Industrial Power for
Business-Critical Continuity™

Emerson FP-60Z 5 to 60kVA

AC UPS system catalogue - FP-60Z31 and FP-60Z33

EMERSON
Network Power

Emerson FP-60Z 5 to 60kVA

AC UPS system - FP-60Z31 and FP-60Z33

1 Scope

This document describes a continuous duty three phases Alternating Current (AC) input, stand-alone, three-phase or one-phase AC output Uninterruptible Power System (UPS).

All products from the Emerson FP range include a wide choice of ratings and a selection of industrialized and pre-configured options to allow the product to be quickly configured and delivered.

The FP-60Z AC UPS range is part of Emerson's know-how and long-time relationship with industrial businesses. The range meets customers' technical specifications for industrial applications such as petrochemical plants, oil and gas offshore developments (platforms, FPSO, etc...), power generation plants, mining, water desalination and treatment plants, aluminium smelters, other manufacturing plants (glass, steel...).

The FP-60Z range is supported by a range of services offered by Emerson Network Power. These services can include, but are not limited to :

- Consultancy services
- Pre-engineering design and support
- Project Management (contract management, detailed engineering, documents for approval, manufacturing, product testing, witness-testing if requested, shipment, tailored user manual)
- Services (recommended commissioning spare parts, commissioning services, product lifetime spare parts, hotline, trainings, maintenance contracts, etc...)

2 General Requirements

2.1 ISO certification

Emerson Network Power is certified as a company with a total quality control system in accordance with the ISO 9001.

2.2 Applied standards

The Emerson FP-60Z AC UPS range shall have the CE mark in accordance with the Safety and EMC Directives 2006/95/EC and 2004/108/EC.
The Emerson FP-60Z range is designed and manufactured in accordance with the following international standards:

- IEC62040 Uninterruptible power systems:
  - IEC62040-1 General and safety requirements for UPS
  - IEC62040-2 Electromagnetic compatibility (EMC) requirements
  - IEC62040-3 Method of specifying the performance and test requirements
  - UPS classification as per IEC62040-3: VFI-SS-111
- IEC60146 Semi conductor converters
- IEC60950 Safety of information technology equipment including electrical business equipment
- IEC60439 Low voltage switchgear and control gear assemblies
- IEC60529 Degrees of protection provided by enclosures (IP Code)
- IEC60076 Power transformers
- IEC60332-1-2 Tests on electric and optical fibre cables under fire conditions - Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame

3 System overview

Emerson FP-60Z is a state of art static UPS system specially designed for industrial applications. Block schematic of the system is as shown on Figure 1. The system operates on a DSP controlled IGBT rectifier and DSP-controlled PWM IGBTs inverter. Emerson FP-60Z utilises digital vector control technology to optimise the performance of the UPS. By adding system components, such as paralleling kits, safety and disconnecting devices, distribution cubicles, as well as software and communications solutions, it is possible to set up elaborated systems ensuring complete AC load protection.

3.1 The system

The UPS provides high quality AC power for electronic equipment loads. It offers the following features:

- Increased AC power quality
- Full input Power Factor Correction (PFC) and very low THDi
- Full compatibility with all types of loads
- Power blackout protection (for systems associated with battery)
- Lifetime of, at least, 20 years, combined with an appropriate preventive maintenance
- Operation temperature of 0 to 40°C permanent.

3.2 Models available

The Emerson FP-60Z range includes several kVA ratings output models as specified in paragraphs 9 to 12. It is of the single- or three-phase output type.

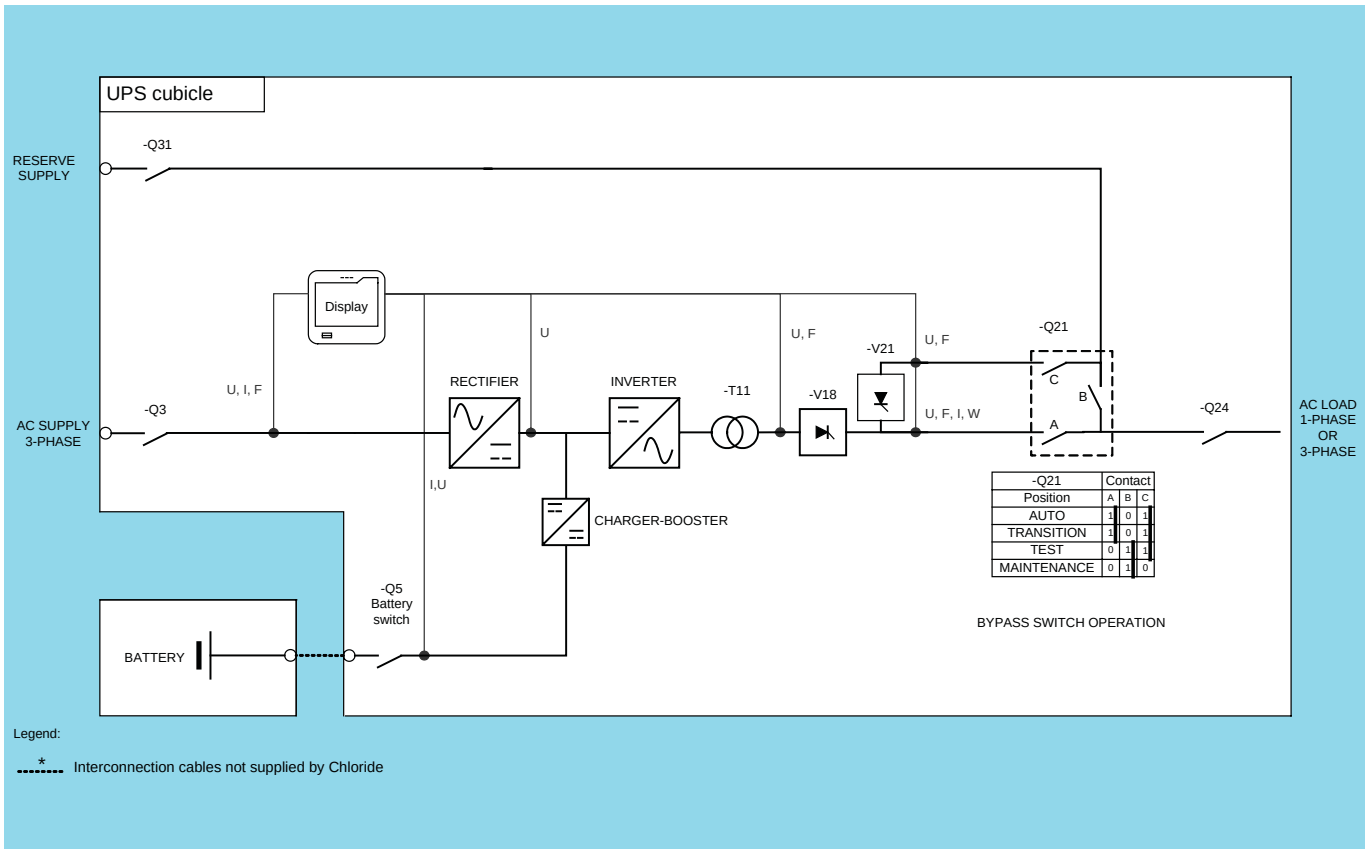

Figure 1: Emerson FP-60Z Single Line Diagram

4 System description

In this section, the main power electronic features and the operating modes of the Emerson FP-60Z UPS range are described.

4.1 General description

The three-phase voltage taken from the AC source is converter to a regulated DC voltage by DSP (Digital Signal Processor) driven IGBT Rectifier. A transformer is provided at the input of the rectifier as an optional feature.

The charger-booster keeps the battery in a fully charged and optimum operational condition.

The DC current taken from the rectifier is converted to a sinusoidal and regulated AC voltage by an IGBTs inverter (Insulated Gate Bipolar Transistor), using PWM (Pulse Width Modulation). This means that the digital signal processor controls the IGBTs so that the DC input voltage is divided into pulsed voltage to generate a low distortion sinewave AC output voltage with good transient response voltage regulation.
A transformer is provided at the output of the inverter bridge.

4.2 Components

As standard, the UPS consists of the following major components:

- One input isolator
- One IGBT rectifier
  One IGBT charger-booster
  One IGBT inverter
- One output transformer
- Electronic static switches
- Manual bypass switch
- Two control units, each based on one microprocessor and one Digital Signal Processor-DSP
- One control and visualisation unit (LCD touch pad colour display)

4.3 Operating modes

The Emerson FP-60Z UPS operates as follow:

4.3.1. Normal operation

The critical AC load is continuously supplied by the UPS inverter. The rectifier derives power from the AC source and converts it into DC power for the inverter. Battery charger takes power from rectifier output and maintains the battery in a fully charged and optimum operational condition (floating mode).

The inverter converts the DC power into clean and regulated AC power to supply the critical load through the static transfer switch. The power loading can reach up to 105% of the inverter nominal rating without considering the inverter in overload conditions.

While supplying the load, the inverter and static switch control unit monitors the reserve supply signal and ensures that the inverter bridge tracks the reserve supply frequency. Thus, any automatic transfer to the reserve supply (e.g. when an overload is detected) is frequency synchronised and does not cause an interruption to the load.

4.3.2. Overload operation

The UPS inverter is considered in overload conditions when the load is beyond 105% of the inverter nominal rating.

- Upon overload detection by the UPS inverter, the static switch automatically transfers the load to reserve supply. The static switch automatically switches back the load to inverter after the load is back to normal.

- Upon overload detection by the UPS inverter (above 110% and up to 125% of the inverter nominal rating):
  - The system initiates a timer for a 10 minutes period.
  - The AC load remains powered by the UPS inverter for this 10 minutes period.
  - Upon expiration of the 10 minutes delay, the UPS inverter shuts down and load is transferred to reserve supply.
  - The AC load remains powered by the reserve static switch for

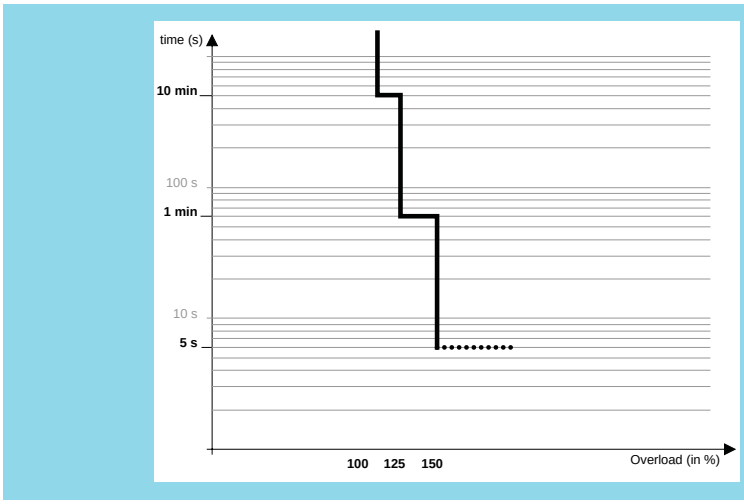

Figure 2: Inverter overload withstanding curve

further 10 minutes period.
- Upon expiration of the 10 minutes delay, the UPS reserve static switch shuts down.

- Upon overload detection by the UPS inverter (above 125% and up to 150% of the inverter nominal rating):
  - The system initiates a timer for a 1 minute period.
  - The AC load remains powered by the UPS inverter for this 1 minute period.
  - Upon expiration of this minute delay, the inverter shuts down and load is transferred to reserve supply.
  - The AC load remains powered by the reserve static switch for further 1 minute period.
  - Upon expiration of the 1 minute delay, the UPS reserve static switch shuts down.

- Upon overload detection by the UPS inverter above 150% of the inverter nominal rating:
  - The UPS inverter keeps powering the AC load for 5 seconds after which it automatically shuts down.

This overload operation mode is shown in Figure 2.

4.3.3. Input supply failure

Upon fault of the input AC source, the rectifier stops while the load remains supplied by the UPS inverter. Upon Mains input fault detection, the inverter immediately draws its power from the associated battery through the booster. While the inverter is powered by the battery through the booster, indication is provided of the discharging status. When reaching the end of battery autonomy, an alarm occurs and the static switch immediately switches the load onto reserve supply, without interruption. If for any reason, the reserve supply is not present or faulty and the battery is no longer available, the UPS automatically shuts down.

4.3.4. Battery recharge operation

After an AC input failure and upon its restoration, the charger-booster automatically recharges the associated battery.
The selection of the optimum charging method will be completely managed by the microprocessor. Several different charging methods are available and are defined at the project stage.

4.3.5. Maintenance bypass operation

If for any reason the UPS has to be taken out of service for maintenance or repair, the Emerson FP-60Z UPS is provided with a manual bypass switch. The bypass switch enables a load transfer to reserve supply without power interruption for the load. Bypass isolation is then complete, all serviceable components such as fuses, power modules etc. are isolated.

The transfer/retransfer is based on the make-before-break principle in order to secure the critical load: the transfer/retransfer operation is automatically accomplished by paralleling and synchronising the inverter output to the reserve supply, before closing or opening the bypass switch as appropriate.

4.4 Electrical features

4.4.1. Total Input Harmonic Distortion (THD) and Input Power Factor (PF)

The maximum voltage THD (THDv) permitted on the rectifier input (either from the utility or generator) will be 10% (normal operation is guaranteed up to 8%). The maximum current THD injected into the mains (THDi) will be less than 3% at maximum input power and input voltage THDv < 1% (nominal input voltage and current). The input power factor (PF) will be up to 0.98. Under other input conditions and with other output load fractions the THDi will be < 5%. This means that the Emerson FP-60Z will be seen by the primary mains sources and distribution as a resistive load (i.e. it will absorb only active power and the current waveform will be practically sinusoidal), thus ensuring total compatibility with any power source and minimizing OPEX costs.

4.4.2. Operation with diesel generator

In order to obtain the required THD on input voltage, the coordination between a diesel generator and UPS will be based on the generator's sub transient reactance, as opposed to its short-circuit reactance.

4.4.3. Battery charging modes

The battery charger will be operable with the following types of batte-

ries:
- Sealed Lead Acid
- Lead Acid (VRLA)
- Nickel Cadmium

The selection of the optimum charging method will be completely managed by the microprocessor.

4.4.4. Temperature compensated battery charging

In order to ensure optimum battery charging, float voltage will be automatically adjusted to the ambient temperature. The IGBT rectifier will be capable of supplying the battery charger with DC voltage at rated power, even if the UPS input AC voltage is below the nominal voltage specified. A further reduction of the input AC voltage (within specified limits) will inhibit the battery charger but will not require the discharging of the batteries.

4.4.5. Output voltage harmonic distortion

The inverter provides harmonic neutralisation and filtering to limit the total harmonic distortion on the voltage to less than 2% with a linear load. For reference non-linear load (as defined by IEC/EN62040-3) the THD will be limited to less than 5%.

4.4.6. Inverter short-circuit capacity

The inverter short circuit capacity of Emerson FP-60Z for the first 100ms will be 250% RMS for any short circuit configuration. After the first 100ms, it will limit the current to 150% for no longer than 5s and then it will shut down. The short-circuit capacity on the output of Emerson FP-60Z is detailed in Figure 3.

4.4.7. Static Switch overload capacity

The bypass static switch will be capable of supporting the following overloads:
- 125% for 10 minutes
- 150% for 1 minute
- 700% for 600 milliseconds
- 1000% for 100 milliseconds

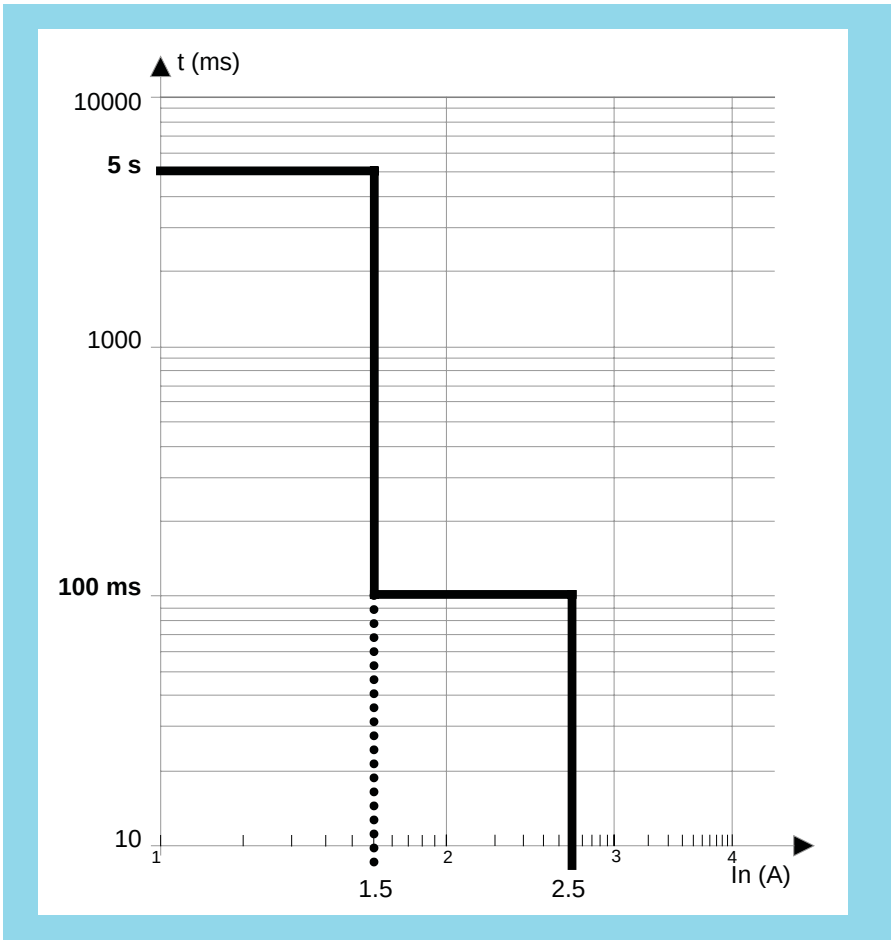

Figure 3: 1-ph & 3-ph inverter short circuit capacity

5 Monitoring and Control Interface

The UPS incorporates the necessary controls, instruments and indicators to allow the operator to monitor the system status and performance and take any appropriate action. Furthermore, interfaces are available upon request, which allow extended monitoring and control, as well as service functions.

5.1 Touch Pad

The Emerson FP-60Z control panel includes a backlit touch-pad color Liquid Crystal Display for complete UPS monitoring and control. Complete access to all LCD menus is possible through navigation buttons located on the touch-pad screen.

After 30 seconds of inactivity (i.e. without buttons being pressed) the display reverts to the default page.

5.2 Main screen

The main screen shall display an active mimic diagram of the UPS (see Figure 4). This screen may also display the main input/output currents and voltages values (if configured to do so via the menus).

The active mimic diagram displays the following information:

- Graphical view of the power flow
- Graphical view of the status of each functional block (red/yellow/green/grey) depending on each block state (alarm, warning, ok)
- Graphical view of the systems isolators.

5.3 Light emitting diodes (LEDs)

The UPS includes 3 external Light Emitting Diodes (LEDs) to indicate the overall system operation status

Figure 4: Emerson FP-60Z UPS– Local Human-Machine Interface (HMI)

Symbol	Colour	Description
	Green Green flashing	**Normal Operation** When this light is on (not flashing), the system is running normally and neither warnings nor alarms are present. During mains failures (all other conditions being at nominal level), this LED will flash.
	Yellow	**Warning Condition(s) present** This indication will be activated by the presence of anomalous conditions, which could affect the nominal functioning of the UPS. These conditions are not originated with the UPS, but may be caused either by the surrounding environment or by the electrical installation (mains side and load side). It will be possible to read the description of the active warning(s) by browsing the relevant LCD display menus.
	Red	**Alarm Condition** When this light is on, immediate attention should be given to the severity of the alarm, and service should be called promptly. It will be possible to read the description of the active alarm(s) by browsing the relevant LCD display menus.

Figure 5: Light Emitting Diodes (LED) description

as well as the condition of the functional blocks. LEDs operation is described in Figure 5.
These LEDs shall interact with the active mimic diagram displayed on the graphical display (see Figure 6).

5.4 Start and Stop push buttons

The Start and Stop push buttons are integrated into the mimic panel board, and have the following predefined functions:

The control will incorporate a safety feature to prevent inadvertent operation yet still allow for rapid shutdown in the event of an emergency.
This is achieved by pressing the «STOP» button of the appropriate module (Rectifier or Inverter) and by confirming in the pop-up window which appears. See Figure 7.

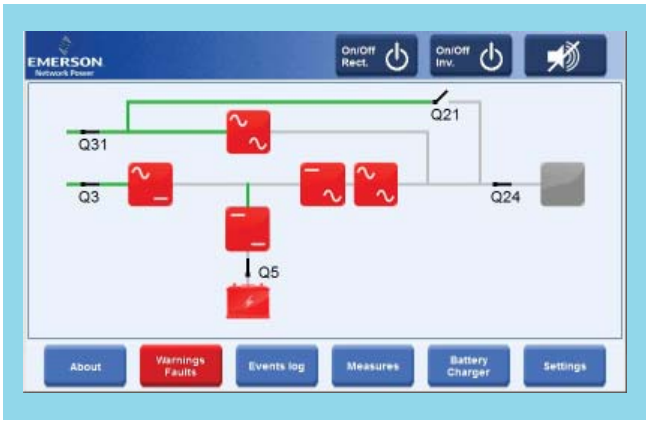

Figure 6: Example of UPS fault condition on all modules

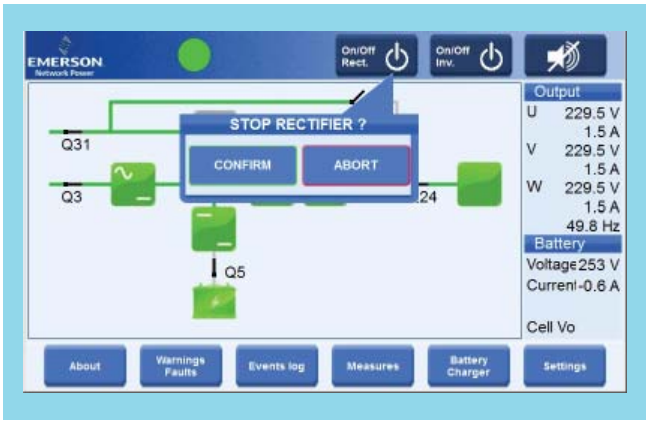

Figure 7: Start/stop Rectifier function

5.5 Access to UPS information

5.5.1. Block Information

By touching the appropriate functional block of the single line diagram, it is possible to access to the relevant block information:

- Measures
- Status
- Active warnings and alarms, if any.

An example is provided on Figure 8.

5.5.2. Measures

A dedicated page holds the full set of measurements for each functional block (rectifier, bypass, booster/charger, batteries, inverter and load).
An example is shown on Figure 9.

5.5.3. Warning/Faults

This page contains information regarding various anomalies concerning power converters such as the bypass, rectifier, inverter and booster charger. In addition to this there is also warning and fault information relating to the battery and the load. This window is shown on Figure 10.

5.5.4. Event Logger

The display board can store all the events that took place on the UPS. The event log screen allows to display all the faults, warnings or status changes, that has appeared or disappeared on the UPS internal CAN Bus.
An event log will show the last 2000 events that appeared on the UPS. These events are ordered by date.
A reset event log function available for the customer on the display enables to cancel the current recordings.
See Figure 11 for an example of Evet Lgger page.

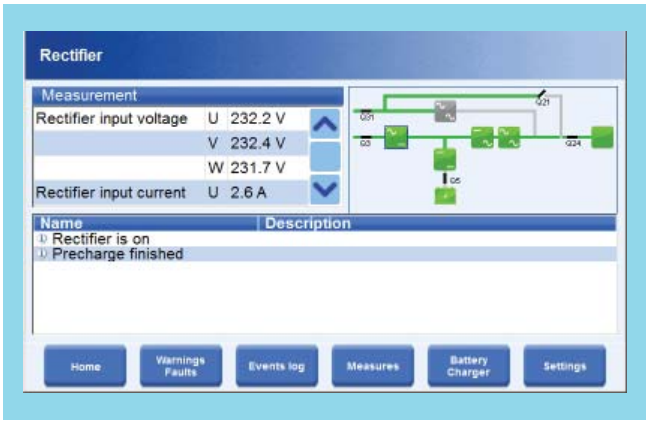

Figure 8: Block status information page (Rectifier example)

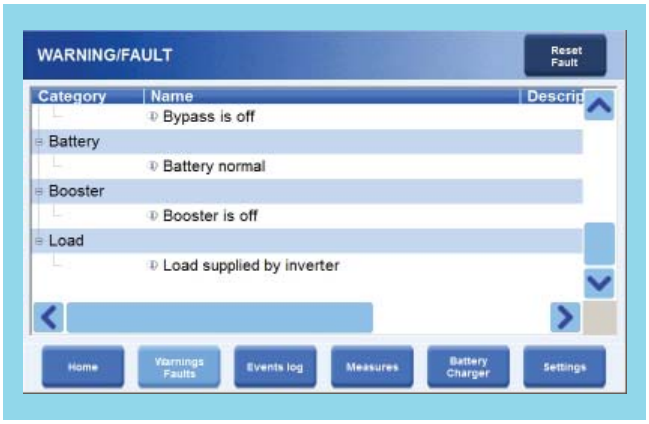

Figure 10: Warning / faults page (example)

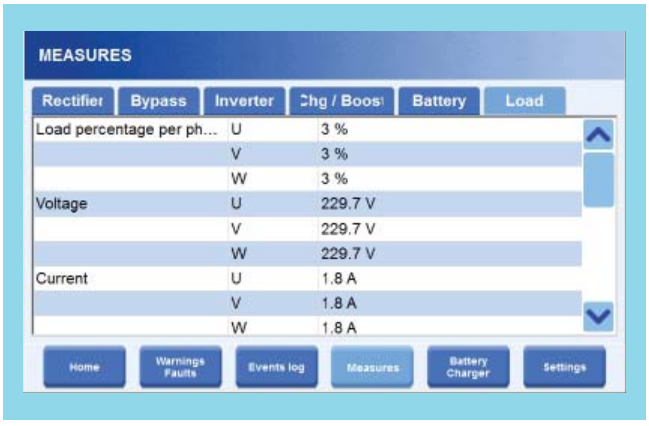

Figure 9: Block Measures page (Load example)

Figure 11: Event logger page (example)

5.5.5. Event Log Export function

All the events recorded can be downloaded on an USB key, as shown on Figure 13. By this way, it is possible to get the events on a tabular format file without having to connect any maintenance tool.

Figure 12: Event Log export function

5.6 Remote signalling and control signal

5.6.1. Logic outputs for remote indications

The Emerson FP-60Z is able to deliver several output information. These output information are made available on double-pole change-over (dpco) contacts (8A/250V AC1; 8A/30V DC1; 1A/60V DC1).

The following information is made available on voltage-free contacts:

- UPS general alarm
- Charger fault
- Inverter fault
- Reserve supply fault
- Load on reserve
- Imminent shutdown

Connection of the customer cables is achieved on the identified, screw-clamp terminal blocks of each relay-holder.

5.6.2. Logic inputs

The Emerson FP-60Z range allows the signalisation of specific alarms from the customer's environment and eventually takes the appro-priate action on the UPS thanks to dedicated logic inputs.

As standard, the UPS includes the following input:

- Emergency power off

Among all possible function, the following logic input can be wired upon request:

- Remote control on/off

5.7 Communication inter-faces (options)

Upon request, The Emerson FP-60Z can be equipped with a communi-cation board offering either RS232 serial or RS485 serial communica-tion, as shown onFigure 15.

5.7.1. Isolated RS 232 link

The communication board of the Emerson FP-60Z includes one sub-D 9 points connector for direct (1 master, 1 slave, max 15 meters) serial RS232 communication.

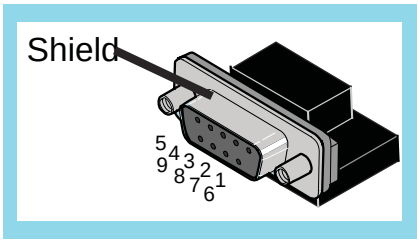

Figure 13: RS 232 D-Sub 9 points connector

Pin assignment is described in the Table hereafter.

Pin	Signal	Explanation
1	Not used	
2	Tx	Transmission RS232
3	Rx	Reception RS232
4	Not used	
5	RS232 GND	Signal ground
6	Not used	
7	RTS	Clear to send RS232
8	Not used	
9	Not used	

Table 1: RS232 pin assignment

NOTE:
If simultaneous use of RS232 port and RS 485 is necessary, this will require 2 separate PCBs, one for RS232 and the other for RS485.

5.7.2. Isolated RS 485 link

The communication board of the Emerson FP-60Z also includes one 6 points socket for multipoint (1 master, up to 31 slaves, max 1300 meters) serial RS485 communica-tion.

Customer connection is easily achieved thanks to the screw-clamp connector provided (see figure below). Earth connection is

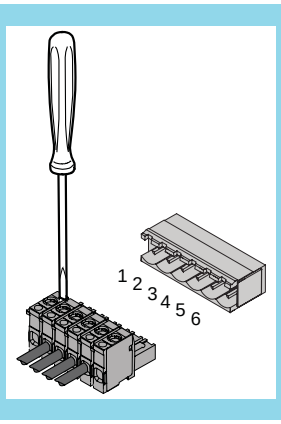

Figure 14: RS 485 6-points connector

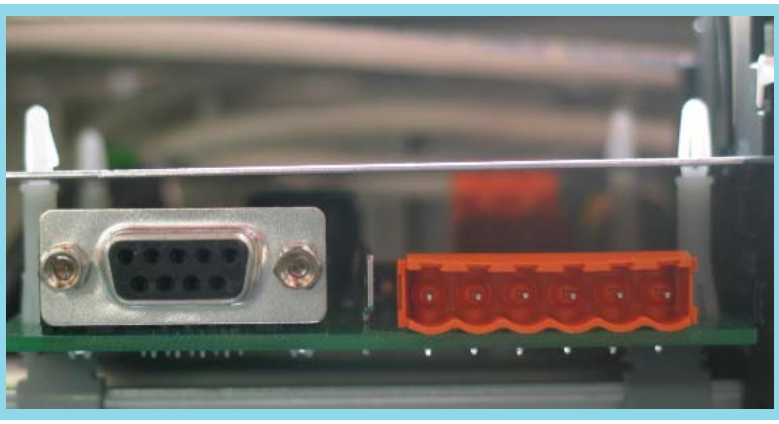

Figure 15: Serial Communication board

achieved on the PCB through a 6.35 Faston lug.

The RS485 communication path may be used either in 4 wires mode or in 2 wires mode, as described in the Table 2 hereafter.

Pin	Signal	4-wires mode	2-wires mode
1	GND	Not used	Not used
2	Tx-	Transmission RS485/ neg.	Negative signal
3	Tx+	Transmission RS485/ pos.	Positive signal
4	Rx-	Reception RS485/ neg.	Not used
5	Rx+	Reception RS485/ pos.	Not used
6	+5V	Not used	Not used

Table 2: RS 485 pin assignment

5.7.3. Ethernet RJ45 Interface

The Emerson FP-60Z is equipped with a RJ45 Ethernet interface accessible on the back of the display unit. This interface is a 10/100 MBit auto negotiation full/half duplex RJ45 Ethernet interface for LAN communication with service software PPVis. It allows the setup of UPS parameters during commissioning and maintenance.

6 Mechanical Data

6.1 Enclosure
The Emerson FP-60Z UPS is housed in a space-saving enclosure including front doors and removable panels (standard external protection IP 42). The enclosure is made of sheet steel. The doors can be locked. The enclosure is of the floor mounted type.

6.2 Ventilation
Fan-assisted air cooling is standard on the Emerson FP-60Z range. The cooling air entry is on the front door and in the base. The air exit is at the top of the device. It is recommended that the enclosure is installed with at least 400 mm of free space between device and ceiling at the top in order to allow an unhindered cooling air exit.

6.3 Cable entry
Cable entry is achieved via the bottom of the cabinet. Top cable entry is also available in option.

6.4 Enclosure design
All the surfaces of the enclosure are finished with an electrostatically applied powder-epoxy-polyester coat, cured at high temperature. The coating has a thickness of 70 microns (+/-10). Colour of the enclosure is RAL 7035 (light grey) textured semi-gloss.
For uniformity of the UPS with other equipments in electrical rooms, the surface finishing and the colour of the enclosure may be tailored according to the customer's specification and upon request.

6.5 Components identification
Main components are identified by PVC label stickers as standard (black characters on white background).

6.6 Cabling
Internal cabling is made of PVC cables as per UL 1015. Halogen-free cables (as per IEC 332-1-2) is available as an option.

6.7 Internal cables connection
Connection of cables is achieved by inserting cables directly in screw-clamps.
Auxiliary cables include ferrules.

6.8 Access to integrated subassemblies
All internal subassemblies are accessible for typical and most frequent maintenance from the front of the unit. Top access is available for replacement of cooling fans. Rear access is not required for installation or servicing. In any case and if side or rear access is required, the side and rear panels are removable.

6.9 Installation
The UPS is forkliftable from the front. Upon request, it can be equipped with lifting lugs to facilitate its installation on site.

7 Environmental Conditions

The Emerson FP-60Z UPS is capable of withstanding any combination of the following environmental conditions. It operates without mechanical or electrical damage or degradation of operating characteristics.

7.1 Ambient temperature
The UPS is capable of operating permanently from 0° to 40°C.

7.2 Relative humidity
The UPS is capable of withstanding up to 95% humidity level (non-condensing) for an ambient temperature of 20°C.

7.3 Altitude
The maximum altitude without derating is 1000 metres above sea level.
For use of the system at an altitude above 1000m and up to 2000m, a derating factor of 1% per 100m will be applied. Please consult us for further information.

8 Technical Data of the Full Range

Data common to the complete Emerson CP-60Z AC UPS range		
Rectifier input		
Nominal input voltage	(V)	400 [380, 415]
Input phases		3ph + N
Input voltage tolerance	(%)	+10 / -10 (with 400V input) (max tolerated +15 / -20)
Nominal Frequency	(Hz)	50 / 60 (factory setting selectable)
Tolerance on frequency	(%)	+5 / -5
Rectifier type		IGBT (Insulated Gate Bipolar Transistors)
Input power factor		Up to 0.98
Soft start	(s)	10 (1 to 90 factory setting selectable)
Inrush current	(x In)	≤ 1 (without input transformer) / ≤ 8 (with input transformer option)
Isolation transformer		Optional
Maximum allowed voltage distortion (THD) from Mains (or generator) on the input of the rectifier	(%)	8
Charger output		
DC voltage stability	(%)	+/- 1
DC ripple voltage (without battery)	(% RMS)	≤1
Inverter output		
Nominal output voltage		See tables on the following pages
Nominal output frequency	(Hz)	50 / 60 [factory setting selectable]
Overload at cos phi = 0.8	(%)	125 (10 min) / 150 (1 min)
Isolating transformer		Standard
Short circuit capacity (1-ph & 3-ph output)	(%)	250 (100 ms) / 150 (5 s)
Voltage stability (for 100% load variation):		
- Static	(%)	+/- 1
- Dynamic	(%)	VFI SS 111 - Complies with IEC/EN 62040-3, class 1
Frequency stability:		
- with own oscillator	(%)	+/- 0.1
- with reserve supply synchronisation	(%)	+/- 1 [adjustable from 1 to 4]
Harmonic voltage distortion:		
- with 100% linear load	(%)	< 2
- with 100% non linear load	(%)	≤5 (non linear load defined by IEC 62040-3)
Output crest factor admissible		3/1
Load power factor operation range		0.5 lag to 0.5 lead
Reserve supply input		
Reserve input voltage	(V)	See tables on the following pages
Reserve input voltage tolerance	(%)	+/- 10 [adjustable from +/-5% to +/-15%]
Reserve input frequency	(Hz)	50 / 60 [factory setting selectable]
Reserve input frequency tolerance	(%)	+/- 1 [adjustable from +/-1% to +/-4%]
System data		
External protection degree		IP 42
Internal protection degree		IP 20
Cable entry		Bottom (top optional)
Accessibility to components		From front (except transformers, if present)
System design life	(years)	20
Environmental Data		
Operating temperature	(°C)	0 to 40
Storage temperature	(°C)	-20 to +70
Maximum relative humidity (at 20°C non condensing)	(%)	<90
Operating altitude	(m)	<1000 (without system derating)

9 230 Vac Single Phase Output Technical Data

Emerson FP-60Z 31E				
Battery voltage:		**110 VDC**		
Output voltage:		**230 VAC [220, 240] - 1 phase**		
Ratings	(kVA)	**5**	**10**	**20**
UPS input				
Input voltage		400 VAC [380, 415] three phase		
Rectifier technology		IGBT		
Nominal input voltage, frequency, tolerances		See common data		
Max current consumption @ 3x400VAC supply (5)	(A)	10	20	39
Current consumption (battery in floating) (5)	(A)	7	14	27
Recommended type for UPS input protection		D curve (circuit breakers)		
Battery				
Battery nominal voltage	(V)	110		
Battery voltage range	(V)	88 – 170 (2)		
Recommended number of cells (VRLA)		54 – 72		
Recommended number of cells (WET)		53 – 63		
Recommended number of cells (NiCd)		88 – 98		
Battery recharge current available (up to)	(A)	13	26	52
UPS output				
Nominal output voltage AC	(V)	230 [220, 240] – 1 phase + neutral		
Output voltage tolerance	(%)	+/- 1%		
Nominal output frequency	(Hz)	50 [60]		
Nominal output current at full load (cos phi 0.8) and nominal output voltage	(A)	22	43	87
Reserve static switch				
Nominal voltage AC	(V)	230 [220, 240] – 1 phase + neutral		
Nominal frequency	(Hz)	50 [60]		
Frequency tracking range	(%)	+/- 3%		
Recommended type for reserve input protection		D curve (circuit breakers)		
UPS System data (Single)				
Heat dissipation system		natural	forced cooling with redundant monitored fans	
UPS system losses in floating at full load and nominal output voltage (for air cond. calculation)	(W)	1063	1639	2824
AC/AC efficiency 100% load (1)(4)	(%)	80.5	84.5	86.5
AC/AC efficiency 100% load (1)(5)	(%)	79	83	85
UPS system noise	(dB)	61	62	64
Height	(mm)	2052	2052	2052
Width (UPS with integrated manual bypass switch)	(mm)	800	800	800
Depth	(mm)	815	815	815
Footprint (UPS with integrated manual bypass switch)	(m^2)	0.65	0.65	0.65
Weight (UPS with integrated manual bypass switch) (5)	(kg)	350	390	515
Drawing code		see paragraph 'General Arrangement'		
Code for general arrangement		E0	E0	E0
Special Configurations				
■ By-pass cubicle with reserve transformer				
- Width	(mm)	400	400	600
- Weight	(kg)	145	165	235
■ Dual distributed with 1 reserve line				
- Width (UPS + bypass with reserve transf. + UPS)	(mm)	800+600+800	800+600+800	800+600+800
■ Dual distributed with 2 reserve lines				
- Width	(mm)	Width of a single unit x2		

NOTES:
-(1) For tolerance, see IEC 60146-1-1. System's efficiency varies according to configurations and options
-(2) For 3x400VAC Mains within the +/-10% limits
-(3) For 3x400VAC Mains nominal
-(4) With output transformer only
-(5) With both input & output transformer

	220 VDC 230 VAC [220, 240] - 1 phase					400 VDC 230 VAC [220, 240] - 1 phase	
	10	20	30	40	60	40	60
	400 VAC [380, 415] three phase					400 VAC [380, 415] three phase	
	IGBT					IGBT	
	See common data					See common data	
	20	39	57	75	110	75	110
	14	27	40	53	77	53	77
	D curve (circuit breakers)					D curve (circuit breakers)	
	220					400	
	177 – 340 (2)					320 – 550 (2)	
	108 – 144					192 – 228	
	106 – 125					192 – 204	
	176 – 200					320 – 323	
	13	26	39	52	77	50	75
	230 [220, 240] – 1 phase + neutral					230 [220, 240] – 1 phase + neutral	
	+/- 1%					+/- 1%	
	50 [60]					50 [60]	
	43	87	130	174	261	174	261
	230 [220, 240] – 1 phase + neutral					230 [220, 240] – 1 phase + neutral	
	50 [60]					50 [60]	
	+/- 3%					+/- 3%	
	D curve (circuit breakers)					D curve (circuit breakers)	
	forced cooling with redundant monitored fans					forced cooling with redundant monitored fans	
	1639	2824	3586	4364	5333	4364	5333
	84.5	86.5	88.5	89.5	91.5	89.5	91.5
	83	85	87	88	90	88	90
	62	64	65	65	66	62	64
	2052	2052	2052	2052	2052	2052	2052
	800	800	800	1000	1200	1000	1200
	815	815	815	815	815	815	815
	0.65	0.65	0.65	0.80	0.96	0.80	0.96
	400	500	550	590	650	600	670
	see paragraph ‘General Arrangement’					see paragraph ‘General Arrangement’	
	E0	E0	E0	F0	G0	F0	G0
	400	600	600	600	800	600	800
	165	235	265	280	370	345	480
	800+600+800	800+600+800	800+600+800	1000+600+1000	1200+800+1200	1000+600+1000	1200+800+1200
	Width of a single unit x2					Width of a single unit x2	

10 110 Vac Single Phase Output Technical Data

Emerson FP-60Z 31E				
Battery voltage:		110 VDC		
Output voltage:		110 VAC [115, 120] - 1 phase		
Ratings	(kVA)	5	10	20
UPS input				
Input voltage		400 VAC [380, 415] three phase		
Rectifier technology		IGBT		
Nominal input voltage, frequency, tolerances		See common data		
Max current consumption @ 3x400VAC supply (5)	(A)	11	20	39
Current consumption (battery in floating) (5)	(A)	7	14	28
Recommended type for UPS input protection		D curve (circuit breakers)		
Battery				
Battery nominal voltage	(V)	110		
Battery voltage range	(V)	88 – 170 (2)		
Recommended number of cells (VRLA)		54 – 72		
Recommended number of cells (WET)		53 – 63		
Recommended number of cells (NiCd)		88 – 98		
Battery recharge current available (up to)	(A)	13	26	52
UPS output				
Nominal output voltage AC	(V)	110 [115, 120] – 1 phase + neutral		
Output voltage tolerance	(%)	+/- 1%		
Nominal output frequency	(Hz)	50 [60]		
Nominal output current at full load (cos phi 0.8) and nominal output voltage	(A)	45	91	182
Reserve static switch				
Nominal voltage AC	(V)	110 [115, 120] – 1 phase + neutral		
Nominal frequency	(Hz)	50 [60]		
Frequency tracking range	(%)	+/- 3%		
Recommended type for reserve input protection		D curve (circuit breakers)		
UPS System data (Single)				
Heat dissipation system		natural	forced cooling with redundant monitored fans	
UPS system losses in floating at full load and nominal output voltage (for air cond. calculation)	(W)	1128	1756	3048
AC/AC efficiency 100% load (1)(4)	(%)	79.5	83.5	85.5
AC/AC efficiency 100% load (1)(5)	(%)	78	82	84
UPS system noise	(dB)	61	62	64
Height	(mm)	2052	2052	2052
Width (UPS with integrated manual bypass switch)	(mm)	800	800	800
Depth	(mm)	815	815	815
Footprint (UPS with integrated manual bypass switch)	(m^2)	0.65	0.65	0.65
Weight (UPS with integrated manual bypass switch) (5)	(kg)	350	395	515
Drawing code		see paragraph 'General Arrangement'		
Code for general arrangement		E0	E0	E0
Special Configurations				
■ By-pass cubicle with reserve transformer				
- Width	(mm)	400	400	600
- Weight	(kg)	145	165	235
■ Dual distributed with 1 reserve line				
- Width (UPS + bypass with reserve transf. + UPS)	(mm)	800+600+800	800+600+800	800+600+800
■ Dual distributed with 2 reserve lines				
- Width	(mm)	Width of a single unit x2		

NOTES:
-(1) For tolerance, see IEC 60146-1-1. System's efficiency varies according to configurations and options
-(2) For 3x400VAC Mains within the +/-10% limits
-(3) For 3x400VAC Mains nominal
-(4) With output transformer only
-(5) With both input & output transformer

	220 VDC 110 VAC [115, 120] - 1 phase					400 VDC 110 VAC [115, 120] - 1 phase	
	10	20	30	40	60	40	60
	400 VAC [380, 415] three phase					400 VAC [380, 415] three phase	
	IGBT					IGBT	
	See common data					See common data	
	20	39	57	76	112	76	112
	14	28	40	53	78	53	78
	D curve (circuit breakers)					D curve (circuit breakers)	
	220					400	
	177 – 340 (2)					320 – 550 (2)	
	108 – 144					192 – 228	
	106 – 125					192 – 204	
	176 – 200					320 – 323	
	13	26	39	52	77	50	75
	110 [115, 120] – 1 phase + neutral					110 [115, 120] – 1 phase + neutral	
	+/- 1%					+/- 1%	
	50 [60]					50 [60]	
	91	182	273	364	545	364	545
	110 [115, 120] – 1 phase + neutral					110 [115, 120] – 1 phase + neutral	
	50 [60]					50 [60]	
	+/- 3%					+/- 3%	
	D curve (circuit breakers)					D curve (circuit breakers)	
	forced cooling with redundant monitored fans					forced cooling with redundant monitored fans	
	1756	3048	3650	4782	5933	4782	5933
	83.5	85.5	87.5	88.5	90.5	88.5	90.5
	82	84	86	87	89	87	89
	62	64	65	65	66	62	64
	2052	2052	2052	2052	2052	2052	2052
	800	800	800	1000	1200	1000	1200
	815	815	815	815	815	815	815
	0.65	0.65	0.65	0.80	0.96	0.80	0.96
	390	505	620	950	1090	925	1065
	see paragraph 'General Arrangement'					see paragraph 'General Arrangement'	
	E0	E0	E0	F0	G0	F0	G0
	400	600	800	800	1200	800	1200
	165	235	280	300	425	300	425
	800+600+800	800+600+800	800+800+800	1000+800+1000	1200+1200+1200(4)	1000+800+1000	1200+1200+1200(4)
	Width of a single unit x2					Width of a single unit x2	

11 400 Vac Three Phase Ouptut Technical Data

Emerson FP-60Z 33E				
Battery voltage:		110 VDC		
Output voltage:		400 VAC [380, 415]- 3 phases		
Ratings	(kVA)	5	10	20
UPS input				
Input voltage		400 VAC [380, 415] three phase		
Rectifier technology		IGBT		
Nominal input voltage, frequency, tolerances		See common data		
Max current consumption @ 3x400VAC supply (5)	(A)	11	20	39
Current consumption (battery in floating) (5)	(A)	7	14	27
Recommended type for UPS input protection		D curve (circuit breakers)		
Battery				
Battery nominal voltage	(V)	110		
Battery voltage range	(V)	88 – 170 (2)		
Recommended number of cells (VRLA)		54 – 72		
Recommended number of cells (WET)		53 – 63		
Recommended number of cells (NiCd)		88 – 98		
Battery recharge current available (up to)	(A)	13	26	52
UPS output				
Nominal output voltage AC	(V)	400 [380, 415] – 3 phases + neutral		
Output voltage tolerance	(%)	+/- 1%		
Nominal output frequency	(Hz)	50 [60]		
Nominal output current at full load (cos phi 0.8) and nominal output voltage	(A)	7	14	29
Reserve static switch				
Nominal voltage AC	(V)	400 [380, 415] – 3 phases + neutral		
Nominal frequency	(Hz)	50 [60]		
Frequency tracking range	(%)	+/- 3%		
Recommended type for reserve input protection		D curve (circuit breakers)		
UPS System data (Single)				
Heat dissipation system		natural	forced cooling with redundant monitored fans	
UPS system losses in floating at full load and nominal output voltage (for air cond. calculation)	(W)	1096	1697	2935
AC/AC efficiency 100% load (1)(4)	(%)	80	84	86
AC/AC efficiency 100% load (1)(5)	(%)	78.5	82.5	84.5
UPS system noise	(dB)	61	62	64
Height	(mm)	2052	2052	2052
Width (UPS with integrated manual bypass switch)	(mm)	800	800	800
Depth	(mm)	815	815	815
Footprint (UPS with integrated manual bypass switch)	(m^2)	0.65	0.65	0.65
Weight (UPS with integrated manual bypass switch) (5)	(kg)	350	400	500
Drawing code		see paragraph 'General Arrangement'		
Code for general arrangement		E0	E0	E0
Special Configurations				
■ By-pass cubicle with reserve transformer				
- Width	(mm)	600	600	600
- Weight	(kg)	170	190	245
■ Dual distributed with 1 reserve line				
- Width (UPS + bypass with reserve transf. + UPS)	(mm)	800+600+800	800+600+800	800+600+800
■ Dual distributed with 2 reserve lines				
- Width	(mm)	Width of a single unit x2		

NOTES:
-(1) For tolerance, see IEC 60146-1-1. System's efficiency varies according to configurations and options
-(2) For 3x400VAC Mains within the +/-10% limits
-(3) For 3x400VAC Mains nominal
-(4) With output transformer only
-(5) With both input & output transformer

	220 VDC 400 VAC [380, 415] - 3 phases					400 VDC 400 VAC [380, 415] - 3 phases	
	10	20	30	40	60	40	60
	400 VAC [380, 415] three phase					400 VAC [380, 415] three phase	
	IGBT					IGBT	
	See common data					See common data	
	20	39	57	76	111	76	111
	14	27	40	53	78	53	78
	D curve (circuit breakers)					D curve (circuit breakers)	
	220					400	
	177 – 340 (2)					320 – 550 (2)	
	108 – 144					192 – 228	
	106 – 125					192 – 204	
	176 – 200					320 – 323	
	13	26	39	52	77	50	75
	400 [380, 415] – 3 phases + neutral					400 [380, 415] – 3 phases + neutral	
	+/- 1%					+/- 1%	
	50 [60]					50 [60]	
	14	29	43	58	87	58	87
	400 [380, 415] – 3 phases + neutral					400 [380, 415] – 3 phases + neutral	
	50 [60]					50 [60]	
	+/- 3%					+/- 3%	
	D curve (circuit breakers)					D curve (circuit breakers)	
	forced cooling with redundant monitored fans					forced cooling with redundant monitored fans	
	1697	2935	3746	4571	5631	4571	5631
	84	86	88	89	91	89	91
	82.5	84.5	86.5	87.5	89.5	87.5	89.5
	62	64	65	65	66	62	64
	2052	2052	2052	2052	2052	2052	2052
	800	800	800	1000	1200	1000	1200
	815	815	815	815	815	815	815
	0.65	0.65	0.65	0.80	0.96	0.80	0.96
	400	500	550	590	650	570	630
	see paragraph 'General Arrangement'					see paragraph 'General Arrangement'	
	E0	E0	E0	F0	G0	F0	G0
	600	600	600	600	800	600	800
	190	245	285	320	405	320	405
	800+600+800	800+600+800	800+600+800	1000+600+1000	1200+800+1200	1000+600+1000	1200+800+1200
	Width of a single unit x2					Width of a single unit x2	

12 220 Vac Three Phase Ouptut Technical Data

Emerson FP-60Z 33E				
Battery voltage:		**110 VDC**		
Output voltage:		**220 VAC [190, 208]- 3 phases**		
Ratings	(kVA)	**5**	**10**	**20**
UPS input				
Input voltage		400 VAC [380, 415] three phase		
Rectifier technology		IGBT		
Nominal input voltage, frequency, tolerances		See common data		
Max current consumption @ 3x400VAC supply (5)	(A)	11	20	40
Current consumption (battery in floating) (5)	(A)	7	14	28
Recommended type for UPS input protection		D curve (circuit breakers)		
Battery				
Battery nominal voltage	(V)	110		
Battery voltage range	(V)	88 – 170 (2)		
Recommended number of cells (VRLA)		54 – 72		
Recommended number of cells (WET)		53 – 63		
Recommended number of cells (NiCd)		88 – 98		
Battery recharge current available (up to)	(A)	13	26	52
UPS output				
Nominal output voltage AC	(V)	220 [190, 208] – 3 phases + neutral		
Output voltage tolerance	(%)	+/- 1%		
Nominal output frequency	(Hz)	50 [60]		
Nominal output current at full load (cos phi 0.8) and nominal output voltage	(A)	13	26	52
Reserve static switch				
Nominal voltage AC	(V)	220 [190, 208] – 3 phases + neutral		
Nominal frequency	(Hz)	50 [60]		
Frequency tracking range	(%)	+/- 3%		
Recommended type for reserve input protection		D curve (circuit breakers)		
UPS System data (Single)				
Heat dissipation system		natural	forced cooling with redundant monitored fans	
UPS system losses in floating at full load and nominal output voltage (for air cond. calculation)	(W)	1161	1816	3162
AC/AC efficiency 100% load (1)(4)	(%)	79	83	85
AC/AC efficiency 100% load (1)(5)	(%)	77.5	81.5	83.5
UPS system noise	(dB)	61	62	64
Height	(mm)	2052	2052	2052
Width (UPS with integrated manual bypass switch)	(mm)	800	800	800
Depth	(mm)	815	815	815
Footprint (UPS with integrated manual bypass switch)	(m^2)	0.65	0.65	0.65
Weight (UPS with integrated manual bypass switch) (5)	(kg)	350	400	500
Drawing code		see paragraph 'General Arrangement'		
Code for general arrangement		E0	E0	E0
Special Configurations				
■ By-pass cubicle with reserve transformer				
- Width	(mm)	600	600	600
- Weight	(kg)	170	190	245
■ Dual distributed with 1 reserve line				
- Width (UPS + bypass with reserve transf. + UPS)	(mm)	800+600+800	800+600+800	800+600+800
■ Dual distributed with 2 reserve lines				
- Width	(mm)	Width of a single unit x2		

NOTES:
-(1) For tolerance, see IEC 60146-1-1. System's efficiency varies according to configurations and options
-(2) For 3x400VAC Mains within the +/-10% limits
-(3) For 3x400VAC Mains nominal
-(4) With output transformer only
-(5) With both input & output transformer

	220 VDC 220 VAC [190, 208] - 3 phases					400 VDC 220 VAC [190, 208] - 3 phases	
	10	20	30	40	60	40	60
	400 VAC [380, 415] three phase					400 VAC [380, 415] three phase	
	IGBT					IGBT	
	See common data					See common data	
	20	40	58	77	112	77	112
	14	28	40	54	79	54	79
	D curve (circuit breakers)					D curve (circuit breakers)	
	220					400	
	177 – 340 (2)					320 – 550 (2)	
	108 – 144					192 – 228	
	106 – 125					192 – 204	
	176 – 200					320 – 323	
	13	26	39	52	77	50	75
	220 [190, 208] – 3 phases + neutral					220 [190, 208] – 3 phases + neutral	
	+/- 1%					+/- 1%	
	50 [60]					50 [60]	
	26	52	79	105	157	105	157
	220 [190, 208] – 3 phases + neutral					220 [190, 208] – 3 phases + neutral	
	50 [60]					50 [60]	
	+/- 3%					+/- 3%	
	D curve (circuit breakers)					D curve (circuit breakers)	
	forced cooling with redundant monitored fans					forced cooling with redundant monitored fans	
	1816	3162	3907	4994	6237	4994	6237
	83	85	87.5	88	90	88	90
	81.5	83.5	86	86.5	88.5	86.5	88.5
	62	64	65	65	66	62	64
	2052	2052	2052	2052	2052	2052	2052
	800	800	800	1000	1200	1000	1200
	815	815	815	815	815	815	815
	0.65	0.65	0.65	0.80	0.96	0.80	0.96
	400	500	550	590	650	570	630
	see paragraph ‘General Arrangement’					see paragraph ‘General Arrangement’	
	E0	E0	E0	F0	G0	F0	G0
	600	600	600	600	800	600	800
	190	245	285	320	405	320	405
	800+600+800	800+600+800	800+600+800	1000+800+1000 (4)	1200+800+1200 (4)	1000+800+1000 (4)	1200+800+1200 (4)
	Width of a single unit x2					Width of a single unit x2	

13 Parallel Operation

The Emerson FP-60Z UPS systems have the capability to be connected in parallel for dual configurations between units of the same rating. The parallel connection of Emerson FP-60Z UPS increases reliability for the AC load.

13.1 Distributed parallel configuration with one reserve line

The Emerson FP-60Z range is capable of operating in distributed parallel configuration as shown on Figure 16 and Figure 17.

Provided each Emerson FP-60Z is supplied with the parallel kit option, equal UPS units of the same rating can be operated in parallel for power upgrade or increase of redundancy. A dual system is controlled and monitored automatically by controlling each individual UPS.

In parallel operation, both UPS must share the same reserve supply.

NOTE:
Figure 16 and Figure 17 show a common battery for the 2 UPS. Obviously, the dual distributed parallel configurations also allow the connection of 2 separate UPS, each of them having its own battery.

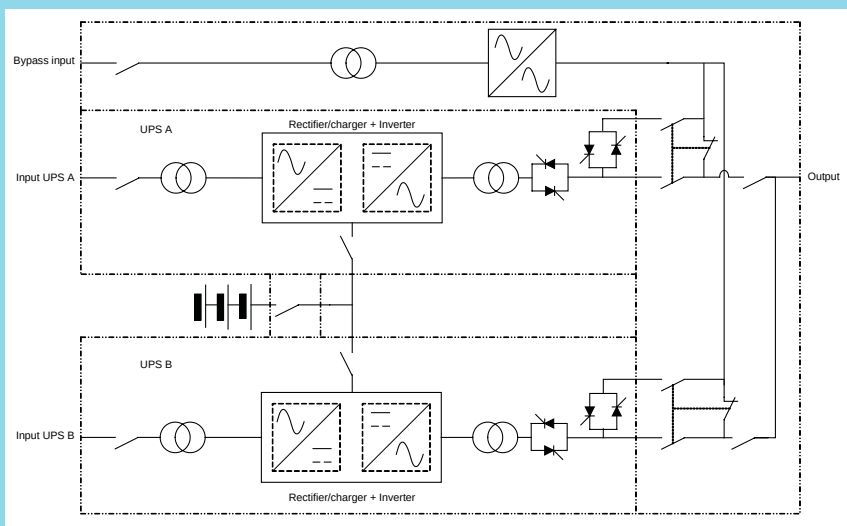

Figure 16: Dual distributed parallel configuration with 1 by-pass line and 1 UPS output

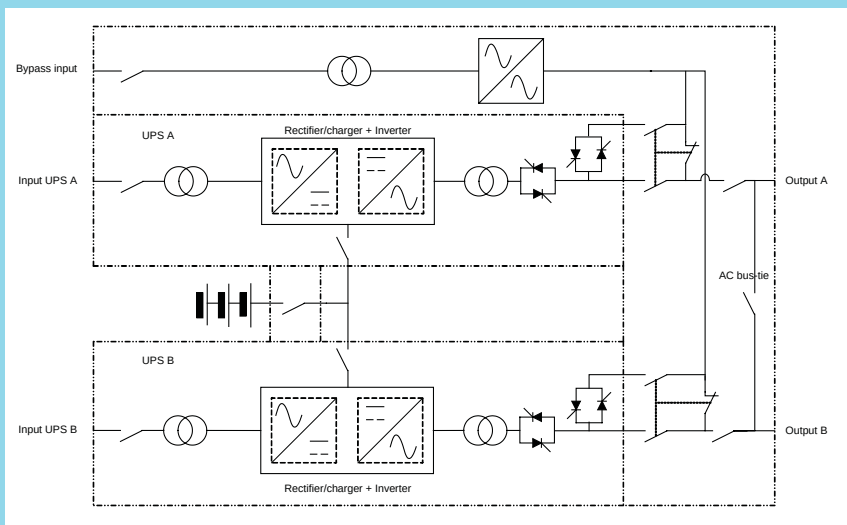

Figure 17: Dual distributed parallel configuration with 1 by-pass line, 2 UPS outputs and AC bus-tie

13.2 Distributed parallel configuration with two reserve line

The Emerson FP-60Z range is capable of operating in distributed parallel configuration as shown on Figure 18 and Figure 19.

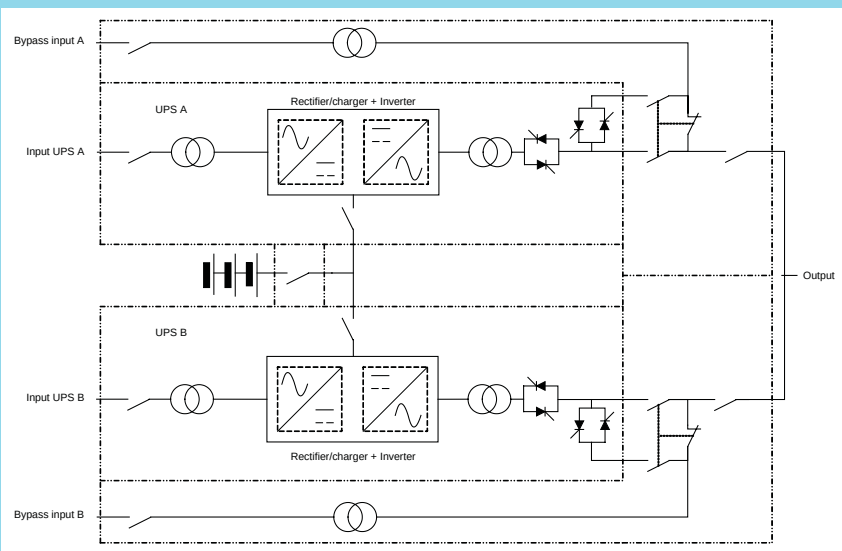

Figure 18: Dual distributed parallel configuration with 2 by-pass lines and 1 UPS output

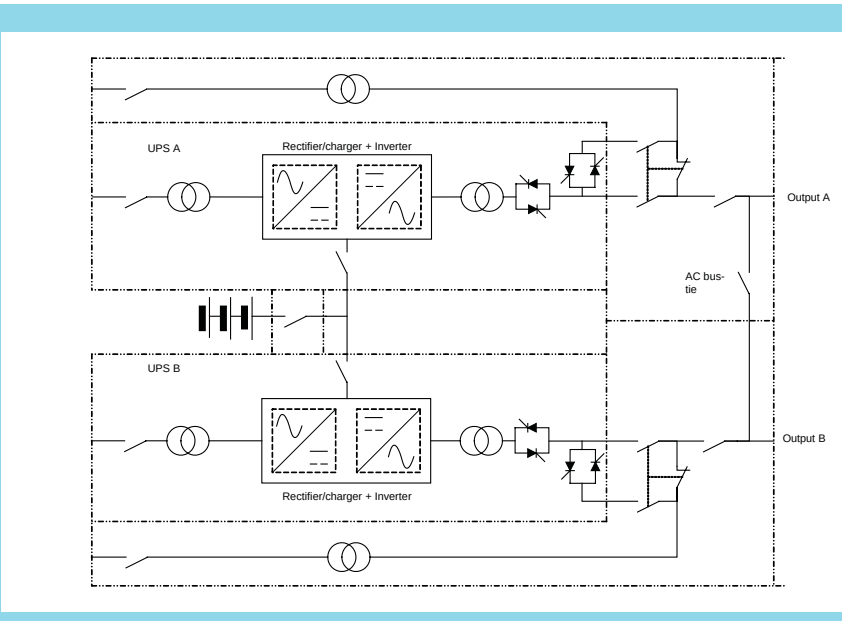

Figure 19: Dual distributed parallel configuration with 2 by-pass lines, 2 UPS outputs and AC bus-tie

14 Options

14.1 Main electrical options

The list of options described in this section is non-exhaustive. Please consult us for any other requirement

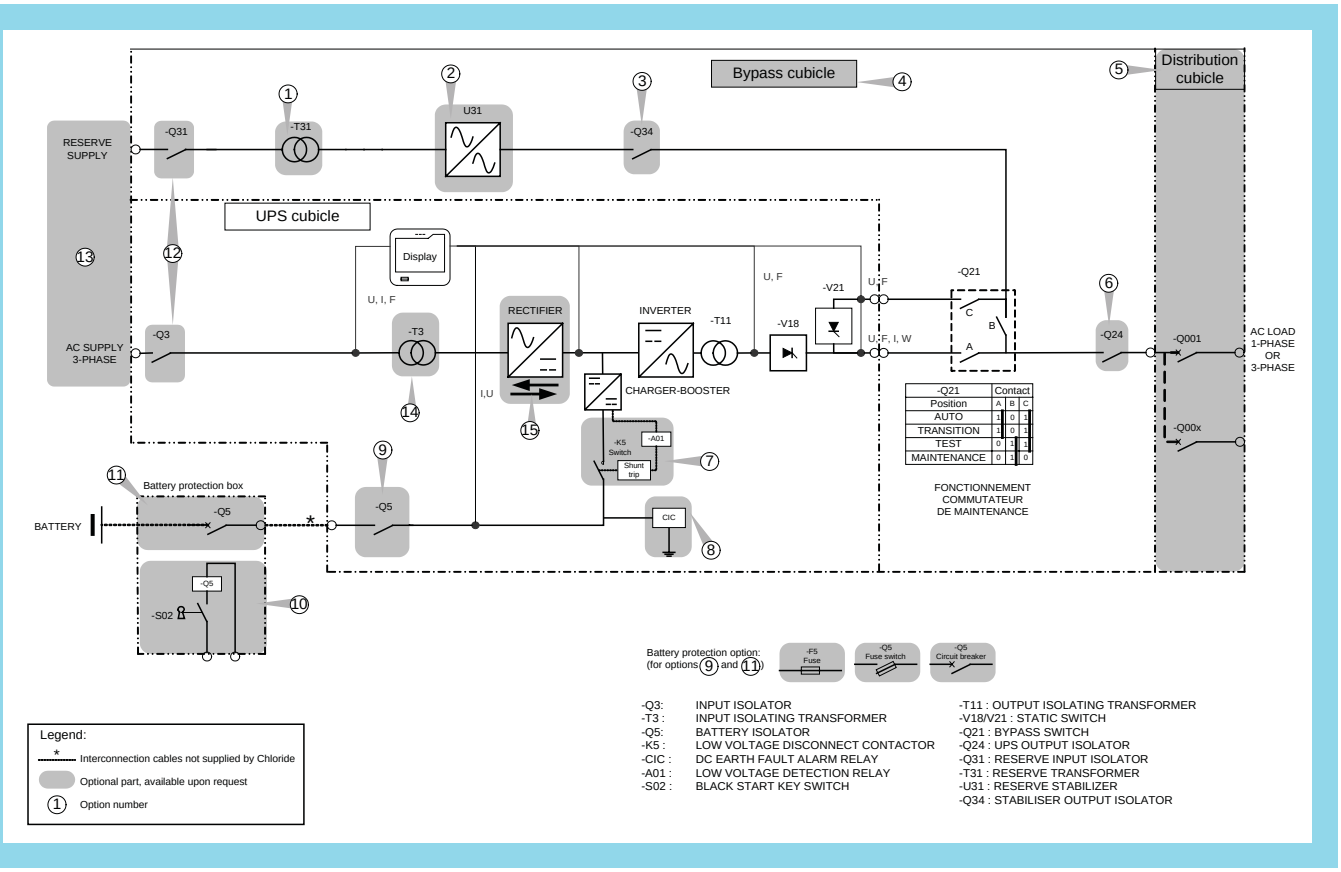

Figure 20: Electrical options on Emerson FP-60Z

Option No	Option name	Description
1	Reserve supply transformer	Provide full galvanic isolation between the input and the output of the UPS. This transformer is with insulation class H. This option is integrated within the Bypass cabinet.
2	Reserve supply stabiliser	Adjust the reserve supply voltage. The reserve supply voltage adjustment ensures the output voltage is within the tolerance accepted by the connected AC load. The stabiliser can be of the electronic type or electro-mechanical type. This option is integrated within the Bypass cabinet.
3	Stabiliser output isolator	Isolate the output of the stabiliser to be able to safely maintain it. This isolator is usually a fully rated switch. By opening the reserve input circuit breaker and this isolator, it is possible to completely isolate the reserve stabilizer. This option is integrated within the Bypass cabinet.
4	Bypass cubicle	Increase safety for maintenance. The Bypass switch and all appropriate reserve supply options (transformer, stabilizer) may be fitted in an external cabinet.

Option No	Option name	Description
5	AC distribution	Ensure the distribution, protection and segregation of the AC load. Distribution boards are installed in a separate cabinet. These distribution panels may be customised (form 1 to form 4) according to the customer's requirements. MCB, MCCB, or fuses are available.
6	Output protection	Protect and isolate the output of the UPS system. 2 types of protections are made available: ■ Switch: the standard configuration includes a fully rated switch with auxiliary contact for the monitoring of its operating status. ■ Circuit breaker: fully rated circuit breaker and an additional auxiliary contact for the monitoring of its position.
7	Low voltage dis-connect contactor (LDV)	Protect the battery from deep discharges and thus enhance battery lifetime. The LDV option includes an output contactor controlled by voltage relay in order to disconnect the load at the end of battery autonomy period. Reconnection of the load is automatic at the charger restoration and upon the resumption of normal conditions.
8	Earth leakage monitor (DC earth fault alarm)	Monitor the insulation resistance on the DC bus. Used in conjunction with the isolation transformer, this option is made of an electronic circuit "Emerson CIC" (or equivalent). It is fitted into the UPS cubicle and delivers remote indication by a changeover voltage-free contact. Local indication (inside the cabinet) by two LED's is available on the PCB (or moulded device) to indicate the polarity on fault. A local test push-button is also available on the device to simulate fault conditions (+ or -).
9	Battery protection	Prevent any short-circuit that could occur on the battery circuit and therefore prevent the battery cables from fire risks. This option is either fitted into the UPS cabinet or externally (battery cabinet or battery protection box). It can not be used with the option N°12. 2 types of protections are made available: ■ Switch: the standard configuration includes a fully rated switch with auxiliary contact for the monitoring of its operating status ■ Circuit breaker: fully rated circuit breaker and an additional auxiliary contact for the monitoring of its position.
10	Battery Black Start	Start-up of the UPS (inverter part only) to provide power to the load, after a process shutdown when the Main is not present on the input of the UPS. This option is made of a manual key switch which allows a manual restart of the inverter from the battery.
11	External battery protection	Protect the battery circuit as for option 10, but can not be used in conjunction with option N°10. The battery protection device is housed in a wall-mounted metal box for battery systems mounted on racks and it is supplied with the battery cabinet, when the battery is fitted in a matching cubicle. Furthermore, this device serves as a safety element for the cross section of the power cable between the UPS and the remotely placed bat-tery system. Therefore, the wall-mounted box must be installed as close as possible to the battery and the length of cables between battery and UPS system must be the shortest.
12	Input protections	Protect and isolate the inputs of the system. The standard input isolator is replaced by a fully rated input circuit breaker plus an auxiliary contact for the monitoring of its position.
13	Special input voltage	Adapt the 3-phase input voltage of the UPS according to the network available on-site. The possible input voltages (3-phase only) are the following : ■ 208, 220, 230, 380, 400, 415, 440, 460, 480, 525, 660, 690 V Please note that this option may affect the overall dimensions of the system and that the technical information included in this document may not be maintained with this option.
14	Input transformer	Provide full galvanic isolation between the input and the DC intermediate circuit of the UPS. This transformer is with insulation class H. This option is integrated within the UPS cabinet.
15	Bi-directional Rectifier	Perform a real battery capacity test by discharging the battery into the Mains. The IGBT rectifier employs a three-phase inverter bridge topology and is controlled to enable power flow in both directions. It can be operated at any desired input power factor, and hence, can even act as a reactive power source as far as the grid is concerned. The rectifier digital electronic controls both DC bus voltage and AC input current vector (value and phase). During battery test input current is 180 degree phase shift with respect to the AC input voltage, thus, allowing battery discharge into the grid.

14.2 Battery-related options

14.2.1. Battery test
The operating conditions of the batteries are automatically or manually tested by the control unit at selectable intervals, e.g. weekly, fortnightly or monthly. A short-time discharge of the battery is made to confirm that all the battery blocks and connecting elements are in good working order.
The battery test is performed without any risk to the user, even if the battery is wholly defective. A detected battery fault is alarmed to the user. The battery test does not cause any degradation in terms of expected life of the battery.

14.2.2. Battery room temperature compensation
This optional feature allows to compensate the battery's charge voltage according to temperature (-3mV/cell/°C for lead acid battery). The rectifier-charger output voltage operates within narrow limits according to the battery manufacturer's technical data. In order to ensure an optimum battery charging, regulation is automatically adjusted to the ambient temperature.

The float or charge voltage is automatically adjusted as a function of the temperature in the battery compartment in order to maximise battery operating life.

14.2.3. Battery Low Voltage Disconnection
See paragraph «14.1 Main electrical options»

14.2.4. Battery circuit protection
See paragraph «14.1 Main electrical options»

14.2.5. External battery circuit protection
See paragraph «14.1 Main electrical options»

14.2.6. DC earth leakage monitor
See paragraph «14.1 Main electrical options»

14.2.7. Battery Black Start
See paragraph «14.1 Main electrical options»

14.3 Environment-related options

14.3.1. Specific ambient operation conditions
Upon request, the FP-60Z is able to operate in specified temperature conditions, above 40°C (and up to 55°C) or below 0°C. In such conditions, a derating factor of 1.5% per °C will be applied according to the specified temperature conditions.

NOTE:
In such conditions, the customer must specify the required service conditions, as written in IEC 60146-2, §5.

14.3.2. Specific Altitude
Upon request, the FP-60Z is able to operate at specified altitude above 1000m and up to 2000m. In such conditions, a derating factor of 1% per 100m will be applied according to the specified altitude.

14.3.3. Anti-condensation heater
This option includes a space heater which is fitted inside the cubicle, to prevent internal components from condensation.

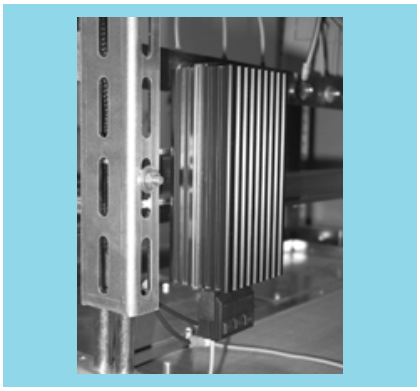

Figure 21: Internal space heater

14.3.4. Temperature monitoring
This option consists in a thermostat fitted inside the cubicle to indicate abnormal heating in the UPS. This device is adjustable below 90°C and includes a remote indication available on a normally open, voltage-free contact.

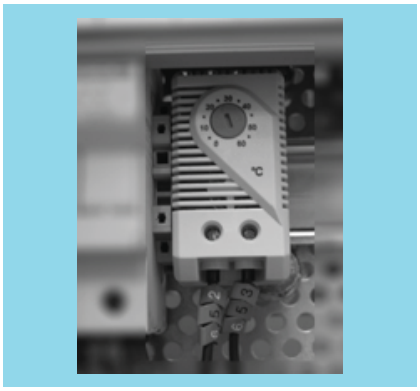

Figure 22: Internal thermostat

14.3.5. Internal lighting
Internal lighting is available upon request to improve internal visibility of the system.

14.4 Mechanical options

14.4.1. Special enclosure painting

Standard finishing of the enclosure is RAL 7035 (grey) textured semi gloss. Any other type of painting specification is also achievable upon request, in compliance with RAL, MUNSELL or BS standards.

14.4.2. Top cable entry

This option allows power cable entry from the top of the system. this option is achieved by adding an external cabinet to drive the power cables down into the equipment.
NOTE:
This option affects the overall dimensions of the system.

14.4.3. Lifting eyes

Upon request, the UPS cubicle can be equipped with lifting eyes to facilitate its installation on site.

14.4.4. Special feet height

Upon request, the UPS cubicle can be equipped with special feet to match false floors depth on site.
The standard feet height is 100mm.
Upon request, the feet can be 200mm high (contact us for other heights).

14.4.5. Internal Cabling

Upon request, the internal cabling of the UPS system can include halogen-free cables as per IEC 30332-2 or IEC 30332-3.

14.5 Communication options

14.5.1. Customer interface relays

It is possible to increase the number of inputs/outputs described in paragraph «5.6.1. Logic outputs for remote indications» by providing one additional board with corresponding output relays. These input/outputs can be used to monitor several parameters specified by the user. Each board includes:

- 3 inputs (from voltage free contacts on site– Not provided)
- 20 outputs to drive voltage free contacts (provided). The requested number of output information will be made available on double-pole change-over (dpco) contacts (8A/250V AC1; 8A/30V DC1; 1A/60V DC1).

14.5.2. Analogue meters

Upon request, The Emerson FP-60Z can be equipped with analogue meters on the front door.
The meters will be sized 72x72 and of the class 1.5 according to the specified requirement.
The measures that can be implemented are: Input voltage, input current, battery voltage, battery current, output voltage, output current. In case of 3-phase measures, a measure selector switch will be implemented to be able to see the measured value on the same meter.

14.5.3. Modbus / Jbus

Upon request, The Emerson FP-60Z is able to remotely deliver information through Modbus/Jbus protocol (2 or 4 wires, RS232 or RS485).

This additional feature includes:
A hardware kit: an additional communication board is included into the Emerson FP-60Z.
A software kit: The Emerson FP-60Z is delivered with Emerson's standard Modbus/Jbus code (embedded into the system) and fully detailed protocol coding documentation.

NOTE:
The communication cable between the UPS and the monitoring station is not part of Emerson scope of supply.

14.5.4. Other Protocols

Upon request, the Emerson FP-60Z can be equipped with the necessary gateway to provide information on a specified protocol such as:

- Modbus TCP
- Modbus SNMP
- Profibus
- DF1
- IEC 61850

NOTE: Please consult us so that we can check the protocol compatibility.

14.5.5. Monitoring software PPVis

Software solution is available to remotely monitor the Emerson FP-60Z. The PPVis software (MS Windows based) offers several features, such as actual state of components, display of output voltage, UPS performances, load current, number of input failures, data storage function.

The Figure 23 hereafter shows a PPVis screenshot for 1-ph output AC UPS system.

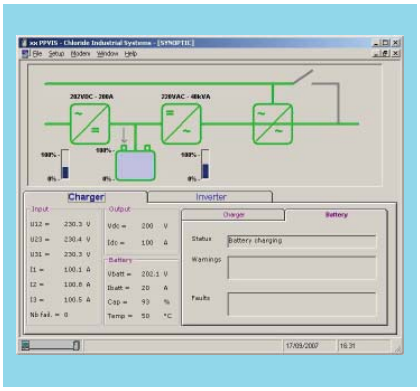

Figure 23: PPVis software screenshot

15 General Arrangement Drawings

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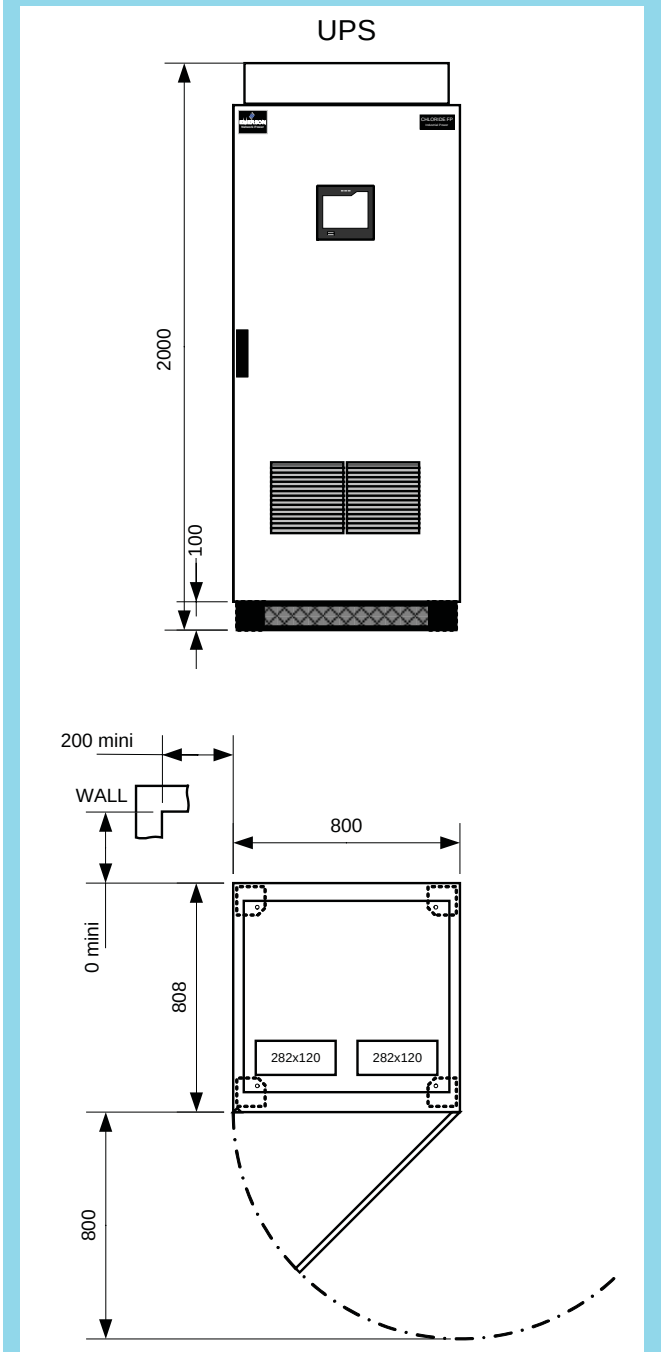

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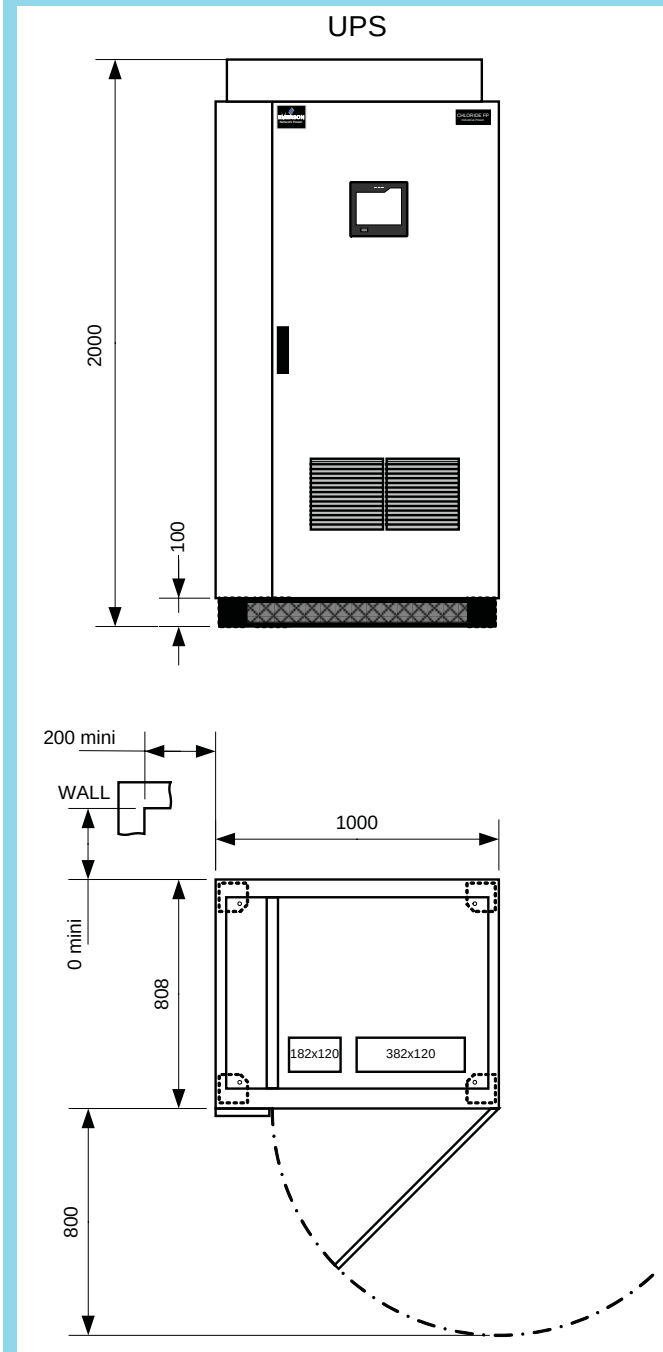

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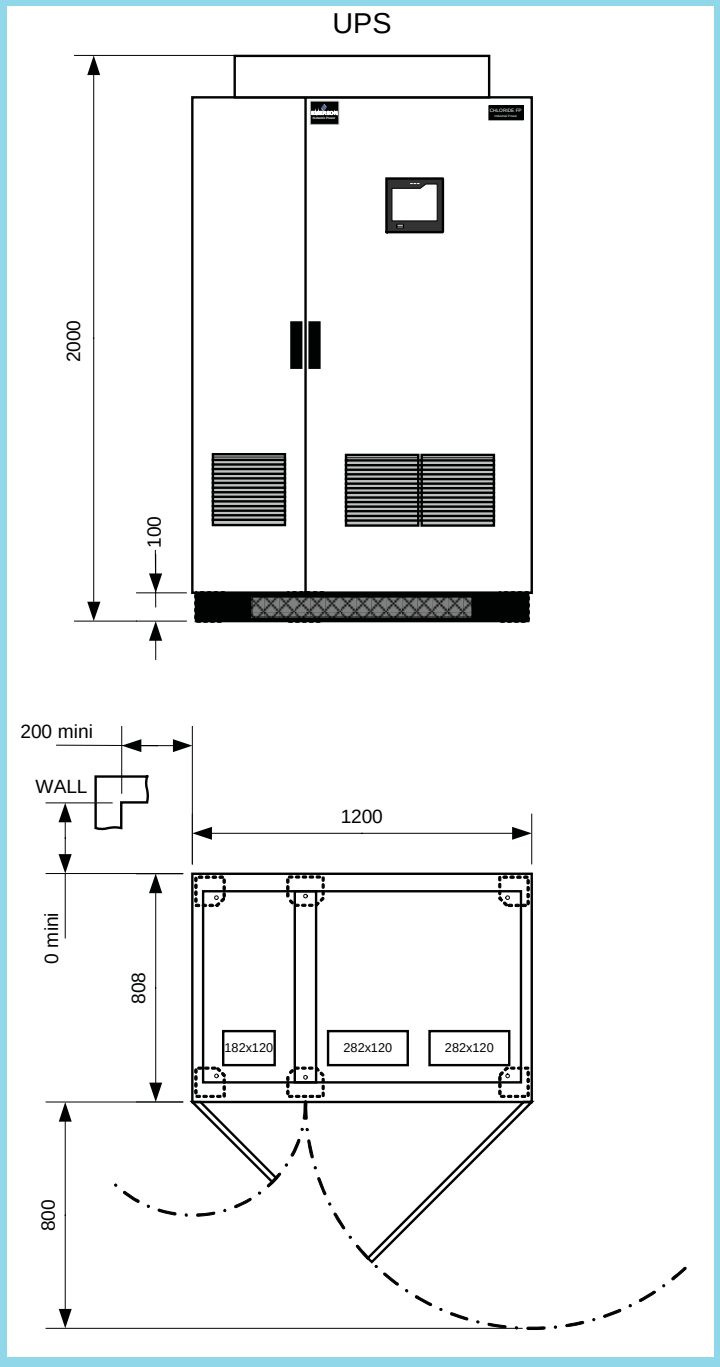
UPS
2000
100
200 mini
WALL
1200
0 mini
808
182x120
282x120
282x120
800

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