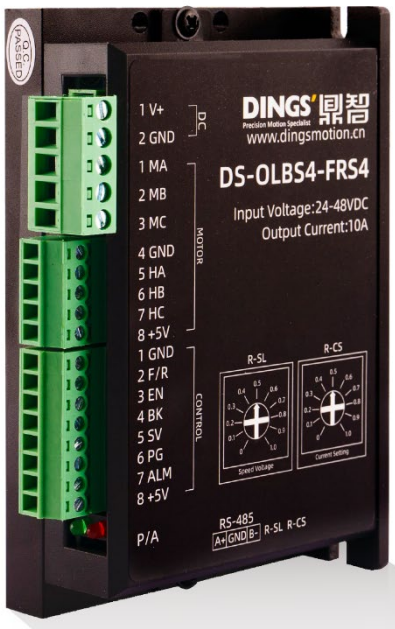
DINGS
Precision Motion Specialist

VER 1.0

Technical Manual

DS-OLBS4-FRS4



DINGS
Precision Motion Specialist

Table of Contents

Click to return to table of contents

Summary

This closed-loop speed controller is designed with the latest type IGBT and MOS power devices. It takes advantage of DC brushless motor's Hall signal to double frequency for closed-loop speed control. PID control links with the speed controller. The control system is stable and reliable, especially at low speed, it always can reach the maximum torque, The speed control range is from 150 to 20000rpm.

1. Specification and Description

- PID speed, current double loop regulator
- 20KHZ chopper frequency
- Electrical stop to ensure the quick action
- Over load ratio larger than 2, the torque can always reach the maximum at low speed.
- Fault alarm function with Over voltage, Under voltage, Over current, Over temperature, and Hall signal illegal.

2. Product Characteristic

Drive model	DS-OLBS4-FRS4
Input voltage	24 VDC – 48 VDC
Under voltage protection	10VDC, Over voltage protection: 60VDC
Maximum continuous output current	10 A
Accelerate time constant, default	0.5 seconds, others can be customized

Warning

*** Do not measuring or touch any components without housing while operating.**
*** Should check soleplate or change fuse 1minter later after power off.**
*** Operating without housing is forbidden.**
*** Make sure to connect the ground terminal, otherwise, the brushless motor will working unsteadily.**
*** Sudden damage while drives working, our company only affords the service and replace in the guarantee. Personal injury and motor damage caused by the accident will invalidate the guarantee.**

3. Terminal Connection

3.1 Power Input

1	V+	24VDC~48VDC input
2	GND	GND input

3.2 Motor Input

1	MA	Motor A phase
2	MB	Motor B phase
3	MC	Motor C phase
4	GND	GND
5	HA	Hall signal A phase input
6	HB	Hall signal B phase input
7	HC	Hall signal C phase input
8	+5V	Hall signal power line

3.3 Control Signal

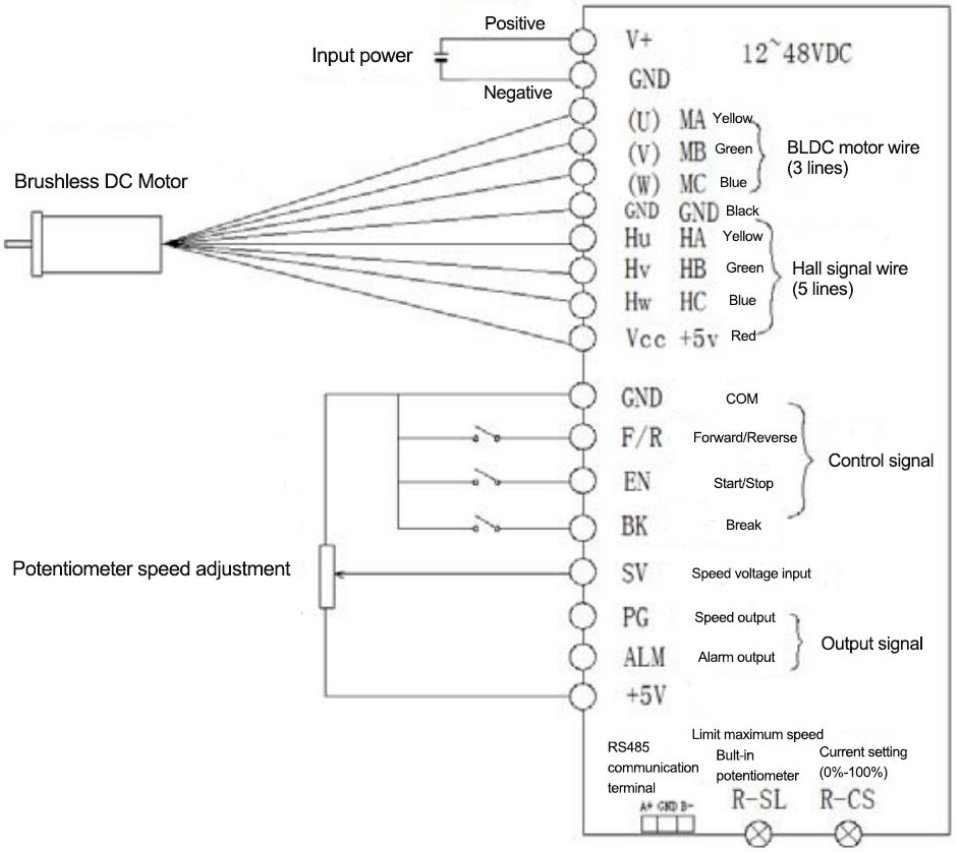
No.	Terminal Name	Description
1	GND	Signal ground
2	F/R	CW/CCW terminal
3	EN	Stop/Start terminal
4	BK	Brake terminal
5	SV	Analog signal input terminal
6	PG	Speed output terminal
7	ALM	Alarm output terminal
8	+5V	+5V power output terminal

Built-in potentiometer R-SI : Adjust the motor speed gain, which can be adjusted from 0~100%.

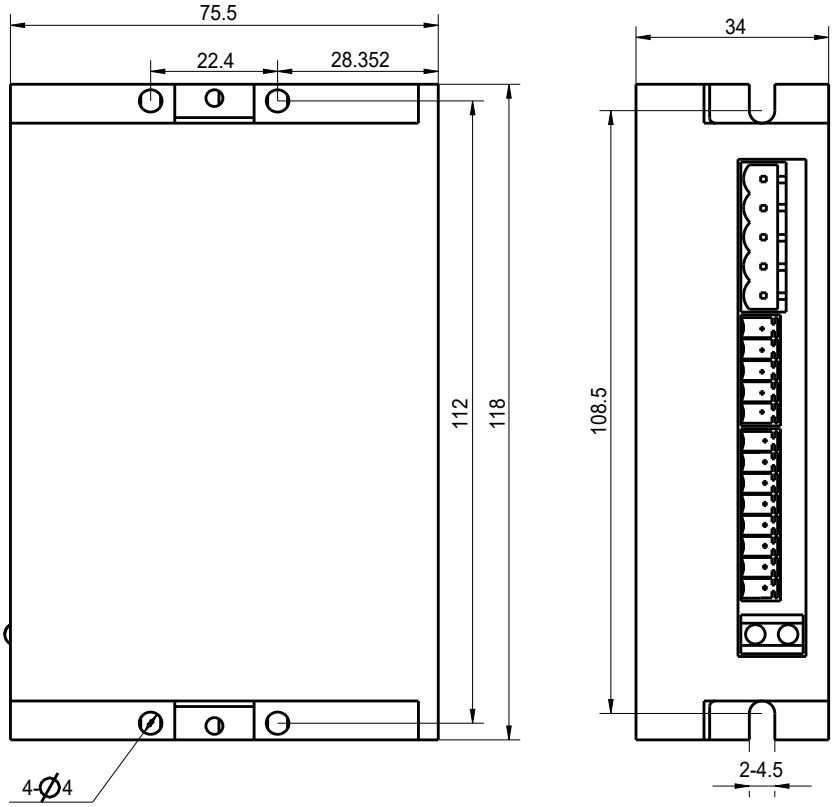
Built-in potentiometer R-CS : Maximum protection current setting, built-in potentiometer can be set 0%~100% continuous current protection.

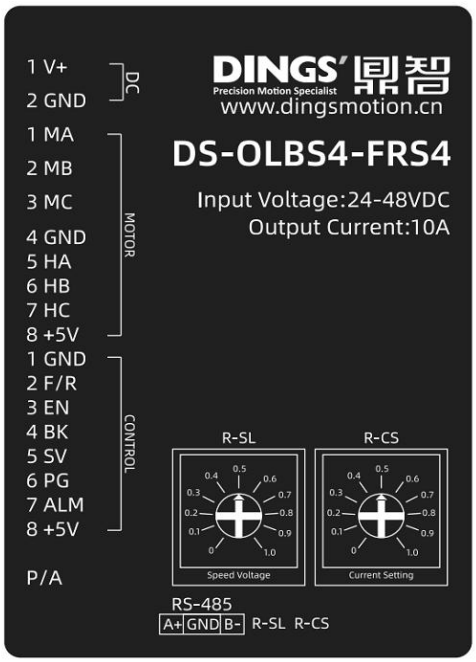
DINGS
Precision Motion Specialist

4. Connection Diagram of motor and driver



5. Dimension





6. Functions and Usage

6.1 Speed Adjustment Method

This driver provides the user below three-speed control method:

Inner potentiometer speed adjustment : Rotate the potentiometer on the driver panel counterclockwise, the rotate speed decrease, rotate the potentiometer on the driver panel clockwise, the rotate speed becomes higher. Please make sure the potentiometer is set in the minimum state when you use external input mode to adjust the speed.

External input adjustment : Connect the terminals of the external potentiometer to the GND and +6.25v terminal, connect the regulator terminal to SV, then you can adjust the speed by using an external potentiometer. It also can achieve speed adjust through other control units (Such as PLC, SCM, etc) input analog voltage to SV. The acceptance of SV is DC 0V~+5V, and the corresponding motor rotate speed is 0 to rated speed.

You also can use the external digital signal to adjust speed: apply PWM with 5V amplitude and 1KHz~2KHz Frequency between SV and GND to adjust the speed. the motor rotate speed is adjusted by the duty radio liner adjustment. At this time, by adjusting the R-SV potentiometer, SV digital signal amplitude can be 0~1.0 ratio attenuation processing. Generally, adjust R-SV to 1.0, SV input digital signal without attenuation processing.

6.2 Motor Operate / Stop Control (EN)

You can control the brushless motor to run or stop by controlling the terminal “EN” and “GND” connecting. The motor will be running when we connect the terminal “EN” to “GND”; when shut down, the motor will stop naturally, and the stopping time will be decided by the inertia and load adding on the motor.

6.3 Motor Rotation Direction Control (F/R)

You can control the motor rotation direction by controlling the terminal “F/R” and “GND” connection. When connect terminal “F/R” to terminal “GND”, the motor will run at CCW (view from motor output side), and when shut down, the motor will run at another direction.

Attention **If you need to change the motor rotation direction, please stop the motor at first, otherwise the driver shall be damaged.**

6.4 Brake the Motor to Stop (BK)

You can break the motor to stop if need. The motor will run when the terminal “BK” not connects to “GND”, but if you connect these two terminals, the motor will stop quickly. And the motor stopping time will be decided by inertia and load adding on the motor.

Attention **If you are not necessary to stop the motor quickly, please DO NOT use this function, cause it has some electrical and mechanical impact on the motor and driver.**

6.5 Speed Signal Output (PG)

The speed pulse output port is 0C, output 30V/10mA max. You can connect with a resistance (3K ohm ~10K ohm) between signal and input power to get the pulse signal, this port will output serial pulses which has fixed extent (it is 50uS). This output pulse from every rotation of the motor is 3 x N, “N” means the total pole number of the magnet. For example, 2 pair of poles, means 4 poles motor, 12 pulses per turn, when the motor speed is 500rpm, the pulses out from the PG is 6000.

6.6 Alarm Output (ALM)

The alarm output port is 0C, output 30V/10mA max. You can connect a resistance (3K ohm ~10K ohm) with the input power to get the alarm signal. When alarm, this port is connecting the GND (Low voltage), and the driver will stop working and keep in alarm status.

6.7 Drive Failure

Over-voltage or over-current will lead the driver to a protection status, the driver will automatically stop working, the motor stop and blue light are flashing. As long as you enable terminals to reset (EN and GND disconnected) or power Off, the driver will disarm the alarm. Please check the motor wiring once this failure occurred.

7. Communication Method

The communication mode adopts the standard Modbus protocol and conforms to the national standard GB/T 19582.1 - 2008. Using RS484 two-wire serial link communication, the physical interface uses the conventional 3-pin 2.54 wiring port (A, GND, B-) terminals, which is very convenient for serial connection. Transfer mode RTU, check mode CRC, CRC start word FFFFH. Data mode 8-bit asynchronous serial, 1 stop bit, invalid check bit,

support multiple communication rates (see parameter table for details).

Notes **If the communication mode control motor is required, it must be performed under the MBUS control mode and the internal control terminal.**

Function parameters support 03H multi-register read, 06H single register write.

Site Address: 00 : Broadcast Address

1-250 : User Address

251-255 : Special address, user cannot use

No.	Address	Name	Setting range	Default	unit
00	$8000	First byte : control bit state	First byte : Bit0 : EN Bit1 : FR Bit2 : BK Bit3 : NW Bit4 : MDX Bit5 : X12 Bit6 : KH	00H	
		Second byte : Hall angle and motor poles	Second byte : Bit0-3: poles 1-15 Bit4-7: hall angle 0:120	02H	
01	$8001	Maximum speed in analog adjustment	0-65535	6000	RPM
02	$8002	First byte: start torque	1-255	40H	
		Second byte: start speed without sense start	1-255	04H	
03	$8003	First byte: accelerate time	1-255	0	0.1s
		Second byte: decelerate time		0	
04	$8004	First byte: max. current		90H	144 corresponds to 13A
		Second byte: type		0FH	15: sensor, 16: no sensor
05	$8005	Communication motor speed setting	Closed loop: 0-65535 Open loop: 0-255	2000 81%	RPM
06	$8006	Brake force	0-1023	1023	

07	$8007	First byte: site address Second byte: reserve	1-250	1 0
10-17		$8010-$8017	reserve	
18	$8018	Real speed		
19	$8019	First byte: bus voltage Second byte: bus current		
1A	$801A	First byte: control port state Second: analog port value	Bit0 : SW1 Bit1 : SW2 Bit2 : SW3 Bit3 : SW4	
1B	$801B	First byte: fault state Second byte: motor running state	Bit0: stall Bit1: over current Bit2: hall abnormality Bit3: low bus voltage Bit4: over bus voltage Bit5: peak current alarm Bit6: temperature alarm Bit7: reserve	
1C		$801C-$801F	Reserve	
20		$8020 above illegal		

Site address 8000H-8017H Read-write register

Site address 8018H-801FH Read-only register

Other address is illegal

8000: first byte:

EN: when NW=0, 0: external EN low level effective 1: external EN high level effective

when NW=1, 0: EN ineffective 1: EN effective

FR: when NW=0, 0: external FR low level effective 1: external FR high level effective

when NW=1, 0: FR ineffective 1: FR effective

BK: when NW=0, 0: external BK low level effective 1: external BK high level effective

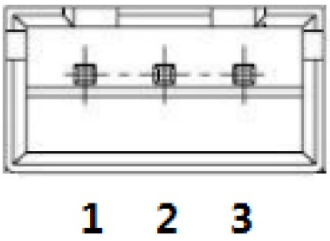
when NW=1, 0: BK ineffective 1: BK effective

NW	MDX	X12	Function
0	0	X(random)	External simulation speed
0	1	0	External SW speed mode 1
0	1	1	External SW speed mode 2
1	X(random)	X(random)	Internal communication control

KH: 0: Speed closed loop mode 1: Speed open loop mode

8. Communication Wiring Method

RS-485 communication can be communicated by driving a conventional 3-pin 2.54 wiring port. The pins for a conventional 3-pin 2.54 wiring port are defined as follows:



Pin	Function
1	A
2	GND
3	B

DINGS
Precision Motion Specialist

International Customer
Person in Charge : *Daniel Jang*
daniel@dingsmotion.com
Building 1#, 355 Longjin Road, Changzhou Economic Development Zone, Jiangsu, China
+86-519-85177826, 85177827

North America Customer
Person in Charge : *Nicolas Ha*
sales@dingsmotionusa.com
335 Cochrane Circle Morgan Hill, CA 95037
+1-408-612-4970

China Customer
Person in Charge : *Sweet Shi*
info@dingsmotion.com
Building 1#, 355 Longjin Road, Changzhou Economic Development Zone, Jiangsu, China
+86-519-85177826, 85177827

DINGS
Precision Motion Specialist

+86-0519-8517 7825

+86-0519-8517 7807

Building 1#,355 Longjin Road, Changzhou Economic Development Zone, Jiangsu, China

www.dingsmotion.com