

User's Manual

3Φ-3Φ

5KVA - 200KVA SFC

STATIC FREQUENCY CONVERTER



POWER SOLUTIONS

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INTRODUCTION

We are proud to have you as one of our esteemed customers. Manufacturing of **Technovision** SFC systems is backed up by wide experience of the company in power electronics field. We manufacture SFC systems professionally and are tested for reliability and long life.

In the manual you will find operating instructions and safety precautions to be observed to avoid failures. We are sure that **SFC** will give you long troublefree service; if the system is installed as per instructions and proper maintenance is done from time to time.

SAFETY NOTICES AND WARNINGS

Important! Please read this before installing your SFC.

Warning, Cautions and Notes appear throughout this manual. Please familiarize yourself with them, as they are essential for your safety and will enable you to maximize longevity of your SFC.

WARNING

Denote a procedure or practice, which, if not performed correctly or adhered to, may result in personal injury. Do not proceed beyond a Warning sign until the indicated conditions are fully understood and met.

Note

CAUTION

Denote a procedure or practice, which, if not performed correctly or adhered to, may result in damage to equipment. Do not proceed beyond a Caution sign until the indicated conditions are fully understood and met.

Denotes an essential procedure of practice.

SAFETY WARNINGS

1. Do not use the unit for other than its intended use.
2. If the SFC is connected to a live AC supply. AC is ALWAYS present at the SFC receptacles.
3. Hazardous voltage can be present at the unit's output any time AC input power or DC battery voltage is applied. To avoid possible personal injury or equipment damage and to make certain there is no output voltage, turn the unit off, unplug the unit or disconnect AC input, and disconnect all DC sources.
4. To reduce the risk of fire or electric shock, install the unit in a temperature-controlled indoor area free of dust. Do not place the unit near liquids or in an excessively humid environment.
5. To reduce the risk of overheating, do not block the unit's ventilation panels. Do not expose the unit to direct sunlight or other heat sources.
6. Do not allow liquids or foreign objects to enter the unit.
7. The unit does not contain any user-serviceable parts. The batteries are not user replaceable. The user must not open the unit.

SITE PREPARATION SFC LOCATIONS & ENVIRONMENTAL CONTROL

SITE PREPARATION

Before installation & commissioning the system following aspects should be taken into account.

POWER SUPPLIES: Electrical power distribution & wiring diagram shall be studied during the site preparation. While providing electrical connections to the SFC system considerations shall be given for future expansion that is a key part of the design. The computer / Critical Machine power source through SFC system should be isolated from other Power system in the center. A dedicated ground circuit for maximum protection is very essential.

SFC LOCATIONS

Your SFC should be in a controlled environment. A controlled environment is one that is indoors, temperature – controlled and free of conductive or semi conductive contaminants. **SFC system is intended for indoor use only.** There should be adequate ventilation and the location should be free of dust and fumes. Do not install the unit next to open windows where uncontrolled environmental condition could affect the unit. Do not install the unit in any type of enclosure without first calling to out Technical Support. The unit must have unrestricted airflow.

ENVIRONMENTAL CONTROL

We recommend well ventilated & dust free environment for SFC installation. Air- conditioned room improves the efficiency and prolongs the life of the unit. It's not a necessary, as the unit is designed to operate in adverse temperature atmosphere. If the batteries are located in a separate room, the same shall be carefully ventilated.

PHYSICAL WEIGHT & OTHER DETAILS

OTHER DETAILS: -

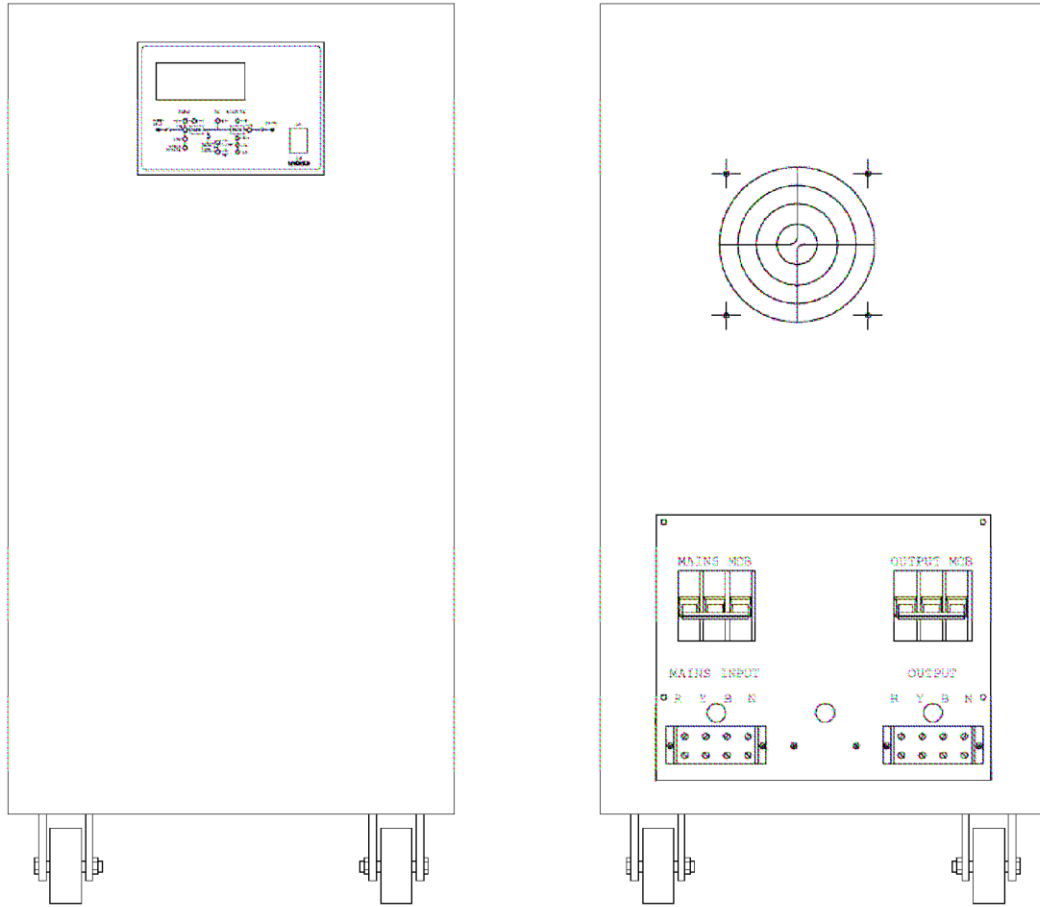
- REMOVABLE SIDE AND TOP COVER.
- BACK SIDE BOTTOM CABLE ENTRY

PANELS CONFIRMING TO **IP - 21**

PAINTING: POWER COATING

COLOR SHADE: SIEMENS GRAY / BLACK

FRONT AND BACK VIEW



3					TITLE : GA DIAG.		
2					PRODUCT : 6 TO 12KVA UPS SYSTEM		
1					SIGN	DATE	SCALE : N.T.S
0	21/09/13			DRN BY	21/09/13	DRG NO: 101	
REV.NO.	REV DATE	APPR BY	DCN NO.	APR BY	21/09/13	REV NO: 0	

SPECIFICATIONS FOR 6 KVA SFC SYSTEMS (THREE PHASE
INPUT & THREE PHASE OUTPUT)

1. INPUT

-- Voltage:	415 Volts, 3 Phase 4 wires
-- Voltage Variation:	+ 10%, - 10%
-- Frequency:	60 Hz
-- Frequency Variation:	57 Hz to 65 Hz

2. OUTPUT

-- Rating:	5-200 KVA
-- Voltage:	115 /200Volts. 3Ph (Customizable)
-- Voltage Regulation:	± 1%
-- Power Factor:	0.8 lag to unity
-- Frequency:	400 Hz (Customizable)
-- Frequency Regulation:	± 0.5%
-- Wave form:	Sine wave
-- Harmonic Distortion:	< 5% THD for Nonlinear load
-- Overload Rating:	150% for 60 SECONDS
-- Transient Response:	For 100% load change voltage Remains within ±8%
-- Response Time:	Recovery to ±1% within 50 mSec.

3. PROTECTIONS

Rectifier: I/P AC Over voltage / under voltageDC
Over voltage

Inverter: O/P Over voltage / under voltage
O/P Overload
DC Under voltage

4. AUDIO ALARM

- Overload.
- System Trip.

5. 16 X 2 LCD DISPLAY

To read I/P AND O/P
Parameters.

- I/P Voltage
- I/P Current
- I/P Frequency
- O/P Voltage
- O/P Current
- O/P Frequency

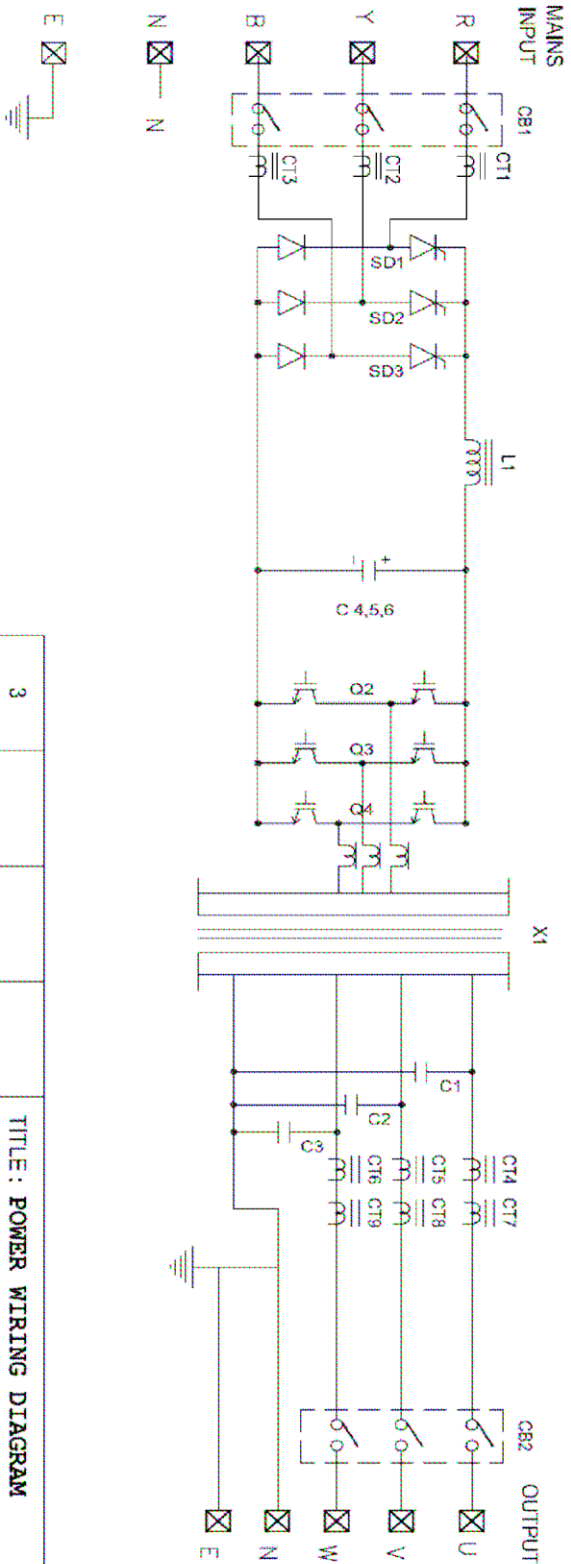
6. PHYSICAL

--	Cable Entry:	Back Side Bottom
--	Colour:	Siemens gray / Black

7. ENVIRONMENT

--	Operating Temperature:	0 to 45 Deg. C. (0 to 50 °C)
--	Storage:	-10 to 70 Deg. C.
--	Humidity:	up to 95% RH. (Non - condensing)
--	Cooling:	Forced Air Cooling.
--	Noise:	< 65 dB
--	Altitude:	< 3000 mtr. Above mean sea level.

POWER WIRING DIAGRAM



3				TITLE : POWER WIRING DIAGRAM	
2				PRODUCT : 6 KVA SFC	
1				SIGN	DATE
0				DRN BY	SCALE : N . J . S
REV. NO.	REV DATE	APPR BY	DCN NO.	APPR BY	DRG NO :
					REV NO : 0

DESCRIPTION OF 5 - 200 KVA SFC

The Total unit comprises of two major sections

- 1. RECTIFIER**
- 2. INVERTER**

RECTIFIER / CHARGER

This is mains connected part. This section consists of full wave rectifier.. The D.C. outputs of this rectifier with its inherently low ripple contents are connected to the inverter through L-C filter. It rectifies input AC voltage to 265 V DC. Rectifier gives 265 V DC . Rectifier also provides protection from Mains High and Mains Low voltages. All settings and like Mains High, Mains Low & D.C high are provided in the controller. Soft start feature for DC output is also provided in controller.

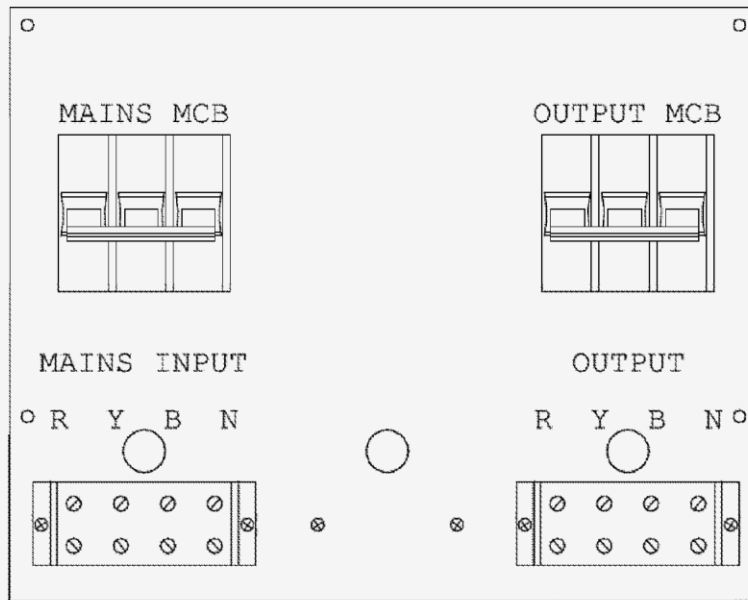
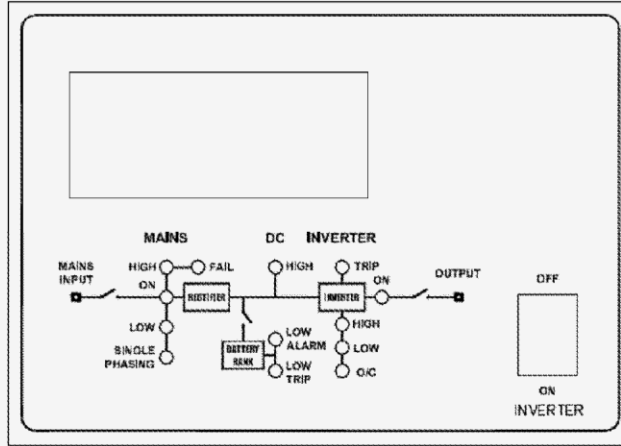
INVERTER

The main function of this block is to invert DC power to altering power to provide regulated output voltage within +/- 1% irrespective of load change and input dc voltage change. To maintain output sinusoidal waveform with distortion less than 5%. Inverter section consists of 3PH IGBT Bridge. Sine weighted PWM technique is used for inversion. The switching frequency of 6.4 / 12.8 kHz is used for inversion. The pulse width is controlled to regulate the output voltage. The drive and control power is derived from regulated dc power supply using dc-to-dc converter. Output of Inverter Bridge is connected to the output transformer via ac choke. AC capacitors are connected to secondary. This L-C filter removes higher harmonics from the Inverter output

to obtain low distortion sine waveform. By controlling pulse width of Inverter Bridge regulates the Output Voltage.

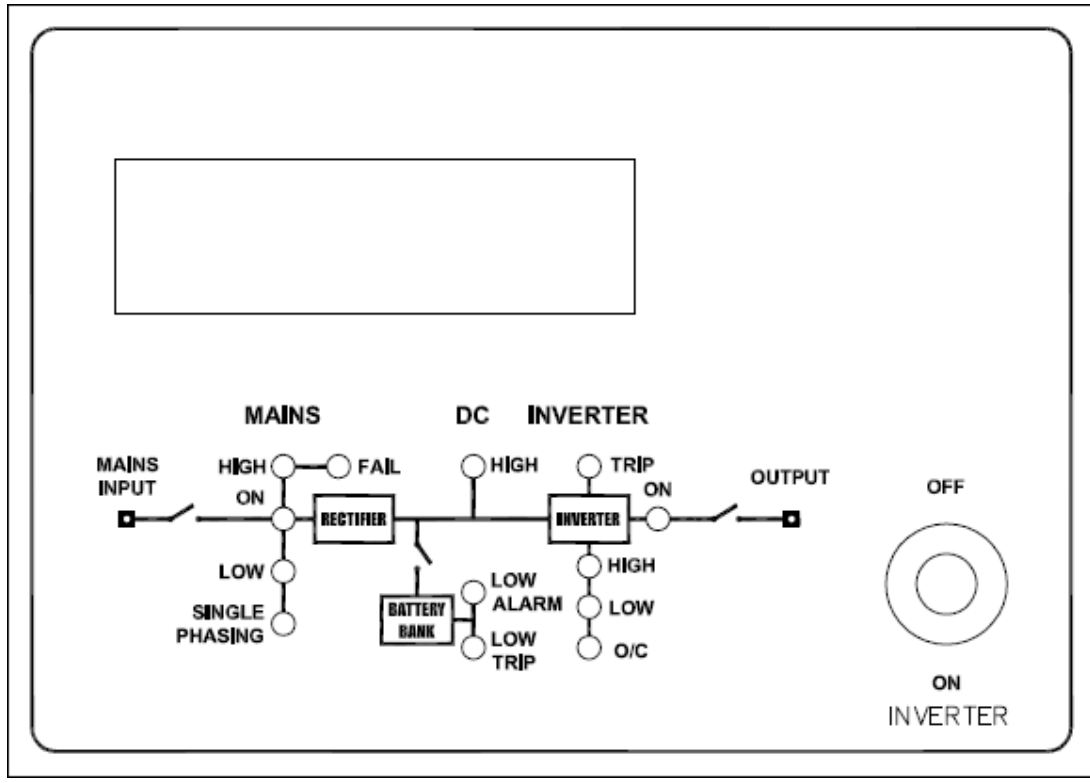
Cooling fans are connected on INPUT for forced air-cooling purpose. Potential transformer and current transformer connected at output of Inverter provide voltage current feedback to Inverter controller

METERING & SWITCHGEAR VIEW



3				TITLE : Metering , Indications & Switchgear		
2				PRODUCT : 6 to 12 KVA UPS SYSTEM		
1				SIGN	DATE	SCALE : N.T.S
0	21/09/13			DRN BY	21/09/13	DRG NO: 201

METERING & INDICATIONS



METERS

Display consists of LED Display; SCROLL Push Button & Parameter Indicator. Normally display reads Output Voltage. Other parameter can be viewed by pressing scrolling Push Button.

1. OUTPUT VOLTAGE
2. OUTPUT CURRENT
3. OUTPUT FREQUENCY
4. INPUT VOLTAGE
5. INPUT CURRENT
6. INPUT FREQUENCY

MIMIC DIAGRAM INDICATIONS

MAINS

Indication	Description	ALARM
ON	Indicates presence of input mains supply.	
HIGH	Indicates mains voltage is above Specified Limit.	YES
FAIL	Indicates absence of input Mains supply.	
LOW	Indicates mains voltage is less than Specified Limit.	YES
SPP	Indicates absence of one phase or reverse phase sequence	YES

D.C

Indication	Description	ALARM
HIGH	Indicates DC bus voltage is above its specified limit & Rect.is tripped. To reset put mains MCB OFF and again ON	YES
ON	Indicates presence of D.C. bus bar voltage.	
LOW ALARM	Indicates battery low warning condition.	YES
LOW TRIP & TRIP	Indicates inverter trip condition because of dc UNDERVOLTAGE	YES
LOW TRIP	Indicates trip condition because of DC UNDER VOLTAGE.	YES

INVERTER

Indication	Description	ALARM
HIGH & TRIP	Indicates Inverter trip condition because of output voltageabove 230V ac.	YES
ON	Indicates inverter is in condition.	
LOW & TRIP	Indicates Inverter trip condition because of output voltagebelow 160V ac.	YES
TRIP	This indication Indicates over temperature / Fan failure condition.	YES
OC & TRIP	Indicates Inverter trip condition because of over current / overload. (Load between 100% to 150% for more than 10 seconds)	YES
OC	Indicates Inverter trip condition because of over current (Load more than 150%)	YES
HIGH	This indication Indicates Inverter Trip because of DCHIGH or Reverse feeding by load.	YES

SWITCH

This switch is to make SFC ON & OFF. This switch is also used to reset Inverter in tripcondition.

TERMINALS & SWITCH GEARS

SWITCH GEARS

Mains Breaker

CB1 is the input breaker. It switches ON & OFF the input supply toSFC system. It is additional protection for input over current.

Output Breaker

CB2 is the output breaker. It switches ON & OFF the output supply toLOAD. It is additional protection for output over current.

TERMINAL STRIPS

Input Terminals

The mains supply is given to the SFC system from this terminal strip it has Phases (R Y B) & Neutral (N) terminals

Output Terminals

When SFC is ON a constant Volts AC Voltage is taken from this terminal strip, it has Phase (U, V, W, Neutral (N) terminal & Earth (E)

HOW TO REPORT THE FAILURE

- When the system trips do not switch off inverter switch before observing Indication on front panel.
- Please refer metering & indication Drawing & description section.
- Communicate & inform the following information required for our record
- This status of indication to service engineer at our office by telephone, fax or telegram.

Dos & Don'ts

Do's

- Please check Mains supply indication and other indication before switching ON the SFC and computers.
- Keep SFC power points isolated from tube lights, fan and other points.
- Keep SFC in ventilated space, protected from rain, dust, wind and vibrations.
- In case of SFC failure please note down the indications before putting off the INVERTER ON/OFF switch off.

Don'ts

- Do not keep any material on SFC.
- Do not block ventilation of SFC from sides also.
- Do not move the wires connecting SFC system or Batteries.
- Do not connect other loads like A/C, Fans, Freeze, Water coolers etc.
- Do not switch off mains supply to SFC system.
- Do not operate any switch on SFC when the computers are ON.
- Do not allow liquid to fall on SFC system.
- Do not restart the system before finding out the cause of tripping.

CAUTION

Do not service the equipment by any unauthorized person.

DESIGNATION FOR PARTS

01]	RESISTOR	R
02]	PRESET	P
03]	CAPACITOR	C
04]	CHOKE	L
05]	TRANSFORMER	X
06]	PULSE TRANSFORMER	PX
07]	POTENTIAL TRANSFORMER	PT
08]	CURRENT TRANSFORMER	CT
09]	SHUNT	SH
10]	DIODE	D
11]	SCR	TH
12]	SCR-SCR module	SS
13]	SCR-DIODE module	LK
14]	IGBT	Q
15]	INTEGRATED CIRCUIT	IC
16]	LED	IL
17]	METER	M
18]	SWITCH	SW
19]	RELAY	k
20]	CONTACTOR	K
21]	BREAKER [MCB, MCCB.]	CB
22]	FUSE	F
23]	HEAT SINK	HS
24]	CONNECTOR	J
25]	TERMINAL BLOCK	TB
26]	PRINTED CIRCUIT BOARDS	PB
27]	BUZZER	BZ
28]	FAN	E
29]	FAN SENSOR SWITCH	ES
30]	INDUSTRIAL THERMOSTAT	RTD
31]	DOOR SENSOR SWITCH	DS
32]	PANEL LAMP	LAMP
33]	PHASE SELECTOR SWITCH FOR METER	MS
34]	DIODE DIODE MODULE	DD

INSTALLATION & COMMISSIONINGPROCEDURE

- **VISUAL INSPECTION**

Before commissioning system should be visually inspected for physicaldamages and proper connections.

Put all switches and MCBs in **OFF** position.

- **COMMISSIONING**

- Connect the input R Y B phase-neutral-earth to the SFC terminals marked "MAINS INPUT "respectively. (as per requirement)
- Connect the LOAD U, V, W, Neutral & Earth to the SFC terminals marked "LOAD" respectively
- Check proper earthling is done.

- **PRE-OPERATING PRECAUTIONS**

1. All electrical external connection is properly done.
2. Be sure that the ground connection is made and connected earth to ground.

- **OPERATING INSTRUCTIONS**

1. Switch ON the input Breaker. Observe DC voltage on DC voltmeter. It should develop softly & stabilize between 240 - 290V DC.
2. Check the D.C. bus voltage on front panel.
3. Switch on Inverter ON / OFF switches on front panel and observe output voltage on front panel. It should rise softly and stabiles at 200V AC or (As per requirement)
4. Check output load wiring and then switches on the Inverter. Connect the load step by step.

PART LIST (SFC SYSTEM)

PART NAME	KVA RATING					DESCRIPTION	MAKE
	6						
C1 to C3	10 MFD					400V AC Capacitors	EPCOS / SARADA
C4,5,6	1 no					3300uF / 350V DC Capacitors	ALCON
CB1	32 Amps					3 Pole MCB For Mains input	SCHNIDER
CB 2	32 Amps					3 Pole MCB For OUTPUT	SCHNIDER
CT1 to CT3	30A / 0.1A					Current transformer for Rect & LCD display	Torotrans
CT4 to CT9	30A / 0.1A					Current transformer for Inverter & LCD	Torotrans
SD1 – SD3	27 A					1600V SCR Diode Modules	Semikron
E1 to E2	4" 2nos					230Volts Cooling Fan	HICOOL
L1	35A					DC Choke	EXPRESS
PCB1						CHARGER CONTROL CARD	TEPL
PCB2						CHOPPER DRIVER CARD	TEPL
PCB3						SMPS CARD	TEPL
PCB4						3PH INVERTER CARD	TEPL

PCB 5						INVERTER DRIVER CARD	TEPL
PCB 8						DISPLAY CARD	TEPL
Q 1 to Q 3	100A					600V IGBT module for Inverter	Semikron
TB1	30A					4 way Terminal Block for Mains input	Suraj
TB2	30A					4Way Terminal block for Output	Suraj

TROUBLESHOOTING

Use the below table to Troubleshoot SFC problem.

Make sure the SFC is connected to AC input power and the AC input voltage is within the specified limits. Make sure the circuit breaker on the backside of SFC or on distribution board has not been tripped.

If you are not able to solve the problem, contact the nearest **Technovision** office, Make sure you have Your units KVA rating, Warranty / AMC status, and full description of the problem available when you call. [+91-9370132704](tel:+91-9370132704)

PROBLEM	POSSIBLE CAUSE	HOW TO REACT
<ul style="list-style-type: none"> The SFC is on but not supplying the power to the equipment. 	<ul style="list-style-type: none"> The output circuit breaker of SFC may have been tripped. 	<ul style="list-style-type: none"> Reset the breaker.
<ul style="list-style-type: none"> A main supply is available but a mains onLED is not lit, and the SFC beeps every few seconds. 	<ul style="list-style-type: none"> No input power may be available to the SFC. The input circuit breaker on the back plate of the SFC has been tripped. 	<ul style="list-style-type: none"> Make certain the SFC is plugged into a receptacle with power applied. Reset the breaker and Restart the SFC.
<ul style="list-style-type: none"> DC Low indication LED is Lit and SFC beeps fast. 	<ul style="list-style-type: none"> The DC voltage is Low. 	<ul style="list-style-type: none"> CHECK INPUT VOLTAGE IS WITHIN LIMITS
<ul style="list-style-type: none"> The SFC output is off. SFC beep continually and DC low trip Indication is ON 	<ul style="list-style-type: none"> SFC is tripped because of DC low condition 	<ul style="list-style-type: none"> CHECK INPUT VOLTAGE IS WITHIN LIMITS

CAUTION

Even with the SFC switched off, dangerous voltages may still be present at the SFC or its outlets.



POWER SOLUTIONS

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The Technical Service & Support (T.S.S.) network,
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Manager-Service - 07507053131

Marketing Manager - 09370132710

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We Also Manufacture – Online UPS, Static Voltage Stabilizers, Isolation Transformer, Battery charger, frequency converters, static switch & customized power supplies.



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