Shihlin Electric General Inverters SA3 Series
Installation Instruction V1.02-03

High Functioning & High Performance

SA3-023-0.75K/1.5KF ~ 110K/132KF
SA3-043-0.75K/1.5KF ~ 315K/355KF

Thank you for choosing Shihlin inverters SA3 series.

This installation instruction introduces how to use the product correctly. Please read installation instruction carefully before using the product. In addition, please use the product after understanding the safety instructions.

1) Safety Instructions

Safety Instructions

- ✓ **The qualified specialized person should be invited to install, operate, maintain and inspect the product.**
- ✓ **In the instruction, the levels of the safety caution include "Warning" and "Caution".**
  Warning: the incorrect operation may cause hazardous situation, and accordingly lead to death or serious injury.
  Caution: the incorrect operation may cause hazardous situation, and accordingly lead to general or minor injury or damage of the object.

⚠Warning

- ✓ The front cover plate and the wiring board should not be opened when the inverter is powered on. In addition, the inverter should not be operated when the front cover plate and the wiring board are removed. Otherwise, the electric shock may be caused due to contacting with the high-voltage terminal and the charging part.
- ✓ If the wiring needs to be changed or inspection is required, the power supply of the inverter should be turned off first. There is still high voltage inside the inverter before the CHARGE light of the inverter is turned off. Therefore, please don't touch the internal circuit and parts. Operations cannot be implemented until the voltage measured with the volt-ohm-milliammeter is less than 24Vdc between +/P and -/N.
- ✓ The inverter must be earthed correctly.
- ✓ Please don't operate with the wet hand, don't touch the heat sink, and don't plug and unplug the cable; or electric shock may be caused.
- ✓ Do not replace the cooling fan when the inverter is powered on, otherwise the risk may occur. It is dangerous to replace the cooling fan when the inverter is powered on.

⚠Caution

- ✓ Voltage applied to each terminal must be the one specified in the user manual; otherwise, failure or damage may be caused.
- ✓ Do not operate a voltage-resistant test for the parts inside the inverter because semiconductors in inverter may be easily damaged due to high-voltage breakdown.
- ✓ Do not touch the inverter because the temperature of the inverter is very high when it is powered on or right after disconnecting the power supply; otherwise, burn may occur.
- ✓ Failure or damage may be caused due to wrong wiring.
- ✓ Do not reverse the polarities (+, -) by mistake, failure or damage may be caused.
- ✓ Please install the inverter on nonflammable walls without holes (to avoid contacts with the cooling fin of the inverter from the back). If the inverter is installed on or close to flammable objects it may cause a fire.
- ✓ Please disconnect the inverter from power supply in case of failure. Overload current passes through the inverter continuously may cause a fire.
- ✓ Do not connect a resistor on DC terminals +/P and -/N directly; otherwise it may cause fire..

2) Product Model

SA3 - 043 - 0.75K/1.5KF - **

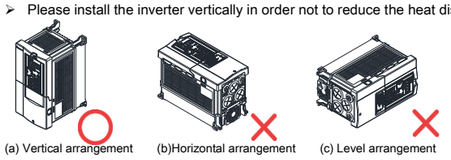
Series category	Voltage level	Capacity	Others
SA3 series	-043 : 400V three-phase -023 : 200V three-phase	Heavy duty: 0.75kW Normal duty :1.5KW	None : General model -** : Customize or specialize or region difference

3) Installation Environment

Ambient temperature	HD:-10 ~ +50℃ (non-freezing) , LD:-10 ~ +40℃ (non-freezing).
Ambient humidity	Below 90%Rh (non-condensing).
Storage temperature	-20 ~ +65℃.
Surrounding environment	Indoor, no corrosive gas, no flammable gas, no flammable powder.
Altitude	Altitude below 3000 meters, when altitude is above 1,000 m, derate the rated current 2% per 100 m Note 1: According to the safety regulation EN61800-5-1, which is required to declare in CE certification, this series of inverters can be installed in an environment of over-voltage class II when the altitude is less than 3000m. When the altitude is less than 2000m, can be installed in harsher conditions that meet the requirements of over-voltage class III.
Vibration	Below 5.9m/s² (0.6G).
Grade of protection	Frame A, B, C,IP20/NEMA TYPE 1 , Frame D and above IP00/UL OPEN TYPE (optional equipment IP20).
The degree of pollution	2

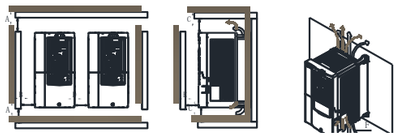
4) Installation and Wiring

➢ Please install the inverter vertically in order not to reduce the heat dissipation effect:



(a) Vertical arrangement (b)Horizontal arrangement (c) Level arrangement

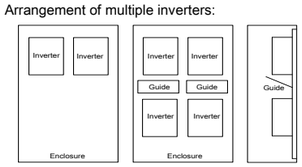
➢ Please follow the installation restrictions shown below to ensure enough ventilation space for inverter cooling and wiring space:



Unit: mm

Size	Frame A	Frame B ~ C	Frame D ~ H
A	50	50	100
B	10	50	100
C	100	100	200
D	10	50	100
E	10	50	50
F	ventilation direction		

Arrangement of multiple inverters:

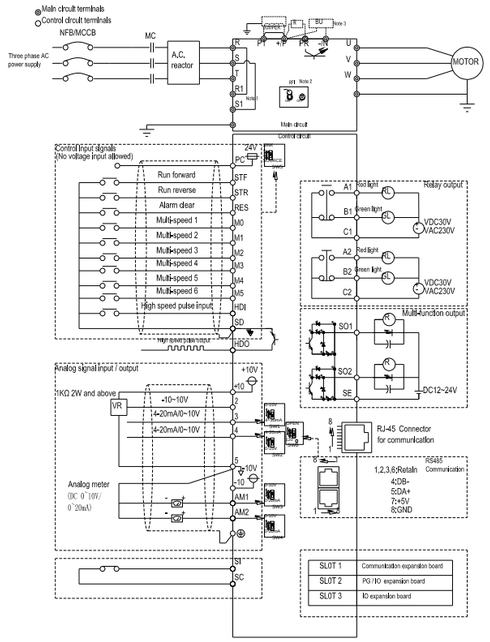


(a) Horizontal arrangement (b) Vertical arrangement

Note1: When installing the inverters of different sizes in parallel, please align the top of all inverters before installation, for easier fan replacement

Note2: When it is inevitable to arrange inverters vertically to minimize space , install guides since heat from the bottom inverters can increase the temperature on the top inverters, causing inverter failures

5) Terminal Connection Diagrams



Note1: SA3-043-37K/45KF, SA3-023-22K/30KF and above inverter models includes terminal R1, S1 for DC bus voltage input application, etc. Please refer to the relative instructions in Instruction Manual.

Note2: All frames includes built-in RFI filter for restraining electromagnetic interference, to in line with CE standard, please refer to the relative instructions in Instruction Manual for installing.

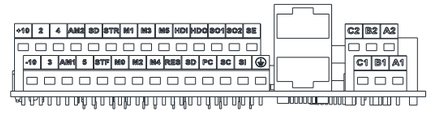
Note3: SA3-043-30K/37KF, SA3-023-18.5K/22KF and below inverter models includes built in brake resistor, please connect the brake resistor between +/P and PR when using.

6) Main Circuit Wiring and Terminal Specification

Inverter model	Terminal screw specifications	Tightening torque(Kgf.cm)	Recommended wiring specification(mm²)				Recommended wiring specification (AWG)			
			R, S, T	U, V, W	+/P, P1	Grounding Cable	R, S, T	U, V, W	+/P, P1	Grounding Cable
SA3-023-0.75K/1.5KF	M4	12~15	2.5	2.5	2.5	2.5	14	14	14	14
SA3-023-1.5K/2.2KF			4	4	4	4	12	12	12	12
SA3-023-2.2K/3.7KF			6	6	6	6	10	10	10	10
SA3-023-3.7K/5.5KF			10	10	10	10	8	8	8	8
SA3-043-0.75K/1.5KF			2.5	2.5	2.5	2.5	14	14	14	14
SA3-043-1.5K/2.2KF			2.5	2.5	2.5	2.5	14	14	14	14
SA3-043-2.2K/3.7KF			2.5	2.5	2.5	2.5	14	14	14	14
SA3-043-3.7K/5.5KF			6	6	6	6	10	10	10	10
SA3-043-5.5K/7.5KF			6	6	6	6	10	10	10	10
SA3-023-5.5K/7.5KF	M5	20~25	10	10	10	10	8	8	8	8
SA3-023-7.5K/11KF			16	16	16	16	6	6	6	6
SA3-023-11K/15KF			25	25	25	16	4	4	4	4
SA3-043-7.5K/11KF			6	6	6	6	10	10	10	10
SA3-043-11K/15KF			10	10	10	10	8	8	8	8
SA3-043-15K/18.5KF			16	16	16	16	6	6	6	6
SA3-023-15K/18.5KF	M6	40~60	35	35	35	16	2	2	2	4
SA3-023-18.5K/22KF			50	50	50	25	1/0	1/0	1/0	2
SA3-043-18.5K/22KF			25	25	25	16	4	4	4	4
SA3-043-22K/30KF			25	25	25	16	4	4	4	4
SA3-043-30K/37KF			35	35	35	35	2	2	2	4
SA3-023-22K/30KF	M8	90~110	70	70	70	35	3/0	3/0	3/0	2
SA3-023-30K/37KF			95	95	95	50	4/0	4/0	4/0	1/0
SA3-023-37K/45KF			120	120	120	70	250	250	250	3/0
SA3-043-37K/45KF			70	70	70	35	3/0	3/0	3/0	1/0
SA3-043-45K/55KF			70	70	70	35	3/0	3/0	3/0	2
SA3-043-55K/75KF			95	95	95	50	4/0	4/0	4/0	1/0
SA3-043-75K/90KF			120	120	120	70	250	250	250	3/0
SA3-023-45K/55KF	M10	180~230	120	120	120	70	250	250	250	3/0
SA3-023-55K/75KF			185	185	185	95	500	500	500	4/0
SA3-043-90K/110KF			120	120	120	70	250	250	250	3/0
SA3-043-110K/132KF			185	185	185	95	500	500	500	3/0
SA3-023-75K/90KF			95×2P	95×2P	95×2P	95	4/0x2P	4/0x2P	4/0x2P	4/0
SA3-043-132K/160KF			95×2P	95×2P	95×2P	95	4/0x2P	4/0x2P	4/0x2P	4/0
SA3-043-160K/185KF	M12	320~400	240	240	240	120	4/0x2P	4/0x2P	4/0x2P	4/0
SA3-043-185K/220KF			120×2P	120×2P	120×2P	120	250x2P	250x2P	250x2P	250
SA3-023-90K/110KF			120×2P	120×2P	120×2P	120	250x2P	250x2P	250x2P	250
SA3-043-220K/250KF			120×2P	120×2P	120×2P	120	250x2P	250x2P	250x2P	250
SA3-023-110K/132KF			120×2P	120×2P	120×2P	120	250x2P	250x2P	250x2P	250
SA3-043-250K/280KF			150×2P	150×2P	150×2P	150	300x2P	300x2P	300x2P	300
SA3-043-280K/315KF			150×2P	150×2P	150×2P	150	300x2	300x2	300x2P	300
SA3-043-315K/355KF			95×4P	95×4P	95×4P	95×2P	4/0x4P	4/0x4P	4/0x4P	4/0

7) Control Terminal

➢ Arrangement of control terminal



➢ Control terminal description

Terminal type	Terminal name	Function instructions	Terminal specifications
Switch signal input	STF	There are 10 multi-function control terminals in total, which can be switched between SINK/SOURCE mode.	Input impedance: 4.7 kΩ Action current: 5mA(when 24VDC) Voltage range: 10~28VDC Maximum frequency: 1kHz
	STR		
	RES		
	M0		
	M1		
	M2		
	M3		
	M4		
	M5		
	HDI		Maximum frequency:100kHz
Analog signal input	10	+10.5±0.5V	Maximum current:10mA
	-10	-10.5±0.5V	Maximum current:10mA
	2	-10~10V or 0~10V voltage signal input terminals	Input impedance:10kΩ
	3	4~20mA/0~10V	When apply current, the input impedance is 235Ω. When apply voltage, the input impedance is 24kΩ.
	4		
Relay output	A1	Multi-function relay output terminals. A-C is normally open contact, B-C is normally closed contact, C is common terminal.	Maximum voltage:30VDC or 250VAC Maximum current: Resistor load 5A NO/3A NC Inductance load 2A NO/1.2A NC (cosΦ=0.4)
	B1		
	C1		
	A2		
	B2		
	C2		
Open collector output	SO1	Multi-function open collector output terminal	Maximum voltage: 48VDC Maximum current: 50mA
	SO2		
Analog signal output	AM1	Multi-function analog signal output terminal	Output voltage: 0~10VDC Maximum current: 3mA ; Output current: 0~20mA Maximum load: 500Ω
	AM2		
Pulse output	HDO	Multi-function pulse output terminal, compatible with FM and 10X.	Minimum load: 4.7kΩ Maximum current: 50mA Maximum voltage: 48VDC Maximum frequency: 100kHz
Safe terminal	SI	Default short circuit	---
	SC		
Communication terminal	RJ45×2	RS-485, optical coupling isolation	Bit rate: up to 115200bps Distance: up to 500m
Common terminal	SD	Public terminal for STF,STR, RES, M0, M1, M2, M3, M4, HDI, HDO(SINK)	---
	SE	Public terminal for SO1, SO2 collector output terminal	---
	5	Public terminal for terminal 10, -10, 2, 3, 4, AM1, AM2	---
	PC	Public terminal for terminal STF, STR, RES, M0, M1, M2, M3, HDI(SOURCE)	Output voltage: 24VDC ±20% Maximum current: 200mA

Note1：When connecting control terminal to external devices, please pay attention to the voltage and current specifications of terminals to avoid damaging the inverter.

Note2：The function of the control terminal is decided by inverter parameters, please refer to Instruction Manual for setting.

Note3：Please pay attention to polarity when connect to external power and devices.

Note4：When the relay is controlled by open collector output terminal, surge absorbers should be used in parallel on the both ends of wire.

➢ Wiring method

- Power supply connection

For the control circuit wiring, strip off the sheath of a cable, and use it with a blade terminal. For a single wire, strip off the sheath of the wire and apply directly.

Insert the blade terminal or the single wire into a socket of the terminal.

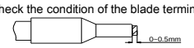
(1) Strip off the sheath for the below length. If the length of the sheath peeled is too long, a short circuit may occur with neighboring wires. If the length is too short, wires might come off.

Wire the stripped cable after twisting it to prevent it from becoming loose. In addition, do not solder it.

(2) Crimp the blade terminal.

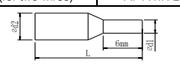
Insert wires to a blade terminal, and check that the wires come out for about 0 to 0.5 mm from a sleeve.

Check the condition of the blade terminal after crimping. Do not use a blade terminal of which the crimping is inappropriate, or the face is damaged.



- Please do use blade terminals with insulation sleeve. Blade terminals commercially available:

Cable gauge (mm²)	Blade terminals model	L (mm)	d1 (mm)	d2 (mm)	Manufacturer	Tool type
0.3	AI 0,25-6 WH	10.5	0.8	2	Phoenix Contact Co., Ltd.	CRIMPFOX 6
0.5	AI 0,5-6 WH	12	1.1	2.5		
0.75	AI 0,75-6 GY	12	1.3	2.8		
0.75(for two wires)	AI-TWIN 2×0,75-6 GY	12	1.3	2.8		



Note1: Please Use a small flathead screw driver (tip thickness: 0.6mm, width:3.0mm). If a flathead screwdriver with a narrow tip is used, terminal block maybe damaged.

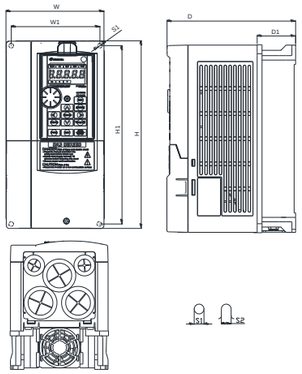
Note2: Tightening torque is 2.12~3.18kgf.cm, too large tightening torque can cause crew slippage, too little tightening torque can cause a short circuit or malfunction.

➢ Wiring Precautions

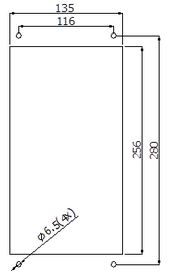
- After wiring, wire offcuts must not be left in the inverter.
  Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., please make sure no medal scraps enter the inverter.
- To prevent a malfunction due to noise, keep the signal cables 10 cm (3.94 inches) or more away from the power cables, and keep it away from the input/output side.
- Set the voltage/current input switch correctly. Incorrect setting may cause a fault, failure or malfunction.

8) Appearance and Dimensions

➢ Frame A



Flange mounting kit
(additional purchase)

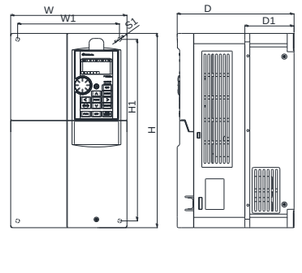


flange mounting cutout dimension

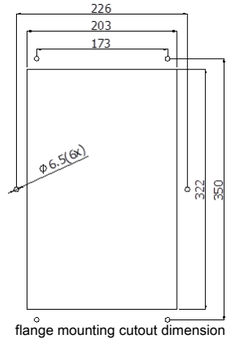
Unit: mm

Model	W	W1	H	H1	D	D1	S1	S2
SA3-043-0.75K/1.5KF	130.0	116.0	250.0	236.0	170.0	51.3	6.2	6.2
SA3-043-1.5K/2.2KF								
SA3-043-2.2K/3.7KF								
SA3-043-3.7K/5.5KF								
SA3-043-5.5K/7.5KF								
SA3-023-0.75K/1.5KF								
SA3-023-1.5K/2.2KF								
SA3-023-2.2K/3.7KF								
SA3-023-3.7K/5.5KF								

➢ Frame B



flange mounting kit
(additional purchase)

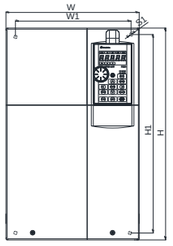


flange mounting cutout dimension

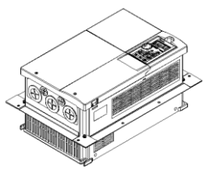
Unit: mm

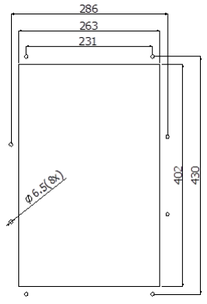
Model	W	W1	H	H1	D	D1	S1	S2
SA3-043-7.5K/11KF	190.0	173.0	320.0	303.0	190.0	80.5	8.5	8.5
SA3-043-11K/15KF								
SA3-043-15K/18.5KF								
SA3-023-5.5K/7.5KF								
SA3-023-7.5K/11KF								
SA3-023-11K/15KF								

➢ Frame C



Flange mounting kit
(additional purchase)



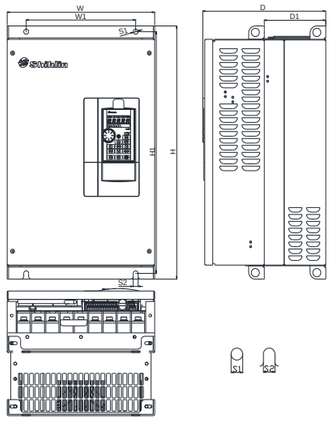


flange mounting cutout dimension

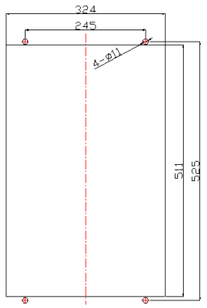
Unit: mm

Model	W	W1	H	H1	D	D1	S1	S2
SA3-043-18.5K/22KF	250.0	231.0	400.0	381.0	210.0	89.5	8.5	8.5
SA3-043-22K/30KF								
SA3-043-30K/37KF								
SA3-023-15K/18.5KF								
SA3-023-18.5K/22KF								

➢ Frame D



Conduit box kit
(additional purchase)

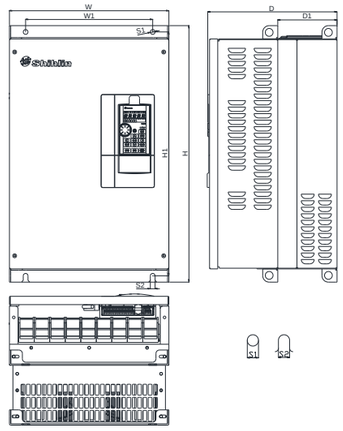


flange mounting cutout dimension

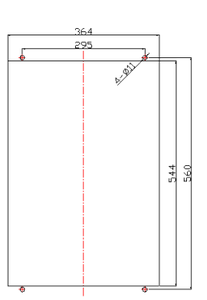
Unit: mm

Model	W	W1	H	H1	D	D1	S1	S2
SA3-043-37K/45KF	330.0	245.0	550.0	525.0	275.0	137.5	11.0	11.0
SA3-043-45K/55KF								
SA3-043-55K/75KF								
SA3-043-75K/90KF								
SA3-023-22K/30KF								
SA3-023-30K/37KF								
SA3-023-37K/45KF								

➢ Frame E



Conduit box kit
(additional purchase)

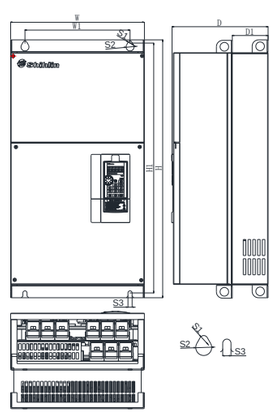


flange mounting cutout dimension

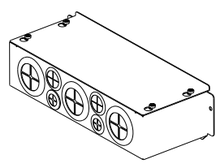
Unit: mm

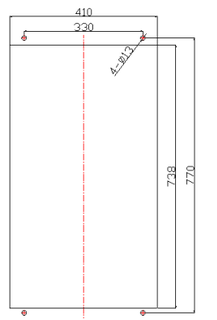
Model	W	W1	H	H1	D	D1	S1	S2
SA3-043-90K/110KF	370.0	295.0	589.0	560.0	300.0	137.5	11.0	11.0
SA3-043-110K/132KF								
SA3-023-45K/55KF								
SA3-023-55K/75KF								

➢ Frame F



Conduit box kit
(additional purchase)



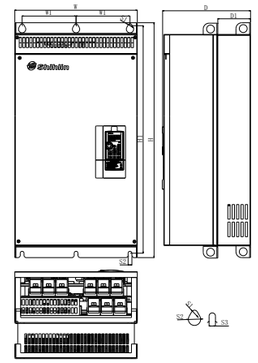


flange mounting cutout dimension

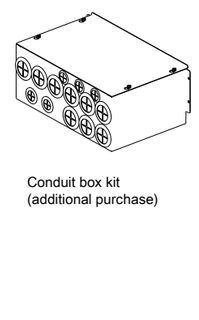
Unit: mm

Model	W	W1	H	H1	D	D1	S1	S2	S3
SA3-043-132K/160KF	420.0	340.0	800.0	770.0	300.0	145.5	13.0	25.0	13.0
SA3-023-75K/90KF									

➢ Frame G



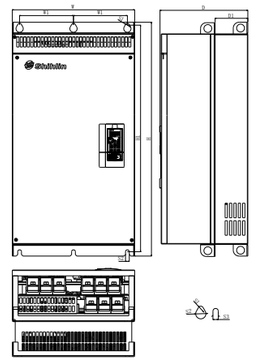
Conduit box kit
(additional purchase)



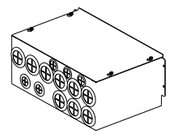
flange mounting cutout dimension
Unit: mm

Model	W	W1	H	H1	D	D1	S1	S2	S3
SA3-043-160K/185KF	500.0	180.0	870.0	850.0	360.0	150.0	13.0	25.0	13.0
SA3-043-185K/220KF									
SA3-043-220K/250KF									
SA3-043-250K/280KF									
SA3-023-90K/110KF									
SA3-023-110K/132KF									

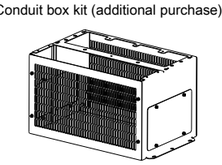
➢ Frame H

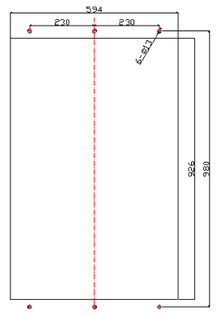


Conduit box kit (additional purchase)



Floor mounting kit (additional purchase)





flange mounting cutout dimension
Unit: mm

Model	W	W1	H	H1	D	D1	S1	S2	S3
SA3-043-280K/315KF	600.0	230.0	1000.0	980.0	400.0	181.5	13.0	25.0	13.0
SA3-043-315K/355KF									

9) Optional Equipment

Category		Name	Description	Order code
Keypad		PU301	LED display	SNKPU301
		PU301C	LCD display	SNKPU301C
Expansion card	Communication card	PD302	Profibus-DP communication card	SNKPD302
		DN301	DeviceNet communication card	SNKDN301
		CP301	Canopen communication card	SNKCP301
		EP301	Ethernet communication card	SNKEP301
		EC301	EtherCAT communication card	SNKEC301
	IO card	EB362R	6 digital input, 2 relay output	SNKEB362R
		EB308R	8 relay output	SNKEB308R
	PG card	PG301C	Optical encoder, open collector dividing frequency output	SNKPG301C
		PG301L	Optical encoder, line driver dividing frequency output	SNKPG301L
		PG302L	Sine encoder, line driver dividing frequency output	SNKPG302L
Other optional equipment		ACL****	AC reactor (External optional equipment for all models)	Refer Instruction Manual
		DCL****	DC reactor (External optional equipment for all models)	Refer Instruction Manual
		FMK30*	Flange mounting kit (suitable for Frame A, B, C)	Refer Instruction Manual
		CTK301	Floor mounting kit (suitable for Frame H)	Refer Instruction Manual
		WBK30*	Conduit box kit (suitable for Frame D ~ H)	Refer Instruction Manual
		CBL1R5GTN	Data transmission line (1.5 m)	SNKCBL1R5GTN2
		CBL03GTN2	Data transmission line (3 m)	SNKCBL03GTN2
		CBL05GTN2	Data transmission line (5 m)	SNKCBL05GTN2
		CBL10GTN2	Data transmission line (10 m)	SNKCBL10GTN2
		SMK301	Snap mounting kit	SNKSMK301
		BKU-020-37	200V 37KW Brake Unit	SNKBKU02037K
		BKU-040-45	400V 45KW Brake Unit	SNKBKU04045K

10) Others

➢ For better display, there is a slight difference between the figures in this instruction and actual products, which will not affect the rights and interests of the customers.

➢ To improve our products, the parameters and contents may be modified, please contact the agent or refer to Shihlin websites(http://automation.seec.com.tw/) to download the latest version.

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