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Technical innovation benefits the world
RENLE Science & technology

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RENLE

RNB6000 SERIES

FREQUENCY INVERTER

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About RENLE

Shanghai RENLE Science & Technology Co., Ltd. is one large industrial enterprise for capital operation, brand operation, and industry operation and so on. RENLE is specialized in the production of LV/MV/HV motor soft starter, LV/MV/HV frequency converter, intelligent electric equipment, new energy electric equipment and complete sets of LV/HV transmission and distribution equipments.

National key projects

Expo 2010 Shanghai China, 2008 Beijing Olympic Games, Yangshan Deepwater Port Project of Shanghai International Shipping Center, Shanghai Pudong Airport, Shanghai Hongqiao Airport, the Three Gorges Project, Gansu Satellite Launching Center, South-to-North Water Diversion Project, West-to-East Natural Gas Transmission Project, China National Petroleum Corp. and SINOPEC etc.

Manufacturer of intelligent power grid and new energy electric








RENLE

RNB6000 SERIES
FREQUENCY INVERTER

Type introduction:

RN-B-6-000

- Power
- 6000 Series
- Frequency inverter
- Manufacturer：RENLE

Note:
The brake unit and DC reactor are both external configuration as optional accessories.

The relation between the altitude and the output derating

Altitude (meter)	Output current derating rate
Below 1000	1.00
1000 −1500	0.97
1500 − 2000	0.95
2000 − 2500	0.91
2500 − 3000	0.88

Unique product performance

Newest space vector technology

Excellent vector algorithm guarantees the big torque for low frequency in premise of lowest switch loss. High efficiency power voltage availability and optimized sine wave output will reduce its working noise and heat of motor.

Unique software dead-zone compensation

Dead-zone time is the cause of low frequency pulsation torque. RNB6000 unique software dead-zone compensation guarantees stable torque characteristics with low frequency and extremely low speed.

Excellent speed tracking self-starting without speed sensor

Start the running motor to guarantee the user's equipment to keep stable running. RNB6000 can automatically recognize the speed to realize stable speed tracking.

Automatic energy saving running

Unique software power factor regulation which will regulate the power factor dynamically according to the change of load so as to save much energy.

Voltage fluctuation control

Automatic voltage control (AVC) could guarantee the output voltage vibration is within ±5 % when the input voltage vibration is within ±20% .

Complete protection function

Overvoltage, overcurrent, undervoltage, IGBT short-circuit, inverse time limit overload protecting design. And it can realize safe protection under short-circuit load and grounding.

DC power supply

Save the power supply investment.

Built-in flexible PWM energy consumption braking.

The user selects the suitable braking resistor to realize energy consumption braking conveniently.

Friendly HMI and flexible input & output interface port

LCD Chinese-English display, supply 7 routines digital input, 2 routines analog output, 3 routines digital output, and multi-speed programmable running.

Intelligent temperature detection and fan management

DC braking

Power loss ride- through

Detailed specification

Serial No.	Type	Rate current	Rated voltage	General application		Heavy load application		The calculated total power loss (W)
				Rate current	Applicable motor power	Rate current	Applicable motor power	
1	RNB6001	4.1	~380	4.1	1.5	3.2	1.1	52
2	RNB6002	5.6		5.6	2.2	4.1	1.5	67
3	RNB6003	7.2		7.2	3.0	5.6	1.5	81
4	RNB6004	10.0		10.0	4.0	7.2	2.2	103
5	RNB6005	13.0		13.0	5.5	10.0	4.0	142
6	RNB6007	16.0		16.0	7.5	13.0	5.5	204
7	RNB6011	24.0		24.0	11	16.0	7.5	295
8	RNB6015	32.0		32.0	15	24.0	11	450
9	RNB6018	37.5		37.5	18.5	32.0	15	540
10	RNB6022	44.0		44.0	22	37.5	18.5	660
11	RNB6030	61.0		61.0	30	44.0	22	900
12	RNB6037	73.0		73.0	37	61.0	30	1100
13	RNB6045	90.0		90.0	45	73.0	37	1350
14	RNB6055	106		106	55	90.0	45	1650
15	RNB6075	147		147	75	106	55	2250
16	RNB6090	177		177	90	147	75	2700
17	RNB6110	212		212	110	177	90	3300
18	RNB6132	260		260	131	212	110	3960
19	RNB6160	315		315	160	260	132	4800
20	RNB6200	368		368	200	315	160	6000
21	RNB6250	480		480	250	368	200	7500
22	RNB6315	600		600	315	480	250	9450
23	RNB6400	760		760	400	600	315	12000
24	RNB6500	972		972	500	760	400	15000

Product technical specification

	Item	Standard
Input	Power supply	3 phase 380V 50/60Hz
	input voltage range	Voltage：±20%，Voltage imbalance ratio：<3%；Frequency：±5%
Output	Applicable motor capacity	1.5~315kW（Constant torque application）
	Rated current output	4.0~600A（Constant torque application）
	Rated voltage	3 phase 380V 50/60Hz
	frequency range	0 ~ 600Hz
	Setting resolution	• Analog setting：0.4% of the maximum setting frequency • Digital setting：0.01Hz（ below 100Hz）；0.1Hz（above 100Hz）
	Frequency precision	• Analog setting：±0.2%（25±10℃） • Digital setting：±0.01%（−10 ~ +50℃）
	Over current withstand capacity	150% rated output current for 1 Min.

Control	Control type	Optimized space vector SPWM
	Torque compensation	Automatic torque arising for starting, which will reach 150%
	Slip compensation	Compensate the speed drop when driving the load in order to enhance the mechanical characteristic hardness
	Restarting when instant power supply failure	It can restart when the power recovers after momentary outage
	Upper and lower frequency	Set the upper frequency and lower frequency
	Skip frequency	Set 3 groups of skip frequency
	Speed tracking restarting	The running motor can change to variable frequency in operation with no need to stop
	Acceleration and deceleration time	0.1 ~ 999.9sec, time for acceleration and deceleration can be set independently
	Acceleration and deceleration integral type	The available linear line, S1 and S2 curve, which will satisfy multi-purpose demand
	Running operation mode	Keyboard operation; keyboard control; communication operation; digital input operation and analog input control Serial communication: controlled by upper machine through the RS485 port
	Stop mode	Free stop, deceleration stop and deceleration with DC braking stop
	Low noise running control	Adjust the frequency from 1KHz to 6KHz to reduce the running noise.
	PID closed-loop control	It is available application for different closed-loop control system such as flow, pressure, temperature
	Frequency setting	• Keyboard setting: use ▲ and ▼ keys to set. • Analog input signal setting(potential setting): with 0 ~ 10VDC voltage signal, 0 ~ 20mA, 4~20mA current signal setting • Multi-step frequency selection setting: Configurated by the digital input to select the 1 ~ 7 running frequency
	Running status output signal	• Relay output: running status, fault status and monitoring status are available. • Analogue output: available to select related parameters like frequency, current, voltage, speed and so on.
Display	Running/stop	Display frequency, current and so on
	Setting mode	Display the set menu No. or set parameter value
	Function operation mode	Display the operating function information and warning information.
	Alarm and fault mode	Display all the alarms and fault codes
Protection	Overload protection	Monitor the output load current of frequency inverter to protect the frequency inverter.
	Overvoltage protection	Monitor the overvoltage of DC bus to protect the frequency inverter.
	Surge voltage protection	When power line-to-line or line-to-grounding exists the surge voltage, this function will protect the frequency inverter
	Under voltage protection	Monitor the fall of DC bus voltage, when the voltage is lower than the setting level of n608, it can protect the frequency inverter
	Overheat protection	Monitor the temperature increment of the heat sink. Once the temperature exceeds the setting, this function will protect the frequency inverter
	Short-circuit protection	Short-circuit or overcurrent of frequency output side, this protection will protect frequency inverter.
	Short-circuit to grounding protection	When Short-circuit to grounding happens on output side of frequency inverter, this function will protect frequency inverter
	Motor overheat protection	The frequency inverter will use electronic relay to carry out the motor overload protection
	Over current protection	100 ~ 150%(Adjustable)
	Grounding protection	The frequency inverter will stop when the current is more than 80%Ie
Environment	Application site	• Indoor, the altitude is less than 1000m. It requests no corrosive gas, no flammable gas, no dust, no oil mist, no water drop. Prohibit direct sunshine without strong magnetic field interference
	Application temperature	-10℃ ~ 40℃
	Application temperature	5~95%RH（No frost）
	Vibration	≤0.5g
	Storage temperature	-25℃ ~ +65℃

Terminal function

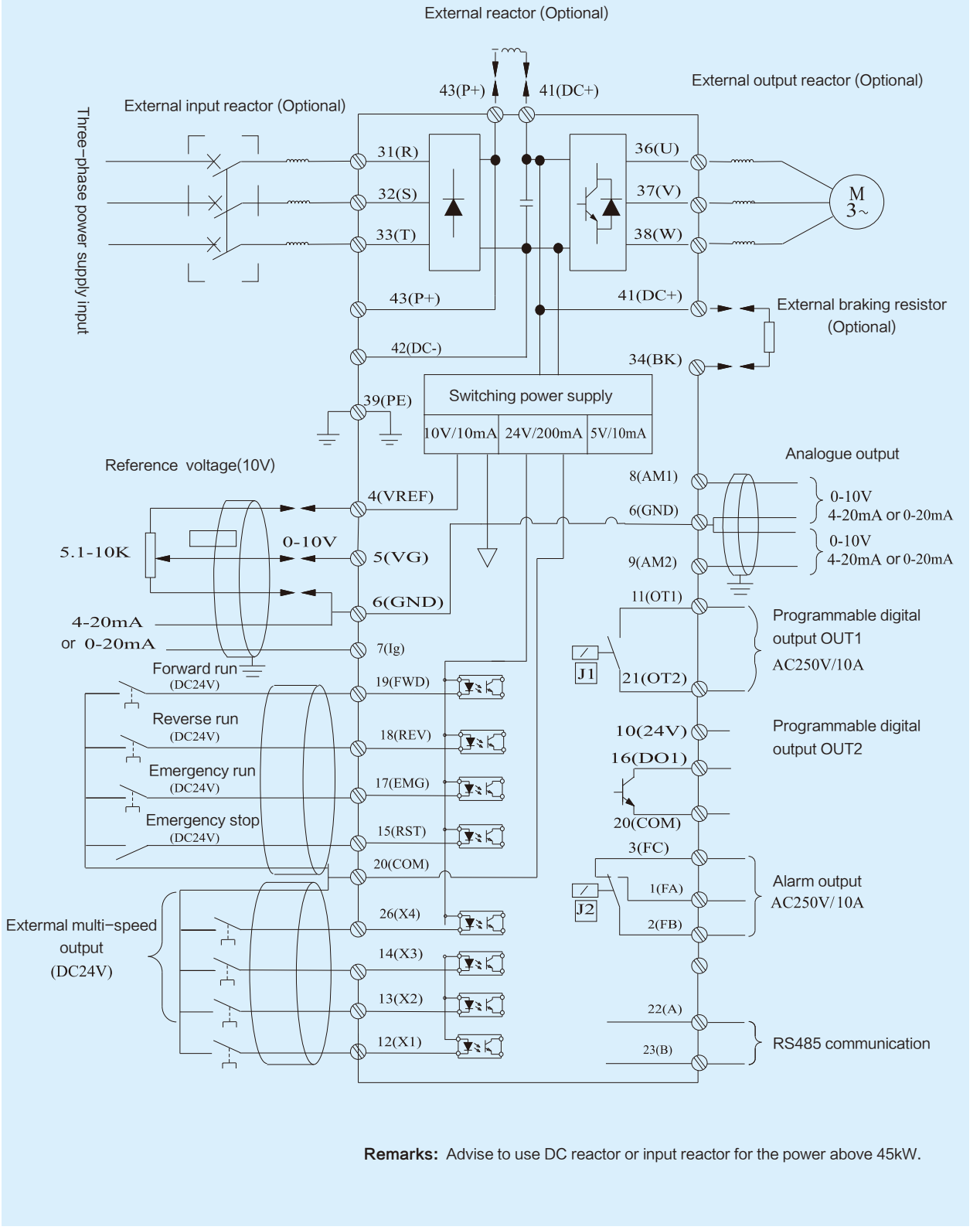
Function description of control terminal

Terminal Code		Terminal name	Instruction
4	VREF	Power supply for potential meter	Power supply(+10VDC) of frequency setting potential meter(5–10k)
5	VG	Voltage input of frequency setting	(1) Connect the external analog input voltage command to set the frequency 0–10V/ 0–100% resolution 10bit input precision is 1% (2) input the feedback signal of PID control (input resistor 20K)
7	IG	Current input of frequency setting	(1) Connect the external current to set frequency 4–20mA (or 0–20mA)/0–100% (2) input the feedback signal of PID control, resolution of 10bit input precision is 1% (input resistor 250Ω)
6	GND	Digital/Analog signal common	The common terminal of analog input/output signal
12 13 14 26	X1 X2 X3 X4	External multi–purpose terminal	(1) 12、13、14 connect with 20 to form external 7 steps setting frequency. (See the detailed instruction) (2) X1、X2 JOG potential meter (3) Extension function(See the detailed instruction)
15	RST	Reset	15 connects with 20 to reset the frequency inverter
17	EMG	Emergency stop	17 connects with 20 to make the motor stop freely, the electric level is 24VDC
18	REV	Reverse	REV–COM close(ON)，reverse running，open(OFF)，deceleration to stop
19	FWD	Forward	FWD–COM (ON)，(Forward running)，(OFF)，deceleration to stop
20	COM	Control signal common	
10	24V	Control signal power	Available to be offered by the external power(24VDC, current <200mA)
8	AM1	Analog output	Output current, voltage and frequency signal (GND is common terminal) terminal output level is 0– V electric level
9	AM		Output current, voltage and frequency signal (GND is common terminal) terminal output signal is 4–20mA(or 0 – 20mA)
11 21	OT1 OT2	Programmable output	Output relay signal of the start/stop, reaching the given frequency(open – loop), exceeding preset frequency, less than preset frequency, the contact capacity: AC 250V A
16	DO1	Programmable output	Output the signal of the start/stop, reaching the given frequency(open–loop), exceeding preset frequency, less than preset frequency, open collector signal output, electrical level 24 VDC, current < 100mA. Voltage withstand 50V
22 23	A B	Signal output	RS485 communication
1 2 3	FA FB FC	Fault relay output	When the frequency inverter stops because of alarm caused by overcurrent, over voltage, undervoltage, overheat, overload, short–circuit. The fault relay output contact (1.2.3) will output the alarm signal. If the alarms occur, the alarms need to be reset according to the manual.Contact capacity: AC250V10A

System control function

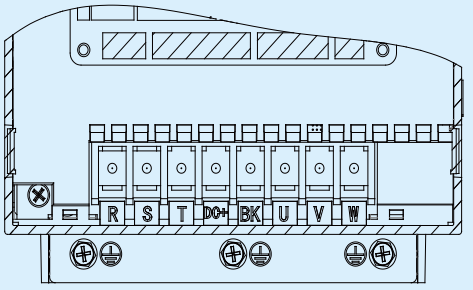
Input control	output control
• Analog input： Voltage input：(0 – 10V) 1 loop Current input：4 ~ 20mA or 0 ~ 20mA 1loop	• Analog output：Two loops (Programmable output) (See function table) 0 ~ 10VOutput 4 ~ 20mA or 0 ~ 20mA output 2 loops programmable terminal can output the voltage, current, power and frequency.
• Digital input：8 loops 1 loop for Forward, 1 loop for reverse, 1 loop for emergency stop and 1 loop for reset Programmable point：4 loops (See the function table)	• digital output：3 loops Fault output relay: 1 loop (see function table) Programmable digital output: 2 loops (See function table)

Wiring diagram

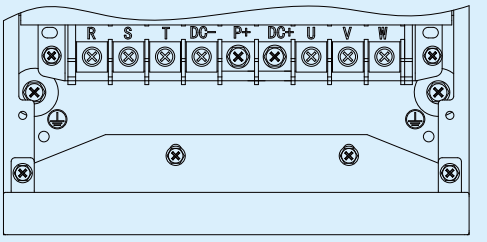


Remarks: Advise to use DC reactor or input reactor for the power above 45kW.

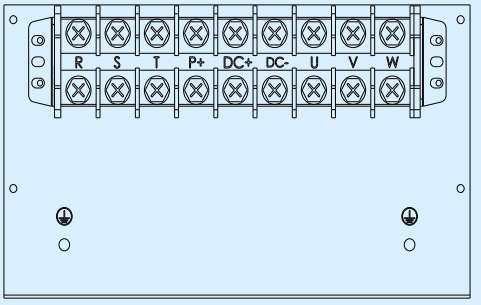
Diagrammatic sketch for main circuit terminal



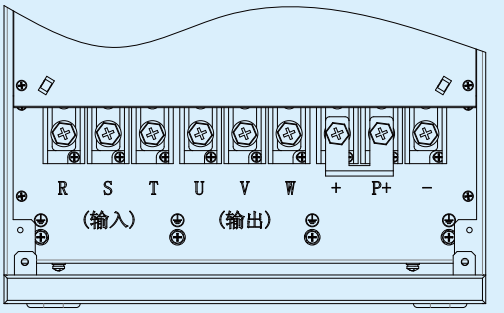
Below 11kW



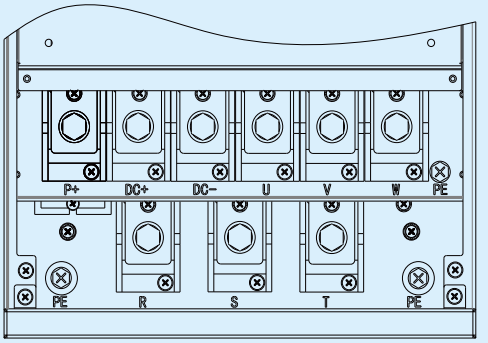
15-37kW



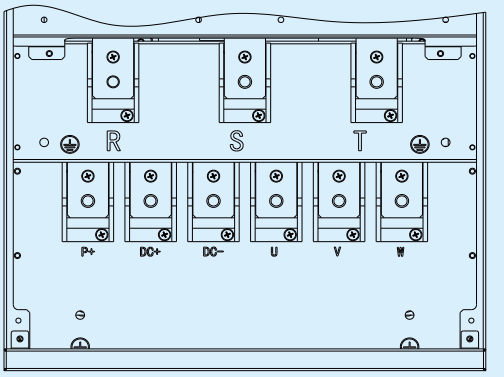
45-55kW



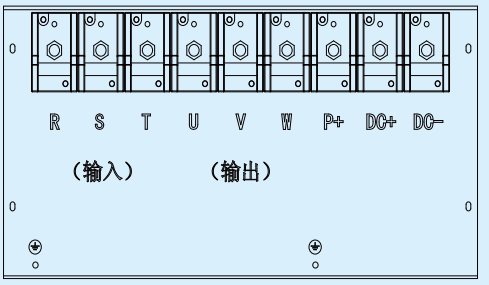
75-90kW



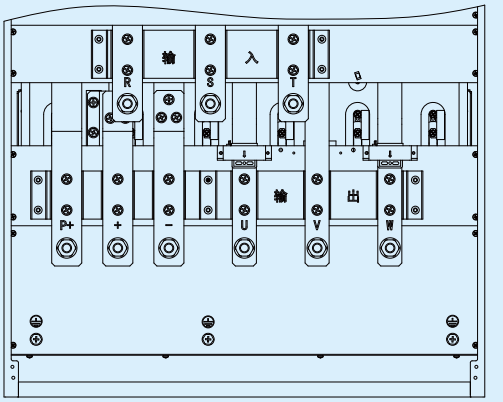
110-132kW



160-200kW



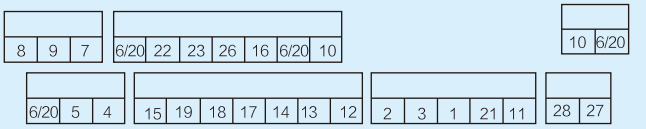
250-315kW



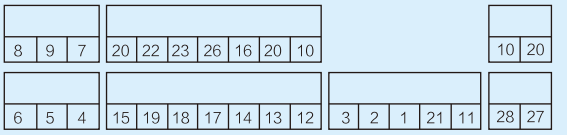
400-500kW

Wiring terminal layout

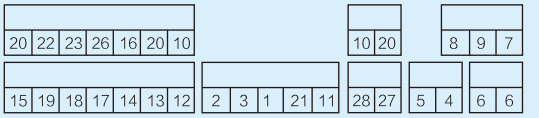
1) Applicable power section:
1.5 ~ 11kW



2) Applicable power section:
15 ~ 55kW

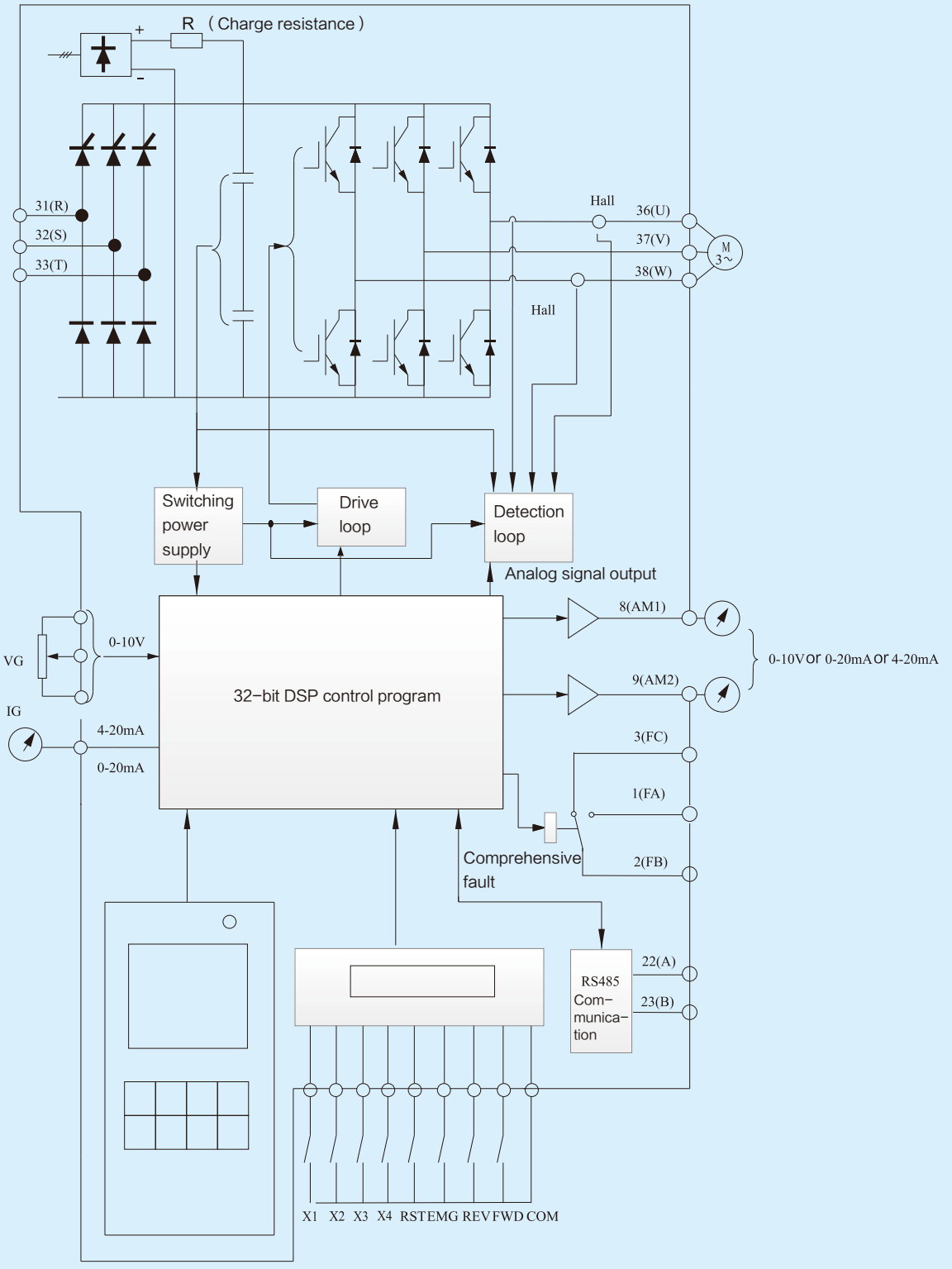


3) Applicable power section:
75 ~ 500kW

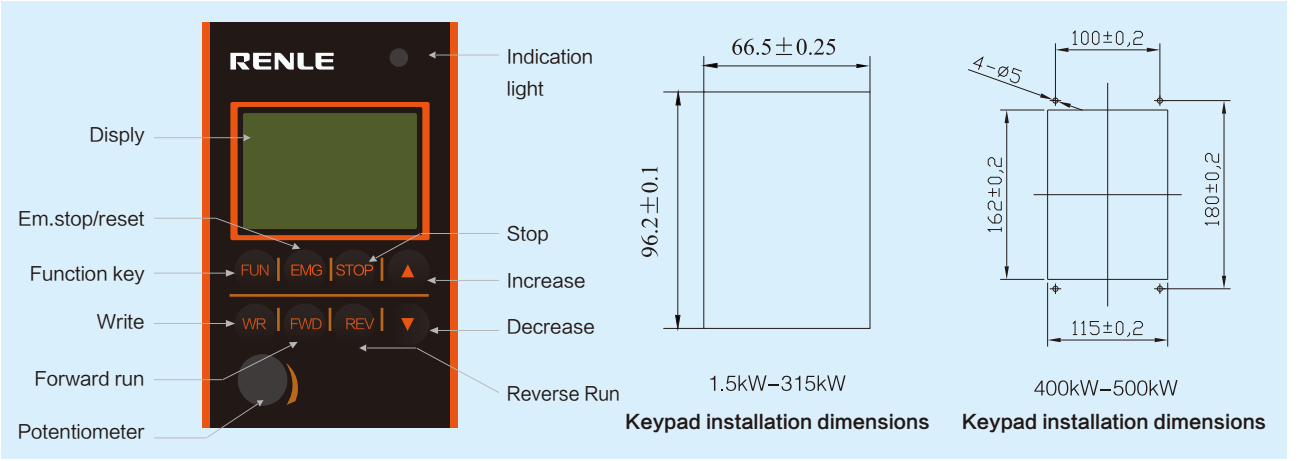


Terminal Code		Terminal Name
1	FA	Fault relay output
2	FB	
3	FC	
4	VRBF	Power supply for potential meter
5	VG	Voltage input of frequency setting
6	GND	Digital / Analog signal common
7	Ig	Current input of frequency setting
8	AM1	Analog output
9	AM2	
10	24V	Control signal power
11	OT1	Programmable OUT1
21	OT2	
12	X1	External multi−purpose terminal
13	X2	
14	X3	
26	X4	
15	RST	Reset
16	D01	Programmable OUT2
17	EMG	Emergency stop
18	REV	Reverse
19	FWD	Forward
20	COM	Control signal common
22	A	RS485 Signal output
23	B	

Internal schematic diagram



Operation keyboard



The keyboard panel can display English and Chinese. The keyboard panel has abundant functions, such as the keyboard panel running (frequency setting, running/stop command), function code data confirmation and change with many confirmation functions. Please operate the equipment after understanding the function operation completely.

- Indication lamp: Indicate the frequency inverter status.
  a. Green lamp flashing: indicate that the inverter is forward running;
  b. Red lamp flashing: indicate that the inverter is reverse running
  c. Alternating flashing between red lamp and green lamp: Indicate the fault happens in frequency inverter
- Display: LCD display is used to display frequency, motor current, DC voltage, synchronous speed, temperature and so on. And it also displays the reason of stop because of protection activation. Moreover, It displays function codes and data codes set by the program.
- Stop key: it is used to interchange main monitoring value display under the status of regular motor stop or stop status.
- Value increased key: it is used to search for the function code or modify the parameters (To constantly press this key will make it to be with automatic step-distance recognition function)
- Value decreased key: It is used to search for the function code or modify the parameters (To constantly press this key will make it to be with automatic step-distance recognition function)
- Emergency stop/reset key: It is used to stop freely and reset fault .
- Function key: It is used for transferring window between function code and function parameter. Pressing the key for one time will transfer one time.
- Input key: It is used to confirm (store) parameter or interchange the display of main monitoring value under running state.

Note Item:

When the frequency inverter is controlled by the contactor or use the output relay of the frequency inverter to control the contactor, the R-C damping loop should be connected with the loop of AC contactor. The DC contactor should be added with the fly-wheel diode.

⚠ Note:

Please confirm that the input power phase number of frequency inverter, rated input voltage should comply with phase and voltage value of AC power number. The frequency inverter just needs three phase AC power supply. The zero wire can not be wired into frequency inverter in any way.

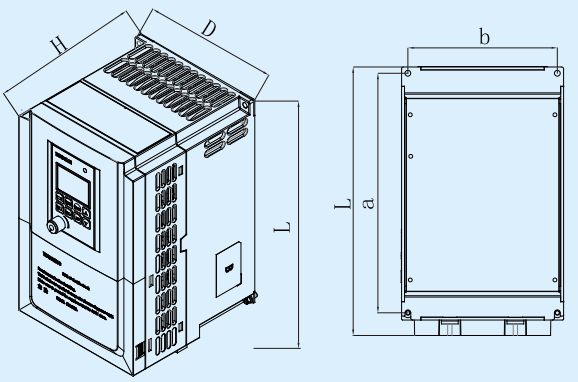
⚠ Note:

- Must connect the grounding wire
- The wiring operation should be carried out by the qualified personnel.
- Confirm to cut off the power and then begin to operate.
- When there is the thermal relay between frequency inverter and motor, we should connect the output filter, input reactor and output reactor due to the wrong action which probably happen even if the cable length from frequency inverter to motor is less than 50m.

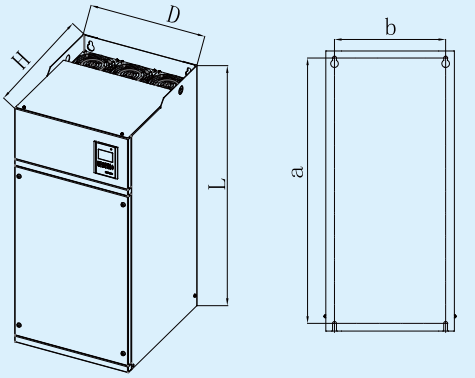
Input reactor (option)	The input reactor can repress the high order harmonic of the frequency inverter current so as to improve the input power factor and prevent the surge impact. For following situation, the input AC reactor is suggested to be used. 1.Imbalance of three phases is more than 3%. 2.The SCR equipments or the power factor compensation device controlled by the switch on the same power supply. 3.The power of frequency inverter is above 110KW
Output reactor (option)	The main function of output reactor is to compensate the influence of the distributed capacitor, which could repress the output harmonic of frequency inverter and reduce the noise of frequency inverter. For following situation, we must adopt output reactor. 1.The length of cable to motor: below 11kw, more than 50m; above 15kw, more than 100m.
DC reactor (option)	Function: improve the power factor. If the power is above 45KW (including 45kw), the DC reactor is suggested to be used.

Size of outline and installation

Small power 1.5~11kW



Medium and big power 15~500kW



6000 series	(L) mm	(D) mm	(H) mm	Installation size (a×b)	Screw installation
1.5-5.5kW	202	142	178	177×129	M5
7.5-11 kW	278	168	183	248×155	M5
15-22 kW	508	242	245	480×180	M8
30-37 kW	580	242	245	560×180	M8
45-55 kW	655	307	288	630×220	M8
75-90 kW	709	370	295	692×260	M8
110-132 kW	800	370	430	760×320	M10
160-200 kW	930	468	405	900×380	M10
250-315 kW	1170	620	418	1140×520	M10
400-500 kW	1430	800	498	1398×680	M12

Remarks: * for wall mounting in installation.

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National Key Projects

Three Gorges Project
Beijing Olympic Rowing-Canoeing Park
Beijing Olympic Games Supporting Projects
Beijing Wukesong Gymnasium
Government Offices Administration of the State Council
CCTV, China
Beijing Capital International Airport
South-to-North Water Diversion Project
Huangshan-Quzhou-Nanping Expressway
West-to-East Electricity Transmission Project
West-to-East Natural Gas Transmission Project
Stations of Shanghai Magnetic Levitation Rail Transportation
Expo 2010 Shanghai China Supporting Projects
Shanghai Pudong Airport
Shanghai International Automobile Museum
Shanghai Hongqiao Airport Extension Project
Terminal of Inner Mongolian Hohhot Baita International Airport Extension Project
Shenyang Olympic Center
Qingdao Olympic Center
Jinan Olympic Center
Chengdu Shuangliu International Airport Extension Project
Chongqing Yuanjiagang Olympic Sports Center
Guangzhou New Baiyun International Airport
Wuhan Tianhe Airport
Shanghai Metro Line 3
Chongqing International Convention & Exhibition Center
Shanxi Wanjiazhai Yellow River Diversion Project
Qinghai Xiaoyou Mountain Ecological Engineering
Tianjin Eight Large Regions Heating Engineering
Shandong Heze City Yellow River Diversion Project
Yangshan Deepwater Port Project of Shanghai International Shipping Center
Sichuan Xichang Satellite Launching Center
Guangxi Longtan Hydroelectric Project

Gansu Satellite Launching Center
Yunnan Honghe River Nansha Hydropower Station
Datang International Power Generation Co., Ltd.
Guizhou Kailin (Group) Co., Ltd
Inner Mongolian Shenhua Group Corporation Limited
Shanghai Petrochemical Company Limited
Baosteel Group Corporation in Shanghai
Taizhou Petrochemical Co., LTD
Anshan Iron and Steel Group Corporation
Jilin Petrochemical Company
Wuhan Iron and Steel (Group) Corp.
Liuzhou Chemical Industry Co., Ltd, Guangxi
Beijing Shougang Company Limited
SINOPEC Cangzhou Company
China Great Wall Aluminum Corporation
SINOPEC Luoyang Company
Guangxi PingguoAluminium Company
Yueyang Petrochemical Factory
Liuzhou Iron and Steel Co., Ltd
Sinopec Nanjing Chemical Industry Co., Ltd
Magang (Group) Holding Company Ltd
SINOPEC Beijing Yanshan Company
Shanxi Zhongyang Iron and Steel Co., Ltd.
PetroChina Urumqi Petrochemical Company
Daqing Oilfield Limited Company
PetroChinaJinxi Petrochemical Company
SINOPEC Shenli Oilfield
CNPC Dushanzi Petrochemical Company
PetroChinaLiaohe Oilfield
Beijing Financial Street
PetroChinaTarim Oilfield
Panda Museum of Chengdu Panda Ecological Park
Karamay Oilfield
Qingdao Beihai Shipyard
PetroChinaChangqing oilfield