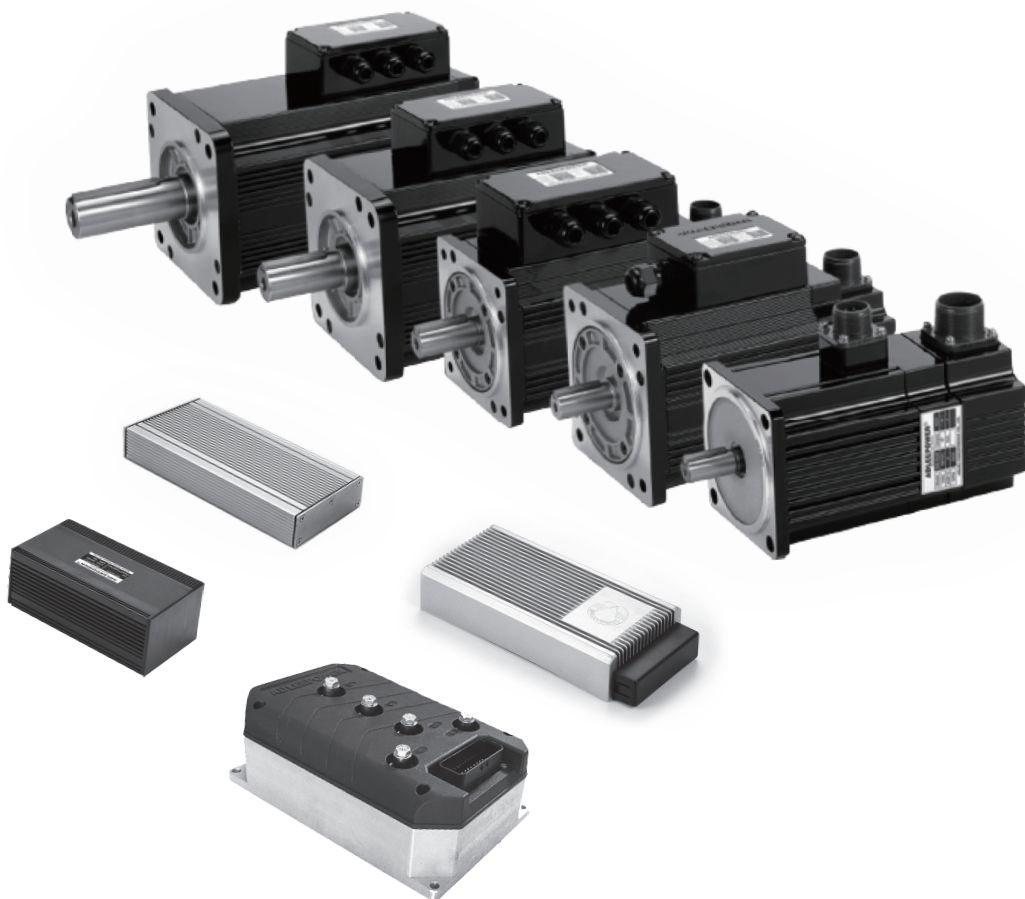


ADLEEPOWER®

INSTRUCTION MANUAL

SERVOMOTOR SWANxV , BM SERIES AND DRIVES



**THANK YOU VERY MUCH FOR YOUR PURCHASE
OF ADLEE SERVO MOTORS AND DRIVES.
PLEASE READ THIS INSTRUCTION MANUAL
BEFORE INSTALLATION OF THE DRIVER.**

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1. RECEIVING

- (1) No damage is found on each product after shipping.
- (2) The product is as ordered (check the nameplate and voltage).
- (3) A set of drive unit and instruction manual is contained in the package.
For any irregularity, contact the sales shop where you purchased immediately.
- (4) The drive has been designed for use in combination with the specified servomotors only. Check if the specifications of drive and servomotor are in a set.
- (5) Check if the servo motor' s shaft can be rotated smoothly by hand.
(The servo motor shaft cannot be rotated if it is with mechanical brake.)

2. SPECIFICATIONS

Servo drive

Drive No.		SWAN2V2 02	SWAN2V2 02	SWAN2V2 04	SWAN2V3 04	SWAN5V2 05	SWAN5V3 05	SWAN5V4 05
Rated voltage (VDC)		24	24	24	36	24	36	48
Max. voltage (VDC)		30	30	30	45	30	45	60
Rated power (W)		180	180	370	370	550	550	550
Rated current (A)		9.3	9.3	18.6	13.1	27.6	19.4	14.4
Max. current (A)		26.1	26.1	52	36.7	77	54.4	40.4
Rated speed		2000RPM	3000RPM					
Encoder type and resolution		A,B,Z,HU,HV,HW open collector, (A, B phase is 128PPR)						
Speed regulation	Load	± 0.3% Below (0~rated torque at rated speed)						
	Voltage	± 0.3% Below (Source voltage± 10% at rated speed no load)						
	Temperature	± 0.3% Below (-10~45 / 14~113 at rated speed no load)						
Type of control		Sin PWM						
Mode of control		Speed mode						
Mode of parameter setting		Communication RS485、 8,N,1 RTU、 Baud rate 9600(Default value)						
Protection		Overload, Over current, Over voltage, Over heat, Low voltage, Encoder abnormal						
Input signal	Analog	Vref + 10V analog input						
	Digital	DI0~DI5 and COM common						
Output signal		DOx open collector(x=0~2), External voltage (48VDC, 50mA below)						
Driver Dimension Fig.		A	A	A	A	B	B	B
Weight (kg)		0.8	0.8	0.8	0.8	1.1	1.1	1.1
Motor Dimension Fig.		1		2		3		

: In development.

Drive No.		SWAN6V4 07	SWAN6V4 15	SWAN6V4 22	SWAN6V7 07	SWAN6V7 15	SWAN6V7 22	SWAN9V4 22	SWAN9V4 37	SWAN9V9 37
Rated voltage (VDC)		48	48	48	96	96	96	48	48	96
Max. voltage (VDC)		60	60	60	120	120	120	60	60	120
Rated power (W)		750	1500	2200	750	1500	2200	2200	3700	3700
Rated current (A)		18.6	36	48	9.3	18	24	48	87	43.5
Max. current (A)		52	101	134	26	50.4	67.2	134	244	121.8
Rated speed		3000RPM								
Encoder type and resolution		A,B,Z,HU,HV,HW open collector, (A, B phase is 128PPR)								
Speed regulation	Load	±0.3% Below (0~rated torque at rated speed)								
	Voltage	± 0.3% Below (Source voltage± 10% at rated speed no load)								
	Temperature	± 0.3% Below (-10~45 / 14~113 at rated speed no load)								
Type of control		Sin PWM								
Mode of control		Speed mode								
Mode of parameter setting		Communication RS485、 8,N,1 RTU、 Baud rate 9600(Default value)								
Protection		Overload, Over current, Over voltage, Over heat, Low voltage, Encoder abnormal								
Input signal	Analog	Vref + 10V analog input								
	Digital	DI0~DI5 and COM common								
Output signal		DOx open collector(x=0~2), External voltage (48VDC, 50mA below)								
Driver Dimension Fig.		C	C	C	C	C	C	D	D	D
Weight (kg)		2.5	2.5	2.5	2.5	2.5	2.5	5.6	5.6	5.6
Motor Dimension Fig.		4	5	5				5	6	

: In development.

(2) Servo motor

Motor No.	BM-180E	BM-370E	BM-550E	BM-750E	BM-1500E	BM-2200E	BM-3700E
Voltage	24	24	24	48	48	48	48
Rated torque (Kg-cm)	8.7	12.2	18.1	24.4	48.8	73.2	122
Rated power (W)	180	370	550	750	1500	2200	3700
Rated speed (RPM)	2000	3000	3000	3000	3000	3000	3000
Rated current (A)	9.3	18.6	27.6	18.6	36	48	87
Max. torque (Kg-cm)	24.4	34.2	77.3	69.8	136.64	205	340
Max. current (A)	26.1	52	77	52	101	134.4	244
Motor Dimension Fig.	1	2	3	4	5	5	6
Driver Dimension Fig.	A	A	B	C	C	C	D

3. DIMENSION DRAWINGS
SWAN2V

Unit:mm

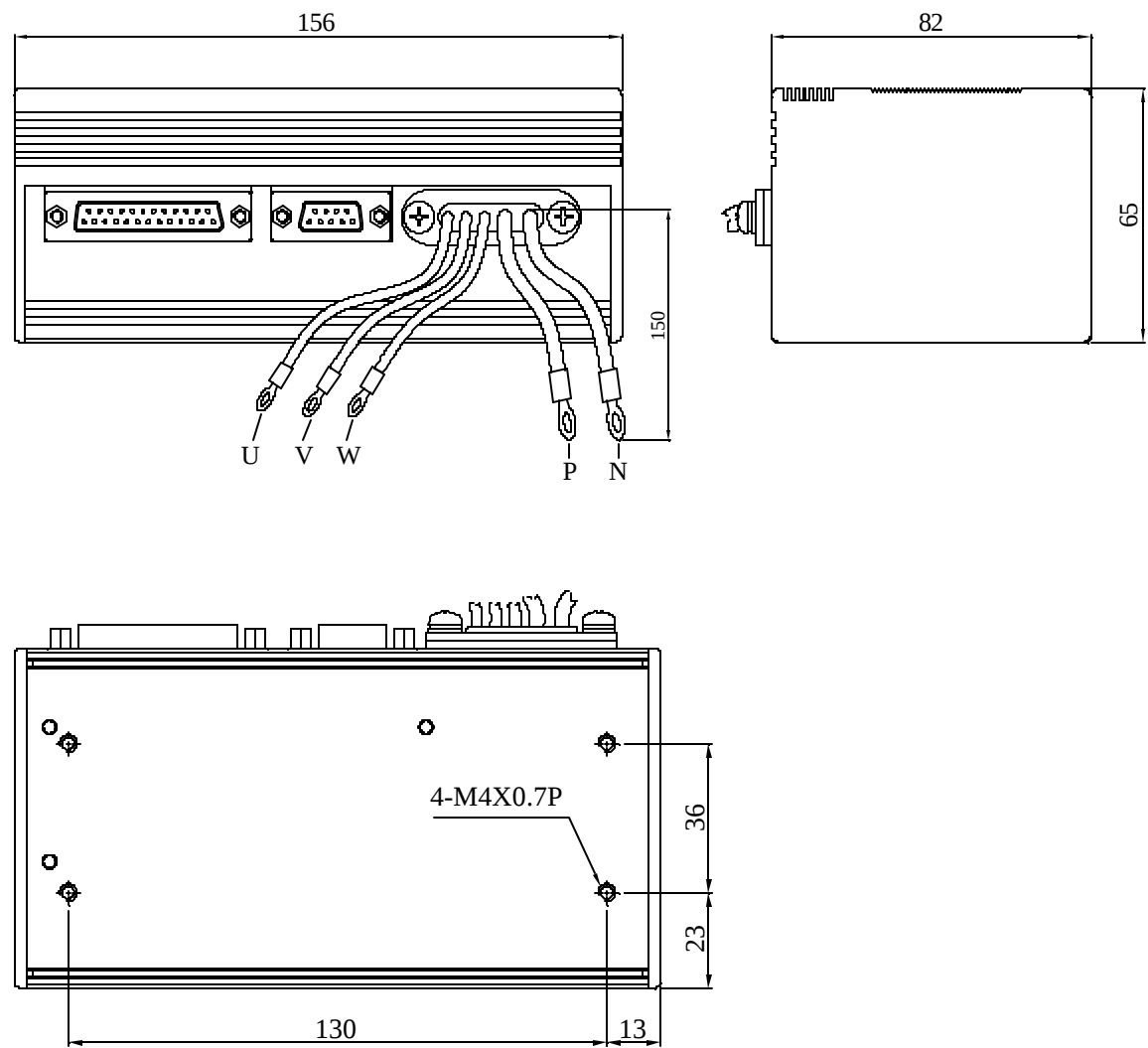


Fig A

SWAN5V

Unit:mm

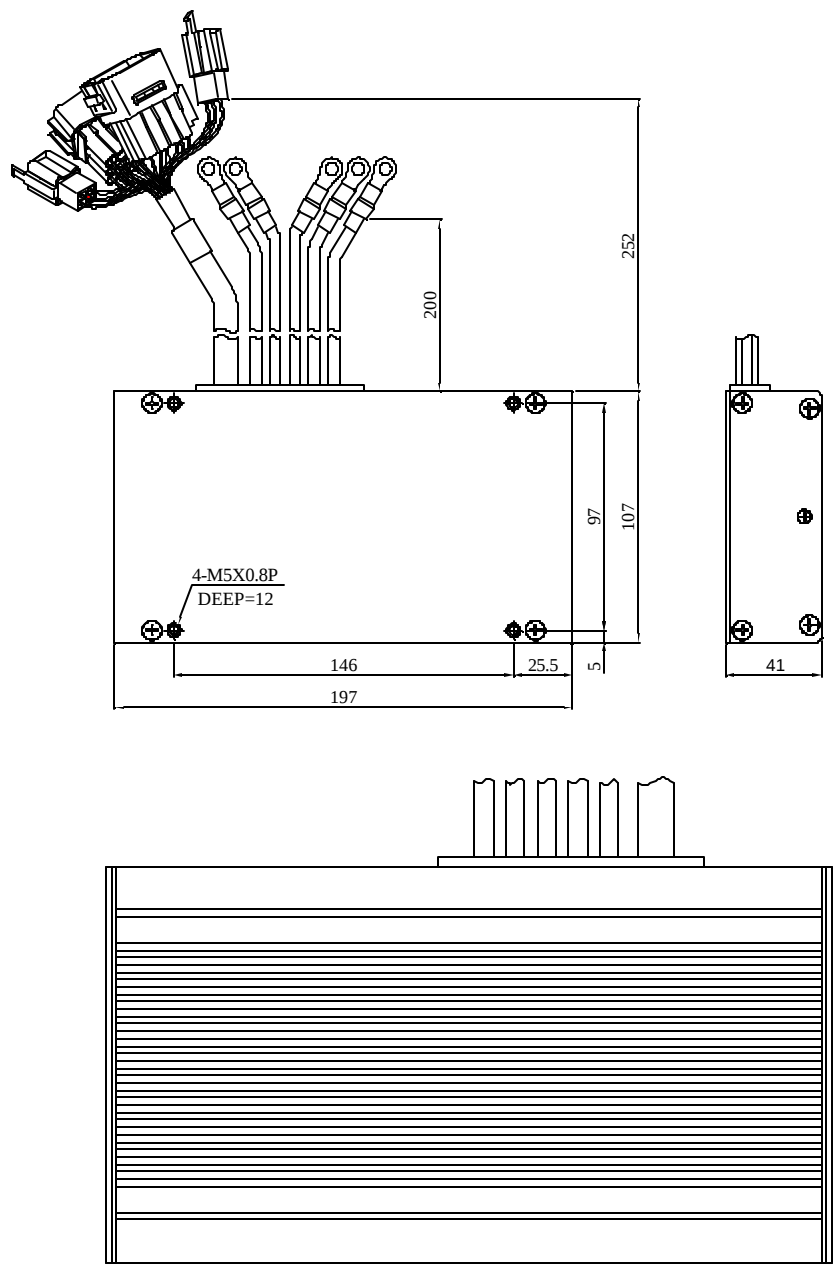


Fig B

SWAN6V

Unit:mm

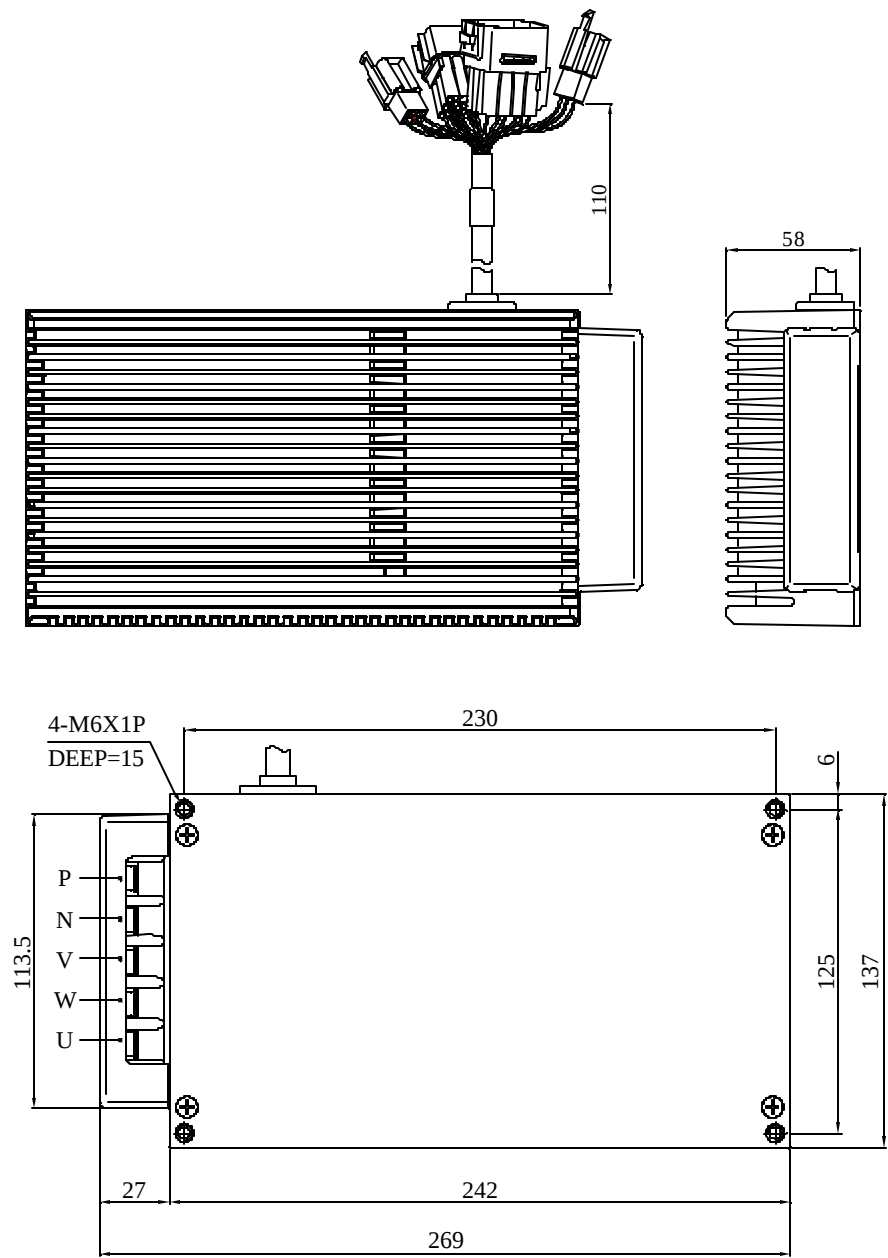


Fig C

SWAN9V

Unit:mm

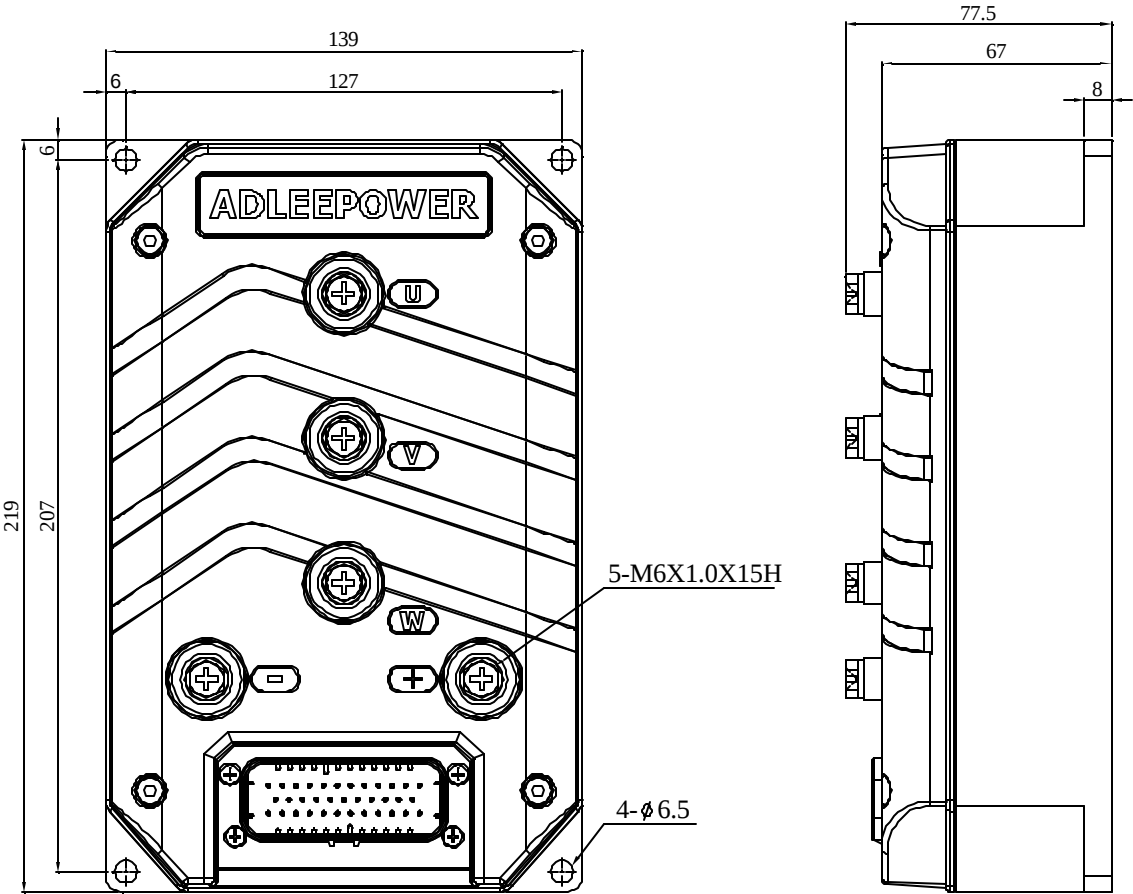


Fig D

BM-180E

Unit:mm

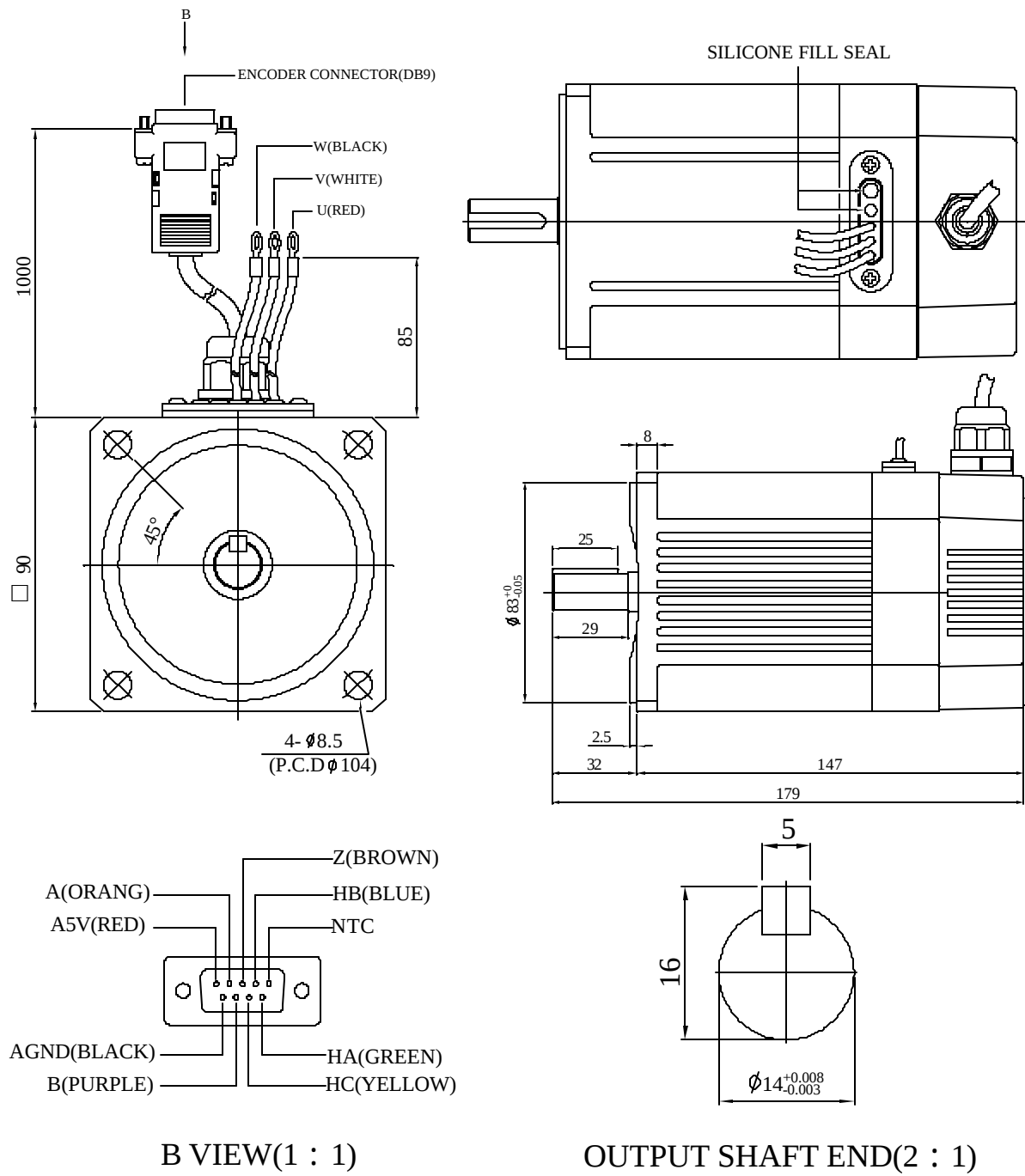
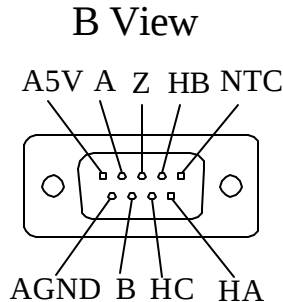
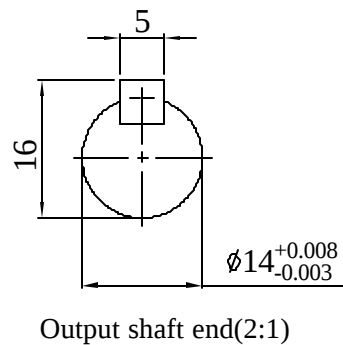


Fig 1

BM-370E

Unit:mm



- A5V : Red
- A : Orange
- Z : Brown
- HB : Blue
- NTC : --
- AGND : Black
- B : Purple
- HC : Yellow
- HA : Light green

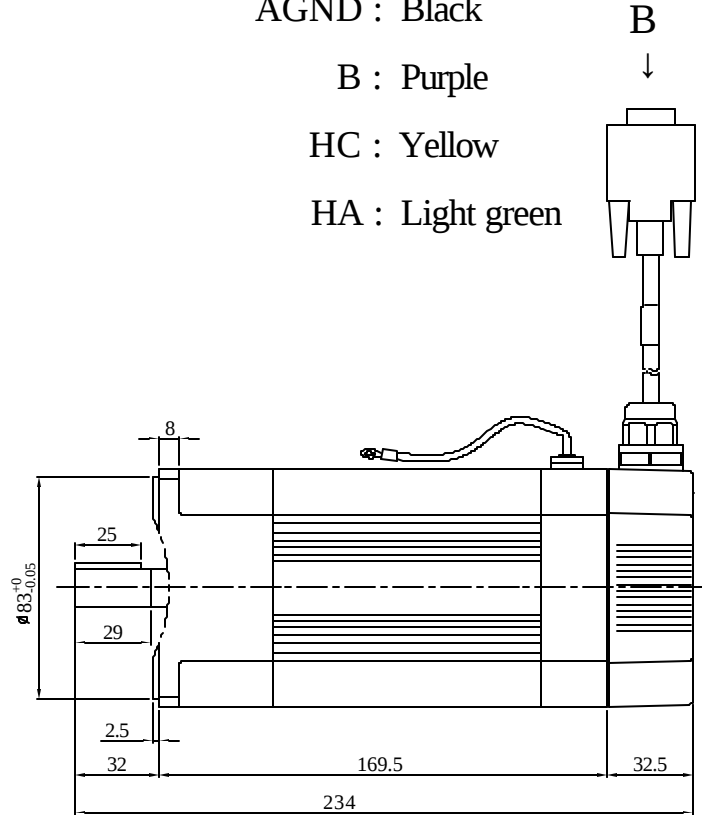
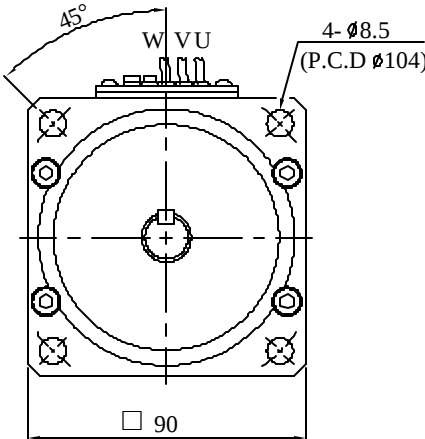


Fig 2

BM-550E

Unit:mm

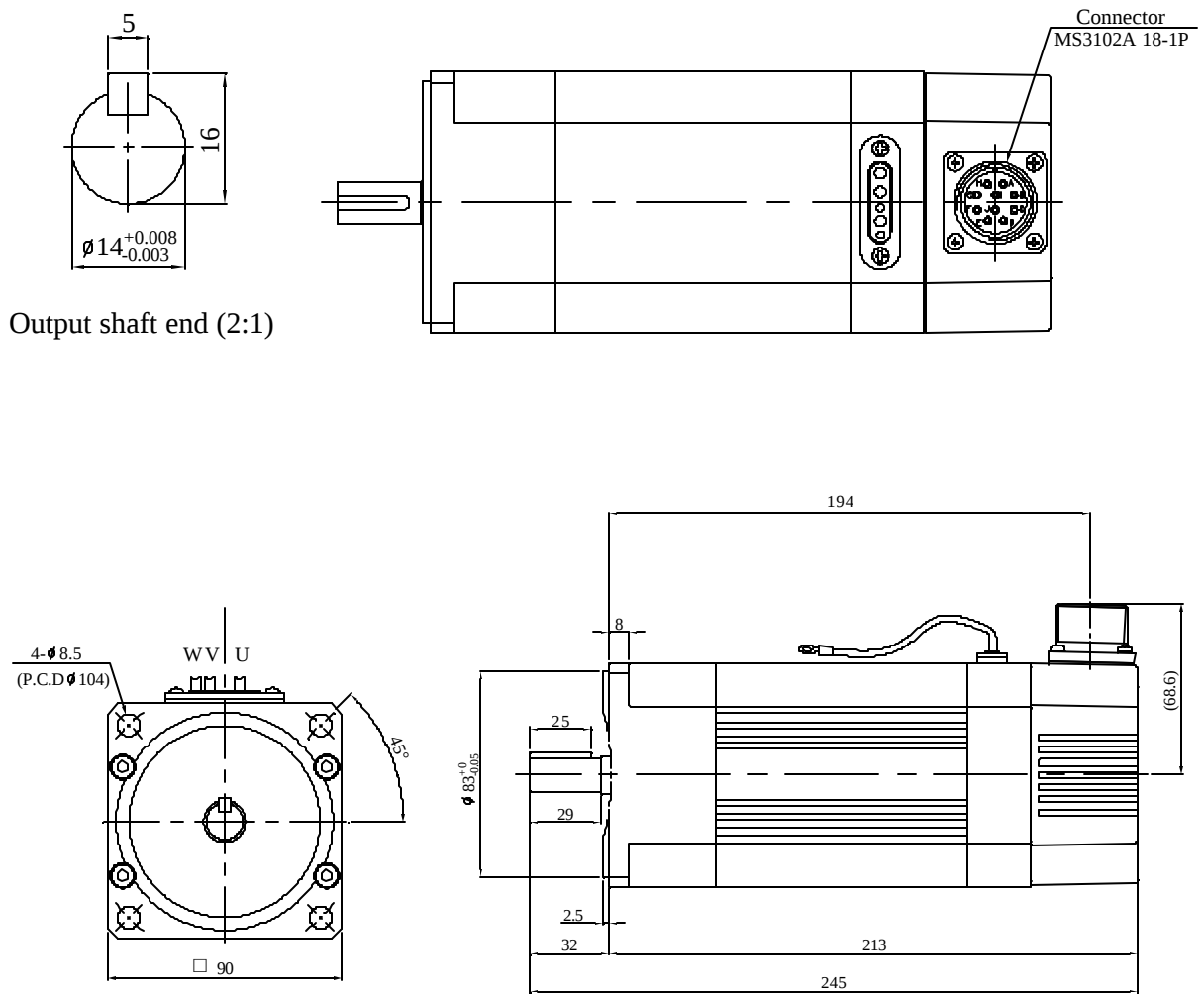


Fig 3

BM-750E

Unit:mm

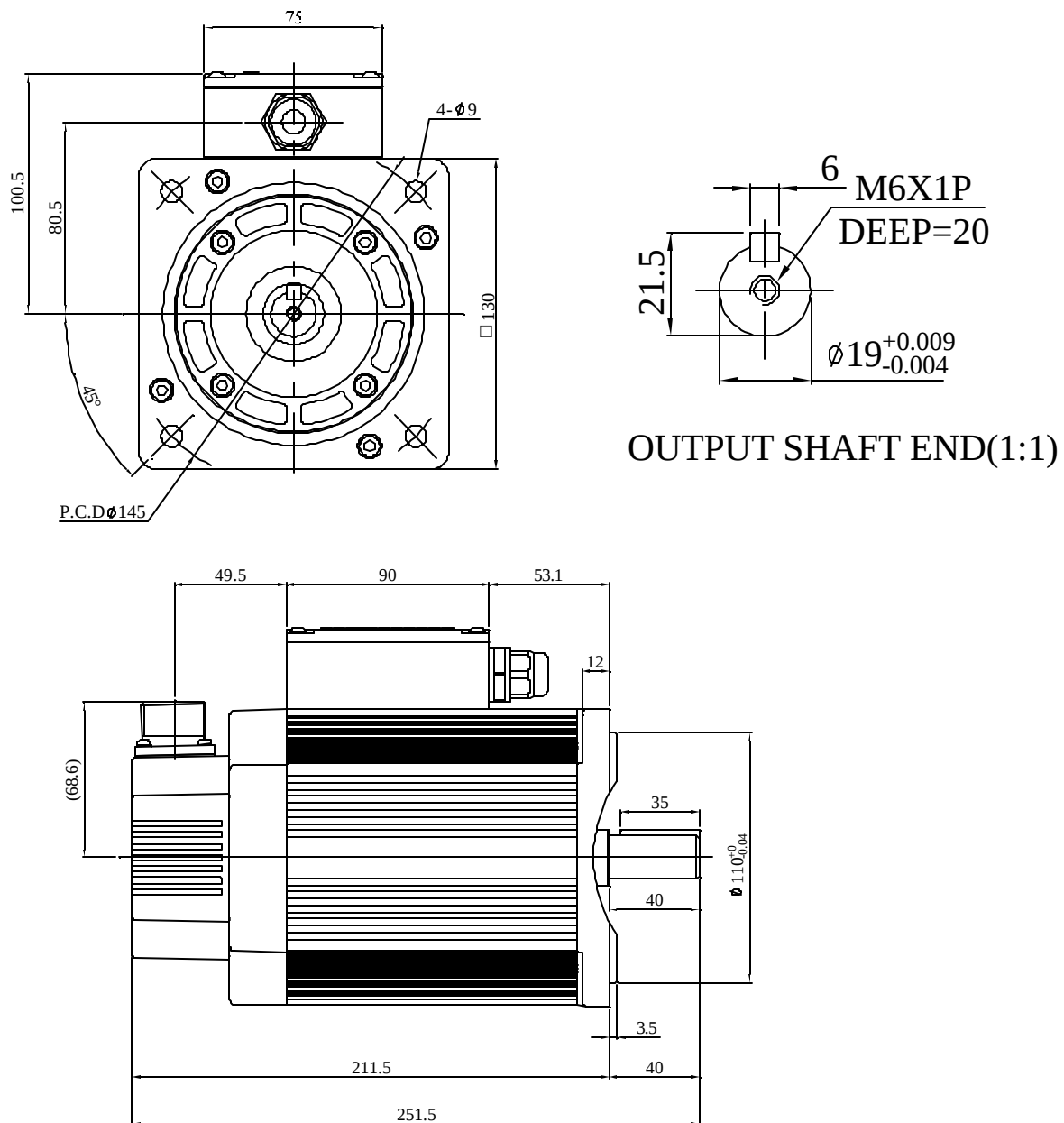


Fig 4

BM-1500E / 2200E

Unit:mm

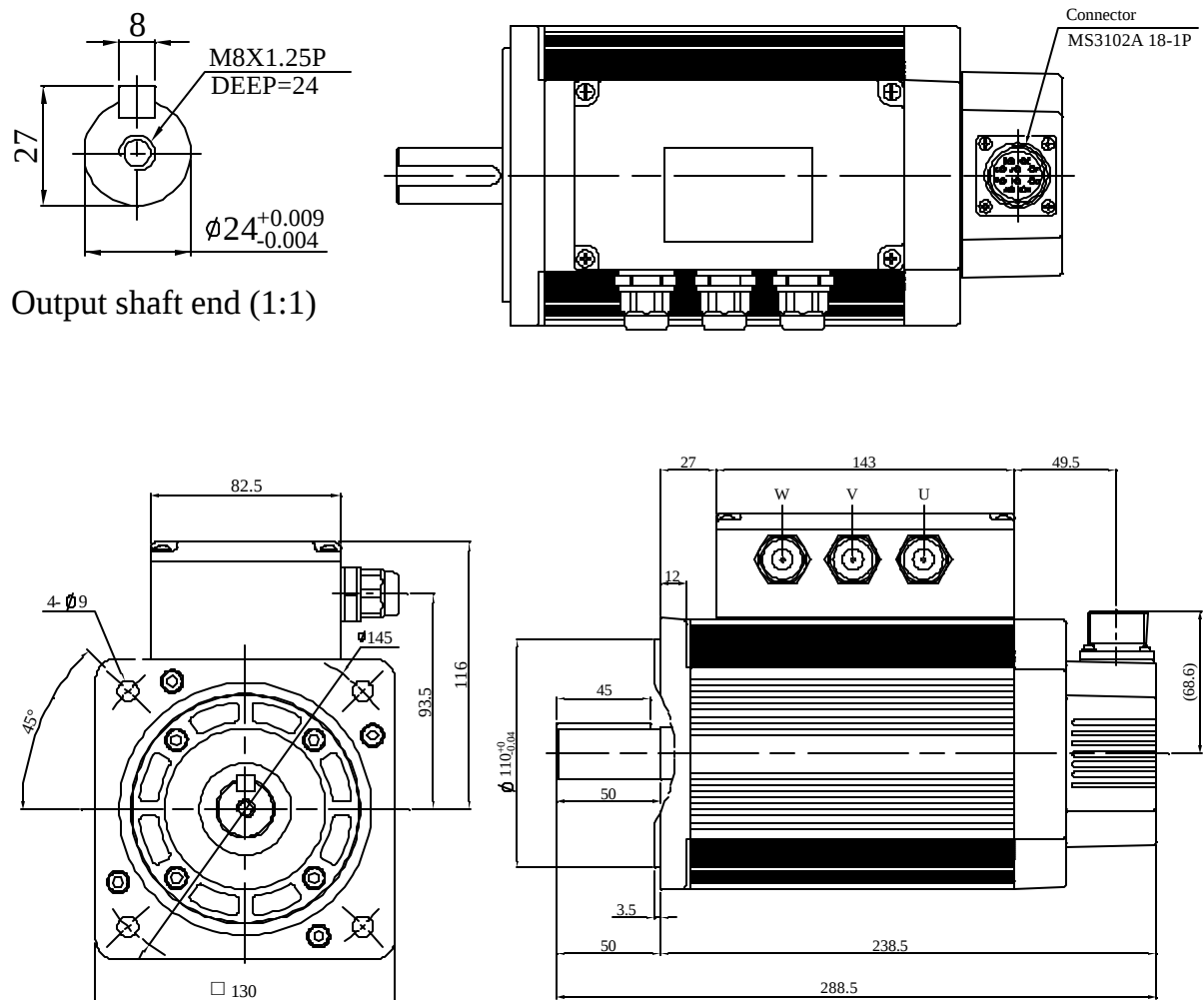
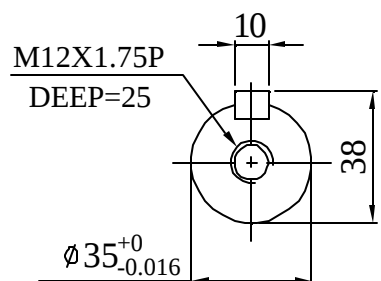


Fig 5

BM-3700E

Unit:mm



Output shaft end (1:1)

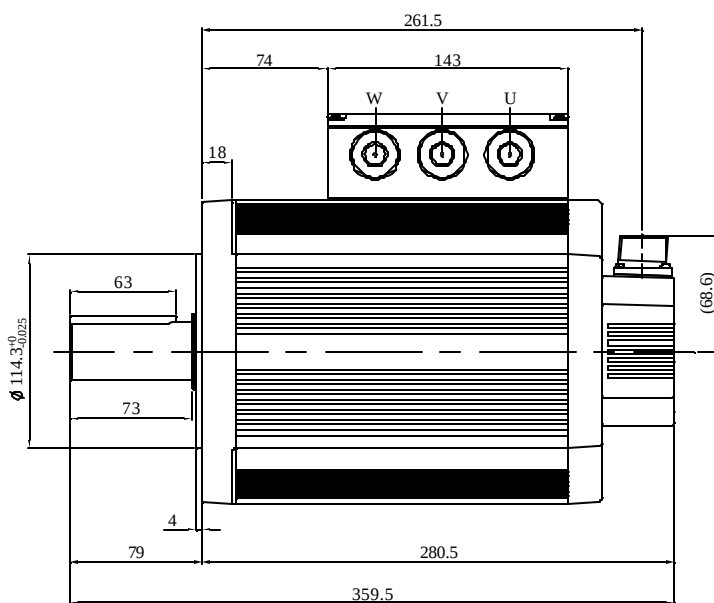
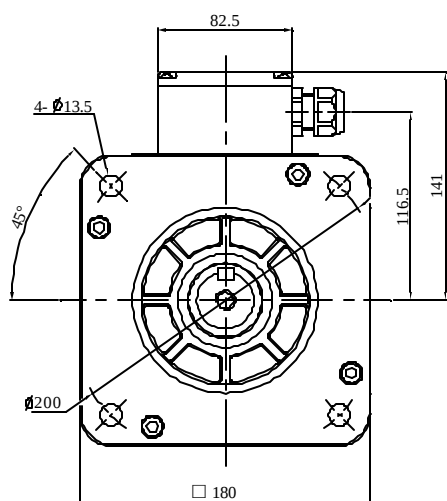
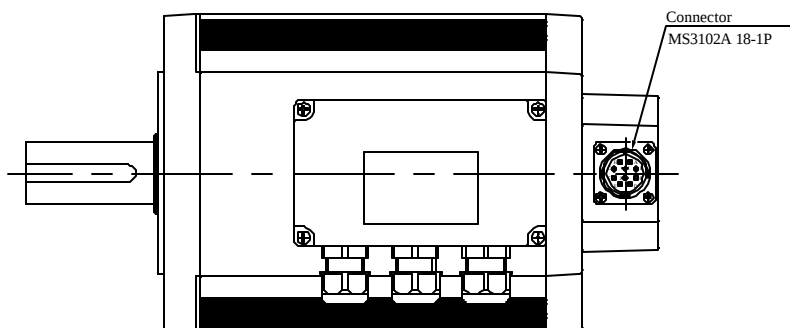


Fig 6

4. INSTALLATION

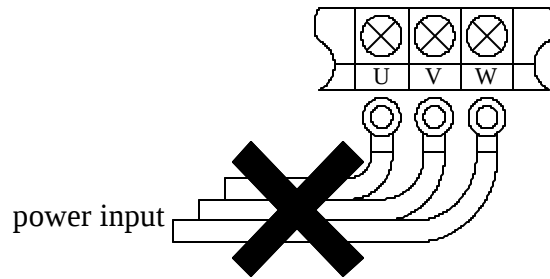
4-1. Servo Motor & Driver

Inadequate environment around installation site and installation surface can result in damage to the drive.

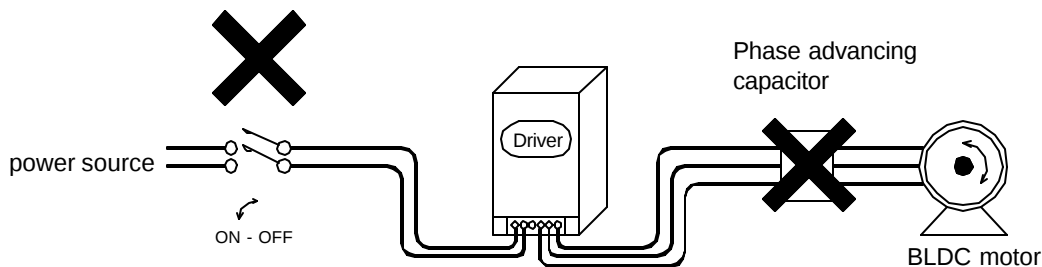
Before operating the SWANxV series drive, please check the following points :

- (1) Avoid high temperature, high humidity, easy-to-dew ambient environment. Don't expose to dust or dirt, corrosive gas, and coolant mist, and direct sunlight. Place the unit in a well-ventilated room.
- (2) Avoid a place subjected to substantial vibration.
- (3) When installing the unit within the cabinet. Please pay attention to ventilation and limit the ambient temperature in between -10 ~ 45 . (14 ~ 113).
- (4) Use a nonflammable material, such a steel sheet for installation.
(The rear side will generate heat)
- (5) Install the unit always vertically with a marginal spacing around.

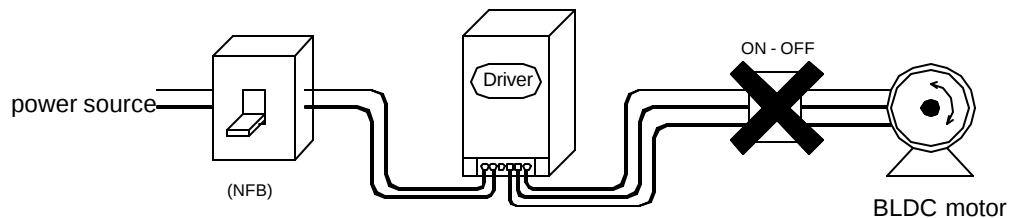
- (6) Please confirm power source voltage to drive input rated voltage.
- (7) Please make sure the wiring is correct when drive adds a braking resistor.
- (8) Be sure to connect the power source to P, N (input terminals) and the servomotor to U.V.W. (output terminals). (Wrong connection will damage the drive.)



- (9) Do not install relay between power source and drive for operating start and stop.
- (10) Do not put the advance phase capacitor between the drive and motor.



- (11) For operating motor “start” and “stop” should use terminal to control these functions.



4-2. Servo Motor & Driver

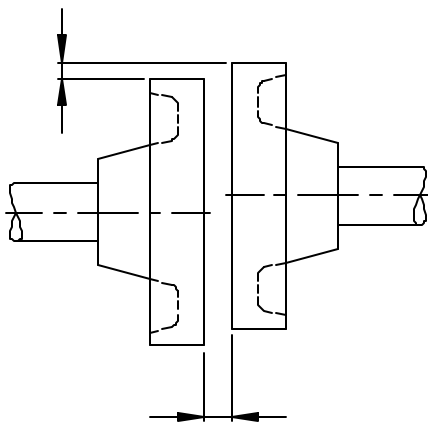
(1) Environmental requests

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
Humidity	Less than 90%, no frosting

- * Free of corrosive or explosive gases.
- * Well-ventilated and free of dust and moisture.

(2) Alignment

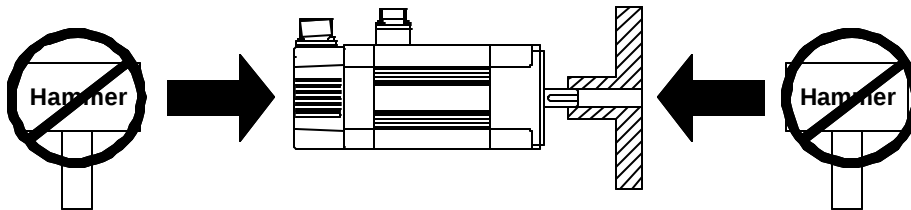
Take care alignment before connecting shafts between servomotor and equipment. Vibration may occur and damage the bearings and encoder if the shafts are not correctly aligned.



Measure these distances at four different positions on the circumference. The difference between the maximum and minimum measurements must be 0.03mm (0.0012in) or less. (Turn together with coupling.)

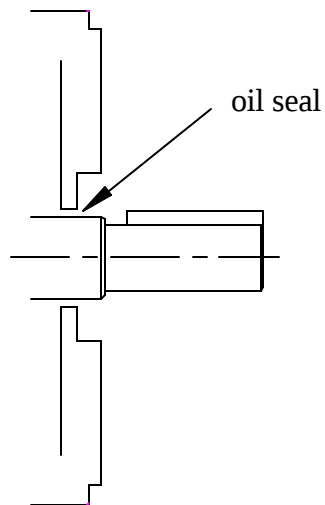
(3) Install motor and coupling

Don't the motor while installing or removing it . Otherwise, the motor parts will be damaged.



(4) Handling oil and water

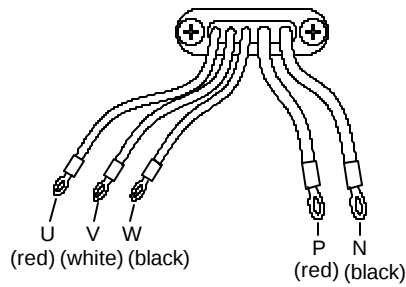
Servomotor needs to install oil seal to seal the through shaft section, if it locates at water drop or oil mist environment.



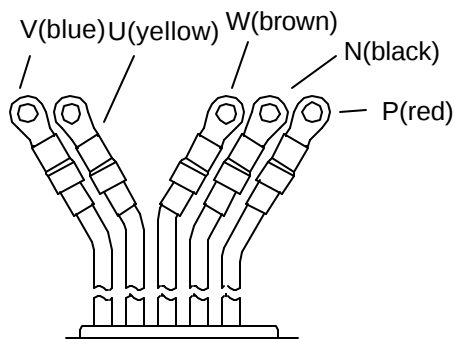
5. DESCRIPTION OF TERMINALS

(1) Main circuit connection diagram

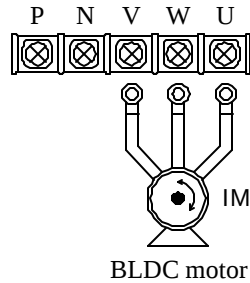
(1-1) SWAN2V connection diagram



(1-2) SWAN5V connection diagram



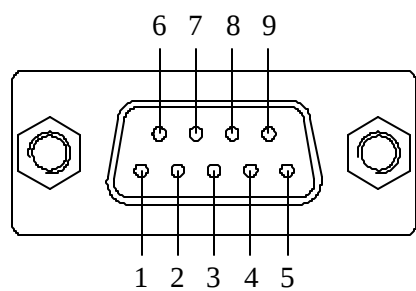
(1-3) SWAN6V connection diagram



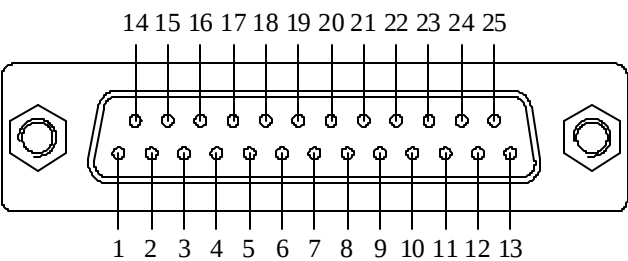
Main circuit terminal				
No.	Symbol	Description	Terminal name	
1	P(+)	Connect power supply	DC power	
2	N(-)			
3	V	Drive output	Terminals connected to motor	
4	W			
5	U			

(2) Servo driver connector definition

(2-1) SWAN2V connector definition

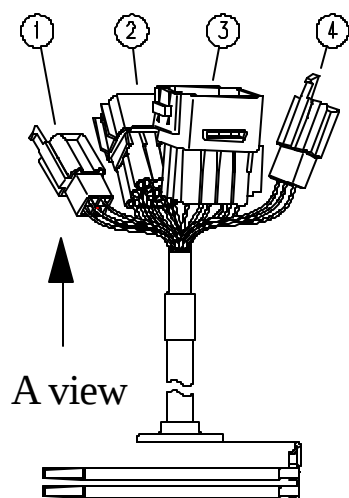


6	7	8	9	
GND	B	HC	HA	
1	2	3	4	5
A5V	A	Z	HB	

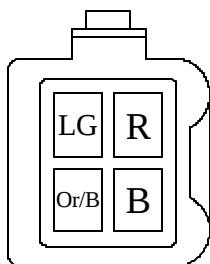


14	15	16	17	18	19	20	21	22	23	24	25	
Vref	A5V			DI1	DI3	DI5	D01	COM		BO	AO	
1	2	3	4	5	6	7	8	9	10	11	12	13
10V	AGND	MET	5V	DI0	DI2	DI4	DO0	D02	S+	S-		

(2-2) SWAN5V/SWAN6V connector definition

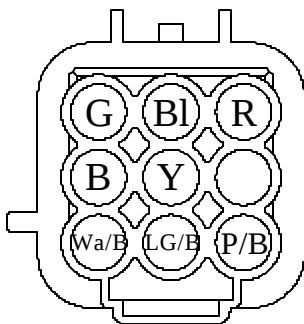


① Communication connection (White)



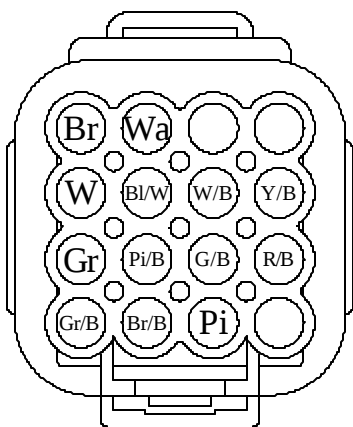
LG : Light Green (S+)(RxD)
 Or/B : Orange/Black (S-)(TxD)
 R : Red (A5V)
 B : Black (AGND)

② Motor connection (Black)



G : Green (HA)	Y : Yellow (HC)
B : Black (AGND)	LG/B : Light Green / Black (B)
Wa/B : Watchet / Black (Z)	R : Red (A5V)
BI : Blue (HB)	P/B : Purple / Black (A)

③ Control connection (Black)



Br : Brown (MET)

W : White (5V)

Gr : Grey (DI4)

Gr/B : Grey / Black (DO2)

Wa : Watchet (AO)

Bl/W : Blue / White (DI3)

Pi/B : Pink / Black (DI5)

Br/B : Brown / Black (DO0)

W/B : White / Black (DI2)

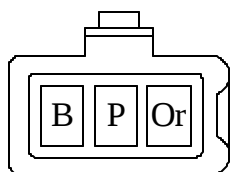
G/B : Green / Black (DI0)

Pi : Pink (COM)

Y/B : Yellow / Black (DI1)

R/B : Red / Black (DO1)

④ Throttle connection (Brown)

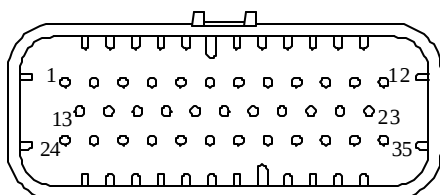


B : Black (AGND)

P : Purple (Vref)

Or : Orange (10V)

(2-3) SWAN9V connector definition



① Control power

Pin NO.	Function
24	KSI
13	P

② Encoder

Pin NO.	Function	Pin NO.	Function
8	5Vd	31	Z
9	GND	32	HA
20	B	33	HC
21	A	22	Motor Temp.
34	HB		

③ RS485

Pin NO.	Function	Pin NO.	Function
30	S+	18	S-

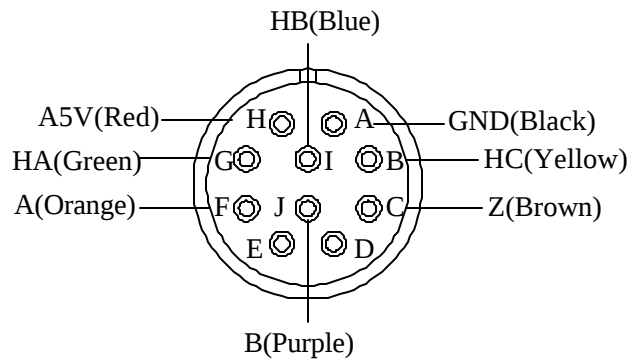
④ Input

Digital Input		Analog Input	
Pin NO.	Function	Pin NO.	Function
7	5V	10	+10V
6	COM	11	AGND
4	DI2	12	T ref
3	DI0	23	V ref
14	DI1		
15	DI3		
16	DI4		
26	DI5		
27	DI6		

⑤ Output

Digital Output		Analog Output	
Pin NO.	Function	Pin NO.	Function
7	5V	10	+10V
6	COM	11	AGND
5	DO0	35	METER0
17	DO1		
28	DO2		
29	DO3		
19	AO		

(3) Servo motor encoder connector definition

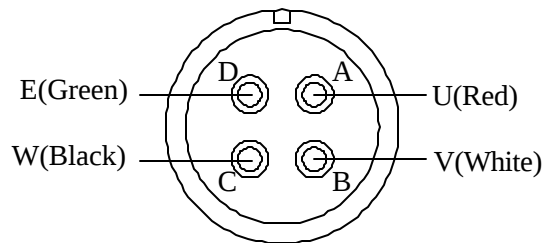


Note :

1. Maximum length is 5M.
2. Wire size : 24~14AWG (0.5mm²~2.0mm²).
3. Tighten torque : 5Kg-cm(4.4lb-in).

(4) Servo motor U.V.W. lead connector definition

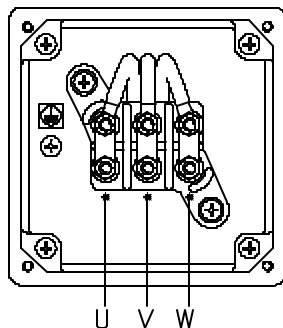
4-1



Note :

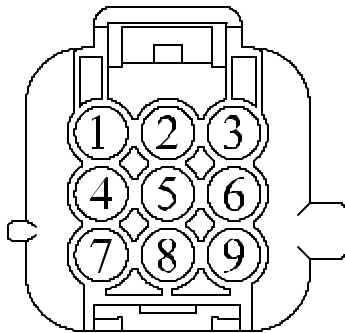
1. Maximum length is 5M.
2. Wire size : 14~12AWG(2.0mm²~3.5mm²).
3. Tighten torque : 10Kg-cm(8.7lb-in).

4-2 1~10HP terminal box

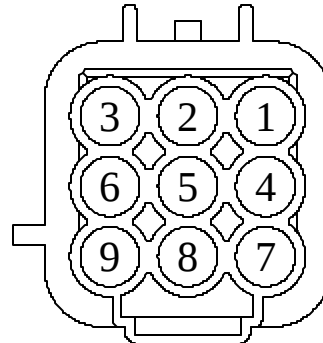


(5) Motor waterproof connector (FW09FB-M) and counterparty (FW09MB-M) definition

A. FW09FB-M

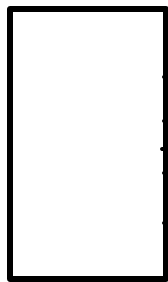


B. FW09MB-M

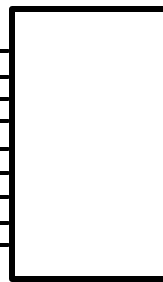


Note : Shielding ground connect with GND for EMS.

35pin
Connector



Waterproof
Connector



Pin No.	Sensor Name	Waterproof Connector
8	5VDC	1
9	GND	6
32	HA	3
34	HB	2
33	HC	5
21	A	7
20	B	8
31	Z	9
22	NTC+	4

(6) Wire Specification

(6-1) Input / output power cable (P_N_U_V_W)

MODEL	WIRE SIZE	WIRE TYPE	TORQUE
SWAN9V	2AWG (36.62mm ²)	Stranded copper only 300V/105	11N.m (95.65lb-in)

(6-2) External control cable (AMP770520-3)

Use AMP776164-1 housing

MODEL	WIRE SIZE	WIRE TYPE
SWAN9V	16~22AWG (1.3mm ² ~0.32mm ²)	Stranded copper only 300V/105

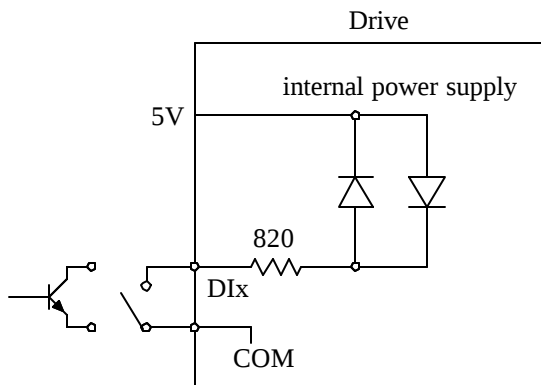
SWAN2V/SWAN5V/SWAN6V

Symbol	Terminal name	Description
DI0	Multi-function input terminal 0	See functions description (Pn010)
DI1	Multi-function input terminal 1	See functions description (Pn011)
DI2	Multi-function input terminal 2	See functions description (Pn012)
DI3	Multi-function input terminal 3	See functions description (Pn013)
DI4	Multi-function input terminal 4	See functions description (Pn014)
DI5	Multi-function input terminal 5	See functions description (Pn015)
DO0	Multi-function output terminal 0	See functions description (Pn026)(max. 50mA)
DO1	Multi-function output terminal 1	See functions description (Pn027)(max. 50mA)
DO2	Multi-function output terminal 2	See functions description (Pn028)(max. 50mA)
COM	Common terminal	Common terminal of DO and DI control terminals
MET	Mutli function analog output terminal	See functions description (Pn037~Pn039)
5V	Terminal power supply	Terminal power supply (5V)
A5V	Encoder power supply VCC	Encoder power supply +5V
HA	Encoder signal input terminal	Encoder HA signal
HB		Encoder HB signal
HC		Encoder HC signal
A		Encoder A signal
B		Encoder B signal
Z		Encoder Z signal
AGND	Encoder & Analog power supply GND (corresponding to 10V system)	Encoder & Analog power supply GND (corresponding to 10V system)
10V	Analog source	Power source +10V of analog terminals
Vref	Speed analog command terminal	Speed analog command input +10V
AO	Encoder output signal terminal	Encoder A signal output (128PPR)
BO	Encoder output signal terminal	Encoder Bsignal output (128PPR)(only SWAN2V)
S+	RS485 RXD	Communication port
S-	RS485 TXD	Communication port

SWAN9V

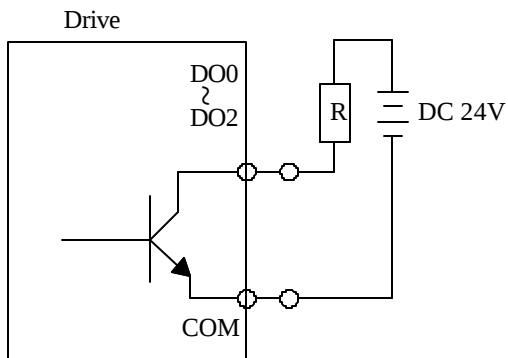
Symbol	Terminal name	Description
DI0	Multi-function input terminal 0	See functions description (Pn010)
DI1	Multi-function input terminal 1	See functions description (Pn011)
DI2	Multi-function input terminal 2	See functions description (Pn012)
DI3	Multi-function input terminal 3	See functions description (Pn013)
DI4	Multi-function input terminal 4	See functions description (Pn014)
DI5	Multi-function input terminal 5	See functions description (Pn015)
DI6	Multi-function input terminal 6	See functions description (Pn016)
DO0	Multi-function output terminal 0	See functions description (Pn026)(max. 50mA)
DO1	Multi-function output terminal 1	See functions description (Pn027)(max. 50mA)
DO2	Multi-function output terminal 2	See functions description (Pn028)(max. 50mA)
DO3	Multi-function output terminal 3	See functions description (Pn029)(max. 50mA)
AO	Encoder output signal terminal	Encoder output (250PPR)
COM	Common terminal	Common terminal of DO and DI control terminals
5V	Terminal power supply	Terminal power supply (5V)
5VD	Encoder power supply VCC	Encoder power supply +5V
HA	Encoder signal input terminal	Encoder HA signal
HB		Encoder HB signal
HC		Encoder HC signal
A		Encoder A signal
B		Encoder B signal
Z		Encoder Z signal
NTC1	NTC terminal of motor	Only SWAN9V
GND	Encoder's & NTC1's GND	Encoder's & NTC1's GND
10V	Analog source	Power source +10V of analog terminals
Vref	Speed analog command terminal	Speed analog command input +10V
Tref	Torque limit analog command terminal	Torque limit analog command input +10V
MET	Mutli function analog output terminal	See functions description (Pn037~Pn039)
AGND	Analog ground	Ground of +10V
S+	RS485 RXD	Communication port
S-	RS485 TXD	Communication port

(7) Wiring diagrams of DI terminals (DI0~DI5)
Relay、 Switch、 NPN, use of internal power supply



(8) Wiring diagram of DO terminals (DO0~DO2)

A. General load

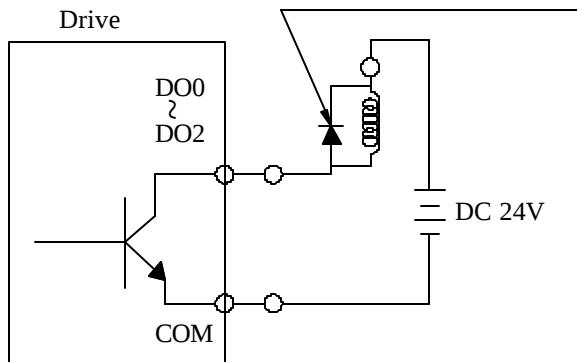


Note :

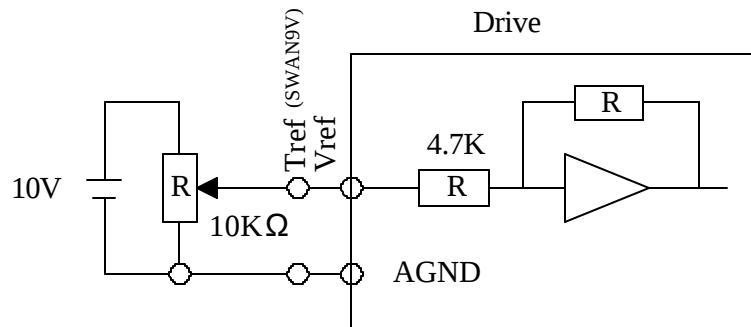
1. Maximum voltage of DO terminals are 48VDC.
2. Maximum current of DO0~DO2 terminals are 50mA.

B. Inductive load

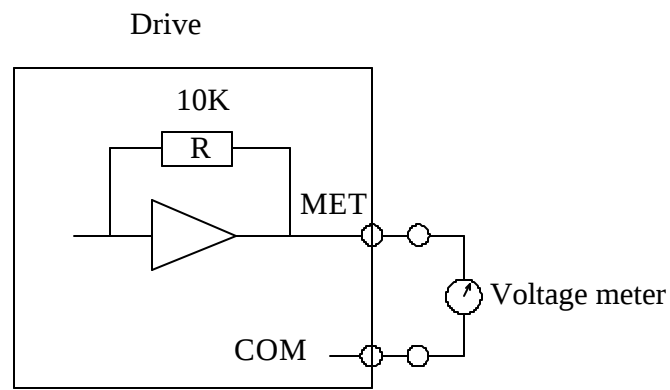
Make sure the polarity(+,-) of the diode is correct.
Otherwise, the drive may damage.



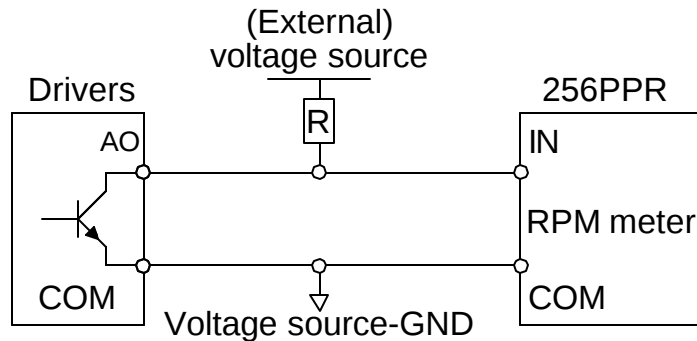
(9) Analog input (Vref)



(10) Analog output (MET)



(11) AO output



SWAN9V only AO output / 256PPR.

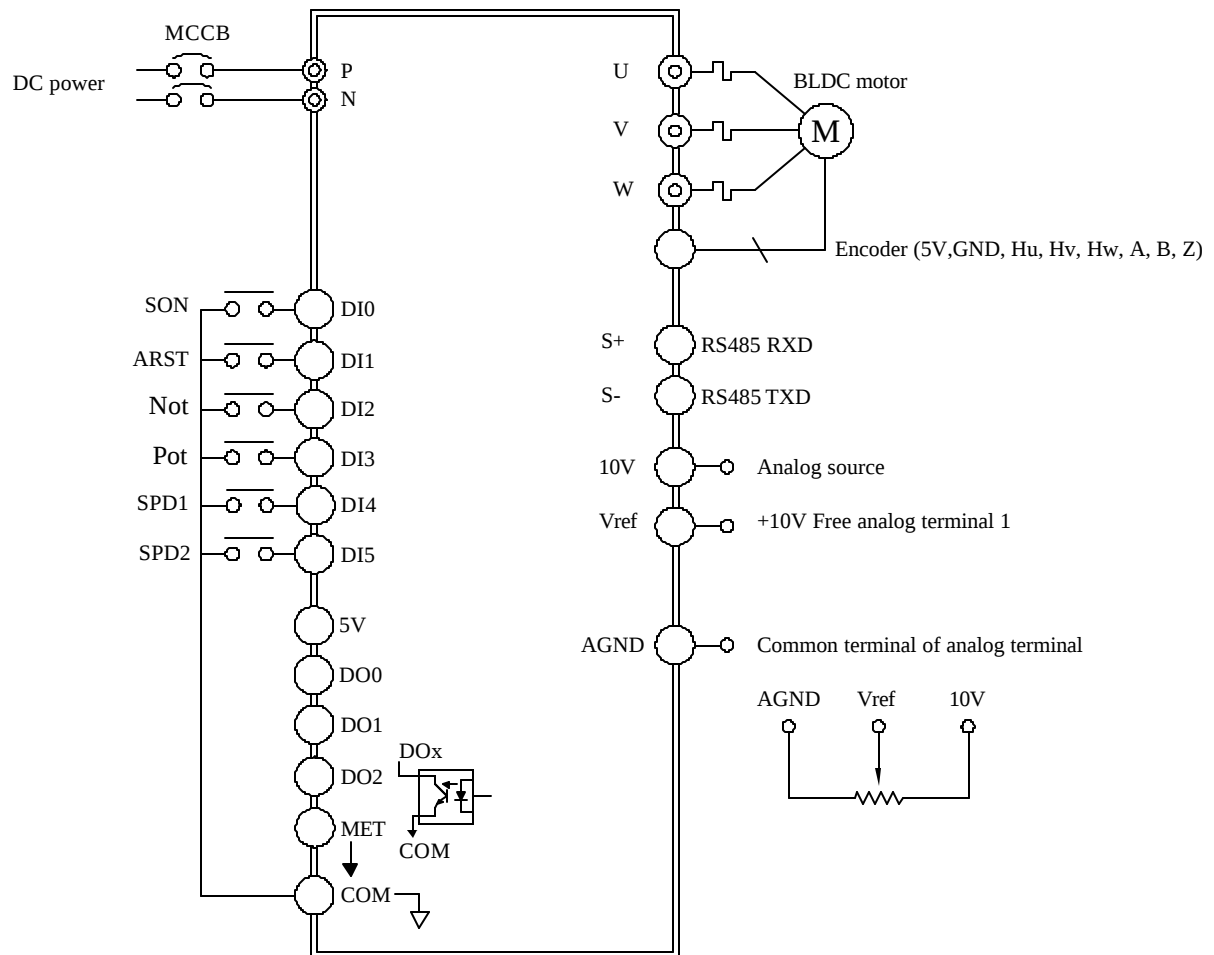
Note : Voltage source is from 5VDC to 24VDC (current 50mA) :

R is from 100Ω to $4.7K\Omega$ (0.5W) when voltage source is 5VDC.

R is from 480Ω to $10K\Omega$ (2W) when voltage source is 24VDC.

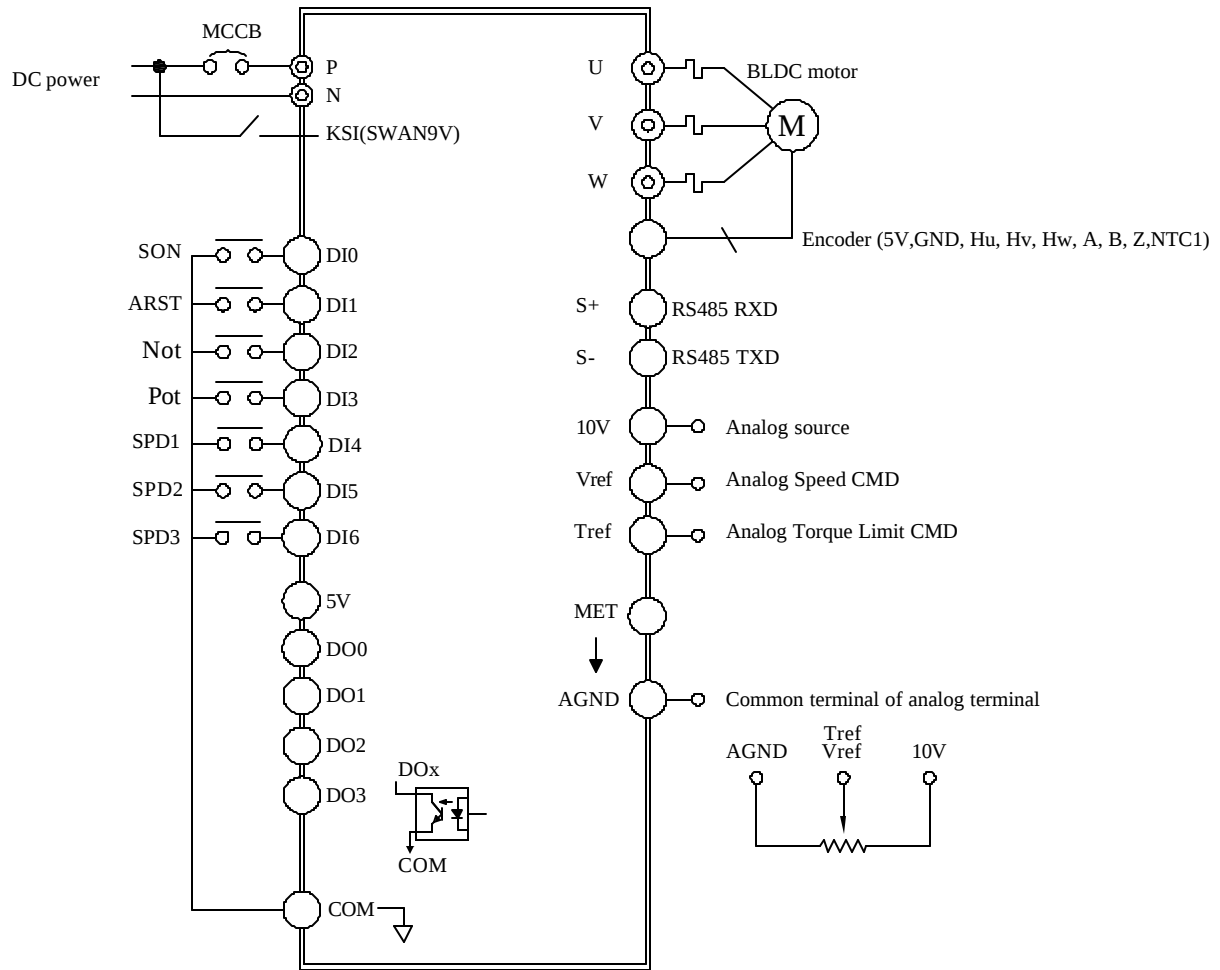
(12) Wiring

(12-1) Terminals wiring diagram - speed control (SWAN2V/SWAN5V/SWAN6V)



Note : CMDINV, SST terminals are available.

(SWAN9V)

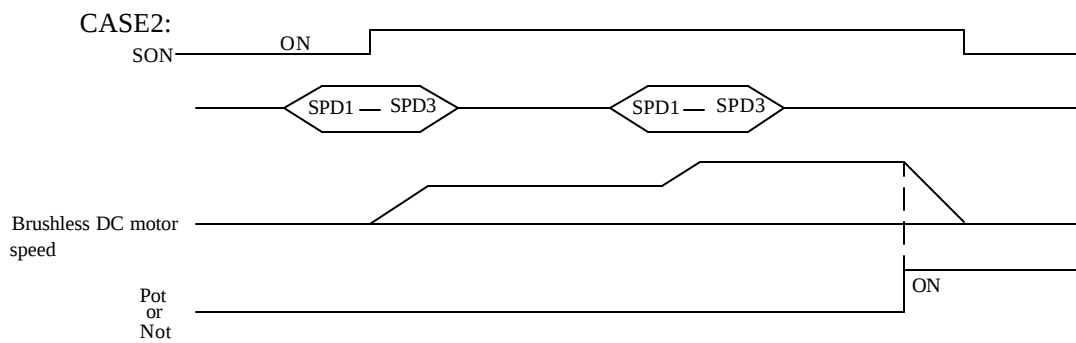
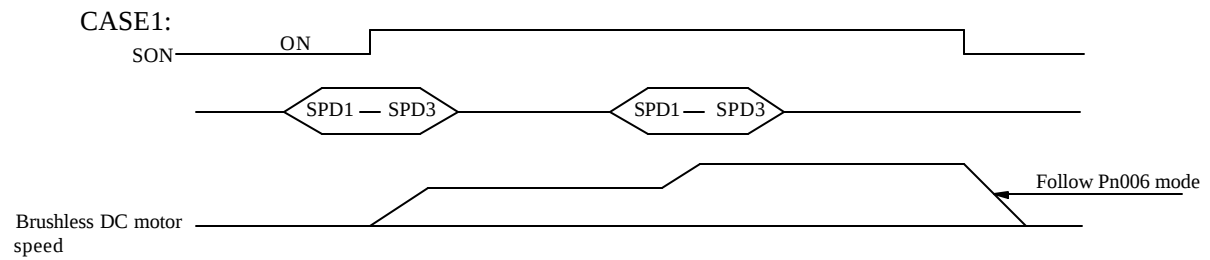


Note : CMDINV, SST terminals are available.

(13) Time chart of control

A. Speed control mode

1. Terminal control



6. Drive parameters

(1) Parameter summary

General use parameter

DISPLAY CODE	FUNCTION	DEFAULT VALUE	SETTING RANGE	UNIT	R / W
Pn000	Password				W
Pn001	Reserved				W
Pn002	Reserved				
Pn003	Control mode	0	0~2		R / W
Pn004	Operation command source	1	0~1		R / W
Pn005	Direction definition	0	0~1		R / W
Pn006	Stop type of SERVO OFF	1	0~2		R / W
Pn007	Reserved				
Pn008	Display ratio	100	1~300	%	R / W
Pn009	Direction limit	0	0~2		R / W
Pn010	DI0 multi-function signal input	1	00~20		R / W
Pn011	DI1 multi-function signal input	2	00~20		R / W
Pn012	DI2 multi-function signal input	3	00~20		R / W
Pn013	DI3 multi-function signal input	4	00~20		R / W
Pn014	DI4 multi-function signal input	8	00~20		R / W
Pn015	DI5 multi-function signal input	9	00~20		R / W
Pn016~ Pn025	Reserved				
Pn026	DO0 multi-function signal output	0	0~13		R / W
Pn027	DO1 multi-function signal output	4	0~13		R / W
Pn028	DO2 multi-function signal output	6	0~13		R / W
Pn029~ Pn033	Reserved				

DISPLAY CODE	FUNCTION	DEFAULT VALUE	SETTING RANGE	UNIT	R / W
Pn034	SERVO HOLD time	0	0~300	100ms	R / W
Pn035	BRKR brake active delay time	0	0~1000	ms	R / W
Pn036	BRKR brake release delay time	0	0~1000	ms	R / W
Pn037	MET analog output logic selection	0	0~3		R / W
Pn038	MET multi function analog output setting	00	00~03		R / W
Pn039	MET output gain	100	0~100	%	R / W
Pn040	Reserved				

Speed mode parameter

DISPLAY CODE	FUNCTION	DEFAULT VALUE	SETTING RANGE	UNIT	R / W
Pn200	Source of speed command	0	0~3		R / W
Pn201	Maximum speed limited	3000	30~3000	RPM	R / W
Pn202	Acceleration time 1	100	1~600	0.1Sec	R / W
Pn203	Deceleration time 1	100	1~600	0.1Sec	R / W
Pn204~ Pn205	Reserved				
Pn206	Acceleration time 2	100	1~600	0.1Sec	R / W
Pn207	Deceleration time 2	100	1~600	0.1Sec	R / W
Pn208	Reserved				
Pn209	Speed loop proportional gain	100	1~500		R / W
Pn210	Reserved				

DISPLAY CODE	FUNCTION	DEFAULT VALUE	SETTING RANGE	UNIT	R / W
Pn211	Speed loop integral gain	100	10~500	ms	R / W
Pn212	Speed command 1	0	± 30~3000	RPM	R / W
Pn213	Speed command 2	0	± 30~3000	RPM	R / W
Pn214	Speed command 3	0	± 30~3000	RPM	R / W
Pn215	Speed command 4	0	± 30~3000	RPM	R / W
Pn216	Speed command 5	0	± 30~3000	RPM	R / W
Pn217	Speed command 6	0	± 30~3000	RPM	R / W
Pn218	Speed command 7	0	± 30~3000	RPM	R / W
Pn219	Speed command 8	0	± 30~3000	RPM	R / W
Pn220	Reserved				
Pn221	Speed arrival detect range	100	0~3000	RPM	R / W
Pn222	Zero speed level	30	30~200	RPM	R / W
Pn223	Torque limit command source	0	0~1		R / W
Pn224	Forward torque limit	280%	0~280%	%	R / W
Pn225	Reverse torque limit	280%	0~280%	%	R / W
Pn226	Analog speed command reference	3000	30~3000	RPM	R / W
Pn227	Analog speed command offset	0	-500~500	mV	R / W
Pn228	Zero speed command voltage	100	0~500	mV	R / W
Pn229	Zero speed definition	30	0~300	RPM	R / W
Pn231	Minimum speed limit	0	30~3000	RPM	R / W

Communication parameter

DISPLAY CODE	FUNCTION	DEFAULT VALUE	SETTING RANGE	UNIT	R / W
Pn500	Communication address setting	1	1~255		R / W
Pn501	Transmission speed	2	0~3		R / W
Pn502	Communication potocol	0	0~7		R / W

Communication write address

DISPLAY CODE	FUNCTION	DEFAULT VALUE	SETTING RANGE	UNIT	R / W
Pn600	Password				W
Pn601	Reset to default	0	0~1		W
Pn602	Clear error records	0	0~1		W
Pn610	Drive speed command		-3000~ +3000	RPM	W

Communication read address

DISPLAY CODE	FUNCTION	DEFAULT VALUE	SETTING RANGE	UNIT	R / W
Pn700	Servomotor speed			RPM	R
Pn701	Servomotor speed command			RPM	R
Pn702	Servomotor torque			0.01A	R
Pn703	Reserved				
Pn704	Stage of multi-stages				R
Pn705	DI input status				R

DISPLAY CODE	FUNCTION	DEFAULT VALUE	SETTING RANGE	UNIT	R / W
Pn706	DO output status				R
Pn707	The last 1 error recode				R
Pn708	The last 2 error recode				R
Pn709	The last 3 error recode				R
Pn710	The last 4 error recode				R
Pn711	The last 5 error recode				R
Pn712	Software version				R
Pn718	Operation status				R

Parameters (Pn000~Pn502) can not be rewritten over 1million times.
In order to aviod EEPROM fail.

(2) Quick start of basic parameter setting

1. Source of command

A. Source of speed command Pn200

Pn200=0 : Vref analog input + 10V correspond to + 3000RPM.

Pn200=2 : Digital input selected by SPD1~SPD3 terminals, speed setting at Pn212~Pn219.

Pn200=3 : Communication command at address 610.

(3) Parameter description

A. General use parameter

Password
Pn000

Setting Range	0000~FFFF(H)
Default Value	0000

Set password to prevent parameter change. Key in password at Cn000 to remove parameter lock. There is no parameter lock if set password at 0000. This is a hexadecimal number.

Control mode
Pn003

Setting Range	0~2
Default Value	0

0 : Speed mode.

1 : Reserve.

2 : Reserve.

Note : Repower “ON” to effect new setting.

Operation command source
Pn004

Setting Range	0~1
Default Value	1

0 : Reserve.

1 : Terminal.

Direction definition
Pn005

Setting Range	0~1
Default Value	0

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

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

STOP type of SERVO SOFF
Pn006

Setting Range	0~2
Default Value	1

0 : Fast stop.

1 : Deceleration stop.

2 : Free run stop.

Display ratio
Pn008

Setting Range	1~300%
Default Value	100%

Available at speed mode only and do not effect at Pn701.(effect Pn700 only)

Display to the first of decimal place.

Direction limit
Pn009

Setting Range	0~2
Default Value	0

0 : Forward and reverse.

1 : Forward only.

2 : Reverse only.

DI0 multi function signal input
Pn010

Setting Range	0~20
Default Value	1 : SON

- 0 : Disable function.
- 1 : SON, servo on.
- 2 : ARST, alarm reset. Not effect at encoder error (Err08)
- 3 : Not, reverse inhibit. Servomotor reverse operation inhibit and forward operation permit, when terminal “ ON” .
- 4 : Pot, forward inhibit. Servomotor forward operation inhibit and reverse operation permit, when terminal “ ON” .
- 5 : Reversed.
- 6 : CMDINV, command reverse, change command direction when terminal “ ON” . (“ +” to “ -”, or “ -” to “ +”)
- 7 : SST, select the 2nd acceleration time Pn206 and 2nd deceleration time Pn207 when terminal “ ON” .
- 8 : Multi stages speed terminal SPD1.
- 9 : Multi stages speed terminal SPD2.
- 10 : Multi stages speed terminal SPD3.

SPD3	SPD2	SPD1	Speed command
OFF	OFF	OFF	Pn212
OFF	OFF	ON	Pn213
OFF	ON	OFF	Pn214
OFF	ON	ON	Pn215
ON	OFF	OFF	Pn216
ON	OFF	ON	Pn217
ON	ON	OFF	Pn218
ON	ON	ON	Pn219

DI1 multi function signal input
Pn011

Setting Range	0~20
Default Value	2 : ARST

DI2 multi function signal input
Pn012

Setting Range	0~20
Default Value	3 : Not

DI3 multi function signal input
Pn013

Setting Range	0~20
Default Value	4 : Pot

DI4 multi function signal input
Pn014

Setting Range	0~20
Default Value	8 : SPD1

DI5 multi function signal input
Pn015

Setting Range	0~20
Default Value	9 : SPD2

Multi function signal output DO0
Pn026

Setting Range	0~13
Default Value	0 : ALRM

- 0 : ALRM, alarm. when error code appear.
- 1 : SRDY, servo ready.
- 2 : ZSPD, zero speed, refer to Pn222.
- 3 : Reserve.
- 4 : TSPD, speed arrival, refer to Pn221.
- 6 : RUN, SON terminal "ON" in terminal control.
- 7 : TQL, under torque limit condition, speed mode only.
- 8 : BRKR, servomotor mechanical brake output signal, set BRKR at DO3 terminal (Pn029) for maximum 50mA and 48VDC.
- 9 : Servomotor running direction output CW=H, CCW=L.
- 10 : Reserve.
- 11 : Reserve.
- 12 : Reserve.
- 13 : Low voltage alarm output.

Multi function signal output DO1
Pn027

Setting Range	0~13
Default Value	4 : TSPD

Multi function signal output DO2
Pn028

Setting Range	0~13
Default Value	6 : RUN

SERVO HOLD time
Pn034

Setting Range	0~300
Default Value	0
Unit	100ms

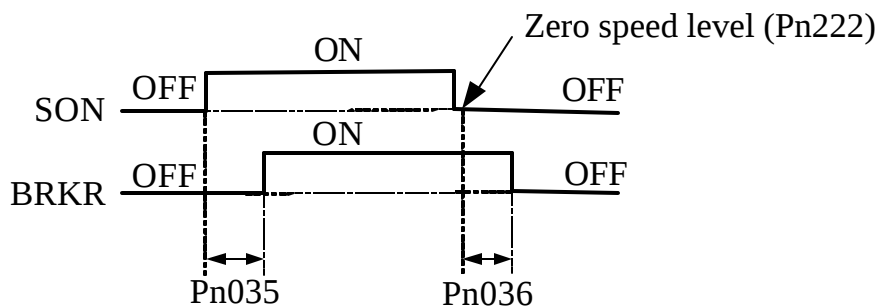
Motor deceleration to STOP, then enter “SERVO HOLD” status. After servo hold time complete, motor shaft become free.

Note : Pn034 function is effective, if Pn006=0 or 1.

BRKR brake active delay time
Pn035

Setting Range	0~1000ms
Default Value	0ms

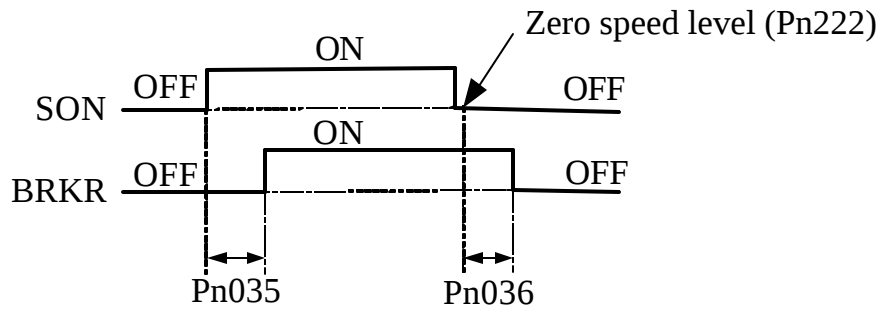
The delay time of BRKR terminal output signal “ON” when SON terminal “ON”. Or delay time by panel RUN command in panel control.



BRKR brake release delay time
Pn036

Setting Range	0~1000ms
Default Value	0ms

When servo OFF, Delay time of BRKR brake terminal output signal “OFF” when servomotor speed reach zero speed level (Pn222 define).



MET analog output logic selection
Pn037

Setting Range	0~3
Default Value	0

0 : MET(+).

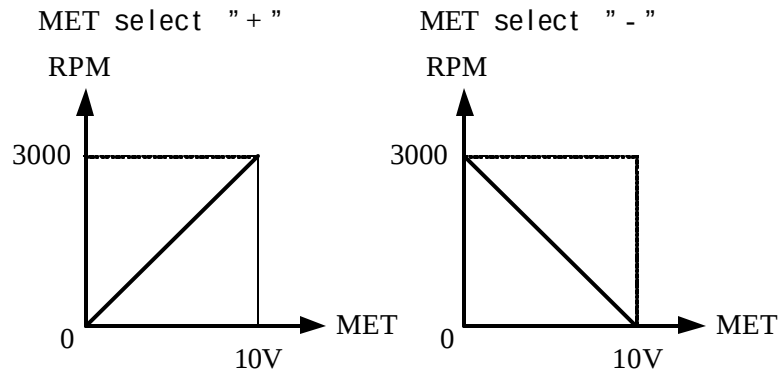
1 : MET(-).

2 : MET(+).

3 : MET(-).

“+” mean 0~10V correspond to 0~3000RPM.

“-” mean 0~10V correspond to 3000~0RPM.



MET multi-function analog output select
Pn038

Setting Range	00~03
Default Value	00

00 : Speed (0~10V / 0~3000RPM).

01 : Reserve.

02 : Speed command (0~10V / 0~3000RPM).

03 : Reserve.

MET output gain
Pn039

Setting Range	0~100%
Default Value	100%

Adjust MET terminal output voltage.

Output voltage = 10V × Pn039.

B. Speed mode parameter

Source of speed command
Pn200

Setting Range	0~3
Default Value	0

0 : Vref analog command input, 0~10V for forward run.

1 : Reserve.

2 : Digital speed command input (1~8 stage speed) (refer to Pn212~Pn219).

3 : Communication speed command input address Pn610.

Maximum speed limited
Pn201

Setting Range	30~3000RPM
Default Value	3000RPM

Limit maximum speed.

Acceleration time 1
Pn202

Setting Range	1~600
Default Value	100(10.0Sec)
Unit	0.1Sec

Acceleration time from 0 to rated speed 3000RPM.

Example : Pn202=2, speed=1500, 0 to 1500RPM need 0.1sec.

Deceleration time 1
Pn203

Setting Range	1~600
Default Value	100(10.0Sec)
Unit	0.1Sec

Deceleration time from rated speed 3000RPM to 0.

Example : Pn203=2, speed=1500, 1500RPM to 0 need 0.1sec to STOP.

Acceleration time 2
Pn206

Setting Range	1~600
Default Value	100(10.0Sec)
Unit	0.1Sec

Acceleration time from 0 to rated speed 3000RPM.

Use SST of DI terminal to active.

Deceleration time 2
Pn207

Setting Range	1~600
Default Value	100(10.0Sec)
Unit	0.1Sec

Deceleration time from rated speed 3000RPM to 0.
Use SST of DI terminal to active.

Speed loop proportional gain
Pn209

Setting Range	1~500
Default Value	100

Set higher value to have fast response, it may cause vibration if the value is too high.

Speed loop integral gain
Pn211

Setting Range	10~500ms
Default Value	100ms

Set lower value to have fast response, it may cause vibration if the value is too low.

Speed command 1
Pn212

Setting Range	± 30~3000RPM
Default Value	0RPM

+ : forward run ; - : reverse run.

SPD3	SPD2	SPD1	Speed command
OFF	OFF	OFF	Pn212
OFF	OFF	ON	Pn213
OFF	ON	OFF	Pn214
OFF	ON	ON	Pn215
ON	OFF	OFF	Pn216
ON	OFF	ON	Pn217
ON	ON	OFF	Pn218
ON	ON	ON	Pn219

Speed command 2
Pn213

Setting Range	± 30~3000RPM
Default Value	0RPM

Speed command 3
Pn214

Setting Range	± 30~3000RPM
Default Value	0RPM

Speed command 4
Pn215

Setting Range	± 30~3000RPM
Default Value	0RPM

Speed command 5
Pn216

Setting Range	± 30~3000RPM
Default Value	0RPM

Speed command 6
Pn217

Setting Range	± 30~3000RPM
Default Value	0RPM

Speed command 7
Pn218

Setting Range	± 30~3000RPM
Default Value	0RPM

Speed command 8
Pn219

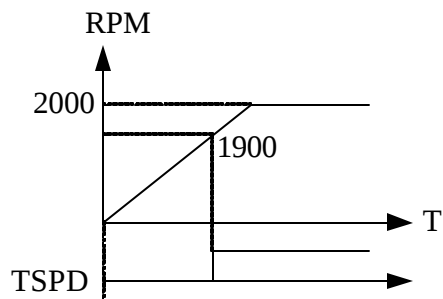
Setting Range	± 30~3000RPM
Default Value	0RPM

Speed arrival detect range
Pn221

Setting Range	0~3000RPM
Default Value	100RPM

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

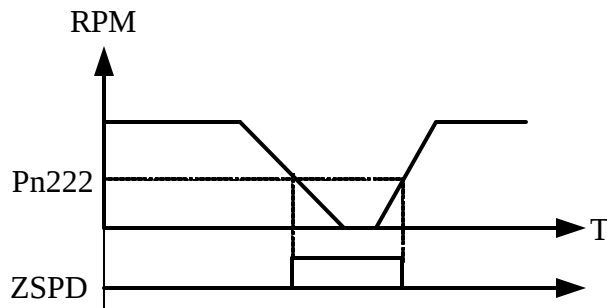
Example : speed command : 2000RPM, Pn221=100RPM.



Zero speed level
Pn222

Setting Range	30~200RPM
Default Value	30RPM

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



Torque limit command source
Pn223

Setting Range	0~1
Default Value	0

0 : Digital torque limit (Pn224 / Pn225).

1 : Analog torque limit by Tref terminal.

Forward torque limit
Pn224

Setting Range	0~280%
Default Value	280%

Position mode and speed mode are effective.

Forward torque limit = rated torque × Pn224.

Reverse torque limit
Pn225

Setting Range	0~280%
Default Value	280%

Position mode and speed mode are effective.

Reverse torque limit = rated torque × Pn225.

Analog speed command reference
Pn226

Setting Range	30~3000RPM
Default Value	3000RPM

At speed mode, set analog $\pm 10V$ corresponding to speed command.

Example : Pn226=1500RPM, means $\pm 10V$ correspond to $\pm 1500RPM$.

Note : $\pm 0.1V$ corresponding to 0RPM.

Analog speed command offset
Pn227

Setting Range	-500~500mV
Default Value	0mV

Analog signal Vref and panel VR effective.

At speed mode, use this parameter to stop servomotor if speed command is zero, but servomotor speed is not zero. Adjust the speed command offset to opposite servomotor running direction to stop servomotor.

Example : Set Pn227=-XXmV to stop servomotor, when command is zero, but motor forward run slowly.

Zero speed command voltage
Pn228

Setting Range	0~500mV
Default Value	100mV

When Vref minimum voltage can not zero. So the motor can not stop. Set this parameter can stop the motor.

Example : Pn228=100 means Vref voltage below 0.1V defined 0RPM.

Zero speed definition
Pn229

Setting Range	0~300RPM
Default Value	30RPM

In speed mode, when command less than or equal Pn229, motor speed is zero.

Example : Pn229=30RPM, expressed less than or equal 30RPM, motor 0RPM stopped. More than 30RPM, the motor starts running.

Minimum speed limit
Pn231

Setting Range	30~3000RPM
Default Value	0RPM

Setting minimum speed limit of the motor.

C. Communication parameter

Communication address setting
Pn500

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
Pn501

Setting Range	0~3
Default Value	2

Setting the transmission speed between computer and drive.

0 : 2400 bits/second.

1 : 4800 bits/second.

2 : 9600 bits/second.

3 : 19200 bits/second.

Communicator protocol
Pn502

Setting Range	0~7
Default Value	0

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 positive 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	

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)

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.

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

D. Communication write address

Password
Pn600

Setting Range	0000~FFFF
Default Value	0000

Parameters are unlock, after input password. Content needs to input password again after repower ON.

Reset to default
Pn601

Setting Range	0~1
Default Value	0

0 : No function.

1 : Reset to default.

Clear error records
Pn602

Setting Range	0~1
Default Value	0

After trouble shoot, do Pn602=1 to clear all alarm records.

Drive speed command
Pn610

0~3000RPM (Hexadecimal 0~0BB8).

0~-3000RPM (Hexadecimal 0~F448).

E. Communication read address

Servomotor speed
Pn700

UNIT	RPM
-------------	------------

This value is worked with Pn008.

Drive speed command
Pn701

UNIT	RPM
-------------	------------

Servomotor torque
Pn702

UNIT	0.01A
-------------	--------------

Stage of multi-stages
Pn704

Stage of SPD1~SPD3.

DI input status
Pn705

DI0~DI5 “ ON” , show 1.

Example : DI2 “ ON” and DI5 “ ON” , binary number 100100.

DO output status
Pn706

DO0~DO2 output “ Low” , show 1.

Example : DO0 output “ Low” and DO2 output “ Low” , binary number 101.

The last 1 error recode
Pn707

- 1 : ERR01 : EEPROM error.
- 2 : ERR02 : ADC fail.
- 3 : ERR03 : Over voltage.
- 4 : ERR04 : Low voltage.
- 5 : ERR05 : Over current.
- 6 : ERR06 : Over load.
- 7 : ERR07 : Over target speed 25%.
- 8 : ERR08 : Encoder error.
- 9 : ERR09 : Drive over heat.

The last 2 error record
Pn708

The last 3 error record
Pn709

The last 4 error record
Pn710

The last 5 error record
Pn711

Software version
Pn712

Operation status
Pn718

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

7. Repairing and Maintenance

1. Turn off the power before inspection and maintenance, wait 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. Recommand 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.

8. TROUBLESHOOTING

Drive output alarm signal and make servomotor stop when protect function active. Please turn power “ OFF” when alarm occur. Please make sure cause of alarm being corrective before reset alarm, then repower “ ON” . Please repower “ ON” after power “ OFF” more than 5 minutes.

Display symbol	Cause of fault message contents	Suggested remedy
ERR01	EEPROM error	Return to factory.
ERR02	ADC failure	Return to factory.
ERR03	Over voltage	Increase deceleration time
		Check input voltage if it is higher than specification.
ERR04	Low voltage	Check input voltage if it is lower than specification.
		Make sure power relay work normally. (Precharge only)
ERR05	Over current	Check U.V.W. short clcuit or not.
		Check U.V.W. screw tightly, there may be one phase loose.
		U.V.W. wrong wiring.
ERR06	Over load	Continue phase current over 120% rated current.
		If over load occur, than decrease loading or upgrade drive and servomotor.
ERR07	Over speed	Over target speed 25%.
		Check loading if it is aviolent change.

Display symbol	Cause of fault message contents	Suggested remedy
ERR08	Encoder error	Please check encoder wiring. (loose or short circuit or mis-connection).
ERR09	Drive over heat	Check phase current over rated current or not.
		Check vantilation of drive.
		Check wiring correct or not.
	Commanication fail	Check host and drive parameter setting (address, baud rate, format).
		Check wiring S+ shall connect S+, S- shall connect S-.

9. APPLICATION EXAMPLES

EXAMPLE 01 : Speed mode

(1) Permit forward and reverse run.

Control command by terminal.

Speed command by digital command setting.

Digital torque limit 100%.

Parameter setting

Pn003=0 (speed mode)

Pn004=1 (terminal control)

Pn014=8 (set DI4 as SPD1)

Pn015=9 (set DI5 as SPD2)

Pn013=6 (set DI3 as CMDINV)

Pn200=2 (digital speed command)

Pn212=1500 (1st speed)

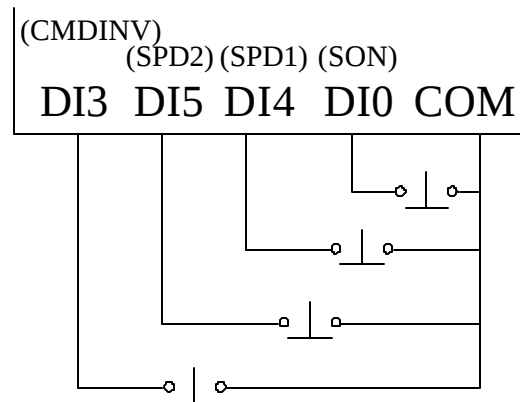
Pn213=3000 (2nd speed)

Pn214=500 (3rd speed)

Pn223=0 (torque limit)

Pn224=100% (forward torque limit)

Pn225=100% (reverse torque limit)



Operation :

DI0 (SON) terminal “ ON” , enter run statu, speed command select by SPD1 and SPD2. DI0 “ OFF” , to stop the servomotor, case of SPD1 and SPD2 list as below.

DI4(SPD1)	DI5(SPD2)	
OFF	OFF	1st speed
ON	OFF	2nd speed
OFF	ON	3rd speed

(2) Permit forward and reverse run.

Control command by terminal.

Speed command by analog terminal Vref.

Digital torque limit 100%.

Parameter setting

Pn003=0 (speed mode)

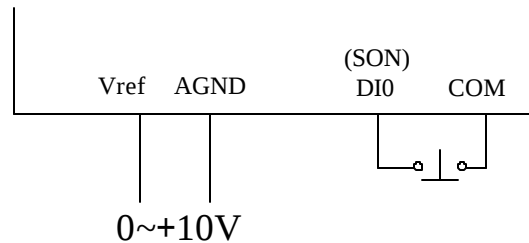
Pn004=1 (terminal control)

Pn200=0 (speed command by Vref)

Pn223=0 (torque limit)

Pn224=100% (forward torque limit)

Pn225=100% (reverse torque limit)



Operation :

DI0 (SON) terminal “ ON” , enter run statu. Forward run 1500RPM, if Vref and AGND add +5V. DI0 (SON) terminal “ OFF” , to stop the servomotor.

MEMO

INSTRUCTION MANUAL

PART NO : E-PHAA-ESWA01

Model : SWANxV series

FEB. 2016 1st edition



ADLEEPPOWER[®] SERVICE OFFICE

Taiwan

Tel No : 886-4-25622651

Fax No : 886-4-25628289

E-mail : webmaster@adlee.com

URL : <http://www.adlee.com>

Guang Dong (China)

Tel No : 86-757-26656498

Fax No : 86-757-26658515

WUXI (China)

Tel No : 86-21-64843529