



 **MOTOLINE**

PI9000 VECTOR CONTROL INVERTERS

Product Overview

BEE4	
EMPOWERING SUPPLIER	
ISO 9001	Certified
ISO 14001	Certified
ISO 45001	Certified

ABOUT US

Established in 1974 as a single bearing shop in Durban, South Africa; BMG's aggressive growth strategy has included acquisitions, supplemented by a steady organic growth discipline. BMG attracts best-of-breed talent resulting in technical expertise that differentiates BMG in the industry. Staff are truly part of the BMG family and its success.

BMG boasts an accredited in-house technical and commercial training academy which fosters a culture of staff development and career advancement; it's all about sustainability.

The net result, is a company that reliably supplies and supports 70 000 customers in 15 countries with the widest range of industrial engineered products and expert services in Africa via 105 branches.

BMG is positioned to deliver bespoke 360 degree solutions to its customers, and subsequently return on investment to its investors and shareholders. BMG plays a pivotal role in supporting the productivity and production targets of all Industrial, Manufacturing, Mining and Agricultural sectors of the economies in the countries it serves. With an enviable reputation as Africa's largest distributor, manufacturer and service provider of the highest quality engineering consumables and components; including

- Bearings & Seals
- Power Transmission Components
- Drives, Motors and Controllers
- Hydraulics, Pneumatics and Filtration
- Heavy and Light Duty Materials Handling
- Valves and Lubrication
- Fasteners, Gaskets and Tools

BMG is a level 4 BEE contributor with ISO 9001 Quality Assurance certification. Health and safety of its employees and customers is a paramount focus and the company adheres to ISO 45001. BMG is also committed to environmental care and sustainability and strictly follows the ISO 14001 charter.

As a key contributor to the Invicta Holdings stable, BMG has played a major part in Invicta's unique achievement of being rated in South Africa's Top 100 Companies for 21 consecutive years.



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OVERVIEW

PRODUCT INTRODUCTION

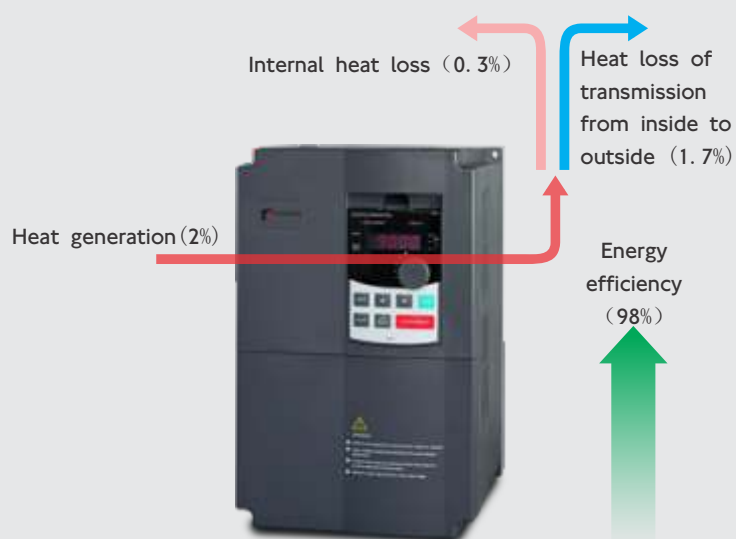
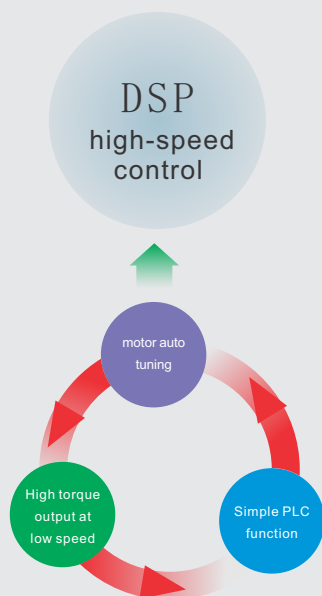
Based on the latest technology in motor control, BMG introduces a new high performance vector control frequency inverter. By monitoring the motor flux current and torque current independently the drive can achieve rapid response and accurate speed & torque control.

CAPACITY RANGE

Power range: 0.4~550kW
Maximum frequency: 600.0Hz
Voltage level: 1-phase 220V
3-phase 380V
3-phase 690V

APPLICATION FIELDS

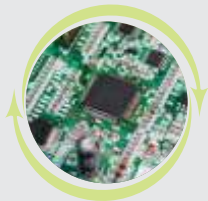
Metallurgy, chemical, coal, medicine, food, plastic, printing, hoist, washing, water supply, water treatment, farming, pumping, fans.





FEATURES

1. Based on 32-bit DSP and adopting an advanced vector control algorithm to achieve a high speed and high performance control.



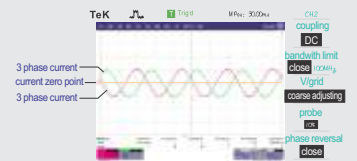
2. Mode of speed control: Sensorless Vector Control, Sensorless Closed Loop Vector Control, V/F control



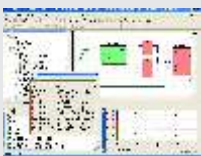
3. Vector control on asynchronous motor and permanent synchronous motors is available. Includes motor parameter auto tuning.



4. 150% torque at low speed running in sensorless vector control mode.



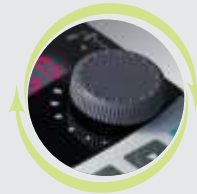
5. Built in logic control.



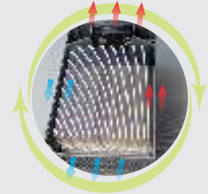
6. Multi-language OLED can display 3 parameter groups at the same time.



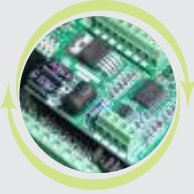
7. Rotating "Key Shuttle".



8. Optimized ventilation design.



9. Supports standard Modbus communication control.



10. Conformal coating for aggressive environments.



11. Unique EMC design minimises interference to power grid.

TECHNICAL SPECIFICATIONS

Item		Specification
Power	Voltage and frequency levels	Single-phase 220V,50/60Hz Three-phase 380V,50/60Hz Three-phase 480V,50/60Hz Three-phase 690V,50/60Hz
	Allowable fluctuation	Voltage:±10% Frequency:±5%
Control system	Control system	High performance vector control inverter based on DSP
	Control method	V/F control, vector control W/O PG, vector control W/ PG
	Automatic torque boost function	Low frequency (1Hz) and large output torque control using V/F control mode.
	Acceleration/deceleration control	Straight or S-curve mode. Four types available with time range 0.0 to 6500.0s.
	V/F curve mode	Linear,square root/m-th power,custom V/F curve
	Over load capability	G type:rated current 150% - 1 minute, rated current 180% - 2 seconds F type:rated current 120% - 1 minute, rated current 150% - 2 seconds
	Maximum frequency	Vector control:0 to 300Hz V/F control:0 to 3200Hz
	Carrier Frequency	0.5 to 16kHz; auto adjust of carrier frequency according to load characteristics.
	Start torque	G type: 0.5Hz/150% (vector control W/O PG) F type: 0.5Hz/100% (vector control W/O PG)
	Speed range	1:100 (vector control W/O PG) 1:1000 (vector control W/ PG)
	Steady-speed precision	Vector control W/O PG: $\leq \pm 0.5\%$ (rated synchronous speed) Vector control W/ PG: $\leq \pm 0.02\%$ (rated synchronous speed)
	Torque response	$\leq 40\text{ms}$ (vector control W/O PG)
	Torque boost	Automatic torque boost; manual torque boost(0.1% to 30.0%)
DC braking	DC braking frequency: 0.00Hz to max. frequency, braking time: 0.0 to 100.0 seconds, braking current value: 0.0%~100.0%.	
Jogging control	Jog Frequency Range: 0.00Hz to max. frequency; Jog Ac/deceleration time: 0.0s~6500.0s	
Multi-speed operation	16 preset speeds	
Built-in PID	Closed-loop control system for process control.	
Automatic voltage regulation(AVR)	Automatically maintain a constant output voltage when the voltage of electricity grid varies	
Self-diagnosis	Self-diagnosis of peripherals after power-up	After powering up, unit will perform safety testing, such as ground fault, short circuit, etc.
	Common DC bus function	Multiple inverters can use a common DC bus.
	Quick current limiting	The current limiting algorithm is used to reduce the inverters overcurrent
	Timing control	Timing control function: time setting range(0m to 6500m).

Item		Specification	
Running	Input signal	<p>Start option Reference option Start signal Multi-speed Emergency stop Wobulate run Fault reset PID feedback signal</p>	<p>Keyboard/terminal/communication 10 frequency settings available, including adjustable DC(0 to 10V),adjustable DC(0 to 20mA), panel potentiometer, etc. Rotate forward/reverse At most 16-speed can be set(run by using the multi-function terminals or program) Interrupt controller output Process control run When the protection function is active, you can automatically or manually reset the fault condition. Including DC(0 to 10V), DC(0 to 20mA)</p>
	Output signal	<p>Running status Fault output Analog output Output signal</p>	<p>Motor status display, stop, ac/deceleration, constant speed, program running status. Contact capacity: normal-closed contact 5A/AC 250V; normal-opened contact 3A/AC 250V; 1A/DC 30V. Two-way analog output, 16 signals can be selected such as frequency, current, voltage and other, output signal range (0 to 10V / 0 to 20mA). At most 3-way output,there are 40 signals each way</p>
	Run function	<p>DC current braking Running command channel Frequency source</p>	<p>Limit frequency,jump frequency,frequency compensation,auto-tuning, PID control Built-in PID regulates braking current to ensure sufficient braking torque under no overcurrent condition. Three channels: operation panel,control terminals and serial communication port. They can be switched through a variety of ways. Total 5 frequency sources: digital,analog voltage,analog current, multi-speed and serial port. They can be switched through a variety of ways.</p>
	Input terminals	<p>Output terminals</p>	<p>6 digital input terminals, compatible with active PNP or NPN input mode, one of them can be for high-speed pulse input(0 to 100kHz square wave); 2 analog input terminals for voltage or current input. 2 digital output terminals, one of them can be for high-speed pulse output(0 to 100kHz square wave); one relay output terminal; 2 analog output terminals respectively for optional range (0 to 20mA or 0 to 10V),they can be used to set frequency, output frequency, speed and other physical parameters.</p>
	Inverter protection	<p>IGBT temperature display Inverter fan control Instantaneous power-down restart Speed start tracking method Parameter protection function</p>	<p>Overvoltage protection, undervoltage protection, overcurrent protection, overload protection, overheat protection, overcurrent stall protection, overvoltage stall protection, losing-phase protection (optional), external fault, communication error, PID feedback signal abnormalities, PG failure and short circuit to ground protection. Displays current temperature IGBT Can be set Less than 15 milliseconds: continuous operation. More than 15 milliseconds: automatic detection of motor speed, instantaneous power-down restart. The inverter automatically tracks motor speed after it starts Protect inverter parameters by setting administrator Password and decoding</p>
	Display	<p>LED/OLED display keyboard</p> <p>Running information Error message</p> <p>LED display OLED display Parameters copy Key lock and function selection</p>	<p>Monitoring objects including : running frequency, set frequency, actual motor current, DC bus voltage, output voltage, actual motor speed, cumulative running time, IGBT temperature, PID reference value, PID feedback value, input terminal status, output terminal status, analog AI1 value, analog AI2 value, current stage of multi-speed, torque set value. At most save 3 error message, and the time, type, voltage, current, frequency and work status can be queried when the failure is occurred. Display parameters Optional, prompts operation content in Chinese/English text. Upload or download function code information of frequency inverters, do the parameter copy quickly. Lock part or all of keys, define the function scope of some keys to prevent misuse.</p>
Communication	<p>RS485</p>	<p>The optional completely isolated RS485 communication module can communicate with the host computer.</p>	
Environment	Environment temperature	-10°C to 40°C (temperature at 40°C to 50°C, please derating for use)	
	Storage temperature	-20°C to 65°C	
	Environment humidity	Does not exceed 90% R.H, no condensation of moisture	
	Vibration	Below 5.9m/s ² (= 0.6g)	
	Application sites	Indoor where no sunlight or corrosive, explosive gas and water vapor, dust, flammable gas, oil mist, water vapor, drip or salt, etc.	
	Altitude	Below 1000m	
Product standard	Pollution degree	2	
	Product adopts safety standards.	IEC61800-5-1:2007	
	Product adopts EMC standards.	IEC61800-3:2005	
Cooling method	Forced air cooling and natural air cooling		

TECHNICAL SPECIFICATIONS

Inverter model	Rated output power	Rated input current	Rated output current	Match motor	Base No.	Input voltage
PI9100-0R4G1	0.4	5.4	2.5	0.4	9S2	1-phase 220V ±10%
PI9100-0R7G1	0.75	8.2	4	0.75	9S2	
PI9100-1R5G1	1.5	14	7	1.5	9S2	
PI9100-2R2G1	2.2	23	10	2.2	9S3	
PI9100-004G1	4.0	35	16	4.0	9S3	
PI9200-5R5G1	5.5	50	25	5.5	9L1	
PI9100-0R7G3	0.75	4.3	2.5	0.75	9S2	3-phase 380V ±10%
PI9100-1R5G3	1.5	5.0	3.8	1.5	9S2	
PI9100-2R2G3	2.2	5.8	5.1	2.2	9S2	
PI9100-004G3	4.0	10.5	9	4.0	9S3	
PI9100-5R5G3	5.5	14.6	13	5.5	9S3	
PI9100-7R5G3/PI9100-011F3	7.5	20.5	17	7.5	9S4	
PI9200-011G3/PI9200-011F3/ PI9200-015F3	11/11/15	26/26/35	25/25/32	11/11/15	9L1	
PI9200-015G3/ PI9200-018F3	15/18.5	35/38.5	32/37	15/18.5	9L1	
PI9200-018G3/ PI9200-022F3	18.5/22	38.5/46.5	37/45	18.5/22	9L2	
PI9200-022G3/ PI9200-030F3	22/30	46.5/62	45/60	22/30	9L2	
PI9200-030G3/ PI9200-037F3	30/37	62/76	60/75	30/37	9L3	
PI9200-037G3/ PI9200-045F3	37/45	76/91	75/90	37/45	9L3	
PI9200-045G3/ PI9200-055F3	45/55	91/112	90/110	45/55	9L4	
PI9200-055G3/ PI9200-075F3	55/75	112/157	110/150	55/75	9L4	
PI9200-075G3/ PI9200-093F3	75/93	157/180	150/176	75/93	9L4	
PI9200-093G3/ PI9200-110F3	93/110	180/214	176/210	93/110	9L5	
PI9200-110G3/ PI9200-132F3	110/132	214/256	210/253	110/132	9L5	
PI9200-132G3/ PI9200-160F3	132/160	256/307	253/304	132/160	9L6	
PI9200-160G3/PI9200-187F3	160/187	307/345	304/340	160/187	9L6	
PI9300-187G3/ PI9300-200F3	187/200	345/385	340/380	187/200	9C1	
PI9300-187G3/ PI9300-200F3	187/200	345/385	340/380	187/200	9C2	
PI9300-200G3/ PI9300-220F3	200/220	385/430	380/426	200/220	9C1	
PI9300-200G3/ PI9300-220F3	200/220	385/430	380/426	200/220	9C2	
PI9300-220G3/ PI9300-250F3	220/250	430/468	426/465	220/250	9C1	
PI9300-220G3/ PI9300-250F3	220/250	430/468	426/465	220/250	9C2	
PI9300-250G3/ PI9300-280F3	250/280	468/525	465/520	250/280	9C3	
PI9300-280G3/ PI9300-315F3	280/315	525/590	520/585	280/315	9C3	
PI9300-315G3/ PI9300-355F3	315/355	590/665	585/650	315/355	9C3	
PI9300-355G3/ PI9300-400F3	355/400	665/785	650/725	355/400	9C3	

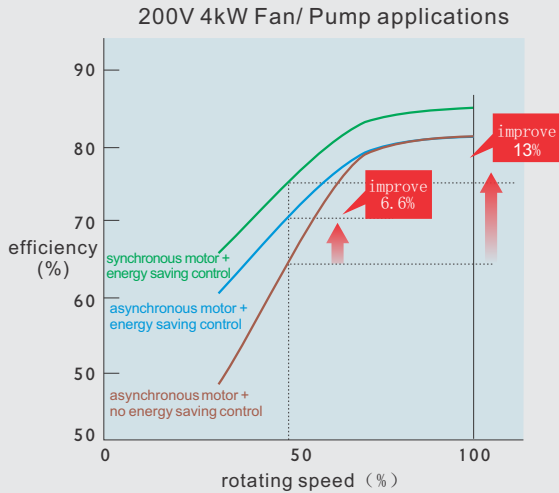
ENERGY SAVING

Advanced energy saving technology

Use energy saving control of frequency converters to improve efficient running of asynchronous motors.

Saving much more energy on synchronous motor

The energy saving control of the inverter combined with high efficiency synchronous motor can give superior energy savings compared to just an asynchronous motor.



ENVIRONMENTAL RESISTANCE

Resistance to corrosion, dust, vibration and environment. Drip-proof enclosures.

ROSH Certification

Reduce noise

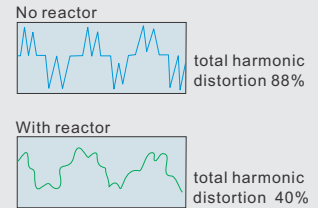
Using Swing PWM technology to reduce EMC.

Compare

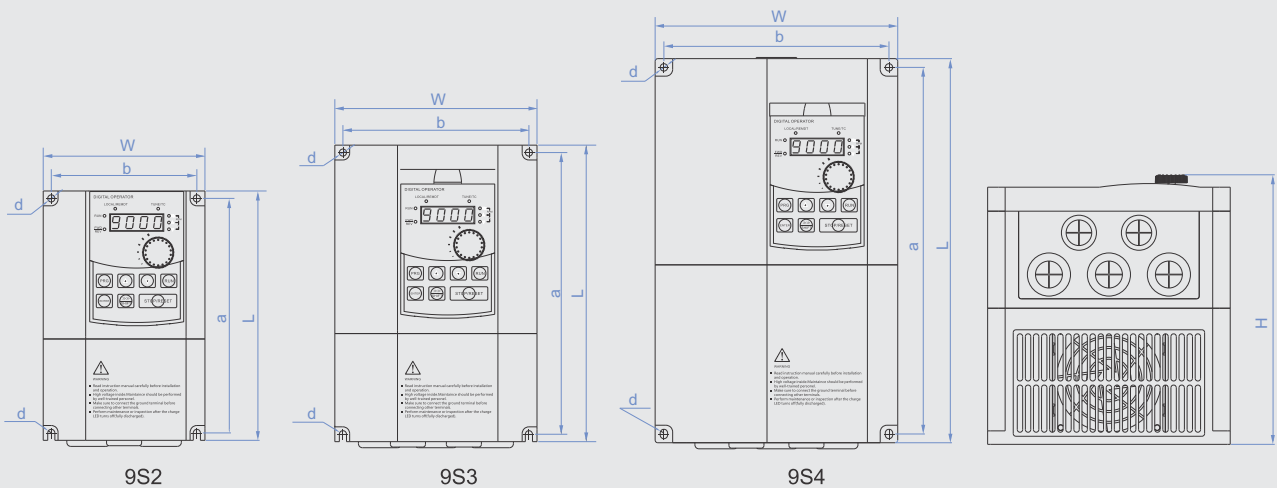


Suppressing the high order harmonics on the grid.

Built in DC reactor use for suppressing high order harmonics. (Optional for 22kW to 160kW, standard from 187kW and above).



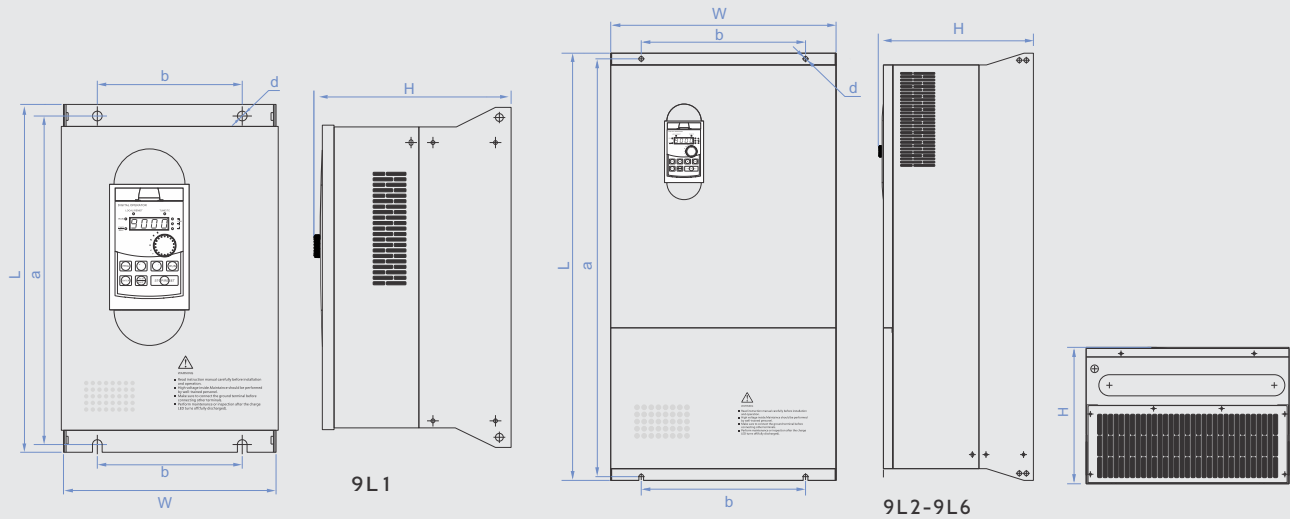
Specifications (plastic housing: 9S2/9S3/9S4)



Base No.	Power(kW)	Voltage(V)	Current(A)	Shape dimensions (L*W*H) mm	Installation dimensions (a*b d) mm
9S2	0.4~1.5 0.75~2.2	1 phase 220 3 phase 380	2.5~7 2.5~5.1	185 x 120 x 178.5	174 x 108 Ø5.3
9S3	2.2~4.0 4.0~5.5	1 phase 220 3 phase 380	10~16 9~13	220 x 150 x 185.5	209 x 138 Ø5.3
9S4	7.5	3 phase 380	17	285 x 180 x 200	272 x 167 Ø5.5

TECHNICAL SPECIFICATIONS

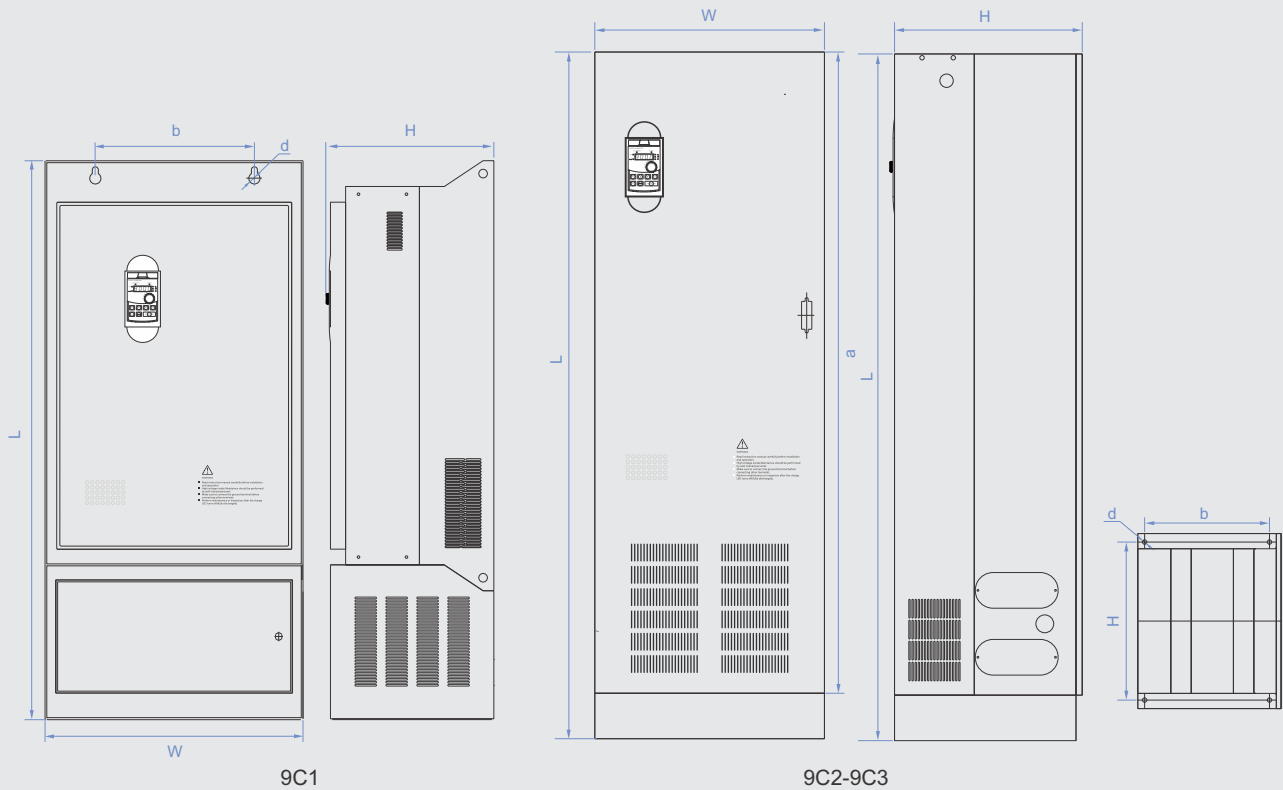
(Wall-mounted metal housing, wiring layout from left to right 9L1—9L6)



Base No.	Power(kW)	Voltage(V)	Current(A)	Shape dimensions(L*W*H) mm	Installation dimensions(a*b d) mm
9L1	5.5	1 phase 220	25	360 x 220 x 210	340 x 150 Ø10
	11~15	3 phase 380	25~32		
9L2	18.5~22	3 phase 380	37~45	435 x 225 x 242	415 x 165 Ø10
9L3	30~37	3 phase 380	60~75	480 x 296 x 246	460 x 200 Ø10
	30~37	3 phase 480	55~65		
9L4	45~75	3 phase 380	93~150	660 x 364 x 280	640 x 250 Ø10
	55~75	3 phase 690	62~85		
9L5	93~110	3 phase 380	176~210	710 x 453 x 280	690 x 350 Ø10
	93~110	3 phase 690	102~125		
9L6	132~160	3 phase 380	253~304	910 x 480 x 323	890 x 350 Ø10
	132~160	3 phase 690	150~175		

TECHNICAL SPECIFICATIONS

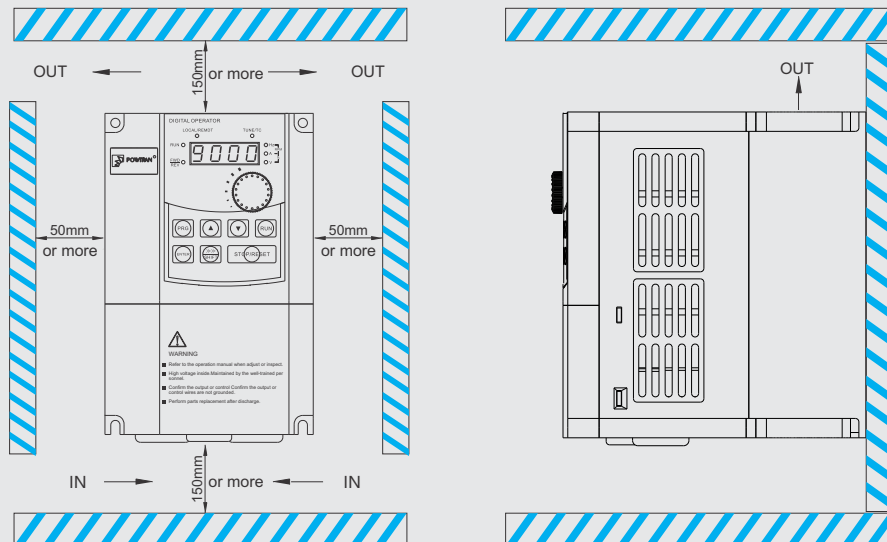
(Floor type with metal housing , wiring layout from left to right 9C1-9C3)



Base No.	Power(kW)	Voltage(V)	Current(A)	Shape dimensions (L*W*H) mm	Installation dimensions (a*b d) mm
9C1	187~220	3 phase 380	340~426	1300 x 600 x 380	550 x 280 Ø13
	187~220	3 phase 690	198~245		
9C2	187~220	3 phase 380	340~426	1540 x 515 x 421	464.5 x 367 Ø13
	187~220	3 phase 690	198~245		
9C3	250~335	3 phase 380	465~650	1698 x 851 x 470	640 x 260 Ø13
	250~550	3 phase 690	260~590		

Airflow requirements

The inverter must be installed in a well ventilated area that allows natural airflow.



Environment:

Working conditions should be in compliance with the regulations of IEC60721-3-3 level 3k3 and GB/T3859,1 section 2.

Environment temperature: -10°C - -40°C (when temperature is between $40-50^{\circ}\text{C}$, please consider derating)

Storage temperature: -20°C - -65°C

Humidity: Below 90°C RH

Vibration: Below 5.9m/s^2 (equal to 0.6g)

Application field: Indoor, no solar radiation, no corrosive or explosive gas or steam, no dust or combustible gas, oil, dripping water or salt.

Altitude: Below 1000m

Class of pollution: 2

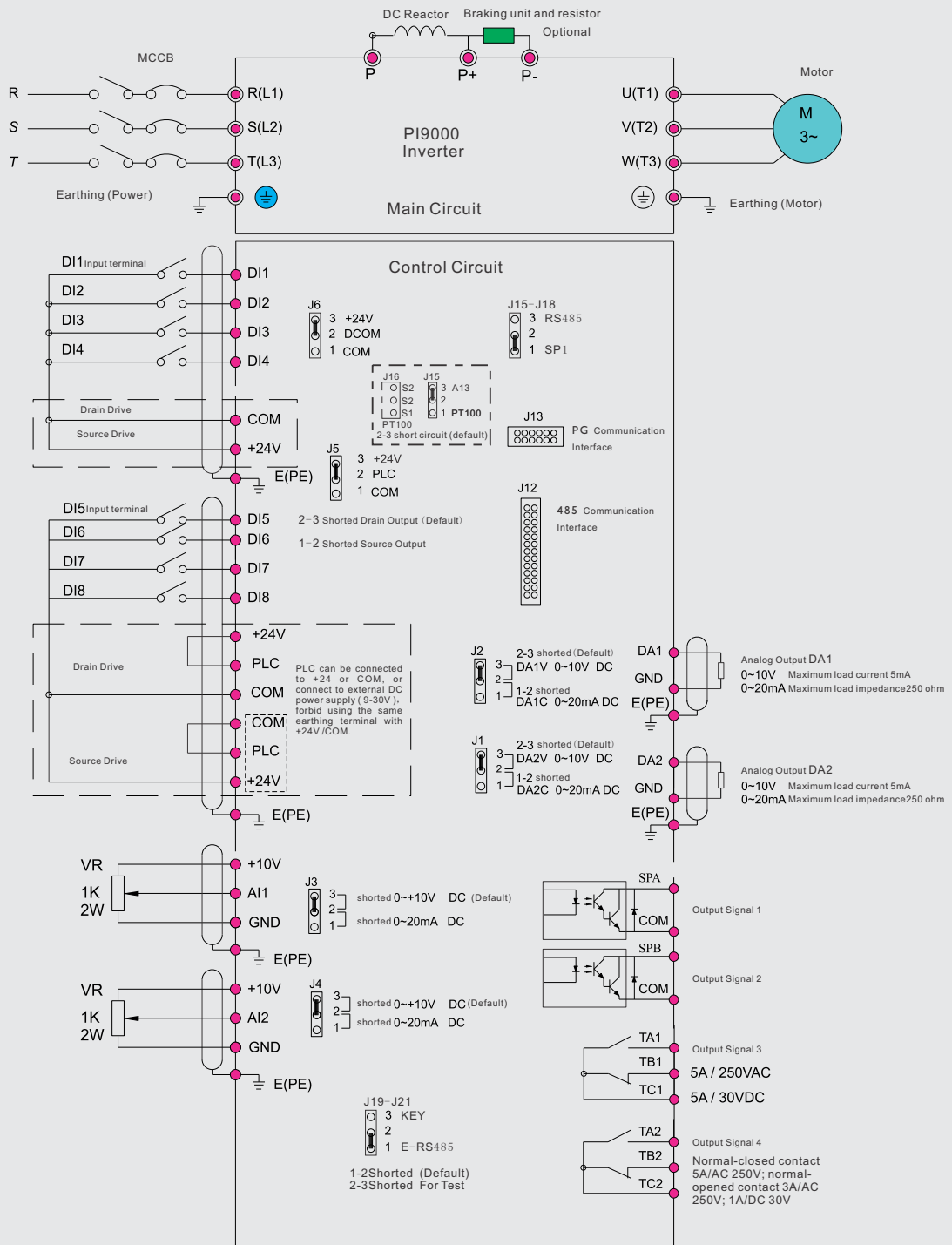
Protection class: IP20

Mechanical installation:

Install on solid indoor base, there should be no restriction to ventilation or cooling system in the installation area or enclosure. Air-conditioners can be utilised to enhance cooling.

Wiring:

Power circuits & control circuits should remain isolated from one another. Wiring should be done according to circuit diagrams & National Standards.



Circuits may vary depending on model selected.

MULTI-FUNCTION CONTROL KEYBOARD








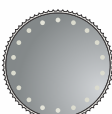
LED and OLED multi-function control keyboard

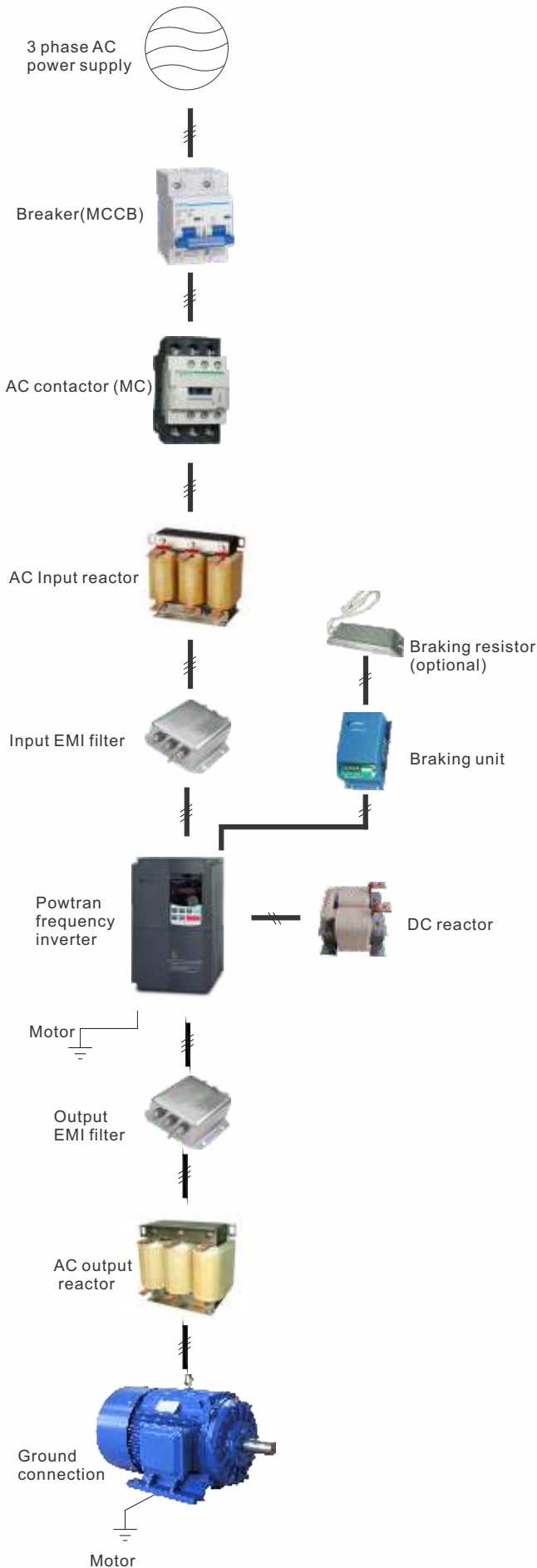
O L E D shows three status groups at the same time
 Unique "one key to shuttle" design
 User friendly



Optional Components: JP6E93 JP6E9300 keyboard (LED)

Operating keyboard: button key description

Sign	Name	Function
	Parameter Setting/ Exit Key	Enter menu parameter change status Exit from function change Return to status display menu from sub-menu or function menu
	Shift Key	Selection of parameter variable.
	Ascending Key	Navigation in menu.
	Descending Key	Navigation in menu.
	Run Key	Used for running motor in local control mode.
	Stop/Reset Key	Stops motor operation and resets fault conditions.
	Enter Key	Enter into levels of menu screen, confirm settings.
	Keyboard potentiometer	Keyboard potentiometer for speed reference.



Various expansion cards:

- Encoder option
- Water pump controller
- PLC function card

Braking unit and braking resistor:
For regenerative applications



AC input reactor & DC reactor
for reduction of harmonic distortion.



AC input reactor



DC reactor

Output reactor for long motor
cables and Du/Dt reduction.



AC output reactor

EMI filters to reduce FRI noise.



BRINGING THE WORLD'S BEST BRANDS TO YOU

In the bid to procure cutting-edge components at competitive prices, BMG is able to capitalise on long-standing relationships with leading manufacturers dedicated to excellence in design and production.

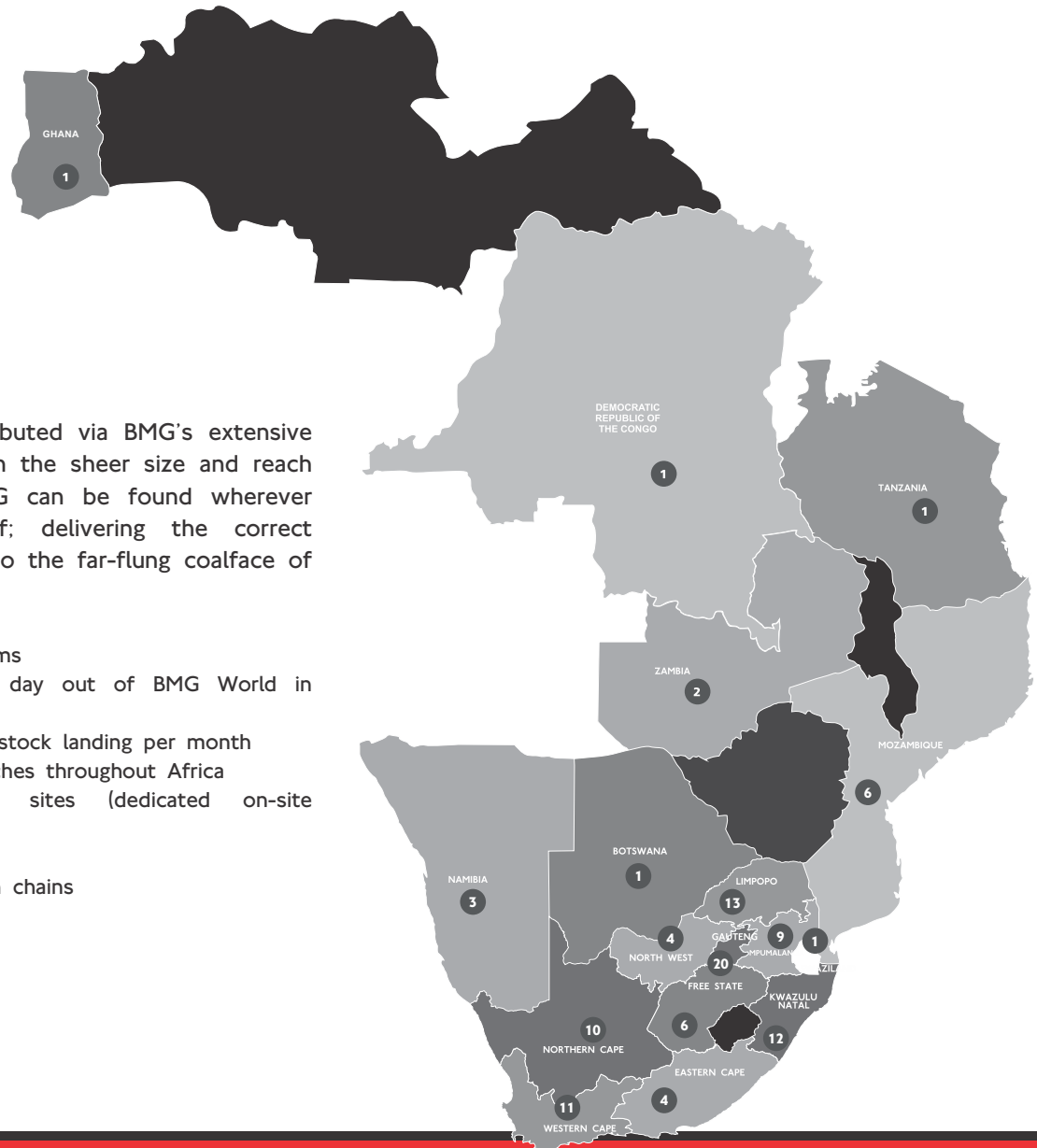
Products are imported from around the globe and brought to BMG's strategically located distribution facilities and regional service centres via the main distribution hub in Johannesburg - BMG World. A world-class facility boasting 308 000m³ of fully stocked warehouse space, an accredited training facility and unlimited engineering capabilities.

Preferred Brands:



Our Extensive Coverage Throughout Africa

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BRANCHES



Products and services are distributed via BMG's extensive distribution network. It's through the sheer size and reach of our infrastructure, that BMG can be found wherever industry has established itself; delivering the correct components at the right time, to the far-flung coalface of our customers' operations.

- Over 300 000 product line items
- Around 4 500 transfers per day out of BMG World in Johannesburg
- Over 1 000 tons of imported stock landing per month
- 105 strategically situated branches throughout Africa
- Vendor Managed Inventory sites (dedicated on-site stockholding)
- International exports
- Locally empowered distribution chains

Be PART

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WEBSITE:

www.bmgworld.net



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TECHNICAL RESOURCES • FIELD SERVICES

