



# UPS-MAK PL Series Industrial UPS Solutions

## 600 kVA / 480 kW 3:3 UPS

### Inbuilt Output Isolation UPS Solution



**MAK**   
**POWER SYSTEMS**  
[www.mak-powersis.de](http://www.mak-powersis.de)

- 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*



*Special Solutions*

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



*Customized 600kVA / 480kW 3:3*



# Technical Advantages of UPS-MAK 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 Customized 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 Customized 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 Customized 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 Customized 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.

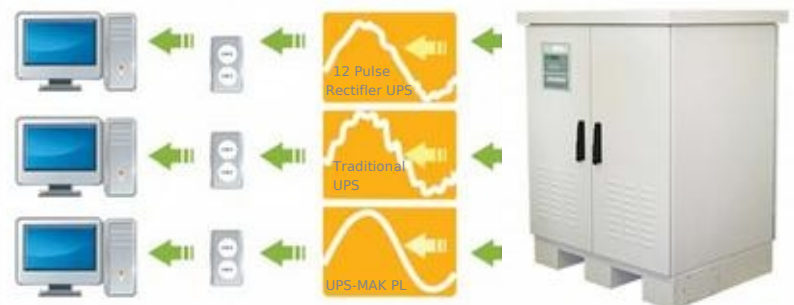
#### ⦿ Static & Manual (Maintenance) Bypass

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 PL Industrial



## 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 Customized 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 Customized 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	600kVA 3:3
Power Watt	480 kW
<b>INPUT</b>	
Input Voltage Range	380V or 400V or 415V -12% +18% 3P+ N+PE Star Connected or Delta Connected Customized
Input Power Factor	At Full Load >0.99
Input Frequency Range	45 - 66 Hz (Selectable) Wide Range Optional 40Hz - 70Hz
Rectifier	IGBT
Total Harmonic Distortion (THDi)	<3% With EMC Filter
<b>OUTPUT</b>	
Output Voltage Range	400 VAC & 50Hz
Recovery	0% - 100% - 0% Load, Maximum Output Tolerance 5%, 1% Back to Band <40ms
Efficiency	Online Mode Up to 93%, "Online Mode Optional %95" & Standard Eco Mode 98%
Output Frequency Range	60Hz ±0.5% Synchronous With the Network / 50Hz ±0.01% Battery Mode
THD (THDv)	Lineer Load <2% Non-Linear Load <5%
Crest Factor (CF)	3:1
Overload Capacity*	At 110% Load 15min, at 150% Load 30Secondn
<b>BATTERY</b>	
Quantity (12V DC VRLA)	33 or 32 or 30 / 12V Battery External
Charge Value (C)	Nominal 0,1 C, Adjustable
Battery Power	25% of The Device Power
Internal Battery	2 x 33 x 220Ah / 12V AGM ==> At%100 Load 5 Minutes Back Up Time
<b>COMMUNICATION</b>	
Communication Port	RS232 Standart, RS485, SNMP Adapter Option & Dry Contact Card
Dry Contact	Optional
Protocol	SEC, TELNET
<b>STANDARDS</b>	
Quality	ISO 9001 - ISO 14001 - ISO 18001
By PAss	Static and External By-Pass Standard
EMC/LVD	EN62040 - 2 / EN62040 -1 EN60950 EN62040 -3 (VFI-SS-111)
<b>GENERAL</b>	
Running Temperature	For UPS 0°C~45°C
Storage Temperature	For UPS 15°C ~45°C For Batteries 0°C~45°C
Protection Class	Standard IP20
Chassis & Humidity	Anti-Static Paint Protection &0-100%
Screen	Standard 320mm x 240mm, 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 Operation	Parallel Power Increase up to 16pcs. And Customized Solutions As Well
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	Inbuilt Output Isolation Transformer
Net Weight (kg)	UPS Cabinet 875kg / Cabinet & Batteries & Cables= 4940kg
Dimensions (WxDxH) (mm)	UPS Cabinet: 2700x1400x2150 / Battery Cabinet Dimensions: 4 Pieces x 1150mm x 470mm x 880mm
*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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