

ADLEEPOWER®

INSTRUCTION MANUAL

BLDC MOTOR AND DRIVES

BLS Series



**THANK YOU VERY MUCH FOR YOUR PURCHASE
ADLEE PRODUCTS.
PLEASE READ THIS INSTRUCTION MANUAL
BEFORE INSTALLATION.**

PREFACE

This BLS drive and BLDC motor made by ADLEE Powertronic Co., Ltd. Read this instruction manual throughly before operation.

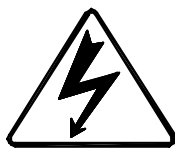
This manual will be helpful in the installation, parameter setting and troubleshooting of the BLDC motors and drives. To guarantee safe operation of the equipment, read the following safety guidelines before connecting power to the drives. Keep this operating manual handy and distribute to all users for reference.

A. General Precaution

1. There are some covers and shields on this drive. Make sure all covers and shields are replaced befor operating this product.
2. This manual may be modified when necessary because of improvement of the product or changes in specification.
3. Contact your ADLEE representative to order a copy of this manual, if your manual has been damaged or lost.
4. ADLEE is not responsible for any modification of the product made by the user, since that will void your guarantee.

B. Safety symbols

Symbols which may appear on the manual



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury to personnel.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury to personnel and damage to equipment.

RECEIVING



CAUTION

- * Do not install or operate the drive and BLDC motor which is damaged or has missing parts.
Failure to observe this caution may result in personal injury or equipment damage.

INSTALLATION



WARNING

- * Wiring should be performed by qualified personnel only.
Failure to observe this warning may result in an electrical shock or a fire.
- * Only commence wiring after verifying that the power supply is turned OFF.
Failure to observe this warning may result in an electrical shock or a fire.
- * Make sure to ground the ground terminal.
Ground resistance : 100 Ohm or less.
Failure to observe this warning may result in an electrical shock or a fire.
- * Never touch any rotating BLDC motor parts while the BLDC motor is running.
Failure to observe this warning may result in injury.



CAUTION

- * Don' t hold the product by the cables or BLDC motor shaft while transporting it.
Failure to observe this caution may damaged the products.
- * Mount the drive on nonflammable material. (i.e. metal)
Failure to observe this caution may result a fire.



CAUTION

- * When mounting units in an enclosure, install a fan or other cooling drive to keep the intake air temperature below 45 °C.
Overheating may cause a fire or damage to the drive.
- * Verify that the drive rated voltage considers with the AC power supply voltage.
Failure to observe this caution may result in personal injury or a fire.
- * Do not perform a withstand voltage test of the drive.
It may cause semi-conductor elements to be damaged.
- * Tighten terminal screws.
Failure to observe this caution may result a fire.
Never connect the AC main circuit power supply to output terminals U, V and W.
The drive will be damaged and invalidate the guarantee.

OPERATION



CAUTION

- * Since it is easy to change. Operation speed from low to high speed, verify the safe working speed range of the BLDC motor and machine before operation.
Failure to observe this caution may result in personal injury and machine damage.
- * All the contents of the drive have been preset at the factory.
Do not change the settings unnecessary.

MAINTENANCE AND INSPECTION



WARNING

- * Only authorized personnel should be permitted to perform installation, maintenance, inspections or parts replacement.
Failure to observe this warning may result in an electrical shock.
- * Never touch high-voltage terminals in the drive.
Failure to observe this warning may result in an electrical shock.
- * Replace all protective covers before powering up the drive.
To remove the cover, make sure to shut OFF the molded-case circuit breaker.
Failure to observe this warning may result in an electrical shock.
- * Never perform maintenance or inspection for five minutes, after the main circuit power supply is turned OFF.
The capacitors are still charged and can be dangerous and cause electrical shock.



CAUTION

- * The control PC board employs CMOS ICs. Do not touch the CMOS elements by hand.
They are easily damaged by static electricity.
- * Do not connect or disconnect wires or connectors while power is applied to the circuit.
Failure to observe this caution may result in personal injury.

OTHERS



WARNING

- * Never modify the product.
Failure to observe this warning may result in an electrical shock or personal injury and will invalidate the guarantee.

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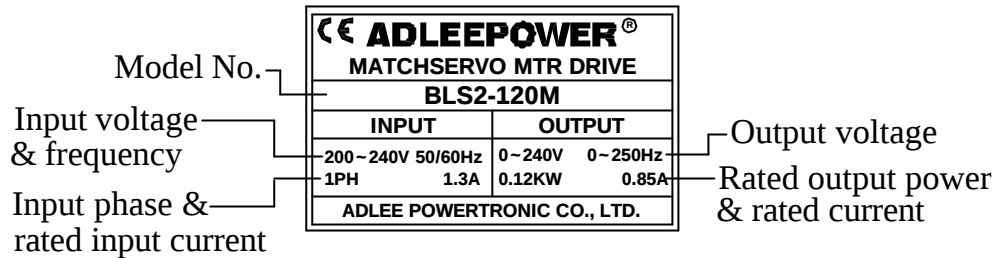
1. RECEIVING

This BLS series BLDC motor drive and BS series BLDC motor have gone through rigorous quality control tests at the factory before shipment. After receiving the BLDC motor and drive , please check for the following:

- (1) No damage is found on each product after receiving.
- (2) The product is as ordered (check the nameplate, voltage and ampere).
- (3) A set of drive unit and instruction manual is contained in the package.
For any irregularity, contact the agent where you purchased immediately.
- (4) The drive has been designed for use in combination with the specified BLDC motor only. Check if the specifications of drive and BLDC motor are in a set.
- (5) Check if the BLDC motor' s shaft can be rotated smoothly by hand.

(6) Description of nameplate

BLS drive



BLS 2 - 120 M

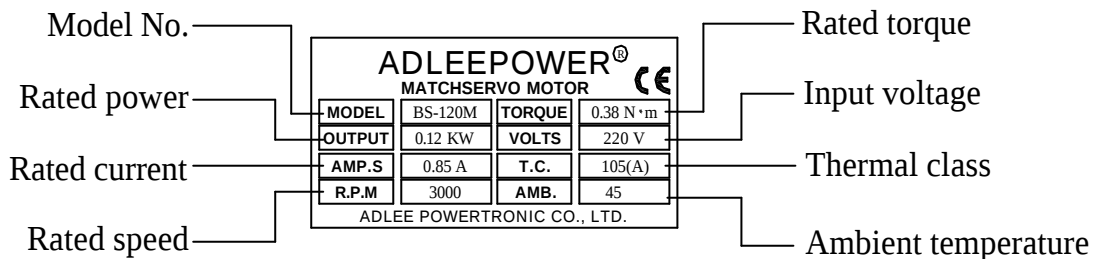
① ② ③

①: Rated voltage : 1:110V, 2:220V.

②: Rated power : 120:120W, 200:200W.

③: Rated speed : L:2000RPM, M:3000RPM.

BLDC motor



BS 2 - 120 L O

① ② ③ ④

①: Rated voltage : 2:220V.

②: Rated power : 120:120W, 200:200W.

③: Rated speed : L:2000RPM, M:3000RPM.

④: Motor shaft : O : Round shaft, K : Shaft with keyway

2. SPECIFICATIONS

Rated Power (W)		120		200	
Motor No.		BS2-120LK/MK	BS2-120LO/MO	BS2-200LK/MK	BS2-200LO/MO
Drive No.		BLS1-120L/M		BLS1-200L/M	
Input Voltage		110VAC± 10% 1			
Input Frequency		50~60			
Motor Rated Torque (N.m)		0.57/0.39		0.96/0.65	
Motor Max. Torque (N.m)		1.14/0.78		1.92/1.30	
Motor Rated Current (A)		0.86/0.85		1.60/1.56	
Motor Max. Current (A)		1.87/1.70		3.20/3.12	
Motor Rated Speed (RPM)		L:2000 / M:3000			
Hall Effect Sensor		HU, HV, HW open collector			
ACC. DEC. time		0.1~15.0Sec			
Speed Regulation	Load	± 0.5% Below (0~rated torque at rated speed)			
	Voltage	± 0.5% Below (Source voltage± 10% at rated speed no load)			
	Temperature	± 0.5% Below (-10~45 /32~113 at rated speed no load)			
Type of Control		Sin PWM			
Mode of Control		Speed Mode			
Digital Input Signal		1. Panel SETTER, Run/Stand-BY switch, Direction switch 2. X0~X2 and C0 common			
Operating		1. Panel : Run/Stand-BY operating switch 2. Terminal : Photocoupler interface: input resistance 680 Ω/X0~X2 3. Communication : RS485			
Output Signal		Y0/Y1 open collector, external power supply (DC4.5V~30V, 100mA below)			
Protection		Overload, over current, over voltage, over heat, over speed, low voltage, initial operation inhibition, hall sensor abnormal, short circuit			
Motor Thermal Class		105(A)			
Motor Enclosure IP Rating		IP40			
Drive Enclosure IP Rating		IP20			
BLS Drive Figure No.		1			
BS Motor Figure No.		2	3	2	3
BLS Drive Weight (Kg)		0.58			
BS Motor Weight (Kg)		1.4/1.2	1.4/1.2	1.65/1.4	1.65/1.4

Rated Power (W)		120		200	
Motor No.		BS2-120LK/MK	BS2-120LO/MO	BS2-200LK/MK	BS2-200LO/MO
Drive No.		BLS2-120L/M		BLS2-200L/M	
Input Voltage		220VAC± 10% 1			
Input Frequency		50~60			
Motor Rated Torque (N.m)		0.57/0.39		0.96/0.65	
Motor Max. Torque (N.m)		1.14/0.78		1.92/1.30	
Motor Rated Current (A)		0.86/0.85		1.60/1.56	
Motor Max. Current (A)		1.87/1.70		3.20/3.12	
Motor Rated Speed (RPM)		L:2000 / M:3000			
Hall Effect Sensor		HU, HV, HW open collector			
ACC. DEC. time		0.1~15.0Sec			
Speed Regulation	Load	± 0.5% Below (0~rated torque at rated speed)			
	Voltage	± 0.5% Below (Source voltage± 10% at rated speed no load)			
	Temperature	± 0.5% Below (-10~45 /32~113 at rated speed no load)			
Type of Control		Sin PWM			
Mode of Control		Speed Mode			
Digital Input Signal		1. Panel SETTER, Run/Stand-BY switch, Direction switch 2. X0~X2 and C0 common			
Operating		1. Panel : Run/Stand-BY operating switch 2. Terminal : Photocoupler interface: input resistance 680 Ω /X0~X2 3. Communication : RS485			
Output Signal		Y0/Y1 open collector, external power supply (DC4.5V~30V, 100mA below)			
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Motor Thermal Class		105(A)			
Motor Enclosure IP Rating		IP40			
Drive Enclosure IP Rating		IP20			
BLS Drive Figure No.		1			
BS Motor Figure No.		2	3	2	3
BLS Drive Weight (Kg)		0.58			
BS Motor Weight (Kg)		1.4/1.2	1.4/1.2	1.65/1.4	1.65/1.4

3. DIMENSION DRAWINGS

3-1. BLS Drive Dimensions

Unit : mm

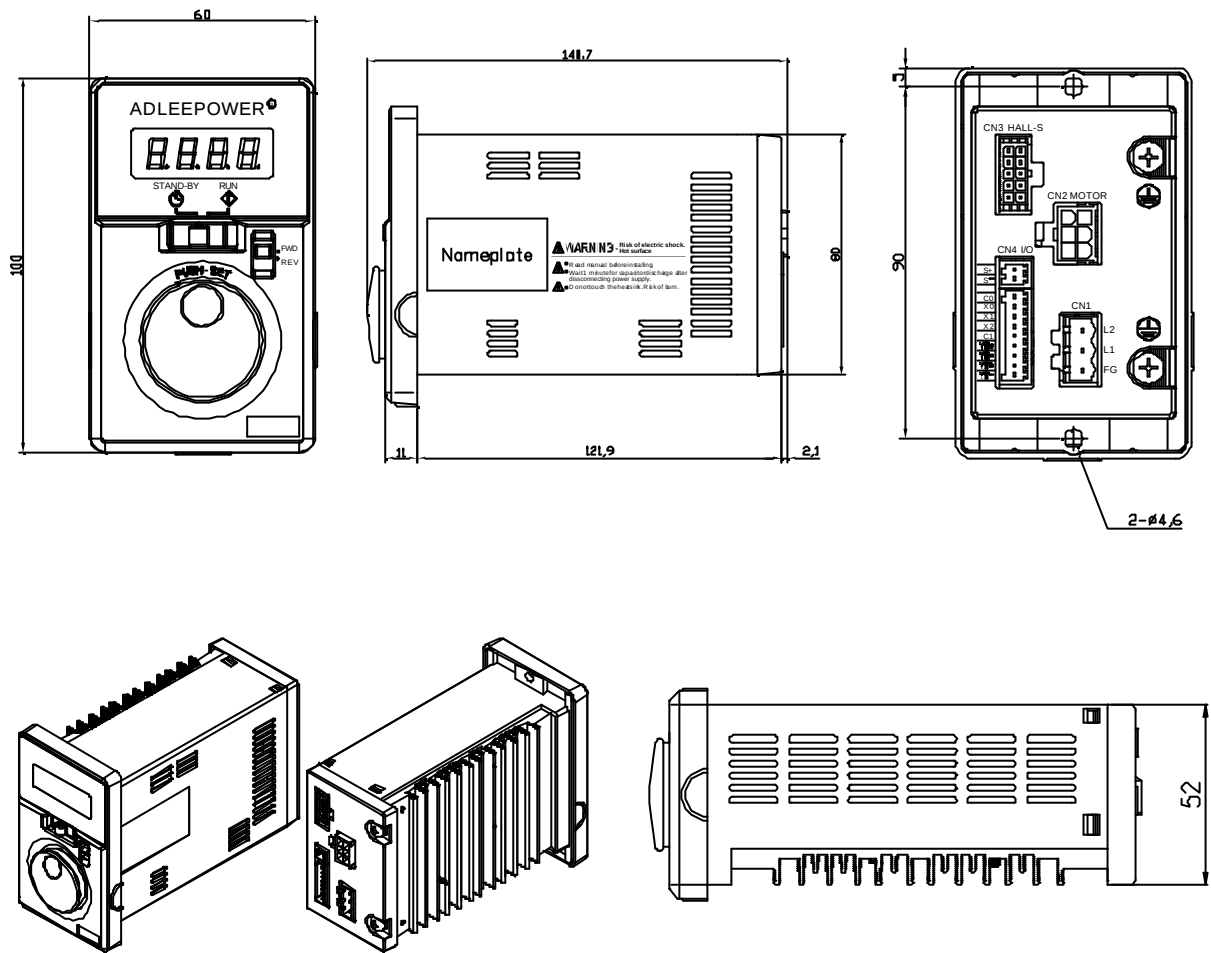


Fig 1

3-2. BLDC Motor - Shaft with Keyway

Unit : mm

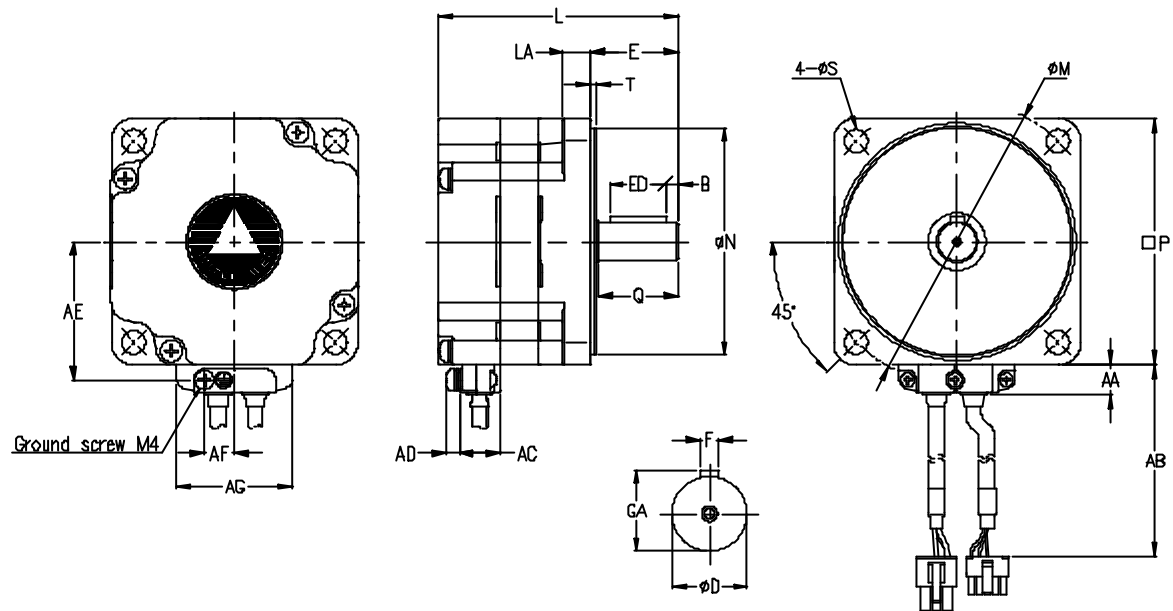


Fig 2

FIG 2	□P	M	S	N	T	L	LA	AA	AB	AC	AD	AE	AF	AG	SHAFT END						
															B	ED	Q	E	D	GA	F
BS-120LK	90	104	8.5	83	2	87.3	10	11	1000	15	5	50.5	11	42	4.5	20	29	32	12	13.5	4
BS-200LK						92.2													14	16	5
BS-120MK						82.4													12	13.5	4
BS-200MK						87.3													14	16	5

3-3. BLDC Motor - Round Shaft

Unit : mm

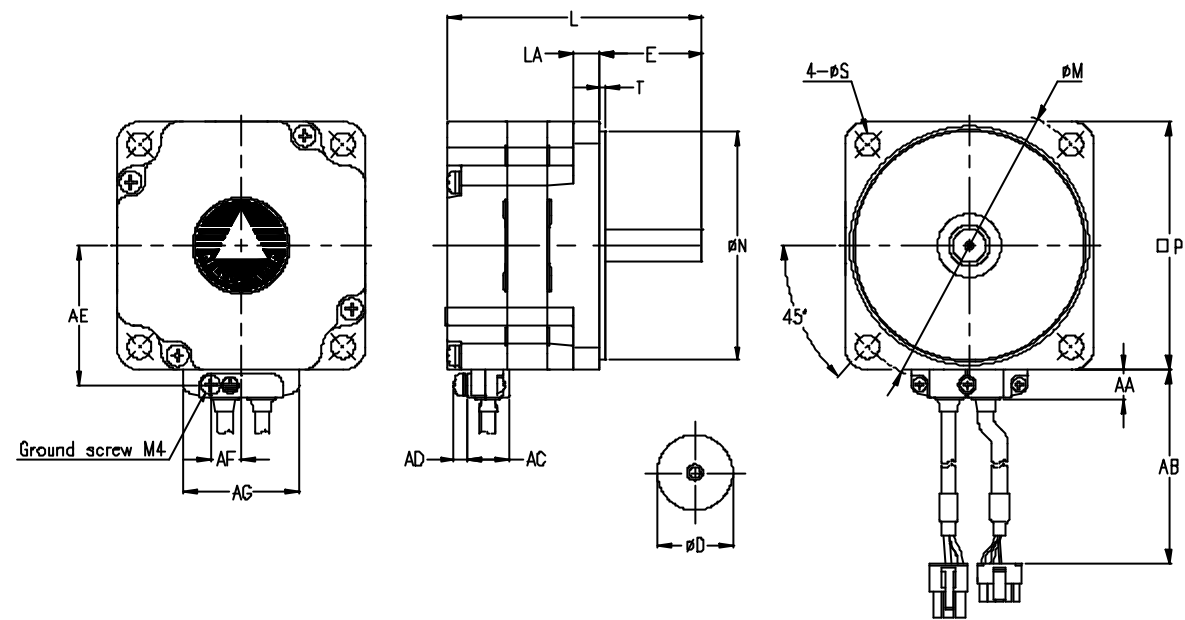


Fig 3

FIG 3	□P	M	S	N	T	L	LA	AA	AB	AC	AD	AE	AF	AG	SHAFT END	
															E	D
BS-120LO	90	104	8.5	83	2	92.3	10	11	1000	15	5	50.5	11	42	37	12
BS-200LO						97.2										14
BS-120MO						87.4										12
BS-200MO						92.3										14

4. PRECAUTION OF BLS DRIVES

After wiring and before POWER UP, Please check follow item and confirm those item .

(1) Wiring is correct

※ L1 & L2 for input power. U V W for motor.

(2) Input power voltage is matched BLS rated voltage

※ BLS2 input voltage is 220Vac $\pm 10\%$.

※ BLS1 input voltage is 110Vac $\pm 10\%$.

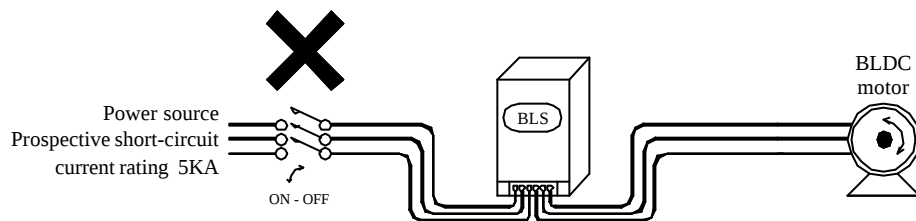
(3) L1 & L2 are skew tightly in terminal

※ Poor contact resulted in heat on terminal.

(4) There is no short circuit among all cable.

(5) For safety, Label GROUND on drives and motor must be grounded.

(6) For operating motor “run” and “stop” should use keypad or terminal or RS485 to control these functions.



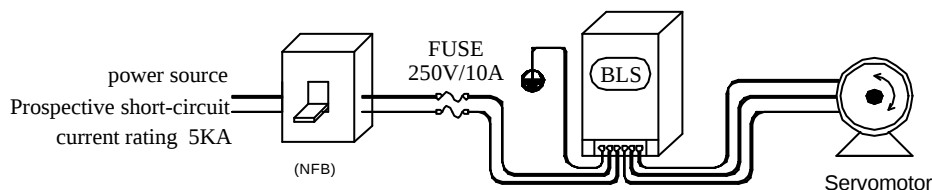
(7) Use a nonflammable material, such as steel sheet on the wall for installation.

(8) When installing the unit within the cabinet. Please pay attention to ventilation.

(9) When high voltage LED light on, do not touch inside component and PCB. It may result in electric shock.

(10) Do not replace component for warranty.

(11) Power source must be fitted with a fuse (250V/10A) to prevent internal short circuit problems.



5. INSTALLATION

5.1. BLDC motor and drives environmental requests

- Air temperature : -10~+45 (14~113)
- Air pressure : 86~106kPa
- Attitude : Under 1000 meters
- Vibration : Less than 20HZ : Maximum 9.86m/s²
20~50HZ : Maximum 5.88m/s²
- Humidity : Less than 90%, no frosting
- Free of corrosive or explosive gases.
- Well-ventilated and free of dust and moisture.
- Free of large power EMI
- Free of direct sun light
- Pollution Degree : 2

5.2. Drive installation space and orientation

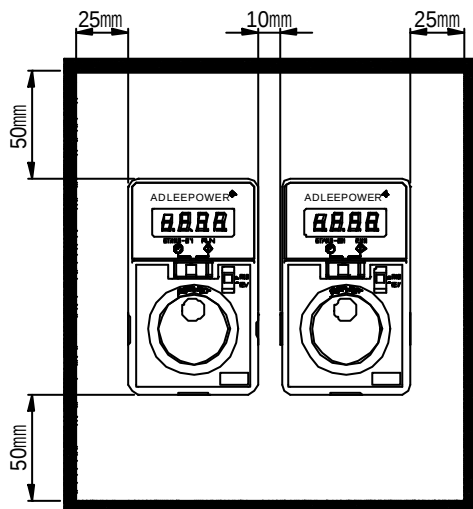
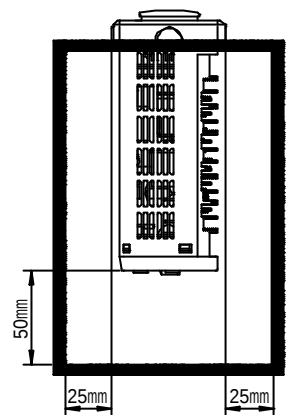
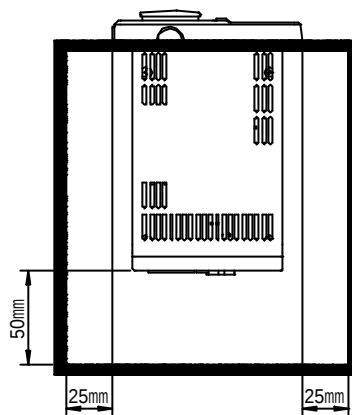
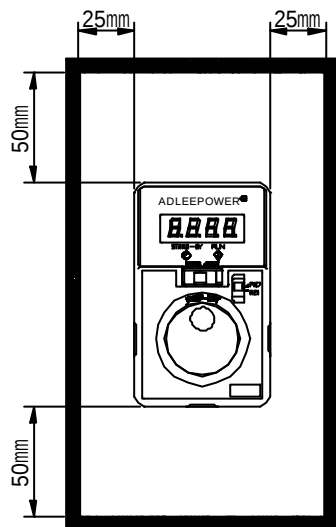
For cooling and easy to maintain, it need marginal space for drive.

We recommend installation example below.

Drive must be installed in the control box.

Drive front panel face front

Drive front panel face up direction



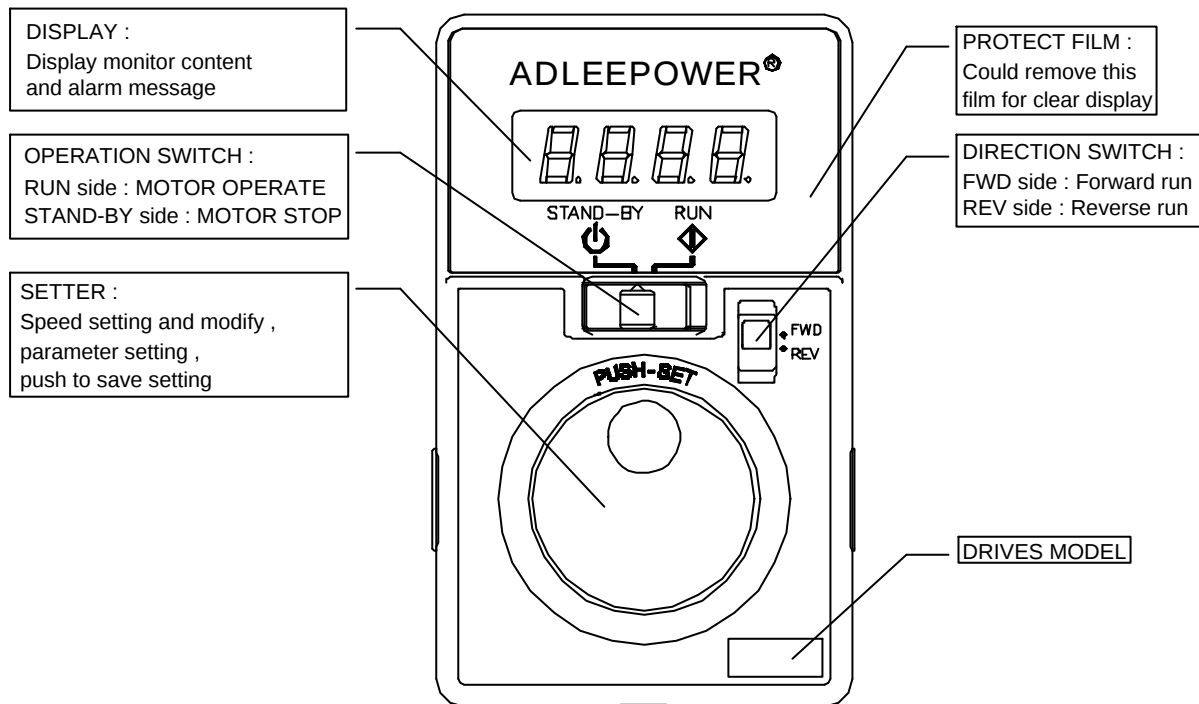
6. DESCRIPTION OF TERMINAL

(1) Panel and Terminal Description

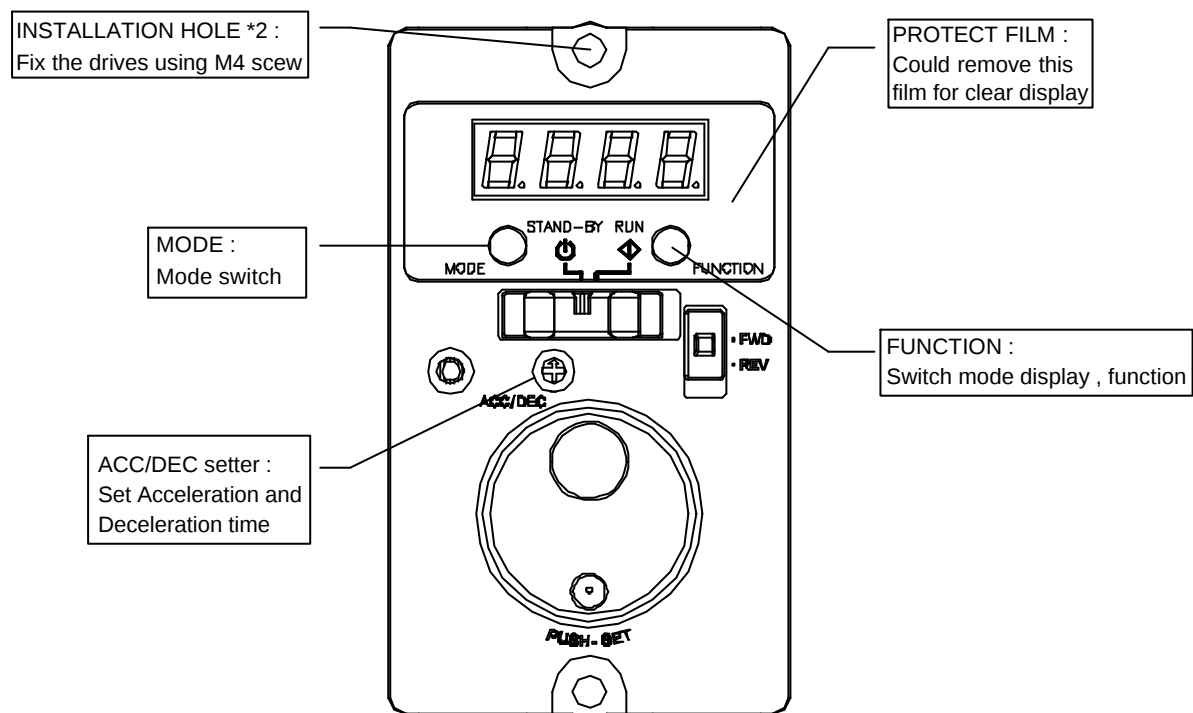
FRONT

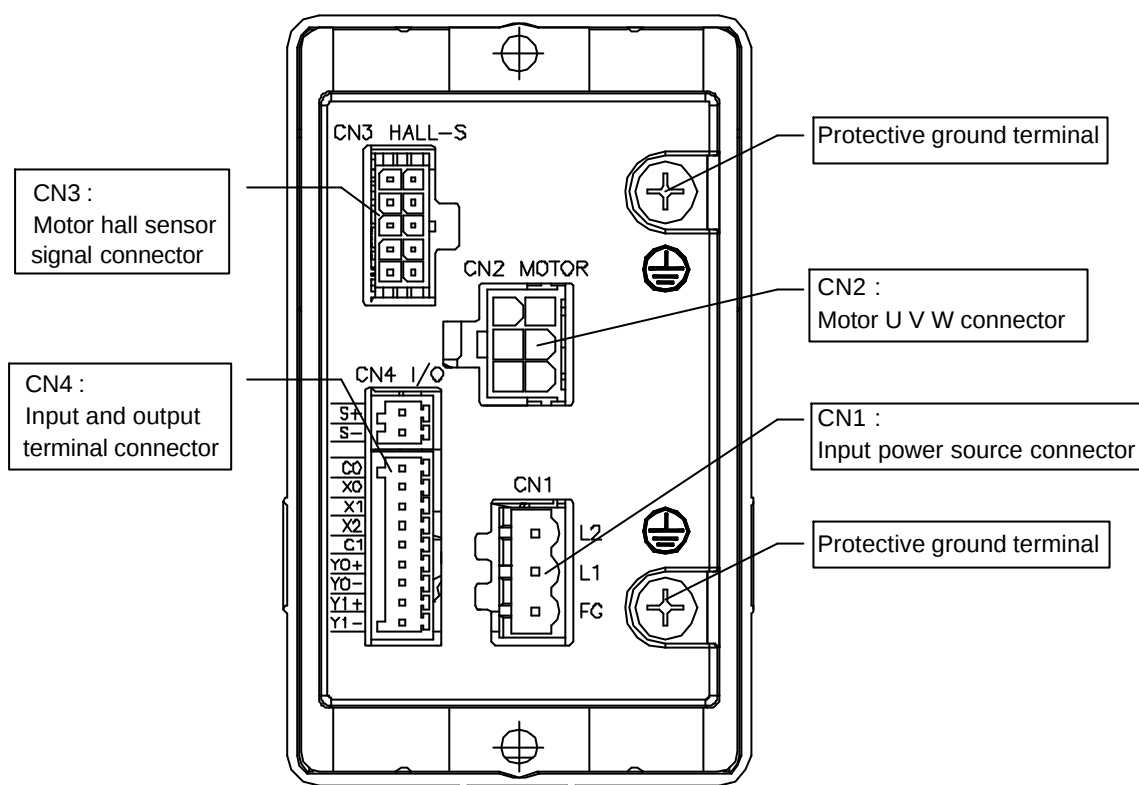
1. Function key : MODE , FUNCTION , SETTER (rotation to change value , push to save value , push to switch parameter mode).
2. Function switch : operation switch (RUN and STAND-BY) , direction switch (FWD and REV).
3. Acceleration and Deceleration time setter.

DRIVES FRONT VIEW : With front protect cover



DRIVES FRONT VIEW : without front protect cover





CN4 terminal function description

LABEL	TERMINAL NAME	DESCRIPTION
S+	RS485 A	Communication port
S-	RS485 B	Communication port
C0	Input common source	X0 ~ X2 common source
X0	Multi-function input terminal 0	Refer to P011
X1	Multi-function input terminal 1	Refer to P012
X2	Multi-function input terminal 2	Refer to P013
C1	Input common ground	X0 ~ X2 common ground
Y0+	Multi-function output terminal 0+	Refer to P014
Y0-	Multi-function output terminal 0-	
Y1+	Multi-function output terminal 1+	Refer to P015
Y1-	Multi-function output terminal 1-	

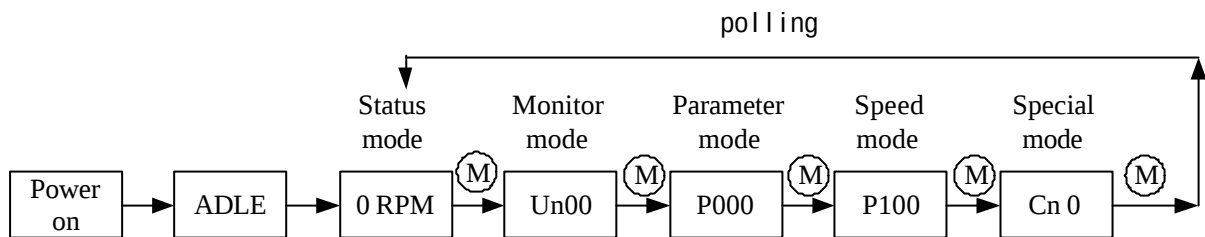
(2) Operation Procedure, Method and Step

1. Operation mode : 5 mode

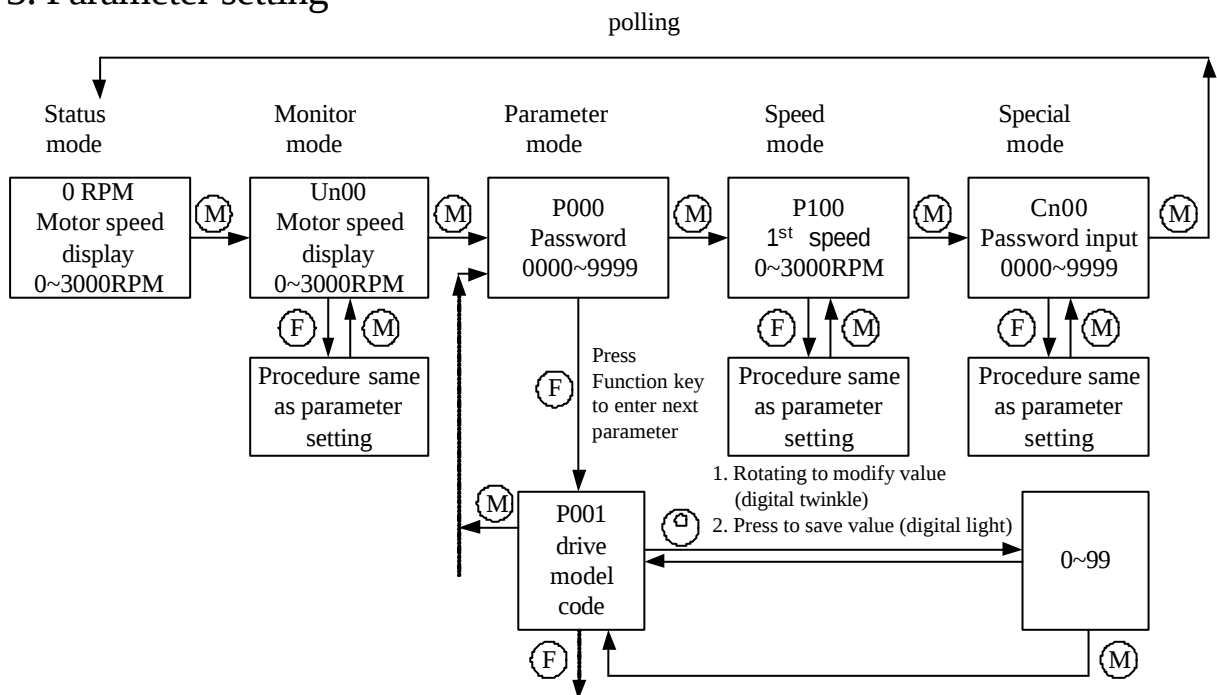
Status mode, Monitor mode, Parameter mode, Speed mode, Special mode ; Press MODE key to switch mode.

2. Mode switch procedure

Status mode(0 Rpm)→ Monitor mode(Un00)→ Parameter Mode (P000) → Speed mode (P100) → Special mode (Cn00) → Status mode(0 Rpm)(polling)



3. Parameter setting



(F) : Press FUNCTION key.

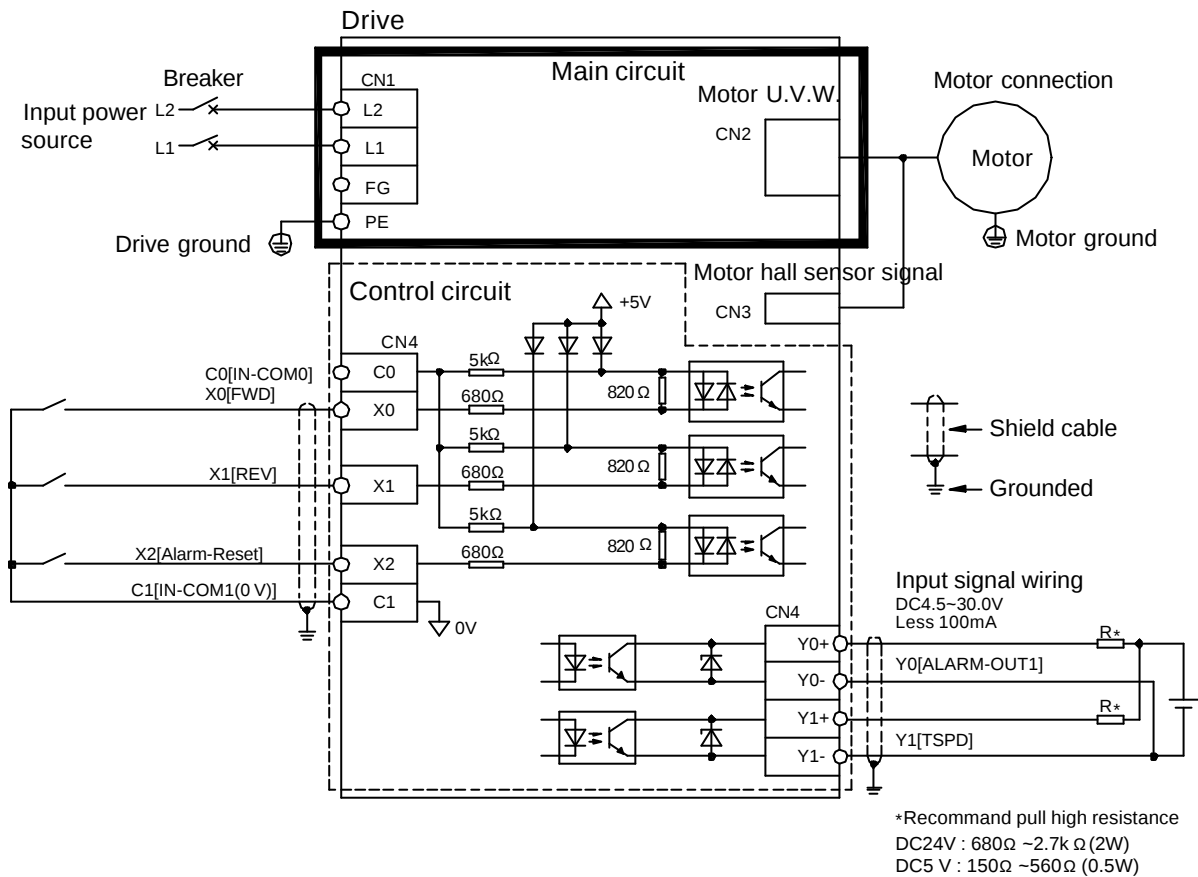
(M) : Press MODE key.

(⌚) : Set value : CW for increase value, CCW for decrease value.

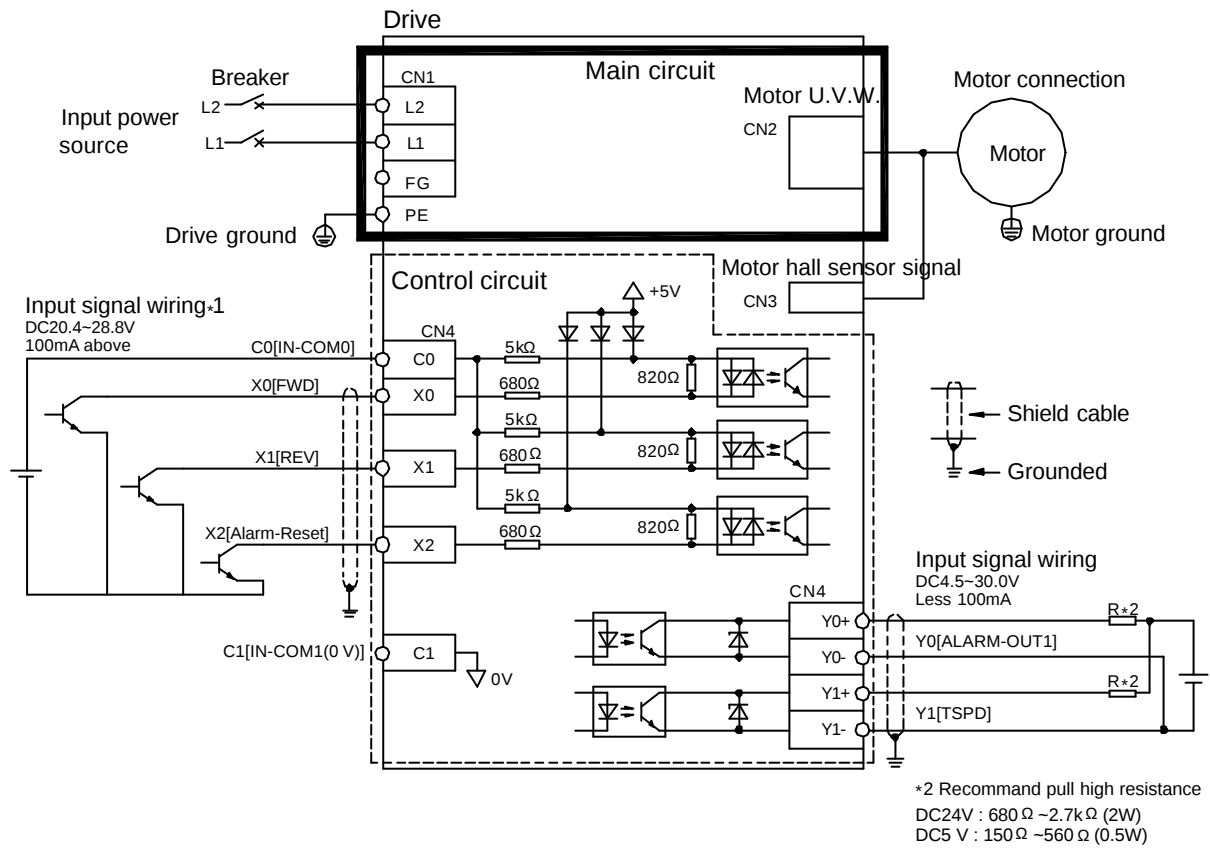
(3) Wiring

(3-1) Sink : Use internal source voltage

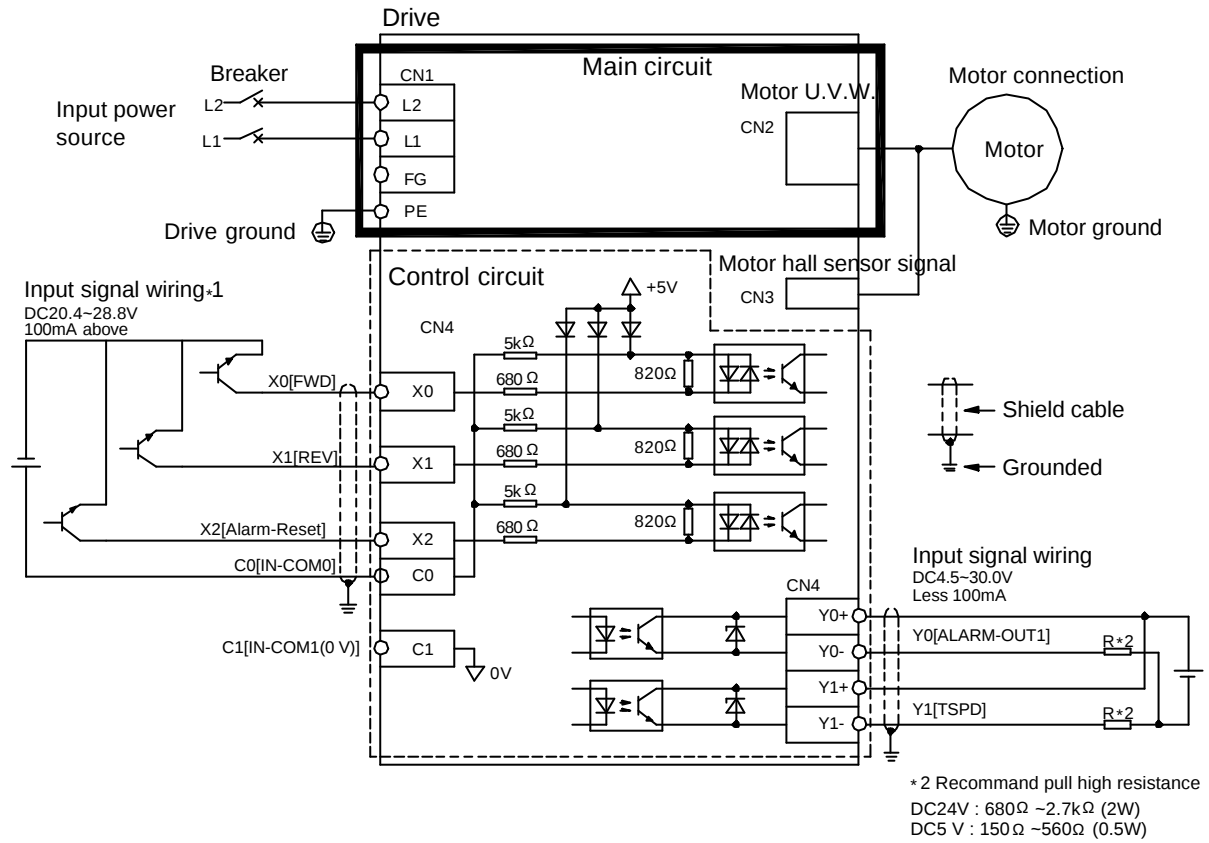
Usage of switch, relay to control motor operation.



(3-2) Sink : Use external source voltage
Usage of transistor to control motor operation.



(3-3) Source : Use external source voltage
Usage of transistor to control motor operation.



(4) Usage of Circuit Breaker or Electro-Magnetic Contactor of Input Power Source

It is recommended to add Circuit Breaker or Electro-Magnetic Contactor between input power source and L1 L2 of BLS input power terminal for safety protection. Table list as below for reference

MODEL	BLS2	
Output Power	120W	200W
Circuit Breaker(MCCB) A	10	10
Electro-Magnetic Contactor A	6	6

Note : If use leakage detect Breaker ; To avoid malfunction please set the sensitivity at 200mA above and trigger time 0.1second above.

(5) Surge Absorber

In order to prevent malfunction, provide the surge absorber on the coils of the electromagnetic contactors, relays and other devices which are to be used adjacent of the drive.

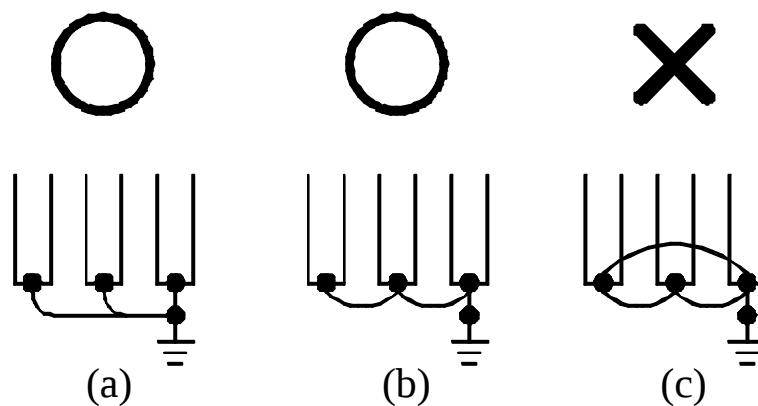
(6) Wiring

A. Wire Specification

	WIRE SIZE	WIRE TYPE	SKEW TORQUE
Input(L1, L2, $\oplus$)	14AWG~16AWG (2.0mm ² ~1.3mm ²)	Stranded copper only (300V/80)	8Kg-cm (6.95lb-in)
I/O terminal	24AWG (0.2mm ²)	Stranded copper only (300V/80)	
Ground skew(M4)	14AWG~16AWG (2.0mm ² ~1.3mm ²)	Stranded copper only (300V/80)	12Kg-cm (10.43lb-in)

B. Grounding

1. Be sure ground both the drive and BLDC motor.
2. Keep grounded leads as short as possible.
3. Shield cables use to protect low-level signal leads should grounded at one end point.
4. Provide class 3 grounding (100 Ω or less) for a terminals.
5. When grounding several drive, make connections as shown below, no loop is produced as shown in FIG a, FIG b.



7. DRIVE PARAMETERS

General Use Parameter

DISPLAY CODE	FUNCTION	ADJUST RANGE	DEFAULT VALUE	UNIT	R/W
P000	Password				W
P001	Drive Model Code				R
P002	Control Mode	0	0		R/W
P003	Operation Command Source	0~2	0		R/W
P004	Direction Definition	0~1	0		R/W
P005	Numerator of Gear Ratio	1~9999	1		R/W
P006	Denominator of Gear Ratio	1~3	1		
P007	Stop Type of Servo Off	0~1	1		R/W
P008	Initial Display after Power On	0~2	0		R/W
P009	Source of ACC/DEC Selection	0~1	0		R/W
P010	Direction Limit	0~2	0		R/W
P011	X0 Multi-input Function	0~7	1		R/W
P012	X1 Multi-input Function	0~7	2		R/W
P013	X2 Multi-input Function	0~7	3		R/W
P014	Y0 Multi-output Function	0~9	0		R/W
P015	Y1 Multi-output Function	0~9	4		R/W
P016	Power On Operation Inhibit Alarm	0~1	1		R/W
P017	Zero Speed Holding Selection	0~1	0		R/W
P018	Overload Detect Time(Lock Exclusion)	0.1~10.0	10.0	SEC	R/W
P019	Overload Level Setting	50~120	120	%	
P020	Communication Address	1~255	1		R/W
P021	Transmission Speed	0~2	2	bps	R/W

DISPLAY CODE	FUNCTION	ADJUST RANGE	DEFAULT VALUE	UNIT	R/W
P022	Communication Protocol	0~7	4		R/W
P023	Source of Speed Command	0~1	0		
P024	Maximum Speed	120~Rated Speed	Rated Speed	RPM	R/W
P025	Minimum Speed	120~Rated Speed	120	RPM	R/W
P026	Speed Loop Proportional Gain	20~200	30		R/W
P027	Speed Loop Integral Gain	10~200	80	ms	R/W
P028	Speed Arrival Detect Range	0~500	50	RPM	R/W
P029	Zero Speed Level	120~200	120	RPM	R/W

Speed Mode Parameter

DISPLAY CODE	FUNCTION	ADJUST RANGE	DEFAULT VALUE	UNIT	R/W
P100	Speed Command 1	120~Rated Speed	Rated Speed	RPM	R/W
P101	Acceleration Time 1	0.1~15.0	15.0	SEC	R/W
P102	Deceleration Time 1	0.1~15.0	15.0	SEC	R/W
P103	Speed Command 2	120~Rated Speed	120	RPM	R/W
P104	Acceleration Time2	0.1~15.0	15.0	SEC	R/W
P105	Deceleration Time2	0.1~15.0	15.0	SEC	R/W
P106	Speed Command 3	120~Rated Speed	120	RPM	R/W
P107	Acceleration Time 3	0.1~15.0	15.0	SEC	R/W

DISPLAY CODE	FUNCTION	ADJUST RANGE	DEFAULT VALUE	UNIT	R/W
P108	Deceleration Time 3	0.1~15.0	15.0	SEC	R/W
P109	Speed Command 4	120~Rated Speed	120	RPM	R/W
P110	Acceleration Time 4	0.1~15.0	15.0	SEC	R/W
P111	Deceleration Time 4	0.1~15.0	15.0	SEC	R/W
P112	Speed Mode Parameter Reset to Default	0~1	0		R/W

Communication Write Address

DISPLAY CODE	FUNCTION	ADJUST RANGE	DEFAULT VALUE	UNIT	R/W
P600	Password				W
P601	Reset to Default	0~1	0		W
P602	Clear Warning Record	0~1	0		W
P603	Clear Error Record	0~1	0		W
P604	Communication Speed Command	0,120~ Rated Speed		RPM	W
P605	Communication Operation Command	0~4	0		W

Communication Read Address

DISPLAY CODE	FUNCTION	ADJUST RANGE	DEFAULT VALUE	UNIT	R/W
P700	BLDC Motor Speed			RPM	R
P701	BLDC Motor Speed Command			RPM	R

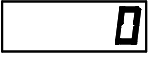
DISPLAY CODE	FUNCTION	ADJUST RANGE	DEFAULT VALUE	UNIT	R/W
P702	Current Display		0.01A		R
P703	Stage of Multi-Stage				R
P704	Drive Status Display				R
P705	Input Status Display				R
P706	Output Status Display				R
P707	Warning Code Display				R
P708	Error display				R
P709	The Last 1 Error Record				R
P710	The Last 2 Error Record				R
P711	The Last 3 Error Record				R
P712	The Last 4 Error Record				R
P713	The Last 5 Error Record				R
P714	The Last 6 Error Record				R
P715	The Last 7 Error Record				R
P716	The Last 8 Error Record				R
P719	Software Version				R
P720	Machine Code				R

EEPROM can not be rewritten over 1 million times.

8. FUNCTION SETTING AND DESCRIPTION

(1) Status Display

Status Display such as Servo Off , Pon , Error code message.

MESSAGE	DESCRIPTION
	Servo Off.
	Inhibit operation when power on operating switch at operation status.
	Error code display when error took place.

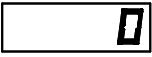
Error Code

1. Er01 : EEPROM Error
2. Er02 : ADC Fail
3. Er03 : Over Voltage
4. Er04 : Low Voltage
5. Er05 : Over Current
6. Er06 : Over Load
7. Er07 : Over Speed (Over target speed 25%)
8. Er08 : Hall Sensor Fail
9. Er09 : Over Heat
10. Er10 : External Stop

(2) Procedure of Key Operation

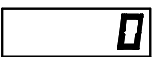
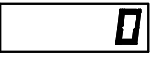
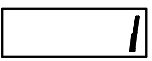
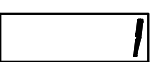
When power on DISPLAY is in Status Display, DISPLAY will display 0 RPM.

A. DISPLAY Showed Current

PROCEDURE	DISPLAY	DESCRIPTION
		0 RPM
		Press  key , Display Un00
 		Press  key twice , Display Un02
		Press  SETTER , Display current(Amp.) Rotate the SETTER to change percentage display.

NOTE : Repower on DISPLAY will back to 0 RPM.

B. Power on DISPLAY Showed Current

PROCEDURE	DISPLAY	DESCRIPTION
		0 RPM
 		Press  key twice , Display P000
 × 8		Press  key 8 times , Display P008
		Press  SETTER , Display 0
		Rotate  SETTER , Set 1(Digital twinkle)
		Press  SETTER , Display 1(Digital Light)
 × 5		Press  5 Times , Display 0.00(current)

(3) Monitor Function UnXXX

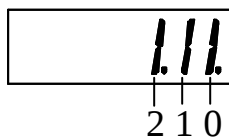
Monitor Function List

MONITOR FUNCTION	FUNCTION NAME	UNIT	NOTE
Un00	BLDC Motor Speed	RPM	
Un01	Speed Command	RPM	
Un02	BLDC Motor Current	A	Rotate SETTER to change Amp. to % or % to Amp.
Un03	Stage of Multi-Speed		
Un04	Operation Status		1 : FWD 2 : REV 3 : STOP 4 : HOLD
Un05	Digital Input Monitor		Refer Input Function of Terminal (A)
Un06	Digital Output Monitor		Refer Output Function of Terminal (B)
Un07	Warning Error Code Display		
Un08~Un16	Error Code Record		
Un19	Software Version		
Un20	Model Code		

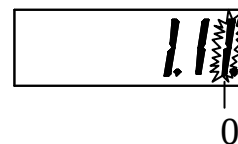
(A) Input Function of Terminal

0 ~ 2 : According to X0 ~ X2

EX : X0 "ON", other "OFF"

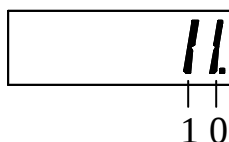


ON : Light
OFF : Extinguish



(B) Output Function of Terminal

0 ~ 1 : According to X0 ~ X1



ON : Light
OFF : Extinguish

(4) Special Function Cn XX

SPECIAL FUNCTION	FUNCTION NAME	DESCRIPTION
Cn00	Password Input	
Cn01	Default	0 : No Function 1 : Default(Effective after repower "ON")
Cn02	Clear Warning Error Code	0 : No Function 1 : Clear Warning Error Code
Cn03	Clear Error Code	0 : No Function 1 : Clear Error Code(Un08~Un16)

(5) Analog Acceleration Time and Deceleration Time Setting

P009 = 0; Select Analog Acceleration time and Deceleration time

Set Range : 0.1 ~ 15.0 Second(Default value is 15Sec)

Remove Front Protect Cover. Adjust ACC/DEC setter to set Acceleration time and Deceleration time.

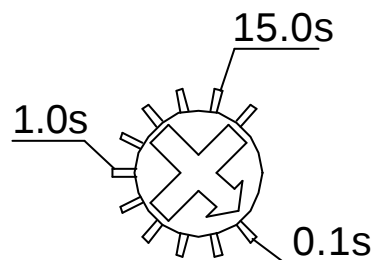
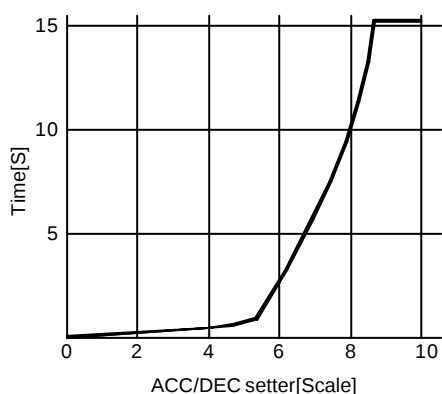
Note : Acceleration time and Deceleration time are same.

Acceleration time definition : 0 rpm~ Rated speed

Deceleration time definition : Rated speed ~ 0 rpm

Real Acceleration time and Deceleration time may difference between setting and real value. It effected by Using condition, Load inertia, Load torque.

●Character of ACC/DEC setter ●ACC/DEC setter Position to Time



(6) Panel Lock Function

For protecting data been modify by operator, Could use Panel Lock Function.

1. Effective the Panel Lock Function

- A. In status mode, press [MODE] key above 3 second continuously.
- B. When Panel Lock Function is effective, The display will show [LOCK].

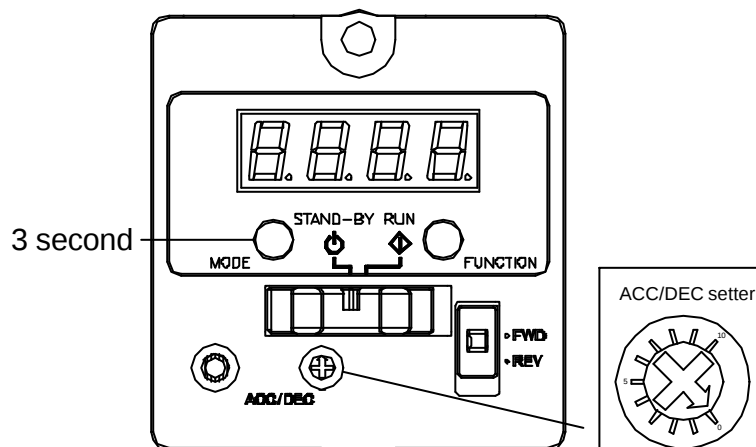
2. Release the Panel Lock Function

- A. In status mode, press [MODE] key above 3 second continuously.
- B. When Panel [LOCK] Function released, The display LOCK message disappear and show status mode context.

3. In Panel Lock Function

- A. [MODE] key invalid.
- B. [FUNCTION] key invalid.
- C. SETTER invalid.
 - a. Speed adjust invalid.
 - b. Value adjust invalid.
 - c. Press SETTER to save value invalid.
- D. Operation switch (Run-Standby) valid.
- E. Direction switch (FWD-REV) valid.
- F. ACC/DEC setter valid.

4. When Panel Lock Function is effective, Repower "ON" the drive Panel Lock Function is still effective.



(7) Procedure of Operation

1. Source of control select P003 (default value : Panel Control)

P003=0 : Panel Control

P003=1 : Terminal Control

P003=2 : Communication Control

2. Source of speed command select P023

P023=0 : Digital Input

Speed command selected by SPD1 and SPD2 combination. (Refer to P011 description).

P023=1 : Communication Input

Speed command of communication input is at address 604(25CH).

(8) Direction Select

Direction is based on definition of direction P004 and direction command.

Below list for reference

P003 Source of control. (Refer to P003 description)

P004	P003=0 PANEL	DIRECTION	P004	P003=1 TERMINAL	DIRECTION	P004	P003=2 RS485	DIRECTION
0	FWD	CCW	0	FWD	CCW	0	P605=1 (FWD)	CCW
0	REV	CW	0	REV	CW	0	P605=2 (REV)	CW
1	FWD	CW	1	FWD	CW	1	P605=1 (FWD)	CW
1	REV	CCW	1	REV	CCW	1	P605=2 (REV)	CCW

Note :

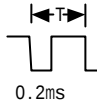
1. Direction is viewed at shaft.

2. P003 = 0 ~ 2. Changing direction by adjusted P004 value is effective.

3. Panel direction switch is effective only at P003 = 0.

(9) Terminal Function Description
Multi-Input and Multi-Output Function list

	TERMINAL	NAME	DESCRIPTION
Input	X0 X1 X2	FWD	1. P003=1. 2. Terminal FWD or REV "ON", motor RUN. 3. Terminal FWD and REV "OFF", motor STOP.
		REV	
		ALARM-RESET	Error occur, "ON" this terminal to release error.
		EXT-ERROR	1. This terminal is designed for external error. When external error take place, "ON" this terminal will stop the motor. 2. This terminal "OFF" and repower "ON" to release this error.
		H-FREE	This terminal "ON" to release zero speed "HOLD".
		SPD1	SPD1 and SPD2 combination could command 4 stage speed. (Refer to P011)
		SPD2	
Output	Y0 Y1	ALARM-OUT1	When error occur, output terminal "ON".
		SRDY	RUN : Output terminal "ON". STOP : Output terminal "OFF".
		ZSPD	Zero speed definition refer to P029. Zero speed : Output terminal "ON". Other speed : Output terminal "OFF".

	TERMINAL	NAME	DESCRIPTION
Output	Y0 Y1	SPEED-OUT	1. Synchronize with motor speed. 30 pulse /turn. 2. Use SPEED-OUT to calculate motor speed.  0.2ms $\text{RPM} = \text{frequency of SPEED-OUT} / 30 * 60$ EX : SPEED-OUT=1500HZ $\text{RPM} = 1500 / 30 * 60 = 3000\text{RPM}$
		TSPD	Speed inside speed arrival range : Output terminal "ON" refer to P028. Speed outside speed arrival range : Output terminal "OFF".
		MOVE	Motor in run status (>120 RPM) Output terminal "ON".
		ALARM-OUT2	Load over P019 : Output terminal "ON".
		DIRECTION	CW : Output terminal "ON". CCW : Output terminal "OFF".
		WNG	In warning status : Output terminal "ON".
		Low voltage protection	Low voltage protect : Output terminal "ON".

Note : X0~X2 or Y0~Y1 set same function. The last setting is effective.

(10) Parameter Description

A. General Use Parameter

Password
P000

Adjust Range	0000~FFFF(H)
Default Value	0000

Set password to prevent parameter change. Key in password at Cn00 to release parameter lock. There is no parameter lock if set password at 0000. This is a hexadecimal number.

Drive Model Code
P001

Display only and read only.

Motor only 220V.

DRIVE MODEL (110V)	BLS1-120L	BLS1-200L	BLS1-120M	BLS1-200M
DRIVE MODEL (220V)	BLS2-120L	BLS2-200L	BLS2-120M	BLS2-200M
MOTOR (220V)	BS2-120L	BS2-200L	BS2-120M	BS2-200M
MODEL CODE	3	4	13	14

Control Mode
P002

Adjust Range	0~0
Default Value	0

0 : Speed mode.

Operation Command Source
P003

Adjust Range	0~2
Default Value	0

0 : Panel operation switch control. (RUN / STANDBY)

1 : Terminal. (FWD / REV)

2 : Communication. (P604)

Direction Definition
P004

Adjust Range	0~1
Default Value	0

0 : Forward is counter clockwise, viewed from the shaft end.

1 : Forward is clockwise, viewed from the shaft end.

Numerator of Gear Ratio
P005

Adjust Range	1~9999
Default Value	1

Denominator of Gear Ratio
P006

Adjust Range	1~3
Default Value	1

Gear shaft speed = Motor speed / gear ratio = Motor speed*P006/P005.

EX1 : Gear ratio=10 Then P005=10 and P006=1,

Motor speed=3000RPM

Gear shaft speed = Motor speed*P006/P005
=3000*1/10=300RPM

EX2 : Gear ratio=1/3 Then P005=1 and P006=3,

Gear shaft speed = Motor speed*P006/P005
=3000*3/1=9000RPM

Stop Type of Servo Off
P007

Adjust Range	0~1
Default Value	1

0 : Free run stop.

1 : Deceleration stop.

Initial Display after Power On
P008

Adjust Range	0~2
Default Value	0

0 : Speed.

1 : Current.

2 : Stage of multi-speed.

Source of ACC./DEC. Selection
P009

Adjust Range	0~1
Default Value	0

Select analog or digital Acceleration / Deceleration time.

0 : Analog ; ACC./DEC. time set by ACC./DEC. setter at panel.

Acceleration time and deceleration time are same.

1 : Digital ; ACC./DEC. time set by Parameter at P01, P102, P104, P105, P107, P108, P110, P111.

Direction Limit
P010

Adjust Range	0~2
Default Value	0

0 : Forward and reverse.
 1 : Forward only.
 2 : Reverse only.

X0 Multi-input Function
P011

Adjust Range	0~7
Default Value	1

Set input terminal function.

“/” mean low active.

0 : No function.

1 : / FWD (Forward run).

2 : / REV (Reverse run).

3 : / ALARM-RESET (Reset the error).

4 : / EXT-ERROR Stop (External error stop the motor).

5 : / H-FREE (Release hold function).

6 : SPD1 (Multi-speed 1).

7 : SPD2 (Multi-speed 2).

SPD1	SPD2	SPEED STATUS	SPEED COMMAND	ACC. TIME	DEC. TIME	Un03
0(OFF)	0(OFF)	1 st speed	P100	P101	P102	1
0(OFF)	1(ON)	2 nd speed	P103	P104	P105	2
1(ON)	0(OFF)	3 rd speed	P106	P107	P108	3
1(ON)	1(ON)	4 th speed	P109	P110	P111	4

X1 Multi-input Function
P012

Adjust Range	0~7
Default Value	2

Refer to P011.

X2 Multi-input Function
P013

Adjust Range	0~7
Default Value	3

Refer to P011.

Y0 Multi-output Function
P014

Adjust Range	0~9
Default Value	0

Set output terminal function (refer to 9 terminal function description).

0 : ALARM-OUT1.

1 : SRDY.

2 : ZSPD.

3 : SPEED-OUT.

4 : TSPD.

5 : MOVE.

6 : ALARM-OUT2.

7 : Direction.

8 : WNG.

9 : Low voltage protection.

Y1 Multi-output Function
P015

Adjust Range	0~9
Default Value	4

Refer to P014.

Power On Operation Inhibit Alarm
P016

Adjust Range	0~1
Default Value	1

0 : OFF (Cancel the power on operation inhibit alarm function).

When power “ON”, the operation switch at “RUN” side and terminal FWD or REV at “ON”, there is no error alarm.

1 : ON (Power on operation inhibit alarm function effective).

When power “ON”, the operation switch at “RUN” side and terminal FWD or REV at “ON”, drive inhibit operation.

Zero Speed Holding Selection
P017

Adjust Range	0~1
Default Value	0

0 : OFF.

When FWD or REV command is “ON”, speed command equal to 0 RPM, motor shaft is free.

1 : ON.

When FWD or REV command is “ON”, speed command equal to 0 RPM, motor shaft is holding.

Overload Detect Time (Lock Exclusion)
P018

Adjust Range	0.1~10.0 SEC
Default Value	10.0 SEC

Overload Level Setting
P019

Adjust Range	50~120%
Default Value	120%

Rated load is 100% load.

When load over P019 and last P018 time, the warning take place.

Communication Address
P020

Adjust Range	1~255
Default Value	1

Each drive must have unique identified address if they are controlled by RS-485 communication. Each address cannot be duplicated.

Transmission Speed
P021

Adjust Range	0~2
Default Value	2

Setting the transmission speed between computer and drive.

0 : 2400 bits/second.

1 : 4800 bits/second.

2 : 9600 bits/second.

Communication Protocol
P022

Adjust Range	0~7
Default Value	4

A. Character Format

0 : 8,N,1 RTU (1 start bit+8 data bits+1 stop bit)

8,N,1 RTU (10-bit)(character frame in hexadecimal)

Start bit	0	1	2	3	4	5	6	7	Stop bit
-----------	---	---	---	---	---	---	---	---	----------

1 : 8,N,2 RTU (1 start bit+8 data bits+2 stop bit)

8,N,2 RTU (11-bit)(character frame in hexadecimal)

Start bit	0	1	2	3	4	5	6	7	Stop bit	Stop bit
-----------	---	---	---	---	---	---	---	---	----------	----------

2 : 8,E,1 RTU (1 start bit+8data bits+1 Even bit+1 stop bit)

8,E,1 RTU (11-bit)(character frame in hexadecimal)

Start bit	0	1	2	3	4	5	6	7	Even Parity	Stop bit
-----------	---	---	---	---	---	---	---	---	-------------	----------

3 : 8,O,1 RTU (1 start bit+8data bits+1 Odd bit+1 stop bit)

8,O,1 RTU (11-bit)(character frame in hexadecimal)

Start bit	0	1	2	3	4	5	6	7	Odd Parity	Stop bit
-----------	---	---	---	---	---	---	---	---	------------	----------

4 : 8,N,1 ASCII (1 start bit+8data bits+1 stop bit)

8,N,1 ASCII (10-bit)(character frame in hexadecimal)

Start bit	0	1	2	3	4	5	6	7	Stop bit
-----------	---	---	---	---	---	---	---	---	----------

5 : 8,N,2 ASCII (1 start bit+8data bits+2 stop bit)

8,N,2 ASCII (11-bit)(character frame in hexadecimal)

Start bit	0	1	2	3	4	5	6	7	Stop bit	Stop bit
-----------	---	---	---	---	---	---	---	---	----------	----------

6 : 8,E,1 ASCII (1 start bit+8data bits+1 Even bit+1 stop bit)

8,E,1 ASCII (11-bit)(character frame in hexadecimal)

Start bit	0	1	2	3	4	5	6	7	Even Parity	Stop bit
-----------	---	---	---	---	---	---	---	---	-------------	----------

7 : 8,O,1 ASCII (1 start bit+8data bits+1 Odd bit+1 stop bit)

8,O,1 ASCII (11-bit)(character frame in hexadecimal)

Start bit	0	1	2	3	4	5	6	7	Odd Parity	Stop bit
-----------	---	---	---	---	---	---	---	---	------------	----------

B. Communication Protocol(Data contents are in hexadecimal with postive and negative format.)

1. RTU

Start	A silent interval of more than 10ms
Address	8-bit Address
Function	8-bit Command
Data (n-1)	Contents of Data : n*8-bit data, n 16
...	
Data 0	
CRC CHK Low	Check Sum (CRCL)
CRC CHK High	Check Sum (CRCH)
End	A silent interval of more than 10ms

2. ASCII

STX	Start character=' : ' (3AH)
Address Hi	Communication Address : 8-bit Address Consists of 2 ASCII codes.
Address Lo	
Function Hi	Function code : 8-bit Command Consists of 2 ASCII codes.
Function Lo	
Data (n-1)	Contents of Data : n*8-bit data consist of 2n ASCII codes. n 16
...	
Data 0	
LRC CHK High	LRC check sum : 8-bit check sum consists of 2 ASCII codes.
LRC CHK Low	
END Hi	End characters : END Hi=CR(0DH) END Lo=LF(0AH)
END Lo	

C. ASCII Code Description

Value	0	1	2	3	4	5	6	7
ASCII code	30H	31H	32H	33H	34H	35H	36H	37H
Value	8	9	A	B	C	D	E	F
ASCII code	38H	39H	41H	42H	43H	44H	45H	46H

D. Function Code

1. 03H : Read drive' s setting.
2. 06H : Write parameter setting into drive.

CRC(Cyclical Redundancy Check) is calculated by the following steps:

Step 1. Load a 16-bit register (called CRC register) with FFFFH .

Step 2. Exclusive OR the first 8-bit byte of the command message with the low order byte of the 16-bit CRC register, putting the result in the CRC register.

Step 3. Shift the CRC registers one bit to the right with MSB zero filling. Extract and examine the LSB.

Step 4. If the LSB of CRC register is 0, repeat step 3, else Exclusive OR the CRC register with the polynomial value A001H.

Step 5. Repeat step 3 and 4 until eight shifts have been performed. When this is done, a complete 8-bit byte will have been processed.

Step 6. Repeat steps 2 to 5 for the next 8-bit byte of the command message . Continue doing this until all bytes have been processed.

The final contents of the CRC register are the CRC value.

LRC (Longitudinal Redundancy Check) is calculated by summing up, module 256, the values of the bytes from Address to last data character then calculating the hexadecimal representation of the 2's-complement negation of the sum.

For example, address 01H, function code 03H, parameter Pn006(D3=00H, D4=06H), read 1 data (D5=00H, 06=01H) :

$01+03+00+06+00+01=B$

the 2's-complement negation of B is F5

LRC HI = " F" (46H), LRC LO = " 5" (35H)

E. Communication Error Respond

Once communication error happened, drive will respond “Function code and 80H” and communication error code to master system.

Communication error code definition

ERROR CODE	DESCRIPTION
01H	Function code error, only 03/06 available
02H	Illegal data address (data address is not available)
03H	Illegal data value (data value is outside limit value)
04H	Illegal command, drive can't do this command
05H	Check sum error

Once communication error happend, drive respond as follow.

1. RTU

D1 Address	D2 Function code & 80H	D3 Error code	D4 CRCL	D5 CRCH
---------------	---------------------------	------------------	------------	------------

2. ASCII

START CODE	3A
Address (01)	30 31
Function code & 80H (86)	38 36
Error code (02)	30 32
LRC (77)	37 37
End code H	0D
End code L	0A

Source of Speed Command
P023

Adjust Range	0~1
Default Value	0

0 : Digital.

1 : Communication.

Maximum Speed
P024

Adjust Range	120~Rated Speed
Default Value	Rated Speed

FWD or REV run upper speed limit.

Speed command > P024 Speed command = P024

Minimum Speed
P025

Adjust Range	120~Rated Speed
Default Value	120RPM

FWD or REV run lower speed limit.

Speed command < P025 Speed command = P025

Speed Loop Proportional Gain
P026

Adjust Range	20~200
Default Value	30

Larger value respond is faster. Too large may be oscillate.

Speed Loop Integral Gain
P027

Adjust Range	10~200ms
Default Value	80ms

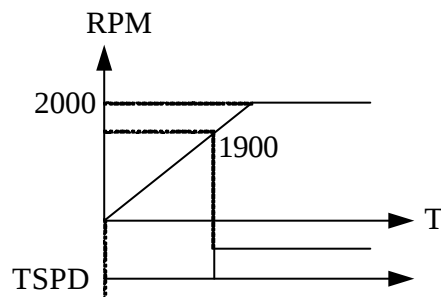
Smaller value respond is faster. Too small may be oscillate.

Speed Arrival Detect Range
P028

Adjust Range	0~500RPM
Default Value	50RPM

Set speed arrival detect range. TSPD of DO terminal output “ON” if speed is within the setting range.

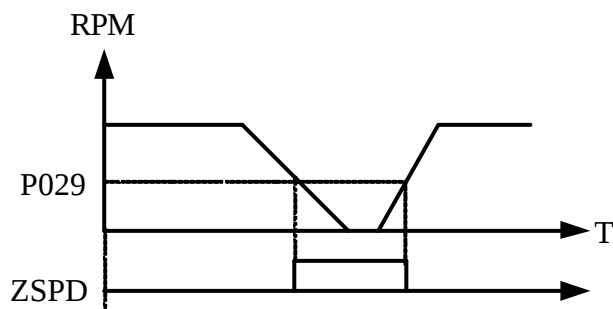
Example : speed command : 2000RPM, P028=100RPM.



Zero Speed Level
P029

Adjust Range	120~200RPM
Default Value	120RPM

ZSPD of Y0 terminal out “ON” if speed is under setting speed.



B. Speed Mode Parameter

Speed Command 1
P100

Adjust Range	120~Rated speed
Default Value	Rated speed

Set 1st stage digital speed.

Acceleration Time 1
P101

Adjust Range	0.1~15.0 SEC
Default Value	15.0 SEC

Set 1st speed Acceleration time.

Definition : Acceleration time from 0 ~ rated speed.

Rated speed : M type 3000RPM, L type 2000RPM

Deceleration Time 1
P102

Adjust Range	0.1~15.0 SEC
Default Value	15.0 SEC

Set 1st speed Deceleration time.

Definition : Deceleration time from rated speed ~ 0.

Speed Command 2
P103

Adjust Range	120~Rated Speed
Default Value	120RPM

Set 2nd stage digital speed.

Acceleration Time 2
P104

Adjust Range	0.1~15.0 SEC
Default Value	15.0 SEC

Set 2nd speed Acceleration time.

Deceleration Time 2
P105

Adjust Range	0.1~15.0 SEC
Default Value	15.0 SEC

Set 2nd speed Deceleration time.

Speed Command 3
P106

Adjust Range	120~Rated Speed
Default Value	120RPM

Set 3rd stage digital speed.

Acceleration Time 3
P107

Adjust Range	0.1~15.0 SEC
Default Value	15.0 SEC

Set 3rd speed Acceleration time.

Deceleration Time 3
P108

Adjust Range	0.1~15.0 SEC
Default Value	15.0 SEC

Set 3rd speed Deceleration time.

Speed Command 4
P109

Adjust Range	120~Rated Speed
Default Value	120RPM

Set 3rd stage digital speed.

Acceleration Time 4
P110

Adjust Range	0.1~15.0 SEC
Default Value	15.0 SEC

Set 4th speed Acceleration time.

Deceleration Time 4
P111

Adjust Range	0.1~15.0 SEC
Default Value	15.0 SEC

Set 4th speed Deceleration time.

Speed Mode Parameter Reset to Default
P112

Adjust Range	0~1
Default Value	0

0 : No function.

1 : Only "P100~P111" reset to default.

C. Communication Write Address

P600~P605 is worked with Cn00~Cn05.

Password
P600

Adjust Range	0000~FFFF(H)
Default Value	0000

- 1 : Password been set, need to input password at Cn00, parameter value change is valid.
2 : 0000 represent no password. Parameter value can change without input password.

Reset to Default
P601

Adjust Range	0~1
Default Value	0

- 0 : No function.
1 : Reset default (All parameter are reset include "P100~P111").

Clear Warning Record
P602

Adjust Range	0~1
Default Value	0

- 0 : No function.
1 : Clear warning record (Un07 & P707).

Clear Error Record
P603

Adjust Range	0~1
Default Value	0

- 0 : No function.
1 : Clear error record (Un08~Un16 & P708~P716).

Communication Speed Command
P604

Adjust Range	0, 120~Rated Speed
Default Value	0RPM

Communication Operation Command
P605

Adjust Range	0~4
Default Value	0

0 : No function.

1 : FWD.

2 : REV.

3 : Stop.

4 : ALARM-RESET (Clear P708 record).

D. Communication Read Address

P700~P720 is worked with Un00~Un20.

BLDC Motor Speed
P700

Display BLDC motor speed. Power off without save.

BLDC Motor Speed Command
P701

Display BLDC motor speed command. Power off without save.

Current Display
P702

Display BLDC motor current. Can select “Amp”. or “%” by rotating the setter on panel. Power off without save.

Stage of Multi- Stage
P703

1 : 1st speed.

2 : 2nd speed.

3 : 3rd speed.

4 : 4th speed.

Power off without save.

Drive Status Display
P704

0 : No function.

1 : FWD.

2 : REV.

3 : Stop.

4 : HOLD.

Power off without save.

Input Status Display
P705

Power off without save.

Output Status Display
P706

Power off without save.

Warning Code Display
P707

1 : Drive overheat.

2 : Overload (Load over P018 & P019 setting).

3 : Operation inhibit.

Power off without save.

Error display
P708

- 1 : ER01 : EEPROM error.
- 2 : ER02 : ADC fail.
- 3 : ER03 : Over voltage.
- 4 : ER04 : Low voltage.
- 5 : ER05 : Over current.
- 6 : ER06 : Over load.
- 7 : ER07 : Over speed (over target speed 25%).
- 8 : ER08 : Hall sensor fail.
- 9 : ER09 : Over heat.
- 10 : ER10 : External stop.

The Last 1 Error Record
P709

The Last 2 Error Record
P710

The Last 3 Error Record
P711

The Last 4 Error Record
P712

The Last 5 Error Record
P713

The Last 6 Error Record
P714

The Last 7 Error Record
P715

The Last 8 Error Record
P716

P709~P716 display refer to P708.

Software Version
P719

Read only.

Machine Code
P720

Read only.

9. REPAIRING AND MAINTENANCE

9-1. Repairing and Maintenance

1. Turn off the power before inspection and maintenance, wait for power light off for 5 minutes to start operate.
2. Only the qualified professional engineers can do repairing and maintenance work.
3. Take off the watches, rings or any other metal accessories before repairing and maintenance, and use insulating measure tools.
4. Please make a static electricity protection to prevent damage the driver inner precision parts.
5. Do NOT use water, solvent or volatilizable liquor to clean driver.
Please use dry clothes to clean stain or use compressed air to clean dirt.
6. Please contact agent or ADLEEPOWER[®] when you cannot obviate problems.
7. Recommend checking list for maintenance.
 - a. Ambient condition around the drive. Checking the ambient temperature, vibration, humidity and any oil, gas, dust or water drops.
 - b. Check if there is any missing or loose screw.
 - c. Check if the magnetic contactor relay work correctly.
 - d. Check cooling system if there is any obstruction in the heat sink, air intake or air outlet. And check the fan is running properly.

Maintenance Period : Daily

	CHECK ITEMS	METHODS AND CRITERIA
Ambient Conditions Around The Drive	Confirm the ambient temperature, vibration, humidity and see if there is any oil, gas, dust or water drops.	Visual inspection and measurement with equipment
	Confirm if there are any dangerous objects around.	Visual inspection
Voltage	Confirm if the voltage of main circuit and control circuit is correct.	Measure with multimeter standard specification
Keypad	Check the display clear for reading or any missing characters.	Visual inspection
Mechanical Parts	Confirm if there is any missing or loose screws.	Tighten or replace screw
Rectifier and IPM	Confirm if there is any abnormal sound ,deformation or peculiar smell.	Visual, aural inspection and smell
DC Capacity	Confirm if there is any leakage of liquid, cracks or deformation.	Visual inspection
Transformer	Confirm if there is any abnormal sound or peculiar smell	Visual and aural inspection
Magnetic Contactor Relay of Main Circuit (Additional)	Confirm if the Magnetic contactor relay works correctly.	Visual and aural inspection.

Maintenance Period : Half Years

	CHECK ITEMS	METHODS AND CRITERIA
Mechanical Parts	Confirm if there is any abnormal sound , vibration, deformation or damage.	Visual and aural inspection
	Confirm if there are any loose screws.	Tighten the screws
	Confirm if there is any color change by overheating, dust or dirt.	Visual inspection
Main Circuit	Confirm if machine or insulator is deformed, cracked, damaged or with changed color due to overheating or aging.	Visual inspection
	Confirm if there is any dust or dirt.	Visual inspection
Terminals and Wiring	Confirm if there is any damaged, deformation or color changed.	Visual inspection
DC Capacity	Measure static capacity when required.	Measure with LC meter (Static capacity initial value*0.8)
Resistor	Confirm if there is any peculiar smell, color change or insulator cracks due to overheating.	Visual and smell inspection
	Confirm if there is any opened or short status.	Visual inspection or measure with multimeter.
PCB and Connector	Confirm if there are any loose screws and connector.	Tighten the screws and press the connectors firmly.
	Confirm if there is any damaged, deformation, color change or peculiar smell.	Visual and smell inspection
Cooling System	Confirm if there is any obstruction in the heat sink, air intake or air outlet.	Visual inspection

9-2. Trouble Shooting

(A) Error

ERROR CODE	ERROR NAME	CAUSE	SUGGESTED REMEDY
ER01	EEPROM Error	EEPROM error	Return to factory.
ER02	ADC Failure	ADC failure	Return to factory.
ER03	Over Voltage	Over voltage	Increase deceleration time
			Check input voltage if it is higher than specification.
ER04	Low Voltage	Low voltage	Check input voltage if it is lower than specification.
			Make sure power relay work normally.
ER05	Over Current	Over current	Check U.V.W. short circuit or not.
			Check U.V.W. connector, there may be one phase loose.
ER06	Over Load	Over load	Continue phase current over 120% rated current.
			If over load occur, then decrease loading or upgrade drive and BLDC motor.
ER07	Over Speed	Over speed	Over target speed 25%.
			Check loading if it is a violent change.
ER08	Hall Sensor Fail	Encoder error	Please check hall sensor connector. (Loose or poor contact).
ER09	Over Heat	Drive over heat	Check phase current over rated current or not.
			Check vantilation of drive.
			Check U.V.W. connector. (Loose or poor contact).

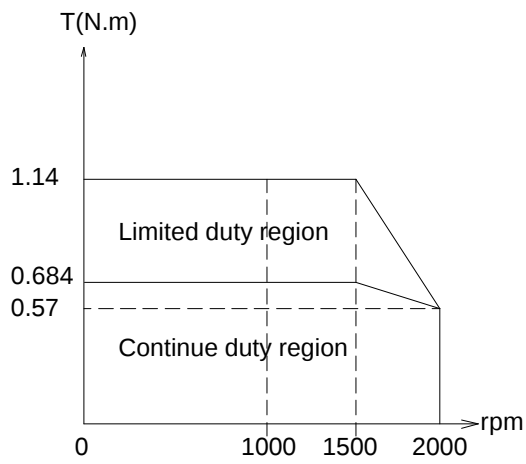
ERROR CODE	ERROR NAME	CAUSE	SUGGESTED REMEDY
ER10	EXT ERROR	Drive EXT-ERROR terminal "ON"	1. Check EXT-ERROR terminal. 2. Item 1 is OK. Return to factory.
	RS485 Fail	Communication fail	Check host and drive parameter setting (address, baud rate, format).

(B) Warning

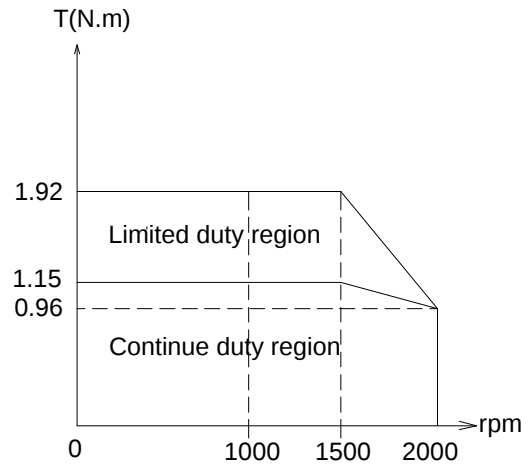
ERROR CODE	ERROR NAME	CAUSE	SUGGESTED REMEDY
Wn01	Drive Over Heat	Drive main circuit temperature over warning level	Improve ventilation of control cabin.
Wn02	Over Load	Motor load over P018 & P019	Check motor load P018 & P019 adjust bigger value.
Pon	Operation Inhibit	1. P003=0, when power "ON", operation switch at "RUN" side. 2. P003=1, when power "ON", operation switch at "RUN" side and "FWD" or "REV" terminal "ON".	1. Operation switch set at "STAND-BY" side. 2. "FWD" or "REV" terminal "OFF".

10. MOTOR T-N CURVE

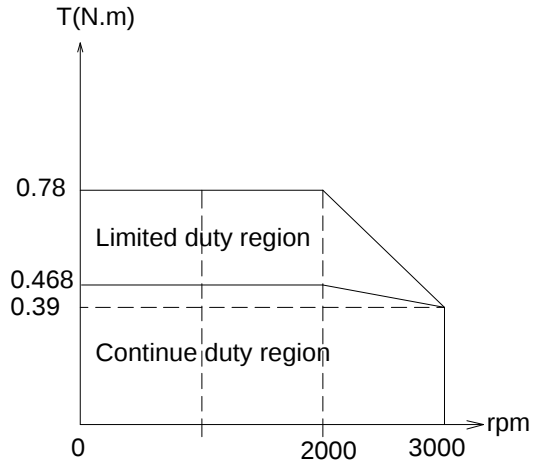
BLS2-120L



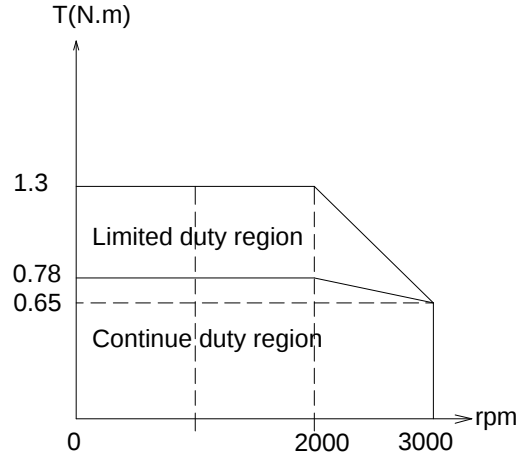
BLS2-200L



BLS2-120M



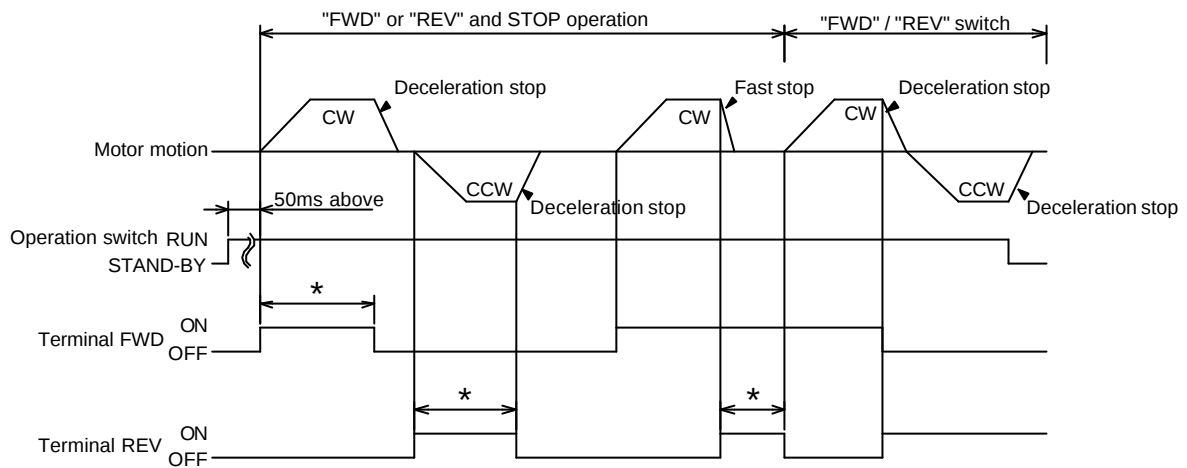
BLS2-200M



11. APPLICATION EXAMPLES

Time Chart

Panel direction' s switch set at “REV” side.



* : 10ms above.

EXAMPLE 01 : 2 Stage Speed Operation

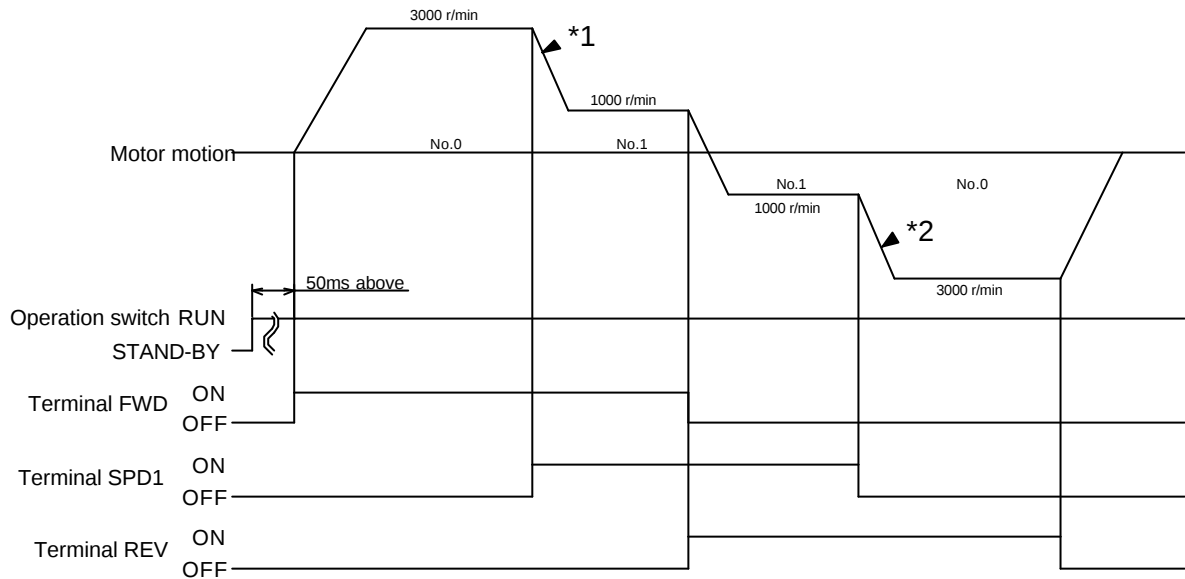
Setting :

1. P003=1, terminal control.
2. P100=3000RPM (1st speed), P103=1000RPM (2nd speed).
3. Panel operation switch set at RUN.
4. Terminal setting.
 - P011=1 (Terminal X0=FWD)
 - P012=2 (Terminal X1=REV)
 - P013=6 (Terminal X2=SPD1)
 - C1=IN-COM

Operation :

1. Panel operation switch set to “ RUN” side, time last over 50ms, terminal “ FWD” set “ ON” .
2. After terminal “ FWD” set “ ON” , motor run 3000RPM at CCW direction.
3. When terminal “ SPD1” set “ ON” , motor change speed from 3000RPM (1st speed) to 1000RPM (2nd speed).
4. When “ FWD” set “ OFF” and “ REV” set “ ON” , motor decelerate to 0RPM, then accelerate to 1000RPM at “ REV” direction.
5. When terminal “ SPD1” set “ OFF” , motor accelerate to 3000RPM.
6. When terminal “ REV” set “ OFF” , motor decelerate to 0RPM.
7. Need 0RPM with holding torque, please set P017 value to 1.

Time Chart



*1 : No. 1 deceleration time (this case is P105).

*2 : No. 0 acceleration time (this case is P101).

Note : Acceleration time and deceleration time is determinate by next stage.

EXAMPLE 02 : 4 Stage Speed Operation

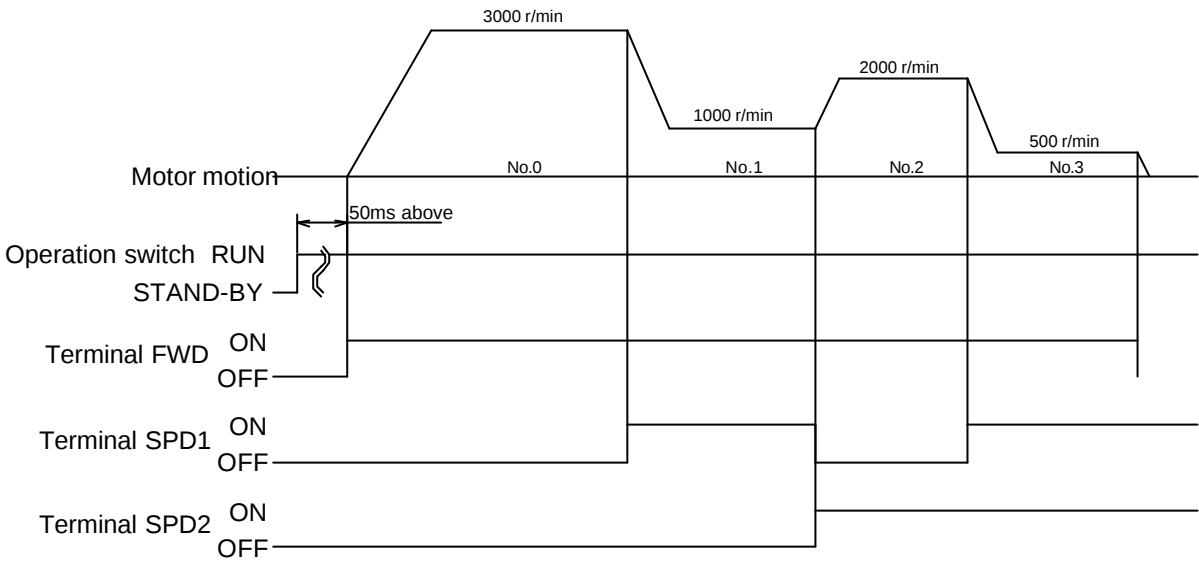
Setting :

1. P003=1, terminal control.
2. Speed setting.
 - P100=3000RPM (1st speed)
 - P103=1000RPM (2nd speed)
 - P106=2000RPM (3rd speed)
 - P109=500RPM (4th speed)
3. Panel operation switch set at “ RUN” .
4. Terminal setting
 - P011=1 (Terminal X0=FWD)
 - P012=6 (Terminal X1=SPD1)
 - P013=7 (Terminal X2=SPD2)
 - C1=IN-COM

Operation :

1. Panel operation switch set to “ RUN” side, time last over 50ms, terminal “ FWD” set “ ON” .
2. After terminal “ FWD” set “ ON” , motor run 3000RPM at CCW direction.
3. When terminal “ SPD” set “ ON” , motor change speed from 3000RPM (1st speed) to 1000RPM (2nd speed).
4. When “ SPD1” set “ ON” and “ SPD2” set “ ON” , motor accelerate speed from 1000RPM (2nd speed) to 2000RPM (3rd speed).
5. When “ SPD1” set “ ON” and “ SPD2” set “ ON” , motor decelerate speed from 2000RPM (3rd speed) to 500RPM (4th speed).
6. When terminal “ FWD” set “ OFF” , motor decelerate to 0RPM.
7. Need 0RPM with holding torque, please set P017 value to 1.

Time Chart



MEMO

INSTRUCTION MANUAL
PART NO : E-PHAA-ESBA01
Model : BLS series

MAR. 2020 2nd Edition



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