

# Shihlin Electric SF3 Series General Inverter Installation Instruction

V1.01-04

Main circuit terminals

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Control circuit terminals

NFB/MCCB

reactor

High Functioning & High Performance

#### SF3-043-5.5K/3.7KG ~ 355K/315KG

Thank you for choosing Shihlin inverters SF3 series.

This instruction will explain the general using of SF3 and points which need attention. Please read this instruction carefully before installation in order to use the inverter correctly and safely. Safety Instructions

#### Safety Instructions

- Installation, operation, maintenance and inspection must be performed by qualified personne
   In this instruction, the safety instruction levels are classified into "Warning" and "Caution".
  - AWarning: Incorrect handling may cause hazardous conditions, resulting in death or severe injury.
  - ACaution: Incorrect handling may cause hazardous conditions, resulting in medium or slight injury, or may cause only material damage.

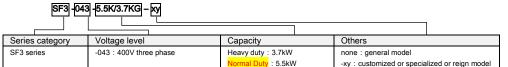
#### △Warning

- Do not open the front cover or the wiring cover when the inverter is power ON. Do not run the inverter with the front cover or the wiring cover removed. Otherwise, you may come into contact with high voltage terminals and charging parts and result in electric shock.
- If change wiring or inspection is needed, first turn off the power of the inverter. When the inverter CHARGE LED is on, it indicates that there is still high voltage inside the inverter. Do not touch the internal circuit and components. Use a voltmeter to measure the voltage between +/P and -/N, it needs to be below 24Vdc before operating.
- $\checkmark$  The inverter must be connected to the ground properly.
- ✓ Do not operate or touch the heat sink or cables with wet hands. Otherwise you may get an electric shock.
- ✓ Do not change the cooling fan while power ON. It is dangerous to change the cooling fan while power ON.

#### △Caution

- ✓ The voltage applied to each terminal must be the ones specified in the Instruction Manual. Otherwise burst, damage, etc. may occur.
- Do not conduct a high voltage test on the components inside the inverter, semiconductors in the inverter are easy to break and damage by high
  voltage.
- ✓ After the inverter run in a period of time, the temperature will rise, don't touch the area outside the keypad otherwise burn may occur.
- ✓ Do not misconnect between terminals. Otherwise burst, damage, etc. may occur.
- ✓ The polarity (+ and -) must be correct. Otherwise burst, damage, etc. may occur.
- ✓ Inverter must be installed on a nonflammable wall without holes (so that nobody touches the inverter heat sink on the rear side, etc.). Mounting it to or near flammable material may cause a fire.
- ✓ If the inverter has become faulty, the inverter power must be switched OFF. A continuous flow of large current may cause a fire.
- ✓ Do not connect a resistor directly to the DC terminals +/P and -/N. Doing so could cause a fire.

#### 1) Product model



### 2) Installation Environment

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Ambient	-10 ~ +40°C (non-freezing) Set "constant rated current, lower carrier frequency when temperature rise", or "constant carrier
temperature	frequency, lower rated current when temperature rise"
Ambient humidity	Below 90%Rh (non-condensing).
Storage	-20 ~ +65°C.
temperature	
Surrounding	Indoor, no corrosive gas, no flammable gas, no flammable powder.
environment	
Altitude	Below 2000 meters, when altitude is over 1000 meters, lower 2% capacity per 100 meters higher.
Vibration	Lower than 5.9m/s <sup>2</sup> (0.6G)
Protection	A、B、C frame IP20, D frame or above IP00( can add IP20 accessories )
Pollution level	2

#### 3) Installation and Wiring

Please ensure vertical arrangement to keep the cooling effect

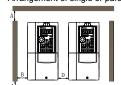






(a) Vertical arrangement (b) Horizontal arrangement (c) Level arrangement

> Please comply with installation conditions shown below to ensure enough ventilation space and wiring space for inverter cooling Arrangement of single or paralleling inverter:

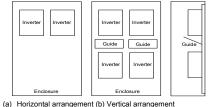






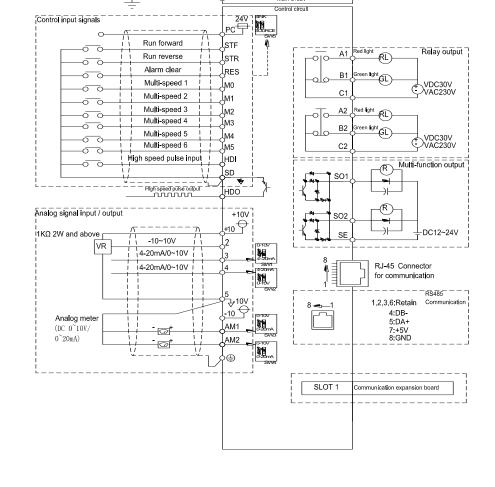
			Unit : mm				
size	Frame A	Frame B ~ C	Frame D~H				
Α	50	50	100				
В	10	50	100				
O	100	200					
D	10	50	100				
Е	10	50	50				
F	Ventilation direction						

## Arrangement of multiple inverters:



Note1: When mounting different sizes inverters in parallel, please align the top of the inverters, so that it is easier to change the cooling fan

Note2: When it is inevitable to arrange inverters vertically to minimize space, please provide guides since heat from the bottom inverters can increase the temperature in the upper inverters, causing failures in inverter.



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Note1: All series built-in RFI filter for restraining electromagnetic interference, to in line with CE standard, please refer to the related instructions in Instruction Manual for installing.

Note2:SF3-043-45K/37KG and under is equipped with brake resistor, please connect between +/P and PR to use the brake resistor.

#### 5) Main Circuit Wiring and Terminal Specification

	Terminal	Tightenin	Recom	mended wiring	specification(	Recommended wiring specification (AWG)				
Inverter model	screw specificati-c ns	a torque	R, S, T	U、V、W	+/P、P1	Ground ing Cable	R、S、T	U、V、W	+/P、 P1	Groun- ding Cable
SF3-043-5.5K/3.7KG	M4	12~15	6	6	6	6	10	10	10	10
SF3-043-7.5K/5.5KG	IVI4	12~15	6	6	6	6	10	10	10	10
SF3-043-11K/7.5KG			6	6	6	6	10	10	10	10
SF3-043-15K/11KG	M5	20~25	10	10	10	10	8	8	8	8
SF3-043-18.5K/15KG			16	16	16	16	6	6	6	6
SF3-043-22K/18.5KG			25	25	25	16	4	4	4	4
SF3-043-30K/22KG		40~60	25	25	25	16	4	4	4	4
SF3-043-37K/30KG	M6		35	35	35	35	2	2	2	4
SF3-043-45K/37KG			70	70	70	35	3/0	3/0	3/0	1/0
SF3-043-55K/45KG			70	70	70	35	3/0	3/0	3/0	2
SF3-043-75K/55KG	M8	90~110	95	95	95	50	4/0	4/0	4/0	1/0
SF3-043-90K/75KG			120	120	120	70	250	250	250	3/0
SF3-043-110K/90KG			120	120	120	70	250	250	250	3/0
SF3-043-132K/110KG	1440	400 000	185	185	185	95	500	500	500	3/0
SF3-043-160K/132KG	M10	180~230	95×2P	95×2P	95×2P	95	4/0x2P	4/0x2P	4/0x2P	4/0
SF3-043-185K/160KG		320~400	240	240	240	120	4/0x2P	4/0x2P	4/0x2P	4/0
SF3-043-220K/185KG			120×2P	120×2P	120×2P	120	250x2P	250x2P	250x2P	250
SF3-043-250K/220KG	M12		120×2P	120×2P	120×2P	120	250x2P	250x2P	250x2P	250
SF3-043-280K/250KG			150×2P	150×2P	150×2P	150	300x2P	300x2P	300x2P	300
SF3-043-315K/280KG	M40	400 000	150×2P	150×2P	150×2P	150	300x2P	300x2P	300x2P	300
SF3-043-355K/315KG	M10	180~230	95×4P	95×4P	95×4P	95×2P	4/0x4P	4/0x4P	4/0x4P	4/0

6) Control Terminal

> Arrangement of control terminal



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Control terminal description

Terminal type	Terminal name	Function instructions	Terminal specifications
	STF		
-		-	
-	STR	-	
F	RES M0	-	Input impedance: 4.7 kΩ
			Action current:5mA(when 24VDC)
Switch signal	M1 M2	There are totally 10 multi-function control terminals, which can	Voltage range: 10~28VDC
input		switch mode of SINK/SOURCE.	Maximum frequency: 1kHz
-	M3	-	
	M4	-	
	M5	-	
	HDI		Maximum frequency:100kHz
-	10	+10.5±0.5V	Maximum current:10mA
	-10	-10.5±0.5V	Maximum current:10mA
Analog signal	2	-10~10V/0~10V	Input impedance:10kΩ
input	3	0~20mA/0~10V 0~10V input voltage to terminal can do PT100 connect(with	When current input the input impedance is 2350
	4	AM2 )	When voltage input the input impedance is 24kΩ
	A1		
	B1	1	Maximum voltage:30VDC or 250VAC
[	C1	Multi-function relay output terminals.	Maximum current:
Relay output	A2	A-C is normal open contact, B-C is normal close contact, C is	Resistor load 5A NO/3A NC
	B2	common terminal.	Inductance load 2A NO/1.2A NC
	C2	1	(cosΦ=0.4)
Open collector	SO1		Maximum voltage: 48VDC
output	SO2	Multi-function open collector output terminal	Maximum current:50mA
			Output voltage:0~10VDC
Analog signal	AM1		Maximum current:3mA;
output	AM2	Multi-function analog signal output terminal	Output current:0~20mA
	AIVIZ		Maximum load: 500Ω
	<u> </u>		Minimum load:4.7kΩ
Pulse output	HDO		Maximum current:50mA
i uise output	TIDO	10X.	Maximum voltage:48VDC
			Maximum frequency:100kHz
Communication	DA+、DB-	RS-485	Highest rate:115200bps
terminal	RJ45	NO-400	Longest distance:500m
		Common terminal ( SINK ) of STF, STR, RES, M0, M1,	
	SD	M2、M3、M4、M5、HDI、HDO	
_	SE	Common terminal of SO1, SO2 open collector output	
Common terminal	5	Common terminal of 10、-10、2、3、4、AM1、AM2、DA+、DB-	
=	PC	Common terminal (SOURCE) of STF, STR, RES, M0, M1, M2, M3, M4, M5, HDI, HDO	Output voltage: 24VDC±20% Maximum current:200mA

- Note1: When connecting control terminal with external devices, please pay attention to the voltage and current specifications of terminals, avoiding 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 connecting external power and devices.
- > Note4 : When the relay is controlled by the open collector output terminal, surge absorbers should be in parallel on the both ends of windings.
- 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. It doesn't need soldering



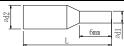
(2) Crimp the blade terminal.

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.

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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		
0.5	AI 0,5-6 WH	12	1.1	2.5	Phoenix Contact	CRIMPFOX 6
0.75	AI 0,75-6 GY	12	1.3	2.8	Co., Ltd.	CRIMPFOX 6
0.75(for two wires)	AI-TWIN2×0,75-6 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 may be 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

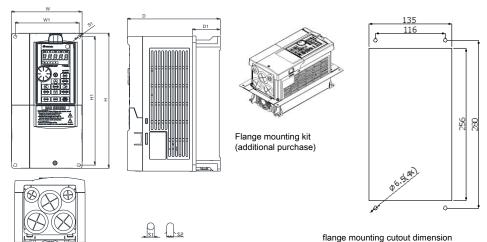
After wiring, wire offcuts must not be left in the inverter.

Wire offcuts can cause an alarm, failure or malfunction. Always keep the inverter clean. When drilling mounting holes in an enclosure etc., please take caution not to allow chips to 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. Also,
- Separate the main circuit cables at the input side from the main circuit cables at the output side.
- Set the voltage/current input switch correctly. Incorrect setting may cause a fault, failure or malfunction

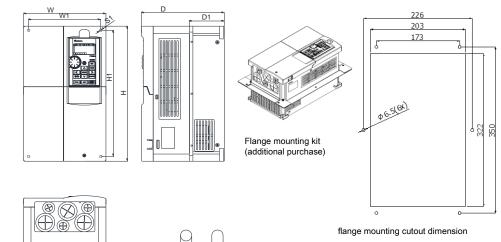
## 7) Appearance and Dimensions

#### > Frame A



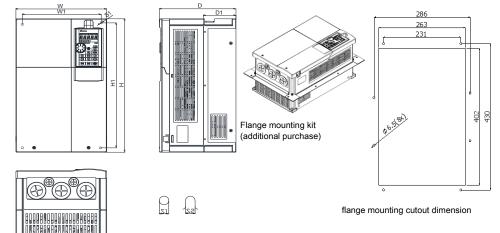
model         W         W1         H         H1         D         D1         S1         S2           SF3-043-5.5K/3.7KG         130.0         116.0         250.0         236.0         170.0         51.3         6.2         6.2           SF3-043-7.5K/5.5KG         1         30.0         116.0         250.0         236.0         170.0         51.3         6.2         6.2		III							Unit:
	model	W	W1	Н	H1	D	D1	S1	S2
		130.0	116.0	250.0	236.0	170.0	51.3	6.2	6.2

#### ➤ Frame B



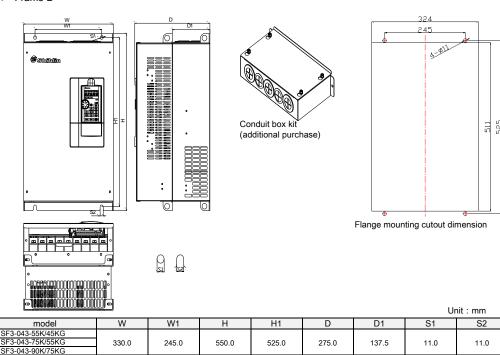
<u> </u>								Unit :
model	W	W1	Н	H1	D	D1	S1	S2
SF3-043-11K/7.5KG								
SF3-043-15K/11KG	190.0	173.0	320.0	303.0	190.0	80.5	8.5	8.5
SE3_043_18 5K/15KG	1							

#### > Frame C

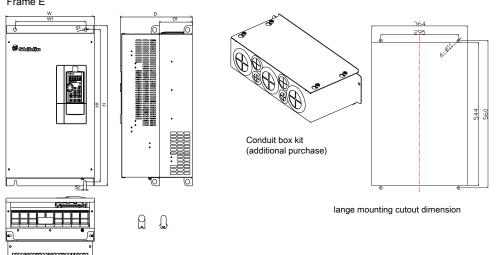


H*								Unit : mm
model	W	W1	Н	H1	D	D1	S1	S2
SF3-043-22K/18.5KG								
SF3-043-30K/22KG								
SF3-043-37K/30KG	250.0	231.0	400.0	381.0	210.0	89.5	8.5	8.5
SF3-043-45K/37KG	1							

## > Frame D

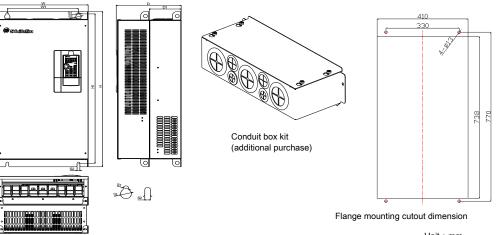


## > Frame E



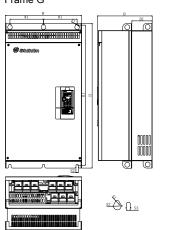
							Offic . Ithiri	
Model	W	W1	Н	H1	D	D1	S1	S2
SF3-043-110K/90KG	370.0	205.0	589.0	560.0	300.0	137.5	44.0	44.0
SF3-043-132K/110KG	370.0	295.0	589.0	560.0	300.0	137.5	11.0	11.0

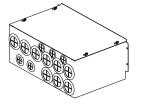
## Frame F



								Unit	: mm
Model	W	W1	Н	H1	D	D1	S1	S2	S3
SF3-043-160K/132KG	420.0	330.0	800.0	770.0	300.0	145.5	13.0	25.0	13.0
SF3-043-185K/160KG	420.0	330.0	800.0	770.0	300.0	145.5	13.0	25.0	13.0

#### Frame G



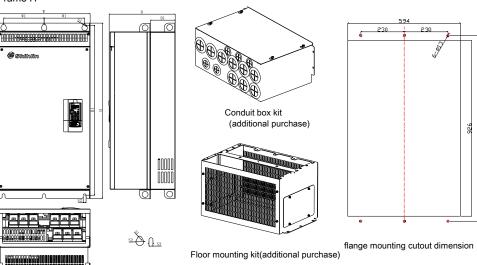


Conduit box kit (additional purchase)

Flange mounting cutout dimension

								· ·	/IIIC . IIIIII
Model	W	W1	Н	H1	D	D1	S1	S2	S3
SF3-043-220K/185KG									
SF3-043-250K/220KG	500.0	180.0	870.0	850.0	360.0	150.0	13.0	25.0	13.0
SF3-043-280K/250KG									

#### Frame H



								Unit:	mm
Model	W	W1	Н	H1	D	D1	S1	S2	S3
SF3-043-315K/280KG	COO O	220.0	4000.0	000.0	400.0	404.5	40.0	25.0	40.0
SF3-043-355K/315KG	600.0	230.0	1000.0	980.0	400.0	181.5	13.0	25.0	13.0

## 8) Optional Equipment

Category		Name	Description	Order code
Parameter unit		PU301	LED parameter unit	SNKPU301
		PU301C	LCD parameter unit	SNKPU301C
Expansion card	Communication	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
	Ю	EB362R	6 digital input, 2 relay output	SNKEB362R
		EB308R	8 relay output	SNKEB308R
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
		CBL1R5	The data transmission line (1.5 m)	SNKCBL1R5GTN2
		CBL03G	The data transmission line (3 m)	SNKCBL03GTN2
		CBL05G	The data transmission line (5 m)	SNKCBL05GTN2
		CBL10G	The data transmission line (10 m)	SNKCBL10GTN2
		SMK301	Snap mounting kit	SNKSMK301
		BKU-040	400V 45KW Brake Unit	SNKBKU04045K
		BKU-040	400V 160KW Brake Unit	SNKBKU040160K

#### ) Others

> For convenient display, there is 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 website (http://automation.seec.com.tw/) to download the latest version



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