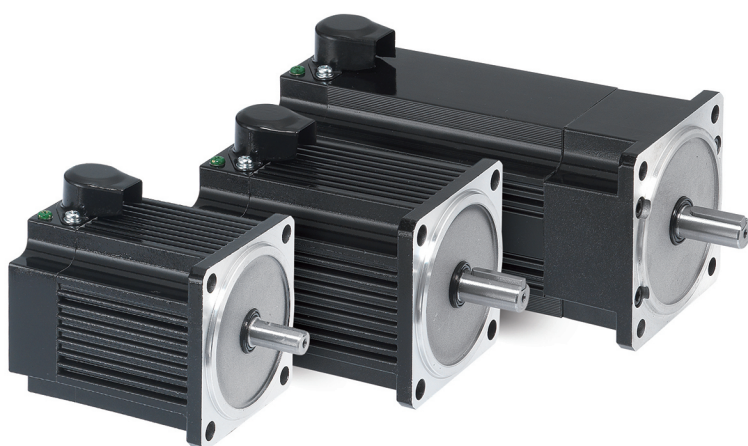


INSTRUCTION MANUAL

BRUSHLESS IPM MOTOR & DRIVES



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

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1. Preface

This D305 drive and brushless servomotor made by ADLEE Powertronic., Ltd.

Read this instruction manual thoroughly 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.

Safety Precaution - Read These First



Dangerous Electrical Shock



Danger and Caution

Indicates a potentially hazardous situation which, if against, may result in personal injury, fire or damage to equipment.

Receiving



DANGER

Do not install or operate motor or drive that are damaged or has missing parts.



CAUTION

Before installation, check specifications are matched the equipment. Ex. voltage, power, torque, RPM...

Installation



CAUTION

Impacts and shocks applied to the shaft end will damage the rotary sensor and ball bearings. Pay more attention when drive elements such as pulleys, clutch disks, toothed wheels etc.



DANGER

Be sure to install the unit on flame-resistant material such as a steel plate. Otherwise, there is the danger of fire.



DANGER

Install units into a flowing air environment. See inside manual requests. When mounting units in an enclosure, install a cooling device to keep the intake air temperature below 45 °C (115 °F).

Wiring



DANGEROUS ELECTRICAL VOLTAGE

Due to the permanent magnet excitation, the power connector carries a hazardous high voltage if the rotor is rotating and the motor is not electrically connected. The unit must be completely de-energized and halted before commencing any connection or installation work.



CAUTION

Wiring should be performed only by qualified personnel.



DANGER

For equipment protection, install a ground leakage type breaker with a fast response circuit capable of handling large currents.



CAUTION

Hazardous terminals for any interconnection (motor, contact breaker, filter, etc.) must be inaccessible in the final installation.



DANGEROUS ELECTRICAL SHOCK

Be sure that the input voltage is matched the drive specifications.



DANGEROUS ELECTRICAL SHOCK

Be sure not to connect an AC power supply to the output terminals.



DANGEROUS ELECTRICAL SHOCK

Be sure to connect the grounding terminal to earth ground. Ground resistance is less than 100Ω .



DANGEROUS ELECTRICAL SHOCK

Never remove connectors by pulling on its wire leads. Otherwise, there is a danger of fire or injury due to wire breakage.



CAUTION

Do not stop operation by switching of electromagnetic contactors on the primary.



CAUTION

Tighten terminal screws.



CAUTION

When using D305 drives should match to ADLEEPOWER[®] AM series motors. If using other brand motors can cause the driver or motor damage.

Operation



CAUTION

Danger of getting burnt! The surfaces of motors can reach temperatures of up to approx. 100 (212). A touch guard is to be provided where necessary.



DANGER

Danger of injury from shaft keys being slung out. Motor may only be operated as installed.



CAUTION

Since it is easy to change operation direction or speed from low to high speed. Verify the safe working range of the equipment.

Maintenance and Inspection



DANGEROUS ELECTRICAL SHOCK

To wait at least five minutes after turning off the input power supply before performing maintenance or an inspection. Otherwise, there is the danger of electric shock.



DANGEROUS ELECTRICAL SHOCK

Never test the withstand voltage(HIPOT) on the drive. It may cause components to be damaged.

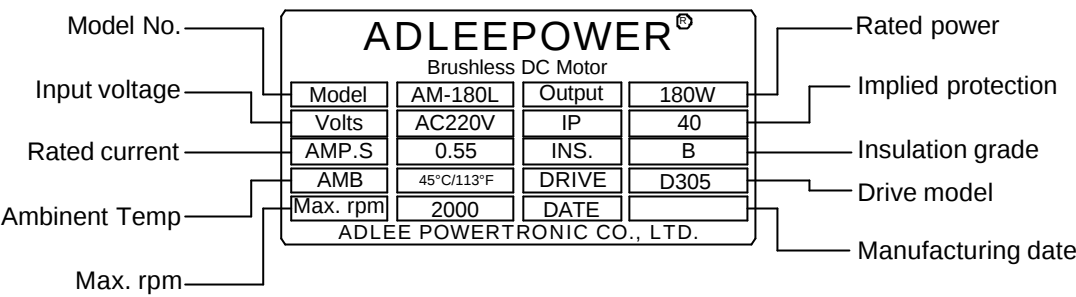


DANGEROUS ELECTRICAL SHOCK

Never modify the unit. Otherwise, it is danger of electric shock or injury.

2. Nameplate

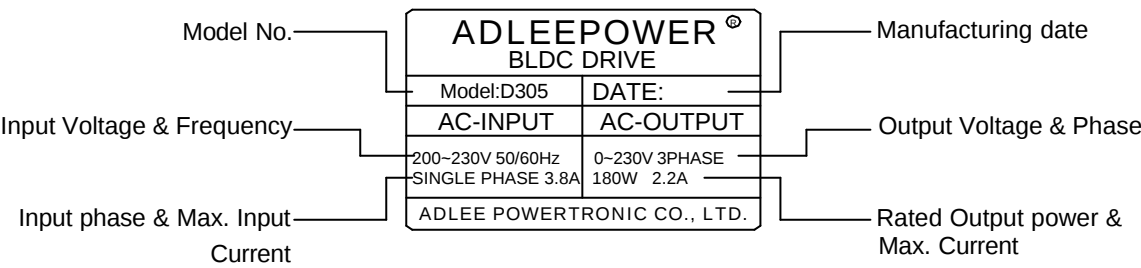
Motor



AM - XXX L (B)
 ① ② ③

- ① : Rated power : example 370 represent 370W
- ② : Rated speed : L : 2000RPM M : 3000RPM H : 6000RPM
- ③ : With B : with magnet brake

Drive



D305 (B) - 1
 ① ②

- ① : With B : with magnet brake
- ② : 1 : 110Vac : input source voltage 110Vac, output 220Vac
 2 : 220Vac : input source voltage 220Vac, output 220Vac

3. Specification

Model No.	AM-60 L/M	AM-90 L/M/H	AM-120 L/M/H	AM-180 L/M/H	AM-250 L/M/H	AM-370 L/M/H
Input Voltage	100~130VAC / 1 ψ OR 200~230VAC / 1 ψ (TN system)					
Input Frequency HZ	50 / 60					
Input Rated Current A	0.7	1.1	1.5	2.1	2.9	3.6
Max. Input Current A (For 220V input)	2.8	3.4	4.2	5	6.5	8.5
Max. Input Current A (For 110V input)	5.6	6.2	7.3	10	11.6	15
Output Rated Current A	0.4	0.6	0.8	1.1	1.6	2.2
Max. Output Current A	1.8	2	2.4	3.2	4.1	4.9
Overload Current Protection (A)	2.0/2.4	2.4/2.4/2	2.6/3.2/3.0	3.6/4.4/3.5	5.0/5.6/5.0	6.4/6.6/6.4
Motor Rated Current A	0.32/0.34	0.45/0.45/0.43	0.61/0.64/0.52	0.94/0.94/0.78	1.45/1.15/1	1.92/1.7/1.4
Motor Phase	3 ψ					
Rated Output W	60	90	120	180	250	370
Rated Torque Kg-cm (in-lb)	2.9/2.0 (2.5/1.7)	4.4/2.9/1.5 (3.8/2.5/1.3)	5.8/3.9/2.0 (5.0/3.4/1.7)	8.8/5.8/2.9 (7.6/5.0/2.5)	12.0/8.1/4.0 (10.4/7.0/3.5)	18.0/12.0/6.0 (15.6/10.4/5.2)
Rated Speed RPM	L:2000 / M:3000 / H:6000					
Max. Efficiency %	> 80	> 80	> 80	> 80	> 80	> 80
Max. Output W	180	220	280	330	450	600
Max. Torque Kg-cm (in-lb)	12/6 (10.4/5.2)	15/9/5.5 (13.0/7.8/4.8)	18/12/8 (15.6/10.4/6.9)	27/18/10.5 (23.4/15.6/9.1)	36/24/13 (31.2/20.8/11.3)	54/36/20 (46.8/31.2/17.3)
Variable Speed Range RPM	L:150~2000 / M:150~3000 / H:300~6000 / HX1:130~5000 / HX2:300~9999					
Acc. Dec. Time	Around 0.2 ~ 600 Sec / Max. 45dB (L Model)					

The magnet brake torque is 25Kg-cm (21.65 in-lb).

The varnished copper wire is F class insulation.

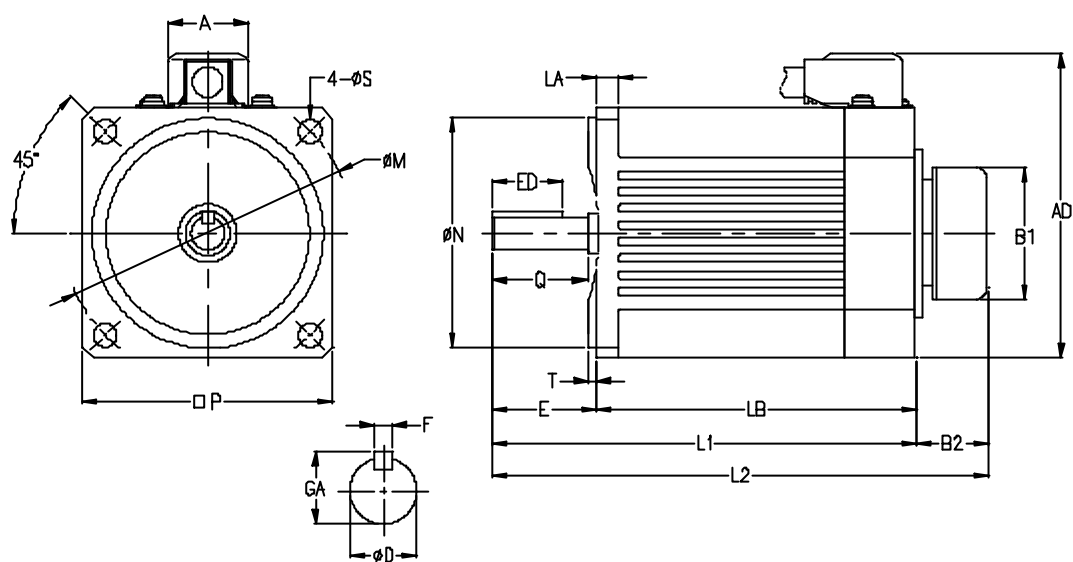
110V/1 ψ Max. input current is approximately double in above table.

Model No.		AM-60 L/M	AM-90 L/M/H	AM-120 L/M/H		AM-180 L/M/H		AM-250 L/M/H		AM-370 L/M/H	
Speed regulation	Load	±1% Below (0~Rated Torque at rated speed)									
	Voltage	±1% Below (Source voltage ±10% at rated speed No Load)									
	Temperature	±1% Below (0~40 / 32~104 at rated speed No Load)									
Motor Insulation/ Max. Working TEMP.		B Class (130 /266) / Max. 100 /212									
Type of Control		Rectangular wave PWM									
Speed Command		Built-in potentiometer / External Potentiometer 2 kΩ / RS-485									
Operation		1. Remove control pannel : CW, CCW, STOP Key 2. Terminal : Type of input : Photocoupler, input impedance 2.2kΩ / CF, CW, CCW, SLOW DOWN Common 3. Communication : RS-485									
Output Signal		Open collect output, External use condition 5VDC、10mA below SPEED OUT、ALARM OUT									
Protection		Any phenomenons as below, motor will stop and output alarm signal. ● Over load : Motor working temperature is not over 120 (248). ● Over heat : Power D305 model over heat 120 (248) shut down itself. 110 (230) Reset. ● Lost phase : Motor signals are abnormal, due to motor cables was broken or disconnector. ● Phase to phase short circuit.									
Motor Enclosure IP Rating		IP40									
Drive Enclosure IP Rating		IP20									
Pollution Degree		Class 1									
Figure No.		1	1	2(L/M)	1	3(L/M)	2	4	5	4(M/H)	
Motor Weight Kg (lb)		2.1/2.1 (4.62/4.62)	2.4/2.4/2.4 (5.28/5.28/5.28)	2.6/2.5/2.5 (5.72/5.50/5.50)		2.9/2.7/2.7 (6.38/5.94/5.94)		4.0/3.8/3.7 (8.8/8.36/8.14)		4.5/4.5/4.0 (9.90/9.90/8.80)	
D305 Driver Weight Kg (lb)		0.75 (1.65)	0.75 (1.65)	0.75 (1.65)		0.75 (1.65)		0.8 (1.77)		0.8 (1.77)	

4. Dimensions

4-1 Motor dimensions

Unit : mm

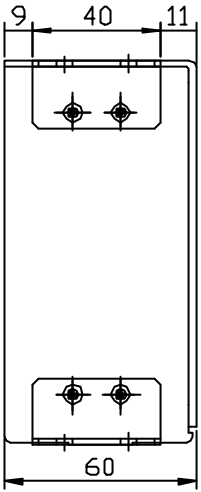


Lead cable length : 1M (3.28ft)

No.	□ P	M	S	N	T	LA	LB	L1	L2	AD	A	B1	B2	Output Shaft End					
														ED	Q	E	D	GA	F
1	90	104	8.5	83	2.5	8	99.5	127.5	160.5	109.8	28.5	61	33	20	25	28	12	13.5	4
2							114.5	146.5	179.5					25	29	32			
3																			
4																			
5																			

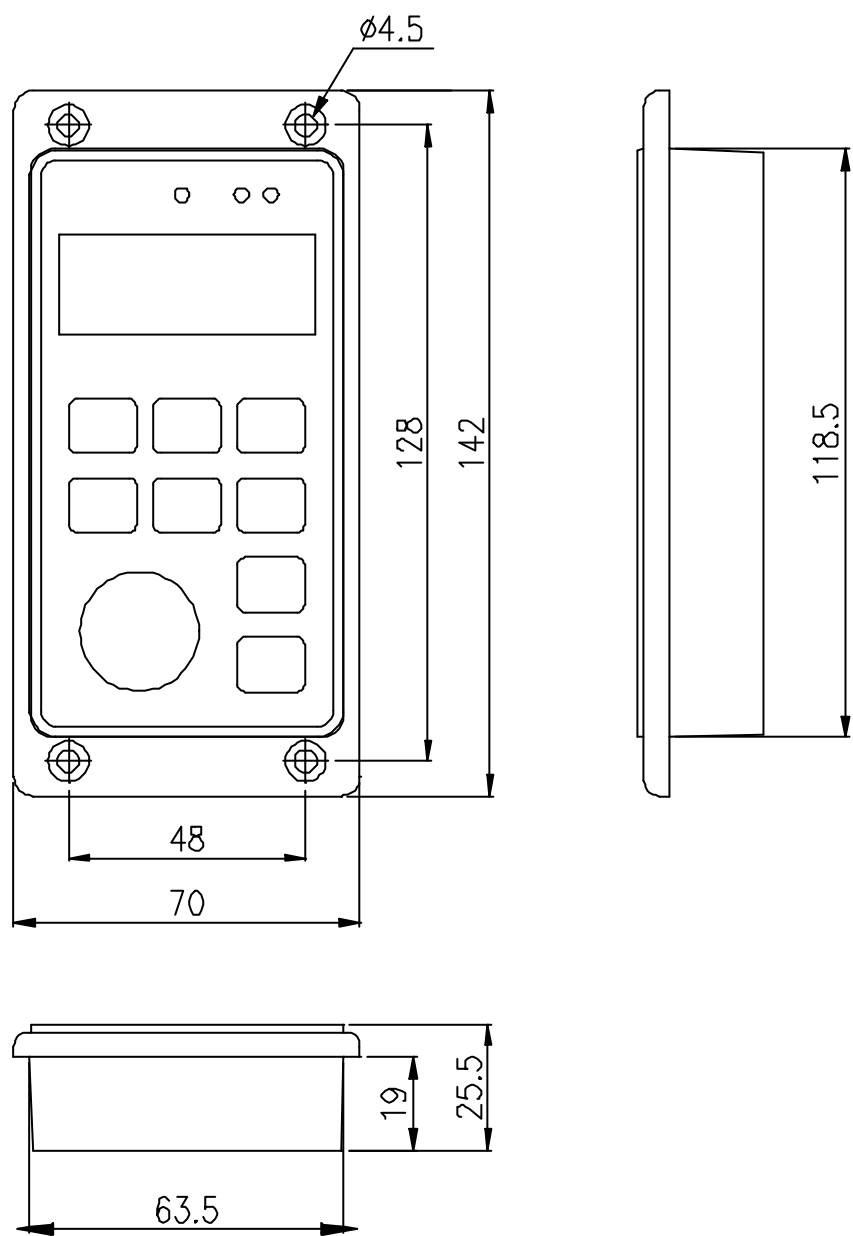
4-2 Drive dimensions

Unit : mm



4-3 F306 dimensions

Unit : mm



5. Environmental requests

Operation

Air temperature	-10~45 (14~113)
Air pressure	86~106kPa
Attitude	Under 1000 meters
Vibration	Less than 20HZ : maximum 9.86m/s ² 20~50HZ : maximum 5.88m/s ²

Storage

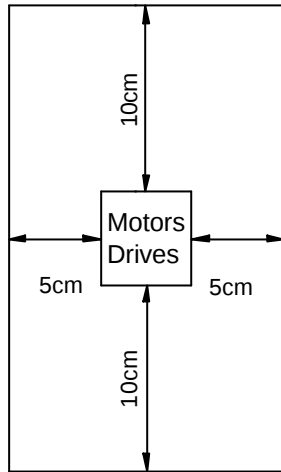
Air temperature	-20~60 (-4~140)
Air pressure	86~106kPa
Humidity	Less than 90%, no frosting

Transportation

Air temperature	-20~60 (-4~140)
Air pressure	86~106kPa
Humidity	Less than 90%, no frosting
Vibration	Less than 20HZ : maximum 9.86m/s ² 20~50HZ : maximum 5.88m/s ²

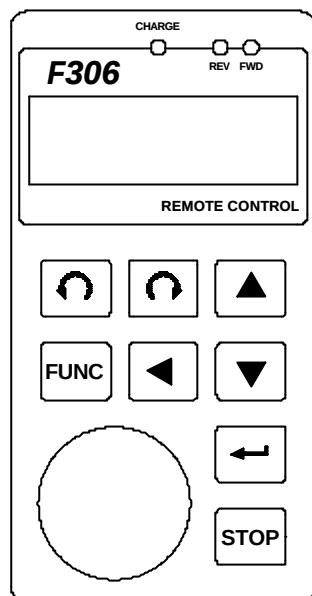
Note :

- a. Bad installation can reduce product service life.
- b. Do not put motors and drives into worse environment. Such as high temperature/humidity/vibration, corrosiveness gas, burst.
- c. Keep enough cooling space for motors and drives.



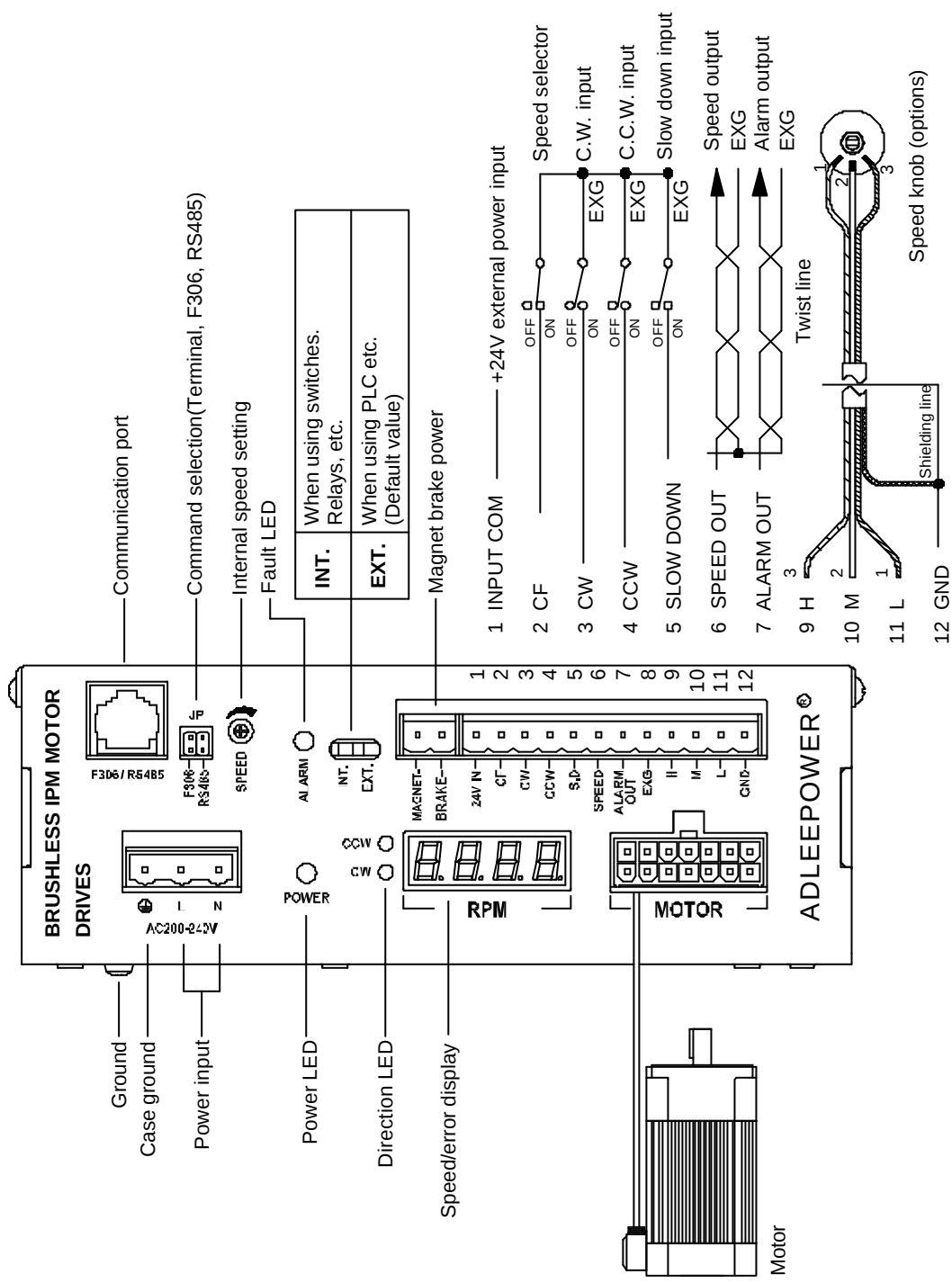
6. Function Description

6-1 Digital operation panel



Keypad	Function	Description
	Forward run	Commands forward run
	Reverse run	Commands reverse run
	Cursor movement	Select the digit
	Down	Decrease the parameter value 9~0
	Up	Increase the parameter value 0~9
	Memory storage	Saves the setting parameter value
	Function	Press once to select function code and press again to change its content
	Stop	Stop operation / Escape to standby mode

6-2 Terminals



6-3 Main circuit terminals

	Wire	Wire type	Torque
Input(L1,L2, )	14AWG~16AWG (2.0mm ² ~1.3mm ²)	Standard copper only (300V/80)	8Kg-cm (6.95lb-in)
External control signal terminals	24AWG (0.2mm ²)	Standard copper only (300V/80)	5Kg-cm (4.34lb-in)
FG screw (M4)	14AWG~16AWG (2.0mm ² ~1.3mm ²)	Standard copper only (300V/80)	8Kg-cm (6.95lb-in)

6-4 Terminal description

 Input source power line added 20A line fuse (or equivalent) is recommended for safety. Do not try to modify the wire between motors and drives. The extension cable is available from factory. Do not connect the shielding wires to any other component. Make sure all plugs are tight enough with socket. Otherwise, it may damaged the motors and drives.

■  : Case ground.

■ L, N : 100~130VAC or 200~230VAC, 50/60HZ, power input.

■ Power : Green LED light on when AC power input.

■ CW, CCW : Motors operation direction.

■ RPM : Static display for motor real speed (motor running).

Flash display for motor setting speed (motor stop).

Error codes, check the trouble shooting.

In “open loop control mode”, the RPM display is showing “Duty”, not motor speed. The unit is 0.1%. Ex. 1000 is 100.0%, 999 is 99.9%.

■ Motor : Wires connect to motors.

There are extension cable for option as below

1M(3.28ft), 3M(9.84ft), 5M(16.4ft), 9M(29.52ft).

Motor cable should be no more than 10M(32.8ft) in length.

■ Ground terminal : Wires by AWG18 (0.75mm²).

■ F306/RS-485 : F306 or RS-485 communication port.

■ JP : Control mode

F306 : Jumper on F306.

RS485 : Jumper on RS485.

Terminal : Jumper on both F306 and RS485.

Note : It needs to reset driver to effect the new JP setting.

■ Speed :

1. Close loop control mode (Default)

Motor stops operation if speed command is lower than minimum speed.

L series : 150~2000 RPM

M series : 150~3000 RPM

H series : 300~6000 RPM

HX1 series : 130~5000RPM

HX2 series : 300~9999RPM

Default value : 0RPM

2. Open loop control mode

Motor speed is controlled by PWM duty. The duty is set by analog signal.(0~100%) Motor speed is changed with loading.

3. Open / close loop control mode is set at CD02.

■ Alarm : Fault LED.

Red LED lighted when protect function effected. Please check the error on display refer to trouble shooting.

■ EXT-INT : EXT : Using external control power 24VDC $\pm 10\%$.

INT : Using internal control power.

■ Magnet brake : Connect to motors external brake, 24VDC Max. 15W.

■ External signal terminals :

The following terminals can be connected to a switch, relay, TTL or Transistor for control purpose.

1. 24V in :

- 24VDC external control power input when using the circuit control. The EXT-INT switch is set on EXT.
- The EXT-INT switch is set at INT when using relays or switch control.

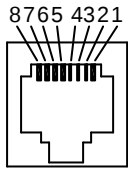
- 2. CF :
 - Analog command mode (CD19=0)
 - OFF : Panel VR
 - ON : Terminal control (HML)
 - Digital command mode (CD19=1)
 - Close loop control
 - OFF : CD28 speed setting
 - ON : CD29 speed setting
 - Open loop control
 - OFF : CD34 speed setting
 - ON : CD35 speed setting

(Note : F306 does not relate to CF setting.)
- 3. CW : Forward operation (ON), stop(OFF).
- 4. CCW : Reserve operation (ON), stop(OFF).
- 5. S.D. : Set "ON" when using S.D. function (Dec. time)
Set "OFF" for immediately stop (without Dec.time)

Model	Slow down signal
Start by Acc. time & stop by Dec. time	ON
Start by Acc. time & stop by CD03 content	OFF

- 6.Speed : Output motor speed
 - L, M, HX1 series : 12 pulse / per turn
 - H, HX2 series : 6 pulse / per turn
- 7. Alarm out : Output fault signal.
 - Drives output fault signal when protect function take effect such as over load, over voltage, overheat and so on.
 - Motors stop by free run.
 - Check detail information at trouble shooting.
- 8. EXG : Common terminal for external signal 2~7.
- 9. H : 5VDC output.
- 10. M : Speed voltage signal input.
- 11. L : Common terminal for H, M terminal.
- 12. GND : Connect to the shielding line for external speed command signal.

6-5 RS485 connector



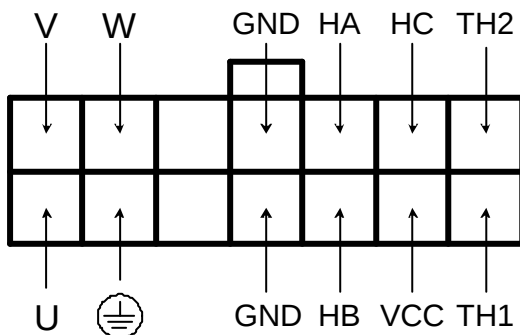
NO	8	7	6	5	4	3	2	1
Color	Black	Red	Orange	Yellow	Green	Blue	Purple	Brown
Symbol	GND	VCC	GND	A	RFA0	B	5V	
	Connect to F306 or RS485							

This connector is for both F306 and RS485. Set JP jumper for selection.

6-6 F306 panel display

Display shows command speed initially. Press  to display motor real speed. Press  one more time to display reference motor current. Press  to display command speed again. It is a cycle to press  to show above values.

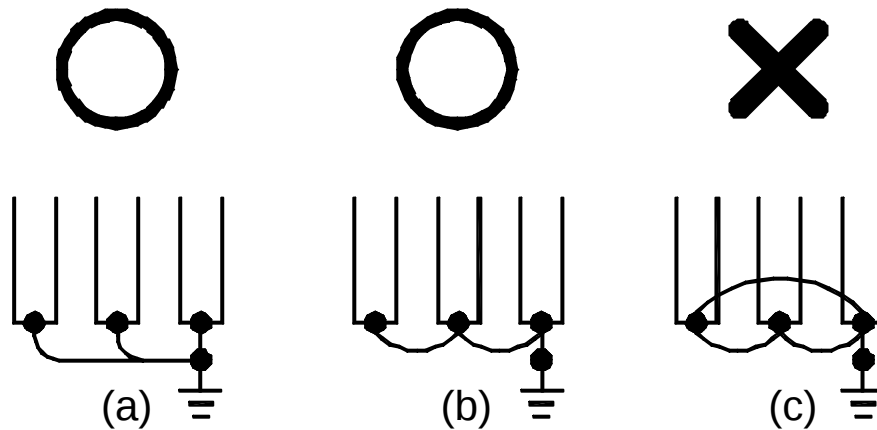
6-7 Motor connector



Symbol	Description
U	Brushless IPM Drives(D305) output
V	
W	
	Ground (Earth)
VCC	Signal source
HA	Hall sensor signal
HB	
HC	
GND	Signal ground
TH1	NTC resistor signal
TH2	

6-8 Grounding

1. Be sure ground both the inverter and motor.
2. Keep grounded leads as short as possible.
3. Shield cables used to protect low-level signal leads should be grounded at one end point.
4. Provide class 3 grounding (0.1Ω or less) for a terminal.
5. When grounding several inverters, make connections as shown below, no loop is produced as shown in FIG "a" , Fig "b".



7. Operation and connection

7-1. Parameter list

Display code	Function	Default Value	Adjust Range	Unit	Remark
CD00	Parameter lock	0	0~9999		
CD01	Model setting	As model	0~4		0 : 2000RPM(L) 1 : 3000RPM(M) 2 : 6000RPM(H) 3 : 5000RPM(HX1) 4 : 9999RPM(HX2)
CD02	Command mode	1	0~1		0 : Open loop control 1 : Close loop control
CD03	Brake mode	0	0~12		
CD04	Maximum speed limited	2000/3000/ 6000/5000/9999	130~9999	RPM	
CD05	Minimum speed limited	0	0~9999	RPM	
CD06	Speed command RPM/5V	2000/3000/ 6000/5000/9999	1000~9999	RPM	
CD07	Speed command RPM/0V	0	0~500 1000~1500	RPM	0~500 : 0~500RPM 1000~1500 : -0~-500RPM
CD08	Acceleration time 1	0.2	0.2~600.0	SEC	
CD09	Deceleration time 1	0.2	0.2~600.0	SEC	
CD10	S curve	0.2	0.2~15	SEC	
CD11	Reserved				
CD12	K _p (P gain)	4000	1~5000	mv/RPM	
CD13	K _i (I gain)	250	10~2000	ms	

Display code	Function	Default Value	Adjust Range	Unit	Remark
CD14	Reserved				
CD15	Display ratio	1	1~200		
CD16	Acceleration mode	0	0~1		0 : Linear 1 : S curve
CD17	Current limit	300	20~300	%	
CD18	Direction limit	0	0~2		0 : CW and CCW 1 : CW only 2 : CCW only
CD19	Analog/digital speed input	0	0~1		
CD20	Terminal or F306 select	1	0~1		0 : F306 or modbus 1 : Terminal or modbus
CD21	Address setting	1	1~255		
CD22	Transmission speed	3	0~3		
CD23	Transmission fault treatment	3	0~3		
CD24	Communicator protocol	4	0~7		
CD25	Communication loss time	0.5	0.1~100.0	SEC	
CD26	Transmission fault treatment	3	0~3		
CD27	Communication error counter	3	1~10		
CD28	1 st speed in digital	1000	0~9999	RPM	L : 150~2000RPM M : 150~3000RPM H : 300~6000RPM HX1 : 130~5000RPM HX2 : 300~9999RPM

Display code	Function	Default Value	Adjust Range	Unit	Remark
CD29	2 nd speed in digital	2000	0~9999	RPM	L : 150~2000RPM M : 150~3000RPM H : 300~6000RPM HX1 : 130~5000RPM HX2 : 300~9999RPM
CD30	Reset to default	0	0 or 1		
CD31	2 nd ACC./DEC. time terminal setting	0	0~1		0 : SLOW DOWN 1 : ACC.1 & DEC. 1 / ACC. 2 & DEC. 2
CD32	Acceleration time 2	0.2	0.2~600.0	SEC	
CD33	Deceleration time 2	0.2	0.2~600.0	SEC	
CD34	1st open loop speed in digital	100	0~1000	0.1%	
CD35	2nd open loop speed in digital	200	0~1000	0.1%	
CD36	The latest error record				
CD37	Errors record 1				
CD38	Errors record 2				
CD39	Errors record 3				
CD40	Clear errors record	1	0 or 1		
CD41	Trip latch current display				
CD42	Hold time standby (Bake force)	0.1	0.1~25.0	SEC	
CD96	Model code				
CD97	Version of program				

Communication address description

Display code	Function	Default Value	Adjust Range	Unit	Remark
28 29 34 35	RS485 speed command				
100	RS485 operating command	0	0~3		0 : Stop or reset 1 : CW 2 : CCW 3 : Stop
101	Motor speed (RPM)				
102	Motor running condition				
103	Error code				

Note :

1. It needs to reset driver (turn off and turn on power) to effect CD02 new setting.
2. CD04, CD05, CD06, CD07, CD12, CD13, CD28, CD29 are inactive in open loop control mode.

7-2 F306 parameter setting sequence

- A. In standby condition, press  to be in setting mode. Press  if it is not in standby mode.
- B. Press    to the parameter number. Press  to return to standby mode if there is no need to change value.
- C. Press  to show parameter setting value. Press  to return to parameter number and press  to return to standby mode, if there is no need to change value.
- D. Press    to the need value.
- E. Press  to save changes and return to standby mode.
- F. Press  or  to operate motor.

7-3 Command source setting

Terminal, RS485 and remote control (F306) are the command source for selection. Use JP jumper to select it.

A. Remote control (F306)

a. Analog/digital speed input

a-1. CD19=0 analog input

- Speed is controlled by F306 VR.

a-2. CD19=1 digital input

- Use   to change speed setting CD28.
- Use   can change speed in operation condition in digital speed input mode. Press  or  to change speed. Repeat to press  or  if it does not response in 5 seconds. In the speed change mode:
 - (1) Press keypad once : change 1 RPM intermittently.
 - (2) Continue to press keypad : change 1 RPM in 0.5 second in first 5 seconds and change 10 RPM after first 5 seconds.

b. Press  or  to operate motor.

c. Press  to stop motor.

d. Use CF terminals to do two speeds control. CF/COM open is 1st speed. CF/COM short is 2nd speed.

B. Communication (RS485)

JP jumper is in RS485 position.

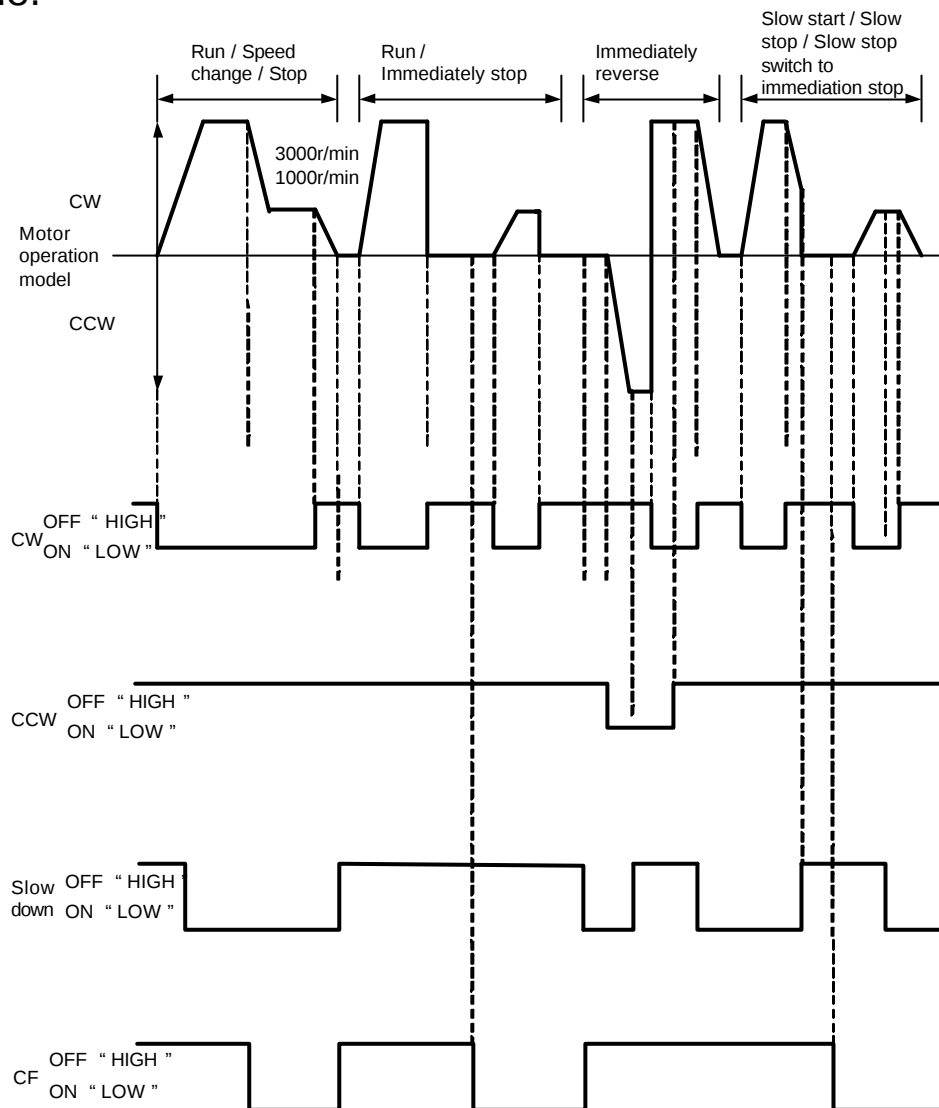
Open loop : speed command use address 34 (22H) or 35 (23H).

Close loop : speed command use address 28 (1CH) or 29 (1DH).

Note : use CF terminal select which one.

D. Terminal control

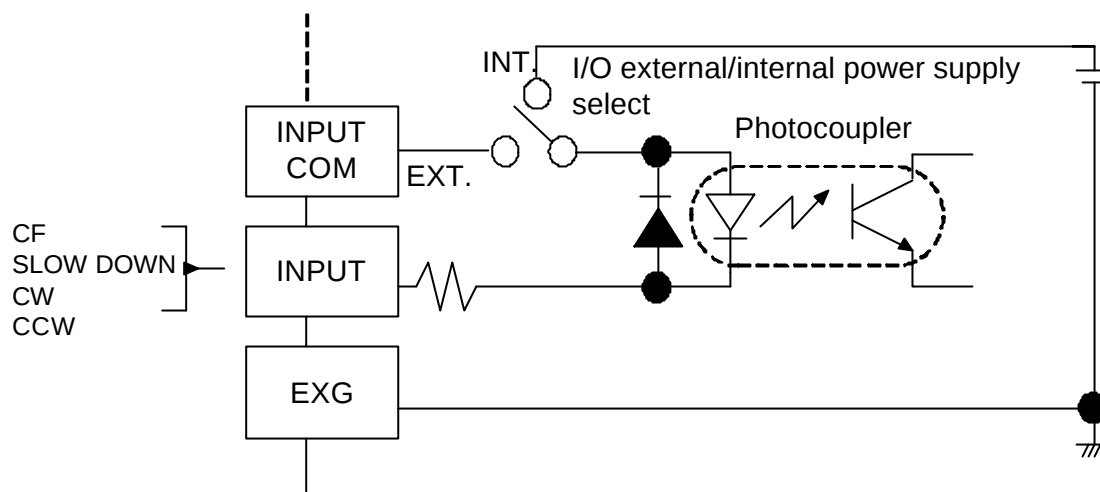
1. Put two jumpers on JP.
2. Set control power in INT position if using internal power.
3. Two speeds control :
 CD19=0, 1st speed is speed VR on panel, 2nd speed is HML on terminal.
 CD19=1, 1st speed is CD28 value, 2nd speed speed is CD29 value.



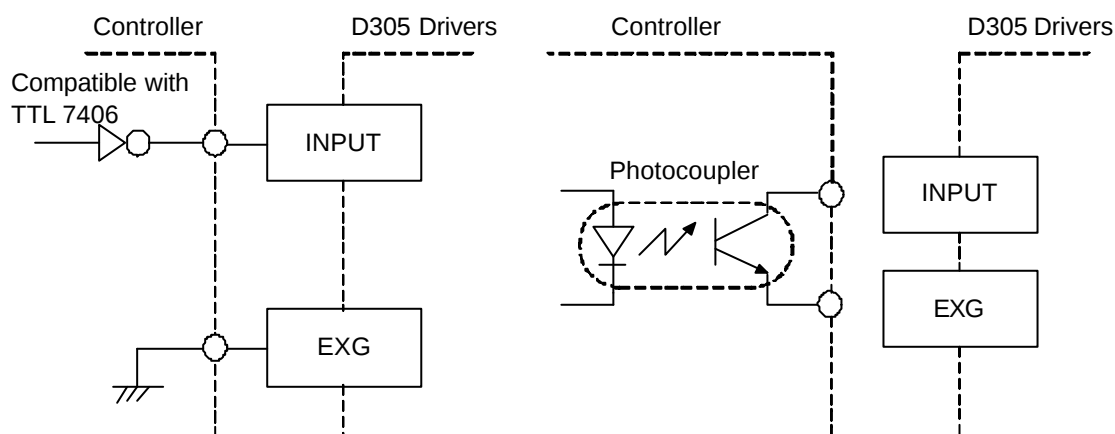
Note :

- a. Use CW/CCW switch to control motors RUN/STOP. Do not use power ON/OFF to control motors RUN/STOP.
- b. Motor changes direction in the fastest mode if slow down is OFF.
 Motor changes direction with ACC/DEC time if slow down is ON.

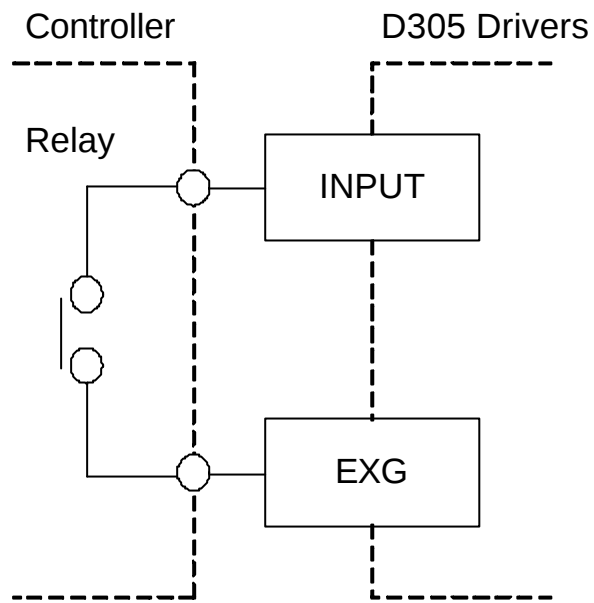
7-4. Signal input circuit



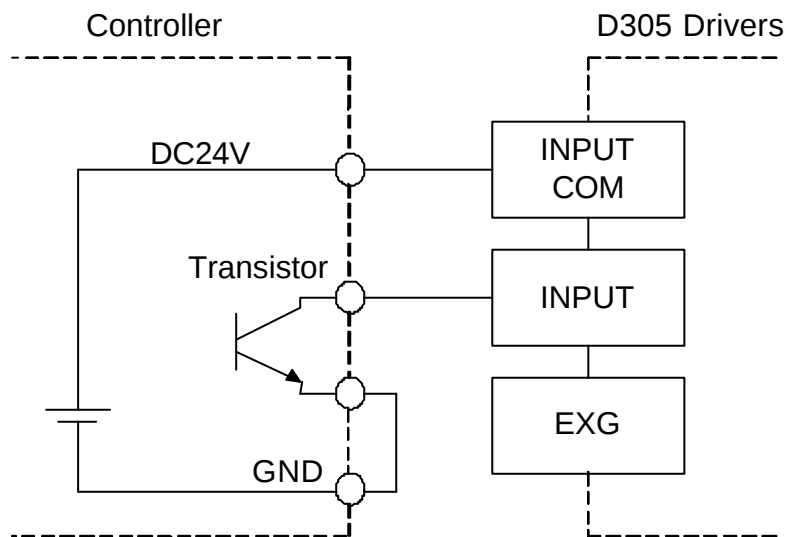
- EXT voltage is 24VDC $\pm 10\%$
 - Using internal power supply control
Set I/O external/internal power supply select at INT. motor cannot operate if I/O external/internal power supply select is at EXT.
- <Non-contact control>



<Contact control>

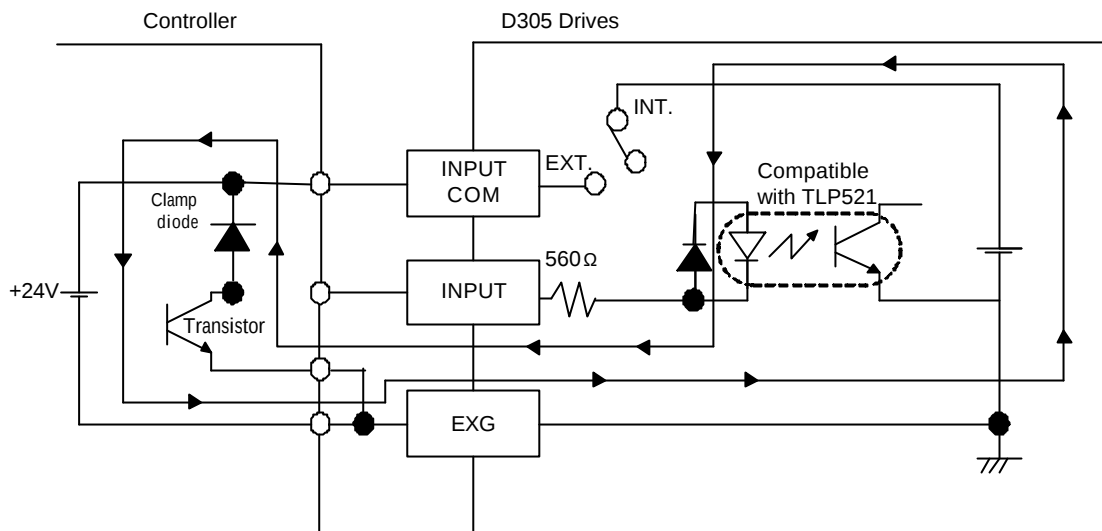


■ Using external power supply control



Set I/O external/
internal power
supply select at
EXT.

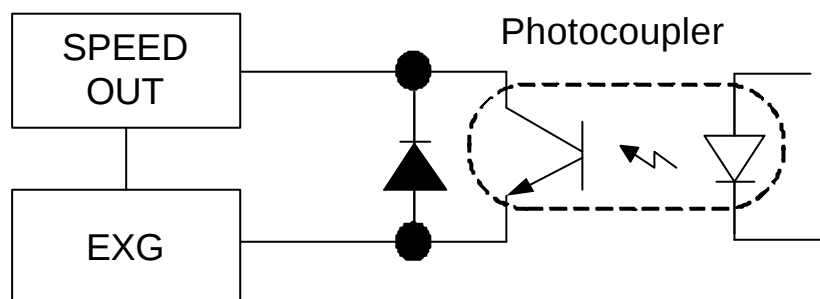
■ Note : controller with built-in clamp diode



It is necessary to set I/O external/internal power supply select at EXT, when controller with built-in clamp diode has been used. If I/O external/internal power supply select is not correct, then motors will run at controller power ON/OFF.

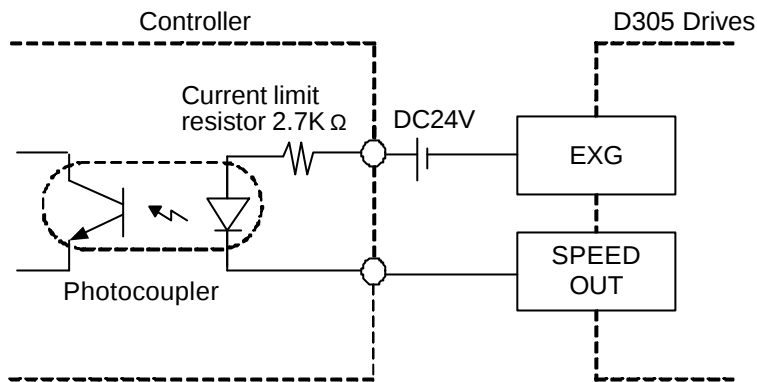
4.Signal output circuit

4-1 Signal output circuit



- External power supply DC voltage should less than 26.4V and current should less than 10mA.
- Select suitable current limit resistor based on DC power supply voltage.

7-5. Example of application of signal output circuit



[Speed out]

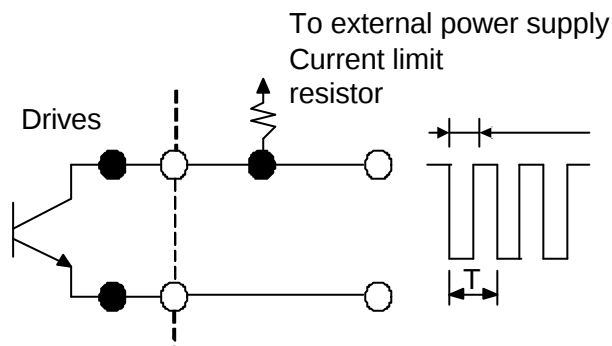
H, HX2 series : 6 pulses/per turn

L, M, HX1 series : 12 pulses/per turn

Motor speed can be measured from the frequencies of terminal "SPEED OUT".

$$\text{Motor speed(r/min)} = \frac{\text{Frequency of speed out (HZ)}}{6 \text{ or } 12} \times 60$$

$$\frac{1}{T} = \text{Frequency of speed out}$$



The pulse width depends on the motor speed.

That is, the faster the motor runs, the narrower the width is.

[Alarm Out]

1. Any fault occurs, alarm will output.
2. Regarding type of protection, please refer to "TROUBLE SHOOTING".

7-4 Parameter description

Parameter lock
CD00

Setting Range	0 ~ 9999
Default value	0

0 : Lock.
1 : Unlock.

Model setting
CD01

Setting Range	0 ~ 4
Default value	As model

0 : 2000RPM(L).
1 : 3000RPM(M).
2 : 6000RPM(H).
3 : 5000RPM(HX1).
4 : 9999RPM(HX2).

Command mode
CD02

Setting Range	0 ~ 1
Default value	1

0 : Open loop control.
1 : Close loop control.

Note : Reset driver to effect this new parameter setting.

Brake mode
CD03

Setting Range	0 ~ 12
Default value	0

CD03 value	Operation mode	SLOW DOWN terminal
0 , 10	ACC. time start with fast stop	OFF
0 , 10	ACC. time start with DEC. time stop	ON
1 , 11	ACC. time start with DEC. time stop	ON / OFF
2 , 12	ACC. time start with free run stop	OFF
2 , 12	ACC. time start with DEC. time stop	ON

F306, MODBUS and CD31=1 modes:

CD03=0 : Immediately stop, provide little brake force at standby mode.

CD03=10 : Immediately stop, does not provide little brake force at standby mode.

CD03=1 : Stop with deceleration time, provide little brake force at standby mode.

CD03=11 : Stop with deceleration time, does not provide little brake force at standby mode.

CD03=2,12 : Free run to stop, does not provide little brake force at standby mode.

Note 1 : CD03=2 and speed command=0 means STOP for both analog and digital speed command. The motor will be free run to stop.

Note 2 : CD31=1, SLOWN DOWN function changes to 2nd ACC./DEC. time selection.

Maximum speed limit
CD04

Setting Range	130 ~ 9999
Default value	2000(L) / 3000(M) / 6000(H) / 5000(HX1) / 9999(HX2)

L : set under 2000RPM

M : set under 3000RPM

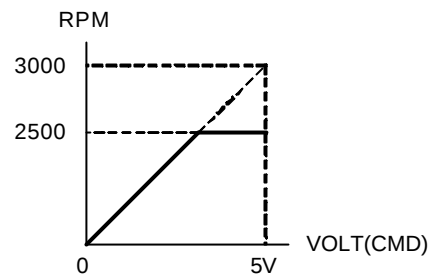
H : set under 6000RPM

HX1 : set under 5000RPM

HX2 : set under 9999RPM

Note : This parameter does not work in open loop control.

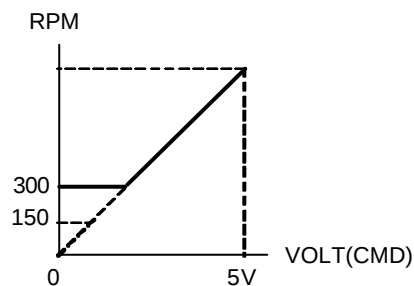
Ex. CD04=2500



Minimum speed limit
CD05

Setting Range	0 ~ 9999
Default value	0

Ex. CD05=300



Suggestion : L/M model 150RPM, H model 300RPM.

Note : This parameter does not work in open loop control.

Speed command RPM / 5V
CD06

Setting Range	1000 ~ 9999
Default value	2000(L) / 3000(M) / 6000(H) / 5000(HX1) / 9999(HX2)

The reference speed command at 5V in close loop.

Note : This parameter does not work in open loop control.

Speed command RPM / 0V
CD07

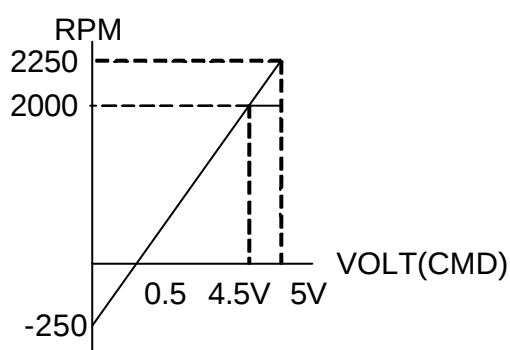
Setting Range	0~500 : 0~500RPM 1000~1500 : -0~-500RPM
Default value	0

The reference speed command at 0V/4mA in close loop.

Note : This parameter does not work in open loop control.

Ex. 2000RPM at 4.5V, 0RPM at 0.5V

CD06=2250, CD07=1250(represent -250RPM), CD04=2000



Acceleration time 1
CD08

Setting Range	0.2 ~ 600.0SEC
Default value	0.2SEC

The acceleration time 1 from 0 RPM to rate speed.

Deceleration time 1
CD09

Setting Range	0.2 ~ 600.0SEC
Default value	0.2SEC

The deceleration time 1 rate speed to 0 RPM.

S curve
CD10

Setting Range	0.2 ~ 15SEC
Default value	0.2SEC

When CD16=1, Acceleration time = CD08+CD10

Deceleration time = CD09+CD10

Note : CD10 content must be smaller than CD08 or CD09 content . For example, CD08=3, and CD09=5, CD10 must be smaller than 3.

K_p (P gain)
CD12

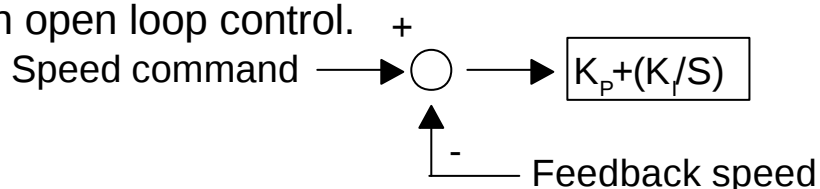
Setting Range	1 ~ 5000
Default value	4000

Higher value is with faster response, it can be overshoot if value is too high. This parameter does not work in open loop control.

K_i (I gain)
CD13

Setting Range	10 ~ 2000 ms
Default value	250 ms

Lower value is with faster response. This parameter does not work in open loop control.



Display ratio
CD15

Setting Range	1 ~ 200
Default value	1

Display speed = (set or real speed) / CD15

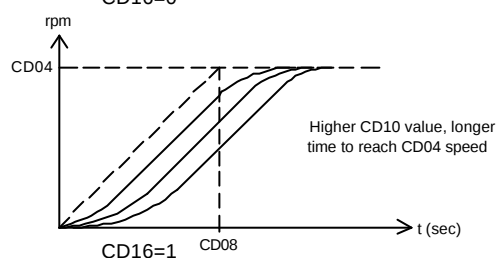
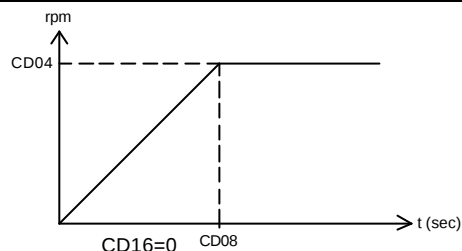
This function is good for motor with gearbox. The display can show the gearbox output speed.

S curve
CD16

Setting Range	0 ~ 1
Default value	0

0 : Liner.

1 : S curve.



Current limit
CD17

Setting Range	20 ~ 300%
Default value	300%

Higher value has higher output torque, but it may occur overheat problem.

Direction limit
CD18

Setting Range	0 ~ 2
Default value	0

0 : CW and CCW.
 1 : CW only.
 2 : CCW only.

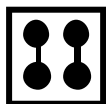
Analog / digital speed input
CD19

Setting Range	0 ~ 1
Default value	0

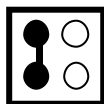
0 : Analog command is from pannel or terminal VR or F306 VR.
 1 : Digital command is from CD28 or CD29 setting.

Terminal or F306 select
CD20

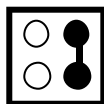
Setting Range	0 ~ 1
Default value	0



Terminal



F306



RS485

JP select F306

CD20=0 : F306 control

CD20=1 : terminal run command CW/CCW

JP select RS485

CD20=0 : RS485 control

CD20=1 : terminal run command CW/CCW

Address setting
CD21

Setting 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
CD22

Setting Range	0 ~ 3
Default value	3

Setting the transmission speed between computer and drive.

0 : 2400 bits/second.

1 : 4800 bits/second.

2 : 9600 bits/second.

3 : 19200 bits/second.

Transmission fault treatment
CD23

Setting Range	0 ~ 3
Default value	3

0 : Alarm and keep operation.

1 : Alarm and decelerate to stop.

2 : Alarm and free run to stop.

3 : No alarm and keep operation.

Communicator protocol
CD24

Setting 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(10bits)(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(11bits)(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+8 data bits+1 Even bit+1 stop bit)
8,E,1 RTU(11bits)(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+8 data bits+1 Odd bit+1 stop bit)
8,O,1 RTU(11bits)(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+8 data bits+1 stop bit)
8,N,1 ASCII(10bits)(character frame in hexadecimal)

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

- 5 : 8,N,2 ASCII (1 start bit+8 data bits+2 stop bit)
8,N,2 ASCII(11bits)(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+8 data bits+1 Even bit+1 stop bit)
 8,E,1 ASCII(11bits)(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+8 data bits+1 Odd bit+1 stop bit)
 8,O,1 ASCII(11bits)(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	Command 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 contrast

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 driver's setting
2. 06H:Write driver's setting
3. 08H:Communication loop detection

(1) 03H : Read drive's setting	
Computer command message	
D1 : Communication address	(00~FFh)
D2 : Function code	(03h)
D3 : Parameter number (H)	(00h)
D4 : Parameter number (L)	(0~3Dh)
D5 : Quantity of parameter (H) (word count)	(00h)
D6 : Quantity of parameter (L) (word count)	(00~10h)
D7 : CRCL or LRC (H)	(0~FFh)
D8 : CRCH or LRC (L)	(0~FFh)
Drive response message	
D1 : Communication address	(01~FFh)
D2 : Function code	(03h)
D3 : Quantity of parameter (byte count)	
D4 : Content of data (H)	(0~FFh)
D5 : Content of data (L)	(0~FFh)
D6 : Content of data (H)	(0~FFh)
D7 : Content of data (L)	(0~FFh)
Dn-1 : CRCL or LRC(H)	(0~FFh)
Dn : CRCH or LRC(L)	(0~FFh)

Ex. To read two parameter data address 28(1CH)=1000(03E8H) and address 29(1DH)=2000(07D0H) from drive address 52(34H).

1.RTU

Computer command message			Drive response message		
D1	Address	34H	D1	Address	34H
D2	Function code	03H	D2	Function code	03H
D3	Start address (H)	00H	D3	Quantity of data (count by byte)	04H
D4	Start address (L)	1CH	D4	CD28 content (H)	03H
D5	# of data (H)	00H	D5	CD28 content (L)	E8H
D6	# of data (L)	02H	D6	CD29 content (H)	07H
D7	CRCL	CRCL	D7	CD29 content (L)	D0H
D8	CRCH	CRCH	D8	CRCL	CRCL
			D9	CRCH	CRCH

2. ASCII

Computer command message			Drive response message		
	STX	3A		STX	3A
D1	Address '3'	33	D1	Address '3'	33
	Address '4'	34		Address '4'	34
D2	Function '0'	30	D2	Function '0'	30
	Function '3'	33		Function '3'	33
D3	Start address '0'	30	D3	# of data '0'	30
	Start address '0'	30		count by byte '4'	34
D4	Start address '1'	31	D4	CD28 content '0'	30
	Start address 'C'	43		CD28 content '3'	33
D5	# of data '0'	30	D5	CD28 content 'E'	45
	# of data '0'	30		CD28 content '8'	38
D6	# of data '0'	30	D6	CD29 content '0'	30
	# of data '2'	32		CD29 content '7'	37
D7	LRC HI	LRC HI	D7	CD29 content 'D'	44
D8	LRC LO	LRC LO		CD29 content '0'	30
	END HI	0D	D8	LRC HI	LRC HI
	END LO	0A	D9	LRC LO	LRC LO
				END HI	0D
				END LO	0A

Note 1 : The parameter values can be in integer, decimal and negative. Each value has different process to read and write.

Refer to 7-1 lists to find out the minimum unit and value range for each parameter.

a. In computer command message D5 80, this value is negative.

b. In drive response message,
Function code 03H : D(4+2n) 80, this value is negative.

Function code 06H, 08H : D(3+2n) 80, this value is negative.

All hexadecimal values have 4 numbers(note2~4), first two numbers are D4, last two numbers are D5.

Note 2 : Processing integer number

Transfer value into hexadecimal value. The first two numbers are D4 and the last two numbers are D5.

Ex. Speed=1710 rpm

1710(decimal)=06AE(hexadecimal)

D4=06H

D5=AEH

Note 3 : Processing decimal number

Using following methods to process if the minimum parameter value is decimal number.

Minimum unit by 1st decimal number : The original value times 10 to be a new number.

Then,

Use this new number to transfer value into hexadecimal value.

The first two numbers are D5 and the last two numbers are D6.

Ex. Acc. time CD08=60.0 sec

$60.0 \times 10 = 600$ (decimal)=0258(hexadecimal)

D4=02H

D5=58H

The value needs to divide by 10 when it returns to original shape.

(2) 06H : Write parameter setting into drive	
Computer command message	
D1 : Communication address	(00~FFh)
D2 : Function code	(06h)
D3 : Parameter number (H)	(00h)
D4 : Parameter number (L)	(0~1Fh)
D5 : Content of data (H)	(0~FFh)
D6 : Content of data (L)	(0~FFh)
D7 : CRCL or LRC (H)	(0~FFh)
D8 : CRCH or LRC (L)	(0~FFh)
Drive response message	
D1 : Communication address	(00~FFh)
D2 : Function code	(06h)
D3 : Parameter number (H)	(00h)
D4 : Parameter number (L)	(0~1Fh)
D5 : Content of data (H)	(0~FFh)
D6 : Content of data (L)	(0~FFh)
D7 : CRCL or LRC (H)	(0~FFh)
D8 : CRCH or LRC (L)	(0~FFh)

Ex. Write parameter setting CD04=1500RPM into address 52(34H) driver.

1. RTU

Computer command message :

D1	D2	D3	D4	D5	D6	D7	D8
34H	06H	00H	04H	05H	DCH	CRCL	CRCH

Drive response message :

D1	D2	D3	D4	D5	D6	D7	D8
34H	06H	00H	04H	05H	DCH	CRCL	CRCH

2. ASCII

Computer command message			Drive response message		
	STX	3A		STX	3A
D1	Address '3'	33	D1	Address '3'	33
	Address '4'	34		Address '4'	34
D2	Function '0'	30	D2	Function '0'	30
	Function '6'	36		Function '6'	36
D3	Number of parameter '0'	30	D3	Number of parameter '0'	30
	Number of parameter '0'	30		Number of parameter '0'	30
D4	Number of parameter '0'	30	D4	Number of parameter '0'	30
	Number of parameter '4'	34		Number of parameter '4'	34
D5	CD04 content '0'	30	D5	CD04 content '0'	30
	CD04 content '5'	35		CD04 content '5'	35
D6	CD04 content 'D'	44	D6	CD04 content 'D'	44
	CD04 content 'C'	43		CD04 content 'C'	43
D7	LRC HI	LRC HI	D7	LRC HI	LRC HI
D8	LRC LO	LRC LO	D8	LRC LO	LRC LO
	END HI	0D		END HI	0D
	END LO	0A		END LO	0A

Ex. Computer commands the address 52(34H) driver to operate CW at 1500RPM.

1. RTU

Step 1 : write address 28(1CH)=1500RPM

Computer command message :

D1	D2	D3	D4	D5	D6	D7	D8
34H	06H	00H	1CH	05H	DCH	CRCL	CRCH

Drive response message :

D1	D2	D3	D4	D5	D6	D7	D8
34H	06H	00H	1CH	05H	DCH	CRCL	CRCH

Note : Process step 2 directly if address 28 is set in 1500RPM already.

Step 2 : write address 100(64H)=1

Computer command message :

D1	D2	D3	D4	D5	D6	D7	D8
34H	06H	00H	64H	00H	01H	CRCL	CRCH

Drive response message :

D1	D2	D3	D4	D5	D6	D7	D8
34H	06H	00H	64H	00H	01H	CRCL	CRCH

2. ASCII

Step 1 : write address 28(1CH)=1500RPM

Computer command message			Drive response message		
	STX	3A		STX	3A
D1	Address '3'	33	D1	Address '3'	33
	Address '4'	34		Address '4'	34
D2	Function '0'	30	D2	Function '0'	30
	Function '6'	36		Function '6'	36
D3	Number of parameter '0'	30	D3	Number of parameter '0'	30
	Number of parameter '0'	30		Number of parameter '0'	30
D4	Number of parameter '1'	31	D4	Number of parameter '1'	31
	Number of parameter 'C'	43		Number of parameter 'C'	43
D5	CD30 content '0'	30	D5	CD30 content '0'	30
	CD30 content '5'	35		CD30 content '5'	35
D6	CD30 content 'D'	44	D6	CD30 content 'D'	44
	CD30 content 'C'	43		CD30 content 'C'	43
D7	LRC HI	LRC HI	D7	LRC HI	LRC HI
D8	LRC LO	LRC LO	D8	LRC LO	LRC LO
	END HI	0D		END HI	0D
	END LO	0A		END LO	0A

Step 2 : write address 100(64H)=1

Computer command message			Inverter response message		
	STX	3A		STX	3A
D1	Address '3'	33	D1	Address '3'	33
	Address '4'	34		Address '4'	34
D2	Function '0'	30	D2	Function '0'	30
	Function '6'	36		Function '6'	36
D3	Content of data '0'	30	D3	Content of data '0'	30
	Content of data '0'	30		Content of data '0'	30
D4	Content of data '6'	36	D4	Content of data '6'	36
	Content of data '4'	34		Content of data '4'	34
D5	Address 100 content '0'	30	D5	Address 100 content '0'	30
	Address 100 content '0'	30		Address 100 content '0'	30
D6	Address 100 content '0'	30	D6	Address 100 content '0'	30
	Address 100 content '1'	31		Address 100 content '1'	31
D7	LRC HI	LRC HI	D7	LRC HI	LRC HI
D8	LRC LO	LRC LO	D8	LRC LO	LRC LO
	END HI	0D		END HI	0D
	END LO	0A		END LO	0A

(3) 08H : Communication loop detection		
Computer command message		
D1 : Communication address		(0~FFh)
D2 : Function code		(08h)
D3 : Data 1		(0~FFh)
D4 : Data 2		(0~FFh)
D5 : Data 3		(0~FFh)
D6 : Data 4		(0~FFh)
D7 : CRCL or LRC (H)		(0~FFh)
D8 : CRCH or LRC (L)		(0~FFh)
Drive response message		
D1 : Communication address		(0~FFh)
D2 : Function code		(08h)
D3 : Data 1		(0~FFh)
D4 : Data 2		(0~FFh)
D5 : Data 3		(0~FFh)
D6 : Data 4		(0~FFh)
D7 : CRCL or LRC (H)		(0~FFh)
D8 : CRCH or LRC (L)		(0~FFh)

Drive response messages need to be same as command message when do communication loop detection.

Ex. Computer commands the address 52(34H) driver, data1=11, data2=22, data3=33, data4=44

1. RTU

Computer command message			Drive response message		
D1	Address	34H	D1	Address	34H
D2	Function code	08H	D2	Function code	08H
D3	Data 1	11H	D3	Data 1	11H
D4	Data 2	22H	D4	Data 2	22H
D5	Data 3	33H	D5	Data 3	33H
D6	Data 4	44H	D6	Data 4	44H
D7	CRCL	CRCL	D7	CRCL	CRCL
D8	CRCH	CRCH	D8	CRCH	CRCH

2. ASCII

Computer command message			Drive response message		
	STX	3A		STX	3A
D1	Address '3'	33	D1	Address '3'	33
	Address '4'	34		Address '4'	34
D2	Function '0'	30	D2	Function '0'	30
	Function '8'	38		Function '8'	38
D3	Content1 '1'	31	D3	Content1 '1'	31
	Content1 '1'	31		Content1 '1'	31
D4	Content2 '2'	32	D4	Content2 '2'	32
	Content2 '2'	32		Content2 '2'	32
D5	Content3 '3'	33	D5	Content3 '3'	33
	Content3 '3'	33		Content3 '3'	33
D6	Content4 '4'	34	D6	Content4 '4'	34
	Content4 '4'	34		Content4 '4'	34
D7	LRC HI	LRC HI	D7	LRC HI	LRC HI
D8	LRC LO	LRC LO	D8	LRC LO	LRC LO
	END HI	0D		END HI	0D
	END LO	0A		END LO	0A

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, refer to 06H CD04

$34+06+00+04+05+DC=1FH$

LRC HI=E(45), LRC LO=1(33)

the 2's-complement negation of FH is E1H

E. Communication error drive respond

Once communication error happend, 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 (03/06/08 available)
02H	Illegal data value(data value is outside limit value)
03H	Illegal data address(data address is not available)
04H	Illegal command, drive can't do this command
05H	Check sum error

Once communication error happened, drive respond as follow

1.RTU

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

2.ASCII

STX	3A
Address (01)	30
	31
Function code & 86H	38
	36
Error code (02)	30
	32
LRC (75)	37
	35
End code H	0D
End code L	0A

EX. In drive 01 write 1B58(7000rpm) to parameter address 04,
but CD04 upper limit is 6000rpm (1770H).

1.RTU

Computer command message :

D1	D2	D3	D4	D5	D6	D7	D8
01H	06H	00H	04H	1BH	58H	CRCL	CRCH

Drive response message :

D1	D2	D3	D4	D5
01H	86H	03H	CRCL(C3H)	CRCH(A1H)

2.ASCII

Computer command message		Drive response message	
STX	3A	STX	3A
Address '0' Address '1'	30	Address '0' Address '1'	30
	31		31
Function '0' Function '6'	30	Function '8' Function '6'	38
	36		36
Address content '0' Address content '0' Address content '0' Address content '4'	30	Error code '0' Error code '3'	30
	30		33
	30	LRC HI '7' LRC LO '5'	37
	34		35
CD04 content '1' CD04 content 'B' CD04 content '5' CD04 content '8'	31	END HI	0D
	42	END LO	0A
	35		
	38		
LRC HI	LRC HI		
LRC LO	LRC LO		
END HI	0D		
END LO	0A		

Communication loss time
CD25

Setting Range	0.1 ~ 100.0SEC
Default value	0.5SEC

Set communication loss time. When communication loss time over CD25 setting, BLDC drive will active as CD26 selected.

Note : This function does not effect in standby condition.

Transmission fault treatment
CD26

Setting Range	0 ~ 3
Default value	3

0 : Alarm and keep operation.

1 : Alarm and decelerate to stop.

2 : Alarm and free run to stop.

3 : No alarm and keep operation.

Use RS485 writing address 100=0 or terminal CW and CCW both “OFF“ to clear the transmission fault.

Note : Alarm means Fault Relay active.

Communication error conunter
CD27

Setting Range	1 ~ 10
Default value	3

When communication error continuous time more than CD27 setting.

BLDC drive will active as CD23 selected.

1st speed in digital
CD28

Setting Range	0 ~ 9999RPM
Default value	1000RPM

L : 150~2000RPM

M : 150~3000RPM

H : 300~6000RPM

HX1 : 130~5000RPM

HX2 : 300~9999RPM

Note : This parameter does not work in open loop control.

For RS485 speed command address.

2nd speed in digital
CD29

Setting Range	0 ~ 9999RPM
Default value	2000RPM

L : 150~2000RPM

M : 150~3000RPM

H : 300~6000RPM

HX1 : 130~5000RPM

HX2 : 300~9999RPM

Note : This parameter does not work in open loop control.

For RS485 speed command address.(CF and EXG short circuit)

Reset to default
CD30

Setting Range	0 or 1
Default value	0

Set address CD30=1 to reset parameters to be in default values.
This parameter value will be back to 0 after reset command automatically.

2nd ACC./DEC. time terminal setting
CD31

Setting Range	0 ~ 1
Default value	0

0 : Slow down refer to CD03 stop mode.

1 : 2nd Accel. and Decel. time select

S_D terminal "OFF" select CD08 and CD09.

S_D terminal "ON" select CD32 and CD33.

ON means S_D and EXG are short.

Acceleration time 2
CD32

Setting Range	0.2 ~ 600.0SEC
Default value	0.2SEC

Deceleration time 2
CD33

Setting Range	0.2 ~ 600.0SEC
Default value	0.2SEC

1st open loop digital speed command
CD34

Setting Range	0 ~ 1000
Default value	100

2nd open loop digital speed command
CD35

Setting Range	0 ~ 1000
Default value	200

When CD02=0, CD19=1

CF “OFF“ open loop digital speed command input by CD34.

CF “ON“ open loop digital speed command input by CD35.

Note : CD34 or CD35 setting 1000 mean 100% duty, 100 mean 10% duty.

The latest error record
CD36

Errors record 1
CD37

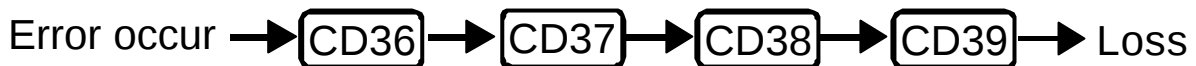
Errors record 2
CD38

Errors record 3
CD39

Clear errors record
CD40

Set CD40=1 to reset CD36~CD39 records.

Errors record flow-chart when Error occur. The new content will shift the other contents to one higher CD code and the highest one will be dropped.



Trip latch current display
CD41

Hold time standby (Brake force)
CD42

Setting Range	0.1 ~ 25.0SEC
Default value	0.1SEC

Short phase lower-arms 3.

Model code
CD96

Version of program
CD97

Communication address description

RS485 speed command
28(1CH),29(1DH) ,34(22H),35(23H)

Close loop speed command :

Setting range is 0 ~ 9999.

CF “OFF“, CD28(1CH) content.

CF “ON“, CD29(1DH) content.

Open loop speed command :

Setting range is 0 ~ 1000.

CF “OFF“, CD34(22H) content.

CF “ON“, CD35(23H) content.

RS485 operating command
100(64H)

Setting Range	0 ~ 3
Default value	0

0 : Reset error code7(No stop).

1 : CW.

2 : CCW.

3 : STOP and reset error code7.

Note : 1.This is last operating command value and it is not real motor running condition.

2.RS485 can reset Err7 only.

Motor speed (RPM)
101(65H)

This parameter is real motor speed value. Use RS485 protocol 03H to read motor speed.

Motor running condition
102(66H)

This real motor running condition.

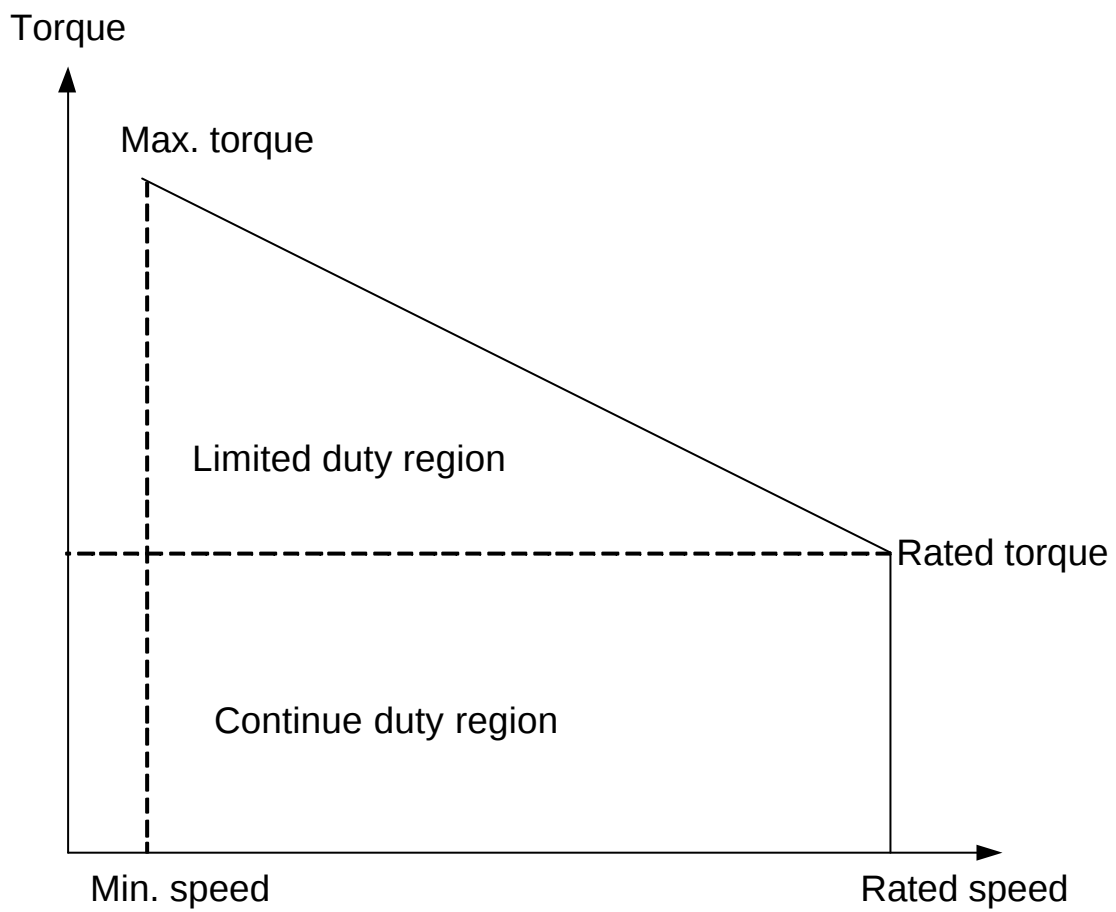
- 1 : CW
- 2 : CCW
- 3 : STOP

Error code
103(67H)

Use RS485 protocol 03H to read error code if driver is in protection mode.

- 2 : Motor overheat.
- 3 : Driver over current / over heat / over voltage.
- 4 : Driver over load.
- 5 : Over speed.
- 6 : Speed too low.
- 7 : Mod Bus fail.
- 8 : Motor lock protection.
- 9 : Hall sensor fail.

8. Motor T-N curve



9. APPLICATION

CD03=0 : Immediately stop, provide little brake force at standby mode.

Drivers will continue to provide little brake force at standby mode , motor does not free

CD03=10 : Immediately stop, does not provide little brake force at standby mode.

At standby mode, control the little brak force time by CD42, motor will release when brak force time over.

CD03=1 : Stop with deceleration time, provide little brake force at standby mode.

Drivers will continue to provide little brake force at standby mode , motor does not free.

CD03=11 : Stop with deceleration time, does not provide little brake force at standby mode.

At standby mode, control the little brak force time by CD42, motor will release when brak force time over.

CD03=2,12 : Free run to stop, does not provide little brake force at standby mode.

Drivers will not provide little brake force at standby mode , motor will release.

10. Trouble shooting

Motors free run to stop when protect functions are effected.

Disconnect power to reset the protect function.

For safety , make sure all problems are solved before reconnect power.

To wait more than 5 minutes to reconnect power after disconnect power.

Display symbol	Description	Check point and suggestion
Err2	Motor overheat	Check motors cooling condition. Check motors loading, motors may be overload.
Err3	Driver overheat Over voltage Over current	Check input voltage(over voltage). Check drives cooling condition (overheat). Check motors loading (overload). Check wire & plug between motors and drives (U,V,W shortage). Check Acc. & Dec. time setting. Check CW, CCW, stop operation frequency. Check inertial load, motors may get traction from loading.
Err4	Over load	Check motor loading. Please refer to specification table.
Err5	Over speed	Check loading variation if load reduces too fast.
Err6	Speed to low	Check loading variation if load increases to fast.
Err7	F306 unconnect or RS485 fail	Connect F306 to RS485 port and press  key to reset. Check RS485 connection and set code address 100=0 or 3 to reset.
Err8	Motor lock protection	Check rotor lock. Check load condition.
Err9	Hall sensor fail	Check wire & plug between motors and drives.

Display symbol	Description	Check point and suggestion
OPE1	Parameter lock	CD00 set 1.
OPE2	FWD or REV only	Motor direction limiter. See function description CD18.
OPE3	Source of speed command error	Set at analog command, but use F306 keypad to change speed. Use CD19 to change setting.
OPE4	Source of operation command error	Terminal control, F306 and RS485 can use one only. Use jumper to change setting.
OPE5	Over range error	Operating error message~over range.
OPE6	Logic error warning	Logic error when setting.(ex. CD05>CD04)
OPE7	Only changed in standby	The parameter can only be changed in standby mode.
OPE8	Read only parameter	The parameter created by system. Unable to be changed by user.
	Mod Bus fail	Check all drives setting are accordance. (address, communication speed, data format) Check communication wires are A to A and B to B.

11. Repairing and Maintenance

1. Turn off the power before repairing 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 call us or send drives to ADLEEPOWER® when you can't obviate problems.

Maintenance Period : Daily

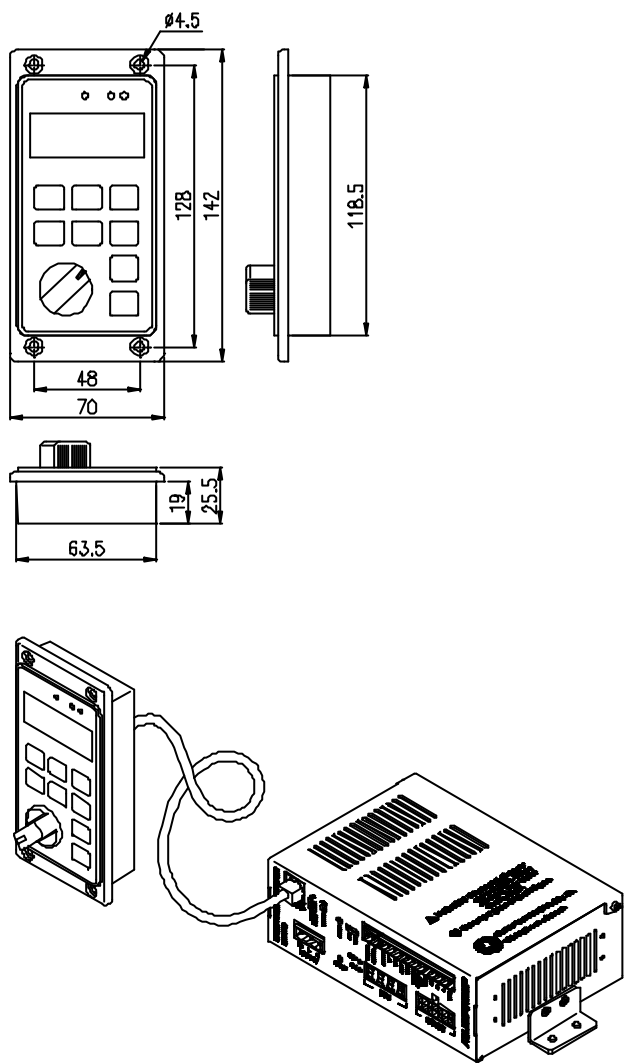
	Check items	Methods and criteria
Ambient conditions around the drive	Confirm the ambient temperature, vibration, humidity and see if there is any oil, gas, dust or water drops.	Visual inspection and measurement with equipment
	Confirm if there are any dangerous objects around.	Visual inspection
Voltage	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

Appendix

1. F306 remote operator extension cable



A-0000-F306G3	F306 Remote operator
E-092A-010200	1 meter extension cable
E-092A-030200	3 meter extension cable
E-092A-050200	5 meter extension cable
E-PEAA-8P8C02	Extension connector

INSTRUCTION MANUAL
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Model : AM series

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