INV-MAK Series Static Power Inverters

General Features

DC or AC, or DC and AC inputs

3phase sine wave output

Input and output 50Hz, 60Hz,

831/3Hz, 400Hz frequency optional.

Output isolated transformer

On Non-lineer loads (computer and switching power supplies) excellent performance

Galvanic insulation

Thanks to IPM (Intelligent Power

Module or IGBT technology full reliability.

DSP (Digital Signal Processor) control.

Space-vector control technology

Low output distortion factor.

High efficiency.

Maximum power

With an LCD display (2x16 / 4x20) all parameters can be programmed and monitored Buzzer

Programmable dry relay outputs and Modbus communication.

Pulse with modulation technology (PWM)
All parameters can be adjusted on Display

Input and output low and high voltage protection, over temperature protection abilities

Ease of use

Remote control interface, central control, PC or modem connection
International and local certificated

2 years warranty

Working when the batteries are input
Automatically start and restart when a fault occurs

Working when feeding the DC or AC input voltages 30

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Scope

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

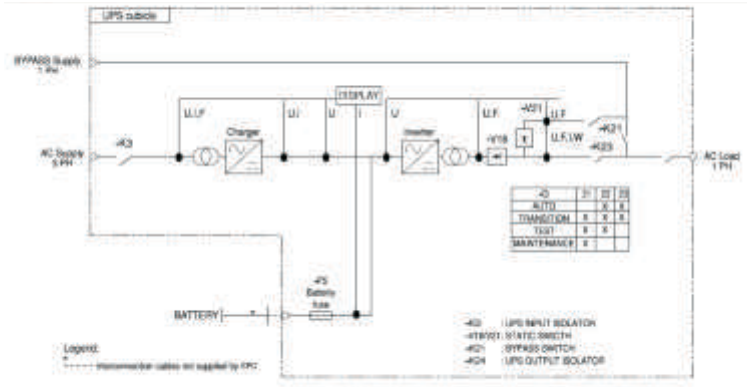
The **INV-MAK** series range meets customers' technical specifications for industrial applications such as: Power generation Oil and gas offshore developments (platforms, FPSO, etc…) Oil and gas transportation (pipelines…) Oil and Gas treatment plants (refineries, petrochemical units…) Railways and undergrounds control and signalling systems, etc...

The **INV-MAK** series range is part of EPC Energy's long-time relationship with industrial businesses. EPC Energy services include: 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 longtime spare parts, hotline, trainings, maintenance contracts, LIFE.net remote maintenance, etc…)

Range overview

The system described is a static UPS system as shown in Figure 1. The system operates on a microprocessor based thyristors charger and microprocessor-based IGBTs inverter.

By means of digital vector control technology the performance of the UPS are enhanced. 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.



Single Line Diagram

The system

The UPS provides high quality AC power for electronic equipment loads. It offers the following features: Increased AC power quality 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-5 to 45°C permanent. The Inverter uses today's most reliable topology: the double conversion. It converts AC power from an AC source in to DC power to charge a battery and reconverts it into AC power to provide a clean and reliable AC output to power the AC load.

Models available

The **INV-MAK** Series 1-ph range includes several kVA ratings .It is of the single-phase output type.

INV-MAK Series Static Power Inverters

General requirements

ISO certification
EPC Energy is certified by the Natinal quality assurance (NQA), as a company with a total quality and environmental control system in accordance with the ISO 9001 and ISO 14001. Applied standards The Series range of UPS shall have the CE mark in accordance with the Safety and EMC Directives 73/23, 93/68 and 89/336, 92/31, 93/68. IEC950 Safety of information technology equipment including electrical business equipment IEC439 Low voltage switchgear and control gear assemblies IEC439-1 Type-tested and partially type-tested assemblies IEC529 Degrees of protection provided by enclosures (IP Code) IEC726 Dry-type power transformers IECEN50091-1-2 General and safety requirements for UPS used in restricted access locations IEC62040-2 / IEC-EN50091- 2 EMC requirements IEC-EN62040-3 Operating requirements
System description In this section, the main power electronic features and the operating modes of the GC Series UPS range are described.

General description

The three-phase current taken from the AC source is converter to a regulated DC voltage by a 6-pulse rectifier. In order to protect the power components within the system, the rectifier bridge is fused with a fast acting fuse. A transformer is provided (standard for 110Vdc and 220 Vdc, optional for 400 Vdc) at the input of the rectifying bridge. 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

Operating modes

The GC Series UPS operates as follow:

Normal operation

The critical AC load is continuously supplied by the UPS inverter. The rectifiercharger derives power from the AC source and converts it into DC power for the inverter whilst simultaneously maintaining 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.

Overload operation

The UPS inverter is considered in overload conditions when the load is beyond 110% of the inverter nominal rating. Two cases are considered:
Reserve supply is available: Upon overload detection by the UPS inverter (above 105% of the inverter nominal rating), the static switch automatically transfers the load to reserve supply. The static switch automatically switches back the load to inverter 10 seconds after the UPS inverter is back to normal conditions.
Reserve supply is not available: 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.
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.