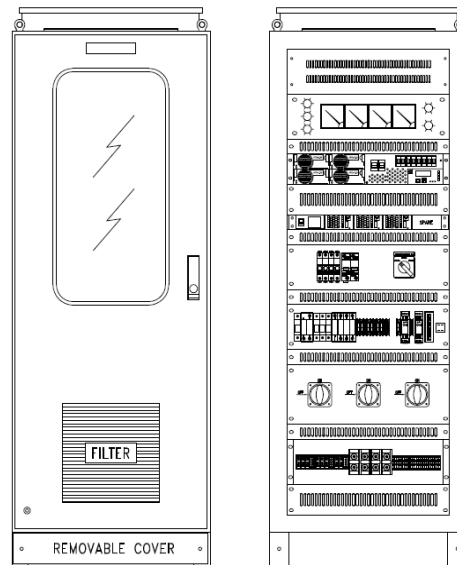


High-Performance AC UPS

HPMI LITE



Introduction

When a critical load require a super stable power supply , a programmable scale able power distribution of dual supply source , a true redundant N+ X UPS system , a perfect protection of all unwanted disturbance even in the Bypass situations , a combination usage of AC and DC supply with having a same autonomy battery time , a flexibility of increasing battery capacity without worried about rectifier size, a very high compact power density with smallest footprint, Thytron INDUSTRIAL INTEGRATED MODULAR UPS SYSTEM is the right choice.

Zero Downtime with modular, fault-tolerant design. If a module fails, the effect on your load is zero. When the faulty module is removed and replaced with a spare (no shutdown, no tools and no set-up required) Even if the control module fails, effect on the AC load is zero. Urgent site call-outs is not required anymore. THYTRON HPMI AC UPS solution is designed to continue to support your load when a module failure has occurred, and is restored to full capacity within minutes on site simply by replacing the faulty module with a spare.

Maximum power per system up to 40kW.

Rectifier System completed with modular , hot swappable concept. Features included flexibility , scalable and N+X redundant systems, configurable for current demand and future expansion.

Each power module designed with high power density up to 27 W/in³. Less heat dissipation with high efficiency up to 95% even with low load.

Input Source can be configured with option of single or three-phase power supply with wide operating temperature range from -20° C to +55° C . Performance increase with wide input voltage range from 90 Vac to 290 Vac.

Reliability will be further enhanced if incorporated with class H galvanic isolation transformer.

Battery cell failure is also tolerated: THYTRON AC UPS solution has a battery made up of multiple strings of cells, so failure of one cell does not compromise system integrity. Battery replacement is simple; if you already manage 48V batteries, then you can also service the batteries of our AC UPS systems.

Thytron AC UPS solutions use industry-standard batteries, can share their battery with other loads, and are ideal for installations with existing batteries. And all THYTRON AC UPS solutions include our field-proven battery management technology fitted as standard.

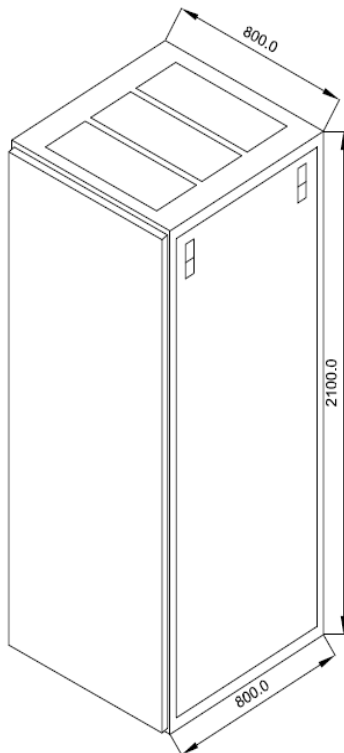
Full Battery Monitoring System with history log and field report can be offered as optional.

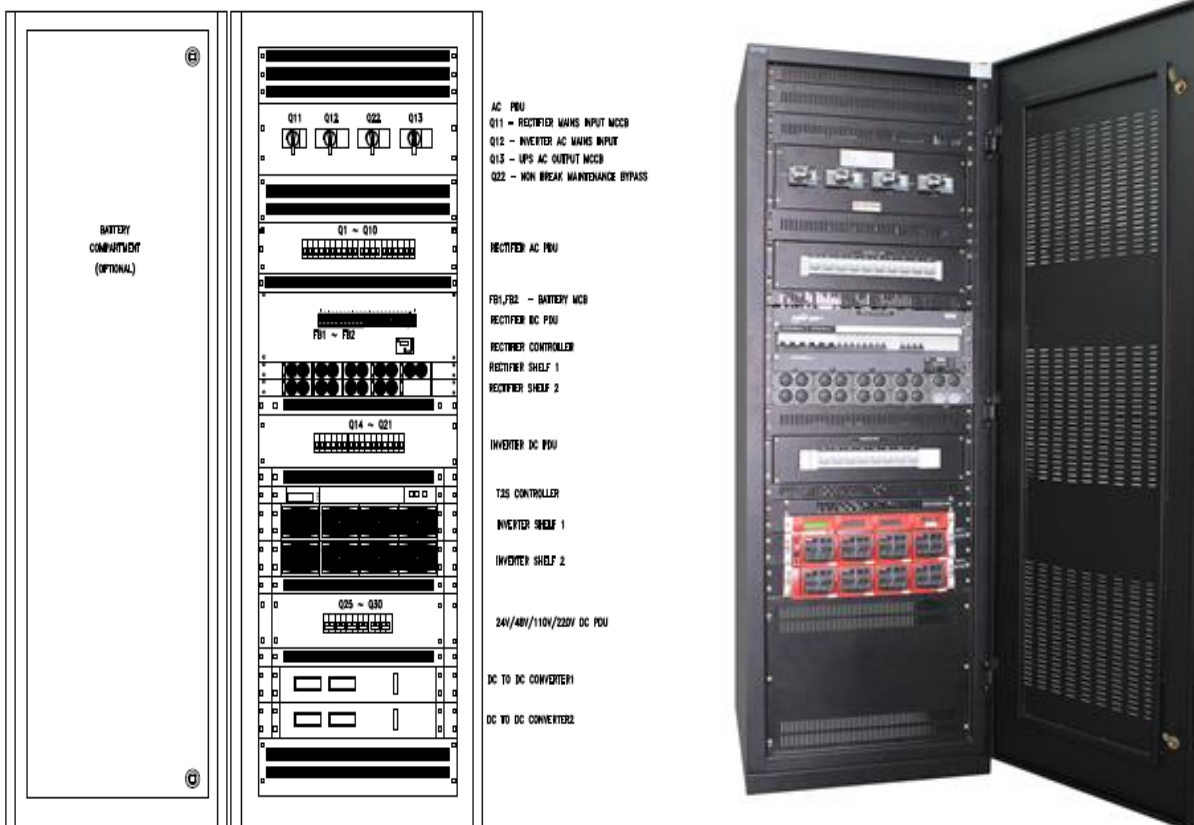


System Features

- AC output voltage interruption time: zero. (True "no-break" AC output on mains failure.)
- Modular, fault-tolerant design, with no single point of failure.
- True Modular design , N+X arrangement , hot swappable and true parallel redundancy.,
- 120VAC , 230VAC single-phase expandable to 80kVA (64kW).
- 400/415 VAC three-phase expandable to 225kVA (180kW).
- High efficiency (96%); lower operating costs, lower cooling requirements.
- Pure sine-wave output voltage, and sine-wave input current from AC supply.
- Input and Output can be configure to 3 in 1 out , 3 in 3 out, 1 in 3 out or 1 in 1 out.
- Multiple AC input, 1phase or 3 phase , 120/277, 415Vac, 480Vac DC input 48VDC.
- Multiple AC Output, DC output 24V , 48V, 72V,110V, 220V DC.(with DC /DC converter).
- Scalable Power Management , DC and AC input ratio can be scale accordingly.
- Multiple battery Bank.
- Proven, reliable battery management technology.
- "Set and forget" with comprehensive alarms, status indication, and battery health monitoring

Voltage distortion:	less than 1.5%
Voltage regulation:	Better than 2% under all variations of AC and DC supply voltage and load power.
Frequency accuracy:	Better than 0.03%.
Crest factor:	3:1
Power Limit/per module	Type A: 1 kW / 1. 25kVA per inverter module. Type B: 2.0kW / 2.5kVA per inverter module.
System power:	Up to 20kVA (16kW) per phase.
Protection:	Surge protection provided within each module; enhanced surge protection available.
Environmental	
Cooling:	Fan-forced
Operating range:(Full Power)	-40°C to +70°C up to 2000m
Derated Operation	+55°C ~ +75°C
Storage:	-60°C to +85°C
Transport:	-40°C to +70°C
Cabinet	
Dimensions and Ingress Protection	Standard enclosures are rated IP42 ~ IP 52 ..Other enclosures are available to suit specific requirements, eg:outdoor installation, swing-frame, corrosive atmospheres





Rectifier and Inverter Module Features

- Modular N+X , fault-tolerant design, with no single point of failure, both for Rectifier an Inverter module
- Twin Sine Innovation , double conversion with internal energy buffering for inverter module
- Hot swappable and Pluggable.
- Small foot print , High Power Density.
- Improve Stock management by Reduce Component Storage
- Short MTTR ,Fast replacement ,No tools or troubleshooting equipment required.
- Wide input voltage range for rectifier
- Light weight , rectifier < 2 kg , inverter module < 5 kg

Inverter Display Module

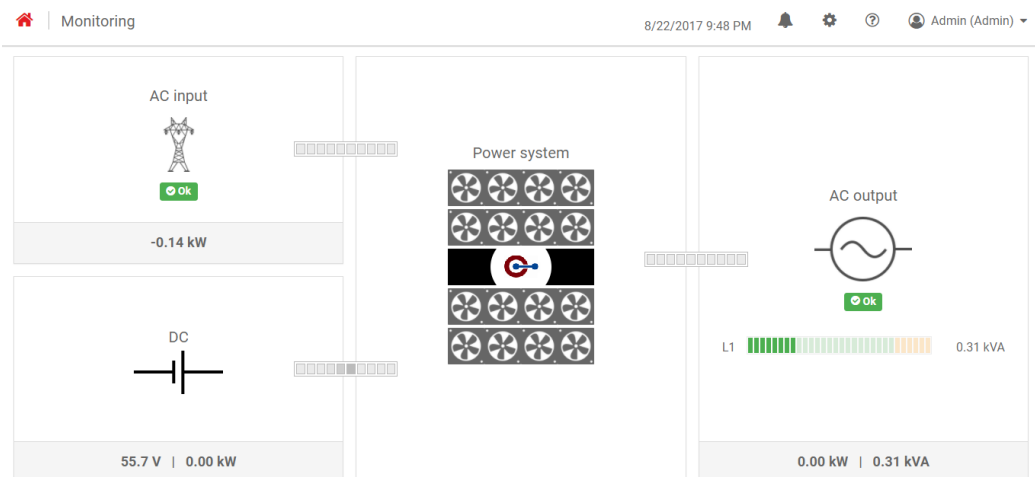


User interface

The interface provides the user to access the configuration and setup files of the modules in the system.

It can monitor up to 32 inverters/converters and featured with:

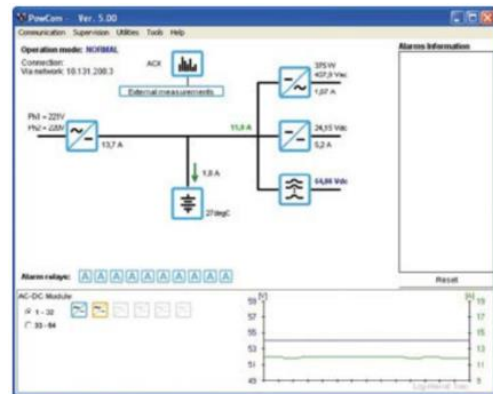
- 1.8" LCD touch screen display
- Three LED's to indicate Major alarm, Minor alarm and System status
- Two Digital Inputs
- Two Output Relay contacts
- Records 5000 logs as FIFO



Rectifier Intelligent Controller Module



Controller



Computer Interface Main Window

Rectifier is a pluggable microprocessor controller that provides monitoring and control for DC Power Systems.

It monitors all system parameters including: DC voltage, rectifier current, rectifier temperature, system capacity, battery parameters, and circuit breaker status.

Alarm and warning notifications are indicated by front panel LEDs, and through potential free alarm contacts that allow remote signaling. External monitoring of alarms and the system is accomplished through a USB or RS232 port using PC-based PowCom™ software.

The controller has an Ethernet port allowing control over a TCP/IP network and web based support.

Alarms can be mapped via SNMP traps to customer OSS (Operation Support System) platforms such as Castle Rock Computing SNMPc Network Manager™.

To meet individual site requirements, the controller contains a Programmable Logic Units that can be used to monitor and control specified requirements. This allows individual alarm routing and logic operations to be set as actions, alarms to be triggered and outputs to be activated, based on internal or external signal monitoring, comparing and processing.

FEATURES

- User-selectable alarm parameters
- Password controlled environment
- USB or RS232* Interface
- Form "C" dry alarm contacts
- Programmable alarm routing, logic unit and analog inputs
- 100 Mbps Ethernet interface + web server support + SNMPv1,v2,v3
- 1000-event alarm log
- Audible Alarm
- Remote configuration upgrade
- Micro SD card data logging
- Multiple Language Support

INTELLIGENT SITE MANAGEMENT

- Supports up to 64 rectifiers as standard or 256 with 4 x 64 multiplexer board
- Battery tests and log
- Battery voltage and symmetry monitoring
- Remaining battery capacity measurement
- Low Voltage Disconnect
- Temperature compensation with programmable compensation factor
- Monthly data logging
- Site log tools

Web Interface

<ul style="list-style-type: none"> • Overview • Rectifier • SLI • Units • Battery • Controller • Auxiliary • Configuration <ul style="list-style-type: none"> ◦ Admin ◦ System ◦ Test ◦ Alarm ◦ Network ◦ Email ◦ Limits • Logs <ul style="list-style-type: none"> ◦ Alarms History ◦ Battery Test ◦ Monthly Battery ◦ Inventory ◦ Peak Load ◦ Site Data ◦ Maintenance and Service ◦ Statistical Data 	<p>Overview</p> <table border="1" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <tr><td style="text-align: center;">System Voltage (V)</td><td style="text-align: center;">54.19</td></tr> <tr><td style="text-align: center;">Load Current (A)</td><td style="text-align: center;">0.0</td></tr> <tr><td style="text-align: center;">Total Battery Current (A)</td><td style="text-align: center;">0.0</td></tr> <tr><td style="text-align: center;">Rectifier Current (A)</td><td style="text-align: center;">0.0</td></tr> <tr><td style="text-align: center;">Temperature 1 (°C)</td><td style="text-align: center;">31</td></tr> <tr><td style="text-align: center;">Charging Mode</td><td style="text-align: center;">Normal</td></tr> <tr><td style="text-align: center;">Remaining Battery Time (Min)</td><td style="text-align: center;">---</td></tr> </table>	System Voltage (V)	54.19	Load Current (A)	0.0	Total Battery Current (A)	0.0	Rectifier Current (A)	0.0	Temperature 1 (°C)	31	Charging Mode	Normal	Remaining Battery Time (Min)	---	<p>Alarms</p> <div style="text-align: center; margin-top: 5px;"> <input type="button" value="Reset Alarms"/> </div> <p style="margin-top: 5px;">▲ Load breaker al</p>
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Temperature 1 (°C)	31															
Charging Mode	Normal															
Remaining Battery Time (Min)	---															

Inverter Module Features

General	
Part Number	T611730201
Cooling / Audible noise	Fan forced cooling / < 65 dBA at 1 meter
MTBF	240 000 hrs (MIL-217F)
Dielectric strength DC/AC	4300 Vdc
RoHS	Compliant
Operating T° / Relative Humidity (RH) non-condensing	Tested according ETS300-019-2-3 Class 3.1 -20°C to 65°C, power de-rating from 40°C to 65°C / Max RH 95% for 96 hours per year
Storage T° / Relative Humidity (RH) non-condensing	Tested according ETS300-019-2-1 Class 1.2 -40°C to 70°C / Max RH 95% for 96 hours per year
Public transport T°/Relative Humidity (RH) non-condensing	Tested according ETS300-019-2-2 Class 3.1 -40°C to 70°C / Max RH 95% for 96 hours per year
Material (casing)	Zinc coated steel
Power	
AC Input Data	
AC voltage: Nominal / range	230 V (150 - 265 V)
Brownout	800 W @ 150 Vac / 1000 W @ >190 Vac linear decreasing
Power factor / THD	> 99% / < 3%
Frequency range (selectable) / synchronization range	50 Hz (range 47 - 53 Hz) / 60 Hz (range 57 - 63 Hz)
DC Input Data	
DC voltage: Nominal / range	48 VDC / (40-60V)*
Nominal current (at 48 Vdc and 1000 W output)	22.3 A
Maximum input current (at 48 Vdc for 15 second) / voltage ripple	34 A / < 10 mV RMS
AC Output Data	
Efficiency (Typical): Enhanced power conversion / on line	96% / >92.5%
Nominal voltage AC** Adjustable)	230 V (200 - 240 VAC)
Frequency / frequency accuracy	50 or 60 Hz / 0.03%
Nominal Output power	1250 VA / 1000 W
Short time overload capacity	150% (15 seconds)
Admissible load power factor	Full power rating from 0 Inductive to 0 capacitive
Total harmonic distortion (resistive load)	< 3%
Load Impact recovery time (10% - 90%)	≤ 0.4 ms
Nominal current	5.4 A @ 230 Vac
Crest factor at nominal power	3 : 1 for load P.F. ≤ 0.7
Short circuit clear up capacity 0 - 20 ms	21.7 A for 20 ms
Short circuit current after 20 ms	9.9 A (20 ms to 15 s) , 7.4 A (15 s to 60 s), > 60 s - manual reset is required
AC output voltage stability	±1% from 10% to 100% load
In Transfer Performance	
Max. voltage interruption / total transient voltage duration (max)	0 s / 0 s
Signaling & Supervision	
Display	Synoptic LED
Supervision	Inview ranges / Inview S - T302004100, Inview S Slot - T602004110, Inview GW - T602004000
Remote on / off	On rear terminal of the shelf
Alarms output	2 dry contacts and 2 digital inputs
Safety & EMC	
Safety	EN62040-1
EMC	EN 61000-4-2 / EN 61000-4-3 / EN 61000-4-4 / EN 61000-4-5 / EN 61000-4-6 / EN 61000-4-8 ETSI EN 300386 v1.9.1

* Permanent 1000 W / derating apply based on Internal heatsink T°.

** Operation within lower voltage networks leads to de-rating of power performances.

Rectifier Module Features

FM48V Rectifier Module Data Sheet

Input

Model	FM48V
Input voltage	Nominal: 100-240V AC
	Permitted variation: 85-300V AC
	Derated Output: 85-180V AC
Current (max.)	<18A
Soft Start	ETSI ETS 300 132-1
Harmonics	EN 61000-3-2 Power Factor > 0.98 Typical
Surge immunity	EN61000-4-5
Fuse	Two 25A Fast Blow (Live & Neutral)
EMC	EN61000-6-2, EN6100-6-3 FCC Part 15 Class B

Output

Output voltage	46-57 VDC
Output power (50-56 VDC)	Po Max = 2500W
Efficiency	92.5%
Tolerance	Vout ± 1.0%
Transient response	±5% at load variation 10-90% or 90-10% recovery time 50 ms
Load sharing	<5% of nominal current
Ripple	<100mV p-p (BW 20 MHz)
Psophometric	<2mV, according to CCITT norms
EMC	EN 61000-6-2, EN 61000-6-4

Mechanical Data

Dimensions	107 x 337 x 40mm (WxDxH)
Weight	2 kg
Cooling	Fan-cooled, speed controlled
Insulation	4.25 kVDC primary-secondary
	2.12 kVDC primary-ground
	0.2 kVDC secondary-ground
Enclosure	IP20
Mounting	19in/ 1U subrack up to 4 modules

Other Technical Data

Safety	UL 60950-1/ CAN/CSA-C22.2 No. 60950-1-03, 1 st Ed. EN60950-1: 2006 IEC 60950-1:2001
Protection	Short circuit proof, automatic current limiting, selective shutdown of modules at excessive output voltage. Thermal protection.
Alarms	High output voltage/ shutdown, Low voltage/ module failure.
Indicators	Green LED Power ON Yellow LED Current limit, thermal protection Com. failure flashing Red LED Module failure/ high output voltage/ shutdown
Audible noise	<60 dBA
Operating temperature	-40 °C to +55 °C up to 2000 m Reduced spec -40 °C to -20 °C Derated output power 55 °C to 75 °C For 3000m altitude derate by 5 °C
Storage temperature	-60 to +85°C
Environment	Storage: ETS 300 019-2-1 Transport: ETS 300 019-2-2 Operation: ETS 300 019-2-3 Earthquake: GR 63 Core Zone 4

Input

Voltage	18 - 60VDC
Current	< 200mA

Interface

Display	3 x 16 character LCD
Language Support	English, German, Spanish, Russian, Chinese
Internal Communication	RS485 Data Bus (64 modules max.) microSD card (up to 4GB)
External Communication	USB or RS232* interface for remote control via modem or directly from a PC with PowCom™ software. Ethernet port allowing monitoring and control over a TCP/IP network. Web browser support + SNMPv1,v2,v3.
Indications	Green LED - Power ON Yellow LED - System warning Red LED - System alarm
Signal Input	Battery current reading (via shunt) Output voltage reading Analog inputs for battery symmetry reading or general use Battery temperature sensor Load fuse failure Battery fuse failure 2 x Digital inputs
Signal Outputs	LVD / PLD disconnect (max 4*) LVD / PLD reconnect 2 x Digital outputs
Software	Site upgradeable by Flash memory

Alarms

Alarm Contacts	4 (optional 10*) potential free change-over alarm contacts
Alarms	Low/High Voltage Batteries on Discharge Overvoltage Shutdown High Load (Rectifier Capacity) Battery Test Failure Battery Symmetry Mains Failure Module Urgent Module Battery Fuse Failure Load Breaker Failure Battery/Load Disconnect High/Low Battery Temperature Temperature Probe Failure High/Low AC Voltage** 16 x Additional User Definable

Other Technical Data

Dimensions, In (mm)	3.4 W x 1.6 H x 8.9 D (85 W x 40 H x 225 D)	
Weight	0.44lb (0.2kg)	
Operating Temp.	-40 to +70°C	
Storage Temp.	-40 to +85°C	
Safety	IEC 60950-1, UL60950-1, & CSA-C22.2 No. 60950-1-03	
EMC	EN 61000-6-2, EN 61000-6-3, EN 300 386-2	
Environment	Storage: Transport: Operation:	ETS 300 019-2-1 ETS 300 019-2-2 ETS 300 019-2-3

Battery Management

Battery Disconnection	Allows voltage controlled disconnection of batteries.
Boost Charging	Manual time controlled or automatic boost charging with adjustable time and voltage levels.
Battery Tests	Automatic or manual testing of batteries up to six times per year with a 10 test memory. Variables include test duration and end voltage. Battery discontinuance test to ensure battery connection.
Enhanced Battery Monitoring	Monthly logging of essential battery parameters including temperature, temperature hours, current, charging voltage and symmetry voltage. Data logged for 5 years.
Site Logs	System tools developed to assist site management. Daily peak load and statistic logs available.
Symmetry Measurement	Optional tool that measures batteries for early detection of thermal runaway.
Temperature Compensation Charging	Allows continuous adjustment of output voltage according to battery temperature. Features include adjustable compensation factor and separate thresholds for high temperature alarms.
Load Shedding (PLD)	Optional feature that allows voltage or time controlled disconnection of non-essential load.

* Depending on system configuration
** Depending on rectifier used