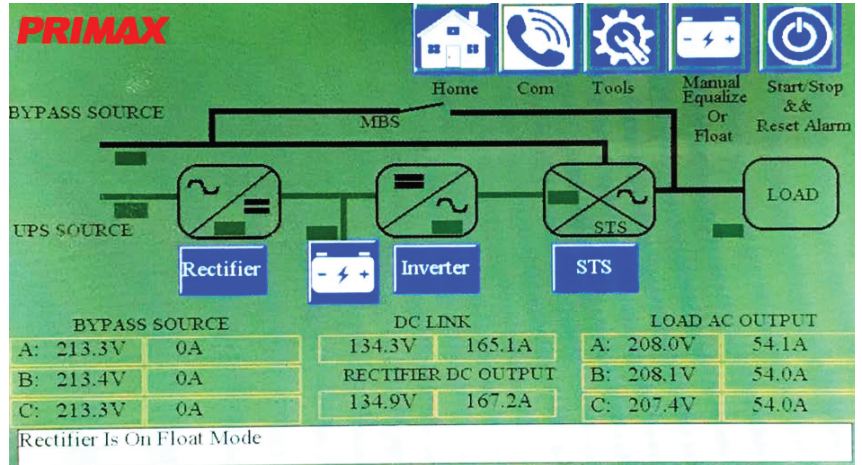


P850 Series

Industrial Grade Inverters & UPS





Rectifier and charging:

The P850 UPS equipped with SCR based rectifier offers a very high reliability compared to switchmode type, simple design and gate firing, high power availability through a single unit, very robust and fault tolerant. Lower voltage dc bus such as 125Vdc or 250Vdc are preferable to keep your lower battery number of cells and help reducing battery reliability and maintenance requirements.

Industrial vs IT grade UPS:

Industrial applications such as Oil&Gas, Power Generation and process require conservative design, models are available for longer period of time backward compatibility, front access, IEEE446... Larger rectifier/charger can also be needed to accommodate faster recharging of batteries or for large capacity batteries. Water and compressed air cooling is available for harsh environments. 12 pulse input rectifiers with or without shielding is available for large power applications or for low input THDi needs.

Short Design Guide:

1. Battery type and needs: Ex. Ni-Cd batteries do not fail open circuit, additional filtering for VRLA which tolerates limited discharge cycles, lower number of cells for reduced issues and maintenance...
2. Environment: seismic, dust, salt and corrosive fumes, heat or cold ambient, zero-energy safety, ac and dc ground leakage alarm needs...
3. Non linear load requirements: harmonics, inrush current, crest factor...
4. Design life and spare: 20+ year and spares available for 12+ years
5. Communication and alarms: Modbus, web page, IEC 61850, 4-20mA transducers, alarm relays...
6. Grid conditions at the point of application: poor and fluctuating conditions, high harmonics contents, high frequency noise, phase balancing issues...
7. Consider high frequency rectifiers instead of SCR type. This provides a very high availability through multiple parallel unit, near unity power factor correction, very low THDi, more compact size, redundancy, easier service and replacement, future growth expendability.

Emergency Power Off (EPO):

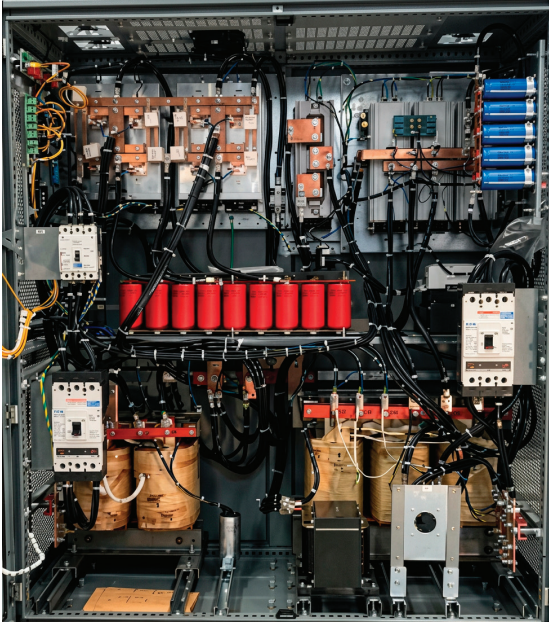
EPO is a remote disconnect EPO switch is used to shutdown the inverter/UPS and to disconnect energy sources during an emergency. For ex. UL1778, NFPA70, IEC364-4, EN50091 standards govern the requirements of an EPO. UL and NFPA require using an EPO in information rooms (ex. data centers). No EPO is required by these standards for industrial applications such as feeding motors or chemical process, control rooms... An EPO is composed of 2 devices: the control and the disconnect itself. The control can be located inside the system but preferably remotely at the room entrance for example, that operators won't be exposed to fire or electrical danger in case of an emergency. It can consist of a push button which command the opening of the disconnect. The disconnect device such as a circuit breaker or a contactor will be tripped

open in an emergency. All energy sources need to be isolated including the backup battery within few minutes following an emergency event.

Mistakenly or accidentally operation of EPO can lead to major unexpected shutdowns or safety issues and unpleasant consequences such as loss of productivity and expensive process restart. Considerations of using and locating an EPO must be seriously analyzed in order to keep the application safe and reliable.

General

- True on-Line double conversion for maximum protection*
- PWM IGBT inverter
- History log time stamped by real time clock (battery backup memory)including time and date
- Galvanic isolation Copper Wound transformers
- Fully rated SCR no break static transfer switch
- Monitoring and interface: Multilingual menu driven 7" color touch screen with power flow mimic diagram. All events are displayed in text format
- Dedicated bypass line input
- Circuit breaker on AC input*, battery, bypass input and AC output
- Temperature compensation* c/w temperature probe, battery and ambient temperature indication on LCD
- Battery cycle counter: number of discharges with time stamps, duration and consumed AH
- Restore factory settings and save site parameters
- Operation without battery except for the backup and overload condition
- Upstream and downstream neutral integrity: input and output neutrals are connected
- Automatic or manual battery test based on voltage, time or AH. Test can be enabled or disabled.
- Real time charge & discharge battery Ammeter
- Audible alarm with silencing button
- 30-Year Design
- Highest Quality Components
- RS232-485-Modbus Communication Port with monitoring software
- Built to meet UL1778, CSA C22.2 141-10 & 107.3, NEMA PE1, NEC ANSI, and FCC



- IGBT POWER MODULES:**
High frequency PWM operating at high frequency to provide fast dynamic response to changing load and battery conditions
- HEAVY DUTY MAGNETICS:**
Very conservatively rated magnetics
- CIRCUIT BREAKERS:**
UPS input, battery and bypass input
- BLACK START CAPABILITY:**
Inverter can be started with the grid is not connected to site
- FILTERED RECHARGING:**
Advanced battery filter to help extending battery life
- ROTARY/DRUM MANUAL BYPASS SWITCH (MBS):**
Make- Before-Break heavy duty switch. External MBS is preferred
- HIGH LOAD HARMONICS TOLERANT:**
Designed to provide non-linear loads with high 3rd, 5th, 7th harmonic contents and with 3:1 crest factor

OPTIONS

Charger/Rectifier*

- Modular (N/N+1) switchmode charger with 0.99pf, less than 5% THD
- 12 pulse rectifiers to reduce input line harmonics and dc ripple

Input and Output

- 50Hz input frequency
- 12 pulse rectification to reduce THD & ripple
- High capacity interrupting breakers
- Bypass line isolation transformer or electronic regulator
- Integrated Distribution panel

Interface:

- Up to 24 individual alarm form “C” contacts
- IEC 61850 communication

4-20mA & 0-10V current and voltage R/W loops

Metering & Monitoring

- Integrated digital AH meter
- Individual cell monitoring

Maintenance

- Battery harmonic filter to extend its useful lifetime
- Independent Manual bypass switch and/or Battery circuit breaker

Mechanical and hardware

- Special paint, NEMA & IP protection
- Seismic design
- Fungus and tropical proofing
- Halogen free and special wiring
- Bottom or side cable entry
- Custom battery racks and enclosures
- Custom enclosures: Stainless steel, aluminum, fibreglass, outdoor, harsh environments, insulated, air conditioned...

Trystar P850 series industrial UPS and inverters are designed to provide high quality ac power back-up for your industrial applications. The UPS is based on a true double online conversion design to feed critical loads with clean, reliable and uninterruptible AC power. Trystar P850 series comes standard with: solid state Static Transfer Switch, front panel monitoring and controls.

Technical Data

General	
Power range : 1 up to 500 KVA	<ul style="list-style-type: none"> All access from hinged front door with menu driven display and real time clock
Heavy duty construction	<ul style="list-style-type: none"> MTBF of 300 000 hours, MTTR less than 1 hour
Numbered PVC copper stranded wire (optional SIS)	<ul style="list-style-type: none"> ISO 9001 Quality control
Protection	
<ul style="list-style-type: none"> Soft start and current limiting* 	<ul style="list-style-type: none"> Semiconductor fuses coordinated with IGBTs and SCRS in series with breakers
<ul style="list-style-type: none"> Low volt shutdown (when enabled) 	<ul style="list-style-type: none"> Surge suppression on input and output.
Standard SCR Rectifier *	
Standard configuration	1 or 3 phase SCR c/w input isola on transformer
Protection	Circuit breakers on UPS input, battery and bypass input
Input voltage	120 up to 600 Vac, $\pm 10\%$, 60Hz, 1 or 3 ph - (-15% without discharging the battery)
Power factor @ 100% load & nominal voltage	0.75 (1ph), 0.85 (3ph), lagging
Inrush current	Limited by soft-start circuit
Static regulation / dc ripple	$\pm 1\%$ / 1% rms
Optional modular high frequency switchmode rectifiers (N, N+1)*	
Power factor / input THDi	0.99 / <5%
Optional 12 pulse rectifier*	
Power factor / input THDi	0,91 lagging typical @ 100% load @ nominal input voltage / THDi $\leq 11\%$
Bypass Input	
Input voltage/ voltage range	120 up to 600 Vac, $\pm 10\%$, 60Hz, 1 or 3 ph / $\pm 5\%$ for manual transfer and 10% for automatic transfer
Alarms	
System	Internal high and low Temperature; ; No load, output voltage out of range, input and output not synchronized, auxiliary power supply fail, EPO, high temperature impeding, high temperature shutdown, fan fail, UPS on battery, load on MBS, reset UPS Optional: External high Temperature shutdown; External low Temperature; ac high voltage; ac low voltage
Rectifier*	Positive ground fault; negative ground fault; ac fail; rectifier fail; rectifier HV; HV shutdown; rectifier LV; high Ripple; rectifier low current; rectifier high current; equalize Alarm; high & low frequency Optional: Common and audible alarm; input phase rotation error, input current imbalance and more... (refer to P4600 extensive alarm list)
Bypass	Sync sense fail, Voltage out of tolerance, frequency error, load on bypass, excessive autoretransfers, transfer failed, bypass breaker open, overload shutdown, forced on bypass

Battery	Battery HV; Battery LV; end of discharge; ; LV shutdown, battery test failed, battery test due (when automatic test is disabled) Optional: Battery low & high current; Battery low capacity; unbalanced battery; temperature probe alarm; battery discharging alarm
Metering and Readings	
System output	Input frequency, inside temperature, load percentage, kVA, kW, kVAR Line-line voltage, line-neutral voltages & currents
Rectifier*	Input frequency, dc voltage, dc current Optional: Input power (kVA, kW, kVAR), line-line voltages, line neutral voltages
Inverter	Line-Line output Voltage, ac current, input dc voltage, input dc current, frequency
Battery	Voltage, charge-discharge current, battery consumed Ah and state of charge
Bypass	Optional: Line-line Voltages, line-neutral voltages, currents and frequency

*not applicable for inverter (non-UPS) applications
 For other requirements consult factory
 Specifications may change without prior notice

Technical Data

Inverter	
Configuration	IGBT PWM controlled with true sine wave output and double wound copper isolation transformer
Nominal output voltage	120-208-240-380-400-415-440-480-575-600 Vac, 1ph or 3ph
Output Voltage regulation	
Static / 100% unbalanced load	± 0.5% / ±2% adjusted to ± 5% manually - 50 ms regulation time
Load step 0% - 100% - 0%	±8% Recovering within tolerance into 2 cycles
Load step 0% - 50% - 0%	±3% Recovering within tolerance into 2 cycles
Output Voltage	
100% Linear load /80% non linear	2% / 5% THD Maximum
Crest factor compatibility	3:1 with 80% load
Output neutral wire rating	200%
Phase Displacement	
100% Balanced load	120° ±1%
100% Unbalanced load (80%-0-80%)	120° ±2%
Output Frequency, Overload and Power Factor	
Free running	50/60Hz, ± 0.01%
Synchronized with utility	±5%
Slew rate	1Hz/s (adjustable 0.01 to 1 Hz/s)
Overload capability (on inverter)	125% at 0.8PF for 10 minutes / 150% at 0.8PF for 60 seconds followed by current limitation
Power factor rating	0.7 to 1 capable to deliver the rated kVA and rated KW at 0.8 lagging pf. For less than 0.8pf loads the rated kW becomes the limiting factor. Contact factory for leading pf or below 0.7 lagging pf.
Static Bypass	
Input configuration	Common with rectifier (default) or dual input (option)
Primary components	Full load rated static switch. Back-feed protection TBs (optional contactor)
Type	100% SCR seamless transfer type
Transfer limits	±10% of nominal output voltage (adjustable)
Overload capability (on bypass)	110% continuous, 150% for 5 minutes / 1000% for 1/2 cycles (non repetitive)
Alarm contacts (voltage free)	User defined
Serial communication	Modbus TCP/IP. Other protocols are optional
Emergency shutdown	Emergency power off terminal blocks. (optional integrated pushbutton)
Input signals	External auxiliary contact for the bypass switch
Display and Interface	
Display	7" color touch screen LCD to display mimic diagram/status, power flow, readings, graphs, waves, functions, history, load percentage, alarms, battery autonomy, time and date, etc.
Touch-screen control	Start-up, shutdowns, resets, transfers, configurations, settings, etc.

Mechanical	
Audible noise level	45 to 65 dBa at 3ft (1 meter) rating dependant
Ambient temperature	Operating: -5°C to 40°C /Storage: -40°C to 85°C
Storage temperature range	5°F to 122°F (-15°C to +50°C)
Temperature de-rating	1.5% / °C from 40°C to 60°C
Operating humidity	0-95% non condensing
Maximum altitude	3300ft (1000m). De-rating: 6500ft (2000m)/-9%, 8000ft (2500m)/-14%, 9000ft (3000m) Ft/-18%
Cooling	Forced air with redundant fans
Enclosure	NEMA 1 (IP20) - steel c/w hinged front access door- RAL7032 or ANSI 61 light grey



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