



# UPS-MAK PL Series Industrial UPS Solutions

16.39 kVA / 15.15 kW “Q:6.25kVA<sub>r</sub>”  
Industrial Application Customized Design



- True On Line-Double Conversion Technology (Class VFI-SS-111)
- IGBT PWM Rectifier & Inverter Technology
- DSP Control
- Low Input Current THD (<3%)
- High Input Power Factor (>0.99)
- High Efficiency up to 93%
- Optional Dual Input
- Wide Input Voltage Range
- Advanced Battery Management
- Short Circuit and Overload Protection
- Unlimited Number of Paralleled Modules
- Selectable Number of Batteries
- 500 Real Time Event Log with Detailed Parameters
- Static&Manual Bypass Operation
- Overload and Short Circuit Protection
- Small Footprint and Easy Maintenance
- Advanced Communication Capabilities
- Perfect Generator Compatibility
- Customizable as Frequency Converter
- Industrial Application, Data Centers, Military Usage and Customized



Customized Applications



Outdoor Solutions



Customized Solutions

\*10kVA \*15kVA \*20kVA \*30kVA \*40kVA \*60kVA \*80kVA \*100kVA \*120kVA \*160kVA \*200kVA \*250kVA \*300kVA \*400kVA \*500kVA \*600kVA \*800kVA



8kVA – 80kVA





# Technical Advantages of UPS-MAK PL Industrial

## The UPS-MAK PL Series An Advanced UPS Technology



PL Series is a true Online Double Conversion, new generation fully digital controlled UPS. Its highly flexible design meets high efficiency and high availability power needs of a wide variety of critical applications and delivers an advanced power solution with low cost of ownership.

### High Performance Power Protection Designed for Maximum Efficiency and Flexibility

Equipped with its new IGBT rectifier Marine PL series keeps your critical loads protected while its space-saving compact design and front access for maintenance successfully reduce mean time to repair (MTTR). Thanks to the wide variety of accessories and options PL Marine Series presents maximum flexibility advantage to users and optimizes total cost of ownership.

#### DSP Power Factor Corrected IGBT Rectifier

IGBT based power factor correction technology provides Input Power Factor close to 1 ( $\geq 0.99$ ) and keeps Input Current Total Harmonic Distortion (THDi) less than 3%, that helps to avoid the disturbance.

#### Low Input Current THD

(THDi) less than 3% avoids the disturbance to connected loads

#### Digital Control System

All of the control functions for PL Marine Series UPS including power-on, start-up control, input stage power factor control, battery charging and boosting control, output stage ac voltage regulation and shut-down control, can be realized by using a single DSP control board.

#### High Input Power Factor

0,99 Input power factor ensures clean and sinusoidal input current. The high input power leads to reduced electricity pay-out, minimizes cable, switchboard, fuse and generator requirements, thus reducing investment cost.

#### High Efficiency & Low Total Cost of Ownership

With its high efficiency up to 93% PL Marine Series UPS consumes less energy to supply the loads. Thanks to this high efficiency rate, the percentage of energy that is produced as heat is reduced to a minimum. As a result of decreased heat emission users can reduce their electricity usage and air conditioning requirements.

#### Static & Manual (Maintenance) Bypass

PL Series includes standard static and manual bypass. Static bypass provides safe failure to mains if the UPS is overloaded or develops a fault condition. Where EMI filters are used to help to neutralize spikes and electrical noise, the load may be routed through bypass to provide further protection. Manual bypass function is intended only for maintenance work, this bypass supply is incorporated into the PL UPS design. Manual bypass is used to power down the UPS without interrupting the power to the load. With this feature it is completely safe for the technical personnel to work on the faulty UPS.

#### Flexibility

PL is compatible with wide range of application. Flexibility achieved through many choices, including type of battery, single or multi-unit configuration, accessories and options.

- Frequency converter mode
- Optional temperature sensor for external battery cabinets (to assist the recharge voltage compensation)
- Additional battery chargers to optimize charge time
- Optional separated bypass
- Isolation transformers to vary neutral connectivity in the event of separate power sources or for galvanic isolation between input and output
- Battery cabinets of different sizes and capacities, for providing extended runtimes.



|                                   | THD  | Power Factor |
|-----------------------------------|------|--------------|
| UPS-MAK PL with IGBT Rectifier    | <3%  | <0.99        |
| Traditional UPS with Input Filter | <10% | <0.95        |
| UPS without Input Filter          | <25% | <0.85        |





# Technical Advantages of UPS-MAK Industrial PL



## ☉ Auto Restart

When the main and bypass sources fail, the UPS draws power from the battery system to supply the load until the batteries are depleted.

When UPS will reach its end of discharge, it will shut down.

The UPS will automatically restart and enable output power:

- ☉ After utility power is restored
- ☉ After the "Auto Start Delay Time" is expired (the default delay is 5 minutes) .

## ☉ Perfect Generator Compatibility

PL Series is perfectly compatible with diverse sources, especially with generators. When generator power is used, thanks to its robust IGBT rectifier, it ensures clean, uninterrupted power to protected equipment.

With high input power factor performance of PL Ups series it is enough to choose generator with power only %20 higher rated than the UPS.

PL Series has the ability to adjust power walk-in from 5 to 15 seconds, along with reduced input current distortion.

## ☉ EPO(Emergency Power Off)

EPO function is designed to switch off the UPS in emergency conditions ( fire, flood, etc.). The system will turn off the rectifier, inverter and will stop powering the load immediately (including the inverter and bypass) also the battery stops charging or discharging.

## ☉ Reverse Energy Tolerance for Regenerative Loads

The PL Marine UPS can be used with regenerative loads, such as synchronous motors. The regenerative loads pump the energy back to mains, traditional Ups systems burn this feedback energy and this causes lower efficiency. PL Marine Series Ups with IGBT rectifier are able to absorb intermittent load generated power. Additionally, this reverse power tolerance permits execution of important system operations like closed transition transfers of the UPS load directly to an engine generator source.

## ☉ Advanced User Interface

PL Series UPS has Large and user-friendly 320x240 LCD display that provides operating information in four different languages. Thanks to this advanced LCD display all parameters of working device can be monitored and controlled. UPS is capable of recording up to 500 events.

## ☉ Advanced Battery Management

PL Series guarantees enhanced battery life and maximizes battery performance, life span and reliability through intelligent precision charging. Temperature Compensated Battery Charging monitors performing measurement of external and internal battery temperature and adjusting the charge current rate accordingly. Advanced battery management provides real-time information about battery capacity and back up time, this information can be seen on LCD panel. The Ups tests the batteries at adjustable periods without switching off the system, the test periods can be set by users.

## ☉ Parallel Operation

PL Series features easy and simple scalability and redundancy. It is ready to grow with your business demands. Different power rated units and any number of UPS can be connected in parallel.

Power Increase: The UPS's can be connected in parallel to increase total capacity of the system. If one of the devices goes out of order, the critical loads are transferred to by-pass.

Parallel Operation Features :

- ☉ Internal standard parallel microprocessor for all models.
- ☉ Up to 16 units parallelable
- ☉ Parallel connection with ring cable
- ☉ Autosensing disconnected parallel cable
- ☉ Equal current share with DSP control
- ☉ Easy power upgrade without any interruption
- ☉ All parallel systems can be controlled from the front panel of one unit
- ☉ Full synchronization of parallel units
- ☉ Isolated parallel operation card
- ☉ Static by-pass for all units





# Model & Technical Details of UPS-MAK PL Industrial

|  |  |
|--|--|
| Capacity   | 16.39 kVA  |
| Power Watt   | 15.15 kW   |
| INPUT  |  |
| Input Voltage Range & Cable Entry                              | TN-S / 400V -12% +15% 3P+ N+PE Star or Delta Connected Please Confirm & Top Cable Entry / Special Cable Entry System   |
| Input Power Factor   | At Full Load > 0.99  |
| Input Frequency Range  | 50Hz = 45 - 66 Hz (Selectable) Wide Range Optional 40Hz - 70Hz   |
| Rectifier  | IGBT With Power Correction   |
| Total Harmonic Distortion (THDi)                               | <3% With EMC Filter at Full Load and <5% at %25-%75 Load   |
| OUTPUT   |  |
| Output Voltage Range & Cable Entry                             | 400V 3P+N+PE & 50Hz Delta & Star Output & Top Cable Entry  |
| Recovery   | 0% - 100% - 0% Load, Maximum Output Tolerance 5%, 1% Back to Band <40ms  |
| Efficiency   | Online Mode Up to 90%, “Online Mode Optional %93” & Standard Eco Mode 98%  |
| Output Frequency Range   | 50Hz ±0.1% Synchronous With the Network / 50Hz ±0.01% Battery Mode   |
| Output Power Factor  | 0.9PF for Output   |
| THD (THDv)   | Lineer Load <2%  |
|  | Non-Linear Load <3%  |
| Crest Factor (CF)  | 3:1  |
| Overload Capacity*   | At 110% Load 15min, at 150% Load 30Secondn   |
| BATTERY  |  |
| Batt. Quantity & Battery Racks                                 | 32x235Ah / 12V Battery INTERNAL & Valve Regulated / EN 50272-2   |
| Charge Value © & Method & Time                                 | Nominal 0,1 C, Adjustable and Temperature Compensated Charging Voltage / 8 Hours for %90   |
| Battery Power & Control Measur.                                | 25% of The Device Power & Midpoint Measurement & Temperature Sensors   |
| External Battery & Cabinet                                     | 32 x 235Ah / 12V GEL ==> At%100 Load 262 Minutes Back Up Time / EN62040-3 5.4.2.2 Max %5 of C10Ah & Seismic Rack 0.1G  |
| COMMUNICATION  |  |
| Communication Port   | RS232 Standart, RS485, SNMP Adapter Option & Dry Contact Card & From Scada 110V  |
| Dry Contact  | Optional   |
| Protocol   | SEC, TELNET  |
| STANDARDS  |  |
| Surge Protection & Cicuit Breaker                              | BRU11/21 Class II with Special Surge Protectors & Schneider Compact NSX 100B & Schneider Avtş 9 IC60N 16A C-Curve And Selectable   |
| By-pass  | <b>Static and External By-Pass Standard / Bypass with Step down Transformer for 110V</b>   |
| EMC/LVD & Quality  | EN62040 - 2 / EN62040 -1 EN60950 EN62040 -3 (VFI-SS-111) / EN 60364-4-41 / EN60529 / EN61439-1 8.2.1 & 10.2.6 / EN60204-1 EN61439-1 Clause 8.4.2 & 8.4.3 & 3.5 & 8.1.4 & 8.2 & 8.2.2 & 8.2.3 & 8.6 & 8.6.5 & 8.6.6 EN62262 / IK05 & ISO 9001 - ISO 14001 - ISO 18001 EN61439-1 9.4 & 10.12 & Annex J - A |
| GENERAL  |  |
| Cooling & Running & Store Temp.                                | Ventilation with Fan, Filter, Thermostat, Fan in Top / Blowing out and Filters in Bottom For UPS 0°C~45°C & For Batteries 5°C~30°C   |
| Control & Signal Supply Terminals Upstream                     | Internal & Redundant Power Supply Card & Icp = 19.3<br>Automatically Disconnection against Upstream & Down Stream / No Residual Current Device / Electrical Separation   |
| Protection Class   | Standard IP22  |
| Chassis & Humidity   | Floor Standing / Eye Bold / Door Stop / Cubic / Schneider or Rittal / Hinged Right & Left / RAL 7035 Rust Protection & 20%-100% Glass Protection for Controllers / Spare Control Terminals for Circuit Breaker   |
| Screen   | Standard 320mm x 240mm, Marine 4x20, Customized Touch LCD Screen & Mimic Diagram & Optional English, German, Spanish, French & Russian   |
| Altitude   | <1000Meter @35°C & <1500Meter @30°C & after 1500Meter for Each Meter %1 Loss   |
| Alerts   | 500 Event Logs & 180 Parameters for Each Log “As Excel Sheet”  |
| Parallel Op. & Transient Voltage                               | No & Category III & Surger Pro   |
| EPO (Emergency Power Off)                                      | Standard EPO / <40°C =Correction Factor 1. & <45°C Correction Factor >0.90 & <50°C Correction Factor >0.60   |
| Isolation Transformer  | Output Isolation Transformer   |
| Net Weight (kg)  | In one Cabinet: Cabinet 250kg / UPS: 190kg / Batteries & Cables: 18 Pieces 26kgx16= 416kg  |
| Dimensions (WxDxH) (mm)  | Cabinet: 1200x1000x1600 / Battery Cabinet 1200x1000x1800   |
| *under certain conditions                                      | <b>We can Adjust the UPS and Battery Cabinet, Pleas Let Us Know If You Have a Special Dimensions</b>   |
| * 3 Phase in / 1 Phase Out Version is Available. (10 to 30kVA) |  |

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