

SAMCO - SVC06

High performance vector-controlled inverter

Product Profile

SANKEN Inverter Manufacturer
SANKEN L.D. ELECTRIC (JIANG YIN) CO., LTD


www.sankenld.com



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The excellent performance of SAMCO-svc06 can be rated as an epoch-making accomplishment in the field of variable frequency control.

SAMCO-svc06 is the product rooted from the 60 years' advanced technologies in Japan SANKEN. The design theory is to satisfy application requirements from various users, and the product is featured with abundant functional settings, extraordinary stable performance and convenient & innovative structure.

With a target to be used in all industrial fields, SAMCO-svc06 has broken through the limitation of inverter application. With advanced control technology and excellent control performance, this product is really a high-performance vector-controlled inverter.

The launch of SAMCO-svc06 has not only enabled SANKEN ELECTRIC to enter a new stage in the development of inverter control technology, but also has opened up more design space for the application of this technology in overall market.

 A new generation of high performance vector-controlled inverter

SAMCO - SVC06 Series

With the research achievements collected by SANKEN in nearly 20 years, and using the calculation & processing technology for up-to-date magnetic flux linkage and speed estimation, the high performance speedless sensor vector control and PG sensor close-loop vector control have been realized.

Enriched Display & Convenient Operation

- ◎ Standard-configured large screen LCD panel
- ◎ Multi-function knob key
- ◎ One-touch key for remote/local switching

Excellent Control Performance

- ◎ Advanced vector control technology, can output high-torque characteristics under extreme low speed
- ◎ Quick response, high accuracy and high dynamic performance of vector control
- ◎ Embedded PG pulse interface can constitute a high accuracy close-loop vector control system
- ◎ High performance V/f control

Varied software functions

- ◎ Brand-new PID control mode
- ◎ Perfect protection and alarm function
- ◎ Support DC bus-bar interconnection by capacity
- ◎ Standard-configured Modbus protocol

SVC06

Extraordinary environment compatibility

- ◎ Embedded filter (order requirements)
- ◎ Correspond to high-altitude area
- ◎ CE certification

Convenient Maintenance

- ◎ Buckled design for cooling fan
- ◎ Can inquire and record the information different from factory default
- ◎ Selection of long-life parts

Speed Control Mode

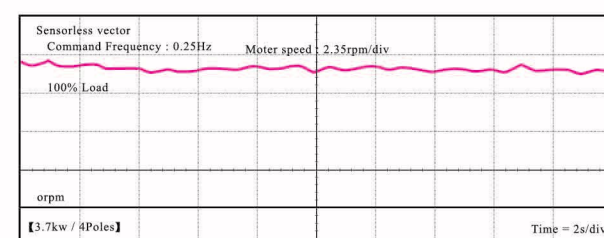
Standard configuration for PG sensor interface

svc06 is equipped with one PG pulse interface (open-collector), this interface can constitute a close-loop vector control system without additional options. For receiving other types of PG pulse signals as well as signal output, a multi-function embedded feedback base-plate (option) should be provided.

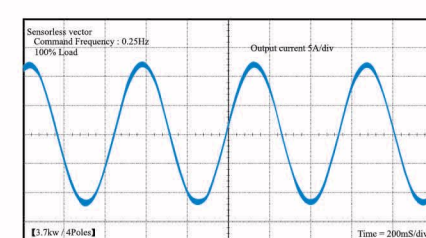
Enlargement of speed control scope

Under the occasions of speedless sensor and with PG sensor, the respective motor speed regulation scopes are:

Without PG Sensor: 0.25 – 240Hz (1:200/50Hz Reference) *

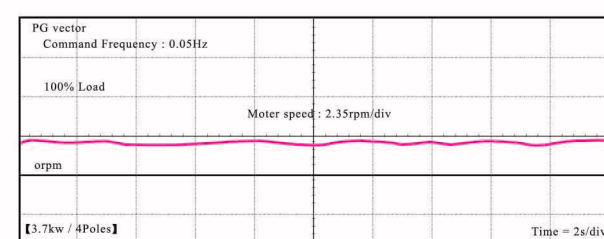


100%-load speed wave at 0.25Hz (without PG)

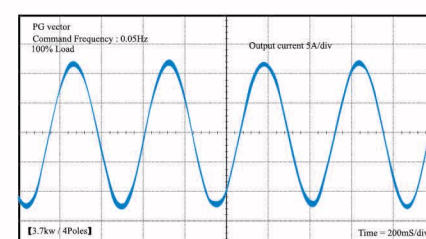


100%-load current wave at 0.25Hz (without PG)

With PG Sensor: 0.05 – 240Hz (1:1000/50Hz Reference) *



100%-load speed wave at 0.05Hz (with PG)



100%-load current wave at 0.05Hz (with PG)

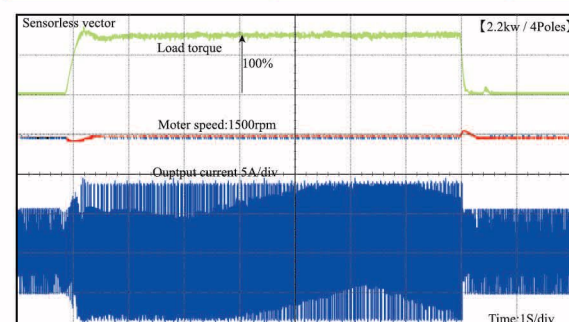
* Performance may vary according to motors manufactured by different companies.

Improvement of speed response

With high performance 32bit DSP, the inverter speed response can be improved by the powerful calculation ability.

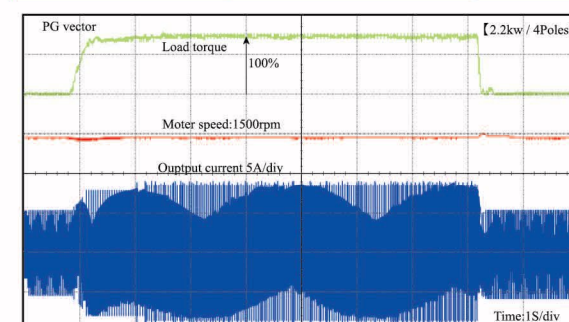
Under the occasions of speedless sensor and with PG sensor, the references for speed response are:

Without PG sensor: response 100 rad/s; accuracy $\pm 0.5\%$ *



Response characteristics of Impact load (without PG)

With PG sensor: response 250 rad/s; accuracy $\pm 0.01\%$ *



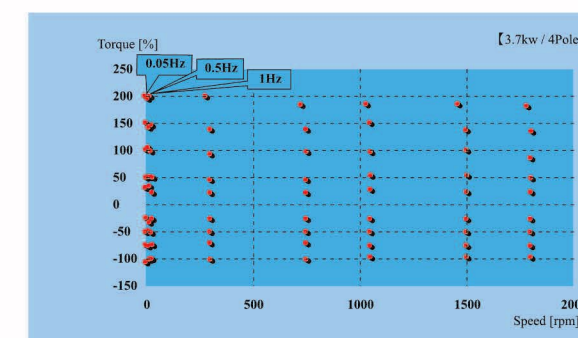
Response characteristics of Impact load (with PG)

* Performance may vary according to motors manufactured by different companies.

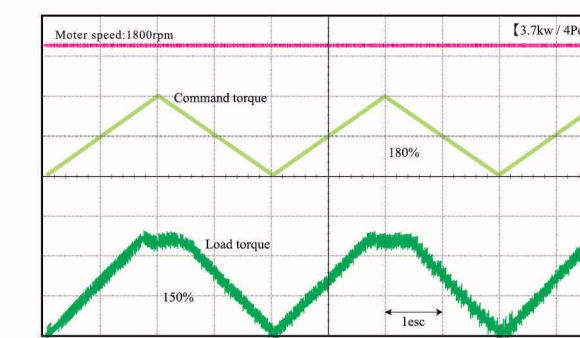
Torque Control Mode

Realization of high torque at low speed

By the help of advanced vector control technology (original of SANKEN) and the self-test function for motor parameters, high torque characteristics can also be output under extreme low speed.



Torque characteristics of SVC06-0040



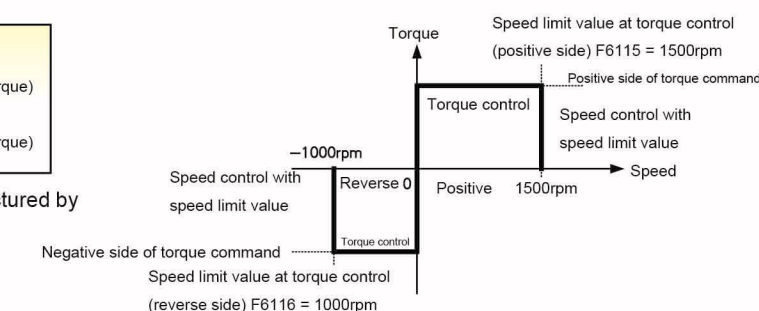
Accurate torque limitation

Standard configuration of torque control function

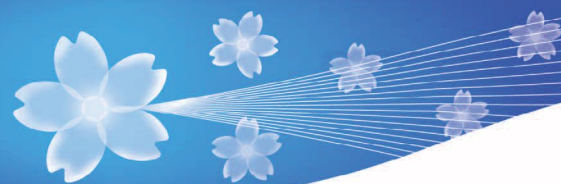
Based on vector control, the torque control function will directly control the motor to output accurate electromagnetic torque. Furthermore, this function can set the limit values of torque command and speed, therefore preventing the damages of mechanical & driving devices.

With PG sensor: torque accuracy $\pm 10\%$ *
Torque control scope: 1:50 (corresponding to rated torque)
Without PG sensor: torque accuracy $\pm 20\%$ *
Torque control scope: 1:20 (corresponding to rated torque)

* Performance may vary according to motors manufactured by different companies



Example of speed limit under torque control

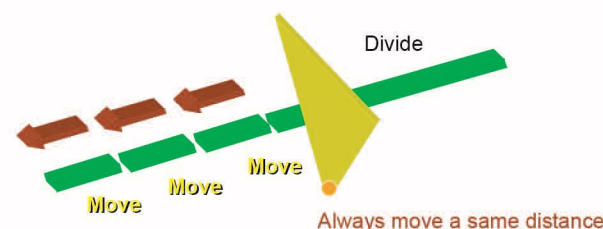


Position Control Mode *

When installing a PG option, **svc06** can be used as a position controller to realize accurate position control.

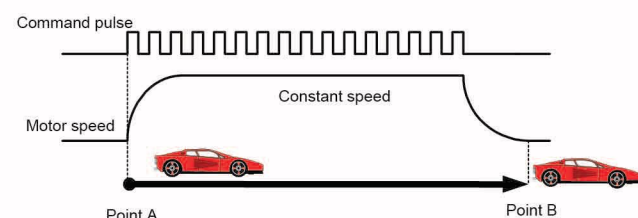
Position control of point-to-point

Number of pulse will be set by functional code. Even when there is no command pulse, the positioning control of fixed path can also be realized by external terminals.



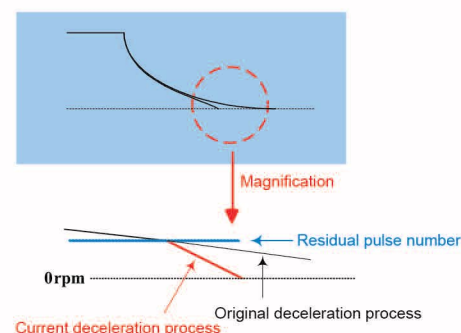
Position control of pulse sequence

The command pulse sequence can realize an accurate control of continuous path. The pulse sequence can also be output for multi-motor synchronous operation.



Quick acceleration/deceleration control

Use variable gain control to improve the speed response at deceleration. Comparing to previous products, the time required to stop has been shortened.



"Electronic gear" control

The motor movement equivalent to input command pulse can be set as arbitrary value through the gear ratio of the "electronic gear". Additionally, the equipped "simple backlash compensation" function can eliminate the position error caused by tooth gap.

Zero-speed servo control

When motor speed decreases to below zero-speed threshold value, it will enter zero-speed servo status, and the motor will always be kept in stop position. Under high performance vector control, **svc06** can output torque (>100%) even at zero speed.

*SC-PG option is required.

On-line motor parameter detection

- Strengthen the auto-detection function for motor parameters, and use brand-new methods to greatly improve the detection precision. The self-detection can control the motor at best status even when the motor parameters are unknown.
- After motors run for a long time, the coil temperature will rise, and the motor parameters may change, therefore resulting in bad control characteristics of speedless sensor. In **svc06** series, the motor parameters will be estimated during motor running and then updated on line, therefore ensuring the motor to run with the best parameters.

High performance V/f control

Automatic torque increase *

- Set the increase amount for torque according to loading conditions. Maximally utilize the torque increase ability when there is no overcurrent.

* Self-detection of motor parameter is required

Automatic slip frequency compensation *

- Under heavy load, the motor speed will decrease and the slip frequency will increase. The automatic slip frequency compensation function can offset the motor slip and improve the speed accuracy.

* Self-detection of motor parameter is required

Settings of fold-line V/f chart

- Randomly set the folding point (2 points) of V/f chart; satisfy the adjusting requirements under special occasions.

V·F Separation

- Control the inverter output frequency and output voltage separately; satisfy the requirements under special occasions (such as torque motor).
- Provide 2 manners of proportional and complete separation, the application is more flexible.

Double-specification design

- Double specifications for Heavy-load Mode A (1 minute for 150% overload) and light-load Mode B (1 minute of 120% overload); can be switched mutually with functional codes.
 - Under light-load occasions, inverters with lower capacity can be selected to reduce customer's cost.
- For example: For 2.2kW light-weight, 1.5kW inverter of Mode A can be purchased and set to Mode B.
- ※ Rated current specification is also leading the industry



Mode A

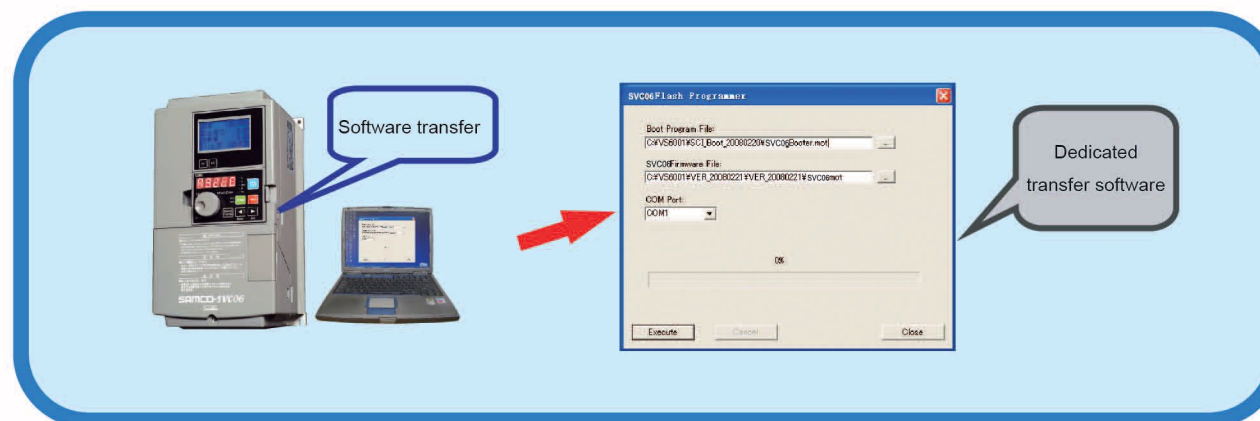


Mode B

Customer Specialization

Software edition update

SANKEN is the first manufacturer of inverters with software edition updating functions. With the dedicated updater, the software function can be adjusted, actualizing the conversion from universal inverters to customer-specialized inverters.



Customer-specialized Code Group

Set a group of special functional codes used in this industry; can quickly set the winding, chemical fiber high-speed spinning, EPS emergency power supply and other application occasions (under development).

Customer initialization

Initial values for parameters which are defined by customers. In case of an inverter abnormality, all settings can be reset to the initial values defined by the customers (different from factory initial values).

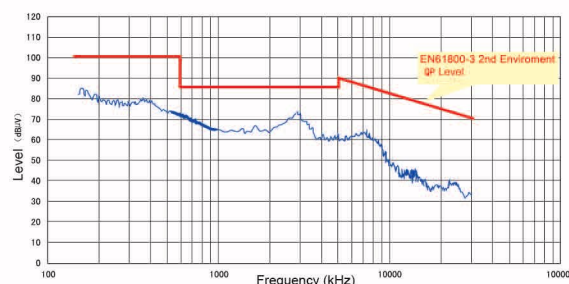
Environment Considerations

Embeddable filter design; reduce the interference to peripheral equipments

- A filter embedded at input side of inverter, can greatly reduce the generated high-frequency interference. Comparing with external filters, embedded filters can save the space within the cabinet and reduce the wirings.

- Inverter unit (including filter) can satisfy the requirements of European EMC Directive *.Notes: Embedded filter is an optional function

*EN61800-3 2nd Environment, C3



Example of SVC06-0040 interference test

All series DC Reactor (DCL)

- Reduce the content of high order harmonic at power supply side
- Inverter input power factor is increased from 70% to over 90%.
- Restrain 3-phase current unbalance caused by unbalanced input voltage.

DC Reactor



Note: SVC06-0150 and below can install DC reactor optionally.
SVC06-0185~0750 should install embedded DC reactor (standard configuration).
SVC06-0900 and above should install external DC reactor (standard configuration).

CE Certification

- LVD: Accord to 2006/95/EC Directive (conform to EN61800-5 -1:2003 Standard)
- EMC: Accord to 2004/108/EC Directive (conform to EN61800 -3: 2004 Standard)

Refined structure design

- Water-proof treated base plate, can improve integral reliability.

Applications accorded to altitude

- The radiation and insulation requirements are fully considered during the design (with a highest altitude of 3000m).
- With current autodecrement function.
- Automatic carrier reduction functions for Mode B.

Convenient Maintenance

Search by keys

- Can display the altered code name and content which are different from factory defaults.

Humanized design of cooling fan

- Buckled design is convenient for clean and replacement. *
 - Exhaust design can prevent the air channel being easily locked.
- * According to CE requirements, use bolts to fix the fan.



Selections of long-life parts

- Use 5000-hour electrolytic capacitance (ambient temperature 105 °C) to realize a long service life.
- Newly designed cooling fan, with ON/OFF control, can increase fan life and reliability.

Part Name	Target life of SVC06	Target of JEMA *
Cooling Fan	10 years	2 to 3 years
electrolytic capacitance used for smoothing the main circuit	10 years	5 years
electrolytic capacitance used for smoothing the base plate	10 years	5 years

* excerpted from JEMA (Japan Electrical Manufacturers' Association)
"Periodical service points for universal inverters"

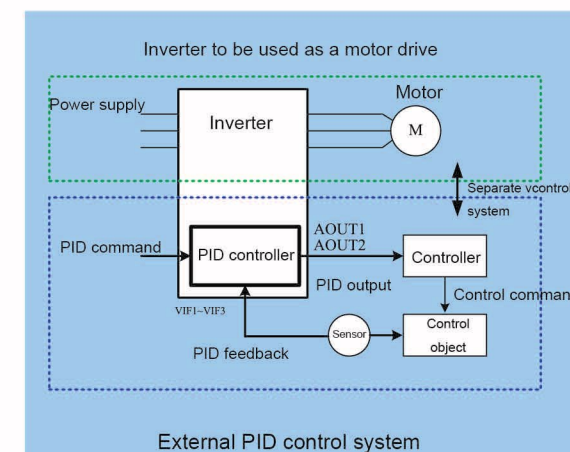
Perfect information record function

- Record inverter Total Running Time, Times of Power On, Alarm Fault Code and related parameters.

Varied control functions

Brand-new PID control mode

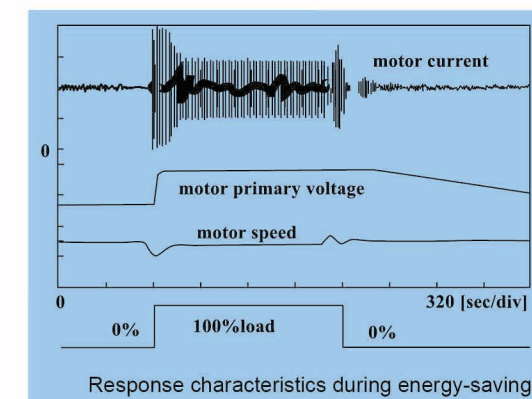
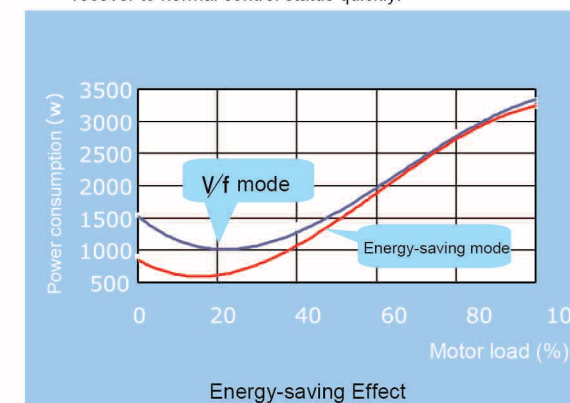
- Set a combining function between PID1 and PID2, parameters can be arbitrarily switched and combined between these two groups.
- Can be opened to external systems as a PID controller.



- Add the effect of integration separation, remove the integration effect when the deviation is too big, and prevent the rapid change of output caused by integration effect in case that the system status is greatly changed.
- Set PID deviation limit, output limit and other limits, prevent the occurrence of system instability and abnormality.
- Set positive and negative polarity for PID to fit different applications.

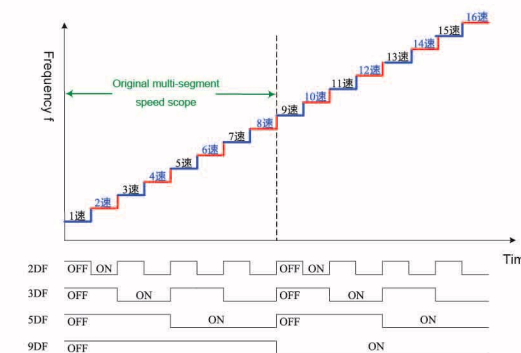
Completely furnished Energy-saving mode

- Detect load status automatically; make sure the motor is under high-efficient running through the control of output voltage and power factor.
- According to different occasions, three energy-saving modes have been provided: simple energy-saving, automatic energy-saving 1 and automatic energy-saving 2.
- If the load is added suddenly during the energy-saving, it can recover to normal control status quickly.



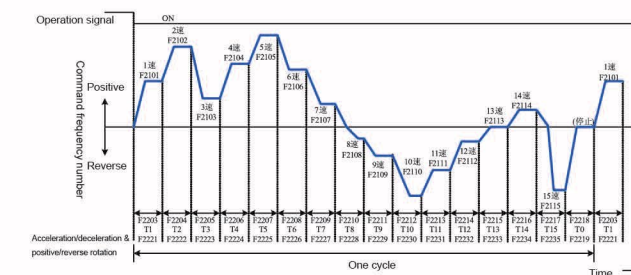
Indeed 16-segment speed

- Can switch the 16 frequencies with external terminals.
- Make the musical fountain more hierarchical.



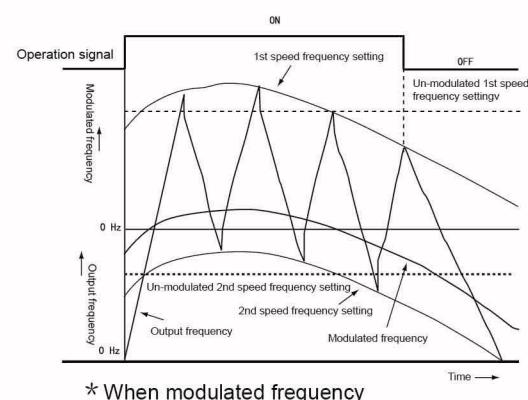
Graphic operation function

- When in combination with internal timers, the automatic cycle of 16-segment speed can be fulfilled.



Disturbed Operation

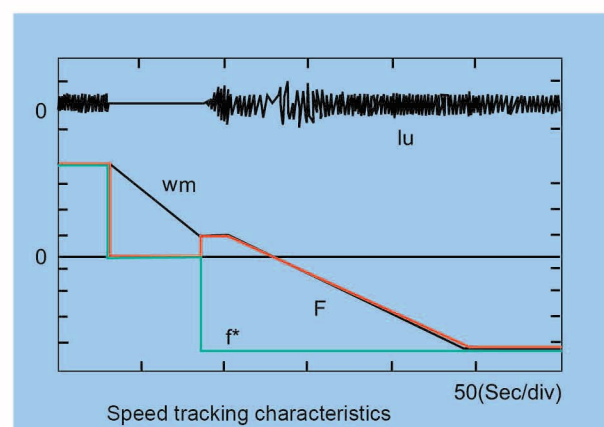
- Realize the automatic swing frequency function, improve the spindle forming effect.
- Modulate the central frequency with external analog.



* When modulated frequency

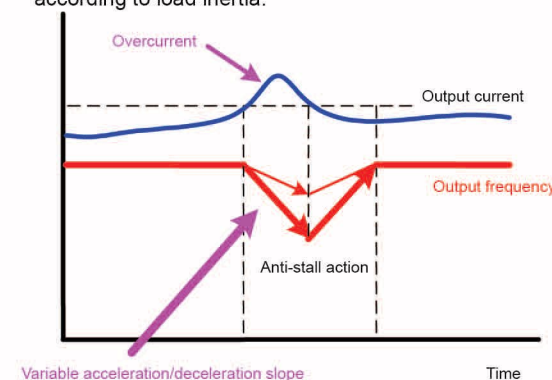
Restart function for rotating speed tracking

- When testing the motor rotating speed and direction, the restart process (without trip) can also be finished even in reversal status.



Anti-stall function

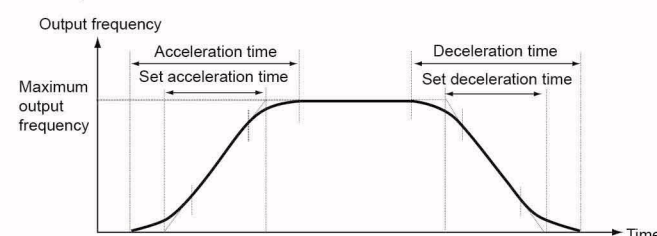
- In case of current overload, the output frequency will be decreased automatically. When output current is recovered to below current limit, the output frequency will be recovered automatically.
- Appropriate acceleration/deceleration time can be selected according to load inertia.



Variable acceleration/deceleration slope

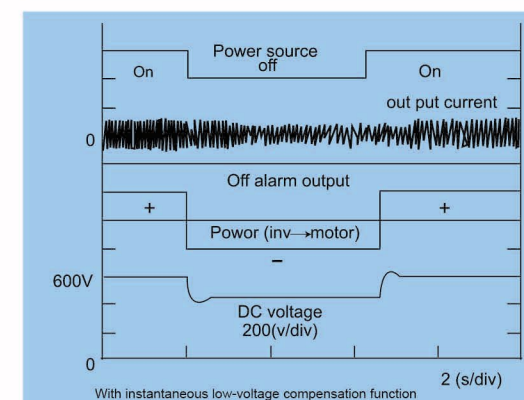
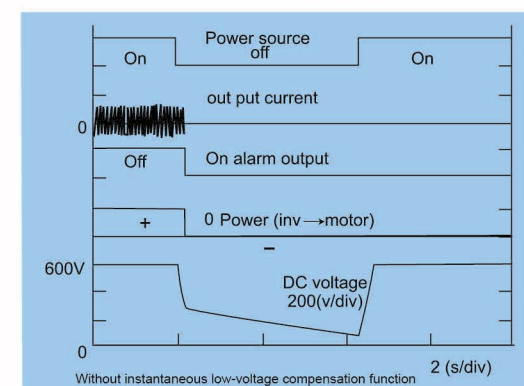
S Curve

- Set the 3 curvatures in the process of startup, midway and stop. Maximum setting scope is 200%.
- Set 2 groups of S parameters, they can be switched mutually with external terminals.
- In the occasions of lifter, three-dimensional garage and etc., it can effectively improve the impact during startup and stop process.



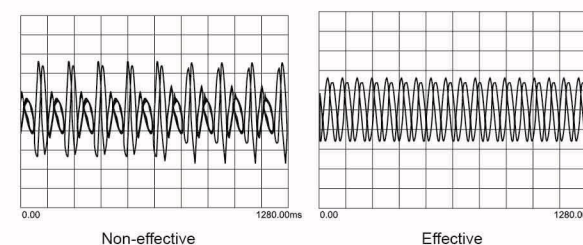
Instantaneous low-voltage compensation function

- When there is an instantaneous power outage at grid side, this function will use regenerated power to largely maintain the motor running.
- The bigger is the load, the more obvious is the effect.



Elimination function for unstable phenomena

- Reduce the unstable phenomena of output current in light-load.



Support DC bus-bar interconnection

- SVC06** All inverters of Svc06 can support DC bus-bar interconnection by capacity.
- The technical process of paper machine requires speed difference between different rollers. When local common DC bus-bar is adopted in dynamoelectric operation and braking operation status, this problem can be resolved perfectly.

Note: Direct DC power supply must be corresponded to special model.



Perfect protection and alarm function

- Overcurrent protection
- Overvoltage protection
- Overload protection (for motor protection)
- Input & output lack-phase protection
- Overheat protection
- Feedback signal disconnection protection

Completely furnished communication function

- RS485 serial communication standard configuration**
Full duplex RS485 design, customer can select 4-wire or 2-wire system.
RS485 dedicated wiring terminal, convenient for wire connection.
Connect 32 inverters maximally.
- MODBUS communication standard configuration**
Support MODBUS-RTU communication protocol, and the maximum baud rate is 57,600 bps.
One primary station can control 247 inverters maximally. *
* Relay is needed.
- CAN, PROFIBUS-DP and etc.... (option)**

Complete input/output port

Comparing to original inverters, svc06 has added input/output ports for convenient & flexible service.

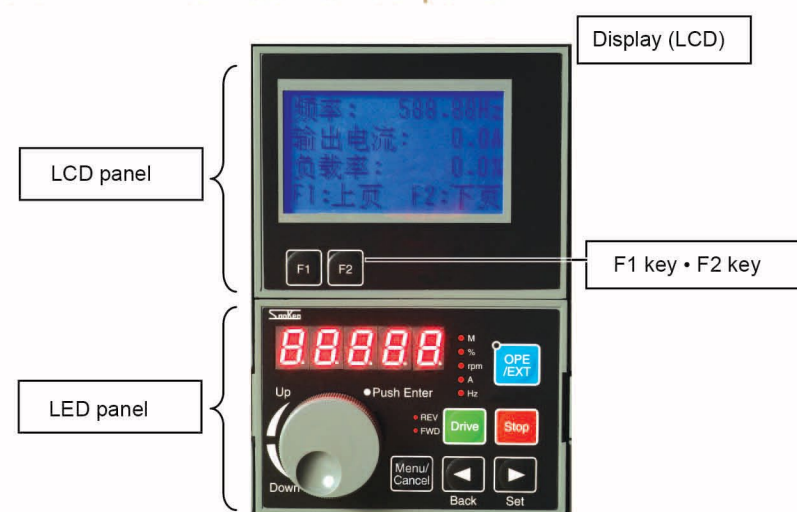
Port	SVC06	VM05
Multi-function digital input port	8 channels	8 channels
SINK/SOURCE switching	○	×
Multi-function digital output port	3 channels	3 channels
Voltage input port	3 channels	2 channels
Current input port	3 channels	1 channel
Voltage input port	2 channels	2 channels
Current input port	1 channel	× (option corresponded)
Multi-function relay port	1 channel	1 channel
PG pulse destination port	1 channel	× (option corresponded)
DC24V power supply port	2 channels	1 channel

○: Corresponded
×: Not corresponded

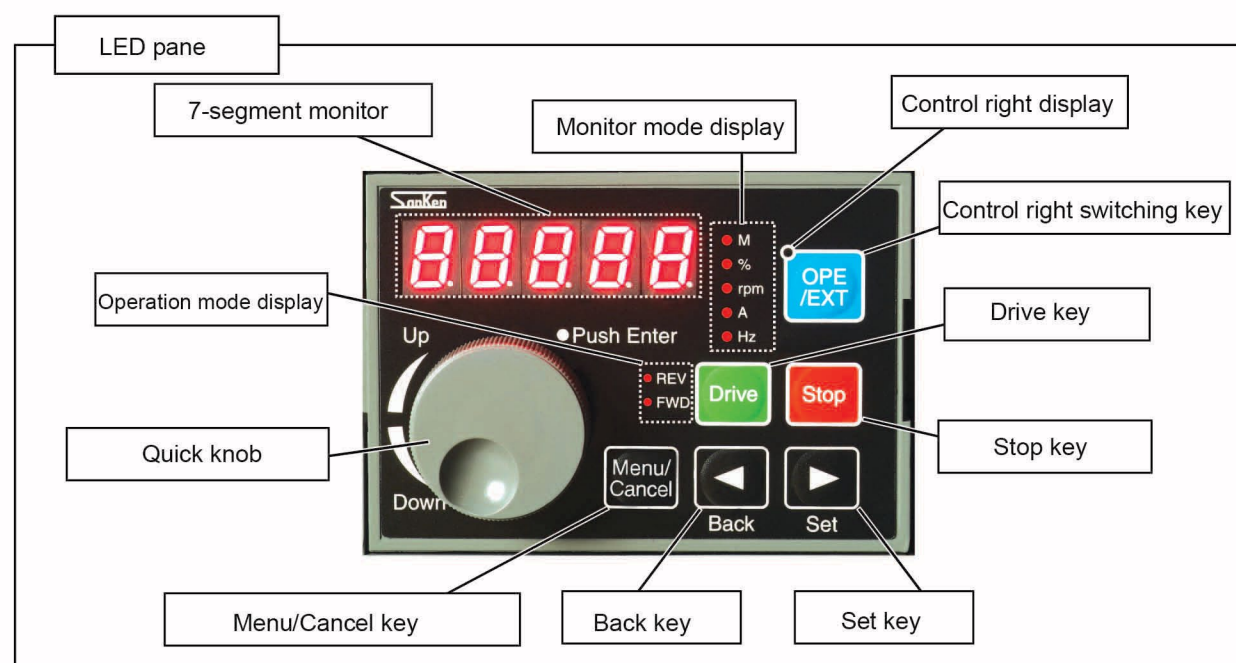
Glaring operator panel

- LED+LCD combined panel is the standard configuration. The panel is flexibly connected, firmly structured and convenient for dismantlement.
- LED panel is equipped with five 7-segment high brightness digital displays and rotary encoders. Ordinary operations can be carried out through the encoders.
- Optional language for LCD panel: Chinese, English and Japanese.
- 128*64 dots LCD panel occupies the largest panel size within this industry. With blue backlight and black characters, the panel can be easily identified in the bright and dark areas. LCD display contrast can be adjusted by software, and is available in various occasions.
- The content displayed on the LCD panel is rich, and the main screen can be defined independently. Users can directly operate this panel without referring to the operation manual.
- In case of an inverter fault, the fault parameters, possible cause and recommended countermeasures will be displayed on the LCD panel; this is convenient for users' troubleshooting.

Appearance of LED+LCD combined panel

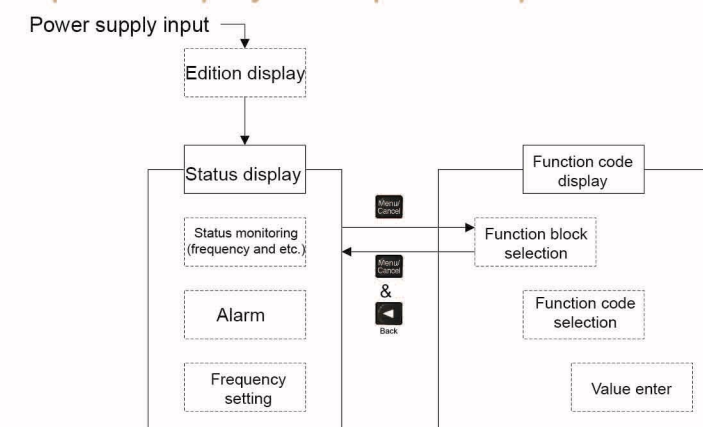


Introduction of LED operation panel



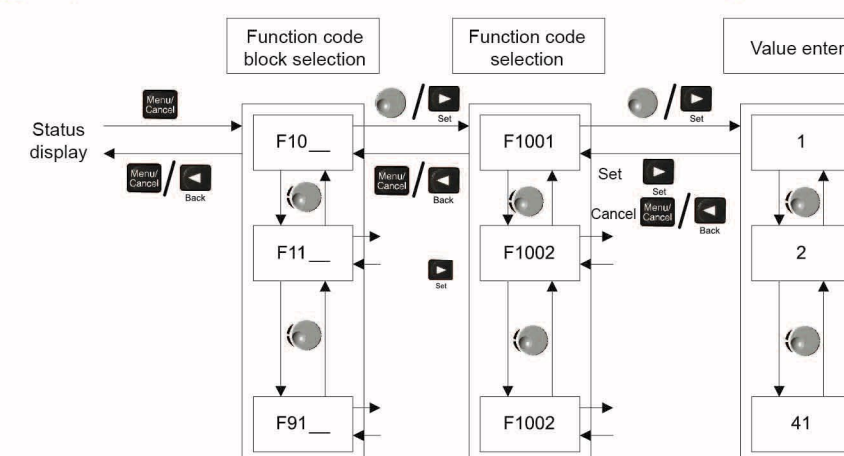
* LCD panel varies according to different inverter types; sometimes the LCD panel is not configured.

LED panel display and operation procedure



* Keep the display content on LCD panel consistent with the LED panel; it is the supplement and detailed illumination for LED panel operation.

Operation method for function code setting



Operation example of frequency setting procedure

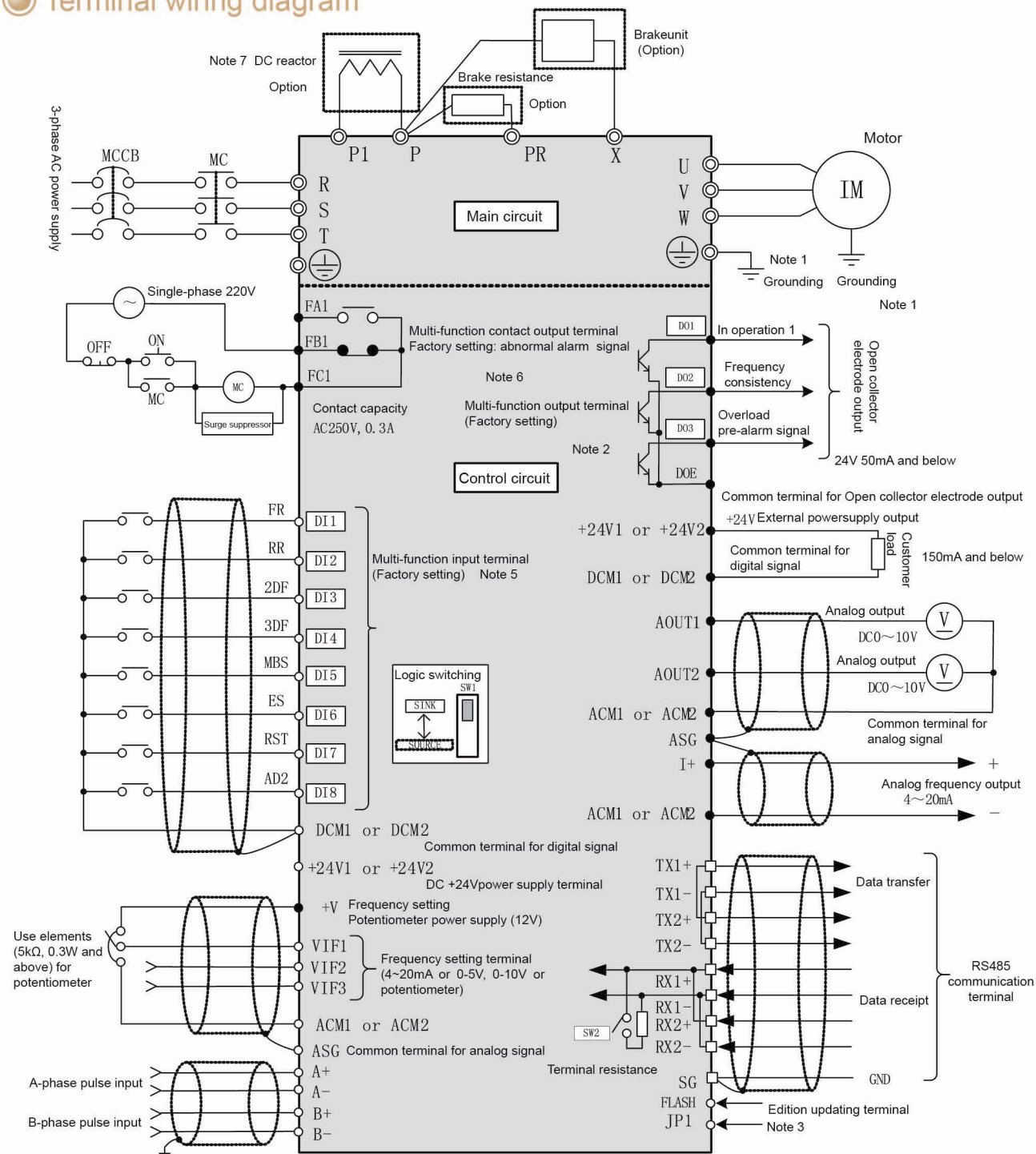
Change from 5Hz to 50Hz

Operation	Display	Description
	500 or 500	Display status monitoring (frequency display)
(press)	500	Press quick knob, and the current setting frequency will be displayed
	500 ⇒ 501 ⇒ 502 ⇒ ...	Turn quick knob, increase or decrease will be displayed
	502 ⇒ 602 ⇒ 702 ⇒ ...	Turn the knob quickly, the digital change of increase or decrease will be displayed
	5000	The expected frequency will be displayed. (※)
(press)	5000 or 5000	Press key or quick knob, the set value will be stored as a new frequency value, and the screen will return to status monitoring display mode. During operation, the output frequency will begin to change into new settings.

5000 lightens 5000 : the brightness will change periodically; 5000 : twinkle

※ When frequency setting is not required, you can return to status monitoring display mode through the operations of key or key .

Terminal wiring diagram

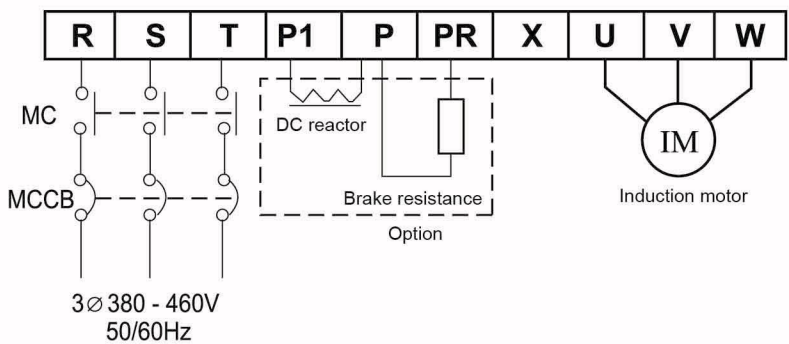


Note 1: The inverter and motor must be grounded before use.
 Note 2: This output terminal is a multi-function terminal; it can set different functions through the function code F1509-F151.
 Note 3: This is a terminal used for edition updating, never use it in normal conditions.
 Note 4: Please switch by function code F1002. It can also be used as input terminal for different feedback signals.
 Note 5: This input terminal is a multi-function terminal; it can set different functions through the function code F1414-F1421.
 Note 6: Multi-function contact output terminal is also a multi-function terminal; it can set different functions through the function code F15139-F1514.
 Note 7: Configure DC reactor for 18.5k or above (standard)

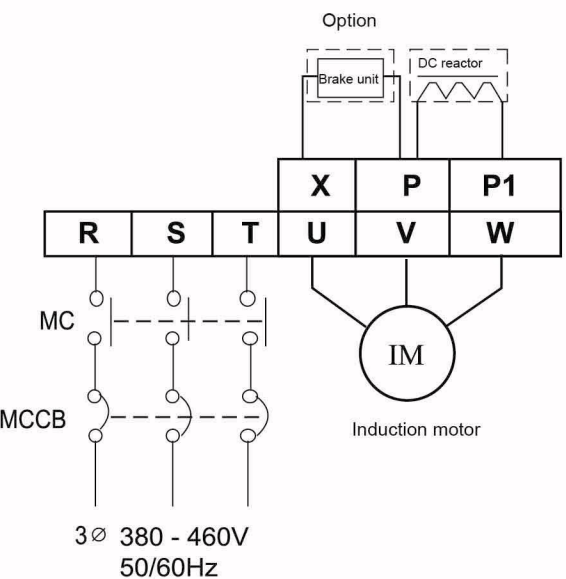
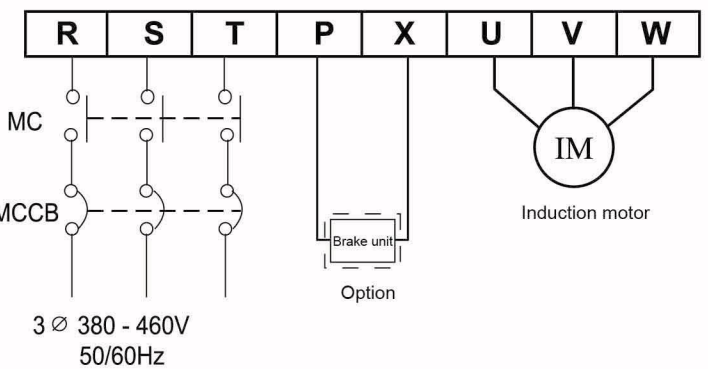
Main circuit terminal

Terminal Symbol	Name	Description
R, S, T	Input power supply terminal	Terminals used for connecting 3-phase municipal power supply
U, V, W	Inverter output terminal	Terminals used for connecting 3-phase induction motor
P, P1	DC reactor connecting terminal	Terminals used for connecting DC reactor
P, PR	Brake resistance connection terminal	Terminals used for connecting brake resistance between P-PR
P, X	DC bus-bar voltage connecting terminal	Terminals used for connecting brake unit Prefers to DC anode terminal, X refers to DC cathode terminal
⊕	Grounding terminal	Terminals used for grounding inverter casing

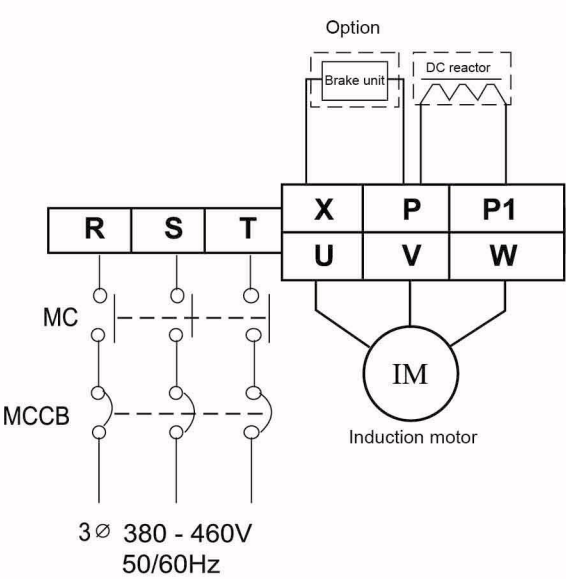
SVC06-0015~0150



SVC06-0185~0750



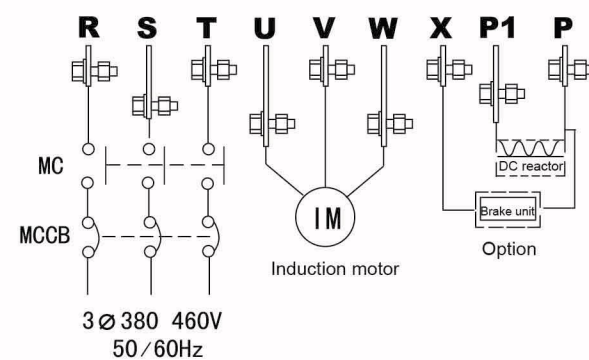
SVC06-0900~1100



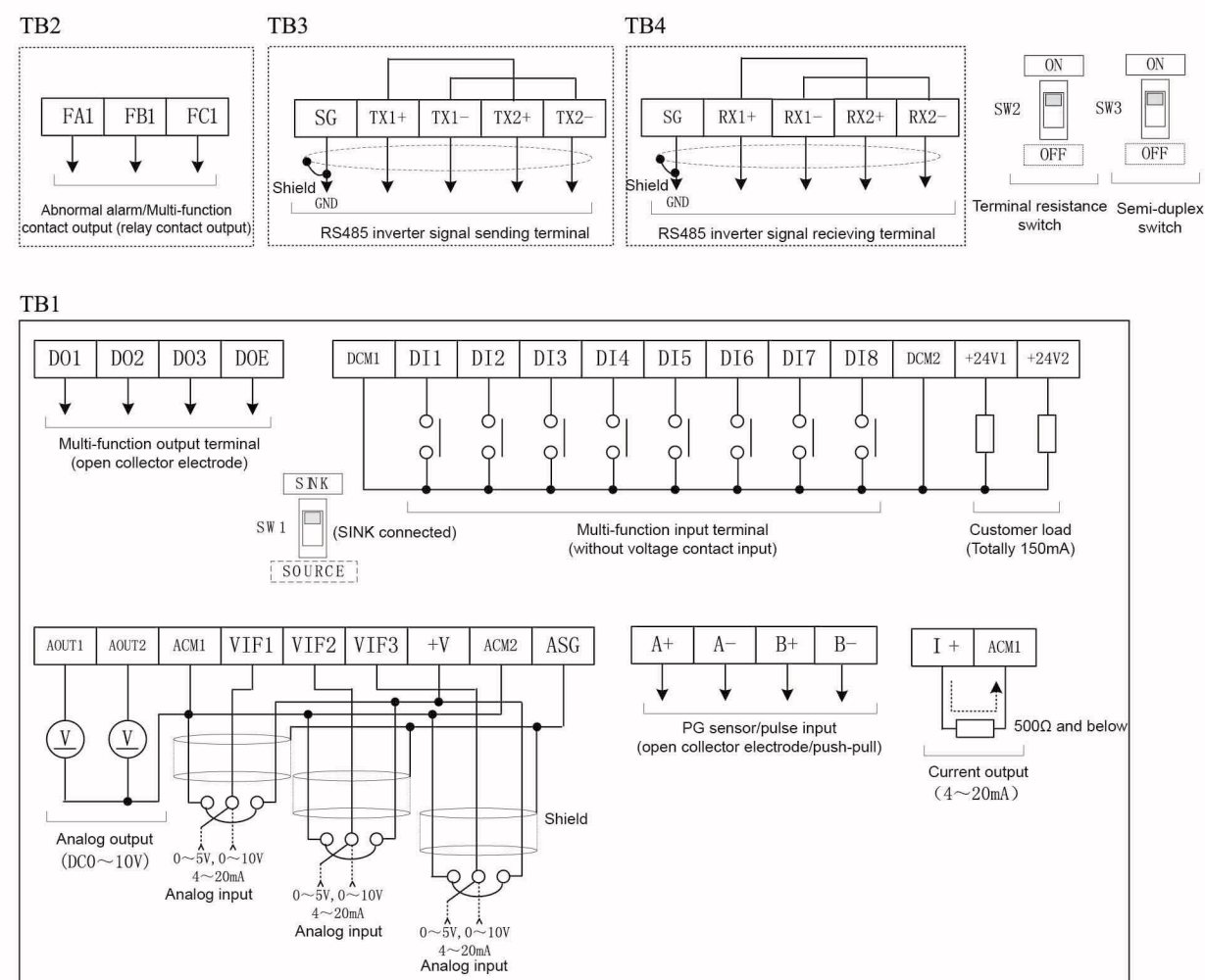
SVC06-1320~1850

Main circuit terminal wiring diagram

SVC06-2000~2500



Control circuit terminal



MCCB, MC capacity and wire diameter

Model	MCCB(Circuit breaker) [A]	MC (electromagnetic contactor)		Main Circuit					Thread diameter	Maximum wire diameter [mm ²]
		Rated current [A]	Rated power-on current [A]	Input wire	Recommended wire diameter[mm ²] P, P1 wire		Output wire	Grounding wire		
SVC06-0015-***4*	15	7	20	2.0(2.0)	2.0(2.0)	2.0(2.0)	5.5	M4	5.5	
SVC06-0022-***4*	20	7	20	2.0(2.0)	2.0(2.0)	2.0(2.0)	5.5			
SVC06-0040-***4*	30	7	20	3.5(2.0)	3.5(2.0)	2.0(2.0)	5.5			
SVC06-0055-***4*	30	17	32	5.5(2.0)	5.5(2.0)	3.5(2.0)	5.5			
SVC06-0075-***4*	50	25	50	5.5(2.0)	5.5(2.0)	5.5(2.0)	5.5			
SVC06-0110-***4*	60	25	50	8.0(3.5)	8.0(3.5)	8.0(3.5)	14	M5	14	
SVC06-0150-***4*	75	32	60	14(5.5)	14(5.5)	8.0(3.5)	14			
SVC06-0185-***4*	75	48	80	14(5.5)	—	8.0(5.5)	14	M6	22	
SVC06-0220-***4*	100	65	100	22(14)	—	8.0(5.5)	14			
SVC06-0300-***4*	125	75	135	38(14)	—	14(5.5)	14			
SVC06-0370-***4*	150	75	135	22x2(22)	—	22(8)	22	M6	60	
SVC06-0450-***4*	175	150	200	60(38)	—	22(14)	22			
SVC06-0550-***4*	225	150	200	38x2(38)	—	38(14)	22	M8	80	
SVC06-0750-***4*	250	150	200	60(38)	—	60(22)	22			
SVC06-0900-***4*	250	180	260	100(60)	150(60)	100(60)	38	M10	150	
SVC06-1100-***4*	300	180	260	150(100)	150(100)	150(60)	38			
SVC06-1320-***4*	350	265	350	150(100)	200(100)	150(100)	38	M16	325	
SVC06-1600-***4*	450	400	420	200(150)	325(150)	200(100)	38			
SVC06-1850-***4*	500	600	660	250(150)	325(200)	250(150)	38			
SVC06-2000-***4*	600	600	660	325(150)	150x2(200)	325(150)	60			
SVC06-2200-***4*	600	600	660	150x2(200)	250x2(200)	150x2(200)	60			
SVC06-2500-***4*	700	600	660	200x2(200)	250x2(200)	200x2(200)	60			

* 1: Category of main circuit wire: 600V/V plastic insulated wire (60°C) when inverter ambient temperature is 40°C; () refers to wire made of cross-linked polyethylene (90°C).

* 2: Maximum wire diameter refers to the maximum wire diameter limited by terminal block.

* 3: Please use thick and short wires for grounding as possible.

List of function code block

- The function block used by svc06 can combine the interrelated codes together, therefore is convenient for user inquiry and setting.

Function	Function Code	Function Code Block	Functional Description
Basic operation function	F10XX	Basic function	Selections of operation mode and frequency, voltage and acceleration/deceleration time
	F11XX	Start/Brake function	Selections of operation command method and start/brake method
	F12XX	Display function	Selections of display content on LED panel
	F13XX	Auxiliary function	Selections of resonance avoidance frequency, inverter mode and other auxiliary functions
Input/Output function	F14XX	Input function	Selections of analog/digital input function and scope
	F15XX	Output function	Selections of analog/digital output function and scope
System-related function	F16XX	System function	Selections of copy, initialization and other system functions
	F17XX	Protection function	Selections of temperature, current, load and other protection functions
	F18XX	Information function	Selections of software edition, fault information checking functions
Special function	F19XX	Energy-saving function	Selections of varied energy-saving modes
	F20XX	V/f characteristics function	Selections of V•F separation function and V/f random curve function
Graphic function	F21XX	Multi-segment speed function	Selections of 16-segment speed frequency setting
	F22XX	Graphic operation function	Selections of graphic operation and disturbed operation function
Display function	F23XX	Display function	Selections of LCD display language, content and brightness functions
PID function	F30XX	Basic PID function 1	Selections of PID1 control method and parameter setting
	F31XX	Basic PID function 2	Selections of PID2 control method and parameter setting
	F32XX	PID1•PID2 combined function	Selections of PID1 & PID 2 combined function and open function
	F33XX	PID control variable readout	Selections of PID1 and PID2 variable readout
Communication function	F40XX	Serial communication function	Selections of communication format, baud rate and other settings
	F41XX	Modbus communication function	Selections of processing method corresponding to Modbus communication timeout
Motor parameter	F5XXX	Motor parameter	Setting and selection of motor parameter and self-tuning
Vector control	F60XX	Vector control function	Setting and selection of torque, excitation and other parameters for vector control
Torque control	F61XX	Torque control function	Setting and selection of torque command and related limiting parameters
PG control function	F81XX	PG control function	Setting and selection of encoder parameters and position control functions
Other functions	F89XX	Other functions (for factory adjustment)	Other corresponding functions (for factory adjustment)

* Please refer to Instruction Manual for detailed information.

Standard specification

400V Series

Item				Specification							
Model (SVC06-□□□□-**4*)				0015	0022	0040	0055	0075	0110	0150	
Output	Mode A Heavy load	Standard applicable motor [kW]		1. 5	2. 2	4	5. 5	7. 5	11	15	
		Rated capacity [kVA]* 1		2. 8	4. 2	6. 2	8. 7	11. 8	17. 3	22. 2	
		Rated current [A] * 2		4	6	9	12. 6	17	25	32	
		Overload current rating * 3		150%~1min							
		Output frequency range * 4		0. 05~600Hz (startup frequency variable from 0.05 ~ 60Hz)							
	Mode B Light load	Standard applicable motor [kW]		2. 2	4	5. 5	7. 5	11	15	18. 5	
		Rated capacity [kVA]* 1		4. 2	6. 2	8. 7	11. 8	17. 3	22. 2	26. 3	
		Rated current [A] * 2		6	9	12. 6	17	25	32	38	
		Overload current rating * 3		120%~1min							
		Output frequency range * 4		0. 05~240Hz (startup frequency variable from 0.05 ~ 60Hz)							
	Rated output voltage * 5			3∅ 380V~460V							
Input	Voltage•Frequency			3∅ 380V~460V, 50/60Hz							
	Allowable fluctuation			Voltage: -15%, +10%; Frequency: ±5%; Voltage Unbalance: within 3%							
	Source impedance			1% and above (When less than 1%, use reactor option)							
	Mode A Heavy load	Required power supply capacity [KVA] * 6		2. 5	3. 7	5. 6	7. 9	10. 7	16. 9	21. 7	
		Input current[A] * 7	With DCL	3. 6	5. 5	8. 2	11. 5	15. 5	24. 5	31. 4	
			Without DCL	5. 6	8. 4	12. 6	17. 6	23. 8	35	44. 8	
	Mode B Light load	Required power supply capacity [KVA] * 6		3. 7	5. 6	7. 9	10. 7	16. 9	21. 7	25. 7	
		Input current[A] * 7	With DCL	5. 5	8. 2	11. 5	15. 5	24. 5	31. 4	37. 2	
			Without DCL	8. 4	12. 6	17. 6	23. 8	35	44. 8	53. 2	
	Protection structure				Encapsulated (IP20)						
Cooling method				Forced air cooling							
Approximate weight * 8				4kg	4kg	4kg	6kg	6kg	7kg	7kg	
Carrier frequency				Sine wave PWM (carrier frequency 1k ~ 14kHz)* 9							
DC reactor				Option							

* 1: Rated capacity is the capacity when output voltage is 400V.
 * 2: When input voltage > AC400V, decrease the rated current according to the output voltage.
 * 3: Allow overload (1 minute) every 10 minutes.
 * 4: In vector control, without PG sensor: 0.25Hz ~ 240Hz; with PG sensor: 0.05Hz ~ 240Hz (varies according to the number of poles)
 * 5: Output voltage should not be larger than source voltage.
 * 6: Vary according to different current impedance (with DC reactor).
 * 7: Vary according to source impedance.
 * 8: In case of embedded EMC filter.
 * 9: Maximum carrier frequency, it will vary according to inverter capacity mode and operation status.

Standard specification

400V Series

Item			Specification							
Model (SVC06-□□□□-***4*)			0185	0220	0300	0370	0450	0550	0750	
Output	Mode A Heavy load	Standard applicable motor[kw]		18. 5	22	30	37	45	55	75
		Rated capacity[kVA] * 1		26	32	42	51	62	76	102
		Rated current[A] * 2		38	46	61	74	90	110	147
		Overload current rating * 3		150%~1min						
		Output frequency range * 4		0.05 ~ 600Hz (startup frequency variable from 0.05 ~ 60Hz)						
	Mode B Light load	Standard applicable motor[kw]		22	30	37	45	55	75	90
		Rated capacity[kVA] * 1		31	41	51	62	76	98	120
		Rated current[A] * 2		46	61	74	90	110	147	173
		Overload current rating * 3		120%~1min						
		Output frequency range * 4		0.05 ~ 240Hz (startup frequency variable from 0.05 ~ 60Hz)						
	Rated output voltage * 5		3Ø 380V~460V							
Input	Voltage•Frequency		3Ø 380V~460V, 50/60Hz							
	Allowable fluctuation		Voltage: -15%, +10%; Frequency: ±5%; Voltage Unbalance: within 3%							
	Source impedance		1% and above (When less than 1%, use reactor option)							
	Mode A Heavy load	Required power supply capacity[kVA] * 6		25. 4	30. 3	40. 4	48. 1	58. 5	72. 4	95. 4
		Input current[A] * 7	With DCL	36. 7	43. 8	58. 3	69. 5	84. 5	104. 5	137. 8
			Without DCL							
	Mode B Light load	Required power supply capacity[kVA] * 6		30. 3	40. 4	48. 1	58. 5	72. 4	95. 4	110. 5
		Input current[A] * 7	With DCL	43. 8	58. 3	69. 5	84. 5	104. 5	137. 8	159. 5
			Without DCL							
	Protection structure			Encapsulated (IP20)						
Cooling method			Forced air cooling							
Approximate weight * 8			25kg			35kg		45kg		
Carrier frequency			Sine wave PWM (carrier frequency 1k ~ 14kHz) * 9							
DC reactor			Option							

- * 1: Rated capacity is the capacity when output voltage is 400V.
 * 2: When input voltage > AC400V, decrease the rated current according to the output voltage.
 * 3: Allow overload (1 minute) every 10 minutes.
 * 4: In vector control, without PG sensor: 0.25Hz ~ 240Hz; with PG sensor: 0.05Hz ~ 240Hz (varies according to the number of poles)
 * 5: Output voltage should not be larger than source voltage.
 * 6: Vary according to different current impedance (with DC reactor).
 * 7: Vary according to source impedance.
 * 8: In case of embedded EMC filter.
 * 9: Maximum carrier frequency, it will vary according to inverter capacity mode and operation status.

Standard specification

400V Series

Item			Specification								
Model (SVC06-□□□□-***4*)			0900	1100	1320	1600	1850	2000	2200	2500	
Output	Mode A Heavy load	Standard applicable motor[kw]	90	110	132	160	185	200	220	250	
		Rated capacity[kVA] * 1	120	146	175	211	249	267	295	327	
		Rated current[A] * 2	173	211	253	304	360	386	426	472	
		Overload current rating * 3	150%~1min								
		Output frequency range * 4	0.05 ~ 400Hz (startup frequency variable from 0.05 ~ 60Hz)								
	Mode B Light load	Standard applicable motor[kw]	110	132	160	200	220	250	280	315	
		Rated capacity[kVA] * 1	146	180	211	267	295	327	374	409	
		Rated current[A] * 2	211	253	304	386	426	472	540	590	
		Overload current rating * 3	120%~1min								
		Output frequency range * 4	0.05 ~ 200Hz (startup frequency variable from 0.05 ~ 60Hz)								
	Rated output voltage * 5		3Ø 380V~460V								
Voltage•Frequency		3Ø 380V~460V, 50/60Hz									
Allowable fluctuation		Voltage: -15%, +10%; Frequency: ±5%; Voltage Unbalance: within 3%									
Source impedance		1% and above (When less than 1%, use reactor option)									
Input	Mode A Heavy load	Required power supply capacity[kVA] * 6		111	135	163	196	232	248	274	304
		Input current[A] * 7	With DCL	161	196	235	283	335	359	396	439
			Without DCL								
	Mode B Light load	Required power supply capacity[kVA] * 6		135	163	196	248	274	304	348	380
		Input current[A] * 7	With DCL	196	235	283	359	396	439	502	549
			Without DCL								
	Protection structure		Encapsulated (IP20)								
Cooling method		Forced air cooling									
Approximate weight * 8		62kg		110kg			140kg				
Carrier frequency		Sine wave PWM (carrier frequency 1k ~ 8kHz)* 9									
DC reactor		Standard configuration (embedded)									

- * 1: Rated capacity is the capacity when output voltage is 400V.
 * 2: When input voltage > AC400V, decrease the rated current according to the output voltage.
 * 3: Allow overload (1 minute) every 10 minutes.
 * 4: In vector control, without PG sensor: 0.25Hz ~ 240Hz; with PG sensor: 0.05Hz ~ 240Hz (varies according to the number of poles)
 * 5: Output voltage should not be larger than source voltage.
 * 6: Vary according to different current impedance (with DC reactor).
 * 7: Vary according to source impedance.
 * 8: In case of embedded EMC filter.
 * 9: Maximum carrier frequency, it will vary according to inverter capacity mode and operation status.

Common specification

400V Series

Control Method			Vector control / Speedless sensor vector control / V/f control
Drive performance ※1	Speed control range	With PG sensor	0.05Hz ~ 240Hz (1:1000/50Hz reference) ※5
		Without PG sensor	0.05Hz ~ 240Hz (1:200/50Hz reference) ※5
	Speed response/accuracy	With PG sensor	Response characteristics: 250rad/sec Accuracy: ± 0.01%
		Without PG sensor	Response characteristics: 100rad/sec Accuracy: ± 0.5%
	Torque control range	With PG sensor	1:50 (rated torque ratio)
		Without PG sensor	1:20 (rated torque ratio)
Torque accuracy	With PG sensor	± 10% (to rated torque)	
	Without PG sensor	± 20% (to rated torque)	
Control Specification	Frequency setting resolution	Digital setting	0.01Hz
		Analog setting	0.05% (12bit 0~10V, 4~20mA), 0.1% (11bit 0~5V) Refer to maximum output frequency
	Frequency accuracy	Digital setting	Output frequency ± 0.01% (within -10 ~ 40※)
		Analog setting	Maximum output frequency ± 0.2% (within 25℃ ± 10℃) ※2
	PG input		Open collector electrode, push-pull maximum pulse number: 491.52kHz ※3
DC brake		Startup frequency (0.05~20Hz), action time (1.0~10s), brake force (1~10 Level)	
Accessorial function		Instantaneous re-start, speed tracking startup, multi-speed operation, frequency avoidance, alarm automatic recovery, PID control, simple graphic operation, energy-saving operation and other functions	
Operational Specification	Drive/Stop setting		Operator panel, serial communication (RS485, Modbus), control circuit terminal
	Frequency command setting	Digital setting	Operator panel, serial communication (RS485, Modbus), terminal block stepping
		Analog setting	3-channel, 0~5V, 0~10V, 4~20mA, potentiometer (5kΩ, 0.3W and above)
	Input signal		Frequency command, forward command, reversal command, acceleration/deceleration time setting, idling stop/alarm reset, emergency stop, inching selection, stepping frequency setting, operational signal holding and etc. [Digital input: 8 channels can be set and assigned discretionarily]; [Analog input: current/voltage occupies 3 common channels]
	Output signal	Contact output	1 channel for various alarm signals and multi-function contact output(1C/0 contact, AC250V, 0.3A)
		Monitoring signal	In operation frequency consistency, overload alarm, undervoltage, frequency and etc.[3 channels for open collector electrode can be set and assigned discretionarily; 2 channels for analog output]
LED display			Frequency, output current, rotating speed, load ratio, without unit: (output voltage, power and so on), in operation, alarm
LCD display			Various status, code, alarm, information display (in English, Japanese and Chinese)
Communication I/F			RS485, Modbus-RTU, SANKEN protocol
External power supply output			DC24V, 150mA (control terminal block)
Protection function			Current limitation, overcurrent cut off, motor overload, external thermistor, undervoltage, overvoltage, transient power outage, radiator fin overheat, phase failure
Alarm function			Alarms in overvoltage prevention, current limitation during acceleration/deceleration, brake resistance overheat alarm, overload alarm, radiator fin overheat alarm
Environment	Ambient temperature		-10℃ ~ +40℃ (without frost); light load, -10℃ ~ +50℃ (without frost); heavy load
	Storage temperature		-20℃ ~ +65℃ (short-term storage during transportation) ※4
	Relative humidity		95%RH and below (without dew)
	Altitude		3000m and below (decrease the current when the altitude is over 1000m)
	Vibration		5.9 m/s ² (0.6G) and below (JIS C 60068-2-6 Standard; IEC60068-2-6)
	Gas medium		Indoor (without corrosive gas, flammable gas, oil mist, dust and etc.)

- ※ 1: Vary according to different environments, conditions, motors and inverters.
- ※ 2: The maximum output frequency refers to the frequency at 5V, 10V and 20mA.
- ※ 3: An optional base plate must be installed for line driver input.
- ※ 4: The temperature applicable for medium-term and short-term storage during transportation.
- ※ 5: The maximum value of frequency setting range is 120Hz when a 2-pole motor is set.

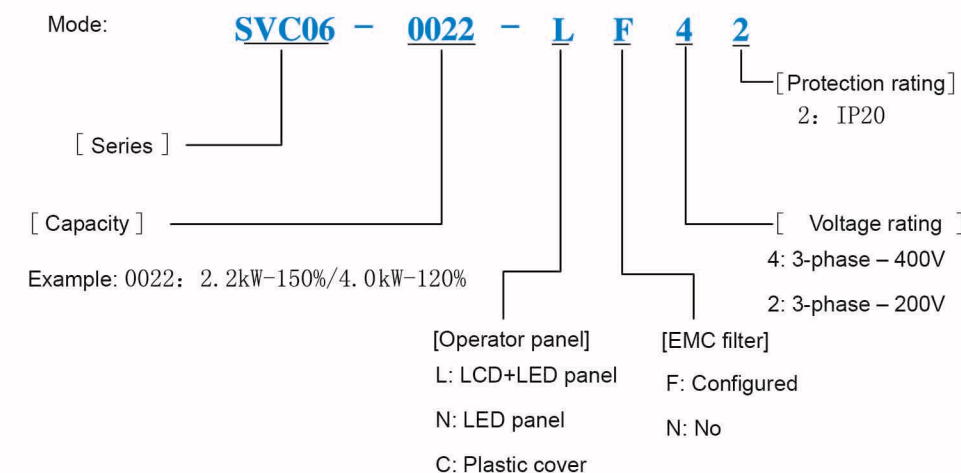
Specifications for communication function

Electrical characteristics		RS485 communication	
Communication protocol		SANKEN protocol	Modbus-RTU communication protocol
Communication type		4-wire/2-wire bus-bar type (RS485 standard)	
Transmission distance		Total wire length is 500m, but have to connect to the terminal resistance	
Number of connected inverters		Maximally 32 sets	Maximally 247 sets ※Note
Connecting cable		Shielded twisted-pair is recommended	
Communication method		Full-duplex / semi-duplex communication	
Communication speed [bps]		57600/38400/19200/9600/4800/2400/1200 optional	
Synchronous method		Start-stop synchronization	
Data format		ASCII code or BINARY	BINARY
Data length		8bit	
Stop bit length		1bit or 2bit	
odd-even check		With (odd number, even number)	without optional
Error check		Sum check	CRC code check
End-of-message code	ASCII	CR+LF/CR optional	NO
	BINARY	NO	

※ Note: A relay is required when the number exceeds 32

400V series (double specification)

● Mode A (heavy: 150% overload) and Mode B (light: 120% overload) Double Specification

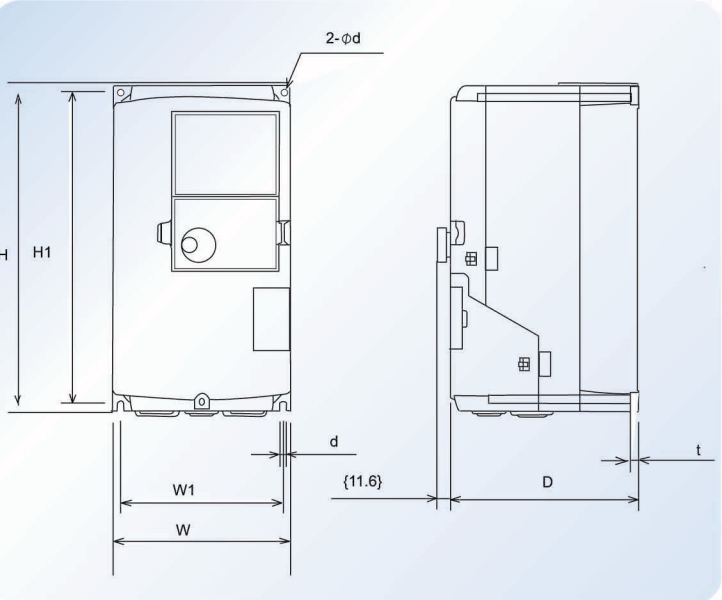


Inverter model (SVC06) and appropriate motor capacity [kW]

	1.5	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	200	220	250
Mode A	1.5K~250K																					
	2.2	4.0	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	200	220	250	280	315
Mode B	2.2K~315K																					

Overall dimension

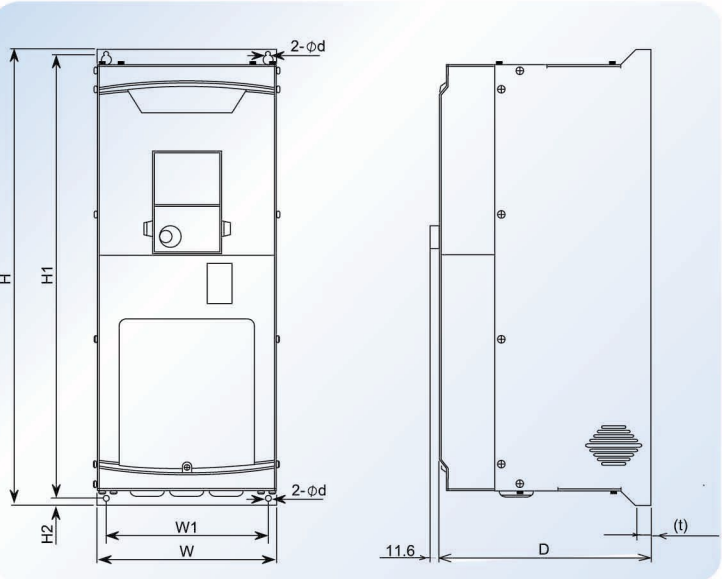
Outline structure and dimension of operation panel



SVC06-0015~0150

Capacity	H	H1	W	W1	D	d	t
SVC06-0015~**4*	280	266	150	138	160	5	7
SVC06-0022~**4*							
SVC06-0040~**4*							
SVC06-0055~**4*	300	286	200	187	195	5.5	7
SVC06-0075~**4*							
SVC06-0110~**4*	330	316	220	208	195	5.5	7
SVC06-0150~**4*							

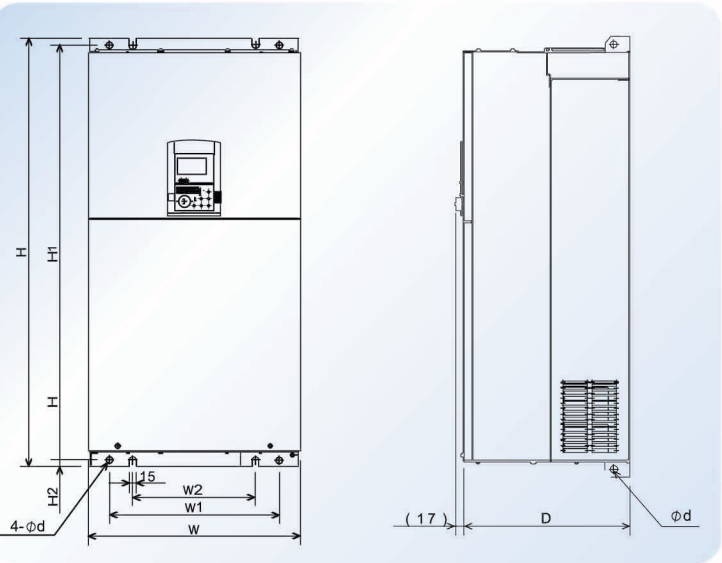
Unit: mm



SVC06-0185~0750

Capacity	H	H1	H2	W	W1	D	d	t
SVC06-0185~**4*	610	593	10	240	216	283	7	20
SVC06-0220~**4*								
SVC06-0300~**4*								
SVC06-0370~**4*	740	722	10	280	256	295	8	20
SVC06-0450~**4*								
SVC06-0550~**4*	810	786	12	320	296	318	12	30
SVC06-0750~**4*								

Unit: mm

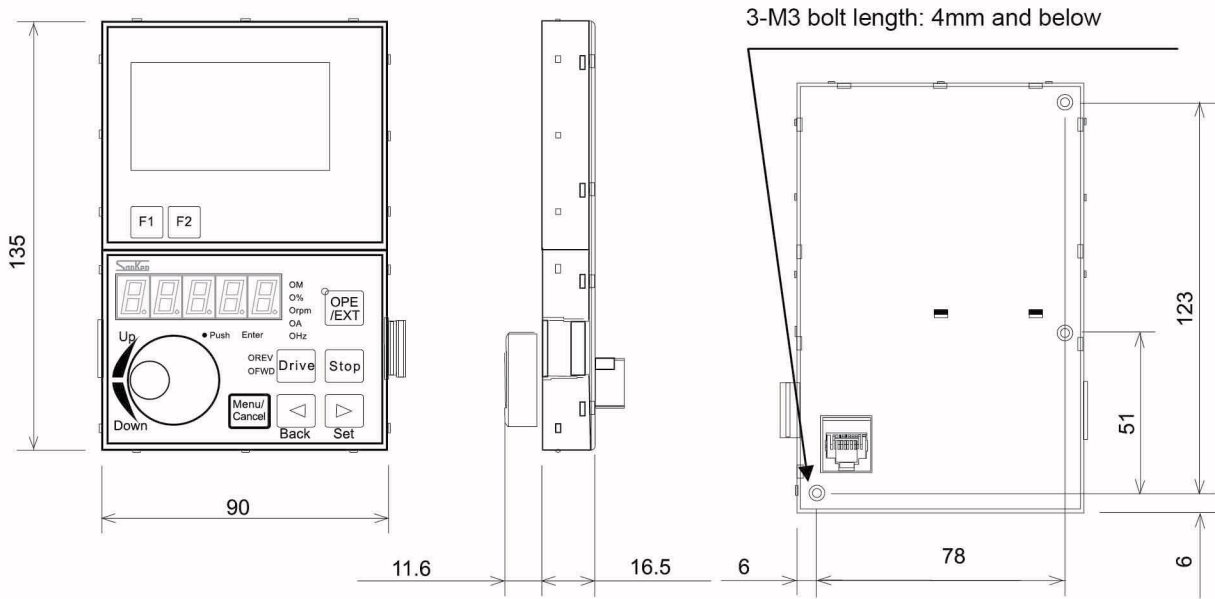


SVC06-0900~2500

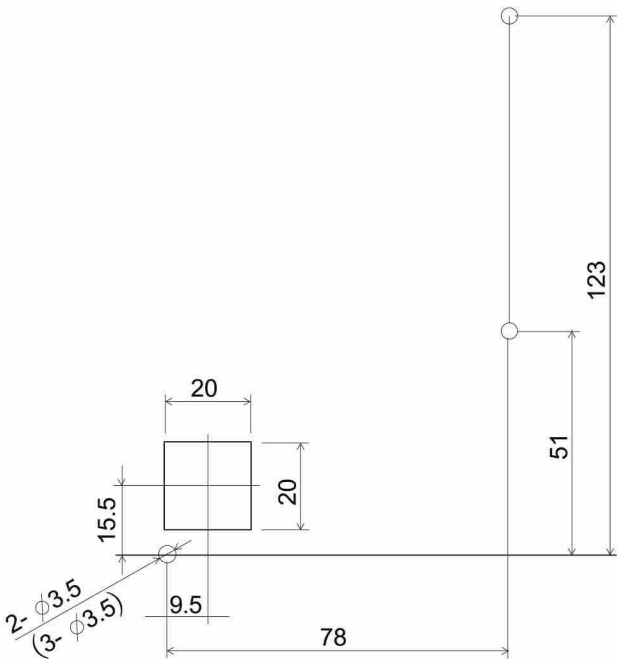
Capacity	H	H1	H2	W	W1	W2	D	d
SVC06-0900~**4*	900	870	15	350	250	140	340	15
SVC06-1100~**4*								
SVC06-1320~**4*	1010	980	15	500	400	290	380	15
SVC06-1600~**4*								
SVC06-1850~**4*								
SVC06-2000~**4*	1010	980	15	680	580	470	380	15
SVC06-2200~**4*								
SVC06-2500~**4*								

Unit: mm

Operation panel



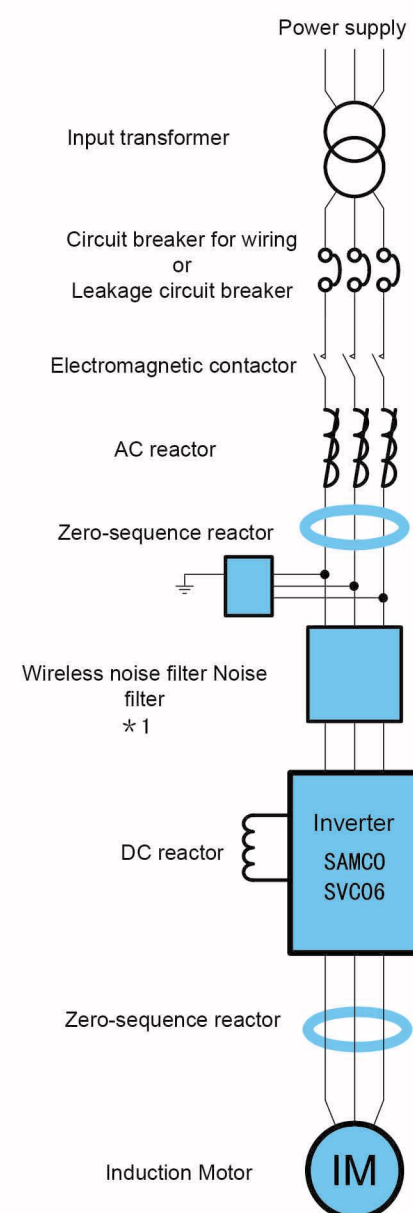
Exterior installation of operation panel: hole dimension



Peripheral equipments for inverter

Connection with peripheral equipments

Name	Purpose & Description
Power supply input transformer	When the rated input voltage of inverter and the system power supply voltage have to be matched, please install a power supply input transformer. When several inverters are connected, please set an input transformer to decrease the affect of high-order harmonic current on other loading equipments.
Circuit breaker Or leakage circuit breaker	Please connect a circuit breaker or leakage circuit breaker to the overload protection circuit during system protection and wiring. When a leakage circuit breaker is adopted, please use products with corresponding high-order harmonic.
Electromagnetic contactor	Coils must be equipped with surge absorbers
Surge absorber	Please install a surge absorber, the absorber will be used to restrain the surge during opening/closing of electromagnetic contactors and relays.
AC reactor DC reactor	A reactor is installed to fulfill the following purposes • Improve the input power factor of the inverter • Decrease the affect on the inverter caused by unbalance between power supply voltage phases • Prevent the inverter tripping off when the phase advance capacitor in the system is activated • High capacity for power supply (500kVA and above) Model Name • AC reactor S□-ACL-●●K • DC reactor S□-DCL-●●K □: 400 series F; 200V series T
Zero-sequence reactor Line noise filter	Decrease the interference when entering the inverter input power supply system and the interference caused by wiring. Install the zero-sequence reactor and other elements as near the inverter as possible. ■ Model Name RC5078 RC5096 [Made by Soshin Electric Co., Ltd.]
Wireless noise filter	Used to restrain the wireless noise radiating on the power supply of the inverter. ■ Model Name 200V series: 3XYEB-105*104 400V series: 3XYHB-105*104 [Made by OKAYA ELECTRIC INDUSTRIES CO., LTD.]
Noise filter	Decrease the interference when entering the inverter input power supply system and the interference caused by wiring. When connecting, install the noise filter as near the inverter as possible. ■ Recommended EMC filters (consult separately)



* 1: For SVC06 series inverters with embedded EMC filters, please set the EMC filter selecting switch to the ON position.
* 2: Please refer to SANKEN inverter model selection for related options.

Customer options

Optional baseplate

Our company has prepared the following different settings for the optional baseplate installed in the inverter.

Option Name	Model	Function	Applicable inverter
PG option card	SC-PG1	Inspect the motor speed with the detector (PG) and feedback the results; i.e. realize the functions of speed control and position control. • Line driver output PG correspondence • A, B phase pulse (differential pulse) input • Pulse monitor output • PG power supply correspondence: +5V or 12V	Common for SVC06 series
	SC-PG2	Inspect the motor speed with the detector (PG) and feedback the results; i.e. realize the functions of speed control and position control. • Open collector electrode/push-pull output PG correspondence • A, B phase pulse input • Pulse supervision output • PG power supply correspondence: +12V	
	SC-PG3	Inspect the motor speed with the detector (PG) and feedback the results; i.e. realize the functions of speed control and position control. • Open collector electrode/push-pull output PG correspondence • A, B phase pulse input • Pulse supervision output • vPG power supply correspondence: +24V	
PROFIBUS communication baseplate	SC-PB	The option can make the inverter serving as a slave station for PROFIBUS, therefore realizing the parameter setting, status monitoring & controlling and other functions by host station through the PROFIBUS bus-bar.	

Note: Two optional baseplates can be synchronously installed in the inverter.

The inverter interior is configured with two plug slots. The outline structure may vary according to different types of optional baseplates. Please insert each optional baseplate into the specified slot.

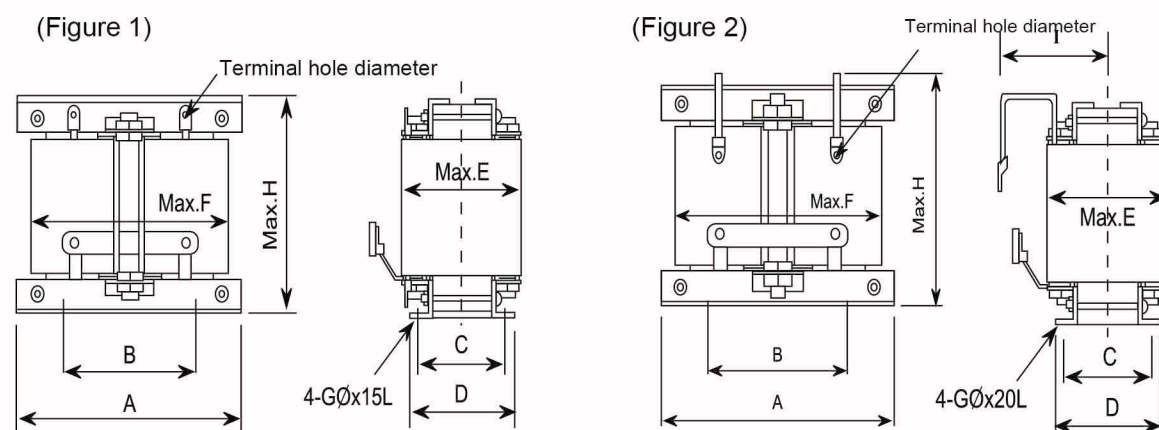
Furthermore, the combination status of optional baseplate sometimes may influence the installation or the inverter function. Please refer to Operation Manual for Optional Baseplate for detailed functions for each baseplate.

Compatibility chart for optional baseplate

Slot 1 \ Slot 2	Not plugged	SC-PG1	SC-PG2	SC-PG3	SC-PB
Not plugged	—	○	○	○	○
SC-PG1	○	×	×	×	○
SC-PG2	○	×	×	×	○
SC-PG3	○	×	×	×	○
SC-PB	○	○	○	○	×

○ : Can be plugged × : Cannot be plugged

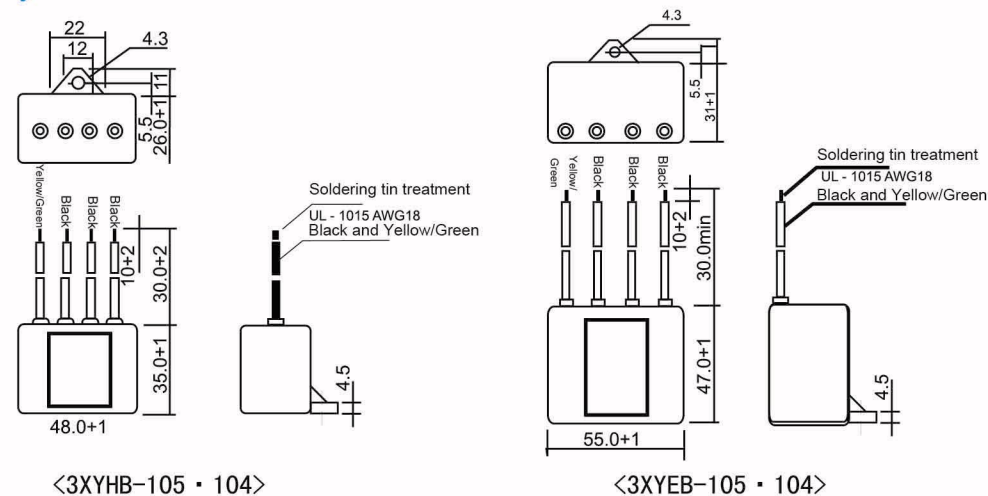
DC reactor



Series	Inverter Model	Reactor Model	Dimension [mm]									Terminal hole diameter	Weight [kg]	Figure Number
			A	B	C	D	E	F	G	H	I			
400V SVC06 series	SVC06-0015-***4*	SF-DCL-2.2K	110 ±5	85 ±2	75 ±2	95 ±5	95	95	5	140	—	M6	3	Figure 1
	SVC06-0022-***4*		110 ±5	85 ±2	75 ±2	95 ±5	95	95	5	140	—	M6	3	
	SVC06-0040-***4*	SF-DCL-4.0K	110 ±5	85 ±2	75 ±2	95 ±5	95	95	5	140	—	M6	3	Figure 1
	SVC06-0055-***4*	SF-DCL-7.5K	140 ±5	100 ±2	90 ±2	115 ±5	110	150	7	160	90	M8	6	Figure 2
	SVC06-0075-***4*		140 ±5	100 ±2	90 ±2	115 ±5	110	150	7	160	90	M8	6	
	SVC06-0110-***4*	SF-DCL-15K	140 ±5	100 ±2	90 ±2	115 ±5	110	150	7	175	90	M8	6	Figure 2
	SVC06-0150-***4*		140 ±5	100 ±2	90 ±2	115 ±5	110	150	7	175	90	M8	6	
	SVC06-0185-***4*													

* Please consult separately for details of AC reactor.

High-frequency filter

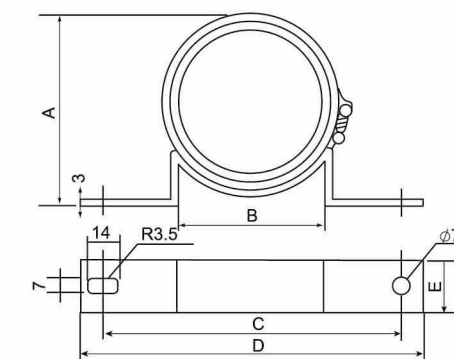


<3XYHB-105 · 104>

<3XYEB-105 · 104>

Zero-sequence reactor

	RC5078	RC5096
A	85	103
B	64	84
C	130	140
D	150	160
E	23(24)	25(26)



Brake resistance

Load list of brake circuit

Model	Brake resistance	Driver element
400V SVC series		
SVC06-0015-***4*	—	○
SVC06-0022-***4*	—	○
SVC06-0040-***4*	—	○
SVC06-0055-***4*	—	○
SVC06-0075-***4*	—	○
SVC06-0110-***4*	—	○
SVC06-0150-***4*	—	○
SVC06-0185~2500-***4* *1	—	—

○: Standard configured —: Not configured

Selection example for external brake resistance

Model	External brake resistance (recommended)		External brake resistance (recommended)	
	Resistance value	Capacity * 2	Resistance value	Capacity * 2
SVC06-0015-***4*	320Ω and above	200 W	190Ω and above	300 W
SVC06-0022-***4*	160Ω and above	400 W	130Ω and above	500 W
SVC06-0040-***4*	120Ω and above	600 W	80Ω and above	800 W
SVC06-0055-***4*	80Ω and above	800 W	52Ω and above	1100 W
SVC06-0075-***4*	60Ω and above	1000 W	38Ω and above	1500 W
SVC06-0110-***4*	40Ω and above	1500 W	32Ω and above	1800 W
SVC06-0150-***4*	40Ω and above	1500 W	32Ω and above	1800 W

- * 1: External brake unit and brake resistance should be configured for a capacity of SVC06-0185 and above, please refer to "Model Selection for SANKEN Inverter Option" for details
- * 2: The above brake resistance is selected according to a maximum utilization ratio of 10%ED. In order to protect the brake resistance, you must set the F1115 (brake resistance utilization ratio) below 10%ED. When %ED setting is above 10%ED, the capacity of brake resistance must be increased proportionally.

Embedded filter

- The EMC filter (if ordered) embedded in the inverter is used to reduce transmission interference.
- EMC filter effective/non-effective can be selected by switching the connecting terminals, please refer to the manual for details.

● Installation & Wiring correlations

Selection of inverter capacity	When 1 inverter is used to drive several motors, the rated current of the selected inverter must be larger than 1.1 times of total rated current of all motors. Furthermore, when a large startup torque is required, please select an inverter with a capacity of a higher grade.
Wiring	When connecting the power supply to the output terminals of U, V and W, the inverter may be damaged. Please make sure the wiring is correct before power on the system.
Installing position & Ambient environment	Please avoid the environments with high temperature, high humidity and dews, as well as the locations with cotton thread, duct, corrosive gas, grinding fluid vapor and chloride. Please install the inverter in a well ventilated room without direct sunshine. When installed in a cabinet, please confirm the cooling method and cabinet dimension; make sure the ambient temperature for inverter is within the allowable temperature range. According to the operation conditions, the surface temperature of inverter body and brake resistance may increase; therefore the inverter must be installed on flame-resistant materials.
Maintenance & Check	Even when the power supply is cut off, the internal capacity must be discharged for a certain time. Since there is residual voltage accumulated in the capacity and it may cause an electric shock. Therefore, please make a check after the charging lamp is out.
Wiring distance for control circuit	During remote operation, please use shielded twisted-pair, and the wiring distance with the inverter must be within 20m. Furthermore, it must be far away from the strong current circuit (main circuit and relay sequence circuit), therefore preventing the interference of peripheral equipments.
Wiring distance between inverter and motor	When the total wiring distance between the inverter and motor is too long, high-order harmonic leakage current will increase accordingly because of the distributed capacitance on the lead, therefore badly affecting the inverter host and peripheral equipments. When the wiring distance is 50m, the carrier frequency should be set as F1009=130 and below; when the wiring distance is between 50 to 100m, the carrier frequency should be set as F1009=90 and below; when the wiring distance is between 100 to 200m, the carrier frequency should be set as F1009=40 and below.
Power cable size	When the wiring distance between the inverter and motor is too long (especially during low-frequency output), the pressure drop in the cable may result in the decrease of the motor torque. Therefore, please select the power cable with a larger gauge.
Grounded wiring	The inverter must be reliably grounded with grounding terminals.

● Use of special motor

Gear-driven motor	The continuous rotating speed range varies according to different lubrication methods and different manufacturers. (Pay special attention to the low-frequency area of oil lubrication method)
Brake motor	Please use a brake motor with a separate power supply for braking. The braking power supply should be connected to the primary side power supply, and "OFF" the inverter output using the idle command (assign "MBS" to multi-function terminal) during the braking (motor stops).
Submersible motor Submersible Pump	Since the rated current is larger than that of general motor; when selecting an inverter, please firstly confirm the rated current of the motor and then select the inverter capacity.
Explosion-proof motor	When driving an explosion-proof motor, a motor which has passed the inverter-motor combined test should be used.
Synchronous motor	Since they are normally designed according to the applicable motor types and specifications, please consult the vendor when selecting an inverter.
Single-phase motor	An inverter is not suitable for speed regulation of the single-phase motor. Please use a 3-phase motor.

● Peripheral equipment correlations

Setting of circuit breaker for wiring	In order to protect power cable, please set the circuit breaker (MCCB) at the input side of inverter. Please use high-frequency products for leakage switch breaker.
Use of electromagnetic contactor at input end	Please don't turn on/off the input electromagnetic contactor (MC) at a high frequency (more than once within one hour), or may result in inverter fault. If high-frequency operation/stop is required, please use the control function of the control terminals
Use of electromagnetic contactor at output end	Normally, if an electromagnetic contactor is installed between the inverter and the motor, don't carry out ON-OFF activities during the operation. When switching to the municipal electricity and an electromagnetic contactor is installed at inverter output end, please operate after the inverter and the motor are stopped.
Used to improver power factor Removal of phase-advance capacitor	The power factor improving capacitor is noneffective for inverter input end. Therefore please don't install it. Please use AC or DC reactor to improve the inverter power factor. Furthermore, please don't insert a power factor improving capacitor at inverter output end. Otherwise,[overcurrent shutdown] may result in machine down.
Installation of thermal relay	Even though the inverter is equipped with electronic thermostat protection function, but when one inverter is driving several motors, please install a thermal relay for each motor.
Wireless interference (high-frequency interference) counter-measures	Since inverter main circuit input/output is contained with high-order harmonic, the communica-tor, radio and sensor used near the inverter may be interfered. Here, a filter can be installed to reduce the interference. Furthermore, the wiring between the inverter and motor & power supply should use metal wire pipes. The grounding of metal pipe may be also helpful to reduce the interference.

● Motor correlations

Isolation Voltage	When using the IGBT Voltage class PWM type inverter and 400V motor, the surge voltage caused by cable length (and etc.) may result in the aging of motor coil isolation. Therefore a motor with reinforced isolation is recommended.
Temperature rise	When driving the general motor with an inverter, the operating temperature may rise comparing to municipal electricity. Furthermore, since the cooling effect may decrease at low-speed area, the allowable output torque may decrease accordingly. Please use the motor with an external ventila-tion fan.
Vibration	Since the inherent vibration frequency (including mechanical system) may cause sympathetic vibration. The installation of anti-vibration rubber and the use of frequency avoidance function can prevent the sympathetic vibration effectively.
Noise	The noise generated by the inverter-driven motor is larger than the motor driven by municipal electricity. To reduce the noise, the inverter carrier frequency may be set a little higher. Further-more, when operating at a speed of 60Hz or above, the wind noise is much more obvious.