{P}{32} r \times P_L \times P_D^4$ $M_B : \text{Ball Screw} \quad (\text{kg})$ $: \quad (\text{kg/m}^3) \quad \dots\dots \text{Iron} \quad = 7.87 \times 10^3 (\text{kg/m}^3)$ $\quad \quad \quad \dots\dots \text{Aluminum} \quad = 2.70 \times 10^3 (\text{kg/m}^3)$
가 s	$t_{am} = \frac{2P \times N_M (J_M + J_L)}{60(T_{PM} - T_L)} \quad J_M : \quad , \quad T_{PM} :$
s	$t_{dm} = \frac{2P \times N_M (J_M + J_L)}{60(T_{PM} + T_L)} \quad J_M : \quad , \quad T_{PM} :$
Power w	$P_o = \frac{2P \times N_M \times T_L}{60}$
가 Power w	$P_a = \left( \frac{2P \times N_M}{60} \right)^2 \frac{J_L}{t_a} \quad (t_a \quad t_{am})$
가 N · m	$T_p = \frac{2P \times N_M (J_M + J_L)}{60t_a} + T_L \quad (t_a \quad t_{am})$
N · m	$T_s = \frac{2P \cdot N_M (J_M + J_L)}{60t_d} - T_L \quad (t_a ? t_{dm})$
N · m	$T_{rms} = \sqrt{\frac{T_p^2 \times t_a + T_L^2 \times (t_s - t_a - t_d) + T_s^2 \times t_d}{t_s}}$

## 4. Ball Screw ( )

(Mechanical Configuration)	
	$V_l$ : (m/min) $F$ : Thrust Force(N) $1/R$ : $P_B$ : Ball Screw Lead(m) $L_B$ : Ball Screw (m) $D_B$ : Ball Screw (m) $M$ : (kg) $M_C$ : Counter (kg) $h$ :
(Speed Diagram)	
(Motion per Cycle) m	$L_s = \frac{V_l}{60} \times \frac{2t_s - t_a - t_d}{2}$ <p>if <math>t_a = t_d</math>, <math display="block">L_s = \frac{V_l}{60} (t_s - t_a)</math></p>
r/min	$N_M = \frac{R V_l}{P_B}$
( ) (Nm)	$T_L = \frac{[9.8(M - M_C) + F]P_B}{2\pi R h}$

kg · m <sup>2</sup>	$J_L = J_W + J_G + \frac{J_B}{R^2}$ $J_W : \quad ( \quad ) \quad , \quad J_G : \quad , \quad J_B : \text{Ball Screw}$ $J_W = (M + M_C) \left( \frac{P_B}{2R} \right)^2 \quad J_B = \frac{1}{8} M_B \times P_D^2 = \frac{P}{32} r \times P_L \times P_D^4$ $M_B : \text{Ball Screw} \quad (\text{kg})$ $: \quad (\text{kg/m}^3) \dots\dots \text{Iron} \quad = 7.87 \times 10^3 (\text{kg/m}^3)$ $\dots\dots \text{Aluminum} \quad = 2.70 \times 10^3 (\text{kg/m}^3)$
가 s	$t_{am} = \frac{2P \times N_M (J_M + J_L)}{60(T_{PM} - T_L)} \quad J_M : \quad , \quad T_{PM} :$
s	$t_{dm} = \frac{2P \times N_M (J_M + J_L)}{60(T_{PM} + T_L)} \quad J_M : \quad , \quad T_{PM} :$
Power w	$P_o = \frac{2P \times N_M \times T_L}{60}$
가 Power w	$P_a = \left( \frac{2P \times N_M}{60} \right)^2 \frac{J_L}{t_a} \quad (t_a \quad t_m)$
가 N · m	$T_p = \frac{2P \times N_M (J_M + J_L)}{60 t_a} + T_L \quad (t_a \quad t_m)$
N · m	$T_s = \frac{2P \cdot N_M (J_M + J_L)}{60 t_d} - T_L \quad (t_a ? t_{dm})$
N · m	$T_{rms} = \sqrt{\frac{T_p^2 \times t_a + T_L^2 \times (t_c - t_a - t_d) + T_s^2 \times t_d}{t_s}}$

## 5. Rack & Pinion

(Mechanical Configuration)	 <p> <math>M</math> : (kg)      <math>\mu</math> :  <math>V_l</math> : (m/min)      <math>F</math> : (Thrust Force) (N)  <math>1/R</math> : <math>h</math> :  <math>D</math> : Pinion (m)      <math>t</math> : Pinion (m)         </p>
(Speed Diagram)	
(Motion per Cycle) m	$L_s = \frac{V_l}{60} \times \frac{2t_s - t_a - t_d}{2}$ <p>if <math>t_a = t_d</math>, <math>L_s = \frac{V_l}{60} (t_s - t_a)</math></p>
r/min	$N_M = \frac{RV_l}{D}$
( ) (Nm)	$T_L = \frac{(9.8\mu M + F)D}{2Rh}$

kg · m <sup>2</sup>	$J_L = J_W + J_G + \frac{J_P}{R^2}$ <p> <math>J_W</math> : ( ) , <math>J_G</math> : , <math>J_P</math> : Pinion  <math>J_W = M(\frac{D}{2R})^2</math> , <math>J_P = \frac{1}{8} M_p \times D^2 = \frac{p}{32} r \times t \times D^4</math>  <math>M_p</math> : Pinion (kg)  : (kg/m<sup>3</sup>) ..... Iron = 7.87 × 10<sup>3</sup> (kg/m<sup>3</sup>)  ..... Aluminum = 2.70 × 10<sup>3</sup> (kg/m<sup>3</sup>) </p>
가 s	$t_{am} = \frac{2p \times N_M (J_M + J_L)}{60(T_{PM} - T_L)}$ $J_M$ : , $T_{PM}$ :
s	$t_{dm} = \frac{2p \times N_M (J_M + J_L)}{60(T_{PM} + T_L)}$ $J_M$ : , $T_{PM}$ :
Power w	$P_o = \frac{2p \times N_M \times T_L}{60}$
가 Power w	$P_a = (\frac{2p \times N_M}{60})^2 \frac{J_L}{t_a}$ ( t <sub>a</sub> t <sub>am</sub> )
가 N · m	$T_p = \frac{2p \times N_M (J_M + J_L)}{60t_a} + T_L$ ( t <sub>a</sub> t <sub>am</sub> )
N · m	$T_s = \frac{2p \cdot N_M (J_M + J_L)}{60t_d} - T_L$ ( t <sub>a</sub> ? t <sub>dm</sub> )
N · m	$T_{rms} = \sqrt{\frac{T_p^2 \times t_a + T_L^2 \times (t_s - t_a - t_d) + T_s^2 \times t_d}{t_s}}$

6.

<p>(Mechanical Configuration)</p>	<div data-bbox="762 264 1141 689" data-label="Diagram"> </div> <div data-bbox="475 766 949 936" data-label="Text"> <p> <math>M</math> : (kg)      <math>1/R</math> :  <math>w_l</math> : (rpm)      <math>T_l</math> :  <math>h</math> :      <math>D</math> :  <math>t</math> :         </p> </div>
<p>(Speed Diagram)</p>	<div data-bbox="667 1041 1268 1377" data-label="Figure"> </div>
<p>(Motion per Cycle) (rad)</p>	$q_s = \frac{w_l}{60} \times \frac{2t_s - t_a - t_d}{2}$ <p>if <math>t_a = t_d</math>, <math>q_s = \frac{w_l}{60} (t_s - t_a)</math></p>
<p>(r/min)</p>	$N_M = R \cdot w_l$
<p>( ) (Nm)</p>	$T_L = \frac{T_l}{R}$

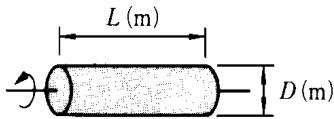
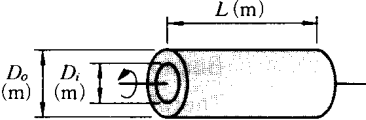
kg · m <sup>2</sup>	$J_L = J_G + \frac{J_W}{R^2}$ $J_W : \quad , \quad J_G : \quad , \quad ,$ $J_W = \frac{1}{8} M \times D^2 = \frac{\mathbf{P}}{32} \mathbf{r} \times t \times D^4$ $\quad : \quad (\text{kg/m}^3) \dots\dots \text{Iron} \quad = 7.87 \times 10^3 (\text{kg/m}^3)$ $\quad \dots\dots \text{Aluminum} \quad = 2.70 \times 10^3 (\text{kg/m}^3)$
가 s	$t_{am} = \frac{2\mathbf{p} \times N_M (J_M + J_L)}{60(T_{PM} - T_L)} \quad J_M : \quad , \quad T_{PM} :$
s	$t_{dm} = \frac{2\mathbf{p} \times N_M (J_M + J_L)}{60(T_{PM} + T_L)} \quad J_M : \quad , \quad T_{PM} :$
Power w	$P_o = \frac{2\mathbf{p} \times N_M \times T_L}{60}$
가 Power w	$P_a = \left( \frac{2\mathbf{p} \times N_M}{60} \right)^2 \frac{J_L}{t_a} \quad (t_a \quad t_{an})$
가 N · m	$T_p = \frac{2\mathbf{p} \times N_M (J_M + J_L)}{60t_a} + T_L \quad (t_a \quad t_{an})$
N · m	$T_s = \frac{2\mathbf{p} \cdot N_M (J_M + J_L)}{60t_d} - T_L \quad (t_a ? t_{dm})$
N · m	$T_{rms} = \sqrt{\frac{T_p^2 \times t_a + T_L^2 \times (t_s - t_a - t_d) + T_s^2 \times t_d}{t_s}}$



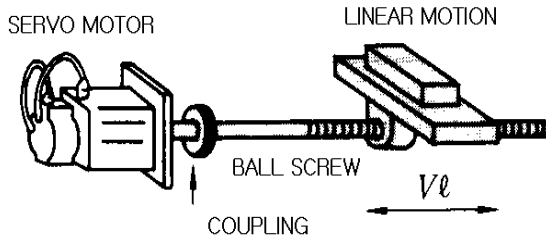
## 2. SI

	(Unit)		
	SI	CGS	
(Force)	N	kgf	1N=0.10197kgf 1kgf=9.80665N
(Weight)	kg	kgf	1kg=1kgf
Torque	N·m	kgf·m	1N·m=0.101971kgf·m 1kgf·m=9.80665N·m
(Moment of Inertia) $J = \frac{GD^2}{4}$	kg·m <sup>2</sup>	gf·cm·s <sup>2</sup>	1kg·m <sup>2</sup> =1.097×10 <sup>4</sup> gf·cm·s <sup>2</sup> 1gf·cm·s <sup>2</sup> =0.980665×10 <sup>-4</sup> kg·m <sup>2</sup>

## 3.

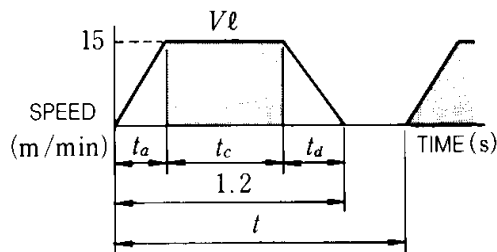
Solid cylinder		$J = \frac{1}{8} M \times D^2 = \frac{\rho}{32} r \times L \times D^4$ <p>M = Weight (kg), <math>\rho</math> = (kg/m<sup>3</sup>)  Iron : <math>\rho = 7.87 \times 10^3</math> (kg/m<sup>3</sup>)  Aluminum : <math>\rho = 2.70 \times 10^3</math> (kg/m<sup>3</sup>)</p>
Hollow cylinder		$J_K = \frac{1}{8} M_K (D_o^2 - D_i^2) = \frac{\rho}{32} r \bullet L (D_o^4 - D_i^4)$ <p>M = Weight (kg), <math>\rho</math> = (kg/m<sup>3</sup>)  Iron : <math>\rho = 7.87 \times 10^3</math> (kg/m<sup>3</sup>)  Aluminum : <math>\rho = 2.70 \times 10^3</math> (kg/m<sup>3</sup>)</p>

## 4. SERVO MOTOR



·	: $V = 15 \text{ m/min}$
·	: $M = 500 \text{ kg}$
Ball Screw	: $L_B = 1.4 \text{ m}$
Ball Screw	: $D_B = 0.04 \text{ m}$
Ball Screw Lead	: $P_B = 0.01 \text{ m}$
Coupling	: $M_K = 1 \text{ kg}$
Coupling	: $D_K = 0.06 \text{ m}$
·	: $n = 40 \text{ /min}$
·	: $\lambda = 0.275 \text{ m}$
·	: $t_m = 1.2 \text{ s or less}$
·	: $\mu = 0.2$
·	: $\mu = 0.9$

(1) (Speed Diagram)



$$t = \frac{60}{n} = \frac{60}{40} = 1.5 \text{ (sec)}$$

$$t_a = t_d$$

$$t_a = t_m - \frac{60\lambda}{V\lambda} = 1.2 - \frac{60 \cdot 0.275}{15} = 0.1 \text{ (sec)}$$

(2) (Speed)

$$\lambda = \frac{V\lambda}{P_B} = \frac{15}{0.01} = 1500 \text{ (r / min)}$$

$$\text{Coupling}, \quad 1/R = 1$$

$$N_M = N\lambda \cdot R = 1500 \times 1 = 1500 \text{ (r / min)}$$

(3)

$$T_l = \frac{9.8 \text{ m} \cdot M \cdot P_B}{2pR \cdot h} = \frac{9.8 \times 0.2 \times 500 \times 0.01}{2p \times 1 \times 0.9} = 1.73 \text{ (N} \cdot \text{m)}$$

(4) Inertia

$$J_{L1} = M \times \left( \frac{P_B}{2\pi R} \right)^2 = 500 \left( \frac{0.01}{2\pi \times 1} \right)^2 = 12.7 \times 10^{-4} \text{ (kg} \cdot \text{m}^2)$$

$$\text{Ball Screw } J_B = \frac{p}{32} r \times L_B \times D_B^4 = \frac{p}{32} \times 7.87 \times 10^3 \times 1.4 \times 0.04^4 = 27.7 \times 10^{-4} \text{ (kg} \cdot \text{m}^2)$$

$$\text{Coupling } J_C = \frac{1}{8} M_C \times D_C^2 = \frac{1}{8} \times 0.06^2 = 4.5 \times 10^{-4} \text{ (kg} \cdot \text{m}^2)$$

$$\text{Inertia } J_L = J_{L1} + J_B + J_C = 44.9 \times 10^{-4} \text{ (kg} \cdot \text{m}^2)$$

(5) Power

$$P_o = \frac{2p \cdot N_M \cdot T_L}{60} = \frac{2p \times 1500 \times 1.73}{60} = 272(W)$$

(6) 가 Power

$$P_a = \left( \frac{2p \times N_M}{60} \right)^2 \frac{J_L}{t_a} = \left( \frac{2p}{60} \times 1500 \right)^2 \times \frac{44.9 \times 10}{0.1} = 1108(W)$$

(7) SERVO MOTOR 가

$T_L$  Motor

$P_a + P_o = (1 \quad 2) \times \text{Motor}$

$N_M$  Motor

$J_L$  Servo Pack Inertia

Servo Motor Servo Pack

<Servo Motor, Servo Pack >

- : CSMD - 1000(W)
- : 2000(r/min)
- Torque : 4.8(N m)
- Torque : 14.4(N m)
- Motor Inertia :  $6.17 \times 10^{-4}$  (kg m<sup>2</sup>)
- Servo Pack Inertia :  $61.7 \times 10^{-4}$  (kg m<sup>2</sup>)

(8) 가 Servo Motor Check  
(가) Torque

$$T_p = \frac{2p N_M (J_M + J_L)}{60 t_a} + T_L = \frac{2p \times 1500 (6.17 + 44.9)}{60 \times 0.1} + 1.73 = 9.75(N \cdot m) <$$

( ) Torque

$$T_s = \frac{2p N_M (J_M + J_L)}{60 t_d} - T_L = \frac{2p \times 1500 (6.17 + 44.9)}{60 \times 0.1} - 1.73 = 6.29(N \cdot m) <$$

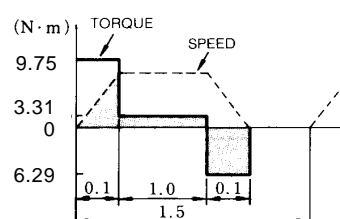
(가) Torque RMS( )

$$T_{rms} = \sqrt{\frac{T_p^2 \cdot t_a + T_L^2 \cdot t_c + T_s^2 \cdot t_d}{t}} = \sqrt{\frac{(9.75)^2 \times 0.1 + (1.73)^2 \times 1.0 + (6.29)^2 \times 0.1}{1.5}} = 3.31(N \cdot m) <$$

(9) SERVO MOTOR

AC SERVO MOTOR

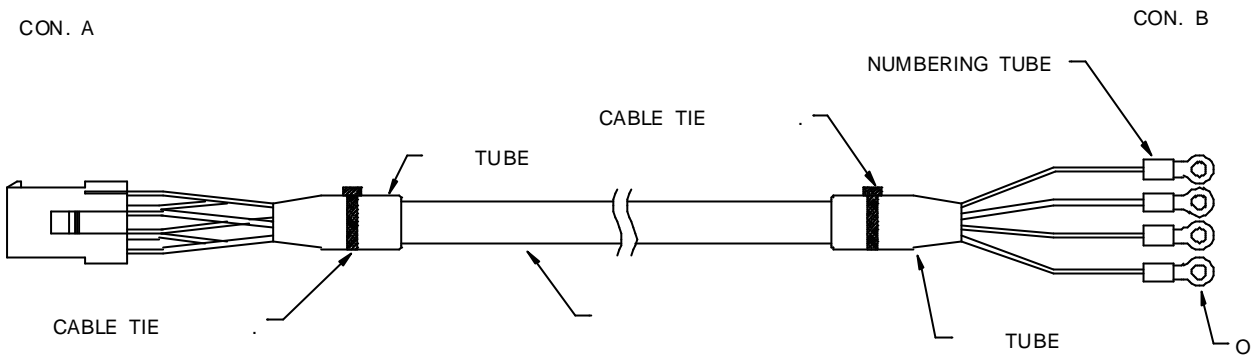
TORQUE





5.

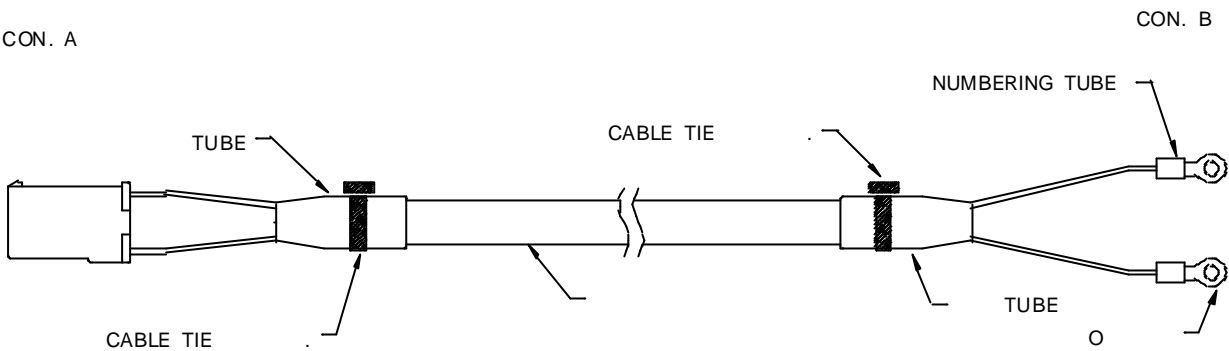
(1) 3 ( / )



MARKING	CABLE COLOR	REMARK
U	3	
V	3	
W	3	
FG	FG Wire ( / )	3 ,

	(mm) ± 10%		
	3,000	POW SL03P010FA	3
	5,000	POW SL05P010FA	
	10,000	POW SL10P010FA	
	15,000	POW SL15P010FA	
	20,000	POW SL20P010FA	
	30,000	POW SL30P010FA	
	50,000	POW SL50P010FA	
가	3,000	POW SL03P010MA	가 3
	5,000	POW SL05P010MA	
	10,000	POW SL10P010MA	
	15,000	POW SL15P010MA	
	20,000	POW SL20P010MA	
	30,000	POW SL30P010MA	
	50,000	POW SL50P010MA	

(2) ( / )

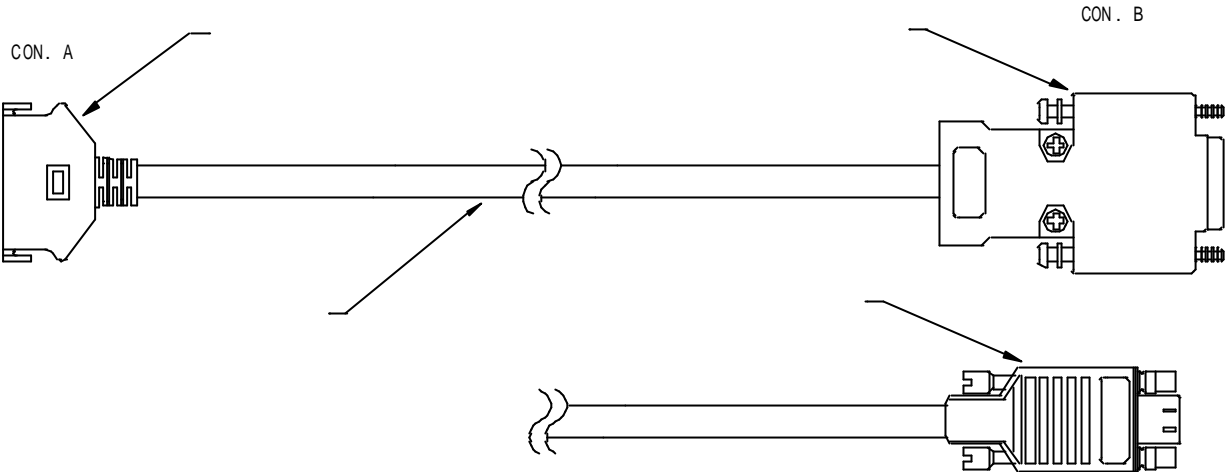


MARKING	CABLE COLOR	REMARK
BK +	2	
BK -	2	

	(mm) ± 10%		
	3,000	BRK SL03BRAKFA	
	5,000	BRK SL05BRAKFA	
	10,000	BRK SL10BRAKFA	
	15,000	BRK SL15BRAKFA	
	20,000	BRK SL20BRAKFA	
	30,000	BRK SL30BRAKFA	
	50,000	BRK SL50BRAKFA	

	(mm) ± 10%		
가	3,000	BRK SL03BRAKMA	가
	5,000	BRK SL05BRAKMA	
	10,000	BRK SL10BRAKMA	
	15,000	BRK SL15BRAKMA	
	20,000	BRK SL20BRAKMA	
	30,000	BRK S30RAKMA	
	50,000	BRK SL50BRAKMA	

(3) ( / )

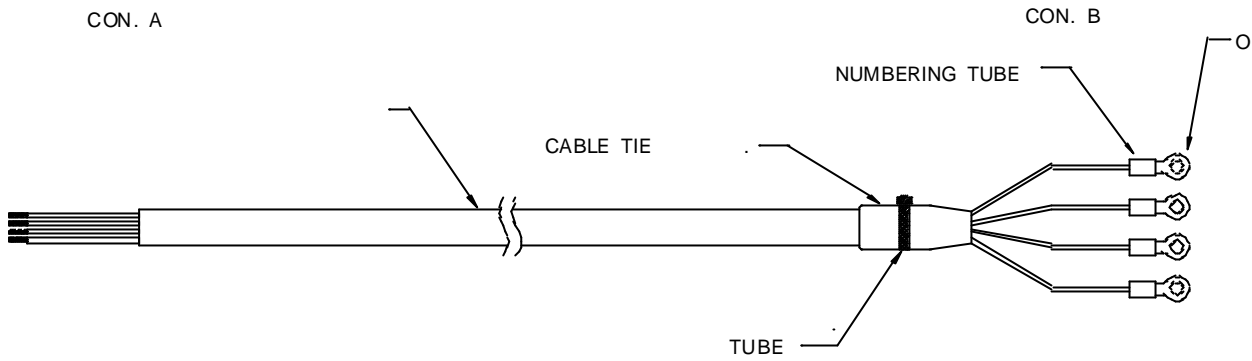


CON. A	CON. B				CON. A	CON. B		
1	5	3P( / ) -	OFF_CHK		7	8	4P( / ) -	VCC
2	4	1P( / ) -	Rx		8	7	3P( / ) -	ESW
3	3	2P( / ) -	Tx		9	6	Shield	F.G
4	2	1P( / ) -	GND		10	CSD-SERIES( )		
5	1	2P( / ) -	GND		11			
6	9	4P( / ) -	VCC		12			

CON. A	CON. B				CON. A	CON. B		
1	1	3P( / ) -	OFF_CHK		7	7	4P( / ) -	VCC
2	2	1P( / ) -	Rx		8	8	3P( / ) -	ESW
3	3	2P( / ) -	Tx		9	9	Shield	F.G
4	4	1P( / ) -	GND		10	CSD -SERIES( )		
5	5	2P( / ) -	GND		11			
6	6	4P( / ) -	VCC		12			

		L (mm) ± 10%
	COM SH03CJGNNA	3,000
	COM SL03CJGNNA	

(4) 3 ( / )



MARKING	CABLE COLOR	REMARK
U	3	
V	3	
W	3	
FG	FG Wire ( / )	3 ,

4-1.600W , 800W

						TUBE
				3	F. G	
600W		3	POW SH03P006F	ROVVU-SB 3C x 1.25SQ (26/0.254 TA) AWG #16	UL1007 Approved AWG #16 Wire	12
		5	POW SH05P006F			
		10	POW SH10P006F			
		15	POW SH15P006F			
		20	POW SH20P006F			
		30	POW SH30P006F			
		50	POW SH50P006F			
	가	3	POW SH03P006M	ROFHVU-SB 3C x 1.25SQ (7/40/0.08 TA) AWG #16		
		5	POW SH05P006M			
		10	POW SH10P006M			
		15	POW SH15P006M			
		20	POW SH20P006M			
		30	POW SH30P006M			
		50	POW SH50P006M			
800W		3	POW SH03P008F	ROVVU-SB 3C x 2.0SQ (41/0.254 TA) AWG #14	UL1007 Approved AWG #14 Wire	12
		5	POW SH05P008F			
		10	POW SH10P008F			
		15	POW SH15P008F			
		20	POW SH20P008F			
		30	POW SH30P008F			
		50	POW SH50P008F			
	가	3	POW SH03P008M	ROFHVU-SB 3C x 2.0SQ (7/60/0.08 TA) AWG #14		
		5	POW SH05P008M			
		10	POW SH10P008M			
		15	POW SH15P008M			
		20	POW SH20P008M			
		30	POW SH30P008M			
		50	POW SH50P008M			



4-2. 3.5KW , 5KW

						TUBE
				3	F.G	
3.5KW		3	POW SH03P035F	ROVVU-SB 3C x 3.5SQ (65/0.254 TA) AWG #12	UL1007 Approved AWG #12 Wire	15
		5	POW SH05P035F			
		10	POW SH10P035F			
		15	POW SH15P035F			
		20	POW SH20P035F			
		30	POW SH30P035F			
		50	POW SH50P035F			
	가	3	POW SH03P035M	ROFHVU-SB 3C x 3.5SQ (19/40/0.08 TA) AWG #12		
		5	POW SH05P035M			
		10	POW SH10P035M			
		15	POW SH15P035M			
		20	POW SH20P035M			
		30	POW SH30P035M			
		50	POW SH50P035M			
5KW		3	POW SH03P050F	ROVVU-SB 3C x 5.5SQ (66/0.320 TA) AWG #10	UL1007 Approved AWG #10 Wire	15
		5	POW SH05P050F			
		10	POW SH10P050F			
		15	POW SH15P050F			
		20	POW SH20P050F			
		30	POW SH30P050F			
		50	POW SH50P050F			
	가	3	POW SH03P050M	ROFHVU-SB 3C x 5.5SQ (19/60/0.08 TA) AWG #10		
		5	POW SH05P050M			
		10	POW SH10P050M			
		15	POW SH15P050M			
		20	POW SH20P050M			
		30	POW SH30P050M			
		50	POW SH50P050M			

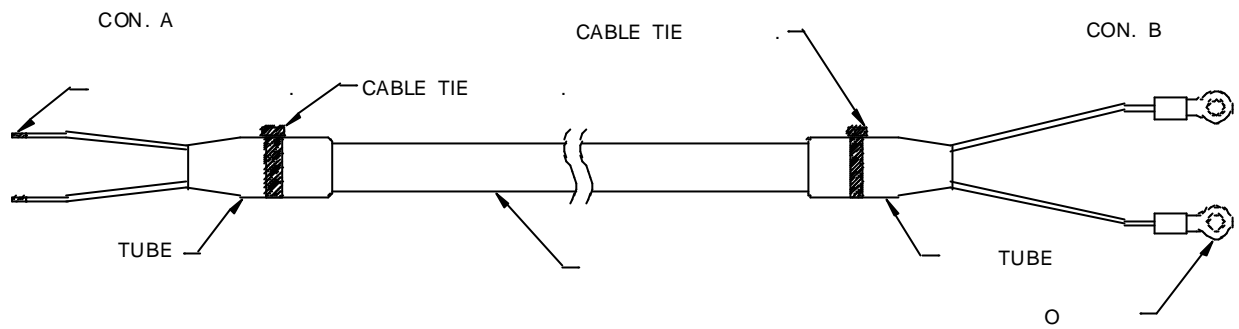
#### 4-3. 6KW

						TUBE
				3	F.G	
6KW		3	POW SH03P060F	ROVVU-SB 3C x 8.0SQ (7/24/0.254 TA) AWG #8	UL1007 Approved AWG #8 Wire	20
		5	POW SH05P060F			
		10	POW SH10P060F			
		15	POW SH15P060F			
		20	POW SH20P060F			
		30	POW SH30P060F			
		50	POW SH50P060F			
	가	3	POW SH03P060M	ROFHVU-SB 3C x 8.0SQ (6/7/40/0.08 TA) AWG #8		
		5	POW SH05P060M			
		10	POW SH10P060M			
		15	POW SH15P060M			
		20	POW SH20P060M			
		30	POW SH30P060M			
		50	POW SH50P060M			

#### 4-4.

	( )				
	600W	800W	3.5KW	5KW	6KW
CSMD		08	10, 15, 20, 25, 30, 35	40, 45, 50	
CSMF	04	08	15, 25, 35	45	
CSMS			10, 15, 20, 25, 30, 35	40, 45, 50	
CSMH	05		10, 15, 20, 30	40, 50	
CSMN	03, 06		09, 12, 20, 30	44	
CSMX	03, 05		09, 13, 18, 29	44	60

(5) ( / )

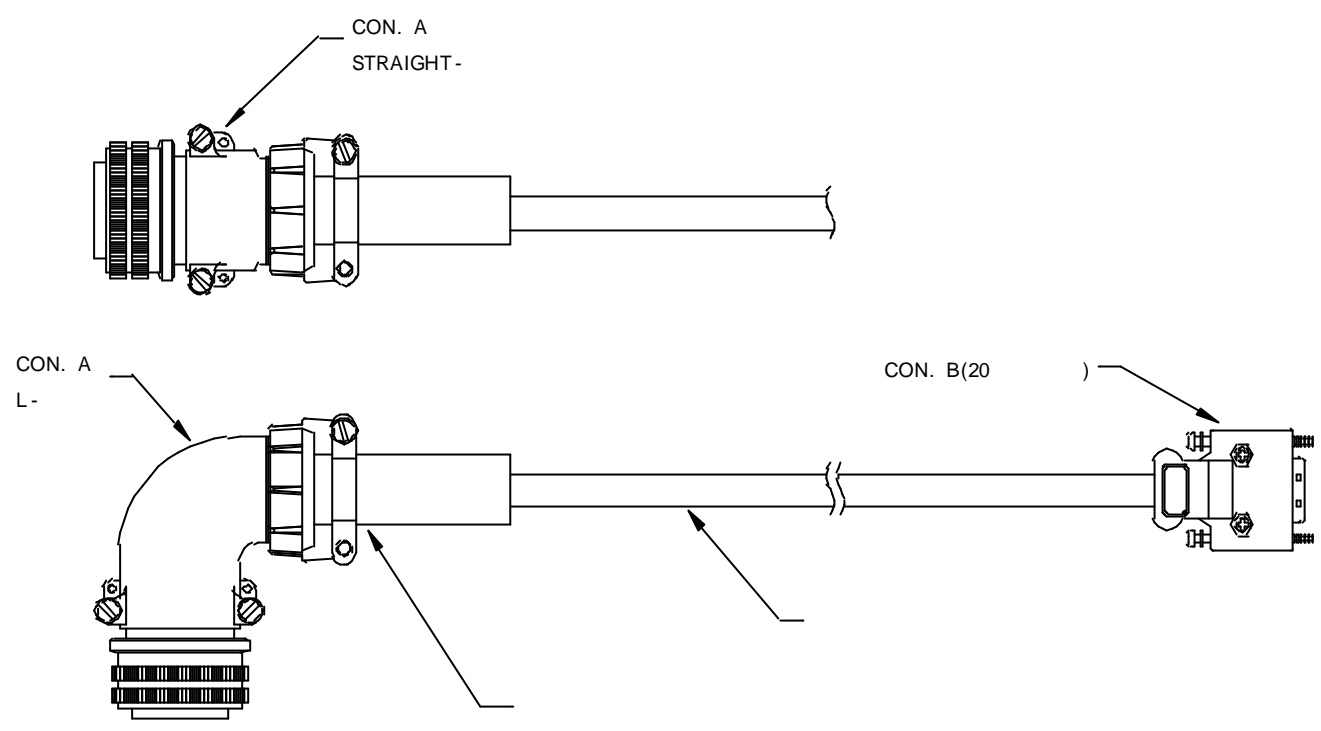


MARKING	CABLE COLOR	REMARK
BK +	2	
BK -	2	

	(mm) ± 10%		
	3,000	BRK SH03BRAKF	
	5,000	BRK SH05BRAKF	
	10,000	BRK SH10BRAKF	
	15,000	BRK SH15BRAKF	
	20,000	BRK SH20BRAKF	
	30,000	BRK SH30BRAKF	
	50,000	BRK SH50BRAKF	
가	3,000	BRK SH03BRAKM	가
	5,000	BRK SH05BRAKM	
	10,000	BRK SH10BRAKM	
	15,000	BRK SH15BRAKM	
	20,000	BRK SH20BRAKM	
	30,000	BRK SH30BRAKM	
	50,000	BRK SH50BRAKM	



(6) INCREMENTAL ( )



INCREMENTAL (10 ) (CON.A CON.B)

CON. A	CON. B			CON. A	CON. B			CON. A	CON. B		
A	3	1P( / )-	A	F	8	3P( / )-	*C	R	13	5P( / )-	*RX
B	4	1P( / )-	*A	G	1	4P( / )-	GND				
C	5	2P( / )-	B	H	20	4P( / )-	+5V				
D	6	2P( / )-	*B	J	12/SH	Shield	FG				
E	7	3P( / )-	C	P	10	5P( / )-	RX				

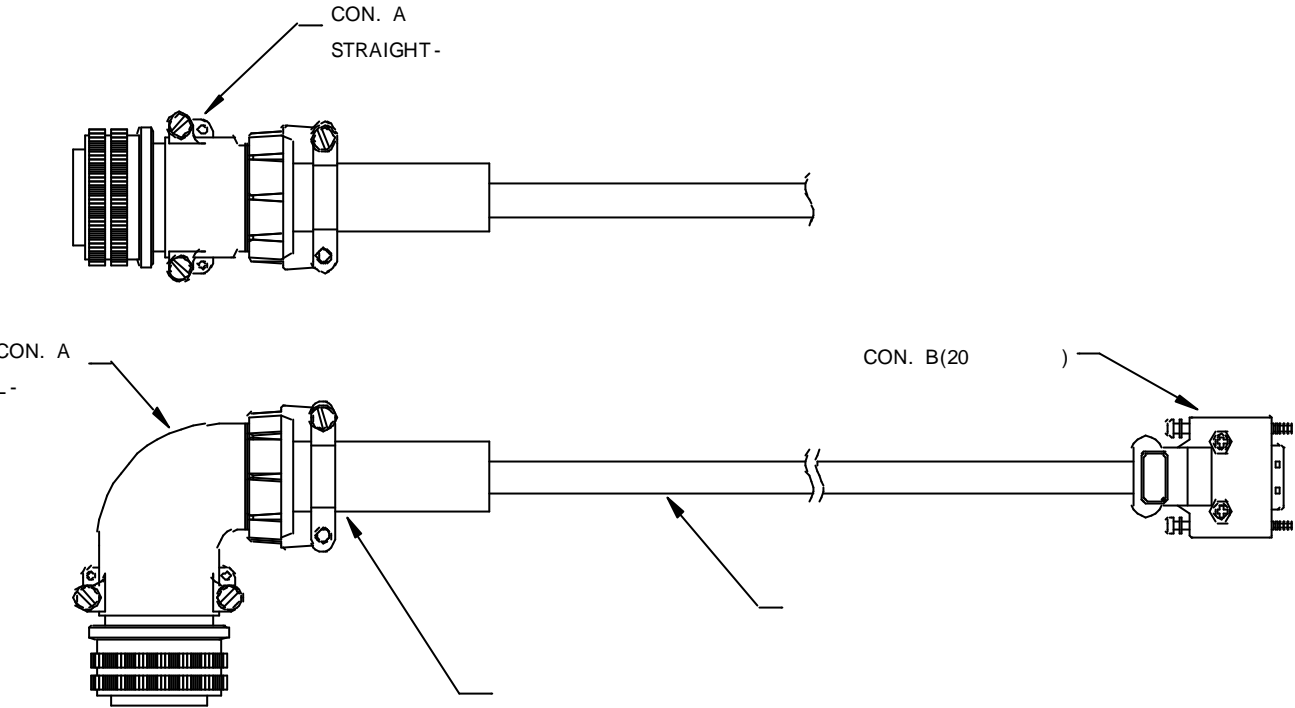
## L-TYPE PLUG

(L) ±10%			
	3,000mm	ENC SH03ECNLFA	L-TYPE INC (10 ) ( )
	5,000mm	ENC SH05ECNLFA	
	10,000mm	ENC SH10ECNLFA	
	15,000mm	ENC SH15ECNLFA	
	20,000mm	ENC SH20ECNLFA	
가	3,000mm	ENC SH03ECNLMA	L-TYPE INC (10 ) (가 )
	5,000mm	ENC SH05ECNLMA	
	10,000mm	ENC SH10ECNLMA	
	15,000mm	ENC SH15ECNLMA	
	20,000mm	ENC SH20ECNLMA	

## STRAIGHT-TYPE PLUG

(L) ±10%			
	3,000mm	ENC SH03ECNSFA	STRAIGHT-TYPE INC (10 ) ( )
	5,000mm	ENC SH05ECNSFA	
	10,000mm	ENC SH10ECNSFA	
	15,000mm	ENC SH15ECNSFA	
	20,000mm	ENC SH20ECNSFA	
가	3,000mm	ENC SH03ECNSMA	STRAIGHT-TYPE INC (10 ) (가 )
	5,000mm	ENC SH05ECNSMA	
	10,000mm	ENC SH10ECNSMA	
	15,000mm	ENC SH15ECNSMA	
	20,000mm	ENC SH20ECNSMA	

(7) INCREMENTAL ( )



INCREMENTAL (14 ) (CON.A CON.B)

CON. A	CON. B			CON. A	CON. B			CON. A	CON. B		
A	3	1P( / )-	A	F	8	3P( / )-	*Z	L	13	5P( / )-	*U
B	4	1P( / )-	*A	G	1	4P( / )-	GND	M	14	6P( / )-	V
C	5	2P( / )-	B	H	20	4P( / )-	+5V	N	15	6P( / )-	*V
D	6	2P( / )-	*B	J	12/SH	Shield	FG	P	16	7P( / )-	W
E	7	3P( / )-	Z	K	10	5P( / )-	U	R	17	7P( / )-	*W

## L-TYPE PLUG

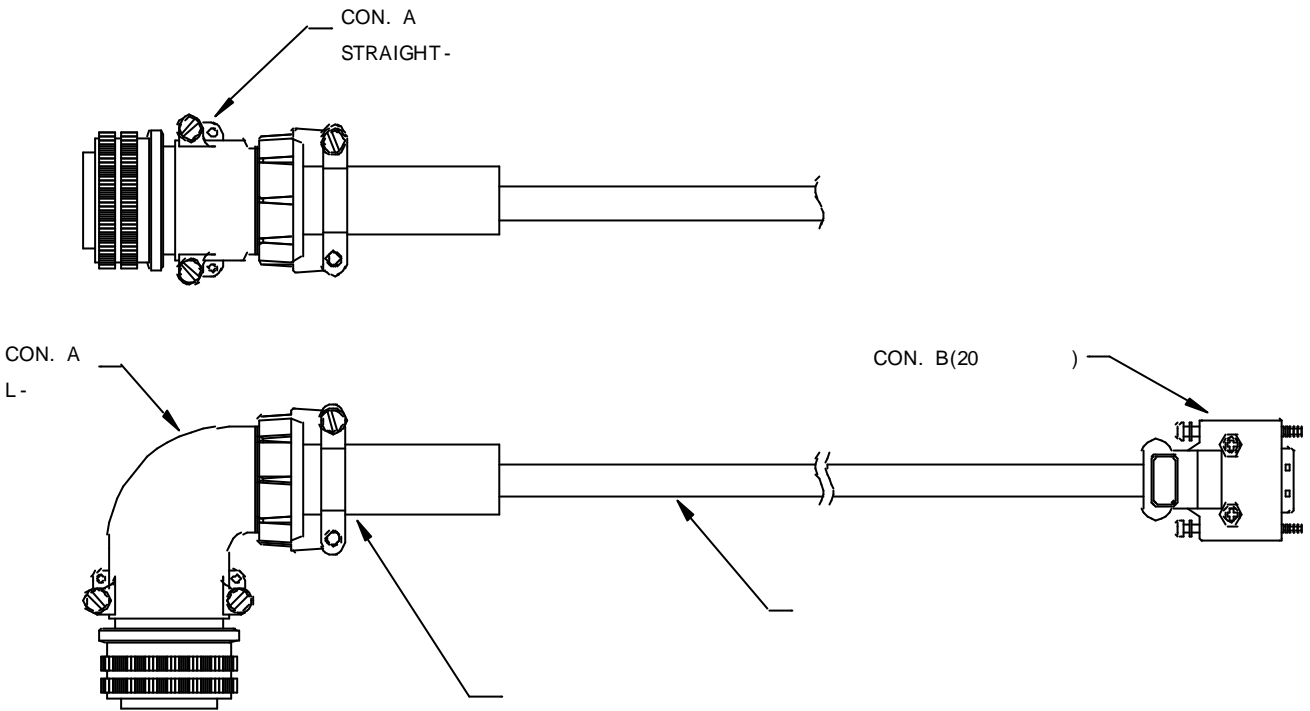
(L) ± 10%			
	3,000mm	ENC SH03ESNLFA	L-TYPE INC (14 ) ( )
	5,000mm	ENC SH05ESNLFA	
	10,000mm	ENC SH10ESNLFA	
	15,000mm	ENC SH15ESNLFA	
	20,000mm	ENC SH20ESNLFA	
가	3,000mm	ENC SH03ESNLMA	L-TYPE INC (14 ) (가 )
	5,000mm	ENC SH05ESNLMA	
	10,000mm	ENC SH10ESNLMA	
	15,000mm	ENC SH15ESNLMA	
	20,000mm	ENC SH20ESNLMA	

## STRAIGHT-TYPE PLUG

(L) ± 10%			
	3,000mm	ENC SH03ESNSFA	STRAIGHT-TYPE INC (14 ) ( )
	5,000mm	ENC SH05ESNSFA	
	10,000mm	ENC SH10ESNSFA	
	15,000mm	ENC SH15ESNSFA	
	20,000mm	ENC SH20ESNSFA	
가	3,000mm	ENC SH03ESNSMA	STRAIGHT-TYPE INC (14 ) (가 )
	5,000mm	ENC SH05ESNSMA	
	10,000mm	ENC SH10ESNSMA	
	15,000mm	ENC SH15ESNSMA	
	20,000mm	ENC SH20ESNSMA	



(8) ( )



(13 ) (CON.A CON.B)

CON. A	CON. B			CON. A	CON. B			CON. A	CON. B		
A	3	1P( / )-	A	F	8	3P( / )-	*C	L	13	5P( / )-	*RX
B	4	1P( / )-	*A	G	1	4P( / )-	GND	R	14	6P( / )-	CLR
C	5	2P( / )-	B	H	20	4P( / )-	+5V		15		Not Used
D	6	2P( / )-	*B	J	12/SH	Shield	FG	S	16	7P( / )-	BAT+
E	7	3P( / )-	C	K	10	5P( / )-	RX	T	17	7P( / )-	BAT-

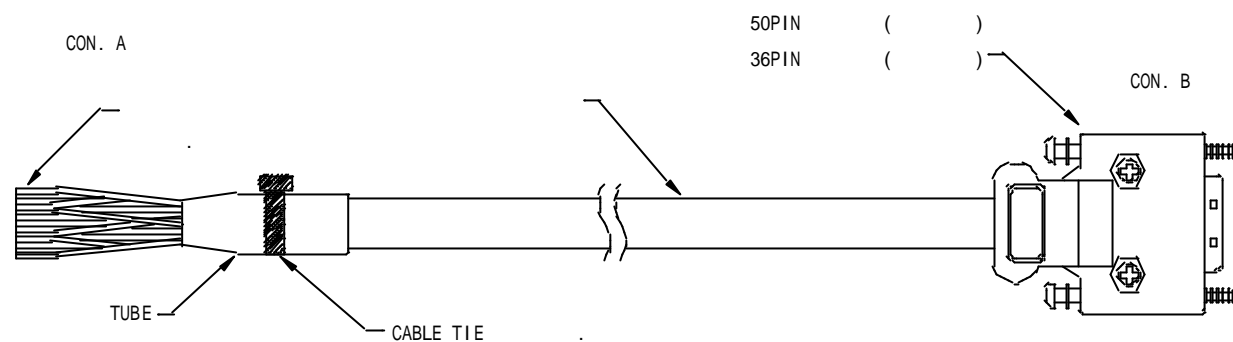
## L-TYPE PLUG

(L) ±10%			
	3,000mm	ENC SH03EABLFA	L-TYPE (13 ) ( )
	5,000mm	ENC SH05EABLFA	
	10,000mm	ENC SH10EABLFA	
	15,000mm	ENC SH15EABLFA	
	20,000mm	ENC SH20EABLFA	
가	3,000mm	ENC SH03EABLMFA	L-TYPE (13 ) (가 )
	5,000mm	ENC SH05EABLMFA	
	10,000mm	ENC SH10EABLMFA	
	15,000mm	ENC SH15EABLMFA	
	20,000mm	ENC SH20EABLMFA	

## STRAIGHT-TYPE PLUG

(L) ±10%			
	3,000mm	ENC SH03EABSFA	STRAIGHT-TYPE (13 ) ( )
	5,000mm	ENC SH05EABSFA	
	10,000mm	ENC SH10EABSFA	
	15,000mm	ENC SH15EABSFA	
	20,000mm	ENC SH20EABSFA	
가	3,000mm	ENC SH03EABSMA	STRAIGHT-TYPE (13 ) (가 )
	5,000mm	ENC SH05EABSMA	
	10,000mm	ENC SH10EABSMA	
	15,000mm	ENC SH15EABSMA	
	20,000mm	ENC SH20EABSMA	

(9) I/O ( / / )



I/O

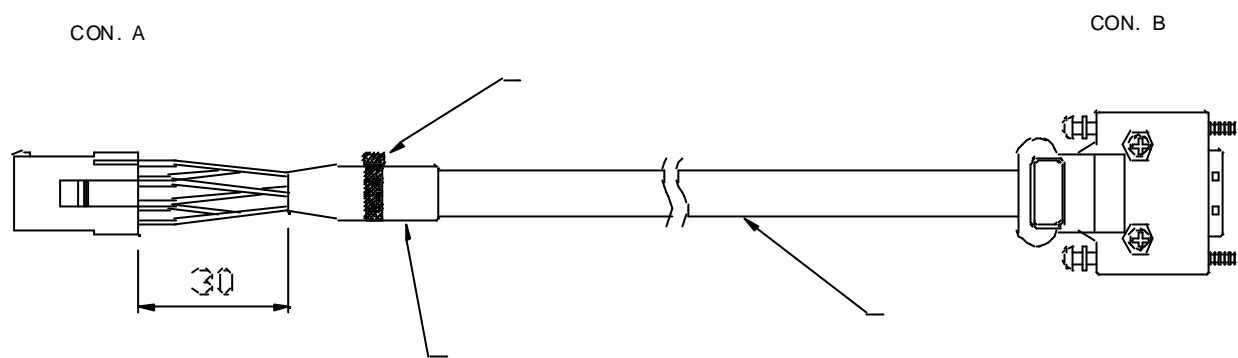
CON. B	COLOR	CON. B	COLOR	CON. B	COLOR	CON. B	COLOR	CON. B	COLOR
1		11	/1	21	/2	31	/4	41	/
2		12	/1	22	/3	32	/4	42	
3		13	/1	23	/3	33	/4	43	/1
4		14	/1	24	/3	34	/4	44	/1
5		15	/2	25	/3	35	/4	45	/1
6		16	/2	26	/3	36	/	46	/1
7		17	/2	27	/3	37	/	47	/1
8	/1	18	/2	28	/3	38	/	48	/1
9	/1	19	/2	29	/4	39	/	49	/1
10	/1	20	/2	30	/4	40	/	50	Shield( )

I/O

CON. B	COLOR	CON. B	COLOR	CON. B	COLOR	CON. B	COLOR
1		11	/1	21	/2	31	/4
2		12	/1	22	/3	32	/4
3		13	/1	23	/3	33	/4
4		14	/1	24	/3	34	/4
5		15	/2	25	/3	35	/4
6		16	/2	26	/3	36	SHIELD( )
7		17	/2	27	/3		
8	/1	18	/2	28	/3		
9	/1	19	/2	29	/4		
10	/1	20	/2	30	/4		

		L (mm) ± 10%	
	IOC SL03U36CNA	3,000	/ I/O
	IOC SL05U36CNA	5,000	
	IOC SL10U36CNA	10,000	
	IOC SL15U36CNA	15,000	
	IOC SL20U36CNA	20,000	
	IOC SL30U36CNA	30,000	
	IOC SL50U36CNA	50,000	
	IOC SH03U50CNA	3,000	/ I/O
	IOC SH05U50CNA	5,000	
	IOC SH10U50CNA	10,000	
	IOC SH15U50CNA	15,000	
	IOC SH20U50CNA	20,000	
	IOC SH30U50CNA	30,000	
	IOC SH50U50CNA	50,000	

(10) INCREMENTAL ( )

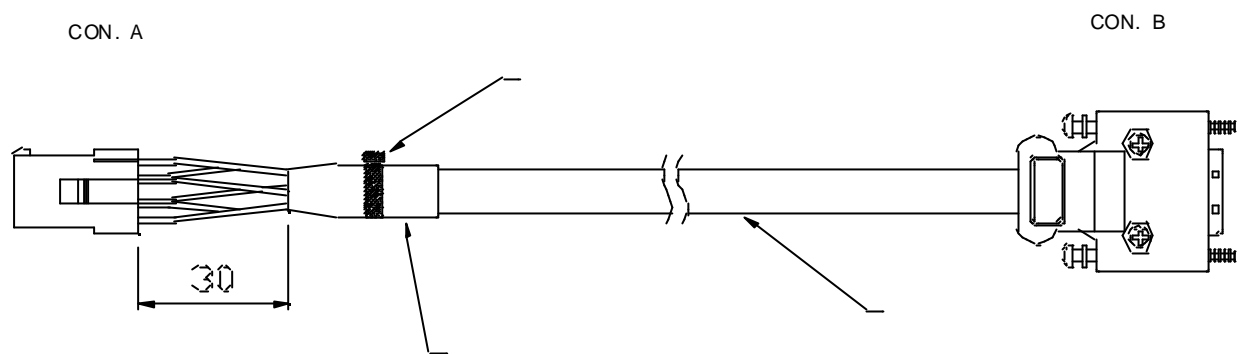


(9 ) (CON. A CON. B)

CON. A	CON. B			CON. A	CON. B		
1	3	1P( / )-	A	6	8	3P( / )-	*C
2	4	1P( / )-	*A	7	20	4P( / )-	VCC
3	5	2P( / )-	B	8	1	4P( / )-	GND
4	6	2P( / )-	*B	9	12/SH	Shield	FG
5	7	3P( / )-	C				

(L) ±10%			
	3,000mm	ENC SL03ECNSFA	INC (8 ) ( )
	5,000mm	ENC SL05ECNSFA	
	10,000mm	ENC SL10ECNSFA	
	15,000mm	ENC SL15ECNSFA	
	20,000mm	ENC SL20ECNSFA	
가	3,000mm	ENC SL03ECNSMA	INC (8 ) (가 )
	5,000mm	ENC SL05ECNSMA	
	10,000mm	ENC SL10ECNSMA	
	15,000mm	ENC SL15ECNSMA	
	20,000mm	ENC SL20ECNSMA	

(11) INCREMENTAL ( )

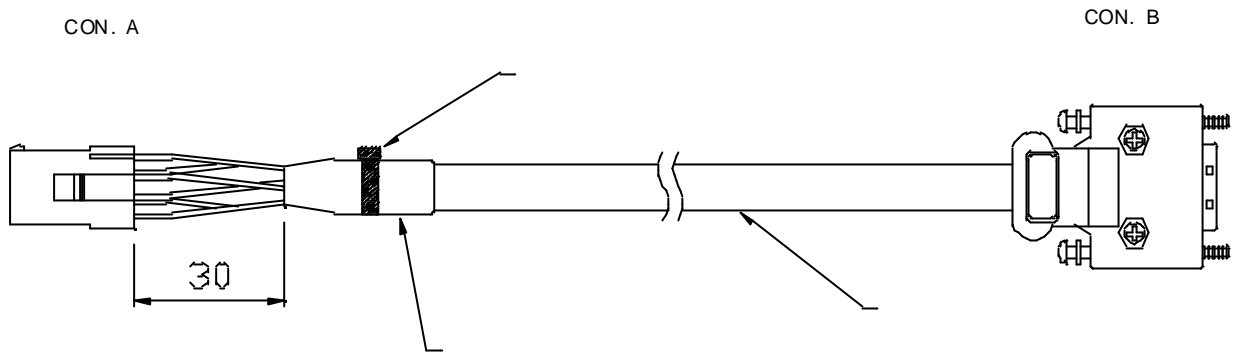


(9 ) (CON. A CON. B)

CON. A	CON. B			CON. A	CON. B			CON. A	CON. B		
1	3	1P( / )-	A	6	8	3P( / )-	*C	11	16	7P( / )-	W
2	4	1P( / )-	*A	7	10	5P( / )-	U	12	17	7P( / )-	*W
3	5	2P( / )-	B	8	13	5P( / )-	*UV	13	20	4P( / )-	VCC
4	6	2P( / )-	*B	9	14	6P( / )-	V	14	1	4P( / )-	GND
5	7	3P( / )-	C	10	15	6P( / )-	*V	15	12	SHIELD	FG

(L) ±10%			
	3,000mm	ENC SL03ESNSFA	INC (14 ) ( )
	5,000mm	ENC SL05ESNSFA	
	10,000mm	ENC SL10ESNSFA	
	15,000mm	ENC SL15ESNSFA	
	20,000mm	ENC SL20ESNSFA	
가	3,000mm	ENC SL03ESNSMA	INC (14 ) (가 )
	5,000mm	ENC SL05ESNSMA	
	10,000mm	ENC SL10ESNSMA	
	15,000mm	ENC SL15ESNSMA	
	20,000mm	ENC SL20ESNSMA	

)



(CON.A      CON.B)

CON. A	CON. B			CON. A	CON. B			CON. A	CON. B		
1	3	1P( / )-	A	6	8	3P( / )-	*C	11	16	7P( / )-	BAT+
2	4	1P( / )-	*A	7	10	5P( / )-	Rx	12	17	7P( / )-	BAT-
3	5	2P( / )-	B	8	13	5P( / )-	*Rx	13	20	4P( / )-	VCC
4	6	2P( / )-	*B	9	14	6P( / )-	RST	14	1	4P( / )-	GND
5	7	3P( / )-	C	10	NO CONNECTION			15	12	SHIELD	FG

(L) ±10%			
	3,000mm	ENC SL03EABSFA	(13 ) ( )
	5,000mm	ENC SL05EABSFA	
	10,000mm	ENC SL10EABSFA	
	15,000mm	ENC SL15EABSFA	
	20,000mm	ENC SL20EABSFA	
가	5,000mm	ENC SL05EABSMA	(13 ) (가 )
	10,000mm	ENC SL10EABSMA	
	15,000mm	ENC SL15EABSMA	
	20,000mm	ENC SL20EABSMA	

## SmartJog Program

CSD Servo Drive PC

- Digital Operator pc
- Parameter HDD
- Oscilloscope .

1 :

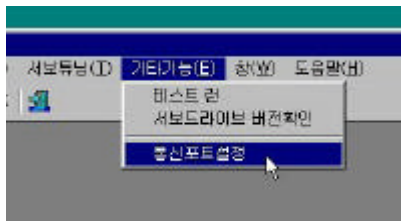
2 :



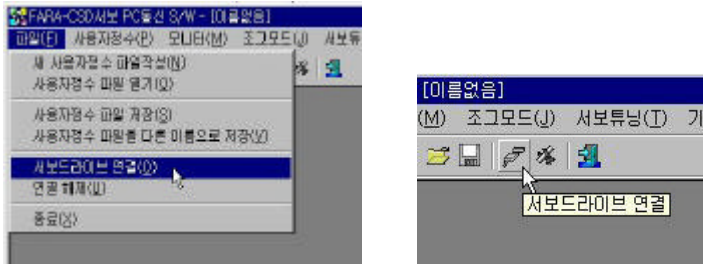
1.

PC .

PC

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \cdot \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad (2)$$


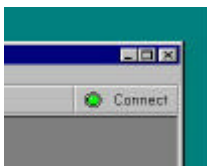
4 / 가



4. FaraPC

가 , 5

LED가 , FaraPC



5. LED

, PC

7

가



6.

PC

가

. FaraPC

가

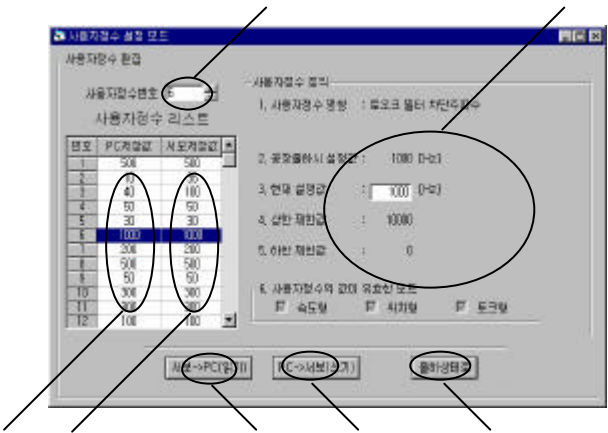
[ ]

2 :

FaraPC /

FaraPC 2 FaraPC  
가

FaraPC /  
7



7.

: /  
: FaraPC  
:  
가 “ ”

```

:
FaraPC
.( )
write
: FaraPC
( )
: FaraPC
가
( )
:
가
.( / /
)
2가 가
7 /
,
7
,
7 / /
가
가
.

```

FaraPC 3 .

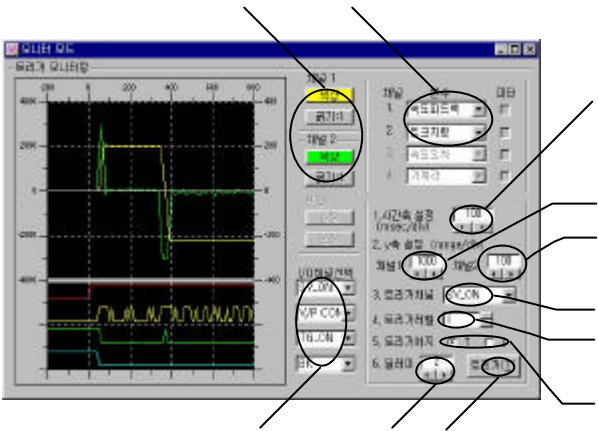
1. 가/ ( 1msec ), ,

2. ( 100msec ), ,

3. 4 ( 100msec ), ,

( 100msec ) .

1. 8



8.

: 1/2 .

: 1/2 .

: .

, x division .

×10

		"10 "		1msec	,
x		division	10msec	.	
:		1 y	division	.	
		1 y		y	.
:		2 y	division	.	
		2 y		y	.
:					
:			(	~	)
:	,				
:		I/O(SV_ON -NCL)		,	I/O
:					
					1/2
	FaraPC		FaraPC		
:	x				
	1 ~9				
:		I/O		4	I/O

2.

9



9.

: 1/2 .

: 1/2 .

: x division . (

100msec .)

: 1 y division .

1 y y .

: 2 y division .

2 y y .

: / .

: WMF( )

: ,

: on/off .

: I/O .

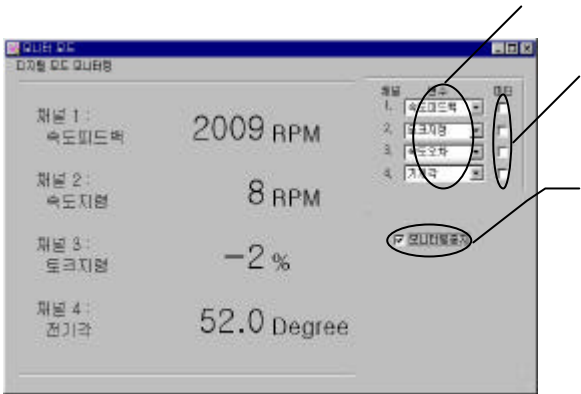
: I/O . ( 4

가 .)



3.

10



10.

: 1 ~ 4

:

가 . ( 가

.)

: /

!! !!

가 100msec

, FaraPC 100msec 1 /

,

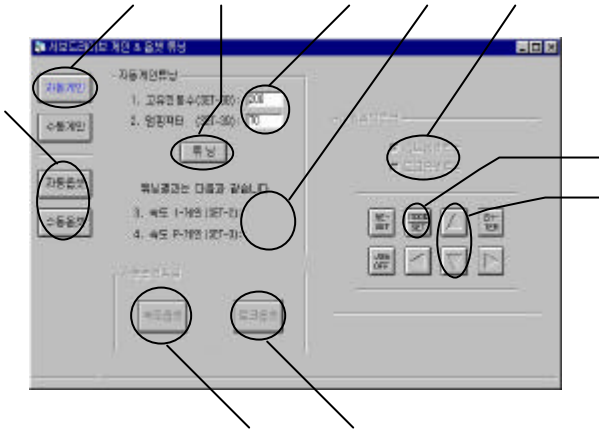
PC

,

가

,

11



11. , /

: /

:

:

:

:

: ( , )

: 가

:

: -2, -3

:

: , ( 가 )

:

[M]ode/Set . ( M )

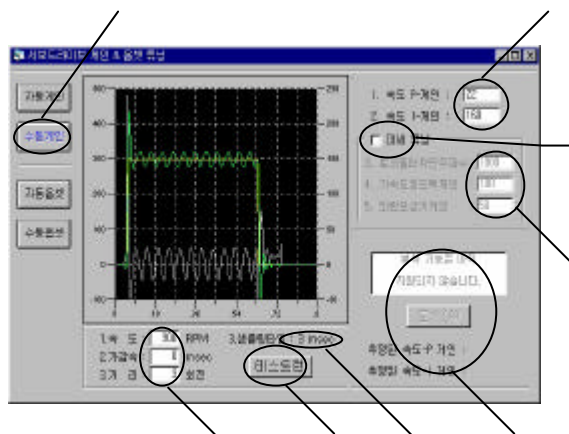
:

:

.

.

12



12.

:

:

가

,

:

on/off .

:

on

,

,

:  
 :  
 :  
 :  
 :

가

/ /

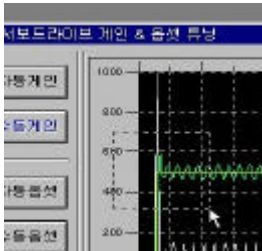
FaraPC

FaraPC

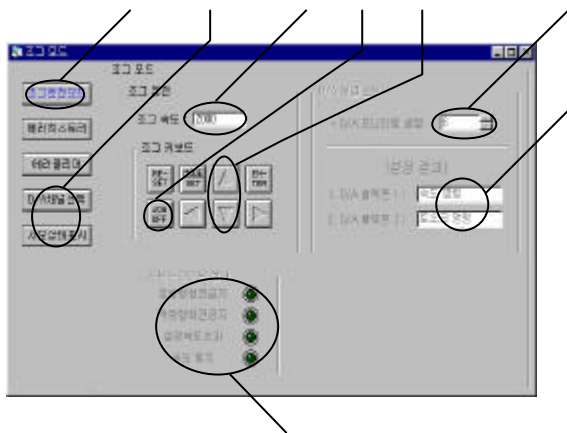
13

drag

, 가/



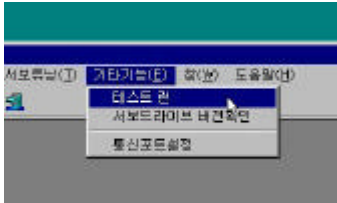
13.

$$\frac{D}{A} = \frac{\text{Distance}}{\text{Area}} = \frac{100 \text{ km}}{100 \text{ km}^2} = 1 \text{ km}^{-1} \quad (14)$$


14.

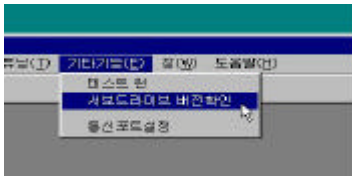
:  
 : D/A  
 :  
 : ( -25)  
 가 /  
 : on/off ( J  
 )  
 : /  
 : ( )  
 : D/A  
 : D/A  
 :  
 : ( .)

가  
 , -25 ( ) 가  
 . ( 15)  
 . , 가  
 , .



15.

( 16)  
 . ( 17)

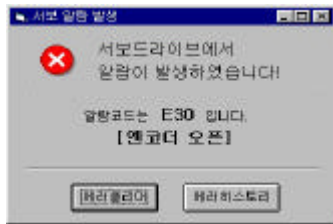


16.



17.

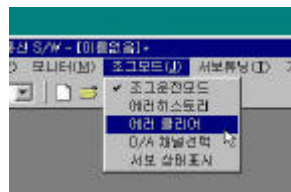
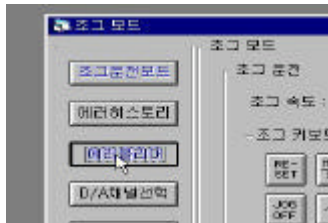
가 18  
가 .



18.

가

가  
19 가 .



19.

( 20)



20.

가

10

가 가 .