𝔚 Windward

BLDC-DZZ Spindle control Unit OPERATION MANUAL

1

Release: 2013-3-23 REV-01

Contents

2

1 Cautions For Handling and operation

⚠ **WARNING**

When using electric tools, basic safety precautions should always be followed to reduce the risk of fire, electrical shock and personal injury. Read all these instructions before operating this product and save these instructions.

1. The BLDC-DZZ is not a hand tool. It is designed to be used on a NC lathe or special purpose machine.

2. In the event of a malfunction or breakdown, grounding provides a path of least resistance for electric current, reducing the risk of electric shock. This system should be equipped with a DC power supply (DC24V~36V). The DC power supply should be equipped with an electric cord with a grounding conductor and a grounding plug. The plug must be plugged into a matching outlet that is properly installed and grounded in accordance with all local codes and ordnances.

Grounding Method

A

Power cord connector

L : Line
N : Neutral
E : Earth

L   E   N
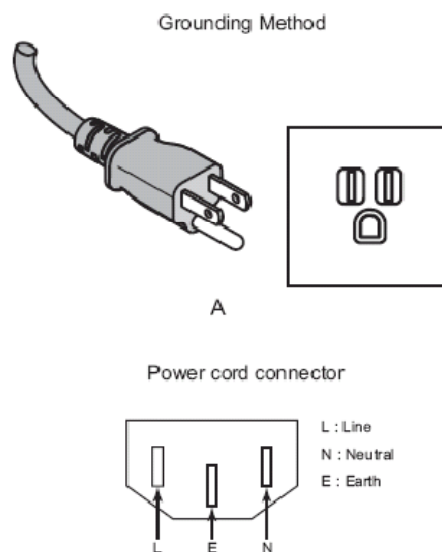
3 . Motor cooling and spindle purge air is required to operate the spindle.

2 Features

1) BLDC-DZZ system is designed to be mounted in a CNC lathe, robot, NC lathe or special purpose machine for drilling, milling, slitting, grinding or other similar application. A high-speed brushless motor is used to achieve a maximum speed of 80,000rpm and eliminate the nuisance of brush maintenance.

2) Automatic control and monitoring of spindle functions are possible
3) Compact control unit for easy installation.

4) Power supply is DC24~36V

5) Speed control and protection functions utilize a high performance microprocessor.

6) BLDC-DZZ system can work in 'Constant power mode' and 'Constant torque mode'

   'Constant power mode'
a) When BLDC-DZZ system working in 'Constant power mode', the Digital Indicator will show the demanding rpm of spindle before Operating.

b) The rpm will be 3,000~50,000rpm. It will be 50,000rpm when the max rpm of spindle is over 50,000rpm.

c) The rpm of spindle will be stable when the load is overloaded.

   'Constant torque mode'
a) When BLDC-DZZ system working in 'Constant torque mode', the Digital Indicator will show '0' rpm of spindle before Operating.

b) The rpm will be 1,000~80,000rpm (2 poles spindle).

c) The rpm of spindle will be slower when the load lever is raising.

7) Built-in Protections

3 Specifications

1) Control Unit

Model	BLDC-DZZ
Input	DC24V-36V
Output	15A max 10A continuous
Operation Temperature	0~40°C
Speed Range	1,000-80,000rpm
Control Signal	PWM or CNC
Protection Circuits	Overvoltage Protection /Overcurrent Protection / Tempreture Protection /
Weight	630g
Dimensions	W45 x D82 x H136 mm

5

2) Motor Spindle

Model	S4225-B60	S4225-B40
Speed Range	60,000rpm	40,000rpm
Spindle Accuracy	<1μm	<1μm
Diameter	Φ42+0/-0.01mm	Φ42+0/-0.01mm
Max. Output	Max300W （20S）	Max300W （20S）
Collet Chuck*	Φ3.175	Φ3.175
Weight(With Motor Cord)	1.0kg	1.0kg
Dimensions	Φ42x L159 mm	Φ42x L159 mm

***Note :**

Collet Chucks are sold separately. Please specify the desired Collet Chuck size when ordering.
Collet Chuck (optional)Φ2/Φ3/Φ4/Φ5

4 CONTROL PANEL FEATURES
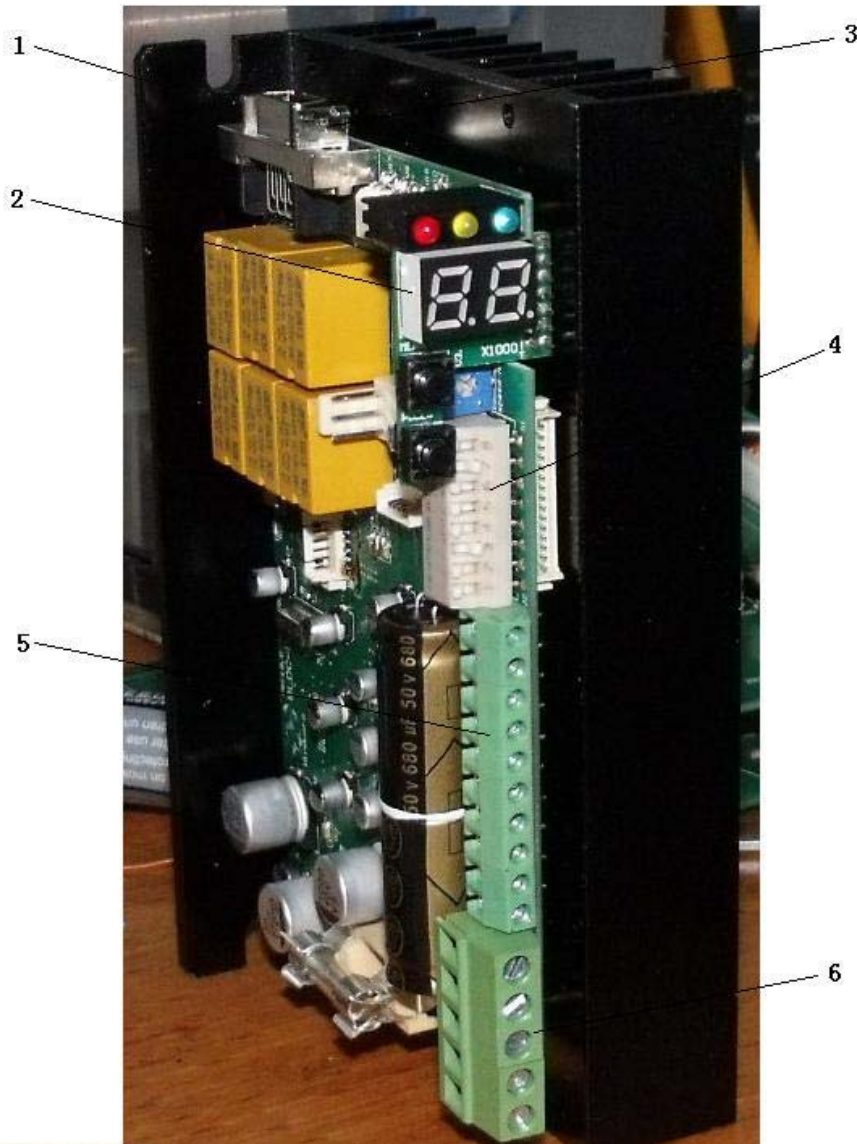
1) Unit(BLDC-DZZ)

2) Control panel
   Refer to Control Panel details

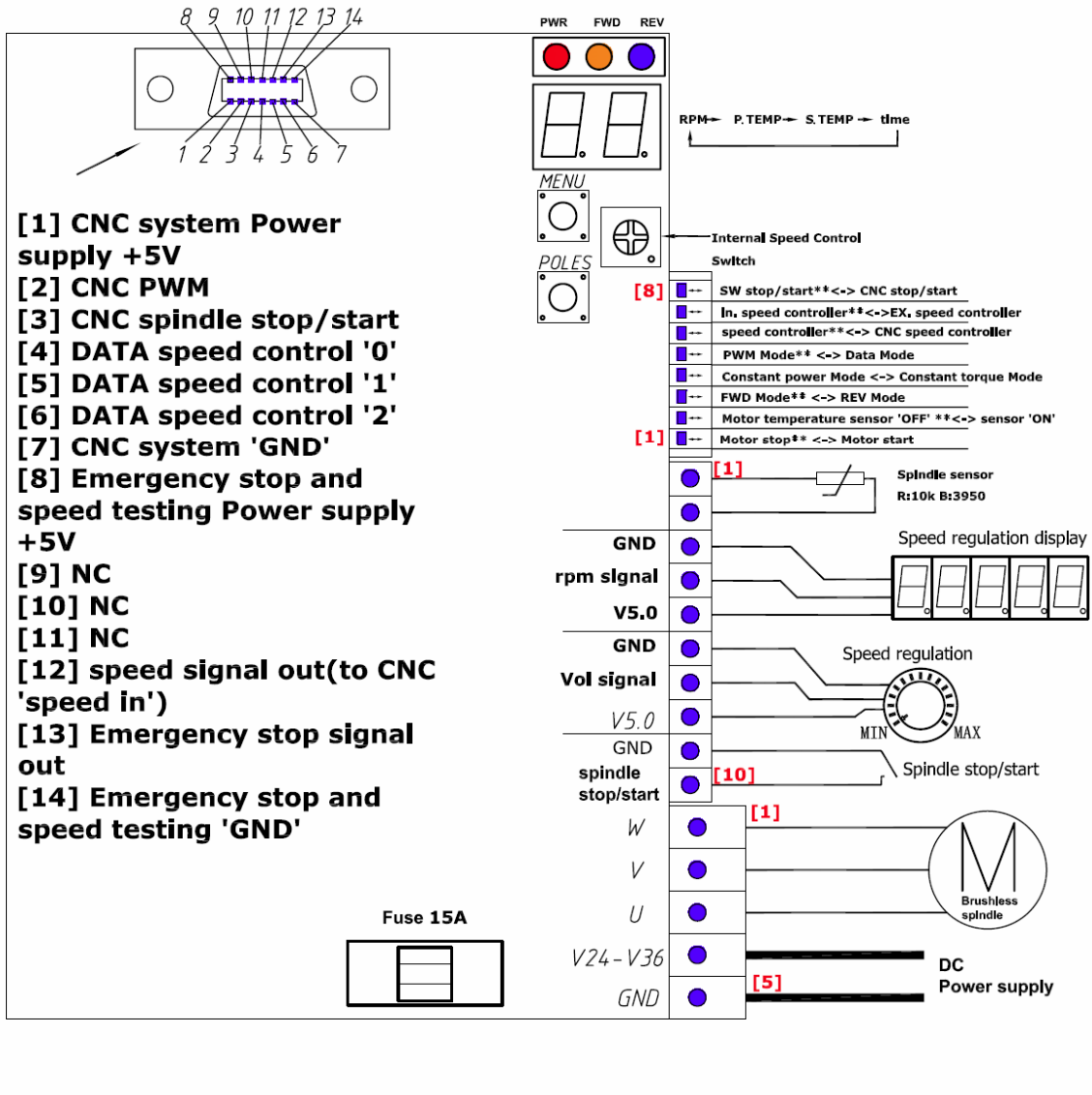## BLDC-DZZ connections

8 9 10 11 12 13 14

1 2 3 4 5 6 7

PWR   FWD   REV

RPM → P.TEMP → S.TEMP → time

MENU

POLES

Internal Speed Control Switch

[1] CNC system Power supply +5V
[2] CNC PWM
[3] CNC spindle stop/start
[4] DATA speed control '0'
[5] DATA speed control '1'
[6] DATA speed control '2'
[7] CNC system 'GND'
[8] Emergency stop and speed testing Power supply +5V
[9] NC
[10] NC
[11] NC
[12] speed signal out(to CNC 'speed in')
[13] Emergency stop signal out
[14] Emergency stop and speed testing 'GND'

[8] SW stop/start** <-> CNC stop/start
In. speed controller** <-> EX. speed controller
speed controller** <-> CNC speed controller
PWM Mode** <-> Data Mode
Constant power Mode <-> Constant torque Mode
FWD Mode** <-> REV Mode
Motor temperature sensor 'OFF' ** <-> sensor 'ON'
[1] Motor stop** <-> Motor start

[1]

Spindle sensor
R:10k B:3950

GND
rpm signal
V5.0

Speed regulation display

GND
Vol signal
V5.0

Speed regulation

GND
spindle stop/start   [10]

MIN   MAX

Spindle stop/start

W
V
U

[1]

Brushless spindle

Fuse 15A

V24 - V36
GND

[5]

DC Power supply

3) PC Jack
To computer.

[1] CNC system Power supply +5V
[2] CNC PWM
[3] CNC spindle stop/start
[4] DATA speed control '0'

[5] DATA speed control '1'
[6] DATA speed control '2'
[7] CNC system 'GND'
[8] Emergency stop and speed testing Power supply +5V
[9] NC
[10] NC
[11] NC
[12] speed signal out(to CNC 'speed in')
[13] Emergency stop signal out
[14] Emergency stop and speed testing 'GND'

8

4) Control Mode Switch

[8] SW stop/start**<-> CNC stop/start
[7] inner speed controller**<->External speed controller
[6] speed controller**<-> CNC speed controller
[5] PWM Mode** <-> Data Mode
[4] Constant power mode <-> Constant torque mode**
[3] FWD Mode** <-> REV Mode
[2] Motor temperature sensor 'OFF' **<-> sensor 'ON'
[1] Motor stop** <-> Motor start
** Factory Default

5) External control

[1][2] Motor temperature sensor

[3][4][5]Motor speed monitor
It shows actual speed of motor.

[6][7][8]Motor speed adjustment switch
Rotate the button clockwise will increase motor speed. Speed is adjustable from 1,000 to 60,000rpm.

[9][10]Spindle stop/start

6) Motor/Power Jack

[1] Motor connector: W
[2] Motor connector: V
[3] Motor connector: U

[4] Main power in: DC 24V~36V
[5] Main power in: GND

2) Control Panel details

7) Monitor LED

Right hand rotation (FWD.) and left hand rotation (REV.) are as viewed with the cutting facing the operator. With the cutting tool facing the operator right hand rotation (FWD) will be clockwise rotation.
RED: Power
Orange: FWD direction-Right hand rotation
BLUE:REV direction-left hand rotation

8) Digital Indicator

Spindle RPM, PCB TEMP, Spindle TEMP, Spindle working time and error codes are displayed to 2 digits. It will show the data by menu selector.
Spindle RPM-> PCB TEMP-> Spindle TEMP-> Spindle working time

9) MENU selector

Select the data showing in digital indicator by pressing Menu selector. It will show Spindle RPM, PCB TEMP, Spindle TEMP, Spindle working time. And will save the latest showing data.
Caution: Only when the poles of motor are selected correct, the rpm will be correct.
It will be shown on Digital Indicator as follows:
Spindle RPM → PCB TEMP → Spindle TEMP → Spindle

working time** → Spindle RPM →······

**Spindle working time will show 1 when the spindle worked for

100hours. It will show 0 when the spindle worked 10000hours. And will show 1 when the spindle worked 10100hours. The exact **Spindle working time** can be read by manufacturer using a software when the spindle worked over 10000hours.

10)   POLES SW

Select pole of motor by pressing the 'Poles SW'. Press once, showing present poles of spindle. Press again, showing the Original plus one. It will be shown on Digital Indicator as follows:

P1→P2→P3→P4→P5→P6→P7→P1······

It will show the present poles after 2 seconds without pressing the 'Poles SW' again.

11)   Internal Speed Control Switch

Turn the switch clockwise to increase the speed.
The rpm of spindle speed range is 1,000~80,000rpm.

12)   Combo External control

For simple use of External control

5 Changing Fuse

⚠ WARNING
* Before removing fuse make sure that the main power switch is in the off position and the power cord is disconnected from the power supply.
* Make sure and use only the properly rated and type of fuse.
* Failure to use the proper type and rated fuse will result in fire, injury, electric shock and/or product damage.

1)   Remove the fuse holder and fuse

2)   Remove the bad fuse and replace with the proper type and rating of fuse as listed below and determined by the input voltage being used
FUSE:T15A/50V

3)   Replace the fuse holder containing the fuse into the fuse inlet box and make sure it snaps in place.

6 Power connections

Connecting wires to 6) Motor/Power Jack [5],[6] according to reference. Make sure the wires are well tighten.

7 Motor connections

The wires of spindle should be connected to Motor/Power Jack [1]W,[2]V,[3]U. Make sure the wires are well tighten. If the spindle's rotation direction is in-correct, exchange any two wires at same time.

8 Operation procedures

> ⚠ CAUTION
> When the Warning LED [20] flashes, please check the Warning code.

There are three working mode of BLDC-DZZ.

8.1 Mode A. Manual mode1- factory default

12

a) Check the 'control mode switch' before operating. Then connect spindle and power following the manual. We start with 'Constant torque mode'+ 'FWD Mode'.
   Control Mode Switch
[8] SW stop/start**
[7] inner speed controller**
[6] speed controller**
[5] PWM Mode**
[4] Constant torque mode**
[3] FWD Mode**
[2] Motor temperature sensor 'OFF' **
[1] Motor stop**

b) when the power on, there will a 'di' sound heard. Monitor LED 'RED' and 'ORANGE' will light. It shows in 'FWD Mode'.
c) Check poles of spindle
   S4225-B60 is a 2 poles spindle. When pressing 'POLES sw'once, the Digital Indicator will show 'P1'. Digital Indicator will show '00' (rpm) after releasing 'POLES SW' more than 2 seconds. You have choose the right poles** of your spindle.
CAUTION: contact your dealer for info of poles when you choose other brand spindle.

d)**Test run of   'FWD Mode'：**
(1) Switch   '4   [1] Motor stop** <-> Motor start' SW to 'Motor start'. The spindle runs. Digital Indicator shows the rpm of spindle.

(2) Turn 'Internal Speed Control' SW clockwise to increase the speed.

(3) Switch   '4   [1] Motor stop** <-> Motor start' SW to 'Motor stop'.

The spindle runs. Digital Indicator shows the rpm of spindle. The spindle stops. Digital Indicator shows the '00' rpm of spindle

(4) You can select the data showing in digital indicator by pressing 'Menu selector' during the running. It will show Spindle RPM, PCB TEMP, Spindle TEMP, Spindle working time. And will save the latest showing data.
Caution: Only when the poles of motor are selected correct, the rpm will be correct.

13

e) **Test run of 'REV Mode'-** Set Rotating Direction
(1) Switch '4 [3] FWD Mode** <-> REV Mode' to 'REV Mode'. Blue LED will light. It shows in 'REV Mode'.

(2) Switch '4 [1] Motor stop** <-> Motor start' SW to 'Motor stop'. The spindle runs in opposite direction. Digital Indicator shows the rpm of spindle. The spindle stops. Digital Indicator shows the '00' rpm of spindle.

(3) Switch '4 [1] Motor stop** <-> Motor start' SW to 'Motor stop'. The spindle runs. Digital Indicator shows the rpm of spindle. The spindle stops. Digital Indicator shows the '00' rpm of spindle

f) **Test run of** 'Constant power mode'
(1) Switch '4 [4] Constant power mode <-> Constant torque mode** ' to 'Constant power mode'. Turn 'Internal Speed Control' SW clockwise to set the rpm of spindle. Say '06', that means the demanding rpm is 6000rpm.

(2) Switch '4 [1] Motor stop** <-> Motor start' SW to 'Motor stop'. The spindle starts running. The spindle will runs in a higher speed in a short time. Then runs in demanding rpm Constantly. Digital Indicator shows the '06' (6000rpm) of spindle.

(3) Switch '4 [1] Motor stop** <-> Motor start' SW to 'Motor stop'. The spindle runs. Digital Indicator shows the rpm of spindle. The spindle stops. Digital Indicator shows the '00' rpm of spindle.

8.2 Mode B. Manual mode2- operating from an

External control

Connect external devices when power is off:
a)'5) External control'

[1][2] Motor temperature sensor

[3][4][5]Motor speed monitor

[6][7][8]Motor speed adjustment switch

[9][10]Spindle stop/start

b) 'Control Mode Switch'
[7] outer speed controller
[2] sensor 'ON'

c) The following procedure refer 8.1

8.3 Mode C. CNC mode

a) Refer   PC Jack
To computer.
[1] CNC system Power supply +5V
[2] CNC PWM
[3] CNC spindle stop/start
[4] DATA speed control '0'
[5] DATA speed control '1'
[6] DATA speed control '2'
[7] CNC system 'GND'
[8] Emergency stop and speed testing Power supply +5V
[9] NC
[10] NC
[11] NC
[12] speed signal out(to CNC 'speed in')
[13] Emergency stop signal out
[14] Emergency stop and speed testing 'GND'
b) Control Mode Switch
[8] CNC stop/start
[6] CNC speed controller
[5] Data Mode

c) Operations refers relative info of pc manual.

9 Protection Function

9.1 Warning functions

BLDC-DZZ will show warning code in 'Digital Indicator' when power on. Referring Table1 below.

9.2 Tempreture protection

a) BLDC-DZZ Tempreture protection--actory default
The fan will run when temp is 55℃. It stops when temp is 45℃. The spindle will stop running when temp is 65℃. The warning code 'F4' will be shown in the 'Digital Indicator', When temp is under 55℃,Pressing 'MEMU' and 'POLES' at same time will cancel the protection function.

b) Spindle Tempreture protection
'Control Mode Switch'
[2] sensor 'ON'

The spindle will stop running when temp is 75℃. The warning code 'F4' will be shown in the 'Digital Indicator'. When temp is under 65℃,Pressing 'MEMU' and 'POLES' at same time will cancel the protection function.

9.3 DC in protection

The built-in protection circuit will reduce the damage of BLDC-DZZ when power supply is wrong polarity.

9.4 Low voltage protection

The warning code 'F1' will be shown in the 'Digital Indicator', When power supply is under 24V. All operations are disable.

10 Trouble shooting

If a problem or concern occurs, please check the following prior to consulting your dealer.

Table 1

Trouble	Cause	Inspection/Corrective
No display	Power is not supplied. ;	Check power supply or connections to power supply.
	Fuse is broken	Change new one
Rpm is not displayed correctly.	The poles of spindle is not right with the BLDC-DZZ	Choose the right 'POLES' according the info of spindle
Warning code 'F1' when power on	Low voltage of power supply	The working voltage is 24~36V. Checking the connections.
Warning code 'F2' when power on	Control Mode Switch [1] is in 'Motor start'	Control Mode Switch [1] in 'Motor stop'
Warning code 'F2' when running	Load level too high.	Reduce load level
Warning code 'F3' when running	The spindle is stall	Check mechanical problems
Warning code 'F4' when running	The temp of spindle is high	Check the air pressure.

⚠ CAUTION

1 BLDC-DZZ is designed for brushless spindle. Never used with AC spindle.
2 Our spindle can not work with an AC inverter.