



Selection Guidance

of VD Series Inverter

Braking Unit

and Resistance

Hunan VicRuns Electric Technology Co., Ltd

Selection Guidance of VD Series Inverter Braking Unit and Resistance

Keywords: VD series user manual, brake resistance, external brake unit, fault diagnosis

1. Overview

Frequency inverter In the process of running, if the controlled motor speed drops too fast, or the motor load inertia is too large, the electromotive force can be charge the internal capacitance of the frequency inverter through reverse the frequency inverter, which can cause the voltage pump to rise at both ends of the power module, causing the inverter to be damaged easily. Inverter internal control will be based on the load on this situation over-voltage suppression, when the braking performance can not meet customer requirements, an external braking resistor is required to achieve timely release of energy. External braking resistor is energy consumption braking mode, its energy will be all consumed in the power braking resistor. Therefore, the braking resistor power and resistance selection must be reasonable and effective.



VicRuns VD300, VD500, VD520, VD530, VD560 series inverter with built-in brake unit in 15G and below, 18.5G ~ 110G optional built-in brake unit, need to order a single order. It is also possible to externally connect an external brake unit (external brake units are recommended for heavy-duty applications, such as mine lifting equipment, tower cranes, and some crane lifting equipment), but they cannot exist at the same time (not built-in and external brake units). Only external brake units can be used for 132G and above. The braking unit and braking resistor resistance and power recommended by VicRuns Inverter are described below. Depending on the load, the user can change the resistance as appropriate, but it needs to meet the range required by VicRuns.

2. The power of the braking resistor and the selection of braking unit

Theoretically, braking resistor power is the same with braking power, but in consideration that the de-rating is 70%.

According to formula: $0.7Pr = Pb \cdot D$

Pr----power of resistor

ED----braking frequency (percentage of regenerating process account for the complete process)

Elevator----20%~30%

Electric hoist, driving----30%~40%

Tower crane, gantry crane and other lifting equipment ----- 40%~50%

Mining lifting equipment----45%~50%

Uncoiling and recoiling----20%~30%

Centrifuge----50%~60%

Accidental braking loading----5%

General take 10%

(Note: The following table lists the 220V ~ 250V, 380V ~ 440 voltage of the two machines corresponding to the brake unit and brake resistor selection reference, not absolute, the actual selection of some special site need special instructions)

Table 1 Frequency Inverter Brake Component Selection Table

Inverter Model	Braking Unit	Braking Resistor			
		ED=10% Resistance power	ED=20% Resistance power	ED=40% Resistance power	Brake resistance value
Single-phase 220VAC 50/60Hz					
VD300-2S-0.7GB	Standard built-in	80W	200W	400W	≥150Ω
VD300-2S-1.5GB		100W	200W	500W	≥100Ω
VD300-2S-2.2GB		200W	400W	800W	≥70Ω
VD300-2S-3.7GB		300W	600W	1000W	≥40Ω
VD300-2S-5.5GB		500W	1000W	1800W	≥25Ω
Three-phase 380VAC 50/60Hz					
VD300-4T-0.7GB	Standard built-in	150W	300W	800W	≥300Ω
VD300-4T-1.5GB		150W	400W	1000W	≥220Ω
VD300-4T-2.2GB		250W	500W	1200W	≥200Ω
VD300-4T-3.7GB/5.5PB		300W	600W	1500W	≥130Ω
VD300-4T-5.5GB/7.5PB		400W	800W	2000W	≥90Ω
VD300-4T-7.5GB/11PB		500W	1000W	2500W	≥65Ω
VD300-4T-11GB/15PB		800W	1500W	2000W	≥43Ω
VD300-4T-15GB/18.5PB		1000W	1800W	2500W	≥32Ω
VD300-4T-18.5G/22P	External VDBU-4T-70G / optional built-in	1300W	2500W	4000W	≥25Ω
VD300-4T-22G/30P		1500W	3000W	5000W	≥22Ω
VD300-4T-30G/37P		2500W	4000W	6000W	≥16Ω
VD300-4T-37G/45P		3.7kW	4.5kW	8.0KW	≥16Ω
VD300-4T-45G/55P	External VDBU-4T-110G / optional built-in	4.5kW	6.0KW	12.0KW	≥15Ω
VD300-4T-55G/75P		5.5kW	8.0KW	15.0KW	≥9.0Ω
VD300-4T-75G/90P		7.5kW	12.0KW	20.0KW	≥8.0Ω
VD300-4T-90G/110P	External VDBU-4T-160G / optional built-in	10.0kW	18.0KW	30.0KW	≥6.5Ω
VD300-4T-110G/132P		15.0kW	22.0KW	45.0KW	≥5.0Ω
VD300-4T-132G/160P	External VDBU-4T-250G	15.0kW	30.0KW	65.0KW	≥4.0Ω
VD300-4T-160G/185P		18.0kW	37.0KW	72.0KW	≥3.5Ω
VD300-4T-185G/200P	External	22.0kW	45.0KW	95.0KW	≥3.2Ω

VD300-4T-200G/220P	VDBU-4T-330G	25.0kW	50.0KW	120.0KW	$\geq 2.9\Omega$
VD300-4T-220G/250P		28.0kW	56.0KW	140.0KW	$\geq 2.7\Omega$
VD300-4T-250G/280P		32.0KWkW	64.0KW	160.0KW	$\geq 2.3\Omega$
VD300-4T-280G/315P	External VDBU-4T-600G	36.0kW	75.0KW	180.0KW	$\geq 2.1\Omega$
VD300-4T-315G/355P		40.0kW	80.0KW	200.0KW	$\geq 1.9\Omega$
VD300-4T-355G/400P		45.0kW	90.0KW	220.0KW	$\geq 1.7\Omega$
VD300-4T-400G/450P		50.0kW	100.0KW	250.0KW	$\geq 1.5\Omega$
VD300-4T-450G/500P	External VDBU-4T-800G	60.0kW	120.0KW	280.0KW	$\geq 1.3\Omega$

3. Check

The external brake units have been subjected to strict testing and quality inspection before leaving the factory. After purchase, please check the packaging of the product, the specification of the product, and whether the model is the same as the order. If you have any questions, please contact VicRuns supplier.

4. Installation

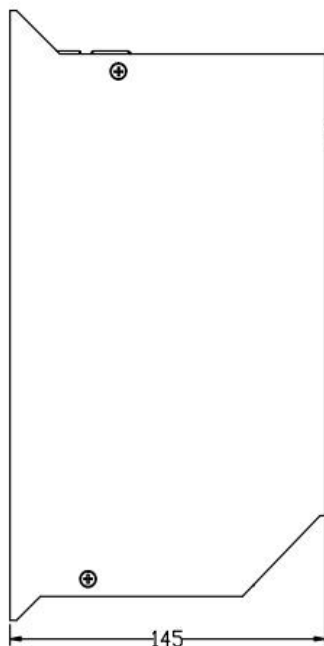
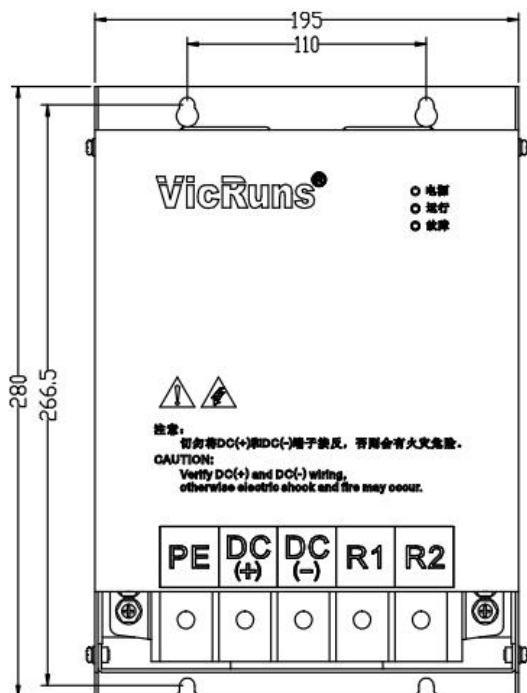
4.1 The use of the environment

In order to ensure that the external brake unit can be safe and reliable long-term work, the use of the surrounding environment should meet the following conditions:

- 1) Ambient temperature $0^{\circ}\text{C} \sim 40^{\circ}\text{C}$, if exceeded, according to each increase 1°C derating 3% of the proportion of derating;
- 2) Below the altitude of 1000m, if more than, please press each more than 100m derating the proportion of 1% derating;
- 3) To prevent electromagnetic interference, away from interference sources;
- 4) To prevent dust, cotton batting, metal powder and oil, salt and corrosive gases into;
- 5) Do not use the brake unit in a hazardous environment with flammable, combustible, explosive gas, liquid or solid;
- 6) To avoid the use of the brake unit in the occasion of the high temperature and humidity, direct sunlight, rain dripping, humidity greater than 90%;
- 7) Avoid vibration

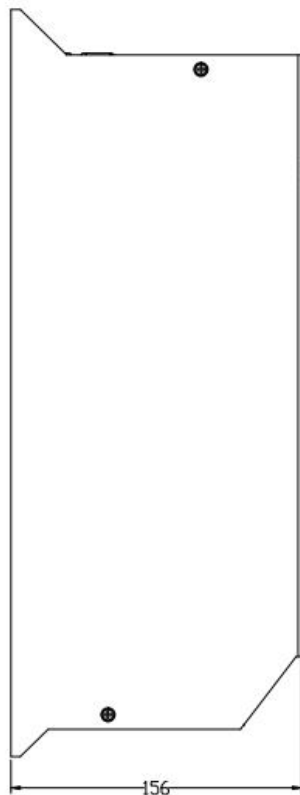
4.2 Outline dimension

This
applies



structure
to

VDBU-4T-70G~VDBU-4T-330G



This structure applies to VDBU-4T-600G~VDBU-4T-800G

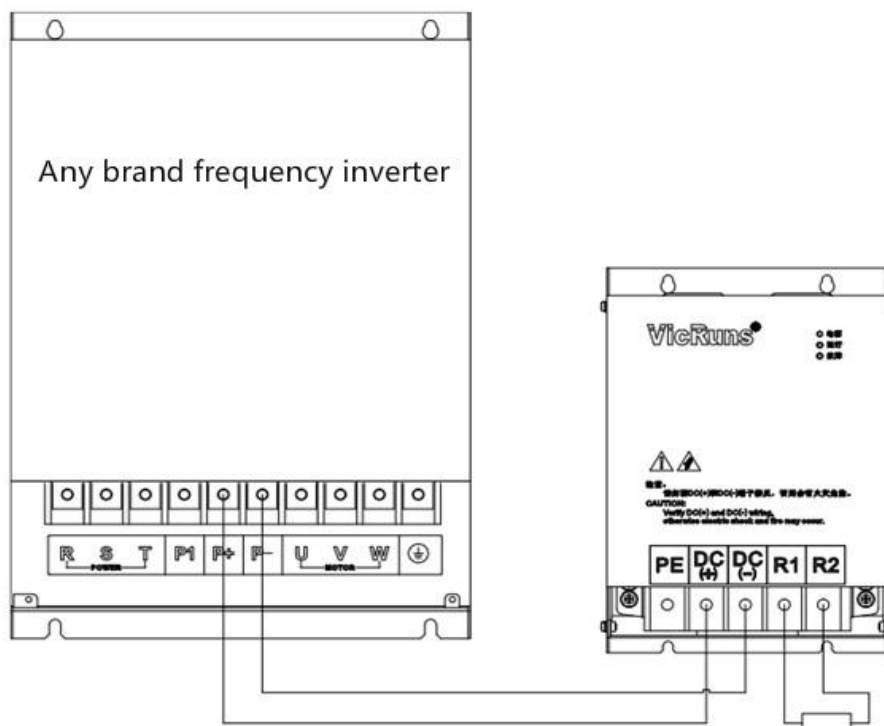
4.3 Brake unit main circuit terminal and control terminal description

PE	DC (+)	DC (-)	R1	R2
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Main circuit terminal

Note:

1. Positive and negative terminals corresponding to the positive and negative bus of frequency inverter, the length of the cable should be less than 5m;
2. R1, R2 connection braking resistor, no polarity requirements, the length of the connection between the braking resistor and braking unit should be less than 10m.

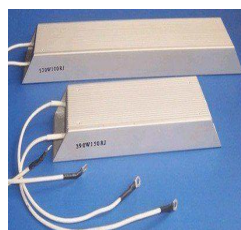


4.4 Brake unit control terminal description

RA	RB	RC
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Control circuit terminal (inside the chassis)

Note: RA: relay common terminal; RB: normally closed contact; RC: normally open contact; relay capacity: 3A



VicRuns VDBU brake unit

Aluminum housing brake resistor

Ceramic ripple braking resistor

Stainless steel brake resistor

5. Naming rules

VDBU – 4T –160G

A

B

C

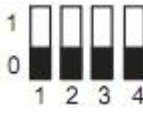
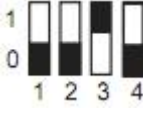
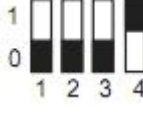
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Field Description: Table 2 Product Model Field Description

Field Identifier	Field Details Description
A	VDBU: VicRuns brake unit
B	2S: Adapted to the line voltage 220V±15% inverter 4T: Adapted to the line voltage 380V±15% inverter 7T: Adapted to the line voltage 690V±15% inverter
C	Rated current (A)
D	G: heavy load type

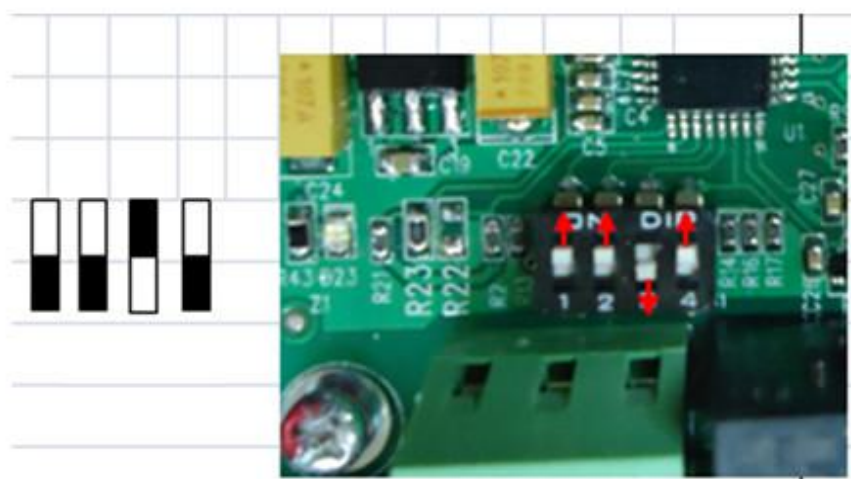
6. External brake unit voltage level selection setting

Select the starting braking voltage by different combinations of DIP switches, as follows:

Number	DIP	220V	380V	690V
1		350	640	1040
2		360	660	1060
3		370	680	1080
4 (Factory default)		380	700	1100
5		390	720	1120

6	1 0 1 2 3 4	400	740	1140
7	1 0 1 2 3 4	410	760	1160
8	1 0 1 2 3 4	420	780	1180

(Note: the black in the above table is off, blank white is closed, that is, 0 is black off, 1 is white closed, the following figure shows the jump position of the actual brake unit 700V when braking voltage)



For example, if you want to set the brake voltage to 680V, you only need to jump 2 and 3 dial positions are reversed, jump 1 and 2 can be the same.

7. Selection specification

7.1 Brake voltage selection

Voltage level	AC grid voltage (Vac)	Recommended starting braking voltage (Vdc)
4T	340	640
4T	360	660
4T	380	700 (Factory default)
4T	400	720
4T	420	740
4T	440	760

4T	460	780
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8. Maintenance and fault diagnosis of external brake unit

Number	Fault state	Reason	Solution
1	The brake resistance is very hot	Brake unit IGBT short circuit	Replace the brake unit
		Brake voltage selection error	Depending on the actual, select the correct brake voltage
		Brake unit fault	Replace the brake unit
		Braking resistor selection error	Re-select the braking resistor
2	The frequency inverter report overvoltage fault	Braking resistor selection problem, lack of braking force	Recalculate the selected braking resistor
		Inverter parameter setting is unreasonable	The overvoltage suppression protection is prohibited (If VD300 is P13.12 = 0, VD520 is F8-07 = 0)
		Brake voltage selection does not match	Reset the brake voltage, set a small block
		Brake unit fault	Replace the brake unit
3	Overtemperature relay action	IGBT temperature reach to 80℃	Braking rate is too high to strengthen the heat dissipation
4	The fault light is on	Braking resistor short circuit	Eliminate short circuit
		IGBT damage	Replace the brake unit

9. Application pictures

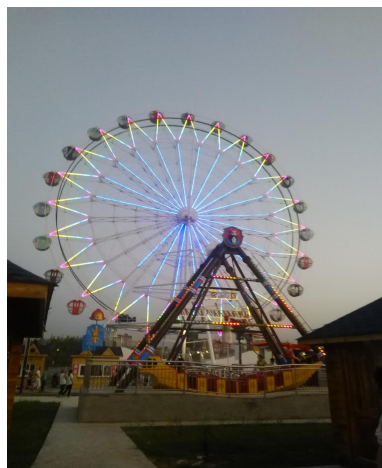


Fig. Application of VicRuns frequency inverter in pirate ship

Vicruns Electric (Shenzhen) Co., Ltd.

◆ **Company Introduce**

Vicruns Electric Technology Co., Ltd. is a company committed to the inverter, servo drives, mining equipment and construction machinery and other industries special drive and control system for R & D, production, sales and service. In a variety of harsh and special environment for the user to provide lasting and reliable standardized and personalized solutions.

The company is a national high-tech enterprises, software companies. With rich standard drives, motor control and industry special series products, all products have independent intellectual property rights, master of the high performance vector control, torque control, servo technique of permanent magnet synchronous motor technology core platform technology.

The company has more than 20 sales branches and 10 stock centers, products are widely used in electric power, mining, metallurgy, petroleum, chemical industry, building materials, lifting, machine tools, textile, paper making, packaging, light industrial, municipal and factory automation and other industries.

We target is to reduce the customer's use and maintenance cost, with the wisdom of science and technology to meet expectations, create new value, enhance customer competitiveness.

Main achievements:

- China's first creator of the super power permanent magnet synchronous motor drive.
- Professional converter production enterprises with famous brand.
- The inverter production enterprises with frequency conversion engineering technology centers recognized by the official.
- First by the Scientific and Technological Department of the identification, the overall technical level in the domestic leading vector inverter.

◆ **Development History**

2006 Year	Vicruns Electric Technology Co., Ltd. was established.
2007 Year	Through "The recognition of hi-tech enterprises" certification.
2008 Year	Through "The software enterprises" certification;
2009 Year	Set up more than 20 sales branches and technical service centers;

2010 Year	Won the science and technology program of ministry of science and technology; Won the "Hunan Famous Trademark" honour.
2011 Year	Obtain five software copyright, a number of patents; Obtain provincial science and technology key projects; Access to the national development and reform commission (NDRC) support of special funds.
2012 Year	Won the most development potential of the ten major brands; VD500 series products won "The Most Competitive Product" honour; Approved by the municipal frequency conversion engineering technology center.
2013 Year	Obtain National torch plan project; Obtain municipal science and technology key projects; Obtain City Science and Technology Progress award.
2014 Year	Obtain five software copyright and a patent; Launch of the first domestic large power permanent magnet synchronous motor drive, used in military armored vehicles.

◆ Product Introduction

Now Vicruns inverter series products, divided into VD300 series general-purpose, VD500 series high-performance type, VD600 series high-end drives, VD100 economical products in four categories. Covered with low pressure, medium pressure full power and meet the needs of the frequency conversion speed control of multiple industries.

Product main function features:

- | | |
|---------------------------------|--|
| 1. 0-3200Hz speed range | 2. 0-1000kW power range |
| 3. Low speed high torque | 4. Current vector control |
| 5. Fast brake | 6. Open loop, closed loop control |
| 7. Speed tracking | 8. Adapter asynchronous motor, synchronous motor |
| 9. Air cooling heat dissipation | 10. Water cooling heat dissipation |

High quality raw material support:

- CPU adopt 28034、28232、28335 chip from TI company;
- IC of main control panel adopt from TI、ON、AVAGO、Toshiba company etc;
- Chip resistor、capacitance adopt from YAGEO、TDK company;
- Terminal adopt from Oulu and Temile(famous brand in China), the terminal number have print on PCB panel directly, convenient to connect;

- Relay using the United States Tyco products;
- Capacitance with Japan ruby is the most high-end YXG series;
- The IGBT module uses the "Infineon", Jiaxing star brand;
- The cooling fan used Sanly, Delta, ADDA brand;
- The electrolytic capacitor used domestic famous brand --- Jianghai;
- Three - paint imported from Germany (Alantas) Bectron PL 4122 three paint.

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