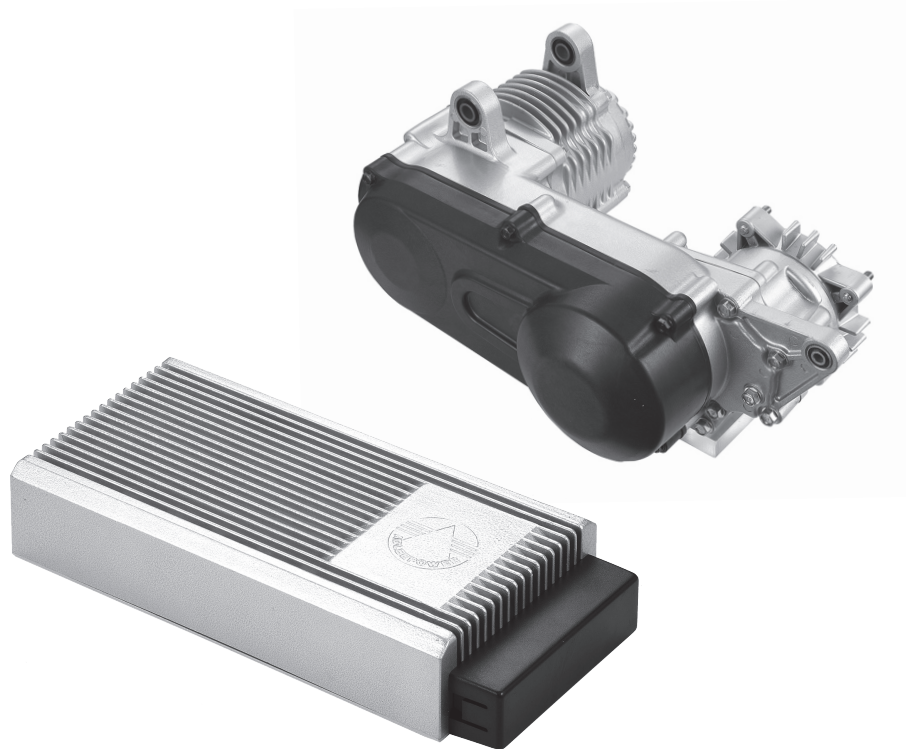


ADLEEPOWER[®]

INSTRUCTION MANUAL

BM SERIES BLDC MOTOR AND SWAN1 DRIVES



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

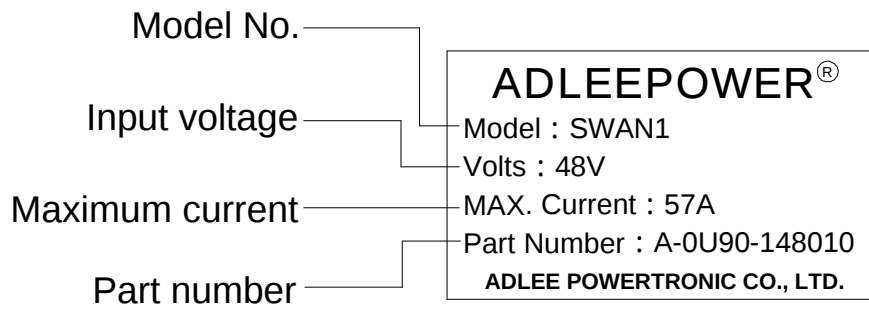
CONTENTS

1. RECEIVING	1
2. SPECIFICATIONS	3
3. DIMENSION DRAWINGS	4
4. INSTALLATION	6
5. DESCRIPTION OF TERMINALS & WIRING	7
(1) Terminal Diagram	7
(2) Terminal Screw Locking Torque	11
(3) Wiring Diagram	12
6. DRIVE PARAMETER	13
7. PARAMETER DESCRIPTION	15
8. COMMUNICATION	23
1. PC Terminal	23
2. MODBUS RTU	26
9. REPAIRING AND MAINTENANCE	30
10. TROUBLE SHOOTING	31
(1) Alarm LED Display & Buzzer	31
(2) Alarm Code	32
(3) Alarm Trouble Shooting	33

1. RECEIVING

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

(6) Description of nameplate
Drive



DMC-1000 motor

ADLEEPOWER®			
MODEL	DMC-1000	RATING	1.1 KW
VOLTS	48VDC	S/N	

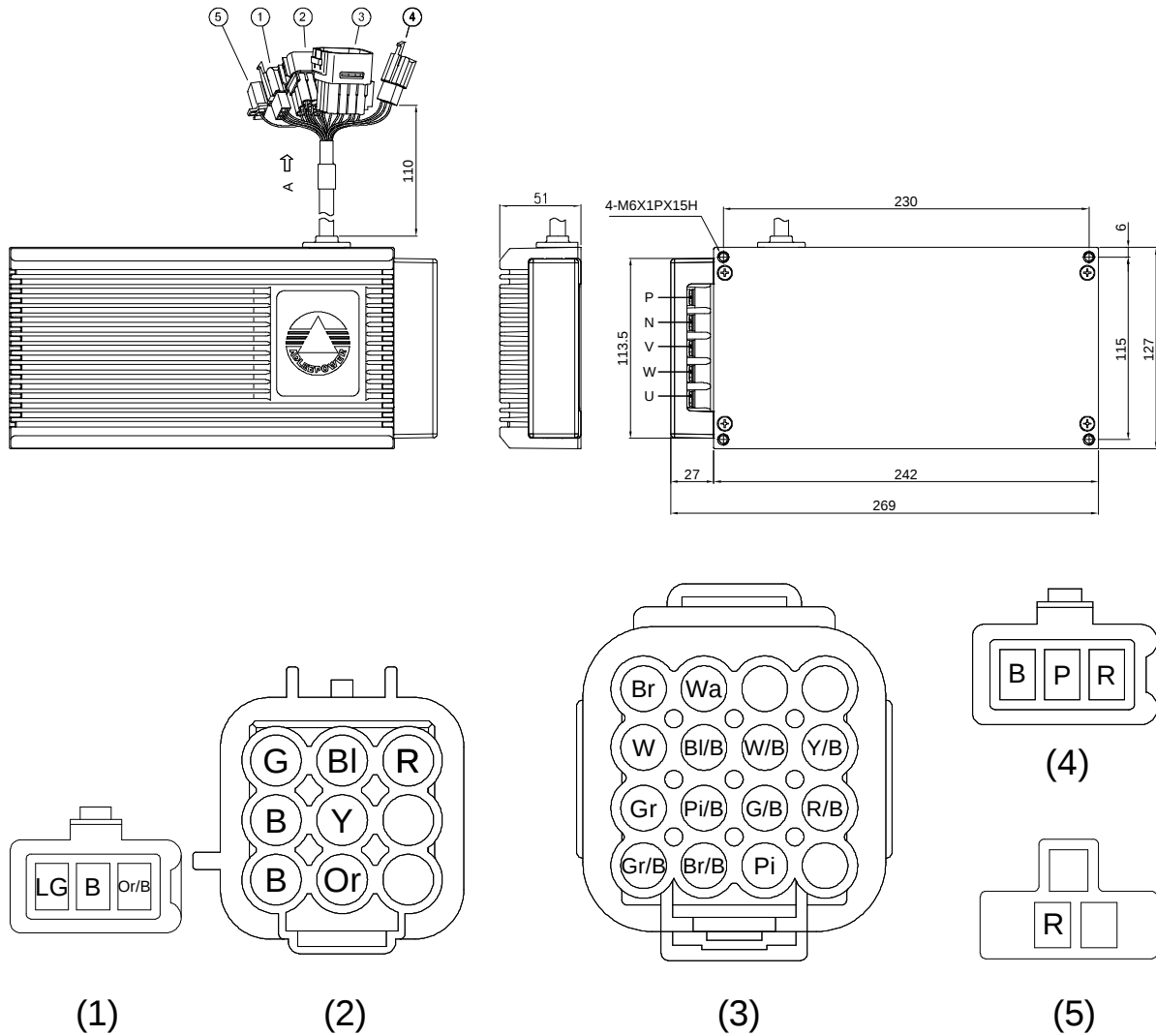
2. SPECIFICATIONS

Drive Model No.		SWAN1
CVT Module Model No.		DMC-1000
Rated Voltage (VDC)		48
Rated Power (kW)		1.1
Max. Current (A)		62
Max. Power (kW)		2.5
Max. Efficiency (%)		92
Max. Torque (N-m)		5.5
High Efficiency Torque Range (N-m)		75% (3N-m)
Drive Method		Square Wave
Encoder Type and Resolution		HU,HV,HW open collector
ACC. / DEC. time		0~5000ms/10A
Type of Control		PWM
Mode of Control		Torque mode
Input Signal	Analog	VR 0~5V analog input
	Digital	DI terminal and 48V common
Operating		1.Terminal : Photocoupler interface 2.Communication : RS485, PC
Output Signal		
Protection		Over current, over heat, low voltage, hall sensor abnormal, accelerator loss signal, power on accelerator non zero, temperature sensor open circuit, motor stall, phase to phase short circuit, standby over time
Driver Dimension Fig.		A
Motor Dimension Fig.		1

3. DIMENSION DRAWINGS

Model No. : SWAN1

Unit:mm



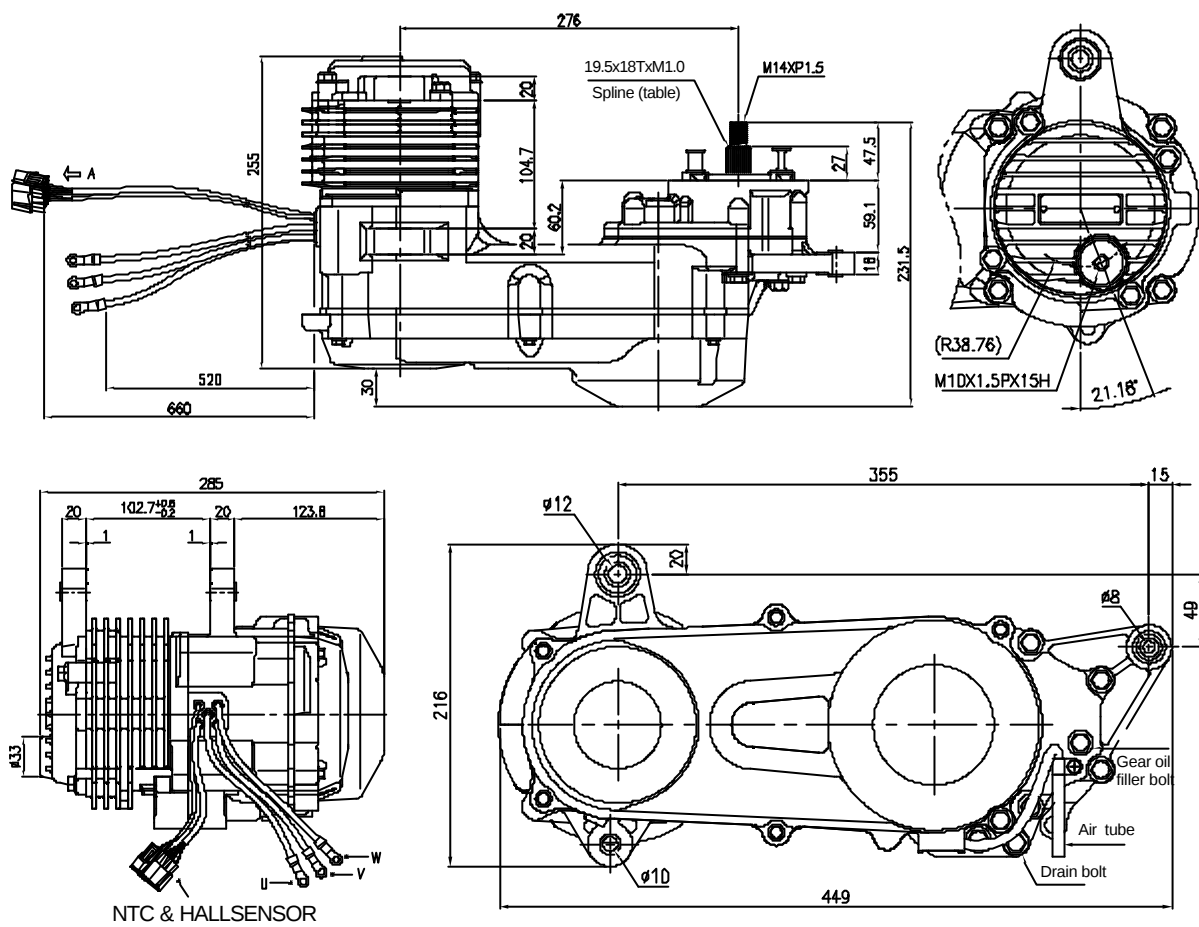
A VIEW

NOTE : (1)Communication connection (Yellow)
 (2)Motor connection (Black)
 (3)Control connection (Black)
 (4)Throttle connection (Brown)
 (5)Communication power supply connection (White)

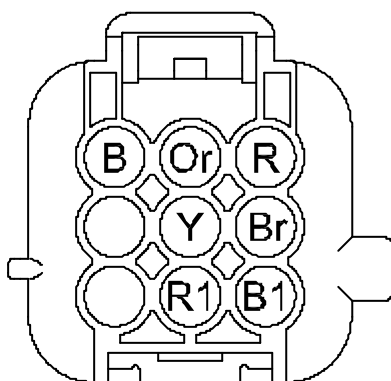
Fig A

Model No. : DMC-1000

Unit:mm



A VIEW



Spline specifications	Ø19.5X18TX1
Module	1
Pressure angle	37.5°
Number of teeth	18T
Major diameter	Ø19.5 ⁰ _{-0.1}
Minor diameter	Ø17.3
Pitch circle diameter	Ø 18
Base circle diameter	Ø14.8
Displacement factor	+0.375
Pin diameter	Ø2
Over Pin Diameter	Ø 21.849 ^{-0.05} _{-0.098}

Fig 1

4. INSTALLATION

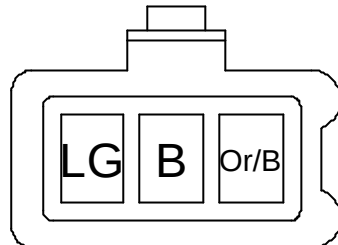
Installation condition for drive :

1. Well ventilation.
2. The drive should be fastened to clean, flat metal surface.
3. Position in easy wiring and maintain place.
4. Avoid direct sunlight.
5. A thermal joint compound can be used to improve heat condition from the drive heat sink to the mounting surface.

5. DESCRIPTION OF TERMINALS & WIRING

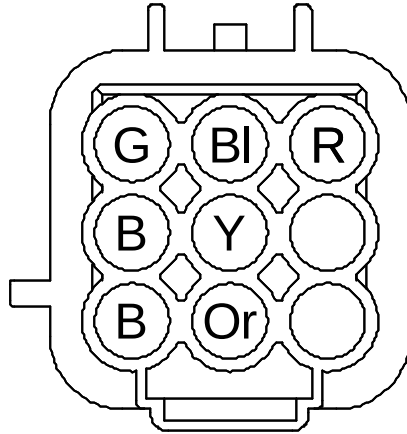
(1) Terminal Diagram

(1-1) Communication connection (Yellow)



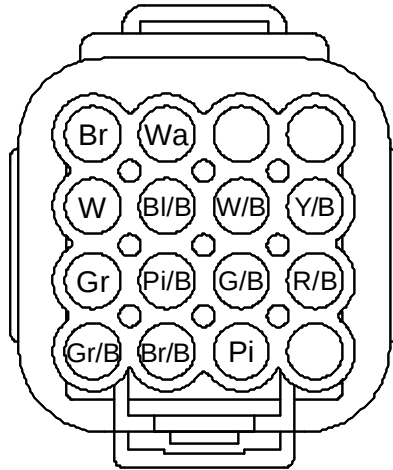
	WIRE COLOR	DEFINITION	DESCRIPTION
LG	Light Green	S+ (RxD)	RS232 Rx
B	Black	AGND	A5V ground
Or/B	Orange / Black	S- (TxD)	RS232 Tx

(1-2) Motor connection (Black)



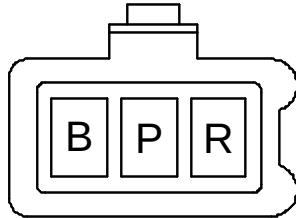
NO.	WIRE COLOR	DEFINITION	DESCRIPTION
G	Green	Hu	Encoder Hu
Bl	Blue	Hv	Encoder Hv
R	Red	A5V	Signal power supply (5V)
B	Black		
Y	Yellow	Hw	Encoder Hw
B	Black	AGND	A5V ground
Or	Orange	NTC+	Temperature sensor

(1-3) Control connection (Black)



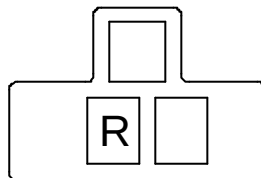
	WIRE COLOR	DEFINITION	DESCRIPTION
Br	Brown	KEY+	Key switch +
Wa	Wathet Blue	KEY-	Key switch -
W	White	5V	Control power
Bl/B	Blue / Black	RUN / STOP H	RUN / STOP (high active)
W/B	White / Black	RUN / STOP L	RUN / STOP (low active)
Y/B	Yellow / Black	ROTATION	Direction selection terminal
Gr	Gray	FEEDBACK +	Regeneration control terminal +
Pi/B	Pink / Black	FEEDBACK -	Regeneration control terminal -
G/B	Green / Black	MAX POWER	Enconomic mode terminal
R/B	Red / Black	BUZZER	Buzzer output terminal
Gr/B	Gray / Black	ALARM	Error output
Br/B	Brown / Black	FEEDBACK LED	Regeneration status LED
Pi	Pink	EXG	5V ground

(1-4) Throttle connection (Brown)



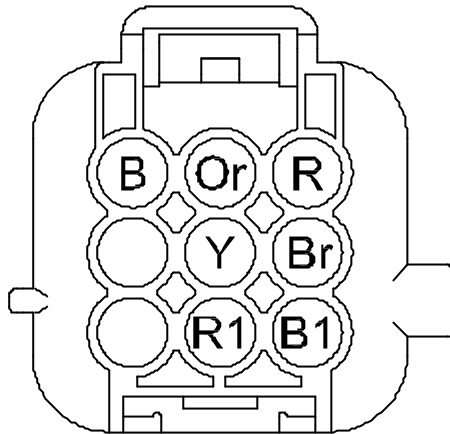
	WIRE COLOR	DEFINITION	DESCRIPTION
B	Black	AGND	A5V ground
P	Purple	TCMD	Throttle analog signal input
R	Red	A5V	Digital power supply (5V)

(1-5) Communication power supply connection (White)



	WIRE COLOR	DEFINITION	DESCRIPTION
R	Red	A5V	Signal power supply (5V)

(1-5) DMC-1000 motor connector definition

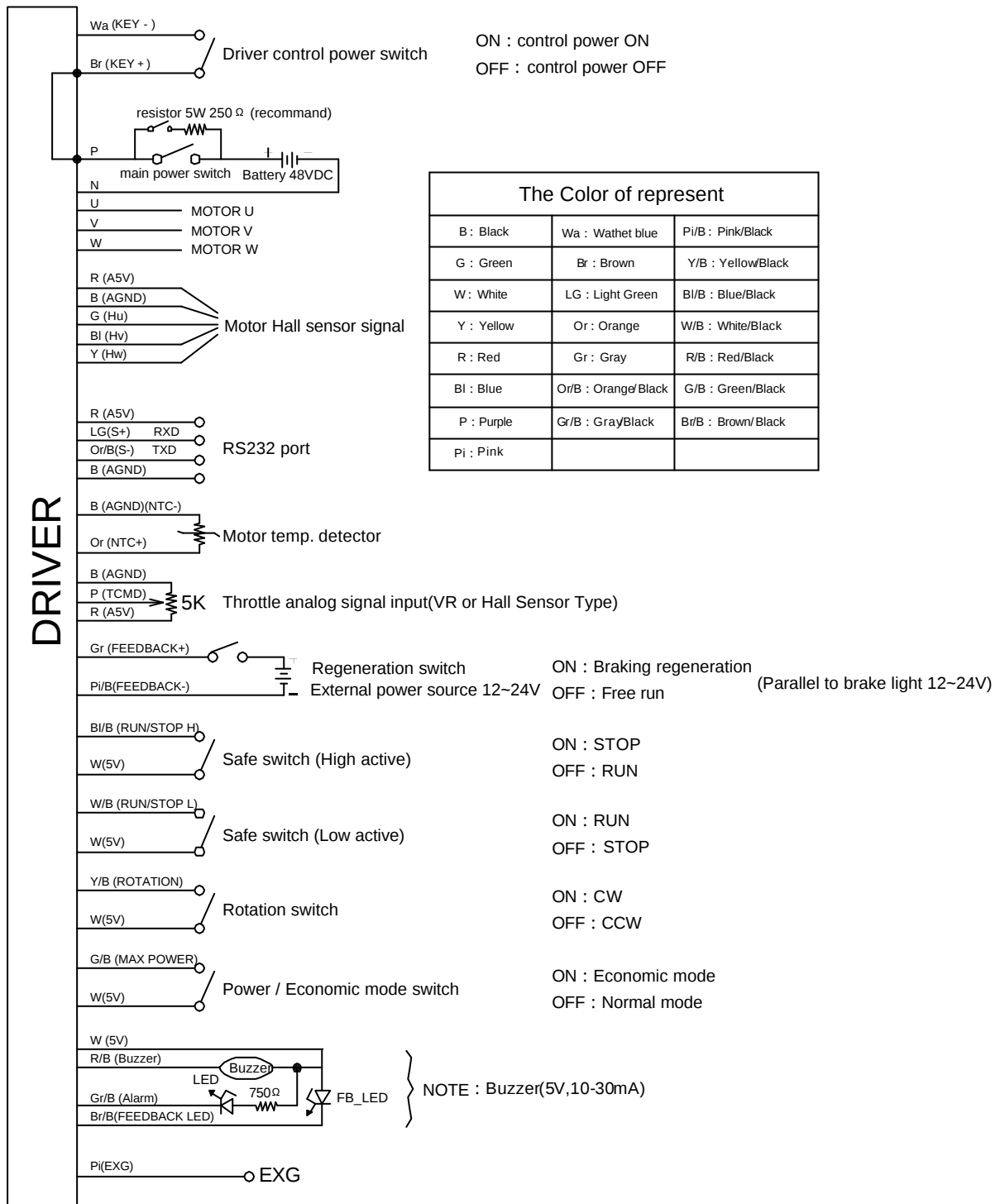


	WIRE COLOR	DEFINITION	DESCRIPTION
B	Black	A5V	Signal power supply (5V)
Or	Orange	Hv	Encoder Hv
R	Red	Hu	Encoder Hu
Y	Yellow	Hw	Encoder Hw
Br	Brown	AGND	A5V ground
R1	Red	NTC+	Temperature sensor "+"
B1	Black	NTC-	Temperature sensor "-"

(2) Terminal Screw Locking Torque

MODEL	TORQUE
SWAN-01	12 Kg-cm

(3) Wiring Diagram



6. DRIVE PARAMETER

DISPLAY CODE	FUNCTION	ADJUST RANGE	DEFAULT VALUE	UNIT	REMARK
P0	Rated Current	10~135	21	A	
P1	Current Limit	10~135	75	A	(PEAK)
P4	Battery Low Voltage Protection Level	36~60	44	V	
P5	Battery Low Voltage Shut Down Level	36~60	41	V	
P6	Battery Low Voltage Trip Monitoring Time	1~20	5	SEC	
P7	Maximum Generation Voltage	48~62	55	V	
P8	Maximum Generation Current	1~80	30	A	(PEAK)
P9	Torque Command Acceleration Time	0~5000	30	10A/ms	
P10	Throttle Polarity	0~1	0		0 : 1~4V 1 : 4~1V
P11	Motor Lock Speed Value	100~1000	100	RPM	
P12	ECO Mode Power Percentage	10~100	70	%TCMD	
P13	Low Voltage Protection Current Limit	0~100	30	%P1	
P14	Generation Mode Current Increasing Rate	0~500	250	ms	Increase 10% duty time
P15	Maximum Battery Current Limit Speed	1000~8000	8000	RPM	
P16	Maximum Battery Current Limit (Phase)	0~100	80	%P1	

DISPLAY CODE	FUNCTION	ADJUST RANGE	DEFAULT VALUE	UNIT	REMARK
P17	Terminal Control Regeneration Current (Phase)	0~80	80	%	Feedback terminal active P1*P17 %
P18	Coast Regeneration Current (Phase)	0~80	10	%	P1*P17 %
P19	ECO Mode 2 nd Stage Current Limit Speed	0~10000	5500	RPM	
P20	ECO Mode 2nd Stage Current Limit	10~100	45	%	
P21	ECO Mode Delay Time	0~20	0	SEC	
P40	Communication Mode Selection	0~1	0		0:PC RS232 interface 1:RS232 interface
P41	MOD BUS ID	1~255	1		
P42	Communication Speed Selection	0~2	0		0 : 9600 1 : 19200 2 : 38400
P96	Machine Code	1217			
P97	Program Version	1023			

7. PARAMETER DESCRIPTION

Rated Current
P0

Adjust Range	10~135A
Default Value	21A

Current Limit (PEAK)
P1

Adjust Range	10~135A
Default Value	75A

In motor mode, the maximum current for driving at forward direction current.

Ex : P1=130, maximum output current is 130A (peak).

Note : This value means Sin-Wave peak value.

Battery Low Voltage Protection Level
P4

Adjust Range	36~60V
Default Value	44V

When battery voltage is lower than P4 and last 5 seconds, low battery protection function is activated. Drive change motor mode current limit from P1 to P13 and alarm LED and BUZZER are activated.

When battery voltage rise over P4+4 volt, drive reset the low battery protection function (alarm LED “OFF”, current limit return to P1).

When battery voltage is lower than P4 to 5 seconds again, low battery protection function is activated again. Drive change motor mode current limit from P1 to P13 and alarm LED and BUZZER are activated.

Battery Low Voltage Shut Down Level
P5

Adjust Range	36~60V
Default Value	41V

Battery Low Voltage Trip Monitoring Time
P6

Adjust Range	1-20 SEC
Default Value	5 SEC

When battery voltage is lower than P5 and last P6 second, battery low voltage protection function is activated. Re-power ON to reset this alarm.

Maximum Generation Voltage
P7

Adjust Range	48~62V
Default Value	55V

Power generation affect battery voltage to be over P7 setting when drive is into generation mode (accelerator return to zero, press brake). Drive will decrease generation current to maintain battery voltage at P7 voltage.

Maximum Generation Current (PEAK)
P8

Adjust Range	1~50V
Default Value	30V

Limit Maximum Generation Current.

Note : Limit motor phase current not bus current (recharge to battery). This value is peak value.

Torque Command Acceleration Time
P9

Adjust Range	0~5000ms
Default Value	30ms

Slope of motor mode current which is increasing every 10A by P9 time.

Ex : P9=30 means 30ms for increasing 10A.

Throttle Polarity
P10

Adjust Range	0~1
Default Value	0

P10=0 : TCMD=1V~4V means 0~TCMDmax.

P10=1 : TCMD=4V~1V means 0~TCMDmax.

Motor lock speed value
P11

Adjust Range	100~1000RPM
Default Value	100RPM

P11=100, if TCMD 40% TCMDmax. and loading causes speed lower than P11 value. Drive execute lock protection function. When motor lock time over 1 second, drive will change current limit to 80A. If motor at 80A still lock and last over 1 second, drive execute lock shut down function (motor current=0A). Return accelerator to zero to reset lock shut down function. if lock shut down function happens 3 times continuously, need to repower on to reset lock shut down function.

ECO Mode 1st Stage Current Limit
P12

Adjust Range	10~100%
Default Value	70%

Low Voltage Protection Current Limit
P13

Adjust Range	100%*P1
Default Value	30%*P1

When drive 's low voltage protection occur, drive change current limit from P1 to P1*P13.

Generation Mode Current Increasing Rate
P14

Adjust Range	0~500ms
Default Value	250ms

Drive is in generation mode (accelerator return to zero, press brake). Slope of generation mode current which is P14 ms increasing every 10A by P9 time.

Maximum Battery Current Limit Speed
P15

Adjust Range	1000~8000RPM
Default Value	8000RPM

Maximum Battery Current Limit (Phase)
P16

Adjust Range	0~100%
Default Value	80%

When motor speed higher than (or equal to) P15, the drive change current limit to P16.

Terminal Control Regeneration Current (Phase)
P17

Adjust Range	0~80%*P1
Default Value	80%

Coast Regeneration Current (Phase)
P18

Adjust Range	0~80%*P1
Default Value	10%

ECO Mode 2nd Stage Current Limit Speed
P19

Adjust Range	0~10000RPM
Default Value	5500RPM

ECO Mode 2nd Stage Current Limit
P20

Adjust Range	10~100%
Default Value	45%

ECO Mode Delay Time
P21

Adjust Range	0~20 SEC
Default Value	1 SEC

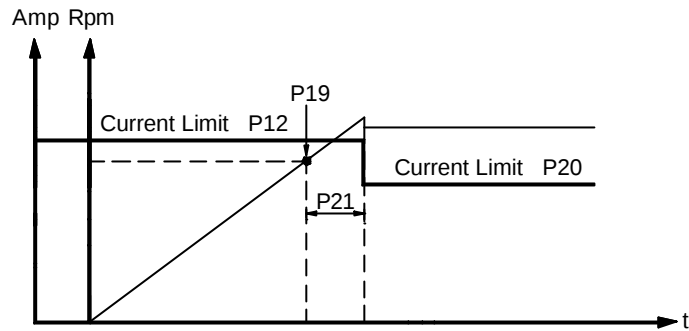
When terminal "MAXPOWER" is "ON", drive will enter ECO mode. Current limit of drive is changed from P1 to P12 or P20. Selecting P12 or P20 based on condition.

Case 1 : Motor Speed < P19 → Current Limit = P12

Case 2 : Motor Speed > P19 & duration < P21 → Current Limit = P12

Case 3 : Motor Speed > P19 & duration > P21 → Current Limit = P20

If throttle is returned to zero, then drive will re-judge the condition.



Communication Mode Selection
P40

Adjust Range	0~1
Default Value	0

0 : PC RS232 interface (protocol Tera Term).
1 : RS232 interface (protocol MODBUS).

MOD BUS ID
P41

Adjust Range	1~255
Default Value	1

Set MODBUS ID.

Communication Speed Selection
P42

Adjust Range	0~2
Default Value	0

Set MODBUS speed.

0 : 9600bps.
1 : 19200bps.
2 : 38400bps.

Note : Data format only 8,N,1.

Machine Code
P96

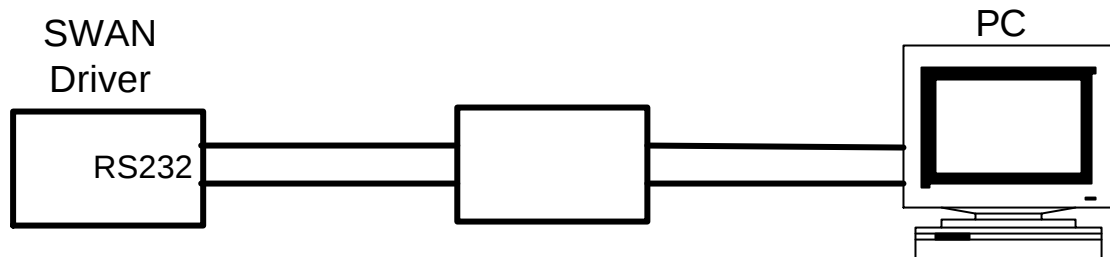
Program Version
P97

8. COMMUNICATION

1. PC Terminal (P40=0)

1-1. Tera Term Communication Software installation Setup.

1-2.



RS232 transfer to USB(PC use USB port)

OR Direct connect to RS232 port (PC use RS232 port)

A. Read Alarm Code and Definition

- Read 8 alarm code : key in AT then press ENTER.

- Read any alarm code : key in AT X then press ENTER (X=0~7).

X=0 : show last 1st alarm code

X=1 : show last 2nd alarm code

Note : Once communication connection success, the promote chart ">" will show up. Key in communication command after ">".

B. Clear Alarm Trace

Key in AT CC then press ENTER.

C. Monitor Parameter

Key in AT X , then press ENTER.

X	NAME	DESCRIPTION
S	Speed	Motor speed (RPM)
V	Voltage	Battery voltage (V)
M	Mode	Mode display : Normal, ECO, Generation
W	How	Run or halt
C	Current	
CC	Current Command	
CL	Current Limit	
DEFAULT		Parameter default to factory set
PASSWORD xxxx	Password	Key in password
AT	Alarm Trace	Show all alarm trace
AT x	Alarm Trace	x=0~7 AT 0 show alarm trace 0 AT 7 show alarm trace 7
AT CC	Clear All Alarm Trace	Clear all alarm trace
?	Help	Show all command
?P	Parameter List	Show all parameter and adjust range

D. Modify Parameter

Key in P nn XX , then press ENTER.

nn : Parameter no.

XX : Setting value.

EX : Change P1 value to 130

>P 1 130 , then press ENTER

E. Read Parameter

Key in P nn , then press ENTER.

nn : Parameter no.

EX : Read P 11 value,

> P 11, then press ENTER, then P11 content value
show up.

2. MODBUS RTU (P40=1)

A. Character Format

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
--------------	---	---	---	---	---	---	---	---	-------------

B. Communication Protocol (data contents are in hexadecimal with positive and negative format.)

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

C. CRC(Cyclical Redundancy Check) is calculated by the flowing 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 step 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.

D. Read Drive's Setting	
Inquire D1. Communication Address D2. Function Code D3. Parameter Number (H) D4. Parameter Number (L) D5. Quantity of Parameter (H) D6. Quantity of Parameter (L) D7. CRCL D8. CRCH	(00~FFH) (03H) (00~FFH) (00~FFH) (00H) (00~10H) CRCL CRCH
Respond D1. Communication Address D2. Function Code D3. Quantity of Parameter D4. Content of Data (H) of Inquire Parameter Number D5. Content of Data (L) of Inquire Parameter Number Dn-1 Dn	(00~FFH) (03H) (00~20H) (00~FFH) (00~FFH) CRCL CRCH

E. Write Drive's Setting	
Inquire	
D1. Communication Address	(00~FFH)
D2. Function Code	(06H)
D3. Parameter Number (H)	(00~FFH)
D4. Parameter Number (L)	(00~FFH)
D5. Quantity of Parameter (H)	(00~FFH)
D6. Quantity of Parameter (L)	(00~FFH)
D7. CRCL	CRCL
D8. CRCH	CRCH
Respond	
D1. Communication Address	(00~FFH)
D2. Function Code	(06H)
D3. Quantity of Parameter (H)	(00~FFH)
D4. Quantity of Parameter (L)	(00~FFH)
D5. Content of Data (H) of Inquire Parameter Number	(00~FFH)
D6. Content of Data (L) of Inquire Parameter Number	(00~FFH)
D7. CRCL	CRCL
D8. CRCH	CRCH

9. REPAIRING AND MAINTENANCE

1. Turn off the power and wait for 5 minutes before inspection and maintenance.
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 drive inner precision parts.
5. DO NOT use water, solvent or volatilizable liquor to clean drive. Please use dry clothes to clean stain or use compressed air to clean dirt.
6. Please contact agent or ADLEEPOWER[®] when you cannot obviate problems.
7. Recommend check 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.

10. TROUBLE SHOOTING

(1) Alarm LED Display & Buzzer

	CONDITION	ALARM LED	BUZZER	NOTE
1	Key On	X	BI-BIBI	
2	Motor Reverse	X	BI-BI	
3	Low Voltage Alarm	Flash	BI--(6 times)	
4	Motor / Drive Overheat Alarm	Flash	BI--(6 times)	
5	Motor Lock	Light		Throttle turn back
6	Motor Lock 3 Times Within 1 Minute	Light	BIBIBI	
7	Low Voltage Shutdown	Light	BIBIBI	
8	Encoder Signal Error	Light	BIBIBI	
9	Motor / Drive Overheat Shutdown	Light	BIBIBI	
10	Power On if Accelerator Is Not at Zero Position	Light	X	
11	Curnet Signal Offset Fail	Light	BIBIBI	
12	Over Current Shutdown	Light	BIBIBI	
13	Throttle Signal Break	Light	BIBIBI	
14	Vehicle Long Time Idle	Flash	BI-BI--(2 minutes)	After 2 minutes alarm LED light on
15	Motor or Drive Temperature Sensor Open Circuit	Flash	BI--(6 times)	

(2) Alarm Code

ALARM CODE	DEFINITION
01	EEPROM Error
02	Current Sensor Error
03	Over Current
04	Encoder Signal Error
05	Drive Overheat
06	Motor Overheat
07	Low Voltage Protection
08	Motor Lock
09	Power On if Throttle Is Not at Zero Position
11	Throttle Signal Break
12	Vehicle Long Time Idle
13	Motor or Drive Temperature Sensor Open Circuit

(3) Alarm Trouble Shooting

	ALARM CODE	MESSAGE	SUGGESTED REMEDY
1		Low Voltage Alarm	Battery low SOC : Charge battery
2		Motor / Drive Overheat Alarm	Reduced load or take a rest
3	01	EEPROM Error	Return to factory
4	02	Current Sensor Error	Return to factory
5	03	Over Current Shutdown	Repower on. If fault do not reset contact factory.
6	04	Encoder Break	Return to factory
7	05/06	Drive / Motor Overheat Shutdown	Take a rest and repower on to reset alarm
8	07	Low Voltage Shutdown	Charge battery and repower on to reset alarm
9	08	Motor Lock	Released by throttle to reset
10	08	Motor Lock 3 Times Within 1 Minute	Repower on to reset alarm
11	09	Power On if Throttle Is Not At Zero Position	Released by throttle to reset
12	11	Throttle Fail	Check throttle wiring broken or not
13	12	Vehicle Long Time Idle	Repower on to reset alarm
14	13	Drives Temperature Sensor Open Circuit	Return to factory

MEMO

INSTRUCTION MANUAL

PART NO : E-PHAA-ES1A01

Model : SWAN1 series

DEC. 2019 1st Edition

ISO 9001 



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