MAGNUS POWER
Global Power Supply Specialists

29 - 30 Brunel Road, Churchfields Industrial Estate, St. Leonards-on-Sea
East Sussex. TN38 9RT. United Kingdom
Sales & Service : 01424 853 013 All Other Departments : 01424 853 464 Fax : 01424 852 268
magnuspower.sales@akersolutions.com magnuspower.service@akersolutions.com

ME3 Three Phase Frequency Converter, Operation and Maintenence.

Magnus Power
29 - 30 Brunel Road, St Leonards on Sea, East Sussex, TN38 9RT. United Kingdom

Telephone +44 (0) 1424 853 013 (Sales & Service)
+44 (0) 1424 853 464 (all other Enquires)
Fax +44 (0) 1424 853 2 268

www.magnuspower.co.uk
magnuspower.sales@akersolutions.com
magnuspower.service@akersolutions.com

MAGNUS POWER ME3 SFC

STATIC FREQUENCY CONVERTER

USER MANUAL

CONTENTS

PRINCIPLES OF OPERATION

INTRODUCTION

The ME3 three phase Static Frequency Converter (SFC). guarantees a supply free of disturbances and of high quality, with maximum reliability. The use of high frequency pulse width modulation (PWM) ensures exceptional performance and extremely quiet operation. A 4 quadrant Power Factor Corrected RECTIFIER guarantees lower input currents, reduced harmonics (THD<5%) and the capability to handle any type of load including regenerative ones.

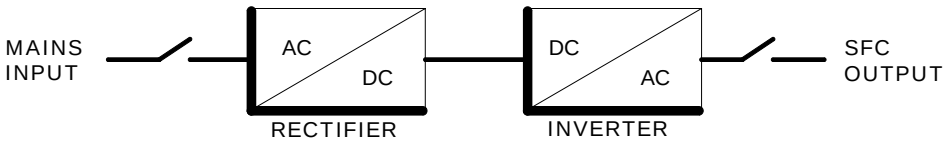
The advantages of this technology are:

- Fast response to load changes.
- Quiet operation.
- Reduction in size and weight.
- High efficiency - low heat losses.
- Short circuit protection.

If your load is sensitive to mains supply, such as computer Systems, process electronics, emergency equipment etc., then the SINE33 is the answer.

The ME3 SFC comprises the following:

- Rectifier
- Inverter



START UP AND SHUT DOWN

POWER UP SEQUENCE

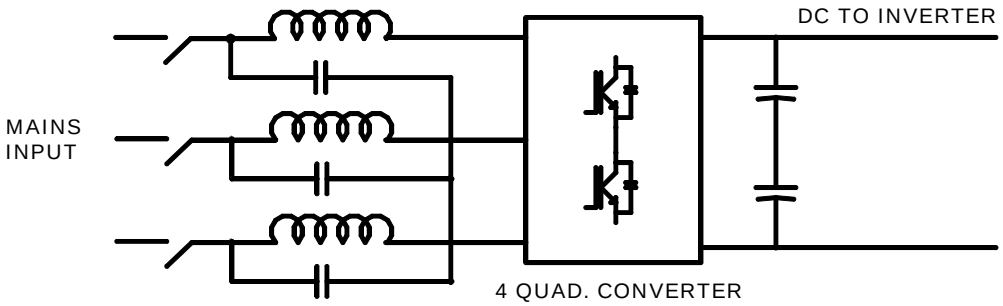
1. Switch on “AUX. SUP SWITCH” (Electronics should start up)
2. Switch on “INPUT MCB”
3. Switch on ”OUTPUT ISOLATOR”
4. Switch Inverter on by pressing the Green button.

POWER DOWN SEQUENCE

1. Switch Inverter off by pressing both Red Buttons simultaneously
2. Switch off “OUTPUT ISOLATOR”
3. Switch off “INPUT MCB”
4. Switch off “AUX.SUP SWITCH”

Any other sequence will not cause any harm to the SFC. Make sure that the Auxiliary Supply Switch is always ON when operating the SFC. This will allow the SFC to operate correctly in the event of Mains Supply dips.

RECTIFIER



The rectifier / charger comprises:

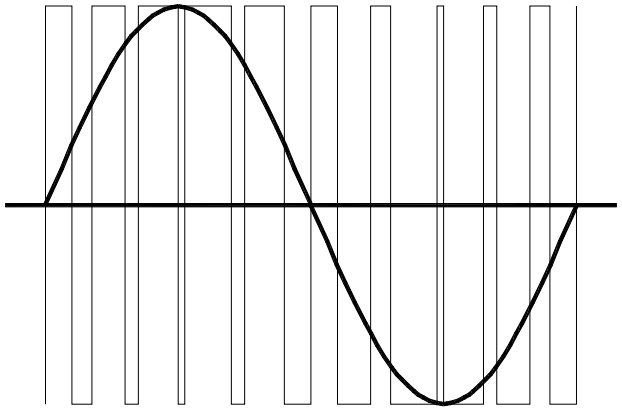
- RFI Filter.
- Input triple pole circuit breaker for protection against faults.
- MOV input protection against over voltage transients.
- LC filter.
- 4 Quadrant, PF Correction IGBT Bridge.

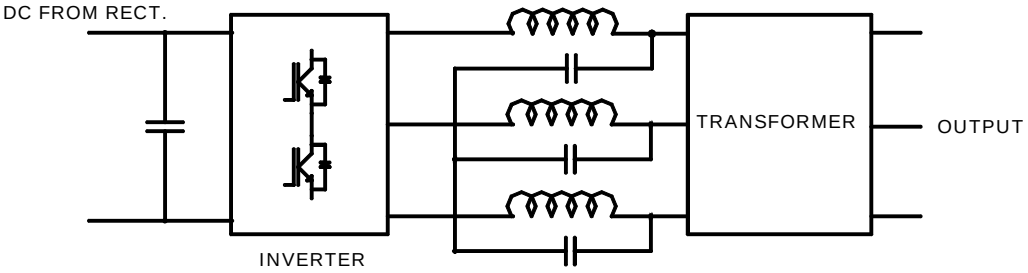
The Rectifier supplies the Inverter with a constant DC voltage .

The Power Factor Correction IGBT Bridge (4 Quad. Converter) guaranties input unity power factor and sinusoidal current with low Harmonic content, as well as 4 quadrant operation.

INVERTER

The basic principle of operation of the Inverter is achieved by having a voltage loop control followed by a current loop control which maintains the output voltage and wave shape constant and with no DC offset. To create the sinusoidal wave shape, the DC supply is switched on and off with varying pulse length (pulse width modulation). These pulses are then filtered by a LC filter producing a low distortion sine wave in the output.

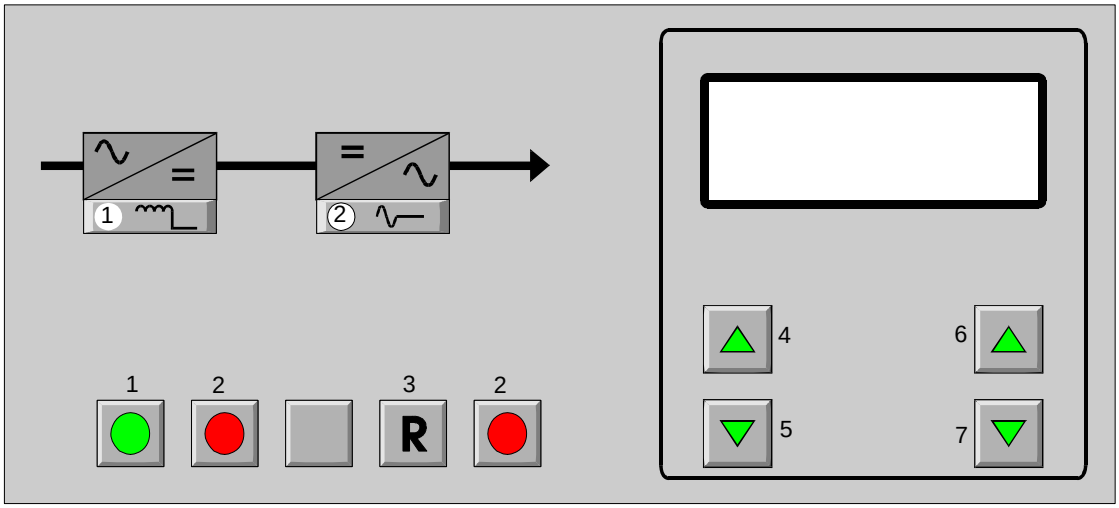




The Inverter consists of:

- 3 Phase IGBT Bridge
- L C Filter
- Inverter transformer
- Control circuitry

MICRO PROCESSOR DISPLAY AND FAULT FINDING



The display panel consists of a digital display, a mimic display, a diagnosis display, an audible alarm and push buttons

MIMIC PANEL

MIMIC POSITION	INDICATION	FLAG IN THE DIGITAL DISPLAY
1 -	INPUT FAILURE	“RECTIFIER OFF”
2 -	INVERTER OFF	“INVERTER OFF”.

PUSH BUTTONS

DISPLAY POSITION	PUSH BUTTON NAME	PUSH BUTTON FUNCTION
1-	INVERTER ON (green)	It will turn the UPS Inverter ON, if no fault is present.
2-	INVERTER OFF (red)	To switch the UPS Inverter OFF and transfer the load to Static Bypass, both red buttons must be pressed simultaneously.
3-	INDICATION RESET (R)	This pushbutton performs the following functions simultaneously when pressed: a) Some fault indications in the Digital Display will latch when triggered. This push-button will Reset these indications if the respective fault has cleared. b) It Resets the audible alarm. c) It will reset and restart the Rectifier (only) after a Rectifier trip. d)It will exit the Logger display, if in this mode.
4-	FLAG SCROLL UP	If more than two Status flags are present in the Digital Display, by pressing this button the flags will scroll up. When there are no more flags above the “ □ “ symbol will show next to the flag. If there are more flags above an arrow will be seen next to the flag. To scroll 5 items at a time press this button and while maintaining it depressed, press the FLAG SCROLL DOWN also.
5-	FLAG SCROLL DOWN	The same as for the “ Flag Scroll Up “ but in the downwards direction. To scroll 5 items at a time press this button and while maintaining it depressed, press the FLAG SCROLL UP also.
6-	METER SCROLL UP	Only two readings from the Meter will be shown at any one time. By pressing this button the meter readings will scroll up. When there are no more readings above the “ □ “ symbol will show next to the last meter reading. If there are more readings above an arrow will be seen. To scroll 5 items at a time press this button and while maintaining it depressed, press the METER SCROLL DOWN also.

7-	METER SCROLL DOWN	The same as for the " Meter Scroll Up " but in the downwards direction. To scroll 5 items at a time press this button and while maintaining it depressed, press the METER SCROLL UP also.
4-5-6-7	ALL SCROLL BUTTONS **MICRO RESET**	Pressing all scroll buttons simultaneously will reset the Micro. After reset all LEDs will light up momentarily, allowing to check faulty ones.
3-4/5	RESET + FLAG SCROLL **LOGGER**	By pressing the Reset Button and any of the Flag Scroll buttons simultaneously, the display will enter the Logger. In this mode buttons 4 and 5 will provide a normal scroll while buttons 6 and 7 will provide a 5 item scroll.

LOGGER DISPLAY

To check the history of the information from the previous section, the Display Logger can be activated, by pressing simultaneously the Reset button and any of the Digital Scroll Buttons (left hand side ones). To exit the Logger mode the Reset button must be pressed.
The Display Logger uses all 4 lines of the LCD. An example:

19-10-04 6:30 G4-FE
DIG SIGNALS = 11111110
19-10-05 6:20 G1-EF
DIG SIGNALS = 11101111

Two events are shown. Both happened at the date 19-10-04. The first one at 6:30 and the fault belongs to group 4 (“Load on Bypass”). The second one happened at 6:20 and the fault belongs to group 1(“Bat Undervolt”). The zeros indicate the faults that triggered the event.
The next table helps to identify the protections that triggered the events from the information above (Position 1 = Least Significant Bit).
The left hand side scroll buttons will scroll the logger lines one by one and the right hand side buttons will scroll 5 lines at a time.
It must be noted that the same information, in a more user-friendly format, is also available using our Windows based software or a Netagent connection.

Group / Position	G1	G2	G3	G4	G5
1	ON LINE	CHARGER OVERVOLT	INVERTER SAT PROT	LOAD ON BYPASS	BUTTON ON
2	EMERG POWER OFF	CHARGER FAULT	INVERTER OVERCURRENT	MANUAL BYPASS	BUTTON OFF
3	MAINS LOW	CHARGER BOOST	INVERTER UNDERVOLT	OUT OF SYNC	REMOTE OFF
4	MAINS HIGH	BAT DISCHARGING	INVERTER OVERVOLT	FUSE FAILURE	REMOTE ON
5	BAT UNDERVOLT	RECT OVERVOLT	OVERLOAD	INV DC OFFSET	BATTERY TEST
6	BAT HALF	RECT FAULT	OVERTEMPERATURE	DC OUT OF BALANCE	MICRO RESET
7	BAT LOW	INVERTER OFF	SHORT CIRCUIT	BAT. EARTH LEAKAGE	-
8	CHARGER OFF	UNVERTER FAULT	PHASE ROTATION	OUTPUT ISOLATED	-

DIGITAL LCD DISPLAY

METER DISPLAY:

The first two lines of the LCD are used for the Meter functions. They can be scrolled by the two right hand side buttons.

The following functions are available:

METER FUNCTION	DESCRIPTION
“Inv Volt PH A =”	Phase A Inverter voltage (V).
“Inv Volt PH B =”	Phase B Inverter voltage (V).
“Inv Volt PH C =”	Phase C Inverter voltage (V).
“Op Curr PH A =”	Phase A Output Current (%).
“Op Curr PH B =”	Phase B Output Current (%).
“Op Curr PH C =”	Phase C Output Current (%).
“Input Volt PH A =”	Phase A Input voltage (V).
“Input Volt PH B =”	Phase B Input voltage (V).
“Input Volt PH C =”	Phase C Input voltage (V).
“Input Curr PH A =”	Phase A Input Current (%).
“Input Curr PH B =”	Phase B Input Current (%).
“Input Curr PH C =”	Phase C Input Current (%).
“Pk Op Curr PH A =”	Phase A Peak Output Current (%).
“Pk Op Curr PH B =”	Phase B Peak Output Current (%).
“Pk Op Curr PH C =”	Phase C Peak Output Current (%).
“DC Link Volt =”	DC Link Voltage (V).
“DC Link Curr =”	DC Link Current (%).
“Input Freq =”	Mains Input Frequency (Hz).
“Invert Freq =”	Inverter Frequency (Hz).
“Temperature =”	Cabinet Interior Temperaure

Every single one of these measurements can be eliminated from the display in the Display Configuration Program.

STATUS FLAG DISPLAY / FAULT FINDING

The Status Flag display (3rd and fourth row) provides enough information for the SFC user to know the operational status of the SFC, as well as in the case of a fault if a technician should be contacted.

If no flags are active the third row will show " Power System OK". If any flag is active the flags messages will appear in the third and fourth rows of the LCD. The left-hand side buttons will scroll the flags.

The following indications are available:

- ***"Mains Low"*** — Mains are absent or bellow limits (-20% of nominal).
- ***"Inverter Fault" ; "Inverter Sat Prot" ; "Inverter Overcurr" ; "Inverter Undervolt" ; "Inverter Overvolt"*** — These indications indicate that the Inverter has been subjected to high stress such as excessive current flown through the IGBT's causing the Inverter to trip. These indication are self-latching. To clear them, the "INDICATION RESET" push button ® must be pressed. If after restarting the Inverter, any of these indications persist, there is a fault in the Inverter and the SFC supplier should be contacted. No further attempts at restarting the Inverter should be made.
- ***"Overtemperature"*** — The SFC heat sinks' temperature has exceeded 80ºC. Check if there is any obstruction to the ventilation inlets or outlets of the SFC and remove it. If that is not the problem, it is likely that one of the fans has gone faulty. Contact the SFC supplier.

  This indication is self-latching. To reset it, the fault must be cleared and the "INDICATION RESET" push button ® pressed.
- ***"Inverter Off"*** — The SFC Inverter is off. If there is no other fault indication the Inverter was switched off manually.
- ***"Short Circuit"*** — When the load current exceeds aproximately 10 times the nominal full load value, the Inverter is switched off. No SFC output will be available. At this stage, this indication and the audible alarm are active. Before trying to reset the SFC, make sure that the short circuit on the load is removed
- ***"Over Load"*** — When the load current exceeds 105%, this indication will be triggered. The Inverter will try to cope with the overload, being protected by an inverse time protection: i.e. the larger the overload, the shorter the time the Inverter will take to switch off. Typically 1min for a 120% overload and 5 seconds for 150%.

- ***"Mains High"*** — The mains input is out of parameters (greater than 110%). The Power Factor Correction function of the Rectifier is inhibited. The SFC should not be operated in this conditions for a long period of time, since it exceeds its design parameters.

- ***"Phase Rotation"*** — If the input phase rotation is not correct (R,Y,B), the indication will be ON. This happens when one of the phases is swapped around or failed. The Rectifier will not start.

  Normally this type of problem only arises in the initial installation of the machine and is easily rectified by swapping around two of the input phases for the Rectifier Input.

- ***"Rectifier Off" ; "Rect Overvolt" ; "Rectifier Fault" ; "DC Offset" ; "DC Out of Balance"*** — The following conditions can cause these indications to be on:

  1. Mains failure.
  2. Mains input breaker in the SFC or Mains feeding breaker in the distribution box tripped.
  3. Phase rotation on mains input incorrect.
  4. Rectifier fault (DC over voltage or control voltage failure)
  5. Inverter control failure causing DC Offset

  The above anomalies should be corrected as soon as possible, by calling the SFC supplier.

- ***"Fuse Fail"*** — When available, this flag indicates one of the SFC main fuses has failed. Other indications, such as "Mains Failure" should give an idea of which fuse has failed. Otherwise a physical observation is necessary to discover the faulty fuse. This is better left done by the Maintenance personnel.

The above fault finding information should be enough to solve any problem that might arise, and should give enough information about the status of the SFC at any moment.

A remote alarm panel is available, with most of the diagnosis information of the SFC display panel, with exception of the digital meter. Also available are a relay interface card with the same characteristics and a network connection with SNMP protocol via Netagent, for easier access to all the SFC information.

CONCLUSION:	For the SFC to be in perfect working order, no red indication should be present on the display panel. The Status Digital Display should have only the flags "Power System OK!" and "P.S. Use=" ; the latter indicating the number of days the SFC has been in use.

SELECTION OF EQUIPMENT

ME3 MODELS:

The ME3 range of SFC comes in 8 different ratings as standard:

10KW – 15KW – 20KW – 30KW – 40KW – 50KW – 60KW – 80KW – 100KW.

Single phase output units only go up to 50KW.

For different power ratings from the above, you can consult us for advice. The above power ratings are for loads of UNITY power factor.

These units can operate with loads of power factor ranging from 0.2 (leading or lagging) to unity due to the 4 quadrant operation of the Rectifier.

The standard models cater for input voltages of 400V - 50Hz, with output voltages 200V - 60Hz ; 480V – 60Hz ; 200V – 400Hz. On request we can supply machines with different input and/or output voltages and frequencies.

PARALLELING

It is also important to note that the ME3 models can be paralleled in a redundant mode to increase reliability or to increase power capability. The units to be paralleled must be of the same rating and no more than 4 in number.

PARALLEL OPERATION

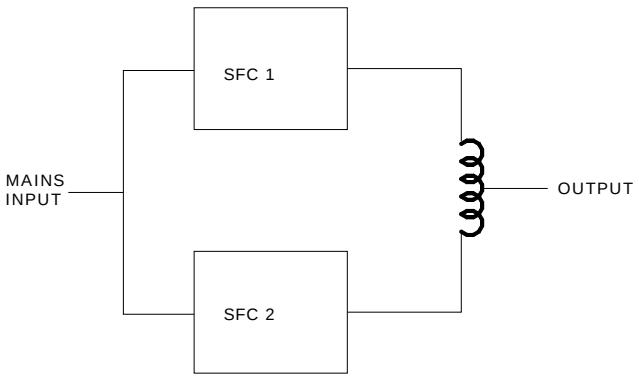
When two or more units are connected in Parallel Redundant mode their outputs are connected to a common point via a current equalizing saturable choke as in Figure 16. They also interface with each other via a CAN Field Bus so that the instructions and controls are synchronized.

Thus the parallel operation causes the following:

- When the ON button is pressed in one SFC the Inverters of all SFC will turn ON (with no faults present).

- If one SFC is switched OFF (manually or by a failure) the others will carry on supplying the load, while the former will be isolated from the load by its own Static Isolator.

Besides the above, the operation of the Individual SFC is identical to a single SFC.

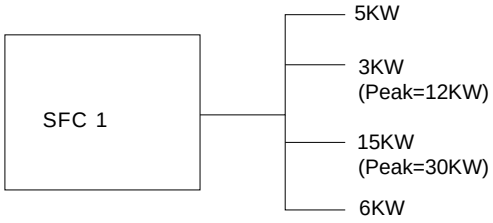


SIZING THE SFC

To size the SFC in a safe way the following points should be taken in to account:

All the peak loads must be added. The sum of the peak loads must be divided by 1.5 and if the result is equal or larger than the sum of the steady loads times 1.2, this result must be used in the selection.

Example:



Steady state load = 5KW + 3KW + 15KW + 6KW = 29KW

Peak load = 5KW + 12KW + 30KW + 6KW = 53KW

53KW/1.5=35.3KW (Larger than 29KVA x 1.2)

Since the next model is a 40KW, this model should be selected.

This will allow for start up and peak currents and will provide a power margin of 20%.

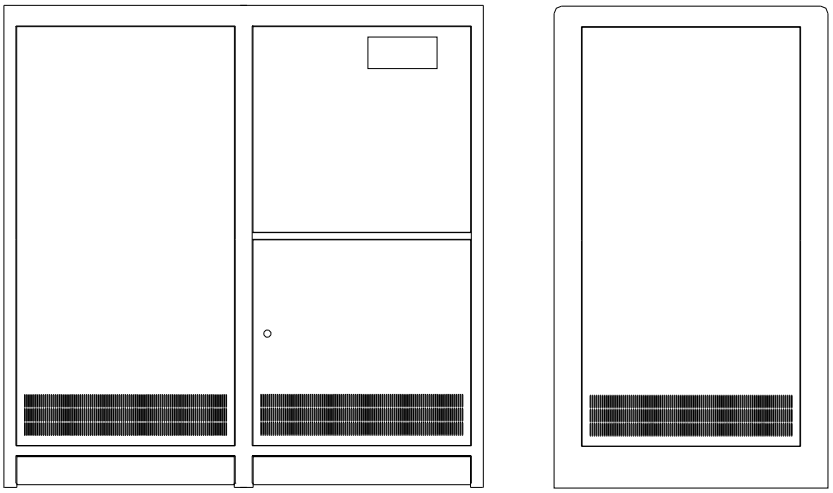
INSTALLATION

INSTALATION DATA

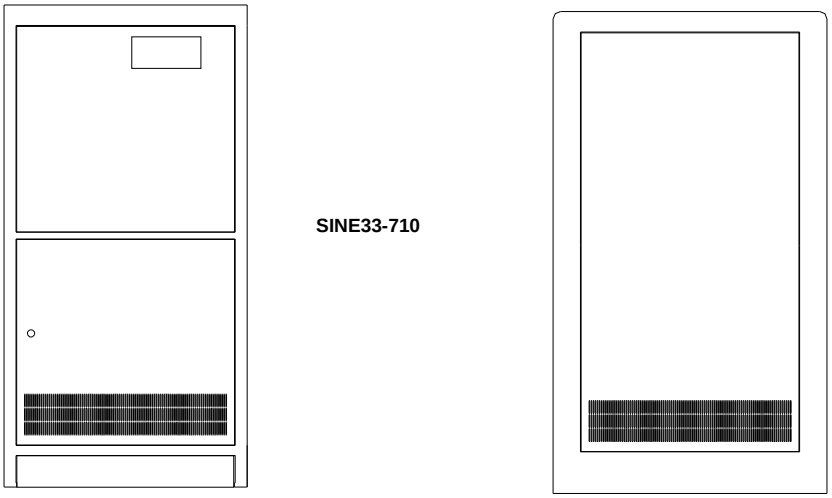
SFC DIMENSIONS (mm)

SFC MODEL	ENCLOSURE	WIDTH	DEPTH	HEIGHT
40K – 50K	SINE33-710	710	800	1400
60K – 100K	SINE33-1400	1400	800	1400

SINE33-1400

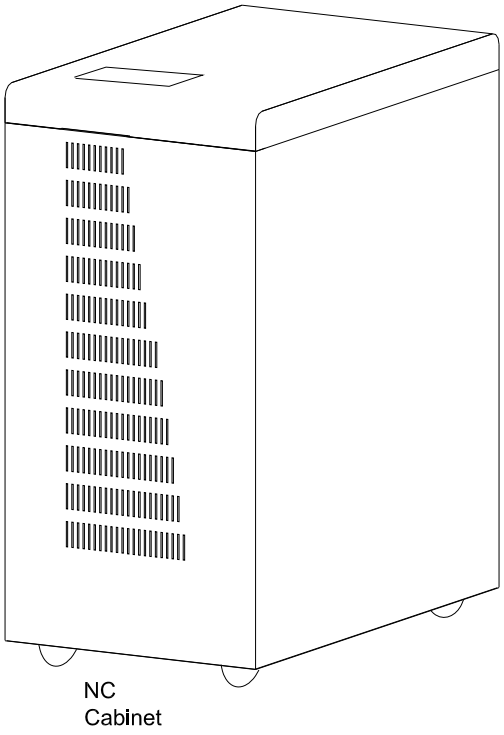


FRONT SIDE



SINE33-710

SFC MODEL	ENCLOSURE	WIDTH	LENGHT	HEIGHT
10K – 30K	SINE33-NC	530	750	990



The ME3 SFC, due to its compact size and quietness of operation, can operate in a computer room environment, on a false floor or normal level floor.

INSTALLATION – 10-15KW:

The 10KW - 30KW Units – are shown above. The units should be installed in a well ventilated area or room, since in spite of very good efficiency heat is still generated.

INSTALLATION – 40-100KW:

All units are front access, which facilitates maintenance and saves space. The units don't need back or side clearance, but care must be taken not to block the top, for proper ventilation.

The units should be installed in a well ventilated area or room, since in spite of very good efficiency heat is still generated.

Users have access to the SFC Switch Gear Via the bottom door that has a Key Lock.

The interior of the SFC should only be accessed by trained technical personnel after complete shut down and a waiting period of at least 10 min to allow the DC capacitors to discharge.

The sequence to open all the SFC panels is as follows:

1. Open the bottom door and unscrew the top door (bottom left hand side).
2. Open the top door and will have access to all the SFC components that may need maintenance.
3. Unscrew the top panel (front), via the round apertures at the inner protection plate, and remove it pulling upwards and to the front.

4. With the top removed the magnetics cooling fans are accessible.

5. Unscrew the side and back panels (top) and remove them by pulling towards you and lifting them. They are secured to the uprights by wedges. The panels have inside handles to help remove and replace them.

Units with external batteries can have remote temperature compensation (optional).

The standard external battery cabinets open in a similar way as the UPS except that they have a single door in the front and don't have a top inner protection plate.

POWER TERMINALS:

The power terminals are accessed via the bottom front door that has a key lock. With units up to 50KW (SINE33-710 cabinets) another protection plate at the MCB assembly must be removed.

The Input & Output cables are fed to the SFC via the bottom gland plate that is placed next to the Power Terminals. Care must be taken to terminate the cables correctly to avoid damage to the SFC. ***Mistakes like connecting the Input cables to the Output Terminals can damage the SFC in spite of its protections.***

Units with Top Cable Entry (optional) will have the Power Terminals on the top inner protection plate, with the cable glands installed at the back of the SFC. This type of unit must be ordered from factory as Top Entry.

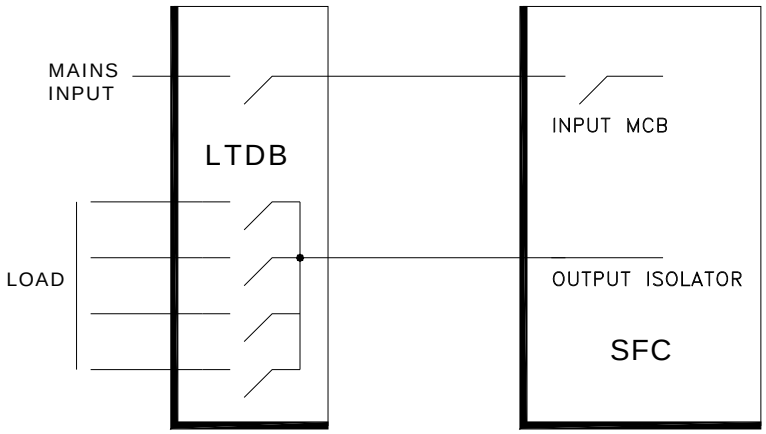
LTDB:

A low-tension distribution board must be provided by the customer, to feed the SFC and the user's load.

The input circuit breaker (feeding the SFC) should be of at least the same rating and of the same type as the "RECTIFIER MCB" breaker in the SFC.

For the output circuit breakers the ratings are dependent on the specific load each of the breakers is feeding. The SFC will be able to clear a B type MCB of at least 33% of the Full Load Current, without tripping the Inverter.

The diagram illustrates an installation with separate supplies in the input section



With larger units, where considerable currents flow in the input and output cables, these must be carefully laid so that the magnetic field they produce does not interfere with other equipment such as screens, magnetic card readers, etc.

ACOUSTICAL NOISE:

The ME3 range of SFC is extremely quiet, making it ideal for use in the office or computer room. The emitted noise is less than 55 dBA.

VENTILATION AND AIR CONDITIONING

The ME3 range of SFC is designed to operate at an ambient temperature of up to 40ºC at sea level. For 2000m altitude the operating ambient temperature should not exceed 30ºC.

Since there are heat losses in the SFC, care must be taken in providing the correct ventilation or air-conditioning for the room where the SFC is going to be installed.

The following table provides information about the heat losses of the various models for 100% load at 1 power factor .

UNIT POWER	HEAT LOSSES (100% Load)
10KW	1.1KW
15KW	1.65KW
20KW	2.2KW
30KW	3.3KW
40KW	4.4KW
50KW	5.5KW
60KW	6.6KW
80KW	8.8KW
100KW	11KW

ELECTRICAL CHARACTERISTICS

ELECTRICAL CHARACTERISTICS

The following table gives the electrical characteristics of the ME3-SFC for an input voltage of 400V, **output voltage of 200V** and full load at 1 power factor.

ME3 MODEL 3 phase	MAX INPUT CURRENT	OUTPUT CURRENT	VDC
10K	17A	29A	750
15K	26A	43A	750
20K	34A	58A	750
30K	51A	43A	750
40K	68A	87A	750
50K	85A	109A	750
60K	102A	130A	750
80K	136A	174A	750
100K	170A	217A	750

CABLES SELECTION

CABLES SELECTION

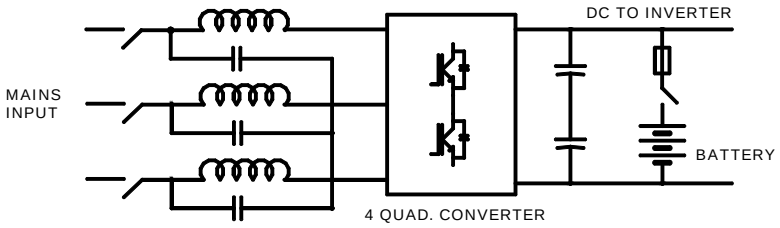
	ARMORED CABLE FREE AIR WIRED	**UNARMORED CABLE FREE AIR WIRED**
$2,5mm^2$	27 Amps	24 Amps
$4,0mm^2$	35 Amps	32 Amps
$6,0mm^2$	43 Amps	41 Amps
$10mm^2$	60 Amps	55 Amps
$16mm^2$	70 Amps	72 Amps
$25mm^2$	100 Amps	94 Amps
$35mm^2$	125 Amps	115 Amps
$50mm^2$	150 Amps	140 Amps
$70mm^2$	180 Amps	175 Amps
$95mm^2$	225 Amps	215 Amps

Suggested maximum currents

HARMONICS FROM RECTIFIER

The ME3 SFC uses a 4 Quadrant Active Power Factor Control rectifier/charger with unity power factor correction and sinusoidal input current to minimize the effect of harmonics upstream of the SFC installation. Input RFI filters are also fitted as a standard in every model to comply with EN50091-2:1995 (EMC) AND IEC61000-3-4:1998 (Harmonics).

4 QUADRANT POWER FACTOR CORRECTED ACTIVE RECTIFIER



The 4 Quadrant capability of the ME3 Rectifier allows the SFC to handle a larger range of difficult loads such as induction motors in regeneration mode and high capacitive circulating currents, which could cause serious problems with standard SFC.

By using this topology not only the input Power Factor is corrected to very close to unity, improving the energy bills, but the current harmonics are greatly reduced (THD<5% at full Load).

EFFECTS OF HARMONICS ON OTHER EQUIPMENT

The presence of current harmonics in the Mains can disrupt the operation of equipment connected to it:

- It can affect the sizing of generating sets feeding the SFC.
- Increases the losses in transformers, motors and other inductive equipment.
- Increases currents through power factor correction equipment.
- Interfaces with measuring instruments, telephone circuits, and sensitive equipment.

- The ME3, with its built in power factor correction minimizes the above mentioned problems.

SFC SPECIFICATIONS

SFC SPECIFICATIONS

INPUT:

4 Wire (3 Wire optional)

3 Phase 400V/415V AC	-20%+10% *
50.0Hz	± 5% *
Input Current Harmonics	<5% at Full Load (Sinusoidal)

OUTPUT

3 Phase200V/ 400V/415V/ AC-60.0 HZ/400Hz	± 1% *
1 Phase115V/ 230V/240V/ AC-60.0 HZ/400Hz	± 1% *
Overall Efficiency	85%-90%
Max. Crest Factor	3:1

RECTIFIER

4 Quadrant Operation

Efficiency	93%-95%
Input Frequency Deviation	5%
Overload Capacity	120% Continuous
Current walk in	2 second to maximum
Overall Current Limit	115%
Short Circuit Proof	Standard

INVERTER

Static regulation 0 - 100% load	± 0.5%
Dynamic regulation 100% load application/removal	
Transient Recovery	5%, recovering to 1%
	within 5 millisecond
Total harmonic distortion	Better than 3% (Linear load)
Overload capacity	120% (Limited to 1 Min)
Frequency stability 50.0 Hz	± .01% crystal controlled
Load power factor	0.2-1
Efficiency	93%-95%

Short circuit proof by electric current limiting and shutdown

COMMUNICATIONS

RS232/RS485	Standard with Windows Software
Ethernet Connection	Standard with Netagent
CAN (With Remote Panel)	Optional

ENVIRONMENTAL CONDITIONS:

Temperature range 0/40 degrees Celsius	At sea level (full load)
	30º Celsius at 2000m (full load)
Humidity: Recommended	40% to 60%
Extreme	0% to 90%
Noise level	below 55 dBA at 1 meter
Altitude	Up to 2500m

* Other Voltages and Frequencies available on request

GUARANTEE

All Magnus Power equipment is guaranteed against faults attributable to faulty design, components and workmanship whilst operating under normal conditions for a period of 12 months from date of delivery. During this period all faulty components will be replaced free of charge. Accommodation and traveling costs involved therein shall be for the customer account. All call-outs which cannot be attributed to faults or malfunctions on our equipment, shall be charged at our standard service rates and be for your account. Our liability under our guarantee is limited to the above and we do not accept any responsibility for any consequential loss.

MAINTENANCE AND BACKUP SERVICE

All spares are available locally and we guarantee stock for ten years. The combination of spares availability and factory trained service personnel should ensure that no unit is out of order for more than 48 hours after receipt of report of malfunction/failure. At the expiry of the guarantee period, we can service the unit on a continuous base, but this would necessitate the negotiation of a separate agreement.

29 - 30 Brunel Road, St Leonards-on-Sea, East Sussex, TN38 9RT. United Kingdom
Sales - 01424 853013 - All Other Departments - 01424 853464 - Fax - 01424 852268
Registered in England, Registered office Unit 12, Clivemont Road, Cornwallis Ind. Est. Maidenhead SL6 7BZ.
Registration No. 4977339. VAT Registration No. GB 829 4203 28